02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS

Submit only ONE copy of this form for each PI/PD and co-PI/PD identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.C.a. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.

Ethnicity Definition Hispanic or Lating of race.		, Pue	rto Rican, Cubar	n, So	uth or	Central American, or other	Spanish c	ulture or origin, regardless	
project 🛛		ently	serving (or hav	e pr	eviou	sly served) as a PI, co-PI o	or PD on a	ny federally funded	
Check here if you	do not wish to provid	le an	y or all of the al	oove	infoi	mation (excluding Pl/PD n	ame):	\boxtimes	
Citizenship: (Cl	noose one)	\boxtimes	U.S. Citizen			Permanent Resident		Other non-U.S. Citizen	
		\boxtimes	None						
			Other						
			Mobility/Orthopedic Impairment						
(Select one or mor	e)		Visual Impairment						
Disability Status:			Hearing Impairment						
		\boxtimes	White						
			Native Hawaiia	n or	Other	Pacific Islander			
			Black or African American						
(Select one or more)			Asian						
Race:			American Indian or Alaska Native						
Ethnicity: (Choose one response)			Hispanic or Latino 🛛 Not Hispanic or Latino						
Gender:		\boxtimes	Male		Fem	ale			
PI/PD Name:	P. Michael Tuts								

Race Definitions:

American Indian or Alaska Native. A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.

Asian. A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

Black or African American. A person having origins in any of the black racial groups of Africa.

Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

WHY THIS INFORMATION IS BEING REQUESTED:

The Federal Government has a continuing commitment to monitor the operation of its review and award processes to identify and address any inequities based on gender, race, ethnicity, or disability of its proposed PIs/PDs. To gather information needed for this important task, the proposer should submit a single copy of this form for each identified PI/PD with each proposal. Submission of the requested information is voluntary and will not affect the organization's eligibility for an award. However, information not submitted will seriously undermine the statistical validity, and therefore the usefulness, of information recieved from others. Any individual not wishing to submit some or all the information should check the box provided for this purpose. (The exceptions are the PI/PD name and the information about prior Federal support, the last question above.)

Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational oppurtunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 19

DEVIATION AUTHORIZATION:

From: Aizenman, Morris L. [mailto:maizenman@nsf.gov] Sent: Tuesday, November 30, 2010 6:36 PM To: Pripstein, Moishe; Aizenman, Morris L. Cc: Dehmer, Joseph L.; Caldwell, C. Denise; Cytryn, Darren E. Subject: Re: Request for page exemption for US ATLAS Cooperative Agreement proposal for 2012-2016

Hi Moishe,

Your request for a waiver with respect to the number of pages included in the Project Description for a proposal to be submitted by Michael Tuts of Columbia University for the renewal of the U.S. ATLAS cooperative agreement for the period 2012 to 2016 is granted.

The Project Description is not to exceed 60 pages.

Regards,

Morris

At 03:37 PM 11/30/2010, Pripstein, Moishe wrote:

From: Dehmer, Joseph L. Sent: Tuesday, November 30, 2010 3:32 PM To: Pripstein, Moishe Subject: RE: Request for page exemption for US ATLAS Cooperative Agreement proposal for 2012-2016

Moishe, I approve this request. Please forward. Joe

From: Pripstein, Moishe Sent: Tuesday, November 30, 2010 3:18 PM To: Dehmer, Joseph L. Subject: FW: Request for page exemption for US ATLAS Cooperative Agreement proposal for 2012-2016

Hi Joe,

As program director for the LHC Operations, I endorse the request from U.S. ATLAS for the page limit to be increased to 60 pages. Considering the scope and complexity of their program, the request is certainly justified.

-- Moishe

Deviation Authorization contd...

From: Michael Tuts [mailto:tuts@nevis.columbia.edu <mailto:tuts@nevis.columbia.edu>] Sent: Thursday, November 25, 2010 8:37 AM To: Pripstein, Moishe Cc: Gordon, Howard A; Ann Therrien Subject: Request for page exemption for US ATLAS Cooperative Agreement proposal for 2012-2016

Dear Moishe,

We are writing to seek a page exemption for the Project description section of the Cooperative Agreement proposal we will be submitting to the NSF in Mid December 2010. We are requesting that the 15 page limit be increased to 60 pages. As you know this CA is a major proposal for \$50M (2012-2016), covering the activities of the US ATLAS Operations Program, involving some 20 subawards to be administered by Columbia University in the areas of Physics Support and Computing (PS&C), ATLAS detector Maintenance and Operations (M&O), and research and development of detector technologies to be used for future upgrades of the ATLAS detector (R&D). The scope of the program is such that in order to provide an adequate description and context which can be sensibly reviewed will require significantly more than the normal 15 pages. Also, in comparison to the last cooperative agreement, we need additional pages to provide a description of the achievements from the last CA, which also form the basis for setting the scope of activities to be covered in the proposal. Hence our request for 60 pages of project description. If you need any further information regarding our request, please do not hesitate to ask.

Regards,

Mike Tuts (US ATLAS Operations Program manager) Howard Gordon (US ATLAS Deputy Operations Program Manager)

Morris L. Aizenman Senior Science Associate Directorate for Mathematical and Physical Sciences National Science Foundation 4201 Wilson Boulevard, Room 1005 Arlington, VA 22230

703-292-8807 (Phone) 703-292-9151 (Fax) maizenman@nsf.gov

SUGGESTED REVIEWERS: Not Listed

REVIEWERS NOT TO INCLUDE: Not Listed

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 10-1 FOR NSF USE ONLY					OR NSF USE ONLY				
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CERTIFICATION PAGE

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the Authorized Organizational Representative or Individual Applicant is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, lobbying activities (see below), responsible conduct of research, nondiscrimination, and flood hazard insurance (when applicable) as set forth in the NSF Proposal & Award Policies & Procedures Guide, Part I: the Grant Proposal Guide (GPG) (NSF 10-1). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

Conflict of Interest Certification

In addition, if the applicant institution employs more than fifty persons, by electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.A; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Drug Free Work Place Certification contained in Exhibit II-3 of the Grant Proposal Guide.

Debarment and Suspension Certification (If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency?	Yes 🗖	No 🛛
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By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Exhibit II-4 of the Grant Proposal Guide.

Certification Regarding Lobbying

The following certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Certification Regarding Nondiscrimination

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative is providing the Certification Regarding Nondiscrimination contained in Exhibit II-6 of the Grant Proposal Guide.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or

- construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:
- (1) community in which that area is located participates in the national flood insurance program; and

(2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:

- (1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
- (2) for other NSF Grants when more than \$25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

Certification Regarding Responsible Conduct of Research (RCR)

(This certification is not applicable to proposals for conferences, symposia, and workshops.)

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative of the applicant institution is certifying that, in accordance with the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.B., the institution has a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students and postdoctoral researchers who will be supported by NSF to conduct research. The undersigned shall require that the language of this certification be included in any award documents for all subawards at all tiers.

AUTHORIZED ORGANIZATIONAL REP	SIGNATURE		DATE	
NAME				
Alexander B Samsky	Electronic Signature		Jan 6 2011 1:37PM	
TELEPHONE NUMBER ELECTRONIC MAIL ADDRESS			FAX N	UMBER
212-854-6866 as2735@columbia.edu			212	2-854-2738
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Summary

The ATLAS collaboration, consisting of 174 institutes from 38 countries, completed construction of the ATLAS detector at the Large Hadron Collider (LHC) at CERN, and began first data collection with colliding beams in late 2009 and 7 TeV running in April 2010. The 44 institutions of U.S. ATLAS, with the support of the NSF, made major and unique contributions to the construction and initial operation of the detector, together with the computing and software program. These investments are allowing U.S. physicists to contribute significantly to physics analyses and the associated publications. Numerous panels have identified the LHC program as having the highest national priority. This proposal requests continued NSF support for the U.S. ATLAS Operations Program in the initial years of LHC running, when there is great potential for discovery. The total request for the five-year period beginning in FY12 is \$50M. The U.S. ATLAS Operations Program aims to provide U.S. university scientists with access to the unique science opportunities at the LHC through a balanced program encompassing: (1) the technical effort associated with maintenance and operation of the U.S. built detector subsystems, essential for a detailed understanding of the detector and sound physics results; (2) the maintenance and ongoing development of software, computing, and physics analysis support, critical in allowing scientists at U.S. universities to exploit the physics potential of the LHC; (3) an R&D program for detector upgrades to ensure that the detector performance keeps pace with improvements of the LHC and that U.S. technical expertise is maintained and exploited; and (4) a strong education and outreach program.

The **Intellectual Merit** of the U.S. ATLAS Operations Program is empowering U.S. physicists to address questions in particle physics: what is the physical origin of mass? Do supersymmetric particles exist and are they associated with dark matter? Does space-time have extra spatial dimensions? Answers to these questions would provide a major advance toward a unified view of the particles in nature, the forces with which they interact, and their role in the universe. There are particularly compelling indications that the LHC, with collision energies three to seven times higher than previous facilities, will lead to discoveries with implications over a broad field of fundamental science. This proposal rests on both that scientific case and the involvement of the international community in providing a major part of the investment necessary to pursue it. The bold initiative of the NSF, in partnership with the DOE, to carry out a significant portion of the construction of the ATLAS detector opened this opportunity for U.S. scientists. The present proposal will follow that vision with a program to operate the facility, and to participate in the planning of detector upgrades. It will allow U.S. scientists and students to continue a leading role in the pursuit of new discoveries at the frontier of scientific knowledge.

The **Broader Impact** of this proposal is to enhance the computing infrastructure for research, education and beyond. The LHC computing requirements are driving a paradigm shift towards global computing with potentially significant economic impacts, and our students will be at the forefront in using and contributing to these new technologies. The NSF-ATLAS groups continue to expand their education and outreach programs, with particular focus on high school teachers and students, and on outreach to under-represented populations. We plan on expanding our outreach efforts during ATLAS data taking, including the network of worldwide grid facilities. The LHC is the major accelerator-based program in which the next generation of physicists is being trained. Support for R&D activities will lay the groundwork for new technologies and detector techniques that might be adopted by other fields as well as train our graduate and undergraduate students. For U.S. physicists, especially those at universities, to profit fully from these investments, and to be at the forefront of the physics discoveries, it is vital that the U.S. continue to be a leading participant in the scientific operational phase of the experiment.

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Appendix (List below.) (Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)		

Appendix Items:

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

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U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier

1 Introduction

The scientific investigations of the 20th century have revealed a universe which is fourteen billion years old and of enormous extent. A constant stream of discoveries since the 1960's has given unique insight into the matter that makes up this universe and has allowed particle physics to formulate the Standard Model. The Standard Model (SM), a theory which describes all matter and interactions in the universe at a fundamental scale, has been amazingly successful in predicting experimental outcomes. However, there are several issues with the Standard Model, and their resolution has the potential to significantly change our understanding of our universe, the matter in it, and its interactions. The LHC is designed to address many of these issues, making it a lynch pin in furthering our understanding.

A number of fundamental questions remain unanswered about the structure of matter and energy such as the origin of quark masses, the nature of dark matter, and the overall organizing symmetry of fermions and bosons. To answer these questions, both theory and experiment point to the need for studying particle interactions at multi-TeV energies. The physics mandate of this exciting program is firmly grounded in previous searches for heavy particles and precision electroweak measurements performed over the last several decades at electron-positron and proton-antiproton colliders, as well as in high precision atomic physics experiments. These measurements make up the components of the Standard Model.

Perhaps the most widely known missing piece of the Standard Model is the as-yet unobserved Higgs boson. Finding it is a major goal of the LHC and ATLAS. A Standard Model without the Higgs boson is a Standard Model in which the fermions (quarks and leptons) are basically massless. The fermions are believed to acquire mass by interacting with the Higgs field. Experiments have been in hot pursuit of the Higgs particle for decades. Searches performed at the LEP collider at CERN, showed there was no SM Higgs below 114 GeV at 95% confidence level. For the past several years the searches at the Tevatron at Fermilab have shown the Higgs does not exist in a mass range between 158 GeV and 175 GeV. Over the next 5 years the LHC and ATLAS are expected to be able to search for the SM Higgs over the full expected mass range above 114 GeV.

Though some electroweak symmetry breaking mechanism to generate the observed masses must exist, it does not have to be the Standard Model Higgs mechanism. However, any such mechanism would be revealed by detectable effects in the same mass range. Further there are two unexplained gravitational effects – so-called dark-matter and dark-energy – that must have an explanation provided by a complete fundamental theory. Dark matter may consist of new particles, possibly the lightest supersymmetric particles, with masses well within the reach of the LHC. The very nature of space-time can be explored through the search for extra spatial dimensions in proton-proton collisions at the LHC. There is no better place in the world to search for such new phenomena than the LHC and if we find something unexpected a new theory must supersede the Standard Model.

These are some of the reasons why the field is so excited by the prospects of the LHC, which has just collected its first 45 pb^{-1} of data at 7 TeV. This is a tiny fraction of the data expected over the next 5 years - almost 100 times more data is expected just in 2011 alone. However, results are already being published by ATLAS and the other LHC experiments, less than a year from the start of data collection. ATLAS has had 8 physics papers published or accepted,¹⁻⁸ and many more are in preparation. A major contributing

factor to such quick publication is the excellent performance of the detector and computing infrastructure. Not only is it working well with fewer than 5% dead channels, but our Monte Carlo and simulation models of the detector have shown remarkably good agreement with observations for a newly started experiment. As a result 7 papers have also been published on the detector performance with cosmic rays or collision data and an eighth has been submitted.⁹⁻¹⁶ In addition to these physics and detector papers, thousands of plots of detector performance and physics quantities have been released by all the experiments (over 4,000 this calendar year by ATLAS alone¹⁷) and are freely available on the web.¹⁸ The U.S. institutions played major roles in many of these papers and plots. As an example of an analysis where U.S. institutions had such a role, Figure 1 shows the measured cross section for production of pairs of top quarks measured by ATLAS and compared with other results.

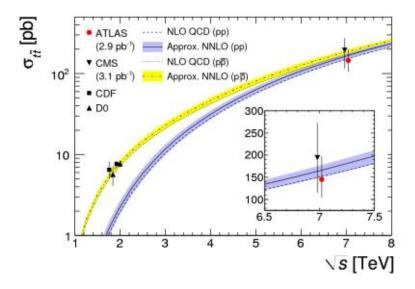


Figure 1. The $t\bar{t}$ cross section measured by ATLAS (red circle) and other experiments shown as a function of center of mass energy.8 The blue line shows the mass dependence for production at a proton-proton collider (LHC), and the yellow shows that for production at a proton-antiproton collider (Tevatron). This measurement requires essentially all elements of the detector and software systems to be functioning well.

With the center of mass energy of 7 TeV, 3.5 times higher than previously available, additional results include searches for new particles in mass regions never before accessible. During the period of the proposal the energy will increase to ~14 TeV, further extending the mass reach. As the LHC performance increases, detector upgrades will be required to retain physics sensitivity. Lead times are long so that R&D for upgrades has already begun, and U.S. institutions are actively participating. The efforts by institutions funded by this proposal are described here.

The goal of this proposal is to empower U.S. university physicists to make major advances toward completing a unified view of the particles in nature, the forces with which particles interact and their role in the past and future of our universe as well as to be ready to make unanticipated discoveries. The overall U.S. ATLAS Operations program is supported by both the DOE and this NSF proposal. The DOE support is \sim \$29M/yr. The Operations Program proposed in this NSF Cooperative Agreement (CA, \$10M/yr, an

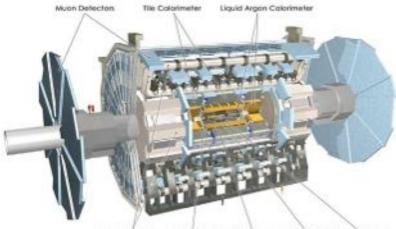
 \sim 10% increase over the current CA funding of \$9M/yr) achieves that empowerment goal by supporting technical personnel and equipment in three main areas of activity:

- o Maintenance and Operations of the ATLAS Detector (M&O)
- o Physics Support and Computing (PS&C)
- o Upgrade Research and Development (R&D)

2 The Instruments of Discovery: The Large Hadron Collider and the ATLAS Detector

The LHC is designed to collide protons-on-protons at 14 TeV center of mass energy – the highest energy that could be obtained practically with superconducting magnet technology in the LEP tunnel at CERN. However, the cryogenic incident of September 2008, when some 50 magnets were damaged by an electrical connection failure during excitation of a sector, has forced a change of the operations program for the next few years. The LHC was initially operated more conservatively at a lower energy (7 TeV) and instantaneous luminosity than design $(10^{32} \text{ cm}^{-2} \text{s}^{-1})$. For the longer-term program during 2013-2015, after a 15 month shutdown needed to fix the LHC splices and install an enhanced collimator system, the LHC will eventually operate near the design energy of 14 TeV with a luminosity of $10^{34} \text{ cm}^{-2} \text{s}^{-1}$. This will allow the full range of proposed physics to be explored. Another year-long shutdown is scheduled for 2016 when upgrades of the ATLAS detector as well as the LHC accelerator complex will be undertaken. Shortly after the end of the decade, the goal is to significantly exceed the design luminosity, thereby driving the need for further ATLAS upgrades.

The ATLAS experiment is one of two general purpose detectors now operating at the Large Hadron Collider (LHC) at CERN. Based on a toroidal magnet geometry for its muon system, a solenoidal central tracker, exceptional hadronic and electromagnetic calorimetry and a versatile triggering system the detector has a broad range of sensitivity to most of the new physics signatures proposed. U.S. groups have been involved in all ATLAS detector subsystems. Figure 2 shows the general layout of the detector.



foroid Mognets Sciencid Mognet SCT Tracker Pixel Detector 1RT Tracker

Figure 2. Shown is the layout of the ATLAS detector located at Point 1 at the LHC. Visible in cutaway are the 8 coils of the barrel toroid system, the endcap toroids, the central solenoid, the muon chambers, calorimeters and inner tracker. The dimensions of the detector are 25 m in height and 44 m in length. The overall weight of the detector is approximately 7,000 tons.

The ATLAS detector has excellent performance that covers all aspects of physics signatures that may be present in both p-p and Pb-Pb collisions at LHC energies. Table 1 is a summary of the design resolutions and triggering coverage. We are already approaching these resolutions and see no limitations in fully achieving them.

Detector component	Required resolution	η cov	erage
		Measurement	Trigger
Tracking	$\sigma_{p_T}/p_T = 0.05\% p_T \oplus 1\%$	±2.5	
EM calorimetry	$\sigma_E/E = 10\%/\sqrt{E} \oplus 0.7\%$	±3.2	±2.5
Hadronic calorimetry (jets)			
barrel and end-cap	$\sigma_E/E=50\%/\sqrt{E}\oplus 3\%$	± 3.2	± 3.2
forward	$\sigma_{\!E}/E = 100\%/\sqrt{E} \oplus 10\%$	$3.1 < \eta < 4.9$	$3.1 < \eta < 4.9$
Muon spectrometer	σ_{p_T}/p_T =10% at p_T = 1 TeV	±2.7	±2.4

Table 1. General performance goals of the ATLAS detector. Note that, for high- p_T muons, the muon-spectrometer performance is independent of the inner-detector system. The units for E and p_T are GeV.

The ATLAS experimental program has been very successful to date. Data from proton-proton and heavy ion collisions have been collected with high efficiency since the LHC started providing p-p collisions in late March 2010.

3 U.S. Leadership

The U.S. ATLAS organization consists of 40 university groups together with 4 DOE national laboratories.¹⁹ It represents about 21% of the overall collaboration. The U.S. groups had major construction responsibilities in all five ATLAS detector systems that have now been commissioned and are taking data. The groups now have important responsibilities for the organization of the experiment, the operation of the detector, and the analysis of the data. U.S. physicists have served as Deputy Spokesperson, Physics Coordinator, and Collaboration Board Chair. They typically comprise about 25% of the experiment's Executive Board. The ATLAS physics analysis organization is divided into 16 areas, each with a convener reporting to the Physics Coordinator. Currently four of these physics conveners are U.S. physicists. Because of very robust computing support and experience at the Fermilab Tevatron, U.S. physicists are also playing major roles in the extraction of the physics results noted above.

4 Summary of Results from Past NSF Support (2007-2011)

4.1 Maintenance and Operations

The ATLAS detector, although an entity unto itself, is also the integration of subsystems of extraordinary complexity.¹³ The support of the NSF from 2007 to 2011 (Cooperative Agreement PHY06-12811 for \$9M/yr) has been critical in enabling U.S. ATLAS universities to contribute to an M&O effort that spans the range from front-line daily operations to leadership roles. The U.S. role as an essential and

trusted partner in the M&O effort is a necessary precursor to assuming leadership roles in the physics analysis.

The M&O program of U.S. ATLAS has been supported by both the DOE and the NSF. Although there are two funding sources the overall management of the Operations Program is performed by the same team thereby assuring full coherence and coordination across the entire program. All the national laboratory contributions to U.S. ATLAS are supported by the DOE, as well as some of the U.S. ATLAS universities that traditionally have DOE core research program contracts.

4.1.1 Inner Detector

The primary NSF CA institution involved in silicon activities is University of California-Santa Cruz (UCSC). The silicon tracker is made up of two components, the Pixel detector and the SCT (silicon strip) detector, which are detector elements closest to the interaction region. Installation and preliminary commissioning were completed in 2007 and 2008 such that both systems were ready for the anticipated LHC collisions in September 2008. Members from all eleven U.S. Silicon institutions made important contributions to meeting this goal. When the accelerator "incident" occurred soon after turn-on, forcing a further delay of more than one year, the two silicon systems used the extra time collecting cosmic ray data as well as detailed calibration and timing data. Much of the cosmic ray data were taken during runs commissioning the entire ATLAS detector including full trigger and data acquisition. This step allowed refinement of the internal alignment constants and timing, and provided operational experience, leading to a Si system that was fully prepared for the first collisions in late 2009.¹¹

During the early running after installation, the cooling system for the silicon tracker was plagued with problems. These included leaks, premature failure of compressor pistons, and failed valves. Most of these problems were resolved by 2009. The fluid distribution rack was re-plumbed to fix leaks and to provide better monitoring of fluid flow and leaks. The preventative maintenance schedule for the compressor plant was accelerated to match the operational experience. UC Santa Cruz technical staff contributed to this work during the shutdown in early 2009. These cooling issues will be addressed again during the 2012 shutdown.

Since the initiation of proton-proton collisions in November 2009 through to the end of operation in 2010, cooling problems have not caused any loss of data taking. The Pixel detector operated with 97% of its 80 M channels live and the SCT with 99% of its 6.3 M channels. Also, the Pixel and SCT up time has been 99% of the stable beam time of the LHC.

Personnel from University of New Mexico and UCSC have designed and built an add-on to the Pixel high voltage distribution panels to allow monitoring of leakage current of individual modules and have provided technical oversight for electronics issues that arise, especially modifications or additions to the silicon electrical systems, respectively.

Most recently, the optical transmitters (VCSEL – Vertical Cavity Surface Emitting Laser) used to send clock, trigger and commands to the on-detector electronics have started to fail much earlier than their expected lifetime. All failures so far have been in components accessible with the detector closed. Prompt intervention and the use of spares have kept the impact to a minimum. Parts are being replaced as necessary and studies are underway to determine the cause and best final remedy. Among these are analytical failure analysis studies by UCSC.

The Transition Radiation Detector, which is an essential part of the Inner Detector, was previously supported by NSF funds but will be tasked to the DOE in the future and therefore not covered by this proposal.

Since the beginning of data taking at 7 TeV in March 2010, the TRT system has been 100% operational. The tracking resolution and the transition radiation pion rejection have all met the design specifications.

Indiana University was one of the founding members of the U.S. ATLAS Transition Radiation Tracker (TRT) group. The barrel tracker was built by Duke University, Hampton University, and Indiana University. The TRT electronics was designed and built by the University of Pennsylvania and CERN. University of Pennsylvania personnel were the major contributors to the commissioning of the TRT electronics and integration of the readout and the DAQ.

The TRT barrel and end caps were installed in the ATLAS detector and commissioned in 2006. An engineer from Indiana University was directly involved in the day-to-day installation, including the ondetector integration. It is largely because of his thorough work that the TRT system had very few problems in coming up to operational status.

Prior to p-p collision data, cosmic ray data were used to commission the TRT and Silicon Detectors. This culminated in the testing of the completed system, with Xenon gas in the TRT system, full cooling, and full magnetic field in the solenoid in the fall of 2008. The TRT system was ready for data taking during the initial beam injection and featured in many of the ATLAS images of interactions in those first exciting days.

The Indiana University team with collaborators has developed methods to use the TRT for measurements of specific energy loss (dE/dx) for particles traversing the TRT straws in order to distinguish pions from kaons. In addition, the TRT works well to distinguish electrons from pions with a lower γ by transition radiation.

4.1.2 Liquid Argon Calorimeter

The majority of U.S. university groups (Columbia, Pittsburgh, Southern Methodist University (SMU), and Stony Brook) that contributed to the M&O of the Liquid Argon Calorimeter subsystem (LAr) were supported by the NSF CA. The LAr Calorimeters are performing very well,⁹ with an earlier estimated 93% availability for physics. The downtime was divided into two categories: luminosity blocks that are excluded from the data because of many "noise" events in the block, and downtime because of an HV trip and subsequent ramp-up of the tripped HV channel.

During the commissioning and cosmic ray data collection stage and during initial operations the performance of the detector has been excellent. At the start of LHC data taking period in March 2010 about 99.2% of about 220,000 individual channels in all calorimeter sections (barrel, electromagnetic endcaps, hadronic endcaps and forward) were fully operational providing energy resolution for photon and electron identification in agreement with the design criteria.

There were several problems encountered during the commissioning of the LAr that required special attention. Faulty design and fabrication by a vendor of the low voltage power supplies (LVPS) has been rectified by two retrofits which have been very successful. During the 2012 shutdown, all the on-detector LVPSs will be replaced by a new design from a new vendor. During the 2010 year-end shutdown faulty optical transmitters (OTx) will be replaced. Despite these difficulties the LAr has operated with good efficiency ~93% with only a minor impact on its performance.

The Stony Brook group carries the responsibility for the High-Voltage (HV) system of the Liquid Argon (LAr) Calorimeters. The HV Feedthroughs and filters have been functioning without failure during the first ATLAS physics run. Currently, personnel from Stony Brook maintain the system. This involves taking the on-site technical responsibility for the LAr HV.

4.1.3 Scintillating Tile Calorimeter (TileCal)

During the current grant the assembly and commissioning of the tile calorimeter was completed and it was brought into operation as a research instrument. It was available for physics in the fall of 2008 when first beams circulated in the LHC. Following the cryogenic incident of September 2008, the full detector was used for cosmic ray studies and millions of events were recorded. These data were the basis of several valuable technical papers.^{15 16} During the LHC data collection the Tile Calorimeter has operated as an essential part of the ATLAS detector and has been an important element in many of the early journal publications. Approximately 97% of the calorimeter channels are operational.

The detector has been closed since the completion of consolidation work in the winter and spring of 2009. During the past 18 months of detector-closed operation the stability of the response has been tracked by a Cs source system irradiating each of the 460,000 scintillating tiles, by a laser system injecting light into each of the 10,000 photomultipliers (PMT) and by a charge injection system monitoring the gain and stability of the electronic readout channels. Also, important operational experience has also been accumulated.

The stability of the calibration is outstanding. The goal is an accuracy of 1%. The readout electronics are stable with no systematic trends seen over an 18 month period and an RMS variation of about 0.1%. The laser shows the PMT responses to be stable to within about 1% over this same period. The Cs source system shows a response increasing smoothly at a rate of about 1% per year. This can easily be tracked and recorded in the calibration data base but we are working to understand the source of the effect. It is seen for both the detector modules in the underground area and for a module in a test building on the surface.

The most unpleasant observation is the limited reliability of the 256 on-detector low voltage power supplies. These custom units have a failure rate of about 5 per year. Because they are inaccessible during detector operation they can only be repaired about once per year. Currently eight (3.1%) are inoperable. There are also trips of the supplies which may be associated with instantaneous luminosity. Recovery takes about 6 minutes. A replacement design is being developed for installation during the 2012 shutdown.

The University of Chicago (UC) group, which built much of the TileCal front-end electronics, and groups from Michigan State University (MSU), University of Illinois Urbana-Champaign (UIUC), Northern Illinois University (NIU), and the University of Texas at Arlington (UTA), monitors and maintains the calibration of the system and performs repairs as necessary.

4.1.4 Muon Spectrometer

The muon system is fully commissioned and operates routinely with high efficiency over the full rapidity range $|\eta| < 2.7$.¹⁴ ¹⁶ All but the 50 remaining EE chambers that were staged have been installed. Personnel from Boston University, Brandeis University, University of Michigan and University of California Irvine (UCI) are supported by NSF funds. Brandeis concentrates on the endcap alignment system and UCI on the firmware/software (FW/SW) and operation of the Cathode Strip Chamber (CSC) Readout Drivers (RODs). Boston and Michigan work on the chamber operation, database, calibration and background studies.

The Michigan ATLAS group is responsible for integrating, commissioning, operating and maintaining the ATLAS endcap Monitored Drift Tubes (MDT) muon chambers and on-chamber electronics for all MDT chambers (barrel and endcap). They work closely with groups from Boston and Brandeis and other U.S. ATLAS muon institutes. A critical contribution during the commissioning period

was the final shakedown of the Chamber Service Modules (CSM) that are mounted on all MDTs. They were designed and largely built by Michigan.

The Michigan MDT Calibration Center is managed by research staff with faculty oversight. Members of the Michigan ATLAS group also provide computing support. The Michigan center collaborates with similar centers in Rome and Munich to provide calibration constants necessary to keep the Muon Spectrometer operating at its full potential: 2% momentum resolution at 100 GeV rising to 10% at 1 TeV. The calibrations required by the MDT tubes are the timing offset (T0), and time-to-space function (RT function).

On the hardware side, the ATLAS Michigan group and Israeli collaborators have constructed and are operating an MDT gas monitor chamber located near the ATLAS detector at CERN. This provides hourly monitoring of the drift spectra and rapid feedback on the chemical integrity of 22 Million liters of Ar/CO_2 flowing through the MDT system every 24 hours and is used to deliver standard MDT calibration RT functions.

Michigan personnel have developed, tested, and maintained the ATLAS MDT and CSC Configuration Database in collaboration with Tel Aviv University. This database stores and provides the information necessary for online data acquisition, such as muon detector configuration and initialization, high level trigger and monitors, and provides access to configuration and mapping data for the offline software and users.

UCI maintains primary responsibility for maintenance and operation of the CSC off-detector electronics and data acquisition systems, and it plays an important role in day-to-day CSC operations and in CSC commissioning and data quality checking. During 2007 and 2008, the CSC chambers were tested and mounted on the Small Wheels, then installed and commissioned in the cavern. UCI participated actively in each of these steps, particularly testing and mounting the chambers, and providing data acquisition support and test software for these activities. In addition, in 2008 the off-detector electronics system was installed and commissioned at Point 1.

At that time, the embedded software for data acquisition from the full system was found not to meet the design data rate specifications. From mid-2008 through 2010, UCI (with critical technical assistance from SLAC) redesigned the software that runs on the CSC ROD, which receives data from the CSCs and formats it for readout by TDAQ. The second half of 2008, 2009, and 2010 were spent developing improvements to the ROD DSP-based software and associated ROD FPGA firmware to improve its operational stability and readout rate. Successive code releases were deployed in summer 2009 and after. The CSC readout was integrated with the rest of ATLAS during the 2009 data taking at 900 GeV, and the CSCs have since taken data without compromising ATLAS performance. The current release of the CSC readout code operates at the ATLAS-specified level 1 trigger rate of 75 kHz with small (6-7%) deadtime (and at 65 kHz with no deadtime). Meanwhile, UCI has been active in commissioning and performance assessment of the CSC system, first with horizontal muons produced by 900 GeV collisions in late 2009, and throughout 2010 with muons from 7 TeV collisions.

4.1.5 Trigger and Data Acquisition System (TDAQ)

During the first beam in 2008, the initial low energy collisions in 2009 and the first 7 TeV collisions in 2010 the DAQ and High Level Trigger (HLT) system worked without problems and met all requirements.²⁰ A run efficiency of well over 90% is regularly achieved.

UCI and MSU contributed to the installation, commissioning and operation of the ATLAS TDAQ system. In 2007 the Level 2 supervisor and Region-of-Interest Builder were commissioned and the first

four racks of the HLT farm installed. In the following years this has increased to 27 HLT racks usable for both Level 2 and Event Filter, and 10 event filter only racks. MSU was involved in the Detector Control System (DCS) support for all HLT racks as well as the Region of Interest (RoI) Builder.

Continuous support for detector operations and combined ATLAS cosmic runs was provided, both before the first beam and in 2009 during the LHC repairs. In addition special week-long tests of the full trigger and DAQ system were performed on a regular basis during that period. Remote monitoring facilities were implemented to allow experts to take shifts from their home institute and the web based monitoring was improved to provide full access to most data that had previously been visible only inside the ATLAS Point 1 network. The ability to run pure offline Athena-based monitoring or reconstruction for on-line events was provided and is now used by most detectors and the global monitoring jobs which reconstruct express stream events in real-time.

Members of UCI are the key developers for the trigger steering and menus used in both Level 2 and event filter and have responded in the past few years to many requests for new features as well as updates needed to meet the changing conditions of the LHC. On the trigger algorithm side, support for Inner Detector tracking in the event filter was provided, as well as on-going development and support for the Level 2 muon trigger. An automated system to re-process all events that caused online processing problems was implemented and has turned out to be an essential tool to test new software and menu versions before they are allowed to go online.

During 2009 all machines in Point 1 were updated to the latest operating system version, and all software development moved from Concurrent Version System (CVS) to Subversion. The prototype system hardware was decoupled physically from the Point 1 network while still providing a small scale version of the full system. Several major changes to the run control Graphical User Interface (GUI) were implemented during this period, as well as improvements to the ATLAS electronic logbook. Members of both institutions provided on-going support as on-call experts (networking, RoI Builder, DAQ, trigger, menu) and through regular control room shifts. Members of UCI and MSU hold various leadership positions in both the DAQ and Trigger area, including TDAQ system run coordinator and TDAQ software coordinator.

4.1.6 Technical Coordination

Brandeis University contributed to the Technical Coordination (TC) of the ATLAS detector by providing mechanical engineering expertise to locate components of the Muon endcap system as well as alignment sensors that are used to readout positions of the endcap calorimeters during closing.

4.2 **Physics Support and Computing**

The physics support and computing effort in U.S. ATLAS has been focused on creating the infrastructure to allow U.S. physicists to take a leadership position in LHC physics. This has included providing computing resources in a distributed facility integrating Tier 1, Tier 2 and Tier 3 centers with one another and with international ATLAS; contributing to the distributed software systems that enable the distributed facility; contributing to the core offline software; and building a team of software and analysis experts able to provide direct support to physicists and undertake targeted development work on software important to U.S. detector responsibilities and analysis.

The commissioning and startup of the LHC have constituted a tremendous success and validation for the distributed computing systems of ATLAS. The full processing workflow, from dataflow off the detector, prompt reconstruction at CERN, data distribution to Tier 1s and Tier 2s, reprocessing and group production at Tier 1s and Tier 2s, and finally to end user physics analysis at Tier 1, Tier 2 and Tier 3 centers has performed exceptionally well and has met the goal of being an effective enabler for timely analysis. An early indicator of this was at the ICHEP conference in July 2010 at which ATLAS talks on Friday incorporated data taken the previous Monday.²¹ During the 2010 run the total data volume produced by ATLAS and distributed and analyzed around the world was 35 Petabytes (PB). By the end of the run ATLAS was routinely running up to 70,000 concurrent production jobs around the world, plus another 15,000 analysis jobs from over 1,000 analysis users, for a total of over 600,000 jobs per day. Figure 3 shows the global growth in distributed analysis over the past year (U.S. in blue). The U.S. has contributed strongly to this success, with its distributed facility consistently being ranked as the best in ATLAS in its performance and reliability (and popularity with both production and analysis users). Both labs and universities fulfill many leadership roles in distributed computing, software, and operations.

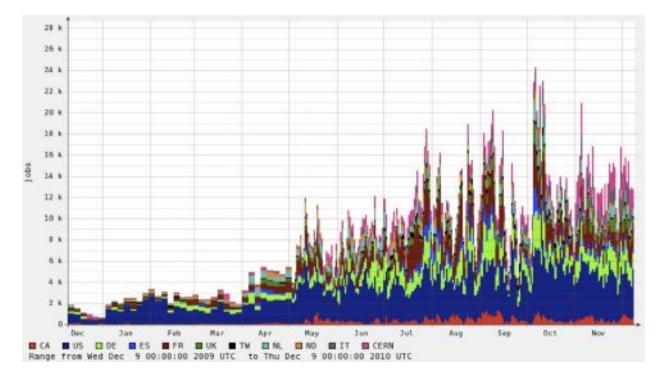


Figure 3. Number of concurrent ATLAS distributed analysis jobs running globally in the U.S. developed PanDA distributed production and analysis system, from December 2009 to December 2010. U.S. jobs are in blue.

The U.S. program in ATLAS core software has been in place for close to a decade. The focus areas of core framework, data management, and distributed software established at the beginning remain the focus areas today. In each of these areas the U.S. continues to play the lead role in delivering central components of the software: the Athena control framework, its event data persistency services, and the PanDA distributed production and analysis system. Their smooth operation through ATLAS commissioning and the first year of data taking was a strong credit to the U.S. program and the institutions that have supported their steady evolution for many years. Software support for users has long been an important part of the effort as well, with U.S. ATLAS librarians serving the software infrastructure needs of the U.S.

The program of placing detector software experts in software infrastructure development roles at universities that are centers of detector expertise has proven very successful. Through these efforts the U.S. has gained prominent roles in the development of muon reconstruction software, hadron calorimeter reconstruction and jet studies, tracking, vertexing and *b* reconstruction. U.S. physicists doing detector studies and physics analysis derive great benefit from having in their midst experts on detector system software who provide direct user support and act as a pool of software expertise for priority development and operations tasks.

An addition to the program in the last two years, motivated by the success of the detector software infrastructure program, was to place analysis software experts at universities close to physicists with deep expertise in analysis tools and the software needs of analysis. These developers and their supervisors are charged to contribute to physics analysis tools development with a particular focus on U.S. priorities but in a way coherent with international ATLAS. This strategy has been very successful as a primary contributor to the emergence of a common format and tool set for Ntuple based analysis.

With ATLAS now operating, all software and computing roles include a substantial and sometimes dominant operations component, supporting users and system operators, and responding in the development program to feedback from operations. The U.S. program makes no separation in terms of personnel between development and operations activities, ensuring development is closely coupled to the real needs of data processing and analysis. The U.S. has secured leading operations roles in ATLAS, including overall leadership, and in the U.S. we run the most successful computing operation in the collaboration.

In the following (Sections 4.2.1-4.2.3) we describe in more detail the U.S. activities in physics support and computing and the results they have shown, with an emphasis on the university-based activities for which continued support is sought in this proposal.

4.2.1 Physics Analysis Support

The work undertaken in physics analysis support empowers U.S. physicists to take leadership roles in the ATLAS physics working groups and ensures that they will have access to the resources needed for these roles. Physics analysis per se is an activity carried out by physicists, and is not considered part of the program receiving operations support. However, because ATLAS analysis software is complex, and a large fraction of U.S. physicists are not based at CERN, and the U.S. has a vested interest in having a strong role in analysis tools and detector performance in ATLAS, U.S. ATLAS has an organization designed to support physics analysis, to promote communication and to stimulate collaboration among U.S. ATLAS physicists.

The primary components of the organization are U.S. analysis forums, a network of Analysis Support Centers (ASCs) acting as hubs for analysis tools assistance and training, an active program of physics analysis jamborees located primarily but not exclusively at the ASCs, and a program in analysis tool software development. A further component, the Analysis Support Group to provide technical expertise to U.S. physicists, has largely been superseded by ATLAS-level technical support channels where the U.S. plays a strong and, in many cases, leading role.

The U.S. analysis forums bring together U.S. physicists with common interests, and in turn strengthen the U.S. participation in LHC physics. They provide a setting for young researchers to discuss and present analyses in a more preliminary and informal way than ATLAS-level meetings. Each forum has two conveners, one based in the U.S. and one based at CERN, with the explicit intent that the forums and their conveners act as a communication channel between analysis activities in the U.S. and at CERN. The

CERN-based conveners also act as a source of help and support for U.S. researchers based at CERN, and they contribute to a strong coupling between U.S. and overall ATLAS analysis activity. The forums include: electron/photon; muon; *b*-tagging/vertexing; jets/missing ET; and trigger, as well as two physics-based forums: Beyond the Standard Model, including supersymmetry and exotics; and Standard Model physics, including Higgs. Operating these forums has been and remains a learning experience. The activity level varies forum to forum, and one motivation for the introduction of dual U.S./CERN conveners was to broaden the responsibility to promote greater activity. We are continuing to evolve the analysis support and are presently developing plans to strengthen the forums for the future. One way is to assign a primary role for forum conveners in organizing the physics content of the U.S. ATLAS annual collaboration meeting, as well as a larger role in the regular U.S. ATLAS analysis meetings.

The Analysis Support Centers, together with the software and analysis experts supporting them, provide tutorials, regular video/phone meetings, physics jamborees several times per year, one-on-one discussions and web documentation. With the ASCs co-located with hubs of computing and software as well as analysis expertise at ANL, BNL and LBNL, the ASCs and their users have many resources on which to draw. Their regional distribution answers a demonstrated need for training and gathering places that are accessible by car -- and thus cheaply by students. This has motivated the establishment of a fourth center, not a full ASC but a physics jamboree host site, at UTA.

The jamboree program has been very successful as measured by the level of activity and participation. The total number of jamborees per year is about 8, each typically having close to 30 attendees. They are often coupled to an adjoining physics meeting. The tutorials at the jamborees and elsewhere have fostered the development and improvement of analysis documentation, and they help to provide feedback to the developers from experience of their users.

A further element of the physics analysis support program, added in the last 2 years, is the support of analysis tools developers, modeled on the successful program in detector software support. Developers were supported by the DOE Operations Program funding at two universities, Iowa State and New York University (NYU), supervised by physicists there who are experts on analysis software and the computing needs of analysis. This program has proven to be very valuable with the prospect that it will be even more so in the future. Together with other U.S. physicists these developers played a role in developing the Derived Physics Data (D3PD) infrastructure for late-stage, ROOT Ntuple based analysis that over the last year has emerged as a broadly adopted de facto standard in the ATLAS physics and detector performance working groups. It is extremely unusual that an experiment of ATLAS' scale this early in its lifetime is able to standardize on late-stage analysis tools, so the wide adoption of the D3PD is a major success. One of the developers is involved in an important extension of this infrastructure driven by its success, to establish a framework for D3PD analysis within which analysis algorithms operating on the D3PD format events can utilize common tools, somewhat analogous to the Athena framework at an earlier stage of processing.

Our analysis software experts are also playing an important role in the expanding Tier 3 program. A key means by which the U.S. can encourage the use of common and effective approaches to analysis is through training and examples. The physics jamborees and tutorials have been one avenue for this and the Tier 3s are becoming another: they are developing functional examples of typical analyses in a Tier 3 setting that users of new Tier 3s will be able to pick up and use. We expect the Tier 3 support role of these positions to continue to grow as about 20 new Tier 3s come online in the next year or so. They also represent an important resource with the recent naming of a U.S. physicist to a two-year appointment as

co-convener of the Physics Analysis Tools (PAT) group in ATLAS; our analysis tools developers will strengthen his ability to drive the PAT program.

A further analysis software expert at Indiana University (IU) Bloomington, a shared position in which he also serves as a tracking and vertexing software expert as described below, provides an essential service to U.S. ATLAS and ATLAS physicists. He is the author and maintainer of the ATLAS Physics Analysis Workbook, a comprehensive wiki that explains by example how to use ATLAS software and physics analysis tools in the real world conditions of specific software releases, good run lists, a rapidly growing data set in still-evolving formats, etc. Our other analysis software specialists assist in improving the workbook. This work was supported by NSF CA Operations Program funding.

4.2.2 Developing and Maintaining ATLAS Core Software

U.S. groups lead the development of a number of core ATLAS software components used to access event data, provide I/O, configure and run algorithms, manage data distribution, and utilize distributed facilities for production and analysis. This software is independent of detector-specific algorithms. This effort is coordinated within the international ATLAS collaboration and is part of the ATLAS Maintenance and Operations MOU. The ATLAS control framework, data management and distributed software are primary U.S. core software deliverables. These activities are primarily centered at national laboratories and funded by the DOE. LBNL leads the development of the ATLAS offline software framework, Athena. This is the main steering code within which reconstruction and analysis algorithms run, and create the output products of the successive stages of the offline processing chain. These output formats are the province of ANL, which leads the ATLAS event data persistency effort. BNL leads development of the PanDA distributed production and analysis system as well as high level distributed data management and production operations tools.

In addition to these lab-based efforts, U.S. universities play key roles in core software, leveraging local expertise and contributing to a tight coupling between software development and the real needs of physicists doing analysis. This distributed effort, with critical mass teams at the labs complemented by university efforts that broaden involvement and expertise and strengthen the coupling to the physics program, has proven very effective. The university contributions to core software are outlined here.

The University of Pittsburgh group accrued substantial experience in detector geometry representations and visualization during their work at the CDF experiment at Fermilab, so a software professional was placed at Pittsburgh to work for ATLAS in this area, and has been supported by NSF CA Operations Program funds. This has been very successful, with the individual leading the development, optimization and maintenance of the ATLAS detector description framework that delivers to physics algorithms the current geometrical description of the detector. The Pittsburgh work has moved this area from a serious problem on the critical path prior to Pittsburgh's entry, to a stable and successful software component today. The group is now also contributing its substantial expertise in visualization to the ATLAS event display effort, which draws heavily on their geometry description work.

Building on significant experience from the D0 experiment at Fermilab, SMU has worked on tools for monitoring ATLAS event data as it is collected, with the software professional engaged in the effort supported by NSF CA funding. They have developed software that quickly combines histograms and trigger objects for monitoring of ATLAS event data as it is collected. The system accesses data from the \sim 6,000 nodes in the ATLAS online event farm and provides updates about once a minute with the processing of millions of histograms. The usage to date has been the online environment, but the system is now being extended to offline access. It will become a tool for widely distributed monitoring and

evaluation of detector performance, possibly contributing in the future to a capability for remote shift taking.

The UTA group is a long standing contributor to distributed processing systems and operations for ATLAS, so support for a software professional was established there to participate in the development of the PanDA distributed production and analysis system, co-led by UTA and BNL. PanDA has progressed from its origins as a U.S. based system has become the basis for distributed production and analysis ATLAS-wide. The contribution of the UTA developer to the program has been critical; he has developed and supports the software for PanDA's 'pilot jobs' that manage the process of acquiring and executing an ATLAS job and managing its inputs and outputs. UTA also contributes to managing site information metadata, and through their strong operations role they help ensure that PanDA development is closely coupled to the real needs of ATLAS computing operations.

4.2.3 Detector Software Development and Maintenance

A major portion of the detector-specific software comes from base program contributions from physicists working at U.S. universities and national laboratories. However to maximally leverage these contributions and to make the overall U.S. physics impact in ATLAS as strong as possible, we have funded some software professionals with strong physics backgrounds to work on developing and maintaining detector software and its surrounding infrastructure. This includes simulation, reconstruction, database integration and support, data persistency, testing and validation tools, performance metrics and monitors, and service tools required for reconstruction. Previous major investment in the construction phase of ATLAS produced many experts in the subsystem detectors. Placing software experts in the same locations as these detector software infrastructure. The developer team has been stable and productive, accruing deep expertise in the detector software systems beyond their own contributions, which makes them a valuable pool of information and assistance for U.S. physicists doing analysis.

For the last four years we have funded three software professionals to support subsystem software infrastructure in calorimetry, Muon Spectrometer and Inner Detector software. The developers have all been in place at least 3 ¹/₂ years and have accrued significant accomplishments. They have been recognized with prominent roles, as will be described.

A software professional at the University of Massachusetts Amherst works on muon reconstruction software, and is supported by the NSF CA. Members of the Amherst group have long been active in ATLAS muon reconstruction software, and the Boston area institutions have significant responsibilities in the Muon Spectrometer construction and M&O. The developer has gathered and harnessed the local expertise in the underlying muon reconstruction software and has provided direct support to U.S. physicists incorporating muons in their physics analysis. A clear measure of his effectiveness is that the developer is now himself responsible ATLAS-wide for the Muon Spectrometer software. This is a great asset to the proximate Muon Spectrometer community.

A software professional at the University of Arizona, supported by the DOE Operations Program funding provides technical support to the strong effort in calorimeter software there. Members of the Arizona group spearheaded the ATLAS calorimeter reconstruction software, and have co-coordinated the ATLAS Jets combined performance group. They also have significant responsibilities in the Forward Calorimeter. The developer is responsible for much of the calorimeter's calibration code and conditions data. His role has evolved and broadened so that he now plays a key role in reconstruction operations for the experiment, as the coordinator for prompt event reconstruction at the CERN Tier 0. He also continues to contribute to calorimeter specific tasks such as managing calibration constants in the conditions database.

A software professional at IU, supported by NSF CA funds, works in the area of Inner Detector reconstruction and analysis support, for the ATLAS Physics Analysis Workbook. His activities include tracking, vertexing and *b*-tagging. Mapping the material in the Inner Detector and ensuring its proper modeling in the simulation is critical to reconstruction performance. He has developed a procedure that reconstructs vertices of interactions in the detector material and provides a direct material map. The same procedure applied to simulation data permits direct comparison of the simulation model with the real detector's material distribution.

4.2.4 Computing Infrastructure in ATLAS: Computing and Networking Challenges

ATLAS has just commenced a multi-decade physics program that places unprecedented demands on computing to process and analyze the enormous data volumes arising from the high interaction rates, fine grained instrumentation and sheer size of the detector. The 10⁹ Hz interaction rate is filtered by multiple trigger levels to reach a recording rate of 200-400 Hz. In its first year ATLAS has recorded 45 pb⁻¹ of integrated luminosity, with the total data volume stored by ATLAS growing in that year from 15 PB to 50 PB. Distributed processing loads tripled over the year, with over 600,000 jobs/day by the end of the 2010 run. About 1,300 physicists worldwide currently use ATLAS's distributed analysis services, about a quarter from the U.S. Next year the integrated luminosity is expected to increase a hundred fold, with further increases year by year. The required computing capacity scales roughly with integrated luminosity, making LHC computing unprecedented in the scale of its storage, processing, and distributed analysis.

A robust computing infrastructure for the LHC experiments is particularly crucial for the U.S. and other remote participants because many of the most challenging (and therefore vulnerable) aspects of LHC computing are associated with providing an effective distributed computing environment that fully enfranchises remote participants in physics analysis. U.S. leadership in building LHC computing is an essential prerequisite to U.S. leadership in physics analysis.

The LHC physics environment makes analysis a complex challenge as well. Much of the interesting physics expected at the LHC is predicted to occur at very low rates. A typical light Higgs signal, for example, may involve of order 1,000 signal events distilled from the 10¹⁴ occurring in the detector in a year of data taking. The ATLAS trigger provides a rejection factor of 10⁵, but the further selection of one event in a million must be performed in offline processing. This presents one of the central computing challenges: the rapid and efficient extraction of sparse physics samples from extremely large datasets.

The scale and global nature of ATLAS computing motivated the development of a computing model that leverages national, regional, and institutional computing resources and expertise, integrated in a distributed hierarchy of centers fulfilling specific roles. The hierarchical computing model of ATLAS begins with the Tier 0 center at CERN. It receives the raw data from the detector and produces the first detailed event reconstruction. Ten Tier 1 centers are associated with national or geographical regions, with U.S. ATLAS served by one at Brookhaven National Lab. The Tier 1 centers hold large volumes of reconstructed and simulated data for samples of the greatest physics interest, and they serve as a redundant archival store for raw data. Their resources are used for re-reconstruction of the data once detailed calibrations are available (reprocessing), analysis by physics working groups and individual users, and simulation. Five Tier 2 centers in the U.S. (of about 70 ATLAS-wide), four of which are supported by NSF

CA funds, provide access to data of the greatest analysis interest, do the bulk of the simulation, and support physics analysis for individuals and physics working groups. Tier 3 centers are resources at universities and labs intended primarily to support local analysis users; their organization lies outside the scope of U.S. ATLAS program management but their close integration is a necessity. The U.S. Tier 3 organization works closely with U.S. ATLAS computing to ensure this. The U.S. contribution to ATLAS Tier 1 and Tier 2 resources scales with the number of scientific authors and is presently about 23%.

A lesson of ATLAS experience to date is that the Tier 2 centers play a more important role than the hierarchical model foresaw. The evolution of ATLAS computing is towards a 'flatter' architecture that discriminates less between Tier 1s and Tier 2s in how they interconnect in the distributed facility, and so is better able to leverage the substantial storage and processing resources of Tier 2s. This larger Tier 2 role stems from the fact that the Tier 2s have much more powerful networking connections than foreseen when the hierarchical model was designed a decade ago.

The distributed computing model depends on linking all sites through high-speed networks into a distributed fabric that manages data and workloads globally in a way that presents a tractable operational load. This has required both a large international effort in developing 'grid middleware' software and large efforts in the experiments to build on this middleware foundation to create the processing and data management systems required. In the U.S. the common efforts in grid infrastructure and middleware are managed by the Open Science Grid (OSG), which is well established as an essential component of ATLAS computing. It enables us to leverage efforts in the common grid computing fabric, and it provides the principal U.S. link to the international grid organizations centered at CERN, in particular the Worldwide LHC Computing Grid (WLCG).

4.2.5 Tier 2 Computing Centers

The U.S. ATLAS Tier 2 computing centers were first funded four years ago through the present NSF cooperative agreement, with a fifth Tier 2 supported by the DOE Operations Program funds. These have proven to be extremely successful facilities based on both substantial support from the universities and sustained funding from U.S. ATLAS. The Tier 2s collectively rely on tight integration as part of the U.S. ATLAS Distributed Facility, and ultimately as part of the Open Science Grid. The ATLAS physicists who initiated the U.S. Tier 2 centers have built strong and stable staffs, and now have a great deal of hard won knowledge about building and operating a successful large-scale computing facility. A tightly knit management for the U.S. ATLAS Distributed Facility under the U.S. ATLAS Facilities Manager has successfully integrated the Tier 2s as part of an overall U.S. ATLAS distributed resource. It has outperformed all other regions in ATLAS, by metrics both quantitative (cycles and job throughput delivered) and qualitative (ATLAS physicists show a strong preference for running their analysis jobs in the U.S. over anywhere else, and production operators show the same preference). The U.S. Tier 2s are all highly ranked among computing facilities ATLAS-wide. The ATLAS Computing Coordinator recently reported that in the latest measure of ATLAS analysis activity, while ATLAS has about 75 analysis sites, 75% of the analysis is done in only 20 sites, and all of the U.S. Tier 1 and Tier 2 sites are in the top 16. This ranking includes not just Tier 2s worldwide but Tier 1s as well; many of our Tier 2s are running more analysis jobs than several Tier 1s. This is not because U.S. sites are over-provisioned; we have generally had just enough resources to meet our ATLAS pledges. It is because the U.S. sites make the most of their resources with high performance and availability within a well-integrated distributed facility.

The Tier 2s have made contributions well beyond their successes in delivering computing capacity. They have innovated in a number of areas, as a matter of necessity in building a large-scale

facility with low manpower support. Several have built high-throughput inter-campus computing and networking infrastructures which have reduced costs through the pragmatic use of existing remote resources. Each of the Tier 2s has built up particular areas of expertise: U.S. ATLAS Great Lakes Tier 2 Center (AGLT2) is a leader in networking development and monitoring; Midwest Tier 2 Center (MWT2) in storage systems, storage management software and distributed data access; Northeast Tier 2 Center (NET2) in software tools for infrastructure management; and Southwest Tier 2 Center (SWT2) in distributed workload management systems and distributed computing operations.

Over the years the Tier 2s have evolved according to principles established by the ATLAS computing model. They have also benefited from practical lessons of early data challenges, functional tests, large scale simulation campaigns, detector commissioning, and now the workloads of the first year of the LHC physics program. Through this time the Tier 2 centers have collaborated closely among themselves and with the BNL Tier 1 center in providing a substantial part of the U.S. computing capacity as part of a coordinated reliable facility for U.S. and international ATLAS collaborators. In the following subsections we describe the NSF-supported Tier 2s themselves, primarily in terms of their development to this point and their status today. Future plans are addressed in Section 5.2.4.

In supplementary materials we include the proposals from all five of our Tier 2s for their participation in 2012-2016. Space limitations prevent us from describing our DOE-supported Western Tier 2 directly in this proposal.

All U.S. ATLAS Tier 2 centers see their roles as much more than a simple service provider, but rather an active participant in researching, testing and enabling cost-effective infrastructures capable of effectively supporting ATLAS physicists and, more generally, all those involved in data-intensive, distributed science. They have demonstrated themselves to be a very reliable and effective resource for U.S. ATLAS and they expect to continue to be so for the foreseeable future.

U.S. ATLAS Great Lakes Tier 2

AGLT2 started operations in September 2006 with strong support from the University of Michigan and Michigan State University (our Tier-2 center is composed of sites at both Universities, which currently split the funding roughly 60/40 respectively). This support has helped AGLT2 to become one of the top Tier 2s ATLAS-wide. During the past five years AGLT2 has delivered resources to U.S. ATLAS to at least meet what was required by the international MOU, by carefully allocating resources where they would bring the most impact. Beyond delivering capacity above expectation, AGLT2 has contributed to the U.S. ATLAS distributed facility in many ways. They have some of the best networking expertise in U.S. ATLAS, they do network research supporting the data-intensive WAN flows characteristic of our computing, they are driving the U.S. ATLAS adoption of a standard perfSONAR based networking monitoring infrastructure across the facility, and they act as an important liaison between U.S. ATLAS and external networking organizations. They have participated in a strong program among the U.S. Tier 2s in storage system research and benchmarking. They also work on facility management and performance issues, including reliable system configuration and system optimization, throughput monitoring and testing, and configuration management and node provisioning.

AGLT2 is hosted at the University of Michigan and Michigan State University. Both sites have provided power, space and cooling over the 5 years and will continue to do so. These university contributions to the program are estimated at \$180k/year over the two sites. The University of Michigan's facility hosts 8 equipment racks, with potential room for 6 more. Critical equipment is backed by an 80kW

UPS system, itself backed by a generator. The Michigan State facility can host up to 15 racks, and here too the critical equipment is backed up by UPS and generator. Both sites benefit from the excellent network infrastructure the Universities have put into place. Currently the Tier-2 has dedicated 10 Gbps links from each site to a Chicago peering point and a shared link between the sites. Network capacity can be expanded quickly and easily as needed.

Midwest Tier 2

MWT2 is a consortium which will consist of two institutions: the UC and IU. Beginning in 2012 the University of Illinois and the National Center for Supercomputing Applications (NCSA) will join. The program began in 2005 with the first production deployments in the summer of 2006 at IU and UC. The resources delivered to U.S. ATLAS included substantial equipment and infrastructure contributions from the two universities. This enabled MWT2 to become a major production and analysis resource for the ATLAS physics community, consistently ranking in the top five of 163 WLCG Tier2s in terms of delivered CPU and storage capacity.

The MWT2 facilities will be hosted at three sites: the Enrico Fermi Institute at the University of Chicago, the IU Informatics and Communications Technology Complex (ICTC) in Indianapolis, and the Advanced Computation Building (ACB) in Urbana (starting in 2012). The universities have provided at substantial expense the space, power and cooling for the past five years, as well as the network infrastructure and regional provider connectivity fees. These expenses will continue to be provided by the universities for the next five-year period. At the University of Chicago, the present MWT2 machine room is next to the high energy physics building and hosts 17 racks of MWT2 equipment, with critical services backed up by 40kW UPS, and served by a 10 Gbps network link. At IU, the ICTC is a 213,815-square-foot building on the Indianapolis campus, housing several major IU computing projects, including the IU Teragrid site. The OSG Grid Operations Center is co-located there, and it is a major peering hub for Internet2. At present MWT2 occupies 6 racks in this facility with room to expand to 10. Should MWT2 require more, it is highly likely additional space and associated infrastructure could be provided. At the UIUC, the MWT2 will be hosted in the ACB, a stone's throw from the Loomis Laboratory of Physics. The ACB houses NCSA's specially designed machine room and most of the Center's high-performance computing and storage systems. The facility also includes conference space and NCSA's Help Desk. The MWT2 resource will be part of the Illinois Campus Cluster (ICC). The floor space, racks, power, cooling, network infrastructure, regional provider connectivity fees, and staffing for core infrastructure support are provided through campus funds that subsidize the operation and maintenance of the ICC resource.

In spring/summer 2011 the Chicago facility will move to a new server room, a major new investment by the University of Chicago on behalf of MWT2. The university is building a new physical sciences research center that will replace the structure currently hosting MWT2 equipment. Cognizant of long-term commitments to the ATLAS computing program represented by the Tier 2 facility, the Dean of the Physical Sciences Division built into the project plan construction of a new server room for the Fermi Institute, with ATLAS as the primary stakeholder, at a cost of \$1.2M from an alumni gift. The new server room will be located in the basement of the adjacent "accelerator building" that once housed Fermi's proton cyclotron. The room will have space for up to 30 racks for ATLAS, more than the expected MWT2 need for the next five years, and will be backed up by 140kW UPS.

The network capacity between all sites is 10 Gbps over multiple regional providers. Connectivity to Internet2, important for Tier 3 access, is provided by this route. UC has a second 10 Gbps link that runs

from the campus to an ESnet peering point, providing a direct path to Brookhaven over a dedicated circuit. The UC campus and edge networks are being redesigned to provide a 40 Gbps core in the next 2 years, with possible expansion to 100 Gbps in the next 5 years.

MWT2 has successfully employed a shared administrative model in which the systems administration domain of each facility is available to all systems staff so as to provide redundancy in operational response and systems monitoring, and to share expertise between the sites, thereby achieving some measure of administrative efficiency. At UC the primary sysadmin is funded by NSF CA funds; a second sysadmin is supported in 1/3 by those funds and the remainder provided by other projects or the University. At Indiana the primary sysadmin is supported 2/3 by NSF CA funds and 1/3 by the University, with a further half-time technician supported by NSF CA funds. At Illinois, the staffing will come from three sources: NCSA core staff supporting the ICC infrastructure, NCSA staff providing integration support for ATLAS workload and data management services, and from the high energy physics group that will provide ATLAS support for the MWT2 activities for outside users.

MWT2 has made contributions to U.S. ATLAS and the distributed facility well beyond its provisioning of computing resources. The MWT2 team has contributed testbed resources, troubleshooting support, and operational feedback through a long period of software and infrastructure development on many fronts: the Open Science Grid (OSG) software stack, ATLAS PanDA and distributed data management (DQ2) development, and storage system deployments (primarily dCache but also some XRootd for Tier 3 sites). UC has expanded its MWT2-directed activity in data management to important roles in providing data management tools to U.S. and international ATLAS, and in designing and developing a data management architecture for the future than can incorporate the needs of a growing number of Tier 2 centers. The UC team has done diagnostic and development work on elements of the dCache storage system, providing feedback to the developers. The Indiana team has also made important contributions to several U.S. ATLAS facility-wide tasks, most recently in the debugging and validation of all the U.S. Tier 2s for proper operation of a crucial caching system for ATLAS conditions data (based on web caching and the U.S. CMS-developed FroNtier system) that enables scalable access to this data for production and analysis worldwide.

The MWT2 team also provides an important interconnect between U.S. ATLAS and OSG. The MWT2 head is also the head of integration for OSG, where he is responsible for validating and sustaining the operation of OSG as a functioning integrated facility through the evolution of the OSG software stack - that is, OSG releases must be validated in an integration testbed that tests its performance against the expectations of users, including of course U.S. ATLAS. MWT2 serves as an important element of the integration testbed and this testing process, helping to ensure U.S. ATLAS expectations for software functionality and stability are met.

Northeast Tier 2

The U.S. ATLAS Northeast Tier 2 center (NET2) is a joint project between Boston University (BU) and Harvard University. As a facility, NET2 is split between three sites in Boston. The Boston University site holds disk storage which is used both by BU worker nodes and by worker nodes which are part of the Harvard Odyssey cluster. A third site on the Harvard campus holds the Harvard gatekeeper and servers and the Harvard Tier 3. NET2 has 10 Gbps connectivity to the BNL Tier 1 and to CERN and has dedicated 10 Gbps internal connectivity between the Boston University and Odyssey cluster sites.

Bandwidth between BU storage and Harvard worker node local storage is more than 6.4 Gbps, effectively as good as in-cluster networking. NET2 presently runs approximately 2,700 PanDA jobs simultaneously.

NET2 leverages experienced campus facility IT teams for much of its support: the Scientific Computing and Visualization Group at BU, and the Faculty of Arts and Sciences Research Computing group at Harvard. Each of these groups provides a primary contact who spends most of their time on ATLAS and who can call on colleagues for further assistance. NET2 experience is that about 3 FTEs is required for maintenance, operations, problem response and facility expansion. The NET2 institutions provide half of this, while program funds pay for the remaining 1.5 FTEs, covering higher level support specific to the ATLAS computing environment and software stack.

In addition to manpower, the NET2 institutes make substantial material contributions to NET2. Harvard has provided all manpower related costs, all power costs, two racks and two air conditioner units for the worker nodes, all maintenance costs, all networking fees and all rental costs for the downtown Boston site. This has been provided at no cost to the program since 2009. Harvard has also provided approximately 500 cores from the Odyssey cluster as contributed capacity to NET2. Boston University in addition to providing approximately 1 FTE of effort above the 1.5 FTEs program funded work, pays for all electrical costs, AC equipment maintenance and networking fees. BU also has contributed a \$180k fund which can be used for NET2 infrastructure costs over the next few years. Both universities have given assurances that these costs will continue to be absorbed by them through 2016. The move to Holyoke will incur no additional costs to the program. The director of Harvard FAS research computing has indicated to us that NET2 will also be able to continue to use opportunistic resources from the Odyssey cluster at approximately 4% of Odyssey continuing as Odyssey expands over the period 2012-2016.

NET2 has also made major infrastructure contributions to U.S. ATLAS, ATLAS and the larger high energy and nuclear physics community. The Pacman software installer created there is used by ATLAS, OSG, Teragrid and others to manage packaging, distributing and installing the very large software systems used by experiments and facilities of this scale. A more recent development is the "Egg" software system which provides a simple, coherent interface to interact with all parts of a distributed computing infrastructure. It grew out of the complex challenge of technically managing a large distributed infrastructure like the U.S. ATLAS facility, and is being used to help manage NET2. Egg is beginning to capture wider interest in ATLAS as a potentially powerful operations tool.²²

Southwest Tier 2

SWT2 sites include the University of Texas at Arlington (UTA) and the University of Oklahoma (OU). During the first four years of U.S. Tier 2 operations, SWT2 has consistently been among the top performers. SWT2 currently provides 2,772 dedicated job slots to ATLAS, and 1,239 TB of storage. The scale of its resources, excellent stability, and efficiency in job completion make SWT2 one of the top Tier 2 sites in ATLAS.

The computing resources for SWT2 are located at three facilities. The main location is in the CPB building at UTA. A dedicated machine room at CPB provides space, power, and cooling for a maximum of 50 racks, 16 of which are currently occupied. A second facility is available at ARDC, a University of Texas System data center located in Ft. Worth. SWT2 has an allocation of 16 racks at this facility (half of which are currently being used). The SRTC facility at OU is capable of providing space, power, and cooling for 5-10 racks, three of which are currently used. Resources operated by OSCER are utilized for ATLAS computing as available.

An additional university is associated with SWT2 through OU: Langston University (LU). Resources provided by LU are hosted at the OU site. They provide resources to ATLAS and broaden the outreach of U.S. ATLAS to traditionally under-privileged institutions.

UTA is connected at 10 Gb/s through Lonestar Education and Research Network (LEARN) and National Lambda Rail (NLR). A second 10 Gb/s connection is expected soon from Internet2. OU has been connected at 10 Gb/s for a few years. Therefore, we expect networking to be well provisioned for the future.

UTA and OU provided a large level of local funding (approximately 1:1) for the first five years of Tier 2 operations. Local funds will continue to be available for the next five years for personnel, travel and M&S, and will support a large physical infrastructure (about 80 racks) with power, cooling and networking. About 40% of the SWT2 funding from the NSF operations program will be spent on personnel in 2012-2016 with substantial local contributions.

The SWT2 facilities team benefits from excellent synergy with the U.S. ATLAS operations team at UTA, OSG support teams at UTA and OU, PanDA development team at UTA, and the physicists who perform LHC data analysis in the Southwest region. The regional contributions to ATLAS are far greater because these local groups operate as a single team. For example, the SWT2 organizes regional jamborees (focused physics analysis support sessions), which bring all teams together. Such activities are usually carried out at National Laboratories: since the Southwest region does not have one locally, the SWT2 acts as the de facto focus of physics and computing in the region.

4.3 Upgrade R&D

For the past 5 years the vigorous ATLAS Upgrade R&D program has engaged physicists and technical personnel from U.S. Universities. The program has grown over time and now involves 23 universities, listed in Table 2. The program is composed of projects detailed in proposals submitted to an ATLAS-wide Upgrade Steering Group. The proposals are evaluated with respect to relevance to ATLAS. including the long term needs of the experiment, and technical feasibility prior to submittal for approval by the ATLAS collaboration board. This program has included studies of potential improvements to ATLAS, including explorations of commercially available new technologies not available 10 years ago in the areas of triggering and data acquisition, as well as development of novel particle sensors, for example using diamond or improved silicon detectors, and the use of very modern electronics technologies, requiring design and test of custom chips. The university R&D program has developed new chips using Si-Ge bipolar technology, small feature size CMOS, and Silicon on Sapphire, providing new data on performance of use to the whole particle physics community. The work has aimed at the frontier of both radiation hardness and extreme data rates, to prepare for an eventual large luminosity increase at the LHC. Other areas of interest have included the development of very light weight, stiff, mechanical support structures for tracking detector improvements, and better integrated electronics systems for calorimetry. ATLAS has already decided on its first major performance upgrade, a new pixel tracking layer at 3 cm radius, leaning heavily on the work supported by the Upgrade R&D program. The final development and construction activities for this device, called the Insertable B Layer (IBL) will be separately supported as an NSF MRI project, with 11 universities participating. The device will allow an increase of a factor of two in rejection of non-*b* jets for a given *b*-jet tagging rate.

The upgrade activities, described very briefly below, have been organized around the detector subsystems in the present ATLAS detector. The goal is to have a small number of improvements ready for installation in 2016, including the IBL, after which the luminosity is expected to go up to a few times the

design luminosity, and then a major upgrade ready for installation in 2020, after which the detector is expected to run for 10 years at five times the design luminosity. Given a typical construction time, the major upgrades need to be ready to start construction around 2015. This implies that the bulk of the R&D for the 2020 installation has to be done during the period of the present proposal. It will, however, build on the successful work of the past 5 years.

Given the significant challenges, the upgrade program has focused on the most difficult areas of the upgrade. These include:

- An entirely new tracker made of more radiation resistant pixel and strip detectors with much less mass in support, cooling and cabling systems, together with lower power consumption per channel.
- New electronics for both the Liquid Argon and the Scintillating Tile ATLAS calorimeters with much improved radiation hardness. An additional goal is to allow examination of the full calorimeter information for newer and more restrictive triggers. Work toward early improvements in the Level 1 trigger using new boards has also begun.
- A new track trigger to allow rapid identification of tracks prior to a level 2 trigger. This will improve triggering, and the rapid identification of *b*-jets, isolated leptons and tau decays.
- Development of newer and better muon electronics for upgrades to the forward muon system in the 2016 shutdown.

University Participation	University Participation in Upgrade R&D				
Institution	Areas of Interest				
Arizona	Forward Calorimetry and Muons				
Boston University*	Trigger DAQ				
Brandeis*	Muon System				
Chicago*	Calorimeter and Track Trigger				
Columbia*	LAr Electronics				
Duke	Strip Tracker				
Hawaii	Novel Pixel Detectors				
Indiana	Trigger DAQ				
Michigan State Univ.*	Level 1 Calorimeter Trigger Improvements				
New Mexico	New Inner Tracker				
NIU	Simulations for Tracker and Track Trigger				
NYU*	Strip Tracker				
Ohio State	Diamond Detectors and Optical Readout				
Oklahoma State	Pixel Detector				
Penn	Electronics for New Tracker and LAr				
SMU*	Data Transmission Electronics				
SUNY Stony Brook	Pixel and Strip Tracker				
UC Berkeley	Pixel Electronics				
UC Irvine*	Trigger DAQ				
UC Santa Cruz*	Pixel and Strip Tracker				
Univ. of Oklahoma	Pixel Tracker				
Washington	Pixel Tracker				
Yale	Mechanics and Powering for New Tracker				

Table 2. University participation in Upgrade R&D. Asterisks indicate proposed support from the NSF.

4.4 Education and Outreach

This program of education and outreach by U.S. ATLAS is now in its 14th year. These past and forthcoming periods provide an unparalleled opportunity to share the excitement of new physics with a national audience. The past year saw the start-up at 7 TeV and the first results from the ATLAS experiment. We must share with our stakeholders the excitement and fascination our research generates. We also participate in educating the next generation of scientific leaders by involving students of many levels in our research. Collectively this provides unique goodwill in many communities.

The members of U.S. ATLAS have taken part in hundreds of widely varying activities as reflected in a survey of these members conducted in October 2010. Table 3 shows the breadth of these activities. Since only a fraction of active members responded, the percentages are approximate. The "other" category includes adopt-a-physicist participation, blogging, ATLAS-made interviews videos, Masterclass programs, newsletters, exhibits, podcasts, and various other activities with students. Table 3 does not reflect the activities conducted by the American leadership of global ATLAS Education and Outreach, which is described further below.

Type of activity	percent
Lecture	29%
Magazine article	14%
Other interview	7%
TV interview	6%
Radio interview	4%
Science cafe	5%
Tours at ATLAS	>5%
QuarkNet etc.	>4%
Open house	3%
Webcast	2%
Op-ed article	1%
Other	16%

Table 3. Outreach Activities. This is the result of a poll conducted in U.S. ATLAS. We know that not all outreach activities are represented in these numbers.

At the signing of the LHC agreement, Dr. Neal Lane, then Director of the National Science Foundation said: "Major discoveries like the top quark and antimatter make headlines on the front pages of the world's major newspapers. Whether readers fully appreciate the significance of these breakthroughs is another matter altogether. That is why this agreement places such a high priority on public education and outreach. Each of the U.S. detectors has named an education coordinator to its senior program management teams. You'll also see that the integration of research and education stands out as a primary objective and responsibility within the overall U.S. investment strategy."

This directive has been fully carried out in the ensuing years. The global ATLAS education and outreach programs have had U.S. leadership for the past 14 years. In the activities described below, many U.S. ATLAS people have been involved.

One of the earliest projects was the production of the "ATLAS Movie", which won gold medals at four international film festivals. It was followed by the production of two popular animated features that described the construction of ATLAS and how the detector works. At this time, ATLAS has produced 32 videos. All are on the ATLAS website,²³ as well as on the ATLAS YouTube site, where they have had 600,000 viewings (one has 125,000 viewings, and many have the highest possible rating). The LHC Rap video (produced by an American employee of ATLAS) became a "viral" hit and has had 6 million viewings.

More recently, people within U.S. ATLAS have taken the lead in producing exciting animated versions of actual events recorded by ATLAS. Another popular feature was a movie of interviews with people in ATLAS (many U.S. ATLAS people). To give a perspective of the enormous task of constructing ATLAS, a time-lapse video was made in which ATLAS is built in 1 minute (with 3 and 5-minute versions too).

ATLAS maintains a public website (based at LBNL) that has received 13 million page views in the past years, with over 3 million expected this year. These pages are updated daily with news, videos, photos, live and special event images, resources, products, and links to everything for students and the public. The site has a news ticker with top stories from within ATLAS, as well as top stories about ATLAS from the news media. U.S. ATLAS people are prominent in writing the internal news stories about developments in ATLAS.

The website contains an extensive and well-organized collection of photographs of the detector, control room, people, and occasions. The majority of these photos were taken by U.S. personnel. Also on the website is the ATLAS Control Room blog, which has several U.S. ATLAS personnel amongst the bloggers. The Twitter site gives headlines from the blog site.

U.S. ATLAS education and outreach leadership as well as many others have been proactive in communicating with local newspapers as well as the New York Times, television, radio, PBS, science magazines, news magazines, etc. These interactions have led to many major stories that have reflected well on the U.S. ATLAS program. Even the production of a huge mural directly above the ATLAS cavern received substantial and favourable coverage (including from arts publications). U.S. ATLAS outreach leadership led the media training for the start-up events, and also led planning for media contingency in the case of problems due to ATLAS.

A major goal of ATLAS has been the development of programs that allow high school students to analyze actual data from collisions in ATLAS. These programs proceed to two variations:

- a) Teachers are trained by physicist mentors, and then students analyze data in their classrooms.
- b) Students attend "masterclasses" at ATLAS institutions, where physicists guide them through hands-on activities with these real data.

In the first case, the primary example of this is QuarkNet, which was founded by U.S. ATLAS and U.S. CMS in response to the directive from then NSF Director Lane. In the second case, the initiative was greatly enhanced by a major grant from the EU Commission that helped develop the computer programs that students use in analyzing data.

U.S. ATLAS has led the production of many educational products and materials for students and the public. These have included:

a) Various brochures: general, technology transfer, computing, fact sheets, technical, etc.

- b) A 24-page Booklet on Antimatter and Other Mysteries of the ATLAS Experiment
- c) A 3D Viewer with slides of the detector and actual events
- d) A very new brochure on the physics of ATLAS
- e) A Pop-up book about ATLAS detector and physics, now in second printing, on sale on Amazon (etc.) plus many bookstores. It is an extremely popular item.
- f) A full-color photo book documenting the ATLAS Experiment.

In connection with the launch of the pop-up book, a major event was held at the New York Academy of Sciences earlier this year. It had a standing-room only audience of 330 people, plus a number of reporters including Dennis Overbye from the New York Times. The actor Alan Alda was the moderator, and the speakers included Lisa Randall and Michael Tuts. Book signing followed.

The release of a major Hollywood feature film (*Angels & Demons*) with a five-minute segment filmed in ATLAS provided an extraordinary opportunity for ATLAS outreach to the public. U.S. ATLAS personnel travelled to Sony Pictures in Los Angeles on two occasions to meet with high-level personnel in order to maximize the communications opportunities. One result of this was that the DVD release of *Angels & Demons* includes a 15-minute featurette (extra) about CERN and ATLAS. U.S. ATLAS guided the content of this featurette. Many U.S. ATLAS personnel took part in a special nationwide lecture series that drew in very large audiences. These lectures connected the physics of *Angels & Demons* with the physics of LHC. Many other later lectures were initiated by this process.

Many more activities have occurred than there is space to describe. A few of them are:

- 1. Exhibitions and special events at CERN and elsewhere.
- 2. A very well-attended session at a meeting of science centers.
- 3. LHC startup events including ATLAS achieved national and worldwide attention.
- 4. New ATLAS visitor center adjoining the ATLAS Control Room.
- 5. Large U.S. ATLAS participation in an extensive program of tours of ATLAS.

5 Proposed Research for 2012-2016

5.1 Maintenance and Operations

During 2012-2016 the LHC will operate at increasing luminosity and energy but will be shut down for two 15-month periods. During times of beam operations the detector must be maintained with relatively short access periods when broken electronics modules can be swapped, etc. The longer shutdowns will allow more extensive repairs and upgrades to be undertaken. The first shutdown starts in 2012 when the bus bar splices between the LHC magnets will be reworked, and the second is scheduled for 2016. Planning for these long shutdowns when the detector will be opened allowing extensive repairs is the major focus of the M&O component of this proposal.

An update of the LHC running schedule will be made at the Chamonix LHC Workshop in early January 2011. Of note at this writing (December 2010) is a dialog between managements of CERN and the LHC experiments concerning the continued operation of the LHC during 2012. This run plan would enable significantly more data to be accumulated during the first running period of the LHC but would delay the 2012 shutdown, thereby delaying accelerator and detector improvements by one year and perhaps delaying the second shutdown until 2017.

5.1.1 Inner Detector

A considerable amount of work is planned for the Silicon Tracker during the year-plus shutdown starting in 2012. We seek NSF funding to support UCSC personnel to contribute to the overall operation of the Si-tracker and in the short-term to develop a solution to the VCSEL lifetime problem, see Table 4.

The cooling plant will be refurbished with new compressors of a more reliable design. These new compressors are now being extensively tested in the surface building under real operating conditions to prove their reliability. Another change being considered is to move the compressor plant to the surface instead of having it housed in an underground service cavern as it is now. This would allow gravity to increase the pressure of the compressed fluid cycle thereby lowering the operating temperature of the detector cooling loops. This would be very desirable as the detector undergoes more radiation damage. A decision on this change of location will be made early in 2011.

Once the Inner Detector end plate is opened, an investigation will be made to better locate the leaks inside the detector, in particular the one in the disabled SCT cooling loop. They will be repaired if this can be done without further intervention than is already planned. Given past involvement with the commissioning and repairs to the cooling system, some U.S. technical support will be expected for this work.

The VCSELs devices located in the service cavern USA15 are being replaced as needed with very little effect on operational uptime, however, there is great concern that the Pixel on-detector VCSELs may also start to fail when their on-time starts to approach that of the clock/trigger/command transmitters. Replacement of these devices will require a major intervention of the Pixel detector. A large effort is underway to understand the failure cause and correct it. Also, a parallel effort is preparing for a possible intervention to replace the Pixel on-detector VCSELs during the 2012 long shutdown if this should prove to be necessary. U.S. institutions, including UCSC (NSF) and OSU (DOE), are actively involved in performing lifetime tests of the VCSELs of the type on detector as well as tests to determine the cause of the off-detector failures. If a full intervention of the Pixel detector VCSELs has been found, they will be all replaced with new units that correct the problem. This could be a new, more robust technology, new packaging or new electrical support, whatever is required to achieve the industry expected >100,000 hours lifetime.

The current LHC schedule for spring 2013 through late 2015 plans for proton collisions at the target center of mass energy of 14 TeV. That will be 27 months of operation with only two 2-month shutdowns around the intervening winter holidays, a long haul that will certainly test the robustness of the LHC and the detectors. Our goal is to maximize the uptime of the Silicon Tracker. Given that most of the U.S. responsibilities are inside the detector, which cannot be opened, only small amounts of technical support are anticipated during this period to handle system electronics issues as they arise, for example, fractional FTE EE and technician support from UCSC. Most of the operational responsibilities will fall to physicists and graduate students resident at CERN.

At the end of 2015, another long shutdown is anticipated lasting through all of 2016. The focus of this shutdown for the Silicon Tracker will be the installation and commissioning of the IBL. The U.S. University responsibilities for this project are already covered by an NSF-MRI grant and will not be discussed further here. Other maintenance work may be scheduled for this period based upon issues

arising during the long three year run but no specific plans exist at this time (to be supported by the DOE Operations Program).

	FY12	FY13	FY14	FY15	FY16
Silicon M&O					
EE (FTEs)	0.08	0.08	0.08	0.08	0.08
Tech (FTEs)	0.67	0.67	0.67	0.67	0.67
Total Costs (Labor and Material)	137.54	141.67	145.92	150.30	154.81

Table 4. Requested NSF Operations Silicon M&O labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support UCSC.

5.1.2 Liquid Argon Calorimeter

The U.S. universities involved in the M&O of the LAr system requesting NSF funds are Columbia Nevis, SMU and Stony Brook, see

Table 5. These institutes are essential for maintaining the efficient operation of the LAr system. In particular, Stony Brook is responsible for the HV system, SMU for the optical couplers (OTx) that are used in the transmission of data from the pit to the off-detector RoDs, and Columbia for the testing and operating of the LVPS as well as supplying expertise for the OTx replacements.

The delivery of the new LVPS units will start in 2011. These will undergo extensive performance, radiation and lifetime testing. They will be installed on the detector during the 15 months shutdown scheduled to start in 2012. The period of commissioning will extend through a large fraction of 2013. In addition to modified slow control boards that will be installed at the same time, a major modification of the control and monitoring software and various on-line display panels will be needed.

The production of the redundant OTx units is contingent on the ATLAS Collaboration endorsement. If the go-ahead is given the replacement would take place during the 2012 shutdown and would require installation of additional optical fibers. The corresponding commissioning stage would extend through 2013.

The projected increase of the LHC currents and collision luminosity is likely to necessitate major TDAQ, on-line monitoring and control changes in order to run smoothly during 2012-2016. These monitoring and control changes, together with projected reduction of the on-line shift personnel will require a new layer of the on-line software and the integration of the data acquisition system of LAr and Tile calorimeters.

As recently discussed by Stony Brook personnel at the ATLAS DCS Workshop (June 14-16 2010), a new OLE for Process Control (OPC) technology is now available. Called the OPC Unified Architecture (OPC-UA), it is virtually platform-independent. We have started an internal discussion focused on this approach. The new technology allows us to migrate the HV system to a Linux platform, thereby improving the operational stability of the HV control servers.

The ISEG OPC server has proven to be the weakest link in the LAr HV control software and requires a significant overhaul. Based on Microsoft Windows proprietary technology and developed by the HV PS manufacturer Iseg, it is still not 100% reliable. We have already received a proposal for the development of an OPC-UA server from Iseg, where the bugs that affect the current release would be fixed by a fully re-written code. If the decision to migrate towards the OPC-UA architecture is taken, an intense test phase will start to debug the new OPC server and test the control software, which will be unchanged, operating in a Linux environment. The PVSS SCADA development tool for Linux exists and all the control scripts are interpreted, so no compilation problems are expected.

The first test phase of the Linux OPC-UA in a test machine is foreseen for late 2011 and the successive migration of the whole HV system is foreseen in 2012, at the end of the first LHC physics run.

During the planned 15-month 2012 shut-down, repair of accumulated faults will be required, and this may involve also repair and changes to the on-detector components of the LAr HV system. Depending on operational experience and expectations for running in 2013 and beyond, we may decide to change resistor components in the HV filters to reduce voltage drop in the filters. We will probably want to overhaul the HV PS modules as well, and we expect a prototype higher-current HV PS module from Iseg sometime in early 2011 for testing.

	FY12	FY13	FY14	FY15	FY16
LAr M&O EE (FTEs) Tech (FTEs)	2.00 0.20	2.00 0.20	2.00 0.20	2.00 0.20	2.00 0.20
Total Costs (Labor and Material)	390.39	402.11	414.17	426.59	439.39

Table 5. Requested NSF Operations LAr M&O labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support SMU, Stony Brook, and Columbia Nevis.

5.1.3 Scintillating Tile Calorimeter (TileCal)

The University of Chicago, NIU and MSU are the NSF institutes of the TileCal system, see Table 6 for the request. Personnel from the University of Chicago propose to continue the maintenance and monitoring work on the front-end electronics they constructed as well as to continue to operate the calibration and test facility. NIU will contribute to the online and offline data quality assessment and MSU will be responsible for the Drawer (which contain PMT and frontend electronics) maintenance.

The need for M&O activity is especially strong when the detector is open and the hardware is accessible. This occurs in December through February each year. The work involves replacing faulty components and bringing the system back into operation. Since the time is limited the pace is intense and requires at least 2 shifts per day. Outside these periods, effort is needed to repair the components removed, to maintain and operate the test facility in Building 175 as well as to perform calibrations and to further refine the calibration systems.

During 2012 shutdown the Tile Calorimeter plans to replace all 256 low voltage power supplies as well as to repair any other faults in the system. A similar shutdown is planned in 2016 when the crack and gap scintillators located between the barrel and endcap calorimeters should be replaced. These scintillators provide valuable information but are subject to radiation damage. By 2016 they are expected to need replacement. Some of the labor costs for this work are included in the totals below.

Another element of on-going work is maintaining and updating the analysis software associated with the calorimeter. New capabilities must be added and speed bottlenecks removed. We plan $\frac{1}{2}$ FTE for this work on a continuing basis.

	FY12	FY13	FY14	FY15	FY16
Tile M&O					
EE (FTEs)	0.10	0.10	0.10	0.10	0.10
Computer Professional (FTEs)	0.50	0.50	0.50	0.50	0.50
Tech (FTEs)	3.00	3.00	3.00	3.00	3.00
Total Costs (Labor and Material)	392.90	404.69	416.83	429.33	442.21

Table 6. Requested NSF Operations Tile M&O labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support Chicago, MSU, and NIU.

5.1.4 Muon Spectrometer

Boston, Brandeis, the University of Michigan and UCI groups proposes to the NSF to continue providing computer professional, technical and engineering personnel to maintain and operate the muon system, see Table 7. Boston and Michigan will concentrate on the M&O of the MDT chamber system, Brandeis on the endcap alignment system and UCI to maintain and operate the off-chamber data acquisition of the CSC tracking chambers.

During FY12 efforts will concentrate on the commissioning of the EE-chambers in the cavern following their certification in Building 191 during 2011 and installation in 2012. Twelve of the 62 EE chambers have been installed in ATLAS in 2009. The remaining 50 chambers are now stored in Building 191 at CERN. Michigan, Boston, Brandeis, Harvard (DOE supported), et al. will contribute to the EE commissioning in Building 191 for readout electronics and gas tests. Michigan faculty and staff are the key personnel for the EE chamber commissioning. The UM, Harvard. Boston and Brandeis students will also make contributions to the tasks.

Planning is underway to replace the current Small-Wheel chambers with new chambers that could handle much higher rate at luminosities beyond 10^{34} cm⁻²s⁻¹. At the moment, the technical choice of the new Small-Wheel detectors has not been determined. The UM group is expected to be part of the working team to test the new detectors and to implement the online configuration DB for DAQ with new detectors.

The Michigan group will continue monitoring MDT readout performance as the LHC luminosity increases. One major task is to monitor the MDT noise and beam background. In case the single tube rate exceeds 50 kHz, the Amplifier Shaper Discriminator (ASD) threshold must be raised in the readout chain to minimize MDT readout inefficiencies. In addition, the DCS quantities must be monitored continuously

and the corresponding monitoring data needs to be added to the conditions database (voltages and temperatures of ~18,000 frontend electronic cards & power supplies; ~13,000 on-chamber temperature sensors; ~2,000 Hall probes and many gas parameters).

Michigan electronics personnel will monitor the front-end board failure rates and establish a repair or replacement program for faulty boards. Some boards have already been exchanged during commissioning and can serve to define future repair options. About half of the CSM boards removed have been found to function fully and will be returned to the spares pool. Our spares count of ~5% is likely to be adequate for the possible upcoming ~2 year run. Depending on the survival rate for front-end cards, we may or may not need to supplement our spares.

The gas monitor operation relies on the combined efforts of the Michigan group working in collaboration with an Israeli group. Routine tasks are daily system checks, internal calibrations, computer and analysis software upgrades, specialized data analysis, routine maintenance and shutdowns, maintenance of network and communications channels, repairs of instrumentation faults and instrumentation upgrades. This work is ongoing and essential to maintain smooth operation.

Precise MDT calibrations are crucial for identifying muons that decay from high mass objects. The major challenges are to develop methods to handle the MDT drift spectra with pileup events, develop new techniques to reject cosmic ray and beam halo contaminations in special Level 2 calibration streams and carefully monitor the T0 "jumps" from run to run and to make the corresponding corrections in the calibration DB. The goal is to provide precise calibration constants and validate these constants promptly for muon reconstruction used in physics analyses. These tasks will be mainly carried out by scientific staff at the Michigan Calibration Center.

Brandeis University proposes to maintain and operate the endcap global alignment system (EGAS). The EGAS is composed of many interlinking optical alignment lines readout by precision sensors.

Throughout 2012-2016, UCI will maintain and operate the CSC off-detector electronics and data acquisition systems, for which it holds primary responsibility. UCI will also play an important role with collaborating institutions in day-to-day CSC operations and data quality checking during data-taking periods and in hardware maintenance and software updates during shutdowns. Maintenance and operation of the CSC off-detector electronics and data acquisition system will include activities such as: routine replacement and repair of failed hardware; updates to data acquisition code to satisfy newly identified functionality requirements, to improve operational efficiency, and to maintain compatibility with ATLAS global data acquisition code; and maintenance of test beds for off-detector electronics and for chambers.

Day-to-day support of CSC operations during data-taking will include providing on-call expertise, support for calibration runs, data quality checking, performance assessment using recorded collision data, and resolution of problems identified. During shutdowns, UCI will provide support for chamber repairs and checkout and will contribute to other system maintenance activities. 2012 shutdown activities will include removal and repair of two chambers with broken wires and repair or replacement of faulty on-chamber electronics boards. (The BNL group has primary responsibility for the chamber repair and maintenance activities.) UCI personnel involved in these activities at all times will be faculty, technical staff, two postdocs, and one to two graduate students.

	FY12	FY13	FY14	FY15	FY16
Muon M&O					
ME (FTEs)	0.50	0.50	0.50	0.50	0.50
EE (FTEs)	0.75	0.75	0.75	0.75	0.75
Techs (FTEs)	4.00	3.00	3.00	3.00	3.00
Computer Professional (FTEs)	2.00	2.00	2.00	2.00	2.00
Total Costs (Labor and Material)	778.76	740.33	762.54	785.42	808.98

Table 7. Requested Muon Operations Muon M&O labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support Boston, Michigan, UCI and Brandeis.

5.1.5 Trigger and Data Acquisition System (TDAQ)

The TDAQ institutes are UCI and MSU. With this NSF CA funding they propose to continue their support for on-going operation, both during beam time and the planned shutdowns, see Table 8. As in the past, they will participate in the commissioning of new HLT hardware. Currently only 50% of the final HLT CPU capacity is installed (20% of the event filter). It is expected to be finalized over the next years as computing power is required, especially with the upgrade to design energy of 14 TeV and the ever-increasing luminosity. In addition there is a replacement cycle of the existing hardware.

Members of the MSU group will continue the data quality monitoring (DQMF) efforts. The tasks of this on-call expert are to maintain the reliability of the DQMF and continue its development as the ATLAS experiment records data with triggers and signatures that increase in complexity over time. Besides the database work, this also involves communication with all of the trigger signature groups to stay up-to-date on proposed configurations and to implement database updates corresponding to trigger changes. MSU staff will continue working on the HLT, dataflow and trigger development and monitoring, and as cosmic signature group convener as well as trigger on-call expert.

In the DAQ/HLT area both UCI and MSU are planning to contribute to evolutionary improvements of the current dataflow and HLT system. Initial discussions on this have started inside the TDAQ subsystem to follow the increased demands on the trigger system as the luminosity increases. The new design takes advantage of the large common code base which is already shared by the Level 2 and Event Filter software and proposes to merge the two systems into a single one. An additional advantage will be the reduction in the overall number of dataflow applications compared to the current system (by a factor of two) and the consequent simplification of the overall architecture. Additional flexibility in the trigger strategy will be gained by removing the strict boundary between RoI-based algorithms and those operating on a full event.

The new architecture requires modifications in many areas of the dataflow, HLT and trigger steering and menu as well as the network setup. In all these areas, members of UCI and MSU hold key developer positions. The timescale for the deployment of such a system would be after the 2012 shutdown when a large increase in luminosity is anticipated.

The overall TDAQ software will have to adapt to the existence of machines with many more CPU cores than in the past. Though already multi-threaded in nature, the current system does not take advantage of more than a few cores, let alone the parallelism available in upcoming vector operations for standard

	FY12	FY13	FY14	FY15	FY16
TDAQ M&O Computer Professional (FTEs)	5.85	5.85	5.85	5.85	5.85
Total Costs (Labor and Material)	655.45	675.11	695.36	716.22	737.71

Intel chips, or GPGPUs. It is expected that modifications will be necessary in all parts of the software, including the infrastructure for monitoring and run control.

Table 8. Requested NSF Operations TDAQ M&O labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support MSU and UCI.

5.1.6 Technical Coordination

Brandeis University (NSF) proposes to continue working with BNL (DOE) on technical coordination issues, see Table 9. The TC activity will concentrate on the technical aspects of installing, integrating and aligning the muon EE chambers. It is expected that all 50 of these chambers will be installed and integrated during the 2012-2013 shutdown. Thereafter, TC work will be devoted to the technical aspects of installing the IBL.

A major improvement to the ATLAS pixel system is the addition of the IBL to increase tracking robustness and precision. To achieve this objective a 7.4 meter section of the existing beam pipe has to be removed and a new beam pipe containing the additional pixel layer has to be inserted. This requires a special tool, called the Long Guiding Tube (LGT), to be inserted into the beam pipe to support it during the removal process. The same tool will be used to insert the new beam pipe with the additional pixels.

Beam pipe extraction consists of opening the Inner Detector ends, removing the external beam pipe sections, and freeing the beam pipe from services. Then the LGT is inserted into the beam pipe and supported at both ends. With the LGT in place, the beam pipe can be disconnected from its present support and the full mechanical load taken. The main problem is deflection (gravity sag) of the beam pipe in the pixel detector region during the extraction and reinsertion. Deflection of even a few millimeters can damage the existing pixel detector. The LGT Tube cannot be a simple object, as that will not achieve the required sag control. A complex tool (active and pretensioned) is required to insure that as the beam pipe is extracted and the load on the LGT changes, a control system changes the tensions rods to adjust to the new load configuration without the LGT changing its shape. An additional requirement is that this activity be controlled remotely to reduce human radiation exposure from the activated beam pipe.

Because of the Brandeis expertise with active alignment bars, they were asked by ATLAS TC to design this tool. This includes the mechanical design of the LGT, the instrumentation to monitor the shape of the tube and the tension in the tensions rods and a remote control system that will control the operations of the tube and the extraction of the beam pipe.

At this writing, Brandeis has a design and has built a 6 meter prototype. The prototype will enable development of the LGT concept including the internal instrumentation to determine shape, ancillary instrumentation for monitoring performance and the writing of the necessary control program. When this is complete (expected around January 2011) Brandeis will build a 7.4 meter prototype to be shipped to

CERN where a full sized mock-up of the relevant parts of the Inner Detector are being built to practice IBL installation and establish pixel safety procedures.

Other activities of the Brandeis group have been the continued work on the integration of the EE chambers into the ATLAS detector. Several issues have been studied including installation clearances, placement of services, and the ability to access chambers once installed.

	FY12	FY13	FY14	FY15	FY16
TC M&O ME (FTEs) Tech (FTEs)	0.50 0.75	0.50 0.75	0.50 0.75	0.50 0.75	0.50 0.75
Total Costs (Labor and Material)	154.63	159.26	164.04	168.96	174.03

Table 9. Requested NSF Operations TC M&O labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support Brandeis.

5.1.7 Common Funds

Other items that are covered in the M&O component include the so-called "common costs". This component is based on the full cost of running the ATLAS detector (consumables, some personnel, etc). The costs are agreed to by an international CERN group called the Resource Review Board (RRB) that has representation by all ATLAS funding agencies. These common costs proposed by the ATLAS collaboration are carefully scrutinized by a subcommittee of the RRB, the Scrutiny Group (which has a U.S. representative).

The common costs are divided into two categories, "A" and "B". The sum is the total operating cost for ATLAS (determined in CHF). The category A costs include items shared by the whole collaboration including TDAQ while the category B costs are specific to the various systems: Inner Detector, Liquid Argon Calorimeter, TileCal and the Muon Spectrometer. The share to be paid by the U.S. is apportioned according to the fraction of PhD authors for any given country. The NSF CA share requested in this proposal proportional to the number of Ph.D. authors supported by the NSF base research program is about \$3.9M over this period with the balance being provided by the DOE component of the Operations Program.

5.2 **Physics Support and Computing**

In Sections 4.2.1-4.2.3 we described the physics analysis support and computing program that we have developed over the last four years. Motivated by the success of this program in building U.S. software professional expertise through which we leverage the detector performance and physics analysis knowledge of U.S. physicists, we propose to extend these parts of the program essentially intact for the period of this proposal. The program has had a positive impact on the overall U.S. ATLAS program goal of enabling U.S. leadership in ATLAS physics analysis and improving the ATLAS software in areas of importance to the US. We revisit some highlights of this in Sections 5.2.1-5.2.2 below, together with comments on the proposed continuation and the anticipated activities over the next five years.

In Sections 4.2.4-4.2.5 we have described the computing infrastructure and Tier 2 computing centers built over the last four years that have made the U.S. the foremost regional computing provider in ATLAS, both for production and analysis. We propose to continue the program that has built this success, following closely the architecture currently in place but making some changes to leverage new opportunities and prepare ourselves for the data onslaught that the LHC will deliver through 2016. Sections 5.2.3 and 5.2.4 describe these plans, on the foundation of the detailed description of the present distributed facility found in the earlier sections.

5.2.1 Physics Analysis Support

As described in Section 4.2.1, there are three primary components of our physics analysis support program: the U.S. analysis forums; the three Analysis Support Centers; the Physics Analysis Jamboree program supported by the ASCs, our technical staff, as well as U.S. ATLAS scientists; and a program in analysis tool software development. Support for these activities presently comes from a mix of DOE and NSF sources. Support for the analysis tools work at Indiana (Physics Analysis Workbook) will come from DOE for 2012 and beyond. In a survey of U.S. ATLAS institutes on analysis support needs in January 2010, improving documentation was the foremost concern of the community, and this need will only grow in the future as analysis activity continues to ramp up. We also propose to transfer the NYU work to the NSF, see Table 10, 1/2 FTE on physics analysis tools and specifically on developing the highly successful D3PD infrastructure, and supporting its use and other analysis chain components on U.S. Tier 3s. Presently this effort is supported by DOE funds. The great success of D3PD standardization is something we must continue and build on, and we foresee a continuous program through 2016 in supporting end-user analysis tools, with as much standardization across ATLAS as possible.

	FY12	FY13	FY14	FY15	FY16
Analysis Support Computer Professional (FTEs)	0.50	0.50	0.50	0.50	0.50
Total Costs (Labor and Material)	55.16	56.82	58.52	60.28	62.09

Table 10. Requested NSF Operations Analysis Support labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support NYU.

5.2.2 Developing and Maintaining ATLAS Core Software

As described in Section 4.2.2, the U.S. program in ATLAS core software has a long record of success in its core elements of control framework, data management and distributed software. With most of the effort lab-based, the NSF contribution has been relatively small, but unique and valuable. We use university-based activity to leverage specific university-based expertise in core software. There are presently two such cases, both supported by NSF, see Table 11. The Pittsburgh work (1 FTE) on detector geometrical description and related areas such as geometry database and detector/event visualization has delivered the ATLAS standard systems in this area, a great success given the area's previous instability. Continuing this program, building on the deep ATLAS knowledge accrued by the Pittsburgh group in these areas over the last four years, will have a very high return. Similarly for the PanDA effort supported

at UTA. This work draws on the central role of UTA (1.42 FTEs) not only in the leadership and development of PanDA but also in U.S. and ATLAS-wide leadership in computing operations, which informs their PanDA effort with the rapidly evolving real-world needs of day-to-day ATLAS production and analysis. ATLAS computing practice and policy has been dynamic enough in the first year of data-taking that it is clear this close development/operations connection is vital and will remain so.

The support for university based software professionals working on detector software, described in Section 4.2.3, has enabled U.S. ATLAS physicists to leverage the detector expertise housed in U.S. universities (which often built the hardware) towards major contributions to the detector software upon which their physics analyses depend. The software professionals, all with a physics background, also constitute a resource for direct assistance with the detector software specifically and the ATLAS software generally. The program has been popular both with the U.S. ATLAS physics community and with the developers themselves; the corps of developers hired initially is still in place, and they have the deep expertise and prominent ATLAS roles to show for it. The specific roles of these developers has evolved over the four years, and will continue to do so; we anticipate that they or their eventual successors will be just as valuable in the coming years as at present, so we propose to extend the NSF support for 1.0 FTE in this area (U Mass Amherst) through 2016.

	FY12	FY13	FY14	FY15	FY16
Software Computer Professional (FTEs)	3.42	3.42	3.42	3.42	3.42
Total Costs (Labor and Material)	494.58	509.42	524.70	540.45	556.66

Table 11. Requested NSF Operations Software labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support Pittsburgh, UTA and UMass.

5.2.3 Computing Infrastructure in ATLAS: Computing and Networking Challenges

With the distributed computing systems and service of ATLAS and U.S. ATLAS now established and successful, the focus of the next five years will be on operational support as the scale of operations increases dramatically with integrated luminosity and analysis activity. Within this operations focus, essential development activities will be important as well to ensure the scalability of our software systems tracks what is required as ATLAS computing needs grow. Here we describe these operations-oriented activities at the two facilities where it is supported by the NSF, MWT2 (U Chicago) and SWT2 (UTA).

Computing Facility Integration

The Computing Facility Integration Program was organized in 2007 to integrate into a single distributed computing facility all components of the U.S. ATLAS computing "cloud", i.e. the resource as it appears to its users and operators. This includes coordination of facility upgrades, deployments of grid and ATLAS services, and site-level operations at each of the computing centers in U.S. ATLAS including Tier

1, Tier 2s and increasingly Tier 3s. Each quarter year a set of tasks is defined such as upgrades or fresh deployments of OSG software, local ATLAS services including releases, web caches, data management services, and benchmarks of analysis and/or network throughput performance. Coordination of purchases of computing equipment (CPU and storage) is made so that ATLAS requirements are met and pledges are satisfied.with leveraged pricing. The program organizes a forum for tight coordination with U.S. ATLAS computing operations, anticipating and responding quickly to functional or performance issues, and planning for periods of heavy processing loads. We propose to sustain the current level of support for this activity at a level of 0.4 FTE, see Table 12.

	FY12	FY13	FY14	FY15	FY16
Facilities Integration Management (FTEs)	0.40	0.40	0.40	0.40	0.40
Total Costs (Labor and Material)	123.81	127.52	131.35	135.29	139.35

Table 12. Requested NSF Operations Facilities Integration labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support University of Chicago.

Facilities Grid Storage and Data Management

This area covers development and support of utilities for efficient Tier 2 data management and access. Examples are tools to validate consistency between datasets stored at the Tier 2, the local file catalog, the storage system name server, and filenames on disk. A local caching framework, *pcache*, was developed at MWT2 to allow re-use of files on worker nodes by subsequent jobs which reduced load on the storage services by as much as 40%. Pcache has been adopted by several sites in the U.S., UK and CERN. Performance optimization for access to local storage for analysis jobs depends on efficient access to data, either from local disk or from network attached storage, and therefore this has been a major focus of activity. An important current and future activity is on extending the xrootd storage system to support distributed access to Tier 2 storage systems, also with great potential as a means of sharing data among Tier 3s in a manageable and scalable way. We propose to sustain support for this activity at a level of 1 FTE, see Table 13.

	FY12	FY13	FY14	FY15	FY16
Grid Storage Development Computing Professional (FTEs)	1.00	1.00	1.00	1.00	1.00
Total Costs (Labor and Material)	174.45	179.69	185.08	190.63	196.35

Table 13. Requested NSF Operations Grid Storage Development labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support University of Chicago.

Computing Operations

When ATLAS readied itself for LHC operations a few years ago it established the ATLAS Distributed Computing (ADC) group which integrates operations and development responsibilities. The UTA group has a long history of leading Monte Carlo production, integration of facilities operations, and distributed analysis support, and has assumed leadership responsibilities in ADC. These efforts are tightly integrated with the PanDA software development effort at UTA, working in close partnership with BNL. We request ongoing support at the level of 3.6 FTEs at UTA for these cross-cutting activities. This will support two Deputy Computing Operations Coordinators (2 FTEs) in charge of resource management (storage and CPU) and Distributed Analysis coordination across all US facilities. Currently, over 14 PB of storage is deployed in the US, in Tier 1 and Tier 2 sites, containing tens of millions of files. Operational coordination of these resources is vital to the success of the physics program. The remaining 1.6 FTEs request at UTA supports Monte Carlo (MC) production, reprocessing, software validation, Tier 3 PanDA support, distributed analysis support and other critical operational tasks, see Table 14.

	FY12	FY13	FY14	FY15	FY16
Computing Operations Computer Professional (FTEs)	3.58	3.58	3.58	3.58	3.58
Total Costs (Labor and Material)	471.47	485.62	500.19	515.19	530.65

Table 14. Requested NSF Computing Operations labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support University of Texas, Arlington.

5.2.4 Tier 2 Computing Centers

The institutional makeup of the Tier 2s four years ago was decided through a rigorous review process in order to select the Tier 2 sites. The evaluation of the proposals was based on the delivery of effective computing capacity, consisting of the raw capacity which would be made available, the effectiveness with which the capacity was delivered, and other site benefits. In the last 5 months we have conducted an extensive cost/benefit review of the now well-established Tier 2 centers, in order to evaluate how we should proceed for the future. We also invited each of our Tier 2s to submit a proposal describing their plans should their Tier 2 continue for another five years, including what local resources their consortium members would contribute. In order to ensure an open process that welcomed potential new entrants into the Tier 2 program, we repeatedly used the U.S. ATLAS Institutional Board as the channel to invite U.S. institutes with potential interest to come forward.

All presently participating Tier 2s, and all their active consortium members, expressed strongly that they wish to continue to participate. The proposals received from all of them are strong expressions of intent to contribute through 2012-2016 as they have so successfully for the past four years. The consortium members also plan to continue making significant local contributions, as described below. The cost/benefit performance of the Tier 2s are broadly comparable, all are among the top performers among ATLAS

computing sites globally, and all have developed strengths and contributions well beyond the delivery of computing capacity, as described in Section 4.2.5. Accordingly we have decided to support the involvement of all existing Tier 2s in the 2012-2016 program, and we seek their continued support with this proposal.

The solicitation for new sites interested in participating yielded two expressions of interest that proceeded to proposals, and of those, one was selected for inclusion in this proposal, based on the strength of its potential contribution to the U.S. ATLAS Distributed Facility. The establishment of a new Tier 2 site depends of course on the outcome of this proposal and the funding level. The potential new site is a collaboration between The University of Illinois and its supercomputing center, NCSA. A condition on any new entrant was that they join an existing Tier 2 consortium, so as not to dilute our funding with the expense of establishing an autonomous new Tier 2 but instead leverage the expertise and resources of an existing Tier 2. Illinois/NCSA after in-depth discussion with a number of Tier 2s has arranged with MWT2 to develop an integration plan with them, outlined below.

As an outcome of the cost/benefit analysis we present here our current best understanding of how Tier 2 capacity will evolve in terms of CPU and disk over the 2012-2016 period, under defined funding assumptions, and what the cost will be to fund the capacity that we estimate will be required to support U.S. and ATLAS analysis out to 2016. ATLAS does not presently have official resource requirements estimates beyond 2012, so we have created estimates to 2016 based on present knowledge of LHC running schedule, luminosity, data volume, and processing requirements from simulation, reprocessing and analysis. The estimates include a 20% component dedicated to U.S. use, such that the community that built the very successful U.S. facility has some preferential access to it for physics analysis. These estimates are shown in Figure 4. Specifics of how these estimates were calculated, together with details on the U.S. ATLAS Tier 2 centers and their plans for 2012-2016, are found on a supplementary web page.²⁴

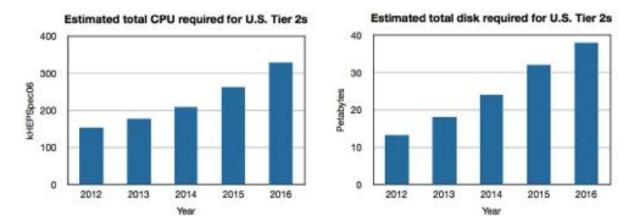


Figure 4. Estimated CPU and disk capacity required for U.S. Tier 2s 2012-2016, total across all five Tier 2s.

In translating funding level to delivered capacity we use the costs outlined in Table 15 to determine the impact of future equipment funds on computing and storage resource capacities. Both CPU (HepSpec06) and disk (TB) assume a 3-year "Moore's Law" doubling time (factor of 1.26 per year). That is, for a fixed cost the procured capacity increases by a factor of 1.26 every year. The cost estimates are based on typical Tier 2 hardware pricing in Fall 2010, e.g., storage includes "delivered useable" TB,

including a powerful server and 10 Gbps networking. We assume a 60/40 split in expenditures between CPU and storage, which gives the best match to the ATLAS requirements. We account for retiring of resources by assuming that resources (both CPU and disk) have a four-year lifetime; each year, the resources procured in the 5th year prior are removed from the capacity calculations. This is consistent with CERN/WLCG's use of a four-year life cycle as a standard.

In Table 15 we summarize for each Tier 2 the next five-year period showing the funding profile at each Tier 2 site and the corresponding delivered resources. The budget assumptions we use are \$600k base funding per Tier 2, as in the past; inflation of this by 1.5% in 2013-2016 to account for 3% inflation of the ~50% of Tier 2 budgets spent on salaries; plus an allocation of \$300k/year to Illinois/NCSA as a new member of MWT2. The year-by-year and integrated budgetary shortfall to reach our ATLAS required capacity across the Tier 2s is shown also. The line "Extra Disk Requested" represents the amount needed to satisfy the requirements which will be funded by NSF and DOE.

Here follows a short summary of how the four NSF supported Tier 2s see their development over the next five years. Common to all of them is great enthusiasm for continuing in the Tier 2 program, among the Tier 2 leadership, their staff and their host institutions.

At AGLT2, for the next five years both universities have committed to provide power, space, and cooling within the existing facility footprint at each site. The MSU networking costs will be covered by MSU for the next 5-year period. UM is presently examining whether these costs can continue to be covered by the university. It is probable that WAN connection will be covered by the university (\$30k/year). Together MSU and UM are providing 3.1 FTEs for Tier-2 related work which is not funded by the program. Their networking infrastructure provides the ability to quickly and easily expand network capacity if demand calls for it.

At MWT2, the expansion plans at UC for a new \$1.2M MWT2 computing room in the new physical science research center, paid by the university, have been described. Indiana has as much expansion space as we foresee requiring. While funding has been divided generally equally between UC and Indiana to date, in the next five-year period the split will be 70/30 between UC and IU to maximize resources, but flexibility in provisioning hardware will be retained in order to optimize local resource contributions. At UC, the university will continue to provide the equivalent 2/3 FTE support to complement the program funded systems administration effort. IU will contribute \$35k/year to local Tier 2 facilities and operations support. At Illinois/NCSA, MWT2 resources will come from a shared campus computing and storage resource, the Illinois Campus Cluster (ICC) with an ATLAS funded component. The facility will follow a "campus Grid" computing model supporting a number of research groups and therefore benefiting from an economy of scale resulting from shared common infrastructure and services (such as network services, file system/storage servers, and systems administration). In addition to dedicated ATLAS cycles, access to unused resources following an opportunistic access policy is envisioned. Over the 2012-2016 period we expect all raw CPU and storage resources to fit seamlessly behind common "head" services for job and data management, resulting in a single operational point of contact for job submission and data storage. The arrangement benefits already from the excellent, lowlatency and high bandwidth networks between the sites, as well as their physical proximity. Illinois/NCSA will provide the equivalent of 1/3 FTE core support for server and storage hardware, operation systems and any virtual machine hypervisor management, and storage file systems (currently GPFS is planned). In addition, 1/3 FTE of an NCSA staff member will support integration of the "ATLAS application" into the ICC environment including additional ATLAS-specific storage service endpoints and caches.

At NET2, the 2012 migration plans to move the facility to a large new computing center shared by Boston and Harvard.²⁵ Construction began in October 2010 on a large new high performance computing facility in Holyoke, MA to be shared by a consortium of Boston-area universities (BU, Harvard, MIT, Northeastern, UMass). When completed in 2012, the facility will be capable of powering and cooling 648 racks using hydroelectric and nuclear power. Besides being carbon-neutral, the new facility will reduce the electricity costs to the Universities by more than a factor of two. NET2 has had a major role in the planning for this facility. The bulk of NET2 computing will move to Holyoke starting late in 2012. In the mean time, there is plenty of power, space and cooling capacity to expand NET2 at their current sites.

Assurances have been received that moving the NET2 facilities to the new Holyoke green HPCC center will incur no costs seen by the program. BU and Harvard will each continue to provide ~1 FTE of support effort. The universities will continue to pay for all electrical costs, AC equipment maintenance and networking fees. In addition, BU has contributed a \$180k fund which can be used for NET2 infrastructure costs over the next few years. Harvard will continue to absorb all costs associated with NET2 resources located in the Odyssey cluster.

SWT2 has sufficient capacity for up to a factor of three increase in resources. No upgrades to computing rooms are therefore necessary for the next 5 years. The universities will continue to pay for all electrical costs and campus networking. In addition, commitments of additional local resources have been secured from both UTA and OU to support SWT2 personnel and equipment.

Cost Projections	FY11	PM12	1113	PY14	ms
S/HSBE (CPU power)	\$14.29	\$11.34	\$9.00	\$7.14	55.67
S/TB (uneable)	\$216.68	\$171.98	\$136.50	\$108.34	\$85.99
Ter-2	FT11	FTLL	FP11	FY14	FRIS
AGLT2	\$600,000	5609.000	\$618,135	\$627,407	\$636,838
Delivered H006	46,596	43,805	17,975	34,827	44,731
Delivered TB	2.711	3.021	3,224	3,365	4.368
Manpower Program 5	\$125,780	\$104,856	\$344,204	\$353,833	\$163,750
Manpower Program FTEs	1.90	1.90	1.90	1.90	1.50
University Contributed FTEs	3.10	3.10	3.10	5.10	3.10
Equipment Program 5	\$212,780	\$226,454	\$226,241	\$225,884	\$225,378
Infrastructure Program S	561,440	\$47,690	\$47,690	\$47,690	\$47,690
MWT2	\$900,000	\$913,500	\$927,205	\$941,111	\$955,227
Delivered HSD6	40.518	52,574	54.004	72,419	91,455
Delivered TB	2,760	2.504	5.403	7,379	9.285
Manpower Program 5	\$993,192	5404,869	5452,701	\$466,263	\$480,029
Manpower Program FTEs	1.77	1.77	2.02	2.02	2,02
University Contributed FTEs	1.70	1.70	1.70	1.70	1.70
Equipment Program 5	\$456,158	\$477,981	\$443,851	\$439,297	\$444,547
Infrastructure Program S	\$50,651	\$30,651	\$30,651	\$15,651	\$30,651
NIT2	\$600,000	5609,000	\$638,285	\$627,407	\$636,858
Delivered H326	46,011	43,875	43,798	\$2,259	61,825
Delivered 18	2,426	2,240	3,392	4,243	5,346
Manpower Program 5	\$327,540	\$117,366	\$347,487	\$157,911	5368,649
Manpower Program FTEs	1.50	1.50	1.50	1.50	1.50
University Contributed FTEs	1.60	1.60	1.60	1.60	1.60
Equipment Program 5	\$253,460	\$252,634	\$251,648	\$250,496	\$249,369
Infrastructure Program S	\$19,000	\$19,000	\$15,000	\$19,000	\$19,000
SWT2	\$600,000	\$609,000	\$616,135	5627,407	\$636,838
Delivered HS06	47,590	\$1,377	42.285	52,706	67,856
Delivered 18	3,000	3,727	4,123	5,213	4,715
Manpower Program 5	\$230,387	\$235,949	\$241,677	\$247,578	\$753,655
Manpower Program FTEs	1.75	1.75	1.75	1.75	1.75
University Contributed FTEs	0.75	0.75	0.75	0.75	0.75
Equipment Program 5	\$297,238	\$828,051	\$326,458	\$329,829	\$333,163
Infrastructure Program S	\$72,375	\$50,000	\$50,000	\$50,000	\$58,000
WT2 (DOE Funded)					
Delivered H306	22,493	26,064	31,046	40,738	\$2,832
Celivered TB	2,465	2,929	1,012	4,029	\$,225
ATLAS requirements HS06	153,000	177,000	208,000	262,000	329,000
ATLAS requirements TB	13,300	18,100	24,300	32,000	18,000
Tier-2 H306 Sum	203,308	217,495	209,058	252,949	\$29,727
Tier-2 TB Sum	13,361	15,422	29,254	24,252	30,938
Sergilus/Deficit HDD6	50,308	40,495	1,058	-9,051	778
Surgius/Deficit TB	61	-2,678	-2,368	-2,902	686
5 for HSD6 defut	50	50	50	\$64,653	50
S for 18 defuit	50	\$460,645	\$295,895	\$314,408	50
Baseline NSF Tier-J \$	\$2,700,000	\$2,740,500	\$2,781,608	\$2,825,552	\$2,865,682
Extra Disk Requested S	50	\$460,645	\$295,895	\$379,062	50

Table 15. Tier-2 summary of Operations Program labor, material and equipment costs. The shaded areas in pink represent the CPU and disk available for ATLAS each year. The shaded areas in yellow represents the surplus and/or deficit in CPU and disk for ATLAS.

5.3 Upgrade R&D

Upgrade R&D is aimed at detector improvements that will sustain ATLAS physics at much higher luminosities than given by the present design luminosity. This will require replacement of some of the detector elements, such as the tracking detectors and the forward muon system, and possibly the very forward calorimeter, where rates and radiation damage require major upgrades. To cope with higher rates the electronics for the calorimeters as well as much of the trigger system will need replacement, typically with very modern electronics and using a higher degree of integration. The various upgrade projects, to be enabled by NSF support over the next 5 years, where in all cases universities play a major role in the work, are described below. The participating university groups are indicated. Graduate and undergraduate students involved in these projects get training with cutting edge research work. To maintain U.S. leadership and educational abilities on the technical front, it is essential to continue to support the upgrade program in the U.S.

5.3.1 Inner Detector

The upgrade of the inner tracker will involve replacing the entire present Inner Detector with an all silicon tracker made of several layers of pixel and strip detectors. The big issues to face with the new requirements are larger track density by a factor of 5, larger total dose and total fluence by up to a factor of 10, and larger data throughput by up to a factor of 10, all this without allowing any larger volume for support services. The U.S. universities, with NSF support (see Table 16), will provide the R&D that will enable us to address these issues in the coming 5 year time span. The specific projects are described below.

Sensors

The University of California at Santa Cruz (UCSC, supported by this proposal), continues with a leadership role in evaluating sensor technologies that could meet the upgrade requirements, especially various silicon technologies. The n-on-p silicon technology has been chosen for the strip sensor based on the NSF CA support to date. The choice for the pixel sensors still requires further investigation. Topics to be investigated over the next few years center on the choice for the inner most pixel layers, with continued radiation studies and electrical performance measurements required. Another area to be investigated is the detailed structure at the edge of the sensor and the methods of cutting the wafers with a goal to greatly reduce the inactive area at the edge of each sensor. In the case of pixels, the sensors are sufficiently small in area that inactive regions have a large impact on coverage and total material burden.

Staves

The baseline plan for the silicon strip part of the tracker is to construct the barrel section out of fully integrated staves, each containing up to 24 modules on the top and on the bottom, where each module consists of a silicon sensor wafer with up to 40 readout ICs and 1 or 2 module controllers.

Figure 5 shows the n-on-p sensor wafer we have developed. It is a single detector subdivided electrically into four sections. The stave would integrate cooling tubes and a bus cable to supply power, control and readout signals. At the end of the stave, data transmission to and from the stave would be converted to high speed Gbits/s optical transmission. The end-cap disks will employ the same integrated concept with wedge shaped objects now called petals.

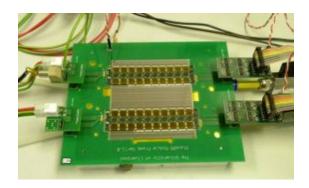


Figure 5. ATLAS Upgrade sensor module on a test board. A stave will have 24 such modules per side.

We have recently demonstrated a one third scale model of a stave, providing initial validation of the new ideas introduced by the U.S. groups. The development of these ideas into a full length, fully functioning device, is the goal of the next 5 years. Yale University, supported by the DOE, will provide mechanical engineering for development of this stave concept. This will involve materials R&D, mechanical engineering design and prototype fabrication leading to development of production fabrication techniques. Module assembly, i.e. mounting readout ICs onto hybrid circuits and hybrid circuits onto sensors plus making all necessary electrical interconnects with up to 6,000 wire bonds per module will be performed by UCSC along with other ATLAS collaborators. Testing of these modules will be performed by UCSC and the DOE supported Duke University group. New York University will provide tooling for electrical testing and also radiation testing.

On-detector Electronics

The electronics for readout of the silicon tracker will have to be completely redesigned in new technologies given that most of the technologies used for the present ATLAS Detector will not be available when construction starts and the requirements for more channels at lower power as well as the radiation levels are much more severe. Evaluation of new technologies at 130 nm and 90 nm minimum feature size has started and we are beginning to learn the idiosyncrasies of designing in these technologies. The University of Pennsylvania, supported by the DOE, is leading the effort to design a necessary module controller to interface multiple readout ICs on a module to long bus cables on the staves and petals that will make up the barrel and end-cap structures. UCSC will provide support for these electronics efforts in the form of an experienced IC designer and an electronics system engineer who was responsible for the existing ATLAS strip detector powering and grounding system. Initial prototypes and then a final design will be produced during the 5 year period of this proposal.

Optical Data Transmission

Transmission of clock and control signals to the staves as well as data from the staves will be handled by 5-10 Gbps optical transmission from the end of stave to the service cavern. SMU (supported by this NSF CA) is part of a collaboration of ATLAS and CMS groups called the Versatile Link Common Project to develop such an optical system from optical transmitter through fiber to optical receiver. The

common project has been working for several years and is on track to deliver a system level specification and prototype units by Spring 2011. This ~5 Gbps system will work with the 5 Gbps multiplexer/demultiplexer chip set called GigaBit Transceiver (GBT) being developed by the CERN microelectronics group. The Versatile Link group then plans to move forward during the period of this proposal to explore parallel optics for ultra high data bandwidth and new technologies emerging from the telecom industry for ultra low power data links. This work will complement the second phase of the GBT project to advance to 10 Gbps, which will be required for the inner most pixel layers of the Silicon Tracker and the Liquid Argon Calorimeter.

	FY12	FY13	FY14	FY15	FY16
Silicon Tracker R&D					
EE (FTEs)	2.00	2.00	2.00	2.17	2.50
Student (FTEs)	1.25	1.25	1.25	1.25	2.50
Tech (FTEs)	0.78	0.78	0.78	1.03	1.45
Total Costs (Labor and Material)	376.00	376.00	376.00	410.00	520.00

Table 16. Requested NSF Operations Silicon Tracker R&D labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support NYU, UCSC and SMU.

5.3.2 Liquid Argon Calorimeter

There is an active upgrade program for the ATLAS Liquid Argon Calorimeter (LAr) to meet the requirements arising from high luminosity running, expected after upgrading the LHC. U.S. university groups, together with their collaborators at national labs, have taken leading responsibilities in both detector and readout electronics R&D projects for this upgrade. This collaboration has proved successful in the present ATLAS detector design and construction, and in the initial phase of these R&D projects, with many important results reported at international conferences. The initial work has produced very early prototype electronics blocks, which will be developed fully into an integrated front-end electronics system over the duration of this proposal. The support requested from NSF is given in Table 17.

LAr Electronics

At Columbia University's Nevis Laboratories, steady progress is being made on the development of the next generation LAr calorimeter front-end board (FEB2) design and some of its essential components. A pre-prototype ADC was fabricated in late 2010 in IBM 130 nm CMOS technology and the next step, a prototype with almost complete functionality is planned for 2012. Work on the layout of FEB2 has been started to identify the constraints on the ASICs imposed by the multitude of fast communication paths needed, and design of a multiplexer ASIC to aggregate traffic from the ADCs to the optical links will start as soon as the ADC work allows.

SMU has successfully identified the 0.25 μ m thin-film silicon-on-sapphire CMOS technology for high speed radiation tolerant ASIC developments for detector front-end electronics. Our recent successful

designs, the 5 Gbps serializer LOCs1 and the 5 GHz LCPLL, are essential milestones towards meeting the unprecedented challenge in the optical link of 100 Gbps per FEB. As the characterizing tests on LOCs1 and the LCPLL are coming to an end, we have started the investigation of array serializer design with each channel operating at 10 Gbps. We plan to prototype this design in 2012. If successful, work can start on both a final design as well as integration into the full front-end electronics chain.

	FY12	FY13	FY14	FY15	FY16
LAr System R&D EE (FTEs) Tech/Student (FTEs)	3.00 2.25	3.00 2.25	3.00 2.25	3.00 2.25	3.00 2.25
Total Costs (Labor and Material)	683.00	597.00	617.00	679.00	595.00

Table 17. Requested NSF Operations LAr System R&D labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support SMU and Columbia Nevis.

5.3.3 Scintillating Tile Calorimeter

The TileCal upgrade required for high luminosity performance is focused on replacement of most of the readout electronics, including the links between on- and off-detector electronics. This development is driven by the requirements for increased radiation tolerance and the need to provide the level one trigger with improved information. The availability of new electronics and communication components and planned developments in the Level-1 trigger will require a revision of the architecture of both the Liquid Argon and the Tile Calorimeter readout systems. It has been proposed to bring all the waveform samples off the detector so they can be used for the Level 1 calorimeter trigger. It will necessitate very high data transmission rates.

An intensive upgrade program will be needed for the Tile Calorimeter electronics as shown in Table 18. This effort has mostly progressed on the conceptual level, and the real R&D is planned to begin over the next 5 year period. The on-detector electronics will require a new front-end board for each channel to use modern components, to be more radiation resistant, and to take advantage of improved performance in the components now available. The mother boards in the electronics drawers will need to be replaced. These will contain control electronics, ADCs for each channel, serializing FPGAs and optical transmission elements. The University of Chicago (supported by this proposal) leads this effort. Work will also be needed for the off-detector system which interfaces with the Level 1 trigger. MSU (supported by this proposal) and the UIUC (supported by the DOE Operations Program component) are active here.

	FY12	FY13	FY14	FY15	FY16
Tile Calorimeter R&D					
EE (FTEs)	1.80	1.80	1.80	1.80	1.80
Tech/Student (FTEs)	1.25	1.25	1.25	1.25	1.25
Total Costs (Labor and Material)	432.00	432.00	432.00	432.00	432.00

Table 18. Requested NSF Operations Tile Calorimeter R&D labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support MSU and Chicago.

5.3.4 Muon Spectrometer

Readout Electronics

Over the past two years the U.S. has significantly increased its activity in developing an upgraded, forward muon system for ATLAS for a high luminosity LHC. The CSC (Cathode Strip Chamber) system was one of the significant U.S. deliverables for the present ATLAS experiment. However, as the luminosity increases beyond the nominal, the rates in the existing forward muon system will begin to significantly degrade its performance. The U.S. groups have been investigating a relatively new detector technology called Micromegas. Micromegas have excellent rate capability as well as good spatial and time resolution. By employing a novel approach of using Micromegas as a TPC (Time Projection Chamber), one is able to form track stubs with just one plane of Micromegas detector.

Alignment System

The new muon chambers for the upgrade will have to be integrated into the existing endcap muon alignment system. This is the responsibility of Brandeis University. To do this will require studies to determine the optical paths that are necessary to link the new system with the rest of the muon endcap. In addition we will need to work with each of the candidate chamber technologies to insure that whatever mechanical design is selected can be aligned. We will insure that the features which provide the precision of the measurement are transferred to outside of the chamber with "hooks" that can be related to the alignment system. We will also have to design sensors that relate these "hooks" to the existing alignment system.

Since we first designed the alignment system over 10 years ago, many of the electronic components have become obsolete and are no longer in production or obtainable. In particular the basic CCD that is used in all of our systems, TP255, is no longer in production and there is no reliable source for them. The new muon system requires that redesign many of the circuits to utilize a different sensor. Also the main data collection board, the LWDAQ driver, has many obsolete components and will have to be

redesigned. An additional complication is that we will have to go further into the high radiation area so that some circuits will have to have a more rad-tolerant design.

To insure the proper operation of the alignment system we will have to work closely with the technical coordination. We plan to maintain a detailed model including all the structural components, detector components, services, and optical stay-clears. We have done this for the original alignment system and it is necessary that we maintain the activity if we are to successfully include the new muon detectors in the endcap alignment system. The resources requested from NSF for all this work is shown in Table 19.

	FY12	FY13	FY14	FY15	FY16
Muon System R&D					
EE (FTES)	0.25	0.25	0.25	0.25	-
ME (FTEs)	0.25	0.25	0.25	0.25	-
Tech/Student (FTEs)	0.20	0.20	0.40	0.40	-
Total Costs (Labor and Material)	81.00	86.00	91.00	89.00	0.00

Table 19. Requested NSF Operations Muon System R&D labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support Brandeis.

5.3.5 TDAQ

Increases in instantaneous luminosity at the LHC beyond the design goal of 10^{34} cm⁻²s⁻¹ will require extensive changes to the ATLAS Trigger and Data Acquisition system to retain sensitivity to interesting physics processes while staying within data readout, storage, and access limitations. We have already begun a program to address some of the issues that will arise as design luminosity is approached. We intend to expand this program in the upcoming five years to: 1) complete those TDAQ improvements necessary for efficient operation at 10^{34} cm⁻²s⁻¹, and 2) begin R&D on new systems to cope with luminosities beyond the baseline. Real data is now available to allow evaluation of the TDAQ performance and provide guidance for the future effort.

Several trigger improvements are planned for installation or testing during the 2012/13 LHC shutdown. U.S. groups have strong involvement in the development of a new system, the *FTK*, designed to provide precise track information at the beginning of Level 2 processing, and are also participating in upgrades to the Level 1 Calorimeter trigger (*L1Calo*). Funding for the U.S. FTK effort is being sought through other avenues and plans in this area will not be discussed here. Members of the MSU TDAQ group are leading the U.S. effort for the Level 1 calorimeter trigger upgrade. A faculty member is in charge of Monte Carlo for L1Calo Upgrade. For the Phase 1 L1Calo upgrade, our initial plans are to add topological trigger algorithms to the existing L1Calo triggers. This can be achieved by using RoI (feature) information from the existing cluster and jet modules in a real time data path. A draft plan, backed up by recent hardware tests, describes increased dataflow rates to Level 1 by quadrupling the backplane clock speed to 160 Mb/s. A design document contains a technically limited schedule that would enable early

prototyping using the 2012 LHC shutdown so that the Phase 1 upgrade, including a new Common Merger Module (CMM++), could be fully tested before the 2016 shutdown. The card would be laid out at MSU.

Beyond the near term trigger upgrades, work is also beginning on more ambitious changes to meet the challenges of luminosities beyond 10^{34} cm⁻²s⁻¹. U.S. groups are involved in R&D related to the evolution of the FTK and L1Calo systems as the ATLAS Inner Detector is replaced and Calorimeter readout electronics are modified. Significant changes may also be required in the L1Muon system, where the possibility of including precise Monitored Drift Tube information into the trigger is being studied. This effort is led by Boston University. Finally, U.S. groups are participating in R&D to develop a new L1 track trigger aimed primarily at managing L1 electron, muon, and tau trigger rates. Although the exact schedule for achieving beyond-design luminosities is still uncertain, design and integration issues for these trigger systems must be worked out over the next few years, with first prototype hardware required toward the end of this five-year period.

In addition to hardware development, software work is also needed throughout the TDAQ Upgrade program. As part of the HLT/DAQ evolution, U.S. groups are making major contributions in the areas of TDAQ dataflow architecture and HLT processing schemes. Changes in these areas will be made incrementally as luminosity increases. Also of vital importance to the TDAQ Upgrade is accurate and efficient simulation of trigger systems. Challenges in this area include coping with memory requirements imposed by the large numbers of interactions per bunch crossing observed at high luminosities, and accurately estimating trigger rates from neutron backgrounds. These efforts are led by UCI and MSU. The U.S. is taking a leading role in all of these studies.

	FY12	FY13	FY14	FY15	FY16
TDAQ System R&D EE/Computer (FTEs)	2.50	2.50	2.50	2.50	2.50
Total Costs (Labor and Material)	465.00	425.00	425.00	375.00	425.00

The request to the NSF is shown in Table 20 includes the work for the Level 1 trigger, R&D and the software R&D.

Table 20. Requested NSF Operations TDAQ System R&D labor (FTEs) and costs (AYk\$s). Total costs include labor and materials. These funds support Boston, UCI and MSU.

5.4 Education and Outreach

These many programs described in section 4.4 will continue during the coming years as U.S. ATLAS takes full advantage of the unprecedented opportunities that physics at the energy frontier provides us. We are actively preparing for an era of major discoveries. We leverage the outreach work done at all the NSF supported institutions. The budget for this activity (~\$50k/year) supports specific tasks or costs which are decided each year. A truly exciting project in the planning stages is a major Planetarium show about Dark Matter and the Big Bang. It will feature amazing footage and animation of ATLAS and the LHC, as well as covering cosmology and deep underground experiments. A short trial segment was

already tested on a planetarium audience with a very enthusiastic response.

U.S. ATLAS will continue to follow the NSF Director's charge to place a very high priority on public education and outreach with an extensive and effective program.

6 Open Data Implementation

We recently had a discussion with the leadership of the experiment and found that ATLAS is moving towards the Open Data policy as agreed in the OECD Communiqué of 2004: http://www.oecd.org/document/0,2340,en 2649_34487_25998799_1_1_1_1_0.0.html . In our experiment with over 2×10^8 channels and complex alignment and calibration procedures, as well as changing conditions and triggers, it is impossible to imagine someone outside of the experiment being able to deal with the raw data. However, due to the world wide effort to preserve high energy physics data for future researchers <u>https://www.dphep.org/</u>, we know that ATLAS will find a format for the data so that scientists outside of the experiment will be able to use it. We imagine this will take a few years.

In the immediate future though, we will make available subsets of our data, for example W boson events, for master classes of high school students.

7 Mentoring Postdocs

Although as a matter of policy we do not support any postdocs in this proposal (there are a couple of operations program supported postdocs working in largely technical roles, whose institutional mentoring plans are discussed in the additional documents section), there are many postdocs who are working in the ATLAS experiment and each NSF supported institution has a mentoring plan in place which has been approved by the NSF. We note that postdocs in this extremely international experiment have a very unique opportunity. There is intense involvement of U.S. faculty members with postdocs in all areas of the experiment.

8 Schedule and Budget

As the detector modules arrived at CERN we had begun operating and maintaining them as soon as possible after delivery and continued those maintenance and operations tasks until the initial LHC collisions and into the operations phase. Substantial commissioning was accomplished in cosmic ray running in 2008 and 2009. LHC pp collision operation began in December 2009 (low energy) progressing to 7 TeV starting in March 2010. The successful operation of the U.S. Deliverables was very gratifying.

For the software and computing, the schedule was largely determined by the high-level ATLAS computing milestones and we met the important goal of having the network of Tier 2 centers fully operational by the start of LHC data taking ahead of schedule.

The U.S. ATLAS Operations Program is jointly funded by the NSF and the DOE. The total NSF operations needs described in this proposal amount to \$50M (AY\$), for the five-year period FY12-FY16, based essentially on a constant level of effort, except in those cases on a longer term shut-down. A summary of costs at WBS Level 2 is given in Table 21. Cost data are derived from resource-loaded FTE schedules for Maintenance and Operations, Physics Support and Computing, and Upgrade R&D. These cost estimates have been extensively reviewed in joint NSF and DOE committees.

Further details on cost estimates are given in the Budget Justification.

NSF	Operations	Proposa	I Needs ((AYk\$s)		
Subsystem	FY12	FY13	FY14	FY15	FY16	Total
Computing						
Software	495	509	525	540	557	2,626
Facilities & Tier 2	3,470	3,986	3,895	3,750	3,732	18,833
Analysis Support	55	57	59	60	62	293
Total	4,019	4,552	4,479	4,351	4,351	21,752
M&O	-					
Silicon		142	146	150	155	730
TRT	-	-	-	-	-	-
LAr	390	402	414	427	439	2,073
Tile	393	405	417	429	442	2,086
Muon	779	740	763	785	809	3,876
TDAQ	655	675	695	716	738	3,480
Common	949	787	753	752	678	3,920
Outreach	50	52	53	55	56	265
Program Management	435	170	175	180	186	1,146
Technical Coordination	155	159	164	169	174	821
Total	3,944	3,532	3,580	3,664	3,677	18,397
Upgrade	7					
Silicon Tracker		376	376	410	520	2,058
Liquid Argon	683	597	617	679	595	3,171
Tile Calorimeter	432	432	432	432	432	2,160
Muon	81	86	91	89	-	347
TDAQ	465	425	425	375	425	2,115
Total	2,037	1,916	1,941	1,985	1,972	9,851
Total NSF Operations Needs	10,000	10,000	10,000	10,000	10,000	50,000
Requested DOE Funds	28,255	28,962	29,685	30,427	31,187	148,516

Table 21. Total NSF Operations needs in AYk\$. The DOE total represents a request to DOE to support additional M&O, Physics Support and Computing, and Upgrade R&D work scope which is not part of this proposal.

9 Program Management

We manage the program by a detailed U.S. ATLAS Operations Program Management Plan (PMP).²⁶ We are using the DRAFT as of April 2010 in conducting our Operations. Michael Tuts is the U.S. ATLAS Operations Program Manager (OPM).²⁷ The Operations Program Manager (Micahel Tuts) and Deputy (DOPM, Howard Gordon) were recently re-appointed for two year terms by the BNL ALD,

Steve Vigdor, after extensive consultation with the U.S. ATLAS collaboration through a subcommittee of the U.S. ATLAS Institutional Board (as called for in the PMP). The subcommittee spoke to and solicited nominations for the OPM and DOPM positions from the representatives of each to the 44 U.S. ATLAS institutions. After this rigorous process was completed, they recommended to the BNL ALD that Tuts and Gordon be re-appointed as OPM and DOPM respectively. That recommendation was accepted.

1 ATLAS Collaboration, "Charged-particle multiplicities in pp interactions at √s = 900 GeV measured with the ATLAS detector at the LHC", Phys Lett B 688 (2010), 21.

2 ATLAS Collaboration, "Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC", Phys. Rev. Lett. 105 (2010), 161801.

3 ATLAS Collaboration, "Search for Quark Contact Interactions in Dijet Angular Distributions in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC", accepted by PLB (submitted 26 Sep 2010).

4 ATLAS Collaboration, "Measurement of inclusive jet and dijet cross sections in proton-proton collisions at 7 TeV centre-of-mass energy with the ATLAS detector", accepted by EPJC (submitted 30 Sep 2010).

5 ATLAS Collaboration, "Measurement of the W-> ℓnu and Z/γ* -> ℓ+ℓproduction cross sections in proton-proton collisions at √s = 7 TeV with the ATLAS detector", accepted by JHEP (submitted 11 Oct. 2010).

6 ATLAS Collaboration, "Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at √s = 2.76 TeV with the ATLAS detector at the LHC", accepted by Phys. Rev. Lett. 105 (2010) 252303.

7 ATLAS Collaboration, "Measurement of underlying event characteristics using charged particles in pp collisions at √s = 900 GeV and 7 TeV with the ATLAS detector", submitted to PRD (3 Dec 2010).

8 ATLAS Collaboration, "Measurement of the top quark-pair production cross section with ATLAS in pp collisions at √s=7 TeV", submitted to EPJC (8 Dec 2010).

9 ATLAS Collaboration, "Readiness of the ATLAS Liquid Argon Calorimeter for LHC Collisions", accepted by EPJC (submitted 14 Dec 2009).

10 ATLAS Collaboration, "Drift Time Measurement in the ATLAS Liquid Argon Electromagnetic Calorimeter using Cosmic Muons", accepted by EPJC (submitted 22 Feb 2010).

11 ATLAS Collaboration, "The ATLAS Inner Detector commissioning and calibration", accepted by EPJC (submitted 26 Apr 2010).

12 ATLAS Collaboration, ?The ATLAS Simulation Infrastructure?, accepted by EPJC (submitted 20 May 2010).

13 ATLAS Collaboration, "Performance of the ATLAS Detector using First Collision Data", JHEP Volume 2010, Number 9, 1-66 (2010). http://www.springerlink.com/content/26783w473n507xq6/.

14 ATLAS Collaboration, "Commissioning of the ATLAS Muon Spectrometer with Cosmic Rays", accepted by EPJC (submitted 18 Jun 2010).

15 ATLAS Collaboration, "Readiness of the ATLAS tile calorimeter for LHC collisions", accepted by EPJC (submitted 30 July 2010).

16 ATLAS Collaboration, "Studies of the performance of the ATLAS detector using cosmic-ray muons", submitted to EPJC (1 Dec 2010).

17 https://twiki.cern.ch/twiki/bin/view/AtlasPublic

18 https://twiki.cern.ch/twiki/bin/view/AtlasPublic/WebHome#Publications_of_the_ATLAS_collab

19 http://www.usatlas.bnl.gov/USATLAS_TEST/institutes,%20reps,%20emails.htm

20 ATLAS Collaboration, "Readiness of the ATLAS Trigger and Data Acquisition system for the first LHC beams", Nuclear Physics B Proceedings Supplements 197, 306 (2009).

21 http://indico.cern.ch/conferenceTimeTable.py?confld=73513&ttLyt=room#20100723.detailed

22 http://egg.bu.edu/

- 23 http://atlas.ch/
- 24 Supplementary materials regarding U.S. ATLAS Tier 2 centers: http://bit.ly/hPzIOM

25 http://atlas.bu.edu/NET2-tour/

26 http://www.usATLAS.bnl.gov/USATLAS_TEST/Operations%20Program.shtml

27 http://www.usatlas.bnl.gov/USATLAS_TEST/Org%20Chart%20Sept%202010.pdf

Biographical Sketch Philip Michael Tuts Born: 1/1/1953

Professional Preparation		
M.I.T.	Physics	BS, 1974
M.I.T.	Mathematics	BS, 1974
SUNY, Stony Brook	Physics	PhD, 1979
SUNY, Stony Brook	Experimental HEP	1979-1983

<u>Appointments</u>

2004-present	Operations Program Manager, US ATLAS
2004-2006	Secretary/Treasurer DPF
2002-2005	Director of Nevis Labs
2001	APS Fellow
1996-present	Professor of Physics, Columbia University
1991-2001	Co-leader/project manager D0 Upgrade
1999-2000	Visiting Scientist, Fermilab
1990-1999	Associate Director of Nevis Labs
1987-1996	Associate Professor of Physics, Columbia University
1987-1991	Co-spokesman for CUSB Experiment
1986-1990	Alfred P. Sloan Foundation Fellow
1983-1987	Assistant Professor of Physics, Columbia University

Publications – closely related to proposed project

- 1. The ATLAS Experiment at the CERN Large Hadron Collider, The ATLAS Collaboration, G. Aad et al., JINST 3 (2008) S08003.
- Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Lett. B 688, issue 1, 21 (2010).
- 3. Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 161801 (2010).
- Measurement of the W -> Inu and Z/gamma* -> II production cross sections in proton-proton collisions at √s = 7 TeV with the ATLAS detector, ATLAS Collaboration, accepted by JHEP (2010).
- 5. Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 252303 (2010).

Publications – other significant publications

- 1. Observation of the Y'' at the Cornell Electron Storage Ring, CUSB Collaboration, Phys. Rev. Lett. **45**, 222 (1980).
- 2. Semileptonic Decay of the B Meson, CUSB Collaboration, Phys. Lett. **B130**, 444 (1983).
- 3. Observation of the Top Quark, D0 Collaboration, Phys. Rev. Lett. **74**, 2632 (1995).

4. Measurement of the *W* Boson Mass, D0 Collaboration, Phys. Rev. Lett. **77**, 3309 (1996).

Synergistic Activities

US ATLAS Research Program Manager; Physics Advisory Panel (BNL 1998-2004); Electronic classroom development; CMS/ATLAS review panels; proposed and received GAANN fellowships for Columbia University to support underrepresented physics graduate students; worked as graduate admissions chair to increase minority admissions. PI on NSF grant to support travel by South American colleagues to attend ATLAS workshops. PI on subcontract from Wisconsin to foster OSG computing outreach activities with South African colleagues. PI on LHC Experimental Experience award program for graduate students. As DPF Sec/Treasurer initiated travel grant program for graduate students to attend APS meeting (joint funding from NSF and DPF). Winner of Columbia Presidential Teaching Award. Given numerous public lectures and interviews on LHC/ATLAS (CBC, CNN, NY Times, Science Friday, Leonard Lopate, 92nd St Y, Guggenheim Museum, Café Science...).

Collaborators

The D0 collaboration (see <u>http://www-d0.fnal.gov/~madaras/authorlist.html</u>) The ATLAS collaboration (see <u>http://graybook.cern.ch/programmes/experiments/lhc/ATLAS.html</u>)

Graduate and Postdoctoral Advisors

Prof. Juliet Lee-Franzini (INFN), Dr. Robert Schamberger (SUNY, Stony Brook)

Thesis Advisor and Postgraduate-Scholar Sponsor

Quiwen Wu (Radiation Oncology, Virginia Commonwealth University), Ian Adam (Network Physics), Chris Hays (Lecturer, Oxford University), Mingcheng Gao (Assistant Professor, Loyola University Chicago – Radiation Oncology), Shaohua Fu (Fermilab), Ulrich Heintz (Prof of Physics, Brown University), Ashutosh Kotwal (Prof. of Physics, Duke University), Leslie Groer (Toronto), Georg Steinbruck (MPI), Christos Leonidopolous (CERN), David Khatidze (postdoc, Brown University).

Robert C. Ball

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EDUCATION

1979	Ph.D., Physics, Michigan State University
1974	B.S., Physics, Michigan State University

EMPLOYMENT

2006-Present	Lead Electronics Engineer, University of Michigan
2003-2006	Senior Research Associate Engineering, University of Michigan
2002-2003	Engineering Consultant, University of Michigan
2000-2002	Senior Software Engineer, Service Level Corporation, Ann Arbor, MI
1996-2000	Senior Research Associate, Science and Engineering, U. of Michigan
1995-1996	Senior Research Scientist, University of Michigan
1988-1995	Associate Research Scientist, University of Michigan
1982-1987	Assistant Research Scientist, University of Michigan
1979-1982	Post-Doctoral Fellow, University of Michigan

HONORS

1993 University of Michigan Research Scientist Award

POSITIONS

2006-Present	Manager, ATLAS Great Lakes Tier-2 (AGLT2) Computing Center
1996-1997	Coordinated Selection and Installation of Physics Dept. Network Equipment/Wiring
1990-1993	Chair of Physics Dept. Computing Committee
1989-1997	Member of Physics Dept. Computing Committee
1988	Member of Physics Dept. Computer Upgrade Committee
1986-1988	Member of Physics Dept. Telecommunications Committee
1986-1987	Member of University Committee on Coordinated Email Delivery
1985-1986	Member of University Parallel Processing Computer Search Committee
1983-1984	Co-Coordinator of High Energy Physics Seminar Series

RECENT RESEARCH ACTIVITIES

ATLAS ELECTRONICS Design and development of the ATLAS CSM, the on-board data multiplexer circuit board for the ATLAS Monitored Drift Tube system. With a Xilinx Virtex-II fpga at its core, this circuit board collects serial data streams from as many as 18 24-channel Time to Digital Converter boards mounted on an MDT chamber and time-division multiplexes the resultant parallel data for transmission over fiber to upstream data coordination hardware. Designed in collaboration with Prof. J. Chapman this began as a VME board that simulated components of the ATLAS experiment that were not yet built, and provided access to ATLAS muon chamber data early in the chamber design cycle.

CREST ELECTRONICS Planning and design for the CREST trigger and readout electronics. This Antarctic balloon flight experiment design work incorporates Xilinx fpgas and cplds into a Time to Digital Conversion system for measuring the arrival of cosmic ray shower particles with a least count of 1ns. Sixteen input channels share a single circuit board. Multiple such circuit boards share a serial bus I designed, with multiple busses operating in parallel.

L3 COMPUTER FARM Together with Prof. Byron P. Roe we designed a parallel systems pre-compiler. When applied to the L3 Experiment analysis code, the resultant software was linked with the Fermilab Advanced Computer Project (ACP) libraries and run on an ~60 processor compute farm. Event-wise parallelism was thus implemented and coordinated over the entire farm and served as a major source of Monte Carlo simulations for the L3 experiment.

SELECTED PUBLICATIONS

D.Levin *et al*, "Drift Time Spectrum and Gas Monitoring in the ATLAS Muon Spectrometer Precision Chambers", Nucl. Inst. Meth. **A588**, 347-358 (2008).

James R. Bensinger

Born:

August 20, 1941 Washington, D.C.

Education:

1963 B.S. Bucknell University 1970 Ph.D. University of Wisconsin

Professional Record:

- 1970 73: Instructor/Assistant Professor, University of Pennsylvania
- 1973 74: Research Associate, Brandeis University
- 1974 80: Assistant Professor, Brandeis University
- 1980 89: Associate Professor, Brandeis University
- 1989 Present: Professor, Brandeis University
- 1996 2000: Chair, Brandeis University Physics Department

HEP Collaborations:

- 1. Multiparticle Spectrometer (MPS), Brookhaven Laboratory
- 2. Venus Detector at Tristan, KEK
- 3. Collider Detector at Fermilab (CDF), Fermilab
- 4. SDC Experiment, SSC
- 5. ATLAS Experiment, CERN

Contributions to the ATLAS Experiment

- 1. Design of the on-chamber gas flow system for MDT chambers
- 2. Integration of the endcap muon system
- 3. Design and construction of the muon endcap alignment system
- 4. Mechanical construction of the big and small MDT wheels
- 5. Currently: Level-2 US Muon Subsystem Manager

Recent Publications Relevant to Current Position:

- "Reference Bars for the Alignment of the ATLAS Muon Spectrometer" C. Amelung, J.R. Bensinger, et al., Nuclear Instruments and Methods A555, 36-47 (2005).
- 2. "The Optical Alignment System of the ATLAS Muon Spectrometer Endcaps," C. Amelung, et al., JINST 3:P11005, 2008.
- 3. "The ATLAS Experiment at the CERN Large Hadron Collider," The ATLAS Collaboration, JINST 3:S08003, 2008.
- "System test of the ATLAS muon spectrometer in the H8 beam at the CERN SPS," The ATLAS Muon Collaboration, Nucl. Instrum. Meth. A593:232-254,2008. May 2008.
- 5. "Study of the ATLAS MDT spectrometer using high energy CERN combined test beam data," C. Adorisio, et al., Nucl. Instrum. Meth. A598:400-415, 2009.

Biographical Sketch--Joseph F. Boudreau

1. Professional Preparation

Harvard University, Cambridge MA , B.A. (Physics) 1983 University of Wisconsin, Madison WI , Ph.D (Physics) 1991 CERN, Geneva Switzerland, Particle Physics, 1991-1993 (CERN Associate)

2. Appointments

2000-present Associate Professor, University of Pittsburgh, Pittsburgh, PA 1994-2000 Assistant Professor, University of Pittsburgh, Pittsburgh, PA

3. Publications

Most Relevant to Proposed Research

The ATLAS Simulation Infrastructure, G. Aad *et al.* (The ATLAS Collaboration), Eur. Phys. J. C **70** (2010) 823-874

The ATLAS Experiment at the CERN Large Hadron Collider, G. Aad *et al.* (The ATLAS Collaboration)

Performance of the ATLAS Detector using First Collision Data, G. Aad et al. (The ATLAS Collaboration), JHEP09 (2010) 056

Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, G. Aad. et al. (The ATLAS Collaboration), Phys Lett. B **688** 1, 21

Measurement of inclusive jet and dijet cross sections in proton-proton collisions at 7 TeV centre-of-mass energy with the ATLAS detector, G. Aad et al. (The ATLAS Collaboration), arXiv:1009.5908, accepted by EPJC.

Other Significant Publications

Formulae for the Analysis of the Flavor-Tagged Decay $B^{0}_{s} \rightarrow J/\psi \phi$, F. Azfar et al., JHEP11 (2010) 158

First Flavor-Tagged Determination of Bounds on the Mixing Induced CP Violation in $B^{0}_{s} \rightarrow J/\psi \phi$ decays, T. Aaltonen et al. (The CDF Collaboration), Phys. Rev. Lett. **100**, 161802 (2008)

Measurement of Lifetime and Decay-Width Difference in $B^{0}_{s} \rightarrow J/\psi \phi$ decays, T. Aaltonen et al. (The CDF Collaboration), Phys. Rev. Lett. **100**, 161803 (2008)

Measurement of the Λ^0_b Lifetime in $\Lambda^0_b \rightarrow J/\psi \Lambda^0$ in $p\bar{p}$ Collisions at $\sqrt{s} = 1.96$ TeV, A. Abulencia et al., The CDF Collaboration, Phys. Rev. Lett. 98, 122001 (2007)

Observation of B^{o}_{s} - B^{o}_{s} Oscillations, A. Abulencia et al., The CDF Collaboration, Phys. Rev. Lett. 97, 242003 (2006).

4. Synergistic Activities

2009-2010 Guest Scientist, Centre de Physique des Particules, Marseille (CPPM) 2003 and 2004 Starr Visiting Fellow, Lady Margaret Hall, Oxford 2000-2001 Guest Scientist, Fermi National Accelerator Laboratory International Organizing Committee, CHEP97, April 7-11, Berlin International Organizing Committee, HepVis95, 96, 98, and 99 Leader of the ATLAS Liquid Argon Simulation and the ATLAS Frozen Shower Group. Geant 4 Development Team Virtual Reality Event Display at Fermilab "Open Day" events, 1999-2001

5 . Collaborators and Other Affiliations

Recent Collaborators

Manfred Paulini (CMU), Michal Kreps (Universitaet Karlsruhe), Giovanni Punzi (INFN Pisa), Rick Van Kooten (University of Indiana), Petar Maksimovic(JHU), Gavril Giurgiu(JHU), Farrukh Azfar(Oxford), Srini Rajagopalan(BNL), Jim Shank(Boston University), Wolfgang Ehrenfeld(DESY), Sasha Glazov(DESY), Juan Pablo Fernandez (CIEMAT, Madrid), Mossadek Talby (CPPM, Marseille)

Students Supervised and Postdocs Sponsored

Luis Flores Castillo (University of Wisconsin), Chunlei Liu (CMU), Yuri Gotra (University of Rochestor), George Pope (left the field), Karen Gibson (Case Western)

Thesis Advisors and Postdoctoral Sponsors

Prof. Sau Lan Wu, University of Wisconsin, Madison (Thesis Advisor) Horst Wachsmuth, CERN (retired, Postdoctoral Sponsor)

John M. Butler Biographical Sketch

Professional Preparation

University of Notre Dame:	B.S. in physics, with high honors, 1980
Stanford University:	Ph.D. in physics, 1986

<u>Appointments</u>

2008-2009	Visiting Researcher, CEA Saclay, Gif sur Yvette, France
2004-present	Professor of Physics, Boston University
2003-2006	Project Director, Boston University DOE HEP Umbrella Grant
2003-2006	Associate Chairman, Department of Physics, Boston University
1998-2004	Associate Professor (with tenure), Boston University
1995-1998	Associate Professor, Boston University
1991-1995	Associate Scientist, Fermi National Accelerator Laboratory
1988-1991	Research Associate, Fermi National Accelerator Laboratory
1986-1988	Scientific Associate, CERN, Geneva, Switzerland

Publications

(i) Publications closely related to the proposed project

- G. Aad et al. [ATLAS Collaboration], "Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}} = 2.76$ TeV with the ATLAS detector at the LHC," Phys. Rev. Lett. 105, 252303.
- G. Aad et al. [ATLAS Collaboration], "Search for Quark Contact Interactions in Dijet Angular Distributions in pp Collisions at $\sqrt{s} = 7$ TeV Measured with the ATLAS Detector," Phys. Lett. B694 (2011) 327-345.
- G. Aad et al. [ATLAS Collaboration], "Commissioning of the ATLAS Muon Spectrometer with Cosmic Rays," EPJC 70 (2010) 875.
- G. Aad et al. [ATLAS Collaboration], "Performance of the ATLAS Detector using First Collision Data," JHEP 1009:056,2010.
- G. Aad et al. [ATLAS Collaboration], "The ATLAS Experiment at the CERN Large Hadron Collider," JINST 3, S08003 (2008).

(ii) Significant publications

- V. M. Abazov et al. [DØ Collaboration], "Direct Limits on the B_s^0 Oscillation Frequency," Phys. Rev. Lett. 97, 021802 (2006).
- V. M. Abazov et al. [DØ Collaboration], "A precision measurement of the mass of the top quark," Nature 429, 638 (2004).
- S. Abachi et al. [DØ Collaboration], "Observation of the Top Quark," Phys. Rev. Letters 74, 2632 (1995).
- S. Abachi et al. [DØ Collaboration], "The DØ Detector," Nucl. Instr. and Methods A338, 185 (1994).

• J. M. Butler et al. [DØ Collaboration], "Study of Fast Gases, Resolutions and Contaminants in the DØ Muon System," Nucl. Instr. Meth. A290, 122 (1990).

Synergistic Activities

- Lecturer at the *New England Particle Physics Student Retreats*, see http://physics.bu.edu/NEPPSR/
- Participant in Boston University's LERNet *Saturday Science Labs* program, see http://www.bu.edu/lernet/
- Co-organized a field trip for Boston University's SPS chapter to Fermilab

Collaborators

For lists of collaborators, see the web links listed below:ATLAS Collaboration:http://atlas.web.cern.ch/CALICE Collaboration:https://twiki.cern.ch/twiki/bin/view/CALICE

<u>Graduate Advisor</u>

Prof. Joseph Ballam, Stanford Linear Accelerator Center

Postdoctoral Sponsors

Dr. Rafael Armenteros, CERN Dr. Dan Green, Fermi National Accelerator Laboratory Dr. Hugh Montgomery, Thomas Jefferson National Accelerator Facility

Graduate Advisees

Jeremy Love: Boston University

Postdoctoral Advisees

Robert Harrington:Boston UniversityJason Kasper:IndustryManas Maity:Visva-Bharati University

Dhiman Chakraborty

Professional preparation

Post-doctoral: State University of New York at Stony Brook, 1995-1997; University of Iowa, 1994-1995 Graduate: State University of New York at Stony Brook, Physics, Ph.D., 1994 Undergraduate: Indian Institute of Technology, India, B.Tech., Engineering Physics, 1988

Appointments

2010-present: Director of Graduate Studies, Physics Dept, Northern Illinois University
2010-present: Professor, Physics Dept, Northern Illinois University
2008-2009: Visiting Scientist, Laboratoire de Physique Subatomique et de Cosmologie,
Grenoble (France).
2007-2010: Associate Professor, Physics Dept, Northern Illinois University
2001-2007: Assistant Professor, Physics Dept, Northern Illinois University
1997-2001: Research Scientist, Dept of Physics and Astronomy, State University of New York
at Stony Brook, Stony Brook, New York

Publications

- (i) Most closely related to the proposed project
 - 1. "The ATLAS Experiment at the CERN Large Hadron Collider", Aad G et al. (the ATLAS Collaboration), *JINST* 3 S08003 (2008),
 - 2. "Charged-particle multiplicities in pp interactions at \sqrt{s} = 7 TeV", ATLAS Collaboration, *Phys. Lett.* B 688, issue 1, 21 (2010),
 - 3. "Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions With the ATLAS Detector at the LHC", ATLAS Collaboration, *Phys. Rev. Lett.* 105, 161801 (2010),
 - 4. Measurement of the W-> lnu and Z/gamma* \rightarrow ll production cross sections in protonproton collidions at \sqrt{s} = 7 TeV with the ATLAS detector", ATLAS Collaboration, accepted by *JHEP* (2010),
 - 5. Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with the ATLAS detector at the LHC, ATLAS Collaboration, *Phys. Rev. Lett.* 105, 252303 (2010),

(ii) Other significant publications

- 1. "Photon Detectors" (in "The Review of Particle Physics"), Nakamura K et al. (the Particle Data Group), *J. Phys.* :1 (2010) <u>http://pdg.lbl.gov</u>
- 2. "Directly Coupled tiles as elements of a scintillator calorimeter with MPPC readout", Blazey G et al, *NIM* A {605} 277 (2009),
- 3. "Investigation of a solid-state photodetector", Beznosko D et al, NIM A {553} 438 (2005),
- 4. "Top Quark Physics", Chakraborty D, Konigsberg J, Rainwater DL, Ann. Rev. Nucl. & Part. Phys. {53} 301 (2003),
- 5. "Direct Search for Charged Higgs Bosons in Decays of Top Quarks", Abazov VM et al. (the D0 Collaboration), *Phys. Rev. Lett.* [88] 151803 (2002),
- 6. "Search for Charged Higgs Bosons in Decays of Top Quark Pairs", Abbott B et al. (the D0 Collaboration), *Phys. Rev. Lett.* {82} 4975 (1999),

7. "Observation of the Top Quark", Phys. Rev. Letters {74} 2632 (1995).

Synergistic activities

Leader, NIU Atlas team, 2007-present

Member, Detector R&D Common Tasks Group appointed by the ILC Research Director, 2008present,

Member, Executive Board, International Linear Collider Detector (ILD) collaboration, 2008present,

Co-leader, Calorimetry working group of the American Linear Collider Physics Group, 2002-2008,

Coordinator, Digitization validation, Atlas collaboration, 2008-2010,

Co-convener, tau identification group, D0 collaboration, 2001-2005,

Co-convener, top physics group, D0 collaboration, 1998-2000,

Coordinator, Calorimeter Software, D0 Collaboration, 1995-1997

Volunteer, "Ask a scientist" – A sunday afternoon outreach program held at Fermilab, 2001present,

Coordinator and mentor, QuarkNet center at NIU, 2008-present.

Collaborators in past 24 months

All member institutions on D0, ALCPG, CALICE, ATLAS. Other co-authors: members of the Particle Data Group (PDG).

Graduate Advisor – R. Engelmann (SUNY, Stony Brook, NY).

PostDoctoral Advisors - U. Mallik (U. of Iowa), M. Baarmand/P. Grannis/J. Hobbs (SUNY, Stony Brook).

Thesis Students Supervised – M. Arov (PhD, 2001-2007), J. McCormick (MS, 2002-2004), D. Menezes (PhD, 2006-), R. Calkins (PhD, 2007-), C. Suhr (PhD, 2007-).

Post-doctoral scholars sponsored – A. Dychkant, J.G. Lima, V. Rykalin.

Biographical Sketch: Kyle Cranmer

Education & Training

Rice University	Physics, Mathematics	B.A., 1999
University of Wisconsin-Madison	Physics	M.A., 2002
University of Wisconsin-Madison	Physics	Ph.D., 2005
Brookhaven National Lab	Physics	2005-2007

Research & Professional Experience

Assistant Professor	Physics Dept., New York University	2007-current
Visiting Researcher (on leave)	LAPP, Annecy, France	FebAug.2008
Goldhaber Fellow	Brookhaven National Laboratory	2005-2007

Selected Publications

- R. Barate *et al.* [ALEPH Collaboration] "Observation of an excess in the search for the standard model Higgs boson at ALEPH," Phys. Lett. B **495**, (2000) [arXiv:hepex/0011045].
- K. S. Cranmer, "Kernel estimation in high-energy physics," Comput. Phys. Commun. 136, 198 (2001) [arXiv:hep-ex/0011057].
- [3] LEP Higgs Working Group, "Search for the standard model Higgs boson at LEP". Phys. Lett., B 565 (2003). [arXiv:hep-ex/0306033]
- [4] S. Asai, et al. "Prospects for the search for a standard model Higgs boson in ATLAS using vector boson fusion," Eur. Phys. J. C3252:19–54, (2004). [hep-ph/0402254].
- [5] K. Cranmer "The ATLAS Analysis Architecture", Nucl. Phys. B P-12266 (2007)
- [6] B. C. Allanach, K. Cranmer, C. G. Lester and A. M. Weber, "Natural Priors, CMSSM Fits and LHC Weather Forecasts," JHEP 08, 023 (2007). [arXiv:0705.0487 (hep-ph)].
- [7] K. Cranmer, "Statistics for the LHC: Progress, Challenges, and Future", CERN yellow report CERN-2008-001, 2008
- [8] [ATLAS] (K. Cranmer, S. Tsuno, et. al.) "Search for the Standard Model Higgs via Vector Boson Fusion production process in the di-tau channel with ATLAS", in Expected Performance of the ATLAS Experiment - Detector, Trigger and Physics, [arXiv:0901.0512].
- [9] [ATLAS] (K. Cranmer, M. Cristinziani, A. Loginov, A. Shibata, D.B. Ta, *et. al.*) "Prospects for measuring top pair production in the dilepton channel with early ATLAS data at $\sqrt{s}=10$ TeV" ATLAS public result, ATL-PHYS-PUB-2009-086.
- [10] ALEPH Collaboration, S. Schael et al., Search for neutral Higgs bosons decaying into four taus at LEP2, JHEP 05 (2010) [hep-ex/1003.0705].

Synergistic Activities

- Level-3 Manager US-ATLAS Analysis Support (2009-). Convener of US-ATLAS Standard Model and Higgs Forum (2007-10). Convener of US-ATLAS Trigger Forum (2005-07).
- Various ATLAS activities and responsibilities: coordinator of MissingET Trigger (2005-2009), official 'expert' of statistics committee member of software architecture team, member of event management board (adjudicates content of ATLAS data).
- Primary organizer 2009 ATLAS Workshop of the Americas, held at NYU August 3-5
- Founder of the RooStats project, developing common statistical tools for the LHC.
- Lecture series on "Statistical Techniques for Particle Physics" for CERN academic training lectures and at LAPP in Annecy, France. Member of steering committee for PhyStat.org, an online repository for statistical tools used in particle physics and astrophysics.

Collaborators:

The ATLAS Collaboration, The CDF Collaboration, The ALEPH Collaboration

Ben Allanach (The University of Cambridge), Doug Benjamin (Duke), Marteen Bosman (IFAE), Michael Bridges (The University of Cambridge), Bob Cousins (UCLA), Glen Cowan (Royal Holloway, U. of London), Markus Cristinziani (Bonn University), Luc Demortier (The Rockefeller University), Michael Ernst (Brookhaven National Lab), Amir Farbin (University of Texas-Arlington), Farhan Feroz (The University of Cambridge), Pamela Ferrari (NIKHEF), Eilam Gross (Weizmann Institute), Chris Hays (Oxford University), Mike Hobson (The University of Cambridge), Ashutosh Kotwal (Duke University), Tadashi Maeno (Brookhaven National Lab), Stephanie Majewski (Brookhaven National Lab), Bruce Mellado (Wisconsin University-Madison), Chris Lester (The University of Cambridge), Andrey Loginov (Yale University), Sergey Panitkin (Brookhaven National Lab), Tilman Plehn (University of Edinburgh), Edward Quinlan (University of California-Irvine), Roberto Ruiz de Austri (IFIC-UV/CSIC), Philip Schuster (Perimeter Institute), Jorgen Sjolin (Stockholm University), Oliver Stelzer-Chilton (TRIUMF), Natalia Toro (Perimeter Institute), Roberto Trotta (Imperial College London), Arne Weber (Max Planc Institute in Munich), Itay Yavin (New York University), Wouter Verkerke (NIKHEF), Ofer Vitells (Weizmann Institute), Daniel Whiteson (University of California-Irvine)

Co-Editors:

Soshi Tsuno (The University of Tokyo, International Center for Elementary Particle) Co-editor of ATLAS publication on Vector Boson Fusion Higgs Decaying to Taus.

Graduate Student and Postdoctoral Advisors:

Sau Lan Wu (University of Wisconsin-Madison), David Lissauer (Brookhaven National Lab)

Graduate Student Advised:

George Lewis, James Beacham, Sven Kreiss (New York University)

Postdoctoral Advisees:

Akira Shibata (New York University, 2007-2010), Attila Krasznahorkay (New York University, 2009-current), Kirill Prokofiev (New York University, 2010-current)

Curriculum Vitae

Kaushik De

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Phone: (817) 272-2813 (office), -2266 (physics dept.), -2824 (FAX), (682)521-5323 (cell)

Professional Preparation

B.A./M.A., Physics/Honors Curriculum, Summa Cum Laude,	
Hunter College of CUNY, Class Rank 1/734, GPA 3.94/4.00	1978-81
Sc.M., Physics, Brown University	1982
Ph.D., Physics, Brown University	1988

Appointments

Professor , University of Texas at Arlington	2003-
Associate Dean, Honors College, UT Arlington	1999-2003
Associate Professor, University of Texas at Arlington	1997-2003
Assistant Professor, University of Texas at Arlington	1993-1997
Assistant Research Scientist, University of Michigan	1992
Research Fellow , University of Michigan	1989-1992
Research Associate, Indiana University	1988-1989
Research Assistant/Teaching Assistant, Brown University	1984-88
Teaching Assistant, Hunter College of CUNY	1980-81

Publications – closely related to proposed project

- 1. The ATLAS Experiment at the CERN Large Hadron Collider, The ATLAS Collaboration, G. Aad et al., JINST 3 (2008) S08003.
- Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Lett. B 688, issue 1, 21 (2010).
- 3. Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 161801 (2010).
- Measurement of the W -> Inu and Z/gamma* -> II production cross sections in proton-proton collisions at √s = 7 TeV with the ATLAS detector, ATLAS Collaboration, accepted by JHEP (2010).
- 5. Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 252303 (2010).

Publications – other significant publications

- 1. T. A. Fuess et. al., "Search for Anomalous Particles in High-Energy Hadron Proton Interactions", Phys. Rev. D {35}, 3297, (1987).
- 2. E-745 Collaboration, "A New Method to Investigate the Nuclear Effect in Leptonic Interactions", Phys. Lett. B {214}, 281, (1988).
- 3. S. Kartik et al., "A-Dependence of J/Psi Production in Pi-Nucleus Collisions at 530 GeV/c", Phys. Rev. D {41}, 1, (1990).

- 4. DØ Collaboration, "The DØ Detector", Nucl. Instrum. Methods A {338}, 185, (1994).
- 5. DØ Collaboration, "Observation of the Top Quark", Phys. Rev. Lett. {74}, 2632, (1995).

Synergistic Activities

- a) **New Physics**: pioneered search for supersymmetric particles in top quark decays using the DØ detector at Fermi National Accelerator Laboratory.
- b) Grid Computing: led implementation of a computing grid for ATLAS. Coordinated development of new software tools: Windmill and Panda, used at hundreds of supercomputing centers internationally. Managed ATLAS MC production and U.S. Computing Operations. Co-supervised masters and Ph.D. theses in CSE.
- c) **New Physics:** led search for large extra dimensions at DØ.
- d) **New Detector**: proposed a new Intermediate Tile Calorimeter for the ATLAS experiment at CERN. Led five year project to build 50 tons of calorimeter detector at UTA.
- e) **Planning for the Future**: led effort to motivate high luminosity Fermilab upgrade from the viewpoint of supersymmetry discovery, through the TeV2000 and TeV33 groups and at the Snowmass workshop.
- f) **Supercomputing technology**: founding director of SouthWest Tier 2 supercomputing center, located at UTA and Oklahoma University.
- g) **Beyond the Standard Model**: pioneered search for dilepton supersymmetry signatures at DØ.

Collaborators

The D0 collaboration (see <u>http://www-d0.fnal.gov/~madaras/authorlist.html</u>) The ATLAS collaboration (see http://graybook.cern.ch/programmes/experiments/lhc/ATLAS.html)

Graduate and Postdoctoral Advisors

Prof. Mildred Widgoff (Brown University), Prof. Andrej Zieminski (Indiana University), Prof. Homer Neal (University of Michigan).

Thesis Advisor and Postgraduate-Scholar Sponsor

Yan Song (IBM), Barry Spurlock (UTA), Rishiraj Pravahan (UTA), Elizabeth Gallas (Oxford), Mark Sosebee (UTA), Armen Vartapetian (UTA), Nurcan Ozturk (UTA), Paul Nilsson (UTA), Alden Stradling (UTA).

ROBERT W. GARDNER

ute, University of Chicago	Enrico Fermi Instit Institute Thiwarsi	Senior Research Associate, Enrico Fermi Institute, University of Chicago Senior Fellow Computation Institute University of Chicago	2002-present
		nts	Appointments
Res. Assoc., 1991-1993	Physics	University of Illinois, Urbana-Champaign	University of II
Ph.D., 1984-1991	Physics	lotre Dame	University of Notre Dame
BS (Honors), 1980-1984	Physics	University of California, Riverside	University of C
			Education
rwg@uchicago.edu		http://www.linkedin.com/in/robertwgardner	http://www.link
+1 773 834 6818 fax		637	Chicago, IL 60637
+1 312 804 0859 cell		ve	5735 S. Ellis Ave
+1 773 834 9885 office		hicago	University of Chicago

1996-2002	Senior Fellow, Computation Institute, University of Chicago Assistant Professor of Physics, Indiana University Bloomington
1996-2002	Assistant Professor of Physics, Indiana University Bloom
2000-2002	Affiliated Faculty Member, School of Informatics, Indiana University Bloomington
1993-1996	Visiting Research Assistant Professor, University of Illinois Urbana-Champaign

Publications on Distributed Computing in Physics

- Ξ "Virtualization Platforms for LHC Tier 3 Clusters", with M. Mambelli et al., to appear in *Proc. Computing in High Energy and Nuclear Physics (CHEP '10)*, 2010.
- 2 "Automated Validation of Integration Testbeds", with S. Thapa et al., to appear in Proc. Computing in High Energy and Nuclear Physics (CHEP '10), 2010.
- ω (CHEP '10), 2010. Africa", with J. Caballero et al., to appear in Proc. Computing in High Energy and Nuclear Physics "Employing Open Science Grid to Support National Grid Initiatives in South America and South
- [4] FERMILAB-PUB-10-236-CD, submitted to Journal of Grid Computing, Springer-Verlag, 2010. "A Science Driven Production Cyberinfrastructure: the Open Science Grid", with R. Pordes et al.,
- [2] Phys.: Conf. Ser. 219 072041. "Job Optimization in ATLAS Tag-based Distributed Analysis", with M. Mambelli et al., 2010 J.
- 6 "A Skimming Service for Locally Resident Analysis Data", M. Mambelli, et al., Proc. Computing in High Energy and Nuclear Physics (CHEP '07), 2007.
- Ξ "The Open Science Grid Integration Testbed", R. Gardner et al., Proc. Computing in High Energy and Nuclear Physics (CHEP '06), 2006.
- [8] Nuclear Physics (CHEP '06), 2006. "The Capone Workflow Manager", M. Mambelli et al., Proc. Computing in High Energy and
- [9] "Progress in Grid Computing for Particle Physics", R. Gardner, Proc. 9th International Conference on Advanced Technology and Particle Physics (ICATPP), Como, Italy, 2005.

Invited Talks on Grid Computing

- Ξ "The Open Science Grid Integration Testbed", R. Gardner et al., Computing in High Energy and Nuclear Physics (CHEP '06), Mumbai, India, February 13-17, 2006.
- 2 "Progress in Grid Computing for Particle Physics", R. Gardner, 9th International Conference on Advanced Technology and Particle Physics (ICATPP), Como, Italy, October 17-21, 2005.
- Ξ "ATLAS Grid Computing on Grid3 and the Open Science Grid", 13th Annual Mardi Gras Baton Rouge, LA, February 4-7, 2005. Conference on "Frontiers on Grid Applications and Technologies", Louisiana State University,
- 4 "Grid3: An Application Grid Laboratory for Science", Computing in High Energy and Nuclear Physics (CHEP '04), Interlaken, Switzerland, September 27 – October 1, 2004

- $\overline{\Omega}$ "Lessons Learned in Grid Deployments: Grid2003", GGF-11: 11th Global Grid Forum, Honolulu, Hawaii, June 6-10, 2004.
- [6] "The Grid2003 Production Grid: Principles and Practice", Performance Distributed Computing, Honolulu, Hawaii, June 4-6, 2004. ¹, 13th IEEE Intl. Symposium on High
- [7] "Grid Applications, Testbeds, and Demonstrations" Plenary summary, Conference on Computing in High Energy and Nuclear Physics (CHEP '03), La Jolla, California, 24-28 March 2003.
- $\overline{\mathbf{s}}$ "Virtual Data Grid Technologies for High Energy Physics", American Physical Society Conference on Computational Physics, San Diego, CA, 25-28 August 2002.
- [9] Grid Forum, Amsterdam, Netherlands, March 5-7, 2001. "GriPhyN and ATLAS: Grid Computing for the ATLAS Experiment at CERN", GGF-1: 1st Global

Leadership Activities

- 2007-present: U.S. ATLAS Facilities Integration Program Manager
- 2006-present: Integration and Sites Coordinator, Open Science Grid Consortium
- 2005-present: Principal Investigator, ATLAS Midwest Tier2 Center
- 2004-2006: Director, The Teraport Project, University of Chicago
- 2001-2005: Coordinator and co-PI of the International Virtual Data Grid Laboratory (iVDGL)
- 2003-2005: Co-Coordinator of the Grid2003 Project
- 2003-2005: Co-Coordinator for International ATLAS Grid Infrastructure
- 2003-2005: Project Manager for Grid Tools and Services, U.S. ATLAS Computing Project
- 2000-2002: Project Manager, Distributed IT Infrastructure, U.S. ATLAS Collaboration
- 2000-2002: U.S. ATLAS Grid liaison to International ATLAS Collaboration
- 2000-2002: IT Advisory Committee, Telecommunications Taskforce, IU Bloomington IT Council
- 1998-2000: Project Lead, Forward Tracking System, Fermilab BTeV Collaboration

Synergistic Activities

- <u>Computing in High Energy Physics:</u> I lead a research group working on distributed Grid computing technologies for the CERN/LHC ATLAS experiment. ATLAS physicist since 1998. Currently responsible for ATLAS Midwest Tier2 Center and the distributed U.S. ATLAS Computing Facility Integration Program.
- for the Open Science Grid; various coordination roles in OSG, iVDGL and ATLAS. Distributed Computing Infrastructure: Area lead for Grid Integration testbeds and sites coordination
- ٠ data technologies for high energy physics dataset provenance tracking and automated workflow Computer Science Research: GriPhyN (Grid Physics Network, NSF-ITR): development of virtual measurement of metrics for distributed computing (Grid Telemetry, NSF-ITR). calculi for distributed, service-based computation in physics (DOE-SBIR). Collection and generation. Collaborative work with FiveSight Technologies to develop frameworks based on process

Awards

- Joseph and Sophia Konopinski Award for Outstanding Teaching in Physics, Indiana University 1999.
- Outstanding Teaching Assistant in Physics, University of Notre Dame, 1986

c. Reiner Hauser

<i>i) Professional Preparation</i> 1989 1994	Diploma in Physics, University of Heidelberg, Germany Ph.D. Physics, University of Heidelberg, Germany
Appointments 2007-present 1999-2007 1997-1999 Geneva, Switzerland	Research Assistant Professor, Michigan State University Research Associate, Michigan State Universy Research Associate, CERN/Digital Joint Project, CERN,
1994-1996	CERN Fellowship, CERN, Geneva, Switzerland

ii) Publications

Publications most closely related to the proposed project

- 1. <u>"Search for supersymmetry via associated production of charginos and neutralinos</u> using trilepton final states", V.M.Abazov et al., Phys. Rev. Lett. **95** 151805 (2005)
- 2. "High-Level Trigger, Data Acquisition and Controls Technical Design Report" (CERN/LHCC/2003-022)
- "Commissioning of the ATLAS Trigger and Data Acquisition System with Single Beam and Cosmic Rays", R. Hauser, Proceedings 11th ICATPP Conference, Como (2000) http://villaolmo.mib.infn.it/ICATPP11th_2009/accepted/HEP/Hauser.pdf

iii) Synergistic Activities

Co-leading the re-design of the D0 Level 3 event building system. Convener of the D0 Common Samples group responsible for providing all official data samples (2004-2006). Currently ATLAS TDAQ software coordinator.

iv) Collaborators & Other Affiliations

Collaborators: Members of the DØ collaboration Members of the Atlas collaboration

v) Thesis Advisor(s)

Reinhard Männer (Heidelberg) Postdoctoral Advisor: Rudolf Bock (CERN), Maris Abolins(MSU)

a. Joey Walter Huston

i) Professional Preparation:

B.S. Physics (with University Honors)	Carnegie-Mellon University 1976
M.A. Physics	University of Rochester 1979
Ph.D Physics	University of Rochester 1983
Thesis: "Radiative Width of the ρ +"	Thesis advisor: Fred Lobkowicz

ii) Appointments

Visiting Professor: Durham University, UK 2003-Present
Professor: Michigan State University 1998-Present
Associate Prof.: Michigan State University 1991-1998
Assistant Prof.: Michigan State University 1986-1991
Visiting Assistant Prof.: Michigan State University 1985-1986
Research Associate: University of Rochester 1983-1985

iii) Publications

Publications closely related to project:

- 1. Hard Interactions of Quarks and Gluons: a Primer for LHC Physics, J. Campbell, J. Huston, W.J. Stirling, *Rept. Prog. Phys.* **70**, 89 (2007); http://stacks.iop.org/0034-4885/70/89.
- 2. Jets in Hadron-Hadron Collisions", *Prog. Part. Nucl. Physics* **60**, 484 (2008), S. Ellis, K. Hatekayama, J. Huston, P. Loch, M. Toenessman
- 3. Inclusive Jet Production, Parton Distributions and the Search for New Physics, J. Huston et al., *JHEP* **0310**, 046 (2003).
- 4. Measurement of the Inclusive Jet Cross Section in $p\bar{p}$ Interactions at \sqrt{s} =1.96-TeV Using a Cone-based Jet Algorithm," J. Huston et al. *Phys. Rev. D* **74**, 071103 (2006).
- 5. The Les Houches SM and NLO Multileg Working Group: Summary Report", T. Binoth, J. Huston et al., arXiv:1003.1241.

JH has over 500 publications with greater than 30,000 citations including 8 renown papers (> 500 cites), 4 of which are experimental papers and 4 phenomenology.

iv) Synergistic Activities:

JH is the co-spokesman of the CTEQ collaboration. He is a visiting professor at the Institute for Particle Physics at Durham University (UK) and has been invited as a Distinguished Visitor by the the Scottish Universities Physics Alliance (SUPA). He has given a series of lectures on LHC QCD physics at national meetings in the U.S., Canada, France and Germany, as well as ATLAS collaboration-wide. He has organized many workshops, including six at Les Houches, at Santa Barbara (a 3 month workshop at the Kavli Institute), at Cambridge University and at Fermilab (TeV4LHC, Higgs Physics at the Tevatron and LHC, Standard Model Benchmarks at the Tevatron and LHC). He delivered the plenary talk on QCD at the 1998 International Conference in High Energy Physics held in Vancouver and the plenary talk on Photon and Drell-Yan physics at the 1989 Lepton-Photon meeting at Stanford. He is one of the authors of the Handbook on Perturbative QCD, published by CTEQ in the Reviews of Modern Physics. He is one of the authors of the CTEQ parton distribution functions and has worked on

developing many phenomenology tools (such as parton error pdf's, the Les Houches accords, the Les Houches NLO *wishlist*, PDF4LHC LHC cross section benchmarks) crucial for today's experimental analyses. He is the co-developer of *SpartyJet*, a framework to allow for very flexible jet reconstruction and analysis, in use at the Tevatron, LHC and phenomenology community. He has organized many CTEQ summer schools as well as the first sub-Saharan school on high energy physics (South Africa, August 2010). JH was a member of the Fermilab Users Executive Committee from 1995-1996 and 2002-2003. He organized the 1995, 2002 and 2003 UEC trips to Washington. In 1996, he was appointed by the Fermilab director to an ad hoc Public Policy Committee to deal with relations with both Congress and the Administration. In 2007, he was elected to the first executive committee for the newly formed US LHC Users Organization.

He has published recent review articles on physics at the LHC and on jet production in hadron-hadron colliders. His review paper with John Campbell and James Stirling is one of the most downloaded articles for the ROP in recent years. He is expanding it into a book to be published by Oxford University Press.

He has been invited to be an author for the Reviews of Particle Properties by the Particle Data Group (with responsibility for jet and W/Z cross section measurements) and has written an "Explain it in 60 seconds" article on jets for Symmetry magazine.

v) Collaborators and Other Affiliations:

Collaborators

- a. The CDF Collaboration, www-cdf.fnal.gov/cdfmemb.html
- b. The ATLAS Collaboration, graybook.cern.ch/programmes/experiments/ATLAS.html

Graduate and Postdoctoral Advisors

- c. Ph.D thesis: Prof. Fred Lobkowicz, University of Rochester
- d. Postdoctoral advisor: Prof. Tom Ferbel, University of Rochester

Thesis Advising and Postgraduate Scholar Sponsor

- e. Thesis advisor for Lee Sorrell, Simona Murgia, (Valeria Tano, Matthias Tonnesmann; formal advisor was Siggi Bethke but they were working with me on CDF as visitors at MSU), Gene Flanagan, Brian Martin, Mohammad Hussein, Ulrike Schnoor, Jessica Muir
- f. Postdoctoral advisor for John Mansour, Carlos Yosef, Ben Cooper, Andrea Messina, Mario Campanelli, Giorgi Arabidze

Biographical Sketch Andrew J. Lankford

Mail address:	Department of Physics & Astronomy	Telephone:	949-824-2632
	University of California	e-mail:	Andrew.Lankford@uci.edu
	Irvine, CA 92697		

PROFESSIONAL PREPARATION:

Yale University	Mathematics and Physics,	Magna Cum Laude w/ Departmental Honors	B.S. 1972
Yale University	Physics	M.Phil 1974,	Ph.D. 1978
Thesis: Pr	oduction of Vector Mesons of	and Direct Photons at the CERN ISR	

APPOINTMENTS:

University of California, Irvine:		
Professor,	Dept. of Physics and Astronomy	1990-present
Chair,	Dept. of Physics and Astronomy	2002-2007
CERN, European Laboratory for Particle Physics		
Scientific Associate	Physics Department	2009-present
Superconducting Super Collider Lab .:		
Guest Scientist	Physics Research Division	1993
Stanford Linear Accelerator Center:		
Physicist - Experimental (Tenure Staff)	Research Division	1990
Physicist - Experimental (Continuing Staff)	Research Division	1981-90
Stanford University:		
Lecturer,	Dept. of Physics	1988-90
Lawrence Berkeley Laboratory:		
Staff Scientist	Physics Research Division	1978-81
Research Physicist	Physics Research Division	1978

PUBLICATIONS:

Publications closely related to the proposed project:

- 1. Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}} = 2.76$ TeV with the *ATLAS detector at the LHC*, with G. Aad, *et al.* [ATLAS Collaboration], Phys. Rev. Lett. **105** (2010) 252303.
- 2. Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC, with G. Aad, et al. [ATLAS Collaboration], Phys. Rev. Lett. **105** (2010) 161801.
- 3. Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, with G. Aad, et al. [ATLAS Collaboration], Phys. Lett. **B688**, issue 1 (2010), 21.
- 4. *Off-detector electronics for a high-rate CSC detector*, J. Dailing, N. Drego, D. Hawkins, A.J. Lankford, Y. Li, M. Medve, S. Pier, M. Schernau, D. Stoker., IEEE Trans. Nucl. Sci. **51** (2004) 461.
- 5. *The Second Level Trigger of the ATLAS Experiment at CERN's LHC*, with A. Dos Anjos, *et al.* [ATLAS Trigger and Data Acquisition Collaboration], IEEE Trans. Nucl. Sci. **51** (2004) 909.

Other significant publications:

- 1. Observation of direct CP violation in $B^0 \to K^+ \pi^-$ decays, with B. Aubert, et al. [BABAR Collaboration], Phys. Rev. Lett. **93** (2004) 131801.
- 2. Observation of a narrow meson decaying to $D_s^+ \pi^0$ at a mass of 2.32 GeV/c², with B. Aubert, et al. [BABAR Collaboration], Phys. Rev. Lett. **90** (2003) 242001.
- 3. *Measurement of the CP violating asymmetry amplitude sin 2\beta,* with B. Aubert, *et al.* [BABAR Collaboration], Phys. Rev. Lett. **89** (2002) 201802.
- 4. *Observation of CP violation in the B⁰ meson system*, with B. Aubert, *et al.* [BABAR Collaboration], Phys. Rev. Lett. **87** (2001) 091801.
- 5. Architecture of the BABAR Electronics System, Nucl. Instr. Meth. A409 (1998) 654.

- ATLAS Collaboration (1994-present), including Deputy Spokesperson (2009-2013), Project Leader for Trigger, Data Acquisition, and Controls System (2000-02), Trigger and Data Acquisition Steering Group (2000-2009), Chair of Trigger and Data Acquisition Institute Board (2007-2009), Trigger and Data Acquisition Resource Committee (2001-present), Executive Board (2000-02, 2009-2011), Technical Management Board (2001-02)
- 2. U.S. ATLAS Collaboration (1994-present), including Trigger and Data Acquisition Subsystem Manager (1996-2000, 2003-present), Executive Committee (1994-2010)
- BABAR Collaboration (1993-present), including Central Management Group (1997-99), Electronics System Co-Manager (2001-2008), Electronics System Manager (1994-2001), Technical Board (1994-2008), Online Software Coordinator (1999)
- 4. Committee to Assess the Science Proposed for the Deep Underground Science and Engineering Laboratory, National Research Council (Chair 2010-present
- 5. Particle Physics Project Prioritization Panel (P5), Subpanel of High Energy Physics Advisory Panel to DOE and NSF (2008-present)
- 6. Visiting Committee for Fermilab Science Programs, Fermilab Research Alliance (2009-present; Chair 2010)
- 7. DOE Office of Science Review Committees (*e.g.* 12 GeV CEBAF Upgrade Project, JLab (2005-present), U.S. ALICE Experiment, CERN (2005-present), Facility for Rare Isotope Beams Merit Review Panel (2008))
- 8. Physics Advisory Committee, Fermi National Accelerator Laboratory (2001-2006; Chair 2005-2006)
- 9. Beyond Einstein Assessment Committee, National Research Council (2006-2007)

AWARDS:

Alfred P. Sloan Fellow (1972-1974) Fellow, American Physical Society (2000)

COLLABORATORS & OTHER AFFILIATIONS:

Collaborators and Co-Editors (last 5 years):

Collaborators: ATLAS Collaboration, BABAR Collaboration

Graduate and Postdoctoral Advisors:

Graduate Advisors: William J. Willis (Columbia), Jack Sandweiss (Yale)

Postgraduate Advisor: George H. Trilling (Berkeley)

Thesis Advisor and Postgraduate-Scholar Sponsor (last 5 years):

Thesis Advisor: Ming Chao (Ph.D. 2005; Stanford), Donovan Hawkins (Ph.D. 2005; industry), R. Porter (present, UCI)

Total number of graduate students advised: 20

Postgraduate-Scholar Sponsor: J. Deng, C. Flacco, H. Okawa, N. Zhou (UCI),

M. Bondioli (industry), Yong Li (industry), A. Negri (Pavia),

Jose Guilherme Lima

Professional preparation

Post-doctoral: Fermilab, 1998-2000;

Graduate: Centro Brasileiro de Pesquisas Físicas, Rio de Janeiro, Brazil. M.Sc. 1991, Ph.D. 1995 Undergraduate: Universidade Federal do Pará, Brazil, Physics, 1988

Appointments

2004-present: Research Scientist, Physics Dept, Northern Illinois University 2003-2004: Visiting Assistant Professor, Physics Dept, Northern Illinois University 1996-2003: Adjunct Professor, Universidade do Estado do Rio de Janeiro, Brazil 1995-1996: Visiting Professor, Universidade do Estado do Rio de Janeiro, Brazil 1991-1993: Guest Scientist, Fermilab

Publications

- (i) Most closely related to the proposed project
 - 1. "Charged-particle multiplicities in pp interactions at $\sqrt{s} = 900$ GeV measured with the ATLAS detector at the LHC", ATLAS Collaboration, *Phys. Lett.* B 688, issue 1, 21 (2010),
 - 2. "Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions With the ATLAS Detector at the LHC", ATLAS Collaboration, *Phys. Rev. Lett.* 105, 161801 (2010),
 - 3. "Measurement of the W-> lv and $Z/\gamma * \rightarrow ll$ production cross sections in proton-proton collisions at $\sqrt{s} = 7$ TeV with the ATLAS detector", ATLAS Collaboration, accepted by *JHEP* (2010),
 - 4. "Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}} = 2.76$ TeV with the ATLAS detector at the LHC", ATLAS Collaboration, *Phys. Rev. Lett.* 105, 252303 (2010),
 - 5. "The status of the simulation project for the ATLAS experiment in view of the LHC startup", ATLAS Collaboration, *J. Phys. Conf. Ser.* {219} 032060 (2010).

(ii) Other significant publications

- 1. "Directly Coupled tiles as elements of a scintillator calorimeter with MPPC readout", Blazey G et al, *NIM* A {605} 277 (2009),
- 2. "Particle flow reconstruction based on the directed tree clustering algorithm", Chakraborty D., Lima J.G.R., McIntosh R. and Zutshi V., *AIP Conf. Proc.* {867} 546 (2006),
- 3. "Investigation of a solid-state photodetector", Beznosko D et al, NIM A {553} 438 (2005),
- 4. "Small-angle muon and bottom-quark production in pp collisions at $\sqrt{s} = 1.8$ TeV", Abbott et al. (the D0 Collaboration), *Phys. Rev. Lett.* [84] 5478 (2000),
- 5. "Inclusive μ and b-quark production cross-sections in p anti-p collisions at $\sqrt{s} = 1.8$ TeV", Abachi S. et al. (D0 Collaboration), *Phys.Rev.Lett.* {74} 3548 (1995)
- 6. "Study of the doubly Cabibbo suppressed decay D+ ---> phi K+ and the singly Cabibbo suppressed decay D(s)+ ---> phi K+", Anjos J.C. (TPS Collaboration), *Phys. Rev. Lett.* [69] 2892 (1992)

Synergistic activities

Co-coordinator, Atlas tile calorimeter software, 2010-present Deputy leader, NIU Atlas team, 2007-present Co-convener, Vertex-ID group, D0 collaboration, 2000-2003

Collaborators in past 24 months

All member institutions on ALCPG calorimetry, CALICE and ATLAS.

Graduate Advisor - A. Santoro (CBPF, Rio de Janeiro, Brazil).

PostDoctoral Advisors - M. Narain (Boston Univ.)

Shawn P. McKee

Department of Physics & School of Information University of Michigan Ann Arbor, Michigan 48109



Telephone (734) 764-4395 FAX: (734) 936-6529 E-mail: smckee@umich.edu

EDUCATION

1991	Ph.D., Physics, University of Michigan, Ann Arbor, Michigan
1986	B.Sc., Physics, Michigan State University, Lansing, Michigan

1986 B.Sc., Astrophysics, Michigan State University, Lansing, Michigan

EMPLOYMENT

2008- 2004-2008	Joint appointment: Asst.(SI) & (Physics) Research Scientist Joint appointment: Asst.(SI) & Assoc.(Physics) Research Scientist
2003-2004	Joint appointment with MGRID and Physics, Asst. Research Scientist
1999-2003	Asst. Research Scientist, Physics Department, University of Michigan
1993-1999	Research Fellow, Physics Department, University of Michigan
1992-1993	SSC Fellow, Physics Department, University of Michigan
1991-1992	Research Fellow, Physics Department, University of Michigan
1986-1991	Rackham Fellow, GRA, Physics Department, University of Michigan
1983-1986	Undergrad. RA, National Superconducting Cyclotron Facility, Michigan State U

POSITIONS

2006-	Director of US ATLAS Great Lakes Tier-2 Computing Center
2005-	Co-Chair of new Open Science Grid technical group on networking
2005-2006	Organizer of LHC Tier0-Tier1 Network Monitoring
2003-2004	Chair of Internet2 End-to-End Technical Advisory Group (E2E-TAG)
2002-2005	Technical Lead, Michigan NMI test-bed project
2002-	Member of ICFA SCIC Sub-Committee on Monitoring
2001-	Network Project Manager, US ATLAS
2001-	Co-Chair, HENP Internet2 Working Group

RECENT RESEARCH ACTIVITIES

ATLAS (A Toroidal LHC AparatuS) One of four primary experiments planned for the Large Hadron Collider (LHC) at CERN which will search for the Higgs particle and explore a new energy regime. I have worked on online software and database activities for the MDT (Monitored Drift Tube) production at Michigan, as well as working on the detector simulation and analysis software. My recent focus has been the US ATLAS grid infrastructure and network efforts, where I am the Network Project Manager as well as the Director of the ATLAS Great Lakes Tier-2 (AGLT2). This has allowed me to pursue integrating my network research efforts into "production" in support of the ATLAS computing infrastructure. As of Fall of 2009, I am working on analyzing possible SUSY physics channels in ATLAS, focusing on the 2 and 3 lepton channels which show promise for early discovery.

WORK EXPERIENCE AND AWARDS

Co-PI on **UltraLight**: An Ultra-scale Optical Network Laboratory for Next Generation Science, an NSF ITR funded by MPS 9/15/2004-9/14/2008 (*\$2 Million*)

Co-PI on **GridNFS**: A NMI Development project to create a grid-aware version of NFS based upon V4. Funded for 8/1/2004-7/31/2007 (\$1.2 Million)

Co-PI on PLaNetS: Physics-Lambda based Network System. Fund for 8/1/07-9/1/08 for (\$460K)

Co-PI on **DYNES**: Development of a Dynamic Network System for 6/1/10-5/31/13 for (\$1.4M)

UltraLight Project wins Internet2 IDEA award for 2007. See <u>http://www.internet2.edu/idea/2007</u> for details.

Featured on LiveScience.com, see the article at

http://www.livescience.com/technology/070824_bts_ultralight.html, August 2007.

UltraLight Project wins the **CENIC 2008 Innovations in Networking Award.** See <u>http://cenic08.cenic.org/program</u>, March 11, 2008.

Editor for "Challenges in Internet" part of the International Journal on Advances in Internet Technology (See <u>http://www.iariajournals.org/internet_technology/index.html</u>).

INTERNET 2009 **Technical Program Committee Chair** (See <u>http://www.iaria.org/conferences2009/INTERNET09.html</u>).

Interviewed for "Research Computing and Engineering" RCE podcast, aired June 6 2009. See http://www.rce-cast.com

Merit Network's **Award for Innovation in Networking and Information Technology**, June 2009

INTERNET2009 Best Paper Award for "Establishment and Management of Virtual End-to-End QoS Paths through Modern Hybrid WANs with TeraPaths", September 8, 2009.

SELECTED TALKS

- 1. "The Dark Matter Puzzle: The Search for What Makes Up 90% of Our Universe", University of Michigan Public Lecture Series, Ann Arbor, MI, December 2 and December 9, 1995.
- 2. "Indirect Detection of WIMPs with Cosmic Ray Positrons and Antiprotons: Current Status and Future Prospects", (Invited Talk) 2nd International Conference on the Sources and Detection of Dark Matter in the Universe, Santa Monica, CA, February 16, 1996.
- 3. "The Grid: The Future of HEP Computing?", University of Michigan Physics Department Seminar, January 7, 2002 (http://wlap.org/umich/phys/seminars/hep-astro/2002/mckee/)
- 4. "UltraLight Overview", US ATLAS Tier-1 and Tier-2 Network Planning Meeting, invited talk, Brookhaven National Lab, NY, December 14, 2005.
- 5. "The ATLAS Computing Model: Status, Plans and Future Possibilities", Invited Talk, Conference on Computing in Physics, Gyeongju, Republic of Korea, August 30th 2006.
- 6. "High-Energy Physics, ATLAS and Trans-Pacific Collaboration Opportunities", Invited talk for Driving eResearch Collaboration Across the Pacific Workshop, Perth Australia, October 12th 2007.
- 7. "Preparing for the Data Deluge: Some Experiences in Networking for the ATLAS Experiment at the LHC", Invited talk for Merit Member's Annual meeting, Ann Arbor, MI, June 12 2009.
- 8. "Preparing for the LHC Restart: An Overview of the ATLAS Experiment and its Related Networking Needs", Invited Talk for Fall Internet2 Member Meeting, San Antonio, Texas, October 7, 2009.

RECENT COLLABORATORS

William Adamson – University of Michigan Homer Neal – University of Michigan Paul Avery – University of Florida Gregory Tarle – Thesis Advisor Peter Honeyman – University of Michigan Harvey Newman - Caltech

BIOGRAPHICAL SKETCH OF ALLEN MINCER

Professional Preparation:

Brooklyn College	Physics & Mathematics	B.S. 1978
	(Magna Cum Laude, Honors in Math &	<i>z</i> Physics)
University of Maryland, College Park	High Energy Cosmic Ray Physics	Ph.D. 1984
The Technion - Israel Inst. Tech.	Lady Davis Fellow	1984 - 1986
Caltech - Calif. Inst. Tech.	Research Fellow	1986-1989
Caltech - Calif. Inst. Tech.	Senior Research Fellow	1989

Appointments:

Professor, 2001 - present; Associate Professor, 1995 - 2001; Assistant Professor, 1989 - 1995 New York University, New York, New York 10003 Visiting Associate Professor, A.Y. 1997 The Technicon Jersel Inst. Tech. Haife 22000 Jersel

The Technion - Israel Inst. Tech., Haifa 32000, Israel

Administrative Appointments:

Chair, Department of Physics, Sep. 2001 - Aug. 2005, NYU Director at NYU, NYU - Stevens Inst. Tech. Joint Degree Program, Sep. 2000 - Aug. 2001, NYU Physics Department Director of Undergraduate Studies, Sep. 1997 - Aug. 2000, NYU Physics Department Director of Graduate Studies, Sep. 1995 - Aug. 1996, NYU

Honors and Awards:

Collegiate Professor Sep. 2008 - Aug. 2011, New York University Golden Dozen Teaching Award - 2000 & 1995, New York University

Five Publications Closely Related to Proposed Project:

- "Beam Tests of the D0 Uranium Liquid Argon End Calorimeters," With the D0 Collaboration, N.I.M. A324, 53 (1993).
- "The Lead Liquid Argon Sampling Calorimeter of the SLD Detector," With the SLD Collaboration, N.I.M A328, 472 (1993).
- "Observation of the Top Quark," With the D0 Collaboration, FERMILAB-PUB-95/028-E; Phys. Rev. Lett. **74**, 2632 (1995), http://prola.aps.org/abstract/PRL/v74/i14/p2632_1
- "Measurement of the W Boson Mass," With the D0 Collaboration, Phys. Rev. Lett. 77, 3309 (1996), http://prola.aps.org/abstract/PRL/v77/i16/p3309_1
- "The ATLAS Experiment at the CERN Large Hadron Collider," With the ATLAS Collaboration, JINST **3** S08003 (2008). http://www.iop.org/EJ/abstract/1748-0221/3/08/S08003

Five Other Significant Publications:

- "Resonant Substructure in K- pi+ pi+ pi- Decays of D⁰ Mesons," With the MARK-III Collaboration, P.R.L. **64**, 2615 (1990), http://prola.aps.org/abstract/PRL/v64/i22/p2615_1
- "First Measurement of the Left-Right Cross-Section Asymmetry in Z Boson Production by e+ e- Collisions," With the SLD Collaboration, Phys. Rev. Lett. **70**, 2515 (1993), http://prola.aps.org/abstract/PRL/v70/i17/p2515_1

- "Muon Conversion Experiments Current and Future," Presented by A.I. Mincer, for the MECO Collaboration, Intersections of Particle and Nuclear Physics - 7th Conference CIPANP2000, Quebec City, Canada, May 22 - 28, 2000, AIP Conf. Proc. 549 (p. 942), http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id= APCPCS000549000001000942000001&idtype=cvips&gifs=yes
- "Charge Production in Thin Gap Multi-Wire Chambers," A.I. Mincer, S. Dado, J.J. Goldberg, Y. Gernitzky, D. Lazic, N.Z. Lupu, S. Robins, Y. Rozen, and S. Tarem, N.I.M. A439, 147 (2000).
- "TeV Gamma-Ray Sources from a Survey of the Galactic Plane with Milagro," With the Milagro Collaboration, Ap.J. Lett. **664**, L91 (2007), http://arxiv.org/abs/0705.0707

Synergistic Activities:

Physics Education research with Jhumki Basu of the NYU Department of Teaching and Learning.

Collaborators and Co-Editors Within the Past 48 Months:

Milagro Collaborators: <u>GMU</u>: R.W. Ellsworth; <u>LANL</u>: B. Dingus, S. Casinova, G. Gisler, T.J. Haines, C. Hoffman, F. Samuelson, C. Sinnis, G. Walker, M. Wilson, X. Xu; <u>MSU</u>: A. Abdo, J. Linnemann; <u>NYU</u>: L. Fleysher, R. Fleysher, P. Nemethy, <u>UCI</u>: B. Allen, S. Delay, I. Leonor, A. Shoup, G.B. Yodh; <u>UCR</u>: B. Shen, T. Tumer, K. Wang, M. Wascko; <u>UCSC</u>: W. Benbow, D. Coyne, D. Dorfan, L. Kelley, J. McCullough, M. Morales, P. Saz Parkinson M. Schneider, S. Westerhoff, D. Williams; <u>U of Md.</u>: D. Berley, E. Blaufuss, J. Bussons-Gordo, T. DeYoung, J. Goodman, E. Hays, C. Lansdell, D. Noyes, A. Smith, G. Sullivan; <u>UNH</u>: A. Falcone, R. Miller, J. Ryan; <u>U. of Wisc.</u>: R. Atkins, M. Gonzalez, J. McEnery;

MECO Collaborators: <u>BNL</u>: M. Brennan, K. Brown, G. Greene, L. Jia, W. Marciano, W. Meng, W. Morse, P. Pile Y. Semertzidis, P. Yamin; <u>BU</u>: J. Miller, O. Rind, L. Roberts; <u>INR, Moscow</u>: V.M. Lobashev, A.N. Toropin; <u>NYU</u>: R. Djilkibaev, P. Nemethy, J. Sculli; <u>Osaka U.</u>: M. Aoki, Y. Kuno, A. Sato; <u>Syracuse U.</u>: R. Holmes, P. Souder; <u>UCI</u>: C. Chen, M. Hebert, T.J. Liu, W. Molzon, J. Popp, V. Tumakov; <u>U. of Houston</u>: Y. Cui, E.V. Hungerford, K.J. Lan, B.W. Mayes, L.S. Pinsky, J. Wilson; <u>U. Ill.</u>: D. Koltick; <u>U. Mass.</u>: K. Kumar <u>U Penn.</u>: W.D. Wales; <u>U VA.</u>: E.C. Dukes, K.S. Nelson, A. Norman; Wm and Mary: M. Eckhause, J. Kane, R. Welsh

ATLAS Collaboration: http://graybook.cern.ch/programmes/experiments/lhc/ATLAS.html

Science Education Collaborators: <u>BNL</u>: S. Bronson, J. Clodius, K. White; <u>U. of Houston</u>: J. Wilson; NYU Teaching and Learning: J. Basu, P. Fraser-Abder, C. Milne, R. Wallace.

Graduate and Postdoctoral Advisors:

<u>Thesis Advisor:</u> Gaurang B. Yodh, Univ. of California, Irvine, <u>Postdoctoral Advisors:</u> David Hitlin, Caltech; Jacques Goldberg, The Technion-Israel Institute of Technology

Graduate Students Advised & Postdoctoral Scholars Sponsored Over the Past Five Years:

Postdoctoral Scholars Sponsored (3): James Popp & Alexander Toropin (with J. Sculli & P. Nemethy), Diego Casadei (with P. Nemethy)

Graduate Students - PhD's sponsored (3): Grant Christopher, Lazar Fleysher, Long Zhao

Homer A. Neal Samuel A. Goudsmit Distinguished University Professor of Physics University of Michigan, Ann Arbor, Michigan 48109-1120

Professional Preparation

June, 1961	B.S., Physics (with honors), Indiana University
Feb., 1963	M.S., Physics, University of Michigan
April, 1966	Ph.D., Physics, University of Michigan

Appointments

1967-70 1970-72 1972 1972-81 1974	Assistant Professor of Physics, Indiana University Associate Professor of Physics, Indiana University Visiting Scientist, Stanford Linear Accelerator Center, Stanford University Professor of Physics, Indiana University Visiting Scientist, Niels Bohr Institute, University of Copenhagen
1976-81 1981-87	Dean, Research and Graduate Development, Indiana University Professor of Physics, State University of New York at Stony Brook
1981-86	Provost, State University of New York at Stony Brook
1987-	Professor of Physics University of Michigan
1987-93	Chair, Department of Physics, University of Michigan
1993-97	Vice President for Research, University of Michigan
1996-97 2000-	Interim President, University of Michigan Samuel A. Goudsmit Distinguished University Professor of Physics

Selected Recent Publications

- 1. Search for 3- and 4-body Decays of the Scalar Top Quark in $p\overline{p}$ Collisions at \sqrt{s} = 1.8 TeV, V.M. Abazov, Phys. Lett. B **581**, 147-155 (2004).
- 2. Search for Narrow $t\overline{t}$ Resonances in $p\overline{p}$ Collisions at $\sqrt{s} = 1.8$ TeV, V.M. Abazov, *et al.*, Phys. Rev. Lett. **92**, 221801-1 (2004).
- 3. Search for New Particles in the Two-jet Decay Channel with the D0 Detector, V.M. Abazov, *et al.*, Phys. Rev. D **69**, 111101-1 (2004).
- 4. An Improved Measurement of the Top Quark Mass, V.M. Abazov, et al., Nature **429**, 638 (2004).
- 5. Search for Pair Production of Light Scalar Quarks in $p\overline{p}$ Collisions at \sqrt{s} = 1.8 TeV, V.M. Abazov, *et al.*, Phys. Rev. Lett. **93**, 011801-1 (2004).
- Combination of CDF and D0 Results in the W Boson Mass and Width, V.M. Abazov, *et al.*, Phys. Rev D 70, 092008 (2004).
- 7. Search for Doubly Charges Higgs Boson Pair Production in the Decay to $\mu^+\mu^+\mu^-\mu^-$ in $p\overline{p}$ Collissions at $\sqrt{s} = 1.96$ TeV, V.M. Abazov, *et al.*, Phys. Rev. Lett. **93**, 141801-1 (2004).
- 8. Observation and Properties of the X(3872) Decaying to $J/\psi\pi^+\pi^-$ in $p\overline{p}$ Collisions at \sqrt{s} = 19.6 TeV, V.M. Abazov, *et al.*, Phys. Rev. Lett. **93**, 162002-1 (2004).

- 9. Search for Supersymmetry with Gauge-Mediated Breaking in Diphoton Events at D0, V.M. Abazov, *et a.,* Phys. Rev. Lett. **94**, 041801-1 (2005).
- 10. Measurement of the B_S^0 Lifetime in the Exclusive Decay Channel $B_S^0 \rightarrow J/\psi\phi$, V.M. Abazov, *et al.*, Phys. Rev. Lett. **94**, 042001-1 (2005).
- 11. Search for the Flavor-Changing Neutral Current Decay $B_s^0 \rightarrow \mu^+ \mu^-$ in $p\overline{p}$ Collisions at $\sqrt{s} = 1.96$ TeV with the D0 Detector, V.M. Abazov, *et al.*, Phys. Rev. Lett. **94**, 071802-1 (2005).
- 12. Measurement of the Lambda(b) lifetime in the exclusive decay Lambda(b) ---> J / psi Lambda. By D0 Collaboration (V.M. Abazov et al.). FERMILAB-PUB-07-094-E, Apr 2007. 7pp. Published in Phys.Rev.Lett.99:142001,2007.
- Direct observation of the strange b baryon Xi(b)-.
 By D0 Collaboration (V.M. Abazov et al.). FERMILAB-PUB-07-196-E, Jun 2007. 7pp.
 Published in Phys.Rev.Lett.99:052001,2007.
- 14. DOE/NSF, High Energy Physics Advisory Panel, University Grants Program Subpanel Report, July 22, 2007, Department of Energy, National Science Foundation
- 15. The ATLAS Experiment at the CERN Large Hadron Collider, The ATLAS Collaboration, G. Aad et al., JINST 3 (2008) S08003.
- 16. Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Lett. B 688, issue 1, 21 (2010).
- 17. Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 161801 (2010).
- Measurement of the W -> Inu and Z/gamma* -> II production cross sections in proton-proton collisions at vs = 7 TeV with the ATLAS detector, ATLAS Collaboration, accepted by JHEP (2010)
- 19. Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $v_{S_{NN}}$ = 2.76 TeV with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 252303 (2010)

Synergistic Activities

H.A. Neal is the ATLAS Institutional Representative for the University of Michigan and is also Director of the University of Michigan ATLAS Collaboratory Project, which is focused on the use of web based archiving technology and other collaboration tools in support of research and training. One accomplishment in this latter work has been the development of tools for software training and web recordings in the ATLAS high energy physics experiment. Neal is a member of the National Academies Board on Physics and Astronomy, is a member of the External Advisory Board for Lawrence Berkeley National Laboratory, a member of the Board of Trustees of the Lounsbery Foundation, and a member of the Board of Directors of the Ford Motor Company. Neal leads the ATLAS B-physics Working Group on the preparation for a study of the polarization of inclusively produced Λ_b hyperons in ATLAS. His postdoc, Eduard de la Cruz Burelo, spearheaded the recently announced discovery of the Ξ_b hyperon in DZERO, partly as a step in preparing for the ATLAS Λ_b studies. Another of his postdocs, Natalia Panikashvili, led the recently PRL published DZERO Λ_b precision lifetime analysis, and is coordinating the UM ATLAS group's plans for SUSY studies.

JAMES E. PILCHER

12/17/10

Department of Physics+1 773 702 7443Enrico Fermi Institue+1 773 702 1914 faxUniversity of Chicagoj-pilcher@uchicago.edu5640 S. Ellis AvenueChicago, IL 60637

Professional Preparation

Undergraduate	University of Toronto	Engineering Physics	BASc, 1964
Graduate	University of Toronto	Physics	MSc, 1966
	Princeton University	Physics	PhD, 1968
Postdoctoral	Princeton University	High Energy Physics	1968-69
Appointments			
Professor	University of Chicago, De	epartment of Physics and	1979-present
	EFI	1 2	1
Associate Professor	University of Chicago, De	epartment of Physics and	1977-79
	EFI		
Assistant Professor	University of Chicago, De	epartment of Physics and	1972-77
	EFI	•	
Assistant Professor	Harvard University, Depar	rtment of Physics	1970-72
Visiting Scientist	CERN	-	1969-70
-			

Publications (selected from a total of 477)

(a) Related to current proposal

- [1] Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, The ATLAS Collaboration, Phys Lett B 688, 21 (2010).
- [2] Study of energy response and resolution of the ATLAS barrel calorimeter to hadrons of energies from 20 to 350 GeV, ATLAS Collaboration (E. Abat *et al.*), Nucl. Instr. and Meth. A621, 134 (2010).
- [3] *Readiness of the ATLAS Tile Calorimeter for LHC collisions*, The ATLAS Collaboration, submitted to EPJC.
- [4] *Testbeam studies of production modules of the ATLAS Tile Calorimeter*, ATLAS Collaboration (P. Adragna *et al.*), Nucl. Instr. and Meth. **A606**, 362 (2009).
- [5] *Design of the front-end analog electronics for the ATLAS tile calorimeter*, ATLAS Collaboration (K. Anderson *et al.*), Nucl. Instr. and Meth. **A551**, 469 (2005).

(b) Others

- [1] *Measurement of the Mass and Width of the W Boson*, The OPAL Collaboration, Euro. Phys. Journal C45, 307 (2006).
- [2] Measurement of Single Photon Production in e⁺e⁻ Collisions near the Z⁰ Resonance, The OPAL Collaboration, Zeit. Phys. C65, 17 (1995).
- [3] Measurement of the Z^0 Mass and Width with the OPAL Detector at LEP, The OPAL Collaboration, Phys. Lett. **B235**, 379 (1990).

- [4] Determination of the Pion Structure Function from Muon-Pair Production, C.B. Newman, K.J. Anderson, R.N. Coleman, G.E. Hogan, K.P. Karhi, K.T. McDonald, J.E. Pilcher, E.I. Rosenberg, G.H. Sanders, A.J.S. Smith, J.J. Thaler, Phys. Rev. Lett. **42**, 951 (1979).
- [5] Experimental Study of the Decay $K_L \rightarrow \pi^{\theta} \pi^{\theta}$ and Other Rare Decay Modes, M. Banner, J. W. Cronin, J. K. Liu, J. E. Pilcher, Phys. Rev. **188**, 2033 (1969).

Synergistic Activities

- Chair, ATLAS Publications Committee, 2009-10
- Associate Editor, European Physical Journal C, 2007-present.
- Organizer of the Compton Lectures, a series of 10 public lectures offered each fall and spring at the University of Chicago, 2001 to 2007.
- Science fair judge, Chicago Public School System.
- Organizing Committee, International Workshop on LHC Physics, 2001.
- Chair, ATLAS Collaboration Board, 2000-2001.
- Editorial Board, Physical Review Letters, 1995-98.

Collaborators and Other Affiliations

(i) Collaborators and Co-Authors

The OPAL Collaboration

The ATLAS Collaboration

(ii) Graduate and Postdoctoral Advisors

James W. Cronin - University of Chicago Carlo Rubbia - CERN

(iii) Thesis Advisees and Postdoctoral Scholars of the past 5 years

PhD Students (15 total)	E. Feng	University of Chicago
	I. Jen-La Plante	University of Chicago
	M. Hurwitz	University of Chicago
Postdoctoral Scholars (20 total)	G. Choudalakis	University of Chicago
	P. Onyisi	University of Chicago
	M. Dunford	CERN
	G. Usai	University of Texas, Arlington
	A. Gupta	
	R.Teuscher	University of Toronto / CERN

b. Bernard Pope

i) Professional Preparation

B.Sc. Physics (First Class Honours),	1965.	University of Birmingham (U.K.)
M.A. Physics,	1967,	Columbia University, New York
Ph.D. Physics,	1971,	Columbia University, New York

ii) Appointments

Professor, Department of Physics, Michigan State University	1982 – present
Visiting Research Associate, PPE Division, CERN	1995 – 1996
Assistant Professor, Physics Department, Princeton University	1977 - 1982
Staff Member, EP Division, CERN	1973 – 1977
CERN Fellow, NP/EP Division, CERN	1971 – 1973
Research Assistant, Nevis Laboratory, Columbia University	1967 – 1971
Teaching Assistant, Physics Department, Columbia University	1965 – 1967

iii) Publications

Publications related to the proposed project

- 1. "Multivariate searches for single top quark production with the DZero detector", Phys. Rev. D {75}, 092007 {2007}.
- 2. "Evidence for production of single top quarks and first direct measurement of |V_tb|", Phys. Rev. Lett. {98}, 181902 (2007).
- 3. "Prospects for single top observation with ATLAS data at 10 TeV and at 7 TeV", J.L. Holzbauer, P. Ryan, B.G. Pope, R. Schwienhorst, ATL-COM-PHYS-2010-324, (July 2010).
- 4. *"Performance of the ATLAS detector using first collision data",* the ATLAS Collaboration, arXiv:1005.5254v1, accepted by JINST (submitted May 2010).
- 5. "Search for top pair candidate events in ATLAS at sqrt(s)=7 TeV", the ATLAS Collaboration, ATLAS-CONF-2010-063, submitted to the 35th International Conference on High Energy Physics, Paris, (July 2010).

Other significant publications

- 1. "Physics Possibilities of $p\bar{p}$ Collisions in the CERN SPS", B.G. Pope and S. Van der Meer, CERN/06/77-1 (1977).
- 2. "An Improved Measurement of the Top Quark Mass", Nature {429}, 638 {2004}.
- 3. "ATLAS High-Level Trigger Data Acquisition and Controls", CERN/LHCC/2003-022, ATLAS TDR 016, (June 2003).
- 4. *"The ATLAS High Level Trigger Region of Interest Builder"*, ATL-DAQ-PUB-2007-001. Published in the Journal of Instrumentation, 2008-JINST-3-P04001 (April 2008).
- 5. "Charged-particle multiplicities in pp interactions at sqrt(s)=900 GeV measured with the ATLAS detector at the LHC", CERN-PH-EP/2010-004 (15 March 2010), Phys. Lett. B 688, Issue 1, 21-42.
- iv) Synergistic Activities

Secretary/Treasurer of the Division of Particles and Fields, American Physical Society, 1986-1989. Chair of the DØ Speakers' Bureau, 1998-2000. Have several times coordinated the DØ collaboration's submission of abstracts to APS conferences. Institutional Representative on ATLAS Collaboration Board. Member of ATLAS Trigger/DAQ Institutes Board. Active in Quarknet which has included organized visits to Fermilab for mid-Michigan teachers and students, a two-weekly, summer training session for local teachers, organized a *World Year of Physics/ Einstein Centennial* Symposium (March 2005). Taught SME862, a course in modern physics leading to a masters' degree for high school teachers. Awarded the 2010 Distinguished Faculty Award of Michigan State University.

v) Collaborators & Other Affiliations

Members of the DØ Collaboration Members of the ATLAS Collaboration

vi) Graduate and Postdoctoral Advisors

Thesis Advisor – Leon Lederman, Columbia University and Fermilab Postdoctoral Advisor – Luigi DiLella, CERN

vii) Thesis AdviseesJenny HolzbauerTotal number of PhD students – 7

viii)Postgraduate Scholar Advisees Barbara Alvarez-Gonzalez Alessandro DiMattia Patrick Ryan Total number of postdoctoral scholars sponsored– 6

MICHAEL M. RIJSSENBEEK

Department of Physics and Astronomy, Stony Brook University Stony Brook, New York 11794-3800, Phone: 631-632-8099, Fax: 631-632-8101

I. EDUCATION

University of Amsterdam	Ph.D. Physics	October, 1979
University of Amsterdam	B.S., Physics and Astronomy	January, 1972

II. PROFESSIONAL CAREER

1994–	Professor	Stony Brook University, NY; DØ and ATLAS experiments
1989–1994	Associate Professor	Stony Brook University, NY; DØ experiment
1985–1989	Assistant Professor	Stony Brook University, NY; DØ experiment
1981–1985	CERN Staff member	CERN, Switzerland; UA1 experiment
1979–1981	CERN Fellow	CERN, Switzerland; UA1 experiment

III. Publications

~500 Publications with the UA1 (46), DØ (~420), PP2PP, and ATLAS Collaborations.

Five publications related to building detectors

- 1. "The Construction of the Central Detector for an Experiment at the CERN Anti-p p Collider," the UA1 Collaboration (<u>M. Barranco-Luque *et al.*</u>). Nucl.Instrum.Meth.176:175,1980.
- 2. "The DØ Detector," the DØ Collaboration (<u>S. Abachi *et al.*</u>). Nucl. Instrum. Meth. A338:185-253,1994.
- 3. "The Upgraded Dzero Detector," V. M. Abazov *et al.*, (DZero Collaboration), Nucl. Instrum. Meth. A 565, 463, 200**6**.
- "Construction, Assembly and Tests of the ATLAS Electromagnetic Barrel Calorimeter," the ATLAS Electromagnetic Barrel Liquid Argon Calorimeter Group (<u>Bernard Aubert *et al.*</u>). Nucl. Instrum. Meth. A558:388-418, 2006.
- "The High Voltage Feedthroughs for the ATLAS Liquid Argon Calorimeters," B.Botchev, G.Finocchiaro, J.Hoffman, R.L.McCarthy, M.Rijssenbeek, JSteffens, A.Talalaevskii, M.Thioye, M.Zdrazil, J.Farrell, S.Kane. JINST 2:T10002, 2007.

Five other significant publications

- 1. "Experimental Observation of Lepton Pairs of Invariant Mass Around 95-GeV/c**2 at the CERN SPS Collider," the UA1 Collaboration (<u>G. Arnison *et al.*</u>). Phys. Lett. B126:398-410,1983
- "Experimental Observation of Isolated Large Transverse Energy Electrons with Associated Missing Energy at s**(1/2) = 540-GeV," the UA1 Collaboration (<u>G. Arnison *et al.*</u>). Phys. Lett. B122:103-116,1983.
- 3. "Observation of the Top Quark," the DØ Collaboration (<u>S. Abachi *et al.*</u>). Phys. Rev. Lett. 74:2632-2637,1995.
- Conference Summary XIth International Conference on Elastic and Diffractive Scattering, <u>Stanley</u> <u>J. Brodsky</u>, (<u>SLAC</u>) and <u>Michael Rijssenbeek</u>; SLAC-PUB-11553, Nov 2005. Invited talk at 11th Int. Conf. on Elastic and Diffractive Scattering: Towards High Energy Frontiers: The 20th Anniversary of the Blois Workshops, Chateau de Blois, France, 15-20 May 2005. e-Print: hep-ph/0511178.
- 5. "Measurement of the W boson mass," the DØ Collaboration (<u>V. Abazov *et al.*</u>). Phys. Rev. Lett. 103:141801,2009.

IV. PROFESSIONAL ACTIVITIES

Reviewer of PRL, PRD, IEEE submissions; reviewer of NSF and DOE grant proposals (1996-)

Member/chair of several DØ Editorial Boards (1994-)

Chair Local Organizing Committee for XIIth International Conference on Hadron Collider Physics, June 1997, Stony Brook.

Invited conference talks, colloquia, and seminars

V. SYNERGISTIC ACTIVITIES

2002–2004	Convener of the ATLAS Luminosity and Forward Physics Working Group
1997–present	Stony Brook ATLAS representative
1995–1998	Co-convener of DØ W mass group
1989–1992	Co-convener of DØ Electroweak Physics group
1986	DØ Tracking test-beam czar

VI. COLLABORATORS

- Dzero Collaboration (<u>http://www-d0.fnal.gov</u>)
- ATLAS Collaboration (http://atlas.web.cern.ch/Atlas/Welcome.html)
- FP420 Collaboration (<u>http://www.fp420.com</u>)

VII. ADVISEES (Stony Brook: DØ and ATLAS)

- 1. James Cochran PhD 1993; Professor, Iowa State University
- 2. Joseph Thomson PhD 1994; CEO Circadiant Systems Inc.
- 3. Dennis Shpakov PhD 2000; Northeastern University
- 4. Abid Patwa PhD 2001; Scientist, Brookhaven National Laboratory
- 5. Chunmei Chang PhD 2001
- 6. Andrei Talalaevskii Engineer, HYPRES Inc.
- 7. Zhongmin Wang PhD 2004, University of Pennsylvania, Medical Center
- 8. Marian Zdrazil PhD 2004, Royal Bank of Canada
- 9. Moustapha Thioye PhD 2008, Postdoc, Yale University
- 10. Feng Guo PhD 2010, Financial Industry (Chicago)
- 11. Julia Ann Gray PhD 2011 (estimated)
- 12. John Stupak PhD 2013 (estimated)

VIII. ADVISORS

- (Postdoctoral) C. Rubbia, CERN, B. Sadoulet, CERN.
- (Ph.D. Thesis) D. Harting, UvA; L. H. Muirhead, U Liverpool (deceased).

IX. AWARDS and HONORS

- Faculty Teaching Award, Physics Dept., Stony Brook, 1997.
- APS Fellow, 2010

Abraham Seiden Santa Cruz Institue for Particle Physics (SCIPP) UC Santa Cruz Department of Physics

PROFESSIONAL PREPARATION

Columbia University	Applied Physics	B.S.	1967
California Institute of Technology	Physics	M.S.	1970
University of California, Santa Cruz	Physics	Ph.D.	1974

POST DOCTORAL APPOINTMENTS

1975-1976	Postdoctoral Research Scientist, High Energy Physics, University of California,
	Santa Cruz
1974-1975	Visiting Scientist, CERN

APPOINTMENTS

Distinguished Professor of Physics, University of California, Santa Cruz
Director, Santa Cruz Institute for Particle Physics
Professor of Physics, University of California, Santa Cruz
Visiting Scientist, European Laboratory for Particle Physics (CERN)
Associate Professor of Physics, University of California, Santa Cruz
Assistant Professor of Physics, University of California, Santa Cruz
Assistant Professor of Physics in Residence, University of California, Santa Cruz

SELECTED PUBLICATIONS PERTINENT TO THIS PROPOSAL

- 1. Radiation-hard semiconductor detectors for Super LHC. M. Bruzzi *et al.* Nucl. Instrum. Meth. A 541, 189 (2005).
- Tracking detectors for the sLHC, the LHC upgrade.
 H.F.-W. Sadrozinski and A. Seiden. Nucl. Instrum. Meth. A 541, 434 (2005)
- The Particle Tracking Microscope PTSM.
 H. F.-W. Sadrozinski *et al.* IEEE Trans. Nucl. Sci., 51(5): 2032-2036, 2004.
- 4. Ionization Damage on Atlas-SCT Front-End Electronics considering Low-Dose-Rate Effects. M. Ullan *et al.*, IEEE Trans. Nucl. Sci. 49:1106-1111, 2002.
- 5. The BaBar silicon vertex tracker, performance and running experience. V. Re et al., Nuclear Instruments and Methods A 485, 10(2002).

OTHER PUBLICATIONS

Search for CP Violation in the Decays D0 → K-K+ and D0 → pi-pi+.
 B. Aubert et al. (BaBar Collaboration), Phys. Rev. Lett. 100:061803 (2008).

- Evidence for D0-anti-D0 Mixing.
 B. Aubert *et al.* (BaBar Collaboration). Phys. Rev. Lett. 98:211802 (2007).
- 3. Search for D0-anti-D0 Mixing and Branching-Ratio Measurement in the Decay D0 → K+pipi0. B. Aubert *et al.* (BaBar Collaboration). Phys. Rev. Lett. 97:221803 (2006).
- 4. Limits on D0-anti-D0 mixing and CP violation from the ratio of lifetimes for decay to K-pi+, K-K+ and pi-pi+.
 B. Aubert *et al.* (BaBar Collaboration). Phys. Rev. Lett. 91:121801 (2003).
- Tracking at the SSC/LHC.
 H. F.-W. Sadrozinski, A. Seiden, A. Weinstein, Nuclear Instruments and Methods A 279, 223, 1998.

SYNERGISTIC ACTIVITIES

Author of a textbook on particle physics: "Particle Physics, A Comprehensive Introduction", published by Addison Wesley in 2005.

Have had significant service roles for US ATLAS, various laboratories, the US High Energy Physics Program and other areas of physics. Examples, with dates of service are given below.

2010		Member of DUSEL Program Advisory Committee
2009		Member of Particle Astrophysics Scientific Assessment Group
2005-	present	Manager, US ATLAS Upgrade Effort
2002-2	2007	Chair, Particle Physics Project Prioritization Panel
2001-2	2003	Chair of LIGO Program Advisory Committee
1994-2	2000	Member of CERN Scientific Policy Committee
		•

COLLABORATORS & OTHER AFFILIATIONS

a) Collaborators

I am a member of the ATLAS collaboration with approximately 3000 members. Recent individuals with whom I have worked closely include: Howard Gordon (BNL), Mike Tuts (Columbia), Maurice Garcia-Sciveres (LBNL), Carl Haber (LBNL), M. Gilchriese (LBNL), Phil Allport (Liverpool, U.K.), Nigel Hessey (Nikhef, Holland).

- **b)** Graduate Advisor Clemens Heusch, retired.
- c) Postdoctoral Advisor Pierre Darriulat, retired
- d) Advisees

Graduate Students: Michael Wilson, Christian Flacco, Ken Fowler, Peter Manning (current). Postdoctoral Scientists: Jovan Mitrevski, Sofia Chouridou.

James Thomas Shank

Physics Department	+1-617-353-6028
Boston University	+1-617-353-9393 (fax)
590 Commonwealth Ave	shank@bu.edu
Boston, MA 02215	

Professional Preparation

Undergraduate	Oakland University	Physics	BS, 1976
Graduate	University of California, Berkeley	Physics	PhD, 1988

Appointments

Research Professor	Boston University, Center for Computational Science	2006-present
	and Physics Department	
Research Associate Professor	Boston University, Physics Department	2000-2006
Research Assistant Professor	Boston University, Physics Department	1991-2000
Research Associate	Boston University, Physics Department	1988-91
Research Assistant	University of California, Berkeley Physics Department	1980-88
Teaching Assistant	University of California, Berkeley Physics Department	1976-79

Publications

- [1] Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC, 14 Aug 2010, Submitted to Physical Review Letters. <u>arXiv:1008.2461v1</u>
- [2] The ATLAS Detector: Status and Results from Cosmic Rays, James T. Shank for the ATLAS Collaboration, Proceedings of DPF-2009, Detroit, MI, July 2009, eConf C090726. <u>arXiv:0910.3081</u>
- [3] Expected Performance of the ATLAS Experiment Detector, Trigger and Physics, The ATLAS Collaboration, (Submitted on 28 Dec 2008 (v1), last revised 1 Apr 2009 (this version, v3)) <u>arXiv:0901.0512v3</u>
- [4] The ATLAS Experiment at the CERN Large Hadron Collider. August, 2008. JINST 3 S08003 http://www.iop.org/EJ/journal/-page=extra.lhc/jinst
- [5] The ATLAS Computing Technical Design Report. June, 2005. ATLAS-TDR-017, CERN-LHCC-2005-022 http://doc.cern.ch//archive/electronic/cern/preprints/lhcc/public/lhcc-2005-022.pdf
- [6] A Step Towards a Computing Grid for the LHC Experiments: ATLAS DATA CHALLENGE 1. By ATLAS DC1 Task force Collaboration (<u>R. Sturrock et al.</u>). CERN-PH-EP-2004-028, Apr 2004.24pp. Submitted to Nucl.Instrum.Methods
- [7] High-level Triggers in ATLAS. <u>A. Radu et al.</u> 2002. Prepared for 12th IEEE-NPSS Real Time Conference, Valencia, Spain, 4-8 Jun 2001. Published in IEEE Trans.Nucl.Sci.49:377-382,2002
- [8] Search for Charmless Hadronic Decays of B Mesons with the SLD Detector. By SLD Collaboration (Kenji Abe et al.). SLAC-PUB-8280, SCIPP-99-45, Oct 1999. 15pp. Published in Phys.Rev.D62:071101,2000
- [9] Detector and Physics Performance Technical Design Report, The ATLAS collaboration, LHCC 99-14/15 (1999)
- [10] Measurement of hadronic shower punchthrough in magnetic fields, C. Albajar, *et al.* Z. Phys.C69, 415-425, 1996
- [11] A UV Laser Technique for the Lorentz Angle Effect Compensation Studies in End-cap Cathode Strip Chambers Yu. Bonushkin *et al.* Nucl. Instr. Methods A367 (1995) 311-315.
- [12] Double Track Resolution of Cathode Strip Chambers, V. Gratchev et al.; Nucl. Instr. and Methods A365 (1995) 576-581.
- [13] Position and Timing Resolution Interpolating Cathode Strip Chambers in a Test Beam, G. Bencze et al., Nucl. Instr. and Methods A357 (1995) 40-54.
- [14] Test Beam Performance of a Tracking TRD Prototype. J. T. Shank et al., Nucl. Inst. Meth. A309:377 (1991).

Invited Talks/Conferences

The ATLAS Detector: Status and Results from Cosmic Rays. DPF2009, Meeting of the Division of Particle and Fields of the American Physical Society. 26-31 July, 2009.

To be published in the proceedings of DPF-2009, Detroit, MI, July 2009, eConf C090726.

Synergistic Activities

- Currently Deputy ATLAS Computing Coordinator.
- Co-Chair of the Experimental Particle Physics group of the "Workshop on the Scientific Challenges for Understanding the Quantum Universe and the Role of Computing at Extreme Scale" sponsored by the DOE ASCR/HEP.
- Member International Advisory Committee, Computing in High Energy Physics, 2009.
- Executive Project Manager for Computing and Physics Support in the U.S. ATLAS collaboration. (2003-2009)
- ATLAS Distributed Computing manager (2009)
- Chair of the ATLAS Computing Resource Management group.
- Recently elected by the ATLAS Collaboration Board:
 - Deputy Computing Coordinator (starting 1 March, 2010)
 - Computing Coordinator (starting 1 March, 2011)
- Member of the Open Science Grid governing Council.
- Member of the steering committees for the International Virtual Data Grid Laboratory and the Particle Physics Data Grid projects.
- Offline software coordinator for the ATLAS muon system 2002-2003.
- Deputy to the Assistant Project Manager for Physic and Computing, U.S. ATLAS collaboration 2000-2003.

Collaborators and Other Affiliations

(i) Collaborators and Co-Authors

The ATLAS Collaboration - http://atlas.web.cern.ch/Atlas/ORGANISATION/member_query.html

(ii) Graduate and Postdoctoral Advisors

Thesis title	Charmed Particle Pair and As	sociated Production at 20 GeV.
Thesis advisor	Harry Bingham (deceased)	University of CA, Berkeley.

Edwin Spencer Santa Cruz Institue for Particle Physics (SCIPP) UC Santa Cruz Department of Physics

PROFESSIONAL PREPARATION

University of California, Santa Cruz	Physics	B.S.	1984
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APPOINTMENTS

1995-present	Senior Development Engineer, Santa Cruz Institute for Particle
	Physics
1989-1995	Assistant Development Engineer, Santa Cruz Institute for Particle
	Physics

SELECTED PUBLICATIONS PERTINENT TO THIS PROPOSAL

- 1. The ATLAS Experiment at the CERN Large Hadron Collider, The ATLAS Collaboration, G. Aad *et al.*, *JINST* **3** (2008) S08003.
- 2. The integration and engineering of the ATLAS SemiConductor Tracker Barrel, A. Abdesselam *et al.*, *JINST* **3** P10006 (2008).
- 3. Engineering for the ATLAS SemiConductor Tracker (SCT) End-cap, A. Abdesselam *et al.*, *JINST* **3** P05002 (2008).
- 4. Evaluation of silicon-germanium (SiGe) bipolar technologies for use in an upgraded ATLAS detector, M. Ullán *et al.*, *Nucl. Instrum. Meth*ods A604, 668 (2009).
- 5. The ATLAS semiconductor tracker end-cap module, A. Abdesselam *et al.*, *Nucl. Instrum. Methods* **A575** 353 (2007).

SYNERGISTIC ACTIVITIES

Engineer responsible for grounding and shielding design for the Insertable B-Layer (IBL) upgrade of the ATLAS Detector. Electronics System Engineer for the SCT sub-detector of the ATLAS Detector. Architect of the grounding and shielding design of the SCT sub-detector of the ATLAS Detector now successfully operating at the CERN Laboratory.

COLLABORATORS

The ATLAS collaboration (see:<u>http://graybook.cern.ch/programmes/experiments/lhc/ATLAS.html</u>)

Ryszard Stroynowski

Education

Ph.D. in Physics, 1973, University of Geneva, Switzerland.			
	M.Sc. in Physics, 1968, University of Warsaw, Poland.		
	Employment	t	
	Since 1993	Professor, SMU, Dallas, TX 75275.	
	1991-1993	Associate Professor, SMU, Dallas, TX 75275.	
	1983-1991	Senior Research Associate, Caltech, Pasadena, CA 91125.	
	1987	Lecturer, Caltech, Pasadena, CA 91125.	
	1980-1983	Senior Research Fellow, Caltech, Pasadena, CA 91125.	
	1975-1980	Research Associate, SLAC, Stanford, CA 94305.	
	1970-1975	Staff Physicist, CERN, Geneva, Switzerland.	
	1969-1970	Visiting Scientist, CERN, Geneva, Switzerland.	
	1968-1969	Assistant, University of Warsaw, Poland.	
	Short visits		
	1997+2002	Professeur Invite, Academie de Versailles and Laboratoire d'Accelerateur	
		Lineaire, Orsay, France.	
	1986	Visiting Professor, University of California Los Angeles.	
	1983	Visiting Professor: Enseignement du troisieme cycle de la physique,	
		Lausanne, Switzerland.	
	1972	University of Helsinki, Helsinki, Finland.	
	1969	Niels Bohr Institute, Copenhagen, Denmark.	
	Societies		
	Fellow:	American Physical Society.	
	Mombor	Society of Physics Students	

Member: Society of Physics Students.

Synergistic activities

PI of the SMU Experimental Particle Physics program, since 1991. Level-2 Manager for the US-ATLAS Liquid Argon Calorimeter, 1996-2010. Member ATLAS Collaboration Board Advisory Group 2002-2005. US Representative to the Steering Committee, NATO Science for Peace Program 1997-2004. Gerald L. Ford Research Fellowship and Medal, 2006. Chair, Department of Physics, SMU, 2007-2010.

Research experience

	T
2007 -	ebubble
1997 –	ATLAS at LHC.
1990-2004	CLEO at CESR.
1991-1993	GEM at SSC.
1985-1989	MARK II at SLC.
1980-1984	DELCO at PEP.
1975-1980	SLAC E-127 experiment (LASS Spectrometer).
1973-1975	Split Field Magnet Facility at ISR, CERN.
1967-1972	Bubble chamber experiments at CERN and Fermilab.

Research interests

Higgs boson, physics beyond the Standard Model, physics of the tau lepton, solar neutrinos

Selected publications

Full list contains over 600 items published in refereed journals. Notes representing various activities are:

1) Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC. G. Aad et al., Phys.Lett.B688:21-42,2010.

2) Prospects for the discovery of the standard model Higgs boson using the H ---> gamma gamma decay. ATLAS Collaboration C. Adam Bourdarios et al., ATL-PHYS-PUB-2009-053, ATL-COM-PHYS-2009-204, May 2009.

3) The ATLAS Experiment at the CERN Large Hadron Collider, G. Aad et al, JINST 3 (2008) S080003.

4) Construction, Assembly and Tests of the ATLAS Electromagnetic Calorimeter. B. Aubert et al., NIM.A5583, 2006.

5) Radiation qualification of the front-end electronics for the readout of the ATLAS liquid argon calorimeters. N. J. Buchanan et al,, JINST 3 P10005 (2008).

6) Search for new particles in two-jet final states in 7 TeV proton-proton collisions with ATLAS detector at LHV, Physics Letters 103, 161801 (2010).

7) Observation of a centrality=dependent dijet asymmetry in lead-lead collisions at 2.76 TeV with ATLAS detector at the LHC. G. AAd et al, Phys. Rev. Lett. 105, 252303 (2010).

8) Neutrinoless tau decays. Nucl. Phys. B76, 185-191 (1999).

9) The tau lepton and its neutrino. R. Stroynowski and A. Weinstein, Annu. Rev. Nucl. Part. Sci.43,457-528 (1993).

10) First measurement of the rate for the inclusive radiative penguin decay $b \rightarrow s+g$. M. S. Alam et al., Phys. Rev. Lett.74, 2885 (1993).

Graduate advisors: R. Mermod, (University of Geneva) & D. R. O. Morrison (CERN)

Postdoctoral sponsors: D.R.O. Morrison (CERN), G. Charpak (CERN), D. Leith (SLAC), B. Barish (Caltech)

Graduate Students Advised at Caltech: Max Marshall, Eric Soderstrom, Andrew Weir, Hitoshi Yamamoto, M. Chadha

Graduate Students Advised at SMU: Pavel Zadorozhny, M.Sc. 1994, Guoheng Wei, M.Sc. 1995, Igor Volobouyev, Ph.D. 1997, Vasili Shelkov, Ph.D. 2997, Ilia Korolkov, Ph.D.1999, Vitaliy Fadeyev, Ph.D. 2000, Ilya Narsky, Ph.D. 2001, Yuri Maravin, Ph.D. 2002, Ana Firan, Ph.D. 2008. Y. Li, Ph.D. 2010, R. Daya, R. Ishmukhametov, R. Rios

Postdocs Supervised at Caltech: C. Hawkes, E. Wicklund, J. McKenna, B. Milliken, M. Kuhlen, D. Akerib, D. Cowen, J. Urheim, G. Eigen, S. Sherman

Postdocs supervised at SMU: J. Dominick, M. Lambrecht, S. Sanghera, J. Staeck, J. Ye, T. Wlodek. E. Barberio, J. Hoffman, D. Joffe, F. Liu, S. Simion, D. Goldin, A. Firan, H. Hadavand

Biographical Sketch Anyes Taffard

PROFESSIONAL PREPARATION:

Institut Universitaire de Technologie, France	Computer Sciences	D.U.T. 1994
Brunel University, U.K.	Physics	Master 1998
University of Liverpool, U.K.	Physics	Ph.D. 2002
University of Illinois, Urbana, U.S.A.	Physics	Postdoc 2003-2006

APPOINTMENTS:

University of California, Irvine		
Assistant Professor	Dept. of Physics and Astronomy	January 2007
University of Liverpool, U.K.		-
PPARC Research Fellow	Dept. of Physics	2002-2003
University of Liverpool, U.K.		
Research Associate	Dept. of Physics	2001-2002

PUBLICATIONS:

Publications closely related to the proposed project:

- 1. "Measurement of the top quark-pair production cross section with ATLAS in pp collisions at $\sqrt{s=7/TeV}$ ", The ATLAS Collaboration, arXiv:1012.1792, Submitted to EPJC.
- 2. The CDF Collaboration, "Search for Standard Model Higgs Boson Production in Association with a W Boson at CDF", Phys. Rev. D78 (2008) 032008
- 3. The CDF Collaboration, "First Measurement of the Production of a W Boson in Association with a Single Charm Quark in Proton Anti-proton Collisions at $\sqrt{s} = 1.96$ TeV" Phys. Rev. Lett. **100** (2008) 091803
- 4. The CDF Collaboration, "Search for anomalous semileptonic decay of heavy flavor hadrons produced in association with a W boson at CDF II". Phys.Rev.D 73, (2006) 051101.
- 5. The CDF Collaboration, "Measurement of the $t\bar{t}$ production cross-section in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV using lepton plus jets events with semileptonic B decays to muons", Phys.Rev.D 72, (2005) 032002.

Other significant publications:

- 1. The CDF Collaboration, "Observation of B_s^o anti- B_s^o oscillations". Phys.Rev.Lett 97, (2006) 062003.
- 2. The CDF Collaboration, "Search for H to b anti-b produced in associations with a W boson in p anti-p collisions at $\sqrt{s} = 1.96$ TeV", Phys.Rev.Lett **96**, (2006) 081803.
- 3. The CDF Collaboration, "Top quark mass measurement using the template method in the lepton+jets channel at CDFII", Phys.Rev.D **73**, (2006) 032003.
- 4. The CDF Collaboration, "First measurements of inclusive W and Z cross sections from Run II of the Tevatron collider", Phys.Rev.Lett **94**, (2005) 091803.

 R. Downing,, N. Eddy, L. Holloway, M. Kasten, H. Kim, J. Kraus, C. Marino, K. Pitts, J. Strologas, A. Taffard, for the CDF collaboration, *"Track Extrapolation and Distribution for the CDF-II Trigger System"*, NIM A570:36-50, 2007

SYNERGISTIC ACTIVITIES:

- ATLAS editor for conference note and publication for Winter 2011
- Missing Transverse Energy liaison for ATLAS Top working group
- US-ATLAS Executive Board, 2008-Present
- US-ATLAS: IB chair election committee (2010), Cola review committee (2009).
- Top Properties co-convener, U.S. CDF Collaboration, 2005-2007
- Review committee member for the CDF publications (2009, 2010).
- UCI graduate admission committee (2007-present)

COLLABORATORS & OTHER AFFILIATIONS:

Collaborators and Co-Editors (last 5 years):

Collaborators: ATLAS Collaboration, CDF Collaboration, DELPHI Collaboration **Direct Collaborators:**

Prof. Andrew Lankford, University of California, Irvine

Prof. Daniel Whiteson, University of California, Irvine

Prof. Tony Liss, University of Illinois, Urbana

Prof. Kevin Pitts, University of Illinois, Urbana

Thesis and Postdoctoral Advisor:

Brokk Toggerson, University of California, Irvine (graduate student) Steve Farrell, University of California, Irvine (graduate student) Matt Relich, University of California, Irvine (graduate student) Cristobal Cuenca (postdoc Yale University) Hideki Okawa, University of California, Irvine (postdoc)

Biographical Sketch of **Daniel Whiteson**

Professional Preparation

University of Pennsylvania Postdoctoral Research Fellow, CDF experiment	2003-2007
University of California, Berkeley Ph.D. Physics, D0 experiment	1998-2003
Niels Bohr Institute, University of Copenhagen Fulbright Fellow, DELPHI experiment	1997-1998
Rice University B.A. Physics, Computer Science	1993-1997
 <u>Appointments</u> University of California, Irvine Assistant Professor, Department of Physics & Astronomy <u>Selected Publications</u> "Discovering Majorana neutrinos produced via a Z boson at hadron <i>Rev., D81:071301, 2010.</i> Search for New Bottomlike Quark Pair Decays QQ (tW)(tW) 	
 Search for New Bottomike Quark Fail Decays QQ ((tw)) (tw) Same-Charge Dilepton Events." <i>Phys. Rev. Lett.</i>, 104:091801, 20 "Tevatron Discovery Potential for Fourth Generation Neutrinos: Dirac, Majorana and Everything in Between". <i>Accepted Phys. Re</i> "Direct Mass Limits for Chiral Fourth-Generation Quarks in All M <i>Accepted Phys. Rev. Lett.</i>, 2010. "Search for the associated production of the standard model Higgs hadronic channel", <i>submitted to Phys. Rev. Lett</i> (2009) "Machine learning for event selection in high energy physics", <i>En</i> of 	010. ev. D, 2010 lixing Scenarios". boson in the all-
 Artificial Intelligence (2009) "Search for maximal flavor violating scalars in same-charge leptor collisions at \$\sqrt{s} = 1.96\$ TeV", <i>Physical Review Letters 20</i> "Top quark mass measurement with dilepton events using neuro-evente <i>Review Letters 2009</i> "Tevatron signatures of MxFV models", <i>Physical Review D 2008</i> "Probing the Standard Model with Dilepton Events", <i>Modern Phys No. 38, 2007</i> "Stochastic Optimization for Event Selection in Top Quark Mass International Applications of Artificial Intelligence, 2007 "Top quark mass measurement from dilepton events at CDF II", <i>Physical 2008</i> 	09 volution", <i>Physical</i> sics Letters A - Vol. 22, Measurement",

Synergistic Activities CDF Statistics Committee UC Irvine Physics Department, Graduate Education Committee Fermilab Colloquium Committee Tevatron University Dean University of Chicago Lab School, substitute physics teacher Numerous public lectures Liquid Nitrogen Demonstrations, area elementary schools

<u>Collaborations:</u> CDF, D0 and ATLAS collaborations

<u>Post-doctoral advisor</u> Prof. H.H. Williams, University of Pennsylvania

<u>Graduate Advisor</u> Prof. Mark Strovink, University of California, Berkeley

Direct Collaborators

Prof. Max Welling, University of California, Irvine
Prof. David Gerdes, University of Michigan
Prof. Ashutosh Kotwal, Duke University
Prof. I Joseph Kroll, University of Pennsylvania
Prof. Andrew Lankford, University of California, Irvine
Prof. Anyes Taffard, University of California, Irvine
Prof. Shimon Whiteson, University of Amsterdam

Biographical Sketch Stephane Willocq Born: 13 Dec 1963

Professional Preparation

SLAC, Stanford U.	Experimental HEP	1995-1998
Yale University	Experimental HEP	1993-1995
Tufts University	Physics	PhD, 1992
Univ. Libre de Bruxelles	Physics	BS, 1985

<u>Appointments</u>

2010-present	Professor of Physics, U. Massachusetts-Amherst
2010-present	Deputy Manager US ATLAS Physics Support & Computing
2009-present	Co-Chair of ATLAS Speakers Committee Advisory Board
2007-2009	ATLAS Muon Software Coordinator
2005-2007	ATLAS Muon Reconstruction Coordinator
2004-2010	Associate Professor of Physics, U. Massachusetts-Amherst
1999-2004	Assistant Professor of Physics, U. Massachusetts-Amherst

Publications – closely related to proposed project

- 1. The ATLAS Experiment at the CERN Large Hadron Collider, The ATLAS Collaboration, G. Aad et al., JINST 3 (2008) S08003.
- Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Lett. B 688, issue 1, 21 (2010).
- 3. Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 161801 (2010).
- Measurement of the W -> Inu and Z/gamma* -> II production cross sections in proton-proton collisions at √s = 7 TeV with the ATLAS detector, ATLAS Collaboration, accepted by JHEP (2010).
- 5. Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 252303 (2010).

Publications – other significant publications

- Measurement of the B → Xs I+ I- branching fraction with a sum over exclusive modes, BaBar Collaboration, Phys. Rev. Lett. 93, 081802 (2004).
- 2. Search for time-dependent B0s B0sbar oscillations using a vertex charge dipole technique, SLD Collaboration, Phys. Rev. D **67**, 012006 (2003).
- Measurement of the B → K* gamma branching fractions and charge asymmetries, BaBar Collaboration, Phys. Rev. Lett. 88, 221803 (2002).
- 4. Highlights of the SLD physics program at the SLAC Linear Collider, with P.C. Rowson and D. Su, Ann. Rev. Nucl. Part. Sci. **51**, 345 (2001).

Synergistic Activities

US ATLAS Deputy Manager for Physics Support & Computing; ATLAS Physics Review Committee for Upsilon observation and lepton-jet search; ATLAS Muon software validation coordinator; Main organizer for New England Particle Physics Student Retreat.

Collaborators

The SLD collaboration (see <u>http://www-sld.slac.stanford.edu/sldwww/sld.html</u>) The BaBar collaboration (see <u>http://www-public.slac.stanford.edu/babar/</u>) The ATLAS collaboration (see http://graybook.cern.ch/programmes/experiments/lhc/ATLAS.html)

Graduate and Postdoctoral Advisors

Prof. Jacob Schneps (Tufts U), Prof. Charles Baltay (Yale U), Dr. Blair Ratcliff (SLAC)

Thesis Advisor and Postgraduate-Scholar Sponsor

Tulin Varol (PhD student), Emily Thompson (PhD student), Niels van Eldik (postdoc), Martin Woudstra (postdoc), Karsten Koeneke (CERN), Ventzislav Koptchev (former PhD student), Hermann Staengle (former postdoc), Cheng-Ju Lin (LBNL)

Biographical Sketch Jingbo Ye Born: 3/17/1964

Professional Preparation		
University of Science and Technology of China (USTC)	Physics	B.Sc., 1986
USTC, ETH, Zurich and IHEP Beijing	Physics	Ph.D., 1992

Appointments

2009-present	Tenured Associate Professor in Physics and EE, SMU, Dallas, Texas.
2004-2009	Assistant Professor in Physics and Electrical Engineering, SMU, Dallas, Texas.
1998-2004	Senior Research Associate in Physics, SMU, Dallas, Texas.
1995-1998	Postdoctoral Research Associate in Physics, SMU, Dallas, Texas.
1993-1995	Scientific Associate, CERN, Geneva, Switzerland.
1992-1993	Lecturer, USTC, China.

Professional experience

I am an experimental particle physicist. From 1989 to 1995 I worked in L3 at LEP on detector simulation, physics data analysis, software development and maintenance. From 1995 to 1998 I worked in CLEO at CESR on detector development for the CLEO III upgrade. Since 1998, I have been a member of ATLAS at LHC. I coordinated the design and construction of the optical link system for the Liquid Argon Calorimeter (LAr) front-end readout. I now lead R&D programs at SMU for upgrades in ATLAS for the sLHC and for LATPC front-end readout in LBNE.

Hardware projects and Research Infrastructure establishments at SMU:

- I am the Principal Investigator (PI) for the R&D programs at SMU. In this program we successfully developed a 5 Gb/s serializer and a 5 GHz phase-locked-loop for high speed serial data transmission in particle physics experiments.
- I am PI at SMU and in the steering group of the Versatile Link collaboration to develop radiation tolerant optical transceivers that conform to industrial standards.
- From 2000 to 2007, I coordinated an international team which designed, constructed, installed and commissioned the radiation tolerant optical links for the ATLAS LAr readout system. I am responsible for this link's maintenance and operation at SMU.
- In 1998 I established the Optoelectronics laboratory in the Department of Physics at SMU. The ATLAS LAr optical link project and other projects were carried out in this lab. In 2006, I added to this lab the capability to design and develop ASIC chips. I maintain full responsibility for this lab since 2004. Projects in this lab now support three engineers, one technician and a few graduate students from both the Physics and the Electrical Engineering Departments.

Physics Data Analyses and Other Research Activities at SMU:

- I advised one postdoc in the following studies in ATLAS: searches for the Higgs particles in its $Z\gamma$ decay channel, in its Z or W associate production and in its WW decay channel.
- I co-supervised Ph.D. students in the search for the Dirac magnetic monopole with the ATLAS detector, and in DiBoson physics studies (Zγ and ZZ channels) with the ATLAS (MC) data. I also supervised Master students in the following studies: *"A Time to Digital Converter Implemented in FPGA"*; *"The Production Cross Section Calculation of the Dirac Magnetic Monopole Production through the Two Photon Process"*; *"The Experimental Studies and GEANT4 Based Monte Carlo Modeling on Radiation Effects of Silicon-on-Sapphire Semiconductor Devices"*.
- Since 2008, I am the PI for the Advanced Detector Research (ADR) program supported by the Department of Energy on the "Evaluation of the 0.25 µm Silicon-on-Sapphire technology for ASIC developments for future particle physics detector front-end readout systems".

Publications - closely related to proposed project

- J. Ye on behalf of the ATLAS Liquid Argon Calorimeter Group, "A Serializer ASIC at 5 Gbps for Detector Front-end Electronics Readout", presented at the XIV International Conference on Calorimetry in High Energy Physics, May 10-14, 2010, Beijing, China.
- With T.Liu, D. Gong, A. Xiang, C. Liu and M. King, *et al.*, presented at the Topical Workshop on Electronics for Particle Physics, Sep. 20-24, 2010, Aachen, Germany, and submitted to JINST for publications: "A 4.9-GHz Low Power, Low Jitter, LC Phase Locked Loop", "A 16:1 Serializer ASIC for Data Transmission at 5 Gbps", "Link Model Simulation and Power Penalty Specification of Versatile Link Systems", "Design and Verification of a Bit Error Rate Tester in Altera FPGA for Optical Link Developments", "R&D Towards Cryogenic Optical Links", "Response of a Commercial 0.25 µm Thin-Film Silicon-on-Sapphire CMOS Technology to Total Ionizing Dose".
- With B. Arvidsson *et al.*, "The radiation tolerance of specific optical fibres exposed to 650 kGy(Si) of ionizing adiation", JINST 4 P07010 (2009).
- With A.Firan *et al.*, "Search for Magnetic Monopoles using the ATLAS Detector" ATL-COM-PHYS-2008-208
- With N.J.Buchanan *et al.*, "Design and Implementation of the Front End Board for the readout of the ATLAS liquid argon calorimeters", JINST 3, P03004 (2008) and with A. Bazan *et al.*, "Atlas Liquid Argon Calorimeter Back End Electronics", JINST 2, P06002 (2007)
- D.Goldin and J.Ye, "Survey of Higgs Production in Association with W and Z bosons", ATL-COM-PHYS-2007-064
- With M.-L. Andrieux *et al.*, "Single-event upset studies of a high-speed digital optical data link", Nucl. Instrum. Meth. A 456 (2001) 342-351.

Publications - other significant publications

- J.Ye *et al.*, "Radiation Resistance of Single Frequency 1310-nm AlGaInAs-InP Grating-Outcoupled Surface-Emitting Lasers", Photonics Technology Letters,Vol.18,No 1, Jan. 2006, pp148-150.
- T.Coan, T.Liu and J.Ye, "A compact apparatus for muon lifetime measurement and time dilation demonstration in the undergraduate laboratory", Am. J. Phys. 74 (2), Feb. 2006, p.161 164.
- With R.J.Mountain *et al.*, "The CLEO III ring imaging Cherenkov detector", Nucl. Instrum.Meth. A 433 (1999) 77
- With M. Acciarri *et al.*, "Tests of QED at LEP Energies using $e^+e^- \rightarrow \gamma\gamma(\gamma)$ and $e^+e^- \rightarrow l^+l^-\gamma\gamma$ ", Phys.Lett. B 353 (1995) 136.
- J. Ye, "Meas. of Photon Polarization from 3γ Annihilation of Orthopositronium", Phys.Lett. A 133 (1988)309.

Synergistic activities: I am a member of ATLAS and LBNE. I am the deputy L2 manager for US-ATLAS LAr upgrade program for sLHC. I am the ATLAS coordinator in the Joint ATLAS-CMS Optoelectronics Working Group to address common issues in development of radiation tolerant optical links.

<u>Collaborators</u>: Close collaborations with BNL, Columbia University, CERN and Oxford.

Graduate advisors: X.W.Tang (USTC), J.Ulbricht (ETH) and H.S.Chen (IHEP)

<u>Graduate students advised at SMU</u>: Y.He, T.Dougall, J.Norton, A.Firan, Z.Liang and Y.Li.

Postdocs supervised at SMU: D.Goldin and A.Firan

SAUL YOUSSEF

Professional Preparation

Undergraduate: Carnegie-Mellon University, Physics, B.S., 1977. Graduate: Carnegie-Mellon University, Physics, Ph.D., 1982. Postdoctoral: Columbia University, High Energy Physics, 1982-1986.

Appointments

Research Associate Professor, Center for Computational Science, Boston University, 2000-present. Research Scientist, SCRI, Florida State University, 1996-1999. Associate Research Scientist, SCRI, Florida State University, 1990-1996. Assistant Research Scientist, SCRI, Florida State University, 1987-1990.

(i) Publications most closely related to the proposal

The ATLAS Experiment at the CERN Large Hadron Collider, Journal of Instrumentation, 3 S08003 (2008), by the ATLAS collaboration.

The ATLAS Simulation Infrastructure, European Physical Journal C, Volume 70, Number 3, 823-874 (2010), by the ATLAS collaboration.

Study of Jet Shapes in Inclusive Jet Production in pp Collisions at sqrt(s)=7 TeV using the ATLAS Detector, submitted to Phys. Rev. D (2010), by the ATLAS Collaboration.

(ii) Five other significant publications

S.Youssef, J.Brunelle, J.Huth, D.C.Parkes, M.Seltzer and J.Shank, *Minimal Economic Distributed Computing*, arXiv:0902.4730v1, 2009.

S.Youssef, Is complex probability theory consistent with Bell's theorem?, Phys. Lett. A204, 18, 1995. S.Youssef, *Physics with exotic probability theory*, hep-th/0110253, 2001.

S. Abachi et al., Observation of the Top Quark, S. Abachi et al., Phys. Rev. Lett. 74, 3548 (1995).

S.Youssef, *Prospects for Category Theory in Aldor*, Categorical Programming Languages Workshop, University of Western Ontario, London, Canada, July 2001.

Synergistic Activities

- Member of the ATLAS collaboration;
- Manager of the U.S. ATLAS Northeast Tier 2 center;
- Author of software for general use in high energy physics including *Egg* (distributed computing) and *Pacman* (software installation);
- Taught courses in mathematical physics and computational physics at Boston University;
- PI of the ITR funded Egg project involving physicists and computer scientists;
- Recent seminars about the Egg project at Harvard University, Tufts University, Boston University and Argonne National Laboratory.
- Co-founded FreeHEP organization with Tony Johnson of SLAC;

Collaborators and other affiliations

The ATLAS Collaboration: http://atlas.web.cern.ch/Atlas/ORGANISATION/member_query.html

Graduate and Postdoctoral Advisors

My thesis advisor was Professor Robert Kraemer of Carnegie-Mellon University. My post-doctoral advisor was Professor Paolo Franzini of Columbia University.

Biographical Sketch Bing Zhou

Physics Department The Univ. of Michigan Ann Arbor, MI 48109 bzhou@umich.edu

<u>Education</u>

Ph.D 1987 BS 1982	Physics Physics	M.I.T. Univ. of Sci. and Tech. of China
<u>Appointments</u>		
2002 – Present	Professor of Physi	cs, the Univ. of Michigan
1998 – 2002	Associate Profess	or of Physics, the Univ. of Michigan
1997 – 1998	Associate Profess	or of Physics Boston University

1997 – 1998	Associate Professor of Physics, Boston University
1991 – 1997	Assistant Professor of Physics, Boston University
1990 – 1991	Research Assistant Professor, Boston University
1992 – 1993	L3 experiment EX Committee member
1992 – 1993	Leader for L3 Silicon detector integration and test
1991 – 1997	Leader for L3 SMD radiation monitor system
1997 – 2001	US ATLAS Muon Software Coordinator
1999 – 2001	ATLAS EX Committee member
2005 – 2007	ATLAS Muon Steering Group member
2000 – 2005	US ATLAS Muon MDT Detector Production Project Leader
2005 – 2009	Co-leader for US ATLAS Muon system calibration
2005 – 2009	Associate Chair for Research, Physics Department, UM
2010	ATLAS Speaker Committee member

Awards and Honors

1990 – 1991	SSC Fellowship for postdoctoral Physicists
1992 – 1993	SSC Fellowship for Junior Faculty
1994 – 1995	NSF Career Advancement for Woman Scientist
2001	Elected APS Fellow
2004 – 2005	CERN Scientific Fellow

Publications – closely related to proposed project

- 1. The ATLAS Experiment at the CERN Large Hadron Collider, The ATLAS Collaboration, G. Aad et al., JINST 3 (2008) S08003.
- Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Lett. B 688, issue 1, 21 (2010).
- Search for New Particles in Two-Jet Final States in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 161801 (2010).

- Measurement of the W -> Inu and Z/gamma* -> II production cross sections in proton-proton collisions at √s = 7 TeV with the ATLAS detector, ATLAS Collaboration, accepted by JHEP (2010).
- 5. Observation of a centrality-dependent dijet asymmetry in lead-lead collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Rev. Lett. 105, 252303 (2010).

Publications – other significant publications

- 1. Search for the Standard Model Higgs Boson In e+e- interactions at 161 GeV $< \sqrt{s} < 172$ GeV, L3 Collaboration, Phys. Lett. B411 (1997) 373.
- 2. Direct Measurement of the W Boson Decay Width with the D0 Experiment, D0 Collaboration, Phys. Rev. D66 (2002) 032008.
- A Measurement of the ppbar → WZ+X Cross-section at √s = 1.96 TeV and limits on WWZ trilinear Gauge Couplings, D0 Collaboration, Phys. Rev. D76, (2007) 111104.
- 4. The First Precision Chambers for ATLAS Muon Spectrometer, Nucl. Instr. & Methods, A 487 (2002) 153.
- 5. Large Precision Muon Detector for ATLAS, Nucl. Instr. & Meth. A494 (2002) 464.

Synergistic Activities

DOE/NSF ILC Detector R&D review panel (2006 – 2009); The Organization Committee member for NSF PATHWAYS program to encourage high school girls to study nature science in universities (1994 – 1995). Given numerous lectures in HEP summer schools in China (1997, 2010) and interviews on LHC/ATLAS (for Michigan radio stations and news papers).

Current Collaborators

The D0 collaboration (see <u>http://www-d0.fnal.gov/~madaras/authorlist.html</u>) The ATLAS collaboration (see <u>http://graybook.cern.ch/programmes/experiments/lhc/ATLAS.html</u>)

Postdoctoral Advisors

Professor S. Hou (Central Research Institute, Taiwan), Professor Z. Zhao (USTC, China), Professor X. Zhang (USTC, China), Dr. Q. Xu (Fermilab), Dr. M. Cirilli (CERN), Dr. E. Diehl (UM), Dr. H. Yang (UM)

<u>Ph. D. Thesis Advisor</u>

Joel Goldstein (L3 experiment), Jianguo Xu (L3 experiment), James Degenhardt (D0 experiment), Qichun Xu(D0 experiment), Alan Wilson (D0 experiment), Xufei Li (ATLAS experiment), Alex Burgers(ATLAS experiment), Yusheng Wu (ATLAS experiment)

Biographical Sketch Junjie Zhu Born: 2/2/1980

Professional Preparation

University of Science and Technology of China	Applied physics	BS, 07/2000
University of Maryland	Physics	PhD, 10/2004

<u>Appointments</u>

2010 - present	Assistant professor, University of Michigan
2009 - 2010	Research scientist, SUNY Stony Brook
2004 - 2009	Research associate, SUNY Stony Brook

Publications – closely related to proposed project

- 1. Measurement of direct photon pair production cross sections in ppbar collisions at $\sqrt{s=1.96}$ TeV, Phys. Lett. B **690**, 108 (2010).
- 2. Measurement of the W boson width, Phys. Rev. Lett 103, 231802 (2009).
- 3. Measurement of the W boson mass, Phys. Rev. Lett. 103, 141801 (2009).
- 4. Search for resonant diphoton production with the DØ detector, Phys. Rev. Lett. **102**, 231801 (2009).
- 5. Measurement of W boson charge asymmetry in electron channel, Phys. Rev. Lett. **101**, 211801 (2008).
- 6. Measurement of the forward-backward asymmetry and extraction of $\sin^2 \theta_W$ in $Z/\gamma^* \rightarrow ee$ events produced at $\sqrt{s=1.96}$ TeV, Phys. Rev. Lett. **101**, 191801 (2008).
- 7. Measurement of the shape of the boson transverse momentum distribution in $Z/\gamma^* \rightarrow ee$ events produced at $\sqrt{s=1.96}$ TeV, Phys. Rev. Lett. **100**, 102002 (2008).
- 8. A novel method for modeling the recoil in W boson events at hadron colliders, Nucl. Instrum. and Meth. A **609**, 250 (2009).
- 9. The DØ Run II impact parameter trigger, submitted to Nuclear Instruments and Methods A, physics/0701195.

<u> Publications – others</u>

- 1. Tevatron-for-LHC report: top and electroweak physics, Fermilab-CONF-07-052.
- 2. Updated combination of CDF and D0 results for the mass of the W boson, Fermilab-TM-2439-E, arXiv:0908.1374.
- 3. Recent electroweak results at the Tevatron, Fermilab-CONF-09-364.
- 4. A precision measurement of the W boson mass at D0, Fermilab-CONF-09-291.
- 5. Combination of CDF and D0 results on the W boson width, Fermilab-TM-2330-E.
- 6. Direct measurement of the W width in ppbar collisions at \sqrt{s} =1.96 TeV, International Journal of Modern Physics A, Vol 20, No. 15 (2005).

<u>Awards</u>

1. June 2009, Alvin Tollestrup award for outstanding postdoctoral researcher at Fermilab, Universities Research Association

"for his outstanding work on the measurement of the mass of the W boson"

2. January 2008, Martin and Beate Block award, Aspen Center for Physics

- 3. January 2008, Travel support for Aspen meeting
- 4. May 2004, Travel support for APS meeting
- 5. June 2000, USTC Undergraduate Student Excellence Award
- 6. September 1999, Liu Yong-Lin (Elite) Prize
- 7. September 1998, Excellent Student Scholarship
- 8. September 1997, Japanese Enterprise Communication Prize

Research Positions

2008-2010	Convener of electroweak physics group at DØ
2008-2009	Convener of W and Z boson properties group at DØ
2005-2010	Leader of Silicon Track Trigger (STT) group
2003-present	Member of the Tevatron Electroweak Working Group
2004-2007	MC representative of electroweak physics group

Conference, Seminar and Colloquium Talks

RBRC workshop at BNL (2010), Aspen physics meeting (2010), Fermilab (2010), Rutgers University (2009), CTEQ workshop (2009), Argonne (2009), SLAC (2009), Fermilab Users meeting (2009), CIPANP (2009), Texas A&M (2009), Yale (2009), MSU (2009), FSU (2009), KSU (2009), BNL (2008), University of Mich (2008), ISU (2008), University of Washington (2008), SMU (2008), Fermilab Joint Experimental Theoretical Seminar (2008), University of Chicago (2008), PHENO (2008), Aspen physics meeting (2008), Northwestern (2007), MSU (2007), USTC (2006), University of Chicago (2004), DPF (2004), APS meeting (2004), Lepton and Photon (2003)

Synergistic Activities

Graduate student mentorship: directly mentored eight graduate students for their thesis work at $D \ensuremath{\varnothing}$

Electroweak physics and STT group leaders: helped to advise about 20 graduate students and postdocs for their physics analyses and service work at DØ

Collaborators

The DØ collaboration (see <u>http://www-d0.fnal.gov/atwork/index.html</u>) The ATLAS collaboration (see <u>http://atlas.web.cern.ch/Atlas/Collaboration/</u>)

Graduate and Postdoctoral Advisors

Nicholas Hadley and Sarah Eno (University of Maryland) John Hobbs, Paul Grannis and Robert McCarthy (SUNY, Stony Brook)

Thesis Advisor and Postgraduate-Scholar Sponsor

Lulu Liu, Jiaming Yu, Sara Borroni

SUMMARY PROPOSAL BUDG	ET	E <u>AR</u>	FOF	R NSF USE C	ONLY	1
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P. Michael Tuts						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths	Funds Requested E	3v 1	Funds granted by I
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6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (1) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
1. (0) POST DOCTORAL SCHOLARS 2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00		<u>0.00</u> 0.00		-	
3. (0) GRADUATE STUDENTS	51.00	0.00	0.00	409,0	0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				80.5		
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				490,1	-	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				140,8		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				630,9		
TOTAL EQUIPMENT	SSIONS	<u></u>		43,0		
	ESSIONS)			000 0 937	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	i)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0 937 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 937 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 937 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			8		0 937 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3	7,9	0 937 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3	7,969,8	0 937 0 0 0 0 0 876	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>	7,969,4	0 937 0 0 0 0 0 876 857	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3 	7,969,8 998,8 8,968,7	0 937 0 0 0 0 876 857 733	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ORSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>	7,969,4	0 937 0 0 0 0 876 857 733	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>	7,969,8 998,8 8,968,7	0 937 0 0 0 0 876 857 733	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Off campus rate (Rate: 26.0000, Base: 7937) (Cont. on Comments Page)			3	7,969,8 998,8 8,968,7	0 937 0 0 0 0 0 876 857 733 628	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			3	7,969,8 998,8 9,650,6	0 937 0 0 0 0 0 876 857 733 628 372	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Off campus rate (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A)<			<u>}</u>	7,969,8 998,8 9,650,1 349,5	0 937 0 0 0 0 0 876 857 733 628 372	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Off campus rate (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			S	7,969,8 998,8 9,650,1 349,5	0 937 0 0 0 0 0 0 0 876 857 733 628 827 332 628 8372 000 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Off campus rate (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) OTAL INDIRECT AND IN		T COSTS		7,969,8 998,8 9,650,0 349,3 10,000,1	0 937 0 0 0 0 0 0 0 876 857 733 628 827 332 628 8372 000 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Off campus rate (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS		T COSTS	NT \$	7,969,8 998,8 9,650,0 349,3 10,000,1	0 937 0 0 0 0 0 0 876 857 733 628 372 000 0 0 000	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Off campus rate (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS J. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR № CT COS	7,969,8 998,8 998,8 9,650,4 349,5 10,000,4	0 937 0 0 0 0 876 857 733 628 857 733 628 8372 000 0 000	

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs On campus rate (Rate: 60.0000, Base 578847)

SUMMARY PROPOSAL BUDG	ЕТ		FO	R NSF USE ONLY			
ORGANIZATION			POSAL		-	- DN (month	
Columbia University			Proposed			`	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.	•		
P. Michael Tuts							
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	ENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates						
(List each separately with title, A.7. show number in brackets)	List each separately with title, A.7. show number in brackets) CAL ACAD SUM						
1. P. Michael Tuts - Prof	0.00	0.00	0.00	\$	0	\$	
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	51.00	0.00	0.00	41	3,800		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				7	5,815		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					9,615		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				14	0,647		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS $(A + B + C)$				63	0,262		
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	•			0		
	ESSIONS	1					
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	I			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	,			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS	1			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	<u> </u>			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	<u> </u>		-	0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					<u>0</u> 7,937		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR			3		0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 3. SUBSISTENCE 4. OTHER CONTRAVEL CONTRAVENCE			3		0 7,937		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 7,937		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			6		0 7,937 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 7,937 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>		0 7,937 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>	7,97	0 7,937 0 0 0 0 9,604		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>	7,97	0 7,937 0 0 0 9,604 1,241		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>	7,97 1,29 9,27	0 7,937 0 0 0 9,604 1,241 0,845		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>	7,97 1,29 9,27	0 7,937 0 0 0 0 9,604 1,241		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>	7,97 1,29 9,27	0 7,937 0 0 0 9,604 1,241 0,845		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 7937) (Cont. on Comments Page)			<u> </u>	7,97 1,29 9,27 9,90	0 7,937 7,937 0 0 0 0 9,604 1,241 0,845 9,044		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 0 1. MATERIALS AND SUPPLIES			3	7,97 1,29 9,27 9,90	0 7,937 0 0 0 9,604 1,241 0,845		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 7937) (Cont.			<u> </u>	7,97 1,29 9,27 9,90	0 7,937 7,937 0 0 0 0 9,604 1,241 0,845 9,044 0,956		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL INDECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS <td></td> <td></td> <td><u> </u></td> <td>7,97 1,29 9,27 9,90</td> <td>0 7,937 7,937 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td></td>			<u> </u>	7,97 1,29 9,27 9,90	0 7,937 7,937 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	ITICIPAN	T COSTS		7,97 1,29 9,27 9,90 9 10,00	0 7,937 7,937 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	ITICIPAN	T COSTS	NT \$	7,97 1,29 9,27 9,90 9 10,00	0 7,937 7,937 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	ITICIPAN	IFFEREI	NT \$ FOR 1	7,97 1,29 9,27 9,90 9 10,00 \$ 10,00	0 7,937 7,937 0 0 0 0 0 0 0 9,604 1,241 0,845 9,044 0,956 0,000 0 0,000 0 0,000	\$	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 7937) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		IFFEREI	NT \$ FOR 1 CT COS	7,97 1,29 9,27 9,90 9 10,00 \$ 10,00	0 7,937 7,937 0 0 0 9,604 1,241 0,845 9,044 0,956 0,000 0 0,000 0 0,000 0 0,000	\$	

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs on campus (Rate: 60.0000, Base 148154)

SUMMARY PROPOSAL BUDG		FOI	NSF USE ONLY		
ORGANIZATION			POSAL	NO. DURA	TION (mor
Columbia University				Propo	sed Gran
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	O.	
P. Michael Tuts					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	ed 1ths	Funds Requested By	Func		
(List each separately with title, A.7. show number in brackets)	SUMR	proposer	granted b (if differ		
1. P. Michael Tuts - Prof	0.00	0.00	0.00	\$	0\$
2.					
3.					
4.					
	0.00	0.00			•
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		0
1. (0) POST DOCTORAL SCHOLARS 2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		<u>0</u> 26
3. (0) GRADUATE STUDENTS	51.00	0.00	0.00	410,1	0
4. (0) UNDERGRADUATE STUDENTS					0
5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				78,0	-
6. (0) OTHER				70,0	0
TOTAL SALARIES AND WAGES (A + B)				496.2	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				142,7	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				638,9	
TOTAL FOLURMENT	·	5	13,000	13 0	00
TOTAL EQUIPMENT		r	13,000	13,0	00
TOTAL EQUIPMENT		r	13,000	13,0	0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		r	13,000	, í	0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0		r	13,000	, í	0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0		r	13,000	, í	0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0		r	13,000	, í	0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	ESSIONS)		, í	0 75
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAF	ESSIONS)		, í	0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS)		, í	0 75 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 1. STIPENDS 5. 1. STIPENDS 5. 1. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)		, í	0 75 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)		, í	0 75 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) TOTAL PARTICIPANT SERVICES <td>ESSIONS</td> <td>)</td> <td></td> <td>, í</td> <td>0 75 0 0 0 0</td>	ESSIONS)		, í	0 75 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) COMPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)		8,1	0 75 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)		8,1	0 75 0 0 0 0 0 0 0 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)		8,1 8,1 8,143,1 1,103,5	0 75 0 0 0 0 0 0 0 0 0 0 77
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS)		8,143,11 1,103,5 9,246,66	0 75 0 0 0 0 0 0 0 3 77 80
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS	ESSIONS)		8,1 8,1 8,143,1 1,103,5	0 75 0 0 0 0 0 0 0 3 77 80
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL PAR 3. CONSULTANT SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RA	ESSIONS)		8,143,11 8,143,11 1,103,5 9,246,66 9,906,8	0 75 0 0 0 0 0 0 0 0 3 77 80 37
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ORS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8175) (Cont. o	ESSIONS)		8,143,11 8,143,11 1,103,5 9,246,66 9,906,8 93,11	0 75 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I)	ESSIONS)		8,143,11 8,143,11 1,103,5 9,246,66 9,906,8	0 75 75 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8175) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS)		8,143,11 8,143,11 1,103,5 9,246,66 9,906,83 93,11 10,000,00	0 75 75 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS/DOCUMENTATION/DISSEMINATION S. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTA	RTICIPAN		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	8,143,11 8,143,11 1,103,5 9,246,66 9,906,8 93,11	0 75 75 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 0ff campus (Rate: 26.0000, Base: 8175) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	RTICIPAN		S 	8,143,11 1,103,5 9,246,6 9,906,8 93,11 10,000,0 \$ 10,000,0	0 75 75 0 0 0 0 0 0 0 0 0 0 0 37 77 80 37 77 80 37 63 63 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN		S S NT \$ FOR 1	8,143,11 1,103,5 9,246,66 9,906,83 9,906,83 93,11 10,000,00 \$ 10,000,00	0 75 75 0 0 0 0 0 0 0 0 0 0 0 0 0
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 8. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8175) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			S NT \$ FOR I CT COS	8,143,11 1,103,5 9,246,6 9,906,8 93,11 10,000,0 \$ 10,000,0	0 75 75 0 0 0 0 0 0 0 0 0 0 0 0 0

3 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs on campus (Rate: 60.0000, Base 151728)

SUMMARY PROPOSAL BUDG	<u> </u>	FO	R NSF USE ON	LY			
ORGANIZATION		PRC	POSAL		ION (montl		
Columbia University				Propos	ed Grante		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	VARD N	0.			
P. Michael Tuts							
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates							
(List each separately with title, A.7. show number in brackets)	SUMR	Requested By proposer	granted by (if differen				
1. P. Michael Tuts - Prof	0.00	0.00	0.00	\$	0\$		
2.							
3.							
4.							
	0.00	0.00	0.00		0		
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0 0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		U		
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	51.00	0.00	<u>0.00</u> 0.00		-		
3. (0) GRADUATE STUDENTS	51.00	0.00	0.00		0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				80,43	-		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)				510,18	8		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				147,21	0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				657,39	8		
Multiplexer final prototype		5	23,000				
TOTAL EQUIPMENT				23.00	0		
	ESSIONS)			0		
	ESSIONS)			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS)			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 1. CONTRAVEL 2. TRAVEL 2. SUBSISTENCE 0	ESSIONS)			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			3	8,42	0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3	8,42	0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			8	8,42	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3	8,42	0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 0 TOTAL NUMBER OF PARTICIPANTS (0) S. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6	8,42	0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3	8,42	0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3	8,42	0 0 0 0 0 0 0 0 0 4		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			5	8,42 8,42 8,322,57 892,60	0 0 0 0 0 0 0 0 0 4 7		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>	8,322,57 892,60 9,215,18	0 0 0 0 0 0 0 0 0 4 7 1		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3	8,42 8,42 8,322,57 892,60	0 0 0 0 0 0 0 0 0 4 7 1		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3 	8,322,57 892,60 9,215,18	0 0 0 0 0 0 0 0 0 4 7 1		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 0 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) <t< td=""><td></td><td></td><td><u> </u></td><td>8,42 8,42 8,322,57 892,60 9,215,18 9,903,99 96,00</td><td>0 0 0 0 0 0 0 0 0 0 4 7 7 1 9 9</td></t<>			<u> </u>	8,42 8,42 8,322,57 892,60 9,215,18 9,903,99 96,00	0 0 0 0 0 0 0 0 0 0 4 7 7 1 9 9		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 0 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) <t< td=""><td></td><td></td><td>3</td><td>8,42 8,42 8,322,57 892,60 9,215,18 9,903,99</td><td>0 0 0 0 0 0 0 0 0 0 4 7 7 1 9 9</td></t<>			3	8,42 8,42 8,322,57 892,60 9,215,18 9,903,99	0 0 0 0 0 0 0 0 0 0 4 7 7 1 9 9		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8422) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3	8,42 8,42 8,322,57 892,60 9,215,18 9,903,99 96,00 10,000,00	0 0 0 0 0 0 0 0 0 0 0 0 4 4 7 7 1 9 9 1 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL NUMBER OF PARTICIPANTS 0. TOTAL NUMBER OF PARTICIPANTS 0. TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8422) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS		8,42 8,42 8,322,57 892,60 9,215,18 9,903,99 96,00 10,000,00	0 0 0 0 0 0 0 0 0 0 0 0 4 4 7 7 1 9 9 1 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 OFF CONTACT 0 OFF CONTACT AND INDIRECT COSTS 0 OFF CONTACT AND 0 OFF CONTACT AND 0 OFF CONTAC	TICIPAN	T COSTS	NT \$	8,322,57 892,60 9,215,18 9,903,99 96,00 10,000,00 \$ 10,000,00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 ACOMPUTER SERVICES 0 COMPUTER SERVICES 0 COMPUTER SERVICES 0 AGREED LEVEL 0 COMPUTER SERVICES 0 AGREED LE PI/PD NAME	TICIPAN		NT \$ FOR 1	8,322,57 8,322,57 892,60 9,215,18 9,903,99 96,00 10,000,00 \$ 10,000,00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 AGREED LEVEL 0 OFF CONTACT AND INDIRECT COSTS 0 OFF CONTACT 0 OFF CONTACT AND INDIRECT COSTS 0 OFF CONTACT AND 0 OFF CONTACT AND 0 OFF CONTAC			NT \$ FOR 1 CT COS	8,322,57 892,60 9,215,18 9,903,99 96,00 10,000,00 \$ 10,000,00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		

4 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs on campus (Rate: 60.0000, Base 156351)

SUMMARY PROPOSAL BUDG	iet 🗍		FOI	R NSF US	E ONL	Y	
ORGANIZATION			POSAL	L NO. DURATIO		DN (month	
Columbia University				Pr			
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.	•		
P. Michael Tuts							
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	NIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates NSF Funded Person-months						
(List each separately with title, A.7. show number in brackets)	ist each separately with title, A.7. show number in brackets) CAL ACAD SUM						
1. P. Michael Tuts - Prof	0.00	0.00	0.00	\$	0	\$	
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	51.00	0.00	0.00	38	4,292		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				8	2,845		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)				46	7,137		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				13	3,477		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				60	0,614		
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS)			0		
	ESSIONS)					
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS)			0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)		-	0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)		-	0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)		_	0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER				-	0 8,673		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF			5		0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			6		0 8,673		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 8,673		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 8,673 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6		0 8,673 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 8,673 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5	8,56	0 8,673 0 0 0 0 2,028		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>	8,56	0 8,673 8,673 0 0 0 2,028 4,309		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>	8,56 73 9,29	0 8,673 0 0 0 2,028 4,309 6,337		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OCOSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3	8,56 73 9,29	0 8,673 8,673 0 0 0 2,028 4,309		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			5	8,56 73 9,29	0 8,673 0 0 0 2,028 4,309 6,337		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8673) (Cont. on Comments Page)			3 	8,56 73 9,29 9,90	0 8,673 8,673 0 0 0 0 2,028 4,309 6,337 5,624		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus			3	8,56 73 9,29 9,90	0 8,673 8,673 0 0 0 2,028 4,309 6,337 5,624 4,376		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8673) (Cont. on Comments			5	8,56 73 9,29 9,90	0 8,673 8,673 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3	8,56 73 9,29 9,90 9 10,00	0 8,673 8,673 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN	T COSTS		8,56 73 9,29 9,90	0 8,673 8,673 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DECT COSTS (FORMATION/DISSEMINATION) 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RES	RTICIPAN	T COSTS	NT \$	8,56 73 9,29 9,90 9 10,00 \$ 10,00	0 8,673 8,673 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 5,624 4,376 0,000 0 0,000		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus (Rate: 26.0000, Base: 8673) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN	TCOST	NT \$ FOR I	8,56 73 9,29 9,90 9 10,00 \$ 10,00	0 8,673 8,673 0 0 0 0 0 0 2,028 4,309 6,337 5,624 4,376 0,000 0 0,000 0 0,000	\$	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DECT COSTS (FORMATION/DISSEMINATION) 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RES		TCOST	NT \$ FOR I	8,56 73 9,29 9,90 9 10,00 \$ 10,00	0 8,673 8,673 0 0 0 0 0 2,028 4,309 6,337 5,624 4,376 0,000 0 0,000 0 0,000 0 0,000	\$	

5 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs on campus (Rate: 60.0000, Base 153535)

PROPOSAL BUDG	_	FOR NSF USE ONL			•	
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
Columbia University	•					
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	10.		
P. Michael Tuts		NSE Fund	ed		unds	Funds
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	R PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates					
	CAL	ACAD	SUMR			granted by N (if different
1. P. Michael Tuts - Prof	0.00	0.00	0.00	\$	U	\$
2.						
34.						
5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
		0.00	0.00		0 0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00	,	U	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		•	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		055 574	
2. (25) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	255.00	0.00	0.00	Ζ,	055,574	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (5) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					<u>397,735</u>	
				•	0	
TOTAL SALARIES AND WAGES (A + B)					453,309	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>704,905</u> 158,214	
		5	79.000			
	•	•	79,000			
	•	•	79,000			
			79,000			
			79,000			
TOTAL EQUIPMENT			79,000		79,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI			79,000		0	
			79,000			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI			79,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN			79,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			79,000	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			79,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			79,000	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0			79,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	ESSIONS)			0 41,142	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS)			0 41,142	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			0 41,142 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			0 41,142 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	ESSIONS)			0 41,142 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)			0 41,142 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)			0 41,142 0 0 0 0 977,185	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)		5,	0 41,142 0 0 0 0 977,185 020,591	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS)		5, 45,	0 41,142 0 0 0 0 977,185 020,591 997,776	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)		5, 45,	0 41,142 0 0 0 0 977,185 020,591	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS)		5, 45,	0 41,142 0 0 0 0 977,185 020,591 997,776	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN	ESSIONS)		5, 45, 49,	0 41,142 0 0 0 0 977,185 020,591 997,776 276,132	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)		5, 45, 49,	0 41,142 0 0 0 0 977,185 020,591 997,776 276,132 723,868	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS)		5, 45, 49,	0 41,142 0 0 0 0 0 0 977,185 020,591 997,776 276,132 723,868 000,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS)		5, 45, 49, 50,	0 41,142 0 0 0 0 0 0 0 0 0 977,185 020,591 997,776 276,132 723,868 000,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	5, 45, 49, 50,	0 41,142 0 0 0 0 0 0 977,185 020,591 997,776 276,132 723,868 000,000	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			S NT \$ FOR I CT COS	5, 45, 49, 50, \$ 50, NSF US	0 41,142 0 0 0 0 0 977,185 020,591 997,776 276,132 723,868 000,000 0 000,000 0 000,000	\$

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Budget Justification

In this section we provide an overview of the budget justification including all subcontracts. At the end of this section is the detailed yearly budget justification for Columbia University for each of the 5 years. M. Tuts is the PI for the Cooperative Agreement at Columbia University. The budget justification description is complex, so for clarity of reference we note that in the following sections names in italics correspond to lines in Table 1 in the program description section of the proposal (and shown below), whereas the numbered items (for example G.5) refer to lines in the year by year "summary proposal budget" (SPB) sheets. Table 2 shows a detailed breakout of the activities funded for each subcontract.

NSF	Operations	Proposa	I Needs ((AYk\$s)		
Subsystem	FY12	FY13	FY14	FY15	FY16	Total
Computing						
Software	495	509	525	540	557	2,626
Facilities & Tier 2	3,470	3,986	3,895	3,750	3,732	18,833
Analysis Support	55	57	59	60	62	293
Total	4,019	4,552	4,479	4,351	4,351	21,752
M&O	-					
Silicon	138	142	146	150	155	730
TRT	-	-	-	-	-	-
LAr	390	402	414	427	439	2,073
Tile	393	405	417	429	442	2,086
Muon	779	740	763	785	809	3,876
TDAQ	655	675	695	716	738	3,480
Common	949	787	753	752	678	3,920
Outreach	50	52	53	55	56	265
Program Management	435	170	175	180	186	1,146
Technical Coordination	155	159	164	169	174	821
Total	3,944	3,532	3,580	3,664	3,677	18,397
Upgrade	-					
Silicon Tracker	376	376	376	410	520	2,058
Liquid Argon	683	597	617	679	595	3,171
Tile Calorimeter	432	432	432	432	432	2,160
Muon	81	86	91	89	-	347
TDAQ	465	425	425	375	425	2,115
Total	2,037	1,916	1,941	1,985	1,972	9,851
Total NSF Operations Needs	10,000	10,000	10,000	10,000	10,000	50,000
Requested DOE Funds	28,255	28,962	29,685	30,427	31,187	148,516

Table 1. Total NSF Operations needs in AYk\$. The DOE total represents a request to DOE to support additional M&O, Physics Support and Computing, and Upgrade R&D work scope which is not part of this proposal.

The total budget request for the ATLAS Operations Program is \$50M (AY\$) for the five-year period FY12–FY16 of this proposal, and includes Maintenance and Operations (M&O), Physics Support and Computing (PS&C), Upgrade R&D, Education and Outreach, and Program Management. Cost data for both M&O and PS&C are derived from fully resource-loaded FTE schedules. These have been the subject of annual NSF /DOE joint agency Reviews, most recently May 11-12, 2010 for PS&C, M&O and R&D (see https://indico.bnl.gov/conferenceDisplay.py?confId=254 (access=DOENSFLHCreview). The funds requested for the U.S. ATLAS Operations program in this proposal essentially maintain a constant level of effort. Not shown is the DOE component of the U.S ATLAS Operations Program Manager (Tuts, PI of this proposal).

Maintenance and Operations (M&O)

The M&O components of the budget supported by this proposal are described in the text in the individual tables at the end of each section in the program description, and shown under M&O in Table 1. The costs in Table 1 appear in different items of the SPB's (B.4, B.5, C., D., E.1, E.2, G.5 and G.6). Detailed explanations follow under the principal categories shown in Table 1:

<u>Subsystem specific (Inner Detector, LAr, Tile, Muon, TDAO, Technical Coordination)</u>: The maintenance and operations (M&O) component of the Operations Program requires funds for personnel to operate and maintain the ATLAS detector. The associated costs such as travel, repair equipment, and some spare parts form an integral part of this request. General maintenance (beam off) and operations (beam on) tasks are included for all subsystems. Detailed estimates of the personnel and associated costs are provided in the program description for each of the subsystems with U.S. responsibilities: Inner Detector (Silicon); Liquid Argon Calorimeter (LAr); scintillating tile hadronic calorimeter (Tile); Muon Spectrometer (Muon); trigger and data acquisition system (TDAQ); and Technical Coordination (TC). In FY12 there are a total of 21 FTEs supported by this proposal. The total cost for these subsystems (personnel plus associated costs) in FY12 is \$2.51M, broken down by subsystem in Table 1 under the titles Silicon, LAr, Tile, Muon, TDAQ, and Technical Coordination. Most of these funds form part of SPB item G.5 (sub-awards), with the exception of the Columbia LAr items which appear elsewhere in the budget sheets (next paragraph).

Since some of the LAr calorimeter detector activities take place at Columbia University's Nevis Labs, those costs are broken out separately in the budget as they are not part of a sub-award, but rather direct costs to Columbia University. The Columbia LAr activities focus on the maintenance and operations of the front-end electronics. Based on the resource loaded FTE schedule, an average of 1 FTE of electrical engineering is required at a salary of \$196k in FY12. These costs are part of the LAr item in Table 1.

<u>Common Costs</u>: Other items that are covered in the M&O component include the so-called "common costs". This component is based on the full cost of running the ATLAS detector (consumables, some personnel, etc). The costs are agreed to by an international CERN group called the Resource Review Board (RRB) that has representation by all ATLAS funding agencies. These common costs proposed by the ATLAS collaboration are carefully scrutinized by a subcommittee of the RRB, the Scrutiny Group (which has a U.S. representative). The costs are divided into two categories, "A" and "B".

The sum is the total operating cost for ATLAS (determined in CHF). The share to be paid by the U.S. is determined in one of two ways: Category A costs are globally shared costs apportioned according to the fraction of PhD authors for any given country; and Category B costs are for operating costs of specific detector subsystems and apportioned approximately by author share (the actual algorithm is a bit more complex). The category A costs to be supported by this proposal are re-evaluated every year along with re-determinations of the country shares. Documentation of these costs is available on the CERN RRB website (http://indico.cern.ch/categoryDisplay.py?categId=852. The common costs to be supported by this proposal are totaled at \$3.9M for the five years. These costs appear as the Common item in Table 1 of the program description and as SPB item G.6.

<u>Program Management:</u> The program management costs associated with the processing and oversight of some 17 sub-awards are shown in the M&O category as well, although it includes NSF program management costs for all aspects of the Operations Program (M&O, PS&C, R&D). The support personnel required to manage this program consist of 1.0 FTE (administrative assistant). There is also some yearly travel support for the Program Manager (Tuts) included in the program management costs. The largest one-time component is the indirect cost for each subcontract (60% on the first \$25k of each sub-award) which totals \$255k in FY12 but is not repeated over the life of this award. These costs are shown as Program Management in Table 1 and in SPB items B.5. (the 1.0 FTE administrator), E.2 (Program Manager travel), I. (sub-award indirect costs), G.5 (subawards).

Education: Based upon the success of our U.S. ATLAS Education and Outreach efforts during the Construction phase, in conjunction with the expansion of the QuarkNet program, we expect to continue our effort and expenditure at a similar level during the five-year period of the proposal (\$50-56k/year). This funding will support the continuation of programs described in the program description of this proposal, as well as new initiatives. This item appears as Education in Table 1 and in SPB item G.5.

Software and Computing (PS&C)

Costs for software professionals involved in the developing and maintaining the ATLAS core and detector software are estimated at \$137k/year/FTE (fully loaded) in FY12, based on collaboration university averages. This proposal is requesting support for a total of 3 FTEs in sub-awards to the University of Massachusetts Amherst, the University of Texas Arlington, and the University of Pittsburgh. Additional costs for travel and COLA support of \$28k/year/FTE are also included in the sub-awards. The total cost for software maintenance in FY12 is \$495k, which is shown as Software in Table 1, and forms part of G.5. in the SPB.

Costs for the computing facility integration program includes supporting 0.4 FTE of a computer professional (Chicago sub-award) for coordination of computing fabric upgrades, deployments of Grid and ATLAS services, and site-level operations at each of the computing resource centers in U.S. ATLAS. The total cost for this work in FY12 is \$124k.

Also included in the proposal for software and computing is support of one full-time individual (Chicago sub-award) covering development of utilities necessary for efficient Tier 2 site level data management and access. The cost for this support is \$174k in FY12.

This proposal also requests support for continuation of the ATLAS-wide ADC (ATLAS Distributed Computing) group which integrates both operations and development. This work will

continue to be performed under a NSF supported sub-award at UTA. We anticipate support at the level of 3.58 FTEs at UTA to support this operating work, costing \$471k in FY12.

Costing for the Tier 2's (T2) is based on the successful integration of the Tier 2s as part of an overall U.S. ATLAS distributed resource that has outperformed all other regions in ATLAS. The U.S. Tier 2's are all highly ranked among computing facilities ATLAS-wide, greatly based on previous and current NSF funding. This proposal requests support for four such T2 sites, where costs supported by this proposal, for each site, are \$600k in FY12. We note that in addition the T2 sites leverage considerable institutional resources to the benefit of the U.S. ATLAS Operations Program. The funds from this proposal support just under 2 FTEs at each of four sites for operations support at an estimated cost of \$184k/FTE (based on collaborations university averages), with the balance of the funds used for commercial computing hardware purchases. The total Tier 2 cost in FY12 is \$2.7M, which is shown as Tier 2 in Table 1, and forms part of G.5 in the SPB.

The sum of these items under Software and Computing represents the total cost for the Computing line in Table 1 and totals \$4.4M in FY12. This amount forms part of the sub-award funding shown in item G.5 in the SPB.

Upgrade R&D

The upgrade R&D activities focus on silicon tracker upgrades, liquid argon upgrades, tile calorimeter upgrade, muon upgrades, and the TDAQ subsystem upgrades. The timescales are such that R&D must commence now based on an overall plan for research in critical detector areas that will need replacement for high luminosity running. The detailed activities are described in the program description, but generally are a mix of design and prototyping activities. The 15-16 FTEs are supported at the various universities participating in the R&D activities. In FY12 the plan is to fund a total of \$2M for the upgrade work, and is shown under the Upgrade R&D in Table 1. Some of the liquid argon upgrade R&D will take place at Columbia University's Nevis Labs and thus appears as direct costs in the SPB item B.2.

	U.S. ATLAST	ar opera	uons Pro	posal Institutional Needs (AYk\$)
		NSF Prop	oosal Colu	mbia Needs (AYk\$)
End another th			Description	Work
Sub-contract/ institution	Subsystem	Proposal 83	Proposal	Scope
an and a second	Sabayatan		111.0	
Columbia University	Common Funds	3,920		In this proposal we request the category A and B funds for the operations phase of the running in FY12 and beyond equivalent to 15% of the total common fund requirement. This funding will support the continuation of successful programs described.
group and a second	Outreach	265		in the project description of this proposal
	Extra Disk	835		Funding for extra drik to insure goal of having 12's fully able to meet the U.S. commitment to ATLAS. The specific T2 institutional allocation will be determine at a later date. The support personnel required to manage this program including.
	Program Management	1,146	5.00	processing and oversight of the 17 subcontracts listed in Table to along with travel support for the Program Manager.
	LAY MISO	1,042	5.00	Continued maintenance and operation of the FEB of the LAr readout. Testing of OTx replacement solution in collaboration with SMU. Testing and certification of the Weiner LVPS replacements in collaboration with SML. Continued development of the next generation Lar calorimeter front-end
	Upgrade R&D	1,814	16.25 21.25	board design and some of its essential components. A prototype with almost complete functionality is planned for 2012.
	Total Columbia Needs	9.023	26.25	
2	Total Constitute Receip	0,063	. KOKS	
			Section 2.	
	h	SF Propo	sal Subc	ontract Needs (AYk\$)
Sub-contract/	1 A PROPERTY AND	Proposal		Work
institution	Subsystem	85	FIEs	Scope
Boston Univ Computing	Tier 2	3,091	7.50	Continued purchasing and operating CPU & disk equipment to ensure goal of having the T2 center fully operational to meet the U.S. commitment to ATLAS
Boston University	Muon M&O	467	6.00	Maintain and operate the MDT chamber system and also participate in the commissioning of the EE chambers as they are installed
boat of what say	TDAQ R&D	615		Boston University is working on the Level 1 muon trigger using Monitored Drift Tube information . Improvements in the trigger will be required at higher luminosities to allow for a single muon trigger with acceptable rates.
				Maintain and operate the endcap global alignment system and also work on the mechanical design of EE alignment. fixtures and chamber installation
Brandleis	Muon M&O	927		tooling Brandels will design the Long Guiding Tube (LGT), needed for the IBL, which has to be inserted into the beam pipe to support it during the removal process. Other activities will be the continued work on the integration of the EE chambers into the ATLAS detector.
			3.5	Studies to determine the optical path that are necessary to link the new
	Muon R&D	347		muon chambers for upgrade with the rest of the muon endcap
		6,000	10.00	
Chicago Computing	Facilities Operations	1,504	7.00	
	Tier 2	4,637		Continued purchasing and operating CPU & disk equipment to ensure goal of having the T2 center fully operational to meet the U.S. commitment to ATLAS
Chicago	Tile M&O	1,430	13.00	Fill maintenance and support, along with drawer maintenance replacing faulty components and keeping the system in operation. Also involved in the maintaining and operating the calibration and test facility.

Sub-contract/		Proposal		
institution	Subsystem	85	FTER	Scope
				Chicago will lead the effort in replacing the mother boards in the electronic
	Te. 040	1.600	10.000	drawers. These will contain control electronics, ADCs for each channel,
	Tile R&D	1,500	20.75	serialzing FPGAs and optical transmission elements
		2,250	100.13	
				As collision data taking progresses there will be many "new" needs (and
				repairs) for software tools for monitoring and QA. Constant effort will be
				needed for monitoring online operations and offline access to conditions
NU	Tile M&O	388	2.50	database
	1.00.0000			
1999	1.000 Control 1.000	1 2020	0.75	Working on Physics analysis tools & specifically on developing the highly
NYU	Analysis Support	293	2.50	successful D3PD infrastructure
1912	Silicon Tracker R&D	100	1.00	NYU will provide tooling for electrical testing and also radiation testing
		393	3.50	
2			- 202	
				Drawer maintenance replacing faulty components and keeping the system in
MSU	Tile M&O	260	2.50	operation.
				Members of the MSU group will continue the data quality monitoring efforts.
	TDAQ MBO	600	5.00	There are also plans to contribute to an evolutionary upgrade of the current
	10942 Mai	642	2.00	flow and high level trigger system Work will be needed for the off-detector system which interfaces with the
	Tile R&D	660	7.60	Level 1 trigger
	The mail	000	1.00	MSU will be working on both the improvements planned for the Level 1
				calorimeter trigger to include topological information through new cluster
				merging modules and improvements to the High Level Trigger processing
	TDAQ R&D	1,250	7.50	schemes and TDAQ dataflow.
3	10.10.100	2,612	22.50	
6.55		1 1 2 2 2		
SMU	Liquid Argon M&O	862	5.00	Mantenance and operation of OTx
3000		- S. 12		Developing an optical system from optical transmitter through fiber to optical
	Silicon Tracker R&D	736	5.00	neceiver
Q				Array serializer design and prototying with each channel operating at
	Liquid Argon R&D	1,357		10Gbps
		2,954	20.00	
		-		
		1.000	5.00	Working on maintaining the HV fitter system, replacing capacitors when
Stony Brook	Liquid Argon M&O	169	1.00	required along with other responsibilities
		-		Maintaining and operating the CSC ROD System along with maintaining the
UC Irvine	Muon M&O	741	6.00	CSC DSP code located on the CSC RODs.
OC INTER	HILDOT MIGUO		5.00	UCI will continue their support for on-going operations, both during beam
	Concernence of the			time and the planned shutdowns and also participate in the commissioning of
	TDAQ MBO	2.838	34.36	new HLT hardware
	TUPIQ INDU	2,000		UC Irvine will be working on improvements to the High Level Trigger
	TDAO RIAD	250	2.50	processing and TDAQ data flow required at higher luminosities.
		3,629	31.75	
				Testing of the VCSELs of the type on detector and general SCT operations
UCSC	Silicon Tracker M&O	730	3,75	support
	100000000000000000000000000000000000000	552		Performs a leadership role in evaluating sensor technologies that could mee
	Silicon Tracker R&D	1,223		upgrade requirements and also provides on detector electronics support.
2		1,963	20.75	
Univ of Mass Amherst	Software	927	5.00	Muon infrastructure
				Continued purchasing and operating CPU & disk equipment to ensure goal
U of Michigan	Sec.	11 1.18		of having the T2 center fully operational to meet the U.S. commitment to
	Tier 2	3.091	0.02	ATLAS
Computing	in a	33001	2.3	and a second sec
-		+ +		Working the commissioning of the EE chambers and also will continue
				monitoring the MDT noise and beam background. The Michigan group will
				also maintain the gas monitoring system operation which is essential to
Univ of Michigan	Muon M&O	1,742	14.75	raintaining a smooth operation.
and a service of all	in section of the sec	0.446	14.15	Contraction of the second se
Univ of Pittsburgh	Sofware	776	5.00	Detector geometrical description
And the strength of the	Zeoseo	1.000	6375	Development and support for the PanDA workload management system for
	Software	922		ATLAS distributed production and analysis

Sub-contract/	1	Proposal	Proposal	Work
institution	Subsystem	k\$	FTER	Scope
	Facilities Operations	2,503	17.90	Coordination and support for ATLAS production and analysis computing operations in the U.S. and internationally. Management of storage and CPU resources for U.S. ATLAS.
	Tier 2	3,091		Continued purchasing and operating CPU & disk equipment to ensure goal of having the T2 center fully operational to meet the U.S. commitment to ATLAS
		6,517	33.75	
	U.S. ATLAS NSF Proposal Subcontract Total	40,977	244.97	
	U.S. ATLAS NSF Proposal Total	50,000	271.22	

Table 2. Subcontracts Details.

Columbia University Budget Justification YEAR 1

B.2 Engineering and Technical Salaries: Salaries for Upgrade Electronics and LAr construction. \$409,590

B.5 Administrative Support: Administrative support for 17 sub-awards and ATLAS project. \$80,553

C Fringe @ 31.9% of Base \$441,429 = \$140,815

D Equipment: Nevis12 Chip for Upgrade construction \$43,000

E Travel: Project management travel for P.I. Tuts \$7,937

G.5 Sub-Awards:

- 1. Boston Univ. \$203,000
- 2. Boston Computing \$600,000
- 3. Brandeis \$410,156
- 4. Chicago \$570,900
- 5. Chicago Computing \$1,198,260
- 6. Michigan \$376,730
- 7. Michigan Computing \$600,000
- 8. Michigan State \$601,860
- 9. Pittsburgh \$146,232
- 10. SMU \$592,300
- 11. SUNY, Stony Brook \$31,827
- 12. U. Cal, Irvine \$724,087
- 13. U. Cal, Santa Cruz \$346,540
- 14. UTA Computing \$1,245,200
- 15. U. Mass \$174,624
- 16. NIU \$73,000
- 17. NYU \$75,160

TOTAL \$7,969,876

G.6 Other: Foreign exchange rate corrections, CERN category A & B dues, Common Costs,

And Outreach (\$50,000) – Total \$998,857

I Indirect Costs:

See following calculation

J Total Direct and Indirect Costs \$10,000,000

Subawards 17 X 25,000 = \$425,000 X 60% = \$255,000 Administration (Salary & Fringe) \$106,249 X 60% = \$63,750 Technical (Salaries & Fringe) Base: (\$475,998 X 10%) \$47,598 X 60% = \$28,558 Project Management Travel \$7,937 X 26% = \$2,064 TOTAL = \$349,372

Columbia University Budget Justification YEAR 2

B.2 Engineering and Technical Salaries: Salaries for Upgrade Electronics and LAr construction. \$413,800

B.5 Administrative Support: Administrative support for 17 sub-awards and ATLAS project. \$75,815

C Fringe @ 31.9% of Base \$440,901 = \$140,647

D Equipment:

E Travel: Project management travel for P.I. Tuts \$7,937

G.5 Sub-Awards:

- 1. Boston Univ. \$215,640
- 2. Boston Computing \$609,000
- 3. Brandeis \$425,030
- 4. Chicago \$579,030
- 5. Chicago Computing \$1,220,708
- 6. Michigan \$326,240
- 7. Michigan Computing \$609,000
- 8. Michigan State \$556,950
- 9. Pittsburgh \$150,619
- 10. SMU \$554,200
- 11. SUNY, Stony Brook \$32,782
- 12. U. Cal, Irvine \$744,310
- 13. U. Cal, Santa Cruz \$350,666
- 14. UTA Computing \$1,273,556
- 15. U. Mass \$179,863
- 16. NIU \$75,190
- 17. NYU \$76,820

TOTAL \$7,979,604

G.6 Other: Foreign exchange rate corrections, CERN category A & B dues, Common Costs, Outreach (\$51,500), and Extra Disk for T2 (\$452,376) – Total \$1,291,241

I Indirect Costs:

See following calculation

J Total Direct and Indirect Costs \$10,000,000

Administration (Salary & Fringe) \$100,000 X 60% = \$60,000

Technical (Salaries & Fringe) Base: (481,552 X 10%) \$48,154 X 60% = \$28,892

Project Management Travel \$7,937 X 26% = \$2,064

TOTAL = \$90,956

Columbia University Budget Justification YEAR 3

B.2 Engineering and Technical Salaries: Salaries for Upgrade Electronics and LAr construction. \$418,136

B.5 Administrative Support: Administrative support for 17 sub-awards and ATLAS project. \$78,090

C Fringe @ 31.9% of Base \$447,512 = \$142,756

D Equipment: Multiplexer Prototype for LAr electronics \$13,000

E Travel: Project management travel for P.I. Tuts \$8,175

G.5 Sub-Awards:

- 1. Boston Univ. \$218,360
- 2. Boston Computing \$618,140
- 3. Brandeis \$440,200
- 4. Chicago \$587,400
- 5. Chicago Computing \$1,243,627
- 6. Michigan \$336,020
- 7. Michigan Computing \$618,140
- 8. Michigan State \$562,200
- 9. Pittsburgh \$155,138
- 10. SMU \$566,200
- 11. SUNY, Stony Brook \$33,765
- 12. U. Cal, Irvine \$765,139
- 13. U. Cal, Santa Cruz \$354,917
- 14. UTA Computing \$1,302,628
- 15. U. Mass \$185,259
- 16. NIU \$77,450
- 17. NYU \$78,520

TOTAL = \$8,143,103

G.6 Other: Foreign exchange rate corrections, CERN category A & B dues, Common Costs, Outreach (\$53,045), and Extra Disk for T2 (\$297,234) – Total \$1,103,577

I Indirect Costs:

See following calculation

J Total Direct and Indirect Costs \$10,000,000

Administration (Salary & Fringe) \$103,000 X 60% = \$61,800

Technical (Salaries & Fringe) Base: (\$487,269 X 10%) \$48,728 X 60% = \$29,237

Project Management Travel \$8,175 X 26% = \$2,126

TOTAL = \$93,163

Columbia University Budget Justification YEAR 4

B.2 Engineering and Technical Salaries: Salaries for Upgrade Electronics and LAr construction. \$429,756

B.5 Administrative Support: Administrative support for 17 sub-awards and ATLAS project. \$80,432

C Fringe @ 31.9% of Base \$461,474 = \$147,210

D Equipment: Multiplexer FINAL Prototype \$23,000

E Travel: Project management travel for P.I. Tuts \$8,420

G.5 Sub-Awards:

- 1. Boston Univ. \$221,160
- 2. Boston Computing \$627,410
- 3. Brandeis \$448,679
- 4. Chicago \$596,020
- 5. Chicago Computing \$1,267,028
- 6. Michigan \$346,100
- 7. Michigan Computing \$627,410
- 8. Michigan State \$517,610
- 9. Pittsburgh \$159,792
- 10. SMU \$613,400
- 11. SUNY, Stony Brook \$34,778
- 12. U. Cal, Irvine \$786,593
- 13. U. Cal, Santa Cruz \$393,294
- 14. UTA Computing \$1,332,434
- 15. U. Mass \$190,816
- 16. NIU \$79,770
- 17. NYU \$80,280

TOTAL = \$8,322,574

G.6 Other:

Foreign exchange rate corrections, CERN category A & B dues, Common Costs, Outreach (\$54,636), and Extra Disk for T2 (\$85,825) -- Total \$892,607

I Indirect Costs:

See following calculation

J Total Direct and Indirect Costs \$10,000,000

Administration (Salary & Fringe) \$106,090 X 60% = \$63,654

Technical (Salaries & Fringe) Base: (\$502,595 X 10%) \$50,261 X 60% = \$30,157

Project Management Travel \$8,420 X 26% = \$2,190

TOTAL = \$96,001

Columbia University Budget Justification YEAR 5

B.2 Engineering and Technical Salaries: Salaries for Upgrade Electronics and LAr construction. \$384,292

B.5 Administrative Support: Administrative support for 17 sub-awards and ATLAS project. \$82,845

C Fringe @ 31.9% of Base \$418,423 = \$133,477

D Equipment:

E Travel: Project management travel for P.I. Tuts \$8,673

G.5 Sub-Awards:

- 1. Boston Univ. \$224,040
- 2. Boston Computing \$636,820
- 3. Brandeis \$370,467
- 4. Chicago \$604,900
- 5. Chicago Computing \$1,290,922
- 6. Michigan \$356,490
- 7. Michigan Computing \$636,820
- 8. Michigan State \$573,180
- 9. Pittsburgh \$164,586
- 10. SMU \$627,700
- 11. SUNY, Stony Brook \$35,822
- 12. U. Cal, Irvine \$808,691
- 13. U. Cal, Santa Cruz \$507,803
- 14. UTA Computing \$1,362,996
- 15. U. Mass \$196,541
- 16. NIU \$82,160
- 17. NYU \$82,090

TOTAL = \$8,562,028

G.6 Other:

Foreign exchange rate corrections, CERN category A & B dues, Common Costs, and Outreach (\$56,275) – Total \$734,309

I Indirect Costs:

See following calculation

J Total Direct and Indirect Costs \$10,000,000

Administration (Salary & Fringe) \$109,273 X 60% = \$65,563

Technical (Salaries & Fringe) Base: (\$442,628 X 10%) \$44,262 X 60% = \$26,558

Project Management Travel \$8,673 X 26% = \$2,255

TOTAL = \$94,376

SUMMARY PROPOSAL BUDG	iET		FOF	R NSF USE	E ONL'	Y
ORGANIZATION		PRC	POSAL		-	DN (month
Brandeis University					oposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	0.		
James Bensinger						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Funde Person-mor	ed iths	Funds	S.	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Requeste propos	er er	granted by I (if differen
1. James Bensinger - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	33.00	0.00	0.00	190	D,992	
3. (0) GRADUATE STUDENTS					0	
4. (3) UNDERGRADUATE STUDENTS				1/	7,000	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
				007	0	
TOTAL SALARIES AND WAGES (A + B)					7,992	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					4 <u>,436</u> 2,428	
TOTAL EQUIPMENT					0	
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Brandeis University				Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	0.	
James Bensinger					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed iths	Funds Requested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	proposer	granted by N (if differen
1. James Bensinger - Prof	0.00	0.00	0.00	\$ 0	\$
2.					
3.					
4.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE	,	0.00	0.00		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00	0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00	0	
 (0) POST DOCTORAL SCHOLARS (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 	0.00	0.00	0.00		
3. (0) GRADUATE STUDENTS	33.00	0.00	0.00	190,722	
4. (3) UNDERGRADUATE STUDENTS				17,360	
5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				214,082	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				56,057	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				270,139	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN		/		0	
				44,250	
				•	
F. PARTICIPANT SUPPORT COSTS				•	
1. STIPENDS \$0				•	
1. STIPENDS \$0 2. TRAVEL0				•	
1. STIPENDS \$0 2. TRAVEL 0 3. SUBSISTENCE 0				•	
1. STIPENDS \$0 2. TRAVEL 0				•	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0	RTICIPAN	T COSTS	3	•	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS TOTAL PAIL	RTICIPAN	T COSTS	5	44,250	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	RTICIPAN	T COSTS	5	44,250 0 84,976	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	RTICIPAN	T COSTS	3	44,250 0 84,976 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	RTICIPAN	T COSTS	8	44,250 0 84,976 0 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	RTICIPAN	T COSTS	3	44,250 0 84,976 0 0 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	RTICIPAN	TCOST	3	44,250 44,250 0 84,976 0 0 0 0 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 6. OTHER	RTICIPAN	T COSTS	5	44,250 44,250 0 84,976 0 0 0 0 0 0 0 0 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER TOTAL OTHER DIRECT COSTS	RTICIPAN	T COSTS	5	44,250 44,250 0 84,976 0 0 0 0 0 0 84,976	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1	RTICIPAN	T COSTS	3	44,250 44,250 0 84,976 0 0 0 0 0 0 0 0 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	RTICIPAN	T COSTS	8	44,250 44,250 0 84,976 0 0 0 0 0 0 84,976	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1	RTICIPAN	T COSTS	3	44,250 44,250 0 84,976 0 0 0 0 84,976 399,365	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1 travel (Rate: 58.0000, Base: 44250) 1 TOTAL INDIRECT COSTS (F&A) 1	RTICIPAN	T COSTS	3	44,250 44,250 0 84,976 0 0 0 0 0 0 84,976	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER 1 TOTAL OTHER DIRECT COSTS 1 H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 1 travel (Rate: 58.0000, Base: 44250) 1 TOTAL INDIRECT COSTS (F&A) 1 J. TOTAL DIRECT AND INDIRECT COSTS (H + I) 1	RTICIPAN	T COSTS	3	44,250 44,250 0 84,976 0 0 0 0 84,976 399,365 25,665	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 3. CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER 1 TOTAL OTHER DIRECT COSTS 1 H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1 travel (Rate: 58.0000, Base: 44250) 1 TOTAL INDIRECT COSTS (F&A) 1 J. TOTAL DIRECT AND INDIRECT COSTS (H + I) 1 K. RESIDUAL FUNDS 1	RTICIPAN	T COSTS	5	44,250 44,250 0 84,976 0 0 0 0 0 0 84,976 399,365 25,665 425,030	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER 1 TOTAL OTHER DIRECT COSTS 1 H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1 travel (Rate: 58.0000, Base: 44250) 1 TOTAL INDIRECT COSTS (F&A) 1 J. TOTAL DIRECT AND INDIRECT COSTS (H + I) 1 K. RESIDUAL FUNDS 1				44,250 44,250 0 84,976 0 0 0 0 0 84,976 399,365 25,665 425,030 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER 1 TOTAL OTHER DIRECT COSTS 1 H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1 travel (Rate: 58.0000, Base: 44250) 1 TOTAL INDIRECT COSTS (F&A) 1 J. TOTAL DIRECT AND INDIRECT COSTS (H + I) 1 K. RESIDUAL FUNDS 1 L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 1			NT \$	44,250 44,250 0 84,976 0 0 0 0 0 84,976 399,365 25,665 425,030 0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER 1 TOTAL DIRECT COSTS 1 M. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1 travel (Rate: 58.0000, Base: 44250) 1 TOTAL DIRECT COSTS (F&A) 1 J. TOTAL DIRECT COSTS (F&A) 1 J. TOTAL DIRECT COSTS (F&A) 1 J. TOTAL DIRECT AND INDIRECT COSTS (H + I) 1 K. RESIDUAL FUNDS 1 L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 1 M. COST SHARING PROPOSED LEVEL \$ 0 AGREED L		DIFFERE	NT \$ FOR N	44,250 0 84,976 0 0 0 0 0 0 0 0 0 0 84,976 399,365 25,665 425,030 \$ 425,030	\$
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 5. SUBAWARDS 6. OTHER 707AL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1 travel (Rate: 58.0000, Base: 44250) 1 TOTAL DIRECT COSTS (F&A)		DIFFERE	VT \$ FOR N CT COS	44,250 44,250 0 84,976 0 0 0 0 0 84,976 0 0 84,976 399,365 25,665 425,030 0 \$ 425,030 1SF USE ONLY	\$

SUMMARY PROPOSAL BUDG	ET		FOI	R NSF	F USE ONL'	Y
ORGANIZATION	-		POSAL	-		- DN (month
Brandeis University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	NARD N	Ю.		
James Bensinger						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund	ed hths	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		equested By proposer	granted by N (if differen
1. James Bensinger - prof	0.00	0.00	0.00	\$	0	\$
2.					-	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	33.00	0.00	0.00		202,623	
3. (0) GRADUATE STUDENTS					0	
4. (3) UNDERGRADUATE STUDENTS					17,731	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					220,354	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					57,727	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					278,081	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
	ESSIONS)			-	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0 44,978	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 44,978 0 91,054	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 44,978 0 91,054 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6		0 44,978 0 91,054 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>		0 44,978 91,054 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 44,978 0 91,054 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>		0 44,978 91,054 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL CONSULTANT SERVICES S. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>		0 44,978 91,054 0 0 0 0 0 0 0 91,054	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			6		0 44,978 91,054 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 0 0 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT			<u>}</u>		0 44,978 91,054 0 0 0 0 0 0 0 91,054	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN			3		0 44,978 44,978 0 91,054 0 0 0 0 0 91,054 414,113	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN			5		0 44,978 44,978 0 91,054 0 0 0 0 0 91,054 414,113 26,087	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 44978) <td< td=""><td></td><td></td><td>5</td><td></td><td>0 44,978 44,978 0 91,054 0 0 0 0 0 91,054 414,113 26,087 440,200</td><td></td></td<>			5		0 44,978 44,978 0 91,054 0 0 0 0 0 91,054 414,113 26,087 440,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			S		0 44,978 44,978 0 91,054 0 0 0 0 0 91,054 414,113 26,087 440,200 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL MARE: 58.0000, Base: 44978) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL	TICIPAN	T COSTS			0 44,978 44,978 0 91,054 0 0 0 0 0 91,054 414,113 26,087 440,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	TICIPAN	T COSTS	NT \$		0 44,978 44,978 0 91,054 0 0 0 0 91,054 414,113 26,087 440,200 0 440,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 44978) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN		NT \$ FOR I	NSF L	0 44,978 44,978 0 91,054 0 0 0 0 0 91,054 414,113 26,087 440,200 0 440,200 0 JSE ONLY	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 44978) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR I	NSF L ST RA	0 44,978 44,978 0 91,054 0 0 0 0 91,054 414,113 26,087 440,200 0 440,200	\$

SUMMARY PROPOSAL BUDG	iET		FOF	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
Brandeis University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	Ю.		
James Bensinger						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund erson-mor	ed	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		quested By proposer	granted by N (if different
1. James Bensinger - Prof	0.00	0.00	0.00	\$	0	\$
2.					-	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00)	0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	33.00	0.00	0.00)	208,703	
3. (0) GRADUATE STUDENTS					0	
4. (3) UNDERGRADUATE STUDENTS					18,113	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					226,816	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					59,448	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					286,264	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS)			0	
	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0				-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			3		0 45,727	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			8		0 45,727 0 90,166	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAP G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0 45,727 0 90,166 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 45,727 0 90,166 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			6		0 45,727 0 90,166 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		0 45,727 0 90,166 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		0 45,727 0 90,166 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			S		0 45,727 0 90,166 0 0 0 0 0 90,166	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			÷		0 45,727 0 90,166 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>		0 45,727 0 90,166 0 0 0 0 0 90,166	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Ra			3		0 45,727 0 90,166 0 0 0 0 0 90,166 422,157	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 45727) TOTAL INDIRECT COSTS (F&A)			3		0 45,727 0 90,166 0 0 0 0 90,166 422,157 26,522	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 45727) TOTAL INDIRECT AND IN			<u> </u>		0 45,727 90,166 0 0 0 0 0 90,166 422,157 26,522 448,679	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u> </u>		0 45,727 90,166 0 0 0 0 0 90,166 422,157 26,522 448,679 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 45727) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN	TCOSTS			0 45,727 90,166 0 0 0 0 0 90,166 422,157 26,522 448,679	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 45727) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	RTICIPAN	TCOSTS	NT \$		0 45,727 90,166 0 0 0 0 0 0 90,166 422,157 26,522 448,679 0 448,679	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 45727) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN	IFFEREI	NT \$ FOR 1	NSF U	0 45,727 0 90,166 0 0 0 0 0 90,166 422,157 26,522 448,679 0 448,679 0 8E ONLY	\$
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SUMMARY PROPOSAL BUDG	ЕΤ		FO	R NSF	USE ONL	Y
ORGANIZATION			POSAL	-		- DN (month
Brandeis University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
James Bensinger						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund erson-mor	ed	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		quested By proposer	granted by N (if differen
1. James Bensinger - Prof	0.00	0.00	0.00	\$		\$
2.	0.00	0.00	0.00			
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					-	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	33.00	0.00	0.00		177,165	
3. (0) GRADUATE STUDENTS					0	
4. (3) UNDERGRADUATE STUDENTS					18,506	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					Ō	
TOTAL SALARIES AND WAGES (A + B)					195,671	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					50,523	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					246,194	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSE	ESSIONS)			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0			3		0 26,499	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF			3		0 26,499	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			3		0 26,499 0 82,405 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PARTICIPANTS 0 1. MATERIALS AND SUPPLIES			6		0 26,499 0 82,405	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			<u> </u>		0 26,499 0 82,405 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		0 26,499 0 82,405 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>		0 26,499 0 82,405 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		0 26,499 26,499 0 82,405 0 0 0 0 0 82,405	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 26,499 0 82,405 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>		0 26,499 26,499 0 82,405 0 0 0 0 0 82,405	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 26499)			<u> </u>		0 26,499 26,499 0 82,405 0 0 0 0 0 82,405 355,098	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 26499)			<u> </u>		0 26,499 26,499 0 82,405 0 0 0 0 0 82,405 355,098 15,369	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 7 7 9 1. STIPENDS 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) TOTAL INDIRECT COSTS (F&A)			3		0 26,499 26,499 0 82,405 0 0 0 0 0 0 0 82,405 355,098 15,369 370,467	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 TOTAL NUMBER OF PARTICIPANTS 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) TOTAL INDIRECT CO			3		0 26,499 26,499 0 82,405 0 0 0 0 0 0 82,405 355,098 15,369 370,467 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL MARE: 58.0000, Base: 26499) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL	RTICIPAN	T COSTS			0 26,499 26,499 0 82,405 0 0 0 0 0 0 0 82,405 355,098 15,369 370,467	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L.	RTICIPAN	T COSTS	NT \$		0 26,499 26,499 0 82,405 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) travel (Rate: 58.0000, Base: 26499) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	RTICIPAN	TCOSTS	NT \$ FOR 1	NSF U	0 26,499 26,499 0 82,405 0 0 0 0 0 0 82,405 355,098 15,369 355,098 15,369 370,467 0 370,467 SE ONLY	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L.		TCOSTS	NT \$ FOR 1 CT COS	NSF U BT RA	0 26,499 26,499 0 82,405 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

PROPOSAL BUDG	ET		FO	R NS	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
Brandeis University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	IO.		
James Bensinger	1					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	ļı	NSF Fund Person-mor	ed hths	Be	Funds equested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	granted by N (if different
1. James Bensinger - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (15) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	165.00	0.00	0.00		976,205	
3. (0) GRADUATE STUDENTS					0	
4. (15) UNDERGRADUATE STUDENTS					88,710	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					1,064,915	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					278,191	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					1,343,106	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			3	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0 204,998	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER OF PARTICI			6		0 204,998 0 427,529	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			8		0 204,998 0 427,529 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 204,998 0 427,529 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMER SERVICES			3		0 204,998 204,998 0 427,529 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		0 204,998 204,998 0 427,529 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>		0 204,998 204,998 0 427,529 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>		0 204,998 204,998 0 427,529 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			2 2 2		0 204,998 204,998 0 427,529 0 0 0 0 0 427,529 1,975,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>		0 204,998 204,998 0 427,529 0 0 0 0 0 427,529 1,975,633 118,899	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		0 204,998 204,998 0 427,529 0 0 0 0 427,529 1,975,633 118,899 2,094,532	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			2 2 		0 204,998 204,998 0 427,529 0 0 0 0 427,529 1,975,633 118,899 2,094,532 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	ITICIPAN	TCOSTS			0 204,998 204,998 0 427,529 0 0 0 0 427,529 1,975,633 118,899 2,094,532	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	ITICIPAN	TCOSTS	NT \$	\$	0 204,998 204,998 0 427,529 0 0 0 0 427,529 1,975,633 1,975,633 1,975,633 1,975,633 1,975,633 2,094,532 0 2,094,532	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	ITICIPAN	IFFEREI	NT \$ FOR 1	\$ NSF U	0 204,998 204,998 0 427,529 0 0 0 0 0 427,529 1,975,633 1,975,633 118,899 2,094,532 0 2,094,532 0 2,094,532	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPANTIAL AND SHARING PROPOSED LEVEL \$ 0 ACREED		IFFEREI	NT \$ FOR 1 CT COS	\$ NSF U	0 204,998 204,998 0 427,529 0 0 0 0 427,529 1,975,633 1,975,633 1,975,633 1,975,633 1,975,633 2,094,532 0 2,094,532	\$

BRANDI	EIS UNIVER	SITY	PROPC	SAL BU	JDGET			
NSF	BUDGET				FC	R NSF USE O	NLY	
02/0	1/12 - 01/31/	13			Proposal NO	Duration (I	Months)	
ORGANIZATION	Brandeis Ur	nive	rsitv		AWARD N0.	Proposed	Granted	
PRINCIPAL INVESTIGATOR:	Bensinger		<u> </u>					
	Dononigoi		NSE Eun	ded Perso	n-months	Funds	Funds	
A SENIOR PERSONNEL:			CAL	ACAD	SUMR	Requested	Granted	
TOTAL SENIOR PERSONNEL:								
B OTHER PERSONNEL:								
Postdoctoral Associat	e - Engineer							
Other Professionals -		2	21.0			143,188		
Graduate Students						i		
Undergraduate Stude	nts	3	12.0			17,000		
Technicians		1	12.0		-	47,804		
Other					-	0		
TOTAL SALARY AND WAGES						207,992		
C FRINGES Engineers & Technici	an = 28.3% ⁻ Un	dera	rad (summ	er) = 7.7%	6	54,436		
TOTAL SALARY-WAGES-FRIN	IGE BENEFITS	lacigi				262,428		
D EQUIPMENT:	IOL DEINEI II O					0		
E TRAVEL: DOMESTIC:						0		
FOREIGN:						43,544		
F PARTICIPANT SUPPORT						10,011		
G OTHER DIRECT COSTS: Materials and Supplie			Fabricatio		oment	78,928		
Publication/Documen			Tabricatio			10,020		
Consultant Services	lation							
Computer Services								
Other-Machining				Mrs		0		
Other-Shipping	0					78,928		
TOTAL OTHER DIRECT COST	5					10,920		
			· · · · · · · · · · · · · · · · · · ·			384,900		
	00/ travel ash		43,544		+	25,256		
I INDIRECT COSTS: MTDC * 58			43,544			410,156		alaa
J TOTAL DIRECT AND INDIREC	TCOSTS					410,150		
K RESIDUAL FUNDS					-	410,156	· · · · · · · · · · · · · · · · · · ·	
L AMOUNT OF THIS REQUEST					farant	410,150		
M COST SHARING: Proposed Le	vel		Agreed L	evel if Dif	terent			
PI/PD TYPED NAME			SIGNATU	JRE	DATE	FOR NSF U	JSE ONLY	
James Bensinger		\leq	time	Sim.	. "/30	INDIRECT	COST RATE V	RIFICATION
)	1	Date Checked	Date of Rate	Initials-ORG
ORGANIZATIION REP. TYPED N	AME –		SIGNATU	JRE	DATE		Sheet	
Paul O'Keefe	Vinh	CA I	4. Sela.	gy u	30/10			
	1	1 1.4		~ /	1		1	

		NSF BL	JDGET				FC	R NSF USE ON	ILY	
			3 - 01/31/	14			Proposal NO	Duration (I	Vonths)	
	ORGANIZATION	Br	andeis Ur	niver	rsity		AWARD N0.	Proposed	Granted	
	PRINCIPAL INVESTIG	ATOR: E	Bensinger							
						ded Persor		Funds	Funds	
Ą	SENIOR PERSONNEL				CAL	ACAD	SUMR	Requested	Granted	
	TOTAL SENIOR PERS	SONNEL:								
В	OTHER PERSONNEL:									
	Postdoctoral									
_	Other Profes	sionals - En	gineers	2	21.0			147,484		
	Graduate St									
	Undergradua	ate Students		3	12.0			17,360		
	Technicians			1	12.0			49,238		
	Other							0		
	TOTAL SALARY AND							214,082		
С	FRINGES Engineers &	Technician	= 28.3%; Un	dergr	ad (summ	er) = 7.7%	0	56,057		
	TOTAL SALARY-WAG	ES-FRINGE	BENEFITS					270,139		
	EQUIPMENT:							0		
Ξ	TRAVEL: DOMESTIC:							0		
	FOREIGN:							44,250		
F	PARTICIPANT SUPPO	DRT								
3	OTHER DIRECT COS	TS:								
	Materials an	d Supplies			Fabricatio	on of Equp	ment	84,976		
	Publication/[on						-	
	Consultant S	Services								
	Computer Se	ervices								
	Other-Machi	ning								
	Other-Shipp	ing								
	TOTAL OTHER DIREC	CT COSTS						84,976		a
.	TOTAL DIRECT COST	rs .						399,365		
Í	INDIRECT COSTS: M	TDC * 58.0%	travel only		44,250			25,665		
J	TOTAL DIRECT AND							425,030		
K	RESIDUAL FUNDS									
	AMOUNT OF THIS RE	QUEST						425,030		
M	COST SHARING: Prop	oosed Level			Agreed L	evel If Diff	erent			
2],	/PD TYPED NAME				SIGNATU	JRE	DATE	FOR NSF L	JSE ONLY	
	James Bensinger			\sim	7	Bin	00/1	INDIRECT	COST RATE VI	ERIFICATION
	,				Lun			Date Checked	Date of Rate	Initials-ORG
C	RGANIZATIION REP. T	YPED NAM			SIGNATI		DATE		Sheet	
	Paul O'Keefe		. 10.00		1. Del	le con la	30/10	1		

NSF	BUDGET				FC	R NSF USE O	NLY	
02/0	1/14 - 01/31/	15			Proposal NO	Duration (Months)	
ORGANIZATION	Brandeis Ur	nive	rsity		AWARD N0.	Proposed	Granted	
PRINCIPAL INVESTIGATOR:	Bensinger							
				ded Perso		Funds	Funds	
SENIOR PERSONNEL:			CAL	ACAD	SUMR	Requested	Granted	
TOTAL SENIOR PERSONNEL	•							
OTHER PERSONNEL:	to Engineer		_					
Postdoctoral Associa		2	21.0			151,908		
Other Professionals	- ⊏ngineers	2	21.0			101,000		
Graduate Students	anto	n	12.0			17,731		
Undergraduate Stude	ents	3	12.0			50,715		
Technicians		1	12.0			0		
	-					220,354		
TOTAL SALARY AND WAGES	$i_{ab} = 20.20/.11_{ab}$	dore	rod (oumm	(0, -7, 70)	6	57,727		
FRINGES Engineers & Technic	an = 28.3%; Un	uerg	iau (summ	(-1.17)	<u>'U .</u>	278,081		
TOTAL SALARY-WAGES-FRI	NGE BENEFIIS							
EQUIPMENT:						0		
TRAVEL: DOMESTIC:						44,978		
FOREIGN:						44,970		
PARTICIPANT SUPPORT							l	
OTHER DIRECT COSTS:			- · · ·	(=		01.054	r	
Materials and Suppli			Fabricatio	on of Equ	oment	91,054		
Publication/Docume	ntation			L				
Consultant Services								
Computer Services								
Other-Machining								
Other-Shipping						01.054		
TOTAL OTHER DIRECT COS	TS					91,054		
						44440		
TOTAL DIRECT COSTS			4 4 4 7 7 7			414,113		
INDIRECT COSTS: MTDC * 5	3.0% travel only		44,978			26,087		
TOTAL DIRECT AND INDIRE	CT COSTS					440,200	<u></u>	
RESIDUAL FUNDS						440.000		
AMOUNT OF THIS REQUEST					£	440,200	<u>'</u>	
COST SHARING: Proposed Le	evel		Agreed L	evel If Dif				
I/PD TYPED NAME			SIGNAT	URE	DATE	FOR NSF	USE ONLY	
				<u> </u>	1 30		COST RATE V	ERIFICATION
James Bensinger			ferend of	and				
DOWNER THOM DED. THEE			SIGNAT		DATE	Date Checked	Date of Rate Sheet	Initials-ORG
RGANIZATIION REP. TYPED N		. 1.	ULL h	UNE	MAK		Sileet	
Paul O'Keefe		YCA	allen h	y. sell	410 1/3	6/10		

BRAND	EIS UNIVERS	SITY	PROPC	SAL BL	JDGET			
NSF	BUDGET				FC	R NSF USE O	NLY	
02/0	1/15 - 01/31/	16			Proposal NO	Duration (Months)	
ORGANIZATION	Brandeis Ur	niver	rsitv		AWARD N0.	Proposed	Granted	
PRINCIPAL INVESTIGATOR:	Bensinger		lity					
FRINCIPAL INVESTIGATOR.	Densinger		NSE Eun	ded Persor	-months	Funds	Funds	
A SENIOR PERSONNEL:			CAL	ACAD	SUMR	Requested	Granted	
A SENIOR PERSONNEL.			0/12					
TOTAL SENIOR PERSONNEL								
B OTHER PERSONNEL:								
Postdoctoral Associa	te - Engineer							
Other Professionals -		2	21.0			156,466		
Graduate Students	Engineero							
Undergraduate Students	nte	3	12.0			18,113		
Technicians	,110	1	12.0			52,237		
Other		•	12.0			0		
						226,816		
C FRINGES Engineers & Technic	ian - 28.3% · Un	dora	rad (summ	(er) = 7.7%	/	59,448		
TOTAL SALARY-WAGES-FRIM	IGE BENEFITS	luciyi	au (Summ			286,264		
D EQUIPMENT:						0		
E TRAVEL: DOMESTIC:						0		·····
FOREIGN:						45,727		
			· · · · · · · · · · · · · · · · · · ·			10,727		
G OTHER DIRECT COSTS:	· · · · · · · · · · · · · · · · · · ·					l		
Materials and Supplie			Fabricatio	on of Equp	ment	90,166		
Publication/Documer	tation		Tablicatio			50,100		
Consultant Services	lation							
Computer Services								
Other-Machining								
Other-Shipping TOTAL OTHER DIRECT COS ⁻						90,166		
TOTAL OTHER DIRECT COS	3					30,100		
H TOTAL DIRECT COSTS						422,157		
I INDIRECT COSTS: MTDC * 58	8.0% travel only		45,727			26,522		
J TOTAL DIRECT AND INDIREC	CT COSTS		1			448,679		
K RESIDUAL FUNDS								
L AMOUNT OF THIS REQUEST						448,679		
M COST SHARING: Proposed Le			Agreed L	evel If Diff	erent			
PI/PD TYPED NAME			SIGNATI	JRE	DATE	FOR NSF	JSE ONLY	
James Bensinger		\sim	Et my	in	"[30	INDIRECT	COST RATE V	ERIFICATION
					DATE	Date Checked	Date of Rate	Initials-ORG
ORGANIZATIION REP. TYPED N		-	SIGNATI		DATE	<u> </u>	Sheet	and as the contract of the second states and the second states and
Paul O'Keefe	Ve	un	Cr H.	clarg	4 11/36/	10		· · · · · · · · · · · · · · · · · · ·
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	NS	SF BUDGET				FC	R NSF USE O	NLY	
		/01/16 - 01/31/	/17			Proposal NO	Duration (Months)	
		Brandaia II	nivo	reity		AWARD N0.	Proposed	Granted	
	ORGANIZATION	Brandeis U	nive	ISILY		AWARD NU.	Ploposed	Granted	
	PRINCIPAL INVESTIGATOR	Bensinger					Funds	Funds	
					ded Perso	n-months SUMR		Granted	
<u>A</u>	SENIOR PERSONNEL:			CAL	ACAD	SUIVIR	Requested	Granteu	
	TOTAL SENIOR PERSONNE	EL:						-	
В									
	Postdoctoral Assoc	ciate - Engineer							
	Other Professional	s - Engineers	2	18.0			136,812		
	Graduate Students								
	Undergraduate Stu		3	12.0			18,506		
	Technicians		1	9.0			40,353		
	Other						0		
	TOTAL SALARY AND WAGE	ES					195,671		
C	FRINGES Engineers & Techr	nician = 28.3%; U	ndera	rad (summ	er) = 7.79	6	50,523		
-	TOTAL SALARY-WAGES-FF	RINGE BENEFITS	3	1	,		246,194		
D		1					0		
		· · · · · · · · ·					0		
	FOREIGN:						26,499		
F	PARTICIPANT SUPPORT								
	OTHER DIRECT COSTS:				and the second second		and the second second		
-	Materials and Supp	olies		Fabricatio	on of Equ	oment	82,405		
	Publication/Docum								
	Consultant Service	and a second sec							
	Computer Services								
	Other-Machining								
-	Other-Shipping								
	TOTAL OTHER DIRECT CO	STS					82,405		
							· · ·		
н	TOTAL DIRECT COSTS						355,098		
1	INDIRECT COSTS: MTDC *	58.0% travel only		26,499			15,369		
<u>,</u>	TOTAL DIRECT AND INDIR	ECT COSTS	+	,			370,467		
	RESIDUAL FUNDS								
	AMOUNT OF THIS REQUES	ST .					370,467		
	COST SHARING: Proposed		1	Agreed L	evel If Dif	ferent	· · · ·		
ΡI	I/PD TYPED NAME		0	SIGNATI	JRE	DATE	FOR NSF		
	James Bensinger			Junk	sunt	(J) (J)		COST RATE V	
0	RGANIZATIION REP. TYPED	NAME		SIGNAT		DATE	Date Checked	Date of Rate Sheet	Initials-OR0
	Paul O'Keefe		111	x 14.4	Plasm	1 11/30/1	k		
	Paul O'Keefe	KC	aic	h Mit					

		NSE	BUDGET				FC	OR NSF USE O		
			1/12 - 01/31/	47				Duration (
				1/			Proposal NO	Duration	vionins)	
		<u> </u>	UMULATIVE				.			
	ORGANIZ	ZATION	Brandeis U	nive	rsity		AWARD N0.	Proposed	Granted	
	PRINCIP	AL INVESTIGATOR:	Bensinger							
					NSF Fun	ded Perso		Funds	Funds	
Α	SENIOR	PERSONNEL:			CAL	ACAD	SUMR	Requested	Granted	
		ENIOR PERSONNEL			anna anaisteachtaisteachta	and the second second for the second s				
В	OTHER F	PERSONNEL:								
		Postdoctoral Associa								
		Other Professionals -	Engineers	2	102.0			735,858		
		Graduate Students								
		Undergraduate Stude	nts	3	60.0			88,710		
		Technicians		1	57.0			240,347		
		Other					ļ	0		
	TOTAL S	ALARY AND WAGES					ļ	1,064,915		
<u>C</u>	FRINGES	Engineers & Technic	an = 28.3%; Ur	nderg	rad (summ	er) = 7.7%	6	278,191		
		ALARY-WAGES-FRIM	IGE BENEFITS	;				1,343,106		
D	EQUIPM	ENT:						0		
Ε	TRAVEL:	DOMESTIC:					· · · · · · · · · · · · · · · · · · ·	0		
		FOREIGN:			-			204,998		
		PANT SUPPORT								
G	OTHER	DIRECT COSTS:	L			с. С. —		407.500		
		Materials and Supplie	es estatemente estatem estatemente estatemente estatemente estatemente estatemente estatemente estatemente estatemente estatemente est		Fabricatio	on of Equp	ment	427,529		
		Publication/Documer	tation							
		Consultant Services								
		Computer Services								
		Other-Machining								
		Other-Shipping						427,529		
	TIOTALC	THER DIRECT COST	3		<u> </u>			421,529		
1.1	TOTAL							1,975,633		
H		IRECT COSTS T COSTS: MTDC * 58	0% traval calu		204,998			118,899		
+		IRECT AND INDIREC			204,990			2,094,532	·	
교		AL FUNDS						2,007,002		
<u>n</u>	RESIDUA	OF THIS REQUEST						2,094,532		
		ARING: Proposed Le			Agreed	evel If Diff	erent	2,004,002		
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ים	 /PD TYPE				SIGNATU	IRE	DATE	FOR NSF L	ISE ONLY	
P I					SIGINATO		,			l
	James Be	ensinger			1 mile	13-	12/7	INDIRECT	COST RATE V	ERIFICATION
	1					-	1	Date Checked	Date of Rate	Initials-ORG
~		IION REP. TYPED N			SIGNATU	IRE	DATE	Date Checked	Sheet	initial3-OilC
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	Paul O'Ke	eefe	timer.	4.2	schart	5 12	14/10			
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Brandeis University - Columbia University Subcontract Physics Department - High Energy YEAR 1 02/01/12 - 01/31/13

Salaries				190,992
Engineer Engineer Research Tech	1.0 FTE9.0 monthsFull time1.0 FTE12.0 monthsFull time1.0 FTE12.0 monthsFull time		64,896 78,292 47,804	
Students	3.0 FTE 12.0 months Part time	No Fringe	17,000	17,000
Fringe	28.30% engineers & research t 7.70% Students - summer on			54,051 385
Total Salaries & Fri	nge Benefits			262,428
Travel				
Domestic	none			0
Foreign	Approx 20 trips to CERN at \$2,2 (airfare = \$1,250, housing \$500,), misc \$200)	43,544
Materials/Supplies,	Machining, Shipping			78,928
Materials purchased	at Brandeis and CERN and part f	abrications ne	cessary to further dev	velop project.
Indirect	58.0% on travel only			25,256

TOTAL

Brandeis University - Columbia University Subcontract Physics Department - High Energy YEAR 2 02/01/13 - 01/31/14

Salaries		196,722
Engineer Engineer Research Tech	1.0 FTE9.0 monthsFull time66,8431.0 FTE12.0 monthsFull time80,6411.0 FTE12.0 monthsFull time49,238	
Students	3.0 FTE 12.0 months Part time No Fringe 17,360	17,360
Fringe	28.30% engineers & research tech 7.70% Students - summer only	55,672 385
Total Salaries & Fri	nge Benefits	270,139
Travel		
Domestic	none	0
Foreign	Approx 20 trips to CERN at \$2,250 each (airfare = \$1,250, housing \$500, per diem \$300, misc \$200)	44,250
Materials/Supplies,	Machining, Shipping	84,976
Materials purchased	at Brandeis and CERN and part fabrications necessary to further de	velop project.
Indirect	58.0% on travel only	25,665

TOTAL

Brandeis University - Columbia University Subcontract Physics Department - High Energy YEAR 3 02/01/14 - 01/31/15

Salaries		202,623
Engineer Engineer Research Tech	1.0 FTE9.0 monthsFull time68,8481.0 FTE12.0 monthsFull time83,0601.0 FTE12.0 monthsFull time50,715	
Students	3.0 FTE 12.0 months Part time No Fringe 17,731	17,731
Fringe	28.30% engineers & research tech 7.70% Students - summer only	57,342 385
Total Salaries & Fri	nge Benefits	278,081
Travel		
Domestic	none	0
Foreign	Approx 20 trips to CERN at \$2,250 each (airfare = \$1,250, housing \$500, per diem \$300, misc \$200)	44,978
Materials/Supplies,	Machining, Shipping	91,054
Materials purchased	at Brandeis and CERN and part fabrications necessary to further dev	velop project.
Indirect	58.0% on travel only	26,087

TOTAL

Brandeis University - Columbia University Subcontract Physics Department - High Energy YEAR 4 02/01/15 - 01/31/16

Salaries		208,703
Engineer Engineer Research Tech	1.0 FTE9.0 monthsFull time70,9141.0 FTE12.0 monthsFull time85,5521.0 FTE12.0 monthsFull time52,237	
Students	3.0 FTE 12.0 months Part time No Fringe 18,113	18,113
Fringe	28.30% engineers & research tech 7.70% Students - summer only	59,063 385
Total Salaries & Fri	inge Benefits	286,264
Travel		
Domestic	none	0
Foreign	Approx 20 trips to CERN at \$2,250 each (airfare = \$1,250, housing \$500, per diem \$300, misc \$200)	45,727
Materials/Supplies,	Machining, Shipping	90,166
Materials purchased	at Brandeis and CERN and part fabrications necessary to further of	levelop project.
Indirect	58.0% on travel only	26,522
TOTAL	-	

TOTAL

Brandeis University - Columbia University Subcontract Physics Department - High Energy YEAR 5 02/01/16 - 01/31/17

Salaries		177,165
Engineer Engineer Research Tech	1.0 FTE6.0 monthsFull time48,6941.0 FTE12.0 monthsFull time88,1181.0 FTE9.0 monthsFull time40,353	
Students	3.0 FTE 12.0 months Part time No Fringe 18,506	18,506
Fringe	28.30% engineers & research tech 7.70% Students - summer only	50,138 385
Total Salaries & Fri	nge Benefits	246,194
Travel		
Domestic	none	0
Foreign	Approx 12 trips to CERN at \$2,250 each (airfare = \$1,250, housing \$500, per diem \$300, misc \$2	26,499 200)
Materials/Supplies,	Machining, Shipping	82,405
Materials purchased	at Brandeis and CERN and part fabrications necessary t	o further develop project.
Indirect	58.0% on travel only	15,369
		070 407

TOTAL

SUMMARY PROPOSAL BUDG	ET		FO	R NSF L	JSE ONL'	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIC	DN (month
Michigan State University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Reiner Hauser						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	F Bequ	unds lested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	poser	(if differen
1. Reiner Hauser - Prof	6.00	0.00	0.00	\$	40,800	\$
2. Joey W Huston - Prof	0.00				0	
3. Bernard Pope - Prof	0.00	0.00	0.00		0	
4.						
	0.00	0.00	0.00		•	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	1				0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	6.00	0.00	0.00		40,800	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (1) POST DOCTORAL SCHOLARS	7.00	0.00	0.00		27 026	
1. (1) POST DOCTORAL SCHOLARS 2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	7.90		<u>0.00</u> 0.00		<u>37,026</u> 115,455	
3. (0) GRADUATE STUDENTS	20.40	0.00	0.00		0	
4. (1) UNDERGRADUATE STUDENTS					8,800	
5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0,000	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					202,081	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					62,198	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					264,279	
TOTAL EQUIPMENT		· •	00,000		100,000	
TOTAL EQUIPMENT		· •			100,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS				0	
	ESSIONS					
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS			-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 6. 0 3. SUBSISTENCE 6. 0 4. OTHER 6		;)			0 23,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR		;)		-	0 23,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		;)		-	0 23,939 0 11,906 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		;)		-	0 23,939 0 11,906 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		;)			0 23,939 0 11,906 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		;)			0 23,939 0 11,906 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		;)			0 23,939 23,939 0 11,906 0 0 0 0 98,178	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		;)			0 23,939 23,939 0 11,906 0 0 0 98,178 110,084	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DUPLES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)			0 23,939 23,939 0 11,906 0 0 0 0 98,178	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		;)			0 23,939 23,939 0 11,906 0 0 0 98,178 110,084	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 398300)		;)			0 23,939 23,939 0 11,906 0 0 0 0 98,178 110,084 498,302	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 398300) TOTAL INDIRECT COSTS (F&A) <td></td> <td>;)</td> <td></td> <td></td> <td>0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 103,558</td> <td></td>		;)			0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 103,558	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 398300) TOTAL INDIRECT AND INDIRECT COSTS (H + I) <td></td> <td>;)</td> <td></td> <td></td> <td>0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 103,558 601,860</td> <td></td>		;)			0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 103,558 601,860	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 398300) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS		;)			0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 103,558 601,860 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) MTDC (Rate: 26.0000, Base: 398300) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESI	RTICIPAN		5 		0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 103,558 601,860	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 398300) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		S NT \$	\$	0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 103,558 601,860 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 398300) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	RTICIPAN		S S NT \$ FOR 1	\$	0 23,939 23,939 0 11,906 0 0 0 98,178 110,084 498,302 98,178 110,084 498,302 0 601,860 0	•

SUMMARY PROPOSAL BUDG	ET		FOI	r nsf u	SE ONL	Y
ORGANIZATION			POSAL	NO.	DURATIO	DN (month
Michigan State University				F	Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Reiner Hauser						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		nds sted By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	prop	boser	granted by N (if differen
1. Reiner Hauser	6.00	0.00	0.00	\$	42,024	\$
2. Joey W Huston	0.00	0.00	0.00		0	
3. Bernard Pope	0.00	0.00	0.00		0	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	6.00	0.00	0.00		42,024	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	7.90	0.00	0.00		38,137	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	20.40	0.00	0.00	1	18,918	
3. (0) GRADUATE STUDENTS					0	
4. (1) UNDERGRADUATE STUDENTS					9,064	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					208,143	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					64,905	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED				2	273,048	
			50,000		50,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		r	50,000		0	
		r	50,000			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		r	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0		r	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0		r	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0		r	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0		r	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS	ESSIONS)			0 23,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			0 23,000 0 7,116	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			0 23,000 0 7,116 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	ESSIONS)			0 23,000 0 7,116 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)			0 23,000 0 7,116 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)			0 23,000 0 7,116 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)			0 23,000 23,000 0 7,116 0 0 0 99,178	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS)			0 23,000 23,000 0 7,116 0 0 0 99,178 06,294	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)			0 23,000 23,000 0 7,116 0 0 0 99,178	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)			0 23,000 23,000 0 7,116 0 0 0 99,178 06,294	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 402340)	ESSIONS)			0 23,000 23,000 0 7,116 0 0 0 99,178 106,294 152,342	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 402340)	ESSIONS)			0 23,000 23,000 0 7,116 0 0 99,178 06,294 152,342	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MT	ESSIONS)			0 23,000 23,000 0 7,116 0 0 99,178 106,294 152,342 104,608 156,950	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 402340) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS)			0 23,000 23,000 0 7,116 0 0 99,178 06,294 152,342 104,608 156,950 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 402340) TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		0 23,000 23,000 0 7,116 0 0 99,178 106,294 152,342 104,608 156,950	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 402340) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			S 	1 1 4 5 \$ 5	0 23,000 23,000 0 7,116 0 0 0 99,178 06,294 152,342 104,608 155,342 104,608 1556,950 0 1556,950	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 402340) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME			S S NT \$ FOR 1	1 1 4 5 \$ 5	0 23,000 23,000 0 7,116 0 0 99,178 106,294 152,342 104,608 156,950 0 556,950 0 556,950	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 402340) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			S NT \$ FOR I CT COS	1 1 4 5 \$ 5	0 23,000 23,000 0 7,116 0 0 99,178 06,294 152,342 104,608 156,950 0 556,950 0 556,950 0 556,950	\$

SUMMARY PROPOSAL BUDG	ET		FO	R NSF US	E ONL	Y
ORGANIZATION			POSAL	NO. D	URATIC	DN (month
Michigan State University				Ρ	roposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	0.		
Reiner Hauser						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	Fun Request	ds ted Bv	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	propo		granted by N (if differen
1. Reiner Hauser	6.00	0.00	0.00		13,285	\$
2. Joey W Huston	0.00	0.00	0.00		0	
3. Bernard Pope	0.00	0.00	0.00		0	
4.						
	0.00	0.00			•	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	6.00	0.00	0.00	4	13,285	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	7.00	0.00	0.00		0.004	
1. (1) POST DOCTORAL SCHOLARS	7.90	0.00	0.00		<u>39,281</u>	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	20.40	0.00	0.00	14	<u>22,484</u>	
3. (0) GRADUATE STUDENTS					0 226	
4. (1) UNDERGRADUATE STUDENTS 5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					<u>9,336</u> 0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				21	14,386	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					67,457	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					31,843	
TOTAL EQUIPMENT		5	50,000		50,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	r			Ó	
	SSIONS	r				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS	r			Ó	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS	r			Ó	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	r			Ó	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 1. CONTRAVEL 2. TRAVEL 2. SUBSISTENCE 0	SSIONS	r			Ó	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	r			Ó	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0)			Ó	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 5. OTHER DIRECT C)			0 22,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES)			0 22,000 22,000 0 4,822	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION)			0 22,000 22,000 0 4,822 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS)			0 22,000 22,000 0 4,822 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER)			0 22,000 22,000 0 4,822 0 0 0 0 0 0 7,843	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS)			0 22,000 22,000 0 4,822 0 0 0 0 37,843 02,665	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G))			0 22,000 22,000 0 4,822 0 0 0 0 0 0 7,843	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE))			0 22,000 22,000 0 4,822 0 0 0 0 37,843 02,665	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN)		2 	0 22,000 22,000 0 4,822 0 0 0 0 0 97,843 02,665 56,508	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE)			0 22,000 22,000 0 4,822 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 406508) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I))			0 22,000 22,000 0 4,822 0 0 0 0 7,843 02,665 56,508 05,692 52,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 406508) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS)			0 22,000 22,000 0 4,822 0 0 0 0 0 0 7,843 0 2,665 56,508 0 56,508 0 5,692 52,200 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MOUTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN		5 		0 22,000 22,000 0 4,822 0 0 0 0 7,843 02,665 56,508 05,692 52,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 AGREED LEVEL \$ 0 AGREED	TICIPAN		3 3 	2 2 3 3 4 5 6 5 6 5 6 5 6	0 22,000 22,000 0 4,822 0 0 0 0 0 7,843 02,665 56,508 0 55,692 52,200 0 52,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 AGREED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN		S S NT \$ FOR 1	2 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0 22,000 22,000 4,822 0 4,822 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 406508) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			S NT \$ FOR 1 CT COS	2 2 3 3 4 5 6 5 6 5 6 5 6	0 22,000 22,000 4,822 0 0 4,822 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

SUMMARY PROPOSAL BUDG	ET		FOR	RNSE	USE ONL	
ORGANIZATION			POSAL	NO.	DURATIO	ON (month
Michigan State University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Reiner Hauser						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	F	NSF Fund Person-mor	ed hths		⁻ unds Jested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pr	oposer	granted by N (if differen
1. Reiner Hauser	6.00	0.00	0.00	\$	44,584	\$
2. Joey W Huston	0.00	0.00	0.00		0	
3. Bernard Pope	0.00	0.00	0.00		0	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	6.00	0.00	0.00		44,584	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	7.90	0.00	0.00		40,067	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	20.40	0.00	0.00		126,159	
3. (0) GRADUATE STUDENTS					0	
4. (1) UNDERGRADUATE STUDENTS					9,616	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					220,426	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>70,682</u> 291,108	
TOTAL EQUIPMENT					0	
	SSIONS)			0 0 21,100	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS,)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS S C. TRAVEL C 3. SUBSISTENCE 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0				-	0 21,100	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR			3	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0 21,100	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			5		0 21,100 0 3,464	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 21,100 0 3,464 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 21,100 0 3,464 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 21,100 0 3,464 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 21,100 0 3,464 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER					0 21,100 21,100 0 3,464 0 0 0 0 0 95,129	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5 		0 21,100 21,100 0 3,464 0 0 0 0 95,129 98,593	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>		0 21,100 21,100 0 3,464 0 0 0 0 0 95,129	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			5 		0 21,100 21,100 0 3,464 0 0 0 0 95,129 98,593	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 410802)			3		0 21,100 21,100 0 3,464 0 0 0 0 0 95,129 98,593 410,801	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 410802) TOT			<u> </u>		0 21,100 21,100 0 3,464 0 0 0 0 95,129 98,593 410,801 106,809	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MT			<u> </u>		0 21,100 21,100 0 3,464 0 0 0 95,129 98,593 410,801 106,809 517,610	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 410802) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u>}</u>		0 21,100 21,100 0 3,464 0 0 0 95,129 98,593 410,801 106,809 517,610 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 410802) TOTAL INDIRECT COSTS (J) OR (J MINUS K) . AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	TCOSTS			0 21,100 21,100 0 3,464 0 0 0 95,129 98,593 410,801 106,809 517,610	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 410802) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN	TCOSTS	NT \$	\$	0 21,100 21,100 0 3,464 0 0 0 95,129 98,593 410,801 106,809 517,610 0 517,610	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 410802) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LE	TICIPAN	IFFEREI	NT \$ FOR N	\$ NSF US	0 21,100 21,100 0 3,464 0 0 0 95,129 98,593 410,801 106,809 517,610 0 517,610 0 517,610	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 410802) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		IFFEREI	NT \$ FOR N CT COS	\$ NSF US	0 21,100 21,100 0 3,464 0 0 0 95,129 98,593 410,801 106,809 517,610 0 517,610 0 517,610 517,610	\$

SUMMARY PROPOSAL BUDG	ET		FOI	R NSF U	SE ONL	Y
ORGANIZATION			POSAL			DN (month
Michigan State University				F	Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	0.		
Reiner Hauser						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		nds sted By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	prop	oser	granted by N (if differen
1. Reiner Hauser	6.00	0.00	0.00	\$	45,922	\$
2. Joey W Huston	0.00	0.00	0.00		0	
3. Bernard Pope	0.00	0.00	0.00		0	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	6.00	0.00	0.00		45,922	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	7.90	0.00	0.00		41,269	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	20.40	0.00	0.00	1	29,945	
3. (0) GRADUATE STUDENTS					0	
4. (1) UNDERGRADUATE STUDENTS					9,904	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER				-	0	
TOTAL SALARIES AND WAGES (A + B)					227,040	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					72,136	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED		00 \			299,176	
ATLAS Upgrade Phase II TOTAL EQUIPMENT		5	50,000		50,000	
		r	50,000		<u>50,000</u> 0	
TOTAL EQUIPMENT		r	50,000			
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI		r	50,000		Ó	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN		r	50,000		Ó	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		r	50,000		Ó	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		r	50,000		Ó	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0		r	50,000		Ó	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0		r	50,000		Ó	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0	ESSIONS)			Ó	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	ESSIONS)			<u>0</u> 19,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 1. STIPENDS	ESSIONS)			<u>0</u> 19,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAF 6. OTHER DIRECT COSTS	ESSIONS)			0 19,900 0 3,215 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			0 19,900 0 3,215	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 9 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)	ESSIONS)			0 19,900 0 3,215 0 0 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. ONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)			0 19,900 0 3,215 0 0 0 0 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBJUCATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)			0 19,900 0 3,215 0 0 0 0 92,934	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS)			0 19,900 0 3,215 0 0 0 92,934 96,149	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)			0 19,900 0 3,215 0 0 0 0 92,934	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)			0 19,900 0 3,215 0 0 0 92,934 96,149	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 415213)	ESSIONS)			0 19,900 0 3,215 0 0 0 92,934 96,149 165,225	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 415213) TOTAL INDIRECT COSTS (F&A)	ESSIONS)		4	0 19,900 3,215 0 0 92,934 96,149 165,225	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 415213) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) <td>ESSIONS</td> <td>)</td> <td></td> <td>4</td> <td>0 19,900 3,215 0 0 92,934 96,149 165,225 107,955 573,180</td> <td></td>	ESSIONS)		4	0 19,900 3,215 0 0 92,934 96,149 165,225 107,955 573,180	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)		4	0 19,900 3,215 0 0 92,934 96,149 165,225 107,955 573,180 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS //DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6.	RTICIPAN		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	4	0 19,900 3,215 0 0 92,934 96,149 165,225 107,955 573,180	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 415213) TOTAL DIRECT AND INDIRECT COSTS (H + I)	RTICIPAN		S 	4	0 19,900 3,215 0 0 92,934 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,14996,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,14996,149 96,149 96,149 96,14996,149 96,149 100,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149 96,14996,149 96,149,149 96,149,14996,149 96,149,149,14996,149,149,149,149,140	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 9 9 9 9 9 9 9 9 </td <td>RTICIPAN</td> <td></td> <td>S S NT \$ FOR 1</td> <td>4 1 5 \$ 5</td> <td>0 19,900 3,215 0 0 92,934 96,149 165,225 107,955 573,180 0 573,180 0 573,180</td> <td>\$</td>	RTICIPAN		S S NT \$ FOR 1	4 1 5 \$ 5	0 19,900 3,215 0 0 92,934 96,149 165,225 107,955 573,180 0 573,180 0 573,180	\$
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS //DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6.			S NT \$ FOR I CT COS	4 1 5 \$ 5	0 19,900 19,900 0 3,215 0 0 0 92,934 96,149 165,225 107,955 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 573,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 175,180 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

PROPOSAL BUDG	iET				USE ONL	
ORGANIZATION		PRC	POSAL	NO.		ON (month
Michigan State University					Proposed	d Grantee
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A\	NARD N	Ю.		
	1	NSE Fund	ed	-		Funda
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Fund Person-mor		Requ	Funds Jested By	Funds granted by N (if different
	CAL	ACAD	SUMR			+
1. Reiner Hauser	30.00	0.00	0.00		216,615	\$
2. Joey W Huston	0.00	0.00	0.00		0	
3. Bernard Pope	0.00	0.00	0.00		0	
4.						
	0.00	0.00				
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	30.00	0.00	0.00		216,615	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	00.50				405 700	
1. (5) POST DOCTORAL SCHOLARS	39.50	0.00	0.00		195,780	
2. (19) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	102.00	0.00	0.00		612,961	
3. (0) GRADUATE STUDENTS					0	
4. (5) UNDERGRADUATE STUDENTS					46,720	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					<u>,072,076</u>	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>337,378</u> ,409,454	
		\$2	50,000			
		· -	50,000		250,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN		· -	50,000		250,000 0 109,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		· -	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		· -	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0		· -	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0		· -	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0		· -	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0		· -	50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS	ESSIONS)			0 109,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			0 109,939 0 30,523	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			0 109,939 0 30,523 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	ESSIONS)			0 109,939 0 30,523 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)			0 109,939 0 30,523 0 0 0 0 483,262	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)			0 109,939 0 30,523 0 0 0 483,262 513,785	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)			0 109,939 0 30,523 0 0 0 0 483,262	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)			0 109,939 0 30,523 0 0 0 483,262 513,785	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS)		2,	0 109,939 109,939 0 30,523 0 0 0 0 483,262 513,785 ,283,178	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)		2,	0 109,939 109,939 0 30,523 0 0 0 0 483,262 513,785 ,283,178 528,622	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A)	ESSIONS)		2,	0 109,939 109,939 0 30,523 0 0 0 483,262 513,785 ,283,178 528,622 ,811,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS)		2,	0 109,939 109,939 0 30,523 0 0 0 483,262 513,785 ,283,178 528,622 ,811,800 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		5 	2,	0 109,939 109,939 0 30,523 0 0 0 483,262 513,785 ,283,178 528,622 ,811,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	RTICIPAN		S	2, \$ 2,	0 109,939 109,939 0 30,523 0 0 0 483,262 513,785 ,283,178 528,622 ,811,800 0 ,811,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 PI/PD NAME	RTICIPAN		S S NT \$ FOR 1	2, \$ 2, \$ 2,	0 109,939 0 30,523 0 0 30,523 0 0 0 483,262 513,785 ,283,178 528,622 ,811,800 0 ,811,800 5E ONLY	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			S NT \$ FOR 1 CT COS	2, \$ 2, \$ 2,	0 109,939 0 30,523 0 0 0 483,262 513,785 ,283,178 528,622 ,811,800 0 ,811,800 0 ,811,800 5 E ONLY E VERIFIC	\$

INT YEAR PROPOSAL BUDGET PROPOSAL NO					FOR NEF USE ONLY			
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Budget Justification Michigan State University Year 1 DRAFT

A.3	Salary for Senior Personnel: Deputy Program Manager for TDAQ	\$40,800
B.1	Postdoctoral Associates: TDAQ M&O	\$37,026
B.2	Other Professionals: TDAQ R&D, Elec. Engs. TileCal M&O, Techs. TileCal R&D, Techs.	\$50,591 \$19,336 \$45,528
B.4	Undergraduate Students: TileCal R&D	\$8,800
C.	Fringe Benefits:	\$62,198
D.	Equipment: ATLAS Upgrade R&D CMM++	\$100,000
E.2	Travel (Foreign): TDAQ R&D for Test Stand (2 trips) TileCal M&O (3 trips) Tile Cal R&D (4 trips)	\$5,139 \$8,800 \$10,000
G.1	Materials and Supplies: TDAQ M&O Misc. TDAQ R&D Misc. Test Stand Construction TileCal M&O Misc. TileCal R&D Misc.	\$279 \$5,000 \$1,849 \$4,778
G.6	Other (Contractual Services): TDAQ R&D (Engineer, Y. Ermoline) TileCal R&D (Shooltz Solutions Inc.)	\$81,678 \$16,500
I.	Indirect Costs: 26% on all except equipment	\$103,558
J.	Total Direct and Indirect Costs	\$601,860

INCOME.

FOR MSF USE ONLY

2ND YEAR PROPOSAL BUDGET		PROPOSAL NO		DUANTON MONTHE			
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Budget Justification Michigan State University Year 2 DRAFT

A.3	Salary for Senior Personnel: Deputy Program Manager for TDAQ	\$42,024
B.1	Postdoctoral Associates: TDAQ M&O	\$38,137
B.2	Other Professionals: TDAQ R&D, Elec. Engs. TileCal M&O, Techs. TileCal R&D, Techs.	\$52,108 \$19,916 \$46,894
B.4	Undergraduate Students: TileCal R&D	\$9,064
C.	Fringe Benefits:	\$64,905
D.	Equipment: ATLAS Upgrade R&D CMM++	\$50,000
E.2	Travel (Foreign): TDAQ R&D for Test Stand (1 trip) TileCal M&O (3 trips) Tile Cal R&D (4 trips)	\$4,000 \$9,000 \$10,000
G.1	Materials and Supplies: TDAQ M&O Misc. TDAQ R&D Misc. Test Stand Construction TileCal M&O Misc. TileCal R&D Misc.	\$102 \$3,940 \$1,813 \$1,261
G.6	Other (Contractual Services): TDAQ R&D (Engineer, Y. Ermoline) TileCal R&D (Shooltz Solutions Inc.)	\$81,678 \$17,500
I.	Indirect Costs: 26% on all except equipment	\$104,608
J.	Total Direct and Indirect Costs	\$556,950

3RD YEAR PROPOSAL BUDGET

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2 NUCTHER PROPERSIONALE (SECHECKN FROMRAMER ETC)	20	14	10	122	484		
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3 I I GRADUATE ETLIDENTS				1.0	100		
4 (1) LENGERIGRADUATE ETUDEMTE				162	20		
1 I DECKETARIAL - CLERICAL OF DIALROLD DIRECTLY			_				
EI JOINER				1.00	.1, e		
TOTAL SALARRES AND INVISES (F. + 8)		_		21	4.386		
C FRAME NEWFITS IF CHARGED AS DREET CORTS					487		
A set of the			_		1.845		
TO14, EDUPMENT			_	BIS	22		
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 EDUPMENT LIST ITEM AND DOLLAR ANDUNIT FOR EACH NEW DROP ATLAS Uppress CMV++ TOTA, EDUPMENT TOTA, EDUPMENT TODALETIC (NO. CAMPON MERCE AND U.E. POR E. FOREION 				313	1.1		
 EDUPMENT LIST ITEM AND DOLLAR ANDUNIT FOR EACH YOU DOL ATLAS Upgrade CMN++ T014, EDUPMENT T034, EDUPMENT T004/ETIC (AUX: EXAMPLA MERCE WE'LL'E FOR 2, FOREIGN F. AARTICERKIT SUPPORT 				1.22	1.1		
EDUPMENT LIST ITEM AND DOLLAR ANDUNIT FOR EACH YOU DID ATLAS Upgrade CMM++ TOTA, EDUPMENT T DOMETIC (ALC: EXCAPCE MERCIT MICLE FOR				1.22	1.1		
EDUPMENT LIST ITEM AND DOLLARI ANDUNIT FOR ERCH ITEM ENDS KTLAS Upgrade CMW++ TOTA, EDUPMENT T DOMETIC (RC), EXTERA MERICI MEDILE FOR E FOREION ANTICERNAL SUPERIT STPENDS S E TOWEL				1.22	1.1		
EDUPMENT LIST ITEM AND DOLLAR ANDUNT FOR ERCH REM BROK KTLAS Upgrade CMV++ TOTAL EDUPMENT TODALETIC INCL. DATABAS MERICE MID UT FOR Z. FOREINE Z. FOREINE ANTICIPANT SUPPORT STPENDS 2 TOM/EL S. SUDSCTOROC				1.22	1.1		
EDUPMENT LET ITEM AND DOLLARI ANDUNIT FOR ERCH REM BROK KTLAS Upgreite CMM++ TOTAL EDUPMENT T DOMETIC (RC). EXCEPT AND UT FOR	BIST (743)		147	1.22	1.1		
EDUPMENT LIST ITEM AND DOLLAR ANDUNT FOR ERCH REM BROK KTLAS Upgrade CMV++ TOTAL EDUPMENT TODALETIC INCL. DATABAS MERICE MID UT FOR Z. FOREINE Z. FOREINE ANTICIPANT SUPPORT STPENDS 2 TOM/EL S. SUDSCTOROC		HITCH	442	1.22	1.1		
EDUPMENT LIST ITEM AND DOLLARI ANDUNIT FOR ERCH REM BROK KTLAS Uppress CMM++ TOTAL EDUPMENT T DOMETIC (INC. EXCEPT MERCEMED UP FOR	BIST (743)	HITCH	112	1.22	1.1		
EDUPMENT LET ITEM AND DOLLAR ANDUNT FOR ERCH REPORT ATLAS Uppress CMM++ TOTAL EDUPMENT T DOMETIC INC. EXARCA MERCERING UP FOR L FOREIGN ANTICIPANT SUPPORT STPENDS	BIST (743)	ARTICIP	192	1.22	300		
EDUPMENT LET ITEM AND DOLLAR ANDUNT FOR ERCH REPORT ETLAS Uppress CMM++ TOTAL EDUPMENT T DOMERTIC (NCL EXARCA MERCERING LIE POR E PORTED E PORTED	BIST (743)	HITCH	452	22,0	300		
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LISA SOMERS Server Domini and Duals Adversingler Office of Serversed Projects

Budget Justification Michigan State University Year 3 DRAFT

A.3	Salary for Senior Personnel: Deputy Program Manager for TDAQ	\$43,285
B.1	Postdoctoral Associates: TDAQ M&O	\$39,281
B.2	Other Professionals: TDAQ R&D, Elec. Engs. TileCal M&O, Techs. TileCal R&D, Techs.	\$53,671 \$20,513 \$48,300
B.4	Undergraduate Students: TileCal R&D	\$9,336
C.	Fringe Benefits:	\$67,457
D.	Equipment: ATLAS Upgrade R&D CMM++	\$50,000
E.2	Travel (Foreign): TDAQ R&D for Test Stand (1 trip) TileCal M&O (3 trips) Tile Cal R&D (4 trips)	\$3,000 \$9,000 \$10,000
G.1	Materials and Supplies: TDAQ M&O Misc. TDAQ R&D Misc. Test Stand Construction TileCal M&O Misc. TileCal R&D Misc.	\$118 \$2,809 \$1,895
G.6	Other (Contractual Services): TDAQ R&D (Engineer, Y. Ermoline) TileCal R&D (Shooltz Solutions Inc.)	\$81,678 \$16,165
I.	Indirect Costs: 26% on all except equipment	\$105,692
J.	Total Direct and Indirect Costs	\$562,200

4TH YEAR PROPOSAL BUDGET

ORGANIZATION Michigan State University			CROSH, M	0. DUPATION (MONT		a (decret real)
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 (E ROSTDOCTORIA, ASSOCIATES 	7.9	9	1.0	_	0.087	-
2 (4) OTHER PROFESSIONALS ("ECHNICIAN, RECEIVANER, ETC.)	20.	0	18	12	95,199	
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Service Contrast proi Group Administrator Officia of Reconstruct Projects

Budget Justification Michigan State University Year 4 DRAFT

A.3	Salary for Senior Personnel: Deputy Program Manager for TDAQ	\$44,584
B.1	Postdoctoral Associates: TDAQ M&O	\$40,067
B.2	Other Professionals: TDAQ R&D, Elec. Engs. TileCal M&O, Techs. TileCal R&D, Techs.	\$55,282 \$21,128 \$49,749
B.4	Undergraduate Students: TileCal R&D	\$9,616
C.	Fringe Benefits:	\$70,682
D.	Equipment: ATLAS Upgrade R&D CMM++	
E.2	Travel (Foreign): TDAQ R&D for Test Stand (1 trip) TileCal M&O (3 trips) Tile Cal R&D (4 trips)	\$1,600 \$9,500 \$10,000
G.1	Materials and Supplies: TDAQ M&O Misc. TDAQ R&D Misc. Test Stand Construction TileCal M&O Misc. TileCal R&D Misc.	\$136 \$1,701 \$1,627
G.6	Other (Contractual Services): TDAQ R&D (Engineer, Y. Ermoline) TileCal R&D (Shooltz Solutions Inc.)	\$81,678 \$13,451
I.	Indirect Costs: 26% on all except equipment	\$106,809
J.	Total Direct and Indirect Costs	\$517,610

STR YEAR PROPOSAL BUDGET

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Budget Justification Michigan State University Year 5 DRAFT

A.3	Salary for Senior Personnel: Deputy Program Manager for TDAQ	\$45,922
B.1	Postdoctoral Associates: TDAQ M&O	\$41,269
B.2	Other Professionals: TDAQ R&D, Elec. Engs. TileCal M&O, Techs. TileCal R&D, Techs.	\$56,941 \$21,762 \$51,242
B.4	Undergraduate Students: TileCal R&D	\$9,904
C.	Fringe Benefits:	\$72,136
D.	Equipment: ATLAS Upgrade Phase II Module	\$50,000
E.2	Travel (Foreign): TDAQ R&D for Test Stand TileCal M&O (3 trips) Tile Cal R&D (4 trips)	\$9,900 \$10,000
G.1	Materials and Supplies: TDAQ M&O Misc. TDAQ R&D Misc. Test Stand Construction TileCal M&O Misc. TileCal R&D Misc.	\$286 \$1,242 \$1,687
G.6	Other (Contractual Services): TDAQ R&D (Engineer, Y. Ermoline) TileCal R&D (Shooltz Solutions Inc.)	\$81,678 \$11,256
I.	Indirect Costs: 26% on all except equipment	\$107,955
J.	Total Direct and Indirect Costs	\$573,180



CUMMULATIVE PROPOSAL BUDGET

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Budget Justification Michigan State University CUMULATIVE DRAFT

A.3	Salary for Senior Personnel: Deputy Program Manager for TDAQ	\$216,615
B.1	Postdoctoral Associates: TDAQ M&O	\$195,780
B.2	Other Professionals: TDAQ R&D, Elec. Engs. TileCal M&O, Techs. TileCal R&D, Techs.	\$268,593 \$102,655 \$241,713
B.4	Undergraduate Students: TileCal R&D	\$46,720
C.	Fringe Benefits:	\$337,378
D.	Equipment: ATLAS Upgrade R&D CMM++ & Phase II Module	\$250,000
E.2	Travel (Foreign): TDAQ R&D for Test Stand (5 trips) TileCal M&O (15 trips) Tile Cal R&D (20 trips)	\$13,739 \$46,200 \$50,000
G.1	Materials and Supplies: TDAQ M&O Misc. TDAQ R&D Misc. Test Stand Construction TileCal M&O Misc. TileCal R&D Misc.	\$921 \$14,692 \$8,871 \$6,039
G.6	Other (Contractual Services): TDAQ R&D (Engineer, Y. Ermoline) TileCal R&D (Shooltz Solutions Inc.)	\$408,390 \$74,872
I.	Indirect Costs: 26% on all except equipment	\$528,622
J.	Total Direct and Indirect Costs	\$2,811,800

SUMMARY PROPOSAL BUDG	ET		FO	R NSF	USE ONL	Y
ORGANIZATION			POSAL			- DN (month
New York University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Kyle Cranmer				-		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed nths	Ber	Funds juested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	p	roposer	granted by N (if differen
1. Kyle Cranmer	0.00	0.00	0.00	\$	0	\$
2. Allen I Mincer	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		00.000	
1. (1) POST DOCTORAL SCHOLARS	6.00				29,630	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00		11,204	
3. (0) GRADUATE STUDENTS 4. (0) UNDERGRADUATE STUDENTS					<u> </u>	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					U 0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					40,834	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					11,230	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					52,064	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5	-	0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			S		0 6,000 0 0 0 0 0 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN		<u>5</u>		0 6,000 0 0 0 0 0 0 0 0 0 0 0 0 58,064	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MTDC - mixed	TICIPAN		S		0 6,000 0 0 0 0 0 0 0 58,064 17,096	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN ge)	T COSTS			0 6,000 0 0 0 0 0 0 0 0 0 58,064 17,096 75,160 0	\$
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** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 43778)

SUMMARY PROPOSAL BUDGI	ET		FO	R NS	F USE ONL	Y
ORGANIZATION			POSAL	-		- DN (month
New York University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	О.		
Kyle Cranmer						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund erson-mor	ed		Funds	Funds
(List each separately with title, A.7. show number in brackets)		ACAD	SUMR	R	equested By proposer	granted by N (if different
1. Kyle Cranmer	0.00	0.00	0.00	\$		\$
2. Allen I Mincer	0.00	0.00	0.00		0	Ψ
3.	0.00	0.00	0.00			
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		U	
	0.00	0.00	0.00		20 542	
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00	0.00		30,543	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00		<u>11,161</u>	
3. (0) GRADUATE STUDENTS				-	0	
4. (0) UNDERGRADUATE STUDENTS				-	0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
					0	
TOTAL SALARIES AND WAGES (A + B)					41,704	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					11,677	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDI					53,381	
TOTAL EQUIPMENT					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES	SSIONS)				0	
	SSIONS)	I				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES	SSIONS)	· · · · · · · · · · · · · · · · · · ·			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)	·			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 0	SSIONS)	· · · · · · · · · · · · · · · · · · ·			0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0	SSIONS)	· · · · · · · · · · · · · · · · · · ·			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL 0 3. SUBSISTENCE 0					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3		<u>0</u> 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PART			3		<u>0</u> 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PART 0 C 0 C 0 C 0 C C C C C C C C C C C C			5		0 6,000	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>	-	0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 6,000 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>		0 6,000 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3			
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ΓΙCIPAN		<u> </u>		0 6,000 6,000 0 0 0 0 0 0 0 59,381 17,439	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIREC	ΓΙCIPAN		5 		0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
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** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 45095)

SUMMARY PROPOSAL BUDGI	ЕΤ ີ		FO	RNS	F USE ONL	Y
ORGANIZATION			POSAL	-		- DN (month
New York University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	О.		
Kyle Cranmer						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	F	NSF Fund erson-mor	ed hths	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)		ACAD	SUMR	R	equested By proposer	granted by N (if different
1. Kyle Cranmer	0.00	0.00	0.00	\$	0	\$
2. Allen I Mincer	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00	0.00		31,597	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00		11,161	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					42,758	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					11,972	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					54.730	
TOTAL EQUIPMENT	SSIONS				0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)				0 0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3		<u>0</u> 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PART			3		<u>0</u> 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTIG. OTHER DIRECT COSTS			3		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 6,000	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>			
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (F&A)	ΓΙCIPAN		<u> </u>		0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT	ΓΙCIPAN		÷		0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
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** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 46445)

SUMMARY PROPOSAL BUDGI	ET		FOF	R NSF L	JSE ONL'	Y
ORGANIZATION			POSAL			DN (month
New York University				ĺ	Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Kyle Cranmer						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		unds ested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	poser	granted by I (if differen
1. Kyle Cranmer	0.00	0.00	0.00	\$	0	\$
2. Allen I Mincer	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		20.000	
1. (1) POST DOCTORAL SCHOLARS	6.00		0.00		32,688	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 3. (0) GRADUATE STUDENTS	2.40	0.00	0.00		11,161	
3. (0) GRADUATE STUDENTS 4. (0) UNDERGRADUATE STUDENTS					<u> </u>	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					43,849	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					12,278	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					56,127	
TOTAL EQUIPMENT	SSIONS)			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0 0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)			0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS			6		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PART 1. MATERIALS AND SUPPLIES			3		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 6,000 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 6,000 0 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ONLER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Page TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	TICIPAN	T COSTS		\$	0 6,000 0 0 0 0 0 0 0 0 62,127 18,153 80,280	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN	T COSTS	NT \$	•	0 6,000 0 0 0 0 0 0 0 0 0 62,127 18,153 80,280 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEY PI/PD NAME	TICIPAN		NT \$ FOR N	NSF US	0 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE) 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED	TICIPAN		NT \$ FOR N CT COS	NSF US	0 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 47841)

SUMMARY PROPOSAL BUDG	ET		FOF	R NS	F USE ONL	Y
ORGANIZATION	-		POSAL	-		- ON (month
New York University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	Ю.		
Kyle Cranmer						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	F	NSF Fund erson-mor	ed hths	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)		ACAD	SUMR		equested By proposer	granted by N (if differen
1. Kyle Cranmer	0.00	0.00	0.00	\$	0	\$
2. Allen I Mincer	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00	0.00)	33,811	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00		11,161	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					44,972	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					12,592	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					57,564	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS				0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)	1			0 0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)	<u> </u>			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)	I			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)	<u></u>		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)	<u> </u>		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS			3	-	0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 6,000 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5		0 6,000 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		0 6,000 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3			
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OCOSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN		5 			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	TICIPAN		3		0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.00000, Base: 14286) (Cont. on Comments Pag </td <td>TICIPAN</td> <td></td> <td>5</td> <td></td> <td>0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td></td>	TICIPAN		5		0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I)	TICIPAN		5		0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag <tr< td=""><td>TICIPAN</td><td></td><td><u> </u></td><td></td><td>0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td></td></tr<>	TICIPAN		<u> </u>		0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN ge)	T COSTS			0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LEVEL	TICIPAN ge)	T COSTS	NT \$	·	0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LEVEL	Je)	IFFERE	NT \$ FOR 1	NSF U	0 6,000 6,000 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 49278)

PROPOSAL BUDG	iET		FOF	R NSF U	JSE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
New York University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A\	VARD N	0.		
Kyle Cranmer	1	NOFF	1			, I
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor		Reque	unds ested By	Funds granted by N (if differen
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR			
1. Kyle Cranmer	0.00		0.00			\$
2. Allen I Mincer	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (5) POST DOCTORAL SCHOLARS	30.00		0.00		158,269	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00		55,848	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				1	214,117	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					59,749	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					273,866	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS	·)			0	
	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI	ESSIONS	·)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	i)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 2. TRAVEL 1. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3		0 30,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAF			6		0 30,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			3		0 30,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OU TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 30,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 30,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5		0 30,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (1) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u>}</u>		0 30,000 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 30,000 0 0 0 0 0 0 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. ONHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		0 30,000 30,000 0 0 0 0 0 0 0 0 0 0 0 0	
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New York University

<u>A private university in the public service</u> Office of Sponsored Programs

665 Broadway Suite 801 New York, NY 10012-2331 Telephone: (212) 998-2121 Fax: (212) 995-4029

NYU COOPERATING INSTITUTION CONSORTIUM STATEMENT

Title of Application: U.S. ATLAS Operations: Empowering University Physicists to Make Discoveries at the Energy Frontier

Prime Grantee/Contractor Organization: Columbia University

Sponsor: NSF

Prime Grantee/Principal Investigator: Michael Tuts (Columbia)

Sub-Grantee/Contractor:

New York University Washington Square New York, NY 10012

Entire Project

303,866 89,004 \$392,870

NYU Principal Investigator: Kyle Cranmer Phone Number: 212-998-7736 Email address: kyle.cranmer@nyu.edu

Period of Performance: 2/1/12 - 1/31/17 Human Subjects Approval Date: N/A Animal Subjects Approval Date: N/A

	Current Year	
NYU Direct Costs:	58,064	
NYU Indirect Costs:	17,096	
NYU Total Costs:	\$75,160	

For New York University Richard L. Louth, Director Office of Sponsored Programs (212) 998-2121 <u>osp.agency@nyu.edu</u>

Signature and Date

NYU Principal Investigator Kyle Cranmer

12/9/10

Signature and Date

SUMMARY PROPOSAL BUDG	ET		FOI	R NSF	USE ONL'	Y
ORGANIZATION			OPOSAL			DN (month
New York University					Proposed	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR			WARD N	0		
Kyle Cranmer				0.		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	led	F	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Requ	uested By roposer	granted by N (if different
1. Kyle Cranmer - Pl	0.00	0.00				\$
2. Allen I Mincer - Co-PI	0.00	0.00			0	Ψ
3.	0.00	0.00	0.00		U	
4.						
	0.00	0.00	0.00		0	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00			0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00				
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00			29,630	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00		11,204	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					40,834	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					11,230	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					52,064	
TOTAL EQUIPMENT		00.)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS				0	
	SSIONS					
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** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 43778)

Budget Justification: Year 1

B1. 50% of Postdoc salary (Analysis Toolset)

B2. 20% of Technician salary (Upgrade Electronics)

C. Fringe @ 27.5%

E. Travel (2. Foreign) Cost of Living Adjustment (COLA) for Postdoc stationed at CERN

I. Indirect Costs:

Split rate to reflect:

- 1) Calculation uses off-campus rate of 26% for Postdoc stationed at CERN
- Calculation uses mixed rate of 40% for Technician; based on the average of ¹/₂ on-campus rate (54%) and ¹/₂ off-campus rate (26%)

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF	USE ONL	Y
ORGANIZATION			POSAL	-		DN (monti
New York University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR			VARD N	0		
Kyle Cranmer				0.		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed		Funds	Funds
(List each separately with title, A.7. show number in brackets)		ACAD		Red	quested By proposer	granted by (if differer
1. Kyle Cranmer - Pl	0.00	0.00	0.00			\$
2. Allen I Mincer - Co-Pl	0.00	0.00	0.00		0	Ψ
3.	0.00	0.00	0.00			
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		U	
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00	0.00		30,543	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	6.00 2.40	0.00	0.00		<u> </u>	
	2.40	0.00	0.00		 0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
					0	
TOTAL SALARIES AND WAGES (A + B)					41,704	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					11,677	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					53,381	
					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	<u>SSIONS</u>)			-	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS,)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS,)			0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR' G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			6		0 6,000 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5			
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** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 45095)

Budget Justification: Year 2

B1. 50% of Postdoc salary (Analysis Toolset)

B2. 20% of Technician salary (Upgrade Electronics)

C. Fringe @ 28%

E. Travel (2. Foreign) Cost of Living Adjustment (COLA) for Postdoc stationed at CERN

I. Indirect Costs:

Split rate to reflect:

- 1) Calculation uses off-campus rate of 26% for Postdoc stationed at CERN
- Calculation uses mixed rate of 40% for Technician; based on the average of ¹/₂ on-campus rate (54%) and ¹/₂ off-campus rate (26%)

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF 🛛	ISE ONL	Y
ORGANIZATION			POSAL			DN (monti
New York University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR			VARD N			
Kyle Cranmer						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	r	NSF Fund erson-mor	ed		unds	Funds
(List each separately with title, A.7. show number in brackets)		ACAD	SUMR	Reque pro	ested By poser	granted by (if differer
1. Kyle Cranmer - Pl	0.00	0.00	0.00	\$		\$
2. Allen I Mincer - Co-Pl	0.00	0.00	0.00		0	· ·
3.	0.00	0.00	0.00			
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00	0.00		31,597	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00		11,161	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					42.758	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					11,972	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					54,730	
TOTAL EQUIPMENT					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	<u>SSIONS</u>)		-	0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)			0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 6. 0 3. SUBSISTENCE 6. 0 4. OTHER 0			3		<u>0</u> 6,000	
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** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 46445)

Budget Justification: Year 3

B1. 50% of Postdoc salary (Analysis Toolset)

B2. 20% of Technician salary (Upgrade Electronics)

C. Fringe @ 28%

E. Travel (2. Foreign) Cost of Living Adjustment (COLA) for Postdoc stationed at CERN

I. Indirect Costs:

Split rate to reflect:

- 1) Calculation uses off-campus rate of 26% for Postdoc stationed at CERN
- Calculation uses mixed rate of 40% for Technician; based on the average of ¹/₂ on-campus rate (54%) and ¹/₂ off-campus rate (26%)

PROPOSAL BUDG	ET Y		FOF	R NSF USE	ONLY	Y
ORGANIZATION		PRC	POSAL	NO. DU	RATIC	DN (month
New York University				Pro	posed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	0.		
Kyle Cranmer						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed oths	Funds		Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Requested propose	d By er	granted by N (if differen
1. Kyle Cranmer - Pl	0.00	0.00	0.00	\$	0	\$
2. Allen I Mincer - Co-PI	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00	0.00	32	2,688	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00	11	,161	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				43	8,849	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				12	2,278	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				56	5,127	
TOTAL EQUIPMENT	SSIONS)			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)		6	0 0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)		6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)		6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)		6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL 0 3. SUBSISTENCE 0	SSIONS)		6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)		6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3	6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			6	6	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0)			5	6	0 6,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6	6	0 5,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (1) TOTAL PARTICIPANTS (2) TOTAL PARTICIPANTS (2) TOTAL PARTICIPANTS (3) TOTAL PARTICIPANTS (4) TOTAL PARTICIPANTS (5)			3	6	0 5,000 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6	6	0 5,000 5,000 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5	6	0 ,000 ,000 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			3	6	0 5,000 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			5		0 5,000 5,000 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5		0 5,000 5,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 6. OTHER 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ΓΙCΙΡΑΝ		6		0 5,000 5,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ΓΙCΙΡΑΝ		S	62	0 5,000 0 0 0 0 0 0 0 2,127	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag <t< td=""><td>ΓΙCΙΡΑΝ</td><td></td><td>3</td><td>62</td><td>0 5,000 5,000 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td></td></t<>	ΓΙCΙΡΑΝ		3	62	0 5,000 5,000 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pa	ΓΙCΙΡΑΝ		3	62	0 5,000 5,000 0 0 0 0 0 0 0 2,127 8,153	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag T	ΓΙCΙΡΑΝ		3	62	0 5,000 5,000 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDRECT AND INDIRECT COSTS (H + I)	TICIPAN	T COSTS		62	0 5,000 5,000 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag TOTAL INDIRECT COSTS (F&A) J. TOTAL DIR	TICIPAN	T COSTS	NT \$	62	0 5,000 5,000 0 0 0 0 0 0 0 0 0 0 2,127 8,153 9,280 0 0,280	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC - mixed rate (Rate: 40.0000, Base: 14286) (Cont. on Comments Pag	TICIPAN		NT \$ FOR N	62 62 18 80 \$ 80	0 5,000 0 0 0 0 0 0 0 0 0 0 0 0	

** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 47841)

Budget Justification: Year 4

B1. 50% of Postdoc salary (Analysis Toolset)

B2. 20% of Technician salary (Upgrade Electronics)

C. Fringe @ 28%

E. Travel (2. Foreign) Cost of Living Adjustment (COLA) for Postdoc stationed at CERN

I. Indirect Costs:

Split rate to reflect:

- 1) Calculation uses off-campus rate of 26% for Postdoc stationed at CERN
- 2) Calculation uses mixed rate of 40% for Technician; based on the average of ½ on-campus rate (54%) and ½ off-campus rate (26%)

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF	USE ONL	Y
ORGANIZATION			POSAL	-		DN (month
New York University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	NARD N	0.		
Kyle Cranmer						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	r	NSF Fund erson-mor	ed		Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Requ pr	uested By oposer	granted by I (if differen
1. Kyle Cranmer - Pl	0.00	0.00	0.00	\$		\$
2. Allen I Mincer - Co-Pl	0.00	0.00	0.00		0	· ·
3.	0.00	0.00	0.00			
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL SCHOLARS	6.00	0.00	0.00		33,811	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.40	0.00	0.00		11.161	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					44.972	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					12,592	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					57,564	
TOTAL EQUIPMENT					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	<u> </u>			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS	<u> </u>			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)		-	0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 6. 0 3. SUBSISTENCE 6. 0 4. OTHER 0			3		<u> </u>	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. COMPARING STRAVEL 3. SUBSISTENCE 4. OTHER COMPARING STRATE COM			6		0 6,000	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (1) TOTAL PARTICIPANTS (2) TOTAL PARTICIPANTS (3) TOTAL PARTICIPANTS (3) TOTAL PARTICIPANTS (4) TOTAL PARTICIPANTS (5) TO			6		0 6,000	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			<u> </u>		0 6,000 0 0 0 0 0 0 0 0 0	
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** I- Indirect Costs MTDC - off campus (Rate: 26.0000, Base 49278)

Budget Justification: Year 5

B1. 50% of Postdoc salary (Analysis Toolset)

B2. 20% of Technician salary (Upgrade Electronics)

C. Fringe @ 28%

E. Travel (2. Foreign) Cost of Living Adjustment (COLA) for Postdoc stationed at CERN

I. Indirect Costs:

Split rate to reflect:

- 1) Calculation uses off-campus rate of 26% for Postdoc stationed at CERN
- Calculation uses mixed rate of 40% for Technician; based on the average of ¹/₂ on-campus rate (54%) and ¹/₂ off-campus rate (26%)

PROPOSAL BUDG	ET	_	FOF	R NSF USE O	NLY	
ORGANIZATION		PRC	POSAL	NO. DURA	TION	(month
New York University		_		Propo	osed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	VARD N	0.		
Kyle Cranmer	1					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	Funds Requested By	v gran	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	proposer	y grai	nted by N f differen
1. Kyle Cranmer - Pl	0.00	0.00	0.00	\$	0\$	
2. Allen I Mincer - Co-Pl	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (5) POST DOCTORAL SCHOLARS	30.00	0.00	0.00	158,2	69	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00	55,8	48	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				214,1	17	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				59,7	'49	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				273,8	66	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
	ESSIONS	3)		30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	3)		30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS	5)		30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS	3)		30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	;)		30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	;)		30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	;)		30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0				30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			6	30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR			6	30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3	30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3	30,0	0 000 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5	30,0	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SOUTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			6	30,0	0 00 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3	30,0	0 00 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5	30,0	0 00 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5		0 00 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5	30,0	0 00 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			5	303,8	0 00 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			5 	303,8	0 00 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			3	303,8	0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3	303,8 89,0 392,8	0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN			303,8	0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	RTICIPAN		NT \$	303,8 89,0 392,8 \$ 392,8	0 00 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN		NT \$ FOR N	303,8 89,0 392,8 \$ 392,8 NSF USE ONL	0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR N ECT COS	303,8 89,0 392,8 \$ 392,8	0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TION

Budget Justification: Cumulative

B1. 50% of Postdoc salary (Analysis Toolset)

B2. 20% of Technician salary (Upgrade Electronics)

C. Fringe @ 28%

E. Travel (2. Foreign) Cost of Living Adjustment (COLA) for Postdoc stationed at CERN

I. Indirect Costs:

Split rate to reflect:

- 1) Calculation uses off-campus rate of 26% for Postdoc stationed at CERN
- 2) Calculation uses mixed rate of 40% for Technician; based on the average of ½ on-campus rate (54%) and ½ off-campus rate (26%)

Summary proposal budge ORGANIZATION Northern Illinois University PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dhiman Chakraborty A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Dhiman Chakraborty - Prof 2. J. Guilherme Lima - Rsearch scientist 3. 4.			POSAL	R NSF USE ONL	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dhiman Chakraborty A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Dhiman Chakraborty - Prof 2. J. Guilherme Lima - Rsearch scientist 3. 4.				NO. DURATIO	ON (month
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dhiman Chakraborty A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Dhiman Chakraborty - Prof 2. J. Guilherme Lima - Rsearch scientist 3. 4.				Proposed	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Dhiman Chakraborty - Prof 2. J. Guilherme Lima - Rsearch scientist 3. 4.		AV	VARD N	0.	
(List each separately with title, A.7. show number in brackets) 1. Dhiman Chakraborty - Prof 2. J. Guilherme Lima - Rsearch scientist 3. 4.					
Dhiman Chakraborty - Prof J. Guilherme Lima - Rsearch scientist 3. 4.		NSF Fund	ed nths	Funds	Funds
2. J. Guilherme Lima - Rsearch scientist 3. 4.	CAL	ACAD	SUMR	Requested By proposer	granted by N (if differen
2. J. Guilherme Lima - Rsearch scientist 3. 4.	0.00	0.00	0.00	\$0	\$
4.	7.00	0.00	0.00	41,680	
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	7.00	0.00	0.00	41,680	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				41,680	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				16,256	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				57,936	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$0					
2. TRAVEL 0					
2. TRAVEL 0 3. SUBSISTENCE 0					
1. STIPENDS \$					
1. STIPENDS \$	ΓΙϹΙΡΑΝ	T COSTS	6	0	
1. STIPENDS \$	ΓICIPAN	T COSTS	3		
1. STIPENDS \$	ΓICIPAN	TCOSTS	6	0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 0 G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ΓICIPAN	TCOSTS	3	0	
1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 0	FICIPAN	TCOSTS	3	0	
1. STIPENDS O SUBSISTENCE O SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS (O) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ΓICIPAN	TCOSTS	5	0 0 0 0	
1. STIPENDS	ΓICIPAN	TCOSTS	3	0 0 0 0 0	
1. STIPENDS	ΓICIPAN	T COSTS	3	0 0 0 0 0	
1. STIPENDS	ΓICIPAN	TCOSTS	<u> </u>	0 0 0 0 0 0	
1. STIPENDS	ΓΙCIPAN	TCOSTS	<u>}</u>	0 0 0 0 0	
1. STIPENDS	ΓICIPAN	TCOSTS	3	0 0 0 0 0 0	
1. STIPENDS O 2. TRAVEL O 3. SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS (O) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 57937) MDTC (Rate: 26.0000, Base: 57937) MDTC (Rate: 26.0000, Base: 57937) MDTC (Mate: 26.0000, Base: 57937)	ΓICIPAN		<u> </u>	0 0 0 0 0 0	
1. STIPENDS O 2. TRAVEL O 3. SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS O S. OTHER SUBAUARDS 6. OTHER SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)				0 0 0 0 0 0 0 57,936	
1. STIPENDS O SUBSISTENCE O 3. SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS (O) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 57937) TOTAL INDIRECT COSTS (F&A) COTAL INDIRECT COSTS (F&A) 1. SUBASENT (F&A)(SPECIFY RATE AND BASE)			<u> </u>	0 0 0 0 0 0 0 57,936 15,064	
1. STIPENDS O 2. TRAVEL O 3. SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL OTHER DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 57937) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			S	0 0 0 0 0 0 0 57,936 57,936 15,064 73,000	
1. STIPENDS O 2. TRAVEL O 3. SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS (O) TOTAL PART G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4 4. COMPUTER SERVICES 5 5. SUBAWARDS 6 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL OTHER DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 57937) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				0 0 0 0 0 0 0 57,936 57,936 15,064 73,000 0	
1. STIPENDS O 2. TRAVEL O 3. SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS (O) TOTAL PART G. OTHER DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1 H. TOTAL DIRECT COSTS (A THROUGH G) 1 I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 57937) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			NT \$	0 0 0 0 0 0 0 57,936 57,936 15,064 73,000 0	
1. STIPENDS O SUBSISTENCE O 3. SUBSISTENCE O 4. OTHER O TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES Image: Compute State S		IFFEREI	NT \$ FOR N	0 0 0 0 0 0 0 57,936 57,936 15,064 73,000 \$ 73,000	\$

SUMMARY PROPOSAL BUDG	ET		FOF	R NSI	F USE ONL'	Y
ORGANIZATION			POSAL	NO.	DURATIO	ON (month
Northern Illinois University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	О.		
Dhiman Chakraborty						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund erson-mor	ed hths	De	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		equested By proposer	granted by N (if differen
1. Dhiman Chakraborty - Prof	0.00	0.00	0.00	\$	0	\$
2. J. Guilherme Lima - Research scientist	6.94	0.00	0.00		42,931	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	6.94	0.00	0.00		42,931	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS				<u> </u>	0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				<u> </u>	0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					42,931	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					16,744	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED)					59,675	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 6 3. SUBSISTENCE 6			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0)			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 5. OTHER DIRECT COSTS 5. OTHER DIR			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			6			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR' G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			6			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 59674)			3		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 59,675	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 59674) TOTAL INDIRECT COSTS (F&A)			3		0 0 0 0 0 0 0 0 0 0 59,675 15,515	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MD			5		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 59674) TOTAL DIRECT AND INDIRECT COSTS			5		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 59674) TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	TCOSTS			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL PAR G. OTHER O 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 59674) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	TICIPAN	TCOSTS	NT \$		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 59674) TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN	IFFERE	NT \$ FOR N	NSF L	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPALATION COST SALE AND SA		IFFERE	NT \$ FOR N ECT COS	NSF U	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

SUMMARY PROPOSAL BUDG	ET		FO	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
Northern Illinois University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Dhiman Chakraborty						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	ļ	NSF Fund Person-mor	ed hths		Funds quested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	p	proposer	(if differen
1. Dhiman Chakraborty - Prof	0.00	0.00	0.00	\$	0	\$
2. J. Guilherme Lima - Research scientist	6.87	0.00	0.00		44,221	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	6.87	0.00	0.00		44,221	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		0	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0 0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		U 0	
3. (0) GRADUATE STUDENTS 4. (0) UNDERGRADUATE STUDENTS					U 0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					U 0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					44,221	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					17.247	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					61,468	
					0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0)			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER OF PARTICI			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR' G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR' G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR' G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			6			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u>}</u>			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 61468)			5		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 61468)			<u> </u>		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MD			<u> </u>		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 61468)			3	· ·	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 61468) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN	T COSTS	NT \$,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 61468) TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL	TICIPAN		NT \$ FOR 1	NSF U	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	•

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	-		DN (month
Northern Illinois University					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Dhiman Chakraborty						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	F	NSF Fund erson-mor	ed hths	De	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		quested By proposer	granted by N (if differen
1. Dhiman Chakraborty - Prof	0.00	0.00	0.00	\$	0	\$
2. J. Guilherme Lima - Research Scientist	6.80	0.00	0.00		45,546	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	6.80	0.00	0.00		45,546	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					45,546	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					17,764	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					63,310	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0	SSIONS)		-	0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PARTICIPANTS 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0			5		0	
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SUMMARY PROPOSAL BUDG	ET		FOF	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
Northern Illinois University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Dhiman Chakraborty						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed nths	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	не I	quested By proposer	granted by N (if different
1. Dhiman Chakraborty - Prof	0.00	0.00	0.00	\$	0	\$
2. J. Guilherme Lima - Research scientist	6.74	0.00	0.00		46,911	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	6.74	0.00	0.00		46,911	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					46,911	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					18,295	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED					65,206	
		<u>,</u>			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS	i)			0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	·)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS	i)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS S C. TRAVEL C 3. SUBSISTENCE C 0			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS			6		0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 65206) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LEVEL	TICIPAN		NT \$		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 65206) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	TICIPAN		NT \$ FOR 1	NSF U	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 65206) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPANTICAL CONTACTION AND AND AND AND AND AND AND AND AND AN			NT \$ FOR I	NSF U	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

PROPOSAL BUDG	iΕΤ	_	FOF	R NSF	USE ONLY	1
ORGANIZATION		PRC	POSAL	NO.	DURATIC	ON (monthe
Northern Illinois University					Proposed	Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	О.		
Dhiman Chakraborty						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor			Funds quested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	p	proposer	(if different)
1. Dhiman Chakraborty - Prof	0.00		0.00		0	\$
2. J. Guilherme Lima - Rsearch scientist	34.35	0.00	0.00		221,289	
3.						
4.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	34.35	0.00	0.00		221,289	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					-	
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
					0	
TOTAL SALARIES AND WAGES (A + B)					221,289	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					86,306 307,595	
		<u></u>			0	
	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 1. MATERIALS AND SUPPLIES					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBJUE 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>		0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>		0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS					0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3 		0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			B B B B B B B B B B B B B B B B B B B		0 0 0 0 0 0 0 0 0 307,595	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)			3 		0 0 0 0 0 0 0 0 0 307,595	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 4. OTHER 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u>}</u>		0 0 0 0 0 0 0 0 0 0 0 307,595 387,570	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN	T COSTS			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACREED	RTICIPAN	T COSTS	NT \$	·	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		NT \$ FOR N	NSF U	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

		FOR NSF USE ONLY			
SUMMARY PROPOSAL BUDGET			(MONTHS)		
Northern Illinois University			POSAL N	Dorvanor	(MONTHS)
				Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AV	VARD NO		
Dhiman Chakraborty A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	s	NSF-Fur	nded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)	Ň	Person-m		Requested By	Granted by NSF
	CAL			Proposer	(If Different)
1. D. Chakraborty, Pl				\$0	\$
2. J. Guilherme Lima, Research Scientist	7.00	-		\$41,680	
3.			1		
4					
5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	iE)				
7. () TOTAL SENIOR PERSONNEL (1-6)			L		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		- <u>_</u>	·····		
1. () POSTDOCTORAL ASSOCIATES	,	+	4		
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		1		
3. () GRADUATE STUDENTS 4. () UNDERGRADUATE STUDENTS					
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					
6. () OTHER					
TOTAL SALARIES AND WAGES (A + B)				\$41,680	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				\$16,256	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				\$57,936	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCI	EEDING \$5,000.)		•		
	· •				
TOTAL EQUIPMENT					
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)		· · -·		
2. FOREIGN					
F. PARTICIPANT SUPPORT 1. STIPENDS \$					
2. TRAVEL					
3. SUBSISTENCE					
4. OTHER					
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL PA	RTICIPAN	NT T		
COSTS					
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					
2. PUBLICATION/DOCUMENTATION/DISSEMINATION					
3. CONSULTANT SERVICES					
4. COMPUTER SERVICES					
5. SUBAWARDS					
6. OTHER					
TOTAL OTHER DIRECT COSTS				657 026	
H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)				\$57,936	
26% Modified Total Direct Costs					
TOTAL INDIRECT COSTS (F&A)				\$15,064	
J. TOTAL DIRECT AND INDIRECT COSTS (H + 1)				\$73,000	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG II.D	.7.j.)			
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$73,000	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LEVEL	IF DIFFE	RENT: \$		
BURD TYPED NAME AND SIGNATURE*	DATE I			OR NSF USE ONLY	
Dhiman Chakraborty El Chakrabort	12/17/10	?	NDIRECT	COST RATE VERIF	CATION
ORG. REP. TYPED NAME & SIGNATURE	DATE	Date C	hecked	Date of Rate Sheet	Initials-ORG
David Stone	12/17/10	'			

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

			FOR NSF USE ONLY				Y
ORGANIZATION Northern Illinois University			PRO	POSAL N	O. DURATION		N (MONTHS)
					Proposed		Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Dhiman Chakraborty			AW	ARD NO	•		
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associa	es		NSF-Fun	ded	!	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)			erson-mo	onths	F	Requested By	Granted by NSF
A D. Chalasharta Ol	c	AL	ACAD	SUMR		Proposer	(If Different)
1. D. Chakraborty, PI 2. J. Guilherme Lima, Research Scientist	6	.94			\$0	2,931	S
3.							
4.							
5.					4		
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PA	GE)						
7. () TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							ľ
1. () POSTDOCTORAL ASSOCIATES					T		
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC	2.)						
3. () GRADUATE STUDENTS							
4. () UNDERGRADUATE STUDENTS 5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							1
6. () OTHER							
TOTAL SALARIES AND WAGES (A + B)					\$4	2,931	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						6,744	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EX(<u> </u>			\$5	59,675	
							· ····································
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. PO	SSESSIONS)						
2. FOREIGN							
F. PARTICIPANT SUPPORT				-			
1. STIPENDS \$ 2. TRAVEL							
3. SUBSISTENCE							
4. OTHER							
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PAF	RTICIPAN	т			
COSTS G. OTHER DIRECT COSTS				-			
1. MATERIALS AND SUPPLIES							
2. PUBLICATION/DOCUMENTATION/DISSEMINATION							
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS 6. OTHER						<u> </u>	
TOTAL OTHER DIRECT COSTS							
H. TOTAL DIRECT COSTS (A THROUGH G)					\$59	9,675	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26% Modified Total Direct Costs							
TOTAL INDIRECT COSTS (F&A)					\$15	5,515	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					\$75	5,190	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJ	ECT SEE GPG	I.D.7	(j.)			100	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)		10. 1			1 2/3	5,190	S
M. COST SHARING: PROPOSED LEVEL S					OB NG	F USE ONLY	,
Dhiman Chakraborty	12/17/	ID			-	RATE VERI	
ORG. REP. TYPED NAME & SIGNATURE	DATE	10	Date C	hecked	Date o	of Rate Sheet	Initials-ORG
NSE Form 1030 (10/99) Supersedes All Previous Editions	*SIGNATURES	REO			EVISED	BUDGET (CPC	2 III (2)

SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)



SUMMARY PROPOSAL BUDGET							
ORGANIZATION			PRO	PROPOSAL NO.			(MONTHS)
Northern Illinois University					-		
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWARD NO.			Proposed	Granted
Dhiman Chakraborty					·		
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates	;		NSF-Fun	ded		Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		P	erson-mo	onths		Requested By	Granted by NSF
	C	AL	ACAD	SUMR	-	Proposer	(If Different)
1. D. Chakraborty, Pl					\$0		\$
2. J. Guilherme Lima, Research Scientist	6.	.87			\$44	4,221	
3.							
4.							
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE	=)				_		
7. () TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. () POSTDOCTORAL ASSOCIATES							
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)					-		
3. () GRADUATE STUDENTS	I		1				
4. () UNDERGRADUATE STUDENTS							
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							
6. () OTHER							
TOTAL SALARIES AND WAGES (A + B)					\$4	44,221	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					\$	17,247	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					\$6	51,468	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCE	EDING \$5,000) .)					
					<u> </u>		
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS	ESSIONS)			· · · · -	_		
2. FOREIGN							
F. PARTICIPANT SUPPORT							·
1. STIPENDS \$							
2. TRAVEL							
3. SUBSISTENCE							
4. OTHER							
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PAF	RTICIPAN	T			
COSTS				,	_		
G. OTHER DIRECT COSTS					_		
1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION							
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS							
6. OTHER							· · · ·
TOTAL OTHER DIRECT COSTS							
H. TOTAL DIRECT COSTS (A THROUGH G)			· · · ·		\$6	1,468	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)					1		
26% Modified Total Direct Costs							
TOTAL INDIRECT COSTS (F&A)						5,982	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					\$7	7,450	<u></u>
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC	T SEE GPG I	I.D.7	(J.)				
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$7	7,450	\$
	AGREED LEV	/EL I	F DIFFER				
		1				SF USE ONLY	CATION
Dhiman Chakraborty IT. Char waver	1411	10				RATE VERIFI	
	DATE 12/17/1		Date C	hecked	Date	of Rate Sheet	Initials-ORG
David Stone	12/1/	0					

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

			FOR NSF USE ONLY				Y
SUMMARY PROPOSAL BUDGET			PRO	POSAL NO)	DURATIO	N (MONTHS)
Northern Illinois University						Durano	
						Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Dhiman Chakraborty			AN	ARD NO.			
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	es		NSF-Fun	ded	T	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		P	erson-ma	onths	Requested By		Granted by NSF
		AL	ACAD		1	Proposer	(If Different)
1. D. Chakraborty, Pl					\$0		\$
2. J. Guilherme Lima, Research Scientist	6	5.8			\$4	5,546	
3.					 		
4.					<u> </u>		·
5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	25						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG 7. () TOTAL SENIOR PERSONNEL (1-6)	3E)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					<u> </u>		_I
1. () POSTDOCTORAL ASSOCIATES							
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC	.)						
3. () GRADUATE STUDENTS							
4. () UNDERGRADUATE STUDENTS							
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					 		
6. () OTHER					<u> </u>		
TOTAL SALARIES AND WAGES (A + B)						45,546	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						17,764	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC		<u></u>			<u> _</u> >	63,310	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS						
2. FOREIGN	55E35I0N3)		· ·		<u> </u>		
F. PARTICIPANT SUPPORT					1-		
1. STIPENDS \$							
2. TRAVEL							
3. SUBSISTENCE							
4. OTHER				_	<u> </u>		
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PAH	TICIPAN	1			
G. OTHER DIRECT COSTS					1		
1. MATERIALS AND SUPPLIES					1		
2. PUBLICATION/DOCUMENTATION/DISSEMINATION					1		
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS							
6. OTHER							
TOTAL OTHER DIRECT COSTS						0.040	
H. TOTAL DIRECT COSTS (A THROUGH G)					30	3,310	1
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26% Modified Total Direct Costs							
TOTAL INDIRECT COSTS (F&A)						6,460	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					\$7	9,770	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG I	II.D.7	.j.)		<u> </u>	0.770	-
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$7	9,770	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LEV	/EL I	r DIFFER			OF LIGE ONLY	,
PI/PD TYPED NAME AND SIGNATURE	DATE	1/1.				SF USE ONLY T RATE VERIF	
Dhiman Chakraborty	1411	1/10					

ORG. REP. TYPED NAME & SIGNATURE

David Stone

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Date of Rate Sheet

Initials-ORG

Date Checked

DATE

12

7/10

		FOR NSF USE ONLY			
ORGANIZATION		PROF	OSAL N	O. DURATION	(MONTHS)
Northern Illinois University				Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Dhiman Chakraborty		AW	ARD NO.		
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates	s	NSF-Fund	led	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		Person-mo		Requested By	Granted by NSF
1. D. Chakraborty, Pl	CAL	ACAD	SUMR	Proposer S0	(If Different) S
2. J. Guilherme Lima, Research Scientist	6.74			\$46,911	
<u>3.</u> 4.					
5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)				
7. () TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		I			
1. () POSTDOCTORAL ASSOCIATES					
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.))				
3. () GRADUATE STUDENTS					
4. () UNDERGRADUATE STUDENTS			<u> </u>		
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					
6. () OTHER TOTAL SALARIES AND WAGES (A + B)				\$46,911	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				\$18,295	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				\$65,206	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCE	EEDING \$5,000.)				
TOTAL EQUIPMENT					
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)				
2. FOREIGN					
F. PARTICIPANT SUPPORT 1. STIPENDS \$					
2. TRAVEL					
3. SUBSISTENCE					
4. OTHER				•	
TOTAL NUMBER OF PARTICIPANTS () COSTS	TOTAL PAP	RTICIPAN	Т		
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					
2. PUBLICATION/DOCUMENTATION/DISSEMINATION					
3. CONSULTANT SERVICES 4. COMPUTER SERVICES					
5. SUBAWARDS					
6. OTHER					
TOTAL OTHER DIRECT COSTS					
H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)			· · · ·	\$65,206	
26% Modified Total Direct Costs					
TOTAL INDIRECT COSTS (F&A)				\$16,954	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				\$82,160	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC	CT SEE GPG II.D.7	7.j.)		602.402	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	AODEC0 1 21/21			\$82,160	\$
	AGREED LEVEL			OR NSF USE ONLY	
PI/PD TYPED NAME AND SIGNATURE; Dhiman Chakraborty H.C. honorootos	12/17/10	1		COST RATE VERIFI	CATION
ORG. REP. TYPED NAME & SIGNATURE	DATE	Date Ch	necked	Date of Rate Sheet	Initials-ORG
David Stone	12/1/10				

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

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SUMMARY PROPOSAL BUDGET								
ORGANIZATION			PRO	POSAL N	0.	DURATION (MONTHS)		
Northern Illinois University								
					Proposed		Granted	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AM	ARD NO	·			
Dhiman Chakraborty A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates		I	ISF-Fun	dod	-	Funds	Funds	
	•	-				Requested By	Granted by NSF	
List each separately with name and title. (A.7. Show number in brackets)	-		erson-mo		_		•	
1. D. Chakraborty, Pl		CAL	ACA	SUMR	\$0	Proposer	(If Different) S	
2. J. Guilherme Lima, Research Scientist		34.35	<u> </u>			1,289	÷	
3.		04.00				1,205		
4.							····	
5.								
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE	E)							
7. () TOTAL SENIOR PERSONNEL (1-6)								
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)			1		- I			
1. () POSTDOCTORAL ASSOCIATES	_							
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)								
3. () GRADUATE STUDENTS								
4. () UNDERGRADUATE STUDENTS								
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)								
6. () OTHER								
TOTAL SALARIES AND WAGES (A + B)						221,289		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						36,306		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					\$3	307,595		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCE	EDING \$5,0	000.)						
TOTAL EQUIPMENT								
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS	SESSIONS)							
2. FOREIGN	323310N3)							
F. PARTICIPANT SUPPORT								
1. STIPENDS S								
2. TRAVEL								
3. SUBSISTENCE								
4. OTHER								
TOTAL NUMBER OF PARTICIPANTS ()	TOTA	L PAR	TICIPAN	T				
COSTS								
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES								
2. PUBLICATION/DOCUMENTATION/DISSEMINATION								
3. CONSULTANT SERVICES					_			
4. COMPUTER SERVICES								
5. SUBAWARDS					_			
6. OTHER					_	· · · · · · · · · · · · · · · · · · ·		
TOTAL OTHER DIRECT COSTS					-			
H. TOTAL DIRECT COSTS (A THROUGH G)						07,595		
1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)								
26% Modified Total Direct Costs								
TOTAL INDIRECT COSTS (F&A)					\$70	9,975		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						37,570		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC	T SEE GPO	G II.D.7.	i.)					
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			, .		\$38	37,570	\$	
	AGREED LI				1.444	, - · -	*	
	DATE	<u> </u>			OR NS	F USE ONLY		
Dhiman Chakraborty Hill And Antort		7/10				RATE VERIFI	CATION	
	DATE	<u> </u>		hecked		of Rate Sheet	Initials-ORG	
David Stone	12/17	10		HELKEU	Date C	n Nate Sheet	initials-OKG	
		The T						

SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification YEAR 1

A2. Engineering and Technical Salaries: Salary for Tile calorimeter software including coordination	\$41,680
C. Fringe @ 39% of Base \$41,680	\$16,256
I. Indirect costs: 26% of \$57,936 (= \$41,680 + \$16,256)	\$15,064
J. Total Direct and Indirect Costs	\$73,000

Budget Justification YEAR 2

A2. Engineering and Technical Salaries: Salary for Tile calorimeter software including coordination	\$42,931
C. Fringe @ 39% of Base \$42,931	\$16,744
I. Indirect costs: 26% of \$59,675 (= \$42,931 + \$16,744)	\$15,515
J. Total Direct and Indirect Costs	\$75,190

Budget Justification YEAR 3

A2. Engineering and Technical Salaries: Salary for Tile calorimeter software including coordination	\$44,221
C. Fringe @ 39% of Base \$44,221	\$17,247
I. Indirect costs: 26% of \$61,468 (= \$44,221 + \$17,247)	\$15,982
J. Total Direct and Indirect Costs	\$77,450

Budget Justification YEAR 4

A2. Engineering and Technical Salaries: Salary for Tile calorimeter software including coordination	\$45,546
C. Fringe @ 39% of Base \$45,546	\$17,764

NIU

I. Indirect costs: 26% of \$63,310 (= \$45,546 + \$17,764)	\$16,460
J. Total Direct and Indirect Costs	\$79,770

Budget Justification YEAR 5

A2. Engineering and Technical Salaries: Salary for Tile calorimeter software including coordination	\$46,911
C. Fringe @ 39% of Base \$46,911	\$18,295
I. Indirect costs: 26% of \$59,675 (= \$42,931 + \$16,744)	\$16,954
J. Total Direct and Indirect Costs	\$82,160

Budget Justification CUMULATIVE

A2. Engineering and Technical Salaries: Salary for Tile calorimeter software including coordination	\$221,289
C. Fringe @ 39% of Base \$221,289	\$86,303
I. Indirect costs: 26% of \$307,592 (= \$221,289 + \$86,303)	\$79,974
J. Total Direct and Indirect Costs	\$387,566

SUMMARY PROPOSAL BUDG	ET	E <u>AR</u>	FOF	RNSF	USE ONL	(
ORGANIZATION		PRO	POSAL	-		DN (month:
Research Foundation of the State University of New York					Proposed	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Michael Rijssenbeek						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed hths		unds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	uested By oposer	granted by N (if differen
1. Michael Rijssenbeek - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		0	
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.00	0.00	0.00		8,000	
3. (0) GRADUATE STUDENTS 4. (0) UNDERGRADUATE STUDENTS					<u> </u>	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					U 0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					8,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					4,269	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					12,269	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL C C C C C C C C C C C C C C C C C C C	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 6. 0 3. SUBSISTENCE 6. 0 4. OTHER 7. 0					0 6,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0 6,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER OF PARTICIPANTS 5. OTHER DIRECT COSTS 5. OTH			3		0 6,600 0 4,927	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3	-	0 6,600 0 4,927 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER OF PARTICIPANTS 5. OTHER DIRECT COSTS 5. OTH			5		0 6,600 0 4,927 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 6,600 0 4,927 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SOUTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 6,600 0 4,927 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		0 6,600 0 4,927 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		0 6,600 0 4,927 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL CONSULTANT SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		0 6,600 0 0 4,927 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DUPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	TICIPAN	T COST	3		0 6,600 0 0 4,927 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A)	TICIPAN	T COST	<u> </u>		0 6,600 4,927 0 0 0 0 0 4,927 23,796 8,031	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)	TICIPAN	T COST	<u> </u>		0 6,600 4,927 0 0 0 0 0 0 4,927 23,796	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	TICIPAN	T COST	<u> </u>		0 6,600 6,600 0 4,927 0 0 0 0 0 0 4,927 23,796 8,031 31,827 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN				0 6,600 4,927 0 0 0 0 0 4,927 23,796 8,031 31,827	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL LINDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	TICIPAN		NT \$	•	0 6,600 0 4,927 0 0 0 0 0 0 4,927 23,796 8,031 31,827 0 31,827	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	TICIPAN		NT \$ FOR N	NSF US	0 6,600 0 4,927 0 0 0 0 0 0 0 0 0 0 23,796 8,031 31,827 0 31,827 0 31,827	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL LINDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	TICIPAN		NT \$ FOR N CT COS	NSF US	0 6,600 0 4,927 0 0 0 0 0 0 0 4,927 23,796 8,031 31,827 0 31,827 0 31,827 5E ONLY E VERIFIC	

PROPOSAL BUDG	ET		FO	RNS	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
Research Foundation of the State University of New York					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	О.		
Michael Rijssenbeek						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	Re	Funds equested By	Funds granted by I
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	(if differer
1. Michael Rijssenbeek	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
3. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.00	0.00	0.00		8,240	
3. (0) GRADUATE STUDENTS				<u> </u>	0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					8,240	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					4,397	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					12,637	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	·)			0	
	SSIONS	i)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS	i)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. TRAVEL 0 3. SUBSISTENCE 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER			6		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)			6		0 6,900 0 4,973 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5		0 6,900 0 4,973 0 0	
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 4. COMPUTER SERVICES 4. COMPUTER SERVICES			3		0 6,900 0 4,973 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 6,900 0 4,973 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			5		0 6,900 0 4,973 0 0 0 0 0 0 0 0	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>		0 6,900 0 4,973 0 0 0 0 0 0 0 0 0 4,973	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G)			5		0 6,900 0 4,973 0 0 0 0 0 0 0 0	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN	T COSTS	<u> </u>		0 6,900 0 4,973 0 0 0 0 0 0 0 0 0 4,973	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 0 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&	TICIPAN	T COSTS	3		0 6,900 0 4,973 0 0 0 0 0 4,973 24,510	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) </td <td>TICIPAN</td> <td>T COSTS</td> <td>5</td> <td></td> <td>0 6,900 0 4,973 0 0 0 0 0 4,973 24,510 8,272</td> <td></td>	TICIPAN	T COSTS	5		0 6,900 0 4,973 0 0 0 0 0 4,973 24,510 8,272	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)	TICIPAN	T COSTS	5		0 6,900 0 4,973 0 0 0 0 0 4,973 24,510 8,272 32,782	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) X. RESIDUAL FUNDS	TICIPAN	T COSTS	3		0 6,900 0 4,973 0 0 0 0 0 0 0 4,973 24,510 8,272 32,782 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) . TOTAL DIRECT AND INDIRECT COSTS (H + I) C. RESIDUAL FUNDS .	TICIPAN	T COSTS			0 6,900 0 4,973 0 0 0 0 0 4,973 24,510 8,272 32,782	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base IOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$	TICIPAN	T COSTS	NT \$		0 6,900 4,973 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base IOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$	TICIPAN	T COSTS	NT \$ FOR 1	NSF (0 6,900 0 4,973 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base IOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$	TICIPAN	T COSTS	NT \$ FOR 1	NSF U	0 6,900 4,973 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

SUMMARY PROPOSAL BUDG	ET	EAR	FO	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
Research Foundation of the State University of New York					Proposed	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	О.		
Michael Rijssenbeek						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed		Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Rec	quested By proposer	granted by N (if differen
1. Michael Rijssenbeek	0.00		0.00	\$	0	\$
2.	0.00	0.00	0.00			
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.00		0.00		8,487	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					8,487	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					4,529	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					13,016	
TOTAL EQUIPMENT	SSIONS	;)			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS	;)			0 0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS	3)		_	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0		, 	3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0		, 	5		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR		, 	3		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS		, 	6		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES		, 	3		0 6,900 0 5,329	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		, 	3		0 6,900 0 5,329 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		, 	3		0 6,900 0 5,329 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		, 	5		0 6,900 0 5,329 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		, 	3		0 6,900 0 5,329 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		, 	3		0 6,900 0 5,329 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN		3		0 6,900 0 5,329 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	TICIPAN		<u> </u>		0 6,900 0 5,329 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN		<u> </u>		0 6,900 0 5,329 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base	TICIPAN		<u> </u>		0 6,900 6,900 0 5,329 0 0 0 0 0 5,329 25,245	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A)	TICIPAN		<u> </u>		0 6,900 6,900 0 5,329 0 0 0 0 0 0 5,329 25,245 8,520 33,765 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL DIRECT AND INDIRECT COSTS (H + I)	TICIPAN		3		0 6,900 0 5,329 0 0 0 0 0 5,329 25,245 8,520 33,765	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1 0 1 0 1 1 1 1 1 2 1 1 1 1 1 1	TICIPAN)	NT \$	·	0 6,900 6,900 0 5,329 0 0 0 0 0 0 5,329 25,245 8,520 33,765 0 33,765	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN)	NT \$	·	0 6,900 6,900 0 5,329 0 0 0 0 0 0 5,329 25,245 8,520 33,765 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN	T COSTS	NT \$ FOR 1	NSF U	0 6,900 6,900 0 5,329 0 0 0 0 0 0 5,329 25,245 8,520 33,765 0 33,765	\$

SUMMARY PROPOSAL BUDG			FO	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
Research Foundation of the State University of New York					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Michael Rijssenbeek						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	Be	Funds quested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	F F	proposer	(if differen
1. Michael Rijssenbeek	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
	0.00	0.00	0.00		•	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00		<u> </u>	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		U	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.50		0.00		10,927	
3. (0) GRADUATE STUDENTS	2.50	0.00	0.00		0,527	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				1	0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					10,927	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					5,831	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					16,758	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
	ESSIONS	i)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	i)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0		, 	3	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0		, 	3		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES		, 	6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		, 	3		0 6,900 0 2,344 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		, 	3		0 6,900 0 2,344 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		, 	3		0 6,900 0 2,344 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		, 			0 6,900 0 2,344 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0 0 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OT		, 	5 		0 6,900 0 2,344 0 0 0 0 0 0 0 0 2,344	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		, 	<u> </u>		0 6,900 0 2,344 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN		<u> </u>		0 6,900 0 2,344 0 0 0 0 0 0 0 0 2,344	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base	TICIPAN		<u> </u>		0 6,900 0 2,344 0 0 0 0 0 2,344 26,002	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) <td>TICIPAN</td> <td></td> <td>3</td> <td></td> <td>0 6,900 0 2,344 0 0 0 0 0 2,344 26,002 8,776</td> <td></td>	TICIPAN		3		0 6,900 0 2,344 0 0 0 0 0 2,344 26,002 8,776	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL DIRECT AND IN	TICIPAN		3		0 6,900 0 2,344 0 0 0 0 0 2,344 26,002	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	TICIPAN		<u> </u>		0 6,900 0 2,344 0 0 0 0 0 2,344 26,002 8,776 34,778 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL LINDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	:: 26002)			0 6,900 0 2,344 0 0 0 0 0 2,344 26,002 8,776 34,778	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	:: 26002)	NT \$		0 6,900 0 2,344 0 0 0 0 0 2,344 26,002 8,776 34,778 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL LINDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVENT	:: 26002	T COSTS	NT \$ FOR 1	NSF U	0 6,900 0 2,344 0 0 0 0 0 2,344 26,002 8,776 34,778 0 34,778	\$

PROPOSAL BUDG	ET		FO	R NS	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
Research Foundation of the State University of New York					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	О.		
Michael Rijssenbeek						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	Be	Funds equested By	Funds granted by I
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	(if differer
1. Michael Rijssenbeek	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
3. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	2.50	0.00	0.00		11,255	
3. (0) GRADUATE STUDENTS				-	0	
4. (0) UNDERGRADUATE STUDENTS				-	0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					11,255	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					6,006	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED)					17,261	
	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS			5		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)			6		0 6,900 0 2,622 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6		0 6,900 0 2,622 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>		0 6,900 0 2,622 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 6,900 0 2,622 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			5		0 6,900 0 2,622 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>		0 6,900 2,622 0 0 0 0 0 0 2,622	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 9 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G)			5		0 6,900 0 2,622 0 0 0 0 0 0 0 0	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 9 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN	T COSTS	<u> </u>		0 6,900 2,622 0 0 0 0 0 0 2,622	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 0 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&	TICIPAN	T COSTS	5		0 6,900 2,622 0 0 0 0 0 2,622 26,783	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) </td <td>TICIPAN</td> <td>T COSTS</td> <td><u> </u></td> <td></td> <td>0 6,900 2,622 0 0 0 0 2,622 26,783 9,039</td> <td></td>	TICIPAN	T COSTS	<u> </u>		0 6,900 2,622 0 0 0 0 2,622 26,783 9,039	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57%), 75% of	TICIPAN	T COSTS	5		0 6,900 2,622 0 0 0 0 0 2,622 26,783 9,039 35,822	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) 25% on campus (rate 57%), 75% off campus (26%) (Rate: 33.7500, Base TOTAL DIRECT AND INDIRECT COSTS (H + I) X. RESIDUAL FUNDS	TICIPAN	T COSTS	5		0 6,900 2,622 0 0 0 0 0 2,622 26,783 9,039 35,822 0	
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PROPOSAL BUDG	<u>ET</u>		FOF	R NSF	USE ONLY	Y
DRGANIZATION		PRC	POSAL	NO.	DURATIC	ON (month
Research Foundation of the State University of New York					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	VARD N	О.		
Michael Rijssenbeek						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		Funds uested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pr	roposer	(if differen
1. Michael Rijssenbeek	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
3. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	11.00	0.00	0.00		46,909	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					46,909	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>25,032</u> 71,941	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS	3)			0 0 34,200	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS	5)			0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0	ESSIONS	;)			0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES		, 	3		0 34,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)		, 	3		0 34,200 0 20,195 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		, 	5		0 34,200 0 20,195 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER		, 	3		0 34,200 0 20,195 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		, 	3		0 34,200 0 20,195 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		, 	3		0 34,200 0 20,195 0 0 0 0 0 0 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G)		, 	<u> </u>		0 34,200 0 20,195 0 0 0 0 0 0 0 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		, 	ð 		0 34,200 34,200 0 20,195 0 0 0 0 0 0 20,195 126,336	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A)		, 	3		0 34,200 34,200 0 20,195 0 0 0 0 0 0 20,195 126,336 42,638 168,974	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		, 	S		0 34,200 34,200 0 20,195 0 0 0 0 0 0 20,195 126,336 126,336 42,638 168,974 0	
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SUMMARY PROPOSAL BUDGET		Sala ang			
ORGANIZATION Research Foundation of the State University of New York at Stony Brook		PRO	POSAL NO	DURATIO Proposed	N (MONTHS) Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Michael Rijssenbeek			ARD NO.		Canet
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates		NSF-Fur	PHY 06-128	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		Person-m		Requested By	Granted by NSF
	CAL	ACAD		Proposer	(If Different)
1.				\$	\$
2.					
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4.				ļ	
5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)				· · · · · · · · · · · · · · · · · · ·	
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE) 7. (0) TOTAL SENIOR PERSONNEL (1-6)					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	1	l	I		
1. (0) POSTDOCTORAL ASSOCIATES	0		l	ls o	1
2. (1) OTHER PROFESSIONALS (2 mo, e.g. Technician Jack Steffens)	2			\$ 8,000	
3. (0) GRADUATE STUDENTS	0	0	0,	\$ 0	
4. () UNDERGRADUATE STUDENTS					1
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					
6. () OTHER					
TOTAL SALARIES AND WAGES (A + B)				\$ 8,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) IFR: 53.36% TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				\$ 4,269	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$			······································	\$12,269	<u> </u>
D. EQUIPMENT (LIST FIEM AND DOLLAR AMOUNT FOR EACH FIEM EXCEEDING S	\$5,000.)				
TOTAL EQUIPMENT	-			\$ 0	i
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSION				\$ 0	
 FOREIGN - 3 trips to CERN (\$900 fare, \$400 transp, 8 days/7 n lodging) 	ights of \$6	0 perdiem	ı + \$60	\$ 6,600	
F. PARTICIPANT SUPPORT					<u> </u>
1. STIPENDS \$					
2. TRAVEL					
3. SUBSISTENCE					
4. OTHER					
	ARTICIPA	NT COST	rs	\$ 0	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES					
2. PUBLICATION/DOCUMENTATION/DISSEMINATION				\$ 4,927	
3. CONSULTANT SERVICES					
4. COMPUTER SERVICES					
5. SUBAWARDS					
6. OTHER				\$ 0	
TOTAL OTHER DIRECT COSTS				\$ 4,927	
H. TOTAL DIRECT COSTS (A THROUGH G)				\$23,796	
1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)	00 75				
25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra	te: 33.75	%		¢ 0.004	
TOTAL INDIRECT COSTS (F&A)				\$ 8,031	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				\$31,827	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE G	PG II.D.7	.)		\$ 0	······
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$31,827	\$
	D LEVEL II	DIFFER	ENT: \$		L¥
M. COST SHARING: PROPOSEDLA VEL \$ 0 AGREEL				R NSF USE ONLY	
Michael M Rijssenbeek 12/08/2	010 I	- IN		OST RATE VERIFI	
ORG. REP. TYPED NAME & SIGNATURE JULI (DATE)		Date Ch		ate of Rate Sheet	
NSF Form 1030 (10/99) Supersedes All Previous Editions U *SIGNATU	JŔES REQU	JIRED ONL	Y FOR REV	ISED BUDGET (GPG	III.C)

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ORGANIZATION Research Foundation of the State University of New York at Stony Brook		PRC	POSALN		ON (MON
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			VARD NO.		d Or
Michael Rijssenbeek A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates		122000000000000000000000000000000000000	PHY 06-12		<u></u>
		NSF-Fur		Funds	Fu
List each separately with name and title. (A.7. Show number in brackets)	CAL	Person-m	onths	Requested By Proposer	Granted
1.		ACAD		\$	(If Diff \$
2.			1	*	+
3.					
4.					
5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)			ļ		
7. (0) TOTAL SENIOR PERSONNEL (1-6)					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		1	l Marianta		
1. (0) POSTDOCTORAL ASSOCIATES	0			\$ 0	
2. (1) OTHER PROFESSIONALS (2 mo, e.g. Technician Jack Steffens)	2		L	\$ 8,240	
3. (0) GRADUATE STUDENTS 4. () UNDERGRADUATE STUDENTS	0	0	0	\$ 0	_
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				· [· · · · · · · · · · · · · · · · · ·	
6. () OTHER					1
TOTAL SALARIES AND WAGES (A + B)				\$ 8,240	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) IFR: 53.36%				\$ 4,397	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				\$12,637	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING	5 \$5,000.)				
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIC				\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIC				\$ 0	
		60 nerdie	m + \$60		
FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging)		\$60 perdie	m + \$60	\$ 6,900	1
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT		60 perdie	m + \$60		
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS \$		\$60 perdie	m + \$60		
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT		60 perdie	m + \$60		
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL		60 perdie	m + \$60		
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER		<u>_</u>			
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 4 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0 \$ 4,973 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 3 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 3 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	7 nights of \$	<u>_</u>		\$ 6,900 \$ 0 \$ 4,973 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 4 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)	PARTICIP			\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 3 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	PARTICIP			\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 3 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective r TOTAL INDIRECT COSTS (F&A)	PARTICIP			\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973 \$ 24,510	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 3 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective r TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)	PARTICIP	ANT COST		\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973 \$24,510 \$ 8,272 \$32,782	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 3 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective r TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE	PARTICIP	ANT COST		\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973 \$24,510 \$ 8,272 \$ 32,782 \$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective r TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) (I	PARTICIP	ANT COST %	۲ <u>۶</u>	\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973 \$24,510 \$ 8,272 \$32,782	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS \$ 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective r TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING: PROPOSED LEVEL \$ 1. AGREE	PARTICIP	ANT COST %	ENT: \$	\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973 \$24,510 \$ 8,272 \$ 32,782 \$ 0 \$32,782	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/ lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective r TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) (I	PARTICIP	ANT COST % j.) F DIFFER	ENT: \$	\$ 6,900 \$ 0 \$ 4,973 \$ 0 \$ 4,973 \$24,510 \$ 8,272 \$ 32,782 \$ 0	

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SUMMARY PROPOSAL BUDGET					
ORGANIZATION Research Foundation of the State University of New York at Stony Brook		PRO	POSAL NC		DN (MONTHS)
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AM.	ARD NO.	Proposed	Granted
Michael Rijssenbeek		for NSF	PHY 06-128	111	
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates		NSF-Fun		Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		Person-mo		Requested By	Granted by NSF
1.	CAL	ACAD	SUMR	Proposer \$	(If Different)
2.				Φ	\$
3.	-				
4.					
5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)					
7. (0) TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		l			
1. (0) POSTDOCTORAL ASSOCIATES	0	1		e 0	
2. (1) OTHER PROFESSIONALS (2 mo, e.g. Technician Jack Steffens)	2			\$0 \$8,487	<u>+</u> !
3. (0) GRADUATE STUDENTS	0	0	0	\$ 0	<u> </u>
4. () UNDERGRADUATE STUDENTS				, , , , , , , , , , , , , , , , , , ,	
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					
6. () OTHER					
TOTAL SALARIES AND WAGES (A + B) C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) IFR: 53.36%				\$ 8,487	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				\$ 4,529	-
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING	3 \$5 000 \			\$13,016	
				\$ <u>0</u>	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days)		60 perdier	n + \$60	\$ 0 \$ 0 \$ 0 \$ 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT		60 perdier	n + \$60	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS \$		60 perdier	n + \$60	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL		60 perdier	n + \$60	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE		60 perdier	n + \$60	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIN 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER	7 nights of \$			\$ 0 \$ 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS				\$ 0 \$ 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	7 nights of \$			\$ 0 \$ 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION	7 nights of \$			\$ 0 \$ 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	7 nights of \$			\$ 0 \$ 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION	7 nights of \$			\$ 0 \$ 6,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	7 nights of \$			\$ 0 \$ 6,900 ***********************************	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	7 nights of \$			\$ 0 \$ 6,900 ***********************************	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	7 nights of \$			\$ 0 \$ 6,900 ***********************************	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	7 nights of \$	NT COST		\$ 0 \$ 6,900 \$ 0 \$ 0 \$ 5,329 \$ 0 \$ 5,329 \$ 25,245	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 1. STIPENDS	7 nights of \$	NT COST		\$ 0 \$ 6,900 \$ 7,329 \$ 0 \$ 0 \$ 5,329	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)	7 nights of \$	NT COST		\$ 0 \$ 6,900 \$ 0 \$ 0 \$ 5,329 \$ 25,245 \$ 8,520	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE	7 nights of \$ PARTICIPA	NT COST		\$ 0 \$ 6,900 \$ 0 \$ 0 \$ 5,329 \$ 0 \$ 5,329 \$ 25,245	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective TOTAL INDIRECT COSTS (H + I)	7 nights of \$ PARTICIPA	NT COST		\$ 0 \$ 6,900 \$ 5,329 \$ 0 \$ 5,329 \$25,245 \$ 8,520 \$33,765	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING: PROPOSED LARVEL \$ 1.00000000000000000000000000000000000	7 nights of \$ PARTICIPA	NT COST .)	S	\$ 0 \$ 6,900 \$ 0 \$ 0 \$ 5,329 \$ 5,329 \$ 25,245 \$ 8,520 \$ 33,765 \$ 0 \$ 33,765	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days, lodging) F. PARTICIPANT SUPPORT 1. STIPENDS \$ 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING: PROPOSED LAVEL \$	7 nights of \$ PARTICIPA rate: 33.759 GPG II.D.7.j	NT COST	S	\$ 0 \$ 6,900 \$ 0 \$ 0 \$ 5,329 \$ 5,329 \$ 25,245 \$ 8,520 \$ 33,765 \$ 0 \$ 33,765 \$ 0 \$ 33,765 \$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING: PROPOSED LARVEL \$ 1.00000000000000000000000000000000000	7 nights of \$ PARTICIPA rate: 33.759 GPG II.D.7.j ED LEVEL IF /2010	NT COST	S ENT: \$ ENT: \$ ENT: CONTECTION	\$ 0 \$ 6,900 \$ 0 \$ 0 \$ 5,329 \$ 5,329 \$ 25,245 \$ 8,520 \$ 33,765 \$ 0 \$ 33,765	

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			FO	R NSF USE ONL	
54 SUMMARY PROPOSAL BUDGET					
ORGANIZATION Research Foundation of the State University of New York at Stony Brook		PRO	POSAL NO		N (MONTHS)
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			ARD NO.	Proposed	Granted
Michael Rijssenbeek A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates		NSF-Fun	PHY 06-128	and a state of the second s	
List each separately with name and title. (A.7. Show number in brackets)				Funds	Funds
List each separately with hame and the. (A.7. Show humber in prackets)	CAL	Person-me	SUMR	Requested By Proposer	Granted by NSF (If Different)
1.		/.0/.0		\$	\$
2.					
3.					
5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)					
7. (0) TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		l		a name a sugar en	
1. (0) POSTDOCTORAL ASSOCIATES	0			\$ 0	
2. (1) OTHER PROFESSIONALS (2.5 mo, e.g. Technician Jack Steffens)	2.5			\$10,927	
3. (0) GRADUATE STUDENTS	0	0	0	\$ 0	· · · · · · · · · · · · · · · · · · ·
4. () UNDERGRADUATE STUDENTS					
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					
6. () OTHER					
TOTAL SALARIES AND WAGES (A + B)				\$10,927	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) IFR: 53.36%				\$ 5,831	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				\$16,758	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING	\$5,000.)			10 m	
					1
TOTAL EQUIPMENT				\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO	ONS)			\$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp, 8 days/7	7 nights of \$	60 perdiei	n + \$60	\$ 6,900	
F. PARTICIPANT SUPPORT					
1. STIPENDS \$					
2. TRAVEL					
3. SUBSISTENCE					
4. OTHER					and the state of the
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL	PARTICIPA	NT COST	S	\$ 0	
G. OTHER DIRECT COSTS					and the second second
1. MATERIALS AND SUPPLIES				\$ 2,344	
2. PUBLICATION/DOCUMENTATION/DISSEMINATION					
3. CONSULTANT SERVICES					
4. COMPUTER SERVICES					
5. SUBAWARDS 6. OTHER					
TOTAL OTHER DIRECT COSTS				\$ 0	
H. TOTAL DIRECT COSTS (A THROUGH G)				\$ 2,344	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)				\$26,002	
25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective rate	ate: 33.75%	6			
	,			\$ 8,776	
TOTAL INDIRECT COSTS (F&A)					
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)	· · · · ·			\$34,778	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE	GPG II.D.7.j	.)		\$ 0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$34,778	\$
M. COST SHARING: PROPOSEDILE & AGREE	ED LEVEL IF	DIFFER			
PI/PD TYPED NAME AND SIGNATURE OF DATE				R NSF USE ONLY	
Michael M Rijssenbeek 12/08/2				OST RATE VERIFIC	
ORG. REP. TYPED NAME & SIGNATURE* JUNU CHADRY DATE	ULA	a second company of the second	Contraction of the second	ate of Rate Sheet	
NSF Form 1030 (10/99) Supersedes All Previous Editions () *SIGNAT	TURES REQU	VIRED ONL	Y FOR REV	ISED BUDGET (GPG I	II.C)

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				FO	R NSF USE ONI	_¥
54 SUMMARY PROPOSAL BUDGET		111111111				
ORGANIZATION Research Foundation of the State University of New York at Stony Br	ook		PRO	POSAL NO	DURATIC Proposed	ON (MONTHS) Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	·			ARD NO.		Granieu
Michael Rijssenbeek A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	1		f∝ NSF ISF-Fun	PHY 06-128	Contraction Contraction Of Contraction Contraction	
List each separately with name and title. (A.7. Show number in brackets)	85				Funds Requested By	Funds Granted by NSF
List each separately with name and due. (A.7. Show humber in brackets)	CA		ACAD	SUMR	Proposer	(If Different)
1.		<u></u>	110/10	001111	\$	\$
2.		-				+*
3.					· · · · ·	
4,						
	<u></u>	_ -				
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG 7. (0) TOTAL SENIOR PERSONNEL (1-6)	<u>5E)</u>	_				
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		, I,	••••••	5. S. 2. S. 2.		
1. (0) POSTDOCTORAL ASSOCIATES	0				\$ 0	
2. (1) OTHER PROFESSIONALS (2.5 mo, e.g. Technician Jack Steffens)	2.5	5			\$11,255	
3. (0) GRADUATE STUDENTS	0		0	0	\$ 0	
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER TOTAL SALARIES AND WAGES (A + B)			<u> </u>			
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) IFR: 53.36%			·····		\$11,255 \$6,006	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					\$ 6,006	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC	EEDING \$5.000.)				φ17,201	
	,					
						2.24 T
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS			• • • • •		\$ 0	
2. FOREIGN - 3 trips to CERN (\$1000 fare, \$400 transp.		F \$ 60	nordio	n + \$60	\$0 \$6,900	
lodging)	o dayan nigitta o	ψυυ	o peruier	n • 400	\$ 0,900	
F. PARTICIPANT SUPPORT						
1. STIPENDS \$						
2. TRAVEL 3. SUBSISTENCE						
4. OTHER						11 A. 1997
TOTAL NUMBER OF PARTICIPANTS (0)	TOTAL PARTICI	ΡΔΝ	TCOST	·c	\$ 0	
G. OTHER DIRECT COSTS	TOTALTARTION		1 0001	<u> </u>		
1. MATERIALS AND SUPPLIES					\$ 2,622	
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES	·					
5. SUBAWARDS 6. OTHER					¢ 0	
TOTAL OTHER DIRECT COSTS					\$0 \$2,622	
H. TOTAL DIRECT COSTS (A THROUGH G)					\$26,783	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)					420,700	
25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): eff	fective rate: 33.7	75%				
				-	\$ 9,039	
						Ļ
J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT		7:1			\$35,822	ļ
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)		<u>, , , , , , , , , , , , , , , , , , , </u>	1		<u>\$0</u> \$35,822	+ <u>c</u>
M. COST SHARING: PROPOSED LEVEL \$	AGREED LEVEL		NICCON	 באוד, ס	φυυ,022	\$
PI/PD TYPED NAME AND SIGNATURE	DATE	ו דו ב 1111 ב			R NSF USE ONLY	
PI/PD TYPED NAME AND SIGNATURE	12/08/2010		IN		OST RATE VERIF	
					ate of Rate Sheet	
ORG. REP. TYPED NAME & SIGNATURE* Lydia Chabzy	DATE U/10					
NSF Form 1030 (10/99) Supersedes All Previous Editions	*SIGNATÚRES RE	QUI	RED ONL	Y FOR REV	ISED BUDGET (GPG	6 III.C)

			FO	R NSF USE ÖI	NLY
54 SUMMARY PROPOSAL BUDGET					
ORGANIZATION		PRC	POSAL NO	DURAT	ION (MONTH
Research Foundation of the State University of New York at Stony Brook					
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AV	VARD NO.	Propose	ed Grar
Michael Rijssenbeek		for NSF	PHY 06-128	111	
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates		NSF-Fu	nded	Funds	Func
List each separately with name and title. (A.7. Show number in brackets)		Person-m		Requested By	Granted by
1.		ACAD	SUMR	Proposer \$	(If Differ
2.				Φ	\$
3.					
4.					
5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)					
7. (0) TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POSTDOCTORAL ASSOCIATES	0	1	l I	\$ 0	
2. (1) OTHER PROFESSIONALS (11 mo, e.g. Technician Jack Steffens)	11	1		\$46,910	
3. (0) GRADUATE STUDENTS	0	0	0	\$ 0	
4. () UNDERGRADUATE STUDENTS					
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					
6. () OTHER TOTAL SALARIES AND WAGES (A + B)					
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) IFR: 53.36%				\$46,910	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				\$25,031	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING	\$5,000.)			\$71,940	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO	NS)			\$ <u>0</u>	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8	NS) days/7 nig	hts of \$60	perdiem	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging)	NS) days/7 nig	hts of \$60	perdiem		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging)	NS) days/7 nig	hts of \$60	perdiem	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT	NS) days/7 nig	hts of \$60	perdiem	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE	NS) days/7 nig	hts of \$60	perdiem	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER	NS) days/7 nig	hts of \$60	perdiem	\$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I	NS) days/7 nig PARTICIPA			\$ <u>0</u> \$34,200 \$	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS	days/7 nig			\$0 \$34,200 \$0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	days/7 nig			\$ <u>0</u> \$34,200 \$	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	days/7 nig			\$0 \$34,200 \$0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	days/7 nig			\$0 \$34,200 \$0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	days/7 nig			\$ 0 \$34,200 \$ 0 \$ 20,195	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	days/7 nig			\$ 0 \$34,200 \$ 0 \$ 20,195	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	days/7 nig			\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$ 0 \$20,195	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G)	days/7 nig			\$ 0 \$34,200 \$ 0 \$ 20,195	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective rates	days/7 nig PARTICIPA			\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$ 0 \$20,195	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra TOTAL INDIRECT COSTS (F&A)	days/7 nig PARTICIPA			\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$126,335 \$ 42,638	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra TOTAL INDIRECT COSTS (H + I)	days/7 nig PARTICIPA	<u>NT COS</u>		\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$ 126,335 \$ 126,335 \$ 42,638 \$ 168,974	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE (days/7 nig PARTICIPA	<u>NT COS</u>		\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$126,335 \$ 126,335 \$ 126,335 \$ 168,974 \$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE G L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	DARTICIPA PARTICIPA ate: 33.75	<u>ANT COS</u> %	FS	\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$ 126,335 \$ 126,335 \$ 42,638 \$ 168,974	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE G L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	days/7 nig PARTICIPA	<u>ANT COS</u> %	ENT: \$	\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$126,335 \$126,335 \$126,335 \$168,974 \$ 0 \$168,974	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE G L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING: PROPOSED LEVEL \$. AMERICA COMPARIANCE AND SIGNATURE	DARTICIPA PARTICIPA ate: 33.75 3PG II.D.7. D LEVEL II	NT COS	ENT: \$	\$ 0 \$34,200 \$ 0 \$20,195 \$20,195 \$126,335 \$126,335 \$126,335 \$168,974 \$ 0 \$168,974 \$ 0 \$168,974 \$ 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIO 2. FOREIGN - 15 trips to CERN (\$900-\$1000 fare, \$400 transp, 8 + \$60 lodging) F. PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL I G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 25% on campus (rate 57.0%), 75% off-campus (rate 26.0%): effective ra TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE G L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	days/7 nig PARTICIPA ate: 33.75 3PG II.D.7, D LEVEL II	NT COS , , , , , , , , , , , , , , , , , , ,	ENT: \$	\$ 0 \$34,200 \$ 0 \$ 0 \$20,195 \$126,335 \$126,335 \$126,335 \$168,974 \$ 0 \$168,974	\$ Y

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Budget Justification for Stony Brook Proposal FY2012 - FY2016

Below we justify the Stony Brook budget request for maintenance and operations of the High Voltage of the ATLAS Liquid Argon Calorimeters. We require technical support for maintenance of the HV Filters (repairs, maintenance of test setup) and support during yearly access. We request funds for three trips to CERN per year, specifically for LAr M&O. One of these trips will be for Rijssenbeek's long-term stay at CERN (typically 5 months/yr) during which he will spend about 20% of research time on HV M&O. One trip each for Dr. Dean Schamberger (~20% FTE on LAr HV) and for the senior technician. We request Materials and Supplies in support of the LAr M&O task: for parts and tools, cables, software, and test supplies at CERN and at Stony Brook.

B2. Salaries.

We request 2 months salary (i.e. \$8,000 in FY12; we increase by 3%/yr in succeeding years) of our inhouse senior technician Jack Steffens, or equivalent personnel.

C2. The Fringe Benefits (IFR) cost is 53.36%.

E2. Foreign Travel.

We request three CERN visits per year directly related to the LAr M&O task of Stony Brook: per year one extended trip by Rijssenbeek, one trip by Dean Schamberger, and one trip by Steffens. We expect travel cost to increase by \$100/trip in FY14 and following.

G1. Materials and Supplies.

We request about 5k\$/yr in materials and supplies to support our LAr HV M&O responsibilities.

I. Indirect Costs.

Our ATLAS task is charged university overhead at the minimum rate because 75% of the work takes place off-campus. The current overhead rates are 26% for off-campus work and 57% for on-campus work. The resulting overhead rate is 33.75%.

SUMMARY PROPOSAL BUDG	ìΕΤ		FOR	R NSF	USE ONL	Y
ORGANIZATION			POSAL	-		- DN (month
Southern Methodist University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Ryszard Stroynowski						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	F	NSF Fund Person-mor	ed hths	Bog	Funds guested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	granted by N (if differen
1. Ryszard Stroynowski - Prof	0.00	0.00	0.00	\$	0	\$
2. Jingbo Ye - Prof	0.00	0.00	0.00		0	
3.						
4.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		0	
1. (0) POST DOCTORAL SCHOLARS 2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	<u>0.00</u> 0.00		260,900	
3. (0) GRADUATE STUDENTS	40.00	0.00	0.00		200,900	
4. (0) UNDERGRADUATE STUDENTS					U 0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					U	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					260,900	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					73,000	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					333,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. EOREIGN	ESSIONS	1			0 20,600 30,600	
	ESSIONS	I			-	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	<u> </u>		-	20,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS	<u> </u>		-	20,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS			-	20,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS			-	20,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					20,600 39,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAF			5	-	20,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			3	-	<u>20,600</u> <u>39,600</u> 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		20,600 39,600 0 75,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		20,600 39,600 0 75,800 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6		20,600 39,600 0 75,800 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5		20,600 39,600 0 75,800 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAP G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5		20,600 39,600 0 75,800 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		20,600 39,600 0 75,800 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3 		20,600 39,600 0 75,800 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DUPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		20,600 39,600 0 75,800 0 0 0 0 0 75,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5		20,600 39,600 0 75,800 0 0 0 0 0 75,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 470768) TOT			5		20,600 39,600 0 75,800 0 0 0 0 0 75,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 470768) TOT			<u> </u>		20,600 39,600 39,600 0 75,800 0 0 0 0 0 75,800 469,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 TOTAL NUMBER OF PARTICIPANTS 1 MATERIALS AND SUPPLIES 2 PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3 CONSULTANT SERVICES 5 SUBAWARDS 6 OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) <			5		20,600 39,600 39,600 0 75,800 0 0 0 0 0 0 75,800 469,900 122,400 592,300 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 470768) TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			3		20,600 39,600 39,600 0 75,800 0 0 0 0 0 75,800 469,900 122,400 592,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 470768) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	RTICIPAN	T COSTS	NT \$		20,600 39,600 39,600 0 75,800 0 0 0 0 0 0 0 75,800 469,900 122,400 592,300 0 592,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. STIPENDS \$ 1. STIPENDS \$ 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 470768) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN	IFFERE	NT \$ FOR 1	NSF U	20,600 39,600 39,600 0 75,800 0 0 0 0 0 0 0 0 75,800 469,900 122,400 592,300 0 592,300 592,300	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)		IFFERE	NT \$ FOR I	NSF U BT RA	20,600 39,600 39,600 0 75,800 0 0 0 0 0 0 0 75,800 469,900 122,400 592,300 0 592,300	\$

SUMMARY PROPOSAL BUDG	ET Y		FOF	R NSF	USE ONL'	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
Southern Methodist University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	О.		
Ryszard Stroynowski						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Req pi	uested By roposer	granted by N (if differen
1. Ryszard Stroynowski	0.00	0.00	0.00	\$	0	\$
2. Jingbo Ye	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	48.00	0.00	0.00		268,700	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					268,700	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					75,200	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					343,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			020,700	
	ESSIONS)			•	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			20,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			20,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS)			20,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			20,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 0 3. SUBSISTENCE 0	ESSIONS)			20,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			20,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR					20,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		20,700 40,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES					20,700 40,600 0 34,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			6		20,700 40,600 0 34,600 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		20,700 40,600 0 34,600 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES					20,700 40,600 0 34,600 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		20,700 40,600 0 34,600 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		20,700 40,600 0 34,600 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL CONSULTANT SERVICES S. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		20,700 40,600 0 0 34,600 0 0 0 0 0 34,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)					20,700 40,600 0 34,600 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE					20,700 40,600 0 0 34,600 0 0 0 0 0 34,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DUPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIR			5 		20,700 40,600 40,600 0 34,600 0 0 0 0 0 34,600 439,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			<u> </u>		20,700 40,600 40,600 0 34,600 0 0 0 0 0 0 34,600 439,800 114,400	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MTDC (Rate: 26.0000, Base: 440000) TOTAL INDIRECT AND INDIRECT COSTS (H + I)			<u> </u>		20,700 40,600 40,600 0 34,600 0 0 0 0 0 0 34,600 439,800 439,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS				5 5	20,700 40,600 40,600 0 34,600 0 0 0 0 0 0 0 34,600 439,800 439,800 1114,400 554,200 0	S
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J)		T COSTS		\$	20,700 40,600 40,600 0 34,600 0 0 0 0 0 0 34,600 439,800 439,800	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS // OCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS		T COSTS	NT \$		20,700 40,600 40,600 0 34,600 0 0 0 0 0 0 0 34,600 439,800 439,800 114,400 554,200 0 554,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 440000) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME			NT \$ FOR N	NSF US	20,700 40,600 40,600 0 34,600 0 0 0 0 0 0 0 0 34,600 439,800 439,800 439,800 554,200 554,200 554,200	•
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS // OCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			NT \$ FOR N CT COS	NSF US	20,700 40,600 40,600 0 34,600 0 0 0 0 0 0 0 34,600 439,800 439,800 114,400 554,200 0 554,200	•

SUMMARY PROPOSAL BUDG	ET YI		FOF	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
Southern Methodist University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	0.		
Ryszard Stroynowski						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed iths	Dev	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Red F	quested By proposer	granted by N (if differen
1. Ryszard Stroynowski	0.00	0.00	0.00	\$	0	\$
2. Jingbo Ye	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	48.00	0.00	0.00		276,700	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					276,700	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					77,500	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					354,200	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)			•	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			18,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			18,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)			18,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0	SSIONS)			18,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)			18,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					18,900 41,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3		18,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 7. CONTRAVE			3		18,900 41,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		18,900 41,600 0 34,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		18,900 41,600 0 34,800 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		18,900 41,600 0 34,800 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>		18,900 41,600 0 34,800 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u>}</u>		18,900 41,600 0 34,800 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		18,900 41,600 0 34,800 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		18,900 41,600 0 0 34,800 0 0 0 0 0 34,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>		18,900 41,600 0 34,800 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 0 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G)			3		18,900 41,600 0 0 34,800 0 0 0 0 0 34,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			}		18,900 41,600 41,600 0 34,800 0 0 0 0 0 34,800 449,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN			3		18,900 41,600 41,600 0 34,800 0 0 0 0 0 0 34,800 449,500 116,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) TOTAL INDRECT COSTS (F&A)			3		18,900 41,600 41,600 0 34,800 0 0 0 0 0 34,800 449,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 448848) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u>}</u>		18,900 41,600 41,600 0 34,800 0 0 0 0 0 0 0 0 34,800 449,500 116,700 566,200 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 448848) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS			18,900 41,600 41,600 0 34,800 0 0 0 0 0 0 0 34,800 449,500 116,700 566,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 448848) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS	NT \$	Ţ	18,900 41,600 41,600 0 34,800 0 0 0 0 0 0 0 0 34,800 449,500 116,700 566,200 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 448848) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN		NT \$ FOR N	NSF U	18,900 41,600 41,600 0 34,800 0 0 0 0 0 0 0 34,800 449,500 116,700 566,200 0 566,200	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DURECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			VT \$ FOR N CT COS	NSF U	18,900 41,600 41,600 0 34,800 0 0 0 0 0 0 0 0 34,800 449,500 116,700 566,200 0 566,200 SE ONLY	\$

SUMMARY PROPOSAL BUDG	ET		FO	r NSF	F USE ONL	Y
ORGANIZATION			POSAL	NO.	DURATIO	ON (month
Southern Methodist University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	О.		
Ryszard Stroynowski				-		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	F	NSF Fund Person-mor	ed hths	Bo	Funds equested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	granted by N (if differen
1. Ryszard Stroynowski	0.00	0.00	0.00	\$	0	\$
2. Jingbo Ye	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	48.00	0.00	0.00		285,100	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					285,100	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>79,800</u> 364,900	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	NG \$5.0	00)				
TOTAL EQUIPMENT E TRAVEL 1 DOMESTIC (INCL CANADA MEXICO AND U.S. POSSE	SSIONS				0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS)			0 18,300 40,100	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)		-	18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)		-	18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0			3		18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3		18,300 40,100	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OU TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			5		18,300 40,100	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		18,300 40,100 0 63,600 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OU TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6		18,300 40,100 0 63,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		18,300 40,100 0 63,600 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 63,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			3		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 63,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 486540)			S		18,300 40,100 40,100 0 63,600 0 0 0 0 63,600 486,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 486540)			3 		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 63,600 486,900 126,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 486540)			3		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 63,600 486,900 126,500 613,400	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 486540) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 126,500 613,400 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 486540) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	TCOSTS			18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 63,600 486,900 126,500 613,400	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 486540) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN	TCOSTS	NT \$		18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 0 0 0 0 63,600 486,900 126,500 613,400 0 613,400	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. STIPENDS \$ 1. STIPENDS \$ 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (F&A) 5. TOTAL DIRECT COSTS (F&A) 5. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS 4. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 4. COST SHARING PROPOSED LEVEL \$ 1 0 AGREED LE PI/PD NAME	TICIPAN	IFFERE	NT \$ FOR 1	NSF L	18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 63,600 486,900 486,900 486,900 486,900 513,400 0 613,400	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 486540) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		IFFERE	NT \$ FOR 1	NSF L	18,300 40,100 40,100 0 63,600 0 0 0 0 0 0 0 0 0 0 0 0 0 63,600 486,900 126,500 613,400 0 613,400	\$

SUMMARY PROPOSAL BUDG	ET		FOF	R NSI	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
Southern Methodist University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	О.		
Ryszard Stroynowski						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	D	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Re	equested By proposer	granted by N (if differen
1. Ryszard Stroynowski	0.00	0.00	0.00	\$	0	\$
2. Jingbo Ye	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	48.00	0.00	0.00		293,500	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					293,500	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					82,200	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					375,700	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
	ESSIONS)			•	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3		18,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		18,300 39,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		18,300 39,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		18,300 39,700 0 64,500 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		18,300 39,700 0 64,500 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		18,300 39,700 0 64,500 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		18,300 39,700 0 64,500 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL CONSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER BERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			<u> </u>		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 64,500 498,200	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			3		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 64,500 498,200 129,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 7 7 7 8 9 1. STIPENDS 9 2. TRAVEL 9 3. SUBSISTENCE 9 4. OTHER 9 7 7 7 7 7 8 9 9 10 11 11 12 13 14 15 16 17 17 11 11 11 12 12 14 15 16 17 17 18 19 10 10 110 1110 1210 1210			3		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 64,500 498,200 129,500 627,700	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 498078) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3		18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 64,500 498,200 129,500 627,700 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 498078) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS			18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 64,500 498,200 129,500 627,700	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 498078) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN	T COSTS	NT \$	Ţ	18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 0 64,500 498,200 129,500 627,700 0 627,700	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 498078) TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LEVEL \$ 0 AGREED LEVEL \$ 0	TICIPAN		NT \$ FOR N	NSF L	18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 64,500 498,200 498,200 129,500 627,700 0 627,700	•
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 498078) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR N CT COS	NSF U	18,300 39,700 39,700 0 64,500 0 0 0 0 0 0 0 0 0 0 64,500 498,200 129,500 627,700 0 627,700	•

PROPOSAL BUDG	iET		FO	R NS	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
Southern Methodist University					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A\	WARD N	О.		
Ryszard Stroynowski	1					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	I	NSF Fund Person-more	ed hths	B	Funds equested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	granted by N (if differen
1. Ryszard Stroynowski	0.00	0.00	0.00	\$	0	\$
2. Jingbo Ye	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (20) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	240.00	0.00	0.00		1,384,900	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					1,384,900	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					387,700	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					1,772,600	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			96,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			96,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			96,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0	ESSIONS)		-	96,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	96,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			96,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0			3		96,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			6		96,800 201,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PARTICIPANTS 0 1. MATERIALS AND SUPPLIES			5		96,800 201,600 0 273,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		96,800 201,600 0 273,300 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		96,800 201,600 0 273,300 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5		96,800 201,600 0 273,300 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u> </u>		96,800 201,600 0 273,300 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		96,800 201,600 0 273,300 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		96,800 201,600 201,600 0 273,300 0 0 0 0 0 273,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5		96,800 201,600 0 273,300 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			S		96,800 201,600 201,600 0 273,300 0 0 0 0 0 273,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 0 1. STIPENDS			5		96,800 201,600 201,600 0 273,300 0 0 0 0 273,300 2,344,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI			5		96,800 201,600 201,600 0 273,300 0 0 0 0 273,300 2,344,300 609,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			<u> </u>		96,800 201,600 201,600 0 273,300 0 0 273,300 2,344,300 2,344,300 2,953,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u> </u>		96,800 201,600 201,600 0 273,300 0 0 0 0 0 0 0 0 273,300 2,344,300 2,344,300 2,953,800 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	S
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN	TCOSTS			96,800 201,600 201,600 0 273,300 0 0 273,300 2,344,300 2,344,300 2,953,800	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$	RTICIPAN	TCOSTS	NT \$		96,800 201,600 201,600 0 273,300 0 0 273,300 2,344,300 2,344,300 2,953,800 0 2,953,800 0 2,953,800	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) <	RTICIPAN	IFFERE	NT \$ FOR 1	NSF	96,800 201,600 201,600 0 273,300 0 0 0 0 273,300 2,344,300 2,344,300 2,953,800 0 2,953,800 0 2,953,800 USE ONLY	•
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		IFFERE	NT \$ FOR I	NSF St R	96,800 201,600 201,600 0 273,300 0 0 273,300 2,344,300 2,344,300 2,953,800 0 2,953,800 0 2,953,800	•

SUMMARY			SUMMARY	
PROPOSAL BUDGET			FOR NSF USE	
RGANIZATION	PROPOSAL	NO.	and the second se	MONTHS)
Southern Methodist University	AWARD NO	-	Proposed	Granted
Rvszard Strovnowski				
SENIOR PERSONNEL: PI/PD, CoPI's, Faculty and Other Senior Associates	NSF Fun	bed	Funds	Funds
(List each separately with title, A.7 show number in brackets)	Person-		Requested by	Granted By NS
Duran d Danier and L		SUMR	Proposer	(If Different
Ryszard Stroynowsk	0.0 0.0	0.0	0	
Associate Research Professor	60.0 0.0	0.0	402,700	
	0.0 0.0	0.0	0	
	0.0 0.0	0.0	Ū	
. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	0.0 0.0	0.0	0	
	60.0 0.0	0.0	402,700	
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.0 0.0	0.0	Ū	
OTHER			982.200	
GRADUATE STUDENTS			0	
(0) UNDERGRADUATE STUDENTS		-	0	
() SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)		-	0	
. ER AL E AND WAGES +		_	1,384,900	
FRINGE BENEFITS F			387,700	
TOTAL SALARIES, MAGES FARSE FRIENDS FRIENDS FRIENDS			1.772.600	-
EQUIPMENT (LIST ITEM AND DOLLAR INT FOR EACH ITEM EXCEEDING \$5,000.)				
TRAVEL 1 DOMESTIC L. ION 2. FOREIGN		-	96,800 201,600	
PARTICIPANT SUPPORT COSTS				-
STIPENDS \$0				
TRAVEL \$0				
SUBSISTENCE				
OTHER				
I TOTAL PARTICIPANT COSTS		-	0	
. OTHER DI COLONIA		-		
. MATERIALS AND UPPLIES			273,300	
COSTS/DOC INATION			-	
ULTANT SERVICES SERVICES				-
Amoun	t to Indirect:	50		
, OTHER	Tuition =	50	070 000	
DIRECT COSTS			273.300 2,344,30(
TOTAL DI COSTS INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)			2,344,300	-
INDINEST COSTS (FOR) (SEECHTINELAND DAGE)		_		
26.0% Modified Total Direct Costs			1100000	
OTAL INDIRECT COSTS (F&A)	Base Amount: \$2	,344,300	609,500	and the second sec
L DIRECT AND INDIRECT COSTS + FUNDS FOR FURTHER CUR ECTS SEE GPG I			2,953,800	
			2,953,800	
OF THIS REQUEST (J) OR (J MINUS K	REED LEVEL IF DIFFER			
		FOR	NSF USE ONLY	
AGE	DATE			
AGE		INDIRECT	COST RATE VER	IFICATION
Ryszard Stroynowski	1/15/2010	INDIRECT ate Checked	COST RATE VER Date of Rate Sheet	IFICATION
AGF Ryszard Stroynowski NAME & SIGNA	1/15/2010			
AGF Ryszard Stroynowski NAME & SIGNA Alicia Brossette	2/15/2010	ate Checked	Date of Rate Sheet	Initials-ORG
AGF Ryszard Stroynowski NAME & SIGNA	2/15/2010	ate Checked		Initials-ORG

SUMMARY PROPOSAL BUDGET				YEAR 1 FOR NSF US	E ONLY	
RGANIZATION	- In	PROPOSA	L NO		N (MONTHS)	
SOUTHERN METHODIST UNIVERSITY				Proposed	Granted	
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR	4	AWARD NO	0			
Ryszard Stroynowski SENIOR PERSONNEL: PI/PD, CoPI's, Faculty and Other Senior Associates	_	NSF Fu	nded	Funds	Funds	
(List each separately with title, A 7. show number in brackets)		Persor		Requested by	Granted By N	
List each separately with little, A 7. show humber in bracketsy	CAL		SUMR	Proposer	(If Different	
Ryszard Stroynowsk	0.0	0.0	0.0	U		
Jingbo Ye	0.0	0.0	0.0	0	-	
Associate Research Professor	12.0	0.0	0.0	75.900	-	
	0.0	0.0	0.0	0		
	0.0	0.0	0.0	0		
(0) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	0.0	0.0	0.0 0.0	0 75,900		
(3) TOTAL SENIOR PERSONNEL (1-6 OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS	12.0	0.0	0.0	75,500		
(0) POST DOCTORAL ASSOCIATES	0.0	0.0	Ū.Ū	Ū	-	
(3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC				185.000		
(0) GRADUATE STUDENTS				0		
(0) UNDERGRADUATE STUDENTS				0		
(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
(0) OTHER			-	0		
TOTAL SALARIES AND WAGES (A + B)		_		260,900 73,000		
FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				333,900	-	
EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,00	n)	_		555,500		
TOTAL EQUIPMENT TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN				0 20,600 39,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS				20,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS				20,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL				20,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE				20,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER				20,600 39,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS				20,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI				20,600 39,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND				20,600 39,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES				20,600 39,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES				20,600 39,600		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS				20,600 39,600 0 75.800		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition =		Indirect:	0	20,600 39,600 0 75.800		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS				20,600 39,600 0 75.800		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT				20,600 39,600 0 75.800 0 75.800		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)				20,600 39,600 0 75.800 0 75.800		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs	Tub	ion =	50	20,600 39,600 0 75,800 75,800 469,900		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A)	Tub		50	20,600 39,600 0 75.800 0 75.800		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A)	Base A	ion =	50	20,600 39,600 0 75,800 0 75,800 469,900 122,400 592,300		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (H + 1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG AMOUNT OF THIS REQUEST (J) OR (J MINUS K	Base A Base J	ion = Amount: \$4	\$0 469,900	20,600 39,600 0 75,800 469,900 122,400		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs OTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (H + 1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPC AMOUNT OF THIS REQUEST (J) OR (J MINUS K COST SHARING: PROPOSED LEVEL \$	Base A Base A H.D.7 j) GREED LEVEL	ion = Amount: \$4	\$0 469,900 RENT \$	20,600 39,600 0 75,800 0 75,800 469,900 122,400 592,300		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs DTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG AMOUNT OF THIS REQUEST (J) OR (J MINUS K COST SHARING: PROPOSED LEVEL \$ 40 PD TYPED NAME & SIGNATURE*	Base A Base J	ion = Amount: \$4	\$0 469,900 RENT \$	20,600 39,600 0 75,800 0 75,800 469,900 122,400 592,300		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (H + 1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPC AMOUNT OF THIS REQUEST (J) OR (J MINUS K COST SHARING: PROPOSED LEVEL \$	Base A Base A H.D.7 j) GREED LEVEL	ion = Amount: \$4	\$0 469,900 RENT \$ F(20,600 39,600 0 75,800 0 75,800 469,900 122,400 592,300		
TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS) 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DI MATE AND PUBLICATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct NOT tuition = TOTAL OTHER DIRECT COSTS DIRECT INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% Modified Total Direct Costs OTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + 1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPC AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ PD TYPED NAME & SIGNATURE* PJ 2YS Zard Stroynowski	Base A Base A H.D.7 j) GREED LEVEL	Amount: \$	\$0 469,900 RENT \$ F(20,600 39,600 0 75,800 0 75,800 469,900 122,400 592,300 592,300 DR NSF USE ONL		

Budget Justification Year 1

A3.	Associate research professor (electronics engineering) salary Salary for electronics engineer working on LAr M&O	\$75,900
B2.	Engineering and technical staff (1.5 EE, 0.5 ET) salaries: Salaries for engineers and technical staff working on upgrade R&D for tracker and for LAr systems	\$185,000
С.	Fringe 28%	\$73,000
	Domestic travel to collaborating institutions Foreign travel to CERN - electronics repairs and meetings	\$20,600 \$39,600
G1.	Optical spectrum analyzer, serializer chip submission	\$75,800
I.	Indirect cost 26% of salary, benefits, travel and components	\$122,400
	Total direct and indirect cost	\$592,300

SUMMARY PROPOSAL BUDGET				YEAR 2 FOR NSF US	EONLY
RGANIZATION		PROPOSA	L NO.		N (MONTHS)
SOUTHERN METHODIST UNIVERSITY				Proposed	Granted
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR	¢.	AWARD NO	D C		
Ryszard Stroynowski	-				
SENIOR PERSONNEL: PI/PD, CoPI's, Faculty and Other Senior Associates	1	NSF Fu		Funds Requested by	Funds
(List each separately with title, A 7 show number in brackets)	CAL	Persor ACAD	SUMR	Proposer	Granted By NS (If Different
Ryszard Stroynowsk	0.0	0.0	.0	0	(ii Different
Jingbo Ye	0.0	0.0	0.0	0	
Associate Research Professor	12.0	0.0	0.0	78.100	
	0.0	0.0	0.0	0	
	0.0	0.0	0.0	0	
(0) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	0.0	0.0	0.0	0	
(3) TOTAL SENIOR PERSONNEL (1-6)	12.0	0.0	0.0	78,100	
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.0	0.0	0.0	Ū	
 (0) POST DOCTORAL ASSOCIATES (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 	0.0	0.0	0.0	190.600	
(0) GRADUATE STUDENTS			-	0	
				Ū	_
0 - CLERICAL				0	-
(0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				268,700	
FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS				/5,200	
TOTAL SALARIES. WAGES AND FRINGE BENEFITS (A+B+C EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)				343,900	
				0 20,700 40,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS				and the second se	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN				20,700	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS				20,700	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL				20,700	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER				20,700 40,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI				20,700	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE				20,700 40,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE				20,700 40,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES				20,700 40,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES				20,700 40,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU	Sul	ndrect	\$0 \$0	20,700 40,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU m I Direct NOT tuition =	Sul	vdrect		20,700 40,600 0 34,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES SU m I Direct NOT tuition =	Sul	ndrect		20,700 40,600 0 34,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU m I Direct NOT tuition =	Sulfied to b	närect Son –		20,700 40,600 0 34,600 0 34,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU M I DIrect NOT tuition = TOTAL DI THROUG INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)	suljed to Turt	ndrect		20,700 40,600 0 34,600 0 34,600	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU MIDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs	Tult	ion =	10	20,700 40,600 0 34,600 34,600 439,800	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU m I Direct NOT tuition = TOTAL DI THROUG INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A)	Tult	Amount: \$	10	20,700 40,600 0 34,600 439,800 114,400	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU MIDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + 1)	Turi Base A	ion =	10	20,700 40,600 0 34,600 34,600 439,800	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU MIDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DIRECT COSTS (F&A) TOTAL DI THROUG INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A)	Turi Base A	ion =	10	20,700 40,600 0 34,600 439,800 114,400	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU m I Direct NOT tuition = TOTAL DI THROUG INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs ITAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) FOR FURTHER SUPPORT OF CURRENT PROJECTS EE G II AMOUNT OF THIS REQUEST (J) OR (J MINUS K	Turi Base A	Amount: \$	10 439,800	20,700 40,600 0 34,600 439,800 114,400 554,200	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU MIDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs STAL INDIRECT COSTS (F&A) TOTAL DI THROUG INDIRECT COSTS (F&A) TOTAL DI COSTS (F&A) TOTAL DI FOR FURTHER SUPPORT OF CURRENT PROJECTS EE G II AMOUNT OF THIS REQUEST (J) OR (J MINUS K COST SHARING: PROPOSED LEVEL \$ AGR PD TYPED NAME & SIGNATURE* DATI	Base A	Amount: \$	439,800 RENT \$	20,700 40,600 0 34,600 439,800 114,400 554,200	
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU MIDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL DI THROUG INDIRECT COSTS (F&A) TOTAL DI THROUG INDIRECT COSTS (F&A) COST SHARING: PROPOSED LEVEL \$	Base A	Amount: \$	10 439,800 RENT \$ FC	20,700 40,600 0 34,600 439,800 439,800 114,400 554,200 554,200	γ
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU MIDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DIAL DIRECT COSTS (F&A) TOTAL DI TOTAL DI THROUG INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TO	Base A I.D.7 REED LEVEL E	Amount: \$	439,800 RENT \$ FC INDIREC	20,700 40,600 0 34,600 34,600 439,800 114,400 554,200 554,200	γ
TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER PARTI OTHER PARTI OTHER MATERIALS AND PPLIE BLICATION COSTS/DOCUMENTATION/DI TION CONSULTANT SERVICES COMPUTER SERVICES SU m I Direct NOT tuition = TOTAL DI THROUG INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs TAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) FOR FURTHER SUPPORT OF CURRENT PROJECTS EE G II AMOUNT OF THIS REQUEST (J) OR (J MINUS K COST SHARING: PROPOSED LEVEL \$ AGR PD TYPED NAME & SIGNATURE* DATI	Base A I.D.7 REED LEVEL E	Amount: \$	10 439,800 RENT \$ FC	20,700 40,600 0 34,600 34,600 439,800 114,400 554,200 554,200 0 554,200	Y

Budget Justification Year 2

A3.	Associate research professor (electronics engineering) salary Salary for electronics engineer working on LAr M&O	\$78,100
B2.	Engineering and technical staff (1.5 EE, 0.5 ET) salaries: Salaries for engineers and technical staff working on upgrade R&D for tracker and for LAr systems	\$190,600
С.	Fringe 28%	\$75,200
	Domestic travel to collaborating institutions Foreign travel to CERN - electronics repairs and meetings	\$20,700 \$40,600
G1.	ASIC testing setups and materials	\$34,600
I.	Indirect cost 26% of salary, benefits, travel and components	\$114,400
	Total direct and indirect cost	\$554,200

SUMMARY PROPOSAL BUDGET	1	-		YEAR 3 FOR NSF US	E ONLY
RGANIZATION		PROPOSA	L NO.	DURATI	MONTHS)
SOUTHERN METHODIST UNIVERSITY				Proposed	Granted
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWARD N	0		
Ryszard Stroynowski SENIOR PERSONNEL: PI/PD, CoPI's, Faculty and Other Senior Associates		NSF Fu	unded	Funds	Funds
(List each separately with title, A 7. show number in brackets)			n-mos.	Requested by	Granted By N
(List each separately with the, A r. show humber in brackets)	CAL	ACAD	SUMR	Proposer	(If Different
Ryszard Inc. nowski	0.0	0.0	0.0	0	
Jingbo Ye	0.0	0.0	0.0	0	-
Associate Research Professor	12.0	0.0	0.0	80,500	
	0.0		0.0	0	2
	0.0	0.0	0.0	0	
. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	0.0	0.0	0.0	80.500	
. (3) TOTAL SENIOR PERSONNEL (1-6	12.0	0.0	9.9	00.000	-
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS (0) POST DOCTORAL ASSOCIATES	0.0	0.0	0.0	0	
(3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ET	0.0	0.01		196,200	
				0	-
0 UNDERGRADUATE STUDENTS		_		Ū	
0 HECHETARAL CLINICAL OF CHARGED DIRECTLY				0	
0 OTHER				Ū	
TOTAL SALARIES AND +				276	
EFITS CHARGED AS DIRECT		_		77. j00 354.:	
ES WAGES AND FRINGE BENEFITS . EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,00	2)		_	334.	
				0 18 41.600	
C INCL. CANADA AND U S 2 FOREIGN				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS . STIPENDS				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS . STIPENDS . TRAVEL				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS				18,900	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES				18 41,600	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES				18 41,600	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES				18 41,600	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR	un subject to	Indirect:	10	18 41,600 34 800	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER Of all NOT tuition =	unt subject to	Indirect:		18 41,600 34 800	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER Of all NOT tuition = TOTAL OTHER DI	un sutget to	Indirect:		18 41,600 34 800 0 34	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER Of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH	un outgett to	Indirect:		18 41,600 34 800	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER Of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH	un output to	Indirect:		18 41,600 34 800 0 34	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER Of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH	Tui	tion =	10	18 41,600 34 800 0 3 449 500	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER Of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL I	Tui	tion =		18 41,600 34 800 0 3 449 500 116,700	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER OTHER Of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL I TOTAL DIRECT D DI COSTS +	Base	tion =	10	18 41,600 34 800 0 3 449 500	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER Of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL I TOTAL DIRECT D DI COSTS + RESIDUAL FUNDS SUPPORT OF CURRENT P S	Base	tion =	10	18 41,600 34 800 0 3 449 500 116,700 200	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL I TOTAL DIRECT D DI COSTS + RESIDUAL FUNDS SUPPORT OF CURRENT P S T	Base II D.7	lion – Amount: 1	\$0 (449,500	18 41,600 34 800 0 3 449 500 116,700	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL I TOTAL DIRECT D DI COSTS + RESIDUAL FUNDS SUPPORT OF CURRENT P S T	Base	lion – Amount: 1	10 1449,500 ERENT \$	18 41,600 34 800 0 3 449 500 116,700 200	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES C COMPUTER SUBAWAR OTHER Of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) O.0% Modified Total Direct Costs OTAL I TOTAL DIRECT D DI COSTS + RESIDUAL FUNDS SUPPORT OF CURRENT P S T COST SHARING: PROPOSED LEVEL \$ V/PD TYPED NAME & SIGNATURE*	Base II D.7 GREED LEVE	lion – Amount: 1	10 1449,505 RENT \$ F(18 41.600 34 800 3 449 500 116.700 200 566 200 DR NSF USE ONL	
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL I TOTAL DIRECT D DI COSTS + RESIDUAL FUNDS SUPPORT OF CURRENT P S T COST SHARING: PROPOSED LEVEL \$ V/PD TYPED NAME & SIGNATURE* Ryszard Stroynowski	Base II D.7 GREED LEVE ATE	Lif Diffi	IO HAN SOS ERENT \$ F(INDIREC	18 41.600 34 800 0 3 449 500 116.700 200 566 200 DR NSF USE ONL DR NSF USE ONL DR NSF USE ONL	Y ERIFICATION
C INCL. CANADA AND U S 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT DIRECT COSTS AND SUPPLIES COMPUTER SUBAWAR OTHER of all NOT tuition = TOTAL OTHER DI DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL I TOTAL DIRECT D DI COSTS + RESIDUAL FUNDS SUPPORT OF CURRENT P S T C COST SHARING: PROPOSED LEVEL \$ V/PD TYPED NAME & SIGNATURE* Ryszard Stroynowski	Base II D.7 GREED LEVE	Lif Diffi	10 1449,505 RENT \$ F(18 41.600 34 800 3 449 500 116.700 200 566 200 DR NSF USE ONL	Y ERIFICATION

Budget Justification Year 3

A3.	Associate research professor (electronics engineering) salary Salary for electronics engineer working on LAr M&O	\$80,500
B2.	Engineering and technical staff (1.5 EE, 0.5 ET) salaries: Salaries for engineers and technical staff working on upgrade R&D for tracker and for LAr systems	\$196,200
С.	Fringe 28%	\$77,500
E 1. E 2.	Domestic travel to collaborating institutions Foreign travel to CERN - electronics repairs and meetings	\$18,900 \$41,600
G1.	ASIC testing, PCB level studies and system integration	\$34,800
I.	Indirect cost 26% of salary, benefits, travel and components	\$116,700
	Total direct and indirect cost	\$566,200

SUMMARY PROPOSAL BUDGET	1		_	YEAR 4 FOR NSF US	E ONLY
RGANIZATION		PROPOSA	L NO		N MONTHS)
SOUTHERN METHODIST UNIVERSITY				Proposed	Granted
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR Ryszard Stroynowski		AWARD N	0.		
SENIOR PERSONNEL: PI/PD, Co -PI's, Faculty and Other Senior Associates		NSF Fu	nded	Funds	Funds
(List each separately with title, A.7. show number in brackets)		Persor		Requested by	Granted By N
	CAL	ACAD	SUMR	Proposer	(If Differen
Ryszard Stroynowsk	0.0		0.0	0	2
2 Jingbo Ye	0.0		0.0	0	
Associate Research Professor	12.0		0.0	82.900	-
	0.0		0.0	0	
5 3. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	0.0		0.0	0	
(3) TOTAL SENIOR PERSONNEL (1-6)	12.0		0.0	82,900	
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
. (0) POST DOCTORAL ASSOCIATES	0.0	0.0	0.0	D	
2 (3) OTHER PROFESSIONALS PROGRAMM ETC.				202.200	
. (0) GRADUATE STUDENTS			-	0	
(0) UNDERGRADUATE STUDENTS (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)		_		0	
i (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY) i. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				285,100	
FRINGE BENEFITS (IF CHARGED AS DIRECT COST				79,800	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				364,900	
EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5	,000)				
TOTAL EQUIPMENT		_		0 18,300 40,100	
			_		
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE				18,300	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE				18,300	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS				18.300 40,100 0	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS MATERIALS AND SUPPLIES				18.300 40,100	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N				18.300 40,100 0	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N CONSULTANT SERVICES				18.300 40,100 0	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N CONSULTANT SERVICES COMPUTER SERVICES	mount autoport to	Indirect	50	18.300 40,100 0 63.600	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct Costs NOT tuition =	mount subject to Turk	Indensit Bioth =	10 50	18,300 40,100 0 63.600 0	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N SCONSULTANT SERVICES SUBAWARDS ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS	mound subject to Turi	Indeed		18,300 40,100 0 63.600 0 63.600	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N SCONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS THROUGH	nourd autged to Tuil	Indirect Sign =		18,300 40,100 0 63.600 0	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N SCONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS THROUGH	mount autoport to Turi	Indirect Bion =		18,300 40,100 0 63.600 0 63.600	
. TRAVEL 1 AND 2 FOREIGN 2 FOREIGN AND 2 FOREIGN AND 2 FOREIGN AND 2 FOREIGN AND 2 FOREIGN AND 2 FOREIGN 3 SUBSISTENCE 4 OTHER () TOTAL PARTICIPANT COSTS 5 OTHER () TOTAL PARTICIPANT COSTS 5 DIRECT COSTS 5 MATERIALS AND SUPPLIES 2 PUBLI N 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 5 ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS THROUGH	Tul	lion =	6 0	18,300 40,100 0 63.600 0 63.600	
. TRAVEL 1 AND 2 FOREIGN 2 FOREIGN AND 2 FOREIGN AND 2 FOREIGN AND 2 FOREIGN AND 2 FOREIGN AND 3 SUBSISTENCE 3 SUBSISTENCE 4 OTHER () TOTAL PARTICIPANT COSTS 5 DIRECT COSTS MATERIALS AND SUPPLIES 2 PUBLI N 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 5 SUB OF all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs	Tul	Amount:	6 0	18,300 40,100 0 63,600 486,900 126,500	
. TRAVEL 1 AND 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 3 STIPENDS 2 TRAVEL 3 SUBSISTENCE 4 OTHER () TOTAL PARTICIPANT COSTS 4 OTHER () TOTAL PARTICIPANT COSTS 5 DIRECT COSTS 1 MATERIALS AND SUPPLIES 2 PUBLI N 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 5 ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS 1 HROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL INDIRECT COSTS 1 TOTAL DIRECT COSTS (H + 1)	Tul	lion =	6 0	18,300 40,100 0 63,600 63,600 486,900	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS DIRECT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS THROUGH DIRECT COSTS O.0% Modified Total Direct Costs OTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H + 1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE G	Tul	lion =	6 0	18.300 40,100 0 63.600 63.600 486.900 126,500 613,400	
. TRAVEL 1 AND 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 3 SUBSISTENCE 3 SUBSISTENCE 4 OTHER () TOTAL PARTICIPANT COSTS 4 DIRECT COSTS 5 MATERIALS AND SUPPLIES 2 PUBLI 9 CONSULTANT SERVICES 4 CONSULTANT SERVICES 5 SUBAWARDS 4 ER Sum of all other Direct Costs NOT tuition = 1 TOTAL OTHER DIRECT COSTS 1 THROUGH 1 DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs 1 OTAL DIRECT COSTS 1 OTAL DIRECT COSTS 1 OTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs 1 OTAL DIRECT COSTS 1 OTAL DIRECT COSTS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE G AMOUNT OF THIS REQUEST (J) OR (J MINUS K	Tur Base GPG II.D 7 j)	Amount:	50 900	18,300 40,100 0 63,600 486,900 126,500	
. TRAVEL 1 AND 2 FOREIGN 2 FOREIGN 2 FOREIGN AND 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 3 STIPENDS 3 TRAVEL 3 SUBSISTENCE 4 OTHER () TOTAL PARTICIPANT COSTS 5 DIRECT COSTS 5 MATERIALS AND SUPPLIES 2 PUBLI N 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 5 ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS 5 SUBAWARDS 5 ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS 1 TOTAL OTHER DIRECT COSTS 1 TOTAL DIRECT COSTS 2 TOTAL DIRECT COSTS 3 TOTAL	Tul	Amount:	50 900 Keni \$	18.300 40,100 0 63.600 63.600 486.900 126,500 613,400	
TRAVEL 1 AND 2 FOREIGN 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS THROUGH DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) O.0% Modified Total Direct Costs O.0% Modified Total Direct Costs TOTAL DIRECT COSTS TOTAL DIRECT COSTS (H + I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE G AMOUNT OF THIS REQUESI (J) OR (J MINUS K COST SHARING: PROPOSED LEVEL \$	Base BPG II.D 7 j) AGREED LEVE	Amount:	50 900 Keni \$	18,300 40,100 0 63,600 63,600 486,900 126,500 613,400 613,400	
TRAVEL 1 AND 2 FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT COSTS DIRECT COSTS DIRECT COSTS DIRECT COSTS MATERIALS AND SUPPLIES PUBLI N SCONSULTANT SERVICES SUBAWARDS ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS O.0% Modified Total Direct Costs O.0% Modified Total Direct Costs TOTAL DIRECT COSTS (H + I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE G AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ D//PD TYPED NAME & SIGNATURE*	Base BPG II.D 7 j) AGREED LEVE DATE	Amount:	50 900 RENT \$ FC	18,300 40,100 0 63,600 486,900 126,500 613,400 513,400 513,400 513,400 513,400	Y
. TRAVEL 1 AND 2 FOREIGN 2 FOREIGN 2 FOREIGN AND 2 FOREIGN 2 FOREIGN 2 FOREIGN 2 FOREIGN 3 STIPENDS 3 TRAVEL 3 SUBSISTENCE 4 OTHER () TOTAL PARTICIPANT COSTS 5 DIRECT COSTS 5 MATERIALS AND SUPPLIES 2 PUBLI N 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 5 ER Sum of all other Direct Costs NOT tuition = TOTAL OTHER DIRECT COSTS 1 TOTAL OTHER DIRECT COSTS 1 TOTAL OTHER DIRECT COSTS 1 THROUGH 1 DIRECT COSTS 1 TOTAL DIRECT COSTS 2 TOTAL DIRECT COSTS 3 TOTAL DIRECT COSTS	Base BPG II.D 7 j) AGREED LEVE	Amount:	50 400,900 RENT \$ FC	18,300 40,100 0 63,600 486,900 126,500 613,400 513,400	A

Budget Justification Year 4

A3.	Associate research professor (electronics engineering) salary Salary for electronics engineer working on LAr M&O	\$82,900
B2.	Engineering and technical staff (1.5 EE, 0.5 ET) salaries: Salaries for engineers and technical staff working on upgrade R&D for tracker and for LAr systems	\$202,200
С.	Fringe 28%	\$79,800
	Domestic travel to collaborating institutions Foreign travel to CERN - electronics repairs and meetings	\$18,300 \$40,100
G1.	ASIC prototyping, testing and system integration	\$63,600
I.	Indirect cost 26% of salary, benefits, travel and components	\$126,500
	Total direct and indirect cost	\$613,400

SUMMARY PROPOSAL BUDGET			_	YEAR 5 FOR NSF US	
ROAMONTON		PHOPOSA	1. 10		N (MONTHS)
SOUTHERN METHODIST UNIVERSITY			F	Proposed	Granted
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWARD	10		
Ryszard Stroynowski		NOFE		Friede	Frede
SENIOR PERSONNEL: PI/PD, Co -PI's, Faculty and Other Senior Associates		NSF F		Funds	Funds
(List each separately with title, A 7 show number in brackets)			n-mos	Requested by	Granted By N
Dunner Chromeser I	CAL 0.0	ACAD	SUMR 0.0	Proposer 0	(If Different
Ryszard Stroynow	0.0	0.0	0.0	0	-
Jingbo Ye Associate Research Professor	12.0	0.0	0.0	85,300	
Associate Research Professor	0.0	0.0	0.0	03,300	
	0.0	0.0	0.0	D	
(0) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	0.0	0.0	0.0	0	-
	12.0	0.0	0.0	85.300	-
OTHER P	12.0	0.0	0.0	00.000	
0 POST	0.0	0.0	0.0	0	-
and the second sec	1 0101			208,200	
(3) OTHER P E E E E E E E E E E E E E E E E E E				U	
(0) UNDERGRADUATE STUDENTS			_	Ū	
(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				U	-
(0) OTHER				Ū	
TOTAL SALARIES AND WAGES (A + B)				293,500	
PRINCE BENETITS OF CHARGED AS DIRECT COSTS.				82.200	
TOTAL SALA				375.700	
TOTAL EQUIPMENT		_		0	
TRAVEL 1 IC I IC III ION		_		18.300	
TOTAL EQUIPMENT . TRAVEL 1 C I ION 2. FOREIGN					
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE				18.300	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS				18.300	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS				18.300 39,700	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES				18.300 39,700	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION				18.300 39,700	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT				18.300 39,700	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER	.mount to	Indirect:	\$0	18.300 39,700	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS A	the second se	Indirect:	\$0	18.300 39,700 0 64,500	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS A	the second se			18.300 39,700 0 64,500 (64,500	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS	the second se			18.300 39,700 0 64,500	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G)	the second se			18.300 39,700 0 64,500 (64,500	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS A	Tu	tion =	\$0	18.300 39,700 0 64,500 64,500 498,200	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS A OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A)	Tu	tion =		18.300 39,700 0 64,500 (64,500 498,200	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS A OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DI COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A)	Tur Base /	tion =	\$0	18.300 39,700 0 64,500 64,500 498,200	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DI COSTS + RESIDUAL FUNDS F R FURTHER S	Tur Base /	tion =	\$0	18.300 39,700 0 64,500 (64,50(498,20(129.500 627.700	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS A OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) SECONDAL FUNDS F R FURTHER S SECONDAL	Base / GPG II.D.7	lign = Amount: {	\$0 \$498,200	18.300 39,700 0 64,500 (64,500 498,200	
TRAVEL 1 C I ION 2. FOREIGN 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) COSTS + RESIDUAL FUNDS F R FURTHER S SEE (CANON AND AND AND AND AND AND AND AND AND AN	Base / GPG II.D.7 AGREED LEVE	lign = Amount: {	\$498,200 ERENT \$	18.300 39,700 0 64,500 (64,50(498,20(129.500 627.700 627.700	
TRAVEL 1 C I ION 2. FOREIGN 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) COSTS + RESIDUAL FUNDS F R FURTHER S SEE (CANON AND AND AND AND AND AND AND AND AND AN	Base / GPG II.D.7	lign = Amount: {	\$498,200 ERENT \$	18.300 39,700 0 64,500 (64,50(498,20(129.500 627.700	
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE)	Base / GPG II.D.7 AGREED LEVE	lign = Amount: {	\$498,200 ERENT \$ F(18.300 39,700 64,500 (64,500 498,200 129,500 627,700 527,700 DR NSF USE ONL	¥
TRAVEL 1 C I ION 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs DTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) TOTAL DIRECT COSTS + RESIDUAL FUNDS F R FURTHER S AMOUNT OF THIS REQUEST (J) OR COST SHARING: PROPOSED LEVEL \$ //PD TYPED NAME & SIGNATURE* 2yszard Stroynowski	Base / SPG II.D.7 AGREED LEVE DATE	Amount: \$	\$498,200 ERENT \$ F(18.300 39,700 0 64,500 (64,50(498,20(129.500 627.700 627.700	¥
TRAVEL 1 C I ION 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS STIPENDS TRAVEL SUBSISTENCE OTHER AL PARTICIPANT COSTS DI COSTS SUPPLIES P MENTATION/DISSEMINATION CONSULTANT COMPUTER SUBAWARDS OTHER Sum of all other Direct NOT TOTAL OTHER DIRECT COSTS TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 0.0% Modified Total Direct Costs OTAL INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) T	Base / GPG II.D.7 AGREED LEVE	Amount: \$	\$498,200 ERENT \$ F(INDIREC	18.300 39,700 0 64,500 (64,500 498,200 129,500 627,700 527,700 527,700 527,700 527,700 527,700	Y

Budget Justification Year 5

A3.	Associate research professor (electronics engineering) salary Salary for electronics engineer working on LAr M&O	\$85,300
B2.	Engineering and technical staff (1.5 EE, 0.5 ET) salaries: Salaries for engineers and technical staff working on upgrade R&D for tracker and for LAr systems	\$208,200
С.	Fringe 28%	\$82,200
E 1. E 2.	Domestic travel to collaborating institutions Foreign travel to CERN - electronics repairs and meetings	\$18,300 \$39,700
G1.	ASIC prototyping, testing and system integration	\$64,500
I.	Indirect cost 26% of salary, benefits, travel and components	\$129,500
	Total direct and indirect cost	\$627,700

SUMMARY PROPOSAL BUDG	ET		FO	R NSF	USE ONLY	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIC	DN (month
The Regents of the University of California					Proposed	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	Ю.		
Abraham Seiden						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths		Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	- Req pr	uested By roposer	granted by N (if differen
1. Abraham Seiden - Prof	0.00	0.00	0.00	\$	0	\$
2. Edward Spencer - Engineer	4.60	0.00	0.00		29,804	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.60	0.00	0.00		29,804	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	19.40	0.00	0.00		85,741	
3. (0) GRADUATE STUDENTS					0	
4. (2) UNDERGRADUATE STUDENTS					15,191	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					130,736	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>51,251</u> 181,987	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	0ING \$5,0)00.)				
TOTAL EQUIPMENT			10,000		10,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
	ESSIONS	i)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	i)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	i)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER		, 			036,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR		, 		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS		, 			0 36,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES		, 			0 36,000 0 49,108	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		, 			0 36,000 0 49,108 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 4. COMPUTER SERVICES		, 			0 36,000 0 49,108 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		, 			0 36,000 0 49,108 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		, 			0 36,000 0 49,108 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		, 			0 36,000 0 49,108 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		, 			0 36,000 49,108 0 0 0 0 0 49,108	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		, 			0 36,000 49,108 0 0 0 0 0 49,108	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		, 			0 36,000 49,108 0 0 0 0 0 49,108	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 267095) </td <td></td> <td>, </td> <td></td> <td></td> <td>0 36,000 49,108 0 0 0 0 0 49,108 277,095</td> <td></td>		, 			0 36,000 49,108 0 0 0 0 0 49,108 277,095	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN		, 			0 36,000 49,108 0 0 0 0 0 49,108 277,095 69,445	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 0. TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 267095) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)		TCOSTS	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		0 36,000 49,108 0 0 0 0 0 49,108 277,095 69,445 346,540	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 267095) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		TCOSTS	S 	,	0 36,000 36,000 0 49,108 0 0 0 0 0 49,108 277,095 346,540 0 346,540	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 267095) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME			S NT \$ FOR 1	NSF US	0 36,000 36,000 0 49,108 0 0 0 0 0 49,108 277,095 69,445 346,540 0 346,540 0 346,540	\$
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The Regents of the University of California Propose PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR AWARD NO. Propose Abraham Seiden	Fund granted b (if diffe	Funds Requested By proposer
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR AWARD NO. Abraham Seiden	Fund granted b (if diffe	Funds Requested By proposer 0
Abraham Seiden NSF Funded Funds A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) NSF Funded Funds 1. Abraham Seiden - Prof 0.00 0.00 0.00 \$ (0.00) 2. Edward Spencer - Engineer 4.60 0.00 0.00 30,694	granted b (if diffe	Requested By proposer
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	granted b (if diffe	Requested By proposer
(List each separately with title, A.7. show number in brackets)CALACADSUMRRequested by proposer1. Abraham Seiden - Prof0.000.000.00\$12. Edward Spencer - Engineer4.600.000.0030,6983	granted b (if diffe	Requested By proposer
(List each separately with title, A.7. show number in brackets) CAL ACAD SUMR proposer 1. Abraham Seiden - Prof 0.00 0.00 0.00 \$ 1 2. Edward Spencer - Engineer 4.60 0.00 0.00 \$30,694 3.	(if diffe	proposer 0
2. Edward Spencer - Engineer 4.60 0.00 0.00 30,694 3.		-
3.	98	30,698
4.		
5.		
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 0.00 0.00 0.00	0	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6) 4.60 0.00 30,69	18	30,698
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		
1. (0) POST DOCTORAL SCHOLARS 0.00 0.00 0.00	0	0
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 18.80 0.00 0.00 85,45	j7	85,457
3. (0) GRADUATE STUDENTS	0	0
4. (2) UNDERGRADUATE STUDENTS 15,64	15	15,645
	0	
6. (0) OTHER	0	0
TOTAL SALARIES AND WAGES (A + B) 131,80)0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) 52,014	4	131,800
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) 183.814	4	131,800 52,014
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)		
TOTAL EQUIPMENT 10,000		52,014
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS))0 0	52,014 183,814 10,000
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,631)0 0	52,014 183,814 10,000
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 F. PARTICIPANT SUPPORT COSTS)0 0	52,014 183,814 10,000
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 F. PARTICIPANT SUPPORT COSTS 1. STIPENDS)0 0	52,014 183,814 10,000
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) (2. FOREIGN 36,630 F. PARTICIPANT SUPPORT COSTS (1. STIPENDS 0 2. TRAVEL 0)0 0	52,014 183,814 10,000
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) (2. FOREIGN 36,631 F. PARTICIPANT SUPPORT COSTS (1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0)0 0	52,014 183,814 10,000
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) (2. FOREIGN 36,631 F. PARTICIPANT SUPPORT COSTS 3 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	0 0 30	52,014 183,814 10,000 0 36,630
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS (1) TOTAL PARTICIPANT COSTS ()0 0	52,014 183,814 10,000 0 36,630
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS 6. OTHER DIRECT COSTS	0	52,014 183,814 10,000 0 36,630
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 49,920	0	52,014 183,814 10,000 0 36,630 36,630 0 49,926
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0) TOTAL PARTICIPANT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION ()	0 0 30 0 20 30 20 26 0	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 2. FOREIGN 36,630 F. PARTICIPANT SUPPORT COSTS 0 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS 1. MATERIALS AND SUPPLIES 49,920 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 0 3. CONSULTANT SERVICES 0	0 0 30 30 0 20 26 0 0 0	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 40,00 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 6	0 0 30 30 30 30 30 30 30 30 30 30 30 30	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,630 5. SUBAWARDS	0 0 30 30 30 20 26 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,63 F. PARTICIPANT SUPPORT COSTS 1. STIPENDS O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS 1. MATERIALS AND SUPPLIES 49,920 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	0 0 30 30 30 20 26 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) () 2. FOREIGN 36,63 2. FOREIGN 36,63 7. PARTICIPANT SUPPORT COSTS () 1. STIPENDS () 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS () () TOTAL NUMBER OF PARTICIPANTS () () 1. MATERIALS AND SUPPLIES 49,921 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION () 3. CONSULTANT SERVICES () 4. COMPUTER SERVICES () 5. SUBAWARDS () 6. OTHER () 7. TOTAL OTHER DIRECT COSTS ()	0 0 30 30 30 30 30 30 30 30 50 50 50 50 50 50 50 50 50 50 50 50 50	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 49,926
E. TRAVEL	0 0 30 30 30 30 30 30 30 30 50 50 50 50 50 50 50 50 50 50 50 50 50	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL	0 0 30 30 30 30 30 30 30 30 50 50 50 50 50 50 50 50 50 50 50 50 50	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 49,926
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 36,631 5. FOREIGN 5. FOREIGN 5. SUBAVARDS 6. OTHER 1. MATERIALS AND SUPPLIES 5. SUBAWARDS 6. OTHER 1. TOTAL DIRECT COSTS 1. INDIRECT COSTS 4. OTHER 1. TOTAL DIRECT COSTS 4. OTHER 5. SUBAVARDS 5. SUBAVAR	00 0 30 30 30 30 30 30 30 26 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	52,014 183,814 10,000 0 36,630 36,630 0 36,630 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL	00 0 30 30 30 30 30 30 30 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL	00 0 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) [36,63] 2. FOREIGN 36,63] 2. FOREIGN 36,63] 5. PARTICIPANT SUPPORT COSTS 1 1. STIPENDS \$ 0 36,63] 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS 1 G. OTHER DIRECT COSTS 1 1. MATERIALS AND SUPPLIES 2 1. MOUNT SERVICES 2 1. CONSULTANT SERVICES 2 1. TOTAL OTHER DIRECT COSTS (A THROUGH G) 2 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 3 MTDC (Rate: 26.0000, Base: 270370) 7 1. TOTAL INDIRECT COSTS (H + I) 350,666 X. RESIDUAL FUNDS 2 1. TOTAL DIRECT AND INDIRECT COSTS (H + I) 350,666 X. RESIDUAL FUNDS 2 1. TOTAL DIRECT AND INDIRECT COSTS (H + I) 350,666 X. RESIDUAL FUNDS 2 1. TOTAL DIRECT COSTS (H + I) 350,666 X. RESIDUAL FUNDS 2 1. TOTAL FUNDES 2 1. TOTAL DIRECT COSTS (H + I) 350,666 1. TOTAL FUNDES 2 1. TOTAL FUNDES 2 1	00 0 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 3. FOREIGN 3. SUBSISTENCE 3. SUBPORT COSTS 4. OTHER 0 1. MATERIALS AND SUPPLIES 1. CONSULTANT SERVICES 1. CONSULTANT SERVICES 1. INDIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 270370) 1. TOTAL DIRECT COSTS (F&A) 1. TOTAL DIRECT COSTS (F + I) 3. SUBSISTENCE 4. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 4. COMPUT FIS REQUEST (J) OR (J MINUS K) 4. CAMPUT OF THIS REQUEST (J) OR (J MINUS K) 4. CAMPUT OF THIS REQUEST (J) OR (J MINUS K) 4. CAMPUT OF THIS REQUEST (J) OR (J MINUS K) 4. CAMPUT OF THIS REQUEST (J) OR (J MINUS K) 4. CAMPUT OF THIS REQUEST (J) OR (J MINUS K) 4. CAMPUT OF THIS REQUEST (J) OR (J MINUS K) 4. CAMPUT OF THIS REQUEST (J) OR (J MINUS K) 4. CAMPUTER SERVICES 4. CAMPUTER SERVICES 4. CAMPUTER SERVICES 4. COMPUTER	00 0 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN 3. FOREIGN 3. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS 1. MATERIALS AND SUPPLIES 4. OD 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 1. COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER 1. OTAL DIRECT COSTS 4. OD 4. OTAL DIRECT COSTS 4. OD 4. OTAL OTHER DIRECT COSTS 4. OD 5. SUBAWARDS 6. OTHER 7. OTAL OTHER DIRECT COSTS 4. OD 7. OTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 7. OTAL INDIRECT COSTS (H + I) 4. RESIDUAL FUNDS 4. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 5. SUBALARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0 4. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0 4. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0 4. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0 4. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0 5. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 0. AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 1. ATTAL DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 5. ADD AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 5. SUBALARING PROPOSED LEVEL \$ 5. ADD AGREED LEVEL IF DIFFERENT \$ 5. SUBALARING PROPOSED LEVEL \$ 5. ADD AGREED LEVEL IF DIFFERENT \$	D0 0 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 36,631	00 0 0 30 30 30 30 30 30 30 30	52,014 183,814 183,814 10,000 0 36,630 36,630 0 36,630 0 0 49,926 280,370 0 49,926 280,370 0 49,926 280,370 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 36,631	00 0 0 30 30 30 30 30 30 30 30	52,014 183,814 10,000 0 36,630 36,630 0 49,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

SUMMARY PROPOSAL BUDG	ET		FOF	OR NSF USE ONL		Y
ORGANIZATION		PRC	POSAL	-		DN (month
The Regents of the University of California					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	10.		
Abraham Seiden						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		unds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	- Requ	uested By oposer	granted by N (if differen
1. Abraham Seiden - Prof	0.00	0.00	0.00	\$	0	\$
2. Edward Spencer - Engineer	4.60		0.00		31,619	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.60	0.00	0.00)	31,619	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00)	0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	18.20	0.00	0.00		85,104	
3. (0) GRADUATE STUDENTS					0	
4. (2) UNDERGRADUATE STUDENTS					16,115	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					132,838	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					52,782	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					185,620	
TOTAL EQUIPMENT		\$	10,000		10,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			10,000		0	
			10,000			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			10,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN			10,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			10,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 0			10,000	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0			10,000	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL CO 3. SUBSISTENCE CO					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 6. 0 3. SUBSISTENCE 6. 0 4. OTHER 6	SSIONS	;)		-	0 37,278	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR	SSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 6. 0 3. SUBSISTENCE 6. 0 4. OTHER 6	SSIONS	;)			0 37,278	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS	SSIONS	;)		-	0 37,278	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER OF PARTICIPANTS 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER OF PARTICIPAN	SSIONS	;)			0 37,278 0 50,846	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	SSIONS	;)			0 37,278 0 50,846 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	SSIONS	;)			0 37,278 0 50,846 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	SSIONS	;)			0 37,278 0 50,846 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	SSIONS	;)			0 37,278 0 50,846 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	SSIONS	;)			0 37,278 0 50,846 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	SSIONS	;)			0 37,278 37,278 0 50,846 0 0 0 0 0 50,846	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	SSIONS	;)			0 37,278 37,278 0 50,846 0 0 0 0 0 50,846	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 273744)	SSIONS	;)			0 37,278 37,278 0 50,846 0 0 0 0 0 50,846	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 273744) TOTAL INDIRECT C	SSIONS	;)			0 37,278 37,278 0 50,846 0 0 0 0 50,846 283,744	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	SSIONS	;)			0 37,278 37,278 0 50,846 0 0 0 0 0 50,846 283,744 71,173	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 6 OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1 INDIRECT COSTS (F&A) 0 TOTAL DIRE	SSIONS	;)			0 37,278 37,278 0 50,846 0 0 0 0 50,846 283,744 283,744 71,173 354,917	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 273744) TOTAL DIRECT AND INDIRECT COSTS (H + I) <			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		0 37,278 37,278 0 50,846 0 0 0 0 0 50,846 283,744 283,744 71,173 354,917 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 273744) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			S 		0 37,278 37,278 0 50,846 0 0 0 0 0 50,846 283,744 283,744 71,173 354,917 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			S NT \$ FOR 1	NSF US	0 37,278 37,278 0 50,846 0 0 0 0 50,846 283,744 283,744 71,173 354,917 0 354,917	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 AGREED LEVEL \$ 0 AGREED LE PI/PD NAME			S NT \$ FOR 1 CT COS	NSF US	0 37,278 37,278 0 50,846 0 0 0 0 0 50,846 283,744 71,173 354,917 0 354,917 0 354,917 5 E ONLY E VERIFIC	•

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF I	USE ONL'	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIC	DN (month
The Regents of the University of California					Proposed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	0.		
Abraham Seiden						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		unds lested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	oposer	(if differen
1. Abraham Seiden - Prof	0.00	0.00	0.00	\$	0	\$
2. Edward Spencer - Engineer	4.60	0.00	0.00		32,588	
3.						
4.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.60	0.00	0.00		32,588	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00			
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		02 671	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	19.40	0.00	0.00		<u>93,671</u>	
3. (0) GRADUATE STUDENTS 4. (2) UNDERGRADUATE STUDENTS					<u>0</u> 22,132	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					148,391	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					56,105	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					204,496	
TOTAL EQUIPMENT			10,000		10,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS				0	
	SSIONS					
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0	SSIONS			-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL CO 3. SUBSISTENCE CO	SSIONS			-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL CO 3. SUBSISTENCE 4. OTHER CO)			0 37,947	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL CO 3. SUBSISTENCE 4. OTHER CO)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 1. CONTRAVE)			0 37,947	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER D TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS)			0 37,947	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES)			0 37,947 0 61,758	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION)			0 37,947 0 61,758 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES)			0 37,947 0 61,758 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES)			0 37,947 0 61,758 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS)			0 37,947 0 61,758 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G))			0 37,947 0 61,758 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE))			0 37,947 0 61,758 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 304202))			0 37,947 0 61,758 0 0 0 0 61,758 314,201	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 304202) <t< td=""><td></td><td>)</td><td></td><td></td><td>0 37,947 0 61,758 0 0 0 0 61,758 314,201 79,093</td><td></td></t<>)			0 37,947 0 61,758 0 0 0 0 61,758 314,201 79,093	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 304202))			0 37,947 0 61,758 0 0 0 0 61,758 314,201 79,093 393,294	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 304202) TOTAL)			0 37,947 0 61,758 0 0 0 0 61,758 314,201 79,093 393,294 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) </td <td>TICIPAN</td> <td>) T COSTS</td> <td>2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2</td> <td></td> <td>0 37,947 0 61,758 0 0 0 0 61,758 314,201 79,093 393,294</td> <td>\$</td>	TICIPAN) T COSTS	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		0 37,947 0 61,758 0 0 0 0 61,758 314,201 79,093 393,294	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPANTICAL CONTENTION (CONTENTION (CONTENTION))	TICIPAN) T COSTS	S 	\$	0 37,947 0 61,758 0 0 0 0 61,758 314,201 79,093 393,294 0 393,294	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACTION AND A CONTACT A CONTACT A CONTACT AND A CONTACT AND A CONTACT AND A CONTACT AND A CONTACT A CONTACT AND A CONTACT AND A CONTACT AND A CONTACT A CONTACT A CONTACT AND A CONTACT AND A CONTACT A CONTACT AND A CONTACT A C	TICIPAN		S NT \$ FOR N	\$ NSF US	0 37,947 37,947 0 61,758 0 0 0 0 0 61,758 314,201 79,093 393,294 0 393,294 0 393,294 5E ONLY	
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PROPOSAL BUDG	ET		FO	RNS	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
The Regents of the University of California					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	Ю.		
Abraham Seiden						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed 1ths	B	Funds equested By	Funds granted by I
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	(if differen
1. Abraham Seiden - Prof	0.00	0.00	0.00	\$	0	\$
2. Edward Spencer - Engineer	5.20	0.00	0.00)	37,959	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	5.20	0.00	0.00		37,959	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00)	0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	23.80	0.00	0.00)	123,667	
3. (0) GRADUATE STUDENTS					0	
4. (4) UNDERGRADUATE STUDENTS					54,709	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					216,335	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					67,811	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS $(A + B + C)$					284,146	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED		\$ \$				
TOTAL EQUIPMENT			10,000		10,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS				0	
	ESSIONS					
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS			-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS			-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 0 3. SUBSISTENCE 0		;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0		;)			0 38,635	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1. TOTAL PAR		;)			0 38,635	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS		;)			0 38,635	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 5. OTHER OF		;)			0 38,635 0 0 72,301	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		;)		-	0 38,635 0 72,301 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		;)			0 38,635 0 72,301 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		;)			0 38,635 0 72,301 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		;)			0 38,635 0 72,301 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)			0 38,635 0 72,301 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)			0 38,635 0 72,301 0 0 0 0 0 72,301	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)			0 38,635 0 72,301 0 0 0 0 0 72,301	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		;)			0 38,635 0 72,301 0 0 0 0 0 72,301	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 395082) </td <td></td> <td>;)</td> <td></td> <td></td> <td>0 38,635 38,635 0 72,301 0 0 0 0 0 72,301 405,082</td> <td></td>		;)			0 38,635 38,635 0 72,301 0 0 0 0 0 72,301 405,082	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 395082) TOTAL INDIRECT COSTS (F&A)		;)			0 38,635 38,635 0 72,301 0 0 0 0 0 72,301 405,082 102,721	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 395082) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS		;)			0 38,635 38,635 0 72,301 0 0 0 0 0 0 72,301 405,082 102,721 507,803	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 395082) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN		3		0 38,635 38,635 0 72,301 0 0 0 0 0 0 0 72,301 405,082 102,721 507,803 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 395082) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN		5 	·	0 38,635 38,635 0 72,301 0 0 0 0 0 0 0 72,301 405,082 102,721 507,803 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPANDE	TICIPAN		S S NT \$ FOR 1	NSF	0 38,635 38,635 0 72,301 0 0 0 0 0 0 72,301 405,082 102,721 507,803 0 507,803	\$
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PROPOSAL BUDG	ET		FO	R NSF	OR NSF USE ONL	
ORGANIZATION		PRC	POSAL	NO.	DURATIC	DN (month
The Regents of the University of California					Proposed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	О.		
Abraham Seiden	1					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor		Requ	Funds uested By	Funds granted by N (if different
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pr		
1. Abraham Seiden - Prof	0.00		0.00		0	\$
2. Edward Spencer - Engineer	23.60	0.00	0.00		162,668	
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	23.60	0.00	0.00		162,668	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (25) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	99.60	0.00	0.00		473,640	
3. (0) GRADUATE STUDENTS					0	
4. (12) UNDERGRADUATE STUDENTS					123,792	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					760,100	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>279,963</u> .040.063	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	DING \$5.0	00.)				
TOTAL EQUIPMENT		\$	50,000		50,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			50,000		0	
			50,000			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0			50,000	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0			50,000	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			50,000		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0	ESSIONS)			0 186,490	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAF	ESSIONS)			0 186,490	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS)			0 186,490	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			0 186,490 0 283,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			0 186,490 0 283,939 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 CONSULTANT SERVICES	ESSIONS)			0 186,490 0 283,939 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMER SERVICES	ESSIONS)			0 186,490 283,939 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION S. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)			0 186,490 0 283,939 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS)			0 186,490 0 283,939 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)			0 186,490 283,939 0 283,939 0 0 0 0 283,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL CONSULTANT SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)			0 186,490 283,939 0 283,939 0 0 0 0 283,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)			0 186,490 283,939 0 283,939 0 283,939 ,560,492 392,728	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS)			0 186,490 283,939 0 283,939 0 0 0 0 283,939 ,560,492	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS)		1	0 186,490 283,939 0 0 0 283,939 ,560,492 392,728 ,953,220 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN	T COSTS	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1	0 186,490 283,939 0 0 283,939 0 0 283,939 ,560,492 392,728 ,953,220	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN	T COSTS	S S NT \$	1 \$ 1	0 186,490 283,939 0 0 0 283,939 ,560,492 392,728 ,953,220 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN		S NT \$ FOR 1	1 \$ 1 NSF US	0 186,490 283,939 0 283,939 0 0 0 0 283,939 ,560,492 392,728 ,953,220 0 ,953,220 0 ,953,220	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCIMAL OT A COMPANY AND A COMPANY A COMPANY AND A COMPANY A COMPANY AND A COMPANY A COMPA			S NT \$ FOR 1 CT COS	1 \$ 1 NSF US	0 186,490 283,939 0 283,939 0 0 0 0 283,939 ,560,492 392,728 ,953,220 0 ,953,220 0 ,953,220 5E ONLY FE VERIFIC	

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ORGANIZATION The Regents of the University of California	PRO	POSAL	NO.	DURATION (M Proposed	ONTHS) Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Seiden, Abraham	AW	/ARD N	0.	F1000580	Granieu
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A CENIND DEDGONNIEL - DI/DD. Co. Dia Escultu and Other Casiar Accessions	NSF-FU	MMOR		Funds	Funds
(List each separately with name and title. (A.7. Show number in brackets)	CAL.	ACAD	SUMR		
1. E. Spencer Engineer	4.6	0.0	0.0	· · · ·	\$
2.				8	
3	-				
5.			• • • •		
	9.2	0.0	0.0	46,853	
6. (3) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	13.8	0.0	0.0	76,657	
7. (⁴) TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	10.0			10,001	
1 (0) POST DOCTORAL ASSOCIATES	0.0	0.0	0.0	0	
2. (2) OTHER PROFESSIONAL (TECHNICIAN, PROGRAMMER, ETC.)	10.2	0.0	0.0	38,888	
3. GRADUATE STUDENTS		•.•		0	· · ·····
4. (2) UNDERGRADUATE STUDENTS				15,191	
5. (0) SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)				0	
6.(0) OTHER				0	
TOTAL SALARIES AND WAGES (A+B)				130,736	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				51,251	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)	·			181,987	1
EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING	\$5.000.)				
Equipment 10,0	00				
					and the second
				10,000	
. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSION	 S)			10,000	
. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSION: 2. FOREIGN	S)			10,000	
2. FOREIGN PARTICIPANT SUPPORT	S)				
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS \$	5)				
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS \$ 2. TRAVEL	S)				
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS \$	SI				
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE	S)				
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel)="" participant="" support<="" td="" total=""><td>S)</td><td></td><td></td><td></td><td></td></fiel>	S)				
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel)="" participant="" support<="" td="" total=""><td><u>S)</u></td><td></td><td></td><td></td><td></td></fiel>	<u>S)</u>				
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS \$ 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel)="" 5.="" costs<="" direct="" other="" participant="" support="" td="" total=""><td>S)</td><td></td><td></td><td>36,000</td><td></td></fiel>	S)			36,000	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel)="" 1.="" 5.="" and="" costs="" direct="" materials="" other="" participant="" supplies<="" support="" td="" total=""><td>S)</td><td></td><td></td><td>36,000 49,108</td><td></td></fiel>	S)			36,000 49,108	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel)="" 1.="" 2.="" 3.="" 4.="" and="" c.="" computer="" consultant="" costs="" direct="" dissemination="" documentation="" materials="" other="" participant="" publication="" services="" services<="" supplies="" support="" td="" total=""><td><u>S)</u></td><td></td><td></td><td>36,000 49,108 0</td><td></td></fiel>	<u>S)</u>			36,000 49,108 0	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel)="" 1.="" 2.="" 3.="" 4.="" 5.="" and="" computer="" consultant="" costs="" direct="" dissemination="" documentation="" g.="" materials="" other="" participant="" publication="" services="" subawards<="" supplies="" support="" td="" total=""><td>S)</td><td></td><td></td><td>36,000 49,108 0 0 0</td><td></td></fiel>	S)			36,000 49,108 0 0 0	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel)="" 1.="" 2.="" 3.="" 4.="" 5.="" 6.="" and="" computer="" consultant="" costs="" direct="" dissemination="" documentation="" materials="" other="" other<="" participant="" publication="" services="" subawards="" supplies="" support="" td="" total=""><td>S)</td><td></td><td></td><td>36,000 49,108 0 0 0 0</td><td></td></fiel>	S)			36,000 49,108 0 0 0 0	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel) (g.1="" 1.="" 2.="" 3.="" 4.="" 5.="" 6.="" and="" c.="" computer="" consultant="" costs="" direct="" dissemination="" documentation="" g.6)<="" materials="" other="" participant="" publication="" services="" subawards="" supplies="" support="" td="" through="" total=""><td>S)</td><td></td><td></td><td>36,000 49,108 0 0 0 0 49,108</td><td></td></fiel)>	S)			36,000 49,108 0 0 0 0 49,108	
2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel (a="" (g.1="")="" 1.="" 2.="" 3.="" 4.="" 5.="" 6.="" and="" computer="" consultant="" costs="" direct="" dissemination="" documentation="" g)<="" g.6)="" materials="" other="" participant="" publication="" services="" subawards="" supplies="" support="" td="" through="" total=""><td><u>S)</u></td><td></td><td></td><td>36,000 49,108 0 0 0 0</td><td></td></fiel>	<u>S)</u>			36,000 49,108 0 0 0 0	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel) (<fiel)="" (a="" (f&a)="" (g.1="" (specify="" 1.="" 2.="" 3.="" 4.="" 5.="" 6.="" and="" base)<="" computer="" consultant="" costs="" cother="" direct="" dissemination="" documentation="" g)="" g.6)="" indirect="" materials="" other="" participant="" publication="" rate="" services="" subawards="" supplies="" support="" td="" through="" total=""><td><u>S)</u></td><td></td><td></td><td>36,000 49,108 0 0 0 0 49,108 277,095</td><td></td></fiel)>	<u>S)</u>			36,000 49,108 0 0 0 0 49,108 277,095	
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2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel (a="" (f&a)="" (g.1="" (h+1)<="" (specify="")="" 1.="" 2.="" 26.0%="" 267,095="" 3.="" 4.="" 5.="" 6.="" and="" base="" base)="" computer="" consultant="" costs="" direct="" dissemination="" documentation="" g)="" g.6)="" indirect="" materials="" mtdc="" other="" participant="" publication="" rate="" services="" subawards="" supplies="" support="" td="" through="" total="" x=""><td></td><td></td><td></td><td>36,000 49,108 0 0 0 0 49,108 277,095</td><td></td></fiel>				36,000 49,108 0 0 0 0 49,108 277,095	
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2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE (<fiel (="" (f&a)="" (g.="" (indirect="" (specify="")="" 1="" 26.0%<="" <fiel="" and="" base)="" costs="" direct="" g="" g.6)="" participant="" rate="" services="" support="" td="" through="" total=""><td>EE GPG II.</td><td></td><td></td><td>36,000 49,108 0 0 0 0 49,108 277,095 69,445</td><td></td></fiel>	EE GPG II.			36,000 49,108 0 0 0 0 49,108 277,095 69,445	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel.) \$="" (<fiel.)="" (a="" (f&a)="" (h+i)="" (if="" (j="" (j)="" (specify="" 1.="" 2.="" 26.0%="" 267,095="" 3.="" 4.="" 5.="" 6.="" agreed="" amount="" and="" base="" base)="" computer="" consultant="" cost="" costs="" cother="" current="" direct="" dissemination="" documentation="" for="" funds="" further="" g.6)="" if<="" indirect="" k)="" level="" materials="" minus="" mtdc="" of="" or="" other="" participant="" projects="" proposed="" publication="" rate="" request="" residual="" services="" sharing:="" si="" subawards="" supplies="" support="" td="" this="" through="" total="" x=""><td>EE GPG II.</td><td>NT \$</td><td></td><td>36,000 49,108 0 0 0 49,108 277,095 69,445 346,540 5 348,540</td><td></td></fiel.)>	EE GPG II.	NT \$		36,000 49,108 0 0 0 49,108 277,095 69,445 346,540 5 348,540	
2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel \$="" (a="" (f&a)="" (h+f)="" (if="" (j="" (j)="" (specify="")="" 1.="" 2.="" 26.0%="" 267,095="" 3.="" 4.="" 5.="" 6.="" agreed="" amount="" and="" base="" base)="" computer="" consultant="" cost="" costs="" current="" direct="" dissemination="" documentation="" for="" funds="" further="" g)="" if="" indirect="" k)="" level="" materials="" minus="" mtdc="" of="" or="" other="" participant="" projects="" proposed="" proposed<="" publication="" rate="" request="" residual="" s)="" services="" sharing="" sharing:="" subawards="" supplies="" support="" td="" this="" through="" total="" x=""><td>EE GPG II.</td><td>NT \$</td><td>RNSFU</td><td>36,000 49,108 0 0 0 0 0 49,108 277,095 69,445 346,540</td><td></td></fiel>	EE GPG II.	NT \$	RNSFU	36,000 49,108 0 0 0 0 0 49,108 277,095 69,445 346,540	
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2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER (<fiel \$="" (a="" (f&a)="" (h+f)="" (if="" (j="" (j)="" (specify="")="" 1.="" 2.="" 26.0%="" 267,095="" 3.="" 4.="" 5.="" 6.="" agreed="" amount="" and="" base="" base)="" computer="" consultant="" cost="" costs="" current="" direct="" dissemination="" documentation="" for="" funds="" further="" g)="" if="" indirect="" k)="" level="" materials="" minus="" mtdc="" of="" or="" other="" participant="" projects="" propose<="" proposed="" publication="" rate="" request="" residual="" s)="" services="" sharing:="" subawards="" supplies="" support="" td="" this="" through="" total="" x=""><td>EE GPG II.</td><td>NT \$ FO DIRECT</td><td>COST</td><td>36,000 49,108 0 0 0 49,108 277,095 69,445 346,540 5 346,540</td><td>S</td></fiel>	EE GPG II.	NT \$ FO DIRECT	COST	36,000 49,108 0 0 0 49,108 277,095 69,445 346,540 5 346,540	S

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UCSC Budget Justification Year 1

A.1	Senior Personnel:	
	E. Spencer Engineer	\$29,804
A.6	Other Senior Personnel:	
	V. Fadeyev, S. Kachiguin, G. Martinez-McKinney	\$46,853
B.2	Other Professional:	
	M. Wilder, J. DeWitt	\$38,888
B.4	Undergraduate Students:	\$15,191
С	Fringe (39.2% of Base \$130,736)	\$51,251
D	Equipment:	
	Lab test instrument	\$10,000
Е	Travel:	
	Travel for M&O tasks, collaboration meetings and workshops	\$36,000
G	Other Direct Costs:	
	Materials and Supplies	\$49,108
Ι	Indirect Costs:	
	26% x \$267,095 MTDC Base	\$69,445
J	Total Direct and Indirect Costs:	\$346,540

SUMMARY PROPOSAL BUDGET	Year02			t 02/01/2012 I R NSF USE ONLY	End 01/01/2017	
ORGANIZATION The Regents of the University of California	PRO	POSAL			IONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR				Proposed Granted		
Seiden, Abraham	AW	ARD N	0.			
CENIOD DEDCOMMENT OF DID Co Die Equility and Other Service Accessions	NSF-FUNDED			Funds	Funds	
(List each separately with name and title. (A.7. Show number in brackets)	CAL.	ACAD	SUMR		1 unug	
1. E. Spencer Engineer	4.6	0.0	0.0	\$ 30,698	3 \$	
2.				\$		
3.						
4.						
5.						
6. (3) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	9.2	0.0	0.0	48,259		
7. (4) TOTAL SENIOR PERSONNEL (1-6)	13.8	0.0	0.0	78,957	7	
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL ASSOCIATES	0.0	0.0	0.0	0		
2. (2) OTHER PROFESSIONAL (TECHNICIAN, PROGRAMMER, ETC.)	9.6	0.0	0.0	37,198		
3. (0) GRADUATE STUDENTS 4. (2) UNDERGRADUATE STUDENTS	.			15,645		
5. (0) SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY) 6. (0) OTHER				0		
TOTAL SALARIES AND WAGES (A+B)				131,800		
. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)			·	52,014		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)	······			183,814		
EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING	\$\$5.000.)					
Equipment 10,0						
			Ê	10,000		
TRAVEL 1. DOMESTIC (INCL, CANADA, MEXICO AND U.S. POSSESSION	IS)				1	
2. FOREIGN				36,630		
PARTICIPANT SUPPORT						
1. STIPENDS ^{\$} 2. TRAVEL						
3. SUBSISTENCE						
4 OTHER						
() TOTAL PARTICIPANT SUPPORT]	
OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES				49,926		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3. CONSULTANT SERVICES				0		
4. COMPUTER SERVICES				0		
5. SUBAWARDS						
5. OTHER				0		
TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G)				49,926		
INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)				280,370		
26.0% x 270,370 MTDC Base				70,296		
TOTAL DIRECT AND INDIRECT COSTS (H+I)				350,666		
RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S	EE GPG II.I T	J.7.J.}		150.000	~	
AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL II			s	350,666	5	
				JSE ONLY		
aiden Abraham M						
G. REP. TYPED NAME & SIGNATURE DATE	Date Checke			RATE VERIFICATION Date of Rate Sheet	N Initials - ORG	
prifer Wolling Act the LADA A	and oneute	-				
Form1030 (10/98) Simemedies All Previous Follows	1		-			

UCSC Budget Justification Year 2

A.1	Senior Personnel:	
	E. Spencer Engineer	\$30,698
A.6	Other Senior Personnel:	
	V. Fadeyev, S. Kachiguin, G. Martinez-McKinney	\$48,259
B.2	Other Professional:	
	M. Wilder, J. DeWitt	\$37,198
B.4	Undergraduate Students:	\$15,645
С	Fringe (39.5% of Base \$131,800)	\$52,014
D	Equipment:	
	Lab test instrument	\$10,000
Е	Travel:	
	Travel for M&O tasks, collaboration meetings and workshops	\$36,630
G	Other Direct Costs:	
	Materials and Supplies	\$49,926
Ι	Indirect Costs:	
	26% x \$270,370 MTDC Base	\$70,296
J	Total Direct and Indirect Costs:	\$350,666

Year03				End 01/01/2017
	POSAL		NSF USE ONLY DURATION (M	ONTHE
		NO.	Proposed	Granted
AN	VARD N	0.		
NSF-FU	NDED		Funds	Funds
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			\$ 31.619	le
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9.1	0.0	0.0	49.143	2
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S-Saussen				
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\$5.000.)				
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S)			10,000	
			37,278	
		and the second se		
			50,846	
		· · · · · ·	0	
			0	
H			0	
			0	
			50,846	
			283,744	
		ſ	71,173	
		1		
			354,917	
EE GPG II.	D.7.J.)		354,917	
ee gpg II.	D.7.J.)	s		s
ee gpg II. F differe		S		S
	NT S			S
F DIFFERE	NT S FO	r nsf l	354,917	
F DIFFERE	NT \$ FO DIRECT	R NSF L	354,917 ISE ONLY	
)	lococo	4.6 0.0 9.1 0.0 13.7 0.0 9.1 0.0 9.1 0.0 9.1 0.0 9.1 0.0 9.1 0.0	DEDBONINGS CAL ACAD SUMR 4.6 0.0 0.0 9.1 0.0 0.0 13.7 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0 9.1 0.0 0.0	DEDECIM MACC CAL ACAD SUMR 4.6 0.0 0.0 \$ 31,619 9.1 0.0 0.0 \$ 31,619 9.1 0.0 0.0 49,143 13.7 0.0 0.0 80,762 0.0 0.0 0.0 80,762 0.0 0.0 0.0 80,762 0.0 0.0 0.0 0.0 9.1 0.0 0.0 0.0 9.1 0.0 0.0 35,961 0 0.0 0.0 35,961 0 0.0 16,115 0 0 0 132,838 52,782 185,620 355.000.) 000 37,278 37,278 37,278 50,846 0 0 0 0 0 0 0 0 0 0 0

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UCSC Budget Justification Year 3

A.1	Senior Personnel:	
	E. Spencer Engineer	\$31,619
A.6	Other Senior Personnel:	
	V. Fadeyev, S. Kachiguin, G. Martinez-McKinney	\$49,143
B.2	Other Professional:	
	M. Wilder, J. DeWitt	\$35,961
B.4	Undergraduate Students:	\$16,115
С	Fringe (39.7% of Base \$132,838)	\$52,782
D	Equipment:	
	Lab test instrument	\$10,000
Е	Travel:	
	Travel for M&O tasks, collaboration meetings and workshops	\$37,278
G	Other Direct Costs:	
	Materials and Supplies	\$50,846
Ι	Indirect Costs:	
	26% x \$273,744 MTDC Base	\$71,173
J	Total Direct and Indirect Costs:	\$354,917

TOANUZATION	L BUDGET	Year04			t 02/01/2012 E R NSF USE ONLY	nd 01/01/2017
RGANIZATION The Regents of the University of Calif	ornia	PRO	POSAL		DURATION (M	ONTHS)
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR		۵۱۵	ARD N	 ז	Proposed	Granted
Seiden, Abraham				<i>.</i> ,		
ENIOD DEDCOMMEL - DI/DD Co Dia Econity and Other Soni	at Anonsistan	NSF-FU			Funds	Funds
List each separately with name and title. (A.7. Show number in	brackets)	CAL	ACAD	SUMR		
1. E. Spencer Engineer		4.6	0.0	0.0		\$ ·
2.					\$	
3.	***					
4.						
5.						
6. (3) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLA	NATION PAGE)	9.2	0.0	0.0	51,197	
7. (4) TOTAL SENIOR PERSONNEL (1-6)		13.8	0.0	0.0	83,765	
				~ ~		
		0.0	0.0	0.0	0	
2. (2) OTHER PROFESSIONAL (TECHNICIAN, PROGRAM	IMER. ETC.)	10.2	0.0	0.0	42,494	
(0) GRADUATE STUDENTS	·		·····		0	
() UNDERGRADUATE STUDENTS					22,132	
(0) SECRETARIAL-CLERICAL (IF CHARGED DIRECTL	Y)				0	
					0	
TOTAL SALARIES AND WAGES (A+B)					148,391	
RINGE BENEFITS (IF CHARGED AS DIRECT COSTS) OTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+(~				56,105	
					204,496	
EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EAC Equipment						
	10,00	U				
					10,000	
RAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND	U.S. POSSESSIONS	3)				
2. FOREIGN					37,947	
				ž		
STIPENDS ^{\$}						
STIPENDS ^{\$} TRAVEL				and an and a		
STIPENDS \$ TRAVEL SUBSISTENCE						
STIPENDS ^{\$} TRAVEL SUBSISTENCE OTHER						
STIPENDS S NRAVEL SUBSISTENCE OTHER) TOTAL PARTICIPANT SUPPORT						
STIPENDS TRAVEL SUBSISTENCE OTHER) TOTAL PARTICIPANT SUPPORT DTHER DIRECT COSTS					61,758	
STIPENDS ^{\$} TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES	 N				61,758 0	
STIPENDS TRAVEL SUBSISTENCE OTHER OTHER OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO	<u></u>					
STIPENDS STIPENDS TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT SUPPORT TOTAL PARTICIPANT SUPPORT THER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES	N				0	
TRAVEL	N				0 0	
STIPENDS TRAVEL SUBSISTENCE OTHER	N				0 0	
STIPENDS STIPENDS TRAVEL SUBSISTENCE OTHER OTHER OTHER OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6)	N				0 0 0	
STIPENDS STIPENDS STIPENDS STRAVEL SUBSISTENCE OTHER OTHER OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G)	N				0 0 0	
STIPENDS S TRAVEL SUBSISTENCE OTHER TOTAL PARTICIPANT SUPPORT TOTAL PARTICIPANT SUPPORT TOTAL PARTICIPANT SUPPORT TOTAL DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)					0 0 0 0 61,758	
STIPENDS STIPENDS TRAVEL SUBSISTENCE OTHER OTHER SUBSISTENCE OTHER SUBAUARDS STATUS SUBAUARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G.) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)	N 1 MTDC Base				0 0 0 0 61,758	
STIPENDS \$ TRAVEL SUBSISTENCE OTHER) TOTAL PARTICIPANT SUPPORT DTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G.) NDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% 304,20					0 0 0 0 61,758 314,201	
STIPENDS ^{\$} TRAVEL SUBSISTENCE OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% 304,20 TOTAL DIRECT AND INDIRECT COSTS (H+I)	¹ MTDC Base).7.J.)		0 0 0 61,758 314,201 79,093	
STIPENDS \$ TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 304,20 TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURE	¹ MTDC Base	E GPG II.(D.7.J.)		0 0 0 0 61,758 314,201 79,093 393,294	
STIPENDS \$ TRAVEL SUBSISTENCE OTHER QTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% 304,20 TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURF AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	1 MTDC Base RENT PROJECTS SE				0 0 0 0 61,758 314,201 79,093 393,294	3
STIPENDS S TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G.) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 304,20 TOTAL DIRECT AND INDIRECT COSTS (H+i) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURF AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$	¹ MTDC Base RENT PROJECTS SE AGREED LEVEL IF		VT \$		0 0 0 61,758 314,201 79,093 393,294 393,294	3
STIPENDS S TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 304,20 TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURF AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ D TYPED NAME & SIGNATURE*	1 MTDC Base RENT PROJECTS SE AGREED LEVEL IF DATE	DIFFEREI	NT \$ FOI	R NSF U	0 0 0 0 61,758 314,201 79,093 393,294 393,294 393,294	
STIPENDS \$ TRAVEL SUBSISTENCE OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 304,20 TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURE	1 MTDC Base RENT PROJECTS SE AGREED LEVEL IF DATE 12/13/10	DIFFEREI	NT \$ FOI DIRECT	R NSF U	0 0 0 0 61,758 314,201 79,093 393,294 393,294 393,294 393,294 393,294	
STIPENDS STIPENDS STIPENDS TRAVEL SUBSISTENCE OTHER OTHER OTHER OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATIO CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 304,20 TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURF AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ D TYPED NAME & SIGNATURE* Jen, Abraham	1 MTDC Base RENT PROJECTS SE AGREED LEVEL IF DATE	DIFFEREI INI	NT \$ FOI DIRECT	R NSF U	0 0 0 0 61,758 314,201 79,093 393,294 393,294 393,294 393,294 393,294	

UCSC Budget Justification Year 4

A.1	Senior Personnel:	
	E. Spencer Engineer	\$32,568
A.6	Other Senior Personnel:	
	V. Fadeyev, S. Kachiguin, G. Martinez-McKinney	\$51,197
B.2	Other Professional:	
	M. Wilder, J. DeWitt	\$42,494
B.4	Undergraduate Students:	\$22,132
С	Fringe (37.8% of Base \$148,391)	\$56,105
D	Equipment:	
	Lab test instrument	\$10,000
Е	Travel:	
	Travel for M&O tasks, collaboration meetings and workshops	\$37,947
G	Other Direct Costs:	
	Materials and Supplies	\$61,758
Ι	Indirect Costs:	
	26% x \$304,201 MTDC Base	\$79,093
J	Total Direct and Indirect Costs:	\$393,294

PROPOSAL BUDGET				t 02/01/2012 E R NSF USE ONLY	End 01/01/2017
RGANIZATION The Regents of the University of California	PRC	POSAL		DURATION (M	
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR Seiden, Abraham	AV	VARD N	0.	Proposed	Granted
·					
ETHOR REPRONNELL BURD Co. Dis. Equility and Other Series Accession (List each separately with name and title. (A.7, Show number in brackets)	NSF-FU			Funds	Funds
1. E. Spencer Engineer	CAL5.2		SUMR 0.0	\$ 37,959	
2.	5.2	0.0	0.0	\$ 57,808	<u> </u>
3.				D	
4.					
5.					1
6. (3) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	13.6	0.0	0.0	79,898	
7. (4) TOTAL SENIOR PERSONNEL (1-6)	18.7	0.0	0.0	117,857	1
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.0		0.0	0	1
2.(2) OTHER PROFESSIONAL (TECHNICIAN. PROGRAMMER. ETC.)	10.2	0.0	0.0	43,769)
3.(0) GRADUATE STUDENTS				0	
4.(2) UNDERGRADUATE STUDENTS				54,709	
5.(0) SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)				0	
6.(0) OTHER			· · · · ·	0	
TOTAL SALARIES AND WAGES (A+B)				216,335	
FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				67,811 284,146	
EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING	RE 000 1				
Equipment 10,0	00			Control Market and Control	
Equipment 10,0					
Equipment 10,0				10,000	
				10,000	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN				10,000	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT					
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT J. STIPENDS					
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT I. STIPENDS 2. TRAVEL					
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE					
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER				38,635	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE					
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT				38,635	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS \$ 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS				38,635	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES				38,635 72,301 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS . MATERIALS AND SUPPLIES . PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION . CONSULTANT SERVICES				38,635 72,301 0	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES SUBAWARDS				38,635 72,301 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES SUBAWARDS OTHER				38,635 72,301 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6)				38,635 72,301 0 0 0 0 72,301	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS . MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION . CONSULTANT SERVICES . SUBAWARDS . OTHER . OTHER . OTHER . OTHER . OTHER . TOTAL DIRECT COSTS (G.1 THROUGH G.6) . OTAL DIRECT COSTS (A THROUGH G)				38,635 72,301 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)				38,635 72,301 0 0 0 72,301 405,082	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 395,082 MTDC Base				38,635 72,301 0 0 0 0 72,301 405,082 102,721	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS \$ SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS • MATERIALS AND SUPPLIES • PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION • CONSULTANT SERVICES • SUBAWARDS • OTHER • OTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) • OTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) • 26.0% x • 26.0% x • TOTAL DIRECT AND INDIRECT COSTS (H+I)	IS)			38,635 72,301 0 0 0 72,301 405,082	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 395,082 MTDC Base TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S	IS)	.D.7.J.)		38,635 72,301 0 0 0 72,301 405,082 102,721 507,803	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES OCMPUTER SERVICES SUBAWARDS OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 395,082 MTDC Base TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				38,635 72,301 0 0 0 0 72,301 405,082 102,721	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G.6) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 395,082 MTDC Base TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$		ENT \$		38,635 72,301 0 0 0 72,301 405,082 102,721 507,803 \$ 507,803	
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES SUBAWARDS OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 395,082 MTDC Base TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL \$		ENT \$ FC	OR NSF	38,635 72,301 0 0 0 72,301 405,082 102,721 507,803 S 507,803	S
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT 9. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 395,082 MTDC Base TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL 1 DATE 12/1.3 //D		ENT \$ FC	OR NSF	38,635 72,301 0 0 0 72,301 405,082 102,721 507,803 S 507,803 USE ONLY RATE VERIFICATIO	S
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESSION 2. FOREIGN PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES SUBAWARDS OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26.0% x 395,082 MTDC Base TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL \$	IS)	ENT \$ FC	OR NSF	38,635 72,301 0 0 0 72,301 405,082 102,721 507,803 S 507,803	S

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UCSC Budget Justification Year 5

A.1	Senior Personnel:	
	E. Spencer Engineer	\$37,959
A.6	Other Senior Personnel:	
	V. Fadeyev, S. Kachiguin, G. Martinez-McKinney	\$79,898
B.2	Other Professional:	
	M. Wilder, J. DeWitt	\$43,769
B.4	Undergraduate Students:	\$54,709
С	Fringe (31.4% of Base \$216,335)	\$67,811
D	Equipment:	
	Lab test instrument	\$10,000
Е	Travel:	
	Travel for M&O tasks, collaboration meetings and workshops	\$38,635
G	Other Direct Costs:	
	Materials and Supplies	\$72,301
Ι	Indirect Costs:	
	26% x \$395,082 MTDC Base	\$102,721
J	Total Direct and Indirect Costs:	\$507,803

SUMMARY PROPOSAL BUDGET			FO	t 02/01/2012 R NSF USE ONL	End 01/01/2017 Y
ORGANIZATION The Regents of the University of California	PRO	POSAL	NO.	DURATION (Proposed	
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR Seiden, Abraham	AV	VARD N	0.		
CENIOD DEDCONNEL - DIDD Co Dia Escutto and Other Serier Association	NSF-FL	INDED		Funds	Funds
(List each separately with name and title. (A.7. Show number in brackets)		N.MOS	LSUMR		runus
1. E. Spencer Engineer	23.4		0.0		48 ¢
2.		0,0	- 0.0	\$	
3.		<u> </u>	┠━───		
4.					
5.					
	50.4	0.0	0.0	275.31	-
6. (3) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE) 50.4		0.0	275,38	
7. (4) TOTAL SENIOR PERSONNEL (1-6)	73.8	0.0	0.0	437,99	18
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.0		0.0		0
2. (2) OTHER PROFESSIONAL (TECHNICIAN, PROGRAMMER, ETC.)	49.3	0.0	0.0	198,31	0
3. (0) GRADUATE STUDENTS					0
4.(2) UNDERGRADUATE STUDENTS				123,79)2
5.(0) SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)	· · · · · · · · · · · · · · · · · · ·				0
6.(0) OTHER					0
TOTAL SALARIES AND WAGES (A+B)				760,10	0
FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				279,96	3
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				1,040,06	3
Equipment	DING \$5.000.) 50,000	·			
	50,000			50,00	0
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESS	50,000				
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN	50,000			50,00 186,49	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESS	50,000				
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT	50,000				
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS ^{\$}	50,000				
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL	50,000				
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT	50,000				
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS	50,000			186,49	0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT	50,000				0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS	50,000			186,49 283,93	0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES	50,000			186,49 283,93	9
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	50,000			186,49 283,93	0 9 0 0
TRAVEL 1. DOMESTIC /INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	50,000			186,49 283,93	0 9 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	50,000			186,49 283,93	0 9 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER SERVICES 5. SUBAWARDS	50,000			186,49	0 9 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER 5. SUBAWARDS 5. OTHER	50,000			186,49 283,93 283,93	0 9 9 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER 5. SUBAWARDS 5. OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6)	50,000			186,49	0 9 9 0 0 0 0
TRAVEL 1. DOMESTIC (INCL., CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER 5. SUBAWARDS 5. OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G)	50,000			186,49 283,93 283,93 283,93 1,560,492	0 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <t< td=""></t<>
TRAVEL 1. DOMESTIC (INCL., CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 9. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER TOTAL OTHER SERVICES 3. SUBAWARDS 3. OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages attagender	50,000			186,49 283,93 283,93 (0 283,93 1,560,49 392,728	0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages atta TOTAL DIRECT AND INDIRECT COSTS (H+I)	50,000 SIONS)			186,49 283,93 283,93 283,93 1,560,492	0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 9. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages atta TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT	50,000 SIONS)	D.7.J.)		186,49 283,93 283,93 283,93 1,560,492 392,728 1,953,220	0 0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 9. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 5. OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages attatages TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	50,000 SIONS)	•		186,49 283,93 283,93 283,93 1,560,492 392,728 1,953,220	0 0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL OTHER DIRECT COSTS (G.1 THROUGH G.6) TOTAL OTHER DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages atta TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$	50,000 SIONS)	NT \$		186,49 283,93 283,93 283,93 1,560,49 392,728 1,953,220	0 0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 5. OTHER TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (G.1 THROUGH G.6) TOTAL DIRECT COSTS (G.1 THROUGH G.6) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages atta TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ AGREED LEVEND	50,000 SIONS)	NT \$		186,49 283,93 283,93 283,93 1,560,492 392,728 1,953,220	0 0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER 5. OUPUTER SERVICES 6. COMPUTER SERVICES 6. SUBAWARDS 8. OTHER TOTAL DIRECT COSTS (G,1 THROUGH G,6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages attac TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ PD TYPED NAME & SIGNATURE* DATE iden, Abraham	50,000 SIONS) ICNS ICN8d. IS SEE GPG II IL IEL IF DIFFERE	NT \$ FC	R NSF L	186,49 283,93 283,93 283,93 1,560,49 392,728 1,953,220	0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0
TRAVEL 1. DOMESTIC (INCL. CANADA. MEXICO AND U.S. POSSESS 2. FOREIGN PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL PARTICIPANT SUPPORT OTHER () TOTAL PARTICIPANT SUPPORT OTHER DIRECT COSTS 4. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 3. OTHER TOTAL DIRECT COSTS (G,1 THROUGH G,6) TOTAL DIRECT COSTS (G,1 THROUGH G,6) TOTAL DIRECT COSTS (G,1 THROUGH G,6) TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) Refer to individual budget pages attaccosts (H+4) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL PD TYPED NAME & SIGNATURE* DATE	50,000 SIONS) ICNS ICN8d. IS SEE GPG II IL IEL IF DIFFERE	INT \$ FO	R NSF L	186,49 283,93 283,93 283,93 1,560,49 392,728 1,953,220 3 1,953,220 JSE ONLY	0 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0

UCSC Budget Justification Cumulative

A.1	Senior Personnel:	
	E. Spencer Engineer	\$162,648
A.6	Other Senior Personnel:	ФОЛЕ 250
	V. Fadeyev, S. Kachiguin, G. Martinez-McKinney	\$275,350
B.2	Other Professional:	
	M. Wilder, J. DeWitt	\$198,310
B.4	Undergraduate Students:	\$123,792
С	Fringe (36.8% of Base \$760,100)	\$279,963
D	Equipment:	
	Lab test instrument	\$50,000
Е	Travel:	
	Travel for M&O tasks, collaboration meetings and workshops	\$186,490
G	Other Direct Costs:	
	Materials and Supplies	\$283,939
Ι	Indirect Costs:	
	26% x \$1,510,492 MTDC Base	\$392,728
J	Total Direct and Indirect Costs:	\$1,953,220

SUMMARY PROPOSAL BUDG	iΕT		FO	R NSF L	JSE ONL	(
ORGANIZATION		PRC	POSAL	NO.	DURATIC	N (month
The Regents of the University of California, Irvine					Proposed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.	•	
Andrew J Lankford						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed nths		unds ested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	poser	(if differen
1. Andrew J Lankford - Prof	0.00	0.12	0.00	\$	0	\$
2. Anyes Taffard - Asst Prof	0.00	0.12	0.00		0	
3. Daniel Whiteson - Asst prof	0.00	0.12	0.00		0	
4.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)					0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.36	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		0	
1. (0) POST DOCTORAL SCHOLARS 2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00				0 448,285	
3. (0) GRADUATE STUDENTS	70.20	0.00	0.00		440,20J 0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					448,285	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					112,071	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					560,356	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
	ESSIONS	;)			-	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			Û	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS	;)		-	Û	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS	;)			Û	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		, 	3		0 4,000 9,316 0 0 0 0 1,000 10,316	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		, 	5		0 4,000 9,316 0 0 0 0 0 1,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		, 	<u>5</u>		0 4,000 9,316 0 0 0 0 1,000 10,316	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 574672) </td <td></td> <td>, </td> <td>S</td> <td></td> <td>0 4,000 9,316 0 0 0 1,000 10,316 574,672</td> <td></td>		, 	S		0 4,000 9,316 0 0 0 1,000 10,316 574,672	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate		, 	S		0 4,000 9,316 0 0 0 1,000 10,316 574,672 149,415	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MTDC (Rate: 26.0000, Base: 574672) TOTAL NUMERCT AND INDIRECT COSTS (H + I)		, 	3		0 4,000 9,316 0 0 0 1,000 10,316 574,672	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate		, 	S		0 4,000 4,000 0 9,316 0 0 0 0 10,316 574,672 149,415 724,087 0	\$
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		NT \$	\$	0 4,000 4,000 0 9,316 0 0 0 0 10,316 574,672 149,415 724,087 0	
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PROPOSAL BUDG	ET		FOF	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
The Regents of the University of California, Irvine					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	О.		
Andrew J Lankford						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed hths	Bo	Funds quested By	Funds granted by I
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	F F	proposer	(if differer
1. Andrew J Lankford - Prof	0.00	0.12	0.00	\$	0	\$
2. Anyes Taffard - Asst Prof	0.00	0.12	0.00		0	
3. Daniel Whiteson - Asst Prof	0.00	0.12	0.00		0	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.36	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	76.20	0.00	0.00		453,967	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					453,967	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					122,571	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					576,538	
	SSIONS	8)			0	
	SSIONS	3)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS	3)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 0	SSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS	;)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					0 4,120	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0			3	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			6		0 4,120	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0 4,120 0 9,034	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 4,120 0 9,034 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5		0 4,120 0 9,034 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBJUSTICE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5		0 4,120 0 9,034 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 4,120 0 9,034 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5		0 4,120 0 9,034 0 0 0 0 0 1,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		0 4,120 9,034 0 0 0 0 0 1,030 10,064	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5		0 4,120 0 9,034 0 0 0 0 0 1,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			5		0 4,120 9,034 0 0 0 0 0 1,030 10,064	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN			5		0 4,120 9,034 0 0 0 0 0 1,030 10,064 590,722	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 0 1. MATERIALS AND SUPPLIES 0 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 0 5. SUBAWARDS 0 6. OTHER			5		0 4,120 9,034 0 0 0 0 0 1,030 10,064 590,722 153,588	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 590722) TOTAL INDIRECT AND INDIRECT COSTS (H + I) <td></td> <td></td> <td>3</td> <td></td> <td>0 4,120 9,034 0 0 0 0 1,030 10,064 590,722</td> <td></td>			3		0 4,120 9,034 0 0 0 0 1,030 10,064 590,722	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			3		0 4,120 9,034 0 0 0 1,030 10,064 590,722 153,588 744,310 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 590722) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) </td <td>TICIPAN</td> <td></td> <td></td> <td></td> <td>0 4,120 9,034 0 0 0 1,030 10,064 590,722 153,588 744,310</td> <td>\$</td>	TICIPAN				0 4,120 9,034 0 0 0 1,030 10,064 590,722 153,588 744,310	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 590722) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN		NT \$		0 4,120 9,034 0 0 0 1,030 10,064 590,722 153,588 744,310 0 744,310	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 590722) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN		NT \$ FOR N	NSF U	0 4,120 9,034 0 9,034 0 0 0 1,030 10,064 590,722 153,588 744,310 0 744,310	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 590722) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR N ECT COS	NSF U	0 4,120 9,034 0 0 0 1,030 10,064 590,722 153,588 744,310 0 744,310	

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF	USE ONL	T
ORGANIZATION		PRC	POSAL		1	- DN (month
The Regents of the University of California, Irvine					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Andrew J Lankford						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	I	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Req pr	uested By roposer	granted by I (if differen
1. Andrew J Lankford - Prof	0.00	0.12	0.00	\$	0	\$
2. Anyes Taffard - Asst Prof	0.00	0.12	0.00		0	
3. Daniel Whiteson - Asst Prof	0.00	0.12	0.00		0	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.36	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	76.20	0.00	0.00		459,114	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					<u> </u>	
TOTAL SALARIES AND WAGES (A + B) C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					459,114	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>133,143</u> 592,257	
	ESSIONS	8)			0 0 4 244	
	ESSIONS	3)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ESSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					04,244	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 5. OTHER DIRECT C			3		0 4,244	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6		0 4,244 0 9,692	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 4,244 0 9,692 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5		0 4,244 0 9,692 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMER SERVICES			5		0 4,244 0 9,692 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5		0 4,244 0 9,692 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5		0 4,244 0 9,692 0 0 0 0 0 0 1,060	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5		0 4,244 0 9,692 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			5		0 4,244 9,692 0 0 0 0 0 1,060 10,752	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			5		0 4,244 9,692 0 0 0 0 1,060 10,752 607,253 157,886	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			3		0 4,244 9,692 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 607253) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			5		0 4,244 9,692 0 0 0 0 0 1,060 10,752 607,253 607,253 157,886 765,139 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 607253) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	0 4,244 9,692 0 0 0 0 0 1,060 10,752 607,253 607,253 157,886 765,139	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 AGREED LEVEL 0 O O O O O O O O O O O O O O O O O O			NT \$	Ţ	0 4,244 9,692 0 0 0 0 0 0 10,752 607,253 607,253 157,886 765,139 0 765,139	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 AGREED LEVEL 0 AGREED LE PI/PD NAME			NT \$ FOR N	NSF US	0 4,244 9,692 0 9,692 0 0 0 1,060 10,752 607,253 157,886 765,139 0 765,139 0 765,139	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 AGREED LEVEL 0 AGREED LEVEL 0 AGREED LEVEL 0			NT \$ FOR N ECT COS	NSF US	0 4,244 9,692 0 9,692 0 0 0 1,060 10,752 607,253 157,886 765,139 0 765,139 0 765,139	

SUMMARY PROPOSAL BUDG	έET		FOF	R NSF	USE ONL	(
ORGANIZATION		PRO	POSAL	NO.	DURATIC	ON (month
The Regents of the University of California, Irvine					Proposed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Andrew J Lankford						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed nths		Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	неq р	uested By roposer	granted by N (if differen
1. Andrew J Lankford - Prof	0.00	0.12	0.00	\$	0	\$
2. Anyes Taffard - Asst Prof	0.00	0.12			0	
3 Daniel Whiteson - Asst Prof	0.00	0.12	0.00		0	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.36	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	76.20	0.00	0.00		464,921	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					464,921	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					144,126	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED					609,047	
TOTAL EQUIPMENT	ESSIONS	;)			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN	ESSIONS	3)			0 0 4,371	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS	ESSIONS	5)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	3)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS	5)		_	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	s)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	5)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	5)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL CO 3. SUBSISTENCE CO			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER			3		0 4,371	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRACT COSTS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			6	-	0 4,371	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRUE CONT			6		0 4,371 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			5	-	0 4,371 0 0 9,770	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 4,371 0 0 9,770 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 4,371 0 9,770 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		0 4,371 0 0 9,770 0 0 0 0 0 0 1,092	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			S		0 4,371 9,770 0 0 0 0 1,092 10,862	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 4,371 0 0 9,770 0 0 0 0 0 0 1,092	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			3		0 4,371 9,770 0 0 0 0 1,092 10,862	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 624280)			5		0 4,371 4,371 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MTDC (Rate: 26.0000, Base: 62			5 		0 4,371 4,371 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MTDC (Rate: 26.0000, Base: 624280) TOTAL INDIR			<u>5</u>		0 4,371 4,371 0 0 9,770 0 0 0 0 0 1,092 10,862 624,280 624,280 162,313 786,593	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 624280) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u>5</u>		0 4,371 4,371 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL	RTICIPAN			- -	0 4,371 4,371 0 0 9,770 0 0 0 0 0 1,092 10,862 624,280 624,280 162,313 786,593	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS //OCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	RTICIPAN		NT \$	·	0 4,371 9,770 0 0 0 0 0 0 1,092 10,862 624,280 624,280 162,313 786,593 0 786,593	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS A. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 624280) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED L PI/PD NAME	RTICIPAN		NT \$ FOR N	NSF US	0 4,371 9,770 0 9,770 0 0 1,092 10,862 624,280 162,313 786,593 0 786,593 0 786,593	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS //OCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			NT \$ FOR N ECT COS	NSF US	0 4,371 9,770 0 0 0 0 0 0 1,092 10,862 624,280 624,280 162,313 786,593 0 786,593	

PROPOSAL BUDG	ET		FOF	R NS	F USE ONL	Y
ORGANIZATION		PRO	POSAL	NO.	DURATIO	DN (month
The Regents of the University of California, Irvine					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Andrew J Lankford	1					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo		R	Funds equested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	(if differen
1. Andrew J Lankford - Prof	0.00					\$
2. Anyes Taffard - Asst Prof	0.00				0	
3. Daniel Whiteson - Asst prof	0.00	0.12	0.00		0	
4.						
	0.00	0.00				
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)					0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.36	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		•	
1. (0) POST DOCTORAL SCHOLARS	0.00				0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	76.20	0.00	0.00		470,894	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS 5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					<u> </u>	
					U	
TOTAL SALARIES AND WAGES (A + B)					470,894	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>155,395</u> 626,289	
					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
	ESSIONS	;)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 0	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	;)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			5		0 4,502	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3		0 4,502	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR G. OTHER DIRECT COSTS			5		0 4,502	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			5		0 4,502 0 9,902	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 4,502 0 9,902 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 4,502 0 9,902 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 4,502 0 9,902 0 0 0 0 0 1,125	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 4,502 0 9,902 0 0 0 0 1,125 11,027	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5		0 4,502 0 9,902 0 0 0 0 0 1,125	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DUBECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5		0 4,502 0 9,902 0 0 0 0 1,125 11,027	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 0. FOREIGN			S		0 4,502 0 9,902 0 0 0 0 1,125 11,027 641,818	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			S		0 4,502 0 9,902 0 0 0 0 0 1,125 11,027 641,818 166,873	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			<u> </u>		0 4,502 0 9,902 0 0 0 0 1,125 11,027 641,818	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			S		0 4,502 9,902 0 0 0 0 0 0 1,125 11,027 641,818 166,873 808,691 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			S		0 4,502 9,902 0 0 0 0 0 1,125 11,027 641,818 166,873 808,691	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 641818) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) </td <td>TICIPAN</td> <td></td> <td></td> <td></td> <td>0 4,502 9,902 0 0 0 0 0 0 1,125 11,027 641,818 166,873 808,691 0</td> <td>\$</td>	TICIPAN				0 4,502 9,902 0 0 0 0 0 0 1,125 11,027 641,818 166,873 808,691 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 641818) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS<	TICIPAN		NT \$		0 4,502 9,902 0 0 0 0 0 0 1,125 11,027 641,818 166,873 808,691 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 641818) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR N ECT COS	NSF (0 4,502 9,902 0 0 0 0 1,125 11,027 641,818 166,873 808,691 0 808,691 0 808,691 USE ONLY ATE VERIFIC	CATION
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 641818) TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME			NT \$ FOR N ECT COS	NSF (0 4,502 9,902 0 0 0 1,125 11,027 641,818 166,873 808,691 0 808,691 USE ONLY	

PROPOSAL BUDG	iET		FOF	R NSF	USE ONL	1
ORGANIZATION		PRC	POSAL	NO.	DURATIC	DN (month
The Regents of the University of California, Irvine					Proposed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	О.		
Andrew J Lankford	1					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	1	NSF Fund Person-mo		Red	Funds quested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	(if differen
1. Andrew J Lankford - Prof	0.00		0.00		0	\$
2. Anyes Taffard - Asst Prof	0.00		0.00		0	
3. Daniel Whiteson - Asst Prof	0.00	0.60	0.00		0	
4. 5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00		0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	1.00	0.00		U	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
	381.00		0.00		2.297.181	
3. (0) GRADUATE STUDENTS	001.00	0.00	0.00		_, <u></u> ,, 0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				1	2,297,181	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					667,306	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				1	2,964,487	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	3)			0	
	ESSIONS	5)			-	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	6)			Ō	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	3)			Ō	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS	\$) 			Ō	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	5)			Ō	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	;)			Ō	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	;)			Ō	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			6		Ō	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			5		0 21,237	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6		0 21,237 0 0 47,714	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 21,237 0 0 47,714 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5		0 21,237 0 47,714 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 21,237 0 47,714 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 21,237 0 47,714 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			5		0 21,237 21,237 0 47,714 0 0 0 0 0 5,307	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		0 21,237 21,237 0 47,714 0 0 0 0 5,307 53,021	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 9 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G)			5		0 21,237 21,237 0 47,714 0 0 0 0 0 5,307	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN			5		0 21,237 21,237 0 47,714 0 0 0 0 5,307 53,021 3,038,745	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			5		0 21,237 21,237 0 47,714 0 0 0 0 5,307 53,021 3,038,745 790,075	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			5		0 21,237 21,237 0 47,714 0 0 0 5,307 53,021 3,038,745 790,075 3,828,820	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			3		0 21,237 21,237 0 0 47,714 0 0 0 5,307 53,021 3,038,745 790,075 3,828,820 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) <td>RTICIPAN</td> <td></td> <td></td> <td></td> <td>0 21,237 21,237 0 47,714 0 0 0 5,307 53,021 3,038,745 790,075 3,828,820</td> <td>\$</td>	RTICIPAN				0 21,237 21,237 0 47,714 0 0 0 5,307 53,021 3,038,745 790,075 3,828,820	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	RTICIPAN		NT \$	\$	0 21,237 21,237 0 47,714 0 0 0 5,307 53,021 3,038,745 790,075 3,828,820 0 3,828,820	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) <td>RTICIPAN</td> <td></td> <td>NT \$ FOR N</td> <td>\$ \$</td> <td>0 21,237 21,237 0 0 47,714 0 0 0 5,307 53,021 3,038,745 790,075 3,828,820 0</td> <td></td>	RTICIPAN		NT \$ FOR N	\$ \$	0 21,237 21,237 0 0 47,714 0 0 0 5,307 53,021 3,038,745 790,075 3,828,820 0	

	54	+	

2/1/2012

1/31/2013

SUMMARY PROPOSAL BUDGET					FOR NSF USE ONLY			
		INIVERSITY OF CAL					PROPOSAL NO.	DURATION (MONTH
		INIVERSITY OF CAL						Proposed Grant
PRINCIPAL INVESTIGATOR/PR	roject director						AWARD NO.	
A. SENIOR PERSONNEL: PI		Other Senior Associates		1	NSF-Funded		Funds	Funds
(List each separately with	title; A.7. show number in	brackets)			Person-mos		Requested by	Granted by NSF
1. A. Lankford, Princip	al Investigator (was	1% effort)		CAL	ACAD 0.12	SUMR	Proposer	(If Different)
2. A. Taffard, Co-Inves					0.12			
	vestigator (wos - 1%	,			0.12			
4. Specialist III (TBN)					-			
5.								
6. () OTHERS (LIST IN	NDIVIDUALLY ON BUDGE	T JUSTIFICATION PAGE)						
7. () TOTAL SENIOR F	PERSONNEL (1-6)							
B. OTHER PERSONNEL (SH	HOW NUMBERS IN BRAC	KETS)			-			
1. () POST DOCTORA	AL ASSOCIATES							
2. () OTHER PROFES	SIONAL (TECHNICIAN, PI	ROGRAMMER, ETC.)		76.20			448,285	
3. () GRADUATE STU								
4. () UNDERGRADUA								
	CLERICAL (IF CHARGED	DIRECTLY)						
6. () OTHER TOTAL SALARIES AND V							448,285	
C. FRINGE BENEFITS (IF C		STS)					112.071	
TOTAL SALARIES, WAGE		· · · · · · · · · · · · · · · · · · ·					560,356	
TOTAL EQUIPMENT		1. DOMESTIC (INCL. CA	NADA, MEXICO AND U.S. PO					
		2. FOREIGN		00020010110)			4,000	
F. PARTICIPANT SUPPORT	Г							
1. STIPENDS	5	\$						
2. TRAVEL	Ş	\$						
3. SUBSISTENCE		\$	_					
4. OTHER		\$						
	UMBER OF PARTICIPANT	ſS	ТО	TAL PARTICIPA	NTS COSTS			
G. OTHER DIRECT COSTS							0.047	
1. MATERIALS AND S	SUPPLIES STS/DOCUMENTATION/D						9,317	
2. FUBLICATION CUS	STORENTATION/D							
3. CONSULTANT SEE	RVICES	ISSEMINATION						
3. CONSULTANT SEF 4. COMPUTER SERV		ISSEMINATION						
		ISSEMINATION						
4. COMPUTER SERV		ISSEMINATION					1,000	
4. COMPUTER SERVE 5. SUBAWARDS	ICES	ISSEMINATION					1,000 10,316	
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR	ICES RECT COSTS	ISSEMINATION					,	
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR	ICES RECT COSTS (A THROUGH G)		of Base		\$574,672		10,316	
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR H. TOTAL DIRECT COSTS	ICES RECT COSTS (A THROUGH G) A) (SPECIFY RATE AND B	ASE)	of Base		\$574,672		10,316 574,672 149,415	
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR H. TOTAL DIRECT COSTS I. INDIRECT COSTS (F & A	ICES RECT COSTS (A THROUGH G) A) (SPECIFY RATE AND B S (F & A)	ASE)	of Base		\$574,672		10,316 574,672	
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR TOTAL DIRECT COSTS I. INDIRECT COSTS (F & A TOTAL INDIRECT COSTS J. TOTAL DIRECT AND IND	ICES RECT COSTS (A THROUGH G) A) (SPECIFY RATE AND B S (F & A) DIRECT COSTS (H + I)	ASE)			\$574,672		10,316 574,672 149,415 724,087	
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR TOTAL DIRECT COSTS I. INDIRECT COSTS (F & A TOTAL INDIRECT COSTS J. TOTAL DIRECT AND IND	ICES RECT COSTS (A THROUGH G) A) (SPECIFY RATE AND B S (F & A) DIRECT COSTS (H + I) DR FURTHER SUPPORT C	ASE) 26.00%			\$574,672		10,316 574,672 149,415	\$
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR TOTAL DIRECT COSTS I. INDIRECT COSTS (F & A TOTAL INDIRECT COSTS J. TOTAL DIRECT AND IND K. RESIDUAL FUNDS (IF FC L. AMOUNT OF THIS REQU M. COST-SHARING: PROPO	ICES RECT COSTS (A THROUGH G) A) (SPECIFY RATE AND B S (F & A) DIRECT COSTS (H + I) DR FURTHER SUPPORT (JEST (J) or (J MINUS K) OSED LEVEL	ASE)26.00%	GPG II.D.7.j.) AGREED LEVEL IF DIFF	ERENT: \$	\$574,672		10,316 574,672 149,415 724,087 724,087	\$
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR TOTAL DIRECT COSTS I. INDIRECT COSTS (F & A TOTAL INDIRECT COSTS J. TOTAL DIRECT AND IND K. RESIDUAL FUNDS (IF FC L. AMOUNT OF THIS REQU M. COST-SHARING: PROPO	ICES RECT COSTS (A THROUGH G) A) (SPECIFY RATE AND B S (F & A) DIRECT COSTS (H + I) DR FURTHER SUPPORT (JEST (J) or (J MINUS K) OSED LEVEL	ASE)26.00%	GPG II.D.7.j.)	ERENT: \$	\$574,672		10,316 574,672 149,415 724,087 724,087 FOR NSF USE ONLY	•
4. COMPUTER SERVI 5. SUBAWARDS 6. OTHER TOTAL OTHER DIR TOTAL DIRECT COSTS I. INDIRECT COSTS (F & A TOTAL INDIRECT COSTS J. TOTAL DIRECT AND IND K. RESIDUAL FUNDS (IF FC L. AMOUNT OF THIS REQU	ICES RECT COSTS (A THROUGH G) A) (SPECIFY RATE AND B S (F & A) DIRECT COSTS (H + I) DR FURTHER SUPPORT (C JEST (J) or (J MINUS K) OSED LEVEL SIGNATURE*	ASE)26.00%	AGREED LEVEL IF DIFF	ERENT: \$		INE	10,316 574,672 149,415 724,087 724,087	•

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification University of California, Irvine Year 1

B.2	Engineering and Technical Salaries: Salaries for Muon & TDAQ M&O and TDAQ Upgrade.	\$448,285
С	Fringe @ 25% of Base \$448,285	\$112,071
E	Travel: Foreign: Engineers to ATLAS meetings and/or conferences	\$4,000
G.1	Materials & Supplies: Electronics components, laboratory tools, computer supplies	\$9,317
G.6	Other: Shop charges, special handling shipping & mailing	\$1,000
Ι	Indirect Costs @ 26% (off-campus rate) of Direct costs \$574,672	\$149,415
J	Total Direct and Indirect Costs	\$724,087

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2/1/2013

	MMARY PROPO	SAL BUDGE	Т			FOR NSF	USE ONLY
RGANIZATION THE REGENTS OF THE U	UNIVERSITY OF CALI	IFORNIA				PROPOSAL NO.	DURATION (MONTH Proposed Gran
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR						AWARD NO.	l'hoposed chain
A. Lankford, Prof. VIII - off scale SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and	Other Senier Accesiotes		T	NSF-Funded		Funds	Funds
(List each separately with title; A.7. show number in				Person-mos.		Requested by	Granted by NSF
			CAL	ACAD	SUMR	Proposer	(If Different)
A. Lankford, Principal Investigator (wo	os - 1% effort)			0.12			
A. Taffard, Co-Investigator (wos - 1%)	effort)			0.12			
D. Whiteson, Co-Investigator (wos - 1	% effort)			0.12			
Specialist III (TBN)				-			
() OTHERS (LIST INDIVIDUALLY ON BUDGE							
	ET JUSTIFICATION FAGE)						
() TOTAL SENIOR PERSONNEL (1-6)							<u> </u>
OTHER PERSONNEL (SHOW NUMBERS IN BRAC	CKETS)			1			
() POST DOCTORAL ASSOCIATES							
() OTHER PROFESSIONAL (TECHNICIAN, F	PROGRAMMER, ETC.)		76.20			453,967	
() GRADUATE STUDENTS							
() UNDERGRADUATE STUDENTS							
() SECRETARIAL - CLERICAL (IF CHARGEI	D DIRECTLY)						
() OTHER							
TOTAL SALARIES AND WAGES (A + B)						453,967	
FRINGE BENEFITS (IF CHARGED AS DIRECT CO	OSTS)					122,571	
TOTAL SALARIES, WAGES AND FRINGE BENEFI						576,538	
							-
TOTAL EQUIPMENT TRAVEL	1. DOMESTIC (INCL. CAN	IADA, MEXICO AND U.S. P	OSSESSIONS)				
	1. DOMESTIC (INCL. CAN 2. FOREIGN	IADA, MEXICO AND U.S. P	OSSESSIONS)			4,120	
		IADA, MEXICO AND U.S. P	OSSESSIONS)			4,120	
TRAVEL PARTICIPANT SUPPORT	· · · · · ·	IADA, MEXICO AND U.S. P	OSSESSIONS)			4,120	
TRAVEL PARTICIPANT SUPPORT	2. FOREIGN	IADA, MEXICO AND U.S. P	OSSESSIONS)			4,120	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS	2. FOREIGN	IADA, MEXICO AND U.S. P	OSSESSIONS)			4,120	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL	2. FOREIGN \$	IADA, MEXICO AND U.S. P	OSSESSIONS)			4,120	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE	2. FOREIGN \$		OSSESSIONS)	ANTS COSTS		4,120	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN	2. FOREIGN \$			ANTS COSTS		4,120	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS	2. FOREIGN \$			NTS COSTS			
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	2. FOREIGN \$			ANTS COSTS		4,120 9,034	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONE	2. FOREIGN \$			ANTS COSTS			
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/C 3. CONSULTANT SERVICES	2. FOREIGN \$			ANTS COSTS			
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/E 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	2. FOREIGN \$			ANTS COSTS			
TRAVEL PARTICIPANT SUPPORT STIPENDS TRAVEL SUBSISTENCE COTHER COTHER TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATIONE CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS	2. FOREIGN \$			ANTS COSTS		9,034	
TRAVEL PARTICIPANT SUPPORT STIPENDS TRAVEL SUBSISTENCE COTHER COTHER TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/E CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS COTHER	2. FOREIGN \$			ANTS COSTS		9,034	
TRAVEL PARTICIPANT SUPPORT STIPENDS TRAVEL SUBSISTENCE A. OTHER TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATIONUE CONSULTANT SERVICES C. SUBAWARDS C. OTHER TOTAL OTHER DIRECT COSTS	2. FOREIGN \$			ANTS COSTS		9,034 1,030 10,064	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONE 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G)	2. FOREIGN			ANTS COSTS		9,034	
TRAVEL PARTICIPANT SUPPORT STIPENDS TRAVEL SUBSISTENCE A. OTHER TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATIONUE CONSULTANT SERVICES C. SUBAWARDS C. OTHER TOTAL OTHER DIRECT COSTS	2. FOREIGN					9,034 1,030 10,064	
TRAVEL PARTICIPANT SUPPORT SUBSISTENCE CONSULTANT SUPPORT CONSULTANT SERVICES CONSULTANT SERVICES COMPUTER SERVICES COM	2. FOREIGN			ANTS COSTS		9,034 1,030 10,064 590,722	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONE 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F & A) (SPECIFY RATE AND R TOTAL INDIRECT COSTS (F & A)	2. FOREIGN					9,034 9,034 1,030 10,064 590,722 153,588	
TRAVEL PARTICIPANT SUPPORT SUBSISTENCE CONSULTANT SUPPORT CONSULTANT SERVICES CONSULTANT SERVICES COMPUTER SERVICES COM	2. FOREIGN					9,034 1,030 10,064 590,722	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONUE 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F & A) (SPECIFY RATE AND E TOTAL INDIRECT COSTS (F & A) TOTAL DIRECT AND INDIRECT COSTS (H + I)	2. FOREIGN \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$					9,034 9,034 1,030 10,064 590,722 153,588	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONUE 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F & A) (SPECIFY RATE AND E TOTAL INDIRECT COSTS (F & A) TOTAL DIRECT AND INDIRECT COSTS (H + I)	2. FOREIGN \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$					9,034 9,034 1,030 10,064 590,722 153,588	\$
TRAVEL PARTICIPANT SUPPORT . STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONE 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F & A) TOTAL INDIRECT COSTS (F & A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT AMOUNT OF THIS REQUEST (J) or (J MINUS K)	2. FOREIGN \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$					9,034 1,030 10,064 590,722 153,588 744,310	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONE 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F & A) TOTAL INDIRECT COSTS (F & A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT AMOUNT OF THIS REQUEST (J) or (J MINUS K) COST-SHARING: PROPOSED LEVEL	2. FOREIGN					9,034 1,030 10,064 590,722 153,588 744,310	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/E 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F & A) TOTAL DIRECT COSTS (F & A) TOTAL DIRECT COSTS (F & A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT AMOUNT OF THIS REQUEST (J) or (J MINUS K) COST-SHARING: PROPOSED LEVEL //PD TYPED NAME AND SIGNATURE*	2. FOREIGN					9,034 1,030 10,064 590,722 153,588 744,310 744,310 FOR NSF USE ONLY	
TRAVEL PARTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTICIPAN OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATIONE 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F & A) TOTAL INDIRECT COSTS (F & A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT AMOUNT OF THIS REQUEST (J) or (J MINUS K) COST-SHARING: PROPOSED LEVEL	2. FOREIGN					9,034 1,030 10,064 590,722 153,588 744,310 744,310	

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification University of California, Irvine Year 2

B.2	Engineering and Technical Salaries: Salaries for Muon & TDAQ M&O and TDAQ Upgrade.	\$453,967
С	Fringe @ 27% of Base \$453,967	\$122,571
E	Travel: Foreign: Engineers to ATLAS meetings and/or conferences	\$4,120
G.1	Materials & Supplies: Electronics components, laboratory tools, computer supplies	\$9,034
G.6	Other: Shop charges, special handling shipping & mailing	\$1,030
Ι	Indirect Costs @ 26% (off-campus rate) of Direct costs \$590,722	\$153,588
J	Total Direct and Indirect Costs	\$744,310

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2/1/2014

1/31/2015

					FOR NSF USE ONLY	
ORG	ANIZATION				PROPOSAL NO.	DURATION (MONTHS)
	THE REGENTS OF THE UNIVERSITY OF CALIFORNIA					Proposed Granted
PRIM	CIPAL INVESTIGATOR/PROJECT DIRECTOR				AWARD NO.	Floposeu Granteu
•	A. Lankford, Prof. VIII - off scale SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates		NSE Eurodoo	4	Funda	Fundo
Α.	(List each separately with title; A.7. show number in brackets)		NSF-Funded Person-mos		Funds Requested by	Funds Granted by NSF
		CAL	ACAD	SUMR	Proposer	(If Different)
1.	A. Lankford, Principal Investigator (wos - 1% effort)		0.12			
2.	A. Taffard, Co-Investigator (wos - 1% effort)		0.12			
3.	D. Whiteson, Co-Investigator (wos - 1% effort)		0.12			
4.	Specialist III (TBN)					
5.						
6. (7. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)) TOTAL SENIOR PERSONNEL (1-6)	-				
B.	OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. () POST DOCTORAL ASSOCIATES) OTHER PROFESSIONAL (TECHNICIAN, PROGRAMMER, ETC.)	76.20			459,114	
2. (3. () GRADUATE STUDENTS	10.20				
3. (4. () UNDERGRADUATE STUDENTS					
4. (5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					
6. () OTHER					
	TOTAL SALARIES AND WAGES (A + B)				459,114	
C.	FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				133,143	
	TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				592,257	
D.	EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
	TOTAL EQUIPMENT					
E.	TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S.	POSSESSIONS)			4.044	
F.	2. FOREIGN PARTICIPANT SUPPORT				4,244	
г.	1. STIPENDS \$					
	2. TRAVEL \$					
	3. SUBSISTENCE \$					
	4. OTHER \$					
	() TOTAL NUMBER OF PARTICIPANTS	OTAL PARTICIPA	ANTS COSTS			
G.	OTHER DIRECT COSTS					
	1. MATERIALS AND SUPPLIES				9,692	
	2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					
	3. CONSULTANT SERVICES					
	4. COMPUTER SERVICES					
	5. SUBAWARDS					
	6. OTHER				1,061	
	TOTAL OTHER DIRECT COSTS				10,753	
H.	TOTAL DIRECT COSTS (A THROUGH G)				607,253	
Ι.	INDIRECT COSTS (F & A) (SPECIFY RATE AND BASE) 26.00% of Base		\$607,253			
—	TOTAL INDIRECT COSTS (F & A)				157,886	
J.	TOTAL DIRECT AND INDIRECT COSTS (H + I)				765,139	
K.	RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG II.D.7.j.)				705 100	
L.	AMOUNT OF THIS REQUEST (J) or (J MINUS K)				765,139	\$
Μ.	COST-SHARING: PROPOSED LEVEL \$ AGREED LEVEL IF DI	FFERENT: \$				
PI/F	D TYPED NAME AND SIGNATURE* DATE				FOR NSF USE ONLY	
	Andrew J. Lankford Andrew J. Lankford S. REP. TYPED NAME AND SIGNATURE* Allison Ramos Allino Ramos Allino Ramos				DIRECT COST RATE VERIFIC	

Budget Justification University of California, Irvine Year 3

B.2	Engineering and Technical Salaries: Salaries for Muon & TDAQ M&O and TDAQ Upgrade.	\$459,114
С	Fringe @ 29% of Base \$459,114	\$133,143
E	Travel: Foreign: Engineers to ATLAS meetings and/or conferences	\$4,244
G.1	Materials & Supplies: Electronics components, laboratory tools, computer supplies	\$9,692
G.6	Other: Shop charges, special handling shipping & mailing	\$1,061
Ι	Indirect Costs @ 26% (off-campus rate) of Direct costs \$607,253	\$157,886
J	Total Direct and Indirect Costs	\$765,139

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2/1/2015

SUMMARY PROPOSAL BUDGET ORGANIZATION THE REGENTS OF THE UNIVERSITY OF CALIFORNIA						FOR NSF USE ONLY						
					PROPO	PROPOSAL NO.		DURATION (MONTH				
RINCIP	AL INVESTIGATOR/PROJECT DIRECTO								AWA	RD NO.	Tioposed	Grant
95	A. Lankford, Prof. VIII - off sc NIOR PERSONNEL: PI/PD, Co-PIs, Facult		aiataa			N	NSF-Funded	1	E.	unds		Funds
	st each separately with title; A.7. show num	-	Ciales				Person-mos.			ested by		ted by NSF
					CAL		ACAD	SUMR	Pro	poser	(If E	Different)
Α.	Lankford, Principal Investigator	r (wos - 1% effort)					0.12					
Α.	Taffard, Co-Investigator (wos -	1% effort)					0.12					
. D.	Whiteson, Co-Investigator (wo	s - 1% effort)					0.12					
Sp	oecialist III (TBN)											
. () OTHERS (LIST INDIVIDUALLY ON E	BUDGET JUSTIFICATION	NPAGE)									
() TOTAL SENIOR PERSONNEL (1-6)											
. от	HER PERSONNEL (SHOW NUMBERS IN	BRACKETS)										
. () POST DOCTORAL ASSOCIATES											
() OTHER PROFESSIONAL (TECHNIC	IAN, PROGRAMMER, E	TC.)		76.2	0				464,921		
() GRADUATE STUDENTS											
() UNDERGRADUATE STUDENTS											
. () SECRETARIAL - CLERICAL (IF CHA	ARGED DIRECTLY)										
. () OTHER											
TO	TAL SALARIES AND WAGES (A + B)									464,921		
. FRI	INGE BENEFITS (IF CHARGED AS DIREC	CT COSTS)								144,126		
TO	TAL SALARIES, WAGES AND FRINGE B	ENEFITS (A + B + C)								609,047		
то	TAL EQUIPMENT											
	TAL EQUIPMENT	1. DOMEST	C (INCL. CAN	NADA, MEXICO AI	ND U.S. POSSESSIC	NS)						
. TR	AVEL	1. DOMESTI 2. FOREIGN		NADA, MEXICO AI	ND U.S. POSSESSIC	NS)				4,371		
. TR	AVEL RTICIPANT SUPPORT	2. FOREIGN		NADA, MEXICO AI	ND U.S. POSSESSIC	NS)				4,371		_
. TR	AVEL RTICIPANT SUPPORT 1. STIPENDS	2. FOREIGN		NADA, MEXICO AI	ND U.S. POSSESSIC	NS)				4,371		_
. TR	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL	2. FOREIGN \$\$		NADA, MEXICO AI	ND U.S. POSSESSIC	NS)				4,371		_
. TR/	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE	2. FOREIGN \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$		NADA, MEXICO AI	ND U.S. POSSESSIC	NS)				4,371		_
. TR/	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER	2. FOREIGN \$ \$ \$ \$ \$		NADA, MEXICO AI						4,371		
. TR	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC	2. FOREIGN \$ \$ \$ \$ \$		VADA, MEXICO AI	ND U.S. POSSESSIC		NTS COSTS			4,371		
. TR. . PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS	2. FOREIGN \$ \$ \$ \$		NADA, MEXICO AI			NTS COSTS					
:. TR. :. РАН 3. ОТ	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES	2. FOREIGN 2. FOREIGN 5 5 CIPANTS		NADA, MEXICO AI			NTS COSTS			9,770		
. TR/ . PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT	2. FOREIGN 2. FOREIGN 5 5 CIPANTS		NADA, MEXICO AI			NTS COSTS					
. TR/ . РАН 3. ОТ	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES	2. FOREIGN 2. FOREIGN 5 5 CIPANTS		NADA, MEXICO AI			NTS COSTS					
. TR. . PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	2. FOREIGN 2. FOREIGN 5 5 CIPANTS		NADA, MEXICO AI			NTS COSTS					
. TR.	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	2. FOREIGN 2. FOREIGN 5 5 CIPANTS					NTS COSTS			9,770		
E. TR.	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	2. FOREIGN 2. FOREIGN 5 5 CIPANTS					NTS COSTS			9,770		
. TR. . PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	2. FOREIGN 2. FOREIGN 5 5 CIPANTS					NTS COSTS			9,770 1,093 10,862		
. TR. PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G)	2. FOREIGN					NTS COSTS			9,770		
. TR. PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	2. FOREIGN			TOTAL PART	ICIPAN				9,770 1,093 10,862		
. TR. PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) (SPECIFY RATE	2. FOREIGN		VADA, MEXICO AI	TOTAL PART	ICIPAN	NTS COSTS			9,770 1,093 10,862 624,280		
. TR. PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (F & A) (SPECIFY RATE TAL INDIRECT COSTS (F & A)	2. FOREIGN			TOTAL PART	ICIPAN				9,770 1,093 10,862		
. TR/ PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) TAL INDIRECT COSTS (F & A) TAL DIRECT AND INDIRECT COSTS (H	2. FOREIGN	.00%		TOTAL PART	ICIPAN				9,770 1,093 10,862 624,280 162,313		
TR PAI PAI TO TO TO TO RE	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) TAL DIRECT COSTS (F & A) TAL DIRECT AND INDIRECT COSTS (H SIDUAL FUNDS (IF FOR FURTHER SUPF	2. FOREIGN	.00%		TOTAL PART	ICIPAN				9,770 1,093 10,862 624,280 162,313 786,593		
. TR/ PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) TAL DIRECT COSTS (F & A) TAL DIRECT COSTS (F & A) TAL DIRECT AND INDIRECT COSTS (H SIDUAL FUNDS (IF FOR FURTHER SUPF IOUNT OF THIS REQUEST (J) or (J MINU	2. FOREIGN \$ \$ CIPANTS TION/DISSEMINATION AND BASE) 26 + I) PORT OF CURRENT PR 5 K)	.00%	of Ba	TOTAL PART					9,770 1,093 10,862 624,280 162,313		
. TR. PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS//DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) TAL DIRECT (F & A)	2. FOREIGN	.00%	of Ba	TOTAL PART					9,770 1,093 10,862 624,280 162,313 786,593 786,593		
. TR. PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) TAL DIRECT COSTS (F & A) TAL DIRECT COSTS (F & A) TAL DIRECT AND INDIRECT COSTS (H SIDUAL FUNDS (IF FOR FURTHER SUPF IOUNT OF THIS REQUEST (J) or (J MINU	2. FOREIGN \$ \$ CIPANTS TION/DISSEMINATION AND BASE) 26 + I) PORT OF CURRENT PR 5 K)	.00%	of Ba	TOTAL PART					9,770 1,093 10,862 624,280 162,313 786,593 786,593 SF USE ONLY	•	
. TR/ PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) (SPECIFY RATE TAL INDIRECT COSTS (F & A) TAL DIRECT AND INDIRECT COSTS (H SIDUAL FUNDS (IF FOR FURTHER SUPF IOUNT OF THIS REQUEST (J) or (J MINU ST-SHARING: PROPOSED LEVEL YPED NAME AND SIGNATURE* TACTION AND AND AND AND AND AND AND AND AND AN	2. FOREIGN	.00%	of Ba	TOTAL PART		\$624,280		NDIRECT COS	9,770 1,093 10,862 624,280 162,313 786,593 786,593 SF USE ONLY T RATE VERIFI	CATION	
. TR/ PAI	AVEL RTICIPANT SUPPORT 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER () TOTAL NUMBER OF PARTIC HER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTAT 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TAL DIRECT COSTS (A THROUGH G) DIRECT COSTS (F & A) (SPECIFY RATE TAL INDIRECT COSTS (F & A) TAL DIRECT AND INDIRECT COSTS (H SIDUAL FUNDS (IF FOR FURTHER SUPF IOUNT OF THIS REQUEST (J) or (J MINU ST-SHARING: PROPOSED LEVEL YPED NAME AND SIGNATURE* ndrew J. Lankford	2. FOREIGN	.00%	of Ba	TOTAL PART		\$624,280	l hecked	NDIRECT COS	9,770 1,093 10,862 624,280 162,313 786,593 786,593 SF USE ONLY	CATION	als-ORG

Budget Justification University of California, Irvine Year 4

B.2	Engineering and Technical Salaries: Salaries for Muon & TDAQ M&O and TDAQ Upgrade.	\$464,921
С	Fringe @ 31% of Base \$464,921	\$144,126
E	Travel: Foreign: Engineers to ATLAS meetings and/or conferences	\$4,371
G.1	Materials & Supplies: Electronics components, laboratory tools, computer supplies	\$9,770
G.6	Other: Shop charges, special handling shipping & mailing	\$1,093
I	Indirect Costs @ 26% (off-campus rate) of Direct costs \$624,280	\$162,313
J	Total Direct and Indirect Costs	\$786,593

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2/1/2016

					FOR NSF USE ONLY		
ORGANIZATION THE REGENTS OF THE UNIVERSITY OF CAL	PROPOSAL NO.	DURATION (MONTHS)					
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR					AWARD NO.	Proposed Granted	
A. Lankford, Prof. VIII - off scale							
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates (List each separately with title; A.7. show number in brackets)			NSF-Funded Person-mos.		Funds Requested by	Funds Granted by NSF	
		CAL	ACAD	SUMR	Proposer	(If Different)	
1. A. Lankford, Principal Investigator (wos - 1% effort)			0.12				
2. A. Taffard, Co-Investigator (wos - 1% effort)			0.12				
3. D. Whiteson, Co-Investigator (wos - 1% effort)			0.12				
4. Specialist III (TBN)							
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)							
7. () TOTAL SENIOR PERSONNEL (1-6)							
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. () POST DOCTORAL ASSOCIATES							
2. () OTHER PROFESSIONAL (TECHNICIAN, PROGRAMMER, ETC.)	7	6.20			470,894		
3. () GRADUATE STUDENTS							
4. () UNDERGRADUATE STUDENTS							
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							
6. () OTHER							
TOTAL SALARIES AND WAGES (A + B)					470,894		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					155,395		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					626,289		
TOTAL EQUIPMENT							
E. TRAVEL 1. DOMESTIC (INCL. CAN	IADA, MEXICO AND U.S. POSSES	SSIONS)					
2. FOREIGN					4,502		
F. PARTICIPANT SUPPORT							
1. STIPENDS \$	_						
2. TRAVEL \$	_						
3. SUBSISTENCE \$	_						
4. OTHER \$ () TOTAL NUMBER OF PARTICIPANTS			NTS COSTS				
G. OTHER DIRECT COSTS	TOTAL	AKTICIFA	113 00313				
1. MATERIALS AND SUPPLIES					9,902		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0,002		
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS							
6. OTHER					1,125		
TOTAL OTHER DIRECT COSTS					11,027		
H. TOTAL DIRECT COSTS (A THROUGH G)					641,818		
I. INDIRECT COSTS (F & A) (SPECIFY RATE AND BASE) 26.00%	of Base		\$641,818				
TOTAL INDIRECT COSTS (F & A)					166,873		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					808,691		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE G	iPG II.D.7.j.)						
L. AMOUNT OF THIS REQUEST (J) or (J MINUS K)					808,691	\$	
M. COST-SHARING: PROPOSED LEVEL \$	AGREED LEVEL IF DIFFEREN	T: \$					
PI/PD TYPED NAME AND SIGNATURE*	DATE				FOR NSF USE ONLY		
Andrew J. Lankford				INE	DIRECT COST RATE VERIFIC	CATION	
ORG. REP. TYPED NAME AND SIGNATURE*	DATE		Date C	hecked	Date of Rate Sheet	Initials-ORG	
Andrew J. Lankford ORG. REP. TYPED NAME AND SIGNATURE* Allison Ramos Allison Ramos							

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification University of California, Irvine Year 5

B.2	Engineering and Technical Salaries: Salaries for Muon & TDAQ M&O and TDAQ Upgrade.	\$470,894
С	Fringe @ 33% of Base \$464,921	\$155,395
E	Travel: Foreign: Engineers to ATLAS meetings and/or conferences	\$4,502
G.1	Materials & Supplies: Electronics components, laboratory tools, computer supplies	\$9,902
G.6	Other: Shop charges, special handling shipping & mailing	\$1,125
Ι	Indirect Costs @ 26% (off-campus rate) of Direct costs \$641,818	\$166,873
J	Total Direct and Indirect Costs	\$808,691

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2/1/2012

1/31/2017

						FOR NSF USE ONLY		
ORGANIZATION THE REC	ENTS OF THE L		FORNIA				PROPOSAL NO.	DURATION (MONTHS)
PRINCIPAL INVESTIGATOR/PR								Proposed Granted
	of. VIII - off scale						AWARD NO.	
A. SENIOR PERSONNEL: P		Other Senior Associates			NSF-Funder	ł	Funds	Funds
(List each separately with	itle; A.7. show number in	brackets)		0.41	Person-mos		Requested by	Granted by NSF
1. A. Lankford, Princip	al Investigator (wo	s - 1% effort)		CAL	ACAD 0.60	SUMR	Proposer	(If Different)
2. A. Taffard, Co-Inve	ž i				0.60			
3. D. Whiteson, Co-In	5	,			0.60			
4. Specialist III (TBN)	Ŭ (,						
5.								
6. () OTHERS (LIST IN	DIVIDUALLY ON BUDGE	ET JUSTIFICATION PAGE)						
7. () TOTAL SENIOR F	ERSONNEL (1-6)							
B. OTHER PERSONNEL (SH	OW NUMBERS IN BRAC	CKETS)			T	T		
1. () POST DOCTORA	ASSOCIATES							
2. () OTHER PROFES	SIONAL (TECHNICIAN, P	PROGRAMMER, ETC.)		381.00			2,297,181	
3. () GRADUATE STU	DENTS							
4. () UNDERGRADUA	E STUDENTS							
	CLERICAL (IF CHARGED	D DIRECTLY)						
6. () OTHER								
TOTAL SALARIES AND V	, ,						2,297,181	
C. FRINGE BENEFITS (IF CI							667,306	
TOTAL SALARIES, WAG		TS (A + B + C) FOR EACH ITEM EXCEEDING \$5					2,964,487	
TOTAL EQUIPMENT								
E. TRAVEL		1. DOMESTIC (INCL. CANA	ADA, MEXICO AND U.S. PC	DSSESSIONS)				
		2. FOREIGN					21,237	
F. PARTICIPANT SUPPORT		¢						
1. STIPENDS		\$	_					
2. TRAVEL		\$ \$	_					
3. SUBSISTENCE 4. OTHER		\$ \$	_					
-	MBER OF PARTICIPAN		TO	TAL PARTICIPA	NTS COSTS			
G. OTHER DIRECT COSTS			10					
1. MATERIALS AND S	JPPLIES						47,714	
	TS/DOCUMENTATION/D	DISSEMINATION					,	
3. CONSULTANT SEF								
4. COMPUTER SERV	CES							
5. SUBAWARDS								
6. OTHER							5,309	
TOTAL OTHER DIF	ECT COSTS						53,022	
H. TOTAL DIRECT COSTS	A THROUGH G)						3,038,745	
I. INDIRECT COSTS (F & A) (SPECIFY RATE AND E	BASE) 26.00%	of Base		\$3,038,745	5		
TOTAL INDIRECT COSTS	(F & A)						790,074	
J. TOTAL DIRECT AND IND	RECT COSTS (H + I)						3,828,819	
K. RESIDUAL FUNDS (IF FC	R FURTHER SUPPORT	OF CURRENT PROJECT SEE GF	PG II.D.7.j.)					
L. AMOUNT OF THIS REQU	EST (J) or (J MINUS K)						3,828,819	\$
M. COST-SHARING: PROPO	SED LEVEL	\$	AGREED LEVEL IF DIFF	ERENT: \$				
PI/PD TYPED NAME AND	GNATURE*	11/11/1	DATE				FOR NSF USE ONLY	
Andrew J. Lankfo	rd	Audion S. Lombled				INE	DIRECT COST RATE VERIFI	CATION
ORG. REP. TYPED NAME		hada fi ladded ~ Roimo S	DATE		Date C	Checked	Date of Rate Sheet	Initials-ORG
Allison Ramos	aller	~ ramos						

Budget Justification University of California, Irvine CUMULATIVE

B.2	Engineering and Technical Salaries: Salaries for Muon & TDAQ M&O and TDAQ Upgrade.	\$2,297,181
С	Fringe @ 29-33% of Base \$2,297,182	\$667,306
E	Travel: Foreign: Engineers to ATLAS meetings and/or conferences	\$21,237
G.1	Materials & Supplies: Electronics components, laboratory tools, computer supplies	\$47,714
G.6	Other: Shop charges, special handling shipping & mailing	\$5,309
I	Indirect Costs @ 26% (off-campus rate) of Direct costs \$3,038,745	\$790,074
J	Total Direct and Indirect Costs	\$3,828,819

PROPOSAL BUDG	ET	E <u>AR</u>	FO	R NSF USE ONI	Y
ORGANIZATION		PRC	POSAL	NO. DURAT	ON (month
Trustees of Boston University				Propose	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.	
John M Butler					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed nths	Funds Requested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	proposer	(if differen
1. John M Butler - Prof	0.00	0.00	0.00	\$ (\$
2. James T Shank - Research Prof	0.00)
3. Saul Youssef - Research Assoc Prof	12.00	0.00	0.00	113,882	2
4.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)					•
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	12.00	0.00	0.00	113,882	2
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		
 (0) POST DOCTORAL SCHOLARS (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 	0.00				
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 3. (0) GRADUATE STUDENTS	17.03	0.00	0.00	101,073	
4. (0) UNDERGRADUATE STUDENTS					
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY))
6. (0) OTHER					
TOTAL SALARIES AND WAGES (A + B)				214,955	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				55,028	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				269,983	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	ING \$5.0	000.)			
TOTAL EQUIPMENT					
				369,160	1
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	5)		<u>369,16(</u> 4,00(
	SSIONS	;))
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	;)		4,000	1
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS	;)		4,000	1
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS	;)		4,000)
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS	;)		4,000	1
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	i) 		4,000	1
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0	SSIONS	;)		4,000	1
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER		, 		4,00(5,00(
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR		, 	5	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS		, 	3	4,00(5,00())))))))))
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES		, 	3	4,000 5,000	1 2 3 4 5 5 5 6 6 7
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		, 	3	4,00(5,00(Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		, 	6	4,00(5,00(5,00((5,00((1 2 3 4 5 5 6 7 7 7 8
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		, 	5		1 2 3 4 5 5 6 7 7 7 8 9
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		, 	S		Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		, 	<u>5</u>		Image: Constraint of the second sec
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		, 	S		Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		, 	3		Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		, 	S		Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 69841) (Cont. on Comments Page)		, 	3	4,00(5,00(5,00(5,00(((((((((((((((((((Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 69841) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A)		, 	3	4,00(5,00(5,00(5,00(((((((((((((((((((Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MDTC (Rate: 26.0000, Base: 6984		, 	3	4,00(5,00(5,00(5,00(((((((((((((((((((Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) MDTC (Rate: 26.0000, Base: 69841) (Cont. on Comments Page) TOTAL INDIRECT AND INDIRECT COSTS (H + I)		, 	3	4,00(5,00(5,00(0,000 5,000 0,000 653,143 149,857 803,000	Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 69841) (Cont. on Comments Page) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN			4,00(5,00(5,00(5,00(((((((((((((((((((Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 69841) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN		NT \$	4,00(5,00(5,00(5,00(0(0(0(0(0(0(0(0(0(0(0(0(Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 69841) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN		NT \$ FOR 1	4,00(5,00(5,00((5,00(((((((((((((((((((Image: state
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 26.0000, Base: 69841) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR I	4,00(5,00(5,00(5,00(0(0(0(0(0(0(0(0(0(0(0(0()

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC (Rate: 61.5000, Base 214143)

PROPOSAL BUDG	ET		FOF	R NSF USE ONL	Y
ORGANIZATION		PRC	POSAL	NO. DURATIO	ON (month
Trustees of Boston University				Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	NARD N	O	
John M Butler					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Requested By proposer	granted by N (if differen
1. John M Butler - Prof	0.00	0.00	0.00	\$0	\$
2. James T Shank - Research Prof	0.00		0.00		
3. Saul Youssef - Research Assoc Prof	12.00	0.00	0.00	117,298	
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	12.00	0.00	0.00	117,298	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0	
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	17.63	0.00	0.00	104,105	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				221,403	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				56,679	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				278,082	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	ING \$5,0	000.)			
T2 CPU Upgrade		\$1	00,000		
T2 Storage Upgrade		1	54,465		
TDAQ R&D		1	25,000		
TOTAL EQUIPMENT			-	379,465	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	5)		<u>379,465</u> 4,000	
	SSIONS	;)			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	;)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS	;)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS	;)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS	;)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	;)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 1. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		3)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS	;)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 0			3	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 4. OTHER 1. SUPSISTENCE 4. OTHER 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 1. SUPPORT SUPPORT COSTS 1. SUPSISTENCE 1. SUPSISTENCE 1. SUPPORT SUPPORT COSTS 1. SUPSISTENCE 1. SUPPORT SUPPORT COSTS 1. SUPSISTENCE 1. SUPPORT SUPPORT COSTS 1. SUPPORT			3	4,000 5,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3	4,000 5,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3	4,000 5,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES			6	4,000 5,000 0 4,381	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)			3	4,000 5,000 0 4,381 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3	4,000 5,000 0 4,381 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3	4,000 5,000 0 4,381 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3	4,000 5,000 0 4,381 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3	4,000 5,000 0 4,381 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>	4,000 5,000 0 4,381 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			3	4,000 5,000 0 4,381 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 71937) (Cont. on Comments Page)			<u> </u>	4,000 5,000 0 4,381 0 0 0 0 0 4,381 670,928	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 71937) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A)			3	4,000 5,000 0 4,381 0 0 0 0 0 4,381 670,928 153,712	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 71937) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) . TOTAL DIRECT AND INDIRECT COSTS (H + I)			3	4,000 5,000 4,381 0 0 0 0 0 4,381 670,928 153,712 824,640	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			<u> </u>	4,000 5,000 4,381 0 0 0 0 0 0 4,381 670,928 153,712 824,640 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 71937) (Cont. on Comments Page) OTAL INDIRECT AND INDIRECT COSTS (H + I)	TICIPAN			4,000 5,000 4,381 0 0 0 0 0 4,381 670,928 153,712 824,640	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 71937) (Cont. on Comments Page) IOTAL INDIRECT COSTS (F&A) . TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING	TICIPAN		NT \$	4,000 5,000 4,381 0 0 0 0 0 0 4,381 670,928 153,712 824,640 \$ 824,640	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 71937) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) . TOTAL DIRECT AND INDIRECT COSTS (H + I) C. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN		NT \$ FOR N	4,000 5,000 0 4,381 0 0 0 0 0 4,381 670,928 153,712 824,640 \$ 824,640 \$ 824,640	\$
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G)			NT \$ FOR N ECT COS	4,000 5,000 4,381 0 0 0 0 0 0 4,381 670,928 153,712 824,640 \$ 824,640	\$

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 61.5000, Base 219526)

PROPOSAL BUDG	ET		FOF	R NSF USE ONL	Y
ORGANIZATION		PRC	POSAL	NO. DURATIO	DN (month
Trustees of Boston University				Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	VARD N	O.	
John M Butler					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths	Funds Requested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	proposer	granted by N (if differen
1. John M Butler - Prof	0.00	0.00	0.00	\$0	\$
2. James T Shank - Resaerch prof	0.00	0.00	0.00	0	
3. Saul Youssef - Research Assoc Prof	12.00	0.00	0.00	120,817	
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	12.00	0.00	0.00	120,817	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	17.63	0.00	0.00	107,229	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				228,046	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				58,380	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				286,426	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED		• ´			
T2 CPU upgrade			00,000		
T2 storage upgrade			53,600		
TDAQ R&D					
		1	25,000		
			25,000		
TOTAL EQUIPMENT			25,000	378,600	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS		25,000	4,000	
	SSIONS		25,000	· · · · ·	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS		25,000	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS		25,000	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS		25,000	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 0	ESSIONS		25,000	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS		25,000	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0			25,000	4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0		;)		4,000 5,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR		;)		4,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS		;)		4,000 5,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 5. OTHER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 5. OTHER 5. OTHE		;)		4,000 5,000 0 4,390	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		;)		4,000 5,000 0 4,390 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		;)		4,000 5,000 0 4,390 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		;)		4,000 5,000 0 4,390 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		;)		4,000 5,000 0 4,390 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		;)		4,000 5,000 0 4,390 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		;)		4,000 5,000 5,000 0 4,390 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)		4,000 5,000 0 4,390 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		;)		4,000 5,000 5,000 0 4,390 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 74095) (Cont. on Comments Page)		;)		4,000 5,000 5,000 0 4,390 0 0 0 0 0 4,390 678,416	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 74095) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A		;)		4,000 5,000 5,000 0 4,390 0 0 0 0 0 4,390 678,416 158,084	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MT		;)		4,000 5,000 5,000 0 4,390 0 0 0 0 0 0 4,390 678,416 158,084 836,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 74095) (Cont. on Comments Page) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS		;)		4,000 5,000 5,000 0 4,390 0 0 0 0 0 0 0 0 0 4,390 678,416 578,416 158,084 836,500 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 74095) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN		ð 	4,000 5,000 5,000 0 4,390 0 0 0 0 0 0 4,390 678,416 158,084 836,500	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 74095) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN		S S NT \$	4,000 5,000 0 4,390 0 0 0 0 0 0 4,390 678,416 58,084 836,500 \$ 836,500	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 74095) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN	DIFFEREI	5 5 	4,000 5,000 0 4,390 0 0 0 0 0 0 4,390 678,416 578,416 578,416 578,416 578,416 578,416 578,416 578,416 578,416 578,416 578,500 578,500 578,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 74095) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		DIFFEREI	S NT \$ FOR N CT COS	4,000 5,000 0 4,390 0 0 0 0 0 0 4,390 678,416 58,084 836,500 \$ 836,500	

3 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 61.5000, Base 225722)

IO. DURATIC Proposed	
Proposed	N (month
	Grante
Funds Requested By	Funds granted by N
proposer	(if differen
6 O	\$
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124,442	
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4,000 5,000 5,000 0 1,115 0 0 0 0 0 0 0 0 0 1,115 688,006 160,564 848,570 0 5 848,570	
	0

4 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 61.5000, Base 228816)

PROPOSAL BUDG	ET Y		FOF	R NSF USE O	NLY
ORGANIZATION		PRC	POSAL	NO. DURA	TION (mon
Trustees of Boston University		_		Propo	sed Grant
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	VARD N	O.	
John M Butler					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed hths	Funds Requested By	Funds granted by
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	proposer	(if differe
1. John M Butler - Prof	0.00		0.00	\$	0\$
2. James T Shank - Research Prof	0.00	0.00	0.00		0
3. Saul Youssef - Research Assoc Prof	12.00	0.00	0.00	128,1	75
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	12.00	0.00	0.00	128,1	75
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	17.63	0.00	0.00	113,7	
3. (0) GRADUATE STUDENTS					0
4. (0) UNDERGRADUATE STUDENTS					0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0
6. (0) OTHER					0
TOTAL SALARIES AND WAGES (A + B)				241,9	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				61,9	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS $(A + B + C)$				303,8	64
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED		. '			
T2 CPU upgrade			00,000		
T2 storage upgrade			57,283		
TDAQ R&D					
		1	25,000		
		1	25,000		
			25,000	382,2	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS		25,000	4,0	00
	SSIONS		25,000		00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS		25,000	4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS		25,000	4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS		25,000	4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SSIONS		25,000	4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS		25,000	4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SSIONS		25,000	4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CO 2. TRAVEL CO 3. SUBSISTENCE 4. OTHER CO		;)		4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR		;)		4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS		;)		4,0	00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER OF PARTICIPANTS 5. OTHER DIRECT COSTS 5. OTHER DIRE		;)		4,0	00 00 00 00 00 00 00 00 00 00 00 00 00
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		;)		4,0	00 00 0 0 47 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		;)		4,0	00 00 0 0 0 47 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		;)		4,0	00 00 0 0 0 47 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		;)		4,0	00 00 00 0 0 47 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		;)		4,0 5,0	00 00 00 0 0 47 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		;)		4,0 5,0	00 00 00 0 0 47 0 0 0 0 0 0 0 0 0 0 0 47
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)		4,0 5,0	00 00 00 0 0 47 0 0 0 0 0 0 0 0 0 0 0 47
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		;)		4,0 5,0	00 00 00 0 0 47 0 0 0 0 0 0 0 0 0 0 0 47
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 78603) (Cont. on Comments Page)		;)		4,0 5,0 7 7 695,8	00 00 00 0 0 47 0 0 0 0 0 0 0 0 0 0 0 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN		;)		4,0 5,0 7 7 695,8 164,9	00 00 00 0 0 47 0 0 0 0 0 0 0 47 94 66
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 78603) (Cont. on Comments Page) TOTAL INDIRECT AND INDIRECT COSTS (H + I) </td <td></td> <td>;)</td> <td></td> <td>4,0 5,0 7 7 695,8</td> <td>00 00 00 0 0 47 0 0 0 0 47 94 94 666 60</td>		;)		4,0 5,0 7 7 695,8	00 00 00 0 0 47 0 0 0 0 47 94 94 666 60
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1 3 CONSULTANT SERVICES 4 COMPUTER SERVICES 5 SUBAWARDS 6 OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1 INDIRECT COSTS (F&A) J TOTAL DIRE		;)		4,0 5,0 7 7 695,8 164,9 860,8	00 00 00 47 0 0 0 0 47 94 94 666 60 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 78603) (Cont. on Comments Page) TOTAL LINDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN		<u>}</u>	4,0 5,0 7 7 695,8 164,9	00 00 00 47 0 0 0 0 47 94 94 666 60 0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 AGREED LEVEL \$ 0 AGREED LEVEL	TICIPAN		S NT \$	4,0 5,0 7 7 695,8 164,9 860,8 \$ 860,8	00 00 00 47 0 0 0 0 0 0 0 47 94 94 66 60 60 8 5
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 78603) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN		5 5 	4,0 5,0 7, 695,8 164,9 860,8 \$ 860,8	00 00 00 0 0 47 0 0 0 0 0 0 0 0 0 47 94 94 94 94 94 94 94 94 94 94 94 94 94
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 78603) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			S NT \$ FOR N CT COS	4,0 5,0 7 7 695,8 164,9 860,8 \$ 860,8	00 00 00 0 0 47 0 0 0 0 0 0 0 0 0 47 94 94 94 94 94 94 94 94 94 94 94 94 94

5 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 61.5000, Base 235007)

PROPOSAL BUDG	ET		FOF	R NSF U	JSE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIC	DN (monthe
Trustees of Boston University					Proposed	Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
John M Butler	1	NSE Eurod	od			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Fund Person-mor		Reque	unds ested By	Funds granted by N
	CAL	ACAD	SUMR		poser	(if different
1. John M Butler - Prof	0.00		0.00		0	\$
2. James T Shank - Research prof	0.00		0.00		0	
3. Saul Youssef - Research Assoc Prof 4.	60.00	0.00	0.00		604,614	
4. 5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	60.00		0.00		604,614	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	00.00	0.00	0.00		004,014	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (10) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	88.15		0.00		536,608	
3. (0) GRADUATE STUDENTS	00.15	0.00	0.00		<u>000,000</u> 0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				1 .	141,222	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					292,152	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					433,374	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS		92,380	1,1	<u>892,380</u> 20,000	
	ESSIONS	,.	92,300	1,		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	,.	92,300	1,1	20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS	,.	92,300	1,1	20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS	,.	92,300	1,1	20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	,.	92,300	1,1	20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS	,.	92,300	1,1	20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS	,.	92,300	1,1	20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0		;)		1,1	20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0		;)		1,1	20,000 25,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OU TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES		;)		1,1	20,000 25,000 0 15,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		;)			20,000 25,000 0 15,633 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		;)		1,1	20,000 25,000 0 15,633 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		;)		1,1	20,000 25,000 0 15,633 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		;)		1,1	20,000 25,000 0 15,633 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		;)		1,1	20,000 25,000 0 15,633 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		;)			20,000 25,000 25,000 0 15,633 0 0 0 0 0 15,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)			20,000 25,000 0 15,633 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		;)			20,000 25,000 25,000 0 15,633 0 0 0 0 0 15,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		;)		3,5	20,000 25,000 25,000 0 15,633 0 0 0 0 0 15,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN		;)		3,;	20,000 25,000 25,000 0 15,633 0 0 0 0 15,633 386,387	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		;)		3,;	20,000 25,000 25,000 0 15,633 0 0 0 0 0 15,633 386,387 787,183	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS		;)		3,;	20,000 25,000 25,000 0 15,633 0 0 0 0 15,633 386,387 787,183 173,570	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3,;	20,000 25,000 25,000 0 15,633 0 0 0 0 15,633 386,387 787,183 173,570 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			5 	3,3	20,000 25,000 25,000 0 15,633 0 0 0 0 15,633 386,387 787,183 173,570 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			S NT \$ FOR N	3,: 4,: \$4,: NSF USI	20,000 25,000 25,000 0 15,633 0 0 0 0 15,633 386,387 787,183 173,570 0 173,570	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

PROPOSAL BUDGE	ĒT	FOR NSF USI			R NSF USE ON	NSF USE ONLY		
ORGANIZATION		PROPO	SAL NO.			ON (MONTHS)		
Trustees of Boston University					Proposed	Granted		
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR James T. Shank		A'	WARD N	0.				
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates		NSF Funded			Funds	Funds		
(List each separately with title; A.7 show number in brackets)			erson-mo		Requested By	Granted By NSF		
		CAL	ACAD	SUMR	Proposer	(If Different)		
1. Research Associate Professor Saul Youssef		12.0			113,882			
2.	····							
3.								
4								
6.() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)								
7. (1) TOTAL SENIOR PERSONNEL (1-5)		12.0			113,882			
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)								
1.() POST DOCTORAL ASSOCIATES								
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		6.0			45,467			
3.() GRADUATE STUDENTS								
4.() UNDERGRADUATE STUDENTS								
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)								
6.() OTHER					450 0.40			
TOTAL SALARIES AND WAGES (A+B)					159,349			
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					40,793			
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	ING \$5 000)				200,142			
	MNG \$5,000.7							
T2 CPU upgrade \$100,000								
T2 storage upgrade \$154,160								
TOTAL EQUIPMENT					254,160			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIC	<u>)NS)</u>				4,000			
2. FOREIGN					5,000			
F. PARTICIPANT SUPPORT COSTS		·····						
1. STIPENDS \$								
2. TRAVEL								
3. SUBSISTENCE								
4. OTHER								
() TOTAL PARTICIPANT COSTS								
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES					5,000			
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION								
3. CONSULTANT SERVICES								
4. COMPUTER SERVICES								
5. SUBAWARDS								
6. OTHER								
TOTAL OTHER DIRECT COSTS	····.				5,000			
H. TOTAL DIRECT COSTS (A THROUGH G)					468,302			
I. INDIRECT COSTS (SPECIFY RATE AND BASE)	¢044440							
61.5% of MTDC,	\$214,142				424.000			
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)		·····			<u>131,698</u> 600,000			
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS					000,000			
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					600,000			
	AGREED LEVEL IF	DIFFERE	NT \$			L		
	DATE		· · · ·	FO	R NSF USE ON	LÝ		
James T. Shank			INE	DIRECT C	OST RATE VER	RIFICATION		
ORG. REP. TYPED NAME & SIGNATURE Sillian Emmons	DATE	Date Ch	ecked	Date of F	Rate Sheet	Initials-ORG		
Gillian Emmons Mun human	12 21/2010	L		l				

1 * ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

BUDGET JUSTIFICATION BOSTON UNIVERSITY

The following budget justification explains the planned allocation of funding for the period February 1, 2012--January 31, 2013.

- A. SENIOR PERSONNEL. Proposed compensation is consistent with that paid to other personnel engaged in similar work both within and outside Boston University.
- A1. Research faculty The Boston University PI, James Shank, is supported primarily by the University and by Task A of our Department of Energy HEP grant. Salary support for Dr. Shank is not requested in this proposal. Twelve months' salary per year, including an annual estimated merit increase of 3% effective September 1, is requested for Associate Research Professor Saul Youssef to cover his full-time effort on Tier 2 support.

B. OTHER PERSONNEL

- B2. Computing professionals. We request 6 months of support for A. Abaris, who runs the CPU and disk systems for this research. We estimate merit increases of 3% per year.
- C. FRINGE BENEFITS. Benefits are requested at the rate of 25.6% of professional salaries. This rate is in accordance with Boston University's rate agreement with the Department of Health and Human Services dated December 21, 2009.
- D. PERMANENT EQUIPMENT. Equipment funds are requested for upgrades as follows:

T2 CPU upgrade	\$100,000
T2 storage upgrade	\$154,160

E. TRAVEL AND SUBSISTENCE. Our domestic travel budget of \$4,000 will support trips to participate in ATLAS, Open Science Grid, and other computing grid meetings. We estimate approximately 5 such trips during the coming budget period.

Our foreign travel budget of \$5,000 will support trips to CERN for ATLAS and grid meetings. We estimate approximately 2 such trips during the coming budget period.

- G. OTHER DIRECT COSTS.
- G1. Materials and supplies -- The budgeted funds of \$5,000 will be used for the purchase of research supplies, including software licenses, distribution, media, and backup.

SUMMARY

PROPOSAL BUDGET		FOR NSF USE ONLY					
ORGANIZATION		PROPO	SAL NO.:		DURATION (MONTHS		
Trustees of Boston University					Proposed	Granted	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		A	WARD N	0.			
James T. Shank							
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates		۲ ا	ISF Funde	d	Funds	Funds	
(List each separately with title; A.7 show number in brackets)		F	erson-mos	5.	Requested By	Granted By NSF	
		CAL	ACAD	SUMR	Proposer	(If Different)	
Research Associate Professor Saul Youssef		12.0			117,298		
2.							
3.							
4							
5.							
6.() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)							
7. (1) TOTAL SENIOR PERSONNEL (1-5)		12.0			117,298		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		ļ					
1.() POST DOCTORAL ASSOCIATES							
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		6.0			46,831		
3.() GRADUATE STUDENTS							
4.() UNDERGRADUATE STUDENTS							
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)							
6.() OTHER					· · · · · · · · · · · · · · · · · · ·		
TOTAL SALARIES AND WAGES (A+B)					164,129		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					42,017		
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)					206,146	1	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDIN	C \$5 000)				200,140		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EACEEDING	G \$5,000.)						
T2 CPU upgrade \$100,000							
T2 storage upgrade \$154,465							
TOTAL EQUIPMENT					254,465		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS					4,000		
2. FOREIGN	5/				5,000		
					5,000		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$							
2. TRAVEL							
3. SUBSISTENCE							
4. OTHER							
() TOTAL PARTICIPANT COSTS							
G. OTHER DIRECT COSTS					· · · · · · · · · · · · · · · · · · ·		
1. MATERIALS AND SUPPLIES					4,381		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					-1,001		
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS							
6. OTHER							
TOTAL OTHER DIRECT COSTS					4,381		
H. TOTAL DIRECT COSTS (A THROUGH G)					473,992		
I. INDIRECT COSTS (SPECIFY RATE AND BASE)							
61.5% of MTDC,	\$219,527				,		
TOTAL INDIRECT COSTS	•				135,008		
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)					609,000		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S	EE GPG II D 7 ii						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					609,000		
	REED LEVEL IF I		NT ¢				
			141 P		R NSF USE ON	v	
PI/PD TYPED NAME & SIGNATURE * DA James T. Shank			INIT		OST RATE VER		
	TE. 4	Date Ch				initials-ORG	
Gillian Emmons	TE 2 21 20 0		eureu	Date of F	ale Sheet		
			0.010111				

1 * ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

BUDGET JUSTIFICATION BOSTON UNIVERSITY

The following budget justification explains the planned allocation of funding for the period February 1, 2013--January 31, 2014.

- A. SENIOR PERSONNEL. Proposed compensation is consistent with that paid to other personnel engaged in similar work both within and outside Boston University.
- A1. Research faculty The Boston University PI, James Shank, is supported primarily by the University and by Task A of our Department of Energy HEP grant. Salary support for Dr. Shank is not requested in this proposal. Twelve months' salary per year, including an annual estimated merit increase of 3% effective September 1, is requested for Associate Research Professor Saul Youssef to cover his full-time effort on Tier 2 support.

B. OTHER PERSONNEL

- B2. Computing professionals. We request 6 months of support for A. Abaris, who runs the CPU and disk systems for this research. We estimate merit increases of 3% per year.
- C. FRINGE BENEFITS. Benefits are requested at the rate of 25.6% of professional salaries. This rate is in accordance with Boston University's rate agreement with the Department of Health and Human Services dated December 21, 2009.
- D. PERMANENT EQUIPMENT. Equipment funds are requested for upgrades as follows:

T2 CPU upgrade	\$100,000
T2 storage upgrade	\$154,465

E. TRAVEL AND SUBSISTENCE. Our domestic travel budget of \$4,000 will support trips to participate in ATLAS, Open Science Grid, and other computing grid meetings. We estimate approximately 5 such trips during the coming budget period.

Our foreign travel budget of \$5,000 will support trips to CERN for ATLAS and grid meetings. We estimate approximately 2 such trips during the coming budget period.

- G. OTHER DIRECT COSTS.
- G1. Materials and supplies -- The budgeted funds of \$4,381 will be used for the purchase of research supplies, including software licenses, distribution, media, and backup.

SUMMARY PROPOSAL BUDGET

PROPOSAL BUDG	ET		FOR NSF USE ONLY					
ORGANIZATION			PROPOS	SAL NO.:		DURATION (MONTHS)		
Trustees of Boston University						Proposed	Grante	ed
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR James T. Shank			AV	VARD NC).			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates			N	SF Funded		Funds	Funds	5
(List each separately with title; A.7 show number in brackets)		-		erson-mos.	1	Requested By	Granted By	
			CAL	ACAD	SUMR	Proposer	(If Differe	ent)
1. Research Associate Professor Saul Youssef			12.0			120,817		
2.								
3. 4.		······						
4. 5.								
6.) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)								
7. (1) TOTAL SENIOR PERSONNEL (1-5)			12.0			120,817		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)								
1.() POST DOCTORAL ASSOCIATES								
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			6.0			48,236		
3.() GRADUATE STUDENTS								
4.() UNDERGRADUATE STUDENTS								
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)								
6.() OTHER TOTAL SALARIES AND WAGES (A+B)						169,053		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						43.278		
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)						212,331		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	DING \$5.00	0.)				2.2,007		
T2 CPU upgrade \$100,000								
T2 storage upgrade \$153,600					ļ	0.000		
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIC						253,600 4,000		
2. FOREIGN	JN3)					5,000		
							••••••••••••••••••••••••••••••••••••••	
F. PARTICIPANT SUPPORT COSTS					1			
1. STIPENDS <u>\$</u>								
2. TRAVEL								
3. SUBSISTENCE								
4. OTHER								
() TOTAL PARTICIPANT COSTS								
G. OTHER DIRECT COSTS							· · · · · · · · · · · · · · · · · · ·	
1. MATERIALS AND SUPPLIES						4,390		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION								
3. CONSULTANT SERVICES 4. COMPUTER SERVICES								
5. SUBAWARDS								
6. OTHER								
TOTAL OTHER DIRECT COSTS						4,390		
H. TOTAL DIRECT COSTS (A THROUGH G)						479,321		
1. INDIRECT COSTS (SPECIFY RATE AND BASE)								
61.5% of MTDC,	\$	225,721						
TOTAL INDIRECT COSTS						138,819		
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)						<u>61</u> 8,140		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT	S SEE GP	G II.D.7.j)						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						618,140		
	AGREED L	EVEL IF		NT\$				
	DATE			IND		R NSF USE ON		
	DATE		Date Che			OST RATE VE Rate Sheet	Initials-ORG	
ORG. REP. TYPED NAME & SIGNATURE Gillian Emmons	Talal	0			- 4.0 011			
		4 * 51 5		0.010111				DOFT

1 1 * ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

BUDGET JUSTIFICATION BOSTON UNIVERSITY

The following budget justification explains the planned allocation of funding for the period February 1, 2014--January 31, 2015.

- A. SENIOR PERSONNEL. Proposed compensation is consistent with that paid to other personnel engaged in similar work both within and outside Boston University.
- A1. Research faculty The Boston University PI, James Shank, is supported primarily by the University and by Task A of our Department of Energy HEP grant. Salary support for Dr. Shank is not requested in this proposal. Twelve months' salary per year, including an annual estimated merit increase of 3% effective September 1, is requested for Associate Research Professor Saul Youssef to cover his full-time effort on Tier 2 support.

B. OTHER PERSONNEL

- B2. Computing professionals. We request 6 months of support for A. Abaris, who runs the CPU and disk systems for this research. We estimate merit increases of 3% per year.
- C. FRINGE BENEFITS. Benefits are requested at the rate of 25.6% of professional salaries. This rate is in accordance with Boston University's rate agreement with the Department of Health and Human Services dated December 21, 2009.
- D. PERMANENT EQUIPMENT. Equipment funds are requested for upgrades as follows:

T2 CPU upgrade	\$100,000
T2 storage upgrade	\$153,600

E. TRAVEL AND SUBSISTENCE. Our domestic travel budget of \$4,000 will support trips to participate in ATLAS, Open Science Grid, and other computing grid meetings. We estimate approximately 5 such trips during the coming budget period.

Our foreign travel budget of \$5,000 will support trips to CERN for ATLAS and grid meetings. We estimate approximately 2 such trips during the coming budget period.

- G. OTHER DIRECT COSTS.
- G1. Materials and supplies -- The budgeted funds of \$4,390 will be used for the purchase of research supplies, including software licenses, distribution, media, and backup.

SUMMARY PROPOSAL BUDGET

PROPOSAL BUDG	ET		FOR NSF USE ONLY				LY
ORGANIZATION			PROPOSAL NO .:				ON (MONTHS)
Trustees of Boston University						Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR James T. Shank				NARD NC).		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates			N	ISF Funded		Funds	Funds
(List each separately with title; A.7 show number in brackets)				erson-mos.		Requested By	Granted By NSF
			CAL	ACAD	SUMR	Proposer	(If Different)
Research Associate Professor Saul Youssef			12.0			124,442	
2							
3.						· · · · · · · · · · · · · · · · · · ·	
4. 5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)							
7. (1) TOTAL SENIOR PERSONNEL (1-5)			12.0			124,442	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						· · · · · ·	
1.() POST DOCTORAL ASSOCIATES							
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			6.0			49,683	
3.() GRADUATE STUDENTS							
4.() UNDERGRADUATE STUDENTS							
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)							
6.() OTHER							
TOTAL SALARIES AND WAGES (A+B)						174,125	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						44,576	
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)						218,701	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	DING \$5,00	0.)					
T2 CPU upgrade \$100,000							
T2 storage upgrade \$157,872						257,872	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIC						4,000	
2. FOREIGN	51137					5,000	
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$							
2. TRAVEL							
3. SUBSISTENCE							
4. OTHER							
() TOTAL PARTICIPANT COSTS							T T
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES						1,115	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS							
6. OTHER							
TOTAL OTHER DIRECT COSTS						1,115	
H. TOTAL DIRECT COSTS (A THROUGH G)						486,688	
I. INDIRECT COSTS (SPECIFY RATE AND BASE)						÷	
61.5% of MTDC,	\$2	228,816					
TOTAL INDIRECT COSTS						140,722	
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)						627,410	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT	S SEE GPO	G II.D.7.j)					
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						627,410	
M. COST SHARING: PROPOSED LEVEL \$	AGREED L	EVEL IF (DIFFERE	NT \$			
	DATE					R NSF USE ON	
James T. Shank						OST RATE VE	
ORG. REP. TYPED NAME & SIGNATURE	DATE		Date Ch	ecked [Date of F	Rate Sheet	Initials-ORG
Gillian Emmons Chillian Comme	12/21	10 1 * EL E					REVISED BUDGET

1 * ELECTRONIC SIGNATURES REQUIRED ł יטה הב

BUDGET JUSTIFICATION BOSTON UNIVERSITY

The following budget justification explains the planned allocation of funding for the period February 1, 2015--January 31, 2016.

- A. SENIOR PERSONNEL. Proposed compensation is consistent with that paid to other personnel engaged in similar work both within and outside Boston University.
- A1. Research faculty The Boston University PI, James Shank, is supported primarily by the University and by Task A of our Department of Energy HEP grant. Salary support for Dr. Shank is not requested in this proposal. Twelve months' salary per year, including an annual estimated merit increase of 3% effective September 1, is requested for Associate Research Professor Saul Youssef to cover his full-time effort on Tier 2 support.

B. OTHER PERSONNEL

- B2. Computing professionals. We request 6 months of support for A. Abaris, who runs the CPU and disk systems for this research. We estimate merit increases of 3% per year.
- C. FRINGE BENEFITS. Benefits are requested at the rate of 25.6% of professional salaries. This rate is in accordance with Boston University's rate agreement with the Department of Health and Human Services dated December 21, 2009.
- D. PERMANENT EQUIPMENT. Equipment funds are requested for upgrades as follows:

T2 CPU upgrade	\$100,000
T2 storage upgrade	\$157,872

E. TRAVEL AND SUBSISTENCE. Our domestic travel budget of \$4,000 will support trips to participate in ATLAS, Open Science Grid, and other computing grid meetings. We estimate approximately 5 such trips during the coming budget period.

Our foreign travel budget of \$5,000 will support trips to CERN for ATLAS and grid meetings. We estimate approximately 2 such trips during the coming budget period.

- G. OTHER DIRECT COSTS.
- G1. Materials and supplies -- The budgeted funds of \$1,115 will be used for the purchase of research supplies, including software licenses, distribution, media, and backup.

SUMMARY PROPOSAL BUDGET

SUMMARY PROPOSAL BUDG	FT		,	FO	R NSF USE ONL	v	
ORGANIZATION	<u>te </u>	PROPO	SAL NO.:		DURATION (MONTH		
Trustees of Boston University			0/12 110		Proposed	Granted	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		A	WARD N	0.			
James T. Shank							
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates			NSF Funde		Funds	Funds	
(List each separately with title; A.7 show number in brackets)			Person-mo		Requested By	Granted By NS	
1. Research Associate Professor Saul Youssef		CAL 12.0	ACAD	SUMR	Proposer 128,175	(If Different)	
Research Associate Professor Saul Yousset		12.0			120,175		
3.							
4.							
5.					· · · · · · · · · · · · · · · · · · ·		
6.() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)							
7. (1) TOTAL SENIOR PERSONNEL (1-5)		12.0			128,175		
3. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					·		
.() POST DOCTORAL ASSOCIATES							
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		6.0			51,173		
B.() GRADUATE STUDENTS							
I.() UNDERGRADUATE STUDENTS							
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)						J	
6.()OTHER							
TOTAL SALARIES AND WAGES (A+B)	. <u> </u>				179,348		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)		· <u></u>			45,913		
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEE					225,261	1	
. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSI 2. FOREIGN	ONS)	·····			4,000 5,000		
PARTICIPANT SUPPORT COSTS							
1. STIPENDS <u>\$</u> 2. TRAVEL							
3. SUBSISTENCE							
4. OTHER							
() TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					747	T	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS							
6. OTHER			······				
TOTAL OTHER DIRECT COSTS					747		
1. TOTAL DIRECT COSTS (A THROUGH G)					492,291		
INDIRECT COSTS (SPECIFY RATE AND BASE)							
61.5% of MTDC,	\$235,	008			144,529		
					636,820		
. TOTAL DIRECT AND INDIRECT COSTS (H+i)) 7 i)			030,020		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	3 SEE GPG II.L				636,820		
	AGREED LEVE		NT ¢		000,020		
M. COST SHARING: PROPOSED LEVEL \$\$	DATE		φ	E0	R NSF USE ONL	×	
James T. Shank			INIT		COST RATE VERI	the second s	
	DATE	Date Ch				nitials-ORG	
GILLIE NAME & SIGNATURE	12/21/10				REQUIRED FOR I		

1 * ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

BUDGET JUSTIFICATION BOSTON UNIVERSITY

The following budget justification explains the planned allocation of funding for the period February 1, 2016--January 31, 2017.

- A. SENIOR PERSONNEL. Proposed compensation is consistent with that paid to other personnel engaged in similar work both within and outside Boston University.
- A1. Research faculty The Boston University PI, James Shank, is supported primarily by the University and by Task A of our Department of Energy HEP grant. Salary support for Dr. Shank is not requested in this proposal. Twelve months' salary per year, including an annual estimated merit increase of 3% effective September 1, is requested for Associate Research Professor Saul Youssef to cover his full-time effort on Tier 2 support.

B. OTHER PERSONNEL

- B2. Computing professionals. We request 6 months of support for A. Abaris, who runs the CPU and disk systems for this research. We estimate merit increases of 3% per year.
- C. FRINGE BENEFITS. Benefits are requested at the rate of 25.6% of professional salaries. This rate is in accordance with Boston University's rate agreement with the Department of Health and Human Services dated December 21, 2009.
- D. PERMANENT EQUIPMENT. Equipment funds are requested for upgrades as follows:

T2 CPU upgrade	\$100,000
T2 storage upgrade	\$157,283

E. TRAVEL AND SUBSISTENCE. Our domestic travel budget of \$4,000 will support trips to participate in ATLAS, Open Science Grid, and other computing grid meetings. We estimate approximately 5 such trips during the coming budget period.

Our foreign travel budget of \$5,000 will support trips to CERN for ATLAS and grid meetings. We estimate approximately 2 such trips during the coming budget period.

- G. OTHER DIRECT COSTS.
- G1. Materials and supplies -- The budgeted funds of \$747 will be used for the purchase of research supplies, including software licenses, distribution, media, and backup.

	[FO	R NSF USE ONL	1
ORGANIZATION	PROPC	PROPOSAL NO.:		DURATIO	N (MONTHS)
Trustees of Boston University		-		Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR James T. Shank	A	WARD NO) .		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates		NSF Funded	. <u></u>	Funds	Funds
(List each separately with title; A.7 show number in brackets)		Person-mos		Requested By	Granted By NS
	CAL	ACAD	SUMR	Proposer	(If Different)
Research Associate Professor Saul Youssef	60.0			604,614	
2					
3 4					
·		<u> </u>			
3.() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)					
7. (1) TOTAL SENIOR PERSONNEL (1-5)	60.0			604,614	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)				, ,	
1.() POST DOCTORAL ASSOCIATES					
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	30.0			241,390	
3.() GRADUATE STUDENTS					ļ
I.() UNDERGRADUATE STUDENTS					l
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)					
				940.004	·
TOTAL SALARIES AND WAGES (A+B) C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				846,004 216,577	
				1,062,581	
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,00				1,002,301	
T2 CPU upgrade 500,000					
T2 storage upgrade 777,380					
TOTAL EQUIPMENT				1,277,380	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				20,000	
2. FOREIGN	<u></u>			25,000	l
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$					
2. TRAVEL					
3. SUBSISTENCE				1 A.	
4. OTHER					
() TOTAL PARTICIPANT COSTS		· · · · · ·			T
G. OTHER DIRECT COSTS					<u> </u>
1. MATERIALS AND SUPPLIES				15,633	T
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				10,000	
3. CONSULTANT SERVICES					
					1
4. COMPUTER SERVICES					
4. COMPUTER SERVICES 5. SUBAWARDS			• • • •		
5. SUBAWARDS				· · · · · · · · · · · · · · · · · · ·	
5. SUBAWARDS 6. OTHER				15,633	
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			•••••	15,633 2,400,594	
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS					
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (SPECIFY RATE AND BASE)	123,214		· · · · · · · · · · · · · · · · · · ·		
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (SPECIFY RATE AND BASE)	123,214				
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (SPECIFY RATE AND BASE) 61.5% of MTDC, \$1	,123,214			2,400,594	
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (SPECIFY RATE AND BASE) 61.5% of MTDC, \$1 TOTAL INDIRECT COSTS				2,400,594 690,776	
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (SPECIFY RATE AND BASE) 61.5% of MTDC, \$1 TOTAL INDIRECT COSTS J. TOTAL DIRECT AND INDIRECT COSTS (H+I)				2,400,594 690,776	
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE)		ENT \$		2,400,594 690,776 3,091,370	
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) 61.5% of MTDC, \$1 TOTAL INDIRECT COSTS J. TOTAL DIRECT AND INDIRECT COSTS (H+I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GP L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING: PROPOSED LEVEL \$	G II.D.7.j)	ENT \$	FC	2,400,594 690,776 3,091,370	
5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (SPECIFY RATE AND BASE) 61.5% of MTDC, \$1 TOTAL INDIRECT COSTS J. TOTAL DIRECT AND INDIRECT COSTS (H+I) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GP L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING: PROPOSED LEVEL \$ AGREED	G II.D.7.j)	IND	IRECT (2,400,594 690,776 3,091,370 3,091,370 R NSF USE ONLY COST RATE VERI	

SUMMARY

1 1 * ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

PROPOSAL BUDGET	FOR NSF USE ONLY					
ORGANIZATION	PROPO	SAL NO.:		DURATION	(MONTHS)	
Trustees of Boston University]	Proposed	Granted	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	A	WARD N	0.	- <u> </u>		
John Butler A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates	<u> </u>	SF Funde		Funds	Funds	
(List each separately with title; A.7 show number in brackets)		Person-mos		Requested By	Granted By NSF	
(List each separately with title, A.7 show humber in blackets)	CAL	ACAD	SUMR	Proposer	(If Different)	
1.		1010	SOIVIN	Floposei	(ir Dinerent)	
2.	╂────					
3.	┼					
4.	┼────					
5.	+					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	╆				·	
7. () TOTAL SENIOR PERSONNEL (1-5)	+					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		L			·	
1.() POST DOCTORAL ASSOCIATES	<u> </u>					
	11.63			55 COC		
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	111.05	L		55,606		
3.() GRADUATE STUDENTS					i	
4.() UNDERGRADUATE STUDENTS						
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)						
6.() OTHER						
TOTAL SALARIES AND WAGES (A+B)				55,606		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				14,235		
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)				69,841		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					······································	
TDAQ R&D			1			
				115,000		
E. TRAVEL. 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						
2. FOREIGN						
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
4. OTHER						
						
() TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER		**********			· · · · · · · · · · · · · · · · · · ·	
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)				184,841		
I. INDIRECT COSTS (SPECIFY RATE AND BASE)				i <u>, , , , , , , , , , , , , , , , , , ,</u>	L,,,,,,,,	
			1	10.450	r	
TOTAL INDIRECT COSTS				18,159		
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)		·		203,000	ļ	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j)						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	203,000					
M. COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL IF	DIFFERE	NT \$				
PI/PD TYPED NAME & SIGNATURE * DATE			FO	R NSF USE ONLY		
John Butler 1 Dec. 2010	[INC		OST RATE VERIF		
ORG. REP. TYPED NAME & SIGNATURE () DATE	Date Ch				tials-ORG	
John Imbergamo din Sindergan 9 Dec 2010						
	ECTRONI	C SIGNA	TURES P	REQUIRED FOR R	EVISED BUDGET	

SUMMARY

PROPOSAL BUDGET	FOR NSF USE ONLY				
ORGANIZATION	PROPC	SAL NO.:	DURATION (MONTH		
Trustees of Boston University	<u>_</u>		Proposed	Granted	
PRINCIPA_INVESTIGATOR/PROJECT DIRECTOR John Butler		WARD NO.			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates		NSF Funded	Funds	Funds	
(List each separately with title; A.7 show number in brackets)	1	Person-mos.	Requested By	Granted By NSF	
	CAL	ACAD SUMR	Proposer	(If Different)	
1					
2					
3.					
<u>4.</u> 5.					
6.) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)		<u> </u>		-	
7. () TOTAL SENIOR PERSONNEL (1-5)					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1.() POST DOCTORAL ASSOCIATES					
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	11.63		57,274		
3.() GRADUATE STUDENTS					
4.() UNDERGRADUATE STUDENTS					
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)					
6.() OTHER					
TOTAL SALARIES AND WAGES (A+B)			57,274		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)			14,662		
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)			71,936		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.))				
TDAQ R&D					
TOTAL EQUIPMENT			125,000	1	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					
2. FOREIGN					
F. PARTICIPANT SUPPORT COSTS			4		
1. STIPENDS \$					
2. TRAVEL					
3. SUBSISTENCE					
4. OTHER					
				-T	
() TOTAL PARTICIPANT COSTS G. OTHER: DIRECT COSTS			[
1. MATERIALS AND SUPPLIES				<u>т</u>	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					
3. CONSULTANT SERVICES					
4. COMPUTER SERVICES					
5. SUBAWARDS					
6. OTHER					
TOTAL OTHER DIRECT COSTS					
H. TOTAL DIRECT COSTS (A THROUGH G)			196,936		
I. INDIRECT COSTS (SPECIFY RATE AND BASE)					
· ·	1.936				
TOTAL INDIRECT COSTS	,		18,704		
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)			215,640	1	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG I	I.D.7.j)		1		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			215,640		
M. COST SHARING: PROPOSED LEVEL \$ AGREED LE	VEL IF DIFFER	ENT \$			
PI/PD TYPED NAME & SIGNATURE * DATE		FC	OR NSF USE ONL	Y	
John Eutler 1 Dec. 2			COST RATE VER	FICATION	
ORG. REP. TYPED NAME & SIGNATURE	Date C	hecked Date of	Rate Sheet Ir	nitials-ORG	
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Senior Associate VP for Financial Affairs	1 * ELECTRON	IIC SIGNATURES	REQUIRED FOR	REVISED BUDGE	

PROPOSAL BUDG	JET	FOR NSF USE ONLY				
ORGANIZATION		PROPO	SAL NO.			(MONTHS)
Trustees of Boston University					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		A	WARD N	О.		
John Butler		 			_	_
A. SENICR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates			NSF Funde		Funds	Funds
(List each separately with title; A.7 show number in brackets)			Person-mo		Requested By	Granted By NSF
1.		CAL	ACAD	SUMR	Proposer	(If Different)
2.			<u> </u>			
3	· · ·	t	1			
3		†	1			
5.						
6.() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	t			,	
7. () TOTAL SENIOR PERSONNEL (1-5)	····					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1.() POST DOCTORAL ASSOCIATES						
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		11.63	1		58,993	
3.() GRADUATE STUDENTS			-			
4.() UNDERGRADUATE STUDENTS						
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)						
6.() OTHER						
TOTAL SALARIES AND WAGES (A+B)					58,993	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)	······································				15,102	
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)					74,095	
D. EQUIFMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEI	EDING \$5,000.)					L
	· •					
TE)AQ R&D						
TOTAL EQUIPMENT		<u> </u>			125,000	
E. TRAVIEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESS	IONS)					
2. FOREIGN						
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$						
2. TRAVEL						
3. SUEISISTENCE						
4. OTHER						<u></u>
() TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PLIBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						i
TOTAL OTHER DIRECT COSTS	• • • • • • • • • • • • •			· · · · ·		1
H. TOTAL DIRECT COSTS (A THROUGH G)					199,095	
I. INDIRECT COSTS (SPECIFY RATE AND BASE)	· · · · · · · · · · · · · · · · · · ·		<u></u>			ł
26.0% of MTDC,	\$74,095					
TOTAL INDIRECT COSTS	ψι +,030				19,265	
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)					218,360	<u> </u>
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT	TS SEE GPG II D 7 N				210,000	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					218,360	l
M. COST SHARING: PROPOSED LEVEL \$	AGREED LEVEL IF		NT ¢		210,000	1
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Senior Associate VP for Financial Affairs	1* ELE	CTRON	IC SIGNA	TURES		EVISED BUDGFT

PROPOSAL BUDGET	· [FO	R NSF USE ONLY	
ORGANIZATION		PROPO	SAL NO.			(MONTHS)
Trustees of Boston University					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR John Butler		A	WARD N	0.		
A. SENICR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates		NSF Funded			Funds	Funds
(List each separately with title; A.7 show number in brackets)			Person-mo		Requested By	Granted By NSF
(1	CAL	ACAD	SUMR	Proposer	(If Different)
1.						
2.						
3.						
4.						
5.						
6.() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)						
7. () TOTAL SENIOR PERSONNEL (1-5)			L			L
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)				r		
1.() POST DOCTORAL ASSOCIATES		44.00				
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		11.63			60,763	
3.() GRADUATE STUDENTS	· · · ·					
4.() UNDERGRADUATE STUDENTS						
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)						
6.() OTHER						
TOTAL SALARIES AND WAGES (A+B)					60,763	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)			<u> </u>		15,555	
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)					76,318	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDIN	IG \$5,000.)					
TDAQ R&D						
I DAQ RAD						
TOTAL EQUIPMENT					125,000	
E. TRAVIEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSION	S)				120,000	
2. FOREIGN			· · · · · · · · ·	·		
F. PARTICIPANT SUPPORT COSTS				•		
1. STIPENDS \$						
2. TRAVEL						
3. SUEISISTENCE						
4. OTHER						
						I
() TOTAL PARTICIPANT COSTS					····	L
G. OTHER DIRECT COSTS			·····			1
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)					201,318	
I. INDIRECT COSTS (SPECIFY RATE AND BASE)						
26.0% of MTDC,	\$76,318					
TOTAL INDIRECT COSTS					19,842	
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)					221,160	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS S	SEE GPG II.D.7.j)					
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					221,160	
M. COST SHARING: PROPOSED LEVEL \$ AG	REED LEVEL IF D	DIFFERE	NT \$			
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Senior Associate VP for Financial Affairs	1 * ELE	CTRONI	C SIGNA	TURES I	REQUIRED FOR R	EVISED BUDGET

PROPOSAL BUDGET			FO	R NSF USE ONLY	
ORGANIZATION	PROPO	SAL NO .:		DURATION	I (MONTHS)
Trustees of Boston University				Proposed	Granted
PRINCIPA_ INVESTIGATOR/PROJECT DIRECTOR John Butler	A	WARD N	0.		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates		NSF Funded		Funds	Funds
(List each separately with title; A.7 show number in brackets)		Person-mo		Requested By	Granted By NSF
	CAL	ACAD	SUMR	Proposer	(If Different)
1					
2.		··· ···			
3.					
<u>4.</u> 5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	-	1			
7. () TOTAL SENIOR PERSONNEL (1-5)					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					•
1.() POST DOCTORAL ASSOCIATES					
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	11.63			62,582	
3.() GRADUATE STUDENTS		•			İ
4.() UNDERGRADUATE STUDENTS					
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)					
6.() OTHER					
TOTAL SALARIES AND WAGES (A+B)				62,582	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				16,021	
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)				78,603	
D. EQUIFMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					·
TDAQ R&D					
				100.000	r
				125,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					
2. FOREIGN					I
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$					
2. TRAVEL					
3. SUBSISTENCE					
4. OTHER					
					1
() TOTAL PARTICIPANT COSTS					l
G. OTHER DIRECT COSTS					I
1. MATERIALS AND SUPPLIES					
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					
3. CONSULTANT SERVICES					
4. COMPUTER SERVICES					
5. SUBAWARDS					
				202 602	
H. TOTAL DIRECT COSTS (A THROUGH G)				203,603	1
I. INDIRECT COSTS (SPECIFY RATE AND BASE)	602				
•	,603				T
TOTAL INDIRECT COSTS				20,437	
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)		• • • • • • • • • • • • • • • • • • •		224,040	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.	U.7.j)	· · · ·		004.040	
		-		224,040	
M. COST SHARING: PROPOSED LEVEL \$ AGREED LEVI		=NI \$			
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		IC SIGNA	TURES	REQUIRED FOR F	EVISED BUDGET
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SUMMARY

PROPOSAL BUDG	ET			FO	R NSF USE ONLY	
ORGANIZATION		PROPO	SAL NO.:		DURATION	I (MONTHS)
Trustees of Boston University					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWARD NO.		р.		
John Butler A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and other Senior Associates			ISF Funde		Funds	Funds
(List each separately with title; A.7 show number in brackets)		1	erson-mo		Requested By	Granted By NSF
(List each separately with the, A.7 show humber in brackets)		CAL	ACAD	SUMR	Proposer	(If Different)
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2.		1			· · · · · · · · · · · · · · · · · · ·	
3.						
34						
5.						
6.() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)						
7. () TOTAL SENIOR PERSONNEL (1-5)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1.() POST DOCTORAL ASSOCIATES	······					
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		58.15			295,218	
3.() GRADUATE STUDENTS						
4.() UNDERGRADUATE STUDENTS						
5.() SECRETARIAL-CLERICAL (IF CHARGED DIRECTLY)						
6.() OTHER]		
TOTAL SALARIES AND WAGES (A+B)					295,218	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					75,575	
TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)					370,793	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEE	DING \$5,000.)					
TOTAL EQUIPMENT					615,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESS	ONS)					
_2. FOREIGN						
F. PARTICIPANT SUPPORT COSTS	· · · · · · · · · · · · · · · · · · ·					
1. STIFENDS \$						
3. SUBSISTENCE						
4. OTHER						· · · · · · · · · · · · · · · · · · ·
() TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)					985,793	
I. INDIRECT COSTS (SPECIFY RATE AND BASE)					·····	•
26.0% of MTDC,	\$370,793					
TOTAL INDIRECT COSTS					96,407	[
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)					1,082,200	
K. RESIDIJAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC	IS SEE GPG II D 7 i)		<u>.</u>		1,002,200	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					1,082,200	
M. COST SHARING: PROPOSED LEVEL \$	AGREED LEVEL IF	DIFFERF	NT \$.,	L
PI/PD TYPIED NAME & SIGNATURE *	DATE		Ψ	FÓ	R NSF USE ONLY	
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ORG. REP. TYPED NAME & SIGNATURE	DATE	Date Ch				ials-ORG
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Senior Associate VP for Financial Affairs		CTRONI	C SIGNA	TURES F	REQUIRED FOR R	EVISED BUDGET

BUDGET JUSTIFICATION BOSTON UNIVERSITY

The following budget justification explains budget for fiscal years 2012-2016, corresponding to the period February 1, 2012 – January 31, 2017.

A. SENIOR PERSONNEL.

- B. OTHER PERSONNEL. Proposed compensation is consistent with that paid to other personnel engaged in similar work both within and outside Boston University.
- B2. Other Professionals. We request 11.63 months of support annually for Z. Yan, the engineering physicist who devotes 100% of his effort to this project. Salary is based on the current rate, with estimated 3% increases effective annually on September 1.
- C. FRINGE BENEFITS. Benefits are requested at the rate of 25.6% of professional salaries. This rate is in accordance with Boston University's rate agreement with the Department of Health and Human Services dated December 21, 2009.
- D. EQUIPMENT. Development of an upgraded Level 1 muon trigger. Services will be provided by Boston University's Electronics Design Facility (EDF), currently charged at \$55/hour and \$38/hour for senior and junior engineer labor, respectively.) Budget amounts for FY2012 through FY2016 represent our best current estimate, based on experience.
- I. INDIRECT COSTS. Boston University's predetermined indirect cost rate for off-campus research is currently 26% of MTDC.

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF US	E ONL	Y
ORGANIZATION		PRC	POSAL	NO. D	URATIC	DN (mont
University of Chicago				Pi	roposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	0.		
Robert W Gardner						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths	Fund	ds ad By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Request propo	ser	granted by (if differen
1. Robert W Gardner - Senior Research Assoc	4.80	0.00	0.00	\$ 5	3,561	\$
2. James E Pilcher - Prof	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00	5	3,561	
3. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	52.00	0.00	0.00	26	<u>6,728</u>	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS 5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					<u> </u>	
TOTAL SALARIES AND WAGES (A + B)				22	20.289	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				-	3,667	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					3,956	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED		00)			0,000	
EDG, M&O, \$80,000; M&O Equipment \$35,000 EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT		1 2	09,887 15,000 94,054		8,941	
EDG, R&D \$258,000; R&D Equipment \$36,054	SSIONS	1	15,000	1	2,000	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS	1	15,000	1	,	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS	ESSIONS	1	15,000	1	2,000	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TOTAL EQUIPMENT T. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN T. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS	1	15,000	1	2,000	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT SSIONS	1	15,000	1	2,000		
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TOTAL	ESSIONS	1	15,000	1	2,000	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SSIONS	1	15,000	1	2,000	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0))	15,000 94,054	1	2,000	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS TOTAL SUPPORT COSTS TOTAL SUPPORT COSTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS CONTHER CONTHER DIRECT COSTS)	15,000 94,054	12	2,000 27,000 0	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS TOTAL SUPPORT COSTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS TOTAL SAND SUPPLIES TOTAL SAND SUPPLIES TOTAL SAND SUPPLIES TOTAL SAND SUPPLIES)	15,000 94,054	12	2,000 27,000 0 2,400	
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EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL OMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN C. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. COMPUTER SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS)	15,000 94,054	1	2,000 (7,000) (7,000) (2,400) (2,400) (0) (0) (0) (0) (0) (0) (0) (0) (0)	
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EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TRAVEL I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN C. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS 1)	15,000 94,054	1 2 1 46 47	2,000 (7,000 (7,000 (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7,000) (7	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAVEL TOREIGN TOREIGN TOTAL SUPPORT COSTS SUBSISTENCE TOTAL NUMBER OF PARTICIPANTS NATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS COTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE))	15,000 94,054	1 2 1 46 47	2,000 (7,000) (7,000) (7,000) (7,000) (2,400) (2,400) (2,400) (0,000) (0,000) (8,400)	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) (Cont. on Comments Page))	15,000 94,054	1 2 1 1 46 47 1,53	2,000 (7,000) (7,000) (2,400) (2,400) (0) (0) (0) (0) (0) (0) (0) (0) (0)	
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EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUBSITENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS SUBMURATS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A))	15,000 94,054	1 2 1 46 47 1,53 23	2,000 (7,000) (7,000) (7,000) (7,000) (2,400) (0,000) (0,000) (0,297) (8,400) (0,297) (8,863) (9,160)	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT 2. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SCONSULTANT SERVICES SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (F&A) I. TOTAL DIRECT COSTS (F&A) I. TOTAL DIRECT COSTS (F&A) I. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS)	15,000 94,054	1 2 1 46 47 1,53 23 1,76	2,000 (7,000) (7,000) (7,000) (7,000) (0,000) (0,000) (0,297) (8,400) (0,297) (8,400) (0,297) (8,863) (9,160) (0) (0) (0) (0) (0) (0) (0) (0) (0) (\$
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EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. NDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) (Cont. on Comments Page) IOTAL INDIRECT COSTS (F&A) 1. TOTAL DIRECT AND INDIRECT COSTS (H + I) C. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN) T COSTS	15,000 94,054	1 2 1 46 47 1,53 23 1,76	2,000 (7,000) (7,000) (7,000) (2,400) (0,00) (2,400) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,0) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00) (0,00)	\$
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT TOTAL EQUIPMENT TAVEL TOTAL POPERT COSTS Second Seco	TICIPAN		15,000 94,054	1 2 1 46 47 1,53 23 1,76 \$ 1,76	2,000 27,000 27,000 0 2,400 0 2,400 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 0 36,0000000000	
EDG, R&D \$258,000; R&D Equipment \$36,054 TOTAL EQUIPMENT 2. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)			15,000 94,054	1 2 1 46 47 1,53 23 1,76 \$ 1,76	2,000 27,000 27,000 0 2,400 0 2,400 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 36,000 0 0 36,0000000000	

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC, off campus, excludes D (Rate: 26.0000, Base 128448)

SUMMARY PROPOSAL BUDG	ET		FOI	r nsf u	ISE ONL'	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
University of Chicago				Γ	Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	IO.		
Robert W Gardner						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths		unds ested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		poser	granted by I (if differen
1. Robert W Gardner - Senior Research Assoc	4.80	0.00	0.00	\$	55,436	\$
2. James E Pilcher - Prof	0.00	0.00	0.00)	0	
3.						
4.						
	0.00	0.00	0.00		•	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00		55,436	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		0	
1. (0) POST DOCTORAL SCHOLARS 2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		<u>0</u> 274,788	
3. (0) GRADUATE STUDENTS	52.00	0.00	0.00		<u>274,700</u> 0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				3	330,224	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				, · · · ·	75,952	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					406,176	
compute server cluster upgrade EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT = TRAVEL 1 DOMESTIC (INCL CANADA MEXICO AND U.S. POSSE		1 3	23,723 14,528 00,295		638,546	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT		1	14,528		638,546 12,000 27,450	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		1	14,528		12,000	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		1	14,528		12,000	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0		1	14,528		12,000	
EDG, M&0, \$81,600; M&0 Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0		1	14,528		12,000	
EDG, M&0, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0		1	14,528		12,000	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0		1	14,528	-	12,000	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0 3. SUBSISTENCE0	ESSIONS	1 3	14,528 00,295	-	12,000	
EDG, M&0, \$81,600; M&0 Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER	ESSIONS	1 3	14,528 00,295	-	<u>12,000</u> 27,450 0	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS	1 3	14,528 00,295		12,000 27,450	
EDG, M&0, \$81,600; M&0 Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS	1 3	14,528 00,295		12,000 27,450 0 11,481 0	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	ESSIONS	1 3	14,528 00,295		12,000 27,450 0 11,481 0 0	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS	1 3	14,528 00,295		12,000 27,450 0 11,481 0 0 0	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS	1 3	14,528 00,295		12,000 27,450 0 11,481 0 0 487,200	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 487,200 0	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 2. FOREIGN	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 487,200 0 498,681	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 487,200 0	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 487,200 0 498,681	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A COMPUTE AND BASE) MTDC (Rate: 56.0000, Base: 326787) (Cont. on Comments Page)	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 487,200 0 498,681 582,853	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326787) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A)	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 0 487,200 0 498,681 582,853 216,885	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326787) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I)	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 0 487,200 0 498,681 582,853 216,885 799,738	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 1. TOTAL DIRECT COSTS (F&A) 1. TOTAL DIRECT COSTS (F&A) 1. TOTAL DIRECT COSTS (F&A) 1. TOTAL DIRECT AND INDIRECT COSTS (H + I) 4. RESIDUAL FUNDS	ESSIONS	1 3	14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 0 487,200 0 488,681 582,853 216,885 799,738 0	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$O 2. TRAVELO 3. SUBSISTENCEO 4. OTHERO TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326787) (Cont. on Comments Page) IOTAL DIRECT AND INDIRECT COSTS (H + I) 4. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 0 487,200 0 498,681 582,853 216,885 799,738	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326787) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE			14,528 00,295		12,000 27,450 27,450 0 11,481 0 0 487,200 0 498,681 582,853 216,885 799,738 0 799,738	
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN G. OTHER O 3. SUBSISTENCE 4. OTHER 0 1. OTAL NUMBER OF PARTICIPANTS (0) 1. OTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER 1. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326787) (Cont. on Comments Page) TOTAL INDIRECT COSTS (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME			14,528 00,295	2 2 1,5 \$ 1,7 \$ 1,7	12,000 27,450 27,450 0 11,481 0 0 487,200 0 498,681 582,853 216,885 799,738 0 799,738 0 799,738	\$
EDG, M&O, \$81,600; M&O Equipment, \$32,928 EDG, R&D, \$263,160; R&D Equipment, \$37,135 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$O 2. TRAVELO 3. SUBSISTENCEO 4. OTHERO TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326787) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			14,528 00,295	2 2 1,5 \$ 1,7 \$ 1,7	12,000 27,450 27,450 0 11,481 0 0 487,200 0 498,681 582,853 216,885 799,738 0 799,738 0 799,738 0 799,738	\$

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC,off-campus,excludes item D (Rate: 26.0000, Base 130323)

SUMMARY PROPOSAL BUDG	iΕT		FOI	R NSF US	SE ONL'	I
ORGANIZATION		PRC	POSAL			DN (month
University of Chicago				F	roposed	Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Robert W Gardner						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths	Fun	nds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Reques	oser	granted by I (if differen
1. Robert W Gardner - Senior Research Assoc	4.80	0.00	0.00	\$	57,376	\$
2. James E Pilcher - Prof	0.00	0.00	0.00		0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00		57,376	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	52.00	0.00	0.00	2	83,106	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					40,482	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					78,311	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED				4	18,793	
compute server cluster upgrade EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT		1 3	23,369 13,946 06,673		43,988	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT		1	13,946		<u>43,988</u> 12,000 27,914	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI		1	13,946		12,000	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		1	13,946		12,000	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0		1	13,946		12,000	
EDG, M&0, \$83,232; M&0 Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL		1	13,946		12,000	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0 3. SUBSISTENCE0		1	13,946		12,000	
EDG, M&0, \$83,232; M&0 Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0		1	13,946		<u>12,000</u> 27,914	
EDG, M&0, \$83,232; M&0 Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)	ESSIONS)	13,946 06,673		12,000	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS)	13,946 06,673	-	<u>12,000</u> 27,914	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 PARTICIPANTS (0) TOTAL PAP G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)	13,946 06,673	-	12,000 27,914 0 10,678	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)	13,946 06,673	-	12,000 27,914 0 10,678 0	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$	ESSIONS)	13,946 06,673	-	12,000 27,914 0 10,678 0 0	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)	13,946 06,673	- -	12,000 27,914 0 10,678 0 0 0	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)	13,946 06,673	- -	12,000 27,914 0 10,678 0 0 94,508	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)	13,946 06,673	4	12,000 27,914 0 10,678 0 0 94,508 0	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$	ESSIONS)	13,946 06,673	4	12,000 27,914 27,914 0 10,678 0 94,508 0 05,186	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)	13,946 06,673	4	12,000 27,914 0 10,678 0 0 94,508 0	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)	13,946 06,673	4	12,000 27,914 27,914 0 10,678 0 94,508 0 05,186	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page)	ESSIONS)	13,946 06,673	44	12,000 27,914 27,914 0 10,678 0 0 94,508 0 94,508 0 0 5,186 07,881	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A)	ESSIONS)	13,946 06,673	44	12,000 27,914 27,914 0 10,678 0 94,508 0 94,508 0 0 5,186 07,881 23,146	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I)	ESSIONS)	13,946 06,673	44	12,000 27,914 27,914 0 10,678 0 94,508 0 94,508 0 05,186 07,881 23,146 31,027	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS)	13,946 06,673	49 50 1,60 22 1,83	12,000 27,914 27,914 0 10,678 0 94,508 0 94,508 0 05,186 07,881 23,146 31,027 0	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		13,946 06,673	49 50 1,60 22 1,83	12,000 27,914 27,914 0 10,678 0 94,508 0 94,508 0 05,186 07,881 23,146 31,027	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 3. CONTARENT AND SUPPLIES (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMPUTER SERVICES 4. COMPUTER TOR TO (J MINUS K) 4. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMPUTER SERVICES 4. COMPUTER TOR TO (J MINUS K) 4. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMPUTER SERVICES 4. COMPUTER TOR TO THIS REQUEST (J) OR (J MINUS K) 4. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 5. SUBAR ADD 5. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 5. COMPUTER SERVICES 5. COMPUTER TOR TO CONTACH TO THIS REQUEST (J) OR (J MINUS K) 5. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 5. COMPUTER SERVICES 5. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 5. COMPUTER SERVICES 5. COMPUTER SERVICES 5. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 5. COMPUTER SERVICES 5. COMPUTER SE	RTICIPAN		13,946 06,673	4 5 1,6 \$ 1,8	12,000 27,914 7,914 0 10,678 0 0 94,508 0 0 94,508 0 0 94,508 0 0 94,508 0 0 94,508 0 0 23,146 31,027 0 31,027	
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN		13,946 06,673	4 5 1,6 \$ 1,8 \$ 1,8	12,000 27,914 27,914 0 10,678 0 94,508 0 94,508 0 94,508 0 94,508 0 94,508 0 94,508 0 94,508 0 0 31,027 0 31,027 0 0 NLY	\$
EDG, M&O, \$83,232; M&O Equipment, \$30,714 EDG, R&D, \$268,423; R&D Equipment, \$38,250 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 337019) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			13,946 06,673	4 5 1,6 \$ 1,8	12,000 27,914 27,914 0 10,678 0 94,508 0 94,508 0 94,508 0 94,508 0 94,508 0 94,508 0 94,508 0 0 31,027 0 31,027 0 0 31,027	\$

** I- Indirect Costs MTDC, off-campus, excludes item D (Rate: 26.0000, Base 132366)

SUMMARY PROPOSAL BUDG	iΕT		FOI	R NSF US	SE ONL	Y
ORGANIZATION		PRC	POSAL	NO. C	URATIO	DN (month
University of Chicago				F	roposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	NARD N	IO.		
Robert W Gardner						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed nths	Fur Reques	nds stod By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	prop	oser	granted by N (if differen
1. Robert W Gardner - Senior Research Associate	4.80	0.00	0.00	\$	59,384	\$
2. James E Pilcher - Prof	0.00	0.00	0.00)	0	
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00)	59,384	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	52.00	0.00	0.00	2	<u>91,688</u>	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					<u>51,072</u>	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					80,747	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED				4	<u>31,819</u>	
compute server cluster upgrade EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT		1	22,738 13,403 13,189	6	<u>49,330</u>	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT		1	13,403	6	49,330 12,000 28,391	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI		1	13,403	6	12,000	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		1	13,403	6	12,000	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0		1	13,403	6	12,000	
EDG, M&0, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0		1	13,403	6	12,000	
EDG, M&0, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE		1	13,403	6	12,000	
EDG, M&0, \$84,897; M&0 Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0		1	13,403	6	12,000	
EDG, M&0, \$84,897; M&0 Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)	ESSIONS	1 3	13,403 13,189	6	12,000	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS	1 3	13,403 13,189	6	<u>12,000</u> 28,391	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS	1 3	13,403 13,189	6	12,000 28,391 28,391 0 9,926	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS	1 3	13,403 13,189	6	12,000 28,391 28,391 0 9,926 0	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$	ESSIONS	1 3	13,403 13,189	6	12,000 28,391 0 9,926 0 0	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS	1 3	13,403 13,189		12,000 28,391 28,391 0 9,926 0 0 0 0	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS	1 3	13,403 13,189		12,000 28,391 28,391 0 9,926 0 0 0 0 0 1,926	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS	1 3	13,403 13,189	5	12,000 28,391 28,391 0 9,926 0 0 0 0,926 0 0 0 0,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$	ESSIONS	1 3	13,403 13,189	5	12,000 28,391 28,391 0 9,926 0 0 0 1,926 0 11,852	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS	1 3	13,403 13,189	5	12,000 28,391 28,391 0 9,926 0 0 0 0,926 0 0 0 0,926 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS	1 3	13,403 13,189	5	12,000 28,391 28,391 0 9,926 0 0 0 1,926 0 11,852	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page)	ESSIONS	1 3	13,403 13,189		12,000 28,391 28,391 0 9,926 0 0 0 1,926 0 11,852 33,392	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A)	ESSIONS	1 3	13,403 13,189		12,000 28,391 28,391 0 9,926 0 0 0 1,926 0 11,852 33,392 29,656	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I)	ESSIONS	1 3	13,403 13,189		12,000 28,391 28,391 0 9,926 0 0 0 0 1,926 0 11,852 33,392 29,656 63,048	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS	1 3	13,403 13,189		12,000 28,391 28,391 0 9,926 0 0 0 0 1,926 0 11,852 33,392 29,656 63,048 0	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$O 2. TRAVELO 3. SUBSISTENCEO 4. OTHERO TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		13,403 13,189		12,000 28,391 28,391 0 9,926 0 0 0 0 1,926 0 11,852 33,392 29,656 63,048	\$
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 3. COMENDED AGREED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. CONT SHARING PROPOSED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL 5. COMENDED 5. SUBARDA 5. CONT SHARING PROPOSED LEVEL 5. COMENDED 5. COM	RTICIPAN		13,403 13,189	6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	12,000 28,391 28,391 0 9,926 0 0 0 11,852 33,392 29,656 63,048 0 63,048	\$
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN		13,403 13,189	6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	12,000 28,391 28,391 0 9,926 0 0 0 1,926 0 0 1,926 0 11,852 33,392 29,656 63,048 0 63,048 0 63,048	
EDG, M&O, \$84,897; M&O Equipment, \$28,506 EDG, R&D, \$273,792; R&D Equipment, \$39,397 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 3. COMENDED AGREED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL 4. CONT SHARING PROPOSED LEVEL 4. COMENDED 4. CONT SHARING PROPOSED LEVEL 5. COMENDED 5. SUBARDA 5. CONT SHARING PROPOSED LEVEL 5. COMENDED 5. COM			13,403 13,189	6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	12,000 28,391 28,391 0 9,926 0 0 0 1,926 0 0 1,926 0 11,852 33,392 29,656 63,048 0 63,048 0 63,048 0 0 63,048	

** I- Indirect Costs MTDC, off-campus, excludes item D (Rate: 26.0000, Base 134467)

SUMMARY PROPOSAL BUDG	ET		FOI	R NSF	USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
University of Chicago					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	10.		
Robert W Gardner						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		Funds guested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	p Rec	proposer	granted by I (if differen
1. Robert W Gardner - Senior Research Associate	4.80	0.00	0.00	\$	61,463	\$
2. James E Pilcher - prof	0.00	0.00	0.00)	0	
3.						
4.						
	0.00	0.00			•	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00)	61,463	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		•	
1. (0) POST DOCTORAL SCHOLARS 2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		<u>0</u> 300.544	
3. (0) GRADUATE STUDENTS	52.00	0.00	0.00	/	<u> </u>	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER				1	0	
TOTAL SALARIES AND WAGES (A + B)					362,007	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					83,262	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					445,269	
compute server cluster upgrade EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT 5. TRAVEL 1. DOMESTIC (INCL. CANADA MEXICO AND U.S. POSSE		1 3	21,895 12,915 19,836		654,646 12 000	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT		1	12,915		654,646 12,000 28,883	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		1	12,915		12,000	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		1	12,915		12,000	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0		1	12,915	-	12,000	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0		1	12,915	-	12,000	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0 3. SUBSISTENCE0		1	12,915		12,000	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0		1	12,915	-	12,000	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0 3. SUBSISTENCE0	ESSIONS	1 3	12,915 19,836	-	12,000	
EDG, M&0, \$86,595; M&0 Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	ESSIONS	1 3	12,915 19,836		12,000 28,883	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS	1 3	12,915 19,836		12,000 28,883	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS	1 3	12,915 19,836		12,000 28,883 0 9,174 0	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	ESSIONS	1 3	12,915 19,836		12,000 28,883 0 9,174 0 0	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS	1 3	12,915 19,836		12,000 28,883 0 9,174 0 0 0 0	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS	1 3	12,915 19,836		12,000 28,883 0 9,174 0 0 0 509,455	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS	1 3	12,915 19,836		12,000 28,883 0 9,174 0 0 0 509,455 0	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS	1 3	12,915 19,836		12,000 28,883 28,883 0 9,174 0 0 0 509,455 0 518,629	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS	1 3	12,915 19,836		12,000 28,883 0 9,174 0 0 0 509,455 0	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS	1 3	12,915 19,836		12,000 28,883 28,883 0 9,174 0 0 0 509,455 0 518,629	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) (Cont. on Comments Page)	ESSIONS	1 3	12,915 19,836		12,000 28,883 28,883 0 9,174 0 0 0 509,455 0 518,629 1,659,427	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A)	ESSIONS	1 3	12,915 19,836		12,000 28,883 28,883 0 9,174 0 0 509,455 0 518,629 1,659,427 236,395	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)	ESSIONS	1 3	12,915 19,836		12,000 28,883 28,883 0 9,174 0 0 509,455 0 518,629 1,659,427 236,395 1,895,822	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$O 2. TRAVELO 3. SUBSISTENCEO 4. OTHERO TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (Cont. on Comments Page) IOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS	1 3	12,915 19,836	1	12,000 28,883 28,883 0 9,174 0 0 509,455 0 518,629 1,659,427 236,395 1,895,822 0	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$O 2. TRAVELO 3. SUBSISTENCEO 4. OTHERO TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + 1) K. RESIDUAL FUNDS 2. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			12,915 19,836	1	12,000 28,883 28,883 0 9,174 0 0 509,455 0 518,629 1,659,427 236,395 1,895,822	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$O 2. TRAVELO 3. SUBSISTENCEO 4. OTHERO TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			12,915 19,836	1 \$ 1	12,000 28,883 28,883 0 9,174 0 0 509,455 0 518,629 1,659,427 236,395 1,895,822 0	
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE			12,915 19,836	1 \$ 1 NSF U	12,000 28,883 28,883 0 9,174 0 0 509,455 0 509,455 0 518,629 1,659,427 236,395 1,895,822 0 1,895,822	\$
EDG, M&O, \$86,595; M&O Equipment, \$26,320 EDG, R&D, \$279,267; R&D Equipment, \$40,579 TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME			12,915 19,836	1 \$ 1 NSF U ST RA	12,000 28,883 28,883 0 9,174 0 0 509,455 0 518,629 1,659,427 236,395 1,895,822 0 1,895,822 0 1,895,822 0 1,895,822	\$

** I- Indirect Costs MTDC, off-campus, excludes item D (Rate: 26.0000, Base 136626)

ORGANIZATION				SE ONL	T	
		PRC	OPOSAL	H		ON (month
University of Chicago					Proposed	d Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	10.		
Robert W Gardner	1	NSE Fund	ed			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Fund Person-mo		Reque	nds sted By	Funds granted by N (if different
	CAL	ACAD	SUMR		oser 0	
1. Robert W Gardner - Senior Research Assoc	24.00	0.00	0.00		<u>87,220 87</u>	
2. James E Pilcher - Prof 3.	0.00	0.00	0.00	,	U	
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 0.00	0.00	0.00)	0	
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)	24.00	0.00	0.00		287,220	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		0.00	0.00	_		
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00)	0	
2. (25) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	260.00	0.00	0.00		16,854	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				1,7	04,074	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				3	91,939	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				2,0	96,013	
E TRAVEL 1 DOMESTIC (INCL CANADA MEXICO AND U.S. POSS	FSSIONS)			205,451	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSS 2. FOREIGN	ESSIONS)			60,000	
	ESSIONS)			,	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			60,000	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			60,000	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0	ESSIONS)			60,000	
2. FOREIGN 4. FOREIGN 4. FOREIGN 4. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0	ESSIONS)			60,000	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			60,000	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0			3		60,000	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER			6	1	<u>60,000</u> <u>39,638</u> 0	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS			6	1	<u>60,000</u> 39,638	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)			3	1	<u>60,000</u> <u>39,638</u> <u>0</u> <u>53,659</u> 0	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (1) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3	1	60,000 39,638 0 53,659 0 0	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5		60,000 39,638 0 53,659 0 0 0	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5		60,000 39,638 0 53,659 0 0 59,089	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS			3	2,4	60,000 39,638 0 53,659 0 0 0 59,089 0	
2. FOREIGN 2. FOREIGN 1. STIPENDS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3	2,4	60,000 39,638 0 53,659 0 59,089 0 159,089 0	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			5	2,4	60,000 39,638 0 53,659 0 0 0 59,089 0	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u>5</u>	2,4	60,000 39,638 0 53,659 0 59,089 0 159,089 0	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			S	2,4	60,000 39,638 0 53,659 0 59,089 0 159,089 0	
2. FOREIGN 2. FOREIGN 2. FOREIGN 1. STIPENDS 0. 2. TRAVEL 0. 3. SUBSISTENCE 0. 4. OTHER 0. TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>	2,4 2,5 8,0	60,000 39,638 0 53,659 0 0 59,089 0 12,748 113,850	
2. FOREIGN 2. FOREIGN 2. FOREIGN 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)			3	2,4 2,5 8,0	60,000 39,638 0 53,659 0 0 59,089 0 12,748 113,850 444,945	
2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			S	2,4 2,5 8,0 1,1 9,1	60,000 39,638 0 53,659 0 0 59,089 0 112,748 113,850 144,945 58,795	
2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)	RTICIPAN	T COSTS		2,4 2,5 8,0 1,1 9,1	60,000 39,638 0 53,659 0 0 59,089 0 112,748 113,850 144,945 58,795 0	
2. FOREIGN 2. FOREIGN 2. FOREIGN 1. STIPENDS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN	T COSTS	NT \$	2,4 2,5 8,0 1,1 9,1	60,000 39,638 0 53,659 0 0 59,089 0 12,748 113,850 113,850 144,945 58,795 0 58,795	
2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED L<	RTICIPAN		NT \$ FOR I	2,4 2,5 8,0 1,1 9,1 \$ 9,1	60,000 39,638 0 53,659 0 0 59,089 0 159,089 0 112,748 113,850 113,850 144,945 58,795 0 58,795 0 58,795	

			FOR NSF USE ONLY			(
SUMMARY PROPOSAL BUDGET								
ORGANIZATION			PRO	POSAL NO			ON (MONTHS)	
The University of Chicago					╞	Proposed	Granted	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			٨٧	/ARD NO.		FTOPUSED	Gianteu	
James E. Pilcher A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	es		NSF-Fun	ded	L	Funds	Funds	
List each separately with name and title. (A.7. Show number in brackets)		F	Person-mo		F	Requested By	Granted by NSF	
		CAL	ACAD	SUMR	Proposer		(If Different)	
1. James E. Pilcher 2.						0	\$	
3.					-			
4.								
5.			-					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	GE)					_		
7. (1) TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						0		
1. () POSTDOCTORAL ASSOCIATES								
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		24			8	5,000		
3. () GRADUATE STUDENTS	I							
4. () UNDERGRADUATE STUDENTS								
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)								
6. () OTHER TOTAL SALARIES AND WAGES (A + B)						- 000		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						5,000 9,550		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)	· · ·					4,550 4,550		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC	EEDING \$5,0	00.)				1,000		
EDG, R&D, \$258,000; R&D Equipment, \$36,054								
EDG, M&O, \$80,000; M&O Equipment, \$35,000								
TOTAL EQUIPMENT					400	9,054		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)					5,004		
2. FOREIGN	<i>,</i>				1	5,000		
F. PARTICIPANT SUPPORT								
1. STIPENDS \$								
3. SUBSISTENCE								
4. OTHER								
TOTAL NUMBER OF PARTICIPANTS ()	ΤΟΤΑΙ	PART	ICIPANT	COSTS	1			
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES					8	8,900		
2. PUBLICATION/DOCUMENTATION/DISSEMINATION					_			
3. CONSULTANT SERVICES 4. COMPUTER SERVICES								
5. SUBAWARDS								
6. OTHER								
TOTAL OTHER DIRECT COSTS					1	3,900		
H. TOTAL DIRECT COSTS (A THROUGH G)					53	7,504		
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)								
MTDC, off-campus, excludes item D (Base: \$128,450; Rate: 26%)								
TOTAL INDIRECT COSTS (F&A)					33	3,396		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					570),900		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG	II.D.7.	j.)					
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	T				\$57	0,900	\$	
M. COST SHARING: PROPOSED LEVEL \$	AGREED LI	EVELI						
	DATE	110				F USE ONLY RATE VERIFI	CATION	
ORG. REP. TYPED NAME & SIGNATURE*		<u>10</u>						
Carol Zuiches, Assoc. VP for Research Addinistration	j2/21/	10	Date Cl	lecked		f Rate Sheet	Initials-ORG	
NSF Form 1030 (10/99) Supersedes All Previous Editions	SIGNATURE	ES REQ		LY FOR RE	EVISED	BUDGET (GPG	III.C)	

Year 2		FOR NSF USE ONLY					
SUMMARY PROPOSAL BUDGET							
						DUDITICS	(10)
ORGANIZATION The University of Chicago			PRO	POSAL N	J.	DURATION	(MONTHS)
					Proposed		Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWARD NO.				
James E. Pilcher A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	s		NSF-Funded			Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		F	erson-mo	onths		Requested By	Granted by NSF
	(CAL	ACAD	SUMR		Proposer	(If Different)
1. James E. Pilcher 2.					+	0	\$
3.					-		
<u> </u>			-				
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)						
7. (1) TOTAL SENIOR PERSONNEL (1-6)						0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. () POSTDOCTORAL ASSOCIATES					<u> </u>		
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		24				86,700	
3. () GRADUATE STUDENTS							
4. () UNDERGRADUATE STUDENTS							
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					_		
6. () OTHER	· · · · ·		-		_	00 700	
TOTAL SALARIES AND WAGES (A + B) C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						86,700 19,941	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					_	06,641	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCI	EDING \$5,000).)			<u> </u>	00,011	
EDG, R&D, \$263,160; R&D Equipment, \$37,135					ł		
EDG, M&O, \$81,600; M&O Equipment, \$32,928							
TOTAL EQUIPMENT						14,823	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)				+-	14,020	
2. FOREIGN					-	15,450	~
F. PARTICIPANT SUPPORT						,	
1. STIPENDS \$							
2. TRAVEL							
4. OTHER							
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT	COSTS	-		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES						8,231	
2. PUBLICATION/DOCUMENTATION/DISSEMINATION					_		
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES 5. SUBAWARDS							<u> </u>
6. OTHER							
TOTAL OTHER DIRECT COSTS						8,231	
H. TOTAL DIRECT COSTS (A THROUGH G)					5	45,146	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)							
MTDC, off-campus, excludes item D (Base: \$130,323; Rate: 26%)							
TOTAL INDIRECT COSTS (F&A)						33,884	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				-	5	79,030	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG I	I.D.7.	j.)				
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$5	579,030	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LE	VEL I	F DIFFE				
PI/PD TYPED NAME AND SIGNATURE	DATE	,				ISF USE ONLY T RATE VERIFI	
James Pilcher Anes C. Julie	12/22/11	<u> </u>					Initials-ORG
ORG. REP. TYPED NAME & SIGNATURE* Carol Zuiches, Assoc. VP for Research Administration	DATE 12/2/	[10		hecked		e of Rate Sheet	-
NSF Form 1030 (10/99) Supersedes All Previous Editions	*SIGNATURES	REQ	UIRED ON	ILY FOR R	EVISE	D BUDGET (GPG	III.C)

			FOR NSF USE ONLY			7		
SUMMARY PROPOSAL BUDGET								
ORGANIZATION			PRO	POSAL N	<u>э.</u> Т	DURATION	ION (MONTHS)	
The University of Chicago					- -		· · · · · · · · · · · · · · · · · · ·	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AW	ARD NO.		Proposed	Granted	
James E. Pilcher								
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	es		NSF-Fun			Funds	Funds	
List each separately with name and title. (A.7. Show number in brackets)	-		Person-months			equested By Proposer	Granted by NSF (If Different)	
1. James E. Pilcher			110/10	COMIT		0	\$	
2.								
3.								
4. 5.								
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	GE)	•			-			
7. (1) TOTAL SENIOR PERSONNEL (1-6)						0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					1			
1. () POSTDOCTORAL ASSOCIATES 2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		24			8	3,434		
3. () GRADUATE STUDENTS		24				,101		
4. () UNDERGRADUATE STUDENTS								
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)								
6. () OTHER TOTAL SALARIES AND WAGES (A + B)						104		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						3,434),340		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						3,774		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC	EEDING \$5,00	0.)						
EDG, R&D, \$268,423; R&D Equipment, \$38,250								
EDG, M&O, \$83,232; M&O Equipment, \$30,714								
TOTAL EQUIPMENT					420),619		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SSESSIONS)							
2. FOREIGN					1	5,914		
F. PARTICIPANT SUPPORT 1. STIPENDS \$								
2. TRAVEL								
3. SUBSISTENCE								
4. OTHER								
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT	COSTS				
1. MATERIALS AND SUPPLIES					· ·	7.678		
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						,0.0		
3. CONSULTANT SERVICES								
4. COMPUTER SERVICES								
5. SUBAWARDS 6. OTHER								
TOTAL OTHER DIRECT COSTS					-	7,678		
H. TOTAL DIRECT COSTS (A THROUGH G)					-	2,985		
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)								
MTDC, off-campus, excludes item D (Base: \$132,366; Rate: 26%)								
TOTAL INDIRECT COSTS (F&A)					34	1,415		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						,400		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG	II.D.7.	j.)				_	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	r .				\$58	7,400	\$	
	AGREED LE	VEL I						
James Pilcher	DATE 12/2/	10	1			F USE ONLY RATE VERIFI	CATION	
ORG REP TYPED NAME & SIGNATURE*	DATE	/	Date C	· · · ·		f Rate Sheet	Initials-ORG	
Carol Zuiches, Assoc. VP for Research Administration puccul	12/21/	10						
NSF Form 1030 (10/99) Supersedes All Previous Editions	SIGNATURE	S REQ	UIRED ON	LY FOR RE	EVISED	BUDGET (GPG	III.C)	
\checkmark								

Year 4			FOR NSF USE ONLY				Y
SUMMARY PROPOSAL BUDGET							
ORGANIZATION			PRO	POSAL NO	Э.	DURATIO	N (MONTHS)
The University of Chicago						Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AM	ARD NO.			Granieu
James E. Pilcher A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associat	es		NSF-Fun	ded	- <u>-</u>	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		F	Person-mo		Requested By		Granted by NSF
1. James E. Pilcher	(CAL	ACAD	SUMR		Proposer 0	(If Different) \$
2.						0	φ
3.							
4							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	GE)						
7. (1) TOTAL SENIOR PERSONNEL (1-6)						0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. () POSTDOCTORAL ASSOCIATES					T		1
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		24			5	0,203	
3. () GRADUATE STUDENTS							
4. () UNDERGRADUATE STUDENTS 5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					+		
6. () OTHER					-		
TOTAL SALARIES AND WAGES (A + B)						0,203	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					_	20,747	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC	EEDING \$5,000).)			11	0,950	1
EDG, R&D, \$273,792; R&D Equipment, \$39,397		,					
EDG, M&O, \$84,897; M&O Equipment, \$28,506							
TOTAL EQUIPMENT					42	6,592	T
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SSESSIONS)						
2. FOREIGN F. PARTICIPANT SUPPORT						6,391	
1. STIPENDS \$							
2. TRAVEL							
4. OTHER							
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT	COSTS			
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES						- / ^ ^	
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						7,126	
3. CONSULTANT SERVICES							
4. COMPUTER SERVICES							
5. SUBAWARDS 6. OTHER							
TOTAL OTHER DIRECT COSTS						7,126	
H. TOTAL DIRECT COSTS (A THROUGH G)					56	1,059	
 INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC, off-campus, excludes item D (Base: \$134,467; Rate: 26%) 							
TOTAL INDIRECT COSTS (F&A)						4.961	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						4,961 6,020	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG II	.D.7.j	.)			0,020	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	r :				\$59	96,020	\$
M. COST SHARING: PROPOSED LEVEL \$ PI/PD TYPED NAM& AND SIGNATURE1			DIFFER			F USE ONLY	
James Pilcher and C. I when	DATE/22/11	,	Ĩ			RATE VERIF	
ORG. REP. TYPED NAME & SIGNATURE* Carol Zuiches, Assoc. VP for Research Administration Muller		0	Date Ch	necked	Date o	of Rate Sheet	Initials-ORG
NSF Form 1030 (10/99) Supersedes All Previous Editions	*SIGNATURES	REQI	JIRED ON	LY FOR RE	VISED	BUDGET (GPO	• III.C)
U							

Year 5 SUMMARY PROPOSAL BUDGET		FOR NSF USE ONLY				
SUMMART PROPOSAL BUDGET						
ORGANIZATION			PROPOSAL	NO.	DURATION	(MONTHS)
The University of Chicago						
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWARD N	0	Proposed	Granted
James E. Pilcher			AWARD N	0.	1	
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	s		NSF-Funded		Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)			erson-months		Requested By	Granted by NSF
1 James E. Dilcher		CAL	ACAD SUMI	<	Proposer 0	(If Different) \$
1. James E. Pilcher 2.					U	Ψ
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)					
7. (1) TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					0	
1. () POSTDOCTORAL ASSOCIATES		1				
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		24			92,007	
3. () GRADUATE STUDENTS						
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)			<u></u>			
6. () OTHER TOTAL SALARIES AND WAGES (A + B)					92,007	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)	·				21,162	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					113,169	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCL	EEDING \$5,00	0.)			· · · · · · · · · · · · · · · · · · ·	
EDG, R&D, \$279,267; R&D Equipment, \$40,579						
EDG, M&O, \$86,595; M&O Equipment, \$26,310						
TOTAL EQUIPMENT					32,751	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)					
2. FOREIGN	· · · · · · · · ·				16,883	
1. STIPENDS \$ 2. TRAVEL						
2. TRAVEL						
4. OTHER						
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT COST	S		
G. OTHER DIRECT COSTS						
1, MATERIALS AND SUPPLIES					6,574	
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES 4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS					6,574	
H. TOTAL DIRECT COSTS (A THROUGH G)					569,377	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)						
MTDC, off-campus, excludes item D (Base: \$136,626; Rate: 26%)						
TOTAL INDIRECT COSTS (F&A)					35,323	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				6	604,900	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG	II.D.7.j	i.)			
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					604,900	\$
M. COST SHARING: PROPOSED LEVEL \$	1	VEL I	F DIFFERENT:			
PI/PD TYPED NAME AND SIGNATURE	DATE 12/22/11	~			NSF USE ONLY ST RATE VERIFI	
James Pilcher	<i>1</i>	U /				·
ORG. REP. TYPED NAME & SIGNATURE* Carol Zuiches, Assoc. VP for Research Administration		m	Date Checked	Dat	e of Rate Sheet	Initials-ORG
NSF Form 1030 (10/99) Supersedes All Previous Editions	*SIGNATURES	S REO	UIRED ONLY FOR	REVIS	ED BUDGET (GPG	III.C)
					,	
V						

		FOR NSF USE ONLY		(
SUMMARY PROPOSAL BUDGET						
ORGANIZATION			PRO	POSAL NO	DURATION	I (MONTHS)
The University of Chicago					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AW	ARD NO.		
James E. Pilcher A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	s		NSF-Fun	ded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)			Person-mo		Requested By	Granted by NSF
	F	CAL	ACAD	-	Proposer	(If Different)
1. James E. Pilcher					0	\$
2.						
3.						
4.						
						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG					0	
7. (1) TOTAL SENIOR PERSONNEL (1-6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)			I	L		
1. () POSTDOCTORAL ASSOCIATES					T	
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		120			442,344	
3. () GRADUATE STUDENTS	·····		·			
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER						
TOTAL SALARIES AND WAGES (A + B)					442,344	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					101,740	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCI		10 1			544,084	l
U. EQUIFINIENT (LIST TEM AND DOLLAR AMOUNT FOR EACH ITEM EACH	LEDING \$3,00	.0.)				
						-
TOTAL EQUIPMENT					2,103,839	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)				70.000	
2. FOREIGN					79,638	
F. PARTICIPANT SUPPORT 1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
4. OTHER						
TOTAL NUMBER OF PARTICIPANTS (TOTAL	PAR	ICIPANT	COSTS		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES					38,509	
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES 5. SUBAWARDS						
6. OTHER TOTAL OTHER DIRECT COSTS					38,509	
H. TOTAL DIRECT COSTS (A THROUGH G)					2,766,070	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)			· .			
MTDC, off-campus, excludes item D (Base: \$662,232; Rate: 26%)						
						
					172,180	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			: \		2,938,250	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	UI SEE GPG	п.р./.].)		¢2.029.250	<u>т</u>
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$2,938,250	\$
	AGREED LE					
James Pilcher	DATE/22/	ัก			OR NSF USE ONLY COST RATE VERIF	
		7				
ORG. REP. TYPED NAME & SIGNATURE*	DATE	lo	Date C	hecked	Date of Rate Sheet	Initials-ORG
NSF Form 1030 (10/99) Supersedes All Previous Editions	*SIGNATURE	SREQ	UIRED ON	ILY FOR RE	VISED BUDGET (GPG	i III.C)

Budget Justification University of Chicago Year 1

B.2	Engineering and Technical Salaries: 2 junior technicians based at CERN for M&O activity	\$85,000
C.	Fringe: 23% of \$85,000	\$19,550
D.	Equipment: Eng. and tech. manpower R&D (1.3 FTE EE, 0.3 FTE tech) Eng. and tech. manpower M&O (0.2 FTE EE, 0.4 FTE tech) M&S for constructed equip (R&D) (parts, PCBs) M&S for constructed equip (M&O) (parts, PCBs) Subtotal	\$258,000 80,000 36,054 35,000 \$409,054
E.,	Travel: 6 trips to CERN (4 for junior techs, 2 for engineering personn	el) \$15,000
G.	Materials and supplies (non-constructed equipment): Small tools, stockroom withdrawals, computer items, etc.	\$8,900
I.	Indirect Costs: 26% of MTDC base of \$128,450; excludes (D)	\$33,397
J.	Total Direct and Indirect Costs:	\$570,900

General Comments

Acronyms: M&O: Maintenance and Operations. R&D: Research and Development.

Engineers: The electronics engineer and senior technician will be hired through the University's Electronics Development Group. Their projected salaries are based on the current rates. They are not subject to indirect costs.

Indirect Costs: Indirect costs are assessed on Modified Total Direct Costs at the rate of 26% for off-campus activity per the University of Chicago's rate agreement dated 28 January 2010 with our cognizant agency, the Department of Health and Human Services.

Labor costs (B2, C, and the engineers in item D) are adjusted by 2% in years 2-5 of this budget. Travel costs (E) are adjusted by 3%.

Budget Justification University of Chicago Cumulative

.

B .2	Engineering and Technical Salaries:	
	10 FTE junior technicians based at CERN for M&O activity	\$442,344
C .	Fringe:	
	23% of \$442,344	\$101,739
D.	Equipment:	
	Eng. and tech. manpower R&D (6.5 FTE EE, 1.5 FTE tech) \$1	,342,642
	Eng. and tech. manpower M&O (1.0 FTE EE, 2.0 FTE tech)	416,323
	M&S for constructed equip (R&D) (parts, PCBs)	191,416
	M&S for constructed equip (M&O) (parts, PCBs)	153,458
	Subtotal	\$2,103,839
E.	Travel: 30 trips to CERN (20 for junior techs, 10 for engineering perso	nnel) \$79,637
G.	Materials and supplies (non-constructed equipment):	
0.	Small tools, stockroom withdrawals, computer items, etc.	\$38,511
I.	Indirect Costs:	
	26% of base of \$662,232	\$172,180
J.	Total Direct and Indirect Costs:	\$2,938,250

SUMMARY YEAR 1

ORGANIZATION University of Chicago	EI			R NSF USE ONL	
University of Chicago		PR	OPOSAL	NO. DURATI	ON (month
		_		Propose	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.	
Robert Gardner	r	NEE			<u></u>
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Fund		Funds Requested By	Funds granted by N
	CAL	ACAD	SUMR	proposer	(It differen
1. Robert Gardner - Pl	4.80	0.00	0.00	\$ 53,561	\$
2.					
3.					
<u>4.</u> 5.					4
				,	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)					
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00	53,561	l
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)				· · · · · · · · · · · · · · · · · · ·	
	0.00				
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	28.00	0.00	0.00		1
3. (1) GRADUATE STUDENTS				0	
4. (1) UNDERGRADUATE STUDENTS 5. (1) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	<u> </u>
				0	┢
6. () OTHER				0	
TOTAL SALARIES AND WAGES (A + B) C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				235,289	
				54,117	+
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)	INO AF -			289,406	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED					
compute server cluster apgrade	i	5 2	09,887		
				1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	· ·
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE				209,887	<u> </u>
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS	2		12,000	
z. Poncidin				12,000	
F. PARTICIPANT SUPPOPT COSTS					
1. STIPENDS \$0					
2. TRAVEL0				· · ·	
3. SUBSISTENCE0				•	}
4. OTHER0					
			1		
TOTAL NUMBER OF PARTICIDANTS (0) TOTAL DAR	TICHOAN	T COST	<u> </u>		
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS	TICIPAN	r costs	3	0	
G. OTHER DIRECT COSTS	TICIPAN	T COSTS	3	· · · · · · · · · · · · · · · · · · ·	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	TICIPAN	T COSTS	3	3,500	· · · · · · · · · · · · · · · · · · ·
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	TICIPAN	r costs	3	3,500 0	· · · · · · · · · · · · · · · · · · ·
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	TICIPAN	T COSTE	3	3,500 0 0	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	TICIPAN	T COSTS	3	3,500 0 0 0	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	TICIPAN	T COSTS	3	3,500 0 0	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		T COSTS	3	3,500 0 0 0 466,000 0	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		T COSTS	3	3,500 0 0 466,000 0 469,500	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G)	TICIPAN	T COSTS	3	3,500 0 0 0 466,000 0	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN	T COSTS	3	3,500 0 0 466,000 0 469,500	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906)	TICIPAN	TCOSTS	3	3,500 0 0 466,000 0 469,500 992,793	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) TOTAL INDIRECT COSTS (F&A)	TICIPAN	TCOSTS	3	3,500 0 0 466,000 0 459,500 992,793 205,467	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) TOTAL INDIRECT COSTS (F&A) 5. TOTAL DIRECT AND INDIRECT COSTS (H + I) 5. CONSULTANT SERVICES 5. SUBAWARDS 5. SUBAWA	TICIPAN	COSTS	3	3,500 0 0 466,000 0 469,500 992,793 205,467 1,198,260	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.000, Base: 366906) COTAL INDIRECT COSTS (F&A) 5. TOTAL DIRECT AND INDIRECT COSTS (H + I) 5. RESIDUAL FUNDS 5. COTAL FUND 5. COTAL FU	TICIPAN	COSTS		3,500 0 0 466,000 0 459,500 992,793 205,467 1,198,260 0	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) OTAL INDIRECT COSTS (F&A) 5. TOTAL DIRECT AND INDIRECT COSTS (H + I) 5. RESIDUAL FUNDS 5. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 5. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 5. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 5. PUBLICATION COSTS (J OR (J MINUS K) 5. CONSULTANT SERVICES 5. SUBAWARDS 5. SUBAWA				3,500 0 0 466,000 0 469,500 992,793 205,467 1,198,260	\$
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.000, Base: 366906) TOTAL INDIRECT COSTS (F&A) 5. TOTAL DIRECT AND INDIRECT COSTS (H + I) 5. RESIDUAL FUNDS 5. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 6. COST SHARING PROPOSED LEVEL \$ 1. AGREED LEY 1. O AGREED LEY 1. AGGREED LEY 1. AGGR			4T \$	3,500 0 0 466,000 0 459,500 992,793 205,467 1,198,260 0 \$ 1,198,260	\$
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) TOTAL INDIRECT COSTS (F&A) 5. TOTAL DIRECT AND INDIRECT COSTS (H + I) 5. RESIDUAL FUNDS 5. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 6. COST SHARING PROPOSED LEVEL \$ 1. 12 (12 (12 (12 (12 (12 (12 (12 (12 (12		FFEREN	IT \$ FOR N	3,500 0 0 466,000 0 469,500 992,793 205,467 1,198,260 0 \$ 1,198,260 9F USE ONLY	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) TOTAL INDIRECT COSTS (F&A) 5. TOTAL DIRECT AND INDIRECT COSTS (H + I) 5. RESIDUAL FUNDS 5. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 6. COST SHARING PROPOSED LEVEL \$ 1. AGREED LEPUPD NAME 1. Robert Gardner 7. AMOUNT (F THIS REQUEST (J) OR (J MINUS K) 7. COST SHARING PROPOSED LEVEL \$ 7. COST		IFFEREN	IT \$ FOR N: CT COS	3,500 0 0 466,000 0 469,500 992,793 205,467 1,198,260 0 \$ 1,198,260 9 \$ 1,198,260 9 \$ 1,198,260	ATION
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 366906) TOTAL DIRECT COSTS (F&A) 5. TOTAL DIRECT AND INDIRECT COSTS (H + I) 5. RESIDUAL FUNDS 5. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 6. COST SHARING PROPOSED LEVEL \$ 1. 12 (12 (12 (12 (12 (12 (12 (12 (12 (12		FFEREN	IT \$ FOR N: CT COS	3,500 0 0 466,000 0 469,500 992,793 205,467 1,198,260 0 \$ 1,198,260 9F USE ONLY	

** I- Indirect Costs Subaward to IU (Rate: 56.0000, Base 25000) Subaward to UIUC (Rate: 56.0000, Base 25000)

SUMMARY PROPOSAL BUDGET

ORGANIZATION PROPOSAL BUDG	iET			R NSF USE		
		PR	OPOSAL	NO. DU	IRATI	ON (mont
University of Chicago PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		·			opose	d Grant
Robert Gardner		A	WARD N	10.		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	T	NSE Ever	lad	,		_ <u></u>
(List each separately with title, A.7. show number in brackets)		NSF Fund Person-mo		Funds Requested		Funds granted by
1. Robert Gardner - Pl	CAL	ACAD	SUMR	propose		(if differe
2.	4.80	0.00	0.00	S 55	i,436	\$
3.	•					ļ
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00 0.00		0 ,436	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	1.00	0.00	0.00		,430	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	28.00	0.00	0.00	188	,088	
3. (0) GRADUATE STUDENTS		A.			0	
4. (0) UNDERGRADUATE STUDENTS					O	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					Ō	
					0	
TOTAL SALARIES AND WAGES (A + B) C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)		·		243,	524	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					011	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED)				299,	535	<u></u> .
compute server cluster upgrade	\$		23,723			
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN	SSIONS)			223, 12,1	000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES	SSIONS)				000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN	SSIONS)			12,	000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES	SSIONS)			12,	000	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. PARTICIPANT SUPPORT COSTS	SSIONS)			12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0	SSIONS)			12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE		COSTS		12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN 3. STIPENDS 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL PART 0. OTHER DIRECT COSTS		COSTS		12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART 1. MATERIALS AND SUPPLIES		COSTS		<u>12,</u> 12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1)		COSTS		12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		COSTS		<u>12,</u> 12,	000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES		COSTS		<u>12,</u> 12,	000 000 0 0 250 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS		COSTS		<u>12,</u> 12,	000 000 000 250 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER		COSTS		12,1 12,1 3,2 487,2	000 000 0 0 250 0 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS		COSTS		12, 12, 12, 3,2 487,2 490,4	000 000 000 0 250 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL OTHER DIRECT COSTS TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G)		COSTS		12,1 12,1 3,2 487,2	000 000 000 0 250 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)		COSTS		12, 12, 12, 3,2 487,2 490,4	000 000 000 0 250 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326785) OTAL INDIRECT COSTS (F&A)		COSTS		12, 12, 12, 12, 12, 12, 12, 12, 12, 12,	000 000 000 250 0 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENDS 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 3267		COSTS		12,1 12,1 12,1 12,1 12,1 12,1 12,1 12,1	000 000 000 0 250 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326785) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS		COSTS		12, 12, 12, 12, 12, 12, 12, 12, 12, 12,	000 000 000 0 250 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326785) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K)		COSTS	S	12,1 12,1 12,1 12,1 12,1 12,1 12,1 12,1	000 000 250 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326785) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING PROPOSED LEVEL S Q				12,1 12,1 12,1 12,1 12,1 12,1 12,1 12,1	000 000 250 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326785) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING PROPOSED LEVEL S Q		Ēfienī	S FOR NSF	12,1 12,1 12,1 12,1 12,1 12,1 12,1 12,1	000 000 000 0 2250 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326785) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING PROPOSED LEVEL S 0 AGREED LEVE 0		EREN I NDIRECT	\$ FOR NSF FCOST F	12, 12, 12, 12, 12, 12, 12, 12, 12, 12,	000 000 000 0 2250 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 326785) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING PROPOSED LEVEL S Q		Ēfienī	\$ FOR NSF FCOST F	12,1 12,1 12,1 12,1 12,1 12,1 12,1 12,1	000 000 250 0 0 0 0 0 0 0 0 0 0 0 0 0 0	FION hais - ORG

ORGANIZATION PROPOSAL BUDG	EI	- 	FO	R NSF US		
		PRO	OPOSAL	NO. D	URATI	ON (mori
University of Chicago PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		-			ropose	
Robert Gardner		A	WARD N	10.		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	r					
(List each separately with title, A.7. show number in brackets)		NSF Fund erson-mor	ed ths	Fund Request		Funds
1. Robert Gardner - Pl	CAL	ACAD	SUMR	propos	ser	granted by (if differe
2.	4.80	0.00	0.00	\$5	7,376	S
3.				L		ļ
4.					·	
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00			
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	4.00	0.00	0.00		7,376	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		- 0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	28.00	0.00	0.00	10/	0 \$.672	
3. (0) GRADUATE STUDENTS	20.00	0.00	0.00	134	-	
4. (0) UNDERGRADUATE STUDENTS					0 0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				····	0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)				252	,048	
FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					,971	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					,019	·····
EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDIN compute server cluster upgrade	NG \$5,00	0.)				
TOTAL EQUIPMENT TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES	SIONS)				,369	
	SIONS)			12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES	SIONS)			12		
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN	SIONS)		· · · · · · · · · · · · · · · · · · ·	12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES	SIONS)			12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS	SIONS)			12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS	SIONS)			12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL	SIONS)			12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0		20216		12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER TOTAL NUMBER OF PARTICIPANTS		COSTS		12	,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIS 3. OTHER DIRECT COSTS MATERIALS AND SUPPLIES		COSTS		<u>12</u> 12,	,000 ,000 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PARTICIPANTS		COSTS		<u>12</u> 12,	,000 ,000 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 0 0 0 0 0		COSTS		<u>12</u> 12,	,000 ,000 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 0 0 0 0 0		COSTS		<u>12</u> 12,	,000 ,000 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PARTIC 0 TOTAL NUMBER OF PARTICIPANTS 0 CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS		COSTS		<u>12</u> 12, 3,1	,000 ,000 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) COHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER		COSTS		<u>12</u> 12,	,000 ,000 0 0 0 0 0 508	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) CONHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS		COSTS		<u>12</u> 12, 12, 12, 12, 12, 12, 12, 12, 12, 12,	000 000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0. SUBSISTENCE 0. TOTAL NUMBER OF PARTICIPANTS 1. OTHER 0. OTHER DIRECT COSTS MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS		COSTS		12, 12, 12, 3,(494,5 497,5	0000 0000 0000 0000 0000 0000 0000 0000 0000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		COSTS		<u>12</u> 12, 12, 12, 12, 12, 12, 12, 12, 12, 12,	0000 0000 0000 0000 0000 0000 0000 0000 0000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 10 0 0 0 0 0 0 0 0 0 0		COSTS		12, 12, 12, 3,(494,5 497,5 1,054,8	000 000 0 0 0 0 0 0 508 0 508 0 508 0 508	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 10 0 0 0 0 0 0 0 0 0 0		COSTS		12, 12, 12, 3,(494,5 497,5	000 000 0 0 0 0 0 0 508 0 508 0 508 0 508	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		COSTS		12, 12, 12, 3,(494,5 497,5 1,054,8	0000 0000 0000 0000 0000 0000 0000 0000 0000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 10 10 11 11 11 11 12 12 13 14 1		COSTS		12, 12, 12, 3,(494,5 1,054,8 188,7	0000 0000 0000 0000 0000 0000 0000 0000 0000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0. OTHER 0. OTHER DIRECT COSTS 0. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 0. OTHER 1. OTHER DIRECT COSTS Yotal OTHER DIRECT COSTS (A THROUGH G) NDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) TIDC (Rate: 56.0000, Base: 337019) TAL INDIRECT AND INDIRECT COSTS (H + I)				12, 12, 12, 3,(494,5 1,054,8 188,7	0000 0000 0000 0000 0000 0000 0000 0000 0000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1<			b	12, 12, 12, 3,(494,5 1,054,8 1,054,8 188,7 1,243,6 1,243,6	0000 0000 0000 0000 0000 0000 0000 0000 0000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1<		ERENI S	OR NSF	12, 12, 12, 3,(494,5 1,054,8 188,7 1,243,6 1,243,6 USE ONL	,000 ,000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1<			OR NSF COST R	12, 12, 12, 12, 3,1 494,5 1,054,8 188,7 1,243,6 1,243,6 USE ONL ATE VER	0000 0000 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSES 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1<			OR NSF COST R	12, 12, 12, 3,(494,5 1,054,8 188,7 1,243,6 1,243,6 USE ONL	0000 0000 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ION ats - ORG

PROPOSAL BUDG	EI			R NSF USE ON	
ORGANIZATION		PRC	POSAL		ION (montl
University of Chicago PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		-		Propose	d Grante
Robert Gardner		AV	VARD N	0.	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	ſ	NSF Funde Person-mon	ed	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	ths SUMR	Requested By proposer	granted by (if differen
1. Robert Gardner - Pl	4.80	0.00	0.00		
2.	4.00	0.00	0.00	a 13,004	
3.					+
4.					+
5,					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	1
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00	59,384	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	28.00	0.00	0.00	201,485	
3. (0) GRADUATE STUDENTS				00	
4. (0) UNDERGRADUATE STUDENTS				0	+
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				260,869	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				60,000	+
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED				320,869	
TOTAL EQUIPMENT TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			<u>222,738</u> 12,000	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			12,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			12,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)			12,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS	SSIONS)			12,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0	SSIONS)			12,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 1. STIPENDS \$ 0 2. TRAVEL 0	SSIONS)			12,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)				12,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 3. SUBPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS				12,000 12,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS				12,000 12,000 0 2,800	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES				12,000 12,000 0 2,800 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				12,000 12,000 0 2,800	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES				12,000 12,000 0 2,800 0 0 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES				12,000 12,000 0 2,800 0 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS				12,000 12,000 2,800 0 0 0 501,926	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS				12,000 12,000 0 2,800 0 0 0 501,926 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)				12,000 12,000 2,800 0 2,800 0 0 501,926 0 504,726	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUBSISTENDS 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669)				12,000 12,000 2,800 0 2,800 0 501,926 0 501,926 0 504,726 1,072,333	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUBSISTENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) OTAL INDIRECT COSTS (F&A)				12,000 12,000 2,800 0 501,926 0 504,726 1,072,333 194,695	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. COMPUTER SERVICES 2. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I)				12,000 12,000 2,800 0 2,800 0 501,926 0 501,926 1,072,333 194,695 1,267,028	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS				12,000 12,000 2,800 0 501,926 0 504,726 1,072,333 194,695 1,267,028 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 TOTAL NUMBER OF PARTICIPANTS 0 0 0 0 0 0 0 0 0 0 0 0 0	TICIPANI	COSTS		12,000 12,000 2,800 0 2,800 0 501,926 0 501,926 1,072,333 194,695 1,267,028	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) I. COST SHARING PROPUSED LEVEL \$ 0	TICIPANI	COSTS	Гъ	12,000 12,000 2,800 0 2,800 0 501,926 0 504,726 1,072,333 194,695 1,267,028 0 \$ 1,267,028	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) I. COST SHARING PROPUSED LEVEL \$ I/PD N	TICIPANI	COSTS	FOR NS	12,000 12,000 2,800 0 2,800 0 501,926 0 501,926 1,072,333 194,695 1,267,028 0 \$ 1,267,028 5F USE ONLY	\$
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 3. SUBSISTENCE 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (COSTS FFEREN INDIREC	T 5 F OR N S CT COST	12,000 12,000 2,800 0 501,926 0 504,726 1,072,333 194,695 1,267,028 0 \$ 1,267,028 0 \$ 1,267,028	\$ CATION
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 347669) OTAL INDIRECT COSTS (F&A) TOTAL DIRECT AND INDIRECT COSTS (H + I) RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHAHING PROPUSED LEVEL \$ 0 AGREED LEV 0		COSTS	T 5 F OR N S CT COST	12,000 12,000 2,800 0 2,800 0 501,926 0 501,926 1,072,333 194,695 1,267,028 0 \$ 1,267,028 5F USE ONLY	\$

PROPOSAL BUDG		+		R NSF USE ONI	
ORGANIZATION		PRO	POSAL		ON (month
University of Chicago PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		- 		Propose	d Grante
Robert Gardner		A	WARD N	0.	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-more	ed	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Requested By proposer	granted by I (if differen
1. Robert Gardner - Pl	4.80	0.00	0.00		+
2.		0.00	0.00	φ 01,40 3	Ψ
3.					
4.					-
5.					-
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	1
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	4.80	0.00	0.00	61,463	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					1
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	28.00	0.00	0.00	208,537	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS					
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				270,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				62,100	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED)				332,100	
compute server cluster upgrade	5	່່າ	21,895		
TOTAL EQUIPMENT				221,895	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)	I		221,895 12,000	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)	I		12,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			12,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)	1		12,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)			12,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0	SSIONS)			12,000	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL0 3. SUBSISTENCE0	SSIONS)			12,000	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0				12,000 12,000	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART				12,000	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS				12,000 12,000	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES				12,000 12,000 0 2,600	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS				12,000 12,000 0 2,600 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 2. TRAVEL 0 2. TRAVEL 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				12,000 12,000 0 2,600 0 0 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 1. MATERIALS AND SUPPLIES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES				12,000 12,000 2,600 0 0 0 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 1. MATERIALS AND SUPPLIES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES				12,000 12,000 0 2,600 0 0 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS				12,000 12,000 2,600 0 0 0 509,455 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER				12,000 12,000 2,600 0 2,600 0 0 509,455 0 512,055	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER 4. OTHER 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)				12,000 12,000 2,600 0 0 0 509,455 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 1. OTHER 0 1. OTHER 0 1. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G)				12,000 12,000 2,600 0 2,600 0 0 509,455 0 512,055	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER 4. OTHER 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)				12,000 12,000 2,600 0 2,600 0 0 509,455 0 512,055	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) OTAL INDIRECT COSTS (H + I)				12,000 12,000 2,600 0 2,600 0 509,455 0 512,055 1,090,050	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 4. STIPENDS \$				12,000 12,000 2,600 0 2,600 0 509,455 0 512,055 1,090,050 200,872	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 4. STIPENDS \$ 0 3. SUBSISTENCE 0 4. OTHER 0 1. OTHER 0 1. OTHER 0 1. OTHER 0 1. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 4. TOTAL DIRECT COSTS 4. TOTAL DIRECT COSTS 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) OTAL INDIRECT COSTS (F&A) 1. TOTAL DIRECT AND INDIRECT COSTS (H + I) 3. RESIDUAL FUNDS 4. MOUNT OF THIS REQUEST (J) OR (J MINUS K)				12,000 12,000 2,600 0 2,600 0 509,455 0 512,055 1,090,050 200,872 1,290,922	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 4. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 1. OTHER 0 1. OTHER 0 1. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1. INDIRECT COSTS (F&A) 1. TOTAL DIRECT COSTS (H + I) 2. RESIDUAL FUNDS 2. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 4. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL		COSTS		12,000 12,000 2,600 0 2,600 0 509,455 0 512,055 1,090,050 200,872 1,290,922 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 4. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 1. OTHER 0 1. OTHER 0 1. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 1. INDIRECT COSTS (F&A) 1. TOTAL DIRECT COSTS (H + I) 2. RESIDUAL FUNDS 2. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 4. COST SHARING PROPOSED LEVEL \$ 1. AGREED LEVEL \$ 1. CALL CALL CALL (1) (C) (1) (C) (C) (C) (C) (C) (C) (C) (C) (C) (C		COSTS	1 \$	12,000 12,000 2,600 0 2,600 0 509,455 0 512,055 1,090,050 200,872 1,290,922 0	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 56.0000, Base: 358700) OTAL INDIRECT COSTS (F&A) 1. TOTAL DIRECT AND INDIRECT COSTS (H + I) C. RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL		FFEREN	1 \$ FOR N CT COS	12,000 12,000 2,600 0 2,600 0 509,455 0 512,055 1,090,050 200,872 1,290,922 \$F USE ONLY T RATE VERIFIC	\$ CATION
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PROPOSAL BUDG	i ET		FOF	R NSF L	JSE ONL	Y
ORGANIZATION		PRO	OPOSAL	NO.	DURATIO	ON (months
University of Chicago					Proposed	d Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Robert Gardner A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ied		unds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	Person-mo ACAD	nths SUMR	Regu	ested By poser	granted by NS (if different)
1. Robert Gardner - Pl	24.00				287,220	+ + + + + + + + + + + + + + + + + + + +
2.	24.00	0.00	0.00	Ψ	201,220	14
3.						
4.					••••••	
5.						1
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	24.00	0.00	0.00		287,220	
3. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00				0	
2. (15) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	140.00	0.00	0.00		974,510	
3. (0) GRADUATE STUDENTS					0	
					0	
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER TOTAL SALARIES AND WAGES (A + B)					0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					261,730	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					290,199 551,929	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	UNG \$5.0	00)			JJ1,323	
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TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)		1,	60,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS	ESSIONS)		1,	60,000	
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TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT COSTS 1. STIPENDS \$			3	2,4	60,000 60,000 15,150 0 159,089 0 459,089 0 474,239	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT COSTS 1. STIPENDS \$			3	2,4	60,000 60,000 15,150 0 0 459,089 0	
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University of Chicago Computation and Enrico Fermi Institutes Budget Justification For February 1, 2012 through January 31, 2013

A. Senior Personnel

Includes salary for the Principal Investigator corresponding to 40% FTE. A fringe benefit rate of 23% is used. We are requesting an exception to exceed NSF's standard 2 months salary rule for Robert Gardner [PI], who will be responsible for managing the U.S. ATLAS Computing Facilities Integration Program including developing a program of work of phased deliverables for computing fabric upgrades, integration of Grid services with site resources, and coordination of the each of the five U.S. ATLAS Tier 2 Centers and their integration with the Tier 1 Center at Brookhaven National Laboratory.

B. Other Personnel

Personnel include one full time Unix systems administrator, and 1/3 FTE of a second Unix systems administrator. A fringe benefit rate of 23% is used.

Personnel also include one full time developer for Grid data storage management tools and infrastructure.

C. Equipment

Equipment purchases each year are to expand the computing and storage capacity of the Midwest Tier 2 center clusters. These include compute (CPU) servers matching ATLAS specifications for processing speed, memory and local disk and RAID controllers, and storage systems which consist of a head storage server equipped with 10 Gigabit Ethernet interface and an external RAID controller connecting (via SAS) storage shelves containing hard disk drives. The purchases may include Ethernet switching units and other items (racks, cables, power distribution units) as appropriate to build the clusters. These quantities of these systems purchased at each institution will vary according to available budget after fixed costs.

D. Travel

Travel of \$12K/year to requested to fund trips for the PI (R. Gardner) and two computing professional staff to domestic U.S. ATLAS meetings (to Brookhaven National Laboratory in New York, or to other Tier 2 institutions). Approximately 18 person-trips per year are planned. International travel at the level of \$12K/year for trips to CERN (for ATLAS software weeks) and to conferences for the PI and the software developer of Grid data management tools is planned at 6 person-trips per year.

E. Other Direct Costs

Miscellaneous expenses for additional parts and/or supplies for the Tier2 center or for supporting group research are included, such as expenses for broadband wireless modems for laptops. These are absolutely necessary to provide access for troubleshooting and monitoring of the facility during non-business hours or during periods of travel away from the office.

F. Indirect Costs

A 56% indirect cost rate is applied to the Modified Total Direct Costs.

SUMMARY PROPOSAL BUDG	ET		FOF	R NS	F USE ONL	Y
ORGANIZATION			POSAL	NO.	DURATIO	DN (montl
University of Massachusetts Amherst					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Stephane Willocq				-		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	В	Funds equested By	Funds granted by
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	n	proposer	(if differen
1. Stephane Willocq - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					-	
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS				<u> </u>	0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				-	0	
6. (0) OTHER				-	0	
TOTAL SALARIES AND WAGES (A + B)				-	0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>0</u> 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 0 0 0 0 0 0 0 138,590	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			3		0 0 0 0 0 0 0 138,590 138,590	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 138591)			3		0 0 0 0 0 0 0 0 138,590 138,590 138,590	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 138591) TOTAL INDIRECT COSTS (F&A)			<u> </u>		0 0 0 0 0 0 0 0 0 138,590 138,590 138,590 138,590 36,034	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 5. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 138591) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			<u> </u>		0 0 0 0 0 0 0 0 138,590 138,590 138,590	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)			<u>}</u>		0 0 0 0 0 0 0 0 0 0 138,590 138,590 138,590 138,590 138,590 138,590	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 138591) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN				0 0 0 0 0 0 0 0 0 0 138,590 138,590 138,590 138,590 36,034 174,624	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	TICIPAN		NT \$	Ţ	0 0 0 0 0 0 0 0 0 0 138,590 138,590 138,590 138,590 138,590 138,590	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN		NT \$ FOR N	NSF	0 0 0 0 0 0 0 0 138,590 138,590 138,590 138,590 138,590 138,590 138,590 138,590 138,590 138,590	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARI G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 138591) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR N CT COS	NSF BT R	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

SUMMARY PROPOSAL BUDG	ЕТ		FOF	R NS	F USE ONL	Y
ORGANIZATION			POSAL	NO.	DURATIO	ON (month
University of Massachusetts Amherst					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	О.		
Stephane Willocq						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	D	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Re	equested By proposer	granted by f (if differen
1. Stephane Willocg - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				L	0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 1. MATERIALS AND SUPPLIES			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (1) TOTAL PARTICIPANTS (2) TOTAL PARTICIPANTS (2) TOTAL PARTICIPANTS (3) TOTAL PARTICIPANTS (3) TOTAL PARTICIPANTS (3) TOTAL PARTICIPANTS (4) TOTAL PARTICIPANTS (5)			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			5			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) TOTAL PARTICIPANTS TOTAL PARTICIPANT SUBJECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR' G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			6		0 0 0 0 0 0 0 0 0 0 0 142,748	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			<u>}</u>		0 0 0 0 0 0 0 0 142,748 142,748	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 0 0 0 0 0 0 0 142,748 142,748	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			5		0 0 0 0 0 0 0 0 142,748 142,748	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 142749) <td></td> <td></td> <td>5</td> <td></td> <td>0 0 0 0 0 0 0 0 142,748 142,748 142,748</td> <td></td>			5		0 0 0 0 0 0 0 0 142,748 142,748 142,748	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			<u> </u>		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) 26% off			<u> </u>		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1 MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) <	TICIPAN	T COSTS			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR	TICIPAN	T COSTS	NT \$		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPALA			NT \$ FOR 1	NSF I	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

SUMMARY PROPOSAL BUDG	ЕΤ Ϊ	_ <u>, ,</u>	FO	R NS	F USE ONL	Y
ORGANIZATION			POSAL	-		- ON (month
University of Massachusetts Amherst					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	О.		
Stephane Willocq						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	Bé	Funds equested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	granted by I (if differer
1. Stephane Willocq - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00			
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 3. (0) GRADUATE STUDENTS	0.00	0.00	0.00		0 0	
3. (0) GRADUATE STUDENTS 4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					U	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0	
	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBJECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			5			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBJECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			<u> </u>		0 0 0 0 0 0 0 0 0 0 0 0 147,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		0 0 0 0 0 0 0 0 147,030 147,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			6		0 0 0 0 0 0 0 0 0 0 0 0 147,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			3		0 0 0 0 0 0 0 0 147,030 147,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 147033)			5		0 0 0 0 0 0 0 0 147,030 147,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			3		0 0 0 0 0 0 0 0 147,030 147,030 147,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN			3		0 0 0 0 0 0 0 0 0 147,030 147,030 147,030 38,229	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 147033) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3		0 0 0 0 0 0 0 0 0 0 0 147,030 147,030 147,030 147,030 38,229 185,259	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) Z6% off-campus overhead rate (Rate: 26.0000, Base: 147033) TOTAL INDIRECT AND INDIRECT COSTS (H + I)	TICIPAN	T COSTS			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) 2. TOTAL DIRECT AND INDIRECT COSTS (H = 1) K. RESIDUAL FUNDS L. AMOUNT OF THI	TICIPAN	T COSTS	NT \$		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMENTICAL CONTENTION OF COSTS (A CONTENT OF COSTS OF CONTENT OF COSTS (FOR CONTENT OF COSTS OF COSTS OF COSTS OF COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL	TICIPAN		NT \$ FOR 1	NSF (0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 147,030 145,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 185,259 100 100 100 100 100 100 100 100 100 10	\$

SUMMARY PROPOSAL BUDG	ЕТ		FOF	R NS	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
University of Massachusetts Amherst					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	О.		
Stephane Willocq						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	D	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	R	equested By proposer	granted by f (if differen
1. Stephane Willocg - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				L	0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PARTICIPANTS 0 1. CONCEPT:			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 3. SUBSISTENCE 4. OTHER CONTRAVEL CONTRAVENT C			5		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER 5. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER OF PARTICIPANTS 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS 5. OTHER DIRECT COSTS 5. OTHER OF PARTICIPANTS			3		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			3		0 0 0 0 0 0 0 0 0 0 0 151,442	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5		0 0 0 0 0 0 0 151,442 151,442	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 0 0 0 0 0 0 0 0 0 0 151,442	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			3		0 0 0 0 0 0 0 151,442 151,442	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 151440)			<u> </u>		0 0 0 0 0 0 0 0 151,442 151,442 151,442	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			3		0 0 0 0 0 0 0 0 151,442 151,442 151,442 151,442 39,374	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 1514			3		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 151440) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			5 		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS A. TOTAL DIRECT COSTS I. INDIRECT COSTS A. TOTAL DIRECT COSTS (F&A) A. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. STIPENDS 2. FOREIGN 6. OTHER 7. 0 7. 0 7. 0 7. 0 7. 0 7. 0 7. 0 7. 0	TICIPAN	T COSTS	NT \$		0 0 0 0 0 0 0 0 0 0 0 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER SUPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 26% off-campus overhead rate (Rate: 26.0000, Base: 151440) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPACTION COST SHARING PROPOSED LEVEL \$ 0 ACREED LEVEL \$ 0 ACREED LEVEN			NT \$ FOR 1	NSF I	0 0 0 0 0 0 0 0 0 0 0 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442 151,442	\$

SUMMARY PROPOSAL BUDG	ET		FOF	R NSI	F USE ONL	Y
ORGANIZATION		PRC	POSAL	NO.	DURATIO	ON (month
University of Massachusetts Amherst					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	VARD N	О.		
Stephane Willocq						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	Re	Funds equested By	Funds granted by N
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	-	proposer	(if different
1. Stephane Willocq - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4. 5.						
5. 6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		U	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		U	
1. (1) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS	0.00	0.00	0.00		0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)			-	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)		-	0	
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University of Massachusetts Amherst					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	О.		
Stephane Willocq				1		, I
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor		Re	Funds quested By	Funds granted by
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Î	proposer	(if differer
1. Stephane Willocq - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.					-	
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u> </u>	
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UNIVERSITY OF MASSACHUSETTS AMHERST

Research Administration Building 70 Butterfield Terrace Amherst, MA 01003-9242 Office of Grant and Contract Administration

voice: 413.545.0698 fax: 413.545.1202

December 17, 2010

Columbia University Ann Therrien Nevis Labs PO Box 137 Irvington, NY 10533

RE: Proposed Subcontract to University of Massachusetts UM Reference No. 111-0785 Entitled: Atlas Experiment at the Large Hadron Collider

Dear Ms. Therrien:

Attached is the subject proposal submitted on behalf of Professor Stephane Willocq of the Physics Department.

It is our understanding that this proposal will be included in a prime proposal which you are submitting to the National Science Foundation.

The University is looking forward to participating in this project, subject to the execution of a mutually acceptable subcontract.

If you have questions on the technical aspects of the proposal, please contact Professor Willocq at (413) 545-0525. Administrative concerns may be directed to Kimberley Broderick, Grant and Contract Administrator, at (413) 545-0698. In all future correspondence about this proposal, please refer to UMass Proposal No. 111-0785.

Sincerely,

Iais

Jennifer A. Donais, CRA Associate Director

JD/as attachment cc: Willocq, P.I.

Statement of Work USATLAS subcontract with UMass 1 Feb 2012 to 31 Jan 2017

The project to be funded under this subcontract consists of the development and maintenance of the ATLAS Muon Spectrometer software. This work will be done by Physicist/Programmer Edward Moyse in collaboration with the CERN based Muon Spectrometer software group. The reporting line is to Professor Willocq.

The planned tasks covered in this statement are part of activities that will start on Feb 1, 2012 and end by Jan 31, 2017. These tasks include:

- Development and maintenance of the muon event data model and common tracking software required for prompt processing of the ATLAS data as well as for reprocessing campaigns.
- Support of overall muon software infrastructure, including event display software.
- Muon software coordination.

Edward Moyse is located at CERN throughout the duration of the time period defined above. The title of the position is physicist/programmer.

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NSF Proposal Year 1: 2/1/12 — 1/31/13 SUMMARY PROPOSAL BUDGET

SUMMARY PROPOSAL BUDGET						
ORGANIZATION			PRO	POSAL NC	D. DURATION (MONTHS)	
University of Massachusetts-Amherst						
					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWARD NO.			
Dr. Stephane Willocq						, I
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	s		NSF-Fun	ded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		F	Person-mo	onths	Requested By	Granted by NSF
	F	CAL	ACAD SUMR		Proposer	(If Different)
1. Stephane Willocq		0			\$	\$
2.		•			+	÷
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)					
7. () TOTAL SENIOR PERSONNEL (1-6)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. () POSTDOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.))					
3. () GRADUATE STUDENTS						
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC	EEDING \$5,00	00.)				
		,				
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)					
2. FOREIGN						
F. PARTICIPANT SUPPORT						
1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
4. OTHER						
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT	COSTS		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
					400 500	
6. OTHER Reimbursement to CERN team account					138,590	
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)				138,590		
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)						
26% off-campus overhead rate						
TOTAL INDIRECT COSTS (F&A)					36,034	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				174,624		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG II.D.7.j.)						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$174,624	\$	
					ψ1/4,024	φ
M. COST SHARING: PROPOSED LEVEL \$	AGREED LE	EVEL I				
PI/PD TYPED NAME AND SIGNATURE*	DATE		FOR NSF USE ONLY			
			1	NDIRECT	COST RATE VERIE	ICATION
ORG. REP. TYPED NAME & SIGNATURE*	DATE		Date C		Date of Rate Sheet	Initials-ORG

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification UMass Subcontract from Columbia University Year 1: 1 Feb 2012 to 31 Jan 2013

G.6	OTHER: Software professional 1 FTE	
	Salary	\$115,360
	Health Insurance	\$6,000
	Materials & Supplies	\$2,000
	Travel/COLA	\$15,230
	2 trips at \$2,000/tri	р
Ι	Indirect Costs: Off-campus rate 26%	\$36,034
	On-campus rate 20/0	\$30,034
J	Total Direct and Indirect Costs	\$174,624

All expenses are included under the item "OTHER DIRECT COSTS" to allow us to use a Team Account at CERN for all expenses. UMass Amherst will apply the off-campus overhead rate of 26% on all expenses related to this proposal since the activity is entirely off campus (based at CERN in Geneva, Switzerland).

FOR NSF USE ONLY

NSF Proposal Year 2: 2/1/13 — 1/31/14 SUMMARY PROPOSAL BUDGET

SUMMARY PROPOSAL BUDGET						
ORGANIZATION			PROPOSAL NO		D. DURATION (MONTHS)	
University of Massachusetts-Amherst						
					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWARD NO.			
Dr. Stephane Willocq						1
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	S		NSF-Fun	ded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		F	erson-mo	onths	Requested By	Granted by NSF
	F	CAL	ACAD SUMR		Proposer	(If Different)
1. Stephane Willocq		0	-		\$	\$
2.		<u> </u>			+	÷
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)					
7. () TOTAL SENIOR PERSONNEL (1-6)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. () POSTDOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.))					
3. () GRADUATE STUDENTS	, 					
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCI	EEDING \$5,00)0.)				•
		,				
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS						
2. FOREIGN						
F. PARTICIPANT SUPPORT						
1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
4. OTHER						
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT	COSTS		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER Reimbursement to CERN team account					142,748	
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)				142,748		
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)				,		
26% off-campus overhead rate						
···· · · · · · · · · · · · · · · · · ·						
TOTAL INDIRECT COSTS (F&A)					37,115	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				179,863		
				179,005		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG II.D.7.j.)					<u> </u>	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$179,863	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LE	VEL I	F DIFFEF	RENT: \$		
PI/PD TYPED NAME AND SIGNATURE*	DATE		FOR NSF USE ONLY			
					COST RATE VERIE	
ORG. REP. TYPED NAME & SIGNATURE*	DATE		Date C		Date of Rate Sheet	Initials-ORG
	DATE		Date C			Initials-OKG

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification UMass Subcontract from Columbia University Year 2: 1 Feb 2013 to 31 Jan 2014

G.6	Software professional 1 FTE Salary		
	Health Insurance Materials & Supplies Travel/COLA 2 trips at \$2,050/trip	\$6,180 \$2,050 \$15,697	
Ι	Indirect Costs: Off-campus rate 26%	\$37,115	
J	Total Direct and Indirect Costs	\$179,863	

All expenses are included under the item "OTHER DIRECT COSTS" to allow us to use a Team Account at CERN for all expenses. UMass Amherst will apply the off-campus overhead rate of 26% on all expenses related to this proposal since the activity is entirely off campus (based at CERN in Geneva, Switzerland).

FOR NSF USE ONLY

NSF Proposal Year 3: 2/1/14 — 1/31/15 SUMMARY PROPOSAL BUDGET

SUMMARY PROPOSAL BUDGET						
ORGANIZATION			PROPOSAL NO		D. DURATION (MONTHS)	
University of Massachusetts-Amherst						
					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWARD NO.			
Dr. Stephane Willocq						
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	es		NSF-Fun	ded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		F	erson-mo	onths	Requested By	Granted by NSF
	F	CAL	ACAD SUMR		Proposer	(If Different)
1. Stephane Willocq		0	-		\$	\$
2.		<u> </u>			÷	÷
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)					
7. () TOTAL SENIOR PERSONNEL (1-6)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. () POSTDOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)					
3. () GRADUATE STUDENTS	/					
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC	EEDING \$5,00)0.)				
		,				
TOTAL EQUIPMENT						[
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS						
2. FOREIGN	02001010)					
F. PARTICIPANT SUPPORT						
1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
4. OTHER						
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT	COSTS		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER Reimbursement to CERN team account					147,030	
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)				147,030		
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)						
26% off-campus overhead rate						
TOTAL INDIRECT COSTS (F&A)					38,229	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				185,259	1	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG II.D.7.j.)				100,200		
				¢105.050	<u>م</u>	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	1				\$185,259	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LE	VEL I	F DIFFEF			
PI/PD TYPED NAME AND SIGNATURE*	DATE		FOR NSF USE ONLY			
		INDIRECT COST RATE VERIE			CATION	
ORG. REP. TYPED NAME & SIGNATURE*	DATE		Date C		Date of Rate Sheet	Initials-ORG
			2410 0			
	1					

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification UMass Subcontract from Columbia University Year 3: 1 Feb 2014 to 31 Jan 2015

G.6	OTHER: Software professional 1 FTE	¢122.20(
	Salary Health Insurance	\$122,386 \$6,365
	Materials & Supplies	\$0,303 \$2,100
	Travel/COLA	\$16,179
	2 trips at \$2,100/trip	÷;;
Ι	Indirect Costs: Off-campus rate 26%	\$38,229
J	Total Direct and Indirect Costs	\$185,259

All expenses are included under the item "OTHER DIRECT COSTS" to allow us to use a Team Account at CERN for all expenses. UMass Amherst will apply the off-campus overhead rate of 26% on all expenses related to this proposal since the activity is entirely off campus (based at CERN in Geneva, Switzerland).

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NSF Proposal Year 4: 2/1/15 — 1/31/16 SUMMARY PROPOSAL BUDGET

ORGANIZATION University of Massachusetts-Amherst			PRO	POSAL NC	DURATION	I (MONTHS)
Onversity of Massachusetts-Annerst					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AW	ARD NO.	•	
Dr. Stephane Willocq A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	s		NSF-Fun	ded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)	.0		erson-mo		Requested By	Granted by NSF
List each separately with name and title. (A.7. Show humber in brackets)	-	CAL	ACAD	SUMR	Proposer	(If Different)
1. Stephane Willocq		0	NOND	COMIX	\$	\$
2.		•			÷	+
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)					
7. () TOTAL SENIOR PERSONNEL (1-6)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. () POSTDOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.))					
3. () GRADUATE STUDENTS						
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC	EEDING \$5,00	00.)				
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)					
2. FOREIGN	020010110)					
F. PARTICIPANT SUPPORT						
1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
4. OTHER						
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PART	ICIPANT	COSTS		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS					454.440	
6. OTHER Reimbursement to CERN team account					151,442	
					454 440	
H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)					151,442	
26% off-campus overhead rate						
TOTAL INDIRECT COSTS (F&A)					39,375	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					190,816	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE	CT SEE GPG	II.D.7.	j.)			
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			-		\$190,816	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LE	VELI		RENT: \$	<u> </u>	ı ·
PI/PD TYPED NAME AND SIGNATURE*	DATE		2		OR NSF USE ONLY	
	-					CATION
ORG. REP. TYPED NAME & SIGNATURE*	DATE		Date Cl		COST RATE VERIE	Initials-ORG
	2,,,,_		Duite			

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification UMass Subcontract from Columbia University Year 4: 1 Feb 2015 to 31 Jan 2016

G.6	OTHER: Software professional 1 FTE Salary Health Insurance Materials & Supplies Travel/COLA 2 trips at \$2,150/trip	\$126,057 \$6,556 \$2,150 \$16,678
Ι	Indirect Costs: Off-campus rate 26%	\$39,375
J	Total Direct and Indirect Costs	\$190,816

All expenses are included under the item "OTHER DIRECT COSTS" to allow us to use a Team Account at CERN for all expenses. UMass Amherst will apply the off-campus overhead rate of 26% on all expenses related to this proposal since the activity is entirely off campus (based at CERN in Geneva, Switzerland).

FOR NSF USE ONLY

NSF Proposal Year 5: 2/1/16 — 1/31/17 SUMMARY PROPOSAL BUDGET

SUMMARY PROPOSAL BUDGET						
ORGANIZATION			PRO	POSAL NO	. DURATION	I (MONTHS)
University of Massachusetts-Amherst						
					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AW	ARD NO.		
Dr. Stephane Willocq						1
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	S		NSF-Fun	ded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)		F	Person-mo	onths	Requested By	Granted by NSF
	F	CAL	ACAD	SUMR	Proposer	(If Different)
1. Stephane Willocq		0			\$	\$
2.						
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE	E)					
7. () TOTAL SENIOR PERSONNEL (1-6)		_				
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)				1	1	1
1. () POSTDOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)						
3. () GRADUATE STUDENTS						
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
		<u> </u>				
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCE	EDING \$5,00	JU.)				
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)					
2. FOREIGN						
F. PARTICIPANT SUPPORT						
1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
4. OTHER						
TOTAL NUMBER OF PARTICIPANTS ()	ΤΟΤΑΙ	PART	ICIPANT	COSTS		
G. OTHER DIRECT COSTS	TOTAL	17411		00010		
1. MATERIALS AND SUPPLIES						
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER Reimbursement to CERN team account					155,985	
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)					155,985	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)					,	
26% off-campus overhead rate						
TOTAL INDIRECT COSTS (F&A)					40,556	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					196,541	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJEC		7 11	i)		130,341	
		ו.ש.ו	J• <i>)</i>		¢106 544	<u>۴</u>
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$196,541	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LE	EVEL I	F DIFFEF			
PI/PD TYPED NAME AND SIGNATURE*	DATE			FO	R NSF USE ONLY	
					COST RATE VERIE	
ORG. REP. TYPED NAME & SIGNATURE*	DATE		Date C		Date of Rate Sheet	Initials-ORG

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification UMass Subcontract from Columbia University Year 5: 1 Feb 2016 to 31 Jan 2017

G.6	OTHER: Software professional 1 FTE	
	Salary	\$129,839
	Health Insurance	\$6,753
	Materials & Supplies	\$2,200
	Travel/COLA	\$17,193
	2 trips at \$2,200/trip	
Ι	Indirect Costs:	\$40,556
	Off-campus rate 26%	\$40,330
J	Total Direct and Indirect Costs	\$196,541

All expenses are included under the item "OTHER DIRECT COSTS" to allow us to use a Team Account at CERN for all expenses. UMass Amherst will apply the off-campus overhead rate of 26% on all expenses related to this proposal since the activity is entirely off campus (based at CERN in Geneva, Switzerland).

FOR NSF USE ONLY

NSF Proposal Cumulative: 2/1/12 — 1/31/17 SUMMARY PROPOSAL BUDGET

ORGANIZATION			PRO	POSAL NC	D. DURATION	I (MONTHS)
University of Massachusetts-Amherst					Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AW	ARD NO.		
Dr. Stephane Willocq						
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associate	es		NSF-Fun	ded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)			erson-mo		Requested By	Granted by NSF
4 Otarkana Willam			ACAD	SUMR	Proposer	(If Different)
1. Stephane Willocq 2.		0			\$	\$
3.						
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAG	E)					
7. () TOTAL SENIOR PERSONNEL (1-6)	,					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. () POSTDOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)					
3. () GRADUATE STUDENTS						
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. () OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXC		0.)				
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EAC	EEDING \$5,00	0.)				
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POS	SESSIONS)					
2. FOREIGN						
F. PARTICIPANT SUPPORT						
1. STIPENDS \$						
2. TRAVEL						
3. SUBSISTENCE						
				00070		1
TOTAL NUMBER OF PARTICIPANTS ()	TOTAL	PARI	ICIPANT	COSIS		
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES						
2. PUBLICATION/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER Reimbursement to CERN team account					735,794	
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)					735,794	
I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)						
26% off-campus overhead rate						
						T
					191,309	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			: \		927,103	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJE L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	UI SEE GPG	II.U./.	J. <i>)</i>		¢007.400	<u>۴</u>
	105555 ·				\$927,103	\$
M. COST SHARING: PROPOSED LEVEL \$	AGREED LE	VELI	- DIFFEF			
PI/PD TYPED NAME AND SIGNATURE*	DATE				OR NSF USE ONLY	
					COST RATE VERIE	
ORG. REP. TYPED NAME & SIGNATURE*	DATE		Date Cl	necked	Date of Rate Sheet	Initials-ORG
	1					

NSF Form 1030 (10/99) Supersedes All Previous Editions

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification UMass Subcontract from Columbia University Cumulative: 1 Feb 2012 to 31 Jan 2017

G.6	OTHER: Software professional 1 FTE Salary Health Insurance Materials & Supplies Travel/COLA	\$612,463 \$31,854 \$10,500 \$80,977
Ι	Indirect Costs: Off-campus rate 26%	\$191,309
J	Total Direct and Indirect Costs	\$927,103

All expenses are included under the item "OTHER DIRECT COSTS" to allow us to use a Team Account at CERN for all expenses. UMass Amherst will apply the off-campus overhead rate of 26% on all expenses related to this proposal since the activity is entirely off campus (based at CERN in Geneva, Switzerland).

NO. 0322 P. 6

FILING REF.: The preced:

COLLEGES AND UNIVERSITIES RATE AGREEMENT

EIN #: 043167352

DATE: July 8, 2009

Agreement was dated

June 26, 2008

...

INSTITUTION: University of Massachusetts at Amherst 340 Whitmore Administration Bldg. 181 Presidents Drive Amherst MA 01003-9313

The rates approved in this agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions in Section III.

SECTION	I I: FACILI	TIES AND ADM	INISTRATIV	E COST RATES*	
RATE TY	PES: FIXED	FINAL	PROV. (P	ROVISIONAL)	PRED. (PREDETERMINED)
	EFFECTIV	IE PERIOD			
TYPE	FROM	TO	RATE(%)	LOCATIONS	APPLICABLE TO
PRED.	07/01/08	• •	57.0	On-Campus	Research
PRED.	07/01/10		58.0	On-Campus	Research
PRED.	07/01/11		58.5	On-Campus	Research
PRED.	07/01/12		59.0	On-Campus	Research
PRED.	07/01/08	06/30/13	26.0	Off-Campus	Research
PRED.	07/01/08	06/30/13	47.0	On-Campus	Instruction
PRED.	07/01/08	06/30/13	26.0	Off-Campus	Instruction
PRED.	07/01/08	06/30/13	34.0	On-Campus	Other Sponsored Act.
PRED.	07/01/08	06/30/13	24.0	Off-Campus	Other Sponsored Act
PROV.	07/01/13	UNTIL AMENDED	Use same	-	itions as those cited
				al year ending	
				-	

.**BASE:

Modified total direct costs, consisting of all salaries and wages, fringe benefits, materials, supplies, services, travel and subgrants and subcontracts up to the first \$25,000 of each subgrant or subcontract (regardless of the period covered by the subgrant or subcontract). Modified total direct costs shall exclude equipment, capital expenditures, charges for patient care, student tuition remission, rental costs of off-site facilities, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of \$25,000.

<u>,</u> ,

JL. 9. 2009 7:29AM

NO. 0322 P. 7

INSTITUTION: University of Massachusetts at Amherst

AGREEMENT DATE: July 8, 2009

SECTION II: SPECIAL REMARKS

TREATMENT OF PAID ABSENCES:

Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are claimed on grants, contracts and other agreements as part of the normal cost for salaries and wages. Separate claims for the costs of these paid absences are not made.

1. The rates in this Agreement have been negotiated to reflect the administrative cap provisions of the revisions to OMB Circular A-21 published by the Office of Management and Budget on May 8, 1996. No rate affecting the institution's fiscal periods beginning on or after October 1, 1991 contains total administrative cost components in excess of that 26 percent cap.

2. Fringe benefits are claimed using approved rates contained in the Massachusetts State-Wide Cost Allocation Plan. The following additional fixed fringe benefit charges are approved for the University:

	FYE 6/30/10
Workers' Comp. Ins.	.37% (S&W)
Health & Welfare(1)	\$13 per week
Sick Leave Bank	.20% (S&W)

(1) Health and Welfare - The State negotiated rate with collective bargaining units.

3. Equipment means an article of nonexpendable, tangible personal property having a useful life of more than one year, and an acquisition cost of \$5,000 or more per unit.

. 2009 7:29AM

/INSTITUTION: University of Massachusetts at Amherst

AGREEMENT DATE: July 8, 2009

SECTION III: GENERAL

A. LIMITATIONS:

The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract of other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the organization were included in its facilities and administrative cost pools as finally accepted costs are legal obligations of the organization and are allowable under the governing cost principles; (2) The same costs that been created as facilities and administrative costs are not claimed as direct costs; (3) Similar types of costs have been acce consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subjec renegotiation at the discretion of the Federal Government.

B. ACCOUNTING CHANGES:

This Agreement is based on the accounting system purported by the organization to be in effect during the Agreement period. Ct to the method of accounting for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the auchorized representative of the cognizant agency. Such changes include, but are not limited to, changes the charging of a particular type of cost from facilities and administrative to direct. Failure to obtain approval may result cost disallowances.

C. FIXED RATES:

IN a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the act costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

D. USE BY OTHER FEDERAL AGENCIES:

The rates in this Agreement were approved in accordance with the authority in Office of Management and Budget Circular A-21 Circular, and should be applied to grants, contracts and other agreements covered by this Circular, subject to any limitations above. The organization may provide copies of the Agreement to other Federal Agencies to give them early notification of the Agreement.

E. OTHER:

If any Federal contract, grant or other agreement is reimbursing facilities and administrative costs by a means other than the approved rate(s) in this Agreement, the organization should (1) credit such costs to the affected programs, and (2) apply the approved rate(s) to the appropriate base to identify the proper amount of facilities and administrative costs allocable to the programs.

BY THE INSTITUTION:

й. С.С.		
(INSTITUTION)	
Fai	(Mithaton,	
SIGNITURE		

University of Massachuserrs at Ambergt

Joyce M. Hatch

(NAME)

Vice Chancellor for Administration & Finance

7/9/2010

(DATE)

ON BEHALF OF THE FEDERAL GOVERNMENT:

DEPARTMENT OF HEALTH AND HUMAN SERVICES

(SIGNATURE)

Robert I. Aaronson (NAME)

DIRECTOR, DIVISION OF COST ALLOCATION (TITLE)

July 8, 2009

(DATE) 0742

HHS REPRESENTATIVE: <u>Michael Stanco</u> Telephone: <u>(212) 264-2069</u>

SUMMARY PROPOSAL BUDG	ET Y		FO	R NSF	USE ONL	Y
ORGANIZATION		PRO	DPOSAL			DN (month
University of Michigan Ann Arbor					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	Ю.		
Robert Ball						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mo	ed nths	De	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	не	equested By proposer	granted by I (if differen
1. Robert Ball - Senior Engineer	11.00	0.00	0.00	\$	76,949	\$
2. Shawn P McKee - Prof	2.40	0.00	0.00)	19,029	
3. Homer Neal - Prof	0.00	0.00	0.00)	0	
4. Bing Zhou - Prof	0.00	0.00	0.00)	0	
5. Junjie Zhu - Asst Prof	0.00	0.00			0	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	13.40	0.00	0.00		95,978	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00				0	
2. (3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	36.00	0.00	0.00		118,680	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (1) OTHER					37,080	
TOTAL SALARIES AND WAGES (A + B)					251,738	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					72,406	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED					324,144	
			22,030		122,030	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			22,030		9,900	
			22,030			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			22,030		9,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN			22,030		9,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			22,030		9,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			22,030	-	9,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			22,030		9,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			22,030	-	9,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0	ESSIONS	s)		-	9,900 60,713	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0	ESSIONS	s)			9,900	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR	ESSIONS	s)			9,900 60,713	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 60 3. SUBSISTENCE 60 4. OTHER 70TAL NUMBER OF PARTICIPANTS (0) 70TAL PAR G. OTHER DIRECT COSTS	ESSIONS	s)		-	<u>9,900</u> <u>60,713</u>	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS	s)		-	9,900 60,713 0 38,604	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS	s)			9,900 60,713 0 38,604 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMER SERVICES	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ONECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 298992) (Cont. on Comments Page) <td>ESSIONS</td> <td>s)</td> <td></td> <td></td> <td>9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539</td> <td></td>	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539 797,326	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539 797,326 179,404	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 298992) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS <	ESSIONS	s)			9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539 797,326 179,404 976,730	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) MTDC (Rate: 26.0000, Base: 298992) (Cont. on Comments Page) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3		9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539 797,326 179,404 976,730 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 298992) (Cont. on Comments Page) TOTAL LINDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			S S NT \$	Ŧ	9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539 797,326 179,404 976,730 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 298992) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			S S NT \$ FOR 1	NSF L	9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539 797,326 179,404 976,730 0 976,730	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 ACOMPUTER SERVICES 0 AGREED LEVEL 0 AGREED LEVEL 0 AGREED LEVEL 0 AGREED LE			S NT \$ FOR 1 ECT COS	NSF L	9,900 60,713 0 38,604 0 23,810 0 218,125 0 280,539 797,326 179,404 976,730 0 976,730 976,730	\$

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 55.5000, Base 158182) subaward >25k (Rate: 55.5000, Base 25000)

SUMMARY PROPOSAL BUDG	ЕΤ Ϊ	E <u>AR</u>	FO	R NSF U	SE ONL	Y
ORGANIZATION		PRC	POSAL	1		- DN (month
University of Michigan Ann Arbor				- F	Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Robert Ball						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		inds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Reque	ested By poser	granted by N (if differen
1. Robert Ball - Senior Engineer	11.00	0.00	0.00	\$	79,257	\$
2. Shawn P McKee - Prof	2.40	0.00	0.00		19,600	
3. Homer Neal - Prof	0.00	0.00	0.00		0	
4. Bing Zhou - Prof	0.00	0.00	0.00		0	
5. Junjie Zhu - Asst Prof	0.00	0.00	0.00		0	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	13.40	0.00	0.00		98,857	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	24.00	0.00	0.00		90,508	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (1) OTHER					38,193	
TOTAL SALARIES AND WAGES (A + B)				2	227,558	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					65,693	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				2	293,251	
		<u></u>		1	128,514	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)		-	9,800	
	SSIONS)		•	,	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)		•	9,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		1	9,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)		-	9,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			9,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)		•	9,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0	SSIONS)		1	9,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			6		9,800	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		<u>9,800</u> <u>54,900</u> 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		9,800 54,900 0 39,099	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PART G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3	-	9,800 54,900 0 39,099 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6		9,800 54,900 0 39,099 0 24,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0) TOTAL PARTICIPANTS 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		9,800 54,900 0 39,099 0 24,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		9,800 54,900 0 39,099 0 24,000 0 228,375	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			5		9,800 54,900 0 39,099 0 24,000 0 228,375 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		9,800 54,900 0 39,099 0 24,000 0 228,375 0 291,474	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		9,800 54,900 0 39,099 0 24,000 0 228,375 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			3		9,800 54,900 0 39,099 0 24,000 0 228,375 0 291,474	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 258921) (Cont. on Comments Page)			3		9,800 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 258921) (Cont. on Comments Page) <td></td> <td></td> <td><u> </u></td> <td></td> <td>9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301</td> <td></td>			<u> </u>		9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) MTDC (Rate: 26.0000, Base: 2589			<u> </u>		9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301 335,240	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 258921) (Cont. on Comments Page) TOTAL INDIRECT AND INDIRECT COSTS (H + I)<			<u> </u>		9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301 335,240 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 258921) (Cont. on Comments Page) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS			9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301 335,240	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1 0 1 0 1 1 1 1 1 1 2 2 2 2 2 3 3 4 <td>TICIPAN</td> <td>T COSTS</td> <td>NT \$</td> <td></td> <td>9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301 035,240 0 0355,240</td> <td>\$</td>	TICIPAN	T COSTS	NT \$		9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301 035,240 0 0355,240	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 258921) (Cont. on Comments Page) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN		NT \$ FOR 1		9,800 54,900 54,900 0 39,099 0 24,000 0 228,375 0 291,474 777,939 157,301 335,240 0 335,240 0 335,240	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 258921) (Cont. on Comments Page) TOTAL INDRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			NT \$ FOR 1		9,800 54,900 54,900 0 24,000 0 24,000 0 228,375 0 291,474 777,939 157,301 335,240 0 335,240 0 335,240 0 201Y E ONLY	

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 55.5000, Base 162129)

SUMMARY PROPOSAL BUDG	iET		FOR NSF USE ONLY			Y
ORGANIZATION		PRC	POSAL		1	DN (month
University of Michigan Ann Arbor					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	0.		
Robert Ball						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	- Rec	quested By proposer	granted by N (if differen
1. Robert Ball - Senior Engineer	11.00	0.00	0.00	\$	81,635	\$
2. Shawn P McKee - Prof	2.40	0.00	0.00		20,188	
3. Homer Neal - Prof	0.00	0.00	0.00		0	
4. Bing Zhou - Prof	0.00	0.00	0.00		0	
5. Junjie Zhu - Asst Prof	0.00	0.00	0.00		0	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	13.40	0.00	0.00		101,823	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	24.00	0.00	0.00		93,223	
3. (0) GRADUATE STUDENTS					Ó	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (1) OTHER					39,338	
TOTAL SALARIES AND WAGES (A + B)					234,384	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					67,664	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					302,048	
TOTAL EQUIPMENT			28,461		128,461	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			28,461		9,900	
TOTAL EQUIPMENT			28,461			
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			28,461		9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			28,461	-	9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0			28,461		9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			28,461	-	9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0			28,461	-	9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			28,461		9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)	ESSIONS)		-	9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS)			<u>9,900</u> <u>56,800</u>	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			9,900 56,800 0 38,772	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			9,900 56,800 0 38,772 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 9 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)	ESSIONS)			9,900 56,800 0 38,772 0 25,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801 0 295,573	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAP G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801 0 295,573	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. O 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 266683) (Cont. on Comments Page)	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS // DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 266683) (Cont. on Comments Page) TOTAL INDIRECT C	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782 161,378	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS // DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H +	ESSIONS)			9,900 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782 161,378 954,160	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN	ESSIONS)			9,900 56,800 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782 161,378 954,160 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 266683) (Cont. on Comments Page) TOTAL INDIRECT AN	RTICIPAN		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		9,900 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782 161,378 954,160	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1 0 TOTAL NUMBER OF PARTICIPANTS 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1<	RTICIPAN		S 		9,900 56,800 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782 161,378 954,160 0 954,160	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL SERVICES 5. SUBAUARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 266683) (Cont. on Comments Page) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN		S S NT \$ FOR 1	NSF U	9,900 56,800 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782 161,378 954,160 0 954,160 0 954,160 SE ONLY	\$
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1 0 1 0 1 1 1 1 1 1 1			S NT \$ FOR I CT COS	NSF U BT RA	9,900 56,800 56,800 0 38,772 0 25,000 0 231,801 0 295,573 792,782 161,378 954,160 0 954,160	\$

3 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 55.5000, Base 165838)

SUMMARY PROPOSAL BUDG	ET		FOR	R NSF I	I	
ORGANIZATION		PRC	POSAL	-		DN (month
University of Michigan Ann Arbor				-	Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	Ю.		
Robert Ball						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	F	unds Jested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	oposer	granted by I (if differen
1. Robert Ball - Senior Engineer	11.00	0.00	0.00	\$	84,084	\$
2. Shawn P McKee - Prof	2.40	0.00	0.00		20,794	
3. Homer Neal - Prof	0.00		0.00		0	
4. Bing Zhou - Prof	0.00		0.00		0	
5. Junjie Zhu - Asst Prof	0.00		0.00		0	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00		0.00		0	
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	13.40	0.00	0.00		104,878	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		0	
 (0) POST DOCTORAL SCHOLARS (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 	0.00 24.00		<u>0.00</u> 0.00		<u>0</u> 96,020	
3. (0) GRADUATE STUDENTS	24.00	0.00	0.00		<u>90,020</u> 0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (1) OTHER					40,519	
TOTAL SALARIES AND WAGES (A + B)					241,417	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					69,694	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					311,111	
			28,101		<u>128,101</u> 9,800	
TOTAL EQUIPMENT		· •	28,101			
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		· •	28,101		9,800	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN		· •	28,101		9,800	
TOTAL EQUIPMENT		· •	28,101		9,800	
TOTAL EQUIPMENT		· •	28,101		9,800	
TOTAL EQUIPMENT		· •	28,101	-	9,800	
TOTAL EQUIPMENT		· •	28,101		9,800	
TOTAL EQUIPMENT TOTAL	ESSIONS	;)			9,800	
TOTAL EQUIPMENT OTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL	ESSIONS	;)			<u>9,800</u> 60,067	
TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS TOTAL SUPPORT COSTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS TOTAL PAR	ESSIONS	;)			<u>9,800</u> 60,067	
TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS TOTAL SUPPORT COSTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS CONTAL PAR CONT	ESSIONS	;)			9,800 60,067	
TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL SUPPORT COSTS TOTAL SUPPORT COSTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS TOTAL NUMBER OF PARTICIPANTS TOTAL SAND SUPPLIES	ESSIONS	;)			9,800 60,067 0 38,500	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN 6. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS	;)			9,800 60,067 0 38,500 0 25,000 0	
TOTAL EQUIPMENT	ESSIONS	;)			9,800 60,067 0 38,500 0 25,000 0 235,278	
TOTAL EQUIPMENT TRAVEL	ESSIONS	;)			9,800 60,067 0 38,500 25,000 0 235,278 0	
TOTAL EQUIPMENT	ESSIONS	;)			9,800 60,067 38,500 38,500 25,000 0 235,278 0 298,778	
TOTAL EQUIPMENT	ESSIONS	;)			9,800 60,067 0 38,500 25,000 0 235,278 0	
TOTAL EQUIPMENT	ESSIONS	;)			9,800 60,067 38,500 38,500 25,000 0 235,278 0 298,778	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN G. 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) <	ESSIONS	;)			9,800 60,067 0 38,500 25,000 25,000 235,278 0 298,778 807,857	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 6. OTHER 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS 0. TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OTHER 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 274683) (Cont. on Comments Page) IOTAL INDIRECT COSTS (F&A)	ESSIONS	;)			9,800 60,067 0 38,500 0 25,000 0 235,278 0 298,778 807,857 165,653	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) <td< td=""><td>ESSIONS</td><td>;)</td><td></td><td></td><td>9,800 60,067 38,500 25,000 235,278 0 298,778 807,857 165,653 973,510</td><td></td></td<>	ESSIONS	;)			9,800 60,067 38,500 25,000 235,278 0 298,778 807,857 165,653 973,510	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS	;)			9,800 60,067 38,500 25,000 235,278 0 298,778 807,857 165,653 973,510 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	TICIPAN		3		9,800 60,067 38,500 25,000 235,278 0 298,778 807,857 165,653 973,510	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) TOTAL NUMBER OF PARTICIPANTS (1) TOTAL DIRECT COSTS (A THROUGH G)	TICIPAN		S S NT \$		9,800 60,067 38,500 25,000 235,278 0 298,778 807,857 165,653 973,510 0	
TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL EQUIPMENT TOTAL DUPORT COSTS TOTAL SUPPORT COSTS SUBSISTENCE TOTAL NUMBER OF PARTICIPANTS O TOTAL PAR O TOTAL NUMBER OF PARTICIPANTS O TOTAL PAR O ACCOST SITE O AGREED LEVEL \$ AGREED LEVEL \$ O AGREED LEVEL \$ AGREED LEVEL \$ O AGREED LEVEL \$ AGREED LEVEL \$ O AGREED LEVEL \$ AGREED	TICIPAN		S S NT \$ FOR 1	\$	9,800 60,067 38,500 0 25,000 235,278 0 298,778 807,857 165,653 973,510 973,510	\$
TOTAL EQUIPMENT 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A) () () () () () () () () () () ()			S NT \$ FOR 1 CT COS	\$	9,800 60,067 38,500 0 25,000 0 235,278 0 298,778 807,857 165,653 973,510 0 973,510 0 973,510 5E ONLY E VERIFIC	\$

4 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 55.5000, Base 169793)

SUMMARY PROPOSAL BUDG	ET Y		FOR NSF USE ONLY			Y
ORGANIZATION		PRC	POSAL			DN (month
University of Michigan Ann Arbor					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	Ю.		
Robert Ball						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	- Red	quested By proposer	granted by I (if differen
1. Robert Ball - Senior Engineer	11.00	0.00	0.00	\$	86,606	\$
2. Shawn P McKee - Prof	2.40	0.00	0.00		21,418	
3. Homer Neal - Prof	0.00	0.00	0.00		0	
4. Bing Zhou - Prof	0.00	0.00	0.00		0	
5. Junjie Zhu - Asst Prof	0.00	0.00	0.00		0	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	13.40	0.00	0.00		108,024	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00)	0	
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	24.00	0.00	0.00)	98,901	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (1) OTHER					41,734	
TOTAL SALARIES AND WAGES (A + B)					248,659	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					71,785	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					320,444	
TOTAL EQUIPMENT			27,643		127,643	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		· •	27,643		9,900	
TOTAL EQUIPMENT		· •	27,643			
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE		· •	27,643		9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN		· •	27,643		9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS		· •	27,643		9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		· •	27,643	-	9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		· •	27,643	-	9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS S C. TRAVEL C O S. SUBSISTENCE O		· •	27,643	-	9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)			9,900	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	ESSIONS)			9,900 61,722	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)	ESSIONS)		-	9,900 61,722	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS	ESSIONS)		-	<u>9,900</u> <u>61,722</u> <u>0</u>	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			9,900 61,722 0 38,734	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PA	ESSIONS)			9,900 61,722 0 38,734 0 26,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 282929) (Cont. on Comments Page)	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 282929) (Cont. on Comments Page) <td>ESSIONS</td> <td>)</td> <td></td> <td></td> <td>9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060</td> <td></td>	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS // DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 282929) (Cont. on Comments Page) <td>ESSIONS</td> <td>)</td> <td></td> <td></td> <td>9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310</td> <td></td>	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL PAR G. OTHER DIRECT COSTS 1 COMPUTER SERVICES 5 SUBAWARDS 6 OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1 INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 282929) (Cont. on Comments Page)	ESSIONS)			9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 282929) (Cont. on Comments Page) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 26.0000, Base: 282929) (Cont. on Comments Page) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE			S		9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310 0 993,310	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS A. TOTAL DIRECT			S NT \$ FOR 1	NSF U	9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310 0 993,310 SE ONLY	\$
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 <td></td> <td></td> <td>S NT \$ FOR I CT COS</td> <td>NSF U ST RA</td> <td>9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310 0 993,310</td> <td>\$</td>			S NT \$ FOR I CT COS	NSF U ST RA	9,900 61,722 0 38,734 0 26,000 0 238,807 0 303,541 823,250 170,060 993,310 0 993,310	\$

5 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

** I- Indirect Costs MTDC T2 (Rate: 55.5000, Base 173871)

PROPOSAL BUDG	iET		FOR NSF USE ON		USE ONL	T
ORGANIZATION		PRC	POSAL	NO.	DURATIO	DN (month
University of Michigan Ann Arbor					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A\	WARD N	0.		
Robert Ball		NSE Eurod	od		<u> </u>	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Fund Person-mor		Requ	unds lested By	Funds granted by N (if differen
	CAL	ACAD	SUMR			
1. Robert Ball - Senior Engineer	55.00	0.00	0.00		408,531	\$
2. Shawn P McKee - Prof 3. Homer Neal - Prof	12.00	0.00	0.00		<u>101,029</u> 0	
4. Bing Zhou - Prof	0.00	0.00	0.00		0	
5. Junjie Zhu - Asst Prof	0.00	0.00	0.00		0	
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	67.00	0.00	0.00		509,560	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	07.00	0.00	0.00		303,300	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (11) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	132.00	0.00	0.00		497,332	
3. (0) GRADUATE STUDENTS	102.00	0.00	0.00		<u>437,002</u> 0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (5) OTHER					196,864	
TOTAL SALARIES AND WAGES (A + B)					203,756	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					347,242	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					550,998	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI			34,749		<u>634,749</u> 49,300	
			34,749		634,749 49,300 294,202	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI			34,749		49,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			34,749		49,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			34,749		49,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0			34,749		49,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0			34,749		49,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			34,749		49,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0	ESSIONS)			49,300	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS)		-	49,300 294,202	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)		-	49,300 294,202 0 193,709	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)		-	49,300 294,202 0 193,709 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) SUBJUSTIC 0 TOTAL NUMBER OF PARTICIPANTS (0) 3. CONSULTANT SERVICES	ESSIONS)		-	49,300 294,202 0 193,709 0 123,810	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)			49,300 294,202 0 193,709 0 123,810 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)			49,300 294,202 0 193,709 0 123,810 0 152,386	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)		1,	49,300 294,202 0 193,709 0 123,810 0 152,386 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 4. STIPENDS 5. SUBSISTENCE 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. OMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS	ESSIONS)			49,300 294,202 94,202 0 193,709 0 123,810 0 123,810 0 469,905	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)			49,300 294,202 0 193,709 0 123,810 0 152,386 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS)			49,300 294,202 94,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) <td>ESSIONS</td> <td>)</td> <td></td> <td></td> <td>49,300 294,202 94,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796</td> <td></td>	ESSIONS)			49,300 294,202 94,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 0 TOTAL NO COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)	ESSIONS)			49,300 294,202 94,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796 833,796	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 4. OTHER 5. SUBSISTENCE 4. OTHER 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	ESSIONS)		1, 1, 3, 4,	49,300 294,202 294,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796 833,796 832,950 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 4. OTHER 5. SUBSISTENCE 4. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	RTICIPAN		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1, 1, 3, 4,	49,300 294,202 94,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796 833,796	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	RTICIPAN		5 	1, 1, 3, 4, \$ 4,	49,300 294,202 94,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796 833,796 833,796 832,950 0 832,950	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) L. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	RTICIPAN			1, 1, 1, 3, \$ 4, \$ 4,	49,300 294,202 294,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796 833,796 8332,950 0 832,950 0 832,950	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) ACOMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			S NT \$ FOR 1 CT COS	1, 1, 1, 3, \$ 4, \$ 4,	49,300 294,202 294,202 0 193,709 0 123,810 0 152,386 0 469,905 999,154 833,796 833,796 8332,950 0 832,950 0 832,950 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

bia (direct)							
6					YEAR	Total	
BUDGET-NSF	F				FOR NSF USE ONLY		
			PROF	OSAL NO	D. DURATIO	N (MONTHS)	
Arbor, MI 48109					Proposed		
			AWARI	D NO.		Funds ited by NSF	
r Senior Associates			NSF Funded		Funds		
Title		CAL	Person-month ACAD	s SUMR	Requested By Proposer		
Professor, F	Pi	0.00	0.00	0.00	\$0		
Professor		0.00	0.00	0.00	\$0		
Assistant P	rofessor	0.00	0.00	0.00	\$0 \$0		

					\$0		
)							
		0.00	0.00	0.00	\$0		
BRAMMER, ETC.)		0.00	0.00	0.00	\$497,332		
	·····				\$0		
					\$0		
CTLY)					\$0		
					\$196,864		
DTAL SALARIES AND WAGES (A+B)					\$694,196		
RINGE BENEFITS (IF CHARGED AS DIRECT COSTS) 28% est of sS&W TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)					\$194,375		
	ITEM EXCEEDING \$5	000)			\$888,571		
	UD U.C. DOCEFECION	0)			\$0		
ANADA, MEXICO AR	ND U.S. POSSESSION	5)			\$0		
					\$269,902		
\$0)						
\$0							
\$0	-						
\$0							
					\$0		
					\$99,924	**************	
NATION					\$0		
					\$123,810		
					\$0		
					\$0		
Expenses					\$0		
					\$223,734		
					\$1,382,207		
Amount		Rate					
\$1,382,207		26.0%	\$359,374				
	•				\$359,373		
RRENT PROJECTS	S SEE GPG II.D.7.(.)				\$1,741,580		
INENT PROJECTS	5 3CE GEG II.D./.J.)				\$0	******	
	AGREED LEVEL IF D	FFERENT	\$		\$1,741,580 \$0		
	DATE		Ψ	EOD	NSF USE ONLY		
	BALL	INT					
	DATE 1	1			T	······	
\sim	12/9/10			20			
-	~		DATE 9/10 Date C	DATE 9/10 Date Checked	DATE 9/10 Date Checked Da	INDIRECT COST RATE VERIFICATION	

Managing Project Representative Div. of Research Develop. & Admin.

For the period	10/1/2011-9/30/2	012				YEAR	1
Title:				<u> </u>		FOR NSF USE ONL	Y
ORGANIZATION				PROF	OSAL NO	D. DURAT	ION (MONTHS)
The Regents of The Uni		nn Arbor, MI 48109				Propose	d Granted
PRINCIPAL INVESTIGATOR/PF	ROJECT DIRECTOR			AWAR	D NO.		Funds
Bing						Gra	nted by NSF
A. SENIOR PERSONNEL: PI/PE		her Senior Associates		NSF Funded		Funds	
(List each separately with title, A 0. Bing	.7. snow number in brackets)	Title	CAL	Person-month	T	Requested By	
1. Bing	Zhou	Professor, Pl		ACAD	SUMR	Proposer	
2. Homer	Neal	Professor	0.00	0.00	0.00	\$0	
3. Junjie	Zhu	Assistant Professor	0.00	0.00	0.00	\$0	
		7653tan 110/6330	0.00	0.00	0.00	\$0 \$0	
() TOTAL SENIOR PER	SONNEL (1-6)					\$0	
B. OTHER PERSONNEL (SHOW	V NUMBERS IN BRACKE	rs)					
1. (0) POST DOCTORAL A	SSOCIATES		0.00	0.00	0.00	\$0	Ι
2. (3) OTHER PROFESSIO	NALS (TECHNICIAN, PRO	DGRAMMER, ETC.)	36.00	0.00	0.00	\$118,680	
3. (0) GRADUATE STUDEN	NTS					\$0	
4. (0) UNDERGRADUATE :	STUDENTS					\$0	
5. (0) SECRETARIAL - CLE	RICAL (IF CHARGED DIF	RECTLY)				\$0	
6. (0.5) OTHER (Electric Engi	neer-6 months					\$37,080	
TOTAL SALARIES AND WA						\$155,760	
C. FRINGE BENEFITS (IF CHAF	GED AS DIRECT COSTS) 28% est of sS&W				\$43,613	
TOTAL SALARIES, WAGES		(A+B+C) AMOUNT FOR EACH ITEM EXCEE				\$199,373	
TOTAL EQUIPMENT							
E. TRAVEL	1 DOMESTIC (INCL)	CANADA, MEXICO AND U.S. POS	RESCIONES				
	2. FOREIGN	CANADA, MEXICO AND U.S. POS	SESSIONS)			\$0	
F. PARTICIPANT SUPPORT CO						\$55,913	
1. STIPENDS		\$0					
2. TRAVEL		\$0					
3. SUBSISTENCE		\$0					
4. OTHER		\$0					
(0) TOTAL NUMBER OF I	PARTICIPANTS				ŀ	\$0	
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPL	ES					\$19,896	
2. PUBLICATION COSTS/DC	CUMENTATION/DISSEM	IINATION				\$0	
3. CONSULTANT SERVICES	6 (Chapman .25 FT	E)				\$23,810	
4. COMPUTERS SERVICES						\$0	
5. SUBAWARDS						\$0	
6. OTHER	Graduate Student Tuitio	on Expenses				\$0	
TOTAL OTHER DIRECT						\$43,706	
H. TOTAL DIRECT COSTS (A TH						\$298,992	
I. INDIRECT COSTS (SPECIFY F	,						
Name of indirect cost ite modified Total Direct Co		Amount \$298,992	Rate 26.0%	\$77,738			
TOTAL INDIRECT COSTS					ŀ	¢77 700	
J. TOTAL DIRECT AND INDIREC	T COSTS (H+I)					\$77,738	
		URRENT PROJECTS SEE GPG II.	D.7i)			\$376,730 \$0	
. AMOUNT OF THIS REQUEST						\$0	
M. COST SHARING: PROPOSED		AGREED LE	VEL IF DIFFERENT \$			\$0	
PI/PD TYPED NAME & SIGNATU	RE*	DATE			FOR N	ISF USE ONLY	
Bing	- 1			RECT COST		ERIFICATION	
NST. REP. TYPED NAME & SIC	Ven /	12/9	Date Ct			Rate of Sheet	·····

David M. Plawchan Managing Project Representative Div. of Research Develop. & Admin.

						FOR NSF USE ONLY		
ORGANIZATION				PRO	POSAL NC		ON (MONTHS)	
The Regents of The	e University of Michigan, A	nn Arbor, MI 48109			00.12.110	Proposed	Granted	
RINCIPAL INVESTIGATO				AWAR			Funds	
Zhou						Granted by NSF		
SENIOR PERSONNEL:	PI/PD, Co-PI'S, Faculty and Oth	er Senior Associates		NSF Funded	t	Funds		
	title, A.7. show number in brackets)			Person-month	ns	Requested By		
0. First Nam	e M Last Name	Title	CAL	ACAD	SUMR	Proposer		
. Bing	Zhou	Professor, PI	0.00	0.00	0.00	\$0		
. Homer	Neal	Professor	0.00	0.00	0.00	\$0		
Junjie	Zhu	Assistant Professor	0.00	0.00	0.00	\$0		
	R PERSONNEL (1-6)			<u></u>	<u></u>	\$0		
	SHOW NUMBERS IN BRACKET	<u>S)</u>		<u></u>	<u></u>			
			0.00	0.00	0.00	\$0		
	SSIONALS (TECHNICIAN, PRO	GRAMMER, ETC.)	24.00	0.00	0.00	\$90,508		
3. (0) GRADUATE ST						\$0		
5. (0) UNDERGRADU	- CLERICAL (IF CHARGED DIR					\$0		
	·····					\$0		
TOTAL SALARIES AN						\$38,193		
	CHARGED AS DIRECT COSTS)) 28% est of sS&	14/			\$128,701		
	AGES AND FRINGE BENEFITS					\$36,036 \$164,737		
		MOUNT FOR EACH ITEM EXCE	EDING \$5 000)		******	<u> </u>		
		0						
TOTAL EQUIPMENT						\$0		
. TRAVEL	1. DOMESTIC (INCL. (CANADA, MEXICO AND U.S. PO	SSESSIONS)			\$0		
	2. FOREIGN					\$50,000		
. PARTICIPANT SUPPOR	T COSTS							
1. STIPENDS		\$0						
2. TRAVEL		\$0						
3. SUBSISTENCE		<u>\$0</u>						
4. OTHER		\$0					<u></u>	
*****	R OF PARTICIPANTS					\$0		
OTHER DIRECT COSTS								
1. MATERIALS AND SI						\$20,184		
	TS/DOCUMENTATION/DISSEM	INATION			·	\$0		
	VICES (Chapman .25 FTE)					\$24,000		
4. COMPUTERS SERV	ICES					\$0		
5. SUBAWARDS	Cardinate Or 1 177					\$0		
6. OTHER TOTAL OTHER D	Graduate Student Tuiti	on Expenses				\$0		
. TOTAL DIRECT COSTS						\$44,184		
INDIRECT COSTS (SPE						\$258,921		
Name of indirect c	,	Amount	Rate					
modified Total Din		\$258,921	26.0%	\$67,320	. 1			
ă		\$200,021	20.076	407,520				
OTAL INDIRECT COSTS						\$67,320		
TOTAL DIRECT AND INC	VIRECT COSTS (H+I)					\$326,240		
RESIDUAL FUNDS (IF F	OR FURTHER SUPPORT OF C	URRENT PROJECTS SEE GPG I	II.D.7.j.)			\$0		
	JEST (J) OR (J MINUS K)					\$326,240		
. COST SHARING: PROP		AGREED	LEVEL IF DIFFERENT	\$		\$0		
/PD TYPED NAME & SIG	NATURE*	DATE			FOR	NSF USE ONLY		
	10/ 21		IN IN	DIRECT COS	ST RATE V	/ERIFICATION		
				<u>.</u>	Det			
IST. REP. TYPED NAME &	VSIGN/TURE*	DATE	Date Date	Checked	Date	e Rate of Sheet		

David M. Plawchan Managing Project Representative Div. of Rescarch Develop. & Admin.

For the period	10/1/2013-9/30/201	14					YEAR	3
							FOR NSF USE ONLY	ſ
ORGANIZATION					PROF	OSAL NO	. DURAT	TON (MONTHS)
The Regents of The Ur	niversity of Michigan, An	n Arbor, MI 48109					Propose	d Granted
PRINCIPAL INVESTIGATOR/P	ROJECT DIRECTOR				AWAR	D NO.		Funds
Zhou							Gra	inted by NSF
A. SENIOR PERSONNEL: PI/P	D, Co-PI'S, Faculty and Other	r Senior Associates		T	NSF Funded		Funds	
	A.7. show number in brackets)				Person-month	<u>s</u>	Requested By	
0. First Name	M Last Name	Title		CAL	ACAD	SUMR	Proposer	
1. Bing	Zhou	Professor,	PI	0.00	0.00	0.00	\$0	
2. Homer	Neal	Professor		0.00	0.00	0.00	\$0	
3. Junjie	Zhu	Assistant P	rofessor	0.00	0.00	0.00	\$0	

() TOTAL SENIOR PE	and the second			+	Į <u></u>	l <u></u>	\$0	L
B. OTHER PERSONNEL (SHO		i)				<u>;:::::::</u>		
1. (0) POST DOCTORAL		-		0.00	0.00	0.00	\$0	
The second se	ONALS (TECHNICIAN, PROC	GRAMMER, ETC.)		24.00	0.00	0.00	\$93,223	
3. (0) GRADUATE STUDE							\$0	
4. (0) UNDERGRADUATE							\$0	Ļ
	ERICAL (IF CHARGED DIRE	CILY)					\$0	<u> </u>
6. (0.5) OTHER (Electric enj							\$39,338	Į
TOTAL SALARIES AND W							\$132,561	
C. FRINGE BENEFITS (IF CHA			% est of sS&W				\$37,117	
	S AND FRINGE BENEFITS (A						\$169,678	L
D. PERMANENT EQUIPMENT	LIST ITEM AND DOLLAR AN	MOUNT FOR EACH	ITEM EXCEEDING \$5,00	00)				
							\$0	
E. TRAVEL	1. DOMESTIC (INCL, C	ANADA, MEXICO AN	ND U.S. POSSESSIONS)			\$0	
	2. FOREIGN		***				\$52,000	L
F. PARTICIPANT SUPPORT CO	DSTS		-					
1. STIPENDS		\$0						
2. TRAVEL		\$(
3. SUBSISTENCE		\$(
4. OTHER		\$0						<u></u>
(0) TOTAL NUMBER OF	PARTICIPANTS						\$0	I
G. OTHER DIRECT COSTS								<u>, </u>
1. MATERIALS AND SUPP							\$20,004	
	DOCUMENTATION/DISSEMIN	NATION					\$0	
3. CONSULTANT SERVICE							\$25,000	
4. COMPUTERS SERVICE	5						\$0	
5. SUBAWARDS							\$0	L
6. OTHER	Graduate Student Tuition	n Expenses					\$0	
							\$45,004	
H. TOTAL DIRECT COSTS (A T							\$266,682	L
1. INDIRECT COSTS (SPECIFY	,	. .		_ .				
Name of indirect cost i		Amount		Rate				
modified Total Direct (JOSIS	\$266,682		26.0%	\$69,337			
TOTAL INDIRECT COSTS							\$69,338	
J. TOTAL DIRECT AND INDIRE					****		\$336,020	
K. RESIDUAL FUNDS (IF FOR I L. AMOUNT OF THIS REQUES		INKENT PROJECTS	SEE GPG II.D./.J.)				\$0	
M. COST SHARING: PROPOSE			AGREED LEVEL IF D	FEEDENIT	¢		\$336,020	
PI/PD TYPED NAME & SIGNAT					Ф 			L
THE DITTED NAME & SIGNAT	0		DATE	16.15				
INST. REP. TYPED NAME & SIG	GNATURE*				1		ERIFICATION	
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NSF Form 1030 (10/97) Supersede	All Previous Editoris	·	44110	I	*SIGNATURE	SREOLUP	ED ONLY FOR REVISED	
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David M	Plawchan							
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Managing Project Representative Div. of Research Develop. & Admin.

For the period 10/1/2014-9/30/2015						YEAR	4
						FOR NSF USE ONLY	,
ORGANIZATION				PROP	OSAL NO	. DURAT	ION (MONTHS)
The Regents of The University of Michigan, Ann Arb	or, MI 48109					Proposed	d Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR				AWARE	NO.		Funds
Zhou						Grai	nted by NSF
A. SENIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Other Senic	or Associates			NSF Funded		Funds	
(List each separately with title, A.7. show number in brackets) 0. First Name M Last Name				Person-month		Requested By	
	Title		CAL	ACAD	SUMR	Proposer	
1. Bing Zhou	Professor, PI		0.00	0.00	0.00	\$0	
2. Homer Neal	Professor	<i>t</i>	0.00	0.00	0.00	\$0	
3. Junjie Zhu	Assistant Pro	tessor	0.00	0.00	0.00	\$0	
() TOTAL SENIOR PERSONNEL (1-6)						\$0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							L
1. (0) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	\$0	······
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMM	MER. ETC.)		24.00	0.00	0.00	\$96,020	
3. (0) GRADUATE STUDENTS			2.1.00	0.00	0.00	\$0	
4. (0) UNDERGRADUATE STUDENTS		***************************************				\$0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						\$0	
6. (0.5) OTHER (Electric engineer, 6 months)						\$40,519	
TOTAL SALARIES AND WAGES (A+B)		· · ·				\$136,539	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)	28%	est of sS&W				\$38,231	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C						\$174,770	
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT	T FOR EACH IT	EM EXCEEDING \$5,000)				
TOTAL EQUIPMENT						\$0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA	A, MEXICO AND	U.S. POSSESSIONS)				\$0	
2. FOREIGN						\$55,167	
F. PARTICIPANT SUPPORT COSTS	* -						
1. STIPENDS	\$0						
2. TRAVEL	\$0						
3. SUBSISTENCE	\$0						
	\$0						
						\$0 	
G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			*****				
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	NI					\$19,746	
3. CONSULTANT SERVICES	IN					\$0	
4. COMPUTERS SERVICES						\$25,000	
5. SUBAWARDS						\$0 \$0	
6. OTHER Graduate Student Tuition Expe	neae					\$0	
TOTAL OTHER DIRECT COSTS	11000					\$44,746	
H. TOTAL DIRECT COSTS (A THROUGH G)						\$274,683	
I. INDIRECT COSTS (SPECIFY RATE AND BASE)							
Name of indirect cost item	Amount	F	Rate				
modified Total Direct Costs	\$274,683		26.0%	\$71,418			
TOTAL INDIRECT COSTS					Ì	\$71,418	na sente de la de la de de distriction de la
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)						\$346,100	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURREN	T PROJECTS S	EE GPG (I.D.7.j.)				\$0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$346,100	
M. COST SHARING: PROPOSED LEVEL		AGREED LEVEL IF DIF	FERENT	\$		\$0	
PI/PD TYPED NAME & SIGNATURE*		DATE			FOR	NSF USE ONLY	
			INC	IRECT COS	T RATE V	ERIFICATION	
INST. REP. TYPED NAME & SIGNATURE*		DATE	Date C	hecked	Date	Rate of Sheet	
NET F AND AND A STATE A STATE		1219110					
NSF Form 1030 (10/97) Stoppedes All Print Build States		6-1-1	-	SIGNATURES	S REQUIRE	D ONLY FOR REVISED	BUDGET (GPG III.B)

Managing Project Representative Div. of Research Develop. & Admin.

ORGANIZATION The Regents of The University of PRINCIPAL INVESTIGATOR/PROJECT DI Zhou A. SENIOR PERSONNEL: PI/PD, Co-PI'S, (List each separately with title, A.7. show n 0. First Name M L 1. Bing Z 2. Homer N	RECTOR Faculty and Other Senior		T			OSAL NO	Proposed	ON (MONTHS) Granted
The Regents of The University of PRINCIPAL INVESTIGATOR/PROJECT DI Zhou A. SENIOR PERSONNEL: PI/PD, Co-PI'S, (List each separately with title, A.7. show n 0. First Name M L 1. Bing Z 2. Homer M	RECTOR Faculty and Other Senior umber in brackets) ast Name hou	Associates	T				Proposed	Granted
The Regents of The University of PRINCIPAL INVESTIGATOR/PROJECT DI Zhou A. SENIOR PERSONNEL: PI/PD, Co-PI'S, (List each separately with title, A.7. show n 0. First Name M L 1. Bing Z 2. Homer N	RECTOR Faculty and Other Senior umber in brackets) ast Name hou	Associates	T					
PRINCIPAL INVESTIGATOR/PROJECT D Zhou A. SENIOR PERSONNEL: PI/PD, Co-PI'S, (List each separately with title, A.7. show n 0. First Name M L 1. Bing Z 2. Homer N	RECTOR Faculty and Other Senior umber in brackets) ast Name hou	Associates		AL INVESTIGATOR/PROJECT DIRECTOR AWAR				
Zhou A. SENIOR PERSONNEL: PI/PD, Co-PI'S, (List each separately with title, A.7. show n 0. First Name M L 1. Bing Z 2. Homer N	Faculty and Other Senior umber in brackets) ast Name hou					D NO.	Funds	
(List each separately with title, A.7. show n 0. First Name M L 1. Bing Z 2. Homer N	umber in brackets) ast Name hou		NIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Other Senior Associates NSF Funded					
(List each separately with title, A.7. show n 0. First Name M L 1. Bing Z 2. Homer N	umber in brackets) ast Name hou				NSF Funded		Funds	
O. First Name M L 1. Bing Z 2. Homer N	ast Name hou	Title			Person-month	s	Requested By	
2. Homer N				CAL	ACAD	SUMR	Proposer	
2. Homer N	eal	Professor, Pl		0.00	0.00	0.00	\$0	
		Professor		0.00	0.00	0.00	\$0	
	hu	Assistant Profe	ssor	0.00	0.00	0.00	\$0	
(3) TOTAL SENIOR PERSONNEL	(1-6)					L	\$0	
B. OTHER PERSONNEL (SHOW NUMBER	RS IN BRACKETS)		ł					
1. (0) POST DOCTORAL ASSOCIAT	ES			0.00	0.00	0.00	\$0	
2. (2) OTHER PROFESSIONALS (TE		IER, ETC.)		24.00	0.00	0.00	\$98,901	
3. (0) GRADUATE STUDENTS							\$0	-
4. (0) UNDERGRADUATE STUDENT	S						\$0	
5. (0) SECRETARIAL - CLERICAL (IF	CHARGED DIRECTLY)					****	\$0	
6. (0.5) OTHER(Electric engineer)							\$41,734	
TOTAL SALARIES AND WAGES (A+F	3)						\$140,635	
C. FRINGE BENEFITS (IF CHARGED AS	DIRECT COSTS)	28% e	est of sS&W				\$39,378	
TOTAL SALARIES, WAGES AND FRI	NGE BENEFITS (A+B+C))					\$180,013	
D. PERMANENT EQUIPMENT (LIST ITEM	AND DOLLAR AMOUNT	FOR EACH ITE	M EXCEEDING \$5,000)				
TOTAL EQUIPMENT							\$0	
	MESTIC (INCL. CANADA	A, MEXICO AND	U.S. POSSESSIONS)				\$0	
2. FC	REIGN						\$56,822	
F. PARTICIPANT SUPPORT COSTS								
1. STIPENDS		\$0						
2. TRAVEL		\$0						
3. SUBSISTENCE		\$0						
4. OTHER		\$0						
(0) TOTAL NUMBER OF PARTICI	PANTS						\$0	
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES							\$20,094	
2. PUBLICATION COSTS/DOCUMEN	TATION/DISSEMINATIO	N					\$0	
3. CONSULTANT SERVICES							\$26,000	
4, COMPUTERS SERVICES							\$0	
5. SUBAWARDS							\$0	
	uate Student Tuition Expe	enses					\$0	
TOTAL OTHER DIRECT COSTS	3						\$46,094	
H. TOTAL DIRECT COSTS (A THROUGH							\$282,929	
I. INDIRECT COSTS (SPECIFY RATE AN								
Name of indirect cost item	,	Amount		Rate				
modified Total Direct Costs		\$282,929		26.0%	\$73,56	1		
TOTAL INDIRECT COSTS							\$73,561	
J. TOTAL DIRECT AND INDIRECT COST	S (H+l)						\$356,490	
K. RESIDUAL FUNDS (IF FOR FURTHER		IT PROJECTS SE	EE GPG II.D.7.j.)				\$0	
L. AMOUNT OF THIS REQUEST (J) OR (\$356,490	
M. COST SHARING: PROPOSED LEVEL	<u> </u>		AGREED LEVEL IF DI	FFEREN	Т\$		\$0	
PI/PD TYPED NAME & SIGNATURE*		T	DATE	[FOF	NSF USE ONLY	
				11	IDIRECT CC		VERIFICATION	
INST, REP. TYPED NAME & SIGNATURI	· · · ·		DATES		Checked		te Rate of Sheet	
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NSF Form 1030 (10/97) Super Star	the set in the set is		-74.2		*SIGNATUF	ES REQUI	RED ONLY FOR REVISE	D BUDGET (GPG III.B
XCM	m/ en							
David M. Plawch	an							
Managing Project Repro								

Div. of Research Develop. & Admin.

BUDGET JUSTIFICATION

U.S. ATLAS Operations: Empowering University Physics to make Discoveries at the Energy Frontier PI: BING ZHOU

Senior Personnel

<u>Principal Investigator</u> —Bing Zhou, Professor: who will coordinate all personnel effort on the project; but is requesting no summer month support from this proposal.

Co-Investigator

- Homer Neal, Professor: who is the Institute Representative to oversee the UM ATLAS project activities; but is requesting no summer month support from this proposal.

- Zhu, Junjie Assistant Professor, who is in charge of Muon MDT detector electronics maintenance and upgrade; but is requesting no summer month support from this proposal.

Other Personnel

<u>Tiesheng Dai</u> — Electric engineer, who is responsible for maintaining and improving the muon configuration database, diagnose the Muon frontend electronics and CMS readout system for MDT detector. A support for Dai at 50% level is required in this proposal. Compensation rate is based on salary of _\$76,636 per year, with increases of 3% each year.

<u>Claudio Ferretti</u> — Computing Professional, who is responsible for maintaining the mezzaning and CMS inventory for Muon system and operating the B-sensors and Temperature monitoring of the Muon system as well as helping the maintaining and operating the entire MDT system for ATLAS. A full support for Ferretti is required in this proposal. Compensation rate is based on salary of \$45,000 per year, with increases of 3% each year.

<u>Ben Meekhof</u> — Computing Assistance, who is responsible for maintaining and operating the Linux computing cluster for muon calibration center at Michigan. A full support for Meekhof is required in this proposal. Compensation rate is based on salary of \$40,000 per year, with increases of 3% each year.

<u>Jianbei Liu</u>— Physics engineer, who is responsible for maintaining and operating the ATLAS MDT gas system. A full support for Liu for FY2012 is required in this proposal. Compensation rate is based on salary of \$33,680 per year, with increases of 3% each year.

<u>J Chapman</u> — A technical consultant, who was the muon CMS designer and production projector, is required to be supported at 25% level per year (\$24,000) for electronics diagnose and fixing the CMS firmware problems.

Fringe Benefits

The fringe benefit rate is calculated at 28% which is based on University wide cost estimates for the average for above positions.

<u>Travel</u> –

<u>Foreign</u>: Total \$55,913 is required for the first year, similar for the rest years in the proposal. The cost includes the COLA (Cost of Living Adjustment) cost at CERN for Dai, Ferretti and Liu (\$45,000). Additional \$10,913 is budgeted for three trips to CERN by Chapman and Meekhof at a rate of \$3638 per trip (ticket costs \$1200; and housing/per diem/rental car cost 2438 for two weeks) The amounts were determined by comparing prices for airfare and lodging on the web.

Other Direct Costs

<u>Materials and Supplies</u>: We have been budgeted a total of \$19,890 each year for lab materials and consumables, including the pre-fixed drift gases for gas monitor calibration, the lab safety supplies, the computing system (including parts) for chamber test and communications – (disposable cell phones are required for communications between researchers only while at the large CERN facility in Switzerland.), DB

recording, the chamber maintaining tools (such as gas leak detector), and other operational costs at CERN. The amount was determined by looking at previous yearly expenditures for the laboratory.

Indirect Costs

Over 50% of research will be off campus, located at CERN facility in Geneva Switzerland. The current indirect cost rate of 26% is based upon an approved rate from DHHS for off campus research.

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David M. Plawchan Managing Project Representative Div. of Research Develop. & Admin.

For the period	10/1/2011-9/30/1	6				YEAR	Total
	CUMULATIV	E BUDGET-NSF		[FOR NSF USE ONLY	
ORGANIZATION				PROF	OSAL NO	D. DURATI	ON (MONTHS)
	University of Michigan, A	nn Arbor, MI 48109				Proposed	Grante
PRINCIPAL INVESTIGATOF Shawn McKee	PROJECT DIRECTOR			AWARI	D NO.		Funds
		h 0i	I	L		T	nted by NSF
	I/PD, Co-PI'S, Faculty and Ot le, A.7. show number in brackets)	ner Senior Associates		NSF Funded Person-month	s	Funds Requested By	
0. First Name	M Last Name	Title	CAL	ACAD	SUMR	Proposer	
1. 1 Shawn	McKee	Associate Research Scie	entist 12.00	0.00	0.00	\$101,029	
2. 1 Bob	Ball	Senior Engineer	55.00	0.00	0.00	\$408,531	
3.			0.00	0.00	0.00	\$0	
(2) TOTAL SENIOR I	PERSONNEL (1-6)					\$509,560	l
	OW NUMBERS IN BRACKE	TS)					
1. (0) POST DOCTORA	******		0.00	0.00	0.00	\$0	Τ
2. (0) OTHER PROFES	SIONALS (TECHNICIAN, PR	OGRAMMER, ETC.)	0.00	0.00	0.00	\$0	
3. (0) GRADUATE STU	DENTS					\$0	
4. (0) UNDERGRADUA	******	·····				\$0	
5. (0) SECRETARIAL - 6. (1) OTHER	CLERICAL (IF CHARGED DI	RECILY)				\$0	
TOTAL SALARIES AND	WAGES (A+B)					\$0 \$509,560	
	HARGED AS DIRECT COSTS	S) 30% est of sS&W	•		*****	\$152,868	
	GES AND FRINGE BENEFITS					\$662,428	
D. PERMANENT EQUIPMEN	IT (LIST ITEM AND DOLLAR	AMOUNT FOR EACH ITEM EXCE	EDING \$5,000)				
\$5 Grid Computing Sy							
(computers, storage	enodes, networking componer	nts) 1 each year					
TOTAL EQUIPMENT						\$634,749	T
E. TRAVEL	1. DOMESTIC (INCL.	CANADA, MEXICO AND U.S. POS	SESSIONS)			\$49,300	
	2. FOREIGN					\$24,300	
F. PARTICIPANT SUPPORT	COSTS						
1. STIPENDS		\$0					
2. TRAVEL 3. SUBSISTENCE		\$0					
4. OTHER		<u>\$0</u> \$0					
(0) TOTAL NUMBER	OF PARTICIPANTS					\$0	
G. OTHER DIRECT COSTS							
1. MATERIALS AND SU	PPLIES					\$93,785	
2. PUBLICATION COST	S/DOCUMENTATION/DISSEI	MINATION				\$0	
3. CONSULTANT SERV						\$0	
4. COMPUTERS SERVI						\$0	
 5. SUBAWARDS(Michig) 6. OTHER 	Graduate Student Tuit					\$1,152,386	
TOTAL OTHER DIF		ion Expenses				\$0 \$1,246,171	
H. TOTAL DIRECT COSTS (\$2,616,948	
I. INDIRECT COSTS (SPEC							
Name of indirect co	st item	Amount	Rate				
modified Total Direc	ct Costs	\$829,813	55.5%	\$460,546			
subaward > 25K		\$25,000	55.5%	\$13,875			
TOTAL INDIRECT COSTS J. TOTAL DIRECT AND INDI				****		\$474,422 \$3,091,370	
		CURRENT PROJECTS SEE GPG I	I.D.7.i.)			\$3,091,370	
. AMOUNT OF THIS REQU						\$3,091,370	
M. COST SHARING: PROPC	SED LEVEL	AGREED L	EVEL IF DIFFERENT	\$		\$0	
PI/PD TYPED NAME & SIGN	ATURE*	DATE			FOR	NSF USE ONLY	
Shawn McKee	<u></u>		/	1	***	VERIFICATION	
NST. REP. TYPED NAME &	SIGNATURE	DATE	Date (Checked	Da	te Rate of Sheet	
I I MATAA							

Title:							FOR NSF USE ONLY		
ORGANIZATION					PROF	POSAL NO		ION (MONTHS)	
The Regents of The University of M	ichigan, Ann Arl	bor MI 48109					Proposed		
PRINCIPAL INVESTIGATOR/PROJECT DIRE					AWAR			d Granted	
Shawn McKee	0,0,0					DINO.	Gra	inted by NSF	
. SENIOR PERSONNEL: PI/PD, Co-PI'S, Fa	culty and Other Ser	nior Associates	T		NSF Funded		Funds	T	
(List each separately with title, A.7. show numbe					Person-month		Requested By		
0. Shawn		Title		CAL	ACAD	SUMR	Proposer		
1 Shawn McKe	3e	Professor, PI		2.40	0.00	0.00	\$19,029		
1 Bob Ball		Senior Engineer		11.00	0.00	0.00	\$76,949		
、	****			0.00	0.00	0.00	\$0		
							\$0		
(2) TOTAL SENIOR PERSONNEL (1-6						<u> </u>	\$95,978	<u> </u>	
OTHER PERSONNEL (SHOW NUMBERS	N BRACKETS)			::::::	::::::::::::::::::::::::::::::::::::::		· · · · · · · · · · · · · · · · · · ·	<u></u>	
. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00	\$0		
. (0) OTHER PROFESSIONALS (TECH	NICIAN, PROGRAI	MMER, ETC.)	I	0.00	0.00	0.00	\$0		
. (0) GRADUATE STUDENTS							\$0		
. (0) UNDERGRADUATE STUDENTS		~~~					\$0		
. (0) SECRETARIAL - CLERICAL (IF CH	IARGED DIRECTL	<u>(1)</u>					\$0		
							\$0		
TOTAL SALARIES AND WAGES (A+B)	ECT COSTO		of a \$ \$ 14/				\$95,978	+	
FRINGE BENEFITS (IF CHARGED AS DIR		30% est	or sS&W			****	\$28,793		
TOTAL SALARIES, WAGES AND FRING							\$124,771	1 -:-:-:-:-:-:-:-:-:-:-:-	
PERMANENT EQUIPMENT (LIST ITEM AN	D DULLAR AMOU	INT FOR EACH TIEN	EXCEEDING \$5,00	0)					
Grid Computing System									
(computers, storagenodes, networkin	g components)								
TOTAL EQUIPMENT							\$122,030		
. TRAVEL 1. DOMES	STIC (INCL. CANAI	DA, MEXICO AND U.	S. POSSESSIONS)				\$9,900		
2. FOREI	GN						\$4,800		
PARTICIPANT SUPPORT COSTS									
1. STIPENDS		\$0							
2. TRAVEL		\$0							
3. SUBSISTENCE		\$0							
4. OTHER		\$0							
(0) TOTAL NUMBER OF PARTICIPAN	TS						\$0		
OTHER DIRECT COSTS									
1. MATERIALS AND SUPPLIES			***				\$18,708	i	
2. PUBLICATION COSTS/DOCUMENTAT	ION/DISSEMINAT	ION		····			\$0		
3. CONSULTANT SERVICES							\$0		
4. COMPUTERS SERVICES			*****				\$0 \$0		
5. SUBAWARDS(Michigan State)							\$218,125		
	Student Tuition Exp						\$0		
TOTAL OTHER DIRECT COSTS							\$236,833		
. TOTAL DIRECT COSTS (A THROUGH G)							\$498.335		
	A 6 C)						\$490,333	L 	
INDIRECT COSTS (SPECIFY RATE AND B.	AGE)	A	-						
Name of indirect cost item modified Total Direct Costs		Amount	F	Rate 55.5%	¢07 700				
		\$158,180			\$87,790				
subaward > 25K		\$25,000		55.5%	\$13,875				
							#404.00F	<u>,,,,,,,,,,,,,,,,,,,,,</u>	
							\$101,665		
TOTAL DIRECT AND INDIRECT COSTS (H							\$600,000		
RESIDUAL FUNDS (IF FOR FURTHER SUF		ENT PROJECTS SEE	: GPG II.D.7.J.)				\$0		
AMOUNT OF THIS REQUEST (J) OR (J MIN	103 K)				¢		\$600,000		
COST SHARING: PROPOSED LEVEL				FERENT	ф		\$0		
PD TYPED NAME & SIGNATURE*		DA	"E -				NSF USE ONLY		
Shawn McKee							ERIFICATION		
ST. REP. TYPEP NAME & SIGNATURE*		DA	写/,, /,,)	Date C	Checked	Date	e Rate of Sheet		
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For the period 10/1/2012-9/30/2013					OR NSF USE ONLY		
ORGANIZATION				OSAL NO			
The Regents of The University of Michigan, A	nn Arbor, MI 48109				Proposed	Grante	
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWAR	D NO.		unds	
Shawn McKee					Grante	d by NSF	
SENIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Oth	er Senior Associates		NSF Funded		Funds		
(List each separately with title, A.7. show number in brackets)			Person-month		Requested By		
). First Name M Last Name	Title	CAL	ACAD	SUMR	Proposer		
1 Shawn McKee	Professor, Pl	2.40	0.00	0.00	\$19,600		
1 Bob Ball	Senior Engineer	11.00	0.00	0.00	\$79,257 \$0		
		0.00	0.00	0.00			
(2) TOTAL SENIOR PERSONNEL (1-6)					\$98,857		
OTHER PERSONNEL (SHOW NUMBERS IN BRACKET	S)						
(0) POST DOCTORAL ASSOCIATES	<u> 2</u> 2	0.00	0.00	0.00	\$0		
(0) OTHER PROFESSIONALS (TECHNICIAN, PRO	OGRAMMER, ETC.)	0.00	0.00	0.00	\$0		
(0) GRADUATE STUDENTS					\$0		
(0) UNDERGRADUATE STUDENTS					\$0		
(0) SECRETARIAL - CLERICAL (IF CHARGED DIR	ECTLY)				\$0		
(0) OTHER					\$0		
TOTAL SALARIES AND WAGES (A+B)					\$98,857		
FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) 30% est of sS&W				\$29,657		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS	(A+B+C)				\$128,514		
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR	AMOUNT FOR EACH ITEM EXCEEDIN	IG \$5,000)					
Grid Computing System							
(computers, storagenodes, netwroking componen	ts) \$128,514						
					<u></u>		
TOTAL EQUIPMENT					\$128,514		
TRAVEL 1. DOMESTIC (INCL.	CANADA, MEXICO AND U.S. POSSES	SSIONS)			\$9,800		
2. FOREIGN					\$4,900		
PARTICIPANT SUPPORT COSTS							
1. STIPENDS	\$0						
2. TRAVEL	\$0						
3. SUBSISTENCE	\$0						
4. OTHER	\$0					<u></u>	
(0) TOTAL NUMBER OF PARTICIPANTS					\$0		
OTHER DIRECT COSTS					******	<u></u>	
1. MATERIALS AND SUPPLIES					\$18,915	~~~~	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEM	AINATION				\$0		
3. CONSULTANT SERVICES					\$0 \$0		
4. COMPUTERS SERVICES					\$0		
					\$228,375		
5. SUBAWARDS(Michigan State)	lan European				\$247,290		
6. OTHER Graduate Student Tuit	tion Expenses				\$519,018		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS	tion Expenses					*************	
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G)	ion Expenses				3519,010		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE)		Rate			9319,016		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item	Amount	Rate 55.5%	\$89.982	,	\$319,010		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs	Amount \$162,129	55.5%			3319,010		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item	Amount				0110,010		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K	Amount \$162,129	55.5%			\$89,982		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K	Amount \$162,129	55.5%					
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K DTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+I)	Amount \$162,129 \$0	55.5% 55.5%			\$89,982		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K DTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF C	Amount \$162,129 \$0	55.5% 55.5%			\$89,982 \$609,000		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K DTAL INDIRECT COSTS TOTAL DIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF C AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	Amount \$162,129 \$0 CURRENT PROJECTS SEE GPG II.D.?	55.5% 55.5%	\$0		\$89,982 \$609,000 \$0		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K DTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF C AMOUNT OF THIS REQUEST (J) OR (J MINUS K) . COST SHARING: PROPOSED LEVEL	Amount \$162,129 \$0 CURRENT PROJECTS SEE GPG II.D.?	55.5% 55.5% 	\$0)	\$89,982 \$609,000 \$0 \$609,000		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K DTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF C AMOUNT OF THIS REQUEST (J) OR (J MINUS K) . COST SHARING: PROPOSED LEVEL //PD-TYPED NAME & SIGNATURE*	Amount \$162,129 \$0 CURRENT PROJECTS SEE GPG II.D.7 AGREED LEV	55.5% 55.5% ''.j.) 'EL IF DIFFERENT	\$() FOR	\$89,982 \$609,000 \$0 \$609,000 \$0 NSF USE ONLY		
6. OTHER Graduate Student Tuit TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFY RATE AND BASE) Name of indirect cost item modified Total Direct Costs subaward > 25K DTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+I) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF C AMOUNT OF THIS REQUEST (J) OR (J MINUS K) . COST SHARING: PROPOSED LEVEL	Amount \$162,129 \$0 CURRENT PROJECTS SEE GPG II.D.7 AGREED LEV	55.5% 55.5% (j.) // // // // // // // // // // // // //	\$() FOR ST RATE \	\$89,982 \$609,000 \$0 \$609,000 \$0		

ANIZATION	PROF	POSAL NO	. DURATIO	N (MONTHS)				
	iversity of Michigan, Ann	Arbor, MI 48109				Proposed	Granteo	
NCIPAL INVESTIGATOR/PROJECT DIRECTOR AWARD NO.						Funds Granted by NSF		
						T	a by Nor	
	D, Co-PI'S, Faculty and Other S A.7. show number in brackets)	Senior Associates		NSF Funded Person-month		Funds Requested By		
First Name	M Last Name	Title	CAL	ACAD	SUMR	Proposer		
1 Shawn	McKee	Professor, Pl	2.40	0.00	0.00	\$20,188		
1 Bob	Ball	Senior Engineer	11.00	0.00	0.00	\$81,635	Anno 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1	
			0.00	0.00	0.00	\$0		
	<u></u>							
2) TOTAL SENIOR PER	RSONNEL (1-6)			1		\$101,823		
	W NUMBERS IN BRACKETS)		8999					
0) POST DOCTORAL A			0.00	0.00	0.00	\$0	found and an effective found and the	
	DNALS (TECHNICIAN, PROGE	RAMMER, ETC.)	0.00	0.00	0.00	\$0		
0) GRADUATE STUDE						\$0		
0) UNDERGRADUATE						\$0		
and a second	ERICAL (IF CHARGED DIREC	.TLY)				\$0		
0) OTHER						\$0		
TOTAL SALARIES AND WA	AGES (A+B)					\$101,823		
RINGE BENEFITS (IF CHAI	RGED AS DIRECT COSTS)	30% est of sS&W				\$30,547		
	S AND FRINGE BENEFITS (A-	+B+C)				\$132,370		
******		OUNT FOR EACH ITEM EXCEEL	DING \$5,000)					
Grid Computing Syste								
	odes, networking components)	128,461						
TOTAL EQUIPMENT						\$128,461		
RAVEL	1. DOMESTIC (INCL. CA	NADA, MEXICO AND U.S. POSS	SESSIONS)			\$9,900		
	2. FOREIGN					\$4,800		
ARTICIPANT SUPPORT CO	OSTS							
1. STIPENDS		\$O						
2. TRAVEL		\$0						
3. SUBSISTENCE		\$0						
4. OTHER		\$0						
0) TOTAL NUMBER OF	PARTICIPANTS					\$0		
THER DIRECT COSTS								
1. MATERIALS AND SUPP	LIES					\$18,768		
2. PUBLICATION COSTS/E	DOCUMENTATION/DISSEMIN	IATION				\$0		
3. CONSULTANT SERVICES						\$0		
4. COMPUTERS SERVICE	S					\$0		
5. SUBAWARDS(Michigan	State)					\$231,801		
6. OTHER	Graduate Student Tuition	Expenses				\$0		
TOTAL OTHER DIRECT COSTS						\$250,569		
OTAL DIRECT COSTS (A T	HROUGH G)					\$526,100		
DIRECT COSTS (SPECIFY	(RATE AND BASE)							
Name of indirect cost i	item	Amount	Rate					
modified Total Direct (Costs	\$165,838	55.5%	6 \$92,040)			
subaward > 25K		\$0	55.5%	6 \$0)			
AL INDIRECT COSTS						\$92,040		
TAL DIRECT AND INDIRE	CT COSTS (H+I)					\$618,140		
		RRENT PROJECTS SEE GPG II.	D.7.j.)			\$0		
	T (J) OR (J MINUS K)					\$618,140		
MOUNT OF THIS REQUES	ED LEVEL	AGREED L	EVEL IF DIFFEREN	Т\$		\$0		
						NSF USE ONLY		
OST SHARING: PROPOSE	'URE*	IDAIC						
OST SHARING: PROPOSE			IN IN	DIRECT CO	ST RATE	VERIFICATION		
OST SHARING: PROPOSE D TYPED NAME & SIGNAT			/ / / / / / / / / / / / / / / / / / / /	DIRECT CO	1	VERIFICATION te Rate of Sheet		

								FOR NSF USE ONLY			
ORGANIZATION PROF The Regents of The University of Michigan, Ann Arbor, MI 48109 PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR AWARI Shawn McKee						PROF	POSAL NO	0. DURATION (MONTHS)			
								Proposed	Granteo		
						d NO.		unds			
					1	L			ed by NSF		
	NIOR PERSONNEL: PI/PD List each separately with title, A	, Co-PI'S, Faculty and Other S	Senior Associates			NSF Funded Person-month		Funds Requested By			
0.	First Name	M Last Name	Title		CAL	ACAD	SUMR	Proposer			
•	1 Shawn	McKee	Professor, P	91	2.40	0.00	0.00	\$20,794			
).)	1 Bob	Ball	Senior Engir		11.00	0.00	0.00	\$84,084			
2.	1 800	Uan	Centor Engi		0.00	0.00	0.00	\$0			
). 					0.00	0.00	1				
	2) TOTAL SENIOR PER	SONNEL (1-6)			1		1	\$104,878			
<u>`````````````````````````````````````</u>		/ NUMBERS IN BRACKETS)									
<u>1. (</u>	0) POST DOCTORAL AS				0.00	0.00	0.00	\$0	<u>4</u>		
2. (NALS (TECHNICIAN, PROGR	RAMMER, ETC.)		0.00	0.00	0.00	\$0			
3. (0) GRADUATE STUDEN		<u> </u>					\$0			
4. (0) UNDERGRADUATE S							\$0			
5. (RICAL (IF CHARGED DIREC	TLY)					\$0			
6. (0) OTHER							\$0			
	TOTAL SALARIES AND WA	GES (A+B)						\$104,878			
	RINGE BENEFITS (IF CHAR		30%	6 est of sS&W				\$31,463			
		AND FRINGE BENEFITS (A+	+B+C)					\$136,341			
		IST ITEM AND DOLLAR AMO		TEM EXCEEDING \$5,00	0)						
	Grid Computing System										
		des, networking components)	128,10	1							
1	FOTAL EQUIPMENT							\$128,101			
	RAVEL	1. DOMESTIC (INCL. CAI	NADA, MEXICO AN	D U.S. POSSESSIONS))			\$9,800			
		2. FOREIGN						\$4,900			
F. PA	RTICIPANT SUPPORT CO	STS									
1	1. STIPENDS		\$C)							
2	2. TRAVEL		\$0	1							
3	3. SUBSISTENCE			1							
2	4. OTHER										
(0) TOTAL NUMBER OF	PARTICIPANTS						\$0			
G. O	THER DIRECT COSTS										
1	1. MATERIALS AND SUPPL	IES						\$18,754			
2	2. PUBLICATION COSTS/D	OCUMENTATION/DISSEMIN/	ATION					\$0			
3	3. CONSULTANT SERVICE	S						\$0			
4	4. COMPUTERS SERVICES	;						\$0			
Ę	5. SUBAWARDS(Michigan S	itate)						\$235,278			
	3. OTHER	Graduate Student Tuition	Expenses					\$0			
	TOTAL OTHER DIREC	T COSTS						\$254,032			
н. тс	DTAL DIRECT COSTS (A TH	ROUGH G)						\$533,174	***		
I. INI	DIRECT COSTS (SPECIFY	RATE AND BASE)									
	Name of indirect cost it	em	Amount		Rate						
	modified Total Direct C	osts	\$169,795		55.5%	\$94,236	5				
	subaward > 25K		\$0		55.5%	\$C)				
TOTA	AL INDIRECT COSTS							\$94,236			
	TAL DIRECT AND INDIREC	CT COSTS (H+I)						\$627,410			
<u>Ј. ТО</u>	SIDUAL FUNDS (IF FOR F	URTHER SUPPORT OF CUR	RENT PROJECTS	SEE GPG II.D.7.j.)				\$0			
	OUNT OF THIS REQUEST	(J) OR (J MINUS K)						\$627,410			
K. RE L. AN		D LEVEL		AGREED LEVEL IF D	IFFERENT	\$		\$0			
K. RE L. AN	OST SHARING: PROPOSEI			DATE	1		FOR	NSF USE ONLY			
K. RE L. AN M. CO	OST SHARING: PROPOSEI			DATE			Shawn McKee INDIRECT COST RATE				
K. RE L. AN M. CO PUPE	D TYPED NAME & SIGNATU Shawn McKee	JRE*		DATE	IN	DIRECT CO	ST RATE	/ERIFICATION			
K. RE L. AN M. CO PUPE	TYPED NAME & SIGNATU	JRE*		DATE /1./1.	1	DIRECT CO Checked	T	/ERIFICATION			

					FOR NSF USE ONLY	
ORGANIZATION						ON (MONTHS)
The Regents of The University of Michigan, Ann Arbor		Proposed				
RINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWAR	D NO.		Funds Funds nted by NSF	
. SENIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Other Senior	Associatos	I	NSF Funded		T	
(List each separately with title, A.7. show number in brackets)	Associates		Person-month		Funds Requested By	
0. First Name M Last Name	Title	CAL	ACAD	SUMR	Proposer	
. 1 Shawn McKee	Professor, PI	2.40	0.00	0.00	\$21,418	
. 1 Bob Ball	Senior Engineer	11.00	0.00	0.00	\$86,606	
		0.00	0.00	0.00	\$0	
				1		
(2) TOTAL SENIOR PERSONNEL (1-6)				1	\$108,024	
OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
. (0) POST DOCTORAL ASSOCIATES		0.00	0.00	0.00	\$0	
. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMME	R, ETC.)	0.00	0.00	0.00	\$0	
. (0) GRADUATE STUDENTS					\$0	
. (0) UNDERGRADUATE STUDENTS					\$0	
. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					\$0	
. (0) OTHER					\$0	
TOTAL SALARIES AND WAGES (A+B)					\$108,024	
. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)	30% est of sS&W				\$32,407	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)					\$140,431	
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT F	OR EACH ITEM EXCEEDIN	√G \$5,000)				
Grid Computing System						
(computers, storagenodes, networking components)	127643					
TOTAL EQUIPMENT					\$127,643	
. TRAVEL 1. DOMESTIC (INCL. CANADA,	MEXICO AND U.S. POSSE	SSIONS)			\$9,900	
2. FOREIGN					\$4,900	
PARTICIPANT SUPPORT COSTS						
1. STIPENDS	\$0					
2. TRAVEL	\$0					
3. SUBSISTENCE						
4. OTHER	\$0					
(0) TOTAL NUMBER OF PARTICIPANTS					\$0	
OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES					\$18,640	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					\$0	
3. CONSULTANT SERVICES					\$0	
4. COMPUTERS SERVICES					\$0	
5. SUBAWARDS(Michigan State)					\$238,807	
6. OTHER Graduate Student Tuition Expense	ses				\$0	
TOTAL OTHER DIRECT COSTS					\$257,447	
. TOTAL DIRECT COSTS (A THROUGH G)					\$540,321	
INDIRECT COSTS (SPECIFY RATE AND BASE)						
Name of indirect cost item	Amount	Rate				
modified Total Direct Costs	\$173,871	55.5%	\$96,499			
subaward > 25K	\$0	55.5%	\$0			
DTAL INDIRECT COSTS		······			\$96,499	
TOTAL DIRECT AND INDIRECT COSTS (H+I)					\$636,820	
RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT	PROJECTS SEE GPG II.D.7	.j.)			\$0	
AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$636,820	
	AGREED LEV	EL IF DIFFERENT	\$		\$0	
. COST SHARING: PROPOSED LEVEL	PI/PD TYPED NAME & SIGNATURE* DATE				NSF USE ONLY	
. COST SHARING: PROPOSED LEVEL	IDATE	Shawn McKee INDIRECT COST RATE				
/PD TYPED NAME & SIGNATURE*			IRECT COS	ST RATE V	ERIFICATION	
/PD TYPED NAME & SIGNATURE*	DATE DATE	70	DIRECT COS		ERIFICATION	

BUDGET JUSTIFICATION Atlas Great Lakes Tier 2 Center PI: Shawn McKee

Senior Personnel

<u>Principal Investigator</u> — McKee, Shawn Research Scientist, who will direct the project; and will be paid 2.4 Calendar months each year from the award at his current salary rate of \$7,925 per month. It is based on current market conditions for his level of expertise.

Other Personnel

<u>Senior Engineer</u>— Ball, Robert, who will manage the Tier-2 center and will be paid 11 Calendar months each year from the award at his current salary rate of \$6,996 per month. It is based on current market conditions for his level of expertise.

Note: Increase of 3% is factored in each year for salaries.

Fringe Benefits

The fringe benefit rate is calculated at 30% for personnel based on University wide cost estimates for the average for these positions.

Equipment

Each year we purchase computers, storage and network components for our grid computing system to deliver on our USATLAS MOU resource requirements. Individual components may be less than the equipment price limit but are part of the larger grid computing system and thus are equipment. The annual equipment budget is estimated based upon standardized pricing used USATLAS-wide and will just meet our MOU requirements in each year.

<u>Travel</u>

<u>Domestic</u>: All members of the Tier-2 travel to various domestic facility meetings, grid and networking workshops annually. Based upon our experience during the first 5-year period of AGLT2 we estimate 8 trips annually; 2-3 Tier-2 members attending two facility meetings and single members attending 3-4 other meetings and workshops. The amounts were determined by comparing prices for airfare and lodging on the web and using our prior experiences. Typical cost is \$1225/person (varies by meeting...this is an average) and we therefore budget \$9800 for domestic travel.

Foreign: All members of the Tier-2 travel internationally to relevant meetings and international conferences. Typically, relevant meetings like HEPIX, CHEP and grid and networking meetings are held at international venues. The amounts were determined by comparing prices for airfare and lodging on the web and using our prior experience. Typical cost is \$2450/person and 2 meetings annually are assumed. We therefore are budgeting \$4900 for international travel.

Other Direct Costs

<u>Materials and Supplies</u>: We have budgeted approximately \$6500/year in miscellaneous parts and component costs (cables, disks, memory, software, etc). The amount was determined by looking at previous yearly expenditures for AGLT2.

<u>Facility Expense</u>: We have two known yearly expenses: 1) yearly support fees for VMware for approximately \$3000/year and 2) network peering charges for our wide-area network connections for approximately \$9000/year. In addition, our existing 10GE WAN connectivity from Michigan to Chicago and from Michigan to Michigan State will be provided at no cost to the project.

<u>Subcontract:</u> Each year we subcontract to Michigan State University for their participation in AGLT2. The first year expense will be \$218,125. The second year will be \$228,375 and will increase by 1.5% in each of the succeeding years.

Indirect Costs

The current indirect cost rate of 55.5% is based upon an approved rate from DHHS.

PROPOSAL BUDG	SUMMARY YEAR 1 PROPOSAL BUDGET		FOR NSF US		F USE ONLY	
ORGANIZATION				DURATIO	ON (month	
University of Pittsburgh					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	WARD N	Ю.		
Joseph F Boudreau						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	- Re	equested By proposer	granted by f (if differen
1. Joseph F Boudreau - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00)	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00)	0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00)	0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00)	79,216	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					79,216	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					26,616	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					105,832	
TOTAL EQUIPMENT)			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS)			0 0 8,870	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			3	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			6		0 8,870	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			6		0 8,870	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 8,870 0 0 3,227 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) 3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3	-	0 8,870 0 3,227 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 8,870 0 3,227 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 8,870 0 3,227 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			S		0 8,870 0 3,227 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			5 		0 8,870 8,870 0 3,227 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 8,870 0 3,227 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>		0 8,870 8,870 0 3,227 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929)			<u> </u>		0 8,870 8,870 0 3,227 0 0 0 0 0 0 3,227 117,929	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929) TOT			3		0 8,870 8,870 0 3,227 0 0 0 0 0 0 3,227 117,929 28,303	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929) TOTAL INDIRECT AND INDIRECT COSTS (H + I)			3		0 8,870 8,870 0 3,227 0 0 0 0 0 0 3,227 117,929 28,303 146,232	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			3		0 8,870 8,870 0 3,227 0 0 0 0 0 0 0 0 3,227 117,929 28,303 146,232 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) </td <td>TICIPAN</td> <td>T COSTS</td> <td></td> <td></td> <td>0 8,870 8,870 0 3,227 0 0 0 0 0 0 3,227 117,929 28,303 146,232</td> <td></td>	TICIPAN	T COSTS			0 8,870 8,870 0 3,227 0 0 0 0 0 0 3,227 117,929 28,303 146,232	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN	T COSTS	NT \$	·	0 8,870 8,870 0 3,227 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE	TICIPAN		NT \$ FOR 1	NSF	0 8,870 8,870 0 3,227 0 0 0 0 0 0 0 0 0 0 0 0 0 3,227 117,929 28,303 146,232 0 146,232 0 146,232	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 117929) TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0			NT \$ FOR 1 CT COS	NSF I	0 8,870 8,870 0 3,227 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$

PROPOSAL BUDG	SUMMARY YEAR 2 PROPOSAL BUDGET FO			FOR NSF USE ONLY		
ORGANIZATION			PROPOSAL NO			
University of Pittsburgh					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	VARD N	0.		
Joseph F Boudreau						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths		unds lested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	oposer	granted by N (if different
1. Joseph F Boudreau - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
1. (0) POST DOCTORAL SCHOLARS 2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00		81,592	
3. (0) GRADUATE STUDENTS	12.00	0.00	0.00		01,552	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					Ū	
TOTAL SALARIES AND WAGES (A + B)					81,592	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					27,415	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					109,007	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 0 3. SUBSISTENCE 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0				-	0 9,136	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF				-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			3		0 9,136	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 9,136 0 0 3,324	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 9,136 0 0 3,324 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 9,136 0 3,324 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3	-	0 9,136 0 3,324 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 9,136 0 3,324 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			<u>}</u>		0 9,136 0 3,324 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>		0 9,136 9,136 0 3,324 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 9,136 9,136 0 3,324 0 0 0 0 0 0 0 0 0 0 3,324	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>		0 9,136 9,136 0 3,324 0 0 0 0 0 0 0 0 0 0 3,324	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 121467) TOTAL INDIRECT COSTS (F&A)			3		0 9,136 9,136 0 3,324 0 0 0 0 0 0 0 0 0 0 3,324	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC			3		0 9,136 9,136 0 3,324 0 0 0 0 3,324 121,467	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 121467) TOTAL INECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			٥ ٥		0 9,136 9,136 0 3,324 0 0 0 0 0 0 3,324 121,467 29,152 150,619 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J)	RTICIPAN	T COSTS			0 9,136 9,136 0 3,324 0 0 0 0 0 3,324 121,467 29,152 150,619	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L.	RTICIPAN	T COSTS	NT \$	\$	0 9,136 9,136 0 3,324 0 0 0 0 0 0 3,324 121,467 29,152 150,619 0 150,619	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAPE 6. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 121467) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME	RTICIPAN		NT \$ FOR 1	\$ NSF US	0 9,136 9,136 0 3,324 0 0 0 0 0 0 3,324 121,467 29,152 150,619 0 150,619 0 150,619	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L.			NT \$ FOR N CT COS	\$ NSF US	0 9,136 9,136 0 3,324 0 0 0 0 0 3,324 121,467 29,152 150,619 0 150,619 0 150,619 0 150,619	

SUMMARY YEAR S PROPOSAL BUDGET			FOF	R NSF USE ONLY		T
ORGANIZATION						• DN (month
University of Pittsburgh					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	0.		
Joseph F Boudreau						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths		unds lested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pro	oposer	granted by N (if differen
1. Joseph F Boudreau - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) 3. (0) GRADUATE STUDENTS	12.00	0.00	0.00		<u>84,040</u> 0	
3. (0) GRADUATE STUDENTS 4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					84,040	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					28,237	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					112,277	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)			0 0 9,410	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0				-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			6		0 9,410	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES					0 9,410 0 3,424	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 9,410 0 0 3,424 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 9,410 0 3,424 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 9,410 0 3,424 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 9,410 0 3,424 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>		0 9,410 0 3,424 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			<u> </u>		0 9,410 9,410 0 3,424 0 0 0 0 0 0 0 3,424	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 9,410 0 3,424 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)			<u> </u>		0 9,410 9,410 0 3,424 0 0 0 0 0 0 0 3,424	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111)			<u> </u>		0 9,410 9,410 0 3,424 0 0 0 0 0 3,424 125,111	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111) TOTAL INDIRECT COSTS (F&A)			3		0 9,410 9,410 0 3,424 0 0 0 0 0 3,424 125,111 30,027	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111) TOTAL INDIRECT AND INDIRECT COSTS (H + I)			3		0 9,410 9,410 0 3,424 0 0 0 0 0 3,424 125,111	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u> </u>		0 9,410 9,410 0 3,424 0 0 0 0 0 3,424 125,111 125,111 30,027 155,138 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS			0 9,410 9,410 0 3,424 0 0 0 0 3,424 125,111 30,027 155,138	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS	NT \$	\$	0 9,410 9,410 0 3,424 0 0 0 0 0 3,424 125,111 125,111 30,027 155,138 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN		NT \$ FOR 1	\$ NSF US	0 9,410 9,410 0 3,424 0 0 0 0 0 3,424 125,111 30,027 155,138 0 155,138	•
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 125111) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE PI/PD NAME			NT \$ FOR N CT COS	\$ NSF US	0 9,410 9,410 0 3,424 0 0 0 0 0 3,424 125,111 125,111 30,027 155,138 0 155,138 0 155,138 0	•

SUMMARY PROPOSAL BUDG	ET YI		FOF	R NSF	USE ONL	Y
ORGANIZATION		PROPOSAL NO.		NO. DURATION (mor		
University of Pittsburgh	Pittsburgh				Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A	WARD N	0.		
Joseph F Boudreau						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates	F	NSF Fund erson-mor	ed	_	Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		quested By proposer	granted by N (if differen
1. Joseph F Boudreau - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00		86,561	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					86,561	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					29,085	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					115,646	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR			6		0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			3		0 9,692	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 9,692 0 3,527	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			6		0 9,692 0 3,527 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 9,692 0 3,527 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3		0 9,692 0 3,527 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5 		0 9,692 0 3,527 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		0 9,692 0 3,527 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			6		0 9,692 0 3,527 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 9,692 0 3,527 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 0 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G)			3		0 9,692 0 3,527 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DUPLES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24			3		0 9,692 9,692 0 3,527 0 0 0 0 3,527 128,865	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN			3		0 9,692 0 3,527 0 0 0 0 3,527 128,865 30,927	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 128864)			S		0 9,692 9,692 0 3,527 0 0 0 0 0 3,527 128,865 30,927 159,792	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) MTDC (Rate: 24.0000, Base: 128864) TOTAL INDIRECT AND INDIRECT COSTS			<u>}</u>		0 9,692 9,692 0 3,527 0 0 0 0 0 0 3,527 128,865 30,927 159,792 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 128864) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	TCOSTS		\$	0 9,692 9,692 0 3,527 0 0 0 0 0 3,527 128,865 30,927 159,792	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 128864) TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ACCOMPANTICAL INPORTION IN CONTRACTION IN CONTRACTION IN CONTRACTION IN CONTRACTION IN INT IN INT IN INT IN INT IN INT IN IT IN INT IN INT IN INT IN INT IN IT IN INT IN INT IN IT IN INT INT	TICIPAN	TCOSTS	NT \$		0 9,692 9,692 0 3,527 0 0 0 0 0 0 0 3,527 128,865 30,927 159,792 0 159,792	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 128864) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN	IFFEREI	NT \$ FOR 1	NSF U	0 9,692 0 3,527 0 0 0 0 0 0 3,527 128,865 30,927 128,865 30,927 159,792 0 159,792	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DURECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		IFFEREI	NT \$ FOR 1 CT COS	NSF U	0 9,692 9,692 0 3,527 0 0 0 0 0 0 0 3,527 128,865 30,927 159,792 0 159,792	\$

	ET		FOF	R NSF	USE ONL'	T
ORGANIZATION		PROPOSAL NO.				
University of Pittsburgh					Proposed	`
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	0.		
Joseph F Boudreau						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		Funds	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	Required Required Required Required Repaired Repaired Repaired Repaired Repaired Repaired Repaired Required Required Required Required Required Required Repaired Repaired Required Required Repaired Rep	uested By roposer	granted by N (if differen
1. Joseph F Boudreau - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00		89,158	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
					0	
TOTAL SALARIES AND WAGES (A + B)					89,158	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>29,957</u> 119,115	
TOTAL EQUIPMENT					0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0	SSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0			3	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0			3		0 9,983	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			8		0 9,983 0 0 3,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			3		0 9,983 0 0 3,633 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			6		0 9,983 0 3,633 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES			3	-	0 9,983 0 3,633 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			5		0 9,983 0 3,633 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			5		0 9,983 9,983 0 3,633 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		0 9,983 9,983 0 3,633 0 0 0 0 0 0 0 3,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 9,983 9,983 0 3,633 0 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 0 0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G)			<u> </u>		0 9,983 9,983 0 3,633 0 0 0 0 0 0 0 3,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 9,983 9,983 0 3,633 0 0 0 0 0 3,633 132,731	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 0 1. STIPENDS \$0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			<u>}</u>		0 9,983 9,983 0 3,633 0 0 0 0 0 0 0 3,633	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 0 1. STIPENDS \$0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS			<u> </u>		0 9,983 9,983 0 0 0 0 0 0 3,633 132,731 31,855	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			5	\$	0 9,983 9,983 0 0 3,633 0 0 0 0 0 0 3,633 132,731 31,855 164,586	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) MTDC (Rate: 24.0000, Base: 132731) TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS<	TICIPAN	T COSTS		\$	0 9,983 9,983 0 0 0 0 0 0 0 0 0 0 0 3,633 132,731 31,855 164,586 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 132731) TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	TICIPAN	T COSTS	NT \$,	0 9,983 9,983 0 0 0 0 0 0 0 0 0 0 0 3,633 132,731 31,855 164,586 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DURECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUND	TICIPAN		NT \$ FOR N	NSF US	0 9,983 9,983 0 0 3,633 0 0 0 0 0 0 0 3,633 132,731 31,855 164,586 0 164,586	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 24.0000, Base: 132731) TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 MCCET SHARING PROPOSED LEVEL \$ 0			NT \$ FOR N CT COS	NSF US	0 9,983 9,983 0 3,633 0 0 0 0 0 0 3,633 132,731 31,855 164,586 0 164,586 0 164,586	

PROPOSAL BUDG	ET	FOR NSF USE ONLY			Y	
ORGANIZATION	PROPOSAL			NO.	DURATIO	ON (month
University of Pittsburgh		_			Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	О.		
Joseph F Boudreau			o.d			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor			Funds quested By	Funds granted by N (if differen
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	-
1. Joseph F Boudreau - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
	0.00	0.00	0.00		0	
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00			
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		420 567	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	60.00	0.00	0.00		420,567	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0 0	
6. (0) OTHER TOTAL SALARIES AND WAGES (A + B)						
					420,567	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					<u>141,310</u> 561,877	
					0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS)			0 0 47,091	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0 2. TRAVEL 0	ESSIONS)			0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)		-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)		-	<u>0</u> 47,091	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF			3	-	0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS			3		0 47,091	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OU TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			3		0 47,091 0 17,135	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			5		0 47,091 0 17,135 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		0 47,091 0 17,135 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 4. COMPUTER SERVICES			6		0 47,091 0 17,135 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT SERVICES 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS			3		0 47,091 0 17,135 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			3		0 47,091 0 17,135 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS					0 47,091 47,091 0 17,135 0 0 0 0 0 17,135	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARE 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			<u> </u>		0 47,091 0 17,135 0 0 0 0 0 0 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS G. OTHER BERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)			3		0 47,091 47,091 0 17,135 0 0 0 0 0 17,135	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 0 1. STIPENDS			3		0 47,091 47,091 0 17,135 0 0 0 0 0 17,135 626,103	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI			3		0 47,091 47,091 0 17,135 0 0 0 0 0 17,135 626,103 150,264	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			<u> </u>		0 47,091 47,091 0 17,135 0 0 0 0 0 17,135 626,103 150,264 776,367	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS			<u> </u>		0 47,091 47,091 0 17,135 0 0 0 0 0 17,135 626,103 150,264 776,367 0	
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E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0		TCOSTS	NT \$ FOR 1 CT COS	NSF U	0 47,091 47,091 0 17,135 0 0 0 0 0 0 17,135 626,103 150,264 776,367 0 776,367	\$

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University of Pittsburgh, 350 Theoleray Hall, Pittsburgh P	A 15260		10000	Preposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			AWARD NO	and the second sec	
Joseph F. Boudreau					
A. SENIOR PERSONNEL: PIPD, Co-PTs, Faculty and Oth	er Senior Associates		NSF-Funded	Funds	Funds
(List each separately with title, A.7. show number in brack	kertis;)		Person-monthy	Requested By	Granted By NS
		CAL	ACAD SUMR	Proposer	(if Different)
t					10000000
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6.() OTHERS (UST INDIVIDUALLY ON BUDGET	EXPLANATION PAGE)	-			
7.() TOTAL SENIOR PERSONNEL (1-0)		_			
8. OTHER PERSONNEL (SHOW NUMBERS IN BRACK)	(18)	_			
1.() POST DOCTORAL ASSOCIATES			1		
2(1) OTHER PROFESSIONALS (TECHNICIAN, PI	ROGRAMMER, ETC.)	12		79,218	
3.() GRADUATE STUDENTS					
4() UNDERGRADUATE STUDENTS					
5.() SECRETARIAL - CLERICAL (IF CHARGED D	RECTLY)				
6 JOTHER					
TOTAL SALARIES AND WAGES (A+B)				79,216	
C FRINGE BENEFITS (IF CHARGED AS DIRECT COST				26,616	
TOTAL SALARIES, WAGES AND FRINGE BENEFIT D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FO				105,832	
2. FOREIGN				8,870	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS B					
2. TRAVEL \$					
1. SUBSISTENCE 1					
4 OTHER				3	
() TOTAL PARTICIPANT COSTS					
3. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				3,227	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMIN	6ATION .				
3 CONSULTANT SERVICES					
4. COMPUTER SERVICES		_			
5. SUBAWARDS					
6. OTHER					
The local sector is a sector of the sector o					
TOTAL OTHER DIRECT COSTS				3,227	
TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH Q)		_		3,227	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH Q) INDIRECT COSTS (SPECIFIC RATE AND BASE)	Star MITTLE Bases - And Allen	_		second seco	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIC RATE AND BASE)	% of MTDC Base + \$117,979	_	_	second seco	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIC RATE AND BASE)	% of MTDC Base - \$117,979			second seco	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH 0) INDIRECT COSTS (SPECIFIY RATE AND BASE) 24.0	% of MTDC Base - \$117,979			117,929	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH Q) INDIRECT COSTS (SPECIFIY RATE AND BASE) 24.0 TOTAL INDIRECT COSTS		74)		117,929 28,303 146,232	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH Q) INDIRECT COSTS (SPECIFIY RATE AND BASE) 34.0 TOTAL INDIRECT COSTS TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H=1)		74)		28,303	\$
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIV RATE AND BASE) 34.0 TOTAL INDIRECT COSTS TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H=1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT O	F CURRENT PROJECT SEE GPG 11.0	_	ID LEVEL # D	117,929 28,303 146,232 146,232	\$
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH Q) INDIRECT COSTS (SPECIFIV RATE AND BASE) 24.0 TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H=1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT Q AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST-SHARING: PROPOSED LEVEL \$	F CURRENT PROJECT SEE GPG 11.0	AGREE	the second s	117,929 28,303 146,232 146,232 FFERENT 5	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIV RATE AND BASE) 34.0 TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H-1) C RESIDUAL FUNDS (IF FOR FURTHER SUPPORT G AMOUNT OF THIS REQUEST (J) OR (J MINUS K) C COST-SHARING: PROPOSED LEVEL S NPD TYPED NAME & SIGNATURE Amount F. Boudness	F CURRENT PROJECT SEE GPG 11.0	AGREE	the second s	117,929 28,303 146,232 146,232	
TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIV RATE AND BASE) 24.0 TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H-1) C RESIDUAL FUNDS (IF FOR FURTHER SUPPORT G AMOUNT OF THIS REQUEST (J) OR (J MINUS K) C COST-SHARING: PROPOSED LEVEL S NPD TYPED NAME & SKONATURES	F CURRENT PROJECT SEE GPG 11.0	AGRES	FOR MINDRECT CO	117,929 28,303 146,232 146,232 FFERENT 5	

B.2.	Other Professionals - Programmer: Vakhtang Tsulaia	(12.0 PM)	\$79,216
C.	Fringe Benefits	(33.6%)	26,616
E.2.	Travel - Foreign: 2 trips to U.S.A @ \$2,700 2 trips to ATLAS meetings/work	shops/tutorials @ \$1,735	\$5,400 <u>3,470</u> 8,870
G.1.	Other Direct Costs - Materials and Su Rackmount processor	ipplies:	3,227
I.	Indirect Costs	(24% of MTDC - \$117,929)	28,303
J.	Total Direct and Indirect Costs		\$146,232

Columbia/NSF FY2013			PROPOSAL BUDGET FOR NSF USE ONLY					
ORGANIZATION			PROPOSAL		DURATION			
University of Pittaburgh, 350 Thackaray Hall, Pittaburgh PA 15	1240				Processon.		Proceed	Granted
PRINCIPAL INVESTIGATOR PROJECT DIRECTOR	2000		444	ARD NO	and the second division of the second divisio	Granted		
Joseph F. Boudneau			1	1	2			
A. SENIOR PERSONNEL: PIPD, Co-Pfx, Faculty and Other St	micr Associates	_	NSF	-Funded	Funds	Funds		
(List each separately with title, A.7. show number in brackets)			Person-months		Requested By	Granted By NSF		
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6 () OTHERS (LIST INDIVIDUALLY ON BUDGET EXP	LANATION PAGE)	-						
T() TOTAL SENIOR PERSONNEL (1-4)		-				-		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	C	-		-				
1() POST DOCTORAL ASSOCIATES		-						
2(1) OTHER PROFESSIONALS (TECHNICIAN, PROG	RAMMER ETC.)	12	-		81,592			
3 () GRADUATE STUDENTS			-					
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5() SECRETARIAL - CLERICAL (IF CHARGED DIREC	151.00			_				
6() OTHER	and a design of the second	_		_	A STREET			
TOTAL SALARIES AND WAGES (A+8)				-	81,592			
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)	2. M 1.			-	27,415	-		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A	(Defe			-	109,007			
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EA	CHITEM EXCEEDING \$5,000.)							
E. TRAVEL 1. DOMESTIC (NICL CANADA, MEXICO AND 2. FOREION					9,136	-		
F. PARTICIPANT SUPPORT COSTS								
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4 OTHER				- 1				
() TOTAL PARTICIPANT COSTS								
G. OTHER DIRECT COSTS				-				
1. MATERIALS AND SUPPLIES			_	-	3,324			
2. PUBLICATION COSTS/DOCUMENTATION/DISDEMINATI	ON .			-				
3. CONSULTANT SERVICES								
4. COMPUTER SERVICES								
5. SUBAWARDS					2	2		
6. OTHER					1			
TOTAL OTHER DIRECT COSTS					3,324	3		
H. TOTAL DIRECT COSTS (A THROUGH G)					121,467	2		
INDIRECT COSTS (SPECIFIY RATE AND BASE)	States and the second states of the second states o							
24.9% a	MTDC Base - \$121,487							
TOTAL INDIRECT COSTS			_	-	29,152			
J TOTAL DIRECT AND INDIRECT COSTS (H+1)				-+	150,619	1		
K. RESIDUAL FUNDS OF FOR FURTHER SUPPORT OF CI	RRENT PROJECT SEE ORG 11	0.713		-	1997918			
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Alan A. DiPaime, Director, Office of Research 1/2 7165/	A Dave 10 12	4510						

B.2.	Other Professionals - Programmer: Vakhtang Tsulaia	(12.0 PM)	\$81,592
C.	Fringe Benefits	(33.6%)	27,415
E.2.	Travel - Foreign: 2 trips to U.S.A @ \$2,780 2 trips to ATLAS meetings/work	shops/tutorials @ \$1,788	\$5,560 <u>3,576</u> 9,136
G.1.	Other Direct Costs - Materials and Su Laptop	pplies:	3,324
I.	Indirect Costs	(24% of MTDC - \$121,467)	29,152
J.	Total Direct and Indirect Costs		\$150,619

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B.2.	Other Professionals - Programmer: Vakhtang Tsulaia	(12.0 PM)	\$84,040
C.	Fringe Benefits	(33.6%)	28,237
E.2.	Travel - Foreign: 2 trips to U.S.A @ \$2,864 2 trips to ATLAS meetings/work	shops/tutorials @ \$1,841	\$5,728 <u>3,682</u> 9,410
G.1.	Other Direct Costs - Materials and Su Disk storage	ipplies:	3,424
I.	Indirect Costs	(24% of MTDC - \$125,111)	30,027
J.	Total Direct and Indirect Costs		\$155,138

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PRINCIPAL INVESTIGATION AVAIABD AG A SEMED REINDONNEL: PHYD, Co-PTX, Faculty and Other Earlor Associates (List each separately with tite, A.7. show number in brackets) NSF-Funds Particle Protection A SEMED REINDONNEL: PHYD, Co-PTX, Faculty and Other Earlor Associates (List each separately with tite, A.7. show number in brackets) NSF-Funds Protection 1 CAL ACAD SLIMR Progenet Protection Protection 2 CAL ACAD SLIMR Protection (J) 3 CAL CAL ACAD SLIMR Protection 4 CAL CAL CAL CAL (J) 3 CAL CAL CAL (J) (J) 4 CAL CAL (J) (J) (J) (J) (J) 3 CHERR REISONAL, CALWARCH, PROCEAUNING, CALWARCH, CALWARCH, CALWARCH, PROCEAUNING, CALWARCH, CALWARCH, CALWARCH, CALWARCH, CALWARCH, CALWARCH, CALWARCH, CALWARCH, CALWAR	University of Pittsburgh, 350 Thackeray Hall,	Pittsburgh PA 15260				the second se	Granted
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Quit each separately with Bite, A.7. allow number in brackets) Person-model Requested by Carlete B 1. CAL CALO Person-model (2) 2. CAL CALO Person-model (2) 3. CAL CALO (2) (2) (2) 4. CAL CALO (2) (2) (2) 5. CHERR SEGMENTS (2) (2) (2) (2) 6. CHERR FERSIONALL (14) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)	Joseph F. Boudreau			1.222		i seren e	
CAL Cal <td>A. SEMIOR PERSONNEL: PVPD, Co-PTs, Fac</td> <td>uity and Other Senior Associates</td> <td></td> <td>NSF</td> <td>-Funde</td> <td>Funds</td> <td>Funds</td>	A. SEMIOR PERSONNEL: PVPD, Co-PTs, Fac	uity and Other Senior Associates		NSF	-Funde	Funds	Funds
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2. 3. 4. 5. 6. 5. 6. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7.	A MARKANA SA	-1. CARE - 1. S.	GAL	ACAD	SUMP	Proposer	Of Different
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TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG 11.D.7.) AMOUNT OF THIS REDUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ VPD TYPED NAME & SIGNATURE* Resept F. Boudseu ACCEST SHARING: PROPOSED LEVEL \$ DATE FOR NSF USE ON, Y ACCEST SHARING: PROPOSED LEVEL \$ DATE FOR NSF USE ON, Y ACCEST SHARING: PROPOSED LEVEL \$ DATE FOR NSF USE ON, Y ACCEST SHARING: PROPOSED LEVEL \$ DATE FOR NSF USE ON, Y ACCEST SHARING: PROPOSED LEVEL \$ ACCEST SHARI	OTHER OTHER DIRECT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWWRDS OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G	0 D BASE)				3,527	
TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG 11.D.7.j.) 159,792 AMOUNT OF THIS REQUEST (J) OR (J MINUS K) 159,792 \$ COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL IF DIFFERENT \$ VPD TYPED NAME & SIGNATURE* DATE FOR NSF USE OM,Y Keeph F. Boudnesi FOR NSF USE OM,Y FOR NSF USE OM,Y	OTHER TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G	0 D BASE)	65			3,527	
RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG 11.D.7.) AMOUNT OF THIS REDUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL IF DIFFERENT \$ POT TYPED NAME & SIGNATURE* Resp 17. Boudness COST SHARING: PROPOSED LEVEL \$ COST SHARING: PROPOSED LEV	OTHER TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND	0 D BASE)	65			3,527 128,805	
AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST SHARING: PROPOSED LEVEL \$ AGREED LEVEL IF DIFFERENT \$ VPD TYPED NAME & SKIMATURE* Komph F. Boudreau AGREED LEVEL IF DIFFERENT \$ DATE FOR NSF USE ONLY AGREED LEVEL IF DIFFERENT \$ DATE FOR NSF USE ONLY AGREED LEVEL IF DIFFERENT \$ DATE FOR NSF USE ONLY AGREED LEVEL IF DIFFERENT \$ CONTRACT COST RATE VERIFICATION DATE CONTRACT COST RATE VERIFICATION DATE CONTRACT COST RATE VERIFICATION CONTRACT	OTHER OTHER DIRECT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL INDIRECT COSTS	0 3 BASE) 34.0% of MTDC Base - \$128.8	65			3,527 128,805 30,927	
COST SHARING PROPOSED LEVEL S AGREED LEVEL IF DIFFERENT S VPD TYPED NAME & SKONATURE* Resept F. Boudseu ACCEPT TO REPORT OF THE STRATE VERIFICATION DATE FOR INSP USE ONLY ACCEPT TO THE STRATE VERIFICATION DATE DATE FOR INSP USE ONLY CONTRACT COST RATE VERIFICATION DATE FOR INSP USE ONLY FOR INSP FOR INFORMATION FOR INFORMATION FOR INT	OTHER OTHER DIRECT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (TOTAL INDIRECT COSTS TOTAL INDIRECT COSTS	0 1 BASE) 24.0% of MTDC Base • \$128.8 1+1)				3,527 128,805 30,927	
VPD TYPED NAME & SKONATURE* Komph F. Boudseu Construction DATE FOR NSF USE ONLY P A: 20 ONDRECT COST RATE VERSFICATION DATE Data (Second To Data) DATE Data (Second To Data) DATE Data (Second To Data) DATE Data (Second To Data)	OTHER () TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES COMPUTER SERVICES OTHER TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL DIRECT COSTS	9 9 BASE) 24.0% of MTDC Base · \$128,8 1+1) JPPORT OF CURRENT PROJECT SEE				3,527 128,965 30,927 159,792	
Komph P. Boudseau AL + ALL PROFILE OF THE VERSFICATION	OTHER () TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL DIRECT COSTS TOTAL DIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS () RESIDUAL FUNDS (IF FOR FURTHER SI AMOUNT OF THIS REQUEST (J) OR (J IN	9 9 BASE) 24.0% of MTDC Base · \$128,8 1+1) JPPORT OF CURRENT PROJECT SEE	GPG 11.D.74)			3,527 128,865 30,927 159,792 159,792	\$
	OTHER () TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWARDS OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL DIRECT COSTS TOTAL DIRECT C	9 9 BASE) 24.0% of MTDC Base · \$128,8 1+1) JPPORT OF CURRENT PROJECT SEE	GPG 11.D.7.(.) (AGRID			3,527 128,865 30,927 159,792 159,792 FFERENT \$	
	OTHER () TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTSIDOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWWRDS OTHER TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL DIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (TOTAL DIRECT AND INDIRECT COSTS (RESIDUAL FUNDS (IF FOR FURTHER S) AMOUNT OF THES REDUEST (J) OR (J IN COST SHARING PROPOSED LEVEL \$ VPD TYPED NAME & SIGNATURE*	0 1 BASE) 24.0% of MITOC Base · \$128.8 1+1) JPPORT OF CURRENT PROJECT SEE INUS K)	GPG 11.D.7.(.) (AGRID			3,527 128,865 30,927 159,792 159,792 FFERENT \$	
Here A. DiPatria, Director, Office of Research The west M. Sattle for 12/15/12	OTHER () TOTAL PARTICIPANT COSTS OTHER DIRECT COSTS MATERIALS AND SUPPLIES PUBLICATION COSTS/DOCUMENTATION CONSULTANT SERVICES COMPUTER SERVICES SUBAWWRDS OTHER TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL DIRECT COSTS TOTAL DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL DIRECT COSTS TOTAL DIRECT COSTS TOTAL DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G INDIRECT COSTS (SPECIFIC) RATE AND TOTAL DIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS TOTAL DIRECT COSTS TOTAL DIN	9 2H.0% of MTDC Base · \$128,8 H+1) JPPORT OF CURRENT PROJECT SEE INUS K)	GPG 11.0.74) (AGRO (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (2417) (241	NDRO	CT CO	3,527 128,865 30,927 159,792 159,792 159,792 159,792 159,792 159,792 159,792 159,792 159,792	

B.2.	Other Professionals - Programmer: Vakhtang Tsulaia	(12.0 PM)		\$86,561
C.	Fringe Benefits	(33.6%)		29,085
E.2.	Travel - Foreign: 2 trips to U.S.A @ \$2,950 2 trips to ATLAS meetings/work	shops/tutorials @ \$1,896	\$5,900 3,792	9,692
G.1.	Other Direct Costs - Materials and Su Disk storage	ipplies:		3,527
I.	Indirect Costs	(24% of MTDC - \$128,865)		30,927
J.	Total Direct and Indirect Costs			\$159,792

Columbia/NSF FY2016	SUMMARY ROPOSAL BUDGET		-	OR NSF USE ON	
ORGANIZATION	ROPUSAL BUDGET		PROPOSAL	DURATION	
University of Pittaburgh, 350 Thackeray Hall, Pittaburgh PA 1526			PHUPUSAL	the second se	and the second s
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	4		AWARD NO	Proposed	Granted
Joseph F. Boudreau			ANNAPO NO.	·	
	A Real Products	-	Line P	#	R-sda
A. SENIOR PERSONNEL: PIPO, Co-Pfs, Faculty and Other Senio	Association		NSF-Funde	Funds	Funds
(List each separately with title, A.7. show number in brackets)		-	Person-month	Requested By	Granted By NSI
		CAL	ACAD SUMR	Proposer	(If Different)
L		-			
2		-			
3					
4,		1			
5.				1	
6.() OTHERS (UST INDIVIDUALLY ON BUDGET EXPLAN	ATION PAGE)				
7.() TOTAL SENIOR PERSONNEL (1-6)			1.1.1		
8. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)		1.000	1000		-
1.() POST DOCTORAL ASSOCIATES					
2.(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAM	MAER, ETC.)	12		89,158	
3.() GRADUATE STUDENTS				and and	
4.() UNDERGRADUATE STUDENTS					
5.() SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY	ń				
6() OTHER					
TOTAL SALARIES AND WAGES (A+8)				89,158	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)	- 21			29,957	
TOTAL SALARIES, WAGES AND FRINCE BENEFITS (A+B+	C1.			119,115	
E TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U. 2. FOREIGN	S. POSSESSIONS)			9,983	
				1 1 1 2 2 2 1 1	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS 8.					
2. TRAVEL 5					
3. SUBSISTENCE 8					
4. OTHER		_			
() TOTAL PARTICIPANT COSTS					
3. OTHER DIRECT COSTS				5 6 5 5 1	
1. MATERIALS AND SUPPLIES				3,633	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION		_			
3. CONSULTANT SERVICES					
4. COMPUTER SERVICES					
5. SUBAWARDS					
6. OTHER					
6. OTHER TOTAL OTHER DIRECT COSTS				3,633	
6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)		_		3,633 132,731	
6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIC RATE AND BASE)					
6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G)	DC Base - \$132,731				
6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFTY RATE AND BASE) 24.0% of NTT TOTAL INDIRECT COSTS	DC Base - \$132,731			31,855	
6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIC RATE AND BASE) 24.0% of NTT TOTAL INDIRECT COSTS 1. TOTAL DIRECT AND INDIRECT COSTS (H+1)				132,731	
6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFTY RATE AND BASE) 24.0% of NTT TOTAL INDIRECT COSTS		1.0.7.j.)		31,855	
OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIC RATE AND BASE) 24.0% of NTT TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+1)		10.7j)		31,855	\$
OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFTY RATE AND BASE) 34.0% of NTT TOTAL INDIRECT COSTS TOTAL DIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURR			D LEVEL # D	132,731 31,855 164,586 154,586	\$
6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFTY RATE AND BASE) 24.0% of MT TOTAL INDIRECT COSTS TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURR AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST-SHARING: PROPOSED LEVEL \$		AGREE	and the second second second second	132,731 31,855 164,586 154,586	\$
6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIY RATE AND BASE) 24.0% of MTD 24.0% of MTD TOTAL INDIRECT COSTS L. TOTAL DIRECT AND INDIRECT COSTS (H+1) K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURR AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	ENT PROJECT SEE GPG 1	AGREE	FOR NS	132,731 31,855 164,586 164,586 FFERENT \$	
6. OTHER TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (SPECIFIY RATE AND BASE) 24.0% of MT TOTAL INDIRECT COSTS TOTAL DIRECT AND INDIRECT COSTS (H+1) RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURR AMOUNT OF THIS REQUEST (J) OR (J MINUS K) COST-BHARING: PROPOSED LEVEL \$ SUPD TYPED NAME & SIGNATURE*	ENT PROJECT SEE GPG 1	AGAER	FOR NS	132,731 31,855 164,586 164,586 FFERENT \$	

B.2.	Other Professionals - Programmer: Vakhtang Tsulaia	(12.0 PM)	\$89,158
C.	Fringe Benefits	(33.6%)	29,957
E.2.	Travel - Foreign: 2 trips to U.S.A @ \$3,040 2 trips to ATLAS meetings/work	shops/tutorials @ \$1,951.50	\$6,080 <u>3,903</u> 9,983
G.1.	Other Direct Costs - Materials and Su Rack mount processor	pplies:	3,633
I.	Indirect Costs	(24% of MTDC - \$132,731)	31,855
J.	Total Direct and Indirect Costs		\$164,586

SUMMARY PROPOSAL BUDG	ET		FOF	r ns	SF USE ONL'	Y
			POSAL	NO.	. DURATIO	DN (mont
University of Texas at Arlington					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	Ю.		
Kaushik De						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths	- B	Funds Requested By	Funds granted by
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	granted by (if differe
1. Kaushik De - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
3. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					-	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	78.00	0.00	0.00		385,706	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
					0	
TOTAL SALARIES AND WAGES (A + B)					385,706	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					115,712	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED		00)			501,418	
			32,238		000.000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)	-		<u>232,238</u> 17.000	
	ESSIONS)			17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			17,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS	ESSIONS)			17,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS)	·		17,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 0	ESSIONS)			17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 0 3. SUBSISTENCE 0	ESSIONS)			17,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0	ESSIONS)		-	17,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE					17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN E. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER					17,000 70,000	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)				-	17,000 70,000	
. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 0					17,000 70,000 0 30,178 0	
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES					17,000 70,000 0 30,178	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0)					17,000 70,000 0 30,178 0 10,000 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (1) TOTAL NUMER OF PARTICIPANTS (1) <td></td> <td></td> <td></td> <td></td> <td>17,000 70,000 0 30,178 0 10,000</td> <td></td>					17,000 70,000 0 30,178 0 10,000	
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT COSTS 1. STIPENDS 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER					17,000 70,000 0 30,178 0 10,000 0 115,000 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS					17,000 70,000 0 30,178 0 10,000 0 115,000 0 155,178	
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL ON COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G)					17,000 70,000 0 30,178 0 10,000 0 115,000 0	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 9 2. TRAVEL 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN				17,000 70,000 0 30,178 0 10,000 0 115,000 0 155,178	
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPENDS \$ 0 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 230482) (Cont. on Comments Pa	TICIPAN				17,000 70,000 0 30,178 0 10,000 0 115,000 0 155,178 975,834	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 230482) (Cont. on Comments Pa OTAL INDIRECT COSTS (F&A)	TICIPAN				17,000 70,000 70,000 0 30,178 0 10,000 0 115,000 0 115,000 0 155,178 975,834 269,366	
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 230482) (Cont. on Comments Pa OTAL INDIRECT COSTS (F&A)	TICIPAN				17,000 70,000 0 30,178 0 10,000 0 115,000 0 155,178 975,834	
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN				17,000 70,000 70,000 0 30,178 0 10,000 0 115,000 0 1155,178 975,834 269,366 1,245,200 0	
. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 1 0 1 0 1 0 1 0 1 1 0 1 1 1 1 1	TICIPAN				17,000 70,000 70,000 0 30,178 0 10,000 0 1155,178 975,834 269,366 1,245,200	\$
TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 230482) (Cont. on Comments Pa OTAL INDIRECT COSTS (F&A) . TOTAL DIRECT AND INDIRECT COSTS (H + I) 4. RESIDUAL FUNDS AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	ITICIPAN	T COSTS	S		17,000 70,000 70,000 0 30,178 0 10,000 0 1155,178 975,834 269,366 1,245,200 0 1,245,200	\$
I. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 230482) (Cont. on Comments Pa OTAL INDIRECT COSTS (F&A) . TOTAL DIRECT AND INDIRECT COSTS (H + I) 4. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) ACOST SHARING PR	ITICIPAN	T COSTS	S		17,000 70,000 70,000 0 30,178 0 10,000 0 115,000 0 1155,178 975,834 269,366 1,245,200 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0 TOTAL PAR 6. OTHER TOTAL OTOCOSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000,		TCOSTS	S NT \$ FOR 1 CT COS	NSF St R	17,000 70,000 70,000 0 30,178 0 10,000 0 1155,178 975,834 269,366 1,245,200 0 1,245,200	

** I- Indirect Costs on campus MTDC (Rate: 49.5000, Base 423113)

SUMMARY PROPOSAL BUDG	ET		FOF	R NSF	USE ONL'	Y
ORGANIZATION			POSAL	NO.	DURATIO	DN (month
University of Texas at Arlington					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		A۱	VARD N	10.		
Kaushik De						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		Funds juested By	Funds granted by I
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR	pr		granted by I (if differen
1. Kaushik De - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
	0.00	0.00	0.00		•	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	0.00	0.00	0.00		•	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	78.00	0.00	0.00)	397,277	
3. (0) GRADUATE STUDENTS 4. (0) UNDERGRADUATE STUDENTS					<u> </u>	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					397.277	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					119,183	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					516,460	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED	ING \$5.0	00.)			••••	
					258,051	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	ESSIONS)			17,000	
	ESSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS	ESSIONS)			17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS	ESSIONS)		-	17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. CONTRAVEL 1. CONTRAVEL 2. TRAVEL 2. SUBSISTENCE 0	ESSIONS)		-	17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)		-	17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				-	17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0			3	-	17,000 70,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR			3		17,000 70,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 60 3. SUBSISTENCE 60 4. OTHER 70TAL NUMBER OF PARTICIPANTS (0) 70TAL PAR G. OTHER DIRECT COSTS			3		17,000 70,000 0 25,960 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES			<u>}</u>		17,000 70,000 0 25,960	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)			3		17,000 70,000 0 25,960 0 10,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES			3		17,000 70,000 0 25,960 0 10,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) S. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER			<u> </u>		17,000 70,000 0 25,960 0 10,000 0 115,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS			3		17,000 70,000 20,000 0 10,000 0 115,000 0 150,960	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G)			<u>}</u>		17,000 70,000 0 25,960 0 10,000 0 115,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN		<u> </u>		17,000 70,000 20,000 0 10,000 0 115,000 0 150,960	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 235863) (Cont. on Comments Pa	TICIPAN		3		17,000 70,000 20,000 0 10,000 0 115,000 0 150,960	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 235863) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A)	TICIPAN		3		17,000 70,000 0 25,960 0 10,000 0 115,000 0 150,960 ,012,471	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 5. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 235863) (Cont. on Comments Pa	TICIPAN		3		17,000 70,000 70,000 0 25,960 0 10,000 0 115,000 0 150,960 ,012,471 261,085	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 235863) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) X. RESIDUAL FUNDS	TICIPAN		<u>}</u>	1	17,000 70,000 70,000 0 25,960 0 10,000 0 115,000 0 150,960 ,012,471 261,085 ,273,556 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 3. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 1. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) 0. TOTAL INDIRECT COSTS (F&A) 0. TOTAL DIRECT AND INDIRECT COSTS (H + I) C. RESIDUAL FUNDS . AMOUNT OF	ITICIPAN	T COSTS		1	17,000 70,000 70,000 0 25,960 0 10,000 0 115,000 0 150,960 ,012,471 261,085 ,273,556	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	ITICIPAN	T COSTS	NT \$	1 \$ 1	17,000 70,000 70,000 0 25,960 0 10,000 0 115,000 0 150,960 ,012,471 261,085 ,273,556 0	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) . INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE <	ITICIPAN		NT \$ FOR 1	1 \$ 1 NSF US	17,000 70,000 70,000 0 25,960 0 10,000 0 115,000 0 115,000 0 150,960 ,012,471 261,085 ,273,556 0 ,273,556	
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS 4. TOTAL DIRECT COSTS (A THROUGH G) INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 235863) (Cont. on Comments Pa OTAL INDIRECT COSTS (F&A) . TOTAL DIRECT AND INDIRECT COSTS (H + I) X. RESIDUAL FUNDS . AMOUNT OF THIS REQUEST (J) OR (J MINUS K) A. COST SHA	ITICIPAN		NT \$ FOR N CT COS	1 \$ 1 NSF US	17,000 70,000 70,000 0 25,960 0 10,000 0 115,000 0 115,000 0 150,960 ,012,471 261,085 ,273,556 0 ,273,556 0 se only TE VERIFIC	

** I- Indirect Costs on campus MTDC (Rate: 49.5000, Base 403557)

SUMMARY PROPOSAL BUDG	ET		FOI	r nsf u	SE ONL	T
ORGANIZATION			POSAL	NO.	DURATIO	ON (month
University of Texas at Arlington				I	Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	IO.		
Kaushik De						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths		inds isted By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		ooser	granted by (if differer
1. Kaushik De - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					-	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	78.00	0.00	0.00	4	<u>109,196</u>	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					109,196	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					22,759	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED				5	531,955	
	·	5 2	61,458			
			61,458		261,458	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			61,458		17,000	
			61,458			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE			61,458		17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN			61,458		17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			61,458		17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS			61,458		17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			61,458		17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 50 2. TRAVEL 0 3. SUBSISTENCE 0			61,458		17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0	ESSIONS)			<u>17,000</u> 70,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR	ESSIONS)			17,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS	ESSIONS)			<u>17,000</u> 70,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL PAR	ESSIONS)			<u>17,000</u> 70,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			17,000 70,000 0 28,828 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 5. OU TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			17,000 70,000 0 28,828	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES	ESSIONS)			17,000 70,000 0 28,828 0 10,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES	ESSIONS)			17,000 70,000 0 28,828 0 10,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS	ESSIONS)		-	17,000 70,000 0 28,828 0 10,000 0 115,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER	ESSIONS)		1	17,000 70,000 28,828 0 10,000 0 115,000 0 153,828	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)		1	17,000 70,000 0 28,828 0 10,000 0 115,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	RTICIPAN)		1	17,000 70,000 28,828 0 10,000 0 115,000 0 153,828	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	RTICIPAN)		1	17,000 70,000 28,828 0 10,000 0 15,000 0 153,828 34,241	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 243469) (Cont. on Comments Pa	RTICIPAN)			17,000 70,000 70,000 0 28,828 0 10,000 0 115,000 0 153,828 034,241 268,387	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 243469) (Cont. on Comments Pa	RTICIPAN)			17,000 70,000 28,828 0 10,000 0 15,000 0 153,828 34,241	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Off campus MTDC (Rate: 26.0000, Base: 243469) (Cont. on Comments Pa TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	RTICIPAN)		1 1 1,0 2 1,3	17,000 70,000 70,000 0 28,828 0 10,000 0 115,000 0 153,828 034,241 2688,387 302,628 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 243469) (Cont. on Comments Pa TOTAL INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	ESSIONS ATICIPAN		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1 1 1,0 2 1,3	17,000 70,000 70,000 0 28,828 0 10,000 0 115,000 0 153,828 034,241 2688,387 302,628	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS I. INDIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	ESSIONS ATICIPAN		5 	1 1 1,0 2 1,3	17,000 70,000 70,000 0 28,828 0 10,000 0 115,000 0 153,828 034,241 268,387 302,628 0 302,628	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 5. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 ARCOME AND A COMPANY A COMPANY AND A COMPANY AND A COMPANY A COMPANY AND A COMPANY AND A COMPANY AND A COMPANY AND A COMPANY A COMPAN	ESSIONS ATICIPAN		S S VT \$ FOR I	1 1 1,1 1,2 1,3 \$ 1,3	17,000 70,000 70,000 0 28,828 0 10,000 0 115,000 0 153,828 034,241 268,387 302,628 0 302,628	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 9 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 243469) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	ESSIONS ATICIPAN Ige)		S NT \$ FOR I CT COS	1 1 1,1 1,2 1,3 \$ 1,3	17,000 70,000 28,828 0 10,000 0 153,828 034,241 268,387 302,628 0 302,628 0 302,628 0 302,628	\$

** I- Indirect Costs on campus MTDC (Rate: 49.5000, Base 414313)

SUMMARY PROPOSAL BUDG	ieτ ΄		FOI	R NSF U	SE ONL	Y
ORGANIZATION			POSAL	1		ON (month
University of Texas at Arlington				I	Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	WARD N	IO.		
Kaushik De						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed 1ths		inds isted By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		ooser	granted by (if differer
1. Kaushik De - Prof	0.00	0.00	0.00	\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					-	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	78.00	0.00	0.00	9 4	1 <u>21,472</u>	
3. (0) GRADUATE STUDENTS					0	
 4. (0) UNDERGRADUATE STUDENTS 5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY) 					<u> </u>	
6. (0) OTHER					U 0	
TOTAL SALARIES AND WAGES (A + B)					121,472	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					126,441	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					547,913	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED		00)				
TOTAL EQUIPMENT			64,829		264,829	
TOTAL EQUIPMENT			64,829		264,829 20,000 72,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI			64,829		20,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS			64,829		20,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0			64,829		20,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			64,829		20,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0			64,829		20,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0			64,829		20,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. 0 2. TRAVEL 0 3. SUBSISTENCE 0 0	ESSIONS)			20,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0	ESSIONS)			<u>20,000</u> 72,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 5. O 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF	ESSIONS)			<u>20,000</u> 72,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS	ESSIONS)			<u>20,000</u> 72,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES	ESSIONS)			20,000 72,000 0 25,851	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION	ESSIONS)			20,000 72,000 0 25,851 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0)	ESSIONS)			20,000 72,000 0 25,851 0 10,000	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANTS (0)	ESSIONS)		-	20,000 72,000 0 25,851 0 10,000 0 115,000 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (ESSIONS)		1	20,000 72,000 25,851 0 10,000 0 115,000 0 150,851	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G)	ESSIONS)		1	20,000 72,000 0 25,851 0 10,000 0 115,000 0	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	RTICIPAN)		1	20,000 72,000 25,851 0 10,000 0 115,000 0 150,851	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 9 2. FOREIGN 9 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) <	RTICIPAN)		1	20,000 72,000 72,000 0 25,851 0 10,000 0 115,000 0 150,851 055,593	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 245372) (Cont. on Comments Pa <td>RTICIPAN</td> <td>)</td> <td></td> <td></td> <td>20,000 72,000 72,000 0 25,851 0 10,000 0 150,851 055,593 276,841</td> <td></td>	RTICIPAN)			20,000 72,000 72,000 0 25,851 0 10,000 0 150,851 055,593 276,841	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 245372) (Cont. on Comments Pa <td>RTICIPAN</td> <td>)</td> <td></td> <td></td> <td>20,000 72,000 72,000 0 25,851 0 10,000 0 115,000 0 150,851 055,593</td> <td></td>	RTICIPAN)			20,000 72,000 72,000 0 25,851 0 10,000 0 115,000 0 150,851 055,593	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$ 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL COSTS // DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) 0 1. NDIRECT COSTS (F&A) J.	RTICIPAN)			20,000 72,000 72,000 0 25,851 0 10,000 0 150,851 055,593 276,841	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 245372) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDU	RTICIPAN)		1 1 1,0 2 1,3	20,000 72,000 72,000 0 25,851 0 10,000 0 115,000 0 150,851 0 55,593 276,841 332,434	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAF G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	ESSIONS RTICIPAN age)		5 	1 1 1,1 2 1,3 \$ 1,3	20,000 72,000 72,000 0 25,851 0 10,000 0 150,851 055,593 276,841 332,434 0 332,434	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 245372) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDU	ESSIONS RTICIPAN age)		5 	1 1 1,0 2 1,3	20,000 72,000 72,000 0 25,851 0 10,000 0 150,851 055,593 276,841 332,434 0 332,434	
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 8. SUPPORT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1 0 TOTAL NUMBER OF PARTICIPANTS 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1	Age)		S NT \$ FOR I CT COS	1 1 1,1 1,1 \$ 1,3 \$ 1,3 \$ 1,3	20,000 72,000 72,000 0 25,851 0 10,000 0 150,851 055,593 276,841 332,434 0 332,434 0 332,434 0 332,434	\$ CATION
TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSI 2. FOREIGN 2. FOREIGN 8. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF T	Age)		S NT \$ FOR I CT COS	1 1 1,1 1,2 1,3 \$ 1,3	20,000 72,000 72,000 0 25,851 0 10,000 0 150,851 055,593 276,841 332,434 0 332,434 0 332,434 0 332,434	\$

** I- Indirect Costs on campus MTDC (Rate: 49.5000, Base 430392)

SUMMARY PROPOSAL BUDG	ET		FO	R NS	SF USE ONL	Y
ORGANIZATION			POSAL	NO.	DURATIO	DN (mont
University of Texas at Arlington					Proposed	d Grante
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AV	VARD N	IO.		
Kaushik De						
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates		NSF Fund Person-mor	ed hths	В	Funds Requested By	Funds
(List each separately with title, A.7. show number in brackets)	CAL	ACAD	SUMR		proposer	granted by (if differen
1. Kaushik De - Prof	0.00	0.00	0.00)\$	0	\$
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00)	0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					-	
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	78.00	0.00	0.00)	434,116	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
					0	
TOTAL SALARIES AND WAGES (A + B)					434,116	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					130,235	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C) D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEED					564,351	
Tier 2 computing farm		, í	68,163			
					268,163	
	ESSIONS)			20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE	SSIONS)				
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN	ESSIONS)			20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS \$0	SSIONS)			20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	SSIONS)			20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0	ESSIONS)			20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0	ESSIONS)			20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					20,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0					<u>20,000</u> 72,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR					<u>20,000</u> 72,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS					<u>20,000</u> 72,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES					20,000 72,000 0 28,335 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				-	20,000 72,000 0 28,335	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES					20,000 72,000 0 28,335 0 10,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES					20,000 72,000 0 28,335 0 10,000	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS					20,000 72,000 0 28,335 0 10,000 0 115,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SERVICES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS					20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 153,335	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER					20,000 72,000 0 28,335 0 10,000 0 115,000 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)	TICIPAN				20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 153,335	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OCOSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 249882) (Cont. on Comments Pa	TICIPAN				20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 153,335 1,077,849	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL OTHER DIRECT COSTS 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 249882) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A)	TICIPAN				20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 115,000 0 153,335 1,077,849 285,147	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL SAND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS (A THROUGH G) 1. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 249882) (Cont. on Comments Pa TOTAL INDIRECT AND IN	TICIPAN				20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 153,335 1,077,849	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 249882) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS	TICIPAN				20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 1153,335 1,077,849 285,147 1,362,996 0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN F. PARTICIPANT SUPPORT COSTS 1. STIPENDS 2. TRAVEL 0 3. SUBSISTENCE 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 249882) (Cont. on Comments Pa TOTAL INDIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF	TICIPAN	T COSTS	S		20,000 72,000 72,000 0 28,335 0 0 10,000 0 115,000 0 1153,335 1,077,849 285,147 1,362,996	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 249882) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN	T COSTS	S S NT \$		20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 153,335 1,077,849 285,147 1,362,996 0 1,362,996	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 4. OTHER UPPORT COSTS 1. STIPENDS 3. SUBSISTENCE 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS 0 AGREED LEVEL \$ 0 AGREED LE PI/PD NAME	TICIPAN	TCOSTS	S S VT \$ FOR 1	NSF	20,000 72,000 72,000 0 28,335 0 0 10,000 0 115,000 0 115,000 0 1153,335 1,077,849 285,147 1,362,996 0 1,362,996 0 1,362,996	\$
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSE 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. FOREIGN 2. TRAVEL 0 2. TRAVEL 0 3. SUBSISTENCE 0 4. OTHER 0 TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAR G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES 4. COMPUTER SERVICES 5. SUBAWARDS 6. OTHER TOTAL OTHER DIRECT COSTS H. TOTAL DIRECT COSTS (A THROUGH G) I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) off campus MTDC (Rate: 26.0000, Base: 249882) (Cont. on Comments Pa TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0	TICIPAN ge)	TCOSTS	S NT \$ FOR 1 CT COS	NSF ST R	20,000 72,000 72,000 0 28,335 0 10,000 0 115,000 0 153,335 1,077,849 285,147 1,362,996 0 1,362,996	\$

** I- Indirect Costs on campus MTDC (Rate: 49.5000, Base 444804)

ORGANIZATION University of Texas at Arlington PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Kaushik De A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Kaushik De - Prof 2. 3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS 2. (35) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	CAL 0.00	AV NSF Funde Person-mor ACAD	WARD N WARD N tths SUMR 0.00	Proposed O. Funds Requested By proposer	Funds granted by N (if different)
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Kaushik De A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Kaushik De - Prof 2. 3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	CAL 0.00	NSF Funde Person-mor	ed <u>iths</u> SUMR	O. Funds Requested By proposer	Funds granted by N (if different)
Kaushik De A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Kaushik De - Prof 2. 3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	CAL 0.00	NSF Funde Person-mor	ed <u>iths</u> SUMR	Funds Requested By proposer	granted by N (if different
 A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets) 1. Kaushik De - Prof 2. 3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS 	CAL 0.00	ACAD	SUMR	Requested By proposer	granted by N (if different
(List each separately with title, A.7. show number in brackets) 1. Kaushik De - Prof 2. 3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	CAL 0.00	ACAD	SUMR	Requested By proposer	granted by N (if different
1. Kaushik De - Prof 2. 3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	0.00				
2. 3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS		0.00	0.00	\$ U	
3. 4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS) 0.00				\$
4. 5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS) 0.00				-
5. 6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	0.00	1			
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE) 7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	0.00				
7. (1) TOTAL SENIOR PERSONNEL (1 - 6) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	, 0.00	0.00	0.00	0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1. (0) POST DOCTORAL SCHOLARS	0.00		0.00		
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		
	0.00	0.00	0.00	0	
	390.00		0.00		
3. (0) GRADUATE STUDENTS	100000			0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				2,047,767	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				614,330	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				2,662,097	
				354,000	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER					
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PAP	RTICIPAN	T COSTS	3	0	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				139,152	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0	
3. CONSULTANT SERVICES				50,000	
4. COMPUTER SERVICES				575.000	
5. SUBAWARDS 6. OTHER				575,000 0	
TOTAL OTHER DIRECT COSTS				764,152	
H. TOTAL DIRECT COSTS (A THROUGH G)				5,155,988	+
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)				0,100,300	
				1,360,826	
TOTAL INDIRECT COSTS (F&A)					1
TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				6,516,814 0	
TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS				0	
TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)	EVEL IF [NT \$	0	
TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)		DIFFERE		0	
TOTAL INDIRECT COSTS (F&A) J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LE			FOR N	0 \$ 6,516,814	\$

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	FORM	FOR NSF USE ONLY	
AA biology Traded			
a mark an ann an ann an ann a	PROPOSAL NO.	DURATION	DURATION (MONTHS)
		Property	Granted
CT DIRECTOR	AWARD NO.		
-Pls, Faculty and Other Senior Associates	NSF-Funded	Funds	Funds
id title. (A.7. Show number in brackets)	Person-months	Requested By	Granted by NSF
	CAL ACAD SUMR	Proposer	(If Different)
	\$		-

ORG. REP. TYPED NAME	M. COST SHARING: PROPOSED LEVEL \$	IINUS K)	TOT	 INDIRECT COSTS (F&A) (SPECIFY HATE AND BASE) 49.5% of \$423113 = \$209441 (on-campus) 26% of \$230482 = \$59925 (off-campus) 	TOTAL OTHER DIRECT COSTS TOTAL DIRECT COSTS (A TH	9. SUBAWARDS 6. OTHER		2. PUBLICATION/DOCUMENTATION/DISSEMINATION 3. CONSULTANT SERVICES		TOTAL NUMBER OF PARTICIPANTS () COSTS G OTHER DIRECT COSTS	1.1.1.1	2. TRAVEL 3. SUBSISTENCE	id in the second s	TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC INCL. CANADA, MEXICO AND U.S. POSSESSIONS)	ST ITEM AND DOLLAR AMOUNT FOR EA J Farm	OLAL SALAHIES AND WAGES (A + B C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)	 a. () SECHETARIAL - VLERIVAL (IF CHANGED DIRECTLT) b. () OTHER c. () OTHER 	. (7)	OTHER		57 .4	1 00	0 -	List each separately with name and title. (A.7. Show number in brackets)	A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates	PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Kaushik De	The University of Texas at Arlington	ORGANIZATION	54
Date Checked Date of Rate Sheet Initials-ORG	AGREED LEVEL IF DIFFERENT: \$ FOR NSF USE ONLY RATE VERIFICATION	9F9 II.U.7	269366 \$ 1245200		\$ 975834	L F	115000	10000	\$ 30178	TOTAL PARTICIPANT			S	SSESSIONS) \$ 17000		\$ 385706 115712 \$ 501418		 2) 78 \$ 385706		GE)			-	Person-months Requested By Granted by NSF CAL ACAD SUMR Proposer (If Different)	NSF-Funded Funds	-	Т	PROPOSAL NO. DURATION (MONTHS)	

NSF Form 1030 (1000 Supersedes All Previous Editions

TURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification

Year 1

J, L	-	G.5	G.3	G.1	E.2	E.1	D	С	B.2
Total costs/Amount of Request	Indirect costs, onsite 49.5%, offsite 26%, (includes \$25k for subcontract) \$269,366	Subcontract for Tier 2 center at Oklahoma University	Software consultants at CERN	Servers, rack, cables, supplies	COLA for people at CERN (2x12x\$2000), trips to CERN for 5 people	Domestic travel by computing specialist (BNL, Tier 2 mtg)	CPU & Storage for Tier 2 Computing Center	Fringe on B2 salaries	Software & Computing specialist salaries 1.5 FTE Southwest Tier 2 operations, 1.4 FTE PanDA developers, 2 FTE US Computing Operations, 1 FTE Production, 0.6 FTE Tier 3 support
\$1,245,200	\$269,366	\$115,000	\$ 10,000	\$ 30,178	\$ 70,000	\$ 17,000	\$232,238	\$115,712	\$385,706

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Initials-ORG	of Rate Sheet	Date Checked Date	DATE	ORG. REP. TYPED NAME &
CATION	SF USE ONLY	MONIC		PD TYPED NAME AND aushik De
\$	\$ 1273556	DIFFERENT: \$		OF THIS REQUEST (J) OR (J MINUS K)
	1273556	\$	OF CURRENT PROJECT SEE GPG II.D.7.j.	J. TOTAL DIRECT AND INDIRECT COSTS (H + I) K. RESIDUAL FUNDS IF FOR FURTHER SUPPORT OF CURRENT PRO.
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	1012471	-at-sph		
	115000	\$		
	10000	÷		3. CONSULTANT SERVICES 4. COMPUTER SERVICES
	25959	49		 G. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION
		RTICIPANT	TOTAL PARTICIPANT	O I
				2. THAVEL 3. SUBSISTENCE 4. OTHER
	258051 17000 70000		OSSESSIONS)	TOTAL EQUIPMENT E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS) 2. FOREIGN E. PARTICIPANT SUPPORT
	397277 119183 516461	⇔ ∞ ↔	(CEEDING \$5,000.)	TOTA FRINGI EQUIPI er 2 Cc
				 4. () UNDERGRADUATE STUDENTS 5. () SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY) 6. () OTHER
	397277		ETC.) 78	 () POSTDOCTORAL ASSOCIATES (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, 3. () GRADUATE STUDENTS
			AGE)	6. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE) 7. () TOTAL SENIOR PERSONNEL (1-6) B. OTHER PE 40W NUMBERS IN BRACK
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Granted by NSF (If Different)	Requested By Proposer	ACAD SUMR \$	CAL	List each separately with name and title. (A.7. Show number in brackets) 1
Funds	Funds	NSF-Funded	alos	Kaushik De A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty Senior
Granted	Proposed	AWARD NO.		PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR
DURATION (MONTHS)	DURATION	PROPOSAL NO.		ORGANIZATION The University of Texas at Arlington
	USE ONI	FOR NSF		
Second Year	S			

NSF Form 1030 (10/99) And All Previous Comment

RES REQUIRED ONLY FOR REVISED BUDGET (GPG III.C)

Budget Justification

Year 2

J, L	-	G.5	G.3	G.1	E.2	E.1	D	C	В.2))
Solution Sol	Indirect costs, onsite 49.5%, offsite 26%	Subcontract for Tier 2 center at Oklahoma University	Software consultants at CERN	Servers, rack, cables, supplies	COLA for people at CERN (2x12x\$2000), trips to CERN for 5 people	Domestic travel by computing specialist (BNL, Tier 2 mtg)	CPU & Storage for Tier 2 Computing Center	Fringe on B2 salaries	Software & Computing specialist salaries 1.5 FTE Southwest Tier 2 operations, 1.4 FTE PanDA developers, 2 FTE US Computing Operations, 1 FTE Production, 0.6 FTE Tier 3 support	
\$1,273,556	\$261,085	\$115,000	\$ 10,000	\$ 25,959	\$ 70,000	\$ 17,000	\$258,051	\$119,183	\$397,277	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

\$ CATION Initials-ORG	268387 1302628 1302628 \$ 1302628 \$ ST PATE VERIFICATION \$ of Rate Sheet Initials D BUDGET (GPG III.C)	SUFFERENT: \$ INDI COS Ate Checked Date	CUR AGREED LEVEL IF D D D D D D D D D D D D D D D D D D D			J. TO J. TO K. REE PI/PD M. CO PI/PD ORG.
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		TOTAL PARTICIPANT	TOTAL P	Ţ		C .+ .αα ⁻
	261 17000 70000		POSSESSIONS)	CANADA, MEXICO AND U.S.	ISTIC INCL.	i in t
	409196 122759 531954	ю м м Ф	EXCEEDING \$5,000.)	DUDENTS CLERICAL (IF CHARGED DIRECTLY) WAGES (A + B) HARGED AS DIRECT AND FRI E BENEFI + B + AND FRI E BENEFI + B +	() () () () () () () () () () () () () (D. C. 6.5.4
	409196	General Contraction of the second se	I PAGE) ETC.) 78	_ANATION	 OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION () TOTAL SENIOR PERSONNEL (1-6) OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) () POSTDOCTORAL ASSOCIATES () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, () GRADUATE STUDENTS 	د ۲ م ۲ م ۳ ۳
Funds Granted by NSF (If Different)	Funds Requested By Proposer	NSF-Funded Person-months L ACAD SUMR	ets) CAL	ulty and Other Senior Asso .7. Show number in brack	Kaushik De . SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates List each separately with name and title. (A.7. Show number in brackets) 1 2	N 1 A X
Third Year ISE ONLY DURATION (MONTHS) Propose(Granted	F USE ONLY DURATION Proposed	FOR NS PROPOSAL NO. AWARD NO.		s at Arlington PR/PROJECT DIRECTOR	ORGANIZATION The University of Texas at Arlington PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	

Budget Justification

Year 3

J, L	-	G.5	G.3	G.1	E.2	E.1	D	С	В.2
S1 Total costs/Amount of Request	Indirect costs, onsite 49.5%, offsite 26%	Subcontract for Tier 2 center at Oklahoma University	Software consultants at CERN	Servers, rack, cables, supplies	COLA for people at CERN (2x12x\$2000), trips to CERN for 5 people	Domestic travel by computing specialist (BNL, Tier 2 mtg)	CPU & Storage for Tier 2 Computing Center	Fringe on B2 salaries	Software & Computing specialist salaries 1.5 FTE Southwest Tier 2 operations, 1.4 FTE PanDA developers, 2 FTE US Computing Operations, 1 FTE Production, 0.6 FTE Tier 3 support
\$1,302,628	\$268,387	\$115,000	\$ 10,000	\$ 28,828	\$ 70,000	\$ 17,000	\$232,238	\$122,759	\$409,196

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7. () TOTAL SENIOR PERSONNEL (1-6) OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)

POSTDOCTORAL ASSOCIATES

OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)

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92	FORI	FOR NSF USE ONLY	
SUMMARY PROPOSAL BUDGET			
ORGANIZATION	PROPOSAL NO.	DURATION (MONTHS)	(MONTHS)
The University of Texas at Arlington		Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Kaushik De	AWARD NO.		
A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates	NSF-Funded	Funds	Funds
List each separately with name and title. (A.7. Show number in brackets)	Person-months	Requested By	Granted by NSF
	CAL ACAD SUMR	Proposer	(If Different)
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NSF Form 1030 (10/99) ¥

ORG. REP. TYPED NAME

Initials-ORG	Date Checked Date of Bate Sheet Initials-ORG	Data Charlad		D NAME &
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20000	ION NSF USE ONLY	PO	DATE	ME AND SOMETHING
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⇔	\$ 1332434			HIS REQUEST (J) OR (J MINUS K)
		'.j.)	ROJECT SEE GPG II.D.7	NDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECT SEE GPG II.D.7.].)
	\$ 1332434			AND INDIRE +
	\$ 276841			CT COSTS (F&A)
				45372 = \$63797 (ott-campus)

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TOTAL INDIRECT COST

26% of \$245372 = \$

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TOTAL DIRECT COSTS THROU

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TOTAL OTHER DIRECT COSTS

INDIRECT COSTS (F&A) (SPECIFY RATE AND BASE)

49.5% of \$430393 = \$213044 (on-campus)

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OTHER

5. SUBAWARDS

3. CONSULTANT SERVICES

4. COMPUTER SERVICES

2. PUBLICATION/DOCUMENTATION/DISSEMINATION

1. MATERIALS AND SUPPLIES

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COST SHARING: PROF

PI/PD TYPED NAME AND

Kaushik De

COSTS G. OTH

OTHER DIRECT

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OTHER

TOTAL NUMBER OF PARTICIPANTS

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TOTAL PARTICIPANT

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Tier 2 Computing Farm

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GRADUATE STUDENTS UNDERGRADUATE STUDENTS

OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)

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Budget Justification

Year 4

J, L	-	G.5	G.3	G.1	E.2	E.1	D	C		В.2
S:	Indirect costs, onsite 49.5%, offsite 26%	Subcontract for Tier 2 center at Oklahoma University	Software consultants at CERN	Servers, rack, cables, supplies	COLA for people at CERN (2x12x\$2000), trips to CERN for 5 people	Domestic travel by computing specialist (BNL, Tier 2 mtg)	CPU & Storage for Tier 2 Computing Center	Fringe on B2 salaries	 1.5 FTE Southwest Tier 2 operations, 1.4 FTE PanDA developers, 2 FTE US Computing Operations, 1 FTE Production, 0.6 FTE Tier 3 support 	Software & Computing specialist salaries
\$1,332,434	\$276,841	\$115,000	\$ 10,000	\$ 25,851	\$ 72,000	\$ 20,000	\$264,829	\$126,441		\$421,472

	ISED BUDGET (GPG III.C)	ONLY FOR RE	Form 1030 (10/99)
Initials-ORG	Date of Rate Sheet	Date Checked Da	ORG. REP. TYPED NAME & DATE
ICATION .	F OR NSF USE ONLY T COST RATE VERI	INDIREC	
ŧ		AGREED LEVEL IF DIFFERENT: \$	
÷	\$ 1362996		AMOUNT OF THIS REQUEST (.)
	\$ 1302900		J. TOTAL DIRECT AND INDIRECT COSTS (H + I
	285147		49.5% of \$444804 = \$220178 (on-campus) 26% of \$249882 = \$64969 (off-campus) TOTAL INDIRECT COSTS /F&A)
	- 1		INDI
	1077849		6. UTHEH TOTAL OTHER DIRECT COSTS
	\$ 115000		
	\$ 10000		3. CONSULTANT SERVICES 4. COMPUTER SERVICES
	\$ 28236		1. MATERIALS AND SUPPLIES 2. PUBLICATION/DOCUMENTATION/DISSEMINATION
			G. OTHER DIRECT COSTS
		TOTAL PARTICIPANT	RTICIPANTS ()
			3. SUBSISTENCE 4. OTHER
			1. STIPENDS \$
	121		2. FOREIGN 2. FOREIGN
	\$ 268163 20000	6	E. TRAVEL 1. DOM IL AND U.S.
			TOTAL SALARIES, W AND D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.) Tier 2 Computing Farm
	116 \$ 130235		TOTAL SALARIES AND WAGES (A + B CHARGED AS DIRECT
	Q.		
	\$ 434116	78	. (7)
			A COTAC SENIOR PERSONNEL (1-9) B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) 1 () POSTDOCTORAL ASSOCIATES
			N
Granted by NSF (If Different) \$	Proposer	Person-months CAL ACAD SUMR	List each separately with name and title. (A.7. Show number in brackets) 1
Funds	Funds	NSF-Funded	A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates
	- Independent	AWARD NO.	PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR
Granted	Proposed		The University of Texas at Arlington
DURATION (MONTHS)	DURATION	PROPOSAL NO.	ORGANIZATION
~	NSF USE ONLY	FOR NS	
Fifth Year			

Budget Justification

Year 5

J, L	-	G.5	G.3	G.1	E.2	E.1	D	С	B.2
Stotal costs/Amount of Request	Indirect costs, onsite 49.5%, offsite 26%	Subcontract for Tier 2 center at Oklahoma University	Software consultants at CERN	Servers, rack, cables, supplies	COLA for people at CERN (2x12x\$2000), trips to CERN for 5 people	Domestic travel by computing specialist (BNL, Tier 2 mtg)	CPU & Storage for Tier 2 Computing Center	Fringe on B2 salaries	Software & Computing specialist salaries 1.5 FTE Southwest Tier 2 operations, 1.4 FTE PanDA developers, 2 FTE US Computing Operations, 1 FTE Production, 0.6 FTE Tier 3 support
\$1,362,996	\$285,147	\$115,000	\$ 10,000	\$ 28,366	\$ 72,000	\$ 20,000	\$268,163	\$130,235	\$434,116

3 III.C)	ED BUDGET (GPG III.C)	NATURES REQUIRED ONLY FOR REVISED	NSF Form 1030 (1000 Supersedes All Content Editions NAT
Initials-OHG	te of Rate Sheet	Date Checked Date	ORG. REP. TYPED NAME & T
Ī		100million	Kaushik De
	NSF USE ONLY	States and	PD TYPED NAME AND SILL URE* // C //
		AGREED LEVEL IF DIFFERENT: \$	I. COST SHARING: PROPOSED LEVEL \$
\$	\$ 6516815		QUEST (J) OR (J MINUS K)
	\$ 6516815		
		40	49.3% 01 \$21 10 160 = \$1047309 (01-campus) 26% of \$1205068 = \$313318 (off-campus) TOTAL INDIRECT COSTS (F&A)
			INDI
	2		
	575000	5	5. SUBAWARDS
	i I	4	
	50000	÷	2. PUBLICATION/DOCUMENTATION/DISSEMINATION
	\$ 139152	\$	3. OTHER DIRECT COSTS 1. MATERIALS AND SUPPLIES
		TOTAL PARTICIPANT	NUMBER OF PARTICIPANTS ()
			3. SUBSISTENCE 4. OTHER
			1. STIPENDS \$ 2. TRAVEL
		6	Z. . PARTICIPANT SUPPORT
	1284739 93000	(S)	. DOME
	204 614330	\$5,000.)	TOTA FRINGI TOTAL EQUIPI ier 2 Co
			3. () GRADUATE STUDENTS 4. () UNDERGRADUATE STUDENTS 5 SECRETARIAL - CLERICAL IF CHARGED DIRE 6. () OTHER
	3 2047766	390	 B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS 1. () POSTDOCTORAL ASSOCIATES 2. (7) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)
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Funds Granted by NSF (If Different)	Funds Requested By Proposer	NSF-Funded Person-months CAL CAD	A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty and Other Senior Associates List each separately with name and title. (A.7. Show number in brackets)
(instance)	-	AWARD NO.	PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR
Granted	Proposed		The University of Texas at Arlington
DURATION (MONTHS)	DURATION	PROPOSAL NO.	SUMMARY PROPOSAL BUDGET
*	ISF USE ONLY	FOR NSF	
Cumulative 5 Years			

Budget Justification

Cumulative

B.2	Software & Computing specialist salaries	\$2,047,766
C	Fringe on B2 salaries	\$614,330
D	CPU & Storage for Tier 2 Computing Center	\$1,284,739
E.1	Domestic travel by computing specialist (BNL, Tier 2 mtg)	\$ 93,000
E.2	COLA for people at CERN, trips to CERN for 5 people	\$352,000
G.1	Servers, rack, cables, supplies	\$139,152
G.3	Software consultants at CERN	\$ 50,000
G.5	Subcontract for Tier 2 center at Oklahoma University	\$575,000
-	Indirect costs, onsite 49.5%, offsite 26%	\$1,360,827
J, L	Total costs/Amount of Request	\$6,516,815

Current and Pending Support (See GPG Section II.C.2.h for guidance on information to include on this form.)

(See GPG Section II.C.2.h for guidance on information to include on this form.) The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.
Other agencies (including NSF) to which this proposal has been/will be submitted.
Investigator: P. Michael Tuts
Support: ☑ Current □ Pending □ Submission Planned in Near Future □ *Transfer of Support
Project/Proposal Title: Experimental Physics Research program at Columbia University/Nevis Labs
Source of Support: NSF PHY0758118 Total Award Amount: \$ 7,497,814 Total Award Period Covered: 02/01/08 - 01/31/11 Location of Project: Nevis Labs Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 2.00
Support: Current Pending Submission Planned in Near Future *Transfer of Support Project/Proposal Title: LHC Experimantal experience at CERN
Source of Support: NSF PHY0840636 Total Award Amount: \$ 450,000 Total Award Period Covered: 09/15/08 - 09/14/11 Location of Project: CERN Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 1.00 Sumr: 0.00
Support: Current Pending Submission Planned in Near Future Transfer of Support Project/Proposal Title: U.S. ATLAS Operations: Empowering U.S. Universities for Discoveries at the Energy Frontier
Source of Support: NSF PHY0612811 Total Award Amount: \$45,017,650 Total Award Period Covered: 02/01/07 - 01/31/12 Location of Project: Nevis/CERN Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 8.00 Sumr: 0.00
Support:
Source of Support: NSF PHY1067934 Total Award Amount: \$ 9,910,424 Total Award Period Covered: 02/01/11 - 01/31/14 Location of Project: Nevis Labs, Columbia University Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 2.00
Support: Current Pending Submission Planned in Near Future Transfer of Support Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier
Source of Support: NSF - this proposal Total Award Amount: \$ 50,000,000 Total Award Period Covered: 02/01/12 - 01/31/17 Location of Project: Nevis Labs Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 8.00 Summ: 0.00
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

В

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for eac	h investigator and other senior personnel. Failure to provide this
information may delay consideration of this proposal	Other agencies (including NSF) to which this proposal has been/will be submitted.
Investigator: Robert C. Ball	Other agencies (including NSF) to which this proposal has been will be submitted.
Support: 🛛 Current 🗌 Pending 🗌	Submission Planned in Near Future 🗌 *Transfer of Support
Project/Proposal Title: ATLAS Great Lakes Tier-2	
Program notice: DE-FG01-04ER04-03/LAB 04	4-03
Source of Support: NSF	
Total Award Amount: \$ 3,000,000 Total Aw	ard Period Covered: 09/01/06 - 08/31/11
Location of Proiect: University of Michigan	
Person-Months Per Year Committed to the Project. 10.	8 Cal: 10.8 Acad: 0.0 Sumr: 0.0
	Submission Planned in Near Future 🗌 *Transfer of Support
Project/Proposal Title: MRI-R2 Consortium: Developmen	t Dynamic Network System (DYNES)
Source of Support: NSF	
	ard Period Covered: 8/01/09-7/30/12
Location of Project: University of Michigan	
Person-Months Per Year Committed to the Project. 1.2	Cal: 1.2 Acad: 0.0 Sumr: 0.0 Submission Planned in Near Future *Transfer of Support
	— …
Project/Proposal Title: ATLAS Great Lakes Tier-2 Re	newai
Source of Support: NSF	
	ard Period Covered: 9/1/2011-8/31/2016
Location of Project:	
Person-Months Per Year Committed to the Project. 10.	8 Cal:10.8 Acad: 0.0 Sumr: 0.0
Support: Current Pending	Submission Planned in Near Future *Transfer of Support
Project/Proposal Title:	
Source of Support:	
	ard Period Covered:
Location of Project:	
Person-Months Per Year Committed to the Project. 0.0	
Support: Current Pending	Submission Planned in Near Future *Transfer of Support
Source of Support:	
	and Deviad Occurrents
	ard Period Covered:
Location of Project: Person-Months Per Year Committed to the Project.	
	Cal: 0.0 Acad: 0.0 Sumr: 0.0 r agency, please list and furnish information for immediately pre-
ceding funding period.	agency, prease not and runnish mormation for minieuratery pre-
NSF Form 1239 (10/99)	USE ADDITIONAL SHEETS AS NECESSARY



CURRENT AND PENDING SUPPORT DR. JOSEPH F. BOUDREAU

CURRENT GRANT SUPPORT:

Project Title:	Experimental Particle Physics at the University of Pittsburgh B Task L (ATLAS Electronics)
Source of Support:	Department of Energy Grant #DE-FG02-91ER40646
Total Award Amount:	\$1,058,000
P.I.:	Vittorio Paolone
Co-PIs:	Joseph Boudreau, Vladimir Savinov, James Mueller, Wilfred
	Cleland
Total Award Period:	11/01/08 в 10/31/11
Location of Project:	University of Pittsburgh
Person-Months per Year:	Cal: 0.00 Acad: 0.00 Summer: 2.00
Project Title:	Electronics Construction for the ATLAS Experiment at LHC
Source of Support:	Columbia University Subaward 9 under NSF Prime Award PHY-06-12811
Total Award Amount:	\$439,505
P.I.:	Vladimir Savinov
Co-PI:	Joseph Boudreau
Co-PI: Total Award Period:	Joseph Boudreau 03/01/07 B 1/31/11
·	1

Pending

Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier - This proposal Source of Support: National Science Foundation Total Award Amount: \$776,367 Total Award Period Covered: 2/1/12-1/31/17 Role: Co-PI Location of Project: Pitt, CERN

<u>John M. Butler</u>

Current and Pending Support

		earrent and renaing support	r	r	
Sponsor	Role	Project Title	Amount	Award Period	Status
DOE	Co-PI	Research in Particle Physics: Task A - ATLAS	463,000	02/01/2010-01/31/2011	Current
		US ATLAS Research Program: Empowering US			
		Universities for Discoveries at the Energy			
NSF	PI	Frontier	34,780	10/01/2010-09/30/2011	Current
DOE	PI	Development of the Data Collector for ILC R&D	20,000	03/20/2009-06/29/2011	Current
		Construction of a Prototype Section of Digital			
DOE	PI	Hadron Calorimeter	53,597	09/01/2007-08/31/2011	Current
		Construction of a Prototype Section of Digital			
NSF	PI	Hadron Calorimeter	20,000	08/01/2009-07/31/2011	Current
		Construction and Testing of a Digital			
DOE	PI	Calorimeter	76,400	08/15/2009-08/14/2011	Current

Support: X Current Pending	g Submission Planned in Near Future *Transfer of Support
Project Director/PI: Chakraborty, Dhiman.	
Project/Proposal Title: ATLAS Pro	oject
Source of Support: Argonne National Laborato	ry
Total Award Amount: \$ 20,084.00	Total Award Period Covered: 07/12/10-06/15/11
Location of Project: Argonne National Laborate	
Person-Months Per Year Committed to the Project	-
Support: X Current Pending	
Project Director/PI: Chakraborty, Dhiman	le et
Project/Proposal Title: ATLAS Pro	bject
Source of Support: Argonne National Laborato	ry
Total Award Amount: \$ 130,865.00	Total Award Period Covered: 09/01/09-08/31/11
Location of Project: Argonne National Laborato	ry
Person-Months Per Year Committed to the Project	t. Cal: Acad: 0.5 Sumr:
Support: X Current Pending	
Project Director/PI: Chakraborty, Dhiman	
	ent of Particle-Flow Algorithms and Simulation Software for
ILC Detect	-
	01(5)
Source of Support: University of Oregon	
Total Award Amount: \$ 159,499.00	Total Award Period Covered: 09/01/05-08/31/11
Location of Project: Northern Illinois University	•
Person-Months Per Year Committed to the Project	
Support: X Current Pending	3 Submission Planned in Near Future Transfer of Support
Project Director/PI: Chakraborty, Dhiman	— —
	nsortium: Development of the US ATLAS Physics Analysis
	for the Analysis of Data from the ATLAS Experiment.
Source of Support: California State University,	
Total Award Amount: \$ 122,760.00	Total Award Period Covered: 03/01/10-02/29/12
101al Awalu Alloull. \$ 122,700.00	
Leastion of Drojecty Northern Illingia University	
Location of Project: Northern Illinois University	
Person-Months Per Year Committed to the Project	t. Cal: Acad: 0.5 Sumr: 0.15
Person-Months Per Year Committed to the Project Support: X Current Pending	t. Cal: Acad: 0.5 Sumr: 0.15
Person-Months Per Year Committed to the Project Support: X Current Pending Project Director/PI: Chakraborty, Dhiman	t. Cal: Acad: 0.5 Sumr: 0.15 Submission Planned in Near Future *Transfer of Support
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Person-Months Per Year Committed to the Project Support: X Current Pending Project Director/PI: Chakraborty, Dhiman	t. Cal: Acad: 0.5 Sumr: 0.15 Submission Planned in Near Future *Transfer of Support
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Current	and Pending Support	
Source of Support: Columbia University		
Total Award Amount: \$ 387,570.00	Total Award Period Covered:	02/01/12-01/31/17
Location of Project: Northern Illinois University		
Person-Months Per Year Committed to the Project.	Cal: Acad	d: 0.5 Sumr:

Current and Pending Support: Kyle Cranmer

Current Awards:

Title:	PECASE Award
Source:	Department of Energy
Location:	New York University
Amount:	\$250,000
Period:	06/01/2008 5/31/2013
Commitment:	none
Title:	Elementary Particle Physics with ATLAS
Source:	National Science Foundation
Location:	New York University
Amount:	\$1,980,000
Period:	09/01/2009 08/31/2012
Commitment:	1 summer months
Title:	CAREER: Applying New Tools to the Discovery and Measurement of the New
	Standard Model
Source:	National Science Foundation
Location:	New York University
Amount:	\$400,000
Period:	07/01/2010 06/30/2015
Commitment:	1 summer month
Title:	MRI-R2 Consortium: Development of Instrumentation for the Analysis of Data
	from the ATLAS Experiment at the Large Hadron Collider
Source:	National Science Foundation
Location:	New York University
Amount:	\$41,194
Period:	03/01/2010 02/29/2012
Commitment:	none
Title:	BNL: U.S. ATLAS Computing MOU
Source:	The U.S. ATLAS Research Program Office
Location:	CERN in Geneva, Switzerland
Amount:	\$104,040
Period:	10/01/2009 09/30/2011
Commitment:	none

Pending Proposals:

Title:	RECAST extending the impact of existing searches for new physics
Source:	Department of Energy
Location:	New York University
Amount:	\$750,000
Period:	05/01/2011 04/30/2016
Commitment:	1 summer month

Support: Current Project/Proposal Title: ATLAS Experiment Research and Computing Source of Support: DoE (sub-contract through Brookhaven National Laboratory) Total Award Amount: \$2,142,745 Total Award Period Covered: 02/01/04 - 12/31/12 Location of Project: The University of Texas at Arlington
Person-Months Per Year Committed to the Project. Cal: 0.0 Acad: 0.0 Sumr: 0.0
Support: Current Project/Proposal Title: The U.S. ATLAS Research Program: Empowering U.S. Universities for Discoveries at the Energy Frontier Source of Support: NSF (sub-contract through Columbia University) Total Award Amount: \$2,818,130 Total Award Period Covered: 02/01/08 - 01/31/11 Location of Project: The University of Texas at Arlington Person-Months Per Year Committed to the Project. Cal: 0.0 Acad: 0.0 Sumr: 0.0
Support: Current Project/Proposal Title: High Energy Physics Base Funding Source of Support: DoE Total Award Amount: \$567,000 Total Award Period Covered: 02/01/09 - 01/31/10 Location of Project: The University of Texas at Arlington Person-Months Per Year Committed to the Project. Cal: 2.0 Acad: 2.0 Sumr: 2.0
Support: Pending Project/Proposal Title: HTC Software Infrastructure for Experimental Physics Applications Source of Support: NSF Total Award Amount: \$593,966 Total Award Period Covered: 10/01/10 - 09/30/16 Location of Project: The University of Texas at Arlington Person-Months Per Year Committed to the Project. Cal: 0.0 Acad: 0.0 Sumr: 0.0
Support: Pending Project/Proposal Title: Easily Deployable, Intelligent, Computational Tiers for the ATLAS Experiment Source of Support: NSF Total Award Amount: \$513,678 Total Award Period Covered: 03/01/11 - 02/28/14 Location of Project: The University of Texas at Arlington Person-Months Per Year Committed to the Project. Cal: 1.0 Acad: 1.0 Sumr: 1.0
Support: Pending Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier Source of Support: NSF (This Proposal) Total Award Amount: \$6,516,185 Total Award Period Covered: 02/01/12-01/31/17 Location of Project: The University of Texas at Arlington Person-Months Per Year Committed to the Project. Cal: 0.0 Acad: 00 Sumr: 0.0

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period. Page G-1 USE ADDITIONAL SHEETS AS NECESSARY	Source of Support: NSF via sub-award from Columbia University Total Award Amount: \$ 6,220,543 Total Award Period Covered: 02/01/12 - 01/31/17 Location of Project: University of Chicago Person-Months Per Year Committed to the Project. Cal:4.80 Acad: 0.00 Summ: 0.00	Support: □Current ⊠Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: US ATLAS Operations: Empowering US Universities for Discoveries at the Energy Frontier (this proposal)	Source of Support: NSF Total Award Amount: \$ 62,798 Total Award Period Covered: 03/01/10 - 02/29/12 Location of Project: University of Chicago Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00	Support: ⊠Current □Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: MRI-R2 Consortium Development: Development of the U.S. ATLAS Physics Analysis Instrument	Source of Support: DOE via University of Wisconsin Total Award Amount: \$ 747,002 Total Award Period Covered: 10/01/09 - 09/30/10 Location of Project: University of Chicago Person-Months Per Year Committed to the Project. Cal:3.00 Acad: 0.00 Sumr: 0.00	Support: ⊠Current □Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: Sustaining and Extending the Open Science Grid: Science Innovation on a Petascale Nationwide Facility	Source of Support: NSF Total Award Amount: \$ 45,313 Total Award Period Covered: 10/01/09 - 09/30/10 Location of Project: University of Chicago Person-Months Per Year Committed to the Project. Cal:3.00 Acad: 0.00 Sumr: 0.00	Support: ⊠Current □Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: Sustaining and Extending the Open Science Grid: Science Innovation on a Petascale Nationwide Dacility	Source of Support: NSF via Columbia University (PHY-06-12811) Total Award Amount: \$ 889,533 Total Award Period Covered: 10/01/10 - 09/30/11 Location of Project: University of Chicago Person-Months Per Year Committed to the Project. Cal:4.80 Acad: 0.00 Sumr: 0.00	Investigator: Robert Gardner Support: ⊠Current □Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: US ATLAS Operations: Empowering US Universities for Discoveries at the Energy Frontier	The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal. Other agencies (including NSF) to which this proposal has been/will be submitted.
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See GPG Section II.D.8 for guid	ance on information to include on th	lis form.)
The following information should be provided for each investigator and othe		
Investigator: Reiner Hauser	Other agencies (including NSF) to which this p	roposal has been/will be submitte
Support: Current Pending Project/Proposal Title: ATLAS Trigger/DAQ M & O	Submission Planned in Near Future	*Transfer of Support
Source of Support: NSF – (Columbia University) Total Award Amount: \$177,699 Total Aw Location of Project: MSU, CERN	vard Period Covered: 10/1/09 – 1/31/2011	
Person-Months Per Year Committed to the Project.	Cal: 6 Acad:	Sumr: 0
Support: Current Pending Project/Proposal Title:	Submission Planned in Near Future	*Transfer of Support
Research in Elementary Particle Physics		
Source of Support: NSF		
	vard Period Covered: 5/1/2008 – 4/30/2011	
Location of Project: MSU, FNAL, CERN		
Person-Months Per Year Committed to the Project.	Cal: 6 Acad:	Sumr: 0
Support: Current Pending	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Investigations in Elementary Particle Physic	s and Particle Astrophysics	
Source of Support: NSF		
Total Award Amount: \$7,289,971 Total Aw	vard Period Covered: 5/1/2011 - 4/30/2014	
Location of Project: MSU, CERN		
Person-Months Per Year Committed to the Project.	Cal: 6 Acad:	Sumr: 0
Support: Current Pending Project/Proposal Title:	Submission Planned in Near Future	Transfer of Support
Source of Support:		
	vard Period Covered:	
Location of Project:		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 0
Support: Current Pending	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Source of Support:		
	vard Period Covered:	
Location of Project:		
Person-Months Per Year Committed to the Project. *If this project has previously been funded by another agency, please list ar	Cal: Acad:	Sumr:
NSF Form 1239 (7/95)		TIONAL SHEETS AS NECESSA

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	ance on information to include on tr	
The following information should be provided for each investigator and othe	er senior personnel. Failure to provide this information r	nay delay consideration of this propose
	Other agencies (including NSF) to which this p	roposal has been/will be submitte
Investigator: Joey Huston		
Support: 🛛 Current 🗌 Pending 🗌	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Particle Physics at High Energy Colliders		
Source of Support: NSF		
Total Award Amount: \$785,000 Total Av	ward Period Covered: 5/1/08 – 4/30/2011	
Location of Project: MSU, FNAL, CERN		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 2
Support: 🛛 Current 🗌 Pending	Submission Planned in Near Future	Transfer of Support
Project/Proposal Title:		
M & O for ATLAS TileCal		
Source of Support: NSF – Columbia University		
Total Award Amount: \$58,141 Total Av	ward Period Covered: 10/1/09 – 1/31/2011	
Location of Project: MSU, CERN		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 0
Support: 🛛 Current 🗌 Pending	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Biennial African School on Fundamental Physics		
· · · · · · · · · · · · · · · · · · ·		
Source of Support: NSF		
Total Award Amount: \$8,000 Total Av	ward Period Covered:10/1/10 – 9/30/2011	
Location of Project: MSU, South Africa		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 0
Support: 🛛 Current 🗌 Pending 🗌	Submission Planned in Near Future	Transfer of Support
Project/Proposal Title:		
CTEQ Summer School		
Source of Support: NSF		
Total Award Amount: \$20,000 Total Av	ward Period Covered: 10/1/10 – 9/30/2011	
Location of Project: MSU, Germany, Wisconsin		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 0
Support: 🗌 Current 🛛 Pending 🗌	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Investigations in Elementary Particle Physic	s and Particle Astrophysics	
o , , ,		
Source of Support: NSF		
Total Award Amount: \$7,289,971 Total Aw	ward Period Covered: 5/1/11 – 4/30/2014	
Location of Project: MSU, FNAL, CERN		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 2
*If this project has previously been funded by another agency, please list a		g period.
NSF Form 1239 (7/95)	USE ADDI	TIONAL SHEETS AS NECESSAF

Current & Pending Support for Andrew J. Lankford, UC Irvine Updated 1/1/2011

Current:

Project/Proposal Title: A Research Program in Elementary Particle Physics – Task E (DOE DE-FG02-91ER40679) Source of Support: Department of Energy Total Award Amount: \$794,000 Total Award Period Covered: 2/1/10-1/31/11 Role: PI Location of Project: UCI, SLAC, CERN Person-Months Per Year committed to the Project: 2 summer months

Project/Proposal Title: Technical Activities of University of California, Irvine for WBS 3.5 Muon Subsystem and WBS 3.6. Trigger and Data Acquisition System of the U.S. ATLAS Operations Program
Source of Support: Columbia University (NSF subcontract; NSF PHY-06-12811)
Total Award Amount: \$3,651,778
Total Award Period Covered: 03/01/07 – 1/31/11
Location of Project: UCI, CERN

Pending:

Project/Proposal Title: A Research Program in Elementary Particle Physics – Task E (DOE DE-FG02-91ER40679) Source of Support: Department of Energy Total Award Amount: \$588,000 Total Award Period Covered: 2/1/11-1/31/12 Role: PI Location of Project: UCI, SLAC, CERN

Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier Source of Support: National Science Foundation Total Award Amount: \$3,828,820 Total Award Period Covered: 2/1/12-1/31/17 Role: Co-PI Location of Project: UCI, CERN

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Support: X Current Pending	Submission Planned in Near Future *Transfer of Support			
Project Director/PI: Chakraborty, Dhiman				
Project/Proposal Title: ATLAS Projec	t			
Source of Support: Argonne National Laboratory				
Total Award Amount: \$ 130,865.00	Total Award Period Covered: 09/01/09-08/31/11			
Location of Project: Argonne National Laboratory				
Person-Months Per Year Committed to the Project.	Cal: 7.84 Acad: Sumr:			
Support: X Current Pending	Submission Planned in Near Future *Transfer of Support			
Project Director/PI: Chakraborty, Dhiman				
Project/Proposal Title: US ATLAS Op	erations: Empowering US Universities for Discoveries at the			
Energy Frontie	er			
Source of Support: Columbia University				
Total Award Amount: \$ 76,000.00	Total Award Period Covered: 10/01/09-01/31/11			
Location of Project: Northern Illinois University				
Person-Months Per Year Committed to the Project.	Cal: 2.61 Acad: Sumr:			
Support: Current X Pending	Submission Planned in Near Future *Transfer of Support			
Project Director/PI: Chakraborty, Dhiman				
Project/Proposal Title: US ATLAS Op	erations: Empowering US Universities for Discoveries at the			
	er (this proposal)			
Source of Support: Columbia University				
Total Award Amount: \$ 387,570.00 Total Award Period Covered: 02/01/12-01/31/17				
Location of Project: Northern Illinois University				
Person-Months Per Year Committed to the Project.	Cal: 7 Acad: Sumr:			

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ee GPG Section II.D.8 for guidance on information to include on this form.)

(See GPG Section II.D.8 for guidance on information to include on this for	
The following information should be provided for each investigator and other senior personnel. Fa information may delay consideration of this proposal.	
Other agencies (including NSF) to which this proposal Investigator: Shawn P. McKee	has been/will be submitted.
Support: Current Pending Submission Planned in Near Future *	Transfer of Support
Project/Proposal Title: ATLAS Great Lakes Tier-2 Renewal	
Source of Support: NSF	
Total Award Amount: \$ 3,091,360 Total Award Period Covered: 9/1/2011-8/31/2016	
Location of Project: University of Michigan	
	r: 0.0
Support: 🛛 Current 🗌 Pending 🔄 Submission Planned in Near Future 🔲 *	Transfer of Support
Project/Proposal Title: MRI-R2 Consortium: Development Dynamic Network System (DYNES)	
Source of Support: NSF	
Total Award Amount: \$1,740,000 Total Award Period Covered: 8/01/10-7/30/12	
Location of Project: University of Michigan	0.0
	r: 0.0
	Transfer of Support
Project/Proposal Title: ATLAS Great Lakes Tier-2	
Program notice: DE-FG01-04ER04-03/LAB 04-03 Source of Support: NSF	
Total Award Amount: \$ 3,000,000 Total Award Period Covered: 09/01/06 - 08/31/11	
Location of Project: University of Michigan	
	r: 0.0
	Transfer of Support
Project/Proposal Title	
Source of Support:	
Source of Support:	
Total Award Amount: Total Award Period Covered:	
Total Award Amount:Total Award Period Covered:Location of Project:	
Total Award Amount: Total Award Period Covered: Location of Project:	r: 0.0
Total Award Amount: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. 0.0 Cal: 0.0 Acad: 0.0 Summer	r: 0.0 Transfer of Support
Total Award Amount: Total Award Period Covered: Location of Project:	
Total Award Amount: Total Award Period Covered: Location of Project:	
Total Award Amount: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. 0.0 Cal: 0.0 Acad: 0.0 Summary Support: □ Current □ Pending □ Submission Planned in Near Future ***	
Total Award Amount: Total Award Period Covered: Location of Project:	
Total Award Amount: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. 0.0 Cal: 0.0 Acad: 0.0 Summary Support: □ Current □ Pending □ Submission Planned in Near Future ***	
Total Award Amount: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. 0.0 Cal: 0.0 Acad: 0.0 Summitted to the Project. Support: □ Current □ Pending □ Submission Planned in Near Future □ *** Source of Support: □ □ □ □ ***	
Total Award Amount: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. 0.0 Cal: 0.0 Acad: 0.0 Summediate Support: Current Pending Submission Planned in Near Future *** Source of Support: Total Award Period Covered: Total Award Period Covered: *** Location of Project: Total Award Period Covered: ***	
Total Award Amount: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. 0.0 Cal: 0.0 Acad: 0.0 Summitted to the Project. Support: Current Pending Submission Planned in Near Future *** Source of Support: Total Award Period Covered: *** Location of Project: Person-Months Per Year Committed to the Project. Cal: 0.0 Acad: 0.0 Summitted to the Project.	Transfer of Support
Total Award Amount: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. 0.0 Cal: 0.0 Acad: 0.0 Summitted to the Project. Support: Current Pending Submission Planned in Near Future *** Source of Support: Total Award Period Covered: Total Award Period Covered: ***	Transfer of Support



Allen Mincer

Current and Pending Support

Current Awards:

Title:	Elementary Particle Physics with ATLAS			
Source:	National Science Foundation			
Locatio	: New York University			
Amoun	: \$1,980,000			
Period:	09/01/2009 - 08/31/20	12		
Commit	ment: 2.0 summer months			

Title:	NYU Noyce Scholarship Program
Source:	National Science Foundation
Location	: New York University
Amount	: \$749,596
Period:	09/01/2007 - 08/31/2011
Commit	ment: none

Pending

Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier - This proposal Source of Support: National Science Foundation Total Award Amount: \$392,870 Total Award Period Covered: 2/1/12-1/31/17 Role: Co-Pl Location of Project: New York University

Investigator: James Pilcher

Current

Project Title:	Research in Elemer Oreglia	ntary Particle Physics unde	r the direction of Mark
Source of Support:	NSF		
Grant No.:	PHY-0757196		
Total Award Amount:	\$7,730,374	Period of Performance:	5/01/2008 - 4/30/2011
Location of Project: The University o		Chicago, CERN, Fermilab	
PI Person-Months Comm	itted to Project:	2 Summer Months	

Project Title:	US/ATLAS Operat	tions	
Source of Support:	NSF; subaward fro	m Columbia University	
Grant No.:	PHY-0612811		
Total Award Amount:	\$1,066,850	Period of Performance:	3/02/2007 - 1/31/2011
Location of Project:	The University of (Chicago; CERN; Columbia	u University
PI Person-Months Comm	itted to Project:	0.5 Academic Month	

Proposal Title:	MRIR2 Consortium	Development: D)evelopme	ent of the U.	S. ATLAS
	Physics Analysis Ins	strument			
Source of Support:	NSF				
Grant No.:	NSF-0959141				
Total Award Amount:	\$62,798	Period of Perform	nance:	3/1/2010 - 2	2/29/2012
Location of Project:	The University of C	hicago, CERN			
PI Person-Months Commi	itted to Project:	0.0 Academic Me	onth		

Pending

Proposal Title: Research in Elemen		entary Particle Physics at the University of C	
Source of Support:	NSF		
Total Request:	\$11,377,547	Period of Performance:	5/01/2011 - 4/30/2014
Location of Project:	The University of C	Chicago, CERN, Fermilab	
PI Person-Months Comm	itted to Project:	2 Summer Months	
Proposal Title:	Maintenance, Opera	ation, and Upgrade of the '	Tile Calorimeter on the
	ATLAS Experimen	t at CERN (THIS PROPO	SAL)
Source of Support:	NSF subaward via	Columbia University	
Total Request	\$2,238,250	Period of Performance:	2/01/2012 - 1/31/2017
Location of Project:	The University of C	Chicago, CERN	
PI Person-Months Comm	itted to Project:	0.5 Academic Month	

	ance on information to include on th	
The following information should be provided for each investigator and othe		
	Other agencies (including NSF) to which this p	roposal has been/will be submitte
Investigator: Bernard Pope		
Support: 🛛 Current 🗌 Pending 🗌	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
ATLAS Trigger/DAQ M & O		
Source of Support: NSF – (Columbia University)		
Total Award Amount: \$177,699 Total Aw	vard Period Covered: 10/1/09 – 1/31/2011	
Location of Project: MSU, FNAL, CERN		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 0
Support: 🛛 Current 🗌 Pending	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Research in Elementary Particle Physics		
Source of Support: NSF		
	vard Period Covered: 5/1/2008 – 4/30/2011	
Location of Project: MSU, FNAL, CERN		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 2
Support: Current Pending	Submission Planned in Near Future	Transfer of Support
Project/Proposal Title:		
Investigations in Elementary Particle Physic	s and Particle Astrophysics	
Source of Support: NSF		
	vard Period Covered: 5/1/2011 – 4/30/2014	
Location of Project: MSU, FNAL, CERN		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 2
Support: Current Pending	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Aw	vard Period Covered:	
Location of Project:		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 0
Support: Current Pending	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Aw	vard Period Covered:	
Location of Project:		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr:
*If this project has previously been funded by another agency, please list an	nd furnish information for immediately preceding funding	period.
NSF Form 1239 (7/95)	USE ADDI	FIONAL SHEETS AS NECESSAR

Current and Pending Support (See GPG Section II.C.2.h for guidance on information to include on this form.)

(See GPG Section II.C.2.n for guidance on information to include on this form.) The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.
Other agencies (including NSF) to which this proposal has been/will be submitted.
Investigator: Michael Rijssenbeek
Support: Current Pending Submission Planned in Near Future Transfer of Support
Project/Proposal Title: Nucleon Decay and Neutrino Experiments and Experiments at High Energy Hadron Colliders
Source of Support: Department of Energy Total Award Amount: \$ 493,000 Total Award Period Covered: 11/15/09 - 11/14/10 Location of Project: Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, Switz Descreption: Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, Switz
Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 4.50 Sumr: 2.00
Support: □ Current ⊠ Pending □ Submission Planned in Near Future □ *Transfer of Support Project/Proposal Title: Nucleon Decay and Neutrino Experiments and Experiments at High Energy Hadron Colliders
Source of Support: Department of Energy Total Award Amount: \$ 157,000 Total Award Period Covered: 11/15/10 - 03/31/11 Location of Project: Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, Switz Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 2.25 Sumr: 0.00
Support: □Current ⊠Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: (THIS PROPOSAL) Experimental Studies of the Standard Model and Beyond at High Energy Colliders
Source of Support:National Science FoundationTotal Award Amount:\$ 5,253,443 Total Award Period Covered:04/01/11 - 03/31/14Location of Project:Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, SwitzPerson-Months Per Year Committed to the Project.Cal:0.00Acad: 4.50
Support: □Current ☑Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: MRI Consortium: Development of an Ultra-precise Proton Time-of Flight Detector System for ATLAS
Source of Support:NSF via University of Texas at Arlington (Subcontract)Total Award Amount:\$ 187,670 Total Award Period Covered:01/11/11 - 01/10/14Location of Project:Stony Brook, NY, CERN, Geneva, SwitzerlandPerson-Months Per Year Committed to the Project.Cal:0.00Acad: 0.00
Support: Current Pending Submission Planned in Near Future *Transfer of Support Project/Proposal Title: Recovery Act ARRA Supplement to Nucleon Decay and Neutrino Experiments and Experiments at High
Source of Support:DOETotal Award Amount:\$ 79,600 Total Award Period Covered:11/15/09 - 11/14/10Location of Project:Stony Brook, NYPerson-Months Per Year Committed to the Project.Cal:0.00Acad: 0.00Summ: 0.00
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

(See GPG Section II.C.2.h for guidance on information to include on this form.)		
The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.		
Other agencies (including NSF) to which this proposal has been/will be submitted. Investigator: Michael Rijssenbeek		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title: U.S. ATLAS Operations Empowering U.S. Universities for		
Discoveries of the Energy Frontier		
Source of Support: NSF via Nevis, Columbia University		
Total Award Amount: \$ 246,897 Total Award Period Covered: 03/01/07 - 01/31/11		
Location of Project: Stony Brook, NY, CERN, Geneva, Switzerland		
Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:		
Support: Current Pending Submission Planned in Near Future *Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Source of Support: Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:		

Current and Pending Support (See GPG Section II.C.2.h for guidance on information to include on this form.)

(See GPG Section II.C.2.n for guidance on information to include on this form.) The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.
Other agencies (including NSF) to which this proposal has been/will be submitted.
Investigator: Michael Rijssenbeek
Support: Current Pending Submission Planned in Near Future Transfer of Support
Project/Proposal Title: Nucleon Decay and Neutrino Experiments and Experiments at High Energy Hadron Colliders
Source of Support: Department of Energy Total Award Amount: \$ 493,000 Total Award Period Covered: 11/15/09 - 11/14/10 Location of Project: Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, Switz Descreption: Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, Switz
Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 4.50 Sumr: 2.00
Support: □ Current ⊠ Pending □ Submission Planned in Near Future □ *Transfer of Support Project/Proposal Title: Nucleon Decay and Neutrino Experiments and Experiments at High Energy Hadron Colliders
Source of Support:Department of EnergyTotal Award Amount:\$ 157,000 Total Award Period Covered:11/15/10 - 03/31/11Location of Project:Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, SwitzPerson-Months Per Year Committed to the Project.Cal:0.00Acad: 2.25Sumr:0.00
Support: □Current ⊠Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: (THIS PROPOSAL) Experimental Studies of the Standard Model and Beyond at High Energy Colliders
Source of Support:National Science FoundationTotal Award Amount:\$ 5,253,443 Total Award Period Covered:04/01/11 - 03/31/14Location of Project:Stony Brook, NY, Fermilab, Batavia, II., CERN, Geneva, SwitzPerson-Months Per Year Committed to the Project.Cal:0.00Acad: 4.50
Support: □Current ☑Pending □Submission Planned in Near Future □*Transfer of Support Project/Proposal Title: MRI Consortium: Development of an Ultra-precise Proton Time-of Flight Detector System for ATLAS
Source of Support:NSF via University of Texas at Arlington (Subcontract)Total Award Amount:\$ 187,670 Total Award Period Covered:01/11/11 - 01/10/14Location of Project:Stony Brook, NY, CERN, Geneva, SwitzerlandPerson-Months Per Year Committed to the Project.Cal:0.00Acad: 0.00
Support: Current Pending Submission Planned in Near Future *Transfer of Support Project/Proposal Title: Recovery Act ARRA Supplement to Nucleon Decay and Neutrino Experiments and Experiments at High
Source of Support:DOETotal Award Amount:\$ 79,600 Total Award Period Covered:11/15/09 - 11/14/10Location of Project:Stony Brook, NYPerson-Months Per Year Committed to the Project.Cal:0.00Acad: 0.00Summ: 0.00
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

(See GPG Section II.C.2.h for guidance on information to include on this form.)		
The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.		
Other agencies (including NSF) to which this proposal has been/will be submitted. Investigator: Michael Rijssenbeek		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title: U.S. ATLAS Operations Empowering U.S. Universities for		
Discoveries of the Energy Frontier		
Source of Support: NSF via Nevis, Columbia University		
Total Award Amount: \$ 246,897 Total Award Period Covered: 03/01/07 - 01/31/11		
Location of Project: Stony Brook, NY, CERN, Geneva, Switzerland		
Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:		
Support: Current Pending Submission Planned in Near Future *Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:		
Support: Current Pending Submission Planned in Near Future Transfer of Support		
Project/Proposal Title:		
Source of Support:		
Source of Support: Total Award Amount: \$ Total Award Period Covered:		
Location of Project:		
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:		

Senior Scientist: Abraham Seiden

CURRENT

Title: Research in High Energy Physics
Co PI: W. Atwood, T. Banks, M. Dine, H. Haber, R. Johnson, A. Litke, J. Nielsen, S. Profumo, H. Sadrozinski, T. Schalk, B. Schumm
Funding Agency: Department of Energy
Award Amount: \$6,233,000
Award Start and End Dates: 11/1/09 – 10/31/12
Person-Months Per Year: 2 Summer, 2 Academic

Title: UCSC Work on ATLAS Detector Funding Agency: Columbia University / NSF Award Amount: \$299,732 Award Start and End Dates: 01/26/10 – 1/31/11 Person-Months: 2 Academic

Title: MRI: Developments for a Novel Pixel Tracking Layer for the ATLAS Detector Funding Agency: National Science Foundation Award Amount: 3,550,000 (4 years cumulative) Award Start and End Dates: 10/01/10 - 9/30/14Person-Months Per Year: 3 Academic

Title: Research in High Energy Physics (supplement)
Co PI: W. Atwood, T. Banks, M. Dine, H. Haber, R. Johnson, A. Litke, J. Nielsen, S. Profumo, S. Ritz, H. Sadrozinski, T. Schalk, B. Schumm
Funding Agency: Department of Energy
Award Amount: \$107,920
Award Start and End Dates: 11/1/09 – 10/31/12
Person-Months: 0

Title: Recovery Act: Infrastructure Proposal for the HEP Group at UCSC Funding Agency: Department of Energy Award Amount: \$296,025 Award Start and End Dates: 08/01/10-12/31/11 Person-Months: 0

PENDING (this proposal)
Title: U.S. ATLAS Operations Program: Empowering University Physicists to make
Discoveries at the Energy Frontier
Project Location: BNL, CERN, UC Santa Cruz
Funding Agency: National Science Foundation
Total Proposed Award Amount: \$50 Million
Award Start and End Dates: 10/01/11 – 09/31/16
Person-Months Per Year: 2 Academic

Current and Pending Support for James T. Shank (See GPG Section 11.0.8 for guidance on information to include on this form.)

The following information should be provided for each myestlgator and other senior personnel Failure to provide this information may delay consideration of this proposal.

Investigator: James T. Shank

Support X Current Project/Proposal Title: U.S. ATLAS Research Program: Empowering U.S. Universities for Discoveries at the Energy Frontier. Source of Support NSF via Columbis University {PI, Mike Tuts} Total Award Amount \$2,400,000.00 Total Award Period Covered· 2/1/07- 1/31/12 Location of Project: Boston University

Support:X CurrentProject/Proposal Title:Research In Particle Physics (PO:J. Butler) Task A2: Colliding Beams, Year1-4 (RS. Whitaker)Source of Support.DOE grant number: DE-FG02-91ER40676Total Award Amount \$436, 500Total Award Period Covered 2/1/10-1/31/11Location of Project:Boston University

Pending

Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier – This Proposal Source of Support: National Science Foundation Total Award Amount: \$3,091,370 Total Award Period Covered: 2/1/12-1/31/17 Role: Co-Pl Location of Project: Boston University Current and Pending Support for Ryszard Stroynowski

- (i) PI for the DOE base program at SMU (4 tasks), \$886,000
- (ii) Columbia University subcontract, ebubble R&D, \$59,340
- (iii) US-ATLAS LAr M&O, NSF-Columbia University, \$222,600
- (iv) BNL cryogenics designs for micro-BOONE and LBNE, \$273,420

(v)Pending: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier – NSF (this proposal 2/1/12-1/31/17) \$2,953,800

Current and Pending Support for Anyes Taffard:

Current: Project/Proposal Title: A Research Program in Neutrino Physics, Cosmic Rays and Elementary Particles – Task E Research in Collider Physics (DOE DE-FG02-91ER40679) Source of Support: Department of Energy Total Award Amount: \$1,764,000 Total Award Period Covered: 2/1/10-1/31/13 Role: Co-PI Person-Months Per Year committed to the Project: 2 summer month

Pending: Project/Proposal Title: A Simplified Model Approach To Explore The Energy Frontier (DE-FOA-0000395) Source of Support: Department of Energy Total Award Amount: \$750,000 Total Award Period Covered: 7/1/11-6/30/16 Person-Months Per Year committed to the Project: 1 summer month

Current and Pending Support for DANIEL WHITESON

Current and Pending Support

DOE HEP Original Junior Investigator Award 2007 "New physics with electrons and muons at ATLAS", \$82k/year Role: PI

Department of Energy "A Research Program in Neutrino, Cosmic Rays and Elementary Particles – Task E" 2010-2013, \$582k/year Role: Co-PI (shared with Lankford, Taffard)

Alfred P Sloan Foundation Fellowship (2010-2011), \$25k/year Role: PI

Pending

Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier Source of Support: National Science Foundation Total Award Amount: \$3,828,820 Total Award Period Covered: 2/1/12-1/31/17 Role: Co-PI Location of Project: UCI, CERN

Stephane Willocq

Current and Pending Support

Current

- US DOE grant DE-FG02-92ER40715 Co-PI with Ben Brau and Carlo Dallapiccola

1 Jan 2011 - 31 Dec 2011 \$469,000

1 Jan 2010 - 31 Dec 2010 \$455,000

- Teaching buyout for US ATLAS Deputy Manager PS&C duties

US DOE, 1 Jan 2011 - 31 Dec 2011 \$27,000

US ATLAS Operations Program, 1 Jan 2011 - 31 Dec 2011 \$27,000

US DOE, 1 Jan 2010 - 31 Dec 2010 \$27,000

US ATLAS Operations Program, 1 Jan 2010 - 31 Dec 2010 \$27,000

- Columbia University for US ATLAS Operations Program NSF subcontract PI

1 Oct 2010 - 30 Sep 2011 \$153,837

Pending

Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier - This proposal Source of Support: National Science Foundation Total Award Amount: \$927,103 Total Award Period Covered: 2/1/12-1/31/17 Role: Co-PI Location of Project: Amherst, CERN

JINGBO YE Current and Pending Support

(i) The DOE base program at SMU of which Ye is one of the co-PIs.

(ii) ADR/DOE, Award No: DE-FG02-08ER41573, from August 15, 2008 to August 14, 2011, in the amount of \$334,210

(iii) US-ATLAS Upgrade R&D, subcontracted from Columbia University, from March 1, 2007 to January 31, 2011, in the amount of \$840,910

(iv) Pending: ADR/DOE, in answering the funding opportunity announcement number: DE-FOA-0000407. A collaborative proposal with Duke University, Vanderbilt University and Yale University for a total amount of \$537,150 for two years.

(See GPG Section II.D.8 for guidance on information to include on this form.)			
The following information should be provided for each investigator and other senior personnel. Failure to provide t information may delay consideration of this proposal.	his		
Other agencies (including NSF) to which this proposal has been/will be sub	mitted.		
Investigator: Saul Youssef			
Support: x Current Pending Submission Planned in Near Future *Transfer of Supp	ort		
Project/Proposal Title: U.S. Atlas Research Program: Empowering U.S. Universities for Discoveries at the Energy Frontier			
Source of Support: National Science Foundation			
Total Award Amount: \$2,400,000 Total Award Period Covered: March 1, 2007 – January 31, 2011			
Location of Project: Boston University			
Person-Months Per Year Committed to the Project. 12 Cal: Acad: Sumr:			
Support: Current x Pending Submission Planned in Near Future Transfer of Supp	ort		
Project/Proposal Title: "NSF – This proposal"			
Source of Support: National Science Foundation			
Total Award Amount: \$3,091,370 Total Award Period Covered: 2011-2016			
Location of Project: Boston University			
Person-Months Per Year Committed to the Project. 12 Cal: Acad: Sumr:	1		
Support: Current Pending Submission Planned in Near Future *Transfer of Support	ort		
Project/Proposal Title:			
Source of Support:			
Total Award Amount: \$ Total Award Period Covered:			
Location of Project:			
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:			
Support: Current Pending Submission Planned in Near Future *Transfer of Supp	ort		
Project/Proposal Title:	JIL		
Source of Support:			
Total Award Amount: \$ Total Award Period Covered:			
Location of Project:			
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:			
Support: Current Pending Submission Planned in Near Future *Transfer of Supp	ort		
Project/Proposal Title:			
Source of Support:			
Total Award Amount: \$ Total Award Period Covered:			
Location of Project:			
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:			
*If this project has previously been funded by another agency, please list and furnish information for immediately p	re-		
ceding funding period.	0.451		
NSF Form 1239 (10/99) USE ADDITIONAL SHEETS AS NECES	SARY		

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	Other agencies to which this proposal has be	en/will be submitted.
Investigator: Bing Zhou	None	
Support: Current Pending	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title: (current proposal) U.S. ATLAS O	perations: Empowering University Ph	vsics to make Discoveries
at the Energy Frontier		
Source of Support: Direct-Columbia University : Prime-Na	tional Science Foundation	
Total Award Amount: \$1,741,580 Total Aw	vard Period Covered: 10/1/11-9/30/16	
Location of Project: Geneva, Switzerland (CERN)		
Person-Months Per Year Committed to the Project. 0	Cal: Acad:	Sumr:
Support: 🛛 Current 🗌 Pending 🗌	Submission Planned in Near Future	*Transfer of Support
Project/Proposal Title: Maintenance & Operation of WBS	3.5.a Muon System	
Source of Support: Direct-Columbia University : Prime-N		
	vard Period Covered: 10/1/06-9/30/11	
Location of Project: Geneva, Switzerland (CERN)		Summ
Person-Months Per Year Committed to the Project. 0 Support: \u00e4 Current Pending	Cal: Acad: Submission Planned in Near Future	Sumr:
Project/Proposal Title: Study the Properties and Inter-		
Tojeco toposa nile. Study the Properties and inter-	actions of Elementary Particles- DOL	
Source of Support: Department of Energy		
Total Award Amount: \$4,361,983 Total Aw	vard Period Covered: 11/1/09-10/31/11	
Location of Project: Geneva, Switzerland (CERN)		
Person-Months Per Year Committed to the Project.	Cal: Acad:	Sumr: 2 mths
Support: Current Pending	Submission Planned in Near Future	*Transfer of Support
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	vard Period Covered:	
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Location of Project:		
Person-Months Per Year Committed to the Project.	Cal: 0 Acad:	Sumr:
*If this project has previously been funded by anothe ceding funding period.	r agency, please list and furnish inforr	nation for immediately pre-
ocumy running period.		

USE ADDITIONAL SHEETS AS NECESSARY

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Other agencies to which this proposal has been/will be submitted. Investigator: Other agencies to which this proposal has been/will be submitted. Support: Current Pending Submission Planned in Near Future *Transfer of Support Project/Proposal Title: Source of Support: Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: Support: Current Pending Submission Planned in Near Future *Transfer of Support Project/Proposal Title: Source of Support: Support: Cal: Acad: Sumr: Support: Support: Submission Planned in Near Future *Transfer of Support Project/Proposal Title: Source of Support: Support: *Transfer of Support			
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Source of Support: Total Award Amount: \$ Total Award Period Covered:			
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Support: Current Pending Submission Planned in Near Future *Transfer of Support			
Project/Proposal Title:			
Source of Support:			
Total Award Amount: \$ Total Award Period Covered:			
Location of Project:			
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:			
*If this project has previously been funded by another agency, please list and furnish information for immediately pre-			
ceding funding period. USE ADDITIONAL SHEETS AS NECESSARY			

<u>Junjie Zhu</u>

Current and Pending Support

<u>Current</u>

35k startup support from University of Michigan.

Pending

Submitted a proposal titled "CAREER: Discovery of New Physics with Muons at the ATLAS experiment" to the NSF faculty early career development (CAREER) program on July 2010. At this time it is still in the pending state.

Submitted a proposal titled "Exploring New Physics Beyond the Standard Model with Muons at the ATLAS experiment" to the DOE early career development program on September 2010. At this time it is still in the pending state.

Submitted a joint proposal titled "LHC Summer Research Experience" with my UM colleagues (Professors Homer Neal, Jean Krisch and Aaron Leanhardt) on September 2010. This CERN-UM REU program brings about fifteen undergraduate students selected from all US universities to CERN for eight weeks in the summer to work with physicists. At this time this proposal is still in the pending state.

Project/Proposal Title: U.S. ATLAS Operations Program: Empowering University Physicists to make Discoveries at the Energy Frontier Source of Support: National Science Foundation Total Award Amount: \$1,741,580 Total Award Period Covered: 2/1/12-1/31/17 Role: Co-PI Location of Project: Michigan, CERN

FACILITIES, EQUIPMENT & OTHER RESOURCES

FACILITIES: Identify the facilities to be used at each performance site listed and, as appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Use "Other" to describe the facilities at any other performance sites listed and at sites for field studies. USE additional pages as necessary.

Laboratory:	4580 sq. ft. high bay area with overhead crane and semi trailer access
-	6293 sq. ft. machine shop
	4565 sq. ft. electronics shop

Clinical:

Animal:

Computer: 2025 sq. ft. computer facility with 4 offices Associated computer equipment

Office: 17 research staff offices at 4533 sq. ft. Local HEP journal and preprint library 8 research group rooms at 4850 sq. ft.

Other: purchasing and stock 3170 sq. ft.

MAJOR EQUIPMENT: List the most important items available for this project and, as appropriate identifying the location and pertinent capabilities of each.

Machine shop/high bay area: Large travel numerically controlled milling machines Specialized aluminum wleding equipment High Vacuum leak detector equipment

OTHER RESOURCES: Provide any information describing the other resources available for the project. Identify support services such as consultant, secretarial, machine shop, and electronics shop, and the extent to which they will be available for the project. Include an explanation of any consortium/contractual arrangements with other organizations.

Microcircuits laboratory (funded mainly by the Keck Foundation) atb 5070 sq. ft. IC design, layout and simulation hardware/software HP IC measuring and testing facility High precison analog test equipment probe station and VME DAQ system

POSTDOC MENTORING PLAN (details)

Although as a matter of policy we do not support any postdocs in this proposal (there are two operations program supported postdocs working in largely technical roles, whose institutional mentoring plans are discussed below), there are many postdocs who are working in the ATLAS experiment and each NSF supported institution has a mentoring plan in place which has been approved by the NSF. We note that postdocs in this extremely international experiment have a very unique opportunity. There is intense involvement of U.S. faculty members with postdocs in all areas of the experiment .In addition our Analysis Support manager keeps track of the physics activities of all groups and is able help in promoting postdocs to positions of responsibility within the ATLAS collaboration at large.

NYU: Post-doc Attila Krasznahorkay has faculty mentoring in two major forms. The first is from weekly group meetings using EVO to connect those at CERN with those at NYU. These include Professors Cranmer, Mincer, and Nemethy as well as the other post-docs and graduate students in the group. The second, and primarily form of mentoring, is one-on-one discussions with Kyle Cranmer. The content of these discussions have a broad range. Some discussions are on technical implementation or design of analysis tools -- they occur approximately five times per year, particularly when we have an idea for a new tool or when a major decision within ATLAS is required. Other meetings are devoted to advice in collaboration matters, such as taking on new roles of responsibility. For instance, Attila was simultaneously asked to coordinate the D3PD Making tools and be the trigger liaison for the top-physics group, and the discussion centered on whether it was wise to accept one or both positions. Attila was also nominated and considered for the ATLAS co-coordinator of the physics analysis tools group; showing that he is well respected within the collaboration and has promising prospects for future employment. In addition, Kyle and Attila have frequent discussions on active research topics in the top and exotic groups; planning future studies and reviewing the status and approach of current studies. Finally, Attila's work within the physics analysis tools group is also coordinated with the conveners of that group as well as the relevant people in US-ATLAS analysis support. In summary, Attila receives both broad and detailed mentoring from a number of established physicists.

<u>Michigan State University</u>: We have always had strong post-docs, who go on to successful careers. This proposal includes a request for partial support for post-docs to work in our projects and we will endeavor to provide an interesting opportunity for them to gain valuable experience on all aspects of our experiments including: hardware design and construction, software development, analysis development and paper writing. In addition our post-docs' development will be enhanced through a program of personalized mentoring activities. The goal of the mentoring program will be to provide the skills, knowledge and experience to prepare the postdoctoral researcher to excel in his/her career path. Specific elements of the mentoring plan will include:

- Working with the postdoctoral researcher to establish and implement a personalized set of goals.
- We have always encouraged our post-docs to develop their own paths in physics analysis and in service roles within our experiments. For example, the user computing facility, ClueD0 was developed by a team of MSU post-docs as a response to lagging Linux computing support in the early DØ. They were slightly outside of the mainstream and we supported and encouraged them fully and were pleased that their collaborative efforts resulted in the primary user cluster in the experiment to this day. We expect similar independent work for the ATLAS Collaboration.
- We will try to give post-docs opportunities to teach classes if they are stationed at MSU, but in any case, we encourage their active involvement with our graduate and undergraduate students.
- We have always encouraged travel to at least one conference and international collaboration meetings each year and likewise encourage that they give talks at the conference and make presentations at the collaboration meetings.

Participation in the collaboration's weekly research group meetings, in which members will be expected to present their research regularly, and feedback and coaching will be given to help all members to develop their communication and presentation skills.

Success of this mentoring plan will be assessed by tracking the progress of the postdoctoral fellow through her/his sets of goals, interviews of the postdoctoral fellow to assess satisfaction with the mentoring program, and tracking of the postdoctoral fellow's progress toward his/her career goals after finishing this phase of their career.

Executive Committee **Institutional Board** Program Manager Chair Chair M. Tuts A. Goshaw A. Goshaw Deputy: H. Gordon Program Office **BNL/Columbia** H. Gordon 2.0 Physics Support & Computing **3.0** Maintenance and Operations 4.0 Upgrade R&D T. Wenaus F. Taylor A. Seiden Deputy: S. Willocq 3.2 TRT 3.1 Silicon Physics Advisor 4.1 Silicon A. Grillo H. Ogren M. Garcia-Sciveres I. Hinchliffe 3.3 Liquid Argon 3.4 TileCal 2.2 Software J. Parsons L. Price 4.3 Liquid Argon P. Loch F. Lanni 3.6 Trigger/DAQ 3.5 Muon 2.3 Facilities and Distributed J. Bensinger A. Lankford Computing 4.4 TileCal Deputy: R. Hauser M. Ernst L. Price 3.7 Common Projects M. Tuts 2.4 Analysis Support 3.10 Technical J. Cochran 4.5 Muon 3.8 Education/Outreach Coordination V. Polychronakos M. Barnett V. Polychronakos Members of Management 4.6 Trigger/DAQ A. Lankford Board

U.S. ATLAS Operations Program Organization as of September 27, 2010

U.S. ATLAS Institutional Board

	September 2010	
Chair	A. Goshaw	goshaw@phy.duke.edu
Operations Program Manager	M. Tuts	tuts@nevis.columbia.edu
Deputy Operations Program Manager	H. Gordon	gordon@bnl.gov
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Argonne National Laboratory	J. Proudfoot	proudfoot@anl.gov
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University of New Mexico	S. Seidel	seidel@phys.unm.edu
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Northern Illinois University	D. Chakraborty	<u>dhiman@fnal.gov</u>
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SUNY Stony Brook	M. Rijssenbeek	rijssenbeek@sbhep.physics.sunysb.edu
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