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'Grayfield' Project Has Silver Lining 2

Photo by Reidar Hahn

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'Grayfield' Project Has Silver Lining

*New methods,
new funding
source serve
economy and
environment
in Technology
Campus rehab*

ON THE WEB:

**Office of Science Excess
Facility Disposition**

www.science.doe.gov/SC-80/sc-82/efd

**Office of Science Space
Plan Management**

www.science.doe.gov/SC-80/sc-82/spplan

Fermilab Particle Physics Division
<http://ppd.fnal.gov/>

**Environment, Safety and
Health Section**

[www.esh.fnal.gov/pls/default/
esh_home_page](http://www.esh.fnal.gov/pls/default/esh_home_page)

by Mike Perricone

When it comes to buildings, whatever goes up must usually come down at some point. The question, at a national laboratory with constant budgeting concerns, is just how to tear down a building at the end of its useful life—and, even more important, how to pay for tearing down that building.

But a current Fermilab project—the ongoing Technology Campus rehab program in the Fixed Target area—serves as a case study in how cooperation, creative funding from the U.S. Department of Energy, long-term planning and relatively new construction techniques allowed the lab, the environment and a construction contractor all to come out ahead.

The story has several beginnings.

Fermilab's first experimental activities, in the 1970s, used a \$25-million bubble chamber for neutrino research. The bubble chamber was filled with liquid neon, processed in the Neon Compressor Building. Like the other original experimental buildings in that area, the Neon Compressor Building was a corrugated steel box with a roof. It was significant scientifically and politically—in that Cold War era, scientists from the Soviet Union were among the collaborators—but not aesthetically.

Now, more than 30 years later, it has been removed to make room for new space for scientists and engineers in the Particle Physics Division, and for future Fermilab users from across the country and around the world. The building has essentially been deleted: nothing remains, not even the concrete foundation. A similar building nearby, the Laser Building, is next on the list for eradication.

"I was a graduate student at Fermilab in 1972-73. I remember taking shifts in the bubble chamber buildings," recalled John Cooper, now head of Fermilab's Particle Physics Division. "And now here I am, watching over the cleanup."

The thinking that led to the cleanup began in 1996. Then-director John Peoples realized that with the end of the original fixed-target program at Fermilab, those original experimental areas could and should be put to new uses. Roger Dixon, head of what was then the Research Division, oversaw the start of construction of the silicon manufacturing buildings and clean rooms.

Since then, the lab's Facilities Engineering Services Section has worked with PPD to develop a long-range for what was termed the Technology Campus: PPD envisioned its needs for the future, and FESS consulted on how to address those needs piece by piece, as funding became available. Ray Stefanski, then associate director, worked with PPD, FESS and architects Gregory Splinter and Associates of Chicago to develop the initial concept of a "master plan." The connections between Labs C and D, and between Labs A and B, were completed in accordance with the master plan.



Photo by Reidar Hahn

Eric Mieland of Fermilab's Environment, Safety and Health section examines material that has been removed from the "deconstruction" of the old Neon Compressor Building in the fixed-target area. New construction methods mean that nearly 85 percent of the material from old buildings in this area will be recycled, reducing costs and enabling a more complete cleanup. Mieland calls it a "paradigm shift" in the way old buildings are removed at the end of their useful life.

In 2001, the plan was revised to reflect changing priorities for the area. The Chicago firm of Holabird and Root was engaged to draw up a visionary architectural rendering for the campus, including grassy areas, sculptures and distinctively shaped buildings. The master plan update was completed in November 2002.

"The original model was nice, but expensive," said David Nevin, head of FESS. "We've deviated somewhat from the original model, but we haven't deviated from the concept. When PPD wants to change something, it's no longer just an individual piece but part of a larger plan."

John Cooper, Hans Jostlein, deputy head of PPD, and Ed Crumpley and Steve Dixon, manager and deputy manager respectively of the FESS engineering department, are in constant consultation on the project. But there wouldn't be much to consult about if there weren't any funding. The story's next beginning point shifts to the DOE Office of Science, and to Fermilab Associate Director for Operations Support Jed Brown.

Beginning in FY 2002, Congress set aside \$10 million for a new Facilities and Infrastructure program to encourage improvements at the DOE Office of Science (SC) laboratories. SC established a new subprogram, Excess Facilities Disposition (EFD), under the Science Laboratories Infrastructure (SLI) program, and dedicated all the funding to removing excess facilities. The news apparently didn't travel equally fast in all directions. At a meeting in Washington, D.C., Fermilab director Michael Witherell heard John Yates of SC's Laboratory Infrastructure Division describe this separate funding source for demolition, and had Brown make some follow-up calls.

"We never have the money to tear facilities down," Brown said, spelling out the lab's constant funding challenge. "We found a source of money that can't be used for anything else."

Brown called the program coordinator, David Michlewicz, at the Lab Infrastructure Division in Germantown, Maryland, and made the connection for Fermilab. Michlewicz visited the site, viewed presentations by FESS, and the funding began coming in.

'Grayfield'

Photos by Reidar Hahn



Workers of contractor Pandecon Construction remove just about everything that can be removed from the corrugated steel building for recycling before tearing it down. Even the concrete of the foundations will be excavated, broken up and recycled. Ron Pansing of Pandecon says it takes about two days to remove all the components from interior, then about two hours to knock down the building. Excavating the concrete foundation takes about four hours.

"I had issued a call in FY02 for the labs to identify their needs," Michlewicz said. "Fermilab came in a little late, and there wasn't much money left. But we were able to allocate about \$55,000."

That worked out nicely for the Neon Compressor Building. From the \$7.9 million in the program for FY03, Fermilab was able to gain about another \$330,000 to fund other projects that will be involved in the Technical Campus rehab. More projects have qualified for future funding under the EFD program, although that money hasn't been earmarked yet. But the benefits are immediate and substantial.

"We get to tear down the buildings, and the money doesn't come out of the physics program," Nevin said.

There is another future benefit involving "space banking." By adding up the square footage from these excess buildings, the lab is building up credit for future construction.

"For any projects starting in FY03," Michlewicz said, "before DOE asks Congress for money for construction, we have to identify an equal amount of excess space to be eliminated. It's a zero growth policy that turned excess space into a commodity. If you want to build, you must first identify what you want to tear down."

That means future demolition carried out under the EFD program, for the Technology Campus or other uses, expands the lab's ability to put up buildings in the future. For future buildings and projects, the lab is trying to implement the concept of "sustainable design," integrating the construction and use of a building with its environment (in other words, constructing "greener" buildings). And beyond banking square footage for EFD credit when buildings are taken down, the lab saves on maintenance, operations and infrastructure it no longer needs to supply for buildings with limited if any use.

The savings extend to the "deconstruction site" out in the fixed-target area, where Fermilab's Stan Boyson is the field manager and construction coordinator. The Technology Campus is described as a "grayfield site," where rehabilitation will involve the use of some existing buildings, as opposed to a "greenfield" site, where there are no existing structures. The contractor, Pandecon Construction of Aurora, is recycling about 85 percent of the material from the demise of the Neon Compressor Building, and others to follow. The building is stripped of virtually everything inside before it is taken down. Concrete foundations are smashed and dug up with backhoes. The recycling methods reduce his costs, which in turn reduce the laboratory's costs. For Pandecon's

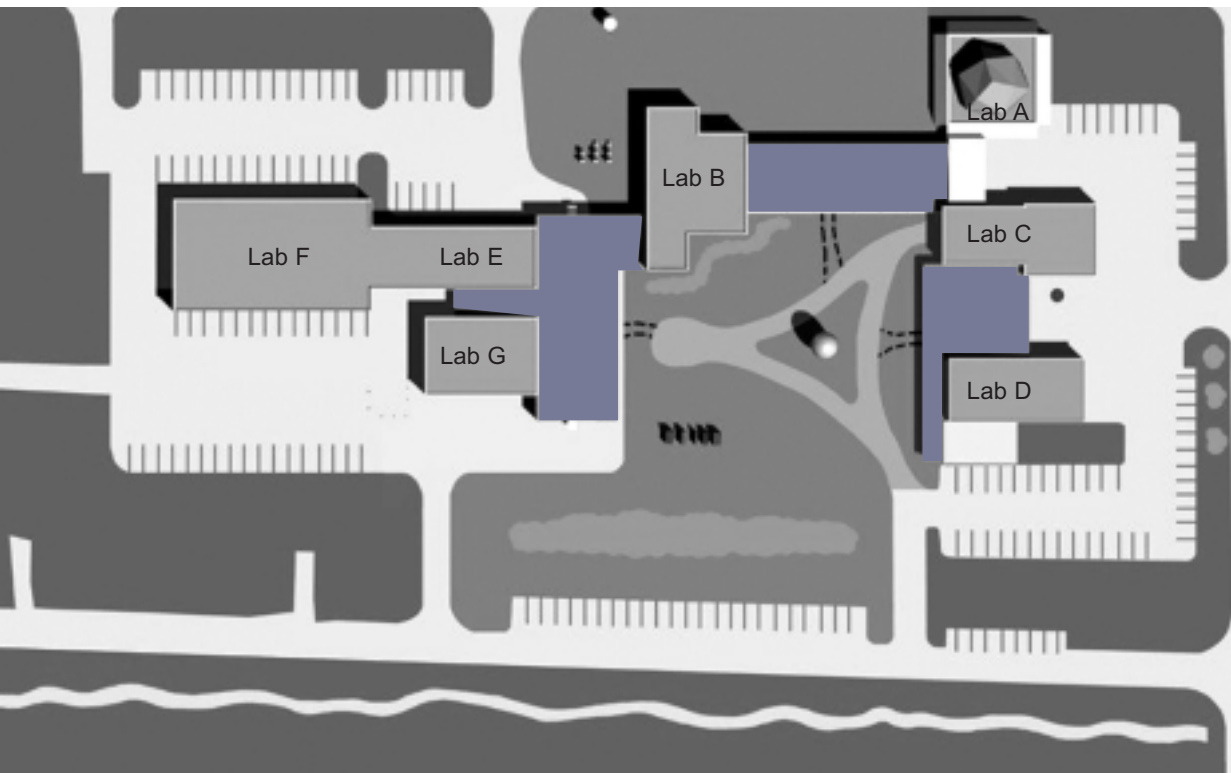


Image courtesy FESS

When this phase of the Technology Campus is completed (left), the new structure will link Labs B, E and G. The BEG connector will feature pillars and a glass sidewall looking onto the courtyard. Between the pillars, each panel will feature a different Feynman diagram, graphic representations of the interactions of elementary particles invented by the late theoretical physicist and Nobel laureate Richard Feynman.

Ron Pansing, recycling is not an idealistic pursuit, but an everyday reality dictated by the economics and logistics of the construction industry.

“When I began in general contracting 25 years ago, we might have recycled 20 percent of this material. Most of it was basically buried,” said Pansing, who was also a contractor on construction of Fermilab’s KTeV experiment in this area of the site.

“The economy is driving the recycling movement, and most projects have been done this way for the last three or four years,” Pansing continued. “One reason is that dumps now won’t accept mixed materials. You can’t just pile stuff in a dumpster and have it hauled away. But concrete suppliers will break this [concrete] up and take it away for free, as long as there aren’t a lot of rebars [steel reinforcing bars] sticking out of it. So we don’t have to pay to have it recycled. Since the dumps are now so selective, the dumping fee for this concrete would probably be three times what it cost to get it out of the ground. And the ‘deconstruction’ process doesn’t really take more time, and it saves costs in demolition. We don’t have to pay dumping fees, recyclers will provide dumpsters for free as long as you sort the material and load it. Then they’ll pay you for the material. And the concrete companies will sell you back the crushed concrete as gravel. So it’s really a good deal.”

It’s a good deal for the environment as well, said Eric Mieland of the lab’s Environment, Safety and Health Section.

“This means we’re being good stewards of the land,” Mieland said. “We’re keeping stuff out of landfills, and trying to re-use as much material as possible. We could just abandon everything in place. But that’s never a good idea because 30 years from now, people won’t know what’s been here and what it was used for. It makes more sense to take care of buildings right at the end of their useful life. I’m very happy to see this kind of paradigm shift.”

The story has more beginnings yet to come. When Labs B, E, and G are connected with a new structure, people will move from Wilson Hall into that space. The resulting space in Wilson Hall will go to the U.S. collaboration on the Compact Muon Solenoid detector at CERN, the European Particle Physics Laboratory in Switzerland. Fermilab is the host lab for the US/CMS collaboration.

“We’re hoping researchers will come to Fermilab instead of going to CERN because of the cost of travel, and because of the opportunity to combine their CMS research with work at CDF and DZero,” Cooper said. “The long-term plan at B-E-G calls for courtyards and green grass. I’d sure like to see the first grass growing out there.” 🌱

برعاية صاحب الجلالة الهاشمية الملك عبد الله
الثاني ابن الحسين المعظم وبحضور المدير العام
لمنظمة اليونسكو السيد كوهيرو ماتسورا، تم ويعون
الله وضع حجر الأساس وتأسيس المجمع العلمي
لمختبر السنكروترون يوم الاثنين المبارك
تاريخ 2 ذوالقعدة 1423 هـ، الموافق
2003/1/6م.

(“UNDER THE PATRONAGE OF
H.M. KING ABDULLAH II BEN AL-HUSSEIN,
AND IN THE PRESENCE OF
H.E.MR. KOICHIRO MATSUURA,
DIRECTOR-GENERAL OF UNESCO,
WITH GOD’S BLESSING
THE GROUND-BREAKING CEREMONY
AND THE ESTABLISHMENT OF THE
SYNCHROTRON LABORATORY COMPLEX
(SESAME) WERE INAUGURATED ON
MONDAY DATED 2/11/1423H., 6/1/2003 A.D.”)



ON THE WEB:

SESAME Homepage

<http://www.sesame.org.jo/>

Synchrotrons worldwide

http://www-ssrl.slac.stanford.edu/sr_sources.html

Al-Balqa Applied University, Jordan

<http://www.bau.edu.jo/>

SESAME

Middle East hopes for world-class synchrotron research center

by Kurt Riesselmann

Following the collaborative model that led to the creation of the European research center CERN, the Middle East is in the process of creating a research center of its own. Eight nations so far have signed the statutes for the governance of a new laboratory called the International Center for Synchrotron-light for Experimental Science Applications in the Middle East (SESAME).

Under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the member nations—Bahrain, Egypt, Iran, Israel, Jordan, Palestine, Pakistan and Turkey—have agreed to fund the annual operation budget and share other responsibilities. Other nations are expected to join the project either as full members or as observers.

On January 6, 2003, a groundbreaking ceremony in Allaan, 20 miles northwest of Amman, Jordan, marked the official start of construction for the complex that will host the new state-of-the-art synchrotron-light facility. It will provide scientists with intense beams of x-rays to conduct research in physics, life sciences, material sciences, archaeology and other areas.

According to UNESCO Director General Koïchiro Matsuura, one of the goals of the SESAME project is to “work against the brain-drain by attracting scientists based in the Middle East and also those originally from the region who now work abroad.” To foster these goals, UNESCO has supported the project by providing the forum and framework for consultations between the countries interested in collaborating in the project. After nine meetings of the International Interim Council of SESAME, the member nations formed a permanent Council in January, with former CERN Director General Herwig Schopper as its first president.

But the onset of the war in Iraq has cast a shadow on the future of the project, which has been under development for about five years.

“This war could break everything apart,” said Dieter Einfeld, technical director of the SESAME project. “Because of the current situation, Jordan now pays its financial contributions into a security fund. It will be bad if the economic situation in Jordan doesn’t improve soon.”

In 2000, Jordan won the right to host the center in a competition that featured 18 sites submitted by seven countries in the Middle East. Jordan agreed to pay about five million dollars over five years for the construction of the complex. But with Jordan’s economy closely tied to oil imports from Iraq, the country’s economic future is uncertain.

The operation budget, estimated to reach US\$5 million five years from now, will be paid by all member nations. For the current year, each member nation has agreed to pay at least \$50,000.



Photos by Yousef Allan



Rendering courtesy SESAME project

Top left: At a groundbreaking ceremony on January 6, 2003, King Abdullah II Ben Al-Hussein of Jordan (right) and Director General Koichiro Matsuura, UNESCO, unveiled a commemorative plaque at the site of the future building that is to hold the SESAME Center. Bottom left: King Abdullah II presents an award to SESAME Council President Herwig Schopper. Above: Rendering of the SESAME complex located on the Allaan site of the Al-Balqa Applied University.

Large parts of the scientific equipment for SESAME already sit in a warehouse outside Amman. In 1999, the German government decommissioned its BESSY I synchrotron-light source in Berlin and agreed to donate its components, estimated to be worth up to US\$30 million, to the SESAME project. Over the next couple of years scientists hope to raise about \$10 to \$15 million to upgrade the 25-year-old machine to make SESAME one of the best synchrotron-light sources in the world. For building the x-ray beam lines, the SESAME project counts on financial support from member and observer nations as well as donations of equipment from existing synchrotron labs.

At present, there are about 50 synchrotron-light sources in 20 countries around the world, none in the Middle East. The machines create x-rays by circulating charged particles, usually electrons, inside a ring of magnets at an energy of a few GeV. BESSY I operated at 0.8 GeV, while the conceptual design report for SESAME will call for electron beam of 2.5 GeV.

“BESSY I created light of up to 2 keV,” said SESAME advisory board member Herman Winick of Stanford Synchrotron Radiation Laboratory. He and Gustav Voss of *Deutsches Elektronen-Synchrotron*, initiated the SESAME project by suggesting that the old machine should be saved, instead of being cut up and shipped to a junkyard.

“Today, the scientific community is interested in shorter-wavelength, higher-energy x-rays,” Winick said. “Our original plan was to use high-field superconducting wigglers to extend the spectral

range of the machine and to create light of up to 20 keV. The latest plan is to go to even higher energies, increasing the circumference of the machine from 62 meters to 120 meters.”

In the last two years about 30 scientists and engineers from the Middle East have worked as trainees at synchrotron laboratories in the U.S. and Europe, funded by the U.S. State Department, the U.S. Department of Energy and several non-U.S. sources. In the fall of this year these trainees, many of them coming from Iran, will move to Jordan to form the core team for the assembly of the upgraded electron accelerator. In November, they will begin to work on upgrading BESSY I’s first-stage accelerator, a microtron about two meters in diameter.

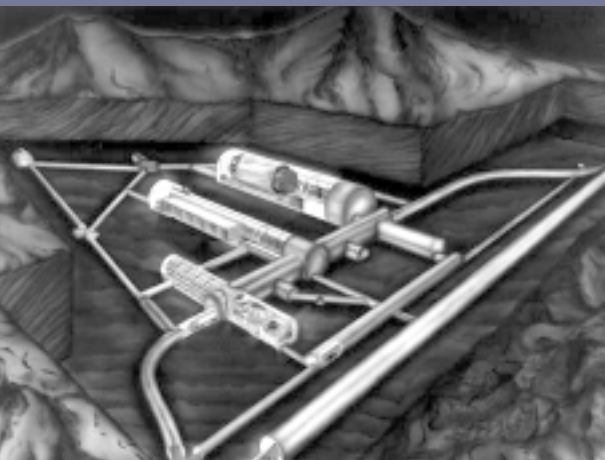
Although the first of six SESAME x-ray beam lines isn’t expected to be ready until 2008, the SESAME Council is already soliciting requests for beam time from scientists in the Middle East. Einfeld said the facility would be “booked for years before we are even ready to deliver the first beam.”

But hopes for the future are inextricably linked to the region’s history of turmoil, as Matsuura stated prophetically in June 2000.

“For the young scientists and Ph.D. students who will use SESAME, the Middle East has always been synonymous with conflict and war,” Matsuura said when Jordan was announced as the host country. “Through their scientific rapprochement, they will be in the vanguard of the political rapprochement that this region so badly needs.” ☛



Dieter Einfeld



The Gran Sasso Laboratories are located beside the Gran Sasso Tunnel (10.4 km long) on the highway connecting Teramo to Rome, at about 6 km from the west entrance.

Notes from Underground

"Alcuni sono così pazzi da avventurarsi nel profondo delle miniere per osservare le stelle del cielo."

("Some are so foolish as to search for the stars in the depths of mines.")

~Pliny, "Natural History"

by Judy Jackson

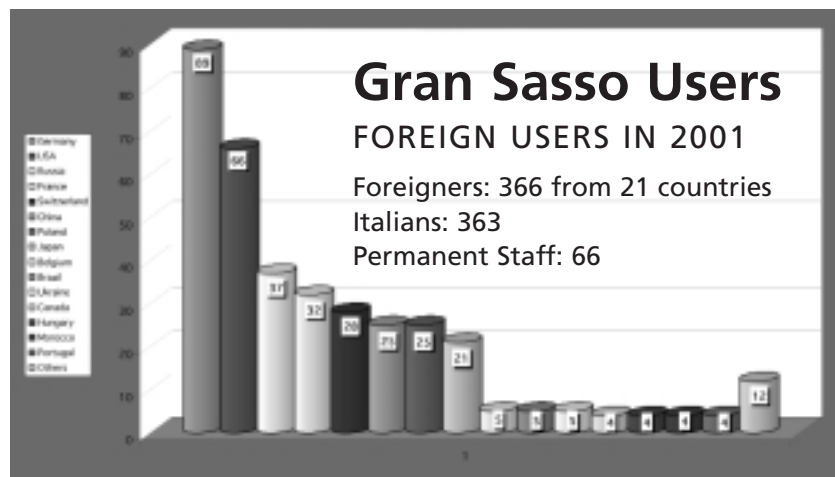
A visit to the Laboratori Nazionale di Gran Sasso

In an experiment at a laboratory nestled on the flanks of the highest peaks of Italy's Apennines, particle physicists search for the first indications of a mysterious component of the universe known as cold dark matter. But it was the cold white matter that first struck a recent visitor to the *Laboratori Nazionale di Gran Sasso* last month. A late winter storm had covered the laboratory's mountainside campus with nearly a meter of fresh snow. Like the array of physics experiments in Gran Sasso's underground caverns, the effect was dazzling.

More than 700 scientists from 22 countries come to carry out research at Gran Sasso, the world's largest underground laboratory for astroparticle physics, located in Italy's Abruzzo Province, some 60 miles east of Rome. They collaborate on experiments that confront the central questions of particle physics today: the nature of neutrinos, the character of dark matter, the asymmetry between matter and antimatter. What draws them here is the unique advantage provided by the Gran Sasso mountain chain itself, in the form of 1,400 meters of solid rock that shields their experiments from the

ON THE WEB:

Gran Sasso:
www.lngs.infn.it





Photos by Judy Jackson

The Gran Sasso mountains from a window in the medieval town of L'Aquila on the morning after a late-winter snowstorm.

constant barrage of cosmic rays that strike the earth's surface and interfere with the signals from neutrinos and other rare particle interactions.

Plus, you don't need an elevator to reach the underground experiments; you can get there by expressway. A 10.4-kilometer tunnel beneath the Gran Sasso has a special members-only off ramp leading to the galleries where the laboratory's experimental halls are carved into the core of the mountain range. As a roadside attraction, the underground laboratory at Gran Sasso is in a class by itself. Three vast experimental halls—conveniently labeled A, B and C—along with connecting tunnels and service areas enclose an area of 180,000 cubic meters. A system of ventilation provides a constant source of fresh air, and air conditioning keeps the temperature

at 18°C. The 18-meter height of the experimental halls gives a cathedral-like aura to the space.

Indeed, said Fermilab physicist Adam Para recently, "you don't travel to Gran Sasso, you make a pilgrimage. It is a cathedral of astroparticle physics."

Gran Sasso is among the youngest of the world's particle physics laboratories; its first experiment began operating in 1989. But in the few years since, the laboratory has established itself as a world center for the exploration of neutrinos, the search for dark matter and the study of nuclear reactions in the astrophysical realm. Currently at Gran Sasso, there are eight operating experiments in astroparticle physics and three more in preparation.



Some things are universal. Just as at Fermilab, parking spaces at Gran Sasso Laboratory are at a premium.

Notes from...



Neutrinos are a Gran Sasso specialty. Experiments now in progress or under construction can zoom in on the behavior of solar neutrinos, atmospheric neutrinos, neutrinos from supernovae and now, after the completion of the new neutrino beamline at CERN, some 730 kilometers away, neutrinos produced at a particle accelerator. Results from Gran Sasso experiments have contributed significantly to the dawning recognition that neutrinos do, in fact, possess mass, however small. And Gran Sasso is the undisputed world leader in the use of so-called "double-beta-decay" experiments to investigate whether neutrinos are their own antiparticles.

When the ICARUS and OPERA experiments begin operating in about 2006, they will provide the opportunity for experimental physicists to observe the phenomenon of neutrino oscillations by

"appearance" experiments. Hitherto, experimenters have successfully detected the presence of neutrino oscillation mainly by observing a deficit in the expected number of neutrinos of a particular flavor. The missing neutrinos have "disappeared" by oscillating into neutrinos of a different flavor. ICARUS and OPERA, however, will actually be able to detect the appearance of tau-flavored neutrinos in a beam of pure muon neutrinos generated by a particle accelerator at CERN, confirming and complementing the results of atmospheric neutrino studies in the Superkamiokande experiment, and other long-baseline neutrino experiments such as KEK's K2K experiment in Japan and Fermilab's MINOS in northern Minnesota.

Besides neutrinos, other astroparticle experiments study nuclear reactions in the sun, the nature of the dark matter that makes up more than 20 percent of the universe, and even the effect of particles on biology. A Gran Sasso experiment looks at the rate of genetic modification in an environment sheltered



A group of science journalists from the Unione Giornalisti Italiani Scientifici visited the Large Volume Detector in Hall A of the underground laboratory at Gran Sasso. The LVD, in operation since 1992, uses large quantities of liquid scintillator to track neutrinos from supernovae.



Dr. Roberta Antolini, Gran Sasso's director of communication and media relations.

Photos by Judy Jackson



Gran Sasso's administrative and office buildings were designed to fit the mountain landscape.

from the effects of cosmic rays. Early results seem to indicate that without interaction with particles from space, the organisms' genetic make-up does not change.

Gran Sasso's environment feels a long way from the western suburbs of Chicago. The style of the above-ground facility, a twenty-minute trip from the underground laboratory, falls somewhere between a college campus and a ski resort. Located within the Parco Nazionale del Gran Sasso, it perches in the mountains between the medieval cities of l'Aquila and Teramo in the heart of the Abruzzo province. For centuries, its impervious territory isolated the Abruzzo from the rest of Italy and Europe. In the 1960's, the construction of highways from Rome, Bologna and Bari opened the region to the outside world, but it retains the distinctive atmosphere of a region apart. Like laboratories in the U.S., however, Gran Sasso must also address concerns of citizens in neighboring communities, and laboratory officials give high priority to environmental issues.

Results from astrophysics and particle physics experiments over the past five years have revolutionized our understanding of the nature of the universe. The ordinary hadronic matter that not long ago seemed dominant is now revealed to constitute a paltry few percent of the actual mass of the universe. The rest belongs to dark matter and dark energy, whatever they may turn out to be.



Posters on a newsstand provide the welcome news of a "snow day" for local students.

Photos by Judy Jackson

"Don't let the bright lights fool you," says astrophysicist Michael Turner of Fermilab and the University of Chicago. "The Dark Side controls the universe."

In the years ahead, some of the brightest light on the dark universe may shine from underground, from experiments deep in the rocky heart of the Gran Sasso. ❄️



PROFILE IN
PHYSICS

FAR-REACHING RESULTS

Elizabeth Simmons spares no effort in physics outreach, with students and within the field

by Sena Desai

Elizabeth Simmons' office shelves at Boston University are crammed with little gadgets—toys that a child would love to have, and craftwork that her two sons have made at school.

But to Simmons they represent complex equations come to life. She often uses these gadgets to explain an elusive physical theory or concept. In fact, she admits that she borrows her sons' toys to explain physics to high school girls who participate in her Pathways outreach program at Boston University.

"The most interesting aspect of my work is connecting an abstract creation of the mind to what really exists," Simmons says. "In particle physics there is symmetry to models, like a cut jewel, that makes them very interesting."

A theorist at B.U. and a visiting researcher at Fermilab for 15 years, Simmons is committed to bringing more women into the field and making life easier for fellow women physicists.

Though their numbers are creeping up in the United States, women physicists are still greatly outnumbered by men. Simmons says that only 20 percent of bachelor's degrees and about 13 percent of Ph.D.s in physics are awarded to women. Women represent just ten percent of the nationwide physics faculty; a survey in the March 2001 report of the American Institute of Physics also suggests they are more likely than men to be hired on a temporary basis. National trends are reflected at Fermilab, where 21 of the 228 physicists (nine percent) are women.

In the last 25 years, the number of women physicists in the United States has doubled, but Simmons describes this progress as "pathetically slow" compared to the life sciences. She says there is a subtle discrimination that women physicists still face. "I am not saying that they mean to, but men often interrupt or don't listen to what a woman has to say," Simmons says. She adds that while some women learn to deal with this subtle discrimination, others may become discouraged and drop out of the field, which may help explain why there are proportionately fewer women at higher levels of physics than in the field as a whole.



Theoretical physicist Elizabeth Simmons of Boston University and Fermilab says: "The most interesting aspect of my work is connecting an abstract creation of the mind to what really exists. In particle physics, there is a symmetry to models, like a cut jewel, that makes them very interesting."

Simmons appears to be among the exceptions that prove the rule. Besides teaching and outreach, her activities include membership in the Particle Physics Project Prioritization Panel (P5), which met at Fermilab recently to evaluate future physics projects. P5 advises the High Energy Physics Advisory Panel (HEPAP) on which physics projects to fund, and HEPAP in turn advises the Department of Energy and the National Science Foundation.

Simmons believes young women may be intimidated by the mathematical requirements of physics. They may also see direct societal benefits from the life sciences, but not from basic research. Simmons has hoped to make physics attractive for high-school students, especially girls, encouraging them to study physics at higher levels. When she joined the physics faculty at B.U. in 1993 she also founded Pathways, her own science outreach program.

Through this two-day program Simmons, each year, brings in about 400 girls and their teachers from 40 Boston-area schools to B.U. The students meet and interact with about 100 different researchers and engineers, mostly women. "They find out about different careers and different types of science and engineering," says Simmons. The girls listen to talks on recent research in physics, try out hands-on experiments, and take lab tours. Though Simmons is involved in other outreach efforts, she says that Pathways is "closest to her heart."

Outreach can work both ways. Simmons credits encouragement from several male physicists in building her own career. Her physicist husband, Sekhar Chivukula, has "always been a pillar of strength and support." Howard Georgi, her Ph.D. advisor at Harvard University, continues to encourage Simmons 13 years after she graduated. At Fermilab, she has a staunch ally in theorist Chris Quigg.

Quigg says it is important for young girls to see successful women like Simmons in physics. "They can look at her and say, 'Oh, if she can do it, why can't I?'" says Quigg. "It is wonderfully empowering to walk through places where people have passed through and gone on to do wonderful things," he says. "To see someone like Liz as an example is energizing and liberating."

Simmons has an overarching goal of helping women in physics move forward into positions of prominence. She has been able to effect specific changes as a board member of the Aspen Center for Physics in Aspen, Colorado.

A non-profit organization run by physicists, the center is known for its annual three-month summer program where physicists from around the world meet to discuss, puzzle, and exchange their ideas unhampered by everyday demands. Simmons says physicists who attend feel "renewed and revitalized." The program is highly competitive, and physicists consider it a privilege if they are asked to attend.

Simmons noted that few women were participating in the conferences; when they were participating, they seemed to occupy less prominent levels than they deserved. In the summer of 1994, Simmons with two other physicists, Catherine Kallin



Photo by Michael Brands

RESULTS

Outreach activities at Snowmass 2001, coordinated by Elizabeth Simmons, produced these happy young faces and many more.

(McMaster University) and Katherine Freese (University of Michigan), ran a weeklong workshop called the “Focal Week on Women in Physics.” The workshop came up with a list of suggestions to increase women’s participation at the Aspen summer program—and the percentage of women attending the program has now doubled.

Simmons made prominent contributions as the chair of the Aspen 2001 Snowmass conference’s outreach committee. Liz Quigg of Fermilab’s Education office remembers that Simmons had set up a huge tent for her outreach activities on a hot Fourth of July. While it was the day off for the conference, Simmons spent all day in the heat, helping children with activities related to physics that she had set up—puzzles, small experiments, and demonstrations, many borrowing her sons’ toys.

Chris Quigg, the chair of the Snowmass conference’s organizing committee knew exactly why he asked Simmons to chair the outreach committee. “I wanted a very serious, energetic, and rigorous program of outreach,” he says. And, he says, Simmons brought that energy and enthusiasm to the outreach “beyond my wildest dreams. She is really very good at bringing in other people and giving them their moment in the sun.”

Simmons has special communication tutors. A former middle-school teacher helps polish her approach. “She helps us know how to speak with

students and how to present things at a level that is not too technical,” says Simmons. And, of course, the fact that Simmons has two sons, four and 11, helps her hone her communication skills. “You learn to choose your words carefully when you are talking to a four-year-old,” she laughs. “Or he will keep asking you the same question again and again until he is satisfied.”

There are special moments that make all the effort worthwhile, like the times when Simmons does a little demonstration and a student says: “Wait—this is something we have done in our physics class!”

“It is really great to see them making the connection between an equation they saw in class and an object that you are handing them to look at,” Simmons says. Even more gratifying are the moments when a student who has attended one of her programs writes to say that he or she has decided to study physics in college.

Chris Quigg says Simmons is one of the important reasons for the growing presence of women in physics. The field of particle physics, especially, has always prided itself on international collaboration, and Simmons, fittingly, practices physics outreach without borders.

“Every now and then,” Quigg says, “I am surprised, but not astonished, to get a request for a letter of recommendation because Elizabeth has found some other program to do with people in South America or Japan.” ☼

FERMILAB ARTS, LECTURE AND FILM SERIES

To purchase tickets for Arts and Lecture Series events, or for further information or telephone reservations, call 630-840-ARTS weekdays between 9 a.m. and 4 p.m. Phone reservations are held for five working days, but will be released for sale if not paid for within that time. Will-Call tickets may be picked up, or available tickets purchased, at the lobby box office on the night of the performance beginning at 7 p.m. When coming to this event, only the Pine Street entrance to Fermilab will be open. **Film Series:** All shows are Friday nights at 8 p.m. in Ramsey Auditorium. Tickets are \$4 for adults, \$1 for children (under 12), and \$2 for Fermilab students, and are sold only at the door. Please join us for refreshments and discussion after the film. For more information, check out our web page at www.fnal.gov/culture.

ARTS SERIES

May 10, 2003

Orquesta Aragon

Founded 60 years ago, Orquesta Aragon is recognized as the premiere charanga group in Cuban Music. In keeping with the charanga-style, Orquesta Aragon is a 13 piece band that does not feature a brass-section, but rather vocals, flute, and violins on top of a rhythm section of piano, bass, congas, timbales, bongo and clave.

Tickets - \$26 (\$13 ages 18 and under)

LECTURE SERIES

Friday, April 11, 2003, 8 p.m.

The Human Genome and Cancer

Professor Arnold Levine, Institute for Advanced Study

Dr. Arnold J. Levine is a leading authority on the role of the molecular basis of cancer, and the co-discoverer of the p53 gene, an important tumor suppressor gene. He will discuss the most up-to-date research on Friday, April 11 at 8 p.m. in Fermilab's Ramsey Auditorium. Tickets- \$5

FILM SERIES

Friday, May 9, 2003

Mulholland Drive

USA (2001), 145 min. Dir: David Lynch.

Lynch's atmospheric film noir intertwines the stories of Betty (Naomi Watts), a perky Hollywood hopeful, and Rita (Laura Harring), amnesiac from a car accident along Mulholland Drive, with strange and macabre doings in the world behind the scenes of showbiz.

CALENDAR/LAB NOTES

CALL FOR ENTRIES

Fermilab Arts and Craft Show

May 1, 2003 to June 2, 2003.

■ Open to all Fermilab employees, visiting scientists or graduate students, retired employees, contractors, and any member of his or her immediate family. Pick up applications at Atrium Desk. Questions Georgia@fnal.gov or call 840-6825.

Website for Fermilab events: <http://www.fnal.gov/faw/events.html>

WELLNESS WORKS PRESENTS BROWN BAG SEMINARS

Noon to 1 p.m., Wilson Hall/One West

■ Wednesday, April 16: "The Five Essentials for Health and Vitality," Drs. Mark Meyers and Richard Hyde, of the Complete Chiropractic Center.

■ Wednesday, April 23: "Stress Management for Everyone," Maureen McKane LCSW, of McKane & Assocs.

■ Thursday, May 8: "Meditation: Getting Back to You," Virginia McDonough LCSW, of The Healing Arts at Park Place.

VIRTUAL ASK-A-SCIENTIST

May 6, 2003

■ The next Virtual Ask-a-Scientist will be on Tuesday, May 6 from 7-9 p.m. Central Time. Bruce Baller and Chris White, both of the MINOS experiment will answer questions live online. For more information, go to <http://www.fnal.gov/pub/inquiring/virtual/index.html>

Alvin Tollestrup Award for Postdoctoral Research

The URA is sponsoring a new award for outstanding postdoctoral research. The recipient must be in a non-permanent position and within six years of a Ph.D. The research must be performed in conjunction with a Fermilab experiment or accelerator physics project, or under the auspices of the FNAL Theory Group. Fermilab scientist Alvin Tollestrup will make the presentation of the \$3,000 award during the annual Fermilab Users

Meeting in June, and the winner will give a talk about the research involved.

The application deadline is short: a CV, cover letter, a short paper on the research, and two letters of recommendation must be received by 20 April 2003. Please see the web page for complete details: http://www.fnal.gov/orgs/fermilab_users_org/Tollestrup.html.

LUNCH SERVED FROM
11:30 A.M. TO 1 P.M.
\$10/PERSON

DINNER SERVED AT 7 P.M.
\$23/PERSON

CheZ Léon M E N U

FOR RESERVATIONS, CALL X4512
CAKES FOR SPECIAL OCCASIONS
DIETARY RESTRICTIONS
CONTACT TITA, X3524
[HTTP://WWW.FNAL.GOV/FAW/EVENTS/MENUS.HTML](http://www.fnal.gov/faw/events/menus.html)

LUNCH WEDNESDAY, APRIL 16

Calzone of Sausage,
Onions, Three Cheeses
Chopped Vegetable Salad
Orange Mousse

DINNER THURSDAY, APRIL 17

Grilled Scallops
Duck Breast w/Cranberry Chipotle
Barley Risotto
Sauteed Greens
Lemon Pudding Cake w/Apricot Sauce

LUNCH WEDNESDAY, APRIL 23

Corn Crepes Stuffed w/Chicken
& Poblanos
Banana Chocolate Tart

DINNER THURSDAY, APRIL 24

Belgium Endive & Roquefort Salad
Baked Halibut w/Sorrel Sauce
Vegetable of the Season
Gran Marinee Souffle

F E R M I N E R W M S

F E R M I L A B
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**The deadline for the Friday, April 125,
2003 issue is Tuesday, April 15, 2003.**

Please send classified ads and story ideas
by mail to the Public Affairs Office, MS 206,
Fermilab, P.O. Box 500, Batavia, IL 60510,
or by e-mail to ferminews@fnal.gov.

Letters from readers are welcome.
Please include your name and daytime
phone number.

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CLASSIFIEDS

FOR SALE

■ '00 Ford Focus LX, 60K miles, auto transmission, AC, radio. Excellent condition, \$6,500. Contact 630-840-4856 or jonsson@fnal.gov.

■ '94 Chrysler Concorde 3.5L AC, cruise control, moon roof, radio and all mod-cons. Runs very well and is a very comfortable car in good condition. Asking price \$3,300 o.b.o. sineadf@fnal.gov or call x2433.

■ '92 Toyota Corolla, 111K miles, asking \$1,500 o.b.o. Call 630-840-6314, usubov@fnal.gov.

■ '89 Harley-Davidson FLHS, 22K miles, red, excellent condition. Maintained by Illinois Harley-Davidson. New tires, new Corbin solo seat and stock seat with luggage rack. Lowered rear end, air shocks, and many chrome extras. \$11,500. Contact Chuck 630-840-3881, or email cmorrison@fnal.gov.

■ 1980-1985 VW Golf/Rabbit/Jetta spare parts for sale. 2 boxes include wiper motor, door handles, relays, blower motor, Haynes manual, etc. \$20 for all. 630-840-6342.

■ '74 Volkswagen Beetle, Kasan Red, restored, all new brakes, front-end parts, body panels, wiring, rubber seals and much more. \$4,500 Contact Dave 630-840-2273 or 815-784-5276.

■ Scotty hard top camper for sale. Blue and white outside. Sleeps six, sink, running water, electric outlets, very clean, well kept. \$800 o.b.o. Contact Bill at 630-840-3358 or miner@fnal.gov.

■ Restored 1937 wood and canvas Old Town 16-foot sailing canoe, model OTCA 16, \$2,500. Contact 630-840-6416. Contact Nancy after 5:30 p.m. at 879-1271, or email ncywrd@yahoo.com

■ Bedroom set, 7 pieces total. Good condition. Queen size headboard and frame, 2 nightstands, dresser with mirror, and armoire. Light oak. \$250 o.b.o.; 2-solid wood end tables and 1 coffee table. \$35 o.b.o.; 1-twin bed headboard and frame. \$15 o.b.o.; 1-green recliner \$15 o.b.o.; 1-oak computer desk armoire. Lots of storage space. lockable. Hardly used. Bought at \$490 asking \$325 o.b.o. All must go ASAP. Contact Brian 630-840-6821 or 630-892-4564.

■ Tapered valance from Country Curtains. Meandering green vine/leaves on a creamy background w/rose and blue flowers w/cream back lining. 30% cotton 70% polyester. Washable. Valance is 10" x 43" w/16" center drop and 3" rod pocket. Brand New. \$15 Valance is here, come and see - beautiful!! Contact Sue, x3876.

■ Noritake Cumberland formal dishes. 8 place settings (dinner, salad, bread/butter, cup, saucer) cream and sugar with lid, salt and pepper. Perfect condition. \$300.

■ Pair of Gemini speakers, 320 Watt, 15" woofers, 7 x 4 midrange, 3 Motorola tweeters, \$150/pair. Call 630-505-0276

■ FE Olds trumpet, 4-1/2 years old, used 3-1/2 years, excellent condition, \$400 o.b.o. (\$750 brand new). Call 630-505-0276

■ Nintendo 64 game system, two controllers, games, very good condition, \$100 o.b.o. Call 630-505-0276

■ Marvin interior French doors with glass panels, 30" x 79-1/4", one right hinge, one left hinge. DOORS ONLY, \$150 o.b.o. Call 630-505-0276

■ Tickets for a performance of the Evanston Township High School (ETHS) Symphony Orchestra on April 30, 8PM, at Symphony Center in Chicago. A student orchestra that plays like the pros, they've played everywhere from Carnegie Hall to Peoria; now hear them downtown. Price range \$20 - \$35 (\$10 for children 12 and younger). Contact Hank at 630-840-8105 or e-mail glass@fnal.gov.

■ Hand-crafted nesting cavities for Butterflies, Wren, Chickadee, Titmouse, Nuthatch, Tree Swallow, Bluebird, Woodpecker, Raptor and nesting platform for American Robin. Nests constructed of Western Red Cedar, (new growth), Midwestern Switch grass, (winter-cut), stainless steel deck screws, and aluminum rivets, (1/2" grip). Adhesives or nails are not used. Nest specifications meet or exceed suggested requirements developed by the USGS, (United States Geological Survey) and Northern Prairie Wildlife Research Center. Call Tom 630-761-9661.

■ 47" Projection TV w/ stereo sound, PIP, \$700. 1 yr old snow blower, \$300. Matching couch and chair, \$150 for set. Bik Futon with cushion and cover \$100. Handmade trestle dining room set \$100. 1992 Voyager minivan, only 120K miles, very dependable and looks good, \$1,100 (\$1,400 book value). Call 896-6196 for more information.

WANTED TO BUY

■ Used or new 3" PVC for underground conduit. Need 250 ft. markl@fnal.gov, x4776

■ Treadmill, Good Quality, 2 hp, power incline, pre-programmed routines; heart rate monitor, \$300-\$500 price range, contact reford@fnal.gov.

■ Furniture refinishing and restoration. Pick-up and delivery services available. Call 630-554-5547.

CHILDCARE AVAILABLE

■ in my home on the southwest side of Batavia. Afternoons, evenings and weekends. For more information call Wendy at 630-406-6009.

HOUSE FOR RENT

■ Batavia 2-story 3-bedroom house with 2 kitchens, 2 baths and 2-car garage. \$1150/month plus deposit and security reference. Call Dael 630-222-4713 or Hellen 630-299-8085.

HOUSE FOR SALE

■ Batavia: Inground pool, recently remodeled two-story with basement, 3 bedrooms, 2 large baths. DR, FR, AC, 2 car garage and HUGE yard. 5-7 minutes away from Fermilab. \$240,000; phone 630-879-7312.

BIBLE STUDY HAS MOVED!

■ The Wednesday Noon bible study group, which previously met in the Huddle, has a new home. Beginning on March 26 we will gather in the Small Dining Room (WH-1SW) at our regular time (noon-12:30). If you would like to check out the No. 1 best seller of all time in a relaxed, no-obligation setting please join us. The current study is entitled Journey into Happiness. Info at 630-840-3607 or dykhuis@fnal.gov.

GOLF LEAGUES

■ Fermilab offers several golf leagues that begin play in April. Everyone is welcome to join one or more of these leagues. Anyone at Fermilab can play: men and women, beginners and seasoned veterans, lefty's and righty's, etc. There are five different leagues, and they meet on Tuesday, Wednesday or Thursday evenings. For details, visit our web site at <http://mccrory.fnal.gov/golf>, or call Elliott McCrory at x4808.

BARN DANCES

■ The Fermilab Folk Club will present two April barn dances. The Malt Lickers play Sunday, April 13 at 6:30 p.m. with calling by Paul Ford. On Sunday, April 20 at 2 p.m., Stephanie & the Boyz will play and Dot Kent will call. Barn dances are held in the Warrenville Community Building and feature traditional square and contra dances. Admission is \$5 for adults, \$2 for age 12-18, and free for under 12 years old. Come with a partner or without; bring the family or not. For more information contact Dave Harding (x2971, harding@fnal.gov) or Lynn Garren (x2061, garren@fnal.gov) or check the webpage at <http://www.fnal.gov/orgs/folkclub/>.

MILESTONES

RETIRING

■ Giorgio Bellettini, PPD-EPP-Guests & Visitors, ID 02459V, March 15, 2003.

STILL TRAVELING

■ Visitors to Rep. Judy Biggert's office last month included Flat Stanley, who earlier spent a day at Fermilab. Stanley was accompanied to Biggert's office by Fermilab Users' Executive Committee Chair Christopher White. Flat Stanley was dispatched by White's daughter, Kimberly, a first-grader in Lisle, Ill.



Photo by Herman White

<http://www.fnal.gov/pub/ferminews/>



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