

February 15, 2016

Andre Rubbia
MS 123

Dear Andre,

Thank you very much for your presentation: "*DUNE: Spokespersons Report*" at the January meeting of the Fermilab Physics Advisory Committee (PAC). The Committee explicitly mentioned its appreciation of the carefully prepared presentations for this meeting.

The future neutrino program hosted by Fermilab was a major topic at the meeting. Excerpts on LBNF/DUNE from the PAC report are attached. As you can see, the committee noted that, "*The DUNE Collaboration has continued to make impressive progress in establishing a strong and well-organized international effort for the long-baseline neutrino physics program of LBNF/DUNE.*" In their report, the PAC identifies a number of things they would like to have updates on in future meetings. In addition, the Committee "*...endorses the recommendation of the LBNC that DUNE set out clear goals for the protoDUNE effort and appropriate oversight and resources be allocated to protoDUNE so as to maximize likelihood of useful running with beam prior to LS2.*" The Committee also endorses the focus areas laid out by the LBNC and would like future progress reports in those identified areas.

I note the PAC comments and LBNC recommendations and would like to add my thanks to you and Mark for your leadership of the DUNE Collaboration during this formative period.

Sincerely,



Nigel S. Lockyer
Director of Fermilab

cc: D. Bortoletto	S. Geer	J. Lykken
G. Bock	T. Meyer	M. Thomson
R. Rameika	A. Stone	J. Kogut
M. Procaro	J. Shank	C. Mossey

Excerpts from the January 2016 PAC Report:

LBNF/DUNE

LBNF continues to make good progress towards approval and initiation of the long-lead conventional facility construction at the Sanford Underground Research Facility. CD-1R was formally approved in November and a successful CD-3a review was conducted in December. It is anticipated that formal approval of the CD-3a request will be in Q2 of FY2016 following the Presidential Budget Request for FY2017. A process and timeline for completing the final design has been laid out, and the project is close to issuing a Request For Proposal for a Construction Manager/General Contractor. The recently concluded US-CERN protocols are a key step in the developing CERN-Fermilab partnership in neutrino physics. The LBNF project is led by a very strong and experienced management team, with an impressive command of all aspects of the Far Site Conventional Facility project. The PAC believes the LBNF project is on track to begin major underground construction, which would be a strong signal to the international community about the intentions of DOE to construct a US-hosted world-class center for neutrino physics.

DUNE

The DUNE Collaboration has continued to make impressive progress in establishing a strong and well-organized international effort for the long-baseline neutrino physics program of LBNF/DUNE. It is truly astonishing what has been accomplished in just 10 months. In August, DUNE has established an organizational structure centered on a set of Working Groups (Near Detector, Far Detector, Accelerator and Beam Interfaces, Software and Computing, and Physics), which are now up and functioning with a regular meeting cadence. In addition, a set of three Task Force efforts were established to address key development and design optimization questions as part of the preparation for CD-2 on an 18-month schedule (Near Detector Optimization, Far Detector Optimization, and Beamline Optimization). These groups integrate and coordinate across the Working Groups to establish timelines, goals, and focused organization of work towards answering specific charge questions. The Collaboration Resource Board has been established to begin the process of defining international contributions to DUNE. There has also been recent progress in establishing leadership and an organizational structure for protoDUNE single and dual phase. The integration of the WA-105 dual phase collaboration under DUNE leadership, and the opportunities for coordination across these two critical technical demonstration projects, are commendable and an important step in establishing a strong cooperation with CERN. The PAC welcomes DUNE management efforts to define effort and resource needs for the Working Groups and Task Force efforts as a good initial step in galvanizing the collaboration around critical tasks.

Good progress has been made on addressing issues raised by the PAC at its last meeting.

A central aspect of the work of the Near and Far Detector Optimization Task Force groups is the development of a full simulation, reconstruction and fitting capability as the foundation for optimization studies. In this context there has been significant progress on the key capability to automate reconstruction of neutrino events in LAr TPCs. These efforts, particularly if grounded on the experience of MicroBooNE and eventually protoDUNE, will build confidence about the viability of the overall physics performance of LBNF/DUNE.

The Near Detector Task Force is looking at various options for detector systems, which will inform the fundamental question of how best to minimize systematic errors on the neutrino flux projection to the Far

Detector. The PAC continues to look for clarity on the importance of auxiliary neutrino cross section measurements by experiments such as CAPTAIN-MINERvA, which should emerge from the Task Force studies. The PAC looks forward to hearing more progress in this direction at its next meeting.

There appears to be welcome close coordination between SBND and DUNE on TPC design and construction efforts, which could be critical given the tight schedules for both SBND and protoDUNE. While the primary goal of SBND is to provide the near detector flux measurement for the SBN program, technical coordination between SBND and protoDUNE, to the degree possible without compromising this mission, is encouraged.

Over the last 6 months, protoDUNE single and dual-phase has emerged as a critical near-term effort for DUNE. ProtoDUNE would be the first major hardware effort by the Collaboration and its success is a key early outcome of the Fermilab-CERN partnership in neutrino physics as well as a demonstration of the important role the CERN Neutrino Platform has in the overall strategy for LBNF/DUNE. The prototyping effort will validate the engineering design and physics performance of the DUNE Far Detector design options, as well as establishing the foundation for eventual full-scale factory production of TPC components. *The PAC endorses the recommendation of the LBNC that DUNE set out clear goals for the protoDUNE effort and appropriate oversight and resources be allocated to protoDUNE so as to maximize likelihood of useful running with beam prior to LS2.*

The PAC endorses the focus areas laid out by the LBNC for FY2016 and looks forward to progress reports in the identified areas:

LBNF:

- *Execution against final design plan for CD-3a scope*

DUNE:

- *Progress against goals, milestones and plan for protoDUNE single- and dual-phase*
- *Progress against goals, milestones and plan for the three Task Force efforts (ND, FD, BO)*
- *Progress in software and computing, and automated reconstruction in particular*
- *Strategy for preparations in advance of CD-2/CD-3c*

Progress in developing a responsibility matrix for protoDUNE (near-term) and DUNE construction (longer-term)