

**Physics Advisory Committee**

June 20-22, 2016

CHARGE

The laboratory continues to pursue a program that is aligned with the recommendations in the Particle Physics Project Prioritization Panel (P5) report: *"Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context."* Within this context there are two major new initiatives for the Fermilab hosted neutrino program: (i) a new long-baseline experimental facility (LBNF) and experiment (DUNE), and (ii) an expanded short-baseline program that complements MicroBooNE with the addition of near and far detectors (SBND and ICARUS, respectively). The realization of the expanded short-baseline program is well advanced, and establishing the long-baseline program is progressing as foreseen. In addition, the P5 plan supported a strong Fermilab-hosted muon program, namely the Muon g-2 and Mu2e experiments. Both of these initiatives are progressing as planned, with g-2 commissioning anticipated to start in the coming year. Finally, the laboratory is engaged in a number of Particle-Astrophysics initiatives that were also highlighted in the P5 plan.

An important focus for the present PAC meeting is to consider whether there are other initiatives that are consistent with the P5 plan, and that would benefit from the participation of the laboratory.

With the completion of MINOS+, the ongoing Fermilab neutrino program consists of the laboratory's flagship experiment (NOvA), one other NuMI experiment (MINERvA), and the new short baseline experiment (MicroBooNE). In addition, Step 1 of the ANNIE experiment has been installed and operated in the SciBooNE Hall. The PAC will hear updates on each of these experiments, and on the corresponding POT expectations for the coming year.

Other important topics for the meeting include the updated particle-astrophysics plan for the upcoming Laboratory Cosmic Frontier Research Programs comparative review, further development and articulation of the theory-group strategic plan, and the engagement of Fermilab scientists in CMS.

Specifically, we ask the PAC to consider the following:

### **1. Future Long-Baseline Program.**

i) We ask the PAC to comment on the current situation and on the progress being made by the collaboration Working Groups to address the open R&D questions.

ii) Has there been adequate progress on the LBNC-identified LBNF and DUNE focus areas listed in the January PAC report?

### **2. Accelerator-Based Program**

We ask the PAC to comment on the current situation, the progress being made, and the expectations for the coming year for NOvA, MicroBooNE, MINERvA and ANNIE.

The Muon g-2 project spending is such that the collaboration is proposing to use some of the contingency to fund an inflector. The inflector is not currently part of the project. We ask the PAC to comment on the scientific case for the inflector, taking into account programmatic priorities and funding constraints.

### **3. Non-Accelerator Program and Possibilities**

i) We ask the PAC to comment on the updated particle-astrophysics plan. Does the current plan respond to previous advice from the PAC, and is the plan well formulated for the upcoming DOE FY16 *Comparative Review* (July 25-28) of Lab Cosmic Frontier Research Programs?

ii) The PAC will hear presentations on CMB Stage-4, neutrinoless double-beta-decay, and non-oscillation physics that could be pursued with scintillation-based neutrino detectors. Is Fermilab involvement in any of these initiatives desirable? Are there other initiatives consistent with the P5 plan that the laboratory should be considering?

### **4. Theory**

The theory group conducts world leading theoretical particle physics and particle astrophysics research, trains the next generation of theorists in a data-rich environment, supports the experimental program hosted by the laboratory and other experimental activities with Fermilab involvement, and plays a leading role in exploring future possibilities for the program. We ask the PAC to comment on an update of the Strategic Plan

for the group. Specifically, is the case for a strong Fermilab theory group well articulated? Does the group make an essential contribution in support of the U.S. experimental particle physics community? Are their strategic relationships with other U.S. theory groups that should be explored or strengthened?

## **5. CMS**

We ask the PAC to comment on the activities of the Fermilab scientists on CMS. Are the scopes and focus of these activities appropriate for the laboratory? Is there a good balance and fair distribution between the scientific and operational activities within the group?

## **6. Other**

The Director would welcome any comments the PAC has on any of the topics presented, or comments on aspects of the program beyond the presented topics.