30 December 2014

Physics Advisory Committee
January 15-17, 2015

CHARGE

The laboratory continues to align its program 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, including the experiment and the associated accelerator facilities, and (ii) an expanded short-baseline program that goes beyond MicroBooNE. These initiatives have now produced LOIs. A major focus for the present PAC meeting is to consider this progress and provide advice on the next steps.

The P5 report identified the LHC experiments as the highest near-term priority. We ask the PAC to consider the support the laboratory gives to CMS – the present status and plans for the future.

The laboratory's present flagship experiment is NOvA. We ask the PAC to consider the present status of NOvA and, given realistic expectations for proton delivery, the associated scientific strategy that will determine when NuMI switches to antineutrino running.

In July the PAC requested a complete report in the present meeting on the long-term plan for the experimental program supported by the Center for Particle Astrophysics. The committee will be given an update on this.

Finally, at this meeting there are four smaller-scale new and/or updated initiatives to consider (ANNIE, CAPTAIN-BNB, CAPTAIN-MINERvA, and NESSiE), and an update on the Stage-1 approved Polarized Drell-Yan Experiment.

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.

ii) Is the initiative described in the LOI consistent with the P5 Plan?

iii) Are there additional actions the laboratory should take to strengthen the collaboration-forming process?

iv) What should be accomplished before a CDR document is submitted to the PAC for consideration and what would the committee like to see included in the CDR?

2. **Future Short-Baseline Program**

i) We ask the PAC to comment on the current situation and on the progress being made.

ii) Is the initiative described in the LOI consistent with the P5 Plan?

iii) Are there additional actions the laboratory should take to strengthen the collaboration/program-forming process?

iv) What should be accomplished before a full proposal (CDR) is submitted to the PAC for consideration and what would the committee like to see included in the proposal?

3. **CMS**

i) We ask the PAC to comment on the current situation and on the progress being made.

ii) Are the present and proposed future activities at Fermilab in support of CMS consistent with the P5 plan?

4. **NOvA**

i) We ask the PAC to comment on the current situation and on the progress being made.

ii) The timing of the switch from neutrino to antineutrino running affects all of the NuMI experiments. We ask the PAC to comment on the scientific strategy NOvA is proposing to adopt to determine when to request this switch.

5. Particle Astrophysics Plan

The PAC is asked to comment on the progress towards a documented plan for involvement in future particle astrophysics experiments, and on progress towards achieving this future.

6. New Initiatives and Updates

E-1039 UPDATE: Drell-Yan Experiment with Polarized Target (SeaQuest extension)
PROPOSAL: P-1057 ν_μ disappearance at FNAL-Booster (NESSiE)
LOI: P-1060 CAPTAIN-BNB
LOI: P-1061 CAPTAIN-MINERvA
LOI UPDATE: P-1063 Atmospheric Neutrino Neutron Interaction Experiment (ANNIE)

For E-1039, which has Stage-1 approval contingent upon funding from the DOE Office of Nuclear Physics, we ask the PAC to comment on progress towards securing the required funding, and on progress towards understanding the transition from SeaQuest to E-1039, and how these Drell-Yan experiments fit within the worlds program.

For the proposal (P-1057) we ask specifically:

i) Is the science in the proposal interesting and/or compelling?

ii) Is the technique proposed appropriate for, and likely to be capable of, reaching the physics goals of the experiment?

iii) What is the competition for reaching the physics goals of the proposed experiment? Does the proposed experiment have particular advantages or disadvantages relative to the competition?

iv) What is needed to make such an experiment successful?

For the LOI's (P-1060, P-1061, and P-1063) we ask the PAC to comment on whether the science goals are compelling, and the scope and appropriateness of the support requested.

7. 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.