

Fermilab Accelerator Advisory Committee Meeting

Charge

October 14-16, 2014

Fermilab's goal is to deliver the highest power neutrino beams in the world. To this end, the number of protons delivered for the production of our neutrino beams must be increased to the NOvA experiment in the near term and to LBNF in the longer term. The goal of the Proton Improvement Plan (PIP) is to enable proton beams of up to 700 kW to the NOvA target. The goal of PIP-II is to deliver proton beams of 1.2 MW to the LBNF target. PIP-II will replace the existing Linac and must interface with the Booster after the PIP upgrades are completed. Additional upgrades to the Booster and Main Injector may be required to realize the 1.2 MW goal. Fermilab has also agreed to collaborate in the production of Superconducting RF (SRF) accelerating modules and the cryogenic distribution system for LCLS-II. This task relies on the Fermilab expertise and experience in SRF and cryogenics and may present a production challenge for PIP-II modules.

Finally, the delivery of multi-MW beams for the future program will require additional upgrades beyond PIP-II such as the replacement of the Booster, and R&D, for example, in high power targets. These preliminary ideas may be described as PIP-III.

The Fermilab Accelerator Advisory Committee is asked to assess and provide advice on the following topics with a concentration on the accelerator physics and engineering:

Near-Term Plans for 700 kW:

Main Injector:

1. Is the goal of achieving 460 kW (without the slow-extraction program) in 2015 and 700 kW by mid-2016 technically achievable?

Recycler:

2. Are the plans in place to overcome beam instabilities and losses during slip-stacking adequate?
3. Are beam losses understood sufficiently to minimize machine and tunnel activation?

PIP:

4. Are the goals, deliverables, budget and schedule of the PIP project properly defined, well understood, achievable and self-consistent?
5. Are the plans to address the Linac vulnerabilities and reliability adequate?
6. Are the plans for the Booster RF cavities sufficient to extend their life at least until 2030?

7. Are the plans to minimize Booster losses adequate and sufficiently understood to allow for the planned higher beam power levels?

PIP – PIP-II:

8. In view of PIP-II plans, is the current PIP scope appropriate and well understood?

LCLS-II:

9. Is the Fermilab effort on producing the LCLS-II deliverables adequately organized and staffed?

Longer Term Plans:

PIP-II and LBNF:

10. Please comment on the present progress and plans for PIP-II: Are the R&D goals, deliverables, budget and schedule for PIP-II properly defined, achievable and self-consistent?
11. What accelerator (MI, RR, Booster), beam line and target improvements are likely to be needed to achieve 1.2 MW beam power for LBNF? Are they well understood?
12. Are potential interferences in realizing the goals LCLS-II and PIP-II well understood? Are the plans to address these interferences adequate?
13. Please comment on the upgradability of PIP-II from pulsed to CW.

PIP-III

14. Please comment on presented goals and options for PIP-III (beyond 1.2 MW), including high-power targets and other affected beamline components.
15. Does the proposed R&D program address the most critical technical issues?
16. Please advise Fermilab on an R&D path towards achieving the PIP-III goals.

The Director would welcome any other comments the AAC has on any of the topics presented, or on other issues beyond the topics presented.