Charge for the PIP-II Machine Advisory Committee (P2MAC)

March 26-28, 2018
Fermilab

The Proton Improvement Plan-II (PIP-II) Project represents a significant step in upgrading the Fermilab accelerator complex to support a world-leading particle physics research program based on intense beams. The goal of PIP-II is to provide, concurrently with the start of the LBNF/DUNE, 1.2 MW of beam power from the Main Injector for the long baseline neutrino experimental program, while establishing a flexible platform for subsequent development of the accelerator complex. A conceptual design has been completed, and documented in a Conceptual Design Report, based on an 800-MeV superconducting linear accelerator, constructed of CW-compatible components, to replace the existing 400-MeV linac and accompanied by improvements to the existing Booster, Recycler, and Main Injector.

PIP-II has recently completed the Department of Energy reviews required for CD-1 and formal receipt of CD-1 is anticipated in advance of the spring 2018 P2MAC meeting. This establishes the project as being in the "preliminary design" phase. Technical activities during this phase are centered on the development of an initial technical design for the facility, to be documented in a Technical Design Report, and the mitigation of risks associated with the Technical Design and the facility construction strategy. These risks include both technical performance risks, and risks associated with the delivery and integration of components from international partners.

The P2MAC is asked to review the strategy for development of the PIP-II Technical Design, and for the mitigation of risks through the PIP-II R&D program. In particular, we would like specific advice, recommendations, and/or commentary on:

1. The PIP-II Project is reliant on the integration of components from international partners. The committee has extensive experience with large-scale accelerator projects incorporating significant in-kind contributions. We expect that PIP-II shares characteristics and challenges with these projects, while being unique in other ways. We ask the committee to assess the challenges and associated systems integration strategies, to advise if these strategies are adequate and realistic to ensure the successful and timely execution of PIP-II, and to share any relevant lessons learned from other projects.

2. The Project is executing an R&D strategy aimed at mitigating technical risk prior to construction. Technical topics of current focus include:
    - Cavity and cryomodule fabrications and testing strategy;
    - Coupler development status and plans;
    - Resonance control in the superconducting cavities;

    Comments and advice are requested on these topics. The committee is also welcomed to comment on any other aspects of the program the committee feels require attention.

3. The project has developed a general definition of "CW-compatible" at the systems level. We invite commentary on the reasonableness of the project's proposed application of this

definition at the sub-system/component level, including any suggestions on what should be included in the project and what could be reasonably delayed.

The P2MAC is not limited by these specific charge areas and may delve into other related areas, and offer advice, comment, or recommendations, as it deems appropriate under the general guidance of this charge. We request an oral closeout presentation by the P2MAC with Fermilab and PIP-II management, and DOE observer(s), at the end of the meeting. A written report is requested to be submitted to the PIP-II Project Director by May 1, 2018.