CHARGE FOR THE FERMILAB PHYSICS ADVISORY COMMITTEE
JUNE 2022

The laboratory continues to align its program with the recommendations in the 2014 Particle Physics Project Prioritization Panel (P5) report: "Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context" and starts the preparation for the 2022 P5. The PAC is asked to evaluate the laboratories current activities in support in the 2014 P5 report while assessing the laboratory's activities in preparing for the next P5 process and future directions.

In the past two years, laboratory scientists made substantial contributions to the Snowmass Community Planning Exercise ("Snowmass") by submitting White Papers and by leading the community both as frontier and topical conveners. In this meeting, the PAC is asked to comment on how the laboratory envisions to partake in the P5 process in its capacity as America's particle physics and accelerator laboratory. An initial framework has been presented at the November 2021 PAC meeting (see here) and a dedicated presentation is included below. The committee will review how the laboratory foresees to:
- Define prioritized scenarios that maximize the program's scientific impact and its potential for discovery.
- Lead and support the U.S. HEP community.
- Build on the scientific interests and capabilities of the laboratories.
- Maintain strong relations with international partners.

The PAC will also be presented several topical talks covering the "Snowmass" frontiers. These presentations are for information only.

The agenda of the meeting will include:

1. **Overview of the DUNE/LBNF Project**
   - <u>Charge</u>: For information only.
2. **Process for defining the Fermilab's scientific program of the next decades**
   - <u>Charge</u>: We ask the PAC to review the process the laboratory is developing to define the Fermilab's scientific program of the next decades, how that program would leverage and enhance all laboratory's capabilities, how it would respond to the interest of the US HEP community, how it would integrate in and complement the international HEP programs.
3. **Overview of the performance and plans for the Operations of the Fermilab accelerator complex**
   - <u>Charge</u>: We ask the PAC to review the performance of the accelerator complex and the operations' plan in the context of the current and future projects and programs at the laboratory.
4. **Overview of the Neutrino Science program**
   - <u>Charge</u>: We ask the PAC to review the status of the Neutrino Science Program at the laboratory including on-going experiments and experiments planned in response to the 2014 P5 recommendations.
6. **Overview of the Neutrino Frontier**
   - <u>Charge</u>: For information only.
5. **Overview of the Collider, Cosmic, Precision Science programs**

- Charge: We ask the PAC to review the status of the Collider, Cosmic, Precision Science Program at the laboratory including on-going experiments planned in response to the 2014 P5 recommendations.

6. **Overview of the Energy Frontier**

   - Charge: For information only.

7. **Overview of the Rare Processes and Precision Measurements Frontier**

   - Charge: For information only.

8. **Overview of the Cosmic Frontier**

   - Charge: For information only

9. **Strategic Plan for Software and Computing at the Laboratory**

   - Charge: We ask the PAC to review the strategic plan for software and computing, including AI/ML, at the laboratory and the status of the recommendation made at the July 2021 PAC meeting: "*The PAC recommends the development of a resource and computing plan including timelines, milestones and connected decision trees based on the progress on the GPU implementation and therefore possible off-loads to HPC resources. This should help to ensure that Fermilab computing resources can be optimally used to support the experiments*".

10. **Status of the SQMS Center**

    - Charge: For information only.

11. **Status of the Spin Quest experiment and proposal of the Dark Quest upgrade**

    - Charge: We ask the PAC to review the status of the Spin Quest experiment and the proposal for its upgrade, referred to as Dark Quest.