

**DRAFT CHARGE OF THE FERMILAB PAC MEETING
NOVEMBER 16-19, 2021**

1. Status of the NOvA Experiment

- a. Charge: We ask the committee to review the status of the NOvA experiment and to comment on the expected sensitivity for neutrino oscillations and neutrino mass hierarchy as a function of the PoT. The PAC will also be asked to review the status of the combination of the NOvA and T2K results as well as the status of the two recommendations made at the July 2020 PAC meeting:
 - i. *The Laboratory should continue to prioritize operations and computing resources required for the NOvA collaboration to produce its oscillation results on the full planned dataset before the planned long shutdown for LBNF. Maintaining and even increasing the strength of the NOvA collaboration to exploit this data should be a high priority.*
 - ii. *The Collaboration should consider ways to engage scientists outside the collaboration who may be able to bring new effort to analysis of the NOvA data for studies of neutrino interactions or BSM physics topics.*

2. Report from the MicroBooNE Collaboration

- a. Charge: for information only

3. Impact of the potential MicroBooNE results on the SBN program

- a. Charge: We ask the committee to review the impact of the potential MicroBooNE results on the SBN program.

4. Status of the SBND

- a. Charge: We ask the committee to review the status of the SBND and to address the following recommendation made at the July 2020 PAC meeting:
 - i. *The Committee would like to hear more details about the cryogenics and LAr purification systems progress, schedule and commissioning plans, including the technical teams involved in these activities at the next PAC meeting.*

5. Overview of the physics case for the ND-Gar

- a. Charge: We ask the committee to evaluate the physics case for ND-GAr and its role in supporting DUNE's ultimate neutrino oscillation goals, as well its potential to broaden DUNE's physics program.

6. Status of the ANNIE Experiment

- a. Charge: We ask the committee to review the status of the ANNIE experiment, including the performance of the detector during the initial data taking period.

7. Proposal for the nuBDX-DRIFT Experiment

- a. Charge: We ask the committee to review the proposal for the nuBDX-DRIFT experiment, the status of the two recommendations made at the January 2021 PAC meeting.
 - i. *The proposing team is encouraged to explore the full physics potential of this setup, including the sensitivity to CEvNS, a larger parameter space in boosted dark matter scenarios, and other beyond standard model scenarios.*

- ii. *Since backgrounds need to be estimated to evaluate experimental sensitivity to any physics case, the PAC recommends the collaboration to perform a quantitative investigation of the current knowledge on the rock neutrons background in NuMI, in order to estimate the physics reach of a pilot run with NuMI beam on-axis.*

8. Status of the CMS experiment

- a. Charge: We ask the committee to review the status of the CMS experiment focusing on the Fermilab's deliverables in the areas of detector and computing operations in preparation for Run 3. The PAC is also asked to review the plans for analysis of the Run 3 and HL-LHC data.

9. Status and plans of the g-2 experiment

- a. Charge: We ask the committee to review the status of the g-2 experiment and plans for future data taking runs.

10. Review of the anomalies observed by the LHCb and g-2 experiments

- a. Charge: for information only

11. Overview of the theoretical physics program at the laboratory

- a. Charge: We ask the PAC to review the theoretical physics program at the laboratory, to comment on the role of the new division, and to assess whether the laboratory integrates in and contributes effectively to community efforts including (but not limited to) the Neutrino Network, Lattice, g-2 Theory Initiative.

12. Overview of the microelectronics program at the laboratory

- a. Charge: We ask the PAC to review the newly launched microelectronics initiative, how it contributes to and how it integrates in the core mission of the laboratory.

13. Status of the g-2 theoretical predictions

- a. Charge: for information only

14. Overview of the preparation for the Snowmass process at the laboratory

- a. Charge: We ask the PAC to comment on the effectiveness of the internal organization, on the participation of the laboratory's scientists in the re-start of the process, and on the role the laboratory may play.

15. Status of the ICARUS detector

- a. Charge: We ask the PAC to review the status of the ICARUS detector and of the recommendation made at the January 2021 PAC meeting:
 - i. *The PAC recommends that the improvements in detector characterization from cosmic and neutrino beam running be incorporated into SBN common reconstruction/analysis tools as soon as possible to allow for detailed sensitivity studies including systematics, which may help in prioritizing detector and reconstruction software development tasks as well as the physics goals for the ICARUS-only data taking period.*