Department of Energy
Office of Science
Washington, DC 20585

May 27, 2022

MEMORANDUM FOR ABID PATWA
PROGRAM MANAGER, ENERGY FRONTIER
OFFICE OF HIGH ENERGY PHYSICS

FROM: GLEN CRAWFORD
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OFFICE OF HIGH ENERGY PHYSICS

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SUBJECT: Charge for National Laboratory Energy Frontier Research Review

The mission of the U.S. Department of Energy (DOE) Office of High Energy Physics (HEP) program is to seek understanding of how our universe works at its most fundamental level. The Energy Frontier program in HEP supports that mission by using powerful accelerators that operate at the highest possible energies to create new particles, reveal their interactions, and investigate fundamental forces by means of highly sensitive experimental detectors. Experimental groups at the Energy Frontier typically have a broad and balanced portfolio of responsibilities and leadership roles in support of research and development, experimental design, fabrication, commissioning, detector operations and maintenance, and performing analysis of large data sets to observe and measure phenomena, thereby advancing the strategic goals for HEP.

This letter is to request that you organize and conduct a review of HEP-supported national laboratory efforts in the area of Energy Frontier Research on September 19-23, 2022, in hybrid format with in-person attendance, as the situation may allow, at the Fermi National Accelerator Laboratory. The purpose of this review is to assess the quality of recent scientific performance by these research groups, the merit and feasibility of their proposed research for achieving the scientific goals and milestones of the field, and the relevance of their research efforts to the overall HEP mission. These assessments should be performed within the context of the 2014 U.S. Particle Physics Project Prioritization Panel's long-range strategic plan (the "P5 plan") that emphasized compelling scientific opportunities be pursued in the global context of the field. The review should also evaluate whether the groups have demonstrated strong and focused programs well aligned with the P5 plan.

We are particularly interested in a review of the laboratories' research contributions, as applicable, along the following programmatic thrusts:

- Large Hadron Collider (LHC) program at CERN: ATLAS and CMS experiments.
- Physics studies and pre-conceptual research and development towards specific and potential future Energy Frontier collider experiments, including but not limited to those for CERN's proposed Future Circular Collider or Japan's proposed International Linear Collider.

For each individual laboratory research group, a specific evaluation is requested for:

1) The quality and impact of the research by the group in the recent past, including accomplishments within the topics identified above;
2) The scientific significance, merit, and feasibility of the proposed research for the next five years, as well as for longer-term future planning;
3) The appropriateness of the research approach including the development and use of innovative concepts or methods to advance scientific results, including leveraging artificial intelligence (AI) and machine learning (ML) techniques to enhance data analyses and the scientific program as well as using analyses as a springboard to further develop AI/ML tools for the benefit of the broader scientific community;
4) The competence and future promise of the group, as well as the adequacy of resources, for carrying out the proposed research and the cost-effectiveness of the research investments;
5) The quality of the support and infrastructure provided by the laboratory;
6) Whether the nature and scope of the group's efforts are well-suited for a DOE national laboratory research program, and how the group's activities align with and support the HEP Energy Frontier program and priorities;
7) For the LHC program, whether each lab's research group, where personnel are supported through research funds, is carrying out balanced efforts across data analysis and physics research, detector operations and/or computing, and/or the high-luminosity LHC detector upgrade tasks, as emphasized by DOE and the international ATLAS and CMS collaborations;
8) The demonstration of leadership in the Energy Frontier and the wider scientific community; and
9) The quality and appropriateness of the lab group's interactions and nurturing of its scientific community, including particularly its efforts to develop a diverse, equitable, and inclusive workforce and workplace, effective and appropriate mentorship of early-stage researchers, and the group's external relations with universities and global collaborators.

In addition, reviewers are requested to evaluate each lab's contribution to the ongoing HEP community-led Snowmass study process, which is intended to guide the path forward for the Energy Frontier program and other topical areas of the particle physics program. Such efforts by the labs not only present an opportunity to guide the next U.S. P5 long-range planning process that is expected to begin in the fall of 2022 but are important to influence each lab's strategic path forward.

The final report should outline the laboratory-based HEP Energy Frontier research program in each of these thrusts and discuss any unique and important elements that the laboratory programs bring to bear in addressing these research topics. In this context, we request a comparative assessment of each laboratory's overall performance and impact in these areas relative to its peers, as well as an assessment of the overall effectiveness and per capita impact when compared with university groups. The overall and individual

evaluations of the laboratory research groups are an important input to the process of optimizing resource allocations within the various research thrusts.

The laboratories should provide relevant information in advance of the review, which addresses the above items and facilitates reviewer evaluations. Their proposed program should be described under certain funding scenarios that you provide to them to develop future program plans.

I encourage you to interact with the laboratory groups and provide them with whatever immediate feedback you find appropriate. Upon completion of the review, reviewers should send a letter summarizing their findings and evaluations, which should address both the overall assessment of laboratory contributions to the Energy Frontier research thrusts noted above and the individual lab evaluations. These letters will be kept confidential within HEP. Individual laboratory evaluations will be summarized and conveyed to the laboratories, and the overall assessment of laboratory contributions to the research thrusts will be incorporated into a summary report from HEP made available to all labs. I would like to receive the individual laboratory evaluations from reviewers no later than two weeks after the completion of the panel review.

cc: Harriet Kung, DOE
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