



U.S. Department of Energy
and the
National Science Foundation



JUN 10 2014

Professor Andrew Lankford
Chair, HEPAP
University of California at Irvine
Physics & Astronomy Department
4129H Frederick Reines Hall
Irvine, CA 92697

Dear Professor Lankford:

We are writing to ask you to conduct an assessment of the accelerator R&D effort within the Department of Energy (DOE) Office of High Energy Physics (HEP).

Particle accelerators have long been a critical, enabling technology for high-energy physics and have become a key element for advances in many other fields of science. The accelerator R&D effort within the DOE HEP is the major source of U.S. funding for the development of accelerators, both to meet the needs of new accelerator facilities for scientific discovery and to pursue novel acceleration concepts and technologies for broader uses. The portfolio of projects supported by this effort¹ includes research activities in accelerator science, accelerator technology and materials, provision of test facilities, simulation work, and training of accelerator physicists. It is carried out in universities and several federally funded national laboratories. The total annual accelerator R&D budget in the FY 2015 budget request for DOE-HEP is \$91M, including \$26M for the HEP Directed Accelerator R&D (\$14M for LARP—the LHC Accelerator Research Program, and \$12M for MAP—the Muon Accelerator Program), and exclusive of the Office of Science (SC) Accelerator R&D Stewardship program.

Accelerator R&D can be partitioned roughly into three categories: short-term research, required for optimization of operating facilities or approved new facilities; medium-term research, to bring new concepts to practice so that they can be considered for the design of a new facility; and long-term, exploratory research aimed at developing new concepts for acceleration, new technologies, new materials, and advanced simulation techniques. The training of accelerator physicists, engineers, and technologists is an additional important goal.

¹ Results from the HEP Accelerator R&D program have been highly influential in developments for accelerators used for nuclear physics, materials science, biology, medical diagnostics and treatment, and for industrial uses. In recognition of this, DOE-HEP has recently been designated by the Office of Science (SC) to oversee, in close consultation with other SC programs, long-term accelerator R&D stewardship activities within SC, including for accelerators critical to applications in areas beyond SC. Note, however, that the SC Accelerator R&D Stewardship program is *not* included as part of this assessment.



The recent High Energy Physics Advisory Panel (HEPAP) Particle Physics Project Prioritization Panel (“P5”) report has highlighted the importance of accelerator based experiments for the future of particle physics and this places renewed emphasis on accelerator R&D efforts in support of medium- and long-term high energy physics projects. In light of this, we are requesting that HEPAP set up a subpanel to examine the research in the current HEP accelerator R&D program and to identify the most promising research areas to support the advancement of high energy and particle physics. The subpanel should consider:

- *National Goals:* Describe in broad terms appropriate goals for medium- and long-term U.S. accelerator R&D that are, in the subpanel’s view, required for a world-leading future program in accelerator-based particle physics consistent with the scientific priorities for DOE-HEP described in the HEPAP-P5 report for Scenarios A and B.
- *Current Effort:* Examine the scope of the current medium- and long-range R&D efforts and evaluate how well these address the HEP mission, as expressed in the HEPAP-P5 report, and the goals articulated in response to the first bullet.
- *Impediments:* Describe any impediments that may exist for achieving these goals including, but not limited to, considerations of resources, management of research efforts, and existing and expected expertise and infrastructure.
- *Training:* Accelerator R&D efforts play a major role in the training of future accelerator scientists and technologists. Assess whether this aspect is adequately addressed in the current programs, including partnerships between national laboratories and universities, and opportunities to enhance the training efforts to meet future needs for such skilled personnel.
- *Balance:* Advise the DOE-HEP program on how to maintain a healthy and appropriately balanced national program for medium- and long-term accelerator R&D, including test facilities, in light of the budget envelopes for Scenarios A and B developed by the HEPAP-P5 panel. Provide further guidance for a plan based on the science and technology case for increased investment in the HEP Accelerator R&D program called for in P5’s Scenario C. We would be particularly interested to know how partnerships between universities, national laboratories and international collaborators could be most effective in achieving the goals.

We will explain the distinction and interplay between the HEP Accelerator R&D program and the SC Accelerator R&D Stewardship program at the outset of the assessment. We welcome the subpanel’s comments on potential synergies or conflicts between the two programs.

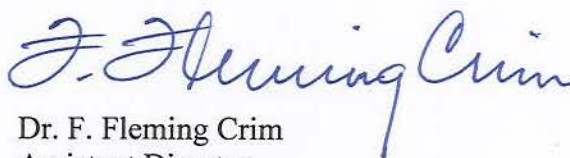
It is requested that preliminary findings of your report should be presented to HEPAP by the end of November 2014, with a final version by March 2015.

We thank you for your help in conducting this strategic assessment; the advice of this HEPAP subpanel will be very important to our program planning. We look forward to working with you in this endeavor.

Sincerely,



Patricia M. Dehmer
Acting Director, Office of Science
U.S. Department of Energy



Dr. F. Fleming Crim
Assistant Director
Directorate for Mathematical and Physical Sciences
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