



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



JUL 27 2005

Professor Frederick Gilman
Chair, HEPAP
Carnegie-Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213

Dear Professor Gilman:

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 Advanced Technology R&D effort within the DOE Office of High Energy Physics (OHEP) and the Elementary Particle Physics program within the National Science Foundation are the major sources of US funding for the development of accelerators, both to meet the immediate needs of new accelerator facilities and to pursue novel acceleration concepts, RF structures, and magnets for broad use in the further future. The portfolio of projects supported by this effort includes research efforts in technology and materials, provision of test facilities, simulation work, and training of accelerator physicists. It is carried out in universities, several Federally funded national laboratories, two Federally operated laboratories, and in industry and has a total annual budget of about \$68M in FY05, including R&D in support of future major accelerator facilities such as the ILC (\$22.6M) and LHC (3.3\$M). The results have been influential in developments for accelerators used for nuclear physics, materials science, biology, medical diagnostics and treatment, and for industrial uses.

Accelerator R&D partitions loosely into three categories: short term research, required for planned 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 longer term, exploratory research aimed at developing new concepts for acceleration, new magnet technologies, new materials, and advanced simulation techniques. The training of accelerator physicists, engineers, and technologists is an additional important goal of this effort.

A number of recent developments, including the decision of the International Technology Recommendation Panel for the Linear Collider; the recommendation of the APS Study of Neutrino physics that a high intensity neutrino beam and R&D towards a muon storage ring should be pursued; and discussion of LHC upgrades, have placed renewed emphasis on accelerator R&D efforts in support of medium term high energy physics projects. At the same time, overall resources are more tightly constrained than ever, and accelerator R&D efforts have not been spared from the impact.

In light of this situation, we are requesting a comprehensive review of all aspects of the OHEP and NSF accelerator R&D programs with the exception of Linear Collider R&D and the LHC Accelerator Research Project, LARP (see below). The review should include:

- **National Goals:** describe in broad terms the needs and goals of US HEP accelerator R&D that are, in the sub panel's view, required for a rich and productive future program in accelerator based particle physics.
- **Stewardship:** Appraise how the DOE/HEP program should continue to maintain its historical national stewardship for accelerator science and technology in light of the increasingly constrained budget for the program.
- **Scope:** provide a description of the current scope of the DOE and NSF programs.
- **Quality:** Appraise the scientific and technical quality of the work being supported and how the US effort rates relative to the worldwide effort in similar areas.
- **Relevance:** Examine the work being performed and determine how well it matches the needs and goals of the high-energy physics program. Are there items missing, items that may be overemphasized, or items that are significantly under-supported? Is the balance between longer term and nearer term research appropriate?
- **Resources:** Estimate whether the program has adequate resources to carry out its scope of effort, and assess whether the program makes the most efficient use of those resources.
- **Management:** Examine how the work is managed and overseen, both in the field and in the agencies. Suggest how the management and oversight might be improved, if appropriate.
- **Training:** Accelerator R&D efforts play a major role in the training of future accelerator scientists and technologists. Is this aspect adequately addressed in the current programs? Are local partnerships between national laboratories and universities performing adequately?

Technical and management review of the Linear Collider R&D and LARP will not formally be part of this review, but your committee should understand and evaluate whether the overall scale and scope of these efforts is appropriate to an optimum overall accelerator R&D program within the DOE Office of High Energy Physics and NSF Mathematical and Physical Sciences Directorate.

It is requested that a preliminary draft of your report should be presented to HEPAP by the end of February 2006, with a final version by July 2006.

We thank you for your help in conducting this review by forming a HEPAP subpanel; its advice will be important to program planning by both agencies. We look forward to working with you in this endeavor.

Sincerely,



Robin Staffin
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Office of High Energy Physics
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Michael S. Turner
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