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Dr. Michael Procario
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Dr. Edward Seidel
Assistant Director for Mathematical and Physical Sciences
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Dear Mike and Ed:

I am writing to summarize the meeting of the High Energy Physics Advisory Panel (HEPAP) held in Washington, D.C. on March 17-18, 2011.

I began the meeting by expressing the concern of the high energy physics community for the well being of our colleagues in Japan.

Mike Procario reviewed the budget situation both for FY11 and FY12. FY11 funding under the continuing resolution is below the FY10 level because of the congressional prohibition on new starts. University grants have been delayed in the Chicago Operations Office because of the uncertainty in the final FY11 budget. The FY12 Presidential request of $797.2M places HEP between P5's scenarios A and B. The problem that the field faces is clearly seen in the plot of funding over the past 15 years, from 1997 to the 2012 request. In then-year dollars, the Office of Science budget has increased by a factor of about 2.5, while HEP has increased by approximately 20%, significantly less than inflation. Mike described the budget breakdown in detail. Of particular concern is the plan to house a long-baseline neutrino experiment and large dark matter and neutrinoless double-beta decay detectors in the DUSEL facility in light of the decision of the National Science Board not to support continued NSF funding of the project. The Office of Science has instituted a review process to determine the most cost effective way to proceed.

Joe Dehmer reported on the NSF Physics Division. The overall NSF request is up by 12% relative to FY10, which is close to the 10-year doubling curve. The MPS directorate is up by 6%, the lowest of any of the directorates, and the Physics Division is up by 3.7%, the lowest within MPS except for Astronomy. The biggest change in Physics is the action of the National Science Board in terminating the DUSEL bridge funding and removing DUSEL from the MREFC list. The Physics Division has tried to retain some support for the science by moving the PI support that was part of the DUSEL funding into general PI support.

HEPAP feels strongly that this decision of the National Science Board will have an extremely negative impact on the US high energy physics program. In 2008, the P5 HEPAP subpanel developed a lean plan to attack the most crucial scientific questions in elementary particle physics. Central to that plan was DUSEL, which was to house major experiments addressing the origin of the universe's matter-antimatter asymmetry that is responsible for our existence and the identity of dark matter which enabled the development of the universe so that we could exist. This high priority science is now in jeopardy. HEPAP is astonished that the decision was made before the Preliminary Design Report and NRC scientific assessment that the NSB had requested were written. We encourage the NSF to reconsider and help develop a plan that can make this exciting physics program a reality.

Glen Crawford gave the Office of High Energy Physics response to the recent Committee of Visitors report. HEP plans to implement most of the COV recommendations. These include charging HEPAP to formulate a strategic plan for stewardship of accelerator science and technology and implementing comparative reviews of university grants. The exception is the recommendation to open HEP's fellowships for theory graduate students to non-DOE funded groups. Glen noted that there is an Office of Science graduate fellowship program that is open to all; the HEP program was developed to address a problem in funding theory students within the DOE program.

Bill Brinkman spoke about the FY12 budget request for the Office of Science and how its funding is following the President's priorities. He reviewed the major projects in each program area. In high energy physics, the intensity frontier program of NOvA, Mu2e, and LBNE are important. However the recent action of the National Science Board presents a serious problem. He has established a panel to look at how best to do LBNE and the dark matter and double-beta decay experiments. There is also a problem with the cosmic frontier because of the size of WFIRST. There is a working group with NASA on how best to proceed. Finally, he noted that the reauthorization of the America COMPETES act requests a report on dissemination and long-term stewardship of the results of research. He has asked HEPAP and the other advisory panels for written reports on this. I responded that a group of HEPAP members has agreed to prepare a draft that will be reviewed by the rest of HEPAP.

Mike Procario described HEP's plan to implement the future intensity frontier program. Mu2e has CD-0, but the current freeze on new starts has slowed its progress. MicroBooNE has CD-1. LBNE also has CD-0, but the action of the NSB has forced a reconsideration of the options. A decision on how to proceed will be made following the report of the Office of Science DUSEL review panel. A review last summer considered proposals to participate in the two super-B factories and the Fermilab g-2 experiment. The recommendation was to support g-2 and the Japanese Super-B factory, but not the Italian Super-B factory. The approved projects are not in the FY12 budget but will hopefully be in future budgets. HEP is in discussion with the Italian government on possible transfer of PEP-II and Babar components to the Italian Super-B project. A multi-megawatt proton source was envisioned by P5 as an important intensity frontier facility. HEP is working with Fermilab to develop that program.

Pier Oddone described Fermilab's plan for the intensity frontier. The lab's strategy is to develop the most powerful set of facilities in the world for the study of neutrinos and rare processes. Dominance at the intensity frontier requires a new front-end to the Fermilab accelerator complex. A 3 GeV continuous-wave linac would avoid fundamental limitations in pulsed machines and allow parallel experiments to each receive beam with an optimal time structure. This new

accelerator would allow a $K^0 \to \pi^0 \nu \bar{\nu}$ experiment a thousand times more sensitive than the experiment at JPARC, giving an experimental uncertainty that would match the theoretical one. The Mu2e experiment's sensitivity would increase by a factor of 20 over phase-I which would use the current Fermilab complex. The ultimate goal would include the addition of an 8 GeV pulsed linac that could feed the current Main Injector to provide 2 MW of beam for LBNE. In the long term, Project X could be the front end to a neutrino factory or a muon collider that would return the energy frontier to the US. LBNE could start with the 700 kW beam developed for NOvA and then be upgraded with Project X. The total US cost for both linacs and a full suite of experiments, after accounting for the likely foreign contributions, is $2.35B, which is similar to other Office of Science projects after correcting for inflation. The Fermilab budget could provide $0.9B from the ramp down of the existing program, meaning that $1.45B additional would be needed over 10 years.

Marcel Demarteau reported on the Fermilab/DPF detector R&D workshop held this past October. He noted that new technologies are science enablers and that there has been insufficient investment in the development of new instrumentation. The workshop identified areas with the greatest opportunities and tried to understand what made some university-lab collaborations very successful. The question posed at the end of the workshop was whether the community should craft a national program on detector R&D. The DPF has charged a taskforce to explore this and submit a preliminary report by the August DPF meeting.

Steve Geer gave a status report on muon collider R&D. In the US, this work is part of the Muon Accelerator Program (MAP) which carries out both muon collider and neutrino factory R&D. The muon collider has the advantages of a potentially large energy reach and a relatively compact size, but the short muon lifetime and the need for substantial phase space reduction in all three dimensions provide major challenges. The R&D, which has been pursued for about a decade, has led to the International Design Study for a Neutrino Factory which expects to have a preliminary design report in two years. Critical tests of ionization cooling begin with the MICE experiment at Rutherford Laboratory and will continue with component tests at Fermilab's MuCool test area. MAP's goal is to produce a design study by FY16 that would enable the community to judge the feasibility of a multi-TeV Muon Collider.

Linda Blevins and Keith Tucker described the Office of Science implementation of the Portfolio Analysis and Management System (PAMS), a software system that should improve management of university grants and laboratory funding. The system will enable program managers to track the life cycle of grants from announcement of opportunity to grant close-out in a system that contains all of the relevant documentation. Since PAMS is already integrated with other federal information systems, they expect that integration in the DOE systems will be straightforward. The first iteration for the Office of Science should be available this year, with the final version in use in 3-4 years.

The next HEPAP meeting will be held on June 23-24 in Rockville, MD when we hope to hear about the details of the final FY11 budget and a resolution of the DUSEL situation.

Sincerely yours,

Melvyn J. Shochet
Chair, HEPAP