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Dr. Dennis Kovar
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Dr. Edward Seidel
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Dear Dennis and Ed:

I am writing to summarize the meeting of the High Energy Physics Advisory Panel (HEPAP) held in Bethesda, Maryland on March 11-12, 2010.

I began by thanking the new members for their willingness to serve on HEPAP, and I announced the membership of the informal HEPAP working groups on demography, university issues, and helping the agencies attract the best applicants for open positions.

The formal meeting began with Ed Seidel reporting on the National Science Foundation's Directorate for Mathematical and Physical Sciences. Ed reviewed the FY11 budget request and the MPS program. The top priority remains healthy core programs and enhancing the nation's scientific workforce through the support of young scientists. Although total Physics Division funding is up by only 2.8% in the FY11 President's budget, the Physics Discovery portfolio which includes the Principal Investigator grants increases at a larger rate. With regard to the Deep Underground Science and Engineering Laboratory (DUSEL), the mandated review by the National Research Council has been initiated. It should be complete by February, 2011, in time for the National Science Board review of DUSEL as an MREFC project.

William Brinkman reported on the Department of Energy's Office of Science (SC). He noted that while the Office of Science budget is up by 6.1% in the President's FY11 budget, high-energy physics is up by only 2.3%. The focus this year is on areas directly related to the energy problem. There are initiatives in HEP including the long-baseline neutrino experiment, the LHC, and Tevatron running in FY11. Bill noted that another Nobel Prize was awarded this past year for work at an accelerator facility. In response to a HEPAP question, Bill said that the Office of Science is conscious that it is the steward of high-energy physics, nuclear physics, and fusion. It won't let those areas die. He noted that the stewardship of accelerators in HEP is now more complicated because of the involvement of BES.

Joe Dehmer reviewed the National Science Foundation's Physics Division, both its portfolio and organization. It expects to announce soon an important new program in mid-size instrumentation development to complement the MRI program whose maximum award was recently increased from $2M to $4M. The FY11 budget increase for most programs in the Physics Division is larger than the 2.8% average increase for the division, which is low due to a reduction in DUSEL preparation funds. Joe noted that the Physics Division budget has doubled over the past 12 years. The DUSEL process including reviews has been going quite well, however the budget is down from $36M in FY10 to $19M in the FY11 request. When the need for satisfying OSHA safety standards is included, this is $40M below the planned and needed amount. This is insufficient to keep the project going. The NSF and OSTP are trying to find a solution. HEPAP is very concerned about this shortfall. If it is not rectified, there will be considerable damage done to important science programs to study the matter-antimatter asymmetry in neutrinos, the interaction of dark matter particles, and neutrinoless double beta decay.

Dennis Kovar reported on the Department of Energy's Office of High Energy Physics (OHEP). He reviewed the long range plan of OHEP which is based on the HEPAP P5 report. The FY11 budget request is up by 2.3%, keeping up with general inflation but not inflation in the technical sector. With these funds, the Tevatron will run in FY11, the LHC program is supported as are NOvA, Daya Bay, and ongoing cosmic frontier experiments. Investments are also being made in future projects and advanced technology research and development. R&D programs through 2015 are being planned for both the ILC and a muon collider. Collaborative work is going well with NSF on DUSEL and the long baseline neutrino experiment. There are a number of scenarios being proposed for US participation in a super-B factory overseas, and a proposal for a g-2 experiment at Fermilab is expected. HEPAP is pleased that these proposals will be expeditiously reviewed. DOE and NASA continue to work on a JDEM plan, with the program offices focusing on an affordable mission. Guidance on JDEM and other cosmic frontier programs will come from the National Research Council's Astro2010 decadal review. A problem in implementing the PASAG recommendations comes from the budget, which is somewhere between the lower two scenarios considered by the panel. In response to a question from HEPAP, Dennis said that a solution to the FY11 DUSEL funding problem has to be found to move forward.

Raymond Brock announced that five national laboratories and the APS Division of Particles and Fields will hold a workshop on generic detector R&D sometime in October.

Steve Myers, head of the CERN accelerator division, gave an update on the LHC accelerator. He reviewed the accident of September, 2008, the repairs that were carried out, and the hardware commissioning that followed. This culminated in operation of the collider at the end of 2009, with the detectors recording data at both 900 GeV and 2.36 TeV. There was a retreat in Chamonix in January in which it was decided to be safe and run the LHC at a center-of-mass energy of 7 TeV during 2010 and 2011, with a goal of accumulating 1 fb^{-1} of data. The LHC upgrade program was also discussed. The bottleneck in the accelerator chain is the SPS and that will be the likely focus of improvements. The previous plan to replace most of the injector chain has now been rethought in light of the resources needed to repair the magnet splices. A decision on the path forward will be made later this year. The most likely operating scenario after all upgrades are complete is luminosity leveling at $5\text{-}6\times10^{34}$, which is best for both the experiments and the accelerator.

Joel Butler reported on the status of the four LHC experiments. All of them have more than 97% of the installed detector channels working. The collaborations had their reconstruction and analysis programs ready so that they could rapidly get first physics results from the collision data obtained in December. All of the detector subsystems are working well. The results from the four experiments show remarkable agreement between the data and detector simulation at this stage in the experiments. Joel noted that this was due in large part to the experimenters' vast experience in CDF, D0, H1, ZEUS, BaBar, Belle, CLEO, and the LEP experiments. First physics publications on single particle distributions have already been prepared by the LHC collaborations.

Sergei Nagaitsev gave an update on Project X at Fermilab. He noted that although the scientific mission hasn't changed, the configuration of the accelerator has been altered. It is no longer an 8 GeV pulsed linac, but rather a 3 GeV continuous wave linac that enables a broad and flexible program investigating rare processes. This would be followed by an 8 GeV synchrotron to raise the beam energy to that needed for transfer into the Main Injector for the neutrino program. In the next 6 months, they will complete the design and try to further reduce the cost of the machine.

Dennis Kovar presented the charge to HEPAP to form a Committee of Visitors to review the Office of High Energy Physics this October. Jim Alexander has agreed to chair the committee.

Glen Crawford summarized the new OHEP programs for young scientists: the Early Career Research program, the new Graduate Fellowship program, and the HEP Theory Fellowships. The HEP component of the SC-wide Early Career program is funded at $16M/year. This year there were 4 laboratory and 10 university scientists who received the awards. HEPAP members questioned the rationale for the large difference between the laboratory and university awards. The SC graduate fellowship program is in the final selection stage. Of the 3200 applicants, approximately 160 awards are expected. In response to advice from a number of previous subpanels, OHEP instituted a program of theory fellowships. These 2-year fellowships are for senior graduate students who are working on their theses. The target is 5 fellowships per year. HEPAP members questioned Glen about a statement in a recent email message to principal investigators that could be interpreted as advising young faculty members who apply for grants that they would be penalized in final awards if they had university start-up funds. Glen responded that this is part of the process of optimizing the use of agency funds. However HEPAP noted that such a policy could easily be counterproductive and reduce the total funding to the field because deans would likely stop giving start-up funds to HEP experimentalists. In the discussion it became clear that this is not the agency's intent and that the policy would be rethought.

Steve Koonin gave a broad view of the plans of the Department of Energy. The first priority is helping the country with jobs and competitiveness, the second is nuclear security, and the third is energy innovation and the green economy. Underlying it all is discovery. He noted that the DOE is one of the major stewards of basic science in the federal government. He wants to keep fields like high energy physics vital while better integrating them with the other needs of the department. This involves shifting some of the effort of the Office of Science to more applied problems. The case for further investment in basic science will have to be made, based in part on its spin-offs and its impact on education. HEPAP notes that the applications that have proven so important broadly in society were not invented for those purposes but came as a result of a

burning drive to solve basic scientific questions. This process continues today, with recent technical advances ripe for application to address society's problems.

Robert Hamm talked about the impact of industrial accelerators, 99% of which are utilized for non-research applications. Accelerators are used for producing essentially all digital electronics and many consumer products like automobile tires and food packaging. They also play an important role in health and the environment. Many of these applications grew out of the worldwide accelerator technology development in particle and nuclear physics. He estimated that accelerator sales to industry are at the level of approximately two billion dollars per year, with the annual value of products processed, treated, or inspected by particle beams exceeding a half trillion dollars. He sees a continuing impact of accelerator R&D on industry, noting in particular free-electron lasers, superconducting linacs and cyclotrons, and fixed-field alternating-gradient cyclotrons.

Walter Henning reviewed the accelerator workshop held last October. Its goal was to identify the R&D needs for the accelerators that are important to the nation's efforts in science, medicine, energy, national security, and industry. Historically, major accelerator innovation comes from the research community, with later development occurring in both the research and commercial sectors. The workshop findings include the need for R&D aimed at major advances in accelerator performance, the importance of accelerator science, and improving the transfer of accelerator technology to industry.

The next HEPAP meeting will be held June 3-4 in Washington, D.C.

Sincerely yours,

Melvyn J. Shochet
Chair, HEPAP