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Dr. Dennis Kovar  
Associate Director for High Energy Physics  
Office of Science  
Department of Energy

Dr. Edward Seidel  
Acting Assistant Director for Mathematical and Physical Sciences  
National Science Foundation

Dear Dennis and Ed:

I am writing to summarize the meeting of the High Energy Physics Advisory Panel (HEPAP) held in Washington, D.C. on October 22-23, 2009.

The meeting began with remarks from William Brinkman, Director of the DOE Office of Science. He described the successes of the past year including three budgets passed by Congress and new programs for graduate student fellowships and early career grants. He said that high energy physics should take pride in the broad use of accelerators in society, noting that the Nobel Prizes in Chemistry this year were for work done at accelerator facilities. His challenge to the community is to articulate the compelling scientific justification for the program of future U.S. experiments in the worldwide context.

Dennis Kovar described the work of the DOE Office of High Energy Physics. Guided by the Particle Physics Project Prioritization Panel (P5), they are carrying out the program including needed investment in critical infrastructure and scientifically important future projects. There is keen competition for funds in the Office of Science. At present we remain close to the P5 scenario-B funding level. The U.S. is proposing that its relation with CERN continue as it is now. International Linear Collider (ILC) R&D is being supported through 2012. The US ILC team is being asked to propose a program for the out years until a worldwide decision on ILC is made. NASA and DOE are requesting that the project offices develop a medium class JDEM mission, which will be scientifically more modest than the existing proposals. ASTRO2010 will provide advice on an optimal ground-space program for dark energy. The accelerator R&D workshop next week will highlight the importance of accelerators broadly in society and help develop a plan for future R&D.

Joe Dehmer reported on the National Science Foundation Physics Division. He noted that the recent budgets, including the FY2010 Congressional markups, are close to the ten year doubling level. He described the timeline for the Deep Underground Science and Engineering Laboratory

(DUSEL) including the recent approval by the National Science Board (NSB) of funding for the Preliminary Design Report (PDR). The goal for the PDR is late 2010 so that it can be presented to the NSB for MREFC approval in the spring of 2011, with a possible construction start in 2013. The NSB resolution that was just signed includes a request for a broad independent review of the priority of the DUSEL science program. The NSF/DOE Joint Oversight Group will jointly coordinate and oversee the DUSEL experimental program. A letter of intent was sent by the agencies to the Office of Management and Budget. NSF and DOE will actively pursue international partners for the DUSEL science program. In response to a question, Joe said that funds for pumping the mine will have to be found for a few years after Sanford Lab funds run out.

Barry Barish presented an update on the activities of the ILC Global Design Effort (GDE). He noted that the scale of ILC is similar to LHC or ITER, both of which have U.S. involvement. The total ILC program is currently about \$100M per year out of approximately \$2.5B worldwide in high energy physics, and much of the ILC expenditure is for superconducting radio frequency R&D, which is becoming broadly important in science. Barry reviewed the major R&D goals. A high yield of cryomodules reaching a gradient of 35 MV/m is close to being achieved. The next major step will be system tests with beam acceleration. A new baseline will be set this spring that will be carried through to the 2012 technical design report. The GDE expects that cost savings from the modified design will offset any other increases. Work is also underway on a project implementation plan including governance and finance models.

Young-Kee Kim spoke about the Tevatron Collider program. The accelerator performance is excellent, with  $7 \text{ fb}^{-1}$  delivered to date. The strategy is to maximize integrated luminosity, which should total close to  $12 \text{ fb}^{-1}$  by the end of 2011. The CDF and D0 detectors are taking data at high efficiency. Their silicon detectors should perform well through the end of the data run. The physics program is still very productive, with approximately two papers published per week. I thanked the CDF, D0, and Fermilab leadership for enabling advanced ATLAS and CMS graduate students to complete their Ph.D.s by writing dissertations based on analysis of CDF and D0 data.

Kevin Lesko described the breadth of the DUSEL science program and the goals of the project team. They are working on the NSB proposal, including facility design, a generic suite of experiments, and the NSF and DOE roles. There is now a users organization, and a scientific program committee with international participation is being formed. The NSF/DOE relationship is working well. For the neutrino experiment, Fermilab is the lead lab and leading the beamline effort, and Brookhaven is leading the detector work.

Dan Marlow presented the report of the HEPAP working group on the university program in the absence of Sarah Eno, the group's chair. This year they looked at basic demographic data, the response of the funding agencies to the 2007 university subpanel recommendations, and the status of university technical infrastructure. To address the latter, they conducted a poll which showed that if groups had more funds, their first priority would be adding scientific personnel. However, about half would put some of those funds into technical infrastructure. This reflects a serious concern about the training of the next generation of scientists. There was extended discussion among HEPAP members and agency personnel about how to make technical resources more accessible to university groups.

Cristinel Diaconu spoke about the International Study Group on HEP Data Preservation, which has held two workshops and is writing a report to the International Committee on Future Accelerators (ICFA). Data preservation would allow for reanalysis using new theory or experimental techniques and detailed combined analyses with new data. It could also be very useful for education and outreach activities. They have considered four models of data preservation, each with different costs and benefits. For the most complete preservation, there would need to be a data archivist for each experiment responsible for maintaining both the data and the associated software. New computing developments such as virtualization and cloud computing make this problem tractable. He described an international organization that could provide the necessary guidance and governance.

Judy Jackson described communications within the particle physics community. The Interaction Collaboration of high energy physics laboratory communicators worldwide was founded in 2001 and now has a web-based news service. The new tradition that groups writing major reports work with communications people from the start has been very successful. In order to further improve the efficacy of the communications efforts, the group is carrying out peer reviews of communications operations at HEP laboratories around the world.

Steve Ritz presented the report of the Particle Astrophysics Scientific Assessment Group (PASAG) HEPAP subpanel. The group was charged with recommending for each of four budget scenarios a program for the Cosmic Frontier – dark energy; dark matter; high energy cosmic rays, gamma rays, and neutrinos; and HEP support for a cosmic microwave background radiation (CMB) experiment. Much of this work is at the interface between particle physics and astrophysics, addressing important scientific questions in each discipline. The PASAG prioritization was based on a project's potential impact on particle physics. There are other advisory groups, for example the astronomy and astrophysics decadal survey, that will set priorities based on the goals of other fields. Steve presented the subpanel's recommendations for each budget scenario. Excellent science can be done under each scenario, but the resources available under the higher scenarios would enable a program with a much higher probability of making major discoveries. For the dark matter program, DUSEL would provide a unique location with needed infrastructure in the U.S. For dark energy, PASAG stressed that a detailed plan is needed to optimize observations from the ground and space. After a discussion, HEPAP unanimously approved the PASAG report.

The next HEPAP meeting will be held March 11-12 in Bethesda, Maryland.

Sincerely yours,



Melvyn J. Shochet  
Chair, HEPAP