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

Dr. Edward Seidel  
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 June 3-4, 2010.

Dennis Kovar began his report on the DOE Office of High Energy Physics (OHEP) by noting that we are in the midst of an extraordinary scientific revolution. None-the-less, the fiscal pressures in Washington require us to carefully craft a plan to both deliver the science and develop the next generation of technology that both addresses our needs and benefits society. OHEP program planning continues to rely on guidance from the P5 and PASAG HEPAP subpanels. There will be a meeting the week of June 7 with the American Regional Team on the International Linear Collider (ILC) R&D needs for FY2012-15. In August, a five-year muon accelerator R&D plan will be reviewed. Further planning for the LHC program including the upgrades awaits the CERN plan to be presented to the CERN Council this month. As a result of the accelerator workshop held last fall, OHEP is considering new initiatives in accelerator R&D.

Joe Dehmer presented an update on the NSF Physics Division. He first noted that Ed Seidel has been appointed Assistant NSF Director for Mathematical and Physical Sciences. Regarding DUSEL, the serious FY2011 budget shortfall has been addressed. There is a preservation plan agreed upon within the Executive branch for \$42M in FY2011, which occurs without increasing the NSF budget. There is good progress toward the DUSEL Preliminary Design Report, and the National Research Council study of the project's science has been charged. The NSF will now start to aggressively pursue international participation in the DUSEL science program.

Kevin Lesko reviewed the status of the DUSEL project. The explicit stewardship responsibilities of the NSF, DOE OHEP, and the DOE Office of Nuclear Physics have been agreed to. The DUSEL organization is nearly complete with approximately 55 staff members, half of which are in South Dakota. Maintenance and operations will be taken over from the state early next year.

Approximately 60% of the work toward the Preliminary Design Report is complete. It will be finished by the end of the year. A Program Advisory Committee is in place.

Jim Strait reported on the long baseline neutrino experiment (LBNE) whose collaboration has now grown to 54 institutions. The new Fermilab neutrino source will initially provide 0.7 MW and be upgradable to 2 megawatts or more. Experimental configurations using two water Cerenkov detectors, two liquid argon detectors, or one of each are being assessed. The goal is the greatest capability for neutrino oscillations and proton decay with the available funding. Discussions are underway to clearly define the boundary of responsibilities between the DUSEL and LBNE projects.

Charlie Baltay described the work of the Joint Dark Energy Mission (JDEM) Interim Science Working Group which was charged in December with developing one or two designs within the fiscal limits of a NASA Probe Class Mission. They presented their conclusions to NASA and DOE at the beginning of May and will later refine their report based on new information that will be available this summer. They considered the type-1a supernova (SN), baryon acoustic oscillations (BAO), and weak lensing methods for measuring dark energy with a stage-IV sensitivity as defined by the Dark Energy Task Force. Significant cost reductions were achieved by using an unobscured telescope design and reducing the number of detectors by using spectroscopy to obtain the light curves. A design for BAO and SN studies, which fits within the Probe Class limit, does as well as previous designs at half the cost. A second design, which would also measure the growth of structure with weak lensing, exceeds the cost limit. HEPAP is concerned that the ASTRO2010 prioritization was done before the JDEM Interim Science Working Group report was available.

Kathy Turner described the DOE's dark energy program. OHEP awaits two reports that will be available in the coming months, that of ASTRO2010 and the report from the OECD Global Science Forum Astroparticle Physics Working Group. In SN studies, DOE is funding the Supernova Cosmology Project, the Supernova Factory, and the Quest CCD camera that is being used by the Supernova Factory. In BAO, they are supporting the Baryon Oscillation Spectroscopic Survey (BOSS) which uses the SDSS telescope. The stage-III Dark Energy Survey, which employs four dark energy methods, is under construction and should start operating in 2012. DOE is looking to ASTRO2010 to recommend a coordinated ground- and space-based stage-IV dark energy program which could include JDEM, LSST, and BigBOSS. Kathy noted that ESA has invited NASA to join as a junior partner in the European Euclid dark energy space mission. HEPAP is concerned that if this became NASA's dark energy program, there might not be any significant opportunity for DOE scientists to participate.

Helen Quinn gave the annual report of the demography group which has been working for over a decade to understand the flow of young people into and out of high energy physics. The annual survey now employs a modern database, with data checking being done by the Iowa group. The numbers at each employment level, from graduate student through tenured faculty, are quite stable. It is difficult however to accurately track the transitions, especially those leaving the field. The survey response rate on where these people go has been poor. It is not clear to the demography group how best to improve the situation. Dennis Kovar said that the data is quite important. The group should make a proposal and then meet with the agencies to decide on an implementation plan.

Maury Tigner reported on the Linear Collider Steering Group of the Americas (LCSGA) which developed recommendations for positioning the Americas to participate in an overseas ILC and for its organization and governance. The LCSGA is supportive of the Global Design Effort (GDE) accelerator R&D plan, development of detector designs, and the collaborative efforts of the ILC and CLIC teams. The group made recommendations on such organizational issues as management structure, the governing body, attribution of in-kind contributions, budgetary control, and access policy.

Glen Crawford spoke for Howard Nicholson on the DOE's generic detector R&D program which now includes fundamental R&D on properties of particle detectors, pre-CD0 work on large detector projects, and future upgrades for which the technological choice isn't clear. There is also the Advanced Detector R&D program which is for short-term detector development at universities, and detector R&D for larger initiatives that can address broad programmatic priorities. To better fit into the OHEP funding model, detector R&D for lepton colliders will be transitioned into the generic detector R&D program as will be some of the LHC upgrade R&D. LHC upgrade work that is not of a generic nature will continue to be funded as before. The details of this new program are still being developed.

Glen then spoke about a problem affecting many DOE-funded university investigators, the lengthy delay this year in getting approved grant funds to the universities. Before addressing that issue, he noted that DOE grantees can now travel to the European Union and Switzerland on non-US flag carriers, although some exceptions exist. Regarding the funding delay, Glen said that the unusual delay in getting grant funds to the principal investigators this year was due to a combination of the long continuing resolution, an additional load from processing ARRA awards, problems with mandated new software which works well for procurements but not for grants, and the loss of key personnel. This is a problem across the entire Office of Science, has the attention of top department management, and is being addressed. However it will take time to fix. If there are urgent problems, PIs should let OHEP know.

Paul DeLuca spoke about the impact of high energy physics technology in medicine, specifically oncology. Great advances in imaging resolution have provided earlier detection of cancer and specific molecular targeting. The use of charged hadron beams rather than photon beams provides much more localized energy deposition which can kill cancer cells with less impact on nearby healthy tissue. This is important for certain cancers and in children. Intense neutron beams hold the promise for satisfying the increasing medical need for molybdenum-99 while avoiding the political difficulties associated with production in reactors. HEPAP asked why there is much activity in light-ion cancer therapy abroad, but not in the U.S. Paul responded that a change in philosophy is needed here. Abroad the centers are built as research facilities, while the U.S. model is one of commercialization.

Sam Ting reported on the Alpha Magnetic Spectrometer (AMS), a precision detector to measure high energy charged cosmic rays. It is scheduled to be launched in the Space Shuttle in November for operation aboard the International Space Station (ISS). The scientific goals of the experiment span important astrophysical and high energy physics questions. NASA's original plan was to fly AMS for three years and then return it to the ground so that the cryogenics for the superconducting magnet could be replenished. With the termination of the Space Shuttle program, AMS will now remain on ISS for 10-20 years of operation without cryogen resupply. As a result, the AMS collaboration has replaced the cryogenic magnet with the permanent

magnet built for early AMS tests. By moving the outer layers of the silicon tracking detector, they retain the design momentum resolution with some sacrifice in acceptance.

The final presentation was by Mike Procaro who described the DOE/NSF LHC Operations Program which manages detector and computing operations and upgrade R&D through the Joint Operations Group. The delay in the LHC schedule resulted in funding reductions in the current year and uncertainty in the timing of future upgrades to both the accelerator and the detectors. The DOE is delaying funding for Phase I upgrades and moving Phase II upgrade work into a generic detector R&D program. The NSF is keeping its upgrade R&D funding within the operations budget.

The next HEPAP meeting will be held in November in Washington, D.C.

Sincerely yours,



Melvyn J. Shochet  
Chair, HEPAP