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Dr. Michael Procario
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Department of Energy

Dr. Edward Seidel
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National Science Foundation

Dear Mike and Ed:

I am writing to summarize the meeting of the High Energy Physics Advisory Panel (HEPAP) held in Rockville, MD on June 23-24, 2011.

Mike Procario reviewed the status of the DOE Office of High Energy Physics (OHEP) efforts in the three high-energy physics frontiers, noting the excellent performance of the Fermilab Tevatron and CERN Large Hadron Collider (LHC), the Daya Bay reactor neutrino experiment remaining on schedule, and the CD0 approval for a next-generation ground-based dark energy experiment. He noted the potential importance of the recent result from the T2K experiment in Japan for the scientific prospects for both the NOνA and Long-Baseline Neutrino Experiment (LBNE) neutrino oscillation programs. There was a $4M reduction from the FY11 continuing resolution budget, which resulted in a delay of the Collider Detector R&D program to FY12. OHEP will carry out comparative grant reviews for existing grants that are up for renewal in FY12. In response to a HEPAP question about including the laboratories in these reviews, Mike said that they will consider doing this in the future.

Joe Dehmer, reporting on the NSF Physics Division, noted that although the President's FY12 budget request gives the NSF a 12% increase compared to FY10, Mathematical and Physical Sciences (MPS) gets only 6%, the lowest of the science directorates. Within MPS, Physics and Astronomy have the lowest increase, presumably because such basic science is not aligned with the administration priorities. Joe stressed his belief that the long-term health of the nation depends on nurturing basic science. The NSF will hold a detailed review of the Deep Underground Science and Engineering Laboratory (DUSEL) Preliminary Design Report so that all of this work provides a solid basis for moving forward. The Physics Division midscale instrumentation program, APPI, is now a top priority. It won't be a competition for a few years, while the funds build up, but it can be utilized to support instrumentation proposals that can't be supported by the usual program funding.

Patty McBride presented HEPAP's response to Bill Brinkman's request for a summary of current practices in disseminating the results of high-energy physics (HEP) research. In HEP experiment, our large international collaborations continue long-standing HEP practices of thorough internal review prior to publication. Long-term stewardship is provided by the journals and the arXiv repository, which along with SPIRES/INSPIRE also provides additional functionality like searches and citation totals. Additional information is publically disseminated by the Particle Data Group. Raw data sets are very large and difficult to use correctly, so they are not generally made public. An IUPAP/ICFA group is studying proposed solutions to preserving the data and the tools necessary to use them later, but this will require additional resources. In HEP theory, manuscripts are posted to arXiv and usually to a peer reviewed journal. Some theory results include new Monte Carlo programs, global fitters, and parton distribution functions. These are usually described in a paper and distributed freely via the web. HEPAP unanimously approved the written report.

Jay Marx reported on the Review of Options for Underground Science. With input from the stakeholders and an intensive 3-day meeting, the committee reviewed each of the experimental scenarios, the cost estimates, design status, and risk. The committee concluded that adding a dark matter (DM) or double-beta decay (DBD) experiment to an LBNE at the 4850-foot Homestake level with shared infrastructure would cost more than if the experiment were done at SNOLAB in Canada. The differential is currently estimated at approximately $100M, but the SNOLAB cost has to be verified. Additional DM or DBD experiments would cost the same at the two sites. The committee noted that these experiments and their follow-on experiments will take decades, and thus the additional cost spread over many years must be balanced against having an intellectual center for underground science in the US and promoting US leadership in the field for the foreseeable future. The committee feels that the choice of technology for the first stage of LBNE should be made as soon as possible because it impacts the strategic decisions on the other experiments. The committee also noted that there might be considerable physics advantages to the 1+1 option in which eventually both a water Cherenkov and liquid argon detector would be in place. In the discussion that followed, it was noted that costing is underway for a liquid argon detector at 4850 feet; it appears that the cost is competitive with other options. HEPAP reaffirms the conclusion of the 2008 P5 HEPAP subpanel that neutrino oscillation, dark matter, and neutrinoless double-beta decay experiments address key questions in elementary particle physics and that their siting in the Homestake mine fed by an intense neutrino beam from Fermilab is important to the US maintaining a leadership position in high-energy physics.

Andy Lankford gave an update on the National Research Council (NRC) panel studying the science that could be done at DUSEL. They were asked to assess the major physics questions that could be addressed and the impact that the DUSEL infrastructure would have on research in other fields. Because the NRC review process isn't quite finished, he could not present the conclusions of the panel. The target release date is July 12.

Kate Scholberg gave the annual report of HEPAP's demography subcommittee. She reviewed the history of the group since it was established in 1998. She summarized the 2010 census results, noting the difficulty and importance of knowing where people who leave HEP go. To address this, a proposal is being written to track the cohort of students and postdocs who left the field and to devise a long-term plan to sustain and enhance the survey. As part of the latter, they are considering the possibility of incorporating the survey into the SPIRES/INSPIRE infrastructure. In the discussion that followed, it was suggested that targeting a fraction of the cohort and reaching them all might yield better results than targeting everyone and only getting

information from a fraction of them. It was also suggested that minority information be collected along with gender information.

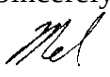
Daniela Bortoletto spoke about the upgrade of the LHC detectors and the important physics questions they will address. She started by describing the extraordinary performance of the LHC. It is possible that the ATLAS and CMS detectors could each collect as much as 15 fb^{-1} by the end of the current run 16 months from now. The experiments are recording data with high efficiency and excellent performance, but, given the plans for accelerator improvements, the detectors will need upgrades so they can handle the resulting large number of interactions per crossing. Daniela summarized the plans of LHCb, ATLAS, and CMS, focusing on the projects underway in the US. She pointed out that critical R&D for phase-2 upgrades must be done now because 5 years will be needed for construction. The US is far behind Europe in providing such funds. The cancellation of the FY11 DOE collider detector R&D program and the FY12 uncertainty are endangering our progress and creating uncertainties among our international partners. For the phase-1 upgrades, a clear funding plan for US participation in the construction is needed as soon as possible.

LK Len reviewed OHEP's role as steward for accelerator science. There are two major components of their accelerator R&D: accelerator science focusing on long-term fundamental research, and accelerator development working to improve existing and next-generation accelerators. Funding has remained relatively flat over recent years at about $80M in accelerator development and $55M in accelerator science. OHEP is developing a strategic plan in coordination with other offices using priorities that came out of the workshop held last year. A new initiative to better fulfill the stewardship role will convert existing HEP accelerator science facilities to user facilities. In response to a HEPAP question, LK noted that other DOE offices do programmatic accelerator R&D, but only OHEP has long-term responsibility for accelerator science.

Maury Tigner reported on the accelerator science being pursued at the Cornell Laboratory for Accelerator-based Sciences and Education. Current work includes reducing electron cloud effects in damping rings, achieving high brightness and current in continuous-wave linacs, exploring fundamental limits and new materials for superconducting RF cavities, and developing simulation code. Cornell has significant accelerator R&D infrastructure and 5 accelerator-science faculty members. Their students have carried out impressive projects, some winning national awards. In response to a HEPAP question on how to increase the number of graduate students in accelerator science, Maury noted that the problem is not support by the agencies but rather the lack of support within universities for appointing faculty in this area.

The next HEPAP meeting will be held on October 27-28 in Washington.

Sincerely yours,



Melvyn J. Shochet
Chair, HEPAP