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

Dr. Tony Chan  
Assistant Director for Mathematical and Physical Sciences  
National Science Foundation

Dear Dennis and Tony:

I am writing to summarize the meeting of the High Energy Physics Advisory Panel (HEPAP) held in Washington on February 14 and 15. The major focus of this meeting was the impact of the recently signed FY08 federal budget on the high energy physics program. Because of the severity of the budget reductions and the implications for entire program – the national laboratories and the universities, ongoing experiments and future projects – this was a very difficult meeting for everyone. HEPAP wants to thank both of you, Ray Orbach, Joe Dehmer, and Marv Goldberg for help and support in dealing with this funding catastrophe.

Ray Orbach presented his views on the recent budget actions in Washington. Ray feels the omnibus bill has serious implications not only for high energy physics but for all of the physical sciences. We must actively and publicly make the case for *long-term* basic research broadly in the physical sciences. The President's mention of science funding in the State of the Union address and the increases in his FY09 budget are an opportunity for us. For high energy physics, a science-driven plan from the Particle Physics Project Prioritization Panel (P5) is crucial. An exciting program must be presented for each of the budget scenarios. HEPAP recognizes the danger of the current situation and the importance of presenting a compelling plan to policymakers and the public.

Dennis Kovar described recent actions within the DOE Office of High Energy Physics (OHEP). He noted that while the Office of Science funding increased by 3.5% between FY07 and FY08, high energy physics dropped by 6%, 12.5% with respect to the President's budget. The impact on the field, including the reduction in force at both Fermilab and SLAC, has been severe. The President's FY09 budget is much better, but even this represents only an inflationary increase compared to the FY07 budget. Dennis feels we are at a pivot point in the HEP program. The community through P5 must develop a compelling and realistic vision for the U.S. program, and then support it. This must be done under all of the budget scenarios. HEPAP is painfully aware of the dire impact of the omnibus bill and understands the importance of having a compelling program for the field.

Dennis also described the new structure of the OHEP which will now be organized by scientific and technical areas as well as facilities and projects. There will also be a new review process for

the national labs. HEPAP sees advantages to the new structure and would like to hear a report after about a year on whether the new organization is meeting expectations. HEPAP is also happy to help OHEP attract the best candidates for the dozen new positions that will be posted as well as the IPAs that will be needed.

Tony Chan described the situation at the National Science Foundation. The FY08 omnibus bill had a serious impact on the Directorate for the Mathematical and Physical Sciences (MPS), decreasing most core programs by 5%, the exceptions being some foundation-wide initiatives and planned investment in new core programs like the Deep Underground Science and Engineering Laboratory (DUSEL) R&D. The FY09 Presidential budget is quite good, with a 20% increase in MPS research and related activities. Three Major Research Equipment and Facilities Construction (MREFC) projects in MPS are being funded: ALMA, IceCube, and Advanced LIGO. Three other projects are in planning and development: DUSEL, the Large Synoptic Survey Telescope (LSST), and the Giant Segmented Mirror Telescope (GSMT). In addition, funding for Physics Frontier Centers would increase by 25%. Tony noted that 70% of the MPS budget goes to individual and group investigators. HEPAP appreciates the positive effect of the proposed FY09 budget, but is very concerned about the impact of the FY08 budget, in particular the 5% decrease in core program funding and the disproportionate effect this will have on grants being renewed this year.

Pier Oddone described the broad science program being carried out at Fermilab. He sees the lab's future with three thrusts, at the energy frontier, the intensity frontier, and particle astrophysics. However the FY08 budget is a serious setback. In addition to halting work on the International Linear Collider (ILC), superconducting RF R&D, and the NOvA experiment, the lab had to implement a 200 person reduction in force and a rolling furlough. Pier is preserving the Tevatron and neutrino running, work on the LHC, and smaller projects that add vitality to the program. For the future, capital expenditure is crucial. Here Fermilab is focusing on Project X, which is technically aligned with the ILC, would provide a broad range of possibilities for a future program of neutrino and flavor physics experiments, and has a clear upgrade path. He stresses that this program has exciting physics, can be done incrementally, and provides a natural path to the energy frontier. HEPAP is very concerned with the impact of the FY08 budget on Fermilab's science program and on the morale of the staff. It commends lab management for working on a plan that addresses the short-term, mid-term, and long-term needs of the field.

Persis Drell described the impact of the FY08 budget on the SLAC HEP program. B Factory operations had to be terminated prematurely, ILC R&D halted, and a reduction in force of 225 had to be implemented. The lab tried to maintain core competencies needed for the LHC program, the GLAST experiment, completion of BaBar analyses, and to support new initiatives in the field including a future lepton collider. Persis argued that the future of the U.S. as a leader in particle physics is now in doubt. P5 must create a realistic plan that can be carried forward by the agencies. To do that, we must first answer difficult questions about which of our facilities are essential and what science we will be able to support. It is critically important that P5 make a compelling and realistic plan, behind which the community must unify. HEPAP concurs in the importance of the P5 planning process and agrees with Persis that questions like those she presented must be answered.

There were two talks on the ILC, one on the global situation and the other on U.S. plans. Barry Barish noted the serious impact of recent decisions in the United Kingdom and the United States to significantly reduce support for the ILC in the near term. In the U.K., they are working to retain the key intellectual contributions through a generic accelerator R&D program. In the U.S., ILC

work will be more narrowly focused. The next phase, producing a detailed technical design, will be accomplished with the available resources by reducing goals, strictly prioritizing, and stretching out the timescale. They will take advantage of synergies wherever they appear: in Europe with the XFEL free-electron laser project, in the U.S. with superconducting RF R&D and Project X, at CERN with CLIC.

Mike Harrison noted that with the enactment of the omnibus bill, almost all work on the ILC in the U.S. had to stop. We were able to pay our Global Design Effort (GDE) dues and keep four key management people. There is a small amount of funds remaining at Fermilab that may allow limited R&D using equipment on hand. The high priority electron-cloud work at Cornell will be carried out with NSF funds and a significant contribution from DOE, and some work on the machine-detector interface may be possible. With the U.S. ILC funding proposed in FY09 at approximately half of that proposed in FY08, the program will have to focus on the R&D that is unique to the U.S. Lost will be the breadth desired of a possible host nation.

HEPAP commends the GDE and the Americas Regional Team (ART) for quickly reacting to a budget disaster by focusing on the most crucial R&D issues and taking maximum advantage of the resources worldwide. Progress must continue if the field internationally is to be in a position to exploit the new physics that is seen at the LHC.

Bob Svoboda spoke on behalf of the U.S. members of the Double Chooz experiment. He showed the timescale for  $\theta_{13}$  sensitivity and noted that while funding has been made available to NSF-supported collaborators, this has not yet occurred for DOE-funded groups. Two years ago, HEPAP stated that “this is a good opportunity to quickly extend the explored range of  $\sin^2 2\theta_{13}$  at a relatively low cost that should be supported.” HEPAP has not changed its view.

Jim Reidy described the structure of the NSF high energy physics budget so that newer members of HEPAP could better understand the budgets. A similar presentation was made by the DOE at the previous meeting. Jim described the three major components of the university program – accelerator-based research, particle and nuclear astrophysics, and theory – as well as the other elements of the program including LHC maintenance and operations, DUSEL, and accelerator and detector R&D. He noted the importance of the field developing a viable long-term plan. HEPAP found the summary quite useful for understanding the NSF budget.

Charlie Baltay gave a status report on the work of the P5 panel, which had its first meeting at the end of January. He reviewed the accomplishments so far and the plans for the remaining meetings of the group. He then presented his own views of the issues and questions that the panel has to tackle in developing a plan for the field. HEPAP found Charlie’s presentation very illuminating.

Hassan Jawahery described the BaBar physics program in light of the premature termination of data taking. He reviewed the science that remains to be done with the data, the strength of the collaboration, and the need for support over the next few years for computing and the young scientists who will be completing the analyses. HEPAP notes the importance of maximizing the scientific return on the large investment that has been made. HEPAP is pleased that the DOE found the funds to extend the run sufficiently to take data on both the 3S and 2S resonances.

Usha Mallik reported on the work of the demographics committee. The database continues to improve and now includes the ability to track individual career paths. Dennis Kovar said he

strongly supports this effort. More detailed information on where the young people go is important both for the field and for the program managers. HEPAP agrees.

Finally, Bob Sugar reviewed the status of the lattice QCD studies being carried out by the USQCD collaboration. Much progress has been made in the range of calculations and their precision, partly due to the software tools that have been developed and the dedicated computing platforms that have been built. They are halfway through the current software and hardware grants and are proposing a new hardware project for 2010-14. HEPAP notes the importance of lattice calculations, especially in the flavor sector.

The next HEPAP meeting will occur on May 29 and 30. The major agenda item will be the report of the P5 panel on the ten-year program for the field.

Sincerely,

A handwritten signature in black ink, appearing to read "Melvyn J. Shochet". The signature is fluid and cursive, with the first name being the most prominent.

Melvyn J. Shochet  
Chair, High Energy Physics Advisory Panel