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Dr. James Siegrist
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 Jim and Ed:

I am writing to summarize the meeting of the High Energy Physics Advisory Panel (HEPAP) held in Washington on October 27-28, 2011.

I welcomed Jim Siegrist as the new Associate Director for High Energy Physics and thanked him for accepting this important responsibility in such a challenging period. Jim began by noting this year's Nobel Prize in Physics for the discovery of the accelerating expansion of the universe and pointing out that it was the DOE's support of innovative ideas at the national laboratories that enabled Saul Perlmutter's discovery. Congress has asked for a strategic plan for accelerator R&D and a strategy for the energy frontier and the expected benefits from that program. The office will develop a strategic vision over the next 12-18 months for a diverse program based on plans developed by previous subpanels. Jim also noted the urgency of a decision on the Long Baseline Neutrino Experiment (LBNE) by the spring.

Joe Dehmer reported on the NSF Physics Division. The highest priority beginning in FY12 is to start the Midscale Instrumentation Program to cover the gap between the MRI maximum award and the MREFC minimum award. It will be a Physics Division initiative to provide funding for projects in normal grant proposals that get highly reviewed but can't be funded from a program's budget. About a year later, Joe hopes to initiate a similar program to support accelerator physics research at universities. Because of the difficult budget climate in Washington, it is felt that flat funding in FY12 would be a good outcome for the science agencies. However because of NSF priorities, physics might suffer a budget decrease, perhaps 3%. Careful planning is necessary so the division doesn't get overcommitted.

Andy Lankford summarized the report of the NRC assessment of the DUSEL science program. The committee concluded that underground experiments on direct detection of dark matter, long baseline neutrino oscillations, and neutrinoless double beta decay would be of paramount importance because they address crucial questions about our understanding of the universe. These three efforts should be pursued independent of location. The US is particularly well

positioned to build a world-leading long-baseline neutrino experiment due to the availability of an intense neutrino beam from Fermilab. The location of all three experiments at the same site would allow efficient sharing of infrastructure and personnel and increase the visibility of US leadership in underground science.

Chris Quigg summarized the achievements of the Tevatron Collider program which recently ended after an extremely successful quarter century run. The accomplishments of the CDF and D0 teams were made possible by important accelerator innovations including helical orbits for multibunch operation and electron cooling. The discovery of the top quark in 1995 was the most visible scientific advance, but there were many other important results including the precision measurements of the top quark and W boson masses and the very rapid B_s oscillation frequency. There were also important detector innovations including silicon vertex detectors and secondary vertex triggers, large scale liquid-argon-uranium calorimeters, and multivariate analysis techniques. There are a few observations that don't agree with expectations: the forward-backward asymmetry in top quark pairs seen in both CDF and D0, an anomalous like-sign charge asymmetry in b quark pairs seen in D0, and an excess of jet pairs in events containing a W boson seen in CDF. Further elucidation of these effects awaits the final analysis of the full data sample. The CDF and D0 spokespersons thanked the agencies for their support and provided copies of their publications for the agency archives. They will need continuing support to complete the ongoing analyses over the next 1-2 years and keep their data accessible for at least 5 years.

Dan Hitchcock gave an overview of the DOE's Advanced Scientific Computing Research program (ASCR) which develops world leading computational and networking capabilities to extend the frontiers of science and technology. ASCR just opened a cross-country fiber network that provides 100 gigabits/wavelength, an order of magnitude increase over previous systems. They recently had a call for proposals. Topics from high energy physics came from the cosmic frontier, lattice QCD, and accelerator modeling and simulation. A major issue for ASCR is energy efficient high performance computing. The biggest challenge is data intensive science rather than CPU intensive science. The early LHC data challenges helped elucidate this problem.

Dan Marlow and Ann Nelson reported for HEPAP's working group on problems of concern to the university community. This year they focused on university technical infrastructure and funding paths for new faculty. Training of young people is a central goal of universities. In experimental high energy physics, there has been a significant decrease in hardware training in recent decades due to a lack of opportunity and the demise of technical infrastructure at universities. The group recommends changes that can help the problem without seriously affecting the high energy physics budget including a modest expansion in funds for generic detector R&D, project management that more fully appreciates the cost effectiveness of doing hardware work at universities, and reducing barriers between base grant and project funding sources. Regarding funding paths for new faculty, the group feels that the DOE's new Early Career Award Program is an important new program. However there are some issues that were raised including the relative funding levels of university and laboratory awards and how to properly acknowledge those young people who are funded through umbrella grants rather than Early Career Awards.

Harry Weerts reported on plans for the upcoming Intensity Frontier Workshop which is charged with identifying the scientific opportunities at the intensity frontier and the experiments and

facilities needed to carry out the program. The work is underway in meetings of the six working groups that started in October. Participation by the community at the workshop is highly encouraged.

Mike Harrison gave an update on the worldwide activity for the International Linear Collider. The 2007-2012 R&D phase will come to an end with the publication of the ILC Technical Design Report at the end of 2012. During this period, significant changes were made in the accelerator design that would improve performance and reduce cost. Important tests are being carried out at KEK's ATF2, DESY's TTF/FLASH, and Cornell's CesrTA test facilities. The ability to build and test superconducting RF cavities has increased dramatically at Fermilab and Argonne in recent years. The high field yield is greatly improved. Plans are being made for a continuing program after 2012 when both the ILC TDR and the CLIC CDR with its cost estimate should be available. A new linear collider organization including both of these projects is being discussed since the mandates are ending for both the Global Design Effort and the International Linear Collider Steering Committee. Mike described a possible US ILC program for 2013-15 that would focus on several important issues.

Glen Crawford described the university proposal comparative review process that is starting this year. The goal is to improve the overall quality of the program by identifying the best proposals. This will be accomplished by comparing all proposals received in a given year. Separate panels will be established for each sub-area – the 3 frontiers, theory, and technology R&D. A person can submit both an Early Career proposal and a comparative review proposal, but they must have distinct research scopes.

Jim Whitmore reviewed the NSF program in particle astrophysics (PA). They are following the PASAG recommendations as well as the recent NRC DUSEL science report. PA is supporting 11 experiments in the US and 20 experiments in other countries covering dark matter, cosmic rays and high-energy gamma rays, ultrahigh-energy neutrinos, reactor neutrinos, solar neutrinos, neutrinoless double beta decay, the cosmic microwave background, and dark energy. On many projects, they are collaborating with DOE and/or the NSF astronomy division.

Kathy Turner described the DOE program at the cosmic frontier. In setting priorities, they are following recommendations of P5, PASAG, and Astro2010. She noted however that some of the recommendations were dependent on the overall funding level, and at present we are at or below the lowest of the PASAG funding scenarios. They are supporting multi-experiment programs in dark matter, dark energy, and cosmic rays and high-energy gamma rays. A technology choice is needed for the second generation dark matter experiments, so a review will be carried out in coordination with NSF. In addition, they are considering a workshop to develop a coordinated dark matter program including both direct and indirect studies. The future dark energy program will include LSST but probably not WFIRST. A BigBOSS review of both the science case and R&D needs will be held. The next proposed large cosmic gamma ray experiment will be the European-led CTA. Review of the R&D requests from US institutions will be coordinated with the NSF.

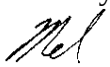
HEPAP is pleased to see the interagency collaboration in the planning for the future cosmic frontier program.

Ian Shipsey reported on the DPF taskforce on instrumentation in particle physics. A workshop was held a year ago, the taskforce has been hard at work since then, and their report is now being

distributed to the DPF membership for comment. The final version is expected during November. Ian stressed that instrumentation is the enabler of both pure and applied science, yet funding has been declining. This is endangering future HEP experiments since new techniques are needed to make those projects affordable. The taskforce is recommending a Detector R&D Coordinating Panel to be charged by the DPF Executive Committee to promote national detector instrumentation R&D. They would also like to see a prestigious program of national instrumentation postdoctoral fellowships, support for graduate students who are doing a Ph.D. in instrumentation, and a DPF award for excellence in instrumentation development.

The next HEPAP meeting will be held in March in the Washington area.

Sincerely yours,



Melvyn J. Shochet
Chair, HEPAP