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Dear Mike and Ed:

I am writing to summarize the meeting of the High Energy Physics Advisory Panel (HEPAP) held in Washington, D.C. on November 18-19, 2010.

Dennis Kovar gave a report on the DOE Office of High Energy Physics (OHEP). He noted that funding in FY11, FY12, and the out-years is uncertain and under pressure due to the overall federal budget problems. The field is somewhere between P5's scenario A and scenario B if a reasonable estimate of technical inflation is applied. OHEP is starting to implement the intensity frontier program recommended by P5. Guidance provided by the Particle Astrophysics Scientific Advisory Group (PASAG) and the ASTRO2010 decadal study is being used to develop the dark matter and dark energy portfolios.

Howard Gordon presented the first physics results from the experiments at CERN's Large Hadron Collider (LHC). He noted that this has been a spectacular year for the LHC with the instantaneous luminosity increasing by 5 orders of magnitude. He showed plots demonstrating that the performance of the detectors is understood exceedingly well. There are physics results from ATLAS and CMS on properties of minimum-bias events, long-range particle correlations, jet, W/Z , top quark production, limits on dijet resonances, contact interactions, and leptoquarks. LHCb has seen a new B_s state and measured the rare two-body decay of B mesons into pions and kaons. Howard concluded by showing results from the first few days of heavy ion collisions.

Marv Goldberg gave a report on the NSF High Energy Physics program (HEP). HEP has developed partnerships with other NSF offices in order to enhance the high-energy physics program, which is especially important in difficult economic times. Funding has been essentially constant not including money budgeted through other offices. Two projects have recently made interesting observations outside of HEP: IceCube's measurement of temperature changes in the Antarctic ozone layer and Borexino's observation of geo-neutrinos and the resulting conclusion about the Earth's core. In the accelerator-based program, Marv noted the partnerships with the

Office of International Science and Engineering; the Atomic, Molecular, and Optical Science program; and the Office of Cyber Infrastructure and Physics at the Information Frontier.

Jim Alexander reported on the recent Committee of Visitors review of the DOE's Office of High Energy Physics. They found that overall the performance of OHEP is extremely high. Their 22 recommendations include getting a HEPAP expert panel to formulate a strategic plan for OHEP's stewardship of accelerator science and technology, using comparative review panels on a regular basis, and working with the Office of Science to address the funding disparity between university and laboratory Early Career Awards. HEPAP unanimously approved the report.

Dan Marlow gave the annual report of HEPAP's informal subcommittee on the university program. The subcommittee sent a letter to principal investigators (PIs) asking for comments on the program. Positive comments and concerns were present in the 33 responses that were received. A number of comments concerned the Early Career Awards. Some theorists suggested making smaller awards so that most of the funds don't go to just a few scientists, while other talented young people receive nothing. The importance of maintaining university technical infrastructure both for the research program and student education was stressed. Respondents also felt that the strict partitioning of funding into programmatic categories unnecessarily limits the PI's ability to redirect funds toward the most pressing scientific problems.

Roger Blandford reviewed the recent ASTRO2010 decadal study. The panel categorized the scientific recommendations into three areas: Cosmic Dawn, New Worlds, and the Physics of the Universe, the latter of which is of prime interest to high-energy physics. They tried to develop a balanced program in a very cost-constrained environment. The highest priority large-scale space program is WFIRST which would study dark energy, exoplanets, and provide a broad astronomical survey. The medium-scale program includes a focus on ground-based observation of B-mode polarization in the cosmic microwave background in order to study the era of inflation. The highest priority in the large-scale ground-based program is LSST, which would study dark energy using gravitational lensing and supernovae. If the budget were insufficient for DOE to support both WFIRST and LSST, the first priority should be given to LSST because the DOE contribution is relatively larger and its technical role is clearer.

Charlie Baltay described the Organization for Economic Co-operation and Development's (OECD) Global Science Forum working group on astroparticle physics. The members are from the funding agencies, augmented by some scientific experts. The charge is to define the new field, assess the present status worldwide, and create a vision of the scientific opportunities over the next 20 years. Their definition of the field includes non-accelerator neutrino studies and proton decay because Europe would like global coordination in those areas as well as dark matter, dark energy, gravitational wave, and cosmic messenger experiments. These subfields have approximately 4000 researchers worldwide and a budget of 400 million dollars.

Patty McBride spoke about the serious impact visa problems are having on the ability of the US to hold large international HEP meetings. The C11 committee of the International Union of Pure and Applied Physics (IUPAP) helps organize the big summer conferences in the field. It is finding hesitancy in siting the International Conference on High Energy Physics in the US because of the 3-4 months needed for some people to get visas. This is problematic because collaborations often do not select their parallel session speakers that far in advance. The problem may affect the Lepton-Photon conferences in the future because its all-plenary format is being

reconsidered. Patty is trying to get more data because there is some indication that the situation has improved. In any case, the field has to plan ahead if we want to successfully host such meetings in the US.

Oya Rieger from the Cornell University library spoke about the new funding model for supporting the arXiv preprint repository which is housed at Cornell. The annual budget is \$400k, mostly for user support and programming. Their unit cost is \$7 per paper submission. Approximately 15% of the articles are on particle physics. In January, they announced a 3-year collaborative support model in which voluntary contributions are requested from the top 200 user institutions. Since that time they have secured \$340k from 122 institutions in 10 countries. They are working to create a strong governance structure with an international advisory group and a scientific advisory board for long-term planning. They are continuing to identify funding sources and understand the perspective of all of the stake-holders.

Lucio Rossi reported on the performance and plans for the LHC. The primary goal for 2010 was reaching a luminosity of $1 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$ so that 1 fb^{-1} could be collected in 2011. The goal was surpassed and 50 pb^{-1} was delivered to each of the experiments. There are intensity limitations due to electron cloud effects, but they can likely be controlled by scrubbing and placing low field solenoids around particularly bad points in the machine. What are apparently dust particles have been observed falling into the beam. This is a problem whose impact increases with intensity, but it is hoped that once the dust is gone, the problem will disappear. Following the proton-proton running there was a very successful heavy ion run. The plans for running in 2011, both energy and duration, will be decided at the annual Chamonix retreat. The integrated luminosity goal will probably be 1 fb^{-1} , but twice that or more could be delivered. Following the next run, there will be a 15-month shutdown to repair the magnet splices and allow the LHC to reach its design beam energy. Lucio concluded by noting that the accelerator luminosity upgrades for the end of the decade will be defined this summer with a design study in which the US is a full participant.

Joe Dehmer reported on the NSF Physics Division. His meeting with the new NSF Director the previous day was very positive. Joe feels that the most optimistic budget scenario for FY11 is a continuing resolution for the rest of the year. The NSF and DOE are working well together on planning for DUSEL; a National Research Council study on its science will begin in December. Cyber Infrastructure for the 21st Century is an important initiative of the Mathematical and Physical Sciences directorate; we should pay attention to solicitations in that area. Open-access data is important to the NSF; a data plan must be included in all proposals starting in January. Joe concluded by restating the policy that at least 50% of Physics Division funding will go to PI grant support.

Randy Ruchti described the substantial effort of the high-energy physics community in education, outreach, and workforce development. The many programs underway include the Partnerships in Research and Education (PIRE) which focuses on pixel detector technology, the University of Michigan-CERN Research Experience for Undergraduate (REU) program that has 32% women and 17% minority students, the Fermilab education office programs that have reached thousands of K-12 students and teachers, the Cornell accelerator center's programs with rural schools, and QuarkNet with its 52 centers in 25 states that reach 500 high school teachers per year. There are also books and lectures for the public, public web pages that display events

from experiments in real time, and an expansion into the new social media. HEPAP is very impressed by the breadth and impact of these programs.

The meeting concluded after Dennis Kovar announced that he is retiring at the end of December. I and others thanked Dennis for the important contributions he has made since becoming Associate Director for High Energy Physics.

The next HEPAP meeting will be held on March 17-18 in Washington when we expect to hear the details of the FY12 budget.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Mel', with a vertical line extending downwards from the end of the signature.

Melvyn J. Shochet
Chair, HEPAP