Report of the 2010 DOE Office of High Energy Physics Committee of Visitors

COV reviews are triennial events mandated by Office of Science (SC) for all divisions.

Previous COVs: 2007, 2004; reports are publically available - on DOE website.

Charged by HEPAP under SC guidelines, report to HEPAP

Panel of ~24 representing principal areas of HEP community

Period under review: 2007-2009.

The Charge

The Panel should assess:

- the efficacy and quality of the processes used to solicit, review, recommend, monitor, and document application and proposal actions;
- The quality of the resulting portfolio, including the breadth and depth of portfolio elements, its national and international standing, and the progress OHEP has made toward its long-term goals
- Are the priorities of the 2008 P5 report being reasonably followed?
- Are the actions of the OHEP maintaining the capabilities needed for healthy laboratory and university programs?
- Comments and suggestions for improvements
- Progress made in addressing action items from the previous COV

Panel Members & subpanel organization

Jim Alexander, Cornell University, Panel Chair

1. Subpanel on Accelerator Based Experiments

Jim Pilcher, University of Chicago (Chair)
Darien Wood, Northeastern University
TejinderVirdee, CERN, Imperial College
Marjorie Corcoran, Rice University
Ron Poling, University of Minnesota

2. Subpanel on non-accelerator-based Experiments

Francis Halzen, University of Wisconsin (Chair)
Hank Sobel, University of California, Irvine
Jean Cottam, NASA-Goddard
Kate Scholberg, Duke University

3. Subpanel on Theoretical Physics

George Sterman, State University of New York, Stony Brook (Chair)
Csaba Csaki, Cornell University
Jonathan Feng, University of California, Irvine

4. Subpanel on Advanced Accelerator R&D

Maury Tigner, Cornell University (Chair)
Chan Joshi, UCLA
David McGinnis, Fermilab
Lia Merminga, TRIUMF

5. Subpanel on Facility Operations

Rod Gerig, ANL (Chair)
Guy Wormser, Laboratoire de l'accelérateur linéaire
John Seeman, SLAC
Stuart Henderson, Fermilab

6. Subpanel on Projects

Gary Sanders, TMT Project (Chair)
Gil Gilchriese, LBNL
Jim Yeck, University of Wisconsin

Agenda

Wednesday Oct 13th

8:30-10:00 Plenary

- OHEP Overview - Kovar
- Budgets - Crawford
- Statistics - Boger

10:00-12:00 Parallel - subpanels

- presentations by pgm mgrs
- Q&A with subpanel & pgm mgr
- first look at records

12:00-1:00 Working Lunch

1:00-3:30 Parallel - subpanels

- study records

3:30-4:30 Executive Session

4:30-5:30 Discussion with OHEP Mtg

Thursday Oct 14th

8:30-11:30 Parallel -subpanels

- study records, formulate subreport

11:30-12:30 Working Lunch

12:30-4:30 COV Plenary

- subpanel reports & discussion

4:30-5:30 Preliminary Closeout

- with OHEP Mgt
- discussion of findings & recommendations

Friday Oct 15th

8:30-9:30 COV Plenary

- summarize, discuss

9:30-10:30 Full Closeout

Strategic Issues (1)

- OHEP is following and appears fully committed to carrying out the roadmap constructed by P5 in 2008.
  - (no recommendations)

- While the energy frontier has moved to Europe with the LHC, the need for accelerators for discovery science, security, energy, environment, industry and medicine, as discussed in the national workshop Accelerators for America's Future, has continued to grow. A new strategic plan for strengthening the stewardship role of OHEP for accelerators is needed.
  - R1. Charge HEPAP to convene an expert panel, as called for in the P5 report, to formulate a strategic plan for strengthening and expanding the stewardship role of OHEP in accelerator science and technology.

Strategic Issues (2)

- Projects underlie the future of the program. For the period under review, eight projects were underway, with budgets totalling about 5% of OHEP funding. … this was a historic low, and in the period since, projects under OHEP stewardship grew to about 10% of the department's funding and show continued rise today.
  - R2. Increase the fraction of the total OHEP budget devoted to projects.

Indeed, the future U.S. roadmap covering the three scientific frontiers contains a number of potential projects, some requiring very substantial funding over the remainder of the decade.

Issues common to all OHEP sectors (1)

- **National and International Standing of the OHEP program:**

  The program emphasizes high quality science, and is meeting goals. The international standing is excellent, indicated by the significant roles that US participants enjoy in collaborations abroad, by the international character of Babar. Tevatron, and neutrino programs which attracted large parts of the European and Asian communities to US facilities, and by the overall first rate research. The stability of international partnerships is much improved.

  - (No recommendation)

Issues common to all OHEP sectors (2)

- **Staffing in the Office of High Energy Physics:**

  Program managers and all administrative personnel are hardworking…, but there are too few people for the size of the mandated workload. In almost all areas additional staff are needed to relieve the load and facilitate operations … Adding more staff is a perennial problem in the office.

  Creative approaches may be useful, … part time consultants from the ranks of recently retired DOE or NSF personnel, … continuing and extending the standard practices of using federal employees, lab detailees, and IPAs. … directed recruitment activities by OHEP management and HEPAP members can be useful, and certain venues such as laboratory user meetings and general HEP conferences may offer effective platforms to advertise the opportunities available within OHEP.

  - R3. Recruit and hire additional OHEP staff.

Issues common to all OHEP sectors (3)

- **The new portfolio-oriented structure:**

  The new office structure introduced during this review period appears to be a real improvement that more tightly couples program managers to natural areas of responsibility. Cross-channel couplings via program manager interactions (for coordination of activities and movement of funds) appear to work in most cases but are informal and ad hoc.

  For the smaller programs the informal nature of the inter-portfolio exchanges is probably beneficial in being lightweight, while for the larger programs involving laboratory operations and project management, more formalization of these relationships could make the procedures more robust over time and in changing circumstances, as well as more transparent to the end users.

- (no recommendation)

Issues common to all OHEP sectors (4)

Proposals and Reviews:

- Use of review templates should continue and expand…
- Faster response and prompt forwarding of reviews to proposers is especially important for declines where proposers need feedback to improve.
- The renewal rate is very high and changes in funding levels are often not very responsive to changes in reviews.
- Comparative reviews via specially-convened panels are strongly recommended to give incisive information, in the form of differential judgments, for program manager decisions. Such information will aid the program manager in tough decisions and help to maintain highest program quality over time.
  - R4. Use comparative review panels on a regular basis.
  - R5. Develop standard procedures to ensure that feedback to proposers is routinely provided in a timely way and with as much information as possible, including reviews, for both declined and accepted proposals.

Issues common to all OHEP sectors (5)

Early Career Awards

- This is a program introduced at the Office of Science level to replace OJIs. The Panel sees this as a very positive development.
- Some issues, however:
  - ECA awardees working at a national lab receive about 3x as much funding as university-based awardee doing similar work. This is attributed to support for PI salary, but disparity still arises because freed-up salary funds are available for other uses.
  - University candidates must be untenured; lab candidates at any level; former OJI winners are eligible.

R8: Work with the Office of Science to address the disparity of funding between university and national laboratory Early Career Awards, taking into account differences in underlying costs.

Accelerator-based Research

- The program includes many world-class experiments performed at U.S. facilities. … BaBar, CDF, D0, and CLEO-c, the neutrino experiments MINOS, MiniBooNE and SciBooNE, and the KTeV fixed target experiment. Many of these experiments have substantial participation from abroad.
- There are U.S. groups supported by OHEP in most important overseas experiments. These are unique experiments, ranging from BESIII, Super-K, T2K, Belle, MEG, to ATLAS and CMS. They push the intensity or the energy frontier –both parts of the key mission of OHEP.
- Proposal process: reviewers well chosen, funding decisions reasonable, long delays for unsuccessful proposals
- Early Career Award disparities are a concern
- Staff size: falls short of the level needed to handle the work effectively. Non-renewal year site visits are not optimal use of time given the existing overload
- *The ARRA funding was handled by OHEP in a timely and effective way despite the large increase in work load. Unfortunately there were very substantial additional delays in the Chicago Field Office in processing the awards.*

Non-accelerator-based Research

- The US is a leader in much of this field … A particularly distinctive feature of the field is that it is a fast moving, highly competitive area where new ideas emerge quickly and are vigorously pursued by an aggressive worldwide community.
- Such a field requires agile, nimble, and responsive management.
- [the materials provided] suggest that grants are being evaluated based on the historical strength of the group rather than the current strength or productivity of the group. This is of particular concern when considering whether new investigators, new science, or high-risk projects can be competitive. Comparative reviews can be a powerful tool for addressing these issues and keeping the program in peak form.
- Low threshold for "projectization" imposes administrative burdens and costs that can delay scientific results - dangerous in this fast-moving, competitive field.
  - Develop ways to mitigate the delays in funding due to the requirement that MIEs must appear in the budget request.

Theory Research (1)

- The recent management restructuring, grouping theory at laboratories and universities together under a single program manager, is a positive development, enabling coordinated support of the full range of theory activities.
- The theory program manager's load is daunting, involving some seventy university grants in addition to the five laboratory programs. … IPA who will soon leave.
- Theory group proposals can be quite diverse, requiring careful matching of reviewers, and adequate number of reviewers
- While every individual grant is appropriately reviewed by external referees … levels of funding often reflect history as much as the balanced positive and negative comments in the reviews. … program managers could benefit from the comparative judgments of experts of diverse experience
- Early Career Award program: comments made above (p11)
- program manager implemented two new programs for graduate students … [these] meet a strong need and are responsive to previous review comments

Theory Research (2)

- Recommendations of theory sub-panel:
  - R3. Recruit and hire additional OHEP staff.
  - R12. Ensure that all substantial subfields represented in a theory task proposal are evaluated by qualified reviewers.
  - R13. Ensure that declinations be communicated no later than eight months after the proposal deadline.
  - R6. Involve program managers in guiding database development.
  - R4. Use comparative review panels on a regular basis.
  - R8. Work with the Office of Science to address the disparity of funding between university and national laboratory Early Career Awards, taking into account differences in underlying costs.
  - R14. Open the eligibility requirements of the theory home institution program so all advanced HEP graduate students have equal opportunity to participate in the home institution graduate program.
  - R15. Expand the theory graduate student fellowship program to support more students per year.
  - R16. Encourage grant applications from OJI and ECA awardees at the end of their OJI/ECA funding period, regardless whether their university theory group is traditionally NSF- or DOE-funded.

Advanced Accelerator R&D

- The world of accelerator based high energy physics has evolved significantly in recent time… need to formulate strategic plan… leads to Recommendation 1.
- The overall staffing shortage in OHEP is most acute in accelerator science and technology which has lost half of its staff through retirement and departures.
- U.S. Advanced Accelerator R&D is world leading and is likely to remain so for some time with the BELLA and FACET initiatives, high field magnets, superconducting RF research, and high gradient normal conducting cavity development.
- OHEP accelerator R&D program is of great depth and breadth as appropriate for the stewardship role it aspires to play in the Office of Science. The work is appropriately distributed among short, medium and long term activities.
- Four recommendations, see slides 5-10

Facilities and Operations (1)

- Facilities: Fermilab, SLAC B-factory, LHC Detector Operations

- The Tevatron ran throughout the three year period being reviewed. During this time it regularly exceeded its performance metrics.
- The B-factory ran through two of the three years. Operation was terminated prematurely in FY08 due to the funding shortfall.
- The LHC detector operations performed among the best of the international collaborators based on collaboration metrics (e.g. US Tier 1 computing facilities for the LHC)

- The OHEP facilities have been highly productive during this period, and have held international leadership positions in multiple frontiers. …. Overall the COV finds that the OHEP is doing an excellent job of managing the facilities, during a time of challenging budget constraints, … future facility planning is made more difficult by the delay in LHC physics results which are needed to define the next facility parameters..

Facilities and Operations (2)

- Need flexibility to make budget-neutral shifts of funding among budget codes… procedures not clear; large number of budget codes --> complications, reduced efficiency, …Metrics for performance measurement evolve in nontransparent way
  - R17,18. Define a transparent method and approval process to facilitate modest funding changes between funding streams in response to evolving circumstances.
  - R18. Develop and articulate a more formal methodology and timeline to define short term and long term operational metrics for OHEP facilities and a method for adjustment for yearly changes.
- Facility reviews 'continue to be of high quality'… 3 detailed recommendations for improving the review process
  - R19, 20, 21

Projects

- Nova, Daya Bay, Minerva, MicroBoone, DES camera, Bella, Facet…
- Funding in 2007-2009 was ~5% of OHEP budget: historically very low. Since then has risen to 10%, will continue to rise with planned projects (LBNE, Mu2E,…)
- Projects are the investment in the future: should be reasonably substantial part of the budget
- The efficacy and quality of the processes used to monitor active projects is high. Consistent, periodic and appropriate reporting is used….
- Staffing levels are marginal….If the anticipated future projects are realized in the next few years, particularly large projects (e.g. LBNE), an additional FTE will be needed …
  - R2. Increase the fraction of the total OHEP budget devoted to projects.
  - R22. Develop more projects to readiness (CD-0, etc.) in order to be able to respond expeditiously to program opportunities.

Concluding Remarks

- The overall portfolio of research, facilities, and projects is professionally managed by OHEP.
- The performance and standing of the program is of the highest caliber.
- The OHEP is closely following the strategic plan of the field as laid out by P5.

- The need for additional staff in OHEP continues to be a serious problem. We all need to engage in identifying & encouraging suitable candidates to apply. Some steps to streamline workload suggested.
- The research portfolio shows some inertial effects and could benefit from incisive judgments of comparative review panels.
- Agility is important in the fast-moving non-accelerator area.
- Management of facilities and projects is on firm footing, some suggestions made to refine lab-agency interactions

List of Recommendations (1-6)

- **1. Charge HEPAP to convene an expert panel, as called for in the P5 report, to formulate a strategic plan for strengthening and expanding the stewardship role of OHEP in accelerator science and technology.** *(p5, p22)*

- **2. Increase the fraction of the total OHEP budget devoted to projects.** *(p5, p30)*

- **3. Recruit and hire additional OHEP staff.** *(p6, p10, p17, p23, p25, p30)*

- **4. Use comparative review panels on a regular basis.** *(p8, p15, p19)*

- **5. Develop standard procedures to ensure that feedback to proposers is routinely provided in a timely way and with as much information as possible, including reviews, for both declined and accepted proposals.** *(p8)*

- **6. Involve program managers in guiding database development.** *(p8, p19)*

List of Recommendations (7-11)

- **7. Implement an adequate data base of potential reviewers to support the efforts of the program monitors. The monitors should be consulted to provide input to the process.** *(p10)*

- **8. Work with the Office of Science to address the disparity of funding between university and national laboratory Early Career Awards, taking into account differences in underlying costs.** *(p10, p20)*

- **9. Rebalance program manager travel, possibly reducing the number of non-renewal year site visits, to ensure the availability of time and funding for travel to reviews, conferences and other program activities.** *(p11)*

- **10. Establish templates for reviewers to follow which are designed for ready interpretation.** *(p15, p22)*

- **11. Develop ways to mitigate the delays in funding due to the requirement that MIEs must appear in the budget request.** *(p16)*

List of Recommendations (12-16)

- **12. Ensure that all substantial subfields represented in a theory task proposal are evaluated by qualified reviewers.** *(p18)*

- **13. Ensure that proposal declinations be communicated no later than eight months after the proposal deadline.** (See also Recommendation 5.) *(p18)*

- **14. Open the eligibility requirements of the theory home institution program so all advanced HEP graduate students have equal opportunity to participate.** *(p21)*

- **15. Expand the theory home institution graduate student fellowship program to support more students per year.** *(p21)*

- **16. Encourage grant applications from OJI and ECA awardees at the end of their OJI/ECA funding period, regardless whether their university theory group is traditionally NSF- or DOE-funded.** *(p21)*

List of Recommendations (17-22)

- **17. Define a transparent method and approval process to facilitate modest funding changes between funding streams in response to evolving circumstances.** *(p25)*

- **18. Develop and articulate a more formal methodology and timeline to define short term and long term operational metrics for OHEP facilities and a method for adjustment for yearly changes.** *(p25)*

- **19. Incorporate into the facility review process the assessment of recommendation responses from previous reviews.** *(p26)*

- **20. Standardize the facility review process to always include a closeout presentation in a form which is immediately useful for the host laboratory or program.** *(p26)*

- **21. Ensure that the OHEP triennial program reviews of laboratory programs include reviewers who are well aligned with laboratory missions, roles, and methodologies. Inclusion of university reviewers is valuable, but the committee should not be dominated by them.** *(p26)*

- **22. Develop more projects to readiness (CD-0, etc.) in order to be able to respond expeditiously to program opportunities.** *(p30)*