# Report of the

# Committee of Visitors
# Review of the Department of Energy
# Office of High Energy Physics

For Fiscal Years 2010, 2011 and 2012

Submitted to HEPAP

Dec. 6, 2013

# I. Executive Summary

The Committee of Visitors (COV) review of the DOE Office of High Energy Physics (OHEP[1]) met in Germantown Oct. 9 – 11, 2013 to review the program management by OHEP for the fiscal years 2010, 2011 and 2012. The 29 committee members listed in Appendix A are prominent members of the field drawn from universities and laboratories in the US and around the world. The Committee was organized through seven subcommittees which focused on (a) the Energy Frontier, (b) Intensity Frontier, (c) Cosmic Frontier, (d) Theory, (e) Accelerator R&D, (f) Facilities and Operations, and (g) Projects. Detector R&D and Computing are common to many activities and were reviewed in the appropriate subcommittees. Relevant documents and lists of proposals and review reports were made available to the COV prior to the review. Representative proposal folders were chosen by subcommittee chairs and made available during the meeting for in-depth review to enable a broad sampling of the proposal review and award processes.

The COV was charged by the Chair of HEPAP Andy Lankford, who also attended the review. The charge is found in Appendix B. The COV heard presentations on all aspects of OHEP program management, and individual program managers were available for extensive discussions with the appropriate subcommittees over the three day meeting. The draft agenda shown in Appendix C was amended somewhat to meet the needs of the committee.

During the period under review OHEP re-organized its management structure, replacing the old research categories of proton-based accelerator experiments, electron-based accelerator experiments, and non-accelerator experiments with the physics oriented categories, adapted in the report of the 2008 Particle Physics Project and Prioritization Panel (P5), of energy, intensity and cosmic frontiers. The 2010 COV suggested two further major changes in OHEP management: the introduction of comparative reviews of research proposals and an increase in the fraction of the budget devoted to projects. These three topics were given particular scrutiny in this review.

The report presents 33 distinct recommendations, of which 18 are first discussed in Section II on overarching issues. Most of these also arise in the subcommittee report sections with slightly altered wording or emphasis and are indicated there with the same number as for the related overarching recommendation, with an asterisk attached. The list of all recommendations that the COV submits to HEPAP for transmittal to the Office of Science is given in Appendix D. It is important to read the recommendations in the context of the findings and comments found in the main body of the report.

The committee expresses its appreciation for OHEP cooperation in preparing the materials for the review and its responsiveness to the COV requests. The presentations to the Committee were clear and comprehensive. The overall conclusion of this COV is that OHEP is carrying out its mission with integrity, efficiency and keen awareness of the trends in the field. It is responsive to the

[1] In the current DOE nomenclature, the Office of High Energy Physics is denoted “HEP”. However, we retain the previous practice of naming the office “OHEP”, reserving the abbreviation “HEP” to refer to the field of research.

mission goals of DOE and to the direction offered by HEPAP and its subpanels. Despite the decline in its budget in actual dollars, the program has seen notable recent physics achievements and several starts on high priority new initiatives were made during the review period. The program is of the highest quality by national standards and in some areas is world-leading.

# II. Overarching Issues

In this section we discuss issues that arise generally across the program:

## A. OHEP organization

***Finding***:
OHEP has reorganized its oversight and budget code structure for experimental high energy physics research from the previous classification of proton-accelerator experiment, electron-accelerator experiment, and non-accelerator experiment to energy frontier research, intensity frontier research and cosmic frontier research.

***Comments***:
The frontier-based classification of the field was initiated in the 2008 P5 report. The switch from a classification based on research facilities to one based on physics thrusts has been important in widely communicating the breadth and vitality of the field and in securing continued support for its mission.

The three frontiers have many overlaps, both in experimental techniques employed and in the basic physics questions that are addressed.

For a complex organization like OHEP, some clear organizing principle is needed. The COV agrees that the new organization by frontiers is an improvement over the previous organization, particularly in view of the major themes in HEP research today. However, the division between frontiers involves some arbitrariness and it creates boundaries that could damage the field if not managed wisely. The issue of when to move funds from one frontier to another is an example of an area where problems are possible, for instance if the division of funds needs to be programmed into the Federal budget cycle, which operates roughly two years in advance. Flexibility is needed, and moving funds across these boundaries to respond to evolving priorities should not be made difficult. Such decisions need to be addressed at an appropriate level, since it is the rare program manager who will volunteer to reduce his or her budget.

We urge OHEP to be alert against allowing stovepipes to form in alignment with these frontier boundaries. One way to make sure that managing a particular frontier program does not become a career in OHEP would be to rotate frontier program managers about every five years. This would allow program managers to maintain broad expertise across HEP and an awareness of the overall program.

***Recommendation***:

***1. OHEP should strive to keep the overall program management coherent, keeping in view the connections and balance among the frontiers, and minimizing the obstacles to well-motivated transfers of funds across frontier boundaries.***

## B. Management of the HEP program

Advice on the priorities for the HEP program was given by the 2008 P5 subpanel. The main recommendations – maintaining the priority of the LHC program and conducting R&D on the ILC at the energy frontier, working toward a world class neutrino program based on an underground experiment in South Dakota using a high power beam from Fermilab, and pursuing $\mu 2e$ and $0\nu\beta\beta$ experiments at the intensity frontier, and continuation of experiments on dark matter and dark energy at the cosmic frontier – were heeded and made central components of the OHEP program. The P5 subpanel was reconvened in 2010 to examine the limited question of extended Tevatron operations, but at this time the panel was not charged to provide a broader review.

With six years elapsed since the main P5 recommendations, much has changed both scientifically and in the budgets. The DOE scope in the underground neutrino experiment was enlarged. When JDEM did not go forward, the LSST program emerged as the major new initiative for studies of dark energy, and various other new thrusts were proposed. As the situation changed, OHEP made decisions somewhat incrementally, sometimes with focused panels convened to provide advice within limited sectors of the program. All of these developments are natural in a healthy dynamic program, but the roadmap laid out in 2008 became less useful as time went on.

On balance, OHEP has done well in managing the program in the face of the changing circumstances. We are pleased that the P5 evaluation of program priorities has begun again this year, but feel that a full review of program priorities at more frequent intervals would have been beneficial. The primary responsibility for the strategic oversight of the program should be retained by HEPAP.

## C. Comparative proposal review

***Findings***:

The 2010 COV report recommended that grant proposals being considered in a given year should be subjected to a comparative review. As implemented, all proposals for that year in a given area are examined together (the areas for comparative review are the three frontiers, theory, accelerator R&D and detector R&D). Proposals with effort in more than one frontier have their separate components reviewed in parallel by different panels. OHEP began this process in FY2012 with roughly one-third of all proposals comprising the total portfolio. Subsequent comparative reviews followed in the two years after the period reviewed by this COV. A companion comparative review of Laboratory research activities was instituted in which consideration of the three frontiers, and also accelerator R&D, detector R&D and theory, were reviewed in rotation over a three year time span.

The 2012 comparative reviews resulted in the reduction or termination of support for several PIs who had long been productive and funded. In these cases, an attempt to achieve a soft landing through bridge funding, typically for six months, was made.

The comparative reviews, in a DOE-wide policy, are not constituted as FACA committees and thus must refrain from articulating committee consensus in ranking evaluations of proposals under review.

In some cases, due to budget pressures, such considerations as the availability of start-up funds, OJI/Early Career Awards, lab LDRD, or other non-DOE sources are used to reduce or delay funding of a proposal.

The time between proposal submission to decision and provision of redacted comments from reviewers to the proponent has decreased slightly since the 2010 review. It is now typically eight months and was reduced during the period under review.

Implementation of comparative reviews for the university program involved bridge funding to realign the new grants to an April 1 start date. For example, in FY12 this amounted to an overall 18% forward funding of the new university theory grants, adding a serious strain to an already unfavorable budget.

The COV found one instance where the redacted review reports sent to proponents contained a comment which, in its view, was not relevant and was inappropriate.

***Comments:***

The COV finds the comparative review to be an improvement over the previous mail-in-reviews-only process. The outcomes that we viewed were fair. The panel sizes and choice of reviewers were in most cases appropriate, but in a few cases we found that there were as few as three reviewers. In such cases, it is possible that the opinions of one vocal reviewer could carry undue weight.

The mail-in reviews add important information to the comparative review process. Whereas the focus in the comparative review is on a specific frontier component of proposals, in some cases the mail-in review provided an evaluation of the full proposal. In other cases, the mail-in reviews added expertise that was not represented on the panel.

We recognize that the number of proposals subject to comparative review in a given year is large, and that there is a desire to subdivide the effort. The alignment of review panels along the frontier boundaries is natural, but the Committee worries that this subdivision could lead to a more parochial view of the program than is desirable. Many of our comments and recommendations go in the direction of assuring a review process that takes the full context of

the program into account. We urge OHEP to continue to assess the optimum way to achieve this balance.

The comparative reviews would be enhanced if the relevant materials were provided to the panel members prior to the review, and if provision were made for clarification of factual questions from the panel to proponents before or during the review.

In proposals addressing multiple frontiers, the synergy among the parts is important to consider. Despite the comparative review focus on a specific frontier, it is important to consider aspects of the full proposal. The mail-in reviews of specific proposals can aid in gaining this overall view. In some cases, PIs may be making a transition from one frontier to another and it is important to assess their track record in previous research. In many cases, the research proposed in one frontier bears directly on work in other frontiers, both in physics questions and in techniques used. The process could usefully be adjusted to better provide this overview by means such as inclusion of reviewers whose expertise lies in frontier areas outside the one being reviewed. This practice would help ensure that the record of a PI in transition is taken into account. Special 'transition grants', as made by other agencies, might be considered to facilitate changes in research areas. It may be useful to provide a check-box for proponents to indicate their desire to have their proposal reviewed by comparative review panels representing the relevant frontiers. It may also be useful to ask reviewers to specifically comment on the synergies in such cross-frontier proposals.

It is important that comparative reviews in subsequent years be conducted with common practices and standards, and that the full program be kept in view for each year's review. It may be useful to provide a summary of the full program actions in the yearly comparative review to provide the overall context, and to appoint a significant fraction of reviewers to serve in multiple years.

Even within the constraints of the non-FACA review panels, the current comparative reviews can provide the OHEP program managers with sufficient information to synthesize evaluations and rankings that reflect the collective assessments of the panel members.

In a significant number of cases, the comments in the folder by the program manager on the reason for the action taken were sufficiently terse, or absent, that the special considerations for an action were difficult to discern. There should be renewed vigilance by program managers to assure that inappropriate comments are removed from the reports and do not flavor the deliberative process unfairly.

Reducing or delaying grant funding because of the existence of university start-up funds or other non-DOE funds is counterproductive, as it penalizes those who have demonstrated substantial initiative and promise.

In the case that a PI's funding is curtailed or discontinued, there should be an attempt to protect the support of postdocs and students under that PI's supervision. The extension awarded for postdocs working with a PI whose funding was discontinued should seek to allow finishing his/her project and to enable the postdoc to find a subsequent position.

The time between proposal and notification has moved in the right direction, but in some cases the COV found that administrative delays within OHEP contributed substantially to delay, and work is needed to improve administrative efficiency.

The negative impact of realignment of grant start dates was primarily examined in the context of the theory program but it has affected all grant actions. When the bridging problem ends in FY15 it will free up some resources. These resources could be used to ameliorate the negative effects incurred during the previous three years.

This COV did not make a substantial review of laboratory comparative reviews, although in the cases we examined the level of scrutiny of individual scientists was lower than for university investigators. Unlike the university proposal reviews, the laboratory reviews for a given frontier are conducted once every three years and assess the activities in that frontier across all laboratories. The laboratory reviews are not proposal-driven but are based on documents prepared by the laboratories based on their mission. The laboratory reviews available to this COV do not have the same focus on the strengths of individual reviewees as is present for university proposals. A more detailed evaluation of the laboratory research reviews should be made by the next COV, including comparison with university comparative reviews.

***Recommendations:***

***2. Continue the comparative reviews. These should be augmented with independent mail-in reviews.***

***3. Ensure that comparative reviews evaluate a particular proposal in the context of the full program over the full three year cycle within each frontier.***

***4. Ensure that review committees are given appropriate charges, that there are sufficient reviewers of each proposal, and that program manager oversight of reviews is uniform.***

***5. Modify the FOAs to request that proposals which address topics in several different review panel areas include a discussion of the synergy gained from this broader scope.***

***6. Institute mechanisms to streamline the movement of PIs moving from one frontier to another. The past record of such PIs should be considered in the reviews.***

***7. OHEP should charge the comparative review panelists to collectively discuss the relative strengths and weaknesses of proposals so that the program managers can judge the relative rankings of proposals.***

***8. Ensure that program manager's comments in grant folders clearly document the reasons for the action taken.***

***9. Work to further reduce the time between proposal and proponent notification and to provide appropriate redacted review comments that will enable PIs to refine future proposals. Provide information to proponents on their comparative review score and the distribution of scores over all proposals reviewed by a panel.***

***10. Refrain from using university startup funds as a consideration in establishing grant funding levels.***

**D. <u>Project budget fraction</u>**

***Finding:***

The fraction of OHEP budget devoted to projects showed a substantial dip in the FY2006 – 2007 period to about 5%, down from about 20% before then. The 2010 COV recommended an increase in the projects fraction. By 2012, the fraction had increased to about 17%, aided in part by the infusion of the American Recovery and Reinvestment Act (ARRA) funding starting in FY2009.

***Comment:***

We appreciate the efforts to raise the project funding fraction. Projects represent the new opportunities that keep the field vital and address new scientific opportunities. While this COV agrees that further increase in project funding is desirable, doing so in the currently constrained budget environment will cause restrictions in other important activities, particularly research. Without guidance on possible budget scenarios, it is difficult to judge the appropriate fraction of project funding. The forthcoming P5 assessment will consider such budget scenarios and we look forward to its advice on the appropriate level of project funding in each of these scenarios.

***Recommendation:***

***11. Further increase in the budget fraction devoted to projects is desirable but should be subject to the recommendations of the 2014 P5 report and budget constraints.***

## E. Senior Research Scientists

***Finding:***
The comparative review in 2012 resulted in the termination of several senior research scientists. The COV review found that these terminations were reasonably documented.

***Comment:***
Senior research scientists often perform crucial roles in assuring the success of large long-term projects. In many cases their contributions center on technical projects, rather than physics analyses. It is important that reviews have the information needed to evaluate senior scientists in the context of their main contributions.

A criterion used by some reviewers as a component of senior scientist's evaluation was whether a postdoc could perform the same functions. The COV feels that this criterion is misplaced. Indeed a good postdoc can perform highly technical or organizational tasks very effectively. It is however inappropriate, for career advancement reasons, to keep postdocs in these roles over long times. The continuity and accumulated expertise of senior scientists has been a major factor in the success of the OHEP program, particularly for projects.

***Recommendation:***

***12. Allocate a few dedicated pages in proposals for senior research scientists to describe their activities and critical accomplishments.***

## F. Management of experiments below the project level

***Findings:***
Projects are defined in the DOE as having Total Project Cost above $5M, and are subject to a rigorous management process characterized by the Critical Decision milestones and associated reviews and reporting. OHEP is allowed to apply tailoring to these projects as the Office of Science is exempt from Order 413. Experiments below the $5M threshold are managed by varying approximations of the CD process.

***Comment:***
We recognize the benefit of identifying goals, milestones and costs for smaller experiments at their inception. However the application of formal project management methods for these experiments can provide an unwanted degree of burden. Often such experiments introduce innovative techniques that offer novel solutions to important physics questions, and they should be allowed a higher degree of risk than large scale projects. The present practice of exempting those experiments which are progressing well from project-style reviews should be retained.

***Recommendation:***

***13. Once goals, milestones and costs have been established for small scale experiments, formal OHEP project oversight should be kept to a minimum.***

## G. Detector R&D

***Finding:***

The definitions of different categories of detector R&D ranging from purely generic research to development of specific prototypes for inclusion in a particular experiment varied through the period reviewed by the COV.

***Comments:***

Detector R&D, like accelerator R&D, seeds transformative new opportunities for research in HEP, and should be managed to optimize the potential for new advances. The funding of R&D aimed at establishing the suitability of subdetectors for an approved project or experiment should be attributed to the budget for that project or experiment. In contrast, R&D that seeks to develop new detector possibilities, whether purely 'generic' or motivated by finding new techniques for potential future experiments, forms a rather continuous spectrum. In the latter category, even though the ideas for the R&D may be rooted in a specific application, it is typically the case that applications far from that originally conceived will occur.

The motivation for detector R&D is often shared with other Office of Science programs and OHEP could profitably explore cooperative approaches to funding detector research.

***Recommendation:***

***14. OHEP should develop a coherent and stable approach to funding detector R&D which embraces the broad range of proposals for new ideas and techniques appropriate to its mission.***

## H. OHEP manpower

***Finding:***

The 2010 COV recommended an increase in staff hires. OHEP has increased its program management staff from 13 federal employees and 4 IPA/detailees in 2010 to 15 and 9 respectively in 2013. The administrative support staff has declined somewhat from 11 to 9.5 FTEs in the period considered.

***Comment:***

The COV is pleased that the staffing level has been improved. The ratio of program managers to budget dollars in OHEP is in line with other Office of Science Divisions. We appreciate the

excellent work done by IPAs and detailees and recognize that these individuals are full partners to their federal counterparts. We do not see the need for large increases in OHEP staff, but limited hiring is warranted, particularly in the theory program now managed by a single individual. The increasing emphasis on projects brings additional workload, and OHEP should monitor whether additional staff are needed to manage this effort effectively.

***Recommendation:***

***15. An additional IPA serving the theory program should be found.***

## I. Program manager travel

***Finding:***

Travel budgets allocated by the Office of Science have been reduced since the previous COV review.

***Comment:***

Visits to universities at the time of three-year renewal proposals are a valuable component of effective program management. In a site visit, the managers can assess the relative strengths of individual PIs, observe the synergy that exists within the group and the infrastructure that the group brings to the research program. Visits to project locations give a valuable opportunity to evaluate at first hand the progress being made and problems being encountered, to judge the quality of the project host infrastructure support, and to discuss plans in detail with project managers.

In addition to the need for site visits to universities and domestic laboratories which occurs in all of the Office of Science Divisions, the highly international character of HEP and the large part of the program conducted at overseas sites under the control of external laboratories places special needs on OHEP travel. Travel is required to negotiate the terms of involvement of US researchers, to monitor international cooperative agreements, attend oversight council meetings, and to evaluate the US performance in these experiments and projects. This additional burden on OHEP travel funds has diminished the travel funding available for the domestic site visits.

***Recommendation:***

***16. Seek to increase the OHEP travel budget.***

## J. Communications

***Comments:***

Communication with researchers in the field is critical for the smooth operation of the program. It is imperative that the HEP community be aware of program priorities and goals, and proposal

procedures. OHEP has worked hard to make the community aware of changes, but in some cases the information does not fully register with individuals in the field. OHEP should continue its efforts to make its procedures and bases for decisions transparent to the community.

Effective communication with the Office of Science and other government bodies is a key component for making policy makers aware of advances in the field and the imperatives for future research. OHEP also has a role to play in stimulating communication to the broader public. Dedicated effort is needed to assure that these characteristics of the field are made available broadly in a timely way.

***Recommendation:***

***17. We urge OHEP to redouble and improve its communications both with the HEP community and in the wider governmental circles.***

## K. Travel restrictions for laboratory supported personnel

***Comment:***

Although it is outside the purview of this COV review, we note the damaging aspect of the current travel rules for laboratory personnel and those supported on laboratory service accounts that have prevented many from attending conferences and workshops to present their research results to the wider community. The restrictions also have inhibited the ability of the laboratories to host conferences and workshops. Conferences and workshops are essential in a globally interconnected field such as HEP. They are the means by which new findings and techniques are disseminated and discussed in intensive face-to-face encounters. Constraints on US scientists' participation in conferences damage the competitiveness of the national program. We urge continuing effort to relax these rules and the deadlines imposed in their application, consistent with appropriate concern for efficiency and budgetary responsibility.

## L. Balance of university and laboratory programs

***Comment:***

This COV had neither the appropriate documentation nor the time to adequately assess the balance in the program between university and laboratory research programs. The new comparative reviews in both sectors were not yet fully in place during the period reviewed. Although the roles of laboratories and universities differ and the programs are managed quite differently, there are often similarities in the roles played by individuals both in experiment and theory. We found anecdotal evidence that the balance, at least in funding, varied among the frontiers. Senior scientists at universities often perform similar activities to laboratory staff scientists, but are evaluated differently. We comment elsewhere on differences in Early Career Awards made to laboratory and university physicists. The balance between senior experienced

scientists and junior investigators is important to strike carefully, and some anecdotal evidence was found to indicate that this balance may be shifting towards more junior scientists. These are important topics and we look forward to their consideration in a forthcoming HEPAP subpanel.

***Recommendation:***

***18. Undertake a separate review of the balance between the laboratory and university research programs.***

**M. OHEP data base**

***Finding:***

The Office of Science is developing its electronic data base Portfolio Analysis and Management System (PAMS) to manage funding announcements, proposal submissions, reviews, progress reports, program manager actions and grant awards. The first use of PAMS was in 2011 for proposal submissions and added functionality continues to be added.

***Comment:***

PAMS will offer comprehensive documentation of all OHEP activities, and promises to improve its management processes substantially. We look forward to the full roll-out of the system and expect a more thorough review by the 2016 Committee of Visitors. We note that with PAMS in place, future reviews could be substantially streamlined by making all documentation available to the committee electronically, allowing future COV and comparative reviews to be conducted in a more efficient way.

# III. Subpanel reports

## 1. Energy Frontier

The Office of High Energy Physics has supported an outstanding program at the energy frontier that successfully executed the Tevatron program and enabled a major role for the US in the LHC experiments. Significant results include the discovery of the Higgs boson. Although some budget reduction was appropriate following the end of Tevatron operations, OHEP should maintain a healthy level of ongoing support for the research program to enable US groups to reap the benefits of the substantial investment in the LHC experiments.

We examined folders from pre-comparative review period (2010 and 2011) and from the first year of comparative reviews (2012)

***Finding:***
The 2012 reviews had both write-in reviews and panelists. There were typically 5-8 reviews per proposal. The funding decisions were clearly correlated with the reviewers' comments.

***Comment:***
The decisions we looked at generally seemed sensible. We felt comparative reviews were more critical and crisp than with the prior review strategy. In one case, we found an inappropriate comment in the panel summary which argued to limit the period of the award due to speculation concerning personal circumstances of one of the PIs.

***Recommendation:***

***4*. Going forward, ensure that there are adequate numbers of reviewers. Reviewers should be instructed carefully to avoid the use of inappropriate or speculative information in making their recommendations.***

***Finding:***
In most cases, the reviews examined individual PIs and Senior Researchers (SRs). In cases where the reviews of individuals were weak, they sometimes had their funding reduced or terminated. The funding decisions usually allowed for some time (e.g., six months to a year) for transition in the case of funding termination to provide a "soft landing".

***Comments:***
While it was clear that a good balance of types of activities (analysis, experiment design and support) was desirable, it was not clear if this was to be reviewed at the level of the group or the individual. For example, reviewers had difficulty evaluating individuals for whom the only work described was analysis in large experiments. Proposals also suffered when they did not articulate a clear plan for future work even when the past work was solid. Some proposals were not written in such a way as to clearly identify and justify the expected contributions of each PI and SR.

OHEP has made significant efforts to ameliorate the effects of cuts to PI's grants on funding for postdocs and students. There is anecdotal evidence that some groups have abused this help by redirecting funds to other purposes.

***Recommendation:***

***12*. Guidance should be communicated clearly to each PI before they prepare their proposals such that the contribution of each PI and SR is spelled out and the plans and desired outcomes of the proposed work are emphasized. Extra pages should be explicitly reserved in the proposal to describe the work of SRs. Reviewers should be given guidance to look at roles where longevity is critical when evaluating SRs.***

***Comment:***

Comparative reviews without an over-arching programmatic set of goals looking forward are more subject to yearly variations.

***Recommendations*:**

***3*. OHEP should have an overall strategy for some of the large issues that are communicated to the reviewers. These issues include the appropriate mix of lab and university funding levels, the role of the national labs that do not run facilities, the numbers vs. the strength of the groups supported.***

***18*. A future HEPAP subpanel should provide guidance on the balance of Laboratory and university programs.***

***Finding:***

The program managers are each responsible for one frontier area, and manage their areas with commitment and enthusiasm.

***Comment:***

Occasional rotation of program managers could bring fresh perspectives and help to ensure balanced management across the three experimental frontiers. We suggest that OHEP consider rotating program managers among the frontiers about every five years.

***Finding:***

The number of applicants in each frontier area does not necessarily match the needs and opportunities.

***Comment:***

Program managers would sometimes like to stimulate migration from one area another, but there is not a mechanism to facilitate this with university programs.

***Recommendation:***

***6*. Consider "transition grants" as a way to help PIs to move smoothly from one frontier to another.***

***Finding:***
PIs who worked in more than one frontier area were evaluated by more than one panel.

***Comment:***
Special care needs to be taken, perhaps in reviewer instructions, in evaluating proposals which cross subject area boundaries.

***Recommendation:***
***6*. Provide a check box on the proposal submission so that PIs whose activities span frontiers can indicate this and request review in multiple comparative reviews.***

***Finding:***
The changes in travel policy and budgets coupled with the increase in off-shore experiments have drastically reduced the numbers of site visits by program managers.

***Comment:***
If current travel rules remain the norm, there is a need to seek a different paradigm for how the office does business and administers its responsibilities.

***Recommendation:***
***16*. Restore some of the budget for site visits.***

***Finding:***
Reviewers have some information from the proposals about what the proponents accomplished in the previous grant period, but do not have access to previous levels of resources or to goals set out in previous proposals.

***Comment:***
A group that accomplished a lot with fewer resources should be valued more highly than one that did the same or less with greater resources. Also, groups can propose to do the same thing cycle after cycle, and it will not be apparent to reviewers that they are not achieving their objectives. While the current and pending support is indicated as part of the proposal, the objectives of prior grants would also be useful supplementary information in evaluating a renewal proposal.

***Recommendation:***
***19. Provide summary information on previous proposals, PIs, FTEs, experiments and funding allocations to reviewers.***

***Finding:***
The results of the review that are conveyed back to the PI consist of redacted reviewer comments and funding decisions.

***Comment:***
It is very important that the Comparative Review process be transparent and fair and be perceived as such. Providing more feedback on scores and reviews would increase the

transparency of the process and improve subsequent proposals. Written notices of favorable reviews can be useful in universities for promotions and supporting new hires.

***Recommendation:***

***9*. Report the score of the proponents and the overall distribution of scores to each PI. Write special letters to those groups ranking in the upper quartile.***

***Finding:***

There was some confusion about different amounts of Cost of Living Adjustment (COLA) requested for different groups for personnel stationed at CERN.

***Comment:***

We were under the impression that there are standard amounts for students, postdocs and senior researchers set by US CMS and US ATLAS.

***Recommendation:***

***20. If there are clear guidelines on COLA for overseas experiments, provide them to the reviewers.***

***Finding:***

Early Career Awards are strongest when they contain both analysis and non-analysis components such as detector development.

***Comment:***

The current situation creates bias toward labs and universities with significant technical infrastructure. Also, it can be more difficult for reviewers to recognize a compelling proposal from an applicant in a large experiment.

***Finding:***

The Office of Science sets minimum Early Career Awards at $500k/year at laboratories compared with $150/k year for universities.

***Comment:***

There are perceptions in the field that the higher awards at laboratories reduce the total number of awards available. At universities, these grants are the pathway for new investigators to get funding and are critical. The difference seems to come from the PI's full salary and the overhead at laboratories, but the corresponding subsidy of full salaries of university researchers is not made. Re-evaluation of the relative sizes of awards at the Office of Science level would be useful.

***Recommendation:***

***18*. Seek an appropriate balance for Early Career Awards between Laboratories and universities and explore ways to increase the number of awards.***

***Finding:***
The research and operations efforts for LHC experiments are strongly connected but appear to be managed largely independently.

***Recommendation:***

***21. The management of the research, operations and upgrade components of the LHC experiments should be closely coordinated.***

## 2. Intensity Frontier

***Finding:***
The Intensity Frontier presents many opportunities for transformational discovery. Several main thrusts would benefit from increased research personnel.

***Comment:***
The ability for PIs to transition seamlessly between Frontiers will improve the situation.

***Recommendation:***
***6*. Special attention should be paid to removing barriers to PIs planning a transition between frontiers.***

***Finding:***
Some of the main Intensity Frontier thrusts are long-term projects.

***Comment:***
A diverse program delivering a steady stream of physics results over the coming decade is important for the health and continuity of the field. To promote that diversity, it would be useful for P5 to consider a range of shorter-term intensity frontier initiatives, in addition to larger long-term projects.

***Finding:***
In the comparative review, reviewers were in general appropriately selected and provided high-quality reviews. For the most part appropriate decisions were made.

***Comment:***
The new comparative review has generally achieved its aim of improving the overall quality of funded PIs and groups. Overall the new comparative review has been a positive development. However there could be some improvement.

***Recommendation:***
***2*. The comparative review panels should be continued.***

***Finding:***
We did find occasional glitches, or potential glitches, such as proposal outcomes hinging on having relatively few reviewers with sufficient expertise.

***Comment:***
Some proposals require specialized expertise for full evaluation that may not be present in a panel.

***Recommendation:***
***4*. There should be more than three reviewers with sufficient expertise for each proposal. Panel reviewers should be supplemented with mail-in reviewers where needed.***

***Finding:***
Feedback to PIs is not automatic and takes many months. Panel scores are not provided to PIs.

***Comment:***
Review feedback, especially for declinations, can be very useful for PIs. Scores or rankings can also be useful to highly-ranking PIs to share with their administrators.

***Recommendation:***
***9*. Feedback to PIs should be improved. Reviewer comments and panel summaries should be provided automatically to PIs in a timely manner rather than only upon request. A quantified score and the distribution of scores should be shared with PIs.***

***Finding:***
The reasons for declining proposals were often not clearly explained.

***Comment:***
Declinations in particular should be carefully documented.

***Recommendation:***
***8*. A brief summary statement explaining a declination decision should be included consistently in each folder.***

***Finding:***
PIs are not always fully aware of review criteria at the time of proposal submission.

***Comment:***
Proposal quality will improve if PIs are aware of review criteria.

***Recommendation:***
***4*. Instructions to reviewers and review templates should be made available to PIs well in advance of the proposal deadline.***

***Finding:***
Panels do not interact with PIs during the comparative review process.

***Comment:***
Sometimes review evaluations could be significantly improved by having prompt clarifications and answers by PIs to questions of fact that come up during a review. It may be useful to consider a mechanism for seeking factual clarification of proposals from the PIs during the comparative review process.

***Finding:***
We found that that communications from DOE are not always propagated efficiently to all co-PIs in a group.

***Recommendation:***

***17*. General and informational announcements should be communicated directly to all co-PIs as well as the PI.***

***Finding:***

The response time between proposal due date and final receipt of funding, although improved recently, still remains long.

***Comment:***

We are concerned that the strength of the administrative support related to grant processing is inadequate.

***Recommendation:***

***22. Improve the quality of OHEP administrative support.***

***Finding:***

For the cases we examined there was successful allocation of funding for PIs working on projects across frontier boundaries. For one case we noted negative reviewer comments associated with a frontier transition; however the final outcome for that case was (appropriately) positive.

***Comment:***

We did not find any serious cross-frontier issues among the cases we examined. However the frontier structure could still potentially create a barrier for PIs attempting to transition from one frontier to another.

***Recommendation:***

***3*. Reviewers should be requested to provide explicit comments on the potential synergistic benefits of work in multiple frontiers or PI transitions between frontiers.***

***Finding:***

DOE site visits have decreased during the period under review.

***Comment:***

The reduction of DOE travel funds for relevant program managers for site and program reviews has been detrimental.

***Recommendation:***

***16*. Site visits by program managers should be made on an appropriate time scale, at least every three years.***

***Finding:***

Some senior research scientists reviewed poorly because of reviewer comments comparing their contributions to what a good postdoc could do.

***Comment:***
We feel that technical and support roles played by research scientists and technical staff in the universities can be crucial and cost-effective for the program (and that such roles should not be allocated for long periods to postdocs.)

***Recommendation:***

***10*. Improve the review criteria for senior scientists.***

***Comment:***
To strengthen the program, it would be useful to support not only Early Career awards that propose to make incremental progress in a certain area, but also broader-scope, higher-risk and higher-reward proposals.

# 3. Cosmic Frontier

## A. General comments

***Finding***:
The U.S. is now at the lead in the exciting and scientifically compelling Cosmic Frontier.

***Comment***:
The Cosmic Frontier was established by OHEP following the 2008 P5 recommendation and is now recognized at high levels in the U.S. appropriations process (OMB and Congress).

***Recommendation***:

***23. Maintain U.S. science in the lead of the Cosmic Frontier.***

***Recommendation***:

***17*. In the last decade OHEP has improved its ability to communicate the excitement of HEP and spinoffs to DOE, OMB and Congress. These efforts should be augmented and strengthened.***

***Finding***:
OHEP has established the thrust areas within the Cosmic Frontier of dark matter, dark energy, high energy cosmic rays, and other (including inflation/early-universe (CMB)).

***Comments***:
The Cosmic Frontier contains a compelling program addressing the frontiers of energy, matter, and space-time, well-focused on the OHEP mission.

OHEP has done an excellent job of working with the HEP community to establish a Cosmic Frontier program that stands at the forefront of the national and international science community. This has been accomplished under a very constrained budget.

The Cosmic Frontier program is balanced and, within the constraint of the budget, can be expected to respond to the on-going HEPAP/P5 review of the field.

***Finding***:
Successful pioneering Cosmic Frontier Stage I and II experiments are giving way to realization of Stage II/III experiments and planning for Stage IV projects.

***Comments***:
The larger scale of next-generation experiments will require an approach to the science and the management which is common in other areas of HEP, involving bigger instruments, larger data sets, higher costs, longer durations, and greater sensitivities and precision. These will require larger, more international collaborations and significant efforts in computing and data storage and distribution for simulation and analysis.

The growing scale and cost of Cosmic Frontier experiments is a natural fit to the OHEP mission and the capabilities and expertise at the labs and universities.

***Recommendations***:

***14*. Support a flexible program of detector R&D and small experiments that is driven by program science requirements and that may provide cost-effective or more sensitive ways of accomplishing the science.***

***24. Support computation, simulation, and phenomenology that are directly needed for planning, execution, and analysis of Cosmic Frontier Stage III and Stage IV experiments.***

***Findings***:

The ability to bring a wide range of funding sources to bear on OHEP Cosmic Frontier projects and operations is becoming increasingly important.

The Cosmic Frontier community has a long history of support by private funding sources.

***Comment:***

OHEP has a long and successful history of coordinating programs with NSF, NASA, and national and international HEP partners.

***Recommendation***:

***10*. OHEP, and the Cosmic Frontier program in particular, should work with the community to best leverage and coordinate funding sources such as university startup, lab LDRD funds, private contributions, and international collaborations.***

**B. Structure of the Cosmic Frontier Program**

***Findings***:

The Cosmic Frontier program is well managed by the program managers and staff at DOE.

The Cosmic Frontier program is organized along major thrust directions.

***Comments***:

The existing thrust directions capture well the variety of present scientific research on the Cosmic Frontier.

The alignment of the science with the thrust structure is not exact as several important scientific questions on the Cosmic Frontier are addressed in complementary ways by different experiments, and the experiments often address questions across several thrusts (and even Frontiers).

***Recommendation***:

***13*. Continue to maintain the mission-focus of the experimental program with well-defined scientific goals, metrics, and deliverables for each experiment.***

***Finding***:
The Cosmic Frontier budgeting is divided into five categories (B&R codes): University Research, Lab Research, Operations, R&D and Fabrication.

***Comments***:
The Cosmic Frontier budget structure captures all major categories of cost and effort needed for the program.

It is important to coordinate support of on-going experiments with the development of future experiments.

The Cosmic Frontier budget structure allows a clear way to redirect resources as older experiments reach their natural conclusion and the program evolves to address the changing scientific priorities.

## C. Management of the Cosmic Frontier Program and the comparative review process

***Comments***:
The comparative review process is clearly an improvement over the previous process.

The comparative process has evolved considerably over the past three years and is still being optimized.

We found a wide range of documentation in the files that we were able to review. In the cases of the old mail-in only reviews, folders had few or no examples of the sorts of materials seen in the later comparative reviews.

In at least one case we found that programmatic considerations by OHEP appeared to overpower the evaluation made by the review committee based purely on strength of the proposals.

***Recommendation***:

***8*. Programmatic considerations made by OHEP should be documented explicitly and clearly.***

***Finding***:
Approximately one third of the grant program is reviewed each year by a different panel.

***Comment***:
Review panels are not able to "normalize" the quality of proposals across the entire grant program, in this or other frontier comparative reviews.

***Recommendations***:

***3*. A significant fraction of review panel membership should be retained from year to year.***

***3*. Provide a more comprehensive overview of entire program to each review panel.***

***Finding***:
Proposals by PIs to redirect a portion of their research from one frontier to another are reviewed multiple times by different panels.

***Comments***:
"Stove-piping" of the OHEP program impedes redirection of effort by PIs.

Review of smaller portions of overall proposals may not be able to recognize the expertise and capabilities being offered by the larger group.

A clear procedure for developing reviews across frontiers and thrusts is needed.

***Recommendations***:

***6*. OHEP should recognize redirection of research effort, and perhaps even formalize a declaration by the PI that a proposal should be reviewed as such.***

***6*. Obtain specific input (perhaps by mail) from reviewers from the "point-of-origin" frontier to the "destination" frontier review of proposals that include transition funds and plans from one frontier to another.***

***Comments***:
Large-scale dark matter experiments are a relatively immature area compared to intensity or energy frontier efforts, and dark energy collaborations are also a relatively new undertaking for high-energy physicists.

***Recommendation***:

***3*. The reviewer pool for Cosmic Frontier experiments should include individuals whose experience comes from some of the more well-developed areas.***

***Finding***:
The fraction of Cosmic Frontier direct funding at universities was reported to be about one third that at the labs.

***Comments***:
Although this may simply reflect historical realities in the Cosmic Frontier, it should be looked at more broadly, as the period of this review has been a time of rapid transition in HEP.

It will be important to develop a way to capture the pass-through of funds through experimental projects and collaborations.

***Recommendation***:

***18*. An examination of the balance between university and lab efforts should be made so as to optimize the breadth and depth of the program given current very tight budget constraints.***

# 4. Theory

The OHEP staff was very helpful in providing materials and information for our review, including patient explanations of process and budget details.

## A. The role of theory

***Comment:***
Theoretical research at universities and labs supports and cuts across all three frontiers of HEP, and is an important forward-looking activity in its own right. It is appropriate that theory is managed as a separate program within OHEP, but OHEP should not lose sight of the key role of theory for the entire program. During the past decade, as in previous decades, new developments in DOE-supported theory have inspired new experimental initiatives, including numerous collider searches, experiments aimed at direct detection of light dark matter, and searches for dark photons.

***Recommendation:***

***25. OHEP should explicitly recognize that a thriving theory program is essential for identifying new directions and opportunities for the field, in addition to supporting the current program.***

***Comment:***
Transparency is essential to successful management of such a complex program. The OHEP staff can help build confidence in the community that considerations such as the diversity of the program, the balance between Laboratory and university efforts, or equitable application of cost of living adjustments have been adequately addressed.

## B. Comparative reviews

***Finding:***
Our scope included the first university theory comparative review in FY12, and the lab theory comparative review in 2011. Theory comparative reviews in general are working very well. Panel member reviews are thoughtful and balanced. They have handled difficult cases fairly, making hard choices that have resulted in defunding of numerous theory PIs who had previously enjoyed DOE support.

***Comment:***
Under the previous review system, as evidenced by FY10 funding actions, we observed several instances of problems with breadth, balance, stature, and experience of reviewers, as well as in the quality and depth of reviews. One negative effect of this was to preserve some historical distortions in the relative support levels of different university groups.

***Finding:***
The selection of reviewers and quality of reviews improved noticeably between FY10 and FY12.

***Comments:***
The two-layer system of broad expertise and engagement of panels on top of outside mail reviewers is critical for reaching optimal outcomes. This is especially evident in difficult decisions to decline support for individual theory PIs who had been funded in previous grants.

It is good that the comparative theory panels have included a broad mix of experienced experts who bring out and discuss the important and difficult issues.

***Finding:***
The 2011 lab theory comparative review assessed the productivity of lab theorists recognizing the unique roles and opportunities of lab positions versus universities. The panel recommended that several senior lab theorists be removed from DOE theory support.

***Comments:***
The labs should follow through on such recommendations, taking into account appropriate professional transitions for the affected scientists.

Separate comparative reviews for laboratory versus university theory is well motivated by programmatic differences between the two programs. The 2011 lab theory review panel and the FY12 university theory review panel had some overlap in membership. This is useful for providing some relative normalization of the theory activity in the two programs.

***Recommendation:***

***2*. The theory comparative review system should continue with appropriate refinements, not neglecting the importance of an initial round of mail reviews including a significant number of non-panelists.***

***Comment:***
The subcommittee suggests that it might be useful if information were provided in proposals to indicate where previously supported (over the prior five years) students and postdocs have gone, as this is a measure of the quality of the proposal.

## C. Impact of bridge funding

***Finding:***
Implementation of comparative reviews for the university theory program involved bridge funding to realign the new grants to an April 1 start date. In FY12 this amounted to an overall 18% forward funding of the new university theory grants, adding a serious strain to an already unfavorable budget.

***Comments:***

This negative impact will of necessity continue in FY13 and FY14. In FY15 the bridge problem ends, freeing up considerable resources. These resources should be used within the theory program to ameliorate the negative effects incurred during the previous three years.

This bridge effect magnified cuts to university theory support originating from overall budget pressures. Some theory PIs affected by budget pressures in FY12 have expressed frustration about not fully understanding the magnitude of the reductions in their support.

**D. Program processes**

*1. Staffing*

***Finding:***
The theory program includes about 70 university grants, theorists at seven national labs and about 15 Early Career awards. During the review period there were significant variations in the fraction of the theory budget going to laboratories or universities. In addition to the large workload, theory involves a challenging variety of different intellectual thrusts, each with its own history, jargon, and technical details. In the past several years OHEP theory management has had the benefit of at least one dedicated IPA or detailee.

***Recommendation:***

***15*. OHEP should hire an additional theory IPA/detailee with complementary background to the theory program manager, preferably with a university background. A clear line of management responsibilities should be defined for the roles of the program manager and the IPA/detailee.***

*2. Travel*

***Finding:***
The current travel restrictions significantly inhibit the theory program manager from performing key functions of the job. Limited program manager travel could also introduce geographical biases to program manager interactions with PIs.

***Comment:***
Regular site visits are an essential part of managing the program, and theory program manager attendance at conferences is a highly efficient way to confer with multiple PIs as well as to keep up with the latest developments in theory.

***Recommendation:***

***16*. OHEP should maximize the flexibility of travel allocations, allowing program managers to make the most of limited travel funds.***

*3. Award determinations*

***Comment:***
In some cases budgetary pressure has led to reductions or delay of funding in cases where the PI had other sources of support such as start-up packages. Such supplementary support often indicates the high quality of the PI and should be rewarded by OHEP in their planning and awards.

***Recommendation:***

***10*. OHEP should strive to avoid penalizing PIs who leverage DOE investments with alternate sources of support, e.g., from startup funds.***

**E. Postdoctoral support**

***Finding:***
Postdoctoral researchers are the linchpin of theory research. Support and training for these young researchers is essential to current and future vitality and to the future of HEP theory. However, postdoc support is especially vulnerable to negative impacts from budget pressures.

***Comments:***
Special programs to recognize the most promising postdocs help develop future scientific leaders. Such programs at laboratories and some universities have been highly successful. A program that is open to the full spectrum of young theorists would be useful.

As noted above, the current negative impact from bridge funding in the theory program will disappear in FY15. This provides an opportunity to gracefully implement new initiatives for postdocs.

There are several successful models for postdoc fellowship programs that could be partially emulated. These include the NSF LHC-TI, NASA Hubble fellows, NIH fellows, and others. OHEP could consider the creation of a new theory postdoc fellowship program.

***Recommendation:***

***26. Create a new theory postdoc fellowship program. The detailed structure of the program should be determined by OHEP, but could be modeled via selection of recipients from a national competition, with three years of support to recipients working at a DOE supported university or lab group of their choice.***

# 5. Accelerator R&D

## A. Proposal reviews

***Findings:***
The subpanel read 12 proposals, of which three were declined, and nine were accepted or partially supported. The average duration for a review, from submission to decision, was about four to five months. The length and depth of individual reviews varied greatly, from half a page to six pages.

***Comments:***
The quality of the reviewers, as well as the reviews submitted, is quite high. The depth of opinions offered on the proposals, based on the considerable experience of the reviewers, is notable and remarkably uniform.

Several of the proposals concerned university-based work on behalf of large accelerator collaborations, for example ILC and muon colliders. The proposals were well handled, with reviewers chosen from both within and outside the communities in question, thus obtaining a relatively broad picture of the intellectual quality of the proposed work.

One proposal was declined after review by a panel of four reviewers who were strongly negative. Although the proposal came from an investigator with no previous OHEP track record, no bias was apparent. This proposal is from the new era of comparative review, and it is fairly clear that the process worked well in this case; the proposal was weak and the weakness was identified.

We appreciate that the recent ARRA program was implemented quickly. However, the review process of ARRA supplements seemed to be less stringent than for other proposals, with a resulting unevenness in funded efforts.

The introduction of PeerNet system helped to establish uniformity in the review process and we consider it to be generally useful. The coming migration of the review process to the PAMS system is expected to further improve the uniformity and quality of the reviews.

OHEP demonstrated commendable attention to reviewers' comments, as seen for example in following suggestions to support only parts of some proposals.

## B. Comparative program reviews

***Findings:***
There was a comparative review of laboratory accelerator development under the General Accelerator Development program (GAD) in 2011. Several reviewers raised issues concerning the relevance of some program elements to the OHEP mission [e.g., LBNL's Center for Beam Physics, and SLAC's Normal Conducting RF program]. Follow-up on these issues did not occur, due to the major reorganization of R&D activities that occurred in 2011.

Since 2011, some accelerator programs have moved within OHEP. For example, the Muon Accelerator Program (MAP) joined the Superconducting RF R&D and the LHC Accelerator Research Program (LARP) under Facilities Development, while FACET moved to Facility Operations.

In FY13, the BNL Accelerator Test Facility (ATF) operations and research was the first element to move into the Accelerator R&D Stewardship R&D program.

***Comments:***
The review of the GAD program was not as deep as other comparative reviews, particularly in the university research program. Furthermore, these reviews produced some criticism in the referee reports that apparently was not communicated by OHEP in the form of advice to the proponents to guide improvement.

## C. GARD, Accelerator Stewardship, and SciDAC

***Findings:***
The General Accelerator R&D (GARD) program is composed of the former GAD and Accelerator Science programs. There are currently seven thrusts in GARD: (1) novel concepts (plasma, laser, dielectric), (2) superconducting RF, (3) accelerator, beam and computational physics (4) particle sources, (5) beam instrumentation and control, (6) normal gradient/high gradient structures and RF sources, and (7) superconducting magnets.

In addition to GARD, OHEP is developing an Accelerator Stewardship program that encompasses accelerator R&D activity in support of all Office of Science research. The full COV heard presentations on this program, and the subcommittee discussed it with the program manager. The Accelerator Stewardship program is still in its promising first stage, with the inclusion of the BNL ATF as the first (small) program element in FY13, and with proposed first substantial funding in FY14. It is expected that some thrusts will migrate from GARD to the Accelerator Stewardship program.

The Scientific Discovery through Advanced Computing (SciDAC) program is managed by ASCR for computing initiatives across the Office of Science; this program contains elements relevant to accelerator R&D. SciDAC had its last COV in 2007, entirely performed within ASCR, with another expected in 2014. In its third phase in 2011, SciDAC-3 received only 2 accelerator-related proposals.

The Illinois Accelerator Research Center (IARC) is a joint initiative between the State of Illinois, FNAL, and OHEP, to enable and enhance the transfer of accelerator technology to address the extended needs of industry and society.

***Comments:***
OHEP is trying to manage several related programs coherently in accelerator R&D – GARD, Accelerator Stewardship, SBIRs, and SciDAC – with several beneficiaries: OHEP, other Office

of Science divisions, other agencies, and society at large. The matrix of mission relevance is shown in Table 1:

Table 1: Matrix of mission relevance.

| | HEP | Office of Science [ASCR, BES, NP, etc] | Agencies [NCI, etc] | Society |
|---|---|---|---|---|
| GARD | X | | | |
| Acc Stewardship | X | X | X | X |
| HEP SBIRs | X | | | X |
| SciDAC | X | X | | |

The program thrusts largely reflect the history and past priorities of OHEP, rather than the current understanding of the medium- and longer-term needs of the domestic HEP program. The most notable omissions include R&D on the enabling technology of high power targets, on research towards future high power proton accelerators, and on the Intensity Frontier (discussed in the 2013 Snowmass report and elsewhere). Reconsideration of the GARD portfolio will therefore be needed soon, synchronized with the delivery of the P5 report in 2014.

It is desirable and even necessary to identify activities that are central to the HEP mission, and therefore properly located within the General Accelerator R&D (GARD) program, and to distinguish them from activities that are more suitably included under the category of Accelerator Stewardship.

The Accelerator Stewardship program is not yet fully in place, so a full evaluation of its management will await a future review. However, as the program was presented to the Committee and is now being formulated through discussions in OHEP and other Office of Science Divisions, we offer some suggestions for its organization.

The OHEP-SBIR program in accelerators is well managed and well balanced between HEP needs and wider research applications. A community of capable small companies has grown to become visible and relevant, meeting many accelerator technology needs. Enhanced inclusion of industrial partners is possible, beyond the current modest SBIR resources, using mechanisms like the Illinois Accelerator Research Center. IARC is a possible component of the Accelerator Stewardship program, but its role needs better definition.

SciDAC is a good example of how HEP benefits from a program that is jointly run with another Office of Science program office. There has been significant progress over the second and third generations of SciDAC. SciDAC accelerator code development might benefit from closer coordination with GARD, and in due course with the Accelerator Stewardship program.

There is informal coordination between SciDAC and GARD, but the desire to optimize the HEP rewards suggests the need for closer coordination and for better accounting of the needs of the code end users. The accelerator software activities within SciDAC could be reviewed to measure and ensure user satisfaction, with the assistance of OHEP.

Potential beneficiaries like BES and NP need to be present when the future of ATF, BELLA, AWA and FACET is discussed. It seems that, in the past, other Office of Science offices did not express interest in the thrusts that OHEP developed, despite their potential to affect other sciences' plans for future. For example, we recognize that advanced accelerator concepts focused on compact high gradient electron acceleration will find compelling near-term applications in GeV-scale light sources, before proceeding to implementation at higher energies.

***Recommendation:***

***27. Evaluate the General Accelerator R&D (GARD) program to identify and prioritize components that are central to the evolving HEP mission, after delivery of the 2014 P5 report.***

The Accelerator Stewardship program was initiated after the period of this review, so is not part of the purview of this committee. However as there were discussions with OHEP staff on this program, the COV considered some ways to enhance the prospect for its success.

***Suggestions:***

***28. Identify goals and areas of mutual and/or complementary accelerator R&D interest jointly with other parts of the Office of Science and other agencies and stakeholders in founding the Accelerator Stewardship program.***

***29. Establish procedures to jointly review proposals addressing Accelerator Stewardship goals, including those outside traditional boundaries, at the initiation of the program.***

***30. Review the progress of the Accelerator Stewardship program periodically (e.g., annually), reporting to OHEP, including reviewers representing other parts of the Office of Science, and representing other governmental agency stakeholders. Consider including SciDAC accelerator activities in the periodic reviews.***

# 6. Facility Operations

## A. Efficacy and quality of the program's processes

***Findings:***
The Facility Operations subpanel was charged with examining facility operations overseen by OHEP. There are three large and several smaller facilities included in this overview.

The Tevatron accelerator was turned off at the end of FY2011 due to the LHC program start.

Small operations programs such as DES, Daya Bay, EXO etc. have been managed in the OHEP Research Division.

Due to reduced travel budgets, travel by OHEP staff to the accelerator and experimental reviews has been reduced in FY2010-FY2012. As a result, the number of contractor visits to Germantown has increased significantly so as to provide adequate communications with OHEP.

***Comments:***
The staffing in OHEP has increased modestly since the last COV and, thus, the work load is more reasonable and distributed.

OHEP Annual Program and Science and Technology (S&T) reviews of the ongoing operational programs have been done in a timely and thorough manner for the Tevatron, Fermilab Accelerator Complex, LHC Detector Operations, FACET, MAP, and LARP.

Operational metrics for the large facilities have been carefully prepared and monitored. The metrics for smaller facilities are varied and may be harder to quantify, and thus could use some further specification for clearer monitoring.

OHEP has worked hard to help adjust operational goals of the facilities in the recent difficult funding cycles. The transfer of small funding amounts between B&R accounts to improve the program is getting better but could use further refinement.

***Recommendations:***

***1*. Further refine the method and approval process to facilitate modest funding changes between funding streams in response to evolving circumstances.***

***13*. Develop simple but clear operational metrics (perhaps milestones) for the smaller scale facilities and experiments.***

## B. Active project and programs monitoring

1. Facility Operation Overview

***Finding:***
All operational programs were reviewed in FY2010-FY2012. The COV subpanel was provided with reports from facility reviews from Fermilab, LHC detector operations, LARP, ILC, and MAP. Responses to recommendations from previous reviews were provided.

***Comments:***
The reviews carried out by OHEP were of high quality and made use of qualified experts in the field. Overall, there is a high level of consistency among the individual reports indicating that the instructions and template method is having a unifying effect.

The COV reading of the Operations and S&T Review supporting documents show that the review process is providing in depth feedback by world experts.

The recommendations from the previous reviews were addressed directly in most subsequent reviews. The closeouts at the end of the reviews provided the needed immediate feedback which is often very useful to the laboratories.

The COV recognizes the extra effort by OHEP to use reviewers from other laboratories to review a given laboratory program so that the differences between laboratories and universities in the mission, methods, and procedures are better taken into account.

2. Fermilab Accelerator Program

The Fermilab Accelerator Complex involves the operation of all the accelerators at FNAL, operation of the test beams, and facility upgrades.

***Findings:***
The FNAL proton accelerator complex is the single largest domestic user facility being managed by OHEP. The budget for operating the FNAL accelerator complex was $109.6 M in FY2012 down from $129.9M in FY2011. Tevatron operations were completed at the end of FY2011. The period FY2010 – 2012 has seen a transition of the physics program utilizing Fermilab's accelerators from emphasizing the energy frontier to a focus on the intensity frontier.

OHEP manages its operational facilities using well-established techniques such as regular external reviews (S&T reviews), quarterly reports on budgets and technical progress, monthly operation reports and weekly phone calls. These long-established practices are effective in maintaining good communication between the facilities and OHEP. The current set of management controls seems well-suited for overseeing operational issues and resolving problems of a short-term nature.

The Fermilab Proton Improvement Plan (PIP) is a $85M multi-year collection of infrastructure and accelerator tasks designed to address aging accelerator infrastructure, improve reliability and enable an increase in proton production by approximately a factor of two. The PIP is being managed internally at FNAL rather than as an MIE. Between FY11 and FY13 the overall PIP completion date was pushed back by two years.

***Comments:***

The annual FNAL S&T reviews are thorough, with a well-chosen committee of experts who have given useful comments and recommendations to both FNAL management and OHEP. Recommendations from the S&T reviews are addressed by Fermilab management with progress typically reported to the S&T review committee the following year.

FNAL has a diverse program and is wrestling with tight and changing budgetary constraints. Measures have been taken to deal with the budgetary constraints by either stretching out or staging programs. These measures threaten to compromise the competitiveness of the planned physics program. As pointed out in the reviews, prioritization of the available options is key.

Efforts with TPCs less than $5M are managed by the OHEP Research Division. Experiments of this scale can often respond quickly to a physics or technical opportunity that can result in an important new measurement or significantly enhanced performance of a detector or accelerator component. It is very important that OHEP maintains flexibility in the funding and implementation of these small scale projects so that opportunities can be exploited whenever they might arise.

Large long-term programs planned for the ongoing operation of an established facility with a common goal (e.g., the Fermilab Proton Improvement Plan), and some AIP or GPP efforts, can benefit from project-style review. Whether conducted by the host Laboratory or DOE, the objective would be to give OHEP assurance that the scope of activities, budget and schedule are properly defined. Although the annual S&T reviews provide a good mechanism to track and manage short and medium term issues, they do not seem to be effective at overseeing long term strategic issues. A methodology should be developed to fill this gap in oversight.

***Recommendation:***

***31. Perform reviews that allow the establishment of well-defined goals, deliverables and multi-year budget plans for programs that have significant budgets and extend over multiple years.***

3. LHC Detector Operations Programs

The LHC Operations Program involves the detector operations for ATLAS and CMS that are managed by US host laboratories overseen by OHEP and NSF.

***Findings:***
There are good and thorough annual reviews for both ATLAS and CMS. The main areas of US involvement are maintenance and operations (M&O), software and computing (S&C), and R&D. The management of M&O and S&C aspects is generally excellent. There are clear metrics and the good results speak for themselves.

OHEP's restructuring of the R&D funding organization caused some difficulties for the experiments when the budget for detector R&D was reduced to provide a pool of funds for generic detector R&D. For CMS, the declination of a generic R&D proposal for the track trigger R&D put budget pressure on the management reserve.

***Comments:***
There has been noticeable variability among recommendations made by the review team members, despite a standard set of questions. It might be useful to provide templates to a future review team to structure their deliberations.

There is a "Response to Previous Reviews" charge. However, this only appears to address a small number of previous recommendations. OHEP should consider including a summary of previous review recommendations and the status of the responses (perhaps as an appendix).

For the next COV process it would be useful to have a compilation of previous recommendations, responsibilities, and the status of responses.

There are very thorough quarterly reports giving a detailed breakdown of all operational aspects. We note that there is a different content and layout for the ATLAS and CMS reports and we suggest the use of a standard template. There are also bi-weekly phone calls with Operations Management and the NSF, supplemented with the Joint Oversight Group JOG meetings.

The reviews and reports from the ATLAS and CMS detector operations program are fully appropriate.

The project reviews do provide information that helps ensure good management. Follow-up of the recommendations arising from the reviews is a best-practice activity that makes the program stronger. There is also comprehensive monitoring of ongoing operations.

There is a need for a clear plan to provide resources for the R&D necessary for the most critical parts of ATLAS and CMS Phase 1 and Phase 2 detector upgrades.

4. FACET

FACET is a new test beam user facility that started in FY2012 at SLAC, used for advanced plasma wakefield acceleration experiments using low emittance 23 GeV electron beams, as well as for many other accelerator experiments.

***Finding:***
The Facility for ACcelerator Experimental Test (FACET) at SLAC was completed in FY2011 and the first user run was in FY2012. The experimental program covered a wide range of topics including plasma wakefield acceleration, dielectric wakefield acceleration, THz radiation, polarized materials, Smith-Purcell radiation, and emittance preservation in linacs. The metrics include the number of users and the hours of experimental beam time. The oversight includes weekly status calls with OHEP, end of run reports, and a Program Advisory Committee.

***Comment:***
The FACET FY2013 beam run was excellent with many new results. OHEP oversight of FACET appears to be appropriate for this facility.

5. LARP

LARP is a program that aims to develop the accelerator-related tools and technology needed to support the LHC program. A primary goal is to maintain US competency in the relevant accelerator technologies.

**Findings:**
The LARP portfolio is varied. It is performing novel and important R&D in a number of fields including superconducting magnet development, crab cavity development, beam instrumentation, novel collimator development, crystal extraction, high bandwidth feedback systems, modeling of energy deposition and radiation damage from beam losses.

The last LARP review was in July 2012. This review was wide-ranging and thorough. Detailed, clear and important recommendations were made.

***Comments:***
Given the issues raised in the last review, it is unfortunate that there has not been a subsequent review. A main concern is the management of the process that will take the magnet program from R&D status towards production capability. This is directed R&D with reasonably clear deliverables and the eventual goals need to stay in focus. The follow-up of some review recommendations appears not to have taken place. The 2012 review said: “LARP has not delivered results with respect to the recommendations of the last two reviews.” In particular, it has not “provided a detailed plan, including budget, to DOE transitioning from LARP R&D to High-Luminosity HL-LHC.” The 2011 review team also made a similar recommendation.

OHEP should provide guidance to LARP for producing a down-selection of deliverables, a list of deliverables with cost estimates, a schedule and budget, and a plan for the transition to construction. The magnet team needs to be aligned with the HL-LHC requirements and construction plans. OHEP should consider a peer review of magnet systems development program with CERN input.

***Recommendations:***

***32. Request that the LARP leadership address the recommendations from a compilation of the 2010-2012 LARP reviews.***

***33. Monitor activities that are transitioning from R&D to full construction (e.g., LARP magnet program) so as to clearly define and track the transition steps.***

6. Muon Accelerator Program

***Comments:***

The MAP program was reviewed twice in 2010-2012. The reviews were carried out with a broad review team and covered the entire spectrum of work. OHEP made decisions to strengthen the management of the organization. Recent progress has been good with clear goals and expectations. The US role in the MICE experiment in the UK is becoming well-defined. Continued refinement of the metrics for evaluating the MICE program should be made.

7. ILC-ART

***Comments:***

The ILC Americas Regional Team ART was reviewed in 2010. The reviewers were pleased with the program's progress. The future R&D plan was deemed reasonable and consistent with the goal of major US participation in a future linear collider. For many reasons, the scope of the ILC program changed significantly after the 2010 review. The ILC Technical Design Report was delivered in 2013.

## 7. Projects

***Findings:***
OHEP manages research in its Research and Technology Division and facilities operations and projects within the Facilities Division. The criteria for an activity to become a project are that it has a clear mission need, well defined deliverables and Total Project Cost (TPC) exceeding $5M.

During the period FY10-12, OHEP oversaw 17 projects in stages ranging from initiation to completion. A total of $340M was invested in projects or pre-project development.

The Office of Science definition of project success is that the project completes with an actual cost less than 10% over TPC, but with no strict constraint on schedule.

CD-0 is awarded when OHEP demonstrates mission need for the proposed activity.

Total Project Cost accounting begins with the assignment of CD-0 to a project.

The level of oversight for projects is determined by the Office of Science and Office of Program Assessment. Oversight increases if or when difficulties are encountered.

OHEP Program Managers communicate with the Projects through the Integrated Project Teams and Project Management Groups, as well as informally.

***Comments:***
HEP maintains a balanced portfolio of projects across the frontiers and OHEP programs.

OHEP applies tailoring of the CD process appropriately matched to the size and needs of the project.

OHEP maintains a number of projects in the CD-0 to CD-1 stages in the portfolio. However the movement of projects to the baseline and construction stage depends on readiness and the available funding.

The future project portfolio will depend on HEPAP and P5 recommendations.

The Laboratories serve as the contractors for major projects with the expectation that there will be university involvement as appropriate. It would be useful to investigate ways to facilitate enhanced contribution by universities.

Budget constraints sometimes mean that even well managed projects are delayed and may not fully exploit their scientific promise. Funding delays affect project schedules, and that has been the new normal in the last few years. This leads to the need to incorporate some flexibility in how the project proceeds through the CD-process.

Although large scale R&D programs share some characteristics with projects, such as the need for establishing deliverables and milestones, they differ in that the outcomes of an R&D program are less predictable. The host Laboratory should take the lead in managing such programs.

***Recommendations:***

***11*. Further increase in the budget fraction devoted to projects is desirable but should be subject to the recommendations of the 2014 P5 report and budget constraints.***

# Appendix A: Committee membership

Paul Grannis, Stony Brook University, Committee of Visitors chair

*Subcommittee on the Energy Frontier*
Darien Wood, Northeastern University (chair)
Karl Jakobs, University of Freiburg
Rob Roser, Fermilab
Heidi Schellman, Northwestern University
Evelyn Thomson, University of Pennsylvania

*Subcommittee on the Intensity Frontier*
Kate Scholberg, Duke University (chair)
Steve Kettell, BNL
Jack Ritchie, University of Texas
Jenny Thomas, University College, London
Rick van Kooten, Indiana University

*Subcommittee on the Cosmic Frontier*
Dave Burke, SLAC (chair)
Brenna Flaugher, Fermilab
Giorgio Gratta, Stanford University
Josh Klein, University of Pennsylvania

*Subcommittee on Theory*
Joe Lykken, Fermilab (chair)
Andy Albrecht, University of California, Davis
Michael Dine, University of California, Santa Cruz
JoAnne Hewett, SLAC
Nathan Seiberg, Institute for Advanced Study

*Subcommittee on Accelerator R&D*
Steve Peggs, BNL (chair)
Jamie Rosenzweig, UCLA
Vladimir Shiltsev, Fermilab

*Subcommittee on Facilities Operations*
John Seeman, SLAC (chair)
Mike Lamont, CERN
Ed O'Brien, BNL

*Subcommittee on Projects*
Regina Rameika, Fermilab (chair)
George Ginther, Fermilab and University of Rochester
Fulvia Pilat, TJNAF

# Appendix B: HEPAP Charge

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DEPARTMENT OF PHYSICS AND ASTRONOMY

IRVINE, CALIFORNIA 92697-4575
Phone (949) 824-6911 Fax (949) 824-2174
Email: Andrew.Lankford@uci.edu

September 20, 2013

Professor Paul D. Grannis
Department of Physics
State University of New York
Stony Brook, NY 11794-3800

Dear Paul:

Thank you for agreeing to chair the Committee of Visitors (COV) to review the management processes and outcomes of the High Energy Physics (HEP) program in the Department of Energy (DOE) Office of Science. This review of practices should be conducted in accordance with the Guidance for DOE Office of Science Committee of Visitors Reviews, issued by the Deputy Director for Science Programs on May 1, 2009 found at the following url:
http://science.energy.gov/~/media/sc-2/pdf/presentations/guidance_for_doe_sc_cov_reviews_v1.pdf

The COV subcommittee is charged by HEPAP to assess the operations of HEP during the fiscal years 2010, 2011, and 2012. As noted in the Guidance, the core COV charge components are to:

- Assess the efficacy and quality of the processes used during the past three years to solicit, review, recommend, and document application and proposal actions, and to monitor active awards, projects and programs.
- Within the boundaries defined by DOE mission and available funding, comment on how the award process has affected the quality of the portfolio elements and of the resulting portfolio as a whole, including breadth and depth and national and international standing.

Additional subjects specific to HEP that the COV should address are:

- The 2008 Particle Physics Project Prioritization Panel (P5) report recommended long-term program goals and priorities. The COV should comment on whether the recommendations of P5 and other recent HEPAP subpanels are being reasonably followed.
- The COV should assess how well the actions of HEP are maintaining the capabilities needed for healthy laboratory and university programs.
- Comparative reviews of university and laboratory proposals and programs have been introduced since the most recent COV in 2010. The COV should assess the effectiveness and impact of these new processes on the quality of the HEP program.

- HEP has aligned its organization, budget, and review processes with the energy, intensity, and cosmic frontier definitions of the 2008 P5 report. The COV should identify the advantages and disadvantages of organization along these lines, and assess the overall effectiveness of this organization.
- HEP has initiated decreases in the percentage of its overall budget being allocated to the Research program in order to increase the percentage allocated to new projects. The COV is asked assess the impact of decreases on the research program. Are the reductions being allocated judiciously within the research program?
- The subcommittee should comment on what progress has been made in addressing recommendations of the previous COV.
- The COV is asked to identify issues that it is not able to appropriately consider within the time span of its review and that deserve subsequent consideration and/or study.

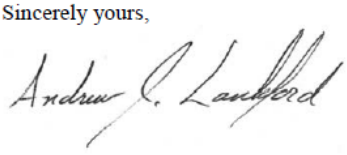
In addition to these, any comments on the observed strengths or weaknesses in any component or sub-component of the HEP's portfolio, along with suggestions for improvement as appropriate, would be appreciated. Additional specific areas where COV findings and comments are requested may be conveyed to you directly by the Associate Director for High Energy Physics.

HEP activities under review include: laboratory and university experimental and theoretical research programs; accelerator R&D; facility operations; and project management. In accordance with the Guidance, COV members will be given access to all program documentation completed during the period under review, including applications, proposals, review documents, and other relevant documentation. COV members may request, at their discretion and according to their criteria, that a representative sample of the program portfolio be provided. In response, the program may suggest a sample of actions, including new, renewal, and supplemental applications and proposals, awards, and declinations. In addition, the COV members may also choose to review files through a random selection process. COV members will have access to interim and final reports upon request.

As Chair of the COV, you should work with the DOE HEP office to enable the COV meeting to take place in October 2013. The results of this review should be documented in a report with findings, comments, and recommendations clearly articulated. This report should be presented to HEPAP at its final meeting of 2013 for their review and approval in a timely fashion.

I appreciate the Committee's willingness to take on these important activities, and HEPAP looks forward to the Committee's final report concerning these important tasks.

Sincerely yours,



Andrew J. Lankford
Professor of Physics, University of California, Irvine
Chair, High Energy Physics Advisory Panel

# Appendix C: Draft Agenda

**AGENDA**
**Committee of Visitors Review of the Office of High Energy Physics**
**October 9 – 11, 2013, DOE Germantown Complex**

| Wednesday, October 9, 2013 | | | |
|---|---|---|---|
| **Time** | **Activity** | **Participants/Lead** | **Location** |
| 7:30 am | Shuttle Pickup | COV Members/Christie Ashton | In Front of Hotel |
| 7:30 am - 8:30 am | Check-in Germantown Facility | HEP Staff/Christie Ashton | North Lobby |
| 8:30 am - 9:00 am | COV Executive Session | Paul Grannis, COV Chair | A-410 |
| 9:00 am - 9:30 am | OHEP Organization | Jim Siegrist, HEP Director | A-410 |
| 9:30 am - 10:00 am | Research and Technology Overview | Glen Crawford, Division Director | A-410 |
| 10:00 am – 10:30 am | Operations and Projects | Mike Procario, Division Director | A-410 |
| 10:30 am- 10:45 am | Refreshment Break | | A-410 |
| 10:45 am – 11:00 am | Energy Frontier Research | Abid Patwa | A-410 |
| 11:00 am – 11:15 am | Intensity Frontier Research | Alan Stone | A-410 |
| 11:15 am – 11:30 am | Cosmic Frontier Research | Kathy Turner | A-410 |
| 11:30 am – 11:45 am | Theory | Simona Rolli | A-410 |
| 11:45 am – 12:00 noon | Accelerator R&D | L.K. Len | A-410 |
| 12:00 noon – 12:15 pm | Detector R&D | Peter Kim | A-410 |
| 12:15 pm – 12:30 pm | Computing | Lali Chatterjee | A-410 |
| 12:30 pm - 1:30 pm | Working Lunch | COV Members | A-410 |
| 1:30 pm – 1:50 pm | Budget Process | Mike Procario, Division Director | A-410 |
| 1:50 pm – 2:05 pm | Information Tracking (PAMS) | Linda Blevins, Office of Science | A-410 |
| 2:05 pm – 2:20 pm | 2010 Action Items | Glen Crawford, Division Director | A-410 |
| 2:20 pm- 3:20 pm<br><br>Panel Breakout #1 | Panel 1 – Energy Frontier Experiment<br>Panel 2 – Intensity Frontier Experiment<br>Panel 3 – Cosmic Frontier Experiment<br>Panel 4 – Theory<br>Panel 5 – Accelerator R&D<br>Panel 6 – Facility Operations<br>Panel 7 - Projects<br><br>• Discussion with program manager<br>• Preliminary Review of Folders | Panel 1 –Darien Wood, Lead<br>HEP Rep: Abid Patwa | G-426 |
| | | Panel 2 – Kate Scholberg, Lead<br>HEP Rep: Alan Stone | G-207 |
| | | Panel 3 – Dave Burke, Lead<br>HEP Rep: Kathy Turner | A-410 |
| | | Panel 4 – Joe Lykken, Lead<br>HEP Rep: Simona Rolli | F-441 |
| | | Panel 5 – Steve Peggs, Lead<br>HEP Rep: L.K. Len | E-114 |
| | | Panel 6 – John Seeman, Lead<br>HEP Rep: John Kogut | E-401 |
| | | Panel 7 – Regina Rameika, Lead<br>HEP Rep: Ted Lavine | E-301 |
| 3:20 pm - 3:35 pm | Refreshment Break (coffee/snacks/drinks) located at A-410 and H-406 | | |
| 3:35 pm - 6:00 pm<br><br>Panel Breakout #2 | Same Breakout Panels and Meeting Locations as Listed in Panel Breakout #1<br><br>• Review Folders<br>• Formulate Panel Questions/unforeseen Issues to discuss with HEP | | |
| 6:00 pm – 6:15 pm | Check-out Germantown Facility | COV Members/Christie Ashton | North Lobby |
| 6:15 pm | Shuttle Return to Hotel | COV Members/Christie Ashton | Germantown Front Entrance |
| 6:45 pm | Shuttle Pickup | COV Members | In Front of Hotel |
| 7:00 pm – 9:00 pm | HEP-hosted working dinner | HEP/COV Members | That's Amore |
| 9:00 pm | Shuttle Pickup | COV Members | In Front of That's Amore |
| 9:15 pm | Shuttle Drop Off | COV Members | In Front of Hotel |

| Thursday, October 10, 2013 | | | |
|---|---|---|---|
| 7:30 am | Shuttle Pick-up | COV Members/Christie Ashton | In Front of Hotel |
| 8:00 am - 8:30 am | Check-in Germantown Facility | COV Members/Christie Ashton/HEP Staff | North Lobby |
| 8:30 am – 9:00 am | COV Chair and Panel Chairs | Paul Grannis, Darien Wood, Kate Scholberg, Dave Burke, Joe Lykken, Steve Peggs, John Seeman, Gil Gilchriese | G-258 |
| 9:00 am – 9:20 am | COV Chair, Panel Chairs and HEP Management | Paul Grannis, Darien Wood, Kate Scholberg, Dave Burke, Joe Lykken, Steve Peggs, John Seeman, Gil Gilchriese, Jim Siegrist, Glen Crawford, Mike Procario | G-258 |
| 8:30 am - 10:20 am<br><br>Panel Breakout # 3 | Panel 1 – Energy Frontier Experiment<br>Panel 2 – Intensity Frontier Experiment<br>Panel 3 – Cosmic Frontier Experiment<br>Panel 4 – Theory<br>Panel 5 – Accelerator R&D<br>Panel 6 – Facility Operations<br>Panel 7 - Projects<br>• Review of Folders<br>• Formulate Panel Comments<br>Refreshments will be served in A-410 and H-406 | Panel 1 –Darien Wood, Lead<br>HEP Rep: Abid Patwa | G-426 |
| | | Panel 2 – Kate Scholberg, Lead<br>HEP Rep: Alan Stone | G-207 |
| | | Panel 3 – Dave Burke, Lead<br>HEP Rep: Kathy Turner | A-410 |
| | | Panel 4 – Joe Lykken, Lead<br>HEP Rep: Simona Rolli | F-441 |
| | | Panel 5 – Steve Peggs, Lead<br>HEP Rep: L.K. Len | E-114 |
| | | Panel 6 – John Seeman, Lead<br>HEP Rep: John Kogut | E-401 |
| | | Panel 7 – Regina Rameika, Lead<br>HEP Rep: Ted Lavine | E-301 |
| 10:20 am - 10:35 am | Refreshment Break (coffee/snacks/drinks) located at A-410 and H-406 | | |
| 10:35 am – 12:05 pm | Panel Breakout #4; meet with HEP staff | All Panels and HEP Staff | A-410 |
| 12:05 pm - 1:00 pm | Working Lunch | COV Members | A-410 |
| 1:00 pm - 3:30 pm<br><br>Second Reading of Selected Folders | All Panels meet together in A-410 to do second reading of selected materials<br>• Review Folders<br>• Formulate Panel Questions | | |
| 3:30 pm – 3:45 pm | Refreshment Break (coffee/snacks/drinks) located at A-410 | | |
| 3:45 pm – 5:00 pm<br>Panel Breakout # 5 | Same Breakout Panels and Meeting Locations as Listed in Panel Breakout #3<br>• Draft of Panel Findings, Recommendations | | |
| 5:00 pm – 6:00pm | Discussion of Findings, Recommendations | COV Members | A-410 |
| 6:00 pm – 6:15 pm | Check-out Germantown Facility | COV members/Christie Ashton | North Lobby |
| 6:15 pm | Shuttle Return to Hotel | COV Members | In Front of Hotel |
| | Dinner | COV Members Only | On their Own |

| Friday, October 11, 2013 | | | |
|---|---|---|---|
| 7:30 am | Shuttle Pick-up | COV members/Christie Ashton | In Front of Hotel |
| 8:00 am - 8:30 am | Check-in Germantown Facility | COV members/Christie Ashton/HEP Staff | North Lobby |
| 8:30 am -10:30 am<br><br>Panel Breakout # 6 | Panel 1 – Energy Frontier Experiment<br>Panel 2 – Intensity Frontier Experiment<br>Panel 3 – Cosmic Frontier Experiment<br>Panel 4 – Theory<br>Panel 5 – Accelerator R&D<br>Panel 6 – Facility Operations<br>Panel 7 - Projects<br><br>• Panel Recommendations<br>• Report Writing<br><br>Refreshments will be served in A-410 and H-406 | Panel 1 –Darien Wood, Lead<br>HEP Rep: Abid Patwa | G-426 |
| | | Panel 2 – Kate Scholberg, Lead<br>HEP Rep: Alan Stone | G-207 |
| | | Panel 3 – Dave Burke, Lead<br>HEP Rep: Kathy Turner | A-410 |
| | | Panel 4 – Joe Lykken, Lead<br>HEP Rep: Simona Rolli | F-441 |
| | | Panel 5 – Steve Peggs, Lead<br>HEP Rep: L.K. Len | E-114 |
| | | Panel 6 – John Seeman, Lead<br>HEP Rep: John Kogut | E-401 |
| | | Panel 7 – Regina Rameika, Lead<br>HEP Rep: Ted Lavine | E-301 |
| 10:30 am -10:45 am | Refreshment Break (coffee/snacks/drinks) located at A-410 and H-406 | | |
| 10:45 am – 12:00 noon | COV Closed Session | COV Members | A-410 |
| 12:00 pm - 1:00 pm | Working Lunch | COV Members | A-410 |
| 1:00 pm – 2:00 pm | COV Closed Session | COV Members and HEP Staff | A-410 |
| 2:00 pm – 2:55 pm | Post Mortem | COV Members and HEP Management | A-410 |
| 3:30 pm | Adjourn – Thank You | | |

Note: no shuttle service available to return back to hotel on Friday afternoon.

# Appendix D: Summary of Recommendations

For convenience, we gather here the full set of 33 recommendations made by the Committee. The first 18 recommendations are taken from the full Committee discussion of overarching issues. Many of these appear in slightly different form, with some differences in motivation, in the subcommittee reports and these recurrent cases are labeled with the same recommendation number followed by *. All recommendations should be read in the context of the comments in the various sections where they are presented.

***1. OHEP should strive to keep the overall program management coherent, keeping in view the connections and balance among the frontiers, and minimizing the obstacles to well-motivated transfers of funds across frontier boundaries.***

***2. Continue the comparative reviews. These should be augmented with independent mail-in reviews.***

***3. Ensure that comparative reviews evaluate a particular proposal in the context of the full program over the full three year cycle within each frontier.***

***4. Ensure that review committees are given appropriate charges, that there are sufficient reviewers of each proposal, and that program manager oversight of reviews is uniform.***

***5. Modify the FOAs to request that proposals which address topics in several different review panel areas include a discussion of the synergy gained from this broader scope.***

***6. Institute mechanisms to streamline the movement of PIs moving from one frontier to another. The past record of such PIs should be considered in the reviews.***

***7. OHEP should charge the comparative review panelists to collectively discuss the relative strengths and weaknesses of proposals so that the program managers can judge the relative rankings of proposals.***

***8. Ensure that program manager's comments in grant folders clearly document the reasons for the action taken.***

***9. Work to further reduce the time between proposal and proponent notification and to provide appropriate redacted review comments that will enable PIs to refine future proposals. Provide information to proponents on their comparative review score and the distribution of scores over all proposals reviewed by a panel.***

***10. Refrain from using university startup funds as a consideration in establishing grant funding levels.***

***11. Further increase in the budget fraction devoted to projects is desirable but should be subject to the recommendations of the 2014 P5 report and budget constraints.***

***12. Allocate a few dedicated pages in proposals for senior research scientists to describe their activities and critical accomplishments.***

***13. Once goals, milestones and costs have been established for small scale experiments, formal OHEP project oversight should be kept to a minimum.***

***14. OHEP should develop a coherent and stable approach to funding detector R&D which embraces the broad range of proposals for new ideas and techniques appropriate to its mission.***

***15. An additional IPA serving the theory program should be found.***

***16. Seek to increase the OHEP travel budget.***

***17. We urge OHEP to redouble and improve its communications both with the HEP community and in the wider governmental circles.***

***18. Undertake a separate review of the balance between the laboratory and university research programs.***

The following recommendations were made by individual subcommittees.

Energy frontier:

***19. Provide summary information on previous proposals, PIs, FTEs, experiments and funding allocations to reviewers.***

***20. If there are clear guidelines on COLA for overseas experiments, provide them to the reviewers.***

***21. The management of the research, operations and upgrade components of the LHC experiments should be closely coordinated.***

Intensity frontier:

***22. Improve the quality of OHEP administrative support.***

Cosmic frontier:

***23. Maintain U.S. science in the lead of the Cosmic Frontier.***

***24. Support computation, simulation, and phenomenology that are directly needed for planning, execution, and analysis of Cosmic Frontier Stage III and Stage IV experiments.***

Theory:

***25. OHEP should explicitly recognize that a thriving theory program is essential for identifying new directions and opportunities for the field, in addition to supporting the current program.***

***26. Create a new theory postdoc fellowship program. The detailed structure of the program should be determined by OHEP, but could be modeled via selection of recipients from a national competition, with three years of support to recipients working at a DOE supported university or lab group of their choice.***

Accelerator R&D:

***27. Evaluate the General Accelerator R&D (GARD) program to identify and prioritize components that are central to the evolving HEP mission, after delivery of the 2014 P5 report.***

***28. (Suggestion) Identify goals and areas of mutual and/or complementary accelerator R&D interest jointly with other parts of the Office of Science and other agencies and stakeholders, at the foundation of the Accelerator Stewardship program.***

***29. (Suggestion) Establish procedures to jointly review proposals addressing Accelerator Stewardship goals, including those outside traditional boundaries, at the initiation of the program.***

***30. (Suggestion) Review the progress of the Accelerator Stewardship program periodically (e.g., annually), reporting to OHEP, including reviewers representing other parts of the Office of Science, and representing other governmental agency stakeholders. Consider including SciDAC accelerator activities in the periodic reviews.***

Facilities operations:

***31. Perform reviews that allow the establishment of well-defined goals, deliverables and multi-year budget plans for programs that have significant budgets and extend over multiple years.***

***32. Request that the LARP leadership address the recommendations from a compilation of the 2010-2012 LARP reviews.***

***33. Monitor activities that are transitioning from R&D to full construction (e.g., LARP magnet program) so as to clearly define and track the transition steps.***