

HEPAP Activities

HEPAP Meeting

Washington, DC; April 6-7, 2015

Andrew J. Lankford

HEPAP Chair

University of California, Irvine

NSAC Neutrinoless Double Beta Decay Subcommittee

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Charge - 1

This letter is to request that the DOE/NSF Nuclear Science Advisory Committee (NSAC) Subcommittee on Neutrinoless Double Beta Decay (NLDBD) provide additional guidance to the DOE and NSF regarding an effective strategy for

implementing a possible second generation U.S. experiment on neutrino-less double beta decay capable of reaching the sensitivity necessary to determine whether the neutrino is a Majorana or Dirac particle under the inverted-hierarchy mass scenario.

As you may know, in May 2014 the report of the NSAC Subcommittee provided recommendations for a strategy for NLDBD. The science case was summarized:

“It is the assessment of this Subcommittee that the pursuit of neutrinoless double beta decay addresses urgent scientific questions of the highest importance, and that sufficiently sensitive second generation experiments would have excellent prospects for a major discovery. Furthermore, we recommend that DOE and NSF support this subject at a level appropriate to ensure a leadership position for the US in this next phase of discovery-caliber research.”

Charge - 2

The Subcommittee was also charged to assess “the status of ongoing and planned first phase NLDBD experiments toward achieving their goals, including major remaining challenges” and to assess “the science-driven down-select criteria for arriving at the most promising approach to a second generation experiment, including a sensitivity goal” The Subcommittee was also asked to assess the status and expected progress of related theoretical efforts.

The Subcommittee recommended that the “current generation” experiments continue to be supported, and that

“...the collaborations continue to work to resolve remaining R&D issues in preparation for consideration of a future “second generation” experiment. New techniques that offer promise for dramatic reductions in background levels should also be supported.”

Charge - 3

Consistent with these recommendations, the NSAC Subcommittee on Neutrinoless Double Beta Decay is requested, in the context of ongoing and planned U.S. efforts as well as international competitiveness, to consider the following:

- Assess the status of ongoing R&D for next-generation NLDBD candidate technology demonstrations for a possible future ton-scale NLDBD experiment.
- For each candidate technology demonstration, identify the major remaining R&D tasks needed ONLY to demonstrate down select criteria, including the sensitivity goals, outlined in the NSAC Report of May 2014. R&D needs for candidate technology demonstrations should be sufficiently documented beyond assertion to allow critical examination both by the panel and by future assessments.
- Identify the time durations needed to accomplish these activities and the corresponding estimated resources, as reported by the candidate technology demonstration groups.

We request that the Subcommittee submit its report to the Office of Science and National Science Foundation by November 2015.

Subcommittee Membership

R. McKeown (Chair)

F. Calaprice

V. Cirigliano

P. Fisher

D. Geesaman (ex-officio)

G. Greene

J. Hardy

W. Haxton

D. Hertzog

K. Langanke

Z.-T. Lu

K. Scholberg

T. Shutt

H. Sobel

S. Vigdor

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Activities – ‘In Progress’

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HEPAP Activities in Progress

- **Conferences**
 - DOE HEP continues to seek HEPAP input on subject of conference travel.
 - Need to conceive approach to the subject
 - Starting from a discussion of the purposes of conferences
 - Discussed addressing subject in partnership with DPF/DPB
- **Future subcommittee on laboratory and university roles & responsibilities**
- **Developing concept of National Scientific Program Advisory SubPanel**

Activities in Progress

**Future subcommittee
laboratory & university
roles & responsibilities**

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Approaching the subject of laboratory & university roles

- **HEPAP discussed the formation of a subpanel or subcommittee to consider the respective roles of laboratory & university groups in the execution of the HEP program.**
 - Arising from topics such as university infrastructure, senior scientists, Theory Panel Report, differences in costs
- **2013 Committee of Visitors recommended an examination of the balance between the laboratory & university research programs.**
- **An approach:**
 - **Start discussion in the context of agency (DOE & NSF) missions**
 - What are the missions of the agencies?
 - How do labs, and how do universities contribute to agency missions?
 - What are “missions” of labs and of uni’s in this context?
 - What can agencies do to enable labs and uni’s to fulfill their “missions”?
 - **Recall Glen Crawford’s presentation at the December 2014 HEPAP meeting.**
 - **Focus on: How to best accomplish science goals in this context?**
 - **What are respective roles of the various types of institutions in accomplishing the program’s science goals, and in satisfying the missions of the program?**
 - **How can roles and working relationships be defined (or redefined) so as to optimize science accomplishment and to satisfy missions?**

Laboratory & university roles - 2

- **Bear in mind:**
 - **DOE & NSF missions differ**
- **Consider:**
 - **How does DOE mission differ for Fermilab & multi-purpose labs?**
 - **How do mission or goals differ for large and small universities?**
- **How do respective roles vary in experimental areas as experiments progress stage by stage from detector R&D through construction to physics analysis?**
- **How do respective roles vary in different areas of theory?**
- **How can roles be designed such that there are no 2nd class citizens?**
- **What degree of “academic freedom” should there be: in theory? in experiment? at universities? at labs?**
 - **What degree of mobility should there be within the field? to neighboring fields? (forays?)**

Activities in Progress

National Scientific Program Advisory Subpanel

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NSPAsP Concept

Goal: Effective and transparent mechanism for HEPAP to advise DOE on the selection of particle physics projects for the national HEP portfolio.

Context:

- P5 process performed strategic planning.
 - P5 set the overall goals and priorities of the national program.
 - For large/medium project concepts, P5 recommendations can provide a basis for “mission need”, CD-0 approval
- DOE CD process performs technical review of projects that are part of national portfolio.
- Project concepts often require additional evaluation of scientific & technical issues before being added to national portfolio.

A sample case:

- How does a concept for a small project, too small to be considered individually by P5, gain approval to become a project?

Concept:

- A HEPAP subpanel provides scientific advice regarding project concepts, following scientific & technical review and evaluation of whether concept is aligned with the P5 strategic plan and considering P5 selection criteria.

NSPAsP Concept – Moving Forward

Concept needs further refinement:

- **Interplay & interactions of NSPAsP & Fermilab PAC**
- **Also:**
 - **Role in interagency projects or initiatives**
 - **Possible role in review of projects previously recommended by P5 that experience significant changes in cost or schedule**

Formal charge needs to be developed.

After discussion of concept in conjunction with P5's recommendation concerning short-baseline neutrino program, decided to:

- **Pause discussion of NSPSsP**
- **Explore concepts for “intermediate” neutrino program**
 - **WINP, Feb 2015 – see Steve Kettell's presentation**

A National Scientific Program Advisory sub-Panel of HEPAP can:

- **Provide an effective and transparent mechanism for HEPAP to advise DOE on the selection of particle physics projects for the national HEP portfolio.**
 - **Following scientific and technical review and evaluation of whether project concept is aligned w/ P5 strategic plan and considering P5 selection criteria.**
- **Address the recommendations of P5 regarding:**
 - **Small project portfolio**
 - **Short-baseline portfolio**
 - **Project reassessment (if costs and/or capabilities change substantively)**
- **Give guidance to DOE *wrt* appropriateness of CD-0 approval of projects.**

NSPAsP would be somewhat similar to Fermilab PAC, but at national level.

- **Main similarity is scientific review. Several differences in mission and operation.**
- **Interplay of NSPAsP and F-PAC needs better definition.**

National short-baseline neutrino program needs initial definition.

- **P5 did not want to preclude either some of these experiments not using LAr or some of these experiments being sited elsewhere than Fermilab.**
- **Fermilab PAC has been developing a short-baseline program.**

**Workshop on Intermediate Neutrino Program
Feb 4-6 BNL**

Moving forward

- **Convene an int'l workshop on intermediate-term neutrino program**
- **Advice to DOE on initial program definition by HEPAP subpanel composed of members of F-PAC, members of HEPAP, and other experts.**
 - **Consider this a “pilot project” to better understand interplay of future NSPAsP and F-PAC**
 - **Settle on path forward by December HEPAP meeting.**

HEPAP Activities

Future Meetings & Topics

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Dates

Dates of remaining (2) meetings in 2015 not yet set.

Now that new members have been announced, I will poll for dates:

- **mid-/late August to end September**
- **mid-November to mid-December**

As previously agreed,

Look to schedule one meeting in 2015 outside DC area

List of Reports for Future Meetings

In addition to regular follow-up on ongoing activities, e.g.:

- Development of implementation of P5 plan
- *Etc.*

Reports (partial list):

- Communications
- CPAD
- Data projects
- Report from NSAC Long-Range Planning
- Further reports on connections with other disciplines
- Reports from other regions (Europe, Japan, China, etc.)

Suggestions for further topics welcome.

Discussion

Agenda

MONDAY, APRIL 6, 2015		
8:00 a.m.	HEPAP Formalities	A. Lankford
8:30 a.m.	CONVENE	
8:30 a.m.	Introduction	A. Lankford
8:40 a.m.	AGENCY REPORTS NSF reports BREAK DOE reports	F. Crim & D. Caldwell P. Dehmer & J. Siegrist
11:40 a.m.	ACCELERATOR TOPICS – I DOE Stewardship FOA DOE University Accelerator Program	E. Colby G. Crawford
12:15 p.m.	LUNCH	
1:30 p.m.	ACCELERATOR TOPICS – II Division of Physics of Beams Report Report of USPAS Review Subcommittee BREAK Report of the Accelerator R&D Subpanel	S. Henderson G. Blazey D. Hartill
5:15 p.m.	Fermilab Report	N. Lockyer
6:00 p.m.	ADJOURN	

Agenda

	TUESDAY, APRIL 7, 2015	
8:30 a.m.	CONVENE	
8:30 a.m.	COMPUTING TOPICS ASCR: Connections with HEP Quantum Information Science, Particle Physics, & Computing BREAK Forum for Computation Excellence	S. Binkley J. Preskill S. Habib/R. Roser
11:00 a.m.	NEUTRINO PHYSICS WINP Report DOE Neutrino FOA	S Kettell G. Crawford
11:45 p.m.	LUNCH	
1:00 p.m.	DOE Comparative Reviews	G. Crawford
1:30 p.m.	HEPAP Activities	A. Lankford
2:15 p.m.	Concluding Discussion	
2:45 p.m.	ADJOURN	

Spare Slides