

*Future topics discussion:*  
**Accelerator R&D**

**HEPAP Meeting**

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# Accelerator R&D

**Accelerator R&D is crucial to the future of particle physics, both mid-term and long-term.**

**Particle physics demands a healthy, multi-faceted program of R&D.**

- **Focused on** (time dimension):
  - **Accelerator projects in the foreseeable future**
    - *e.g. HL-LHC, Japanese-hosted ILC*
  - **Enabling technologies for new accelerators in the more distant future**
    - *e.g. muon collider, very high energy hadron collider*
  - **Striking a balance between “directed” & “basic” accelerator R&D**
- **Focused on** (technology dimension):
  - **Numerous technical subjects:** novel concepts for acceleration; superconducting RF; accelerator, beam and computational physics; particle sources; beam instrumentation and control; normal gradient/high gradient structures & RF sources; superconducting magnets (also see Snowmass)
- **Accelerator test facilities** (*e.g. ATF at BNL, FACET at SLAC*)
- **Basic accelerator science**

**Accelerator R&D is a major commitment of the HEP program.**

- **Significant fraction of HEP budget** (15-20%)
- **New thrust for NSF in basic accelerator science**
- **Also, HEP stewardship responsibility** (but not subject here)

## *Recent related HEPAP activities - 1*

**National accelerator R&D program has been brought into focus recently by:**

- **HEP Committee of Visitors (CoV)**
- **P5**

### **CoV:**

**Comment:** “The (GARD) 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.”

**Recommendation:** “*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.*”

## Recent related HEPAP activities - 2

### P5:

- **Some relevant elements of P5 charge:**
  - “... a **critical examination of the investments that would be needed to ensure the vitality, scientific productivity, and discovery potential of U.S. high energy physics research during this timeframe**. Specifically, we request that HEPAP examine current, planned, and proposed U.S. research capabilities and assess their role and potential for scientific advancement; assess their uniqueness and relative scientific impact in the international context; and **estimate** the time and resources (the facilities, personnel, **research and development** and capital investments) **needed** to achieve their goals.”
  - “... articulate ... the approximate overall **level of support that is needed in the HEP core research and advanced technology R&D programs** to achieve these opportunities in the various scenarios.”
- **Investment in accelerator R&D competes with other elements of HEP program** (from physics research to facility operation to **projects**).
- **P5 will address accelerator R&D with a broad brush.**
  - **Defining detailed R&D plan is beyond the scope & means of P5.**
  - **P5 will articulate approximate overall level of support for R&D.**

## *Accelerator R&D*

# *HEPAP follow-up to CoV and P5*

*(suggestions for discussion by HEPAP)*

- **A HEPAP subcommittee**
  - Composed of HEPAP members and others
  - Flexible mandate, rather than formal charge
- **Outline of a possible mandate:**
  - Define the general goals of the accelerator R&D program.
  - Recommend a balanced program, addressing goals, within budgetary guidance.
  - Suggest an appropriate mechanism to monitor, review, and update the program.
- **Possible additional scope to mandate:**
  - Report on the current demographics and capabilities of the HEP community engaged in accelerator R&D.
  - Assess the manpower and capabilities requirements of the program.
  - Comment on how to match “resources” and “requirements”.
  - Articulate lab-university roles, cooperation, balance.
- **Possible time scale:**
  - Report at Summer 2014 meeting
  - Report preliminary findings at time of P5 report
  - Follow-up report on demographics and capabilities at Fall 2014 meeting