



U.S. DEPARTMENT OF
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The DOE-HEP Accelerator R&D Stewardship Program

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U. S. Department of Energy

Office of Science

Office of High Energy Physics

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Outline

- **What are the origin and motivation for Accelerator R&D Stewardship?**
- **What IS “Accelerator R&D Stewardship”?**
- **How will the program start?**
- **What is the longer-term vision?**
- **How can you engage?**
- **Take-home messages**



2010: Accelerators for America's Future Report



Identified the importance of accelerator technologies to sectors of the US economy

- discovery science, medicine, energy and environment, national security, industry
- “...called for **greatly improved** interagency, interprogram, and industry-agency **coordination.**”
- “...strongly highlighted the value of expanded **training and education** of accelerator scientists and engineers...”

Areas of R&D identified by each working group. All areas are of importance to each working group. Color coding indicates areas with greatest impact.

R&D Need	Energy & Environment	Medicine	Industry	Security & Defense	Discovery Science
Reliability	Red	Red	Red	Blue	Red
Beam Power/RF	Red	White	Orange	Red	Red
Beam Transport and Control	Yellow	Red	Blue	Orange	Yellow
Efficiency	Orange	Blue	Orange	Blue	Yellow
Gradient (SRF and other)	Blue	Blue	Yellow	Red	Blue
Reduced Production Costs	Blue	Orange	Red	Blue	Blue
Simulation	Yellow	Blue	Blue	Orange	Blue
Lasers	Blue	White	White	Orange	Orange
Size	White	Orange	Blue	White	Orange
Superconducting Magnets	White	Yellow	Yellow	Yellow	White
Targetry	Orange	Yellow	White	Blue	White
Particle Sources	Blue	Blue	Blue	Blue	Blue

Color code: increased priority

<http://science.energy.gov/~media/hep/pdf/accelerator-rd-stewardship/Report.pdf>



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2011: Senate Requests 10-Year Plan for Accelerator R&D Stewardship



Accelerators for America's Future
Workshop: October 2009
Report: June 2010

<http://science.energy.gov/~media/hep/pdf/accelerators-rd-stewardship/Report.pdf>

“The Committee directs the Department to submit a ...

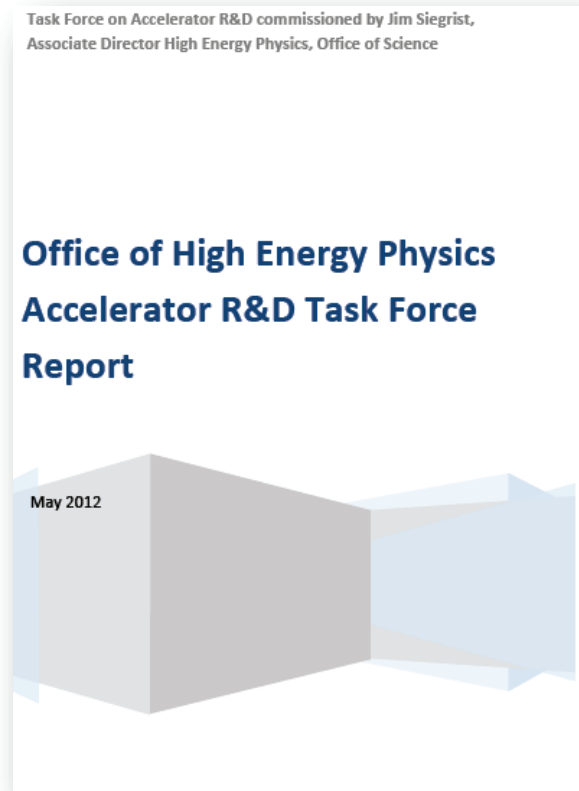
10-year strategic plan ... for accelerator technology research and development to advance accelerator applications in energy and the environment, medicine, industry, national security, and discovery science.

The strategic plan should be based on the results of the Department's 2010 workshop study, *Accelerators for America's Future*, ...”

Senate Report 112-075, p. 93. (Ordered to be printed September 7, 2011)

2012: Accelerator R&D Community Task Force Report

The follow-on to *Accelerators for America's Future*



Accelerator R&D Task Force Report
May 2012

[http://science.energy.gov/~media/hep/pdf/accelerator-rd-stewardship/Accelerator Task Force Report.pdf](http://science.energy.gov/~media/hep/pdf/accelerator-rd-stewardship/Accelerator%20Task%20Force%20Report.pdf)

To prepare for creating an accelerator R&D stewardship strategic plan, Dr. Jim Siegrist, Associate Director of Science for High Energy Physics, in consultation with other SC Associate Directors, asked Dr. Norbert Holtkamp from SLAC to convene and chair a community task force to provide information to:

1. **Identify research opportunities** that might have strong potential for broad national benefits
2. **Summarize the status** of key research and technology areas identified
3. **Identify possible impediments** (both technical and otherwise) to successful accelerator R&D stewardship activities for the broad user base envisioned

How Does Accelerator R&D Stewardship Fit in HEP?

- **Accelerator R&D develops basic science and technologies needed to design, build, and operate state-of-the-art accelerators**
 - accelerators are essential for making new discoveries in HEP
 - **and** for serving a broader community
 - discovery science
 - industry
 - medicine
 - defense and security
 - energy and environment
- **There is already a strong connection between current R&D thrusts and stewardship program needs**



Connecting Accelerator R&D to Science and to End-User Needs

Science Goal “Push”

Application “Pull”

Particle Beam Quality	Photon Beam Quality	Beam Intensity	Compact or High Energy	DOE R&D Program Thrust	Industry	Medicine	Energy and Environment	Defense and Security	Discovery Science
●	●	●	●	Superconducting RF	●		●	●	●
●	●	●	●	Accelerator, Beam, Computation		●	●	●	●
●	●	●	●	Particle Sources	●		●	●	●
		●	●	RF Sources	●		●	●	●
●	●	●	●	Beam Inst. & Controls		●	●	●	●
●	●		●	NC High-gradient Accel. Structures	●	●		●	●
			●	New Accelerator Concepts		●		●	●
●	●	●	●	Superconducting Magnets	●	●			●



2012: Mission of Accelerator Stewardship

- **Mission: to support fundamental accelerator science and technology development of relevance to many fields and to disseminate accelerator knowledge and training to the broad community of accelerator users and providers.**
- **Carrying out this new mission (*in addition to carrying out the present HEP programmatic R&D effort*) will be accomplished through:**
 - **Facilitating access to national laboratory accelerator facilities** and infrastructure for **both industrial and other U.S. government agency users/developers** of accelerators and related technology
 - Working with accelerator user communities and industrial accelerator providers to **develop innovative solutions to critical problems**, to the benefit of **both the broader user communities and the DOE discovery science community**
 - Serving as a catalyst **to broaden and strengthen the community** that relies on accelerators and accelerator technology
- **Strategic Plan sent to Congress October 2012**



Programmatic Elements of Stewardship

- Immediately augment existing programs to **provide opportunities for industrial and other federally funded users at DOE facilities** by increasing support staff and funding for test facilities.
 - 2012: Completed survey of available national lab infrastructure and capabilities
 - **2014: Meeting on Accelerator R&D Stewardship Activities at test facilities**
- In the mid-term (2–5 years), identify a few topical areas with high impact for focused work. Anticipated areas are: (1) **improved particle beam delivery and control for cancer therapy facilities**; and (2) **laser development addressing the needs of the accelerator community**, i.e., high peak power, high average power, and high electrical efficiency; and (3) **energy and environmental applications of accelerators**. Each topical area will have a stakeholder board.
- In the longer term (5–10 years), select additional topical areas for focused work. New stakeholder boards will be created as topics are identified.
- In steady state, SC/HEP goal is to support **at least three topical areas** at any given time.

Initial Topical Area Workshops

- **Workshops organized to assess needs in two identified target areas**
 - **Ion Beam Therapy Workshop** (co-sponsored by NIH/NCI)
 - January 9-11, 2013 in Bethesda, MD
 - organized by DOE
 - **Laser Technology for Accelerators Workshop**
 - January 23-25, 2013 in Napa, CA
 - organized by LBNL
 - Both meetings were small and tightly focused
 - attendance by invitation only; included stakeholder agencies
 - limited number of industrial “observers” accommodated
- **Workshop on the 3rd potential topic area, energy and environmental applications, under consideration**

Five Criteria for “Good” Accelerator R&D Stewardship Activities

- **The application must involve accelerators or accelerator-related technologies having synergy with and benefitting the primary HEP mission**
- **There must be non-trivial intellectual involvement of the institution**
 - Good:* Build an accelerator technology component (usually WFO)
 - Better:* Design an accelerator technology component (possibly WFO)
 - Best:* Design, build, and test an accelerator technology component (Stewardship)
- **The activity must be reasonably consistent with the mission of the institution, and minimally impact the primary SC program**
 - Good:* Activity maintains
 - Better:* Activity expands
 - Best:* Activity develops new

} core skill or facility needed for the mission
- **The institution must arguably be the best provider* of the capability or service**
 - Good:* Institution’s capability is not unique, but institution is close to customer
 - Better:* Institution’s capability is leading, and institution is close to customer
 - Best:* Institution is the only possible provider
- **The customer benefiting from the stewardship activity must endorse the goals**
 - Good:* Customer participates in discussion of task definition, writes letter of support
 - Better:* Customer and institution partner, some cost sharing from customer (e.g. 1:10)
 - Best:* Customer and institution partner, significant cost sharing from customer (e.g. 1:1)

How can you engage?

- **Read the Stewardship program description and workshop reports at**
 - <http://science.energy.gov/hep/research/accelerator-rd-stewardship/>
- **Respond to Test Facilities Pilot Program call (*Labs only*)**
 - Identify potential lab test facility customers and understand their needs
 - Wait for meeting charge to come
- **Topical Area calls**
 - Start gathering ideas, think about your collaborative teams
 - Be aware of related calls
 - The NIH P20 call for a National Center for Particle Beam Radiation Therapy Research
<http://grants.nih.gov/grants/guide/pa-files/PAR-13-096.html>
 - DOE SBIR/STTR new topic area for laser technology
- **Propose new, challenging topical areas**
 - Must result in a “solution” that is broadly useful within a <10 year timeframe
 - There must be market-pull for the “solution” —know your “customer”!

Caveat: **isotope R&D** is supported **exclusively by NP**.

NP issues its own biennial FOA for this topic, to which relevant proposals should be directed.

HEP Accelerator R&D Stewardship Web Site

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You are here: SC Home > Programs > HEP Home > HEP Research > Accelerator R&D Stewardship

High Energy Physics (HEP)

HEP Home
About HEP
HEP Research

Snowmass / P5 Planning Process
Energy Frontier
Intensity Frontier
Cosmic Frontier

Theoretical Physics
Advanced Technology R&D
Accelerator R&D Stewardship
Mission
Background
HEP Accelerator R&D Expertise
Connecting Accelerator R&D to User Needs
Workshop Reports
Research Highlights (13.1MB)
Questions for the Universe
Accomplishments

HEP Research Accelerator R&D Stewardship

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Within the Department of Energy's (DOE's) Office of Science (SC), the High-Energy Physics (HEP) program has traditionally functioned as steward for long-term, fundamental accelerator R&D. This stewardship of "discovery science" accelerator R&D needs has served all of the SC programs. Accelerators are a key element of many SC programs, including Basic Energy Sciences (BES), Fusion Energy Sciences (FES), Nuclear Physics (NP), and, of course, HEP itself. Some of these programs have partnered with the Advanced Scientific Computing Research (ASCR) program to sponsor research in the computationally intensive aspects of accelerator science via the SciDAC (Scientific Discovery through Advanced Computing) program.

In recent years, it has become apparent that accelerator R&D stewardship should be carried out in a broader context than simply discovery science. Accelerators are critical to many areas beyond their traditional role in discovery science, and they influence our everyday lives in myriad—though typically unrecognized—ways. Because of our traditional involvement in this area, HEP was designated by the Office of Science to oversee long-term accelerator stewardship activities within SC, in close consultation with other SC programs.

To publicize our accelerator R&D stewardship activities, we have revised the Accelerators for America's Future website. In addition to serving as a source of information on the uses of accelerators for science and society at large, the updated site provides information on activities and meetings of relevance to both accelerator providers and users, reports of key workshops, and other accelerator-related resources of interest to these communities. Most importantly, the site maintains links to the accelerator-related capabilities of the U.S. national laboratories to facilitate making contact with these institutions in support of the Department of Energy's accelerator R&D stewardship activities.

The Office of High Energy Physics and its accelerator R&D community are enthusiastic about embarking on this broader stewardship mission. We look forward to applying our expertise and skills in support of addressing some of the key economic and societal issues confronting our nation.

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HEP Facilities

HEP Science Highlights
Benefits of HEP
HEP Funding Opportunities
HEP Advisory Committees
HEP News & Resources

Cosmic Frontier

Theoretical Physics

Advanced Technology R&D

Accelerator R&D Stewardship

Mission

Background

HEP Accelerator R&D Expertise

Connecting Accelerator R&D to User Needs

Workshop Reports

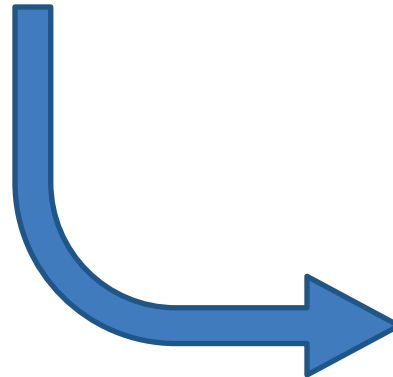
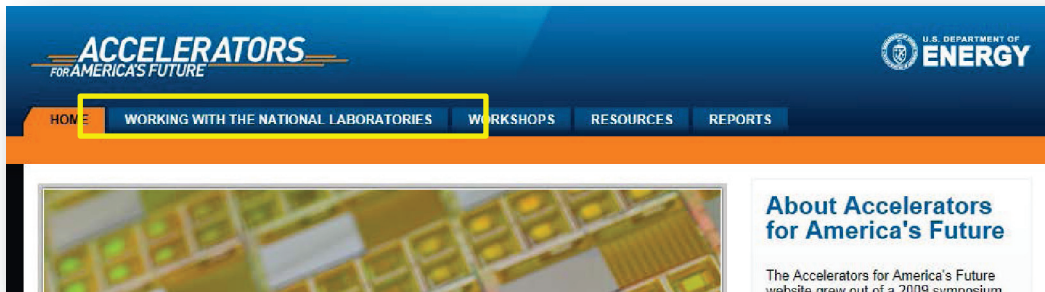
Research Highlights (13.1MB)

Questions for the Universe

Accomplishments

HEP Facilities

Accelerators for America's Future Web Site



The nation's portal for new users to browse lab capabilities and identify a contact person for more information.



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Take-Home Messages

- **Eligibility for stewardship program will be broad**
 - it is *not* a Lab entitlement program
- **“Customer” must actively desire and participate in activity**
 - pure “technology push” is not sufficient
- **Activities should accrue some measureable intellectual benefit to HEP**
- **Stewardship topical areas should address high-impact challenges on ~5-10 year timescale**
 - goal is to solve problems and move on, not create additional long-term R&D thrusts
- **Handling IP remains a challenge**
 - WFO provides precedent
 - **probably need to deal with this case-by-case**

