

Office of Science Statement of Commitment & other Guidance

- **SC Statement of Commitment** – SC is fully and unconditionally committed to fostering safe, diverse, equitable, inclusive, and accessible work, research, and funding environments that value mutual respect and personal integrity. <https://science.osti.gov/SW-DEI/SC-Statement-of-Commitment>
- **Expectations for Professional Behaviors** – SC’s expectations of all participants to positively contribute to a professional, inclusive meeting that fosters a safe and welcoming environment for conducting scientific business, as well as outlines behaviors that are unacceptable and potential ramifications for unprofessional behavior. <https://science.osti.gov/SW-DEI/DOE-Diversity-Equity-and-Inclusion-Policies/Harassment>
- **How to Address or Report Behaviors of Concern**– Process on how and who to report issues, including the distinction between reporting on unprofessional, disrespectful, or disruptive behaviors, and behaviors that constitute a violation of Federal civil rights statutes. <https://science.osti.gov/SW-DEI/DOE-Diversity-Equity-and-Inclusion-Policies/How-to-Report-a-Complaint>
- **Implicit Bias** – Be aware of implicit bias, understand its nature – everyone has them – and implicit bias if not mitigated can negatively impact the quality and inclusiveness of scientific discussions that contribute to a successful meeting. <https://kirwaninstitute.osu.edu/article/understanding-implicit-bias>

Office of Science Office Hours Office of Accelerator R&D and Production “ARDAP”

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U.S. DEPARTMENT OF
ENERGY

Office of
Science

[Energy.gov/science](https://energy.gov/science)

Outline

*Slides & closed-captioned video recordings
of past events are posted at
<https://science.osti.gov/ardap/officehours>*

- March 13, 2024: Introduction to Accelerator Science and ARDAP
- April 10, 2024: Funding Opportunity Announcements (FOAs) and Facilities for Accelerator R&D
- May 8, 2024: Writing a strong proposal and managing an award
- June 12, 2024: ARDAP Merit Review Process
- **July 10, 2024: How ARDAP identifies priority research directions to support**
 - ARDAP's mandate from Congress and cross-cutting nature
 - How we gather input, take advice, and prioritize among many choices
 - Prioritization at the BNL ATF user facility
- August 14, 2024: Avoiding common mistakes: How to prepare key parts of an ARDAP proposal

ARDAP's mandate from Congress



- **Accelerator Stewardship** was established in FY 2014 E&W Bill, S. Rept. 113-47, p. 94
 - <https://www.congress.gov/congressional-report/113th-congress/senate-report/47/1?outputFormat=pdf&s=6&r=1>
- **ARDAP was established** in FY 2022 E&W Bill, S. Rept. 117-36, p.115
 - <https://www.congress.gov/congressional-report/117th-congress/senate-report/36/1>

2014 Accelerator Stewardship

mates, and encourage international collaborators to make financial contributions. Within the funds for High Energy Physics, the Committee recommends \$15,000,000 to support minimal, sustaining operations at the Homestake Mine in South Dakota.

Within the funds for High Energy Physics, the Committee also recommends \$20,000,000 for Accelerator Stewardship. The Committee recognizes the critical role accelerator technology can play in addressing many of the economic and societal issues confronting the country. The Committee supports the Office of Science's efforts to make unique test facilities available to U.S. industry to accelerate applications of accelerator technology. Testing accelerator technology, such as at beam facilities, is the only, unambiguous way to demonstrate the operational efficacy of a new technology and represents the final step in validating a design concept.

NUCLEAR PHYSICS

The Committee recommends \$569,938,000 as requested for Nuclear Physics. Within these funds, the Committee recommends

2022 Accelerator R&D and Production

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ISOTOPE R&D AND PRODUCTION

Isotope R&D and Production ensures robust supply chains of critical radioactive and stable isotopes for the Nation that no domestic entity has the infrastructure or core competency to produce. The Committee supports the FRIB Isotope Harvesting projects.

ACCELERATOR R&D AND PRODUCTION

Accelerator R&D and Production supports cross-cutting research and development in accelerator science and technology, access to unique Office of Science accelerator research and development infrastructure, workforce development, and public-private partnerships to advance new technologies for use in the Office of Science's scientific facilities and in commercial products.

WORKFORCE DEVELOPMENT FOR TEACHERS AND SCIENTISTS

The Committee recommends \$35,000,000 for Workforce Develop-

Office of Accelerator R&D and Production (ARDAP)*

an investment to ensure the U.S. remains a world-leader in the accelerator technologies needed for science and industry

◆ Accelerator Research

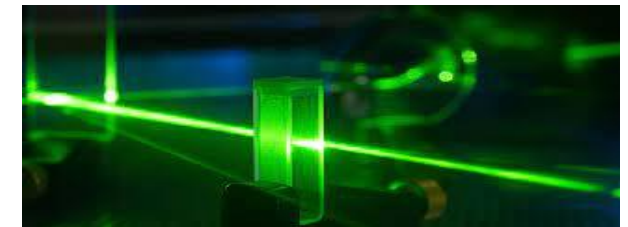
- **Accelerator Stewardship:** developing cross-cutting transformative accelerator technology for future scientific facilities, medicine, industry, security, and defense
- **Technology Maturation:** readying technologies for production and use in scientific facilities, broader USG, and commercial applications
- **Workforce Development:** supporting R&D capacity building and workforce training at MSIs and ERIs
- **Accelerator User Facilities:** Brookhaven Accelerator Test Facility supports technology R&D and industrial access to DOE capabilities

◆ Accelerator Development

- **Domestic Supplier Development:** collaborative early-stage R&D partnerships to develop new domestic sources for critical accelerator technologies

◆ Coordination for effective technology transfer

- Through interagency cooperation, research collaborations, public-private partnerships, and workshops aimed at identifying common R&D needs and forming research networks



*These programs merge back into Office of High Energy Physics in FY 2026

Formulating a program: Input and Advice

- (1) Advice from other SC Programs
- (2) Discussions and joint BRNs with other federal agencies
- (3) RFIs and data calls
- (4) *SBIR/STTR Topics*
- (5) Funded studies
- (6) Community and Federal Advisory Committee reports
- (7) Principal Investigators

Identifying SC's accelerator technology needs

- The **Office of Science Accelerator Joint Oversight Group**

- Meets several times a year
- Shares information across programs
- Develops strategic plans for key accelerator technologies
- Provides input on ARDAP program priorities



- Each SC program maintains webpages with reports on its research needs and plans:

- Basic Energy Sciences: <https://science.osti.gov/bes/Community-Resources/Reports>
- Fusion Energy Science: <https://science.osti.gov/fes/Community-Resources/Workshop-Reports>
- High Energy Physics: <https://science.osti.gov/hep/Community-Resources/Reports>
- Nuclear Physics: <https://science.osti.gov/np/Community-Resources/Reports>
- Accelerator R&D and Production: <https://science.osti.gov/hep/Research/Accelerator-Stewardship/Resources>
- Isotope Program: <https://science.osti.gov/Isotope-Research-Development-and-Production/Resources/Reports>

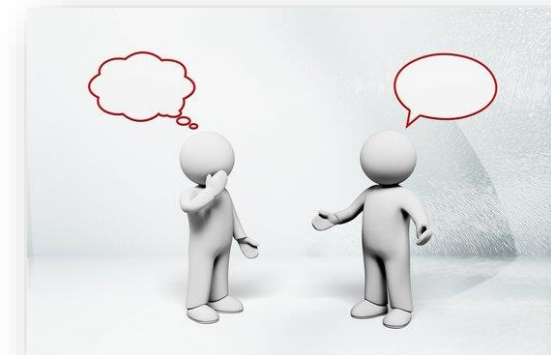


Interagency Coordination

- ARDAP routinely discusses accelerator technology R&D with DHS, DOD, NIH, NNSA, and NSF.
 - The aim is to define swim lanes and promote synergy across the agencies in federal investments in accelerator technology
- As areas of overlapping agency interest become clear, we often will jointly sponsor a [Basic Research Needs \(BRN\) Workshop](#) to explore the applications and needs
 - **2013 Laser Technology for Accelerators**
 - **2013 Ion Beam Therapy**
 - **2015 Energy & Environmental Applications of Accelerators**
 - **2019 Compact Accelerators for Security and Medicine**
 - **2023 Laser Technology**
- The reports of these BRNs serve to guide and prioritize R&D investments for many years



NA-10 NA-21 NA-22 NA-80



What is a “Basic Research Needs Workshop”?

- It is a formal process for developing broad, structured community input that informs federal investment decisions for years to come
- It is charged, sponsored, and guided by one or more federal agencies under strict rules
 - The process, and its product, are “owned” by the sponsoring agencies
 - The workshop report will bear the sponsoring agency’s seals
- The process is structured
 - Participants work together as a group to abstract the **Priority Research Directions** that are likely to be highest impact
 - It is **not** a venue for participants to share status talks on R&D progress and plans
 - Participation is by invitation only; invitations are issued by the lead agency only working in consultation with co-sponsoring agencies
 - Mostly to ensure broad representation, mitigate COIs, control costs
 - Products are a Technology Perspective Factual Document, a Workshop Report, and a brochure
 - Each is written by the workshop leadership, working with the workshop participants; the final report is edited, owned, and publicly posted by the federal gov’t

What is a “Priority Research Direction”?

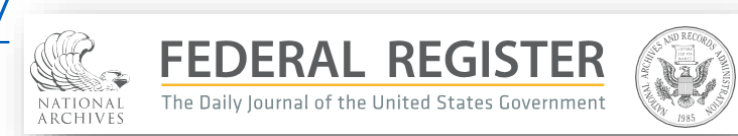
A Priority Research Direction (PRD) is a high-level statement defining a broad R&D area that has high potential for producing transformative scientific breakthroughs.

- It is **broadly applicable** – its successful completion will impact many areas of science (and technology)
- It is **durable** – it will not be mooted by R&D in the next 2-3 years, but could be achieved in 5-10 years

PRDs are called out explicitly in BRN Workshop reports. Look for them!

Requests for Information (RFIs) are an “open door”

- Are posted in the Federal Register: <https://www.federalregister.gov/>
- Accept input for 30 to 45 days after posting
- Include 10-20 questions to indicate what we’re looking for
- Accept input from **anyone**, on **anything**
 - Note: we’re not obligated to act upon any of the advice received
- Are often summarized in a publicly posted document
 - 2014 RFI on Proposed New Program in Stewardship of Accelerator Technologies for Energy and Environmental Applications
 - https://science.osti.gov/-/media/hep/pdf/accelerator-rd-stewardship/E-ERFI_Responses_All.pdf
 - 2015 RFI on Strengthening U.S. Academic Accelerator Science
 - https://science.osti.gov/-/media/hep/pdf/accelerator-rd-stewardship/AcadAccelSciRFI_CatalogOfResponses.pdf
 - 2019 RFI on Creating a Robust Accelerator Science & Technology Ecosystem
 - https://science.osti.gov/-/media/ardap/pdf/2023/RFI_on_Robust_AST_Ecosystem_Public_Summary.pdf



Data Calls

Are specific requests for data from DOE National Labs

- Designed to answer highly specific questions
- Designed to request the minimum amount of data needed
- Summarized in a publicly posted document
 - SC Accelerator Science & Technology Supplier Data Call
 - <https://science.osti.gov/-/media/ardap/pdf/2023/ASnTDataCallOnePage.pdf>
- SBIR topics – see next slide!

Technology	Specific Areas	Value [M\$]	% Foreign
Optics (incl. x-ray optics)	Specialty mat'l's, coatings, optics	\$ 11	100%
Superconducting Accelerators	Accelerator Cavity Manufacturing	\$ 149	70%
Laser Systems	Advanced ultrafast laser systems	\$ 16	67%
HV/UHV Systems	Pumps, chambers	\$ 40	66%
Conventional Magnets	Manufacturing, Perm. Magnet Mat'l's	\$ 117	61%
Cryogenic Systems	Large capacity liquid helium cryoplants	\$ 110	56%
RF Power Systems	High power klystrons, gyrotrons, solid state systems	\$ 156	51%
Superconducting Magnets	Superconducting cable and wire	\$ 49	50%
Power supplies	DC, high current, high voltage, pulsed	\$ 62	20%
Precision Mounts	Precision movers, ultrastable bases, alignment equipment	\$ 15	17%
Advanced Mfr Techniques and equipment	UHV furnaces, Add Mfr tools, advanced CMMs/CNC tools	\$ 38	15%
Particle Sources	Cathodes, Ion source expertise	\$ 28	15%
Specialized dielectrics	HV insulators	\$ 2	8%

AS&T procurement by technical area, value, and % foreign-sourced.

SBIR/STTR Topics

- We reach out to the DOE National Laboratories each year to ask for potential topics for the upcoming SBIR/STTR call.
- Good topics are:
 - For items ***needed in 3-5 years***, when an SBIR effort will have finished
 - ***Appropriate to the length and funding scale*** of the SBIR/STTR program
 - ***Innovative and lead to a marketable product***
- Each year we review the performance of the previous year's topics:
 - How many fundable proposals were submitted per topic?
 - Too many low-scoring proposals may indicate: a badly-written topic, unrealistic metrics in the topic, a technology too far from suppliers' experience, a topic that is mismatched to a strong existing market,...
 - How many awards were made per topic?
 - If the topic was awarded: is there a need to post it again? Or is it best to wait and see how current awards turn out?
 - If there were qualifying proposals, but no award: is the topic in the "rain shadow" of higher-priority topics?
- Feel free to advertise your capabilities to the labs!

Funded Studies

- **National Academies Studies**

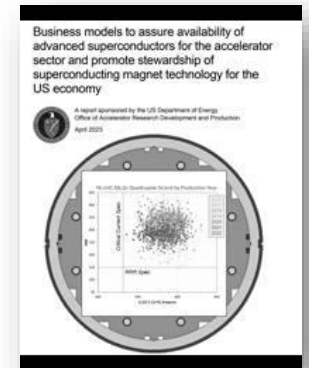
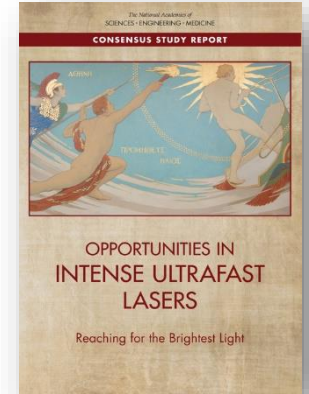
- We partner with other agencies to support National Academies studies
 - “Brightest Light”, with ONR, AFOSR, and NNSA
 - <https://nap.nationalacademies.org/catalog/24939/opportunities-in-intense-ultrafast-lasers-reaching-for-the-brightest-light>

- **Accelerator Design Studies**

- Megawatt-class electron accelerator studies
- Compact accelerator design studies
- Find these on OSTI.GOV: <https://www.osti.gov/>

- **Accelerator Technology Sector Studies**

- Superconducting Magnet Technology
 - https://science.osti.gov/-/media/ardap/pdf/2023/SC_Business_Models_2023.pdf
- *In Progress:*
 - Manufacture of Copper Accelerators: E-Beam welding and allied processes
 - Superconducting RF Cavity Production
 - Sustainable Machine Learning Ecosystem for Accelerators



You!



<https://www.loc.gov/pictures/item/2017645753/>

We read with great interest the...

...new ideas principal investigators
put into proposals!

Prioritization



Prioritization of awards

The FOA tells you how we do this!

1. Scientific and technical merit
2. Mission relevance for SC and OFAs
3. Cost realism and scale of the request
4. Ability to enhance U.S. competitiveness
5. Likelihood of advancing DE&I
6. Skin-in-the-game of participants
7. Efficient use of resources
8. Synergy with other efforts
9. Balance (big v. small, coverage of topics)
10. Prior performance of PI/SKP
11. Synergy with current awards
12. Other

V.B. REVIEW AND SELECTION PROCESS

V.B.1. Merit Review

Applications that pass the initial review will be subjected to a formal merit review and will be evaluated based on the criteria codified at 10 CFR 605.10(d) in accordance with the guidance provided in the "Office of Science Merit Review System for Financial Assistance," which is available at: <https://science.osti.gov/grants/policy-and-guidance/merit-review-system/>.

V.B.2. Program Policy Factors

The Selection Official may consider the following items, listed in order of decreasing significance:

1. Merit of the proposed activity as determined by merit review, using the criteria set out in [Section V.A.2](#);
2. Advice of SC Programs and other federal agencies with specific expertise and interest in the accelerator R&D topics listed in this solicitation:
 - a. At the pre-application phase; and
 - b. At the application review phase;
3. Availability of funds;
4. Extent to which the proposed work will:
 - a. Engage the expertise and facilities of the existing U.S. accelerator R&D ecosystem in a manner that enhances the ability of SC specifically, and other federal agencies generally, to benefit the Nation within their mission spaces;
 - b. Enhance the accelerator technology capabilities and economic competitiveness of U.S. industry; and
 - c. Foster collaboration between developers of accelerator technology and experts who apply accelerator technology;
5. Extent to which the proposed work will:
 - a. Promote diversity of supported Principal Investigators;
 - b. Promote diverse teams and partnerships; and
 - c. Promote the diversity and equitable contributions of institutions receiving awards;
6. Amount of institutional commitment offered;
7. Availability and adequacy of existing accelerator fabrication and testing infrastructure and computational tools;
8. Synergistic potential between the proposed activity and other activities supported by SC;
9. Ensuring an appropriate balance of activities within SC programs;
10. Previous performance of key team members;
11. Degree to which the proposed work is synergistic with, but not duplicative of, existing awards; and
12. Other available advice and information.

Note that, in the context of factors (2), (11), and (12), proposals and excerpts of unattributed reviews may be shared with other federal agencies (such as NSF) during the interagency review process.

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<https://science.osti.gov/ardap/-/media/grants/pdf/foas/2024/DE-FOA-0003253.pdf>

Resulting priorities from SC, OFA, and community feedback are reflected in the 4 “Tracks” of the annual call for proposals (1 of 2)

Track 1: Use-inspired Basic R&D

- a) Particle Therapy Beam Delivery Improvements
- b) Ultrafast Laser Technology Program
- c) High Power Electron Accelerator Technology for Industrial Applications
- d) Compact Accelerator Technologies for Security and Medicine

Track 2: Long-term, Cross-cutting Basic Accelerator R&D

- a) Beam physics and computation
- b) Diagnostics & Instrumentation
- c) Advanced Structure-Based Acceleration and Radiation Generation Concepts
- d) Particle Sources
- e) Superconducting Magnet Technologies
- f) Superconducting RF

Resulting priorities from SC, OFA, and community feedback are reflected in the 4 “Tracks” of the annual call for proposals (2 of 2)

Track 3: Support for non-DOE institutions to use a DOE SC accelerator R&D capability

S. Rept. 113-47, p. 94: “...make unique test facilities available to U.S. industry...”

Track 4: Accelerator Technology: Sector Business Plans and Partnerships

- a) Superconducting accelerator systems—both radiofrequency accelerators and high-field magnets—including research on superconducting materials, engineering, and cryogenic techniques
- b) Particle beam physics and high-fidelity computer modeling, including theory and simulation to accurately model the next generation of particle accelerators; faster, higher-resolution charged-particle and x-ray beam diagnostics, more sophisticated and automated control systems, including AI/ML; and advances in particle-collider-specific beam physics including final focusing and advanced cooling techniques
- c) Very-high-brightness and high-current electron sources, high-intensity proton and ion sources, and more robust megawatt-class targets for secondary beam production
- d) High-average-power radiofrequency systems, including improvements in power-handling devices such as waveguide windows and couplers
- e) High-average-power ultrafast laser sources, high-power optics and coatings for laser systems

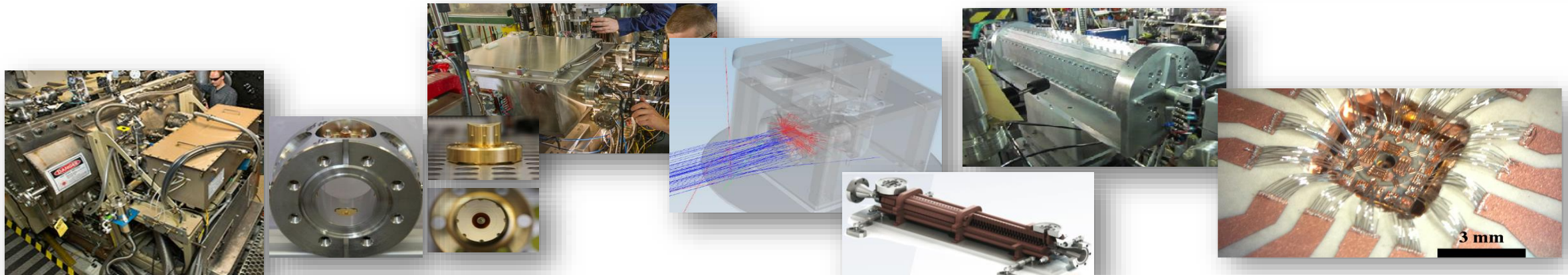
Brookhaven Accelerator Test Facility

- **Brookhaven ATF is part of the Accelerator Stewardship program:**

- <https://www.bnl.gov/atf/>
- Provides a platform for a wide range of laboratory, university, and industry users
- Awards 2,000-2,500 hours/year *free* to non-proprietary users
 - It's also available for proprietary work, but on a full-cost recovery basis
- Supports early-stage basic R&D, later-stage technical demonstrations, and workforce development

- **Prioritization**

- Use of beamtime: BNL-ATF User's Meetings
- Facility upgrades: Science Planning Meetings



Recordings and Slides from past Office Hours

- **Please complete the exit survey!**

- Tell us what you'd like to discuss at future office hours!

- **Past and future Office Hours**

- Wednesday, March 13 at 3pm ET – Introduction to Accelerator Science and ARDAP
- Wednesday, April 10 at 3pm ET – FOAs and Facilities for Accelerator Science
- Wednesday, May 8 at 3pm ET – Writing a strong proposal and managing an award
- Wednesday, June 12 at 3pm ET – ARDAP Merit Review Process
- **Wednesday, July 10 at 3pm ET: How ARDAP identifies priority research directions to support**
- Wednesday, August 14 at 3pm ET: “Avoiding common mistakes: How to prepare key parts of an ARDAP proposal”

- **Reach out!**

- Eric.Colby@science.doe.gov
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FOAs = Funding Opportunity Announcements (‘DOE-speak’ for “solicitations for proposals”)

Additional Slides

