FY 2024 Research Opportunities in Accelerator Stewardship and Accelerator Development DE-FOA-0003253

FOA Issue Date:	January 9, 2024
Submission Deadline for Pre-Applications:	February 6, 2024, at 5:00 PM Eastern Time A Pre-Application is required
Pre-Application Response Date:	February 20, 2024
Submission Deadline for Applications:	March 19, 2024, at 11:59 PM Eastern Time

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Disclaimer : *This presentation summarizes the contents of the FOA. Nothing in this webinar is intended to add to, take away from, or contradict any of the requirements of the FOA. If there are any inconsistencies between the FOA and this presentation or statements from DOE personnel, the FOA is the controlling document.*

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OFFICE OF SCIENCE BY THE NUMBERS

Delivering scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic, and national security of the United States

FY23

6 CORE SCIENCE PROGRAMS

- Advanced Scientific Computing Research
- Basic Energy Sciences
- Biological and Environmental Research
- Fusion Energy Sciences
- High Energy Physics
- Nuclear Physics

3 ENGINEERING AND TECHNOLOGY OFFICES

- Accelerator Research and Development and Production
- Isotope Research and Development and Production
- Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR)

5 NATIONAL QUANTUM INFORMATION SCIENCE RESEARCH CENTERS

ACROSS ITS 10 NATIONAL LABS, OFFICE OF SCIENCE MAINTAINS APPROXIMATELY

24 MILLION SQUARE FEET OF SPACE

1,600 BUILDINGS | **38,000 ACRES OF LAND OWNED**

SUPPORTS RESEARCH SPANNING

16 DOE NATIONAL LABS

50 STATES, GUAM, PUERTO RICO, AND WASHINGTON, D.C.

>310 UNIVERSITIES AND HIGHER-LEARNING INSTITUTIONS

4 BIOENERGY RESEARCH CENTERS

2 ENERGY INNOVATION HUB PROGRAMS

STEWARDS

10 DOE NATIONAL LABORATORIES

3 World-Leading Supercomputers

ESTIMATED RESEARCHERS SUPPORTED

- **11,100** Permanent PhDs
- **3,400** Postdoctoral Associates
- **5,200** Graduate Students
- **9,700** Other Scientific Personnel

OVER 39,500 USERS AT 28 OFFICE OF SCIENCE FACILITIES

10 SITE OFFICES

1 CONSOLIDATED SERVICE CENTER

OVER 100 NOBEL PRIZES

$8.1 BILLION OVERALL OFFICE OF SCIENCE BUDGET | **$918 MILLION** USER FACILITY CONSTRUCTION | **$281 MILLION** SCIENCE LABORATORIES INFRASTRUCTURE

51 ENERGY FRONTIER RESEARCH CENTERS

DOE's Office of Science:
Meeting the Nation's Challenges Today and into the Future

The DOE Office of Science (SC) mission is to deliver the scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic, and national security of the United States.

Advancing the frontiers of science

Largest Federal supporter of basic research in the physical sciences

Research activities support nearly 29,000 PhDs, scientific and engineering professionals, support staff, and graduate/undergraduate students at more than 300 universities and at all 17 DOE laboratories

Accelerating discovery with cutting-edge research tools

- Operate 28 scientific user facilities for over 39,500 users per year
  - High-performance computing
  - X-ray and neutron sources
  - Physics facilities
  - Nanoscience centers
  - Biocharacterization facilities
- Design and construction of next-generation facilities to support the scientific community

DOE SC Scientific User Facilities

28 scientific user facilities
~39,500 users

OLCF

ALCF

NERSC

ESnet

EMSL

ARM

JGI

SNS

HFIR

ALS

APS

LCLS

NSLS-II

SSRL

CFN

CINT

CNM

CNMS

TMF

DIII-D

NSTX-U

FACET

ATF

Fermilab AC

CEBAF

ATLAS

RHIC

FRIB

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Accelerator Stewardship and Accelerator Development

FY 2024 Research Opportunities in Accelerator Stewardship and Accelerator Development (DE-FOA-0003253)

$20M in funding for new and renewal awards in two main areas:

Accelerator Stewardship

- **Track 1: Use-Inspired Basic R&D** – aimed at transitioning accelerator technology into medical, security, environmental, and industrial applications
- **Track 2: Cross-cutting Basic Accelerator R&D** – aimed at developing the foundations and new concepts of next-generation accelerator technology
- **Track 3: Accelerator Test Facility Program** – providing support for non-DOE institutions to use a DOE SC accelerator R&D capability

TRL$\leq$4

Accelerator Development

- **Track 4a: Accelerator Technology Sector Business Plans** – funded studies of specific sectors of the accelerator technology ecosystem
- **Track 4b: Accelerator Technology Partnerships** – public-private partnerships to strengthen domestic suppliers of accelerator technology

TRL$\leq$6, MRL$\leq$7

Track 1: Use-Inspired R&D

- Develop accelerator prototypes (up to TRL 4) in response to a specific technical challenge
    - Design studies in specific topics are also funded
- Technical challenges and priority research directions are identified by **Basic Research Needs workshops**
    - ***Particle Beam Therapy Delivery Improvements***
        - *https://science.osti.gov/-/media/hep/pdf/accelerator-rd-stewardship/Workshop_on_Ion_Beam_Therapy_Report_Final_R1.pdf*
    - ***Ultrashort Pulse Laser Technology R&D***
        - *https://science.osti.gov/-/media/ardap/pdf/2024/Laser-Technology-Workshop-Report_20240105_final.pdf*   Updated!
    - ***High Power Electron Accelerators***
        - *https://science.osti.gov/-/media/hep/pdf/accelerator-rd-stewardship/Energy_Environment_Report_Final.pdf*
    - ***Compact Accelerators***
        - *https://science.osti.gov/-/media/hep/pdf/Reports/2020/CASM_WorkshopReport.pdf*

- Teaming: strongly encouraged
    - Accelerator Technology Expert + Accelerator Application Expert +Commercialization Company
- Evidence of institutional commitment: strongly encouraged
- Eligibility: domestic organizations
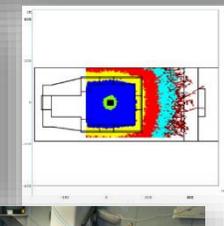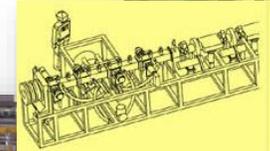- Proposal format: technology development plan (or design study, as appropriate).
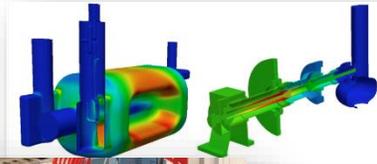
Track 2: Cross-cutting Basic Accelerator R&D

- Long-term R&D that broadly impacts many accelerator applications
  - NOT focused on a single SC program or a single facility
  - MUST be cross-cutting (i.e., impact multiple SC programs)
- Early-stage, PI-originated R&D aimed at significant performance increases and/or cost reduction of particle accelerators
  - Student education and training leading to a skilled, diverse workforce is expected to be a significant outcome.

- Teaming: encouraged
  - Accelerator Technology Expert + Accelerator Application Expert + Private Company
- Evidence of institutional commitment: encouraged
- Eligibility: domestic academic institutions and non-profits
- Proposal format: research proposal
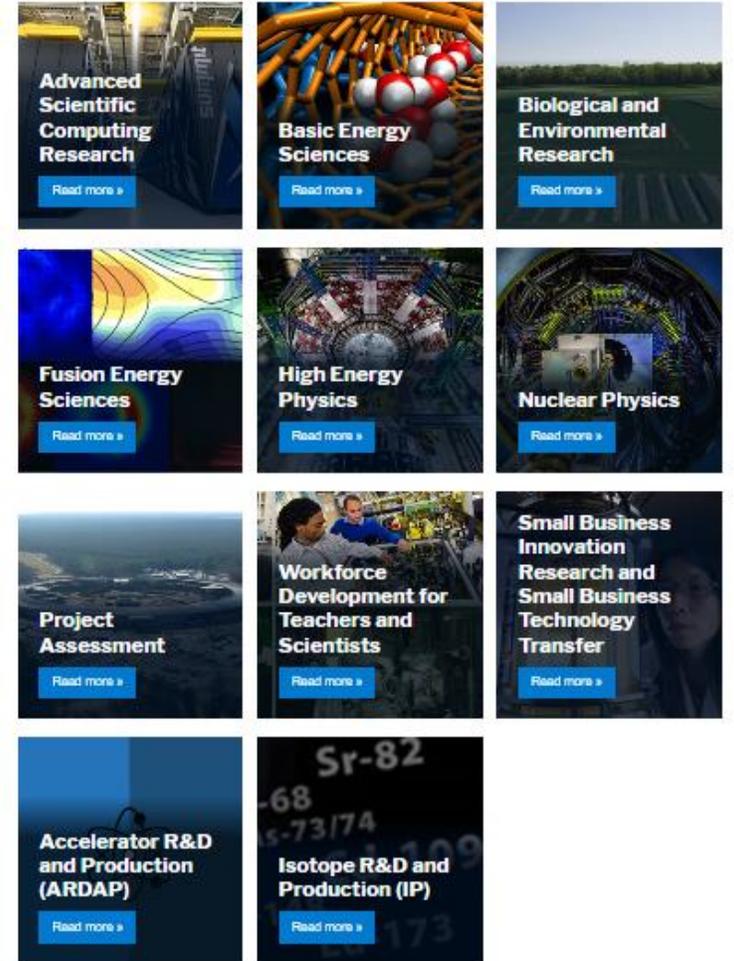
Track 3: Accelerator Test Facility Program

- Provides short-term support for non-DOE entities to use DOE accelerator R&D capabilities
  - Can either (1) use a physical facility, or (2) use a design/computation/engineering capability
  - Up to $300k/12 months
  - Non-renewable!

- Teaming: mandatory
  - non-DOE-entity + DOE SC Laboratory
- Evidence of institutional commitment: encouraged
- Eligibility: domestic organizations (except DOE Labs)
- Proposal format: abbreviated research proposal
- *Note: Track 3 will evolve into BeamNetUS in 2025 and beyond*

Argonne NATIONAL LABORATORY

BROOKHAVEN NATIONAL LABORATORY

Fermilab

Jefferson Lab EXPLORING THE NATURE OF MATTER

OAK RIDGE National Laboratory

BERKELEY LAB Bringing Science Solutions to the World

SLAC NATIONAL ACCELERATOR LABORATORY

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Track 4a: Accelerator Technology Sector Business Plans

- Studies conducted with industry to develop strategic plans for specific technology sectors
  - $200k and one year to conduct the study
  - Improve domestic industrial capability in the sector

- Technology sectors:
  1. SC accelerator systems—both RF accelerators & high-field magnets—including research on SC materials, engineering, and cryogenic techniques.
  2. 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.
  3. Very-high-brightness & high-current electron sources, high-intensity proton & ion sources, more robust MW-class targets for secondary beam production.
  4. High-average-power RF systems, including improvements in power handling devices such as waveguide windows and couplers.
  5. High-average-power ultrafast laser sources, high-power optics and coatings for laser systems.

- Past/ongoing topics: SC wire, cable, high-field magnets; SRF cavity manufacturing; computer software; aspects of NCRF cavity manufacturing

- Teaming: strongly encouraged
  - Accelerator Technology Leader + Multiple Industrial Companies + Business School or Consultant
- Eligibility: domestic organizations
- Proposal format: research proposal

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Track 4b: Accelerator Technology Partnerships

◆ Public-Private Partnerships and other investments to strengthen domestic suppliers of accelerator technology needed for DOE facilities

- Up to $2M per 2-year award, renewable.

◆ This solicitation seeks proposals in these specific areas:

- 1) Manufacturing of superconducting wire, cable, and high field magnets.

- 2) Manufacturing of high intensity sources of electrons.

- 3) Manufacturing of high intensity sources of ions.

- 4) Manufacturing of targets for producing secondary beams.

- 5) Manufacturing of high-efficiency radiofrequency power sources.

- 6) Manufacturing of high-accuracy x-ray optics.

- Teaming: strongly encouraged (Industry (lead)+DOE Lab)

- Eligibility: domestic companies

- Proposal format: research partnership proposal

Considerations for Track 4b Applications

◆ **Successful applications will synergistically leverage the complementary strengths of industry and national laboratories and strengthen domestic suppliers**

◆ Activities of the partnership should be tailored to the specific needs of the technology and current state of the industry, and can include:

- Joint technology development
- Formation of a "center"
- Design for Manufacturing activities
- Industry use of DOE Lab facilities
- Vendor qualification activities
- Government furnished equipment
- Procurement of strategic reserves of materials, components, or subsystems.

◆ Proposals that are for purely academic R&D or that lack industrial partners will be declined without review

◆ Proposals whose net effect will be to *reduce* domestic market competitiveness (i.e., by "picking a winner") will be declined without review

- Document the current state of domestic suppliers and explain why your proposed work *increases* domestic market competitiveness

Applying for Funding

Funding Opportunities: General Advice

<mark>Please read the FOA carefully!</mark>

◆ Omitting required information will cause your application to be declined without review

◆ Common omissions:
- The **PIER Plan** is required, and must be tailored to the proposal activity and participants
- The **Data Management Plan** is required
- **CVs** and **Current and Pending Support** is required
- A **List of Individuals who Should not Serve as Merit Reviewers** is required (please use the template)

  Proposal lacking any of these elements will be declined without review.
- A Checklist for Avoiding Common Errors is included in the FOA, starting on page 7

◆ A Frequently Asked Questions document is posted online
- https://science.osti.gov/-/media/grants/pdf/foas-resources/2024/2024-ARDAP-FOA-FAQs.pdf
- It includes advice on questions about the desired attributes of Teams, Partnerships, and the DE&I activities in a PIER plan, how to properly include funding for a subcontract to a DOE Lab, and more.

◆ Section V "Application Review Information" describes how merit reviewers will read and score your proposal, and Program Policy Factors DOE will take into consideration

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Funding Opportunities: Proposal Review Process

A proposal's Project Narrative should enable reviewers to evaluate the merit review criteria:

- Scientific and/or Technical Merit of the Project
- Appropriateness of the Proposed Method or Approach
- Competency of Applicant's Personnel and Adequacy of Proposed Resources
- Reasonableness and Appropriateness of the Proposed Budget
- Quality and Efficacy of the Plan for Promoting Inclusive and Equitable Research
- Quality of the Accelerator Stewardship or Accelerator Development Opportunity

The proposal should also enable other federal agencies to understand the impact and relevance of your proposed work

- Program Managers across DOE and at DOD, NIH, NSF, and DHS are asked for input on the relevance of the proposed work to their agencies' missions

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Promoting Inclusive and Equitable Research (PIER) Plan

- Beginning in FY 2023, Office of Science solicitations require applicants to submit a plan for **Promoting Inclusive and Equitable Research, or PIER Plan**, along with their research proposals.

  - This is a requirement for proposals submitted to all Office of Science solicitations, as well as invited proposals from the DOE national laboratories.

- PIER Plans are limited to 3 pages should describe the activities and strategies that investigators and research personnel will incorporate to promote diversity, equity, inclusion, and accessibility in their research projects.

  - The complexity and detail of a PIER Plan is expected to increase with the size of the research team and the number of personnel to be supported.

  - The PIER Plans will be evaluated under a new merit review criterion as part of the peer review process.

- Additional information and FAQs: https://science.osti.gov/grants/Applicant-and-Awardee-Resources/PIER-Plans

Funding Opportunities: FAQs

How much support can I get?
- FOA includes "ceiling/floor" amounts for funding individual projects
- Peer review will assess requested budget versus research needs
- Descoping may occur if an award is made (i.e., reduced funding awarded for reduced work scope)

How long will it take for me to find out if my project is funded?
- Reviews typically take 4 – 6 months to complete
- Proposals can be held up to one year for consideration

I want to support my research group with multiple federal grants – what are the requirements?
- Each research proposal to each Agency must be able to "stand alone" with respect work scope and research outcomes
- The work scope funded by each agency must be <u>clearly delineated</u>
- You <u>may</u> submit substantially similar proposals to other agencies, but these must be listed under your Current and Pending Support.

May I include Letters of Support?
- No. However, you may include Letters of Commitment stating that effort or facilities will be made available to the PI.

Funding Opportunities: FAQs

Where can I learn about SC's accelerator technology needs?

♦ Each SC program maintains reports on its research needs and long-range plans on the DOE webpages:
- 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/Workshop-Reports**
- Isotope Program: **https://science.osti.gov/Isotope-Research-Development-and-Production/Resources/Reports**

What are you looking for in a "team"?

♦ Teaming is strongly encouraged for most proposals and peer reviewers are asked to assess the strengths of the team
♦ Each member of the team must substantially contribute to the work scope
♦ The team should include experts in the accelerator technology, experts in the end use application, and a domestic company
♦ Diversity of the investigators and participating institutions is strongly encouraged

How can we find potential collaborators?

♦ For R&D partners of all types, search for authors of recent papers in your proposed topic area
♦ For DOE Lab partners specifically, there is the Lab Partnering Service https://www.energy.gov/technologytransitions/lab-partnering-service

Broadening Participation

Applications are always encouraged from:

- New institutions
- Institutions without current SC awards
- Minority-serving institutions
- Predominantly-undergraduate institutions
- New investigators
- Investigators from populations underrepresented in the SC portfolio

Program managers are available to discuss research concepts, opportunities to submit proposals, or opportunities to form new collaborations

- Note that certain question cannot be answered when a FOA is open*
  - "Do you like my idea?" "Would a proposal on ABC be successful?"
  - PMs are restricted to clarifying the instructions and intent of the FOA
- Outside the procurement period of a FOA, a broader discussion can occur

*The procurement process of a FOA is "open" from the posting date of the FOA until the public announcement of the awards. Typically, this is about 6 months.

Stay Connected

- Receive Office of Science news by email or text
- Sign up for topics of interest
    - FOAs
    - Press releases
    - Meetings
    - Scientific topics
    - Program office news
- science.osti.gov
    - Stay Connected
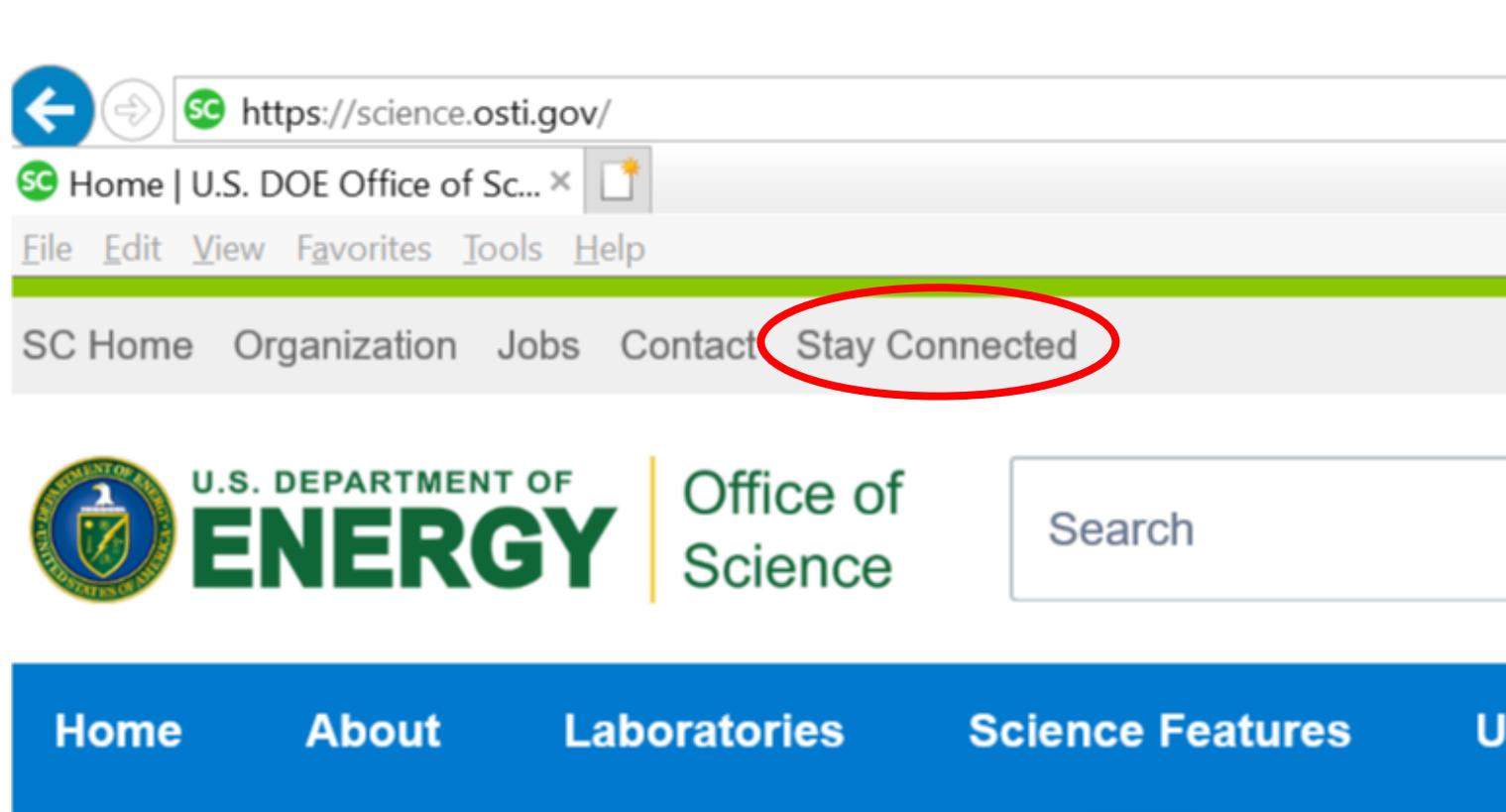
Additional Funding Opportunities to Consider

New Research Capability Development
- **EPSCoR** – enhance R&D capabilities of institutions in designated states
  - https://science.osti.gov/bes/epscor
- **FAIR** – enhance R&D capabilities of MSIs and ERIs
  - https://science.osti.gov/Initiatives/FAIR

Career Development
- **Early Career Research Program** – for high-potential candidates ≤10 yrs post-PhD
  - https://science.osti.gov/early-career
- **RENEW** – internships at MSIs and ERIs
  - https://science.osti.gov/Initiatives/RENEW
- **SC-GSR** – 1 year of graduate support at a DOE lab
  - https://science.osti.gov/wdts/scgsr
- **SULI** – summer undergraduate DOE laboratory internships
  - https://science.osti.gov/wdts/suli

Technology Transfer
- **SBIR/STTR** – 1+2 years of funding to launch a new product
  - https://science.osti.gov/sbir/Funding-Opportunities

A Few Final Thoughts

◆ **A great way to learn how to write successful proposals is to become a reviewer**
- Critically evaluate other investigator's proposals
- Your identity remains confidential, only your comments are sent to the investigator
- Technical reviewers generally have postdoctoral training in physics or engineering, but we also need reviewers able to evaluate business, commercialization, educational, and outreach aspects of proposals

◆ **The ARDAP FOA is very competitive, typically awarding 1$ for every 7$ requested**
- We aim to save everyone time by discouraging uncompetitive pre-applications
- Pre-application discourage rates have approached 50% in some years

◆ **Don't have your proposal administratively declined!**
- Please follow the FOA instructions carefully
- Make sure to submit <u>all</u> required forms and documents

◆ **Contact us!**
- We will be happy to discuss the programs and process with you
  - Accelerator Stewardship (Tracks 1,2,3): Eric.Colby@science.doe.gov
  - Accelerator Development (Tracks 4a, 4b): Camille.Ginsburg@science.doe.gov
- Office hours: 1/24 and 1/31 at 3pm EST, by Zoom ⟶

The Office of Science Research Portfolio

Advanced Scientific Computing Research	• Delivering world leading computational and networking capabilities to extend the frontiers of science and technology
Basic Energy Sciences	• Understanding, predicting, and ultimately controlling matter and energy flow at the electronic, atomic, and molecular levels
Biological and Environmental Research	• Understanding complex biological, earth, and environmental systems
Fusion Energy Sciences	• Supporting the development of a fusion energy source and supporting research in plasma science
High Energy Physics	• Understanding how the universe works at its most fundamental level
Nuclear Physics	• Discovering, exploring, and understanding all forms of nuclear matter
Isotope R&D and Production	• Supporting isotope research, development, production, processing and distribution to meet the needs of the Nation
Accelerator R&D and Production	• Supporting new technologies for use in SC's scientific facilities and in commercial products

Working with the Office of Science
Issues With Submissions

Applications cannot be changed after a FOA deadline

- Applications may be withdrawn before they are released to reviewers
- Applications may be withdrawn by written request after they are released to reviewers
- SC has no policy limiting the number of resubmissions (before a FOA deadline)

Budget Justifications

- All costs on a budget need to be justified
  - "Based on prior experience with similar projects" is acceptable
  - Indicate estimates vs. quotes
- Use the negotiated fringe benefit rates and explain deviations
  - Explain the choice of using off-campus F&A rates

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Working with the Office of Science
Checklist

◆Review the Updates, Reminders, and Checklist at the beginning of each FOA

◆Use one PDF file for the research narrative and all appendices (do not use a PDF binder)

◆Verify math in the budget
- New Grants.gov forms will auto-calculate
- Ensure use of the correct indirect cost rate
- Ensure use of negotiated fringe rate

◆For renewals and supplements, make sure the application is from the same institutional profile that currently holds the award
- We cannot renew or supplement an award to a different institution