Funding Opportunity: DOE Releases $500 Million Open Call to Seed Investments in Fundamental Research in the Physical Sciences

Lewis-Burke Associates LLC – October 11, 2024

The Department of Energy (DOE) Office of Science (SC) released its annual open funding call to solicit applications for fundamental research that help address DOE's discovery science, energy, national security, and environmental missions. Similar to prior years, DOE has set aside $500 million to fund activities under this open solicitation, but this amount covers costs over multiple years and also extends funding for current awards. This means DOE has about $150 million in this fiscal year (FY) 2025 solicitation for new awards. New awards support research projects as well as workshops and roundtables in groundbreaking areas of science and technology.

The funding call, known as the FY 2025 Continuation of Solicitation for the Office of Science Financial Assistance Program, is open from October 1, 2024, through September 30, 2025. Lewis-Burke encourages applicants to apply earlier in the fiscal year to take advantage of funding availability. Lewis-Burke also recommends that researchers submit a white paper or pre-application to a program manager to receive feedback prior to submitting a full application. This significantly increases the rate of success for awards. DOE is seeking applications in research areas not covered by more specific, topical funding opportunity announcements that are issued throughout the fiscal year. Awards from the open funding call often serve as seed funding for larger-scale research programs in the future based on community interest and demand. DOE plans to make up to 350 new awards averaging from $200,000 to $1 million per year for research projects supporting single Principal Investigators (PIs) or small teams and will also use a portion of funding to support workshops and roundtables.

Priority Research Directions

All eight major Office of Science programs participate in the open call. See the graphic below for more information on each of the programs and their principal mission.

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	• Building the scientific foundations for a fusion energy source
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 National Preparedness for isotope production and distribution
Accelerator R&D and Production	• Supporting new technologies for use in SC's scientific facilities and in commercial products

Source: DOE Office of Science.

Every year, DOE updates priority research areas in all its fields of science. Many of the priorities highlighted in the FY 2024 open call remain the same in FY 2025 including in the physical sciences, biological sciences, advanced materials, and geosciences focused on advancing clean energy technologies and understanding the constituent states of matter. DOE will also continue investments in emerging technology areas such as advanced computing, microelectronics, biotechnology and artificial intelligence. As a reminder, DOE reserves this funding for groundbreaking, innovative research that would not be funded through a regular program solicitation. This is also a good opportunity for early career faculty to build relationships with program managers and receive early seed funding to help break into the DOE Office of Science.

Below are highlights of programmatic changes impacting three program areas in FY 2025. There were no major changes to other programs compared to FY 2024.

NEW: Funding Solicitations for Research Proposals

Embedded in the FY 2025 open call are several solicitations for new seed funding in priority research areas or annual calls for proposals in discovery science. Detailed information for each program area can be found in the open call along with links to workshop and roundtable reports.

Targeted solicitations in the open call include:

- The Advanced Scientific Computing Research (ASCR) program is soliciting research proposals in two topic areas:
    - **Randomized Algorithms for Combinatorial Scientific Computing:** Pre-applications due by November 14, 2024.
        - For more information on this research priority, see Section 3.3 of the Randomized Algorithm for Scientific Computing report.
        - ASCR plans to make three awards with an award ceiling of $1 million per year for a three year period.
        - ASCR will review each pre-application and provide feedback by December 13, 2024, and encouraged pre-applications must be submitted by January 16, 2025.
    - **Energy-Efficient Quantum Computing:** Pre-applications due by November 14.
        - ASCR is seeking applications for research at the intersection of quantum thermodynamics and computing, including aspects of energy-efficient quantum computation.
        - ASCR plans to make up to three awards with an award ceiling of $500,000 over two years.
        - ASCR will provide feedback inviting submissions of full applications by December 4, 2024, and full applications must be submitted by January 7, 2025.

- Nuclear Physics (NP) is seeking full proposals in the following program areas:
    - Due by November 15 are research proposals for the follow NP program areas:
        - **Heavy ions;**
        - **Theory;**
        - **Nuclear structure and nuclear astrophysics; and**
        - **Fundamental symmetries.**
    - Due by November 30 are **Quantum Horizons: Quantum Information Science Research and Innovation for Nuclear Science**.

- NP plans to hold merit review panels in early 2025 for these proposals and make awards in Spring 2025.

- High Energy Physics (HEP) is seeking pre-applications for the following targeted program areas:
  - **The HEP Comparative Review for research funding**. This is the main funding mechanism to support research university grants in HEP. Pre-applications are due no later than July 31, 2025. This year, DOE will accept applications in the following priority research topics:
    - Experimental research at the energy frontier;
    - Experimental research at the intensity frontier;
    - Experimental research at the cosmic frontier;
    - Theoretical research;
    - Accelerator science and technology R&D;
    - Instrumentation and detector R&D; and
    - Computational research.
  - **Artificial intelligence for HEP theory and data analysis.** Applications should be "for ambitious projects with the potential to significantly improve or automate theoretical calculations and simulation of HEP relevant problems, as well as gain insights from HEP experimental datasets." Priority topic areas include symbiotic calculation, AI-assisted simulation, physics informed machine learning, uncertainty quantification, differentiable simulation, and inverse problems. Applications are due by April 18, 2025.
  - **Supplemental support for HEP traineeships for additional research topics that include relevant use of AI and machine learning.** This is only for institutions that currently have HEP traineeship awards in accelerator science and engineering, computational HEP, and HEP. Supplemental applications are due by March 31, 2025.

In addition to the targeted solicitations within the open call, below is more general information on how each SC program typically utilizes the open call solicitation.

PROGRAM	OPEN CALL ENGAGEMENT
ADVANCED SCIENTIFIC COMPUTING RESEARCH	• Seed funding in new, emerging research areas, like randomized algorithms and quantum computing listed above. • Funding for conference support or participation in international standardization activities. • Support for existing PIs, especially making an award to a new institution when the PI has changed institutions.
BASIC ENERGY SCIENCES	• The most open to new research proposals with particular interest in fundamental science for clean energy, critical materials and minerals, fundamental science to transform processing and fabrication, and AI and machine learning. • Single PI and multiple PI teams are allowed, with single PI awards usually $180,000 per year and small groups from $500,000 to $2 million per year over three years.
BIOLOGICAL AND ENVIRONMENTAL RESEARCH	• Encourages and uses the open call to support workshops and conferences that feed future research priorities and funding opportunities. • Also used to help PIs moving to a new institution.

FUSION ENERGY SCIENCES	• Encourages conferences and workshops
HIGH ENERGY PHYSICS	• Used to make new awards and renew proposals with highest priority given to priority areas, such as the HEP comparative review and AI for HEP theory and data analytics described above. • Support supplemental proposals to add funding and sometimes research scope to active awards. • Supports conference activities.
NUCLEAR PHYSICS	• Similar to HEP, it is used to make new awards and renew proposals with highest priority given to priority areas such as quantum information science and NP-specific topics such as heavy ions and theory described above. • Supports supplemental proposals to add funding and sometimes research scope to active awards. • Supports conference activities.
ISOTOPE R&D AND PRODUCTION	• Used to make new awards and renew proposals in priority areas focused on basic research supporting the production, processing, extracting, recycling, and distribution of isotopes in short supply including targetry and isotope production research; nuclear and radiochemical separation, purification and radiochemical synthesis; biological tracers, imaging, and therapeutics; and isotopic enrichment technology.
ACCELERATOR R&D AND PRODUCTION	• Very limited new awards are made through this funding mechanism. Priority of funding is for the annual Research Opportunities in Accelerator Stewardship and Early Career Research Program solicitations.

Application and Review Process

NEW: Research Security Training Requirement
Leading researchers listed on an application are required to certify that they have taken research security training consistent with the *CHIPS and Science Act*. "Covered individuals" subject to this requirement include a PI, project director, Co-PI, co-project director, or project manager. This requirement can be fulfilled by utilizing four NSF training models or developing and implementing their own training program in line with the *CHIPS and Science Act*.

White Papers and Pre-Applications
A pre-application, or white paper, in most cases is not required before submitting a full proposal. However, Lewis-Burke strongly recommends that applicants submit a white paper with a summary of the research idea tied to the most relevant topical subprogram. The white paper should be sent to the specific DOE program manager, whose name and contact information is listed with each subtopic in the open funding call. Once a white paper has been submitted, Lewis-Burke strongly recommends that the Principal Investigator request a meeting with the program manager to discuss the relevance of the proposed research idea and advise on how to further improve the white paper. Lewis-Burke has found that the rate of success on awards increases significantly after direction and encouragement to apply from a program manager.

Review Criteria
Review criteria mirrors guidance issued for all FY 2024 awards. Applicants are still required to submit a Promoting Inclusive and Equitable Research (PIER) plan that describes the activities and strategies applicants will incorporate to promote diversity, equity, inclusion, and accessibility in their research projects. The five review criteria include:

- "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; and
- quality and efficacy of the plan for promoting inclusive and equitable research."

DOE also updated guidance related to PIER plans and conferences:

- **PIER Plans:** Renewal applications must include information on how the PIER plans build on or expand upon actions and accomplishments of relevant efforts under the currently supported research. The page limit may be increased from three to five pages based on the complexity of the proposed work. For all applications, budget justifications much now provide the total funding requested across all budget fields to support the implementation of the project PIER plan.
- **Conferences:** For applications requesting SC funds to host a conference, symposium or workshop, the meeting must have a policy of code of conduct in place that addresses discrimination and harassment, including sexual harassment, other forms of harassment, and sexual assault, and that includes processes for reporting complaints and addressing complaints. The policy or code-of-conduct must be shared with all participants prior to the conference, symposium, or workshop and made easily available. Conference applications must include:

    - "An online link to the current code of conduct of the host organization for the meeting, or the link to where the code of conduct will be posted. If a code of conduct has not yet been established by the meeting organizers, the application must describe the process and timeline by which a code of conduct will be written, approved, and endorsed.
    - A recruitment and accessibility plan for speakers and attendees that includes discussion of recruitment of individuals from groups underrepresented in the research/professional community associated with the technical focus of the meeting, and discussion on plans to address possible barriers for attendees, including but not limited to physical barriers."