U.S. DEPARTMENT of ENERGY | Office of Science

FY 2026 Continuation of Solicitation for the Office of Science Financial Assistance Program

Notice of Funding Opportunity (NOFO) Number:
DE-FOA-0003600

NOFO Type: Amendment 000001
Assistance Listings: 81.049

Amendment 000001 is issued to refine program manager contacts in Advanced Scientific Computing Research (ASCR), topical descriptions in Biological and Environmental Research (BER), program manager contacts in Basic Energy Sciences (BES), topical descriptions in Fusion Energy Sciences (FES), and policy provisions in Section IX.

NOFO Issue Date:	September 30, 2025
Submission Deadline for Pre-Applications:	A Pre-Application is optional/encouraged. A Pre-Application may be required for consideration by certain review panels.
Submission Deadline for Applications:	This NOFO will remain open until September 30, 2026, or until replaced by a successor NOFO. Applications may be submitted any time during that period. Individual topics in this NOFO may have scheduled review panels. Applications submitted after the panel's acceptance date may be held until the next review panel.

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I. Basic Information

U.S. Department of Energy (DOE)
Office of Science (SC)

Executive Summary

The Office of Science (SC) of the Department of Energy (DOE) hereby announces its continuing interest in receiving applications for support of work in the following program areas: Advanced Scientific Computing Research, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, High Energy Physics, Nuclear Physics, and Isotope R&D and Production. On September 3, 1992, DOE published in the Federal Register the Office of Energy Research Financial Assistance Program (now called the Office of Science Financial Assistance Program), 10 CFR 605, as a Final Rule, which contained a solicitation for this program. Information about submission of applications, eligibility, limitations, evaluation and selection processes and other policies and procedures are specified in 10 CFR 605.

This NOFO is our annual open solicitation that covers all research areas in SC and is open throughout the Fiscal Year. Any research within SC's Congressionally authorized mission may be proposed under this NOFO.

This NOFO will remain open until September 30, 2026, 11:59 PM Eastern Time, or until it is succeeded by another issuance, whichever occurs first. This NOFO succeeds DE-FOA-0003432, which was published September 30, 2024.

Funding Details

Expected total available funding	Approximately $500,000,000 in current and future fiscal year funds.
Expected number of awards	Historically, 200 to 350 new awards have been made in response to the NOFO each year.
Expected dollar amount of individual awards	Historically, awards from $5,000 to $5,000,000 have been made in response to the NOFO each year.
Expected award project period	Awards are expected to be made for a project period of six months to five years, with the most common project period being three years in duration.

Key Facts

NOFO Title	FY 2026 Continuation of Solicitation for the Office of Science Financial Assistance Program
NOFO Number	DE-FOA-0003600
Announcement Type	Amendment 000001
Assistance Listing	81.049
Statutory Authority	The programmatic authorizing statute is: Section 646 of Public Law 95-91, U.S. Department of Energy Organization Act Section 901, et seq. of Public Law 109-58, Energy Policy Act of 2005 Section 401 of Public Law 115-368, National Quantum Initiative Act
Governing Regulations	Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, codified at 2 CFR 200 U.S. Department of Energy Financial Assistance Rules, codified at 2 CFR 910 U.S. Department of Energy, Office of Science Financial Assistance Program Rules, codified at 10 CFR 605 U.S. Department of Energy Other Transaction Agreements Rules, codified at 2 CFR 930

Key Dates

Key dates are printed on the cover of this NOFO.

Agency Contact Information

Grants.gov Customer Support	800-518-4726 (toll-free) support@Grants.gov
PAMS Customer Support	855-818-1846 (toll-free) 301-903-9610 sc.pams-helpdesk@science.doe.gov
Technical/Scientific Program Contact	Questions regarding the program technical requirements must be directed to the point of contact listed for each program area within this NOFO.
Administrative Contact (questions about budgets and eligibility)	sc.opencall@science.doe.gov

Recommendation

SC encourages you to register in all systems as soon as possible. You are also encouraged to submit letters of intent (LOIs), pre-applications, and applications well before the deadline.

II. Eligibility

A. Eligible Applicants

All types of applicants are eligible to apply, except nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

Federally affiliated[1] entities must adhere to the eligibility standards below:

1. DOE/NNSA National Laboratories

DOE/NNSA National Laboratories are not eligible to submit applications under this NOFO but may be proposed as subrecipients under another organization's application. If recommended for funding as a proposed subrecipient, the value of the proposed subaward will be removed from the prime applicant's award and will be provided to the laboratory through the DOE Field-Work Proposal System and work will be conducted under the laboratory's contract with DOE. No administrative provisions of this NOFO will apply to the laboratory or any laboratory subcontractor. Additional instructions for securing authorization from the cognizant Contracting Officer are found in Section IX of this NOFO.

2. Non-DOE/NNSA FFRDCs

Non-DOE/NNSA FFRDCs are eligible to submit applications (either as a lead organization or as a team member in a multi-institutional team) under this NOFO and may be proposed as subrecipients under another organization's application. If recommended for funding as a lead applicant or a team member, funding will be provided through an interagency agreement Award to the FFRDC's sponsoring Federal Agency. If recommended for funding as a proposed subrecipient, the value of the proposed subaward may be removed from the prime applicant's award and may be provided through an Inter-Agency Award to the FFRDC's sponsoring Federal Agency. Additional instructions for securing authorization from the cognizant Contracting Officer are found in Section IX of this NOFO.

3. Other Federal Agencies

Other Federal Agencies are eligible to submit applications (either as a lead organization or as a team member in a multi-institutional team) under this NOFO and may be proposed as subrecipients under another organization's application. If recommended for funding as a lead applicant or a team member, funding will be provided through an interagency

1 Institutions that are not DOE/NNSA National Laboratories, a non-DOE/NNSA FFRDC, or another Federal agency are not Federally affiliated, even if they receive Federal funds or perform work under a Federal award or contract.

agreement. If recommended for funding as a proposed subrecipient, the value of the proposed subaward may be removed from the prime applicant's award and may be provided through an interagency agreement. Additional instructions for providing statutory authorization are found in Section IX of this NOFO.

Notes for applicants of all types:

- Individual applicants are unlikely to possess the skills, abilities, and resources to successfully accomplish the objectives of this NOFO. Individual applicants are encouraged to address this concern in their applications and to demonstrate how they will accomplish the objectives of this NOFO.
- Non-domestic applicants are advised that successful applications from non-domestic applicants include a detailed demonstration of how the applicant possesses skills, resources, and abilities that do not exist among potential domestic applicants.

This NOFO does not support an applicant's commercial activity. This NOFO seeks to support basic research to advance understanding rather than to address commercial opportunities. Applications that propose research related to current commercial activity or current customer needs may be declined without merit review. All for-profit applicants must include a description, not to exceed 200 words of how their proposed work will advance scientific understanding of a basic and fundamental nature as an appendix to the Project Narrative.

B. Cost Sharing

Cost sharing for basic and fundamental research financial assistance awards is not required pursuant to an exclusion from the requirements of Section 988 of the Energy Policy Act of 2005. For technology investment agreements, to the maximum extent practicable, non-Federal parties carrying out a RD&D project under a TIA are to provide at least 50% cost sharing.

Cost sharing is not required of DOE/NNSA National Laboratories, other Federal agencies, another Federal agency's FFRDC, or their subcontractors at any tier. DOE/NNSA National Laboratories, other Federal agencies, and another Federal agency's FFRDC may impose cost-sharing requirements on their contractors subject to their policies and procedures.

Cost sharing will not be considered as a factor during merit review or award selection.

C. Eligible Individuals

Individuals with the skills, knowledge, and resources necessary to carry out the proposed research as a Principal Investigator (PI) are invited to work with their organizations to develop an application.

III. Program Description

A. Purpose

The DOE SC program hereby announces its continuing interest in receiving applications for support of work in the following program areas: Advanced Scientific Computing Research, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, High Energy Physics, Nuclear Physics, and Isotope R&D and Production. This NOFO is our annual open solicitation that covers all research areas in SC and is open throughout the Fiscal Year. Any research within SC's Congressionally authorized mission may be proposed under this NOFO.

SUPPLEMENTARY INFORMATION

1. Advanced Scientific Computing Research (ASCR)
(a) Applied Mathematics
(b) Computer Science
(c) Computational Partnerships
(d) Advanced Computing Technologies

2. Basic Energy Sciences (BES)
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(b) Biomolecular Materials
(c) Synthesis and Processing Science
(d) Experimental Condensed Matter Physics
(e) Theoretical Condensed Matter Physics
(f) Physical Behavior of Materials
(g) Mechanical Behavior and Radiation Effects
(h) Quantum Information Science in Materials Sciences and Engineering
(i) X-ray Scattering
(j) Neutron Scattering
(k) Electron and Scanning Probe Microscopies
(l) Atomic, Molecular, and Optical Sciences
(m) Gas Phase Chemical Physics
(n) Computational and Theoretical Chemistry
(o) Condensed Phase and Interfacial Molecular Science
(p) Quantum Information Science Research in Chemical Sciences, Geosciences, and Biosciences
(q) Catalysis Science
(r) Separation Science
(s) Heavy Element Chemistry
(t) Geosciences
(u) Photochemistry and Radiation Chemistry

(v) Photosynthetic Systems
(w) Physical Biosciences
(x) BES Accelerator and Detector Research

3. Biological and Environmental Research (BER)
(a) Microbiome Research
(b) Atmospheric Process Research
(c) Environmental Systems Process Research
(d) Earth-Energy Systems Modeling

4. Fusion Energy Sciences (FES)
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(b) Artificial Intelligence and Machine Learning for Fusion & Plasma Science
(c) Fusion Materials and Internal Components
(d) Toroidal Long Pulse
(e) Compact Toroidal Concepts
(f) Inertial Fusion Energy
(g) Measurement Innovation
(h) Closing the Fusion Cycle: Fusion Nuclear Science
(i) Closing the Fusion Cycle: Enabling Research and Development
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(k) Plasma Science and Technology – High Energy Density Physics
(l) Plasma Science and Technology – Microelectronics Research
(m) Plasma Science and Technology – Quantum Information Science
(n) Public-Private Partnerships

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(b) Experimental Research at the Intensity Frontier in High Energy Physics
(c) Experimental Research at the Cosmic Frontier in High Energy Physics
(d) Theoretical Research in High Energy Physics
(e) Accelerator Science and Technology R&D in High Energy Physics
(f) Instrumentation and Detector R&D in High Energy Physics
(g) Computational Research in High Energy Physics
(h) Quantum Information Science for High Energy Physics Research
(i) Accelerator Stewardship and Accelerator Development

6. Nuclear Physics (NP)
(a) Medium Energy Nuclear Physics
(b) Heavy Ion Nuclear Physics
(c) Nuclear Structure and Nuclear Astrophysics
(d) Fundamental Symmetries
(e) Nuclear Theory

(f) Nuclear Data
(g) Nuclear Physics Computing
(h) Accelerator Research and Development for NP Facilities
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(j) Quantum Information Science for Nuclear Physics Research
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(b) Nuclear and Radiochemical Separation, Purification and Radiochemical Synthesis
(c) Biological Tracers, Imaging, and Therapeutics

1. Advanced Scientific Computing Research (ASCR)

Program Website: https://science.osti.gov/ascr

The mission of the Advanced Scientific Computing Research (ASCR) program is to advance applied mathematics and computer science, including artificial intelligence (AI) and quantum information science (QIS); deliver the most sophisticated computational scientific applications in partnership with disciplinary science; create first-of-a-kind advanced computing and networking capabilities for the Nation; and develop future generations of computing hardware and software tools for science and engineering in partnership with the research community, including U.S. industry.

ASCR's research and facilities investments increase the capability, versatility, and efficiency of scientific computing through activities described by four thrusts:

- Breakthrough Tools and Technologies: ASCR enhances software, data processes, and AI for increasingly complex or resource intense modeling and simulation, including enabling the convergence of AI with QIS.
- Deep Understanding of AI and Physical Models: ASCR advances and enables knowledge in core mathematical methods and algorithms that underlie all AI, modelling, and simulation.
- Enabling High-precision Research and Development: ASCR focuses on concurrently advancing applied math and computer science knowledge with disciplinary science in critical areas such as fusion energy and material science.
- Hardware Innovation: ASCR increases the robustness of computing, including underlying communication and energy needs, redefines the art of possible in conventional computing, and leads the development of new emerging technologies.

ASCR supports cross-disciplinary research in which domains of scientific inquiry may provide problems and data that provide use-cases for computer scientists and applied mathematicians to devise generalized methods, models, algorithms and tools. ASCR's interest in these fields is not to solve the specific problems in other scientific domains but to use those challenges to advance the state of the art and increase knowledge in its fields of

research. ASCR advances key areas of computational science and discovery that support the missions of SC through mutually beneficial partnerships.

The computing resources and high-speed networks required to meet SC needs exceed the state-of- the-art by a significant margin. Furthermore, the system software, algorithms, software tools and libraries, programming models and the distributed software environments needed to accelerate scientific discovery through modeling and simulation are often beyond the realm of commercial interest. To establish and maintain DOE's modeling and simulation leadership in scientific areas that are important to its mission, ASCR operates leadership computing facilities, a high-performance production computing center, research prototypes, and a high-speed network, implementing a broad base research portfolio in applied mathematics, computer and network sciences, and computational science to solve complex problems on computational resources at the exascale and beyond. Further information on ASCR facilities can be found at: https://science.osti.gov/ascr/Facilities.

For all ASCR subprograms: Submission of preliminary research descriptions (e.g., pre-applications, concept papers) is strongly encouraged. They will be reviewed for responsiveness of the proposed work to the research topics. You should send an email to a subprogram contact for information regarding format and content.

The ASCR subprograms and their objectives follow:

(a) Applied Mathematics

This subprogram supports basic research leading to fundamental mathematical advances and computational breakthroughs across DOE and SC missions. Important areas of basic research include: (1) novel deterministic or randomized numerical methods for the scalable solution of large-scale, linear and nonlinear systems of equations, including those solution methods that take into consideration the possibilities brought about by future high performance computing (HPC) architectures; (2) optimization techniques and next-generation solvers; (3) numerical methods for modeling multiscale, multi-physics, or multi-component continuous or discrete systems that span a wide range of time and length scales; (4) methods of simulation and analysis of systems that account for the uncertainties of the systems, or are inherently stochastic or uncertain; (5) innovative approaches for analyzing, extracting insight from, or reducing large-scale data sets; and (6) foundational research in scientific machine learning and artificial intelligence (AI) as a cross-cutting area of interest for enabling greater adaptivity, automation, and predictive capabilities in scientific computing.

Areas that are out of scope include:

- Topics not covered in the list of Applied Mathematics topics above, except with the specific encouragement of an Applied Mathematics program manager in response to an

emailed concept paper;
- Research and applications not motivated and justified in the context of current and future SC user facilities, especially those supported by ASCR (i.e., Argonne Leadership Computing Facility [ALCF], Oak Ridge Leadership Computing Facility [OLCF], and National Energy Research Scientific Computing Center [NERSC]): https://science.osti.gov/ascr/Facilities;
- Application-specific research. The Applied Mathematics program seeks research focused on innovative and novel mathematics, not on existing mathematical techniques applied to new applications. Innovative and novel mathematics appropriate for ASCR are typically generalizable to multiple applications, and successful applications often demonstrate such generalizability in the context of two or more applications; and
- Approaches that are not efficient and scalable for problems of increasingly high dimensionality and computational complexity and that do not take advantage of current and emerging high-performance computing architectures or ecosystems.

Notice of Submission Requirements for the Panel Review on the topic of Inverse Methods for Complex Systems. ASCR held a basic-research-needs workshop on "Inverse Methods for Complex Systems," June 10-12, 2025, with the aim of identifying research priorities in developing new algorithms and methods for solving inverse problems within the mission space of the Department of Energy. For more information, see https://www.orau.gov/InverseMethods. ASCR expects to convene a merit-review panel in March 2026 for applications submitted in this area. Topics included discovery, utilization, and preservation of structure, model limitations, multimodal data, goal-oriented inverse problems, and scalable algorithms. Applicants are encouraged to consider the challenges associated with massive and high-dimensional data. Successful applications will advance knowledge in applied mathematics and will apply to multiple scientific domains. To be considered by the panel, a pre-application must be submitted by November 14, 2025. A pre-application may involve researchers from a single or multiple eligible institutions. Each pre-application will be reviewed for responsiveness and competitiveness of the proposed research. ASCR expects to provide pre-application encouragement and discouragement decisions by December 15, 2025. To be reviewed by the panel, an application must be associated with an encouraged pre-application, submitted by January 16, 2026, and request no more than $1,000,000 per year in total across all institutions for a three-year award. ASCR expects to make at most three awards.

Subprogram Contact:
- David Rabson, david.rabson@science.doe.gov

Website: https://science.osti.gov/ascr/Research/Applied-Mathematics

(b) Computer Science

The Computer Science research program supports research that enables computing and networking at extreme scales and the understanding of extreme scale, or complex data from

both simulations and experiments. It aims to make high performance scientific computers and networks highly productive and efficient to solve scientific challenges while attempting to reduce domain science application complexity as much as possible. The computer science program does this in the context of sharp increases in the heterogeneity and complexity of computing systems; the need to integrate simulation, data analysis, and other tasks seamlessly and intelligently into coherent and usable workflows; and the challenges posed by highly novel computing platforms, such as neuromorphic and quantum systems.

Priority interests for the program include the following. Applications are not restricted to a single topic and may span several topics.

- Artificial intelligence (AI) for science:
  ASCR supports the development of parallel, distributed, or federated algorithms and new computational approaches for scientific AI. AI research under the Computer Science topic may focus on optimization and scalability, especially in the context of next-generation computing platforms for science, and the integration needed for enabling AI-driven science and engineering workflows. Foundational AI research under the Applied Mathematics topic (see section (a) above) investigates new modes of scientific machine learning.

- Data analysis and visualization:
  SC-supported researchers and facilities are generating large, complex, multi-modal data at unprecedented rates. There is a need for advanced visualizations and visual analytics tools for making sense of these data and making operational decisions. This program solicits research to develop techniques for deriving and visualizing insights from large scale and/or complex simulation, experimental, or observational data or combinations of these as relevant to SC and DOE priority applications: visual analysis of high-dimensional data at scale, data from multiple sources and of varying types, attributes such as uncertainty, and data in the context of domain-specific knowledge; and visual analytic approaches to understanding artificial intelligence/machine learning outcomes or the state and behavior of a supercomputing system at scale. Also of interest are machine learning or AI techniques for data analysis that are scalable, energy-efficient, explainable, or involve knowledge extraction. Possible topics are highlighted in the "Report for the ASCR Workshop on Visualization for Scientific Discovery, Decision-Making, and Communication", https://doi.org/10.2172/1845709.

- Continuum Computing:
  Scientific computing will increasingly incorporate a number of different tasks that need to be managed along with the main simulation or experimental tasks—for example, ensemble analysis, data-driven science, artificial intelligence, machine learning, surrogate modeling, and graph analytics. Many of these tasks will need to be executed concurrently with simulations and experiments sharing the same computing resources.

Continuum-computing capabilities can enable scientific discovery from a broad range of data sources—i.e. HPC simulations, experiments, scientific instruments, and sensor networks—over a wide scale of computing platforms: leadership-class HPC, clusters, clouds, workstations, and devices at the edge. Continuum-computing capabilities can also manage large data volumes from computations and experiments to minimize data movement, save storage space, and boost resource efficiency—often while simultaneously increasing scientific precision.

This program solicits research to advance continuum-computing capabilities to run on a variety of computing platforms and at different length and time scales; to be automated and controllable; to be more interoperable and composable; and to use provenance and metadata for transparent results. This program also solicits co-designed research activities for continuum computing as well as new management and coordination algorithms.

- Storage Systems and I/O:
  The success of the DOE computational, experimental, and observational sciences is inextricably tied to the usability, performance, and reliability of emerging storage systems and input/output (SSIO) technologies. Emerging technologies include storage and networking devices, including those providing computational capabilities. SSIO technologies involve the organization, movement, placement, and efficient retrieval of data to enhance computation and discovery. This includes innovative interfaces and management methods that allow for flexible, high-performance access to large data sets, potentially federated across different kinds of memory, edge devices, and repositories, capturing and management relevant usage statistics, provenance, and other metadata. This program solicits research to improve SSIO capabilities that enable science understandability and reproducibility; accelerate scientific discovery; enhance SSIO usability, performance, and resilience; and improve efficiency and integrity of data movement and storage. One particular focus of this program is to improve pipelines for analysis-centric, data intensive workflows on HPC systems, and that use large-scale storage. This program also solicits techniques and tools for advancing findable, accessible, interoperable reusable (FAIR) data practices of management, archiving, curation, and/or reuse, of data generated by experimental, observational, and simulation relevant to SC mission areas. Additional areas of interest include combining of data streaming and cloud storage uses for SC infrastructure as well as visualization needs at the edge for SC experimental facilities. Possible topics are highlighted in the "Report for the ASCR Workshop on the Management and Storage of Scientific Data", https://doi.org/10.2172/1845707.

- Programming Models, Environments, and Portability:
  Innovative programming models for developing applications on next-generation platforms, exploiting unprecedented parallelism, heterogeneity of memory systems (e.g. non-uniform memory access [NUMA], non-coherent shared memory, high-bandwidth

memory [HBM]), scratchpads, and heterogeneity of processing (e.g., graphics processing units [GPUs], field- programmable gate arrays [FPGAs], coarse-grained reconfigurable architectures [CGRAs], other types of accelerators, big-small cores, processing in memory, and near memory, etc.), with particular emphasis on making it easier to program at scale. Basic research on programming tools, for all phases of the software-development cycle, are relevant, including but not limited to, design, implementation, verification, optimization, and integration. Particularly welcome are methods that infuse artificial intelligence/machine learning into the programming environment.

Work on programming models, environments, and portability is often informed by considerations stemming from the collaborative nature of the modern scientific enterprise. See the report, "Basic Research Needs in The Science of Scientific Software Development and Use: Investment in Software is Investment in Science", https://doi.org/10.2172/1846009.

- Operating and Runtime Systems:
  System software that provides intelligent, adaptive resource management and support for highly-parallel software and workflow-management systems, and that facilitates effective and efficient use of heterogeneous computing technologies, including diverse execution models, processors, accelerators, memory, and storage systems. Target workloads include modeling and simulation, data analysis, and the processing of large-scale, streaming data from experiments.

- Performance Portability and Co-design:
  Methods that support performance portability, which provides the ability to efficiently use diverse kinds of hardware platforms with minimal changes to the application source code, and/or hardware/software co-design, which is a method for designing and/or adapting both hardware and software design as part of a holistic process. These methods include automated and semi-automated refinements from high-level specification of an application and/or hardware design to low-level code, optimized when compiled and/or, for software, at runtime, to different HPC platforms. The focus is on enabling performance portability of, and/or the design of future hardware for, applications developed for extreme-scale computing and beyond. Possible topics are highlighted in, "Reimagining Codesign for Advanced Scientific Computing: Report for the ASCR Workshop on Reimagining Codesign", https://doi.org/10.2172/1822199.

- Distributed Scheduling and Resource Management:
  As scientific-computing resources are being called upon to support a wide variety of workloads, including those that tightly integrate large-scale and ensemble simulation and data-analysis workflows with experimental data collection and control, the algorithms and implementations matching computational requirements to resources need to scale to handle more tasks, more resources, and more-widely-distributed resources. Specifically sought are methods for decentralized, resilient, secure resource

management, scheduling, and coupled data transfer across widely distributed computing facilities; and modeling of such distributed systems.

- Network-Offloaded Acceleration for Distributed/Parallel Computing:
  Programmable and computation-enabled network interfaces present the opportunity to exploit computational power closer to the network to complement the capabilities of CPUs, GPUs, and other computational components. Note that the programmable network interfaces include both edge accelerators as well as devices in core interconnects in parallel platforms or transport planes in distributed settings. Application behavioral information may be exploited, both in terms of dynamic learning as well as mathematically predefined primitives such as distributed reductions and other offloaded synchronization operations. New methods, algorithms, software, and interfaces are needed to effectively exploit asynchronous and autonomous capabilities of network hardware beyond traditional data-transfer functionalities. Of interest are new conceptual approaches, algorithmic support, application programming interfaces, and use cases in HPC scientific applications.

- Computer Science Fundamentals Accounting for Thermodynamics and Energy:
  Unprecedented levels of modern computation, including areas such as artificial intelligence and machine learning (AI/ML) training, have now made computation a very large consumer of energy in the Nation and the world. Much of modern computer science, and the understanding it provides regarding the fundamental properties of algorithms, does not account for the underlying thermodynamic and information-theoretic reality of computation. As “Beyond Moore” devices are explored along with their corresponding ultra-efficient computer architectures, and the programming paradigms appropriate for these new computing technologies, a better understanding is needed of both potential ultra-efficient computer architectures and the energy-aware properties of algorithms executed on them. Ultra-efficient computer architectures include, but are not limited to, those based on reversible and asymptotically-adiabatic approaches. Investigations combining thermodynamics and information theory, computer architecture, reversible computing and algorithmic properties are sought to advance our ability to design new, energy-efficient approaches to scientific computation.

- Memory-Aware Systems:
  Advances in memory technologies are creating new opportunities and challenges where it is unclear how to best introduce or abstract memory awareness and composition. Memory is evolving in highly asymmetric and distributed directions, with new industry standards greatly expanding memory sharing and capacities to much larger sizes, largely in backward-compatible system architectures. Research is needed to uncover new possibilities for solving larger scientific-computing problems with such highly asymmetric and distributed memory architectures. Innovations in algorithms, software interfaces, programming languages and models are needed to also effectively exploit new processing-in-memory architectures that are emerging as a paradigm for scientific

computing. Memory safety needs to be revisited in fundamental research on programming languages, runtimes, and operating systems, considering the multi-developer and shared nature of modern scientific programming eco-systems. The smoothening of the spectrum from volatile to non-volatile memories needs to be investigated for revisiting out-of-core algorithms to expand the limits of scientific computing. On-the-fly compression and decompression needs investigation for increasing the problem sizes without detriment to performance. The intersection of machine learning (ML) with memory systems opens the potential for new solutions, including smarter ML-informed cache prefetching and replacement policies potentially customizable for specific scientific applications via signatures and other mechanisms.

- Quantum Computing:
  Research to develop modules of end-to-end software toolchains aimed to program and control quantum computing systems at scale. Possible topics include quantum computing algorithms and the areas as presented in "Report for the ASCR Workshop on Basic Research Needs in Quantum Computing and Networking," https://doi.org/10.2172/2001045.

  Notice of Submission Requirements for the Panel Review on the topic "Quantum error detection, prevention, protection, and correction protocols across the quantum software stack" with specific emphasis of codesign of quantum algorithms for applications within the DOE SC mission space. ASCR expects to convene a merit-review panel in March 2026 for applications submitted in this area. To be considered by the panel, a pre-application must be submitted by November 14, 2025. A pre-application may involve researchers from a single or multiple eligible institutions. Each pre-application will be reviewed for responsiveness and competitiveness of the proposed research. ASCR expects to provide pre-application encouragement and discouragement decisions by December 18, 2025. To be reviewed by the panel, an application must be associated with an encouraged pre-application, submitted by January 28, 2026, and request no more than $600,000 in total across all institutions for a two-year award. ASCR expects to make at most three awards.

  Contacts:
  - Marco Fornari, marco.fornari@science.doe.gov

- Quantum Networking:
  This topic involves innovative research in quantum networking concepts, systems, and protocols by which quantum networking applies in scientific discovery, including, but not limited to, distribution of quantum information from sensors, quantum networking in support of interconnected or scalable quantum computing systems, and blind/cloud quantum computing. Networking can span heterogeneous systems or homogeneous systems (such as all-photonic) and parallel quantum processing (in co-located or local-area settings) and distributed quantum communications (at metropolitan or wide-area

scales). Possible topics include quantum networking areas as presented in "Report for the ASCR Workshop on Basic Research Needs in Quantum Computing and Networking," https://doi.org/10.2172/2001045.

This program also supports:

- Participation in International Standardization:
  Scientific computing relies on robust adoption of Voluntary Consensus Standards[2] (VCSs) that are applicable to state-of-the-art computing technologies. Notably, most applications running at the ASCR user facilities depend on some combination of standardized programming languages and application programming interfaces (APIs), and DOE contributes to many of them, including, but not limited to, the Message Passing Interface (MPI), C, C++, Fortran, OpenMP, and SYCL. Moreover, standardization is an important enabler of knowledge transfer from research to industry. Similarly, the characterization of computing hardware relies on benchmarks established through a VCS process, and these benchmarks drive industry decisions affecting what capabilities ASCR user facilities can provide. Such benchmarks include, but are not limited to, SPEC CPU/ACCEL and MLPerf. VCSs and benchmarks relevant to data, artificial intelligence and machine learning, quantum computing, software, and hardware interfaces are all in scope.

  The development of standards relies on robust participation from a broad spectrum of Stakeholders, and the program supports maintaining and broadening participation in standards development. Standards development benefits from the participation of laboratory and university researchers in addition to experts from businesses of all sizes. Funding may support training on standards development and leadership, travel to relevant meetings, the hosting of relevant meetings, the development of applications for, and associated prototypes of, new standardized functionalities, and any Standards Development Activity[3]. Particularly welcome are activities supporting US leadership in standards development and activities including a specific focus on broadening participation from experts from traditionally underrepresented groups, academic institutions, small businesses, and others who may face higher participation barriers.

Topics that are out of scope for Computer Science include:

- Topics not covered in the list of Computer Science Priority Interests, above, except with

[2] Voluntary Consensus Standards are "Standards [that] are developed through a process that is open to participation by representatives of all interested parties, transparent, consensus-based, and subject to due process. These might be developed by governmental organization or private sector groups such as the American Society for Testing and Materials (ASTM) or the International Organization for Standardization (ISO)." See https://www.directives.doe.gov/terms_definitions/voluntary-consensus-standard; for additional discussion, see Office of Management and Budget Circular Number A-119, https://www.nist.gov/system/files/revised_circular_a-119_as_of_01-22-2016.pdf.

[3] Standards Development Activity is defined in 15 USC § 4301(a)(7). See https://www.govinfo.gov/app/details/USCODE-2015-title15/USCODE-2015-title15-chap69-sec4301/summary

the specific encouragement of a Computer Science program manager in response to an emailed concept paper;
- Research with primary emphasis on resilient solvers, and/or new development of machine probabilistic methods and their mathematical formalism;
- Research aimed at advancing computer-supported collaboration, social computing, and generalized research in human-computer interaction;
- Discipline-specific data analytics and informatics without a clear articulation of how the research will generalize to other disciplines and/or advance computer-science capabilities;
- Research focused on the World Wide Web, the dark web, and/or data about it;
- Research that is primarily to advance cloud computing, hand-held, portable, desktop, and/or embedded computing that is not applicable to ASCR-supported computational and data science environments;
- Research and applications not motivated and justified in the context of current and future SC user facilities, especially those supported by ASCR (i.e., Argonne Leadership Computing Facility or ALCF, Oak Ridge Leadership Computing Facility or OLCF, and National Energy Research Scientific Computing Center or NERSC): https://science.osti.gov/ascr/Facilities;
- Development of new candidate physical qubit systems and improvements to physical qubits; and
- Quantum key distribution, quantum cryptography and cryptanalysis.

Submission of preliminary research descriptions (e.g., pre-applications, concept papers) is strongly encouraged. They will be reviewed for responsiveness of the proposed work to the research topics. You must send an email to a subprogram contact for information regarding format and content.

Subprogram Contacts:
- Xujing Davis, xujing.davis@science.doe.gov: artificial intelligence and machine learning for science, data analysis and visualization
- Xujing Davis, xujing.davis@science.doe.gov: Storage Systems and I/O (SSIO); programming models, environments, and portability; operating and runtime systems; performance portability and co-design; distributed scheduling and resource management
- Xujing Davis, xujing.davis@science.doe.gov: Continuum computing
- David Rabson, david.rabson@science.doe.gov: Network-Offloaded Acceleration for Distributed/Parallel Computing, Computer Science Fundamentals Accounting for Thermodynamics and Energy, Memory-Aware Systems
- Marco Fornari, marco.fornari@science.doe.gov: Quantum Computing and Quantum Networking
- Xujing Davis, xujing.davis@science.doe.gov: activities supporting career development, and broadening participation, in computer-science research
- Hal Finkel, hal.finkel@science.doe.gov: participation in international standardization

Website: https://science.osti.gov/ascr/Research/Computer-Science; https://science.osti.gov/ascr/Community-Resources/Program-Documents

(c) Computational Partnerships

This activity primarily supports the Scientific Discovery through Advanced Computing (SciDAC), program, which is a recognized leader for the employment of HPC for scientific discovery. Established in 2001, SciDAC involves ASCR partnerships with the other SC programs, other DOE program offices, and other federal agencies in strategic areas with a goal to dramatically accelerate progress in scientific computing through strong collaborations between discipline scientists, applied mathematicians, and computer scientists. For examples of current SciDAC partnerships, refer to the website https://www.scidac.gov.

Applications to SciDAC that involve software products should demonstrate the need for the software being developed in one or more scientific communities and should address both the dissemination of the software and the strategy for the software's long-term sustainability after the end of the proposed activities.

Other partnerships between discipline scientists, applied mathematicians, and computer scientists are also supported.

Subprogram Contacts:
- Xujing Davis, xujing.davis@science.doe.gov and Marco Fornari, marco.fornari@science.doe.gov, SciDAC Institutes
- Marco Fornari, marco.fornari@science.doe.gov, David Rabson, david.rabson@science.doe.gov, and Xiaofeng Guo, xiaofeng.guo@science.doe.gov, SciDAC and other partnerships

Website: https://science.osti.gov/ascr/Research/scidac

(d) Advanced Computing Technologies

This activity supports the Research and Evaluation of Prototypes (REP), including in quantum computing and networking. The REP activity addresses the challenges of next generation computing systems. By actively partnering with the research community, including industry and Federal agencies, on the development of technologies that enable next-generation machines, ASCR ensures that commercially available architectures serve the needs of the scientific community. The REP activity also prepares researchers to effectively use future generation of scientific computers, including novel technologies, and seeks to reduce risk for future major procurements.

Additionally, this subprogram provides graduate research training for the next generation of scientists as well as activities supporting career development, and broadening participation,

in high-end computational science.

Research topics currently of interest for Advanced Computing Technologies (ACT) include:

- Research focused on information processing and computation systems for emerging computing technologies (including quantum computing and networking technologies) which aim to enable testbed use, including hardware architectures, accelerators, development of programming environments, languages, libraries, compilers, simulators and other modeling tools, and research and development on their algorithms for physical simulation and capability assessment.
- Neuromorphic computing: Specific to HPC-enabled modeling and simulation of computing architecture at extreme scales for generalizable applications of the proposed approach and for the prototyping and fabrication of advanced neuromorphic computing architectures.
- Microelectronics for scientific computing, including innovative methods for processor synthesis, placement, architectures, and algorithms. Especially of interest are multi-disciplinary co-design projects where each scientific discipline informs and engages the other to achieve orders of magnitude improvements in system-level performance.
- Advanced Wireless Networks: Next generation wireless networks could enable scientific facilities to become more mobile, remotely manageable, and distributed. Breakthroughs in new software frameworks, tools, and approaches are needed to broaden and extend those wireless networks into existing or new scientific domains. By leveraging next-generation advanced wireless technology and microelectronics, we can build the tools, applications, and infrastructure needed to explore, understand, and harness new scientific discoveries.
- The maintenance and improvement of the software ecosystem, including that developed through the Exascale Computing Project (ECP), which provides shared software packages, novel evaluation systems, and applications relevant to the science and engineering requirements of DOE, in order that the full potential of the current and future computing systems deployed by DOE can be continuously realized.
- Robotics and Scientific Discovery Automation: Development and prototyping of autonomous and semi-autonomous robotic systems tightly integrated with AI/ML, high-performance computing, and real-time sensor data to enable closed-loop experimentation and laboratory automation at scale. Areas of interest include creation and use of robotics-enabled testbeds, adaptive autonomy for unstructured or hazardous environments, and physics-based digital twins of laboratory systems and instruments for risk-aware planning, simulation, and real-time decision support. Work may also involve edge–cloud orchestration, federated learning across distributed laboratory assets, and methods for ensuring trustworthy autonomy, reproducibility, and provenance in experiment-centric workflows. Efforts should demonstrate broad applicability across DOE Office of Science domains, with the potential to accelerate the planning, execution, and interpretation of experiments in support of DOE missions.

Proposed research in quantum computing should focus on applications of quantum

computing relevant to SC and on devices that are already available or that become available during the term of the award rather than large-scale, high-fidelity, fault-tolerant machines.

Topics that are out of scope include:
- Research that does not address the specific ACT topics described above;
- Development of new candidate qubit systems or improvements to physical qubits;
- Cryptography and cryptanalysis; and
- Projects that are duplicative of, or competitive with, industry efforts.

Submission of preliminary research descriptions (e.g., pre-applications, concept papers) is strongly encouraged. They will be reviewed for responsiveness of the proposed work to the research topics. Send an email to a subprogram contact for information regarding format and content.

Subprogram Contacts:
- Robinson Pino, robinson.pino@science.doe.gov, neuromorphic, heterogeneous computing architectures, and advanced wireless networks
- Robinson Pino, robinson.pino@science.doe.gov and David Rabson, david.rabson@science.doe.gov, microelectronics
- Pavel Lougovski, pavel.lougovki@science.doe.gov, Marco Fornari, marco.fornari@science.doe.gov, quantum information research
- David Rabson, david.rabson@science.doe.gov; Robinson Pino, robinson.pino@science.doe.gov, maintenance and improvement of the software ecosystem
- David Rabson, david.rabson@science.doe.gov, Graduate research training and broadening participation

Website: https://science.osti.gov/ascr/

2. Basic Energy Sciences (BES)
Program Website: https://science.osti.gov/bes/

The mission of the Basic Energy Sciences (BES) program is to support fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels, generating knowledge that can enable development of energy technologies critical to the Nation's economic and national security. BES research provides scientific foundations for DOE missions in energy, environment, and national security. The portfolio supports fundamental research in materials sciences, chemistry, geosciences, and biosciences. The BES website listed above includes more detailed information such as descriptions of program areas, workshop reports that address future directions, and Principal Investigator (PI) meeting summaries.

The following web pages are listed for convenience:
- BES Workshop Reports: http://science.osti.gov/bes/community-resources/reports/

- Materials Sciences and Engineering Division PI Meetings: http://science.osti.gov/bes/mse/principal-investigators-meetings/
- Chemical Sciences, Geosciences, and Biosciences Division PI Meetings: http://science.osti.gov/bes/csgb/principal-investigators-meetings/
- Scientific User Facilities Division web page: http://science.osti.gov/bes/suf/

Proposed research must be responsive to a supported topic in one of the core research areas listed in this document.

Notes For Applicants:

- Prior to submission, applicants are encouraged to discuss their research ideas with the subprogram contacts listed below. While not required, white papers/pre-applications are strongly encouraged.
- Some core research areas indicate target dates for pre-applications and/or applications. These dates are not hard deadlines and applications are accepted throughout the fiscal year for all BES core research areas in this NOFO. The target dates reflect the time needed to conduct the review and recommendation process for support with funds from this fiscal year. Applications submitted after a target date are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.
- Applications submitted to BES through this NOFO typically have Project Narratives that are 15 – 20 pages long. If applicants feel that additional pages are needed for the Project Narrative, they should discuss the requested increase with the relevant subprogram contact listed in this NOFO prior to submission.
- Recordings and slides from past BES and SC events provide an opportunity to learn about BES and SC programs and can be found at https://science.osti.gov/bes/officehours.
- Resources about Data Management and Sharing Plans are available at https://science.osti.gov/funding-opportunities/digital-data-management.

The BES divisions, program areas, and their objectives follow:

Materials Sciences and Engineering

Division Website: https://science.osti.gov/bes/mse

The Materials Sciences and Engineering (MSE) Division supports fundamental experimental, theoretical, and computational research to provide the knowledge base for the discovery, design, characterization, and control of materials with novel structures, functions, and properties. This knowledge serves as a basis for the development of new materials for energy and national priorities. The MSE portfolio consists of the core research areas listed below.

(a) Materials Chemistry

This program supports hypothesis-driven research on materials with a focus on the role of chemical reactivity, chemical transformation, and chemical dynamics on the material composition, structure, function, and lifetime across the range of length scales from atomic to mesoscopic. Discovery of the mechanistic detail for chemical synthesis, transformations and dynamics of materials, fundamental understanding of structure-property relationships of functional materials, and utilization of chemistry to control interfacial properties and interactions between materials are common themes.

Major scientific areas of interest include: (1) Fundamental aspects of chemical synthesis, including covalent and non-covalent assembly of materials from molecular-scale building blocks and macromolecular-to-macromolecular transformations; (2) Synthesis and characterization of new classes of materials including hierarchical materials or other innovative assemblies of matter with novel functionality; (3) Exploitation of extreme and/or non-equilibrium conditions leading to new materials discovery; (4) Control of interphase chemistry and morphology; (5) Fundamental electrochemistry and related charge transport in materials; (6) Chemical dynamics and transformations of functional materials in operational environments; and (7) Development of new tools and techniques for the elucidation of chemical processes in materials, particularly *in situ* or *operando* studies of materials in energy-relevant environments.

Specific topics of interest are aligned with recent BES roundtable and workshop reports and include novel approaches to the chemical conversion of polymers, fundamental investigations of rare earth compounds and other critical materials leading to earth-abundant alternatives, discovery of materials with spin-selective electronic functionality, and new approaches to materials discovery using data-driven science such as AI/ML.

Research will not be supported if it is primarily aimed at optimization of properties of materials for specific applications, optimization of synthetic methods (including non-science-based scale-up research), device fabrication and testing, or synthesis of small molecules. Applications focused on the elucidation of mechanisms of catalytic reactions, particularly with single-site or single-atom catalysts, will not be supported.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Christopher Chervin, christopher.chervin@science.doe.gov

- Craig Henderson, craig.henderson@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Materials-Chemistry

(b) Biomolecular Materials

This program supports fundamental materials science research for discovery, design and synthesis of functional materials based on principles and concepts of biology. Nature provides a blueprint for organizing and manipulating matter, energy, entropy, and information across multiple length scales to build material systems that display complex yet well-coordinated collective behavior. The major programmatic direction is on the science-driven creation of materials and multiscale systems that exhibit well-coordinated functionality and information content approaching that of biological materials but capable of functioning under non-biological environments. We seek innovative fundamental science approaches for co-design and scalable synthesis of materials that coherently and actively manage multiple complex and simultaneous functions and tolerate abuse through autonomous repair and regrowth. New synthetic approaches and unconventional assembly pathways are sought to accelerate the discovery/design of materials. An area of emphasis will be activities to understand and control assembly mechanisms to seamlessly integrate capabilities developed for one length scale across multiple length scales as the material is constructed with real-time adaptive control. Included is the development of predictive models and data-driven approaches that accelerate materials discovery/design and support fundamental science to enable energy efficient scalable synthesis.

Major scientific areas of interest are: 1) novel self-, directed-, and/or dissipative assembly pathways to form resilient materials with self-regulating capabilities such as reconfigurability and self-healing; 2) design and control of active matter through incorporation of non-equilibrium information and signaling processing; 3) management of precise functional group positioning and component interactions across multiple time and length scales; 4) design of biological molecules and/or bio-hybrid hierarchical structures for novel function in non-biological environments; and 5) design and creation of next-generation materials that emulate nature's highly efficient mechanisms for programmable selectivity and active energy management.

The program will not support projects that lack a clear focus on fundamental materials science or are aimed at optimization of materials properties for any applications, device fabrication, sensor development, tissue engineering, understanding of underlying biological synthetic or assembly processes, biological research, or biomedical research.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for

funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
- Aura Gimm, aura.gimm@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Biomolecular-Materials

(c) Synthesis and Processing Science

This program supports research to understand the physical phenomena and unifying principles that underpin materials synthesis and processing across multiple length scales. Some of these phenomena include diffusion, nucleation, and phase transitions as well as the role imperfections and interfaces play in the emergence of materials functionality. The emphasis is on hypothesis-based fundamental research that enables discovery of new materials, from quantum to bulk dimensionalities, with targeted composition, structure, and function. Applications that creatively couple physical synthesis and/or processing techniques with computational/theory approaches (i.e. AI/ML) are encouraged.

Programmatic priorities include (1) the synthesis of controlled complex thin films, nanoscale materials, and other low dimensional systems with atomic precision, (2) preparation techniques for pristine single crystal and bulk materials with novel physical properties, (3) understanding the contributions of precursor and intermediate states to the processing of bulk nanoscale materials, (4) exploring the underlying mechanisms for the selective growth and ordering for nanoscale to mesoscale structures. This research area supports DOE's mission in the synthesis of 2D and wide bandgap materials as semiconductors for microelectronics, light-weight metallic alloys for efficient transportation, novel materials such as metal organic frameworks, high-entropy systems, structural ceramics, critical materials replacements, and the development of materials and processes for transformative manufacturing. The program also is interested in understanding complex synthesis and processing relationships, for example time-temperature-transformation diagrams (TTT), transition state surfaces, or the effect of substrate (stress/strain) or precursor (kinetic energy/structure) states on film growth. Additionally, projects emphasizing the development of real-time diagnostic tools and characterization techniques to understand the fundamental science of nucleation and structure/composition for atomic level control, and computational approaches bridging multiple timescales are encouraged.

Topics targeted for increased emphasis are emerging areas of research that include (1) meta-stable intermediates for phase and composition transformations, (2) the role of localized external fields in directing growth processes, (3) the direct conversion of natural minerals or end-of-life materials into new functional alternatives, and (4) control over defects/disorder in film, single crystal, and bulk synthesis. Projects aimed at controlling synthesis to direct optimization or engineering of properties will be de-emphasized. In addition, research will not be supported that focuses primarily on optimization of properties of materials for

specific applications, device fabrication, device development, or any optimization based on known processing or synthesis principles.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
- Shawn Chen, shawn.chen@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Synthesis-and-Processing-Science

(d) Experimental Condensed Matter Physics

The Experimental Condensed Matter Physics (ECMP) program supports research that will advance our fundamental understanding of the quantum physics governing the electronic structure of complex solid materials and will allow us to achieve new materials functionalities through manipulation and control of collective excitations and quasiparticles. ECMP funds studies of novel magnetic, ferroelectric, charge ordering, nonlinear optical, superconducting, and topological properties known to emerge from the interplay of various interactions and degrees of freedom, as well as away from equilibrium in transient or metastable states. ECMP supports design, synthesis, and characterization of material systems whose electronic properties derive from quantum effects and cannot be described by classical paradigms. Also supported is the development of new experimental tools and techniques that enable the measurement of observables associated with the exotic states found in these quantum materials. The incorporation of computational tools and scientific machine learning algorithms is encouraged in order to advance experimental predictions and validations.

Projects should aim at achieving fundamental understanding of key principles that could be the foundation for transformational quantum technologies (topological quantum computing, sensing, or transduction) and/or next-generation, energy-efficient microelectronics (quantum magnonics, spintronics, and non-von Neumann electronic circuit elements). This program also supports research to reduce or eliminate critical materials and minerals while maintaining functionality in a wide range of energy technologies.

New collaborative opportunities:

(1) In addition to regular applications, ECMP encourages jointly supported, multi-investigator applications aimed at developing new AI/ML methodologies tightly integrated with experimental results to address great challenges in one of the scientific themes listed above. These projects will involve both experimental and computational components and may be co-funded by ECMP and the Theoretical Condensed Matter Physics (TCMP) program. Applications must focus on physics-aware AI systems with embedded domain-specific knowledge. The AI models to be developed must address explainability, interpretability, and reliability. For the experimental component, while applications may incorporate existing data or simulations, a significant portion of the experimental dataset used in the AI/ML workflow must be generated within the scope of the proposed project to ensure close alignment between modeling and measurement. Prior to submission of a pre-application, these applications must be discussed with this subprogram contacts of ECMP and Theoretical Condensed Matter Physics (see research area (e) below). Applications focused on validating models on existing or simulated data, or on the application of existing AI tools will not be considered.
(2) ECMP is also soliciting collaborative applications for combined experimental and theoretical studies of the interaction between the electron spin and chiral symmetry in molecules, hybrid (organic-inorganic), and/or inorganic materials. Prior to submission, multiple investigator collaborative research ideas should be discussed with the subprogram contacts of ECMP and the relevant participating program(s): Theoretical Condensed Matter Physics (see research area (e) below), Computational and Theoretical Chemistry (see research area (n) below), and Condensed Phase and Interfacial Molecular Science (see research area (o) below).

Areas of decreasing emphasis for the program include 3D heavy fermion (non-topological) superconductivity, cuprate superconductivity, and 2D electron and hole gases in conventional semiconductors. Research focused on studies of materials' microstructure to enhance materials' performance, either structural or electronic, will not be supported. Additionally, the program will not consider applications on cold atom physics, conventional superconductivity, bulk semiconductor physics (e.g., Si, GaAs), device development, materials property optimization, and/or incremental optimization of known phenomena.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Research ideas involving multiple principal investigators should be discussed with the subprogram contacts before submitting a pre-application.

Subprogram Contacts:

- Claudia Cantoni, claudia.cantoni@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Experimental-Condensed-Matter-Physics

(e) Theoretical Condensed Matter Physics

The Theoretical Condensed Matter Physics (TCMP) program supports fundamental research in theoretical condensed matter physics advancing our understanding of quantum materials, driving materials discovery and design, and leading to novel materials theory related to DOE missions. It includes research predicting and interpreting emerging quantum phenomena, and out-of-equilibrium quantum dynamics, including driven and many-body quantum-dynamics. Research spans from analytical to computational approaches with strong emphasis on theory, methods, and technique development. This includes the computational design of quantum materials with atomic precision and the development of innovative physics-guided artificial intelligence (AI) approaches to accelerate fundamental research.

Scientific topics funded in the program cover electron- and spin-correlations, superconductivity, quantum magnetism, including altermagnetism, topological states of matter, exotic states of matter including spin liquids, quantum phases of matter, multiferroicity or ferroelectricity, excited states phenomena, as well as the discovery and design of functional materials. The latter includes functional materials to reduce or eliminate the need of critical materials/minerals, to revolutionize computing, memory and/or data storage, or to transform power conversion.

Growth areas focus on:

Growth Area A: Artificial intelligence for science. Artificial intelligence (AI) including machine learning (ML) is a fast-growing area with unprecedented opportunities to accelerate, enhance, and transform condensed matter physics research. Applications must focus on physics-aware AI systems with embedded domain-specific knowledge. To bridge the gap between purely data-driven AI models and domain-driven scientific models, the developed AI model must address explainability, interpretability, and reliability. Applications focusing on novel AI models are encouraged. Applications primarily focused on data generation, or the application of existing AI tools will not be considered.

Growth Area B: Materials exploiting quantum interactions. Quantum interactions in many-body systems refer to the interactions between quantum particles, quasiparticles, or quantum particles and quasiparticles. Examples are electron-electron, electron-phonon, electron-photon, phonon-magnon, and spin-spin interactions. Applications must focus on the exploitation of the complex interplay of quantum interactions to create emerging quantum properties. Applications targeting chiral interactions or quantum interactions

leading to novel chiral effects are also encouraged.

Applications must be hypothesis driven or address specific, challenging scientific questions. All applications must make clear connections to condensed matter physics.

New Collaborative Opportunities:

(1) Collaborative applications in growth area A involving experimental components are also encouraged but must be discussed with the subprogram contacts of TCMP and the Experimental Condensed Matter Physics subprogram (see research area (d) above) before submitting a pre-application.
(2) Collaborative applications on chirality in growth area B involving experimental or quantum chemistry aspects are also encouraged but must be discussed with the subprogram contacts of TCMP and the relevant participating subprogram(s), which are Experimental Condensed Matter Physics (see research area (d) above), Physical Behavior of Materials (see research area (f) below), Computational and Theoretical Chemistry (see research area (n) below), or Condensed Phase and Interfacial Molecular Science (see research area (o) below).

Areas of decreasing emphasis include quantum phase transitions, fractional quantum Hall effect, wide bandgap and conventional semiconductors. Applications with a strong focus on high-throughput calculations, the application of standard AI/ML-tools, and/or machine-learned interatomic potentials are of declining interest.

Research will not be supported on soft matter, polymers, glasses, granular materials, cold atoms classical transport, classical molecular dynamics, and optimization of physical properties.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Research ideas involving multiple principal investigators should be discussed with the subprogram contacts before submitting a pre-application.

Subprogram Contacts:
- Matthias Graf, matthias.graf@science.doe.gov
- Claudia Mewes, claudia.mewes@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Theoretical-Condensed-Matter-

(f) Physical Behavior of Materials

The Physical Behavior of Materials (PBM) program supports fundamental research that advances understanding of the intrinsic processes that take place in materials and in response to external stimuli. These stimuli include, but are not limited to, temperature, pressure, mechanical strain, electromagnetic fields, structural disorder, chemical doping, and the interface-induced proximity effects. The program emphasizes research on the structure-property relationships governing the physical behavior of materials. This includes understanding how atomic structure and defects result in semiconducting, superconducting, and magnetic properties, as well as novel diffusion and transport phenomena. Projects within the program currently explore the physical behavior of material systems such as two-dimensional (2D) materials and heterostructures, spintronics and magnetics, plasmonics, nanophotonics, and other complex and disordered systems. Key thematic research thrusts include: (1) Electron transport and superconductivity; (2) Behavior of quantum and topological materials; (3) Light-matter interactions; (4) Spin, charge, and thermal transport in materials; and (5) Structure- and nano-enabled behaviors.

This year, the program emphasizes fundamental research in nonlinear optics and opto-spintronics. Of particular interest are light-matter interactions occurring on magnetically ordered semiconducting van der Waals materials that demonstrate sensitivity to external stimuli and hold potential for use in atomically thin opto-spintronic device architectures. Research exploring the interplay between optical and exciton-magnon interactions should include a robust spin- and charge-based characterization component.

New Collaborative Opportunities: PBM is also soliciting collaborative research that combines experimental and theoretical efforts on chiral-induced phenomena in materials for photonics and opto-spintronics. Prior to the submission of a pre-application, these projects must be discussed with subprogram contacts of PBM and the relevant participating subprogram(s): Theoretical Condensed Matter Physics (see research area (e) above), Computational and Theoretical Chemistry (see research area (n) below) or Condensed Phase and Interfacial Molecular Science (see research area (o) below).

Areas of de-emphasis in the program include materials for energy storage, conventional semiconductor physics, topological systems (topics covered by the Experimental Condensed Matter Physics program), and research focused on theory and modeling of defects in crystals and their influence on the structural properties of materials (topics covered by the Mechanical Behavior and Radiation Effects program).

Applications must be hypothesis-driven or directly address specific scientific challenges. Applications solely focused on materials synthesis, materials discovery, theory and software development, or the optimization of materials and their properties for specific device

applications (e.g. neuromorphic computing, non-volatile memory, and high-frequency devices) are excluded.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contacts:
- Tim Mewes, tim.mewes@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Physical-Behavior-of-Materials

(g) Mechanical Behavior and Radiation Effects

This program supports basic research to understand defects in materials and their effects on the properties such as strength, structure, deformation, and failure. Defect formation, growth, migration, and propagation are examined by coordinated experimental and modeling efforts over a wide range of spatial and temporal scales as well as a range of environments and stimuli. Topics include deformation of nanostructured materials, fundamentals of radiation damage, corrosion/stress-corrosion cracking in conjunction with radiation or stress, and research that would lead to microstructural design for tailored strength, radiation response, formability, and fracture resistance in energy-relevant materials. In addition to traditional structural materials, this program will also support research to understand fundamental deformation and failure mechanisms of other materials used in energy systems (e.g., polymers, membranes, coating materials, electrodes). Within these areas, research on topics such as driven systems, new materials and non-linear cooperative phenomena (multiple inputs, e.g. radiation + stress + corrosion) are of interest.

There will be an increased emphasis in the program on research to understand defect evolution in materials in radiation environments. Applicants focusing on radiation effects are encouraged to consider the priority research directions and priority research opportunities in the reports from the 2017 Basic Research Needs Workshop for Nuclear Energy and the 2022 Roundtable on Foundational Science to Accelerate Nuclear Energy Innovation. Of particular interest to this program overall are applications that take advantage of advanced synthesis methods to create tailored structures that better isolate mechanisms, high-performance computing and data science techniques, and advanced characterization techniques such as neutron or x-ray scattering. These fundamental science efforts should be related to DOE's mission areas.

Research will not be supported if it is primarily aimed at optimization of properties of

materials for specific applications or focused on developing simple structure-property correlations. Applications emphasizing high-strain-rate deformation, high-dose radiation, or mechanics of materials (rather than materials science) will not be considered responsive.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
- John Vetrano, john.vetrano@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Mechanical-Behavior-and-Radiation-Effects

(h) Quantum Information Science in Materials Sciences and Engineering

This research program focuses on Materials Sciences and Engineering, investigating the fundamental material properties that are essential for Quantum Information Science (QIS) and enable advanced QIS technologies. Within the Basic Energy Sciences, this program crosscuts the three MSE Division research areas - Materials Discovery, Design, and Synthesis; Condensed Matter and Materials Physics; Scattering and Instrumentation Sciences. This program encompasses topics described in BES Roundtable: Opportunities for Basic Research for Next-Generation Quantum Systems and BES Roundtable on Opportunities for Quantum Computing in Chemical and Materials Sciences reports.

This QIS program in MSE focuses on advanced materials that support quantum state stability and control. This program aims to create and control entanglement in multi-level quantum systems (including qubits or qudits) to enable precise measurement of individual quantum elements while mitigating decoherence – a significant obstacle to reliable quantum computing and other quantum technologies such as networking and sensing. Applications must focus on fundamental materials research in QIS, specifically addressing priority area(s) identified by the BES Roundtable reports. Researchers should utilize cutting-edge fabrication and measurement techniques, such as those available at BES User Facilities. Collaborative and multi-disciplinary teams are encouraged. Projects with an exclusive focus on fabrication, device development, or hardware optimization, will be discouraged. Areas of decreasing emphasis in Fiscal Year 2026 are molecular and topological systems.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 30,

2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
- Athena Sefat, athena.sefat@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Quantum-Information-Science

(i) X-Ray Scattering

This program supports basic research on the fundamental interactions of photons with matter to achieve an understanding of atomic, electronic, and magnetic structures and excitations and their relationships to materials properties, including the dynamics of quantum phenomena. The main emphasis is on x-ray scattering, spectroscopy, and imaging research, primarily at major BES-supported user facilities. Instrumentation development and experimental research in ultrafast materials science, across the full electromagnetic spectrum, is an integral part of the portfolio. This includes research aimed at manipulating and detecting ultrafast transient physical phenomena in materials, especially at excitation levels consistent with quantum phenomena and controlled energy conversion and transport.

Advances in x-ray scattering and ultrafast sciences will continue to be driven by scientific opportunities presented by improved source performance and optimized instrumentation, especially with the advent of improved synchrotron coherence and free electron laser sources. The x-ray scattering activity will expand current capabilities at the DOE facilities by providing support for independent external researchers who motivate and lead new instrumentation and technique development at those facilities. For example, research is sought that will take advantage of unprecedented levels of coherent brightness and of controlled timing structures at upgraded light source facilities.

New investments in ultrafast science will emphasize development of novel ultrafast techniques and focus on research that uses radiation sources associated with BES facilities and beamlines. New pump schemes to manipulate dynamic states of quantum materials will be supported, especially those which can be adapted to x-ray free-electron laser and ultrafast electron diffraction probe environments. Additionally, new approaches to improve the collection, processing and analysis of large data sets obtained with high repetition-rate pulsed sources or with fast multi-mega-pixel detector arrays are encouraged under the cross-cutting emerging domain of Data Sciences.

Novel X-ray techniques are sought that enable detailed investigations of the fundamental dynamic mechanisms of energy conversion systems and their active material components. This involves the interaction of complexity at atomic to mesoscopic length scales and

requires the development of multimodal experimental techniques that examine the same active sample positions, in place and under operational boundary conditions. Of particular emphasis for new energy saving quantum computation is the in-place study of the evolution of quantum properties and phase transitions at the shortest relevant time scales.

The program will not support research considered "mature use" of existing x-ray or ultrafast techniques. Typically, the emphasis on new techniques enables new access to inhomogeneous and dynamic systems and therefore the program will de-emphasize steady-state research of bulk and equilibrium systems.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Helen Kerch, helen.kerch@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/X-Ray-Scattering

(j) Neutron Scattering

This program supports hypothesis-driven research to understand atomic, molecular, electronics and magnetic structures and excitations, and their relationships to macroscopic properties, including, mechanical, thermal, electronic, magnetic, and topological. Neutron scattering, spectroscopy, and imaging research performed primarily at DOE neutron facilities should be central to pursuit of the research. Transformative research involving hard and/or soft matter will be considered.

The scientific research should leverage advances in neutron scattering driven by improved source performance, instrumentation, and advanced data acquisition and analysis approaches. The neutron scattering activity will expand current capabilities at DOE neutron facilities by providing support for research that motivates and leads new instrumentation and technique developments. Research is sought to identify fundamental mechanisms governing the response of materials to out-of-equilibrium (including operando) conditions as achieved through correlation of neutron detection with driven changes of sample environment, and concepts to analyze such measurements. New approaches to improve the collection and analysis of large data sets in raw form obtained with high repetition-rate pulsed sources or pulsed sample environment or fast multi-mega-pixel detector arrays are encouraged. Scientific research supported by this activity should enable growth of the neutron scattering community, such as through engagement of postdocs and students and

efforts to make data widely accessible.

The program will not support research considered mature or routine use of neutron scattering techniques. Typically, the emphasis on new techniques enables new access to inhomogeneous and dynamic systems and therefore the program will de-emphasize research of bulk systems in quiescent conditions, or research resulting in incremental advances of understanding of materials.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
- Helen Kerch, helen.kerch@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Neutron-Scattering

(k) Electron and Scanning Probe Microscopies

This program supports basic research in materials sciences using advanced electron and scanning probe microscopy and related spectroscopy techniques to understand the atomic, electronic, and magnetic structures and properties of materials. This activity also supports the development of new instrumentation concepts and quantitative techniques to advance materials characterizations. Supported advancements include ultrafast electron diffraction and imaging techniques. The goal is to develop a fundamental understanding of materials, including quantum phenomena, through advanced microscopy, spectroscopy, and the associated theoretical tools.

This activity emphasizes innovative research using electron and scanning probe microscopy techniques for groundbreaking science. These include understanding and controlling nano- or meso-scale inhomogeneity and investigations of the interplay among the quantum observables (e.g., charge, spin) that produce unique properties. Research topics include imaging the functionality of materials and investigation of electronic structure, spin dynamics, magnetism, phase transitions; transport properties from atomistic to mesoscopic length scales; and data science methods in microscopy and data analysis including machine learning and artificial intelligence. Progress in materials research requires development of innovative techniques and probes that harness quantum behavior in their characterization schema, as well as the utilization of imaging and spectroscopic techniques for the understanding and control of material or defect formation and properties at the atomic or nanometer scales. Advanced *in situ* analysis capabilities for the study of time-dependent

phenomena, including dynamics of quantum materials using ultrafast techniques, is also an area of interest in the program. The program encourages applications that develop AI/ML methods for integrating complex datasets from multimodal imaging and faster and more accurate data reconstruction and analysis.

The program will not support research considered to be "mature use" of microscopy techniques or device development. Electron and scanning probe efforts, including technique development, that is proposed without associated scientific goals or is motivated primarily by support of other funded research will not be considered. Research focused on conventional superconductivity will be de-emphasized.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by October 31, 2025.
- Applications submitted by December 31, 2025, will be considered for funding in FY 2026. Applications submitted after December 31, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Jane Zhu, jane.zhu@science.doe.gov

Website: https://science.osti.gov/bes/mse/Research-Areas/Electron-and-Scanning-Probe-Microscopies

Chemical Sciences, Geosciences, and Biosciences

Division Website: https://science.osti.gov/bes/csgb/

The Chemical Sciences, Geosciences, and Biosciences (CSGB) Division supports experimental, theoretical, and computational research to provide fundamental understanding of chemical transformations and energy flow in systems relevant to DOE missions. This knowledge serves as a basis for the development of new processes for energy and national priorities. The CSGB research portfolio consists of the core research areas listed below.

(l) Atomic, Molecular, and Optical Sciences

The Atomic, Molecular, and Optical Sciences (AMOS) program supports fundamental experimental and theoretical research in ultrafast chemical sciences. The aim of this program is to develop accurate quantum chemical descriptions of excited state physical and chemical processes to establish the foundational knowledge required to control ultrafast (coherent) electronic and vibrational dynamics. The program currently supports efforts to develop and use novel probes of ultrafast phenomena, to understand the dynamics of molecules in intense electromagnetic fields, and to observe and control quantum (de)coherence on increasingly faster timescales.

This program supports ultrafast, strong-field, short-wavelength science, and studies of correlated dynamics in molecular systems. Examples include ultrafast x-ray science at the Linac Coherent Light Source (LCLS-II) and the use of high-harmonic generation and its variants for probing ultrafast charge transfer and chemical reaction dynamics. Applications of these light sources include ultrafast imaging of chemical reactions, inner-shell photoionization of molecules, and probing and controlling charge transfer and non-adiabatic dynamics. The program encourages research exploiting next-generation capabilities of x-ray free electron lasers and modern data science approaches to provide new insights into electronic and molecular dynamics on the attosecond-to-femtosecond time scale. Coherent control of nonlinear optical processes and tailoring of wavefunctions with lasers continues to be of interest, particularly in the context of non-adiabatic excited state dynamics.

The AMOS program is also seeking applications for chemical dynamics research at the space-time limit, i.e., with joint femtosecond temporal and nanometer spatial resolution. Applications aimed at taking advantage of quantum phenomena to enhance classical approaches to probing chemical dynamics are also strongly encouraged. Applications in this area may include elements of quantum information sciences research (quantum light / quantum metrology) and AMOS, with the aim of gaining a deeper fundamental understanding of ultrafast phenomena.

The AMOS program is not currently accepting applications in the areas of plasma physics and the physics of atomic and ultracold systems. Projects involving theoretical, computational, and instrument development must include well-integrated scientific research focused on ultrafast chemical sciences.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by December 31, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

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Website: https://science.osti.gov/bes/csgb/research-areas/atomic-molecular-and-optical-science/

(m) Gas Phase Chemical Physics

This program supports research on fundamental gas-phase chemical processes. Research in

this program explores chemical reactivity, kinetics, and dynamics in the gas phase and seeks to understand energy flow and reaction mechanisms in complex, nonequilibrium, gas-phase environments. A crosscutting theme for the Gas Phase Chemical Physics (GPCP) program is systems chemistry, in which complex molecular behavior emerges from ensembles of molecules or large reaction networks in the gas phase. The GPCP program seeks to understand and ultimately control emergent molecular complexity. Of particular interest are reactions included in gas phase and/or gas/surface chemical reaction networks. In such reaction networks emergent behavior manifests as a significant and possibly precipitous change in chemical reaction rates, branching ratios, particle growth, and/or product energy distributions with changes in conditions, e.g., temperature, pressure, ion concentration, and elementary reactions included in the reaction network.

The major focus of research in this area is in four thrust areas (*Light-Matter Interactions, Chemical Reactivity, Gas-Particle Interconversion*, and *Gas-Surface Chemical Physics*).

- *Light-Matter Interactions* includes research in the development and application of innovative tools for probing the nuclear and electronic structure and dynamics of gas-phase molecules in complex environments. Proposed technical developments must yield new and scientifically impactful insights on dynamic processes, such as energy flow, nuclear rearrangements, and generation and relaxation of quantum coherence and entanglement. The program encourages applications that develop automated methods based on AI/ML to facilitate the analysis of complex experimental observables or provide new insights on quantum phenomena relevant to quantum information science.
- *Chemical Reactivity* comprises research in chemical kinetics and mechanisms, chemical dynamics, collisional energy transfer, and construction of, and calculations on, molecular potential energy surfaces. The Program emphasizes research that develops fundamental insights and transferable knowledge of energy flow and chemical reactions, including electron-driven chemistry. The Program encourages applications to develop and leverage AI/ML methods to advance fundamental understanding of increasingly complex systems.
- *Gas-Particle Interconversion* comprises research on the chemistry of small gas-phase particles, including their interactions with gas-phase molecules and dynamic evolution to understand the molecular mechanisms of formation, growth, and transformation (such as evaporation, phase transition, and reactive processing) of small particles.
- *Gas-Surface Chemical Physics* emphasizes molecular-scale investigations of gas-phase chemical processes with the goal of understanding the cooperative effects of coupling gas-phase chemistry with surface chemistry.

The Gas Phase Chemical Physics program does not support research in non-reacting fluid dynamics (transport phenomena including computational fluid dynamics); reacting and non-reacting turbulent flow and the impact of transport of chemical reactions; spray dynamics; data-sharing software development; end-use combustion device development; and characterization or optimization of end-use combustion devices.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by December 31, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Tom Settersten, thomas.settersten@science.doe.gov

Website: https://science.osti.gov/bes/csgb/Research-Areas/Gas-Phase-Chemical-Physics

(n) Computational and Theoretical Chemistry

This program supports fundamental research for the sustained development, innovation and integration[4] of theoretical and computational approaches for the accurate and efficient prediction of chemical processes and mechanisms relevant to the DOE mission. Part of the focus is on simulation of dynamical processes that are so complex that efficient computational implementation must be accomplished in concert with development of new theories and algorithms. Efforts must be tightly integrated with the research and goals of BES and provide theories and computational approaches to advance the fundamental science of chemical transformations and energy and information transduction processes across multiple scales in complex environments and systems. Applications may include the development or improvement of modular computational tools that enhance interpretation and analysis of advanced experimental measurements, including those acquired at DOE user facilities, or efforts aimed at enhancing the accuracy, precision, applicability and scalability of quantum-mechanical simulation methods. Also included are development of spatial and temporal multiscale methodologies that allow for time-dependent simulations of relativistic, coherent, entangled, and dissipative processes as well as rare events. Development of novel theories and simulation capabilities for theory-guided control of externally driven electronic and spin-dependent processes in real environments is encouraged.

The Computational and Theoretical Chemistry (CTC) focus for FY 2026 is on the innovation of predictive mechanistic theories and practical, systematically improvable and hierarchical methods for describing and simulating dynamical processes occurring in complex molecular ensembles and environments. Topics of interest within this focus include the development and integration of quantum chemical approaches for the accurate simulation and prescriptive design of (i) systems-level behaviors and other emergent functionalities and

[4] A Perspective on Sustainable Computational Chemistry Software Development and Integration, R. Di Felice et al., J. Chem. Theory Comput. 2023, 19, 7056. https://DOI.org/10.1021/acs.jctc.3c00419.

phenomena for manipulating information and energy transduction, with specific emphasis on dynamical chemical systems that exploit coordinated effects of chirality, topology, and magnetoelectric interactions to achieve novel functionalities, (ii) non-biological cooperative reaction networks and mechanisms, leading to programmable matter, chemical artificial intelligence and/or molecular cybernetic functionalities, or (iii) correlated multi-electron, multi-electron, and/or interacting quasiparticle governed chemical transformation and energy transduction processes, including those that may require consideration of symmetry violations or non-Hermitian or non-memoryless dynamical approaches to describe, in field-driven complex open quantum systems.

New Collaborative Opportunity: Collaborative research that involves experimental or theoretical condensed matter physics aspects to address the specific emphasis described in CTC topic of interest (i) above is encouraged. Prior to submission, multiple investigator collaborative research ideas should be discussed with the subprogram contacts of CTC and the relevant participating subprogram(s): Condensed Phase and Interfacial Molecular Science (see research area (o) below), Experimental Condensed Matter Physics (see research area (d) above), Physical Behavior of Materials (see research area (f) above), or Theoretical Condensed Matter Physics (see research area (e) above).

CTC does not support projects based on (i) the "mature use" of presently available implementations of computational and theoretical chemistry methods and/or approaches, (ii) the development of phenomenological models and empirical parameterization of models, (iii) methods for, or applications to, systems that do not explicitly consider rearrangements of quantum-mechanical degrees of freedom, or (iv) the development of density functional theory approximations or machine-learned potentials. AI/ML focused efforts in CTC must develop run-time compute intensive algorithms and methods, such as those that require reasoning and/or inference modelling to be performed during their execution, to advance the current state-of-the-art in exascale, quantum hardware-based, or other novel compute paradigm-based simulations of chemical systems and processes for fundamental knowledge discovery.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 15, 2026, will be considered for funding in FY 2026. Applications submitted after February 15, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Aaron Holder, aaron.holder@science.doe.gov

Website: https://science.osti.gov/bes/csgb/research-areas/computational-and-theoretical-chemistry/

(o) Condensed Phase and Interfacial Molecular Science

The Condensed Phase and Interfacial Molecular Science (CPIMS) program emphasizes basic research at the boundary of chemistry and physics, pursuing a molecular-level understanding of chemical and physical processes in liquids and/or at interfaces. With its foundation in chemical physics, the impact of this crosscutting program is far reaching, providing understanding and scientific foundations underpinning a variety of areas of importance to the DOE, including energy, chemical synthesis and manufacturing, microelectronics, nuclear power generation, and quantum information science. The CPIMS program also supports a significant number of efforts that develop and use Artificial Intelligence and Machine Learning to form the basis for new approaches for understanding science questions of interest to the CPIMS program.

Experimental and theoretical investigations in the gas phase, condensed phase, and at interfaces aim at elucidating the molecular-scale chemical and physical properties and interactions that govern chemical reactivity, solute/solvent structure, and transport. Studies of reaction dynamics at well-characterized surfaces and clusters lead to the development of theories on the molecular origins of surface-mediated catalysis and heterogeneous chemistry. Studies of model condensed-phase systems target first-principles understanding of molecular reactivity and dynamical processes in solution and at interfaces. Fundamental studies of reactive processes driven by radiolysis in condensed phases and at interfaces provide improved understanding of radiation-driven chemistry in nuclear fuel, waste environments, and coolants for fusion and fission reactors. (Radiation chemistry research is managed jointly by the CPIMS program and the Photochemistry and Radiation Chemistry program in section (u); applicants may wish to discuss their radiation chemistry research plans with the contacts for each program.)

The transition from molecular-scale chemistry to the emergence of collective phenomena in complex systems is also of interest, allowing knowledge gained at the molecular level to be exploited through the dynamics and kinetics of collective interactions. In this manner, the desired evolution is toward predictive capabilities that span the microscopic to nanoscale domains, enabling the understanding of molecular-scale interactions as well as their role in complex, collective behavior at larger scales. A molecular level understanding of complex molecular systems is sought, capturing the essence of chemical behavior, uncovering the knowledge of the main molecular-level driving forces behind the behavior, revealing the information that can be discarded while achieving reasonable descriptions, and discovering the universal principles that can be applied more widely.

The CPIMS program will continue to increase emphasis in Systems Chemistry to understand how interacting molecular networks can lead to emergent reactive behavior. Examples include reaction-diffusion systems, positional information, compartmentalized reaction networks, substrate-induced reactive systems, chemical replication, directionality

in chemical flux and assembly growth, and the chemical dynamics of nonequilibrium catalysis. The CPIMS program will add to a portfolio that includes recent awards to develop and use tools to mimic the active chemical processes found in living systems, seeking to understand the emergence of synthetic systems that function away from equilibrium.

The CPIMS program will increase emphasis on chemistry at the boundaries of condensed matter physics, including where unexpected emergent behavior has been identified. The program will increase a portfolio that includes studies of how chemical reactions might be supported at the surface of topological materials, the impact of Moiré effects on electrochemistry, the use of the theories of topological physics to change the way chemical reactions are understood and manipulated, and how light-matter strong coupling can affect chemical reactions. Another topic of interest is the impact of chirality on spin-dependent interfacial chemistry.

New Collaborative Opportunity: CPIMS is also soliciting collaborative applications for combined experimental and theoretical studies of the impacts of chirality on spin-dependent interfacial chemistry. Prior to submission, multiple investigator collaborative research ideas should be discussed with the subprogram contacts of CPIMS and the relevant participating program(s): Computational and Theoretical Chemistry (see research area (n) above), Experimental Condensed Matter Physics, (see research area (d) above); Theoretical Condensed Matter Physics (see research area (e) above), and Physical Behavior of Materials (see research area (f) above).

The CPIMS program does not fund research in mechanics or dynamics of bulk fluids, technological applications, or device development.

Target Dates:

- Pre-applications are strongly encouraged. There is no target date for pre-applications or applications.

Subprogram Contact:

- Gregory Fiechtner, gregory.fiechtner@science.doe.gov

Website: https://science.osti.gov/bes/csgb/Research-Areas/Condensed-Phase-and-Interfacial-Molecular-Sciences

(p) Quantum Information Science Research in Chemical Sciences, Geosciences, and Biosciences

This program supports fundamental research at the intersection of chemistry, quantum physics, and information theories to provide a foundational understanding of quantum information control in complex molecular systems. Efforts in this area build the necessary scientific basis to develop chemical design principles for the next-generation quantum technologies in computing, communication, and sensing.

The program adopts an integrated approach that combines foundational quantum information science (QIS) research, the fundamental understanding of quantum processes underlying quantum technologies, and the translation of QIS advances into applications central to the BES mission. Applicable research areas include:

Foundational studies of quantum information structure and behavior in molecular systems:

- New theoretical frameworks that describe how quantum information is organized in complex molecular systems, using tools such as operator algebras, quantum geometry, noncommutative methods, and related approaches, to reveal structural or conceptual features that are difficult to capture with existing methods.
- Molecular-level understanding of quantum information behavior and functionality in realistic settings, using quantum resource theories, generalized probabilistic models, quantum games, diagrammatic reasoning, and related methods, to capture nonclassical information metrics such as entanglement, quantum entropy, magic, and contextuality.
- Fundamental understanding of how quantum information propagates and transforms in large-scale molecular systems, including entanglement growth, decoherence, thermalization, and other phenomena, laying the foundation for the development of novel control and design strategies for robust quantum functionality at experimentally relevant scales.

Molecular principles and mechanisms for quantum information functionality:

- High-dimensional quantum information encoding using qudits or continuous-variable modes, identifying specific molecular degrees of freedom, or combinations thereof, that support initialization, coherent control, entanglement generation, and state readout under realistic conditions, with attention to chemical design principles that may enable these capabilities across diverse molecular platforms.
- Design and control of quantum state transfer in extended molecular systems, focusing on strategies for propagating quantum information through complex, variable architectures. The goal is to identify general principles that support stable and coherent communication between molecular subsystems via near-field coupling, host-mediated interactions, or photonic pathways.
- Molecular systems as physical learning substrates for quantum AI primitives, with emphasis on physical encodings and interactions that naturally enable operations such as data representation, kernel-based inference, entanglement-assisted feature extraction, and resource-aware learning or decision processes, including their use as quantum reservoirs.

Quantum computing and quantum machine learning for molecular simulations:

- Circuit-based approaches extended to qudit and continuous variable representations, direct fermionic and bosonic primitives realized through physical gate operations, as well as alternative paradigms such as measurement-based computing, quantum cellular automata, and structurally informed frameworks shaped by molecular symmetries and

dynamics.
- Abstract and controllable quantum surrogate models that not only support simulation on quantum hardware but also serve as standalone representations for exposing hidden structure and extracting fundamental physical insight for the underlying system.
- Interpretable quantum machine learning approaches to uncover physically meaningful structure within molecular quantum systems, including the extraction of patterns, universal representations, and resource features from trained models; the discovery of underlying mechanisms and control principles; and the refinement of theoretical frameworks.

To be considered responsive, applications must pursue high impact foundational research that incorporates one or more of the research topics listed above and clearly articulates its importance to the molecular systems relevant to the CSGB domain sciences.

Applications will be deemed nonresponsive if they focus on
- materials science, engineering, synthesis, device optimization, or designing/building quantum computers
- algorithmic translation of established quantum chemistry methods to quantum computers, without addressing foundational QIS questions
- computational simulation, including those based on AI/ML, without contributing to the understanding or advancement of foundational QIS principles

Target Dates:
- Pre-applications are strongly encouraged. There is no target date for pre-applications or applications.

Subprogram Contact:
- Marat Valiev, marat.valiev@science.doe.gov

Website: https://science.osti.gov/bes/csgb/Research-Areas/Quantum-Information-Sciences

(q) Catalysis Science

This program supports basic research pursuing novel catalyst design and molecular-level control of chemical transformations relevant to the conversion of energy resources. Emphasis is on the understanding of reaction mechanisms, enabling precise identification and manipulation of catalytic active sites, their environments, and reaction conditions for optimized efficiency and selectivity. Elucidation of *catalytic reaction mechanisms in varied chemical environments* and *the structure-reactivity relationships of solid and molecular catalysts* comprises a central component of the program.

A long-term objective is to promote the convergence of heterogeneous, homogeneous, electro-, and bio-catalysis as a means to discover novel inorganic, organic, and hybrid catalysts that are atom and energy efficient for selective fuel and chemical production.

Specific focus areas are described below:

- New mechanisms and catalytic transformations mediated by Earth Abundant metals.
- Reducing the dependence on catalysts containing platinum group or other critical elements by advancing novel concepts to increase active site efficiency.
- Approaches that explore catalysts and mechanisms associated with transformations in multicomponent mixtures, multiple reactions, and integrated processes. Transformations involving light hydrocarbons or lignocellulosic-derived molecules towards chemicals and fuels are emphasized.
- Advanced concepts concerning catalyst design, including topics related to atomically precise synthesis, enabling, for instance: multi-functionality, confinement within porous materials, site cooperativity, nano- and single-atom stabilized structures, and manipulation of weak interactions.
- Substituting or coupling thermal energy sources with less-energy intensive ones, such as electrical, mechanochemical, or electromagnetic sources leading to efficient and resilient chemical processes.
- Examination of the dynamics of catalyst and electronic structures occurring during catalytic cycles and deactivation via the development of novel spectroscopic techniques and structural probes for *in situ/operando* characterization of catalytic processes. This also includes strategies to induce changes in catalytic structure and activity via response to stimuli.
- Integrated theory-experiment and predictive theoretical catalysis supported by data-intensive and AI/Machine Learning approaches for mechanism identification, catalyst discovery and development, and benchmarking of catalytic properties.

This program does not support: (1) the study of transformations for pharmaceutical applications; (2) non-catalytic stoichiometric reactions; (3) whole cell or organismal catalysis; (4) studies where the primary focus is photochemistry or photophysics; (5) studies primarily focused on process or reactor design and optimization; and, (6) studies primarily focused on battery chemistry.

Target Dates:

- Pre-applications are strongly encouraged. There is no target date for pre-applications.
- Applications submitted by December 15, 2025, will be considered for funding in FY 2026. Applications submitted after December 15, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contacts:

- Viviane Schwartz, viviane.schwartz@science.doe.gov and
- Chris Bradley, chris.bradley@science.doe.gov

Website: https://science.osti.gov/bes/csgb/research-areas/catalysis-science/

(r) Separation Science

This program supports fundamental, hypothesis-based experimental and computational research questions that seek to discover, predict, and control de-mixing chemical and physical states including the kinetics and dynamics of these transitions. Relevant chemical separation mechanisms include those that provide molecular level insight and may become the basis for solutions to current and long-term energy challenges. Basic research in separation science relies on understanding chemical and physical properties at multiple length and time scales, quantum through macroscopic properties, and molecular interactions and energy exchanges that determine the efficiency of chemical separation processes. Emerging fundamental separation science projects that are not mature and advance critical mineral and material separations are of particular interest to the program. While issues of selectivity, capacity, throughput, durability, and energy input are important parameters for separations and should be of concern for separation science research, these issues should not be the singular focus of a project.

Among topics that align with current program priorities are:

- Elucidating how dynamics and molecular criteria limit mass transfer at interfaces or interfacial regions during a separation process.
- Developing and elucidating how non-thermal and other mechanisms exhibit efficient, selective, and energy-relevant separations. Possible novel mechanisms include but are not limited to magnetic, mechanic, electromagnetic, magneto-reactive, bio-inspired, and other means to affect transport kinetics.
- Determining the mechanism(s) of how separation parameters and processes such as high selectivity, capacity, and throughput are impacted by emergent system properties.
- Controlling and developing mechanistic understanding of how temporal changes in separation systems occur such as activation, degradation, self-repair, or solvation. Consideration of timescales and molecular understanding must be articulated.
- Discovering, understanding, and predicting mechanistic paradigms for removal of dilute constituents from a mixture, including but not limited to (a) reactive separations, (b) intermolecular interactions leading to the formation of a new phase, or (c) emergent phenomena that result from correlation and amplification of individual atomic or molecular processes as well as their resulting effects on kinetics or transport properties.

Pre-applications and applications must explicitly articulate a research question, identify a fundamental hypothesis to be tested, and describe the separation science knowledge gap that will be addressed. These submissions should clearly detail how the proposed project addresses one of the programmatic topics. Scientific research questions that utilize experimental, computational, or artificial intelligence/machine learning approaches are encouraged.

The program does not support goals that primarily focus on (a) engineering design, optimization, or scale-up; (b) synthetic and/or characterization approaches for material or ligand optimization rather than on advancing fundamental separation science; or (c)

technoeconomic analyses of chemical separation processes. The program also does not support goals that primarily seek to (d) develop narrowly defined processes or devices; (e) advance established desalination approaches, microfluidics technology, or sensors; (f) develop databases, characterization methods, computational methods, or theoretical methods, rather than on advancing separation science.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by October 31, 2025.
- Applications submitted by December 10, 2025, will be considered for funding in FY 2026. Applications submitted after December 10, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
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Website: https://science.osti.gov/bes/csgb/Research-Areas/separation-science

(s) Heavy Element Chemistry

This program supports actinide and transactinide fundamental chemical research that underpins the DOE missions in energy, environment, and national security with an emphasis on the chemical and physical properties of the transuranic elements. The unique molecular bonding of these elements is explored using experiment and theory to elucidate electronic and molecular structure, reaction thermodynamics, as well as quantum phenomena. Emphasis is placed on the chemical and physical properties of the transuranic elements to determine their bonding and reactivity, the fundamental transactinide chemical properties, and the overarching goal of resolving the *f*-electron challenge. The *f*-electron challenge refers to the inadequacy of current electronic structure methods to accurately describe the behavior of *f*-electrons, in particular strong correlation, spin-orbit coupling, multiplet complexity, and associated relativistic effects. Theoretical applications are considered that integrate closely with experimental research or otherwise demonstrate impact outside the theory community. Theoretical and experimental investigations of the superheavy elements where relativistic chemical effects dominate and the half-lives are short, are a challenging test of theoretical and chemical techniques; these applications are highly encouraged.

The role of 5*f* electrons in bond formation remains the fundamental topic in actinide chemistry and is an overarching emphasis for this program. Theory and experiment show that 5*f* orbitals participate significantly in molecular actinide compounds. Resolving the role of the *f*-electrons is one of the three grand challenges identified in the *Basic Research Needs for Advanced Nuclear Energy Systems (ANES)* report of the Basic Energy Sciences Workshop (2006) and echoed in the report from the Basic Energy Sciences Advisory Committee: *Science for Energy Technology: Strengthening the Link between Basic Research and Industry*

(2010). Applicants should also look at the priority research directions and opportunities discussed in the reports from the 2017 *Basic Research Needs for Future Nuclear Energy* workshop and the July 2022 *Foundational Science to Accelerate Nuclear Energy Innovation* roundtable.

Catalytic reactivity involving actinides, if not better aligned with the BES Catalysis Science program described in section (q), is of interest to this program if the project yields insight into *f*-electron behavior. Exotic catalytic and redox behavior exhibited by actinides in extreme environments, such as the legacy nuclear waste tanks or molten salts, is also of particular interest to this program.

The inclusion of machine learning, artificial intelligence, and quantum computing methods are particularly desirable. This program does not fund research on: the processes affecting the transport of subsurface contaminants, the form and mobility of contaminants including wasteforms, projects focused on the use of heavy-element surrogates, projects aimed at optimization of materials properties including radiation damage, high-pressure research on neptunium or plutonium, device fabrication, data science efforts without chemical experimentation, or biological research; these are all more appropriately supported through other DOE programs. The HEC program will consider applications to understand how the unique electronic structure of rare earth elements, including the role of *f*-electrons, determines the physical and chemical properties of molecules and materials, with the goal of accelerating their design to reduce or eliminate the use of critical elements. Research that is focused primarily on separations and does not address the unique properties of the heavy elements is better aligned with the BES Separation Science program, which is described in section (r). Development or improvement of computational tools is better aligned with the BES Computational and Theoretical Chemistry program, which is described in section (n). Research that is focused primarily on radiation chemistry (chemistry initiated from excited states) is better aligned with the BES Photochemistry and Radiation Chemistry program, which is described in section (u). Applications should be hypothesis-based.

Target Dates:

- Pre-applications are strongly encouraged. There is no target date for pre-applications.
- Applications submitted by November 30, 2025, will be considered for funding in FY 2026. Applications submitted after November 30, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Philip Wilk, philip.wilk@science.doe.gov

Website: https://science.osti.gov/bes/csgb/research-areas/heavy-element-chemistry/

(t) Geosciences

This program supports basic experimental, theoretical, and computational research in geochemistry and geophysics that have clear connections to energy production or recovery of critical elements. Geochemical research emphasizes fundamental understanding of the reaction mechanisms and rates associated with geochemical processes, focusing on molecular-mesoscale aspects of minerals and interfaces and on the molecular origins of critical element distributions and their influence on migration/separation/fractionation pathways in the earth, ranging from weathering environments to magmatic/hydrothermal systems. Geophysical research focuses on new approaches to understand subsurface processes that characterize the evolution of fractures in the upper crust, particularly when associated with enhanced geothermal systems and hydrocarbon prospection & recovery.

Applicants should look at the geosciences-aligned priority research directions and opportunities discussed in the BES workshop and roundtable reports as well as the National Academies of Sciences, Engineering, and Medicine. The reports that contain particularly topical geosciences topics include *Basic Research Needs for Geosciences: Facilitating 21st Century Energy Systems* (2007) and *Controlling Subsurface Fractures and Fluid Flow: A Basic Research Agenda* (2015).

The inclusion of artificial intelligence or quantum computing methods is particularly desirable. While it is necessary that the work has a well-defined connection to energy production or critical elements, priority in BES Geosciences funding is given to research that has strong potential for breakthrough science. Applicants must make a strong case for (i) the relevance of the work to energy production or critical elements and (ii) the fundamental science nature of the work (i.e., why the work belongs in BES and not a more applied program). Applications that do not make a strong case for both are discouraged. Research that is focused primarily on separation science and does not address subsurface science, would be better aligned with the BES Separation Science program, which is described in section (r). Modeling-focused applications that do not clearly indicate direct engagement with novel and compelling data sets are discouraged. Applications that do not describe subsurface science (e.g. oceanography) are discouraged. The Geosciences program does not fund code development, engineering design or scale-up, development of narrowly defined processes or devices, mapping & surveys, biological research, device fabrication, microfluidics, or sensors; these are all more appropriately supported through other programs. Applications should be hypothesis-based.

Target Dates:

- Pre-applications are strongly encouraged. There is no target date for pre-applications.
- Applications submitted by November 30, 2025, will be considered for funding in FY 2026. Applications submitted after November 30, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
- Philip Wilk, philip.wilk@science.doe.gov

Website: https://science.osti.gov/bes/csgb/research-areas/geosciences/

(u) Photochemistry and Radiation Chemistry

This program supports fundamental, molecular-level research on photochemistry and radiation chemistry in the condensed phase and at interfaces.

Photochemical processes initiated by the absorption of visible or near-infrared light may ultimately form the basis of reliable, secure energy technologies that generate energy-rich chemicals or electricity. Advances in these areas will require a thorough understanding of elementary processes such as light absorption, charge separation, and charge transport within a number of chemical systems, including those with significant nanostructured composition.

Supported research areas include organic and inorganic photochemistry, light-driven electron and energy transfer in condensed phase and interfacial molecular systems, photocatalysis of reactions relevant to fuels or commodity chemicals, semiconductor photoelectrochemistry, light-driven generation or manipulation of quantum phenomena in molecular systems, and artificial assemblies that mimic natural photosynthetic systems. An enhanced theory and modeling effort is needed to improve current understanding of many photochemical phenomena.

To enable the light-driven production of fuels and other energy-rich chemicals, knowledge of photoinduced charge transfer needs to be closely coupled with the conversion of abundant, feedstocks like H_2O, CO_2, or N_2. Fundamental research to enable robust photochemical water oxidation continues to be a particularly challenging and important area of research. Basic science that could underpin light-driven cascade approaches to generate energy-rich chemicals from CO_2 and/or N_2 is a topic of increasing emphasis. More generally, considerable challenges remain in understanding degradation mechanisms to enhance photochemical durability, designing catalytic microenvironments that promote selective reaction outcomes, exploiting direct coupling of light-driven phenomena and chemical processes to enhance performance, and tailoring interactions of complex phenomena to achieve integrated multicomponent assemblies for fuels production.

Another regime of interest is the chemistry initiated through the creation of excited states with ionizing radiation, as can be produced through electron pulse radiolysis, to investigate reaction dynamics, structure, and energetics of short-lived transient intermediates in the condensed phase, solutions, and interfaces. Basic research on radiation chemistry is needed to enable continued advances in nuclear energy production and environmental waste management. Supported topics include fundamental research to understand the radiation-

induced speciation and redox chemistry of coolants and solvents being considered for next-generation nuclear energy systems, the degradation mechanisms and mitigation strategies of molecular reagents employed for separations processes in the nuclear cycle, and the radiation chemistry of solid-liquid interfaces encountered in nuclear waste processing and storage. Radiation chemistry research is managed jointly by the Photochemistry and Radiation Chemistry program and the CPIMS program (see section (o) above); applicants may wish to discuss their radiation chemistry research plans with the contacts for each program.

The Photochemistry and Radiation Chemistry program does support systems-level investigations, but it does not fund applied research on device development or optimization.

Target Dates:
- Pre-applications are strongly encouraged and should be submitted by November 10, 2025.
- Applications submitted by December 15, 2025, will be considered for funding in FY 2026. Applications submitted after December 15, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contacts:
- Christopher Fecko, christopher.fecko@science.doe.gov and
- Jennifer Roizen, jennifer.roizen@science.doe.gov

Website: https://science.osti.gov/bes/csgb/Research-Areas/Solar-Photochemistry

(v) Photosynthetic Systems

This program supports basic research on the capture and conversion of solar energy to chemical energy in the photosynthetic systems of plants, algae, and photosynthetic microbes. Topics of study include, but are not limited to, light harvesting, proton and electron transport, reduction of carbon dioxide to form organic compounds, and the self-assembly and self-repair of photosynthetic proteins, complexes and membranes. Examples of specific topics under these headings include capture of carbon dioxide by carboxylase enzymes and bicarbonate transporters, assembly of subunit proteins into large photosynthetic complexes, quantum coherent excitation energy transfers through photosystems, and extraction of electrons from water for generation of useful organic compounds. The broad goal of the program is to foster greater knowledge of the varied photosynthetic systems found in nature. These offer a natural library of self-assembling biochemical systems that conduct unusually efficient transfers and conversions of energy from one form to another. Understanding of these systems can guide the development of new energy technologies.

All submitted applications must clearly state how the knowledge gained from the proposed

research is relevant to greater mechanistic understanding of the capture and conversion of solar energy to chemical energy in the photosynthetic systems of plants, algae, and photosynthetic bacteria. Photosynthetic Systems does not fund: 1) development or optimization of energy devices or processes; 2) development or optimization of microbial strains or plant varieties for biofuel or biomass production; 3) phenotype analyses that do not test specific hypotheses relevant to the program; 4) genomic, transcriptomic, or proteomic data acquisition that does not test specific hypotheses relevant to the program; and 5) projects that are primarily computational in nature.

Target Dates:
- Pre-applications are strongly encouraged. There is no target date for pre-applications.
- Applications submitted by November 20, 2025, will be considered for funding in FY 2026. Applications submitted after November 20, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:
- Stephen Herbert, stephen.herbert@science.doe.gov

Website: https://science.osti.gov/bes/csgb/Research-Areas/Photosynthetic-Systems

(w) Physical Biosciences

This program supports basic research into the biochemistry, biophysics, and molecular biology that underpins biological energy capture, conversion, and storage. Primary focus areas of the program include:
- structure/function, mechanism, and electrochemical properties of complex multielectron enzyme reactions (e.g. CO_2/CH_4, N_2/NH_3, and C-C bond formation)
- complex metallocofactor and active site biosynthesis
- cofactor redox tuning by ligand coordination and chemical environments that control redox potential and enable catalysis
- mechanisms that control electron bifurcation and catalytic bias in enzymes
- proton coupled electron transfer, tunneling and quantum phenomena in non-photosynthetic systems
- factors and critical components that direct and regulate electron flow across spatial and temporal scales (e.g. protein-protein interactions, conformational changes, and allostery), biochemistry controlling energy rich biological compound or material biosynthesis and structure (e.g., plant cell walls, lipids, terpenes, etc.)

Funded projects typically combine biochemistry, biophysics, molecular biology, computational chemistry, and other approaches to understand the structure, function, and mechanism of enzymes, enzyme systems, and energy-relevant biological reactions that control energy flow in natural systems. Combined approaches that support a broad interdisciplinary understanding of these processes and identify distinctive principles that

can provide foundational knowledge for critical materials and new energy technologies are encouraged. These processes and unique structure-function relationships can provide a basis for the design and synthesis of highly selective and efficient bioinspired catalysts and allow control of the flow of electrons in biological systems to achieve desired metabolic outcomes.

All submitted applications must clearly state how the knowledge gained from the proposed research will further the fundamental understanding how plants, algae, and non-medical microbes capture, convert, and/or store energy. Projects must be hypothesis-driven. Physical Biosciences does not fund research in: 1) animal systems; 2) prokaryotic systems related to human/animal health or disease; 3) development or optimization of energy devices or processes; 4) development or optimization of microbial strains or plant varieties for biofuel/biomass production; 5) cell wall breakdown or deconstruction; 6) transcriptional or translational regulatory mechanisms or processes; 7) environmental remediation or identification of environmental hazards; 8) genomic or other "omic" data acquisition that does not test specific hypotheses relevant to the program; and 9) computational projects that do not contain complementary experimental components (by PI or collaborator).

Target Dates:

- Pre-applications are strongly encouraged. There is no target date for pre-applications.
- Applications submitted by November 20, 2025, will be considered for funding in FY 2026. Applications submitted after November 20, 2025, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Kate Brown, katherine.brown@science.doe.gov

Website: https://science.osti.gov/bes/csgb/Research-Areas/Physical-Biosciences

Scientific User Facilities

Division Website: https://science.osti.gov/bes/suf/

The Scientific User Facilities Division supports the research and development, planning, construction, and operation of scientific user facilities for a vast range of science using x-ray, neutron, and electron beam scattering as fundamental probes of matter. The Division supports research to improve today's facilities and lay the foundation for next generation facilities.

(x) BES Accelerator and Detector Research

This program supports research that advances the instruments, techniques, and capabilities of the existing and/or future scientific user facilities. Research is supported that aims at developing techniques that will strongly benefit the next generation of accelerator-based

particle sources including improved diagnostics. Research includes studies of creation, manipulation, and transport of ultrahigh brightness beams and modeling of beam dynamics.

Specific topics of interest are aligned with the recent BES Basic Research Needs Workshop on Accelerator-based Instrumentation and include:

- research to understand the fundamentals of beam generation and parameters' behavior near or at their theoretical limits;
- research to explore scientific mechanisms that limit system performance and utilization;
- mechanisms to tailor and control beams with unprecedented precision and speed to probe complexity in matter;
- detectors concepts with higher computational capabilities per pixel, improved readout rates, radiation hardness, and better energy and temporal resolution;
- high atomic weight sensors to expand the range of experiments possible at synchrotrons and allow operando probes of diverse materials;
- co-design of optics and detector leading to efficient optics that couple photons for complex detector systems (e.g., cryogenic detectors with limited collections areas);
- ultrafast beam instrumentation capable of accurate measurement of femto- and atto-second bunch lengths;
- tight control of beam losses, and detectors designed for advanced neutron imaging with very high throughput for high-intensity H– currents; and
- advances in probabilistic digital twins that incorporate errors present in physical systems and real-time integration to predict outcomes of specific experiments (with real-time parameter optimization) and facility operations.

Research emphasizing device fabrication will be discouraged.

Target Dates:

- Pre-applications are strongly encouraged and should be submitted by November 30, 2025.
- Applications submitted by February 1, 2026, will be considered for funding in FY 2026. Applications submitted after February 1, 2026, are not guaranteed consideration for funding this fiscal year. If not considered this fiscal year, applications will be held for consideration in a future selection cycle.

Subprogram Contact:

- Mikhail Zhernenkov, mikhail.zhernenkov@science.doe.gov mailto:

Website: https://science.osti.gov/bes/suf/accelerator-and-detector-research/

3. Biological and Environmental Research (BER)

Program Website: https://science.osti.gov/ber

The mission of the Biological and Environmental Research (BER) program is to support transformative science and scientific user facilities to achieve a predictive understanding of

complex biological, Earth, and environmental systems, in support of DOE's vision to advance innovative solutions for the Nation's energy expansion and national security challenges.

BER research seeks to uncover nature's mysteries involving the processes and interdependencies among genomics, plants, ecosystems, watersheds, and the Earth system. BER integrates advanced genomics research with AI-enabled computation and user facility capabilities for basic science on plant and microbial systems relevant to DOE missions in energy and national security. BER seeks to gain a fundamental understanding of genome-encoded functions in plants and microbes to enable the ability to design new biological processes for energy and the economy, and provide the basic science to underpin U.S. leadership in biotechnology innovation. Research includes efforts in bioenergy science, biosystems design, synthetic biology, computational biology, microbiome science, biomolecular research and bioimaging science.

BER supports fundamental science and research capabilities that enable major scientific developments and enhanced predictability involving Earth system-relevant atmospheric, terrestrial, cryospheric, and human system process and modeling research in support of DOE's mission goals for transformative science for energy dominance and expansion, and national security. This includes observational, laboratory experiments, and modeling research on atmospheric components such as clouds, aerosols, precipitation, and turbulence interactions; experimental and modeling research involving terrestrial biogeochemistry, hydrology, ecology, coastal processes, and the energy-water dynamics of urban systems; and the nonlinear dynamics of multi-scale complex systems extending from hyper-resolution to regional and large scales and for temporal scales ranging from subseasonal to multidecadal. Novel uncertainty quantification methodologies and the use of AI/ML to enhance predictability are high priorities for all investments.

BER anticipates holding merit review panels to evaluate applications in each of the four topics that follow. Each panel is expected to meet in the Spring of 2026. To be considered by the panel, a pre-application must be submitted by December 23, 2025. Each pre-application will be reviewed for responsiveness and competitiveness of the proposed research. BER expects to provide pre-application encouragement and discouragement decisions by January 16, 2026. To be reviewed by the panel, applications associated with encouraged pre-applications must be submitted by March 6, 2026. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Additional pre-application instructions:
In addition to the instructions in Section IV, the title page of the pre-application should include the following additional information:

- Subprogram topic to which the pre-application is being submitted
- Name of subprogram contact for the topic
    - BLUF (Bottom Line Up Front) Summary: <100 words describing the main

ideas and approach expressed in the pre-application

Additional application instructions:
Applications with research narratives in excess of 15 pages may pose an undue burden on merit reviewers and may be declined without review. If applicants feel that additional pages are needed for the narrative, prior to submission they should discuss the requested increase with the relevant contact listed in this NOFO.

Applications may be from a single institution or from a multi-institutional team. If submitting an application for a multi-institutional team, a prime and subaward model with one application submitted by the lead institution is a better fit for applications to BER. Multi-institutional teams must follow the instructions in Section IV for a Title Page Supplement for Multi-Institutional Teams, including the required table.

Applications for conference/workshop grants are also applicable to this NOFO but applicants are strongly encouraged to contact program staff (https://science.osti.gov/ber/About/Staff) before submission to ensure scope aligns with programmatic goals and availability of budget.

Previously declined applications that have not been substantially revised to address merit reviewer comments may be declined without additional merit review.

The major thematic research topics for BER under this Funding Opportunity are:

(a) Microbiome Research

BER's Microbiome Research seeks to facilitate microbial solutions across the bioeconomy by developing a holistic understanding of microbiome behavior and how such behavior is derived from genome-encoded traits. This includes interactions among the breadth of known microbes (bacteria, archaea, fungi, and viruses) and ways to understand and manipulate such interactions using genome-based approaches. Microbiomes dynamically and quickly adapt to the spatiotemporal variability in chemical and physical parameters in their environment, leading to complex feedback loops with difficult to predict outcomes. As a result, microbiome behavior is frequently treated as a black box. While systems biology tools allow for routine characterization of microbiomes, our understanding of community responses is often limited. In nature, microbial communities catalyze countless chemical reactions, often simultaneously, at room temperature and at ambient pressure. One of the grand challenges in the biological sciences is the development of a unifying theory that explains how microbial communities (natural or engineered) function as integrated, dynamic, and sustained systems.

The research theme seeks to support research that develops knowledge, theory, and predictive capabilities to harness the potential of microbiomes for energy, biotechnology,

and environmental applications. Work should align with the DOE's mission to ensure America's security and prosperity by addressing energy and environmental challenges through transformative science and technology solutions. Research taking a holistic perspective, considering both synthetic and natural communities, as well as the full breadth of microbial heterogeneity, is encouraged. Successful projects should fundamentally advance knowledge that will aid in manipulating microbial interactions, metabolic handoffs, and physiological dependencies leading to predictable and programmable microbiome behavior in complex settings. In this context, proposed studies could include, but are not limited to the following topic areas:

(i) The development of a unifying theory that explains how communities function as integrated systems in relation to biotic and abiotic controls and enables engineering of microbiomes for real-world applications.

(ii) Studies that provide insight into the mechanisms of microbial interactions, signaling, resource sharing, and communication at the molecular, cellular, and community scales. Such studies could include innovative inquiries into microbial community-scale metabolic and regulatory models and might examine fundamental ecological principles that govern the exchange of energy and resources.

(iii) Ways to elucidate genetic dark matter i.e. genes, pathways, and proteins of unknown functions found in bacteria, archaea, and phage. This might include ways to explain how such genetic elements impact the behavior of complex communities or how they could be leveraged to engineer microbiomes.

(iv) Research that leads to the development of novel omics-based techniques for the interrogation of microbial communities. Novel genome-enabled techniques (e.g. community-scale -omics, isotope tracing, visualization and quantification of activities etc.) should be adapted to interrogate BER-relevant processes.

(v) Studies that provide a framework to understand the role, impact, and persistence of mobile DNA (incl. eDNA, viruses, plasmids) and how this knowledge could be leveraged to manipulate and engineer microbial systems.

(vi) Better ways to account for spatial complexity and heterogeneity to aid in the anticipation of temporal and emergent behaviors of microbiomes. This could include applications that experimentally test hypotheses to reconcile observed community behavior via engineering, high-throughput, or AI-driven approaches to reconstruct microbial communities.

DOE has responsibility for programs and facilities that offer unique and complementary resources that support research in a wide variety of science areas. Applicants are encouraged to consider utilization of DOE-supported User Facilities that have existing and dedicated financial support, thereby leveraging ongoing infrastructure investments, archived samples, services, and long-term data sets when developing their applications.

For BER's Joint Genome Institute (JGI) User Facility, applicants should assess whether the project's needs are within reasonable requests. To determine feasibility of the planned work to be done by JGI, applicants may contact JGI before submitting their application to request

an optional letter of feasibility (because it helps JGI with planning). Awarded projects will receive prioritized consideration for use of JGI capabilities through the Biological and Environmental Research Support Science (BERSS) user program (https://jgi.doe.gov/user-programs/other-programs/).

The Joint Genome Institute (JGI) is a DOE Office of Science User Facility that provides the scientific community access to state-of-the-art genomic sequencing and analysis capabilities, as well as modest amounts of DNA synthesis and metabolomics capabilities, for microbial, plant, microbial community, and other (non-pathogen) targets. In all cases, the aim of the JGI is to provide to the national and international scientific community information on the genome-derived "parts lists" that support further discovery (https://www.jgi.doe.gov/).

Scope of Microbiome Research

For Microbiome Research, BER encourages the submission of innovative "high-risk/high-reward" research applications that address critical knowledge gaps and have the potential for high impact. The probability of success and the risk-reward balance will be considered when making funding decisions. Applications focusing on model organisms or communities that are of limited relevance to DOE's mission space are not encouraged. Surveys or purely computational studies are not encouraged. Emphasis should be placed on experiments motivated by a clear and testable conceptual framework. Applications that aim to solely measure the impact of individual microbes or single metabolites on the structure, function, and stability of a community are not responsive. This NOFO does not invite applications centered on marine environments, estuaries, wetlands, or sediments. Carbon cycling and environmental impact mitigation are not a focus of the NOFO. Bioremediation studies are also not included. Studies of wastewater, pathogens, or food related microbes are not encouraged. Projects that primarily seek metagenomic sequencing should be directed to the DOE Joint Genome Institute's (JGI) Community Science Program (https://jgi.doe.gov/user-program-info/community-science-program/overview-of-the-community-science-program/). Applications for research that would result in incremental advances in our current understanding or technology are not encouraged. Any application submitted without a data management plan or a project abstract will be returned without review.

Specific Instructions for Microbiome Research

Applicants to this topic are advised that:

- BER considers an appropriate budget for to be between $250,000 and $800,000 per year, regardless of the number of participating institutions.
- BER considers award durations of three years to be appropriate for this topic.
- DOE/NNSA National Laboratories, if proposed as subawards, may not request more than 30% of the total funding.
- Attendance at an annual PI meeting held in the Washington, DC, area is expected and an appropriate cost to include in a budget.

Subprogram Contact:
- Boris Wawrik, boris.wawrik@science.doe.gov

Website: https://www.genomicscience.energy.gov/environmental-microbiome-research/

(b) Atmospheric Process Research

Atmospheric process research focuses on using unique DOE user facilities and computational resources to address fundamental atmospheric physics and chemistry questions involving cloud, aerosol, precipitation, radiation, and turbulence processes and their interactions with the land surface that are critical to transforming our understanding of nature and improving projections of precipitation, icing, flooding, winds, drought, and other stresses that impact U.S. energy systems.

BER supports research in atmospheric processes that uses DOE-supported observations, primarily from the Atmospheric Radiation Measurement (ARM) user facility and the Environmental Molecular Sciences Laboratory (EMSL). Atmospheric observations, together with data-driven modeling, AI, and/or laboratory studies, are used to address critical gaps in the understanding and representation of detailed physical and chemical processes in atmospheric system models that limit their ability to inform projections of energy demand, water availability for energy production, and impacts of weather events on grid reliability or other critical domestic infrastructures.

Observations of cloud, aerosol, precipitation, and meteorological variables are critical for addressing atmospheric process knowledge gaps. As a DOE SC user facility, the ARM user facility has provided the scientific research community with strategically located in situ and remote sensing observations that are necessary to improve the physical understanding and representation of cloud, aerosol, and precipitation processes in local, regional, and global models in support of DOE's science, energy, and national security missions. The ARM facility has a rich data record including fine scale observations from fixed, mobile, and aerial platforms and large eddy simulation (LES) modeling. Applicants are expected to explore how ARM's data can contribute to BER atmospheric process studies. Detailed information on historical and recent ARM facility field campaigns is available at https://www.arm.gov/research/campaigns. All ARM data can be accessed through the ARM Data Discovery portal at https://adc.arm.gov/discovery/.

Priority atmospheric process interests include the following:

(i) Multi-scale atmospheric processes controlling precipitation initiation, phase, amount, and intensity. Improving projections of water availability for energy and other critical infrastructure as well as understanding potential impacts of precipitation on energy infrastructure and grid reliability (e.g., heavy snow or icing on power lines) requires detailed understanding of the complex physical processes and interactions that control precipitation. The microphysical processes of cloud and precipitation formation occur at

microscales too small to be directly represented in regional models and are also strongly influenced by multi-scale interactions with atmospheric turbulence and large-scale motions. Critical gaps in understanding include processes and interactions that control precipitation initiation; processes that impact cloud and precipitation phase, including the phase of precipitation at the surface; how land use and land cover impact precipitation initiation, intensity, and amount; and how aerosol-cloud interactions affect precipitation characteristics.

(ii) Multi-scale surface-atmosphere interactions and atmospheric boundary-layer processes. Energy production, demand, and transport are continuously impacted by surface-atmosphere interactions and boundary-layer processes including winds, fog, clouds, precipitation, and aerosols. The atmosphere and surface have inherently different scales of variability, and improving projections of energy demand and understanding risks to critical energy infrastructures requires addressing the more significant challenges inherent in modeling the multiple temporal and spatial scales of their interactions. Critical gaps in understanding include processes that are important for simulating large-scale and localized high wind events such as derechos, microbursts and gust fronts; compound water needs and/or increased energy demand in heat- or cold-stressed regions of the U.S.; promote or inhibit fog, cloud and/or precipitation formation; promote or inhibit aerosol formation and transport; and/or are critical to the high-latitude surface energy budget.

(iii) Predictability of convective cloud processes. Improving projections of the impacts of severe weather systems on energy infrastructure requires enhanced understanding of the multi-scale cloud microphysical, thermodynamic, and dynamical processes that promote and inhibit development, intensity, and propagation of convective cloud systems. Critical gaps in understanding include convective cloud processes that impact the formation, frequency, size, longevity, and severity of mesoscale convective systems and complexes and their associated hazards including lightning, hail, high winds, and heavy precipitation.

The following topics are NOT within the scope of atmospheric process research for this funding opportunity: applications for which process analysis of ARM facility data is not an integral part of the research, applications focused on applied science such as air quality standards or human health effects research, and applied technology development such as new sensor systems.

Specific Instructions for Atmospheric Process Research

Applicants to this topic are advised that:

- BER considers an appropriate budget for this topic to be no more than $1,000,000 in total, regardless of the number of participating institutions.
- BER considers award durations of three or four years to be appropriate for this topic.
- Applications including collaborations with DOE/NNSA National Laboratories should detail how the proposed research is aligned with ongoing BER-supported activities at the

laboratory. Applicants should not include additional funding for DOE/NNSA National Laboratories in the budget.

- BER additional requirements and guidance for digital data management, including links to recommended data archives, are available at https://science.osti.gov/ber/Funding-Opportunities/Digital-Data-Management.
- The ARM data center is the preferred data archive for atmospheric process research.
- Applications proposing to undertake development of new or existing software/code or use modified/enhanced software/code for modeling/simulation as part of the proposed effort must include clear strategies for making those developments open source and be made available to the scientific community.
- Applicants planning to deploy a PI instrument to an ARM site or on an approved ARM tethered balloon system mission must submit a separate application to ARM using ARM's small field campaign request form (https://www.arm.gov/research/campaigns) prior to applying to this NOFO. A copy of the ARM campaign application should be included as an appendix to the NOFO application.
- Attendance at an annual PI meeting held in the Washington, DC, area is expected and an appropriate cost to include in a budget.

Subprogram Contacts:

- Shaima Nasiri, shaima.nasiri@science.doe.gov
- Jeff Stehr, jeff.stehr@science.doe.gov

Website: https://www.arm.gov/

(c) Environmental Systems Process Research

Environmental systems process research uses a systems approach to discover and provide foundational understanding of complex processes that govern the structure, function, feedbacks, and dynamics of terrestrial ecosystems that span from the bedrock through the rhizosphere and vegetation canopy and into the atmospheric surface layer. In order to inform the constraints on the design and siting of energy systems to assure sustained, uninterrupted, and affordability of energy supply, this topic requires new science that links together system components and their interfaces with ecological, watershed, and biogeochemical sciences; study areas for this funding opportunity must focus on energy-sensitive regions in the states and territories of the United States. At a minimum, research efforts must be motivated by the need to incorporate process understanding into a range of scale-appropriate models, thereby improving predictive behavior of the terrestrial system. (https://ess.science.energy.gov/program/).

Applications may focus on collection and use of new measurements from field and/or laboratory experiments or may be focused on meta-analysis and synthesis research efforts that address development and testing of relevant hypotheses using existing data, and that have the potential for high impact research priorities. All applications must combine the data/information with modeling/simulation efforts in a coupled modeling-experimental

(ModEx) approach (https://ess.science.energy.gov/modex/) to enable more rapid advances to predictive, scale-aware understanding. All applications are required to clearly delineate an integrative, hypothesis-driven approach, describe the existing needs/gaps in state-of-the-art models that motivate the proposed research, and identify how proposed approaches will advance mechanistic understanding. Applicants should provide details on how the results of the proposed research will be used to improve the predictability and sophistication of integrated reactive transport, hydrologic, and/or terrestrial ecosystem models. The environmental systems process research topic has particular interest in studies that leverage artificial intelligence and/or machine learning (AI/ML) methodologies as part of observing, modeling, and analysis plans.

Submissions may make use of SC User Facilities and Community Resources (https://science.osti.gov/ber/Facilities and https://science.osti.gov/User-Facilities) or other capabilities from prior or ongoing activities supported by BER or other agencies/entities; if an applicant wishes to leverage such activities, a letter of collaboration should be included (where appropriate) to confirm access to necessary resources.

Priority environmental system process research topics as part of this funding include the following:

(i) Vegetation and Land-Atmosphere Interactions in the Southeast U.S. Systems level research to improve scientific understanding of the coupling of vegetation and land-atmosphere process across the soil-plant-atmosphere continuum leading to advanced knowledge translation from the individual to large spatial and temporal scales.

(ii) Plant-Soil-Microbe Interactions and Belowground Biogeochemical Processes. Systems level research that advances the understanding of how plant-soil-microbe interactions affect belowground biogeochemical processes that integrates hydrology, geochemistry/mineralogy, soil structure, and gaseous constituents with plant and microbial ecological processes. Study regions must be confined to the United States, including territories.

(iii) Synthesis Studies of the U.S. Southeast Coastal Systems. Generate new knowledge and mechanistic understanding of southeastern coastal systems by integrating and interrogating findings and/or data from prior field and/or experimental research activities. Collection of new experimental or observational data, or new model development, is out of scope for synthesis studies.

The following topics are NOT within the scope of the Environmental Systems Process Research for this Funding Opportunity: applied research (e.g., land/water management, energy-related processing or production, restoration, or regulation); agricultural systems (e.g., food crops, rangeland, silviculture, fisheries); agricultural enhancements and human populations; urban and regional design, planning or architecture; aquatic- or water column-only studies; studies focused on harmful algal blooms, pesticide impacts, or aquatic organism impacts; macro-organism (e.g., wildlife) processes or influences; studies that propose to primarily use, parameterize, and/or develop models without equally collecting

new data and contributing to fundamental process understanding; and technology development.

Specific Instructions for Environmental Systems Process Research

Applicants to this topic are advised that:

- For research areas 1 and 2, BER considers award durations of up to three years to be appropriate and the total proposed budget should not exceed $1,000,000 (regardless of the number of participating institutions).
- For research areas 3 (synthesis), BER considers award durations of up to two years to be appropriate and the total proposed budget should not exceed $400,000 (regardless of the number of participating institutions).
- DOE/NNSA National Laboratories, if proposed as subawards, may not request more than 10% of the total funding.
- BER additional requirements and guidance for digital data management, including links to recommended data archives, are available at https://science.osti.gov/ber/Funding-Opportunities/Digital-Data-Management.
- Data Management and Sharing Plans for environmental research plans are required to use the 'Environmental System Science – Data Infrastructure for a Virtual Ecosystem (ESS-DIVE)' data archive (https://ess-dive.lbl.gov).
- Applications that propose to undertake development of new or existing software/code or use modified/enhanced software/code for modeling/simulation as part of the proposed effort must include clear strategies for making those developments open source and be made available to the scientific community
- Attendance at an annual PI meeting held in the Washington, DC, area is expected and an appropriate cost to include in a budget.

Subprogram Contacts:

- Dan Stover, daniel.stover@science.doe.gov
- Brian Benscoter, brian.benscoter@science.doe.gov

Website: https://ess.science.energy.gov/

(d) Earth-Energy Systems Modeling

The goal of BER's earth-energy systems modeling is to develop, demonstrate, and use technologically and scientifically advanced modeling and simulation capabilities to enhance the understanding and predictability of local, regional, and larger scale systems over weekly to decadal timescales and on spatial scales extending from hyper-resolution to regional and global scales. More specifically, modeling investments strive to improve understanding of how local to regional variability and extreme phenomena evolve under non-equilibrium conditions, in particular in highly heterogeneous regions of particular interest to maintaining energy security in support of American economic prosperity. Modeling investments are also designed to understand the complex interdependence of energy-water-

land systems under evolving conditions.

Moving forward, the vision is to provide DOE with the best possible scientific understanding and characterization of evolving Earth-energy-water-land systems over highly non-stationary and non-equilibrium conditions. The approach is to leverage DOE's exascale computers, emerging best-in-class artificial intelligence (AI) and machine learning (ML) research, and existing data provided by DOE and other agencies.

Some examples of modeling tools and capabilities include:

- The Energy Exascale Earth System Model (E3SM) and the Global Change Analysis Model (GCAM) for modeling the coupled natural, energy and other sectoral systems at the global scale;
- Regional modeling capabilities, including the variable resolution E3SM and its component models, Energy Research and Forecasting (ERF) atmospheric model, regional land-use or terrestrial system models, and open-source energy system modeling tools (e.g., grid operations/vulnerability, power plant siting, and energy/water demand);
- Ultra-high resolution models that focus on watersheds, urban development, and inundation models;
- A variety of AI/ML capabilities for quantifying the risk of rare events such as Tropical Cyclones and Atmospheric River, and data analysis workflows and toolsets (e.g, TempestExtremes), and a comprehensive platform for computing metrics and diagnostics (CMEC, PMP, ILAMB).

Priority modeling research subtopics as part of this funding opportunity include the following:

(i) Predictive understanding of severe events. Severe meteorological and hydrologic events can impact energy generation, transmission, and distribution systems and water supply reliability. Of particular importance to this funding opportunity is predictability at weekly to decadal times scales with an emphasis on model development, simulation, analysis, and characterization of events. For example, new science that addresses how precursor conditions separated in space and time can influence the frequency, severity, and geographic extent of events (including heat waves, hurricanes, coastal and inland flooding, wildfires, and extreme droughts) in different parts of the United States. Applications that focus on the Southeast U.S. and/or the mid-Atlantic U.S are particularly encouraged.

(ii) Enhancement of multi-system modeling capabilities. The development of digital data platforms as regional digital testbeds that integrates the aforementioned high-resolution meteorological and hydrological models, models of the energy and Earth systems, and data for hyper-resolution heterogeneous regions of the United States is strongly encouraged, particularly if the suite of models includes full coupling with energy, water, land use, and infrastructure systems that are dynamically responsive to changing conditions. In addition, advancing innovative combinations of process and multiscale modeling, ML, and data driven approaches, together with sophisticated uncertainty

characterization, are key to strengthening energy system reliability and are therefore encouraged.

(iii) Model initialization and/or coupled data assimilation emphasizing subseasonal to decadal timescales. This subtopic focuses on 1) development of computational, algorithmic and middleware solutions that link models to a coupled data assimilation system in high resolution models of the Earth system to tackle the bottlenecks inherent in data assimilation systems, 2) enhanced understanding of the multiscale interactions of the Earth system by making models more useful for a series of hindcast experiments through improved model initialization or data assimilation techniques, and 3) improved understanding of the causes of biases in Earth system models by enabling quantification and characterization of uncertainty, thereby providing guidance for improving Earth system predictability.

Additionally, all applications in response to the modeling topic area must: Identify specific science questions and/or hypotheses that will be addressed as part of the research plan; focus on the United States; advance an integrated multiscale modeling approach with a focus on energy-water-land-infrastructure interactions; and include an actionable plan for evaluation and assessment of the model development activities based on existing observations. As metrics and diagnostics are being developed, include these into existing DOE packages, such as PCMDI Metrics Package-PMP, International Land Model Benchmarking- ILAMB, Coupled Model Evaluation Capabilities- CMEC, and the E3SM diagnostics tools.

The following topics are NOT within the scope of modeling research for this funding opportunity: Applications focused on single discipline studies such as atmospheric-only, ecological-only, oceanographic-only modeling research, or energy-only modeling will not be supported. Applications that focus on climate challenges such as the role of greenhouse gas forcing of climate change over multi-decadal to centennial time scales are out of scope. Applications that connect directly to weather or climate services are out of scope. While applications are welcome to use existing data and observations for, e.g., model validation and uncertainty characterization, no new observations will be supported as part of the modeling topic of this funding opportunity.

Specific Instructions for Earth-Energy Systems Modeling

Applicants to this topic are advised that:

- BER considers an appropriate budget for this topic to be no more than $1,000,000 in total, regardless of the number of participating institutions.
- BER considers award durations of three or four years to be appropriate for this topic.
- Applications including collaborations with DOE/NNSA National Laboratories should detail how the proposed research is aligned with ongoing BER-supported activities at the laboratory. Applicants should not include additional funding for DOE/NNSA National Laboratories in the budget.

- BER additional requirements and guidance for digital data management, including links to recommended data archives, are available at https://science.osti.gov/ber/Funding-Opportunities/Digital-Data-Management.
- Applications that propose to undertake development of new or existing software/code or use modified/enhanced software/code for modeling/simulation as part of the proposed effort must include clear strategies for making those developments open source and be made available to the scientific community.
- Attendance at an annual PI meeting held in the Washington, DC, area is expected and an appropriate cost to include in a budget.

Subprogram Contacts:
- Renu Joseph, renu.joseph@science.doe.gov
- Daniel Winkler, daniel.winkler@science.doe.gov

Website: https://eesm.science.energy.gov/

4. Fusion Energy Sciences (FES)
Program Website: https://science.osti.gov/fes/

The mission of the Fusion Energy Sciences (FES) program is to drive the scientific and technological foundation for a fusion energy source and support the development of a competitive U.S. fusion energy industry. This is accomplished through the study of plasma, the fourth state of matter, and how it interacts with its surroundings. Section 2008 of the Energy Act of 2020 (42 U.S.C. § 18645) expanded the scientific mission of FES to support "the development of a competitive fusion power industry in the U.S."

To achieve its mission, FES is implementing a comprehensive national strategy to accelerate the development and commercialization of fusion energy by the mid-2030s as described in the Fusion Science & Technology (S&T) Roadmap: https://www.energy.gov/fusion-energy. The Roadmap charts a clear path for federal support to the growing fusion energy industry, identifying critical science and technology gaps, and defining the milestones needed to bring commercial fusion power to the grid. Developed with broad input from over 600 researchers, engineers, and industry stakeholders, the Roadmap establishes DOE's Build–Innovate–Grow strategy for advancing a robust and competitive U.S. fusion sector. The goal of the Fusion S&T Roadmap is to deliver the public infrastructure that supports the fusion private sector scale up in the 2030s.

This effort advances President Trump's Executive Order *Unleashing American Energy*, reinforcing the Administration's commitment to expand domestic energy production and restore U.S. energy dominance. By accelerating progress toward commercial fusion power, DOE is strengthening America's grid, rebuilding critical supply chains, and securing a new era of abundant, reliable, American-made energy.

The Roadmap continues to align the FES program toward closing the Long-Range Plan

(LRP) Fusion Materials and Technology gaps, which connects three science drivers: Sustain a Burning Plasma, Engineer for Extreme Conditions, and Harness Fusion Energy as documented in the LRP "Powering the Future: Fusion and Plasmas" developed by the Fusion Energy Sciences Advisory Committee (FESAC): https://science.osti.gov/-/media/fes/fesac/pdf/2020/202012/FESAC_Report_2020_Powering_the_Future.pdf.

FES invests in flexible U.S. experimental facilities of various scales, international partnerships leveraging U.S. expertise, large-scale numerical simulations based on experimentally validated theoretical models, development of advanced fusion-relevant materials, enabling R&D, future blanket concepts and tritium fuel cycle, research in inertial confinement fusion, and innovation in measurement techniques. FES supports partnerships with the private fusion sector to accelerate the development of commercial fusion energy by combining efforts to resolve common scientific and technological challenges and enable commercially relevant fusion pilot plant designs. In addition to its fusion energy mission, FES also supports discovery plasma science and technology, which is focused on research at the frontiers of basic and low temperature plasma science and high-energy-density laboratory plasmas. Finally, FES invests in several crosscutting initiatives, such as artificial intelligence and machine learning (AI/ML), microelectronics, and quantum information science (QIS), that have practical applications and the potential to accelerate progress in several mission areas.

Applications to this NOFO should be aligned with one of the six Technology and Science Drivers identified in the LRP. Applications in fusion energy should also be aligned with the U.S. Fusion Science & Technology roadmap which is currently under development. Applications enabling bridges between foundational science and early-stage technology development, including the needs of the fusion private sector, and addressing priorities of the Fusion Innovation Research Engine (FIRE) Collaboratives are encouraged.

FES also encourages early career development for research scientists and engineers beyond the SC Early Career Research Program (ECRP), mainly to support early career researchers that are in non-tenure track positions and, therefore, ineligible for the ECRP. If you are eligible for the ECRP, FES encourages you to apply to that program. If you are ineligible because you are considered a non-tenure track researcher, FES encourages you to contact the designated subprogram contact of the program area that your research most closely aligns with.

FES may sponsor conferences, workshops, summer schools, and seminars. If you are interested in FES support, please contact the designated subprogram contact for the program area that your event most closely aligns with and follow the due dates in Section V.

Submission of preliminary research descriptions (e.g., pre-applications or white papers) is strongly encouraged to ensure alignment with program goals. They will be reviewed for responsiveness of the proposed work to the research topics. Prior to submission, it is highly

encouraged to contact the relevant subprogram contact listed under each topical area below for format, content, and submission timelines. Applications submitted after the second quarter of the Fiscal Year (FY) may not be able to be considered for an award during the current FY.

Additional resources include:

- A series of community engagement workshops (https://science.osti.gov/fes/Community-Resources/Workshop-Reports)
- The FES Building Bridges vision for fusion energy science
- National Academies reports such as:
    - the 2018 report on a Strategic Plan for U.S. Burning Plasma Research
    - the 2018 report on Opportunities in Intense Ultrafast Lasers
    - the 2020 Decadal Assessment of Plasma Science report
    - the 2021 report on Bringing Fusion to the U.S. Grid

Specific information about FES program areas is as follows:

(a) Theory & Simulation

This program area focuses on advancing the scientific understanding of the fundamental physical processes governing the behavior of magnetically confined plasmas.

Specific areas of interest include:

- Macroscopic stability and dynamics of fusion plasmas, with a strong focus on the prediction, avoidance, control, and mitigation of deleterious or performance-limiting instabilities such as plasma disruptions;
- Understanding and control of the multiscale, collisional and turbulent physical mechanisms responsible for the loss of heat, momentum, and particles from the confining region;
- Interaction of externally launched radiofrequency waves designed to heat the plasma and drive current, with the background plasma and surrounding structures;
- Nonlinear interaction between background plasma, various instabilities, and energetic particle populations, including the alpha particles generated by the fusion reactions, and its impact on the confinement of these particles and the overall plasma performance;
- The effect of multiscale and multiphysics processes at the plasma boundary on the plasma performance and on the interaction and interface of the hot plasma boundary with the material walls and divertor configurations; and
- Predictive modeling of fusion pilot plant concepts including plasma performance, component engineering, and optimization techniques.

The efforts supported by this program provide the foundations for whole-facility modeling of fusion systems and range from analytical work to the development and application of advanced simulation codes capable of exploiting the potential of current and emerging high-

performance computing systems. Modeling and Simulation efforts are not limited to tokamak concepts; work that focuses on stellarator and other alternate MFE concepts is eligible for support.

Subprogram Contact:
- Michael Halfmoon, michael.halfmoon@science.doe.gov

Website: https://science.osti.gov/fes/Research

(b) Artificial Intelligence and Machine Learning for Fusion & Plasma Science

This program supports the application of AI/ML techniques in partnership with data and computational scientists. Supported activities span the full range of other FES program areas. Activities include the development of fusion data resources and frameworks. Novel algorithms, foundation models, Digital Twins, and predictive capabilities that leverage the wealth of experimental and HPC simulation data are eligible for support. See also the Report of the workshop on Advancing Fusion with Machine Learning. The program area is dedicated to supporting:

- Autonomous control of confined plasmas
- Training of Physics-Informed Neural Networks
- Predictive modeling of component manufacturing and supply chain logistics
- Novel techniques in digital engineering for Fusion Pilot Plant design
- Acceleration of computational analysis into near real-time
- Connection between DOE-supported facilities and computational tools in accordance with the American Science Cloud

This program is highly cross-cutting, offering support to all research under the purview of FES. Applications in the following areas are supported

- *Digital Twins:* Digital Twins are considered bi-directional models that both analyze experimental data and inform experimental operations. The time scales of Digital Twins can vary from real-time to "operator time", depending on the complexity of the codes being utilized. AI/ML techniques are used to accelerate, couple, and integrate the constituent parts of a Digital Twin. Digital Twins of fusion facilities should seek to improve workflows, predict/mitigate damage to plasma-facing components, and optimize confinement. Digital Twins for component development should focus on optimizing manufacturing and design, predicting scale-up, and modeling logistics.
- *Surrogate Models:* High-performance computing codes require significant resources and time to deliver high-fidelity results. Surrogate models serve to rapidly accelerate calculations of complex quantities by training neural networks on massive datasets. These serve as the fundamental components of Digital Twins. Surrogate models of transport, plasma disruptions, material performance, laser-particle kinetics, liquid blanket technologies, HTS magnet capabilities, etc. are examples of projects eligible,

though not limited to, for support.
- *Foundation Models:* Foundation models are generalized AI models that can be adapted to a wide variety of tasks by training on massive datasets. Development of foundation models for plasma stability/kinetics, materials qualification, facility operations, the collection/collation of datasets, etc. are potential topics eligible, though not limited to, for support.

FES anticipates holding a merit review to evaluate applications in this area. To be considered, a pre-application must be submitted by January 31, 2026. Each pre-application will be reviewed for responsiveness and competitiveness of the proposed research. FES expects to provide pre-application encouragement and discouragement decisions by February 16, 2025. Applications associated with encouraged pre-applications must be submitted by March 15, 2026. Applications submitted after this deadline will be considered for funding in a future selection cycle.

In parallel, FES plans to issue a Program Announcement to the DOE National Laboratories for research efforts in this topic. Applicants in this topic may wish to coordinate their plans and submissions among proposers to the NOFO and the Program Announcement to form university-lab multi-institutional teaming arrangements. Additional details about the joint review of applications under this NOFO and applications under the Program Announcement will be published with the Program Announcement.

The following guidance will be provided to reviewers: In addition to the standard review criteria listed in the review request, please evaluate the necessity of AI/ML techniques to solve the problem described within the application and ensure that the application either plans to collect necessary data or is leveraging an existing dataset.

Subprogram Contact:
- Michael Halfmoon, michael.halfmoon@science.doe.gov

Website: https://science.osti.gov/fes/Research

(c) Fusion Materials and Internal Components

The development of materials suitable for a power-producing fusion device is prerequisite for the eventual success of fusion power. Every component, from the innermost chamber walls to the outer framework, demands materials that can endure and perform in demanding conditions including extremes of heat, particle exposure, and neutron fluxes. The fusion materials and internal components program area is devoted to advancing materials, developing physical and numerical material models, and realizing essential material tools necessary to achieve fusion power. The program area is dedicated to research that results in:

- Suitable materials for solid plasma-facing components in a fusion power plant (FPP)

- Suitable materials for structural components in an FPP
- Adequate modeling support for component and structural design of an FPP which accurately represents material behavior in the fusion environment
- The effective utilization of, or development of new, research facilities aimed at fulfilling the above
- Adequate materials codes that can be used to assess the suitability of various materials and components in an FPP
- Suitable functional materials (e.g. diagnostics, shielding, magnets, etc.) for an FPP (via collaboration with the relevant research communities)

Therefore, this subprogram supports applications in the following areas. Please note, some research topics are considered cross-cutting and are coupled to the fusion nuclear science program. Please indicate in your application if the topic is cross-cutting, or contact the subprogram contact for more information.

- *Plasma Material Interactions and Plasma Facing Components*: The innermost wall of a fusion device, known as the plasma-facing component, is exposed to the high-energy plasma and a high neutron flux. Plasma-material interactions can cause erosion, sputtering, and material migration. Research in this area aims to advance solid materials that can withstand and perform within the extreme heat, particle fluxes, irradiation effects, and erosion conditions that these components are subject to.
- *Structural Materials for Fusion:* Structural materials refer to those materials used in the overall construction of the fusion device, such as the vacuum vessel, blanket structure, and other supporting components. These materials must be able to withstand the structural loads, radiation, and heat while maintaining their desired material properties. Advanced structural steels, advanced alloys, and engineered composites are areas of interest for research.
- *Fundamental Modeling and Materials Behavior:* Advances in materials modeling play a crucial role in predicting how materials will behave under fusion reactor conditions. Computational tools allow researchers to simulate material responses to high temperatures, radiation, and stress, aiding in material selection and design optimization.
- *Functional Materials:* These are materials that impact the functionality of various fusion components beyond their structural integrity. For instance, materials used for sensors and heat transfer enhancement fall under this category. This category usually has cross-program application to another program in FES.

Below is guidance for FY 2026 and FY 2027 Fusion Materials and Internal Components (FM&IC) Comparative reviews:

- *FY 2026 FM&IC Comparative Review:* FM&IC expects to convene merit review panels in February 2026 for research areas listed above. Research applications, as described above, that are aligned with one or more of those research areas and are received by January 1, 2026, will be considered for merit review by those panels. Applicants are strongly

encouraged to submit pre-applications by November 15, 2025.

- FY 2027 FM&IC Comparative Review: FM&IC expects to convene merit review panels in November 2026 for research areas listed above. Research applications, as described above, that are aligned with one or more of those research areas and are received by September 5, 2026, will be considered for merit review by those panels. Applicants are strongly encouraged to submit pre-applications by July 15, 2026. Encourage/discourage decisions are expected to be returned on preapplications by August 5. Applications submitted without an encouraged pre-application will not be considered by the review panels. FY 2027 comparative review applications are also subject to the following additional criteria/guidance:
    - Research Narratives: Applications requesting $1,000,000 or less with research narratives in excess of 10 pages may present an undue burden on reviewers. Applications requesting more than $1,000,000 with research narratives in excess of 20 pages may present an undue burden on reviewers.
    - Project start date: Applicants may wish to request a project start date in spring/summer of 2027, though actual start dates will be negotiated at a later stage.
    - Project duration: A 3-year project period is standard. However, the program recognizes that some research activities benefit from shorter or longer periods. Any proposed deviations from a 3-year project period must be described in the preapplication.
    - Additional Suggestions for Application: In addition to the points listed in Section IV, FM&IC also offers the following suggestions for the organization of the Project Narrative:
        - Demonstrate the following relevance to the DOE Fusion Science and Technology Roadmap: How this research drives progress towards a fusion power plant; How the research aligns and fits in to the fusion materials ecosystem; How the results could inform the fusion materials community; How the program trains the next generation of researchers; How the resulting data and metadata be managed based on community standards in preparation for a fusion database; Only for renewals: How you are reorienting your existing program to better support the DOE Fusion Science and Technology Roadmap.
        - Timetable of Activities: Timeline for all major activities including aims and objectives.

Subprogram Contact:
- John Echols, john.echols@science.doe.gov

Website: https://science.osti.gov/fes/Research

Sustain a Burning Plasma

This program is aligned with the FESAC LRP science driver Sustain a Burning Plasma to "build the science and technology required to confine and sustain a burning plasma." This program consists of diverse plasma confinement concepts such as toroidal-based systems and linear plasma concepts such as field-reverse configuration, axisymmetric mirrors, and plasma pinches. It includes the areas: Toroidal Long Pulse, Compact Toroidal Concepts, Inertial Fusion Energy, and Measurement Innovation. The goal is that approaches such as tokamaks and other configurations reach more mature designs and are translated to industry, FES will support new innovative concepts that emerge. This element includes the growing IFE activities and other innovative IFE approaches. The FESAC LRP stated that investments should be balanced over time towards emerging approaches as a mitigation strategy towards accelerated paths in realizing fusion energy. This activity also emphasizes the remaining key physics gaps in both toroidal and linear-based plasma concepts. For example, some topics include predicting the dynamic behavior of burning plasmas, alpha-particle heating, self-sustaining pathways, steady-state scenarios, enhanced performance, stability and control in burning plasma scenarios, predicting transient behavior, understanding turbulence and instabilities, and addressing core-edge coupling and its relationship with sustainable confinement conditions in a burning plasma environment.

(d) Toroidal Long Pulse

The Toroidal Long Pulse (TLP) area addresses gaps in the physics and technology basis for the conventional tokamak and stellarator approaches to magnetic confinement fusion. The TLP Tokamak Research area includes research on the DIII-D National Fusion Facility in San Diego, CA, small-scale tokamak research conducted on university-scale devices, and research on international tokamak facilities accessible to U.S. staff under international bilateral agreements and multi-lateral frameworks. The TLP Stellarator Research area includes research on the Helically Symmetric Experiment (HSX) in Madison, Wisconsin, and the Wendelstein 7-X stellarator in Greisfwald, Germany.

This area supports foundational science, early-stage technology development, and capability development in the following priority areas:

- Sustaining Burning Plasmas, which includes managing plasma transport and instabilities from energetic particles, enhancing plasma confinement, accessing and maintaining burning plasma conditions, and optimizing plasma heating and current drive strategies.
- Exhaust Handling, which includes understanding the physics of tokamak divertors, managing plasma exhaust, controlling particle inventories, and integrating plasma core and edge scenarios.
- Plasma Material Interactions, which includes controlling the plasma edge, testing the survivability of materials, effects from impurities on materials and plasma performance, and wall conditioning for long pulse operation.
- Control of Damaging Transients and Instabilities, which includes mitigating tokamak disruptions, avoiding and preventing off-normal events, and controlling instabilities

(e.g., edge localized modes, resistive wall modes, tearing modes, etc.).
- Theory and Model Validation, which includes scope in artificial intelligence and machine learning, simulation support for experimental efforts, integrated control modeling and pulse design, and model validation, including uncertainty quantification.
- Other activities essential for the operation and exploitation of conventional tokamak and stellarator facilities not covered in the areas above.

This program area covers research supported in the following FES programs:
(a) Sustain Burning Plasma: DIII-D Research
(b) Sustain Burning Plasma: Long Pulse Tokamak
(c) Sustain Burning Plasma: ITER Research
(d) Sustain Burning Plasma: Superconducting Stellarator Research
(e) Sustain Burning Plasma: Compact Stellarator Research

Applicants are encouraged to propose research with the following characteristics:
- R&D that addresses common challenges for both tokamaks and stellarators
- Research with the potential for transformative impact on steady-state operation of magnetic confinement configurations

Subprogram Contact:
- Matthew Lanctot, matthew.lanctot@science.doe.gov

Website: https://science.osti.gov/fes/Research

(e) Compact Toroidal Concepts

The Compact Toroidal Concepts (CTC) area supports research necessary to develop a compact toroidal configuration. Two promising concepts addressed in CTC are the spherical tokamak (ST), such as the National Spherical Torus Experimental Upgrade (NSTX-U), and conventional aspect ratio tokamaks operated at high toroidal magnetic fields, exemplified by the SPARC tokamak. These devices offer complementary strategies for improving confinement and achieving compactness: STs leverage enhanced plasma physics properties while high-field conventional tokamaks rely on high-field magnets. Regardless of the approach, enabling technologies are essential for delivering these compact designs, including high-temperature superconducting magnets and liquid metal plasma-facing components. With several private sector stakeholders pushing the frontiers, the CTC program naturally incorporates the fusion energy industry and fosters strong connections to foundational S&T research.

The primary scientific research topics for STs leverage enhanced plasma physics properties at a low aspect ratio. These topics include, but are not limited to, the following research areas:
- Confinement: This encompasses both thermal and energetic particle-driven transport. Studies evaluating collisionality dependencies are of particular interest. This also

includes gyrokinetic model validation of ST confinement against turbulent fluctuation measurements.
- High Beta: This includes studies on both high normalized plasma pressure and pedestals. MHD and plasma stability, including both disruptive and edge transients, are considered within this topic. Additionally, plasma scenario and control development to maximize normalized pressures in STs are addressed.
- High Bootstrap Current: This involves all non-inductive scenario development efforts aimed at maximizing self-driven plasma currents and minimizing auxiliary current drive.

The primary scientific research topics for high-field tokamaks are associated with initial fusion gain studies. These topics include, but are not limited to, the following research areas:
- Fusion Gain: This involves accessing and sustaining $Q > 1$ and burning plasma conditions. Achieving this goal requires integrated efforts spanning thermal transport and confinement, energetic particle stability, heating, exhaust, fueling, impurity, and transient control.
- Emergent Discoveries: This covers other activities arising from inevitable discoveries resulting from the study of high fusion power plasmas for the first time.

The CTC program also considers common technical challenges for any compact fusion core. These areas span both ST and high-field tokamak topics and include science and technology efforts related to extreme divertor heat fluxes and the development of innovative power and particle handling techniques to optimize plasma exhaust in high-performance scenarios. Finally, diagnostic measurements for deployment on major CTC research facilities will be considered.

Subprogram Contact:
- Josh King, josh.king@science.doe.gov

Website: https://science.osti.gov/fes/Research

(f) Inertial Fusion Energy

The Inertial Fusion Energy (IFE) program is dedicated to advancing the foundational science and technology essential for developing IFE as a viable energy source. Key research areas of interest are outlined in the IFE Basic Research Needs Workshop Report. Additionally, the FES program has established three IFE Science and Technology hubs, which focus on both scientific advancement and the stewardship of the IFE ecosystem. We encourage applications that utilize this ecosystem. Areas of interest include, but are not limited to:

- Target Physics: involves improving energy transfer with broad laser bandwidth, demonstrating energy coupling for fast ignition (FI), advancing theoretical and computational models of laser-plasma instabilities, and investigating the physical

processes that restrict fuel compression in low-adiabat implosions.
- Driver Technologies: includes developing conceptual designs for IFE driver system-level architecture, reducing the cost of diode pumps in diode-pumped solid-state laser (DPSSL) technologies, and improving the reliability of high-power switching and capacitor energy storage systems.
- Target Injection and Engagement includes developing an IFE target injector capable of reaching necessary velocities without compromising the target or its fuel layer, and demonstrating accurate, real-time engagement of IFE targets with a driver beam.

Applicants are strongly encouraged to contact the subprogram contact before submitting an application.

Subprogram Contact:
- Kramer Akli, kramer.akli@science.doe.gov

Website: https://science.osti.gov/fes/Research

(g) Measurement Innovation

The Measurement Innovation activity supports the development of world-leading transformative and innovative diagnostic techniques and their application to plasmas. The Measurement Innovation program is looking for applications to develop diagnostics with the high spatial, spectral, and temporal resolution necessary to validate plasma physics models used to predict the behavior of plasmas in all the areas of the fusion program, including burning plasmas and eventual fusion pilot plants. Advanced diagnostic capabilities successfully developed through this activity will then be positioned to migrate to domestic and international plasma facilities.

Subprogram Contact:
- Josh King, josh.king@science.doe.gov

Website: https://science.osti.gov/fes/Research

(h) Closing the Fusion Cycle: Fusion Nuclear Science

Applications for the FES Fusion Nuclear Science (FNS) research activities in the four program areas below may be submitted to this NOFO. The FNS program will conduct yearly comparative merit reviews for both new and renewal applications. Submission of preliminary research descriptions (e.g., pre-applications) is strongly encouraged to ensure alignment with program goals. They will be reviewed for responsiveness of the proposed work to the research topics. Prior to submission it is highly encouraged to contact the subprogram contact for format and content.

Applications in response to this NOFO may also propose activities in support of FNS research, which include, but are not limited to supplemental support for research activities,

conferences, or exploratory (seed) research. Emerging fusion technologies and innovative feasibility studies that contribute to the fusion technology ecosystem and accelerate commercialization of fusion energy are included. These applications are not part of the comparative review process and may receive lower programmatic priority unless exceptions are warranted based on program needs.

The deadline for the FY 2026 FNS Comparative Review was September 5, 2025.

- For FY 2027, FNS expects to convene merit review panels in November 2026 for research areas listed below. Research applications, as described above, that are aligned with one or more of those research areas and were received before September 5, 2026, will be considered for merit review by those panels. Applicants are strongly encouraged to submit pre-applications prior to July 15, 2026. Encourage/discourage decisions are expected to be returned on preapplications by August 5. Applications submitted without an encouraged pre-application will not be considered by the review panels. FY 2027 comparative review applications are also subject to the following additional criteria/guidance:
    - Research Narratives: Applications requesting $1,000,000 or less with research narratives in excess of 10 pages may present an undue burden on reviewers. Applications requesting more than $1,000,000 with research narratives in excess of 20 pages may present an undue burden on reviewers.
    - Project start date: Applicants may wish to request a project start date in spring/summer of 2027, though actual start dates will be negotiated at a later stage.
    - Project duration: A 3-year project period is standard. However, the program recognizes that some research activities benefit from shorter or longer periods. Any proposed deviations from a 3-year project period must be described in the preapplication.
    - Teaming Recommendations: Applications may consist of teams of investigators from multiple institutions in accordance with the mechanisms for Multi-Institutional Teams described in this NOFO. Such teams may be appropriate when the involvement of multiple institutions permits the formation of larger teams that can address a greater scope of scientific inquiry or significant research thrust, but, unless specifically encouraged in the research area descriptions below, such applications are likely to be assigned a lower programmatic priority and may be excluded from the merit review panels.
    - Additional Suggestions for Applications: In addition to the points listed in Section IV, FNS also offers the following suggestions for the organization of the Project Narrative:
        - Demonstrate the following relevance to the DOE Fusion Science and Technology Roadmap: How this research drives progress towards a fusion power plant; How the results could inform the fusion science and technology community; How programs will train the next generation of

researchers; How resulting data and metadata will be managed based on community standards in preparation for a fusion database; *Only for renewals*: How you are reorienting your existing program to better support the Fusion Science and Technology Roadmap.
    - Timetable of Activities: Timeline for all major activities including aims and objectives.

Additional information about the FNS research areas is described below. All applicants should pay particular attention to the following when preparing applications to be submitted to this NOFO:

- External peer reviewers will be explicitly requested to evaluate the applicant's proposed work in relation to the priorities established in Fusion Science and Technology Roadmap.
- FES recognizes the ever-increasing integrated nature of fusion energy technology research. Research that is considered cross-cutting with another program area but primarily sits within one of the research areas listed below must indicate that it is cross-cutting research and identify the other program area(s) the research crosses into.

Additionally, this subprogram provides graduate research training for the next generation of researchers as well as activities supporting career development in foundational engineering science and technology.

Fusion Nuclear Science: Program Areas

The FNS research portfolio focuses on understanding and addressing the challenges associated with the nuclear aspects of fusion energy systems. This includes studying the behavior of blanket functional materials under high neutron fluxes, developing tritium breeding technologies, and advancing fusion nuclear components like blankets and first-wall structures. The portfolio aims to bridge the gap between plasma physics and the engineering requirements of fusion energy systems ensuring that the nuclear components of future fusion systems are safe, reliable, and efficient. Foundational science within the FNS portfolio focuses on understanding fundamental processes and developing new technologies that are not yet ready for commercial application but are essential for overcoming long-term challenges in fusion energy. Areas of interest to the Foundational FNS program:

Blanket Systems:

- *Functional Materials:* Develop materials that optimize tritium breeding, heat transfer, and compatibility with breeding environments.
- *Coolant Interaction Studies:* Investigate the interactions between breeding materials and coolants to ensure efficient heat removal and minimal corrosion or degradation.

Fuel Cycle Systems:

- *Tritium Permeation and Retention:* Research on materials and technologies to control

tritium permeation and retention within fuel cycle systems.
- *Isotope Separation Technologies:* Develop advanced materials and processes for efficient isotope separation and recycling within the fusion fuel cycle.
- *Tritium Breeding and Handling:* Research on tritium management, including breeding and safe handling, while ensuring minimal permeation and environmental impact.

Foundational Crosscutting Research
- *Thermal Management Strategies:* Develop materials and technologies to manage heat loads expected in a fusion energy system, including innovative cooling solutions.
- *Activation Studies:* Understand material activation under neutron exposure and develop strategies to minimize radiological waste. *(Nuclear Data and Fusion Materials)*
- *Radiation Transport:* Develop advanced radiation transport models to predict neutron behavior and their effects on materials within fusion reactors. *(Nuclear Data and Fusion Materials)*
- *Waste Reduction Technologies:* Research into deactivation techniques and materials recycling processes.
- *Safety Analysis:* Foundational research into the safety of nuclear components, including failure modes and accident scenarios, to ensure the safe operation of fusion reactors.

Areas that are considered out of scope include: Research focused on structural materials, solid plasma-facing components, or technologies already demonstrated in public or commercial facilities (Technology Readiness Level [TRL] 5+). The program prioritizes early-stage, high-impact research that advances foundational knowledge and addresses long-term challenges, rather than applied engineering solutions or iterative improvements to existing models and data.

Subprogram Contact:
- John Echols, john.echols@science.doe.gov

Website: https://science.osti.gov/fes/Research

(i) Closing the Fusion Cycle: Enabling Research and Development

The Enabling Research and Development (ERD) program establishes the scientific and technological foundation necessary for the development of essential components across a wide range of concepts that will eventually be integrated into a fusion energy system. This program addresses cross-cutting challenges, such as materials, simulations, and diagnostics, critical for the foundational basis of a fusion component. Enabling R&D supports early-stage, high-impact research. Areas of research within scope are as follows:
- *Fusion Subsystems:* This includes key components such as superconducting magnets, optics, and radiation-hardened electronics. Studies of the material properties of these components, particularly those interacting with harsh fusion environments, will be considered.
- *Auxiliary Heating and Current Drive:* This includes the technological development of

auxiliary systems to heat and drive currents inside fusion plasmas (e.g. neutral beam injectors). These technologies may include plasma injector guns or similar technology.
- *Liquid Metal Plasma-Facing Components*: Research on the use of liquid metals for plasma-facing components, focusing on materials that can withstand high thermal and particle fluxes while maintaining plasma compatibility. Additionally, address engineering challenges such as corrosion, material replenishment, thermal management, system integration, fusion exhaust, and efficient tritium extraction are within scope.

Research focused on structural materials, solid plasma-facing components, or technologies already demonstrated in public or commercial facilities (TRL 5+) is out of scope.

Subprogram Contact:
- Josh King, josh.king@science.doe.gov

Website: https://science.osti.gov/fes/Research

(j) Plasma Science and Technology—General Plasma Science

The General Plasma Science (GPS) program supports research at the frontiers of basic plasma science including laboratory plasma astrophysics. This program aims to develop accurate descriptions of the complex behavior of the plasma state, to push it into new regimes that expand our concept of what constitutes a plasma, to design experiments and diagnostics to explore these states, and to validate theoretical models. The current objective is to support hypothesis-driven, frontier-level research to significantly increase our understanding of the plasma processes that are common to both plasma astrophysics and fusion. Applicants are strongly encouraged to develop integrated research projects in frontier plasma astrophysics, leveraging existing laboratory-based collaborative research facilities, high-performance computing, and space observation data available through NASA and other space agencies. Specific areas of interest include: (i) multi-island or plasmoid-mediated magnetic reconnection (3-D, rate, onset, particle heating and acceleration, fast release of magnetic energy, cross-scale coupling in large systems, multi-scale research from laboratory to large astrophysical system such as magnetospheric or solar plasma); (ii) Waves and turbulence (energy cascade, relaxation, dissipation, heating, acceleration, and coherent structures); and (iii) dusty plasma (dust grain formation in strong magnetic field, nucleation, agglomeration, rate, charging, growth, breakup, and transport). For more information, see GPS science drivers (e.g., Understanding Plasma Universe) in the CPP Report: A Community Plan for Fusion Energy and Discover Plasma Sciences, 2019-2020 and the Report of the Workshop on Opportunities in Plasma Astrophysics, 2010.

FES anticipates holding a merit review to evaluate applications in this area. Applications should be for ambitious projects with the potential to make significant advances in the understanding of the above-mentioned plasma processes. To be considered, a pre-application must be submitted by November 25, 2025. Each pre-application will be reviewed

for responsiveness and competitiveness of the proposed research. FES expects to provide pre-application encouragement and discouragement decisions by December 10, 2025. Applications associated with encouraged pre-applications must be submitted by January 20, 2026. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Applicants in this topic are advised that:

- FES considers an appropriate budget to be up to $300,000 per year, regardless of the number of participating institutions.
- FES considers award durations of three years to be appropriate for this topic.
- If a multi-institutional team is submitting collaborative applications, only the lead institution should submit a pre-application that should include all institutions, institutional Co-PIs, and all other personnel and relevant information.
- The first page of the pre-application should specify at least one scientific hypothesis whose investigation motivates the proposed work. This information must be followed by a clear and concise description of the objectives and technical approach of the proposed research.
- Pre-applications with a sufficiently identical scope of work from a previously reviewed application will be discouraged without review. Applicants must highlight changes or revisions to previously reviewed applications.

Applicants are strongly encouraged to contact the subprogram contact before submitting an application.

Subprogram Contact:

- Nirmol Podder, nirmol.podder@science.doe.gov

Website: https://science.osti.gov/fes/Research

(k) Plasma Science and Technology—High Energy Density Physics

The High Energy Density Physics (HEDP) program seeks to understand how matter behaves under extreme conditions of temperature and pressure. In this domain, energy density is typically defined as being above 1 Mbar (100 GPa or approximately 1 million atmospheres), which is comparable to the energy density of a chemical bond, such as in a water molecule. HEDP conditions are crucial for studying processes such as the formation and destruction of stars and for controlling thermonuclear fusion in laboratory settings.

Areas of interest include but are not limited to high-temperature physics, which examines the behavior of materials at extreme temperatures; plasma physics, focusing on the dynamics and properties of plasmas under intense energy conditions; and shock physics, which explores the generation and effects of shock waves in various substances. Additionally, a key area encompasses relativistic plasmas, which aim to understand the behavior of matter and energy under extreme conditions where particles move at speeds

close to the speed of light, leading to significant relativistic effects and complex interactions.

Applicants are strongly encouraged to contact the subprogram contact before submitting an application.

Subprogram Contact:
- Kramer Akli, kramer.akli@science.doe.gov

Website: https://science.osti.gov/fes/Research

(l) Plasma Science and Technology—Microelectronics Research

Plasmas are essential to the manufacture of devices in the semiconductor industry, from the creation of extreme ultraviolet photons used in the most advanced lithography to thin film etching, deposition, and surface modifications. It is estimated that 40-45% of all process steps needed to manufacture semiconductor devices use low temperature plasmas (LTPs) in one form or another. LTPs have been an enabling technology in the multi-decade progression of the shrinking of device dimensions, often referred to as Moore's Law. New challenges in circuit and device design, novel materials, and increasing demands to achieve environmentally benign processing technologies are pushing the boundaries of what is possible today in plasma technology. Microelectronics research areas are focused on plasma science for microelectronics and plasma-enabled nanofabrication. These include but are not limited to: (i) Plasma assisted processes enabling sustainable device manufacturing at extreme scales; (ii) Optimization and control of plasma-surface interactions down to the atomic scale to enable materials and device structures; (iii) Development of integrated modeling and validation capability to enable next generation semiconductor plasma processing; and, (iv) Generation and control of radiation, radiation transport, and materials interactions in semiconductor processing systems for lithography, plasma etching and deposition applications.

For more information, see the report of the recent FES sponsored microelectronics workshop entitled "Plasma Science for Microelectronics Nanofabrication." Applicants are strongly encouraged to contact the subprogram contact before submitting an application.

Subprogram Contact:
- Riq Parra, enrique.parra@science.doe.gov

Website: https://science.osti.gov/fes/Research

(m) Plasma Science and Technology—Quantum Information Science

The Fusion Energy Sciences Quantum Information Science (QIS) program is organized into two main thrusts: "Quantum for Fusion" and "Fusion for Quantum." The "Quantum for Fusion" thrust focuses on how QIS can impact fusion energy and plasma science, including developing quantum algorithms for plasma physics problems, leveraging quantum

simulation for fusion research, and using quantum sensing to enhance diagnostics for fusion plasmas. Conversely, the "Fusion for Quantum" thrust explores how advances in fusion science can benefit QIS by using high-energy density laboratory plasmas to create novel quantum materials, adapting relativistic plasma techniques for quantum communication, and applying plasma science tools to improve quantum system simulation and control.

A 2018 roundtable identified six priority research opportunities in these areas. The report details these opportunities and emphasizes the potential for QIS to revolutionize both fusion science and quantum technologies. Applications that advance these priority research opportunities are encouraged.

Applicants are strongly encouraged to contact the subprogram contact before submitting an application.

Subprogram Contact:
- Riq Parra, enrique.parra@science.doe.gov

Website: https://science.osti.gov/fes/Research

(n) Public-Private Partnerships

Public-private partnerships (PPPs) enable greater resources to be applied to help achieve technical goals and accelerate commercialization timelines. The rapidly growing private fusion sector is informed and enabled by decades of publicly supported research in fusion. Through PPPs, research can be pursued in a way that is relevant to the private sector and amenable to commercialization. Within the PPP space, multiple avenues exist for the public and private sector to cooperate on research of mutual interest. All activities in this space are contingent on future appropriations.

Applicants must contact the relevant subprogram contact listed below before submitting an application under the PPP program.

Innovation Network for Fusion Energy (INFUSE)
The Innovation Network for Fusion Energy (INFUSE) program supports research partnerships with the emerging fusion private sector, with the goal of accelerating the development of fusion energy in the U.S. Applications under this topic are welcome from university or research institution-based scientists, seeking to collaborate with industrial partners in the INFUSE program. This topic seeks to advance our scientific understanding of fusion-related phenomena by fostering collaborations involving the expertise and unique resources available at DOE national laboratories and U.S. universities.

Partnership awards made under the INFUSE program follow a unique application process, for which more information is available at the INFUSE webpage: https://infuse.ornl.gov/.

Subprogram Contact:
- Colleen Nehl, colleen.nehl@science.doe.gov

Website: https://science.osti.gov/fes/Research

Milestone-Based Fusion Development Program
The Milestone Program aims to accelerate progress toward the development of commercial fusion energy by establishing partnerships with the private sector. Key goals of this program in the near term include the achievement of preliminary designs and technology roadmaps for a fusion pilot plant and enabling significant performance improvements of fusion pilot plant concepts. DOE may award Other Transactions (OT) agreements via Technology Investment Agreements (TIAs) under this topic. DOE implements its OT authority through awarding and administering TIAs (governed by 2 CFR 930). TIAs are assistance instruments used to increase the involvement of commercial entities in DOE's research, development, and demonstration programs. DOE has greater flexibility in tailoring the terms and conditions of a TIA.

Subprogram Contact:
- Colleen Nehl, colleen.nehl@science.doe.gov

Website: https://science.osti.gov/fes/Research

Private Facilities Research Program
As private fusion facilities begin operation, there are opportunities for publicly funded researchers to conduct scientific studies on privately constructed facilities for the mutual benefit of all parties. Uniquely, the Private Facilities Research program aims to advance fusion and plasma science and technology by openly disseminating results using data acquired from world-leading private experimental facilities.

Subprogram Contact:
- Josh King, josh.king@science.doe.gov

Website: https://science.osti.gov/fes/Research

5. High Energy Physics (HEP)
Program Website: https://science.osti.gov/hep

The mission of the High Energy Physics (HEP) program is dedicated to unraveling the mysteries of the universe by exploring the fundamental building blocks of matter and energy.

The scientific objectives and priorities for the field recommended by the High Energy Physics Advisory Panel (HEPAP) are detailed in its recent long-range strategic plan, developed by the Particle Physics Project Prioritization Panel (P5) and available at: https://science.osti.gov/-

/media/hep/hepap/pdf/Reports/2024/2023_P5_Report_Single_Pages.pdf.

The HEP program is divided into four core research programs covering three experimental scientific frontiers and theory:

- *The Energy Frontier*, where powerful accelerators are used to create new particles, reveal their interactions, and investigate fundamental forces using highly sensitive collider-based experimental detectors;
- *The Intensity Frontier*, where intense particle beams and highly sensitive detectors are used to pursue alternate pathways to investigate fundamental forces and particle interactions by studying events that occur rarely in nature, and to provide precision measurements of these phenomena;
- *The Cosmic Frontier*, where data from the universe are used to probe fundamental physics questions and offer new insight about the nature of dark matter, cosmic acceleration in the forms of dark energy and inflation in the early universe, neutrino properties, and other phenomena; and
- *Theoretical Particle Physics*, where the vision and mathematical framework for understanding and extending the knowledge of particles, forces, space-time, and the universe are developed.

Together, these interrelated and complementary discovery research areas offer the opportunity to answer some of the most basic questions about the world around us. Also integral to the mission of HEP are the following four technology research areas that enable new scientific opportunities by developing the necessary tools and methods for discoveries:

- *Accelerator Science and Technology R&D*, where the technologies and basic science needed to design, build, and operate the accelerator facilities essential for making new discoveries are developed;
- *Instrumentation and Detector R&D,* where the basic science and technologies needed to design and build the High Energy Physics instrumentation essential for making new discoveries are developed;
- *AI/ML and Computational High Energy Physics,* where computational tools, data management and analytics, and simulation techniques are developed for advancing the HEP mission; this program also supports research that uses AI/ML to advance the HEP mission, use of HEP datasets and theory to learn about fundamental AI/ML techniques, and development of the HEP AI/ML ecosystem to broaden participation in HEP AI/ML research; and
- *Quantum Information Science for High Energy Physics Research,* an interdisciplinary research area where innovative solutions for scientific discovery techniques leveraging the unique capabilities of quantum information science and technology (e.g., in sensing, computing, and theoretical advances) are developed through partnerships with the wider quantum information science community to advance the HEP science drivers, as identified by P5, the program mission of HEP, and the SC quantum information science

initiative.

While fully distinct and non-overlapping, the research topics supported by HEP and Nuclear Physics (NP) may be of interest for the unique capabilities of research groups in either SC program. To ensure that "transitional" applications for groups exploring new research directions can be accommodated fairly, for a limited period not to exceed one award term, and subject as always to appropriate peer review, HEP and NP will allow for the possibility of support in their own portfolios for groups engaged in such crossover research.

Applications for support of HEP research activities in any of the eight areas identified above may be submitted to this NOFO. HEP expects to convene comparative merit review panels on a yearly basis, as described below, for both New and Renewal applications devoted to these research activities. Eligible applications that are not subjected to this comparative review process will be sent for peer-review but will likely be assigned a lower programmatic priority than those that are, with any exceptions considered on a case-by-case basis to address program priorities. Prior to any submission to this NOFO, applicants are strongly encouraged to contact the relevant HEP subprogram contact listed below to develop applications that properly address program goals.

Applications in response to this NOFO may also propose activities *in support of* HEP research, which include, but are not limited to: supplemental support for research activities, conferences, experimental operations, conceptual research and development (R&D), or design or fabrication *directed towards a specific (pre)project* within the HEP scientific program, but such applications will *not* be considered by comparative merit review panels.

Applications submitted for the annual HEP comparative review process:

1. FY 2027 HEP Comparative Review: HEP expects to convene merit review panels in November 2026 for research areas (a) through (h) below. Research applications, as described above, that are aligned with one or more of those research areas and are received no later than September 3, 2026, will be considered for merit review by those panels. Applicants are strongly encouraged to submit pre-applications no later than July 30, 2026.

Additional information about the HEP research areas described above, and in areas (a) through (i) below, may be found at https://science.osti.gov/hep/research/. *All applicants* should pay particular attention to the following when preparing applications to be submitted to this NOFO:

1. External peer reviewers will be explicitly requested to evaluate the applicant's proposed work in relation to the priorities established in the P5 strategic plan for HEP.
2. Applications for support of *generic particle detector R&D* efforts should be directed to the Detector Research and Development research area described below. However, applicants

proposing physics studies and pre-conceptual R&D efforts *directed towards a specific experiment* within an experimental frontier should submit their application to the relevant HEP scientific frontier research subprogram specified below.

3. Applications which pose an undue burden on merit reviewers may be declined without review:
    a. Applications in HEP from a single institution must not contain project narratives in excess of 9 pages per senior/key person.
    b. Applications in HEP from multi-institutional teams must not contain project narratives in excess of 9 pages per senior/key person or a total of 30 pages, whichever is less.
4. In addition to the points listed in Section IV, HEP also offers these suggestions for the organization of the Project Narrative:
    a. Research using Artificial Intelligence (AI) or Machine Learning (ML), if applicable: If applications or development of AI/ML techniques are a part of your research effort, call attention to them so that it can be properly reviewed. Consider adding a dedicated section to your narrative to describe the research group's efforts in AI/ML and their importance to completing the proposed research, explaining the associated AI/ML methods and datasets to be used and their impact to advance the group's scientific results; highlight particular results which are expected to be significantly improved or enabled by the use of AI/ML methods over traditional techniques. Identify the personnel and effort level (e.g., students, postdoctoral researchers, etc.) carrying out AI/ML activities in the proposed research plan. Additional supporting information (if needed) may be included in Appendix 7: Other Attachment.
    b. Proposed Resources: Identify the resources needed to meet the objectives of the proposed project and accomplish the research goals. Requests for support of any resources in the budgets submitted with the application should be consistent with the scope of research efforts identified in the narrative. Reviewers will be asked to consider if the proposed budgets are reasonable and appropriate to carry out the proposed work and adequately estimated and justified.
    c. Timetable of Activities: Timeline for all major activities including aims and objectives.
5. Previously declined applications that have not been substantially revised in light of merit reviewer comments may be declined without additional merit review and will not be considered for funding.

Additional requirements for multi-task or multi-institution applications follow below. Investigators who are proposing a single-task, single-institution research effort may skip to the HEP Research Subprograms descriptions below.

Multi-Task Applications

HEP allows applications from single institutions that span multiple research areas described

in this NOFO, including applications that span multiple HEP subprograms or research thrusts. These separate research areas are called "tasks" within the application and should be separately delineated. Specifically, applications in response to this NOFO may propose multiple research tasks, addressing a) two or more HEP research subprograms (e.g., the Energy Frontier and Theoretical Particle Physics) and/or b) different research thrusts (specific experiments, experimental or technology R&D campaigns, or other significant collaborations) within a particular HEP research subprogram (e.g., LSST and LZ/LUX in the Cosmic Frontier).

Eash task should constitute a distinct, non-overlapping subsection of the application narrative. Each task should be associated with one or more of the listed senior/key personnel. Reviewers will be requested to comment on each of the proposed activities and their impact.

If proposing a multi-task application:

- Ensure that the application describes an overall integrated and synergistic research effort. Do not propose unconnected discrete research efforts.
- Organize the narrative portion of the application by task.
- Provide a common narrative: any narrative material that is common to all research tasks or thrusts should be included in a single separate section within the narrative.
    - This section should address the integration and the synergies of the different research activities (as appropriate) and describe the management of the overall research effort. Reviewers will have access to the complete application and will be asked to comment on the adequacies of such synergies and institutional support and/or infrastructure as appropriate to the application.
- Provide both a summary budget and a budget for each task, using the Research and Related Subaward Budget Attachment(s) Form to provide multiple task budgets by identifying the task budget type as being for a "project."
- Provide a supplementary page to the DOE title page, including:
    1. List all research task(s) by name with each Co-Investigator (Co-I) for the respective research on the same line.
    2. Indicate the Lead PI who will serve as the point of contact and coordinator for the combined application.
    3. Include a table modeled on the following chart providing summary budget information for each research task. Provide the total costs (Direct and Indirect) in the budget request in each funding year for each subprogram or thrust as well as the totals for all rows and columns.
    4. If necessary, appropriately add rows for additional Co-I(s) and research tasks.
    5. Applicants should appropriately modify the table below for the correct number of years where a budget is being requested in their application.

Name and Yearly Budget for Applications with Multiple Research Tasks

	Name	Research Task	Year 1 Budget ($)	Year 2 Budget ($)	Year 3 Budget ($)	Total Budget ($)
Lead PI						
Co-I #1						
Co-I #2						
Co-I #1						
Co-I #2						
Co-I #3						
Co-I #4						
TOTAL	—	—	Total Year 1	Total Year 2	Total Year 3	Total Y1-Y3

Example Summary Budget Table (for Applications with Multiple HEP Tasks)

6. If any senior/key person requests support from two or more HEP research tasks (including two or more tasks in the same research subprogram), provide information on the estimated distribution of research effort (FTE) for them in a table (example below) in the subprogram/task budget justification. Applicants should appropriately modify the table for their proposed efforts.

Yearly FTE Estimates for Senior/Key Personnel with Multiple HEP Tasks						
Name	Application Project Period					
	Budget Period 1		Budget Period 2		Budget Period 3	
	Name of Task 1	Name of Task 2	Name of Task 1	Name of Task 2	Name of Task 1	Name of Task 2
	FTE	FTE	FTE	FTE	FTE	FTE
Senior/Key Person A	0	100%	25%	75%	50%	50%
Senior/Key Person B	50%	50%	25%	75%	0%	100%

Example Effort Table (for Applications with Multiple HEP Tasks)

Multi-Institutional Teams

Applications in response to this NOFO may consist of teams of investigators from multiple institutions to submit applications in accordance with the mechanisms for "Multi-Institutional Teams" described at the end of this section. Such teams may be appropriate when the involvement of multiple institutions permits the formation of larger teams that can address a greater scope of scientific inquiry or significant research thrust, but, unless

specifically encouraged in the research area descriptions below, such applications are likely to be assigned a lower programmatic priority and excluded from the merit review panels.

Multi-institutional team applications should provide a supplementary page to the DOE title page, including:

1. List all institutions by name and each Co-Investigator (Co-I) at that institution.
2. Indicate the Lead PI who will serve as the point of contact and coordinator for the combined application.
3. Include a table modeled on the following chart providing summary budget information for each institution. Provide the total costs (Direct and Indirect) in the budget request in each funding year for each institution as well as the totals for all rows and columns.
4. If necessary, appropriately add rows for additional Co-I(s).
5. Applicants should appropriately modify the table below for the correct number of years where a budget is being requested in their application.

Name and Yearly Budget for Applications with Multiple Institutions						
	Name	Institution	Year 1 Budget ($)	Year 2 Budget ($)	Year 3 Budget ($)	Total Budget ($)
Lead PI						
Co-I #1						
Co-I #2						
Co-I #1						
Co-I #2						
Co-I #3						
Co-I #4						
TOTAL	—	—	Total Year 1	Total Year 2	Total Year 3	Total Y1-Y3

Example Summary Budget Table (for Applications with Multiple Institutions)

Applications from multi-institutional teams should not be part of a multi-task application from the lead institution.

HEP Research Subprograms

(a) Experimental Research at the Energy Frontier in High Energy Physics

This research area seeks to support studies of fundamental particles and their interactions using particle beam collisions at the highest possible energies and/or luminosities. This is accomplished through direct detection of new phenomena or through sensitive

measurements of processes that probe the Standard Model and new physics beyond it. In particular, applications are sought for physics research utilizing data being collected at the Large Hadron Collider (LHC) by the ATLAS (A Toroidal LHC Apparatus) and CMS (Compact Muon Solenoid) experiments. This research area also provides graduate, undergraduate, and postdoctoral research training for the next generation of scientists, and equipment and computational support for LHC physics research activities. Applications addressing physics studies and pre-conceptual R&D directed towards specific future proposed Energy Frontier collider experiments are also accepted through this NOFO but will not be considered under the annual HEP comparative review process. Instead, applicants are strongly encouraged to work with the nationally coordinated consortia or organizations that were recently formed in the U.S. to seek support for such future collider physics studies and pre-conceptual R&D efforts. Support for heavy-ion physics research is not provided under this research area.

Subprogram Contact:
- Abid Patwa, abid.patwa@science.doe.gov

Website: https://science.osti.gov/hep/research

(b) Experimental Research at the Intensity Frontier in High Energy Physics

This research area seeks to support precision studies that are sensitive to new physical processes at very high-energy scales, beyond what can be directly probed with energy frontier colliders, and that often require intense particle beams. This research area includes studies of the fundamental properties of neutrinos produced by a variety of sources, including accelerators and nuclear reactors; studies of rare processes or precision measurements probing new physics processes as described above with either high intensity stored beams or beams incident on fixed targets; and studies of high intensity electron-positron collisions. In addition, this research area includes searches for proton decay. Graduate and postdoctoral research training for the next generation of scientists, and equipment and computational support for physics research activities are also provided. Applications addressing physics studies and pre-conceptual R&D directed towards specific future Intensity Frontier experiments are also accepted but will be assigned a lower priority for support than those that are considered in support of existing experiments and approved projects. Support for the Large Hadron Collider beauty experiment (LHCb) research or studies of neutrinoless double beta decay is not provided under this research area.

Some research areas in this subprogram are closely related to but distinct from research areas pursued in the Nuclear Physics program. See note in the HEP introduction above concerning “transitional” applications to support cross-cutting research on NP and/or HEP topic areas.

Subprogram Contact:
- Brian Beckford, brian.beckford@science.doe.gov

Website: https://science.osti.gov/hep/research

(c) Experimental Research at the Cosmic Frontier in High Energy Physics

This research area seeks to support precision studies using observations of the cosmos and naturally occurring cosmic particles to understand the properties of fundamental particles and fields. Priorities include the study of cosmic acceleration by studying the nature of dark energy, planning the next-generation ground-based cosmic microwave background experiment to explore the inflationary epoch, and using direct-detection experiments to search for dark matter particles. Many of the experiments in the program also place constraints on neutrino masses. Measurements using high-energy cosmic rays, gamma rays and other phenomena are included, but at a lower priority. Applications are sought for physics research efforts in support of current experiments in the Cosmic Frontier, as well as physics studies and pre-conceptual planning directed towards specific future experiments being considered for the program. This research area also provides undergraduate, graduate and postdoctoral research training for the next generation of scientists, and equipment and computational support for physics research activities.

Research efforts aimed at developing techniques or understanding experimental data within the context of theoretical models that are expressly for or as part of an experimental research collaboration are included in this area. General theoretical or computational research applications not specifically carried out as part of a particular Cosmic Frontier experimental collaboration should be directed to the Theoretical Research in High Energy Physics subprogram. Studies of gravitational physics (other than for cosmic acceleration), classical astrophysics phenomena, fundamental symmetries, or planning for future cosmic ray or gamma ray experiments are not included in this research area.

Subprogram Contacts:
- Manuel Bautista (Dark Matter), manuel.bautista@science.doe.gov
- Bryan J. Field (Cosmology and Dark Energy), bryan.field@science.doe.gov
- Kathleen (Kathy) Turner, kathy.turner@science.doe.gov

Website: https://science.osti.gov/hep/research

(d) Theoretical Research in High Energy Physics

This research area seeks to support theoretical activities that provide the vision and the mathematical framework for understanding and extending our knowledge of particles, forces, space-time, and the universe. Theoretical research is essential to support current experiments at the Energy, Intensity and Cosmic Frontiers, to identify new directions for High Energy Physics and to provide a deeper understanding of nature. Topics studied in theoretical high energy physics research include but are not limited to: phenomenological studies that seek to interpret experimental data, suggest searches for new physics at existing facilities and develop a research program for future facilities; precision calculations of

experimental observables to test our current theories at the level of quantum corrections; the development of new models of physical interactions to describe unexplained phenomena or to unify seemingly distinct concepts; progress in quantum field theory, quantum gravity and other possible frameworks to develop a deeper understanding of nature; quantum information science to extend the reach of HEP theory; and the development of analytical and numerical computational techniques to facilitate studies in these areas. This research area also provides undergraduate, graduate and postdoctoral research training for the next generation of scientists and the computational resources needed for theoretical calculations. Activities that rely on experimental data, performed expressly for or with an experimental research collaboration, are not included in this research area.

Subprogram Contact:
- William (Bill) Kilgore, william.kilgore@science.doe.gov

Website: https://science.osti.gov/hep/research

(e) Accelerator Science and Technology R&D in High Energy Physics

The Accelerator Science and Technology R&D subprogram develops the next generation of particle accelerators and related technologies that are essential for discoveries in HEP. This research area supports world-leading research in the physics of charged particle beams, and long-range, early-stage exploratory research aimed at developing new acceleration concepts. Additionally, this subprogram also provides graduate and postdoctoral research training, equipment for experiments, test facilities and related computational efforts.

Topics studied in the Accelerator Science and Technology R&D subprogram include but are not limited to: accelerator and beam physics, including the development of analytic and computational techniques for modeling particle beams and simulation of accelerator systems; novel acceleration concepts; the science of high gradients in accelerating cavities and structures; high-power radio-frequency sources; high-power targets; high-brightness beam sources; and beam instrumentation and controls. Also of interest are superconducting materials and conductor development for high field magnets; innovative magnet design and development of high-field superconducting magnets; as well as associated testing and cryogenic systems. R&D applications which are focused on accelerator uses outside of high-energy physics continue to be coordinated through the Accelerator Stewardship program, see section (i) below.

Subprogram Contact:
- Derun Li, derun.li@science.doe.gov

Website: https://science.osti.gov/hep/research

(f) Instrumentation and Detector R&D in High Energy Physics

The Detector R&D subprogram develops the next generation of instrumentation for HEP. It

supports research leading to fundamental advances in the science of particle and radiation detection, and the development of new experimental techniques. This is typically long-term, "generic" R&D that is high-risk but has the potential for wide applicability and/or high impact. Applications should broadly align with the priority research directions identified in the report of the FY 2020 HEP Detector R&D Basic Research Needs study. Moreover, applications for "Blue-Sky" scientific research on innovative technologies not already in contention for implementation in future HEP projects are specifically encouraged.

Topics studied in the Detector R&D research area include but are not limited to: low-mass, high channel density charged particle vertexing and tracking detectors; high resolution, fast-readout calorimeters and particle identification detectors; techniques for improving the radiation tolerance and fast-timing capabilities of particle detectors; detectors for photons from ultraviolet to infrared wavelengths; detectors for cosmic microwave background radiation; detectors and experimental techniques for low-mass dark matter and ultralow-background experiments, including those enabled by advances in QIS; and advanced front-end electronics and data acquisition systems, including those enabled by advances in 3D heterogeneous integration and real-time, edge AI/ML. Support for undergraduate, graduate, and postdoctoral research training, engineering and other technical efforts, and equipment and computational efforts required for experimental detector R&D is included in this research area.

Multi-institutional team applications to the FY 2027 HEP Comparative Review described above are not encouraged for this topic.

Targeted Review: Multi-institutional team applications for HEP Detector R&D

This topic area is elucidated in the report on the "DOE Basic Research Needs Study on High Energy Physics Detector Research and Development", https://doi.org/10.2172/9659761. HEP expects to convene a merit-review panel in June 2026 for multi-institutional team applications submitted to the topic, proposing high-risk, high-reward blue-sky research that address significant challenges beyond the scope of typical single-investigator awards. Multi-institution applications with a single prime awardee and subawards are favored in order to provide strong focus and management to the proposed R&D activity. To be considered by the panel, a pre-application must be submitted by February 27, 2026. A pre-application must involve researchers from multiple eligible institutions. Each pre-application will be reviewed for responsiveness and competitiveness of the proposed research. HEP expects to provide pre-application encouragement and discouragement decisions by March 27, 2026. To be reviewed by the panel, applications associated with encouraged pre-applications must be submitted by May 1, 2026. The award ceiling is $500,000 per year in total across all institutions for a three-year award. HEP expects to make at most three awards. Areas that are out of scope include:

- Topics not identified as a priority in the HEP Detector R&D Basic Research Needs Study.
- Research that primarily results in incremental improvements to the existing state of the

art.
- Project-specific research.

In parallel, HEP plans to issue a Program Announcement to the DOE National Laboratories for such research efforts. Applicants in this topic may wish to coordinate their plans and submissions among applicants to the NOFO and the Program Announcement to form university-lab multi-institutional teaming arrangements. Additional details about the joint review of applications under this NOFO and applications under the Program Announcement will be published with the Program Announcement.

Subprogram Contact:
- Helmut Marsiske, helmut.marsiske@science.doe.gov

Website: https://science.osti.gov/hep/research

(g) Computational Research in High Energy Physics

This research area supports advanced computing research and development targeting challenges that are or have the capability of being broadly applicable to the increasingly complex HEP computing ecosystem. These challenges may include hardware-software co-design, development of collaborative software infrastructure, and research into high performance software and algorithms. These advanced computing techniques may include development of AI/ML techniques and novel applications that go well beyond current research standards, research that exploits unique aspects of HEP to learn about fundamental AI/ML techniques, and development that broadens participation in HEP AI/ML research. This subprogram also facilitates the effective use of DOE computing resources including, but not limited to, high-performance computing.

This program seeks applications into forward looking blue-sky seed research, and development of successful seed research into mature software products for the broader HEP community through bridge applications. This subprogram does not support computing research and/or activities specific to individual projects or experiments in the other research and technology R&D subprograms described in this solicitation. Support for specific operation efforts and/or hardware requests are also outside the scope of this area.

Targeted Review: AI Accelerated DUNE Science

This program intends to hold a targeted review for application on the topic of AI Accelerated DUNE Science. Computational HEP expects to convene a merit-review panel for applications submitted to this topic proposing novel Blue-Sky research, that goes well beyond what is common practice in the field of neutrino physics, to apply AI methods to significantly speed up and enhance the DUNE science program, https://doi.org/10.2172/1699419. Applications should focus on AI research that can reduce the time needed for the DUNE collaboration to publish neutrino oscillation measurements,

significantly improve the sensitivity to neutrinos from core-collapse supernova, and develop new flagship measurements that will enhance the DUNE science goals. Methods may include, but are not limited to, uncertainty quantification and AI methods that will reduce measurement systematic uncertainties and lessons learned from datasets recorded by analogous experiments that improve data quality.

Applications from individuals or teams with the appropriate expertise to carry out the proposed R&D activities and realize the benefit for the DUNE science program are encouraged to apply. To be considered by the panel, a pre-application must be submitted by December 5, 2025. A pre-application may involve researchers from multiple eligible institutions. Each pre-application should make clear how the proposed work meets the objectives of the opportunity to speed up and enhance the DUNE science program. All pre-applications will be reviewed for responsiveness and competitiveness of the proposed research. HEP expects to provide pre-application encouragement and discouragement decisions by December 19, 2025. To be reviewed by the panel, applications associated with encouraged pre-applications must be submitted by January 30, 2026. The expected award floor is $80,000 per year and the award ceiling is $250,000 per year in total across all institutions for two-year awards with a median size of $125,000 per year. HEP expects to make approximately twelve awards. Areas that are out of scope include:

- Research that proposes AI-based reconstruction methods, that do not change the DUNE science timeline;
- Research that primarily results in incremental improvements to the existing state of the art;
- Research that is not carried out as part of the DUNE collaboration.

Subprogram Contact:

- Jeremy Love, jeremy.love@science.doe.gov

Website: https://science.osti.gov/hep/research

(h) Quantum Information Science for High Energy Physics Research

Quantum information science (QIS) is the study of how the unique behaviors of the microscopic world described by quantum mechanics – such as entanglement, superposition, and interference – can be used to solve scientific problems and build new technologies, such as quantum sensors and computers. HEP-QIS pursues the potential for QIS to solve previously intractable problems, measure previously undetectable signals, and bring new theoretical tools to bear on our understanding of the universe through our Quantum Information Science Enabled Discovery (QuantISED) program. This research area is aligned to the SC and U.S. national initiatives in QIS, particularly those that focus on interdisciplinary partnerships between HEP and the wider QIS communities. This subprogram supports efforts that advance the HEP science drivers, as identified by P5, as well as the program mission of HEP in the context of broader benefits to QIS.

This subprogram does not support general (i.e., not related to the HEP mission) quantum computing research, algorithms, or hardware; or quantum networking R&D. Applications to this subprogram without a clear connection to the HEP mission will be declined without review.

QuantISED in HEP Comparative Review

QuantISED will join the HEP comparative review process in FY 2027 for the first time. Previously the QuantISED program has been funded through a separate NOFO most recently published in FY 2024 (DE-FOA-0003354, QuantISED 2.0) and continued with a targeted review in FY 2026, see below. As most of the anticipated funding is committed to the support of ongoing projects, the number of new awards to be made through comparative review in FY 2027 is anticipated to be small. However, we encourage applications for renewals as needed as well as small requests in support of existing HEP-QIS projects. It is expected that future applications for both new and renewal awards for QuantISED will be solicited primarily through the comparative review process, as permitted by appropriations and other programmatic considerations.

Topics of interest for the QuantISED comparative review process include, but are not limited to: application of quantum information theory to fundamental physics problems; quantum computational study to understand, apply, and implement quantum computing devices to HEP problems and experiments; theory and experiment to develop, characterize, and make practical sensors that apply unique features of quantum mechanics (such as entanglement and back-action evasion) to surpass the standard quantum limit to precision in HEP experiments; and integration of QIS tools and techniques into new or ongoing HEP projects. Applications should highlight their novelty and innovation in both HEP and QIS, making a case for the value of the proposed scope of work to both fields and providing evidence that their team possesses sufficient expertise in both subfields to accomplish the proposed research goals.

QuantISED Targeted Review: Quantum Outposts on the Energy and Intensity Frontiers

This subprogram intends to hold a merit review of applications for Quantum Outposts on the Energy and Intensity Frontiers in 2026. These applications should represent exploratory projects with the potential to identify opportunities to advance theoretical and experimental efforts in the Energy and Intensity Frontiers through quantum information science tools, techniques, and technologies. Technical descriptions of the priorities of the Energy and Intensity Frontier subprograms can be found in subsections (a) and (b), above, and on the HEP website. HEP seeks applications that advance the sensitivity and power of existing and future experiments while also enabling new methodologies that offer qualitatively new routes to asking and answering fundamental scientific questions. Projects without a clear application to the research goals of the Energy or Intensity Frontier will be declined without review.

Applicants are encouraged to form teams that combine expertise in both the HEP research areas of interest and the QIS techniques being applied. Teams are encouraged to support the national strategy of "ensuring that QIS creates new opportunities for all Americans," for example, by incorporating collaborators from states that fall under the Established Program to Stimulate Competitive Research (EPSCoR). If submitting an application for a multi-institutional team, a prime and subaward model with one application submitted by the lead institution is a better fit for applications to this subtopic.

To be considered, a pre-application must be submitted by November 15, 2025. Each pre-application will be reviewed for responsiveness and competitiveness of the proposed research. HEP expects to provide pre-application encouragement and discouragement decisions by December 15, 2025. Applications associated with encouraged pre-applications must be submitted by February 1, 2026. HEP plans to make awards for amounts ranging from $250,000 -$800,000 with an expected duration of two to three years and a start date of July 1, 2026. Priority research topics of interest include, but are not limited to:

- Quantum scientific computing. Research responsive to this area includes the development of algorithms, error-correcting codes, and implementations on both near-term and future (i.e., fault-tolerant) quantum computers. Applications must articulate a specific connection to the Energy or Intensity Frontiers (EF/IF); applications that advance the technology of quantum computing are not responsive if the only connection is that EF/IF problems may be an area of future application, and may be declined without review. Example application areas of interest include data analysis or quantum simulation.
- Quantum sensor and detector development for future EF/IF experiments and projects. Applicants should clearly outline a path to application, ideally by identifying specific experiments supported by P5 and explaining how quantum technology can help meet the needs of those efforts. Applicants are encouraged to identify and address risks or barriers to the deployment and integration of quantum technologies in the intended setting as well as concretely identifying and quantifying the potential for advantage over classical technology. Technologies proposed should leverage the tools, techniques, and concepts of QIS, such as entanglement, back-action evasion, squeezing, non-demolition, or other uniquely quantum effects. Applications that do not incorporate QIS technologies may be declined without review.
- Quantum signatures in EF/IF. Applications responding to this priority will use the tools and techniques of QIS to analyze and better understand phenomena of interest to EF/IF research. Efforts may include the use of QIS-informed theory or phenomenology to analyze EF/IF experiments or to identify signatures of quantum phenomena in EF/IF experiments. Applications should clearly identify how these analyses have the potential to advance EF/IF physics goals or enable new physics results. Applications to search for new physics should include an explanation of what models or theories would be tested and validated or invalidated by the search.

HEP plans to issue a Program Announcement to the DOE National Laboratories in this subject area, which will be published at https://science.osti.gov/hep/Funding-Opportunities. Applicants to this topic under this NOFO may wish to coordinate their plans and submissions with applicants to the Program Announcement if considering a multi-institutional teaming arrangement.

Interested applicants are highly encouraged to reach out to the Subprogram Contact to discuss this opportunity prior to submitting a pre-application.

Subprogram Contact:
- Zachary Goff-Eldredge, zachary.goff-eldredge@science.doe.gov

Website: https://science.osti.gov/hep/research

(i) Accelerator Stewardship and Accelerator Development
Program Website: https://science.osti.gov/ardap

The Accelerator Stewardship and Accelerator Development subprograms (collectively referred to as Accelerator Stewardship, and formerly known as ARDAP) share a mission to:

- Coordinate accelerator research and development (R&D) within the Office of Science;
- Advance accelerator science and technology relevant to the Department of Energy, other federal agencies, and U.S. industry;
- Foster public-private partnerships and other collaborative R&D activities to develop, demonstrate, and enable the commercial deployment of accelerator technology;
- Support the development of a skilled accelerator workforce;
- Provide access to accelerator design and engineering resources through BeamNetUS.

Applicants addressing cross-cutting accelerator research or technology development activities in one or more of the following five research areas are strongly encouraged to submit applications to the annual Research Opportunities in Accelerator Stewardship and Accelerator Development NOFO, available through https://www.grants.gov.

Accelerator Stewardship applications for supplements to current awards may be submitted to this NOFO but new applications will likely be assigned a lower programmatic priority than those submitted to the dedicated Accelerator Stewardship NOFO. Prior to any submission to this NOFO, applicants are strongly encouraged to contact the program contact listed below.

Program Contact:
- Eric R. Colby, eric.colby@science.doe.gov

Website: https://science.osti.gov/ardap

6. Nuclear Physics (NP)
Program Website: https://science.osti.gov/np/

The mission of the Nuclear Physics (NP) program is to explore the nature of matter: understanding how protons and neutrons are formed from elementary particles and how they interact to form elements, observed properties, and phenomena. The largest contribution by far to the mass of the matter we are familiar with comes from protons, neutrons, and heavier nuclei. Although the fundamental particles that compose nuclear matter—quarks and gluons—are themselves relatively well understood, exactly how they interact and combine to form the different types of matter observed in the universe today and during its evolution remains largely unknown.

The priority areas for NP are described in *A New Era of Discovery: The 2023 Long Range Plan for Nuclear Science* and include the following:

- Develop experiments, methods, and techniques to accurately describe and predict the interactions between neutrons and protons that drive nuclear structure and nuclear reactions.
- Advance forefront nuclear physics to determine how quarks and gluons make up protons, neutrons, and atomic nuclei.
- Use atomic nuclei to uncover physics beyond the Standard Model.
- Connect multi-messenger and nuclear physics observables to characterize the nuclear processes that drive the birth, life, and death of stars.
- Conceive, construct, and operate national scientific user facilities and develop novel detector and accelerator instrumentation and technologies.

Within each of these priority areas, unique nuclear physics opportunities using artificial intelligence (AI), machine learning (ML), new developments in microelectronics, and R&D integration which advances detector and imaging technologies are also of NP programmatic interest. Applicants are encouraged to contact the relevant subprogram contact.

To carry out its mission and target priority areas, the NP program addresses three broad, tightly interrelated, scientific thrusts: Quantum Chromodynamics (QCD); Nuclei and Nuclear Astrophysics; and Fundamental Symmetries. NP supports basic research in seven subprograms areas: Medium Energy, Heavy Ion, Nuclear Structure and Nuclear Astrophysics, Fundamental Symmetries, Nuclear Theory, Nuclear Data, and Nuclear Physics Computing (a through g). Additionally, NP supports Accelerator Research and Development for NP Facilities (h), Artificial Intelligence and Machine Learning Applications (i), Quantum Information Science for Nuclear Physics Research (j), and Generic Detector Research and Development (k). Contact the relevant subprogram contacts for guidance if the proposed scope of work includes multiple NP subprograms.

While fully distinct and non-overlapping, the research topics supported by NP and High Energy Physics (HEP) may be of interest for the unique capabilities of research groups in either SC program. To ensure that "transitional" applications for groups exploring new research directions can be accommodated fairly, for a limited period not to exceed one award term, and subject as always to appropriate peer review, NP and HEP will allow for the possibility of support in their own portfolios for groups engaged in such crossover research.

Applicants should pay attention to the following when preparing applications to NP under this NOFO:

- Applications with research narratives in excess of 20 pages (with an additional 5 pages per major research thrust or separate task) may pose an undue burden on merit reviewers and may be declined without review.
- For all applications, the end of the project narrative must include a bulleted list of annual objectives that mark anticipated research achievements, phase of completed work, or a key decision point in the proposed timeline. Each objective needs a clear, specific, measurable metric that signifies progress.
- For renewal applications, the project narrative must describe the progress made under the previous award.
- For all applications, a table in the budget justification section should specify the funding request by subprogram and, if relevant, AI/ML and microelectronics. An example follows.

	FY 2026	FY 2027	FY 2028
Medium Energy	$50,000	$40,000	$50,000
Microelectronics	$15,000	$25,000	$10,000
AI/ML	$60,000	$80,000	$90,000

- For all applications, a student tracking table is required. This table must be included at the end of the project narrative and will not count against the narrative page limit. An example follows.

Student	Date Entered Grad. School	Date Joined Group	Degree Program	Date Degree Awarded/Expected	Advisor
L. Meitner	Aug. 2023	Jan. 2024	Ph.D.	(May 2028)	M. Curie

- For renewal applications, PIs are cautioned that the Renewal Proposal Products list generated in PAMS should *only* include publications from the immediately prior

project period.
- For renewal applications, PIs should list their contributions to publications from the immediately prior project period. This list must be included at the end of the project narrative and will not count against the narrative page limit.
- For all new and renewal applications, the narrative reference list must not exceed 3-pages.

Applicants may email subprogram contacts regarding the technical requirements for the application. Administrative questions should be directed to sc.opencall@science.doe.gov. The NP subprograms and their objectives follow:

(a) Medium Energy Nuclear Physics

The Medium Energy Nuclear Physics subprogram is dedicated to unraveling the fundamental nature of matter, specifically focusing on hadrons. This research primarily seeks to understand the internal structure of hadrons, the dynamics of quarks within them, and to rigorously test Quantum Chromodynamics (QCD), the theory describing the strong interaction. QCD posits that all observed nuclear particles, collectively known as hadrons (such as the familiar protons and neutrons in atomic nuclei), are formed from the profound interaction of quarks, antiquarks, and gluons. Although computationally complex, QCD predicts the existence, interaction, and decay of these particles.

Key questions guiding this subprogram include:

- What is the intricate internal arrangement of protons and neutrons (nucleons)?
- What are QCD's predictions for the properties of strongly interacting matter?
- What mechanisms govern the transformation of quarks and gluons into pions and nucleons?
- What is the precise role of gluons and their self-interactions within nucleons and nuclei?

To address these questions, the subprogram aims to develop a comprehensive understanding of the spatial, momentum, and angular momentum substructure of the nucleon. It also strives to elucidate the mysteries of quark confinement, hadron excitations, and the origin of mass, while deepening our knowledge of the strong interaction within nuclei.

Experimental efforts employ various approaches to map the distribution of "up," "down," and "strange" quarks, their antiquarks, and gluons inside protons and neutrons. These experiments also clarify the critical role of gluons in confining quarks and antiquarks within hadrons, often utilizing polarized electron and proton beams to probe the effects of quark and gluon spins and nuclear environmental influences. The subprogram further supports experimental searches for predicted "excited states" and exotic hadrons, alongside studies of

their production and decay.

This subprogram primarily supports experimental research, including data analysis, at its cornerstone facility, the Continuous Electron Beam Accelerator Facility (CEBAF) at the Thomas Jefferson National Accelerator Facility (TJNAF). Support also extends to other significant facilities such as the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory (BNL), the High Intensity Gamma Source (HIGS) at the Triangle Universities Nuclear Laboratory (TUNL), and the future Electron-Ion Collider (EIC). Applications are invited for physics research supporting current and future experiments, as well as for physics studies and early-stage planning for prospective experiments. Applications for novel instrumentation development for near-term experiments will also be considered. However, research focused on Dark Matter and Dark Energy is generally not prioritized by this subprogram. Applicants may also incorporate research components involving the application of AI/ML tools and methods, with specific guidance for scope and budget provided in the NP introduction section of this NOFO.

Subprogram Contact:
- Gulshan Rai, gulshan.rai@science.doe.gov

Website: https://science.osti.gov/np/research/

(b) Heavy Ion Nuclear Physics

The Heavy Ion Nuclear Physics subprogram focuses on studies of condensed quark-gluon matter at extremely high densities and temperatures characteristic of the infant Universe. The primary facilities in the world currently capable of exploring the properties nuclear matter in these conditions are RHIC at BNL and the Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN). The goal is to explore and understand unique manifestations of QCD in this many-body environment and their influence on the Universe's evolution. Important avenues of investigation are directed at resolving properties of the quark-gluon plasma at different length scales and learning more about its physical characteristics including its temperature, the energy loss mechanism for quarks and gluons traversing the quark-gluon plasma, determining the speed of sound in the quark-gluon plasma, measuring the effect of the chiral magnetic force, understanding how quarks fragment and recombine to form hadronic matter (hadronization), and locating a possible critical point for the transition between the quark-gluon plasma and normal matter. The high baryon-density region of the phase diagram for nuclear matter continues to be explored. Experimental research is carried out primarily using the RHIC facility and the LHC. Applicants may propose research components related to the application of AI/ML tools and methods. Scope of AI/ML related work and its estimated budget should follow the guidance outlined in the NP introduction section of this NOFO.

NP anticipates holding a merit review panel of experts to evaluate applications in this subject. The panel is expected to meet in early 2026. Applications submitted by November

14, 2025, will be evaluated by the panel. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Subprogram Contact:
- Spyridon (Spiros) Margetis, spyridon.margetis@science.doe.gov

Website: https://science.osti.gov/np/research/

(c) Nuclear Structure and Nuclear Astrophysics

The Nuclear Structure and Nuclear Astrophysics subprogram focuses on high-impact science with proton-rich and neutron-rich nuclei, searches for super-heavy elements as well as nuclear processes that inform our understanding of stellar nucleosynthesis, neutron stars, and Big Bang nucleosynthesis. Both frontiers are identified in *A New Era of Discovery: The 2023 Long Range Plan for Nuclear Science*.

The subfield of nuclear structure addresses the underlying nature of atomic nuclei and the limits of their existence and describes dynamical processes such as nuclear reactions and fission. The goal is to develop a predictive understanding of nuclei and their interactions grounded in fundamental QCD and electroweak theory; furthermore, this understanding must be based on experimental data from a wide variety of nuclei.

Nuclear astrophysics addresses the role of nuclear physics in our universe. As a field at the interface of astrophysics and nuclear physics, it is concerned with the impact of nuclear processes on the evolution of the universe, the role of nuclear structure in influencing the evolution of the cosmos, and the cosmogenic origin of elements that are the building blocks of life. It is a broad discipline that can identify new observational signatures probing our universe. Nuclear astrophysics can identify the conditions at the very core of stars and provide a record of the violent history of the universe. To fully realize the discovery potential of this subfield, interdisciplinary collaborations must be formed and strongly encouraged that include nuclear experimentalists, theorists and multi-messenger observers with a broad range of expertise.

Major goals of this subprogram are to develop a comprehensive description of nuclei across the entire nuclear chart, including as-yet undiscovered superheavy nuclei, to utilize rare isotope beams to reveal new nuclear phenomena and structures unlike those that are derived from studies using stable ion beams, and to measure the cross sections of nuclear reactions that power stars and spectacular stellar explosions and are responsible for the synthesis of the elements. Experimental research is currently carried out primarily at the Argonne Tandem Linac Accelerator System (ATLAS), the Facility for Rare Isotope Beams (FRIB) at Michigan State University, the 88-Inch Cyclotron at Lawrence Berkeley National Lab, the Texas A&M University Cyclotron Institute, and the Triangle Universities Nuclear Laboratory (TUNL) at Duke University. Applicants may propose research components related to the application of AI/ML tools and methods. Scope of AI/ML related work and its

estimated budget should follow the guidance outlined in the NP introduction section of this NOFO.

NP anticipates holding a merit review panel of experts to evaluate applications in this subject. The panel is expected to meet in early 2026. Applications submitted by November 14, 2025, will be evaluated by the panel. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Subprogram Contact:
- Spyridon (Spiros) Margetis, spyridon.margetis@science.doe.gov

Website: https://science.osti.gov/np/research/

(d) Fundamental Symmetries

This subprogram supports precision experiments to test the fundamental symmetries of nature and search for evidence of new forces or particles. Questions addressed in this frontier include: *What is the nature of neutrinos, what are their masses, and how have they shaped the evolution of the universe? Why is there now more matter than antimatter in the universe? What are the unseen forces that were present at the dawn of the universe but disappeared from view as the universe evolved?* Specifically, the subprogram seeks to support: research to measure the neutrino mass and to determine if the neutrino is its own antiparticle; experiments with cold and ultra-cold neutrons to investigate the dominance of matter over antimatter in the universe, and to determine the lifetime of the neutron; experiments to illuminate the fundamental symmetries of nature through precise measurements of beta decay and searches for anomalous parity violation; research on other aspects of Fundamental Symmetries and interactions involving nuclei. A major focus of this subprogram is furthering progress towards a major priority of *A New Era of Discovery: The 2023 Long Range Plan for Nuclear Science*: the implementation of a ton-scale neutrino-less double beta decay experiment to determine whether the neutrino is its own anti-particle. Applicants may propose research components related to the application of AI/ML tools and methods. Scope of AI/ML related work and its estimated budget should follow the guidance outlined in the NP introduction section of this NOFO.

NP anticipates holding a merit review panel of experts to evaluate applications in this subject. The panel is expected to meet in early 2026. Applications submitted by November 14, 2025, will be evaluated by the panel. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Subprogram Contact:
- Paul Sorensen, paul.sorensen@science.doe.gov

Website: https://science.osti.gov/np/research/

(e) Nuclear Theory

The Nuclear Theory subprogram provides the formal mathematical aspects of physics needed to explain the fundamental nature of the world around us. It provides the theoretical pillar needed to complement and interpret the wide range of data obtained from the experimental nuclear science subprograms and to guide new ideas and hypotheses that can ascertain prospective areas of experimental investigations. This subprogram addresses all of the field's scientific thrusts described in *A New Era of Discovery: The 2023 Long Range Plan for Nuclear Science*, as well as the specific questions listed for the experimental subprograms above. Theoretical research on QCD (the fundamental theory of quarks and gluons) addresses the questions of how the properties of the nuclei, hadrons, and nuclear matter observed experimentally arise from this theory, how the phenomenon of quark confinement arises, and what phases of nuclear matter occur at high densities and temperatures. In Nuclear Structure and Nuclear Astrophysics, theorists investigate a broad range of topics, including calculations of the properties of stable and unstable nuclear species, the limits of nuclear stability, the various types of nuclear transitions and decays, how nuclei arise from the forces between nucleons, and how nuclei are formed in cataclysmic astronomical events such as supernovae and neutron star mergers. In Fundamental Symmetries, nucleons and nuclei are used to test the Standard Model, which describes the interactions of elementary particles at the most fundamental level. Theoretical research in this area is concerned with determining how various (beyond) Standard Model aspects can be explored through nuclear physics experiments, including the interactions of neutrinos, unusual nuclear transitions, rare decays, and high-precision studies of cold neutrons. Applicants may propose research components related to the application of AI/ML tools and methods. Scope of AI/ML related work and its estimated budget should follow the guidance outlined in the NP introduction section of this NOFO.

NP anticipates holding a merit review panel of experts to evaluate applications in this subject. The panel is expected to meet in early 2026. Applications submitted by November 14, 2025, will be evaluated by the panel. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Subprogram Contact:
- Astrid Morreale, astrid.morreale@science.doe.gov

Website: https://science.osti.gov/np/research/

(f) Nuclear Data

The Nuclear Data subprogram is multi-disciplinary with applications to energy, defense, space, and medicine. Nuclear data underlies modeling and simulation software in nuclear applications, so it is key for ensuring results are accurate. Working groups have been established among researchers, as well as federal programs, to help coordinate, prioritize, and fund research efforts to improve nuclear data in basic science and applied nuclear

technologies.

In addition, the Nuclear Data subprogram collects, evaluates, and disseminates nuclear data with its support of the U.S. Nuclear Data Program (USNDP) and the National Nuclear Data Center (NNDC). This process combines historical and modern experiments, theory, and modeling to publish best values for nuclear properties such as cross sections and decay data. The extensive nuclear databases produced by this effort are an international resource consisting of carefully organized scientific information gathered over 50 years of low-energy nuclear physics research worldwide.

Research opportunities exist for both theoretical and experimental nuclear structure and nuclear reactions, with particular interest in predictive capabilities in emerging needs in applications such as, but not limited to, energy generation (fission and fusion), space exploration, and medicine. The most recent needs have been discussed at the annual Workshop on Applied Nuclear Data Activities (WANDA) found here: https://www.nndc.bnl.gov/ndwg/workshops.html. Applicants may propose research components related to the application of AI/ML tools and methods. Scope of AI/ML related work and its estimated budget should follow the guidance outlined in the NP introduction section of this NOFO.

Subprogram Contact:
- Keith Jankowski, keith.jankowski@science.doe.gov

Website: https://science.osti.gov/np/research/

(g) Nuclear Physics Computing

The Nuclear Physics Computing subprogram supports research in nuclear physics that relies on large-scale, high-performance computing. The topical areas this subprogram supports include: 1) low energy nuclear physics; 2) the properties and structure of nuclei and nuclear interactions; 3) the internal structure of nucleons in terms of quarks and gluons; 4) hadron spectra and exotic states of QCD; 5) neutrino and electron interactions in nuclei and dense nuclear matter; 6) properties of quark-gluon plasma; and 7) nuclear astrophysics and nucleosynthesis. The Nuclear Physics Computing subprogram also supports the development of Lattice QCD computations and techniques that are critical to the understanding of nuclei, nuclear reactions, hadron structure, and the dynamics of strong interactions.

Of particular interest is the development of research software and advanced computing algorithms that are broadly applicable across the NP computing ecosystem, including the development of AI/ML techniques and novel applications unique to NP research. Scope of AI/ML related work and its estimated budget should follow the guidance outlined in the NP introduction section of this NOFO.

Subprogram Contact:
- Astrid Morreale, astrid.morreale@science.doe.gov

Website: https://science.osti.gov/np/research/

(h) Accelerator Research and Development for NP Facilities

This NP activity supports transformative research and development (R&D) of relevance to current (ATLAS, FRIB, CEBAF) or next generation (e.g., EIC) NP accelerator facilities that include heavy-ion, electron, and proton accelerators and associated systems. Areas of interest include R&D for heavy ion and polarized proton beams, linear accelerators, intense rare isotope beam generation, stable isotope beam generation, and accelerator science and technology for next-generation NP facilities. Research aimed at transformative advances in ion sources, superconducting radiofrequency, and beam cooling is also encouraged, as well as R&D integration which leads to new capability in particle detection.

Accelerator R&D for this subprogram should significantly advance the state-of-the-art capabilities relevance to 1) next generation machines for NP or 2) to improve the performance of existing NP facilities. Particularly, applications in the following areas are encouraged:
- Transformative accelerator R&D in superconducting radiofrequency (SRF) technology for restoring cryomodule performance at SRF-based accelerator facilities. One example is R&D to establish practical and reproduceable in situ plasma processing techniques.
- High performance polarized electron photocathodes and polarized light ion sources.
- Transformative accelerator R&D in next generation ion and electron sources.

Applications may be from a single institution or from a multi-institutional team. If submitting an application for a multi-institutional team, a prime and subaward model with one application submitted by the lead institution is a better fit for applications to this subtopic.

NP anticipates holding a merit review panel of experts to evaluate applications in this subject. The panel is expected to meet in early 2026. Applications submitted by November 14, 2025, will be evaluated by the panel. Applications not submitted in time to be considered by the panel may be considered for funding in a future selection cycle.

Subprogram Contact:
- Manouchehr Farkhondeh, manouchehr.farkhondeh@science.doe.gov

Website: https://science.osti.gov/np/research/

(i) Artificial Intelligence and Machine Learning Applications

This program supports artificial intelligence/machine learning (AI/ML) research and development to accelerate fundamental discoveries, enhance cost savings in NP accelerator

user facilities and experimental programs, and advance massive data interpretation. The NP approach applies AI/ML tools to nuclear physics experiments, simulation, theory, and accelerator operations to expand scientific reach and accelerate discovery. This research area broadly aims at applying scientific AI/ML for intelligent automation and decision support within complex nuclear physics systems and accelerator facilities.

NP is interested in receiving applications aimed at advancing the NP mission through the development of AI ready datasets with the goal of using the power of AI to accelerate progress on addressing fundamental questions on the nature of nuclear matter. Applications should establish the data to be used, the AI-driven approach, and how the project would advance and accelerate NP science beyond current capabilities. Applications should describe the plan to develop and socialize data standards with communities of interest and how datasets will be curated and made accessible, including documentation.

Example science questions:

How do the rich patterns observed in the structure and reactions of nuclei emerge from the interactions of neutrons and protons?

Answering this question requires data collected and disseminated from a diverse suite of scientific instrumentation at NP-supported national user facilities and cross-cutting activities in nuclear chemistry, theoretical physics, engineering, data science, and computer science. Efforts in this domain should reset current limits on automated data collection and data management. Successful scope will make the data and metadata from complex nuclear physics experiments AI-ready for pre-training and fine-tuning of AI models. The resulting outcomes, in addition to accelerating our understanding of nuclear structure and nuclear astrophysics, will also provide curated data broadly available to the SC community through NP's PuRe nuclear data resource.

How do quarks and gluons make up protons, neutrons, and ultimately, atomic nuclei?

NP supports research in hot and cold quantum chromodynamics (QCD). In this science domain, datasets collected by scientific instrumentation at RHIC, CEBAF, and CERN, up to the exabyte scale in size, generate high-dimensional data requiring complex, multi-level analyses to recreate events. Much of these data are unique, as the experiments are difficult or even impossible to repeat. The dominant model at scales probing the structure of an individual proton or neutron is lattice quantum chromodynamics (LQCD), a numerical approach for solving QCD on discrete space-time grids. LQCD is essential for studying strong nuclear forces and computationally intensive. Successful scope will generate AI-ready data across experiments to maximize scientific insights across energy regimes and probes.

Addressing questions #1 and #2 requires unleashing the full potential of DOE-SC

accelerator-based user facilities. AI-management of thousands of accelerator parameters will substantially improve operational efficiency through precise and informed adjustment of accelerator components. Meeting the experimental needs of future machines to achieve unprecedented energies and intensities requires advances in accelerator performance, driven by AI. Successful scope will develop AI-ready data standards for the autonomous control of accelerators and scientific instruments, optimizing the control of complex systems to fast-track scientific discoveries. Establishing data standards that can be broadly applied across SC facilities is a priority, and collaboration with other SC programs is encouraged.

Applications to this subprogram may be from a single institution or from a multi-institutional team, and multi-institutional teaming is encouraged. If applying as a multi-institutional team, a prime and subaward model with one application submitted by the lead institution is a better fit for applications to this subtopic.

NP anticipates holding a merit review panel of experts to evaluate applications in this subject. The panel is expected to meet in early 2026. Applications submitted by November 14, 2025, will be evaluated by the panel. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Subprogram Contact:
- Manouchehr Farkhondeh, manouchehr.farkhondeh@science.doe.gov

Website: https://science.osti.gov/np/research/

(j) Quantum Information Science for Nuclear Physics Research

Quantum Horizons: QIS Research and Innovation for Nuclear Science is a pioneering effort with the primary objective of advancing discovery science at the intersection of NP and QIS. By identifying and coordinating emerging research and applied challenges in both fields, and by leveraging the interdisciplinary nature of quantum computing and QIS, this program creates new opportunities to address complex problems, expanding the frontiers of NP-supported research and fostering innovation vital for scientific advancement.

Successful applications should address at least one of the following topics:

1. Collaborative Experimental Research at the NP-QIS Interface: This research aims to unlock new scientific frontiers through robust collaboration between the Nuclear Physics and Quantum Information Science communities. Applications must clearly demonstrate how merging expertise from academic institutions, national laboratories, and industrial partners will drive innovation and provide a clear path for either:

- Revolutionizing Nuclear Science through Quantum Innovation: Utilizing cutting-edge QIS technologies to achieve breakthroughs in nuclear science. This involves developing quantum-enabled detectors and instruments that exploit distinct quantum

phenomena like superposition, entanglement, and squeezing, thereby providing unprecedented capabilities for sensing, information acquisition, and data processing relevant to nuclear physics.

- Enhancing Quantum Information Science via Nuclear Science Expertise: Leveraging nuclear science knowledge and its specialized infrastructure to significantly advance the foundational components of QIS. Some examples include the design, fabrication, and characterization of novel nuclear-spin-based qubits, and the development of radiation-tolerant quantum device engineering crucial for the resilience and performance of quantum computing and sensing platforms in diverse environments.

2. Theoretical and Algorithmic Research at the NP-QIS Interface: This area supports theoretical and computational research dedicated to leveraging the transformative capabilities of emerging quantum computing technologies—including digital quantum computers, hybrid systems, quantum annealers, and quantum simulators—to address critical challenges in nuclear physics. Applications must rigorously delineate how the integration of QIS principles, through the development of novel quantum algorithms and theoretical frameworks, will enable a more profound and otherwise unattainable understanding of complex nuclear phenomena. An equally critical objective is the advancement of classical algorithms in nuclear physics robust enough to model, challenge, or surpass specific claims of quantum supremacy.

3. Grand Challenges: Supports larger, multidisciplinary teams engaged in sustained, ambitious endeavors aimed at driving paradigm-shifting experimental advancements. Ambitious undertakings could include developing high-precision nuclear clocks or creating fundamentally novel types of nuclear qubits. *Prospective investigators should contact the subprogram contact to present their ideas and organizational entity.*

Applications must adhere to the following guidelines:

- Team Structure: Applications can originate from a single institution or a multi-institutional team. For multi-institutional collaborations, a prime and subaward model, with the lead institution submitting a single consolidated application, is a better fit for applications to this subtopic.
- Interdisciplinary Requirement: Applications with experimental scope must involve researchers from both NP and QIS disciplines. Applications must clearly articulate how the proposed research will generate significant impact in both fields.
- National Laboratory Alignment: Applications that include subawards from Department of Energy (DOE) or National Nuclear Security Administration (NNSA) National Laboratories must explicitly detail how the proposed research aligns with the existing and ongoing scientific activities at the respective laboratory.
- AI/ML Integration: If the application includes AI/ML components, the scope of this work and its estimated budget must conform to the specific guidance provided in the NP

introduction section of this NOFO.
- Relevance to Objectives: Applications that do not clearly articulate the relevance of the proposed research to the NP and QIS objectives within the application narrative will not be considered.

The Quantum Horizons program plans to evaluate applications through either a technical merit review, a panel of experts, or a combination of both. This review is anticipated to take place in early 2026. To be considered for evaluation in this initial review, applications must be submitted by November 28, 2025. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Applicants are strongly encouraged to review recent QIS awards from NP. Those awards can be found at https://science.osti.gov/np/Research/Quantum-Information-Science. To learn more about SC endeavors, visit the QIS Centers webpage https://science.osti.gov/Initiatives/QIS/QIS-Centers and the SC Program Offices QIS webpage https://science.osti.gov/Initiatives/QIS/Program-Offices-QIS-Pages.

Subprogram Contact:
- Gulshan Rai, gulshan.rai@science.doe.gov

Website: https://science.osti.gov/np/Research/Quantum-Information-Science

(k) Generic Detector Research and Development

This activity supports generic detector R&D efforts across the NP portfolio. Primary interest is addressing the scientific requirements for measurements at the future Electron-Ion Collider (EIC) with the goal of advancing R&D on innovative, cost-effective detector concepts that reduce risk and could be incorporated as upgrades to the on-project detector or an envisioned second detector. The EIC project scope includes one detector known as ePIC (https://www.bnl.gov/eic/epic.php). The scientific community is planning for a future second detector (https://indico.bnl.gov/event/18414/) that is off-project. The EIC User Group authored the Yellow Report (https://www.osti.gov/biblio/1764596) that includes requirements for both detectors. Detector technology areas of interest include particle identification, calorimetry, particle tracking, as well as associated readout electronics.

There is also interest in supporting efforts in detector R&D that enhance scientific instrumentation at NP-supported national laboratory and university facilities. Specific detector technology areas include advanced particle and gamma ray tracking as well as time-of-flight measurements.

This program will not duplicate but instead exist synergistically with NP's Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) program.

NP anticipates holding a merit review panel of experts to evaluate applications in this

subject. The panel is expected to meet in early 2026. Applications submitted by November 14, 2025, will be evaluated by the panel. Applications submitted after this deadline will be considered for funding in a future selection cycle.

Subprogram Contact:
- Michelle Shinn, michelle.shinn@science.doe.gov

Website: https://science.osti.gov/np/research/

7. Isotope R&D and Production (IRP)
Program Website: https://science.osti.gov/Isotope-Research-Development-and-Production

The mission of Isotope R&D and Production (IRP) is to ensure American dominance in isotope production through a multi-faceted strategy that includes securing a reliable domestic supply, fortifying critical infrastructure, achieving U.S. science supremacy, and ensuring American isotope independence. Only the basic, fundamental, and use-inspired research portion of the IRP mission is supported by this NOFO. Isotopes are high-priority commodities of strategic importance for the Nation and are essential in medical diagnosis and treatment, discovery science, national security and preparedness, industrial processes and advanced manufacturing, space exploration and communications, biology, archaeology, quantum science, and other fields. Isotopes can directly enable emerging technology and contribute to the economic, technical and scientific strength of the United States.

IRP relies on expertise across numerous technical disciplines to accomplish its mission, including nuclear and radiochemistry, nuclear physics, accelerator and reactor science, materials science and engineering, separations science, nuclear data, and others. IRP utilizes domestic facilities and capabilities throughout the national laboratory complex and at domestic universities for the production and distribution of stable and radioactive isotopes to promote a reliable, domestic supply of isotopes to research, federal, and commercial entities. Facilities utilized by IRP include particle accelerators, nuclear research reactors, enrichment technologies, and radiochemical processing capabilities throughout the national laboratory complex and at universities. Isotope production capabilities are located at Argonne National Laboratory, Brookhaven National Laboratory, Los Alamos National Laboratory, , Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Savannah River National Laboratory, Michigan State University, Texas A&M University, University of Alabama-Birmingham, University of Missouri, University of Washington, and University of Wisconsin-Madison.

IRP supports world-leading R&D associated with creating innovative and more efficient isotope production and processing techniques. Core research competencies associated with the IRP R&D portfolio include radio and nuclear chemistry, advanced targetry, artificial intelligence (AI) and machine learning (ML), robotics, automation and advanced manufacturing concepts. Research, development, and fabrication of equipment directed toward any IRP mission relevant topic may be proposed, but applications including

extensive projects requiring detailed review of scope, budget, and schedule beyond the procedures for this announcement should first be socialized with the Program Office. Additionally, applications should not attempt to bolster the case for facilities or major items of equipment not currently approved for funding or not expected to be available during the proposed work.

While not an exhaustive list, three broad basic, fundamental, and use-inspired research topics of interest to the IRP R&D portfolio are listed below. The topics seek basic research supporting the development of advanced, cost-effective, and efficient technologies for producing, processing (including isotopic separations, and the development of biological tracers), extracting, recycling, and distributing isotopes in short supply as well as aspects related to stable isotopes. Workforce development is viewed as an essential component of the Program's R&D portfolio.

Excluded from this call are applications related to the production of Mo-99 and Pu-238, as these isotopes are under the purview of the National Nuclear Security Administration Office of Materials Management and Minimization and the DOE Office of Nuclear Energy, respectively. Additional information about IRP may be found at: https://science.osti.gov/Isotope-Research-Development-and-Production.

(a) Targetry and Isotope Production Research

Applications to this topic should be focused on basic research supporting novel or improved capabilities for inducing transmutation of atoms in targets to create radioisotopes that strongly align with the IRP mission space. This includes aspects of targetry and target fabrication in a variety of form factors and batch sizes (e.g., milligrams to kilograms), low-loss advanced manufacturing techniques, as well as the development of innovative approaches, including integration of AI and ML techniques to model and predict the purity and processing of stable isotope products as well as the behavior of targets undergoing irradiation to optimize yield and minimize target failures during routine isotope production. It is understood that accelerator- and reactor-based isotope production have different considerations. Applications to this topic can address either production modality. Robotics and advanced manufacturing techniques, as they apply to isotope production and processing, may also be proposed. Studies aimed at the development of automated techniques to enhance the efficiency and safety of materials processing are also encouraged. Uses of AI or ML might include, but are not limited to, multi-physics modeling and advanced manufacturing. All applications should first be discussed with the subprogram contacts listed below.

Subprogram Contacts:
- Ethan Balkin, ethan.balkin@science.doe.gov
- April Gillens, april.gillens@science.doe.gov

Website: https://science.osti.gov/Isotope-Research-Development-and-Production

(b) Nuclear and Radiochemical Separation, Purification and Radiochemical Synthesis

Work in this topic is broadly applicable to basic research supporting the improvement and/or development of novel chemical and physical processes to recover and purify radioisotopes from activated targets or further refinement and purification of stable isotope feedstocks and final products. Applications proposing scopes of work dealing with isotopes resulting from activated targets along with those not necessarily resulting from direct transmutation of target material (e.g., the recovery and purification of radioisotopes from legacy materials, facility components, used nuclear fuel, or waste streams/effluents of other processing efforts) are also considered responsive. Scopes of work should be strongly aligned with the IRP mission space.

Additionally, basic research supporting the development or synthesis of chemical constructs or processes with physical or chemical properties that make them particularly useful in the isotope science landscape (e.g., the synthesis and development of novel chelating agents selective ion trapping ligands, chromatography resins, other novel separation technologies, or methods leading to increased chemical conversion efficiencies for stable isotope feedstocks and/or products) are programmatically very relevant. Development of automated production and processing techniques to enhance the efficiency and safety of radioisotope production and processing (including uses of AI or ML and advanced manufacturing) are also encouraged. It is important to note that the development of purification and separation techniques may, but do not have to, include the handling of radioactive materials or irradiation of targets (e.g., experiments based on surrogate material are acceptable). All applications should first be discussed with the subprogram contacts listed below.

Subprogram Contacts:

- Ethan Balkin, ethan.balkin@science.doe.gov
- April Gillens, april.gillens@science.doe.gov

Website: https://science.osti.gov/Isotope-Research-Development-and-Production

(c) Biological Tracers, Imaging, and Therapeutics

Work in this topic should be focused on basic research supporting the development of isotopes that might be useful as biological tracers, imaging and/or therapeutic agents. The development or modification of chemical constructs which have physical or chemical properties that make them particularly useful with isotopes in this category would also be considered responsive. Included in this topic are the modification of existing agents, synthesis and development of: novel ligands, pharmacokinetic modifying linkers, or other hydrodynamic volume altering compounds. Please note that IRP funds only basic science R&D. Studies investigating the applications of isotopes will not be considered for funding. All applications should first be discussed with the subprogram contact listed below.

Subprogram Contact:
- Ethan Balkin, ethan.balkin@science.doe.gov

Website: https://science.osti.gov/Isotope-Research-Development-and-Production

Multi-Institutional Teams

SC uses two different mechanisms to support teams of multiple institutions.

Collaborative Applications

Teams of multiple institutions may submit collaborative applications. Each submitted application in such a team must indicate that it is part of a collaborative project/group. Every partner institution must submit an application through its own sponsored research office. Each multi-institutional team can have only one lead institution. Each application within the multi-institutional team, including the narrative, starting with the title page, and all required appendices and attachments, must be identical with the following exceptions:
- Each application must contain a correct SF-424 (R&R)[5] cover page for the submitting institution only.
- Each application must contain a unique budget corresponding to the expenditures for that application's submitting institution only.
- Each application must contain a unique budget justification corresponding to the expenditures for that application's submitting institution only.
- Each application must contain a Project/Performance Site Location(s) form for the submitting institution and its subawards.
- Each application must include a list for the Identification of Merit Review Conflicts for the submitting institution's senior/key personnel and its subawards' senior/key personnel.
- Each application must include a Research and Related Senior/Key Person Profile

5 The Standard Form 424 (SF-424) family of forms is used to apply for Federal financial assistance through https://www.Grants.gov. The Research and Related (R&R) set of forms is used by the Office of Science.

(Expanded) form with the biographical sketches and current and pending support from that institution's senior/key personnel. The applicant leading the multi-institutional team must include biographical sketches and current and pending support from each institution's senior/key personnel.

Our intent is to create from the various applications associated with a multi-institutional team one document for merit review that consists of the common, identical materials combined with a set of detailed budgets from the partner institutions. Each team member's application must contain the same project title. Team members may use Grants.gov Workspace(s), webforms, and their system-to-system services in any combination.

SUBAWARDS[6]

Multi-institutional teams may submit one application from a designated lead institution with all other team members proposed as subrecipients.

DOE/National Nuclear Security Administration (NNSA) National Laboratories[7], other Federal agencies, and another Federal agency's FFRDCs[8], if participating in a team led by another institution, may be proposed as subrecipients.

Note that the value of any such proposed subaward may be removed from any such prime award: DOE may make separate awards to Federally affiliated institutions.

DISTINGUISHING BETWEEN COLLABORATIVE APPLICATIONS AND SUBAWARDS

The following points of advice to applicants may be helpful:

1. Both collaborative applications and proposed subawards are methods by which multiple institutions can work together to reach the scientific objectives described in this NOFO. Choose the appropriate structure based on the nature of the scientific work being proposed. If multiple institutions will be functioning as a network of peer-level researchers, a collaborative structure would be more appropriate. If multiple institutions will be functioning with leadership and direction coming from one institution, a subaward arrangement would be more appropriate.
    a. Collaborative applications are assembled from multiple identical applications submitted by the proposing institution. Such applications may be submitted under this NOFO in Grants.gov. The multiple applications will be assembled into one joint collaborative application, which will be merit-reviewed as one

6 Subawards are made to subrecipients. Both terms are defined in 2 CFR 200.1 (https://www.ecfr.gov)
7 The phrase "National Laboratories" is used broadly to encompass DOE/NNSA laboratories and sites capable of performing the work described in this NOFO and capable of receiving funds through the DOE Field Work System.
8 An authoritative list of all Federally Funded Research and Development Centers (FFRDCs) may be found at https://www.nsf.gov/statistics/ffrdclist/

document, with recommendations to fund or decline the application made at the level of each independent application.

b. Subawards exist when multiple institutions work together to submit one application with a designated prime recipient and multiple potential subrecipients.
c. DOE/NNSA National Laboratories, other Federal agencies, and another Federal agency's FFRDCs may be proposed as subrecipients, but the value of any such proposed subaward may be removed from any such prime award: DOE will often make separate awards to Federally affiliated institutions.

2. A well-thought-out research plan and its associated budget(s) should leave no confusion about which institution will do which parts of the research.

Open Science

SC is dedicated to promoting the values of openness in Federally supported scientific research, including, but not limited to, ensuring that research may be reproduced and that the results of Federally supported research are made available to other researchers. These objectives may be met through any number of mechanisms including, but not limited to, data access plans, data sharing agreements, the use of archives and repositories, and the use of various licensing schemes.

The use of the phrase "open-source" does not refer to any particular licensing arrangement, but is to be understood as encompassing any arrangement that furthers the objective of openness.

All entities submitting applications to this NOFO must recognize the moral and legal obligations to comply with export controls and policies that limit the transfer of technologies with potential dual use. Applicants are reminded that international activities must comply with nonproliferation, sanction, and other protocols described at https://www.trade.gov/export-solutions. International activities related to special nuclear materials (SNM) are subject to additional requirements. Please see 10 CFR 810 for further information. All work proposed under this NOFO must be for basic and fundamental research whose results may be published in scholarly literature. Do not submit applications containing restricted data or unclassified controlled nuclear information as defined in the Atomic Energy Act of 1954, as amended, 42 USC 2011, et seq., 10 CFR 1017, 10 CFR 1045.

B. Program Goals, Objectives, and Priorities

The Office of Science's (SC) mission is to deliver scientific discoveries and major scientific

tools to transform our understanding of nature and advance the energy, economic, and national security of the United States (U.S.). SC is the Nation's largest Federal sponsor of basic research in the physical sciences and the lead Federal agency supporting fundamental scientific research for our Nation's energy future.

SC accomplishes its mission and advances national goals by supporting:

- The frontiers of science—exploring nature's mysteries from the study of fundamental subatomic particles, atoms, and molecules that are the building blocks of the materials of our universe and everything in it to the DNA, proteins, and cells that are the building blocks of life. Each of the programs in SC supports research probing the most fundamental disciplinary questions.
- The 21st Century tools of science—providing the nation's researchers with 28 state-of-the-art national scientific user facilities, the most advanced tools of modern science, propelling the U.S. to the forefront of science, technology development, and deployment through innovation.
- Science for energy and the environment—paving the knowledge foundation to spur discoveries and innovations for advancing the Department's mission in energy and environment. SC supports a wide range of funding modalities from single principal investigators to large team-based activities to engage in fundamental research on energy production, conversion, storage, transmission, and use, and on our understanding of the earth systems.

SC is an established leader of the U.S. scientific discovery and innovation enterprise. Over the decades, SC investments and accomplishments in basic research and enabling research capabilities have provided the foundations for new technologies, businesses, and industries, making significant contributions to our nation's economy, national security, and quality of life.

C. Award Contribution to Goals and Objectives

Awards resulting from this NOFO are intended to increase our understanding of scientific phenomena.

D. Performance Goals

You will be expected to demonstrate progress toward increasing knowledge in periodic progress reports.

E. Substantial Involvement

Either a grant or cooperative agreement may be awarded under this NOFO. If the award is a cooperative agreement, the DOE contract specialist/grants management specialist and DOE program manager will negotiate a Statement of Substantial Involvement prior to award.

F. Program Unallowable Costs

You must apply the cost principles of 2 CFR 200, as modified by 2 CFR 910 and 10 CFR 605, to your application and any resulting award.

G. Citations to Statute and Regulations

The programmatic authorizing statutes and governing regulations are:
Section 646 of Public Law 95-91, U.S. Department of Energy Organization Act
Section 901, et seq. of Public Law 109-58, Energy Policy Act of 2005
Section 401 of Public Law 115-368, National Quantum Initiative Act
Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, codified at 2 CFR 200
U.S. Department of Energy Financial Assistance Rules, codified at 2 CFR 910
U.S. Department of Energy, Office of Science Financial Assistance Program Rules, codified at 10 CFR 605
U.S. Department of Energy Other Transaction Agreements Rulse, codified at 2 CFR 930

H. Program History

You can learn about SC's history at https://science.osti.gov/About/History. You can read about our achievements at https://science.osti.gov/Science-Features/Science-Highlights. You can find information about all of our awards at https://pamspublic.science.energy.gov/WebPAMSExternal/interface/awards/AwardSearchExternal.aspx.

I. Other Information

Anticipated Award Size

The award size will depend on the number of meritorious applications and the availability of appropriated funds. Historically, awards from $5,000 to $5,000,000 have been made in response to the NOFO.

Period of Performance

DOE anticipates making awards with a project period of six months to five years, with the most common project period being three years.

Continuation funding (funding for the second and subsequent budget periods) is contingent on: (1) availability of funds appropriated by Congress and future year budget authority; (2) progress towards meeting the objectives of the approved application; (3) submission of

required reports; and (4) compliance with the terms and conditions of the award.

Award Budget Periods

SC is committed to distributing workloads (internally and externally) across as much of the calendar as is practical. Accordingly, awards made under this NOFO will generally be made with budget periods that end between December 1 and June 30. New awards may be made with a first budget period of more than 12 months. Renewal awards may be made with first budget periods that may be longer or shorter than 12 months.

Applicants should prepare budgets with 12-month budget periods. Actual start dates and cycle dates will be negotiated if an application is recommended for award. Budget periods will generally not be made for less than 9 months or more than 18 months.

IV. Application Contents and Format

A. Preliminary Submissions

1. Letter of Intent (LOI)

Not applicable.

2. Pre-application

PRE-APPLICATION DUE DATE

Pre-applications may be submitted at any time while this NOFO is available. Note that some topics may have required or strongly encouraged submissions by specified dates if an application is to be considered by a review panel.

A pre-application (also called white paper) is recommended but optional. Before submitting a pre-application, read the information in Section III of this NOFO carefully to make sure your idea is responsive and to select the topical subprogram most relevant to your idea.

You will be required to select a program manager when you submit your pre-application using the DOE SC Portfolio Analysis and Management System (PAMS) website. Choose the subprogram contact for the topical area most relevant to your idea from those listed in Section III of this NOFO.

Feedback from DOE to the principal investigator is optional, but you are encouraged to use your submitted pre-application/white paper to initiate a discussion with the listed program manager about the appropriateness of the proposed research for this solicitation.

If a multi-institutional team is submitting collaborative applications, only the lead institution may submit a pre-application.

The pre-application must begin with a title page that will not count toward the pre-application page limitation. Include, at the top of the first page, the following information:

Title of Pre-application
Principal Investigator Name, Job Title
[Lead] Institution
PI Phone Number, PI Email Address
NOFO Number: Include the NOFO Number indicated on the cover of this NOFO
Include a list of all senior/key personnel at the applicant and, if applicable, team member institutions

This information must be followed by a clear and concise description of the objectives and technical approach of the proposed research. The pre-application may not exceed three pages, when printed using standard letter-size (8.5-inch x 11-inch) paper with 1-inch margins (top, bottom, left, and right). The body text font must not be smaller than 11 point. Figures and references, if included, must fit within the three-page limit.

In addition, the pre-application must include a listing of senior/key personnel and a listing of individuals who should not serve as merit reviewers of a subsequent application. Detailed instructions for how to craft the required listings are provided in Section IX of this NOFO. Note that the listing of individuals who should not serve as merit reviewers is rarely empty because the instructions contain mandatory inclusions requirements. This listing will not count toward the pre-application's page limit. The list of individuals must be included as an "Additional Attachment" to your pre-application in PAMS.

The pre-application must be machine-readable. Do not submit a scanned image of a printed document.

The absence of a pre-application will not negatively affect a thorough evaluation of a responsive application submitted in a timely fashion.

Pre-Application Submission

Pre-applications are created in the software system of your choice and must be submitted electronically through the DOE SC Portfolio Analysis and Management System (PAMS) website https://pamspublic.science.energy.gov/. You cannot draft or edit a pre-application in PAMS. Do not submit a pre-application through FedConnect or Grants.gov.

Pre-applications may be submitted by a PI or by other users at the PI's institution with the "Submit to DOE" privilege in PAMS.

Applicants are strongly encouraged to inform their DOE Program Manager if teaming arrangements, proposed personnel, topics, or the anticipated title change between submitting the pre-application and when an application is submitted, to ensure that their application is properly linked to their pre-application and that reviewers are properly assigned to the application.

Detailed instructions about how to submit a pre-application are in Section IX of this NOFO.

B. Application

Applications in response to this NOFO must be submitted through Grants.gov. Detailed instructions for registering in and using Grants.gov are in Section IX of this NOFO.

C. Component Pieces of the Application

Letters of Collaboration or Access

Letters from collaborators or from institutions providing access to data, models, software, equipment and/or facilities may be appended to your Project Narrative and are not considered part of the Project Narrative's page limit. Please ensure that letters from collaborators or from institutions providing access to data, models, software, equipment and/or facilities only describe the nature of the collaboration or the access to data, models, software, equipment and/or facilities. Letters of recommendation are not allowed in applications under this NOFO.

Letters of collaboration or access should be placed in Appendix 7 (Other Attachments). Letters of collaboration or access must not be written as recommendation or endorsement letters, which are not allowed. Each letter of collaboration or access may contain two and only two sentences and must use the following format:

> Dear <Principal Investigator Name>:
>
> If your application entitled, "<Application Name>," is selected for funding under the FY 2026 Continuation of Solicitation for the Office of Science Financial Assistance Program, it is my intent to collaborate in this research by <Complete Sentence With a Very Short Description of What the Collaborator Offers to Do or Provide>.
>
> Thank you for the opportunity to participate.
>
> Sincerely,
>
> <Collaborator's Name and Signature Block>

Scientific User Facilities

Documentation from any SC scientific user facility (https://science.osti.gov/User-Facilities) may be provided with other letters of collaboration or access in Appendix 7.

If the proposed research includes activities at the DIII-D National Fusion Facility, a U.S. DOE Office of Science user facility, then a Record of Discussion from the facility must be included in the submission. The Record of Discussion documents potential resources required by the facility to support the proposed research scope. Information on the Record of Discussion process at DIII-D is available at https://d3dfusion.org/become-a-user/ under the "Records of Discussion" header. A Record of Discussion form is available for download from that site.

1. SF-424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 is available on the DOE Financial Assistance Forms Page at https://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Certifications and Assurances[9]. Applicants are bound by their representations and certifications in SAM.gov.

TYPE OF SUBMISSION (FIELD 1)

Select the checkbox for "Application" for an initial submission. Select the checkbox for "Changed/Corrected Application" if submitting an updated version of an application. Do not submit pre-applications via Grants.gov: Do not select the checkbox for "Pre-application."

IDENTIFYING NUMBERS (FIELD 4)

For renewals and supplemental funding, enter the DOE award number in Field 4a. Do not enter any other number in Field 4a. Do not enter anything in Field 4b. If submitting an updated version of an application, you may enter the previous Grants.gov Tracking ID in Field 4c, though this is not required.

UEI AND EIN NUMBERS (FIELDS 5 AND 6)

The Uniform Entity Identifier (UEI) and Employer Identification Number (EIN) fields on the SF-424 (R&R) form are used in PAMS to confirm the identity of the individual or organization submitting an application.

- Enter the UEI as a 12-digit alpha-numerical sequence.
- Enter the EIN as a nine-digit number.
- Do not use hyphens or dashes.
- SC does not use the 12-digit EIN format required by some other agencies.
- Applications will not be rejected if an applicant's system-to-system service uses a 12-digit EIN format or inserts hyphens or dashes in an EIN.

TYPE OF APPLICATION (FIELD 8)

A new application is one in which DOE support for the proposed research is being requested for the first time. A renewal application requests additional funding for a period of time following a current award. If the application requests a significant change in the scope of work, please consult with the Program contact identified in this NOFO to determine if the application should be considered new or a renewal.

9 No separate form or submission is required for the Certifications and Assurances.

SC does not make use of the Resubmission or Continuation options.

Applications for supplemental support of an existing award should be marked as "Revision."

Please answer "yes" to the question "Is this application being submitted to other agencies?" if substantially similar, identical, or closely related research objectives are being submitted to another Federal agency. Indicate the agency or agencies to which the similar objectives have been submitted.

Do not attach pre-applications to Field 20 of the SF-424(R&R) form or letters of intent to Field 21 of the SF-424(R&R) form.

DOE will accept new, renewal, and supplemental applications under this NOFO. Information about how to distinguish between new and renewal applications is located in Section IX.

Applications for supplemental funding to existing SC awards compete for funding with all other applications submitted under this NOFO. Applications for supplemental funding may be made in two broad types:

1. Supplemental funding. Such applications must indicate that they are being made to request additional funding and must describe how the additional funds will be used. These applications must mark the box for "A. Increase Award" in Field 8 of the SF-424 (R&R) application form.
2. Supplemental funding with additional time. Such applications must also indicate the need for additional time. These applications must mark the boxes for "A. Increase Award" and "C. Increase Duration" in Field 8 of the SF-424 (R&R) application form.

Regardless of whether or not an application for supplemental funding requests additional time, the application may propose a change in the scope of the award. If, in SC's determination, an application for supplemental funding proposes a change in scope, the application will be subject to merit review.

Applications for supplemental funding must include the existing award number in Field 4.a. of the SF-424 (R&R) application form and indicate that the type of application is a "Revision" in Field 8 of the SF-424 (R&R) application form.

Applicants intending to submit an application for supplemental funding are strongly encouraged to consult their DOE Program Manager before submitting the application.

Applications for supplemental funding to an existing SC award are typically intended to address extraordinary or unexpected circumstances, and may include, but are not limited to,

requests for:

- Support for additional personnel (e.g., graduate students, postdocs, research technicians or equivalent).
- Replacing or repairing equipment (items with a useful life of more than 12 months and a per-item acquisition cost of more than $10,000) required to conduct proposed research.
- Previously unrequested travel for project personnel to attend one or more user facility, scientific conference, workshop, or professional society meetings relevant to the proposed research.
- Support for temporary personnel to continue productivity of work while project personnel are on extended leave in accordance with the recipient institution's policies, whether for family, parental, military service, or other extended leave. *Note that the disengagement of a PI or other senior/key personnel for more than three months (or 25% of their approved effort) requires agency prior approval, separate from the request for supplemental funds.*
- Purchase of new equipment or modification of existing equipment, and/or the provision of services necessary to enable work to be carried out by project personnel with disabilities.
- Support for increased costs for previously budgeted and approved materials, supplies, or equipment.

All costs requested in a budget must conform to the applicable cost principles.

2. Research and Related Other Project Information

Complete questions in Fields 1 through 6 of the SF-424 Research and Related Other Project Information form.

> Note regarding question 4.a. and 4.b.:
>
> If any environmental impact, positive or negative, is anticipated, indicate "yes" in response to question 4.a., "potential impact – positive or negative - on the environment." Disclosure of the impact should be provided in response to question 4.b. First indicate whether the impact is positive or negative and then identify the area of concern (e.g., air, water, exposure to radiation, impacts to endangered species or historic properties, etc.).
>
> For actions that could have adverse impacts to the environment or have any possibility for adverse impacts to human health (e.g., use of human subjects, Biosafety Level 3-4 laboratory construction/operation, manufacture or use of certain nanoscale materials which are known to impact human health, or any activities involving transuranic or high level radioactive waste, or use of or exposure to any radioactive materials beyond de minimis levels), applicants should indicate a "negative" impact on the environment.

Lastly, based on requirements and guidance in 10 CFR 1021.102 and DOE's NEPA Implementing Procedures, to find that a proposal is covered by a categorical exclusion (CX), DOE will determine: (1) the proposal fits within one or more classes of actions for which CXs are permissible, (2) there are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal (DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the CX would apply), and (3) the proposal has not been segmented to meet the definition of a CX.

The bulk of your application will consist of files attached to the Research and Related Other Project Information form. The files must comply with the following instructions:

PROJECT SUMMARY/ABSTRACT (FIELD 7 ON THE FORM)

The project summary/abstract is a summary of the proposed activity suitable for distribution to the public and sufficient to permit potential reviewers to identify conflicts of interest. It must be a self-contained document. The project summary/abstract must be comprised of:

- The project title, the PI name and the PI's institutional affiliation, and any coinvestigators and their institutional affiliations. This information will not count toward the abstract's one-page limit.
- This information must be followed by a statement of the project's objectives, a description of the project, including methods to be employed, and the potential impact of the project (i.e., benefits, outcomes).
- The description of the proposed research may not exceed one page (excluding Project Title and list of investigators) when printed using standard letter-size (8.5-inch x 11-inch) paper with 1-inch margins (top, bottom, left, and right). The body text font must not be smaller than 11 point. Figures and references, if included, must fit within the one-page limit.

A sample is provided below:

Project Title

A. Smith, Lead Institution (Principal Investigator)
A. Brown, Institution 2 (Co-Investigator)
A. Jones, Institution 3 (Co-Investigator)

Text of abstract (no more than one page, excluding Project Title and list of investigators)

If an application is recommended for award, the project summary will be used in preparing

a public abstract about the award. Award abstracts and titles form a Government document that describes the project and justifies the expenditure of Federal funds in light of the DOE and SC mission statements at https://energy.gov/mission and https://science.osti.gov/about/.

- Do not include any proprietary or sensitive business information.
- DOE may use the abstract to prepare public reports about supported research.

DOE TITLE PAGE
(PART OF PROJECT NARRATIVE ATTACHED TO FIELD 8 ON THE FORM)

The application narrative must begin with a title page. The title page must include the following items:

- The project title:
- Applicant/Institution:
- Street Address/City/State/ZIP:
- Postal Address:
- Lead PI name, telephone number, email:
- Administrative Point of Contact name, telephone number, email:
- NOFO Number: Include the NOFO number printed on the cover of this NOFO.
- DOE/SC Program Office:
- DOE/SC Program Office Technical Contact:
- DOE Award Number (if Renewal Application):
- PAMS Pre-application tracking number (if applicable):
- Research area or areas as identified in Section III of this NOFO:

Senior/Key Personnel

- Senior/Key Personnel Name, Institution
- Senior/Key Personnel Name, Institution
- Senior/Key Personnel Name, Institution
- …

Institution	Year 1 Budget	Year 2 Budget	Year … Budget	Total Budget

Important Instructions to the Sponsored Research Office of Submitting Institutions: SC requires that you create one single machine-readable PDF file that contains the DOE Title Page, Project Narrative, all required appendices, and other attachments. This single PDF file may not be scanned from a printed document and must be

attached in Field 8 on the Grants.gov form. This must be a plain PDF file consisting of text, numbers, and images without editable fields, signatures, passwords, redactions, or other advanced features available in some PDF-compatible software. Do not use PDF portfolios or binders. The Project Narrative will be read by SC staff using the full version of Adobe Acrobat: Please ensure that the narrative is readable in Acrobat. If combining multiple files into one Project Narrative, ensure that a PDF portfolio or binder is not created. If creating PDF files using any software other than Adobe Acrobat, please use a "Print to PDF" or equivalent process to ensure that all content is visible in the Project Narrative. Once a Project Narrative has been assembled, please submit the combined Project Narrative file through a "Print to PDF" or equivalent process to ensure that all content is visible in one PDF file that can be viewed in Adobe Acrobat. Do not attach any of the appendices listed in this paragraph separately in any other field in Grants.gov. If you do, these additional attachments will not become part of the application in PAMS.

TITLE PAGE SUPPLEMENT FOR COLLABORATIVE APPLICATIONS
(PART OF PROJECT NARRATIVE ATTACHED TO FIELD 8 ON THE FORM)

If a multi-institutional team is submitting collaborative applications, provide the following information on a separate page as a supplement to the title page. This page will not count toward the Project Narrative page limitation.

- List all institutions by name with each institution's PI on the same line.
- Indicate the lead PI who will be the point of contact and coordinator for the combined research activity.
- Provide a statement explaining the leadership structure of the team.
- Include a description of each institution's facilities, equipment, and resources that will be made available to the team.
- If applicable, explain how students and early-stage researchers will be trained and mentored by senior researchers.
- Include a table modeled on the following chart providing summary budget information from all institutions. Provide the total costs of the budget request in each year for each institution and totals for all rows and columns.

	Names	Institution	Year 1 Budget	Year 2 Budget	Year … Budget	Total Budget
Lead PI						
Co-PI						
Co-PI						
Co-PI						

Example budget table ($ in thousands)

* Note that collaborating applications must be submitted separately.

PROJECT NARRATIVE (FIELD 8 ON THE FORM)

The Project Narrative consists of technical information, including charts, graphs, maps, photographs, and other pictorial presentations, on standard letter-size (8.5-inch x 11-inch) paper with 1-inch margins (top, bottom, left, and right). The body text font of all main text must not be smaller than 11 point.

Do not include any websites (URLs) that provide supplementary or additional information that constitutes a part of the application. Merit reviewers are not required to access websites; however, Internet publications in a list of references will be treated identically to print publications. See Section IX of this NOFO for instructions on how to mark proprietary application information. To attach a Project Narrative, click "Add Attachment."

The Project Narrative comprises the research plan for the project. It should contain enough background material in the Introduction, including a brief review of the relevant literature and any prior research in this area, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including the hypothesis to be tested and details of the methods to be used. It should also include a timeline for the major activities of the proposed project and should indicate which project personnel will be responsible for which activities. There should be no ambiguity about which personnel will perform particular parts of the project, and the time at which these activities will take place.

The following organization of the Project Narrative is suggested:

- Background/Introduction: Explanation of the importance and relevance of the proposed work as well as a review of the relevant literature.
- Project Objectives: This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.
- Progress Report (for Renewal Applications Only): The Project Narrative of a renewal application must include a separate section that includes a description of results of the work accomplished during the current project period (since the last new or renewal award), an analysis of how the results relate to the activities proposed to be undertaken during the renewal period, and a description of any changes that affected the overall direction of the research being performed. Include an estimate of any remaining funds from the current project period at its anticipated end.
- Proposed Research and Methods: Identify the hypotheses to be tested (if any) and details of the methods to be used including the integration of experiments with theoretical and computational research efforts.

Buy America Requirement for Infrastructure Projects

Awards funded through this NOFO that are for, or contain, construction, alteration, maintenance, or repair of public infrastructure in the United States undertaken by applicable recipient types, require that:

- All iron, steel, and manufactured products used in the infrastructure project are produced in the United States; and
- All construction materials used in the infrastructure project are manufactured in the United States.

Applicants should consult 2 CFR 184 and Section IX of this NOFO to determine whether the Buy America Requirement applies and if they should consider the application of the Buy America Requirement in the proposed project's budget and/or schedule.

Within the first two (2) pages of the Project Narrative, include a short statement on whether the project will involve the construction, alteration, maintenance and/or repair of public infrastructure in the United States. See Section IX of this NOFO for applicable definitions and other information regarding Infrastructure Projects and the Buy America Requirement.

The Project Narrative is considered the intellectual work of the proposed researchers. Concurrent submission of the same or substantially similar narratives attributed to different researchers may constitute academic dishonesty or research misconduct. Submission of a Project Narrative that is not the work of the proposed researchers, including machine-generated Project Narratives, may constitute academic dishonesty or research misconduct.

SC will apply a "fair-use" concept regarding the use of generative artificial intelligence to support investigators' efforts in presenting their intellectual work in an application. Guided by the principles expressed by others (https://www.acm.org/publications/policies/frequently-asked-questions and https://journals.ieeeauthorcenter.ieee.org/become-an-ieee-journal-author/publishing-ethics/guidelines-and-policies/submission-and-peer-review-policies/#ai-generated-text), applicants must disclose the use of any artificial intelligence tools in applications, unless the tools were used solely for editing an original draft.

For Collaborative Applications Only: Each institution in a multi-institutional team submitting collaborative applications must submit an identical common narrative, including all appendices. Collaborative applications will necessarily be longer than single-institution applications. The common narrative must identify which tasks and activities will be performed by which of the institutions in every budget period of the proposed project. The budget and the budget justification—which are unique to each institution—may refer to parts of the common narrative to

further identify each institution's activities in the joint project. There should be no ambiguity about each institution's role and participation in the team.

SC will use the multiple applications associated with a multi-institutional team to create one consolidated document for merit review that consists of the common, identical application materials, a set of detailed budgets from the partner institutions, and the senior/key personnel form (with attached biographical sketches and current and pending support statements). It is very important that every Project Narrative in the team be identical (including the title).

Do not attach any of the requested appendices described below as files for Fields 9, 10, 11, and 12 on the SF-424 Research and Related Other Project Information form in Grants.gov. Follow the below instructions to include the information as appendices in the single Project Narrative file.

Biographical sketches and current and pending support may no longer be provided as attachments to a Project Narrative. These documents must be attached to the Research and Related Senior/Key Person Profile (Expanded) form in an application.

APPENDIX 1: BIBLIOGRAPHY & REFERENCES CITED

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. For research areas where there are routinely more than 10 coauthors of archival publications, you may use an abbreviated style such as the *Physical Review Letters* (PRL) convention for citations (listing only the first author). For example, your paper may be listed as, "A Really Important New Result," A. Aardvark et. al. (MONGO Collaboration), PRL 999. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. Provide the Bibliography and References Cited information as an appendix to your Project Narrative.

- Do not attach a bibliography to Field 9 of the Research and Related Other Project Information form.

APPENDIX 2: FACILITIES & OTHER RESOURCES

This information is used to assess the capability of the organizational resources, including subrecipient resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and

the extent to which they would be available to the project. For proposed investigations requiring access to experimental user facilities maintained by institutions other than the applicant, please provide a document from the facility manager confirming that the researchers will have access to the facility. Such documents, provided that they do not become letters of support or recommendation, may be printed on any letterhead. Please provide the Facility and Other Resource information as an appendix to your Project Narrative.

- Do not attach a facilities and other resources statement to Field 10 of the Research and Related Other Project Information form.

APPENDIX 3: EQUIPMENT

List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. Provide the Equipment information as an appendix to your Project Narrative.

- Do not attach an equipment statement to Field 11 of the Research and Related Other Project Information form.

APPENDIX 4: DATA MANAGEMENT AND SHARING PLAN

Provide a Data Management and Sharing Plan (DMSP) as an appendix to the Project Narrative. DMSPs are not required for applications that only request support for a conference, workshop, or scientific meeting. Subject to the applicable cost principles, applications may request costs necessary for implementing the DMSP.

- Do not attach a separate file to Field 12 of the Research and Related Other Project Information form.

The standard requirements for a DMSP may be found in Section IX of this NOFO. In addition, the DMSP should specifically address:

- How FAIR (Findable, Accessible, Interoperable, and Reusable)[10] principles will apply to the anticipated data sets, software[11], and models[12] to be developed.
- What developed software, data sets, and models will be made available using an "opensource" licensing arrangement, noting the Software Package Data Exchange

[10] Wilkinson, M. D. et al. The FAIR Guiding Principles for Scientific Data Management and Stewardship. Sci. Data
3:160018, 2016. https://doi.org/10.1038/sdata.2016.18

[11] Chue Hong, N. P., Katz, D. S., Barker, M., Lamprecht, A-L, Martinez, C., Psomopoulos, F. E., Harrow, J., Castro, L. J., Gruenpeter, M., Martinez, P. A., Honeyman, T., et al. (2022). FAIR Principles for Research Software version 1.0. (FAIR4RS Principles v1.0). Research Data Alliance. DOI: https://doi.org/10.15497/RDA00068

[12] Ravi, N., Chaturvedi, P., Huerta, E.A. et al. FAIR principles for AI models with a practical application for accelerated high energy diffraction microscopy. Sci Data 9, 657 (2022). https://doi.org/10.1038/s41597-022-01712-9

(SPDX) identifier(s) (https://spdx.org/licenses/) when possible, and where deviation in this arrangement is expected from The Open Source Initiative's "Open Source Definition" (https://opensource.org/osd), a specific justification must be provided.
- How best practices in scientific software development will be applied to any development activities. For more information on best practices, see Better Scientific Software (https://bssw.io/).

Appendix 5: Synergistic Activities (Optional)

In addition to biographical sketches in the Common Format, each senior/key person may provide a one-page list of no more than five distinct examples of synergistic activities that demonstrate the individual's professional and scholarly activities that focus on the integration, transfer, and creation of knowledge as related to the application.

- Do not attach a separate file to Field 12 of the Research and Related Other Project Information form.
- This appendix may not exceed a limit of the same number of pages as senior/key personnel when printed using standard letter-size (8.5-inch x 11-inch) paper with 1-inch margins (top, bottom, left, and right).

Appendix 6: Transparency of Foreign Connections

As an appendix to your Project Narrative, applicants must provide the following information as it relates to the proposed recipient and subrecipient(s). Include a separate disclosure for the applicant and each proposed subrecipient.

Disclosure exceptions by entity type:

- U.S. National Laboratories and domestic government entities are not required to respond to the Transparency of Foreign Connections disclosure.
- Institutions of higher education and non-profit research organizations are only required to respond to items with an asterisk symbol (*).

Applicants, regardless of entity type, must provide complete responses for all proposed subrecipients that are not U.S. National Laboratories, domestic government entities, or institutions of higher education.

Disclosure Format: For the convenience of the entity providing the disclosure and certification a template is available at Transparency of Foreign Connections | Department of Energy, however, the entity is not required to use this specific format. If another format is used, the signatory must include the same substantive information, a signature, date, and the certification statement provided at Transparency of Foreign Connections | Department of Energy.

Questions: Contact rtesinfo@hq.doe.gov

DOE reserves the right to request additional or clarifying information based on the information submitted.

Appendix 7: Other Attachment

If you need to elaborate on your responses to questions 1-6 on the "Other Project Information" document, please provide the Other Attachment information as an appendix to your Project Narrative. Information not easily accessible to a reviewer may be included in this appendix, but do not use this appendix to circumvent the page limitations of the application. Reviewers are not required to consider information in this appendix.

- Do not attach a separate file to Field 12 of the Research and Related Other Project Information form.

Reminders Regarding all Appendices

- Follow the above instructions to include the information as appendices to the Project Narrative file.
- Do not attach any appendices to Fields 9, 10, 11, or 12.

3. Research and Related Senior/Key Person Profile (Expanded)

Complete the Research and Related Senior/Key Person Profile (Expanded) form in accordance with the instructions on the form and the following instructions. Complete this form before the Budget form to populate data on the Budget form.

You must submit this information for the PI and all senior/key personnel who will be identified by name in Section A of the application's budget. List all other personnel who contribute in a substantive, meaningful way to the scientific development or execution of the project, whether or not salaries are requested. Consultants should be included in this "Senior/Key Person Profile (Expanded)" Form if they meet this definition. List individuals that meet the definition of senior/key regardless of what organization they work for. Senior/key personnel must be aware that they are included in the application and must agree to perform the work if awarded. The form will pre-populate with the PI identified on the SF-424(R&R) form. For each senior/key person:

- Complete the required sections in their profile.
- In the "credential" field, enter the person's PAMS username, if known.
- Attach the person's biographical sketch, following the instructions in Section IX of this NOFO for crafting a biographical sketch.
- Attach the person's current and pending support, following the instructions in Section IX of this NOFO for crafting current and pending support.

The Senior/Key Person Profile (Expanded) form will support the PI and up to 99 additional senior/key personnel. On the addition of the 99th senior/key person, you will be presented

with an option to upload an additional file with the required information for all other senior/key personnel.

4. Research And Related Budget

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. All fields with a red border are required, but you may enter a zero "0" in any field in which funds are not being requested. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this NOFO.

Additional information is found in Section IX of this NOFO.

BUDGET JUSTIFICATION (FIELD L ON THE FORM)

Provide a justification that explains all costs proposed in the budget. The following items of advice are offered to assist you in developing a justification.

- Organize the justification by listing items in the same order as presented on the budget.
- Ensure that the narrative matches the budget in dollar amounts and language.
- Explain the line items. If costs are estimated, provide a basis for the estimate. Explain if costs are based on prior experience of similar activities. If a cost is based on the product of two numbers (such as a number of items at a per-item price), ensure that your math is correct.
- If including an inflationary factor for future budget periods, explain the basis for the inflationary factor.

Provide any other information you wish to submit to justify your budget request. Including items in the budget justification is not considered a form of cost-sharing: Provide the details of all personnel (key or other) who will be working on the award, regardless of their source(s) of compensation. Explain their source(s) of compensation if it is not from this award. Include the indirect cost rate agreement as a part of the budget justification.

Attach a single budget justification file for the entire project period in Field L. The file automatically carries over to each budget year.

Additional information is found in Section IX of this NOFO.

5. R&R Subaward Budget Attachment(s) Form

Budgets for Subawards: You must provide a separate R&R budget and budget justification for each subrecipient. Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET ATTACHMENT(S) FORM and either email it to each subrecipient that is required to submit a separate budget or use the collaborative features of Workspace. After the subrecipient has either emailed its completed budget back to you or completed it within Workspace, attach it to one of the blocks provided on the form. All fields with a red border are required, but you may enter a zero "0" in any field in which funds are not being requested. Use up to 10 letters of the subrecipient's name (plus.pdf) as the file name (e.g., ucla.pdf or energyres.pdf). Filenames must not exceed 50 characters.

If the project involves more subrecipients than there are places in the SUBAWARD BUDGET ATTACHMENT(S) FORM, the additional subaward budgets may be saved as PDF files and appended to the Budget Justification attached to Field L.

Applicants should consult their local information technology ("IT") support resources for any necessary assistance in converting the forms downloaded from Grants.gov into plain PDF files that can be combined into one non-Portfolio PDF file (the Budget Justification).

Ensure that any files received from subrecipients are the PDF files extracted from the SUBAWARD BUDGET ATTACHMENT(S) FORM. Errors will be created if a subrecipient sends a prime applicant a budget form that was not extracted from the application package.

Note: The prime award budget request should include any subawards to a DOE/NNSA National Laboratory, a Federal agency, or another Federal agency's FFRDC, and subaward budgets and budget justifications should be included in the application; the details of such proposed budgets are essential for understanding and analyzing the proposed research. If recommended for an award, a revised budget will be requested where the value of such proposed subawards is deducted from any resulting award: Those classes of organizations will be paid directly by SC.

If the budget for an application is comprised of discrete or separable projects or tasks, the SUBAWARD BUDGET ATTACHMENT(S) FORM allows you to identify a budget as belonging to either a "project" or a "subaward."

The standard subaward budget form allows for a maximum of 10 subawards. If an application contains more than 10 subawards, please present the budgets for the eleventh and subsequent subawards in a tabular format, followed by the appropriate budget justification, as a part of the lead applicant's budget justification.

6. Project/Performance Site Location(s)

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

7. Disclosure of Lobbying Activities (SF-LLL)

If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying." Applicants that have never paid any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress do not need to submit this form.

8. Identification of Merit Reviewer Conflicts

Provide a list of individuals who should not serve as merit reviewers of this application, following the instructions in Section IX of this NOFO. Attach this information to Field 12 of the Research and Related Other Project Information Form.

9. Summary of Required Forms/Files

Your application must include the following items:

Name of Document	Format	Attach to
SF 424 (R&R)	Form	N/A
RESEARCH AND RELATED Other Project Information	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative, including required appendices	PDF	Field 8
Identification of Merit Review Conflicts	File	Field 12
RESEARCH & RELATED	Form	N/A

Name of Document	Format	Attach to
Senior/Key Person Profile (Expanded)		
RESEARCH & RELATED BUDGET	Form	N/A
Budget Justification	PDF	Field L
R&R SUBAWARD BUDGET ATTACHMENT(S) FORM (if applicable)	Form	N/A
Subaward Budget Justification (if applicable)	PDF	Field L of the subaward budget
PROJECT/PERFORMANCE SITE LOCATION(S)	Form	N/A
SF-LLL Disclosure of Lobbying Activities, if applicable	Form	N/A

D. Information that Must be Submitted After Application but Before Award

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable
- Environmental Information
- Information required to resolve concerns about conflicts of interest, conflicts of commitment, potential duplication of support

Applicants that are not institutions of higher education, that request indirect costs, and that do not already have an Indirect Cost Rate Agreement with their Cognizant Federal Agency or documentation of rates accepted for estimating purposes by DOE or another Federal agency, are advised to begin preparing an Indirect Cost Rate Proposal for submission, upon request, to the DOE contract specialist/grants management specialist who will evaluate your application if you are selected for award.

V. Submission Requirements and Deadlines

A. Address to Request Application Package

Application forms and instructions are available at Grants.gov. To access these materials, go to https://www.Grants.gov, select "Search Grants", and then enter the Assistance Listings[13] number (81.049) and/or the NOFO number shown on the cover of this NOFO. Select the "Apply" button to access the application package.

Applications submitted through www.FedConnect.net will not be accepted. Applications may not be submitted through PAMS at https://pamspublic.science.energy.gov.

Detailed instructions for registering in and using Grants.gov are in Section IX of this NOFO.

B. Unique Entity Identifier (UEI) and System for Award Management (SAM.gov)

Applicants must complete a series of registrations and enrollments to submit applications in response to this NOFO. Applicants not currently registered with SAM and Grants.gov should allow at least four weeks to complete these requirements. Applicants refers to the legal entity submitting an application: This is usually a corporate entity, not an individual investigator.

You should start the process as soon as possible.

You may not be able to use your preferred Internet browser: Each system has its own requirements.

Applicants must register with SAM at https://www.sam.gov/ and obtain a Unique Entity Identifier (UEI). Assistance is available at https://sam.gov/content/help.

Applicants must provide a Taxpayer Identification Number (TIN) to complete their registration in www.SAM.gov. An applicant's TIN is an EIN assigned by the Internal Revenue Service (IRS). You may obtain an EIN from the IRS at https://www.irs.gov/businesses/small-businesses-self-employed/apply-for-an-employer-identification-number-ein-online.

If entities have technical difficulties with the UEI validation or SAM registration process, they should utilize the HELP feature on SAM.gov. SAM.gov will work entity service tickets in the order in which they are received and asks that entities not create multiple service tickets for the same request or technical issue.

13 The Assistance Listings were formerly known as the Catalog of Federal Domestic Assistance (CFDA).

Do not use a SSN as a TIN. Obtain a TIN from the IRS using the website listed above.

1. Requirement for System for Award Management

Unless exempt from this requirement under 2 CFR 25.110, the recipient must maintain a current and active registration in SAM.gov. The recipient's registration must always be current and active until the recipient submits all final reports required under this Federal award or receives the final payment, whichever is later. The recipient must review and update its information in SAM.gov at least annually from the date of its initial registration or any subsequent updates to ensure it is current, accurate, and complete. If applicable, this includes identifying the recipient's immediate and highest-level owner and subsidiaries and providing information about the recipient's predecessors that have received a Federal award or contract within the last three years.

2. Requirement for Unique Entity Identifier (UEI)

If the recipient is authorized to make subawards under this Federal award, the recipient:

- Must notify potential subrecipients that no entity may receive a subaward until the entity has provided its UEI to the recipient.
- Must not make a subaward to an entity unless the entity has provided its UEI to the recipient. Subrecipients are not required to complete full registration in SAM.gov to obtain a UEI.

C. Submission Instructions

Letters of Intent (LOIs) and pre-applications, if permitted under this NOFO, must be submitted in PAMS at https://pamspublic.science.energy.gov. Detailed instructions for LOIs are in Section IX of this NOFO. Detailed instructions for pre-applications are in Section IX of this NOFO.

Applications must be submitted in Grants.gov at https://www.grants.gov. Detailed instructions are in Section IX of this NOFO.

D. Submission Dates and Times

1. Letter of Intent Due Date

Not applicable.

2. Pre-application Due Date

Optional pre-applications may be submitted at any time while this NOFO is available. Note

that some topics may have required or strongly encouraged submissions by specified dates if an application is to be considered by a review panel.

3. Application Due Date

This NOFO will remain open until September 30, 2026, 11:59 PM Eastern Time, or until it is succeeded by another issuance, whichever occurs first. This NOFO succeeds DE-FOA-0003432, which was published September 29, 2024.

Applications for conference or workshop support must be submitted at least six months before the meeting date and no later than April 1, 2026, to be considered for FY 2026 funding.

Renewal applications compete with all other applications and must be submitted through Grants.gov at least six months before the scheduled expiration of the current award's project period. Earlier submission is strongly encouraged to allow for timely processing.

VI. Application Review Information

A. Responsiveness Review

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b) to determine that (1) the applicant is eligible for the award; (2) the information required by the NOFO, including LOIs or pre-applications, has been submitted; (3) all mandatory requirements are satisfied; (4) the proposed project is responsive to the objectives of the NOFO; and (5) the proposed project is not duplicative of programmatic work. Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.

B. Review Criteria

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following criteria, listed in descending order of importance, as found in 10 CFR 605.10 (d), the Office of Science Financial Assistance Program Rule.

- 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
- Appropriateness of the Data Management and Sharing Plan

Note that external peer reviewers are selected regarding both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

The questions below are provided to the merit reviewers to elaborate the criteria established by regulation:

1. Scientific and/or Technical Merit of the Project

- What is the scientific innovation of the proposed research?
- What is the likelihood of achieving valuable results?
- How might the results of the proposed work impact the direction, progress, and thinking in relevant scientific fields of research?
- How does the proposed work compare with other efforts in its field, both in terms of scientific and/or technical merit and originality?
- *For renewal applications only*: Is the proposed work an appropriate outgrowth of, continuation to, or successor of the currently supported research?

2. Appropriateness of the Proposed Method or Approach

- How logical and feasible are the research approaches?
- Does the proposed research employ innovative concepts or methods?
- Are the conceptual framework, methods, and analyses well justified, adequately developed, and likely to lead to scientifically valid conclusions?
- Does the applicant recognize significant potential problems and consider alternative strategies?
- Is the proposed research aligned with the published priorities identified or incorporated by reference in Section III of this NOFO?

3. Competency of Applicant's Personnel and Adequacy of Proposed Resources

- *For renewal applications only*: What is the past performance and potential of the research team?
- How well qualified is the research team to carry out the proposed research?
- Are the research environment and facilities adequate for performing the research?
- Does the proposed work take advantage of unique facilities and capabilities?

4. Reasonableness and Appropriateness of the Proposed Budget

- Are the proposed budget and staffing levels adequate to carry out the proposed research?
- Is the budget reasonable and appropriate for the scope?

5. Appropriateness of the Data Management and Sharing Plan

- To what extent does the Data Management and Sharing Plan (DMSP) enable data generated in the course of the research project to be publicly shared and preserved in a timely and fair manner that enables validation and replication of results?
- How well do the selected digital repositories enable appropriate sharing of scientific data?
- Does the DMSP adequately justify any limitations of data sharing?
- Are there any weaknesses in the DMSP that should be addressed prior to the start of the project?

C. Review and Selection Process

Applications submitted to this NOFO will be reviewed and considered for funding on a rolling basis. Applicants are cautioned that the Federal budget cycle may impact the availability of funds. Applications submitted in the latter half of the Federal fiscal year (April 1 – September 30) may be considered for funding in the next fiscal year.

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/.

2. Program Policy Factors

The Selection Official may consider any of the following program policy factors in making the selection, listed in no order of significance:

- Availability of funds
- Relevance of the proposed activity to SC priorities
- Relevance of the proposed activity to the President's policy priorities
- Ensuring an appropriate balance of activities within SC programs
- Performance under current awards
- Commitment to sharing the results and products of research
- Promoting principal investigators not previously supported by SC
- Promoting institutions not previously supported by SC
- Lower institutional indirect cost rate
- Commitment to complying with administration policies, procedures, and guidance related to Gold Standard Science
- Institutional history of training and mentoring students, postdoctoral and early-career researchers
- Participation with multi-institutional teams in accordance with program priorities identified and incorporated in Section III of this NOFO

3. Selection

The Selection Official will consider the findings of the merit review and may consider any of the Program Policy Factors described above and/or the review of risk described below.

4. Discussions and Award

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to the following: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation); and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will

preclude award to the applicant.

5. Risk Review

Pursuant to 2 CFR 200.206, DOE will conduct a review of any potential risks posed by the applicant. Such review of risk will include:

- Quality of the application,
- Reports and findings from audits performed under 2 CFR 200 and/or 2 CFR 910, and
- Systems maintained under 2 CFR 180.

DOE may make use of other publicly available information and the history of an applicant's performance under DOE or other Federal agency awards.

Applicants with no prior performance of DOE awards may be asked to provide information about their financial stability and or their ability to comply with the management standards of 2 CFR 200.

6. Due Diligence for Research, Technology, and Economic Security

All applications submitted to DOE are subject to a due diligence review.

As DOE invests in critical infrastructure and funds critical and emerging technology areas,[14] DOE considers possible threats to United States research, technology, and economic security from undue foreign government influence when evaluating risk. As part of the research, technology, and economic security risk review, DOE may contact the applicant and/or proposed project team members for additional information to inform the review. This risk review is conducted separately from the technical merit review.

All project participants, which for purposes of this term includes individuals participating in the project, are subject to RTES due diligence reviews. The due diligence review of covered individuals includes but is not limited to the review of resumes/biosketches, disclosures, and certifications, as required in the NOFO. DOE reserves the right to require resumes/biosketches, disclosures, and certifications for project participants not defined as covered individuals. The Applicant need not submit any additional information on non-covered individuals, unless requested by DOE. The volume and type of information collected may depend on various factors associated with the award.

Note this review is separate and distinct from DOE Order 142.3B "Unclassified Foreign National Access Program."

In the event an RTES risk is identified, DOE may require risk mitigation measures,

14 See Critical and Emerging Technologies List Update (whitehouse.gov).

including but not limited to, requiring that an individual or entity not participate in the award. If significant risks are identified and cannot be sufficiently mitigated, DOE may elect to not fund the applicant.

Consistent with section 4(e) of the Presidential Memorandum on United States Government-Supported Research and Development National Security Policy-33 (NSPM-33), DOE may share information regarding the risks identified as part of the RTES due diligence review process or monitoring with other Federal agencies.

DOE's decision regarding a due diligence review is not appealable.

VII. Award Notices

A. Type of Award Instrument

DOE anticipates awarding grants, cooperative agreements, interagency agreements, and/or technology investment agreements under this NOFO.

Technology investment agreements (TIAs) may be awarded under this NOFO. TIAs are a type of assistance instrument for DOE to support or stimulate research projects involving for-profit firms, especially commercial firms that do business primarily in the commercial marketplace. TIAs are different from grants and cooperative agreements in that the award terms may vary from the Government-wide standard terms (See DOE OT regulations at 2 CFR 930). The primary purposes for including TIAs in the type of available award instruments are to encourage non-traditional Government contractors to participate in this RD&D program and to facilitate new relationships and business practices.

An applicant may request a TIA if it believes that using a TIA could benefit the RD&D objectives of the program and can document these benefits. After an applicant is selected for award, the Agreements Officer will determine if awarding a TIA would benefit the RD&D objectives of the program in ways that likely would not happen if another type of assistance instrument were used (e.g., cooperative agreement subject to all the requirements of 2 CFR part 200 as supplemented by 2 CFR part 910 (DOE Financial Assistance Regulations)). The Agreements Officer will use the criteria in 2 CFR 930, Subpart B to make this determination.

Other Requirements for a TIA. In accordance with 2 CFR 930.125, to the maximum extent practicable, non-Federal parties carrying out a RD&D project under a TIA are to provide at least 50% cost sharing, even though the statutory cost sharing requirement may be less. The Agreements Officer will consider the amount of cost sharing proposed in determining if a TIA is the appropriate instrument for a particular project.

DOE will consider funding multi-institution teams submitted as collaborative applications, in which each institution must submit its own application with an identical common Project Narrative, under this NOFO. Multi-institutional teams may also apply using a prime and subaward model with one application submitted by the lead institution.

B. Anticipated Timeline for Notice of Selection for Award Negotiation

DOE anticipates making funding decisions within six months. The time interval begins on the date the application is received.

1. Notice of Selection for Award Negotiation

Applicants Selected for Award Negotiation Notification: DOE will notify applicants

selected for award negotiation. This notice of selection for award negotiation is not an authorization for the applicant/recipient to begin performance.

Non-selected Notification: Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award

An Assistance Agreement issued by the DOE Contracting Officer is the authorizing award document. It normally includes, either as an attachment or by reference, the following items: (1) Special Terms and Conditions, (2) Intellectual Property Provisions, (3) Federal Assistance Reporting Checklist and Instructions, (4) Budget Pages, (5) The Research Terms and Conditions, available at https://www.nsf.gov/pubs/policydocs/rtc/rtcoverlay_march17.pdf, and DOE Agency Specific Requirements, available at https://www.nsf.gov/awards/managing/rtc.jsp, (6) Applicable program regulations, 10 CFR 605 at https://www.ecfr.gov/, (7) DOE Assistance Regulations, 2 CFR 200 as supplemented by 2 CFR 910 at https://www.ecfr.gov/, (8) Application/proposal as approved by DOE, (9) National Policy Assurances to Be Incorporated as Award Terms in effect on date of award at https://www.nsf.gov/awards/managing/rtc.jsp.

TERMS AND CONDITIONS

Sample DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at https://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Terms.

The standard DOE financial assistance intellectual property provisions applicable to various types of recipients are located at: https://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards

NATIONAL POLICY ASSURANCES

The National Policy Assurances To Be Incorporated As Award Terms are located at https://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Terms.

VIII. Post-Award Requirements and Administration

A. Administrative and National Policy Requirements

Additional policy provisions applicable to this NOFO are included in the list below. Awards made under this NOFO are subject to the respective Administrative and National Policy Requirements. The full text of each provision is in Section IX of this NOFO and may be accessed by navigating to the hyperlinks below:

B. Reporting

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. The standard checklist is available at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Forms: Individual awards may impose additional requirements.

C. Reporting of Matters Related to Recipient Integrity and Performance (December 2015)

DOE, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM(see 41 USC 2313).

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM.

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 CFR 200.206 Federal awarding agency review of risk posed by applicants.

D. Interim Conflict of Interest Policy for Financial Assistance

1. Policy

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) is applicable to all recipients or subrecipients applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant or cooperative agreement) and, through the implementation of this policy by the entity, to each Investigator who is planning to

participate in, or is participating in, the project funded wholly or in part under the DOE financial assistance award. The term “Investigator” means the PI and any other person, regardless of title or position, who is responsible for the purpose, design, conduct, or reporting of a project funded by DOE or proposed for funding by DOE. Recipients must flow down the requirements of the interim COI Policy to any subrecipient. Further, for DOE funded projects, the recipient must include all financial conflicts of interest (FCOI) (i.e., managed and unmanaged/unmanageable) in its initial and ongoing FCOI reports.

It is understood that recipients or subrecipients receiving DOE financial assistance awards will need sufficient time to come into full compliance with DOE’s interim COI Policy. To provide some flexibility, DOE allows for a staggered implementation. Specifically, prior to award, applicants selected for award negotiations must: ensure all Investigators complete their significant financial disclosures; review the disclosures; determine whether a FCOI exists; develop and implement a management plan for FCOIs; and provide DOE with an initial FCOI report that includes all FCOIs (i.e., managed and unmanaged/unmanageable). Recipients will have 180 days from the date of the award to come into full compliance with the other requirements set forth in DOE’s interim COI Policy. Prior to award, the applicant must certify that it is, or will be within 180 days of the award, compliant with all requirements in the COI Policy.

2. SC Implementation

SC only requires only the following COI types be included in the financial conflict of interest (FCOI) report: 1) unmanaged or unmanageable financial conflicts of interest; 2) actual, apparent, or potential COI involving any foreign governments, their instrumentalities, or any other entities owned, funded, or otherwise controlled by a foreign government.

IX. Other Information

A. Checklist for Avoiding Common Errors

Note that not all items in this checklist will apply to every submission under every NOFO.

Item	Issue
Applications	Submitted in Grants.gov. Do not submit applications in PAMS or FedConnect.
Grants.gov Submission	Ensure that applications are submitted under the correct Opportunity Number. Standard Form (SF)-424 Research and Related (R&R): - Attach nothing to Field 20 - Attach nothing to Field 21 SF-424 Research and Related Other Project Information form: - Attach the abstract to Field 7 - Attach the Project Narrative, with all appendices, to Field 8 - Attach nothing to Field 9 - Attach nothing to Field 10 - Attach nothing to Field 11 - Attach the list of individuals who should not serve as merit reviewers (Collaborator Template) to Field 12 - Do not attach other files to Field 12 - NOTE: Files attached to Field 12 will not be shared with merit reviewers.
Letters of Intent (LOIs)	- Submit your LOI in PAMS. - Do not submit your LOI in Grants.gov. - Do not attach your LOI to the SF-424 Research and Related (R&R) form. - Follow the instructions in Section IV for the preparation of an LOI.
Pre-Applications	- Submit your pre-application in PAMS. - Do not submit your pre-application in Grants.gov. - Do not attach your pre-application to the SF-424 Research and Related (R&R) form. - Follow the instructions in Section IV for

Item	Issue
	the preparation of a pre-application.
Page Limits	Strictly followed throughout application, including particular attention to: - Project Narrative and appendices - Biographical sketches - Data Management and Sharing Plans (DMSPs) - Letter(s) of Collaboration or Access, if any
Personally Identifiable Information	None present in the application
Project Narrative	Composed of one PDF file including all appendices (bibliography, facilities, equipment, DMSP)
Project Summary / Abstract	Name of PI, PI's institutional affiliation(s), Co-Investigator(s), Co-Investigator's institutional affiliation(s)
DOE Title Page	Follow instructions closely
Budget	Use current negotiated indirect cost and fringe benefit rates
Budget Justification (attached to budget)	Justify all requested costs
Biographical Sketches	Follow page limits strictly and do not include list of collaborators. Attach the biographical sketch to the Senior/Key Person Profile (Expanded) Form.
Current and Pending Support	Ensure complete listing of all activities, regardless of source of funding. Attach the current and pending support to the Senior/Key Person Profile (Expanded) Form.
List of Individuals who Should not Serve as Merit Reviews	Attach to Field 12 of the SF-424 Research and Related Other Project Information form.
Data Management and Sharing Plans (DMSP)	- If referring to an experiment's DMSP, describe the relationship to the proposed research. - Include a DMSP even if no experimental data is expected.
Institutions capable of being funded through the DOE Field Work System	If National Laboratories and/or DOE sites are permitted to submit under this NOFO: - Do not create new institutions in the PAMS website.

Item	Issue
	- Submit applications in Grants.gov using the name of the laboratory or site in Field 5 of the SF-424(R&R) application form, not the contractor operating the laboratory or site. Submissions under this NOFO will be evaluated for technical merit, but any resulting funding, work, or awards will be made under the laboratory or site's contract with DOE. No separate financial assistance awards will be made. No administrative provisions of this NOFO will apply to the laboratory or any laboratory subcontractor.

B. How-To Guides

The how-to guides provided in this section are intended as general guidance about SC. Not all parts will be applicable to every NOFO, every application, or every institution.

1. How to Distinguish Between a New and Renewal Application

New Application: An application must be submitted as "new" in the following circumstances:

- When applying for funding to create a new research award that has not previously received DOE funding, including any funding for the current year,
- When applying for funding to support continued research from the same applicant institution as the current grant but with a significant change in fundamental nature of the research, or
- When applying for funding to support continued research supported by an existing DOE award but at a new applicant institution.

Renewal Application: A renewal application is appropriate when funds are requested for an award from the same recipient/applicant institution that has no significant changes in the following items:

- The award's senior leadership, and
- The fundamental nature of the award.

A change in an award's PI does not necessarily require submission as a new application: The change in personnel must be considered in light of other changes.

Renewal applications compete for funds with all other peer-reviewed applications and must be developed as fully as though the applicant were applying for the first time. Renewal

applications must be submitted by the same sponsoring institution as that holding the current award for which renewal funding is requested, and the proposed research topic must be logical scientific extensions of the research that has been performed in the current award.

2. How Federally Affiliated Organizations May Participate and Be Funded

VALUE/FUNDING FOR DOE/NNSA NATIONAL LABORATORIES AND NON-DOE/NNSA FFRDCS

For grant awards, the value of, and funding for, a DOE/NNSA National Laboratory contractor, a non-DOE/NNSA Federally Funded Research and Development Center (FFRDC) contractor, or another Federal agency's portion of the work will not be included in the award to the successful applicant. DOE will fund a DOE/NNSA National Laboratory contractor through the DOE field work authorization system or other appropriate process and may fund non-DOE/NNSA FFRDC contractors and other Federal agencies through an interagency agreement in accordance with the Economy Act, 31 USC 1535, or other statutory authority.

RESPONSIBILITY

The successful prime applicant/recipient (lead organization) will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the applicant and any team member, and/or subrecipient.

If an award is made to a DOE/NNSA National Laboratory, all Disputes and Claims will be resolved in accordance with the terms and conditions of the DOE/NNSA National Laboratory's management and operating (M&O) contract, as applicable, in consultation between DOE and the prime recipient.

If an award is made to another Federal agency or its FFRDC contractor, all Disputes and Claims will be resolved in accordance with the terms and conditions of the interagency agreement in consultation between DOE and the prime recipient.

3. How Federally Affiliated Organizations May Apply

DOE SC NATIONAL LABORATORIES

DOE Office of Science (SC) National Laboratories (Ames National Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Princeton Plasma Physics Laboratory, SLAC National Accelerator Laboratory, Thomas Jefferson National Accelerator Facility)

DOE SC National Laboratories, if eligible either as a prime applicant or a proposed team member on another entity's application, should ensure that their cognizant DOE Contracting Officer provides written authorization. This authorization does not need to be submitted with the application as part of the Budget Justification for DOE SC National Laboratory Contractor File. However, this authorization must be provided prior to any award being made. [This is not required for the National Energy Technology Laboratory because it is a Government Owned/Government Operated (GOGO) Laboratory.] If a DOE SC National Laboratory Contractor is selected for award, or proposed as a team member, the proposed work will be authorized under the DOE field work authorization system or other appropriate process and performed under the laboratory Contractor's M&O contract, as applicable. The authorization may be addressed "To Whom It May Concern:". The following wording is acceptable for the authorization:

> "Authorization is granted for the _____ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory and will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory."

(End of acceptable authorization)

If a DOE/NNSA FFRDC is selected for award negotiation, the proposed work will be authorized under the DOE work authorization process and performed under the laboratory's Management and Operating (M&O) contract.

DOE NON-SC/NNSA NATIONAL LABORATORIES

DOE Non-SC/NNSA National Laboratories (Idaho National Laboratory, Lawrence Berkeley National Laboratory, Los Alamos National Laboratory, National Laboratory of the Rockies, Sandia National Laboratories, and Savannah River National Laboratory)

DOE Non-SC/NNSA National Laboratories, if eligible either as a prime applicant or a proposed team member on another entity's application, should ensure that their cognizant DOE/NNSA Contracting Officer provides written authorization. This authorization should be submitted with the application as part of the Budget Justification for DOE/NNSA National Laboratory Contractor File. [This is not required for the National Energy Technology Laboratory because it is a Government Owned/Government Operated (GOGO) Laboratory.] Please note that failure to provide this authorization may result in rejection of an application prior to merit review. If a DOE/NNSA National Laboratory Contractor is selected for award, or proposed as a team member, the proposed work will be authorized under the DOE field work authorization system or other appropriate process and performed under the laboratory Contractor's M&O contract, as applicable. The authorization may be addressed "To Whom It May Concern:". The following wording is

acceptable for the authorization:

> "Authorization is granted for the _____ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory and will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory."

(End of acceptable authorization)

If a DOE/NNSA FFRDC is selected for award negotiation, the proposed work will be authorized under the DOE work authorization process and performed under the laboratory's Management and Operating (M&O) contract.

NON-DOE/NNSA FFRDCS

Non-DOE/NNSA FFRDCs, if eligible either as a prime applicant or a proposed team member on another entity's application, should follow the following guidelines:

The prime applicant must obtain written authorization for non-DOE/NNSA FFRDC participation. The cognizant Contracting Officer for the Federal agency sponsoring the FFRDC contractor must authorize in writing the participation of the FFRDC contractor on the proposed project and this authorization should be submitted with the application. The written authorization must also contain a determination that the use of a FFRDC contractor is consistent with the contractor's authority under its award and does not place the FFRDC contractor in direct competition with the private sector, in accordance with FAR Part 17.5. Please note that failure to provide this authorization may result in rejection of an application prior to merit review. The authorization may be addressed "To Whom It May Concern:". The following wording is acceptable for the authorization:

> "Authorization is granted for the _____ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory and will not adversely impact execution of the (insert agency) assigned programs at the laboratory. This laboratory is authorized to perform the work proposed in the application submitted under DOE Funding Opportunity Announcement <<Include the NOFO number on the cover page>> by the following statutory authority (insert statute name, citation, and section)."

(End of acceptable authorization)

OTHER FEDERAL AGENCIES

Other Federal Agencies, if eligible either as a prime applicant or a proposed team member

on another entity's application, must include in their budget justifications any specific statutory authorization (other than the Economy Act) that permits their receipt of an interagency agreement or that authorizes the payment of certain costs.

4. How Consortia May be Used

INCORPORATED CONSORTIA

Incorporated consortia are eligible to apply for funding as a prime recipient (lead organization) or subrecipient (team member).

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the DOE Contracting Officer. There is no requirement that subawards be formalized into incorporated consortia.

UNINCORPORATED CONSORTIA

Unincorporated consortia (team arrangements) must designate one member of the consortium to serve as the prime recipient/consortium representative (lead organization). There is no requirement that subawards be formalized into unincorporated consortia.

Upon request, unincorporated consortia must provide the DOE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's:

- Management structure;
- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions (though neither required nor considered); and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

Note that a consortium is applied for in one application and results in one award with subawards to consortia members. Multi-institutional teams may, if permitted under this NOFO, submit collaborative applications with each institution submitting its own application with an identical Project Narrative, resulting in multiple awards to the collaborating institutions.

5. How to Submit Letters of Intent

Do not submit an LOI unless a NOFO requires or allows their submission.

It is important that the LOI be a single file with extension .pdf, .docx, or .doc. The filename must not exceed 50 characters. The PI and anyone submitting on behalf of the PI must register for an account in PAMS before it will be possible to submit a LOI. All PIs and those submitting LOIs on behalf of PIs are encouraged to establish PAMS accounts as soon as possible to avoid submission delays.

Submit Your Letter of Intent:

- Create your LOI outside the system and save it as a file with extension .docx, .doc, or .pdf. Make a note of the location of the file on your computer so you can browse for it later from within PAMS.
- Log into PAMS and click the Proposals tab. Click the "View / Respond to Funding Opportunity Announcements" link and find the current announcement in the list. Click the "Actions/Views" link in the Options column next to this announcement to obtain a dropdown menu. Select "Submit Letter of Intent" from the dropdown.
- On the Submit Letter of Intent page, select the institution from which you are submitting this LOI from the Institution dropdown. If you are associated with only one institution in the system, there will only be one institution in the dropdown.
- Note that you must select one and only one PI per LOI; to do so, click the "Select PI" button on the far-right side of the screen. Find the appropriate PI from the list of all registered users from your institution returned by PAMS. (Hint: You may have to sort, filter, or search through the list if it has multiple pages.) Click the "Actions" link in the Options column next to the appropriate PI to obtain a dropdown menu. From the dropdown, choose "Select PI."
- If the PI for whom you are submitting does not appear on the list, it means he or she has not yet registered in PAMS. For your convenience, you may have PAMS send an email invitation to the PI to register in PAMS. To do so, click the "Invite PI" link at the top left of the "Select PI" screen. You can enter an optional personal message to the PI in the "Comments" box, and it will be included in the email sent by PAMS to the PI. You must wait until the PI registers before you can submit the LOI. Save the LOI for later work by clicking the "Save" button at the bottom of the screen. It will be stored in "My Letters of Intent" for later editing.
- Enter a title for your LOI.
- Select the appropriate technical contact from the Program Manager dropdown.
- To upload the LOI file into PAMS, click the "Attach File" button at the far-right side of the screen. Click the "Browse" (or "Choose File" depending on your browser) button to search for your file. You may enter an optional description of the file you are attaching. Click the "Upload" button to upload the file.
- At the bottom of the screen, click the "Submit to DOE" button to save and submit the LOI to DOE.

- Upon submission, the PI will receive an email from the PAMS system <PAMS.Autoreply@science.doe.gov> acknowledging receipt of the LOI.
- If this NOFO requires that LOIs be submitted only by an authorized institutional official, the PI (or the PI's delegate) will only be able to send the LOI to a user at the PI's institution with the institutional "submit to DOE" privilege. That user will then apply an institutional countersignature to the LOI when it is sent to DOE.

You are encouraged to register for an account in PAMS at least a week in advance of the LOI submission deadline so that there will be no delays with your submission.

> WARNING: The PAMS website at https://pamspublic.science.energy.gov/ will permit you to revise a previously submitted LOI in the time between your submission and the deadline. Doing so will remove your previously submitted version from consideration. If you have not submitted the revision at the time of the deadline, you will not have a valid submission. Please pay attention to the deadline.

Do not attach pre-applications to Field 20 of the SF-424(R&R) form or letters of intent to Field 21 of the SF-424(R&R) form. Doing so will render your application unreadable.

6. How to Submit a Pre-Application

Do not submit a pre-application unless a NOFO requires or permits their submission.

It is important that the pre-application be a single file with extension .pdf, .docx, or .doc. The filename must not exceed 50 characters. The PI and anyone submitting on behalf of the PI must register for an account in PAMS before it will be possible to submit a pre-application. All PIs and those submitting pre-applications on behalf of PIs are encouraged to establish PAMS accounts as soon as possible to avoid submission delays.

Submit Your Pre-Application:

- Create your pre-application (called a preproposal in PAMS) outside the system and save it as a file with extension .docx, .doc, or .pdf. Make a note of the location of the file on your computer so you can browse for it later from within PAMS.
- Log into PAMS and click the Proposals tab. Click the "View / Respond to Funding Opportunity Announcements" link and find the current announcement in the list. Click the "Actions/Views" link in the Options column next to this announcement to obtain a dropdown menu. Select "Submit Preproposal" from the dropdown.
- On the Submit Preproposal page, select the institution from which you are submitting this preproposal from the Institution dropdown. If you are associated with only one institution in the system, there will only be one institution in the dropdown.
- Note that you must select one and only one PI per preproposal; to do so, click the "Select PI" button on the far-right side of the screen. Find the appropriate PI from the list of all registered users from your institution returned by PAMS. (Hint: You may have to sort,

filter, or search through the list if it has multiple pages.) Click the "Actions" link in the Options column next to the appropriate PI to obtain a dropdown menu. From the dropdown, choose "Select PI."

- If the PI for whom you are submitting does not appear on the list, it means he or she has not yet registered in PAMS. For your convenience, you may have PAMS send an email invitation to the PI to register in PAMS. To do so, click the "Invite PI" link at the top left of the "Select PI" screen. You can enter an optional personal message to the PI in the "Comments" box, and it will be included in the email sent by PAMS to the PI. You must wait until the PI registers before you can submit the preproposal. Save the preproposal for later work by clicking the "Save" button at the bottom of the screen. It will be stored in "My Preproposals" for later editing.
- Enter a title for your preproposal.
- Select the appropriate technical contact from the Program Manager dropdown.
- To upload the preproposal file into PAMS, click the "Attach File" button at the far-right side of the screen. Click the "Browse" (or "Choose File" depending on your browser) button to search for your file. You may enter an optional description of the file you are attaching. Click the "Upload" button to upload the file.
- At the bottom of the screen, click the "Submit to DOE" button to save and submit the preproposal to DOE.
- Upon submission, the PI will receive an email from the PAMS system <PAMS.Autoreply@science.doe.gov> acknowledging receipt of the preproposal.
- If this NOFO requires that pre-applications be submitted only by an authorized institutional official, the PI (or the PI's delegate) will only be able to send the pre-application to a user at the PI's institution with the institutional "submit to DOE" privilege. That user will then apply an institutional countersignature to the pre-application when it is sent to DOE.

You are encouraged to register for an account in PAMS at least a week in advance of the preproposal submission deadline so that there will be no delays with your submission.

> WARNING: The PAMS website at https://pamspublic.science.energy.gov will permit you to revise a previously submitted pre-application in the time between your submission and the deadline. Doing so will remove your previously submitted version from consideration. If you have not submitted the revision at the time of the deadline, you will not have a valid submission. Please pay attention to the deadline..

Do not attach pre-applications to Field 20 of the SF-424(R&R) form or letters of intent to Field 21 of the SF-424(R&R) form. Doing so will render your application unreadable.

7. How to Register and Submit an Application in Grants.gov

This section provides the application submission and receipt instructions for applications to SC. Please read the following instructions carefully and completely.

Electronic Delivery

SC is participating in the Grants.gov initiative to provide the grant community with a single site to find and apply for grant funding opportunities. SC requires applicants to submit their applications online through Grants.gov.

How to Register to Apply through Grants.gov

a. Instructions: Read the instructions below about registering to apply for SC funds. Applicants should read the registration instructions carefully and prepare the information requested before beginning the registration process. Reviewing and assembling the required information before beginning the registration process will alleviate last-minute searches for required information.

Organizations must have an active System for Award Management (SAM) registration which provides a Unique Entity Identifier (UEI), and Grants.gov account to apply for grants. If individual applicants (those submitting on their own behalf) are eligible to apply for this funding opportunity, they need only refer to steps 2 and 3 below.

Creating a Grants.gov account can be completed online in minutes, but SAM registration may take several weeks. Therefore, an organization's registration should be done in sufficient time to ensure it does not impact the entity's ability to meet required application submission deadlines.

1) *Register with SAM*: All organizations applying online through Grants.gov must register with SAM at https://www.sam.gov. Failure to register with SAM will prevent your organization from applying through Grants.gov. SAM registration must be renewed annually. For more detailed instructions for registering with SAM, refer to: https://www.grants.gov/applicants/applicant-registration/

2) *Create a Grants.gov Account*: The next step is to register an account with Grants.gov. Follow the on-screen instructions provided on the registration page.

3) *Add a Profile to a Grants.gov Account*: A profile in Grants.gov corresponds to a single applicant organization the user represents (i.e., an applicant) or an individual applicant. If you work for or consult with multiple organizations and have a profile for each, you may log in to one Grants.gov account to access all of your grant applications. To add an organizational profile to your Grants.gov account, enter the UEI (Unique Entity Identifier) for the organization in the UEI field. If you are an individual applicant submitting on your own behalf, you do not need a UEI to add the profile. For more detailed instructions about creating a

profile on Grants.gov, refer to: https://www.grants.gov/applicants/applicant-registration/add-profile

4) *EBiz POC Authorized Profile Roles*: After you register with Grants.gov and create an Organization Applicant Profile, the organization applicant's request for Grants.gov roles and access is sent to the Electronic Business Point of Contact (EBiz POC)[15]. The EBiz POC will then log in to Grants.gov and authorize the appropriate roles, which may include the Authorized Organization Representative (AOR) role, thereby giving you permission to complete and submit applications on behalf of the organization. You will be able to submit your application online any time after you have been assigned the AOR role. For more detailed instructions about creating a profile on Grants.gov, refer to: https://www.grants.gov/applicants/applicant-registration/ebiz-poc-authorizes-profile-roles

5) *Track Role Status*: To track your role request, refer to: https://www.grants.gov/applicants/applicant-registration/track-profile-role-status

b. Electronic Signature: When applications are submitted through Grants.gov, the name of the organization applicant with the AOR role that submitted the application is inserted into the signature line of the application, serving as the electronic signature. The EBiz POC must authorize people who are able to make legally binding commitments on behalf of the organization as a user with the AOR role; this step is often missed and it is crucial for valid and timely submissions.

HOW TO APPLY TO SC VIA GRANTS.GOV

Grants.gov applicants can apply online using Workspace. Workspace is a shared, online environment where members of a grant team may simultaneously access and edit different webforms within an application. For each NOFO, you can create individual instances of a workspace.

For an overview of applying on Grants.gov using Workspaces, refer to: https://www.grants.gov/applicants/workspace-overview/

1) Create a Workspace: Creating a workspace allows you to complete it online and route it through your organization for review before submitting.

2) Complete a Workspace: Add participants to the workspace to work on the application together, complete all the required forms online or by downloading PDF versions, and

15 Individuals with the EBiz POC role are commonly found in an Office of Sponsored Research or similar institutional business office. Other than small businesses, a PI would usually not have the EBiz POC role.

check for errors before submission. The Workspace progress bar will display the state of your application process as you apply. As you apply using Workspace, you may click the blue question mark icon near the upper-right corner of each page to access context-sensitive help.

a. Adobe Reader: If you decide not to apply by filling out webforms you can download individual PDF forms in Workspace so that they will appear similar to other Standard forms. The individual PDF forms can be downloaded and saved to your local device storage, network drive(s), or external drives, then accessed through Adobe Reader.

NOTE: Visit the Adobe Software Compatibility page on Grants.gov to download the appropriate version of the software at: https://www.grants.gov/applicants/adobe-software-compatibility

b. Mandatory Fields in Forms: In the forms, you will note fields marked with an asterisk and a different background color. These fields are mandatory fields that must be completed to successfully submit your application.

c. Complete SF-424 Fields First: These forms are designed to fill in common required fields across other forms, such as the applicant's name, address, and SAM UEI. Once it is completed, the information will transfer to the other forms.

3) Submit a Workspace: An application may be submitted through workspace by clicking the Sign and Submit button on the Manage Workspace page, under the Forms tab. Grants.gov recommends submitting your application package *at least 24-48 hours prior to the close date* to provide you with time to correct any potential technical issues that may disrupt the application submission.

4) Track a Workspace: After successfully submitting a workspace package, a Grants.gov Tracking Number (GRANTXXXXXXXX) is automatically assigned to the package. The number will be listed on the Confirmation page that is generated after submission.

For additional training resources, including video tutorials, refer to:
https://www.grants.gov/applicants/applicant-training

Applicant Support: Grants.gov provides applicants 24/7 support via the toll-free number 1-800-518-4726 and email at support@Grants.gov. For questions related to the specific grant opportunity, contact the number listed in the application package of the grant you are applying for funding.

If you are experiencing difficulties with your submission, it is best to call the Grants.gov Support Center and get a ticket number. The Support Center ticket number will assist SC

with tracking your issue and understanding background information on the issue.

Timely Receipt Requirements and Proof of Timely Submission

Proof of timely submission is automatically recorded by Grants.gov. An electronic date/time stamp is generated within the system when the application is successfully received by Grants.gov. The applicant AOR will receive an acknowledgement of receipt and a tracking number (GRANTXXXXXXXX) from Grants.gov with the successful transmission of their application. Applicant AORs will also receive the official date/time stamp and Grants.gov Tracking number in an email serving as proof of their timely submission.

When SC successfully retrieves the application from Grants.gov, and acknowledges the download of submissions, Grants.gov will provide an electronic acknowledgment of receipt of the application to the email address of the applicant with the AOR role. Again, proof of timely submission shall be the official date and time that Grants.gov receives your application. Applications received by Grants.gov after the established due date for the program will be considered late and may not be considered for funding by SC.

Applicants using unreliable internet connections should be aware that the process of completing the Workspace can take some time. Therefore, applicants should allow enough time to prepare and submit the application before the package closing date.

Grants.gov will provide either an error or a successfully received submission message in the form of an email sent to the applicant with the AOR role attempting to submit the application.

If you do not promptly receive an email from Grants.gov with an agency tracking number, indicating receipt of the application by SC, please contact the Grants.gov Helpdesk at 800-518-4726 (toll-free) or support@Grants.gov immediately. SC will have no records of your attempted submission without the second email from Grants.gov.

8. How to Prepare an Application

Application Preparation

You must submit the application through Grants.gov at https://www.Grants.gov/, using either the online webforms or downloaded forms. (Additional instructions are provided above.)

You are required to use the compatible version of Adobe Reader software to complete a Grants.gov Adobe application package. To ensure you have the Grants.gov compatible version of Adobe Reader, visit the software compatibility page at https://www.Grants.gov/web/grants/applicants/adobe-software-compatibility.html.

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below.

Files that are attached to the forms must be PDF files unless otherwise specified in this NOFO. Attached PDF files must be plain files consisting of text, numbers, and images without editable fields, signatures, passwords, redactions, or other advanced features available in some PDF-compatible software. Do not use PDF portfolios or binders.

Please note the following restrictions that apply to the names of all files attached to your application:

- Please limit file names to 50 or fewer characters
- Do not attach any documents with the same name. All attachments must have a unique name.
- Please use only the following characters when naming your attachments: A-Z, a-z, 0-9, underscore, hyphen, space, period, parenthesis, curly braces, square brackets, ampersand, tilde, exclamation point, comma, semi colon, apostrophe, at sign, number sign, dollar sign, percent sign, plus sign, and equal sign. Attachments that do not follow this rule may cause the entire application to be rejected or cause issues during processing.

Renewal Applications

For renewal applications only, the PI is required to submit a Renewal Proposal Products section through the PAMS website at https://pamspublic.science.energy.gov. The PI must enter into PAMS each product created during the course of the previous project period. Types of products include publications, intellectual property, technologies or techniques, and other products such as databases or software. As soon as the renewal application is assigned to a DOE Program Manager, the PI will receive an automated email from PAMS (<PAMS.Autoreply@science.doe.gov>) instructing him or her to navigate to the PAMS Task tab to complete and submit the Renewal Proposal Products. The submitted product list will be sent for merit review as part of the application. The application will not be considered complete and cannot be sent for review until the product list has been submitted.

Resubmission of Applications

Applications submitted under this NOFO may be withdrawn from consideration by using the PAMS website at https://pamspublic.science.energy.gov. Applications may be withdrawn at any time between when the applicant submits the application and when DOE makes the application available to merit reviewers. Such withdrawals take effect immediately and cannot be reversed. Please exercise due caution. After the application is made available to merit reviewers, the applicant may contact the DOE program office

identified in this NOFO to request that it be withdrawn.

After an application is withdrawn, it may be resubmitted, if this NOFO is still open for the submission of applications. Such resubmissions will only count as one submission if this NOFO restricts the number of applications from an applicant.

Note that there may be a delay between the application's submission in Grants.gov and when it is available to be withdrawn in PAMS. SC will usually consider the last submission, according to its Grants.gov timestamp, to be the intended version. Please consult with your program manager to resolve any confusion about which version of an application should be considered.

Improper Contents of Applications

Applications submitted under this NOFO will be stored in controlled-access systems, but they may be made publicly available if an award is made. As such, it is critical that applicants follow these guidelines:

- Do not include information that a non-Federal entity may not openly distribute, whether classified, export control, or unclassified controlled nuclear information. Non-Federal entities are not subject to any restrictions on distributing controlled unclassified information (CUI).
- Do not include sensitive and protected personally identifiable information, including social security numbers, birthdates, citizenship, marital status, or home addresses. Pay particular attention to the content of biographical sketches and curriculum vitae.
- Do not include letters of support from Federal officials.
- Do not include letters of support on Federal letterhead. Letters that are not letters of support (such as letters confirming access to sites, facilities, equipment, or data; or letters from cognizant Contracting Officers) may be on Federal letterhead.
- Clearly mark all proprietary or trade-secret information.

Change of Recipient Institution

If a recipient chooses to relinquish an award made under this NOFO to permit the transfer of the award to a new institution, the new institution must apply under the then-available SC "annual" or "open" NOFO.

9. How to Prepare a Biographical Sketch

As part of the application, each covered individual at the applicant and subrecipient level must submit a biographical sketch ("*Biosketch*"). Use SciENcv (Science Experts Network Curriculum Vitae) to produce a DOE/NNSA compliant PDF version of the *Biosketch*. Note that there is no page limitation for the *Biosketch*, though some fields in SciENcv have character limitations for consistency.

Consistent with the instructions in NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support[16] and the DOE/NNSA NOFO-Specific Biosketch Instructions below, the *Biosketch* and *CPS Common Form* must together include a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All connections with malign foreign talent recruitment programs must be identified.
Please note the following:

- With the exception of "covered individual", which is defined in Section IX, all other definitions of terms used in the *Biosketch* are available at: NSPM-33 Definitions.
- If there is any conflict between NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support and the DOE/NNSA NOFO-Specific Biosketch Instructions below, follow the DOE/NNSA NOFO-Specific Biosketch Instructions.

DOE/NNSA NOFO-Specific Biosketch Instructions	
Persistent Identifier (PID) of the Covered Individual	The PID field is required for all applications sent to SC.
Appointments and Positions Reporting Timeframe	Identify all domestic and foreign professional appointments and positions outside of the primary organization for a period up to three years from the date the applicant submits the application.
Products: Limitation on number provided	List up to 10 products most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights and software systems developed may be provided in addition to or substituted for publications. An abbreviated style such as the Physical Review Letters (PRL) convention for citations (list only the first author) may be used for publications with more than 10 authors.

Biographical sketches must be attached to the Research and Related Senior/Key Person

16 This table supersedes in its entirety, Table 2a and Paragraph 7 of the Disclosure Requirements and Standardization Section of the NSPM-33 Implementation Guidance.

Profile (Expanded) form in an application.

Personally Identifiable Information: Do not include sensitive and protected personally identifiable information including social security numbers, birthdates, citizenship, marital status, or home addresses. Do not include information that a merit reviewer should not make use of.

10. How to Prepare a List of Individuals Who Should Not Serve as Reviewers

To assist in identifying individuals who should not serve as merit reviews, provide the following information for each senior/key person who is planned to be or is identified in Section A of the R&R Budget for the applicant and any proposed subrecipients:

- Advisees (graduate students or postdocs) of the senior/key person
- Advisors of the senior/key person while a graduate student or a postdoc
- Close associates of the senior/key person over the past 48 months
- Co-authors of the senior/key person over the past 48 months
- Co-editors of the senior/key person over the past 48 months
- Co-investigators of the senior/key person over the past 48 months
- Collaborators of the senior/key person over the past 48 months

Do not identify any personnel at the applicant institution or any proposed subrecipient or team institution: Those personnel are prohibited from serving as merit reviewers.

Large collaborations of 10 or more researchers do not require that all collaborators be identified: rather, only list the researchers with whom the senior/key person collaborated.

For all identified individuals, provide the following information:

- The senior/key person to whom the individual was an advisee, advisor, close associate, co-author, co-editor, co-investigator, or collaborator, identified by first name and last name
- The individual's first (given) name
- The individual's last (family) name
- The individual's Open Researcher and Contributor ID (ORCiD), if known
- The individual's institutional affiliation spelling out acronyms (For joint appointments, separate each institution with a slash ("/"). Do not list departmental affiliations.)
- The reason for listing the individual (advisee, advisor, close associate, co-author, co-editor, co-investigator, collaborator)
- The year when the individual last was a close associate, co-author, co-editor, co-investigator, or collaborator

You may also provide a list of all senior/key personnel who are planned to be or are identified in Section A of the R&R Budget for the applicant and any proposed subrecipients.

The lists do not need to be sorted in any method.

The lists must be submitted in tabular format, preferably as Microsoft Excel (.xls or .xlsx) files.

For your convenience, a Collaborator Template is available at https://science.osti.gov/grants/Policy-and-Guidance/Agreement-Forms. The template may also be posted with this NOFO in Grants.gov. If using the template:

- Do not add tabs to the spreadsheet
- Do not merge the existing tabs
- Do not remove headers
- Fill out the requested headers on both tabs with the same information
- Ensure that given and family names are presented in the correct columns

11. How to Prepare Current and Pending Support

Current and pending (other) support ("*CPS Common Form*") is used to identify potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support.

As part of the application, each covered individual at the prime applicant and subrecipient level must submit a *CPS Common Form*. Use SciENcv (Science Experts Network Curriculum Vitae) to produce a DOE/NNSA compliant PDF version of the *CPS Common Form*. Note that there is no page limitation for the *CPS Common Form*, though some fields in SciENcv have character limitations for consistency.

Consistent with the instructions in NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support[17] and the DOE/NNSA NOFO-Specific CPS Instructions below, the *CPS Common Form* and *Biosketch Common Form* must together include a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All connections with malign foreign talent recruitment programs must be identified in current and pending support.

Please note the following:

[17] This table supersedes in its entirety, Table 2a and Paragraph 7 of the Disclosure Requirements and Standardization Section of the NSPM-33 Implementation Guidance.

- With the exception of "covered individual", which is defined in Section IX, all other definitions of terms used in the *CPS Common Form* are available at: NSPM-33 Definitions.
- If there is any conflict between NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support and the DOE/NNSA NOFO-Specific CPS Instructions below, follow the DOE/NNSA NOFO-Specific CPS Instructions.

	DOE/NNSA NOFO-Specific CPS Instructions
Persistent Identifier (PID) of the Covered Individual	The PID field is required for all NOFOs and Awards that encompass R&D activities, or technical assistance to support R&D activities.
Reporting Timeframe for Proposals, Projects, and In-Kind Contributions	Disclose only current and pending support, as defined in the "Status of Support" field of the SciENcv CPS Common Form.
Types of Proposals and Active Projects to Disclose	In addition to the guidance listed above, consulting activities must be disclosed under the proposals and active projects section of the form when any of the following scenarios apply: • The consulting activity will require the covered individual to perform research as part of the consulting activity; • The consulting activity does not involve performing research, but is related to the covered individual's research portfolio and may have the ability to impact funding, alter time or effort commitments, or otherwise impact scientific integrity; or The consulting entity has provided a contract that requires the covered individual to conceal or withhold confidential financial or other ties between the covered individual and the entity, irrespective of the duration of the engagement.
Disclosure Instructions for In-Kind Travel	Follow the disclosure instructions for travel in NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support. :

Current and Pending (Other) Support Addendum	The Current and Pending (Other) Support Addendum is not required for this NOFO.

Submission of current and pending support constitutes the individual's certification that they have complied with the Research Security Training requirement.

12. How to Prepare a Data Management and Sharing Plan

Data Management and Sharing Plans (DMSPs) must be provided for the proposed research following DOE and DOE sponsoring office guidelines. If needed, updates to the DMSP, through the course of the R&D, must be provided to DOE for review and approval. In general, a DMSP should address the following requirements:

1. Validation and replication of results
The DMSP should describe how scientific data generated in the course of the research project will be publicly shared and preserved in a timely and fair manner that enables validation and replication of results. If data will not be publicly shared and preserved (see "Data sharing limitations"), the DMSP should describe how results could be validated and replicated.

2. Timely and fair access
The DMSP should provide a plan for making all scientific data displayed in peer-reviewed scholarly publications resulting from the proposed research open, machine-readable, and digitally accessible to the public at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital scientific data used to generate peer-reviewed scholarly publications should be made freely available and publicly accessible at the time of publication, in accordance with the principles stated above. The published article should indicate how these data can be accessed. The DMSP should also provide a timeline for sharing digital scientific data produced under the DOE funded R&D effort not associated with peer-reviewed scholarly publications.

3. Data repository selection
The DMSP should specify the use of digital repositories that align, to the extent practicable, with the National Science and Technology Council document entitled "Desirable Characteristics of Data Repositories for Federally Funded Research," by the Subcommittee on Open Science of the National Science and Technology Council,

May 2022.[18] In general, DOE does not endorse or require sharing in any specific repository and encourages researchers to select the repository that is most appropriate for their data type and discipline, though individual sponsoring research offices may provide specific guidance or designate a specific repository.

4. Data management and sharing resources
The DMSP should describe the data management and sharing resources that may be available and used in the course of the proposed research. In particular, a DMSP that explicitly or implicitly commit data management and sharing resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management and sharing at DOE scientific user facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMSP.

5. Data sharing limitations
The DMSP must address any limitations of scientific data sharing to facilitate the protection of confidentiality, privacy, business confidential information, and/or security; avoid negative impact on intellectual property rights, innovation, program and operational improvements, and U.S. competitiveness; consider maximizing appropriate sharing through risk-mitigated limited access; preserve the balance between the relative value of long-term preservation and access and the associated cost and administrative burden; and otherwise be consistent with all applicable laws, regulations, and DOE orders and policies. Depending on the DOE funding agreement, a contractor or financial award recipient may have the right to assert copyright to or protect from public release for certain scientific data products. When contractors or award recipients assert copyright of scientific data, the DMSP should address licensing requirements and any limitations for sharing the copyrighted data. When contractors or award recipients assert data protection, the scientific data will not be shared with the public during the data protection period.

To improve the discoverability of and attribution for datasets created and used in the course of research, DOE encourages the citation of publicly available datasets within the reference section of publications, including using the persistent identifiers associated with the dataset, such as a Digital Object Identifier (DOI).

In addition, scientific data made publicly available through the implementation of a DMSP are required to be reported under any applicable reporting requirements to DOE's Office of Scientific and Technical Information (OSTI). A DOI is a type of persistent identifier that may be assigned to a dataset prior to reporting to OSTI, e.g., by the repository hosting the

[18] NSTC Subcommittee on Open Science. Desirable Characteristics of Data Repositories for Federally Funded Research. (2022) DOI: https://doi.org/10.5479/10088/113528

data or by a publisher. When there is a DOI assigned to a dataset, it must be provided within the metadata record submitted to OSTI. In cases where a data record does not already have an associated DOI, OSTI will assign a DOI for the data record.

DMSPs will be reviewed as part of the overall SC research application merit review process. Applicants are encouraged to consult the SC website for further information and suggestions for how to structure a DMSP: https://science.osti.gov/funding-opportunities/digital-data-management.

13. How to Prepare a Research and Related Budget and Justification

The following advice will improve the accuracy of your budget request:

- Funds requested for personnel (senior, key, and other) must be justified as the product of their effort on the project and their institutional base salary.
- Funds requested for fringe benefits must be calculated as the product of the requested salary and, if present, the negotiated fringe benefit rate contained in an institution's negotiated indirect cost rate agreement.
- Funds requested for indirect costs must be calculated using the correct indirect cost base and the negotiated indirect cost rate.
- If a field is required (indicated with either an asterisk or a differently colored background) and no funds are being requested, enter a zero "0."
- You are encouraged to include the rate agreement used in preparing a budget as a part of the budget justification.
- Do not prepare a budget justification using the expired DOE form F4260.1.

If you are proposing indirect costs and do not already have an Indirect Cost Rate Agreement with your Cognizant Federal Agency or documentation of rates accepted for estimating purposes by DOE or another Federal agency, it is recommended that you begin preparing an Indirect Cost Rate Proposal to be submitted, upon request, to the DOE contract specialist/grants management specialist who will evaluate your application if you are selected for award.

For your convenience in preparing an Indirect Cost Rate proposal, a link to applicant resources, including indirect rate model templates, has been provided below: https://science.osti.gov/sbir/applicant-resources/grant-application/.

Institutions of higher education must either include their negotiated Indirect Cost Rate Agreement or a Uniform Resource Locator (URL, commonly referred to as a web link) where their agreement can be found in their budget justifications.

BUDGET FIELDS

Section A	For each Senior/Key Person, enter the requested information. List

Senior/Key Person	personnel, base salary, the number of months that person will be allocated to the project, requested salary, fringe benefits, and the total funds requested for each person. The requested salary must be the product of the base salary and the effort. Include a written narrative in the budget justification that justifies the need for requested personnel. Within the justification, explain the fringe benefit rate used if it is not the standard faculty rate.
Section B Other Personnel	List personnel, the number of months that person will be allocated to the project, requested salary fringe benefits, and the total funds requested for each person. Include a written narrative in the budget justification that fully justifies the need for requested personnel. Within the justification, provide the number of positions being filled in each category of other personnel.
Section C Equipment	For the purpose of this budget, equipment is designated as an item of property that has an acquisition cost of $10,000 or more and an expected service life of more than one year, unless a different threshold is specified in a negotiated Facilities and Administrative Cost Rate. (Note that this designation applies for proposal budgeting only and differs from the DOE definition of capital equipment.) List each item of equipment separately and justify each in the budget justification section. Do not aggregate items of equipment. Allowable items ordinarily will be limited to research equipment and apparatus not already available for the conduct of the work. General-purpose office equipment is not eligible for support unless primarily or exclusively used in the actual conduct of scientific research.
Section D Travel	For purposes of this section only, travel to Canada or to Mexico is considered domestic travel. In the budget justification, list each trip's destination, dates, estimated costs including transportation and subsistence, number of staff traveling, the purpose of the travel, and how it relates to the project. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). To qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Domestic travel is to be justified separately from foreign travel. Within the budget justification, detail the number of personnel planning to travel and the estimated per-traveler cost for each trip.
Section E Participant/Trainee Support Costs	If applicable, submit training support costs. Educational projects that intend to support trainees (precollege, college, graduate and postgraduate) must list each trainee cost that includes stipend

	levels and amounts, cost of tuition for each trainee, cost of any travel (provide the same information as needed under the regular travel category), and costs for any related training expenses. Participant costs are those costs associated with conferences, workshops, symposia or institutes and breakout items should indicate the number of participants, cost for each participant, purpose of the conference, dates and places of meetings and any related administrative expenses. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).
Section F Other Direct Costs	• Materials and Supplies: Enter total funds requested for materials and supplies in the appropriate fields. In the budget justification, indicate general categories such as glassware, and chemicals, including an amount for each category (items not identified under "Equipment"). Categories less than $1,000 are not required to be itemized. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • Publication Costs: Enter the total publication funds requested. The proposal budget may request funds for the costs of documenting, preparing, publishing or otherwise making available to others the findings and products of the work conducted under the award. In the budget justification, include supporting information. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • Consultant Services: Enter total funds requested for all consultant services. In the budget justification, identify each consultant, the services he/she will perform, total number of days, travel costs, and total estimated costs. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • ADP/Computer Services: Enter total funds requested for ADP/Computer Services. Cloud computing costs must be included under this item. The cost of computer services, including computer-based retrieval of scientific, technical and education information may be requested. In the budget justification, include the established computer service rates at the proposing organization if applicable. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • Subawards/Consortium/Contractual Costs: Enter total costs

	for all subawards/consortium organizations and other contractual costs proposed for the project. In the budget justification, justify the details. • Equipment or Facility Rental/User Fees: Enter total funds requested for Equipment or Facility Rental/User Fees. In the budget justification, identify each rental/user fee and justify. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • Alterations and Renovations: Enter total funds requested for Alterations and Renovations. In the budget justification, itemize by category and justify the costs of alterations and renovations, including repairs, painting, removal or installation of partitions, shielding, or air conditioning. Where applicable, provide the square footage and costs. • Other: Add text to describe any other Direct Costs not requested above. Enter costs associated with "Other" item(s). Use the budget justification to further itemize and justify.
Section G Direct Costs	This represents Total Direct Costs (Sections A through F).
Section H Other Indirect Costs	Enter the Indirect Cost information, including the rates and bases being used, for each field. Only four general categories of indirect costs are allowed/requested on this form, so please consolidate if needed. Include the cognizant Federal agency and contact information if using a negotiated rate agreement. Within the budget justification, explain the use of multiple rates, if multiple rates are used.
Section I Total Direct and Indirect Costs	This is the total of Sections G and H.

GUIDANCE FOR APPLICATION BUDGETS AND COSTS

All costs requested in a budget must adhere to standard requirements for all Federal awards:
- Costs must be reasonable, using a prudent-person standard. (2 CFR 200.404),
- Costs must be allocable, related to the particular Federal award. (2 CFR 200.405),
- Costs must be allowable under the relevant Federal cost principles. (See 2 CFR 200.420 and following),
- Costs must be consistently treated, whether they are paid for with Federal funds or institutional funds. (2 CFR 200.403(c))

Allowable costs may include, but are not limited to, the following, subject to the applicable cost principles:

- "Buying out" faculty time dedicated to teaching or administrative responsibilities,
- Support for administrative personnel dedicated to the proposed activity,
- Support for professional development, training, mentoring of students and junior researchers,
- Travel to meet with collaborators at other institutions and relevant DOE/NNSA national laboratories, including costs for internships at the national laboratories; or to attend one or more science team, user facility, scientific conference, workshop, or professional society meetings relevant to the proposed research; or for the conduct of off-site research,
- Fringe benefits, which must be paid in accordance with an institution's negotiated rates agreement, institutional policies, and the individual's appointment,
- Temporary dependent-care costs incurred during travel,
- Membership costs in relevant professional societies, including both scientific societies and those dedicated to research administration,
- Instrumentation required to conduct proposed research,
- Equipment (items with a useful life of more than 12 months and a per-item acquisition cost of more than $10,000) required to conduct proposed research,
- Purchase of equipment, modification of equipment, or provision of services necessary to enable work to be carried out by project personnel with a disability,
- Stipends and benefits for students and post-doctoral researchers, recognizing their dual nature as both trainees and employees,
- Participation in standards development relevant to the proposed research, including travel and membership costs,
- Salary support to cover time to participate in outreach for recruitment, internships, and training events, science team meetings, partnership development, or information gathering, and
- Other direct costs, e.g., materials and supplies such as office supplies, desktop or laptop computer, and/or software licenses that are directly necessary to enable the proposed activities.

LIMITATION ON INDIRECT COSTS

DOE has established a maximum dollar amount that it will reimburse for indirect costs and fringe benefits under its financial assistance awards. The maximum amount of funds to be paid or reimbursed under an award for indirect costs and fringe benefit costs will be calculated as a percentage of the Total Award Amount and the maximum dollar amount will be included in the award terms and conditions.

For for-profit organizations, this maximum dollar amount is calculated as fifteen percent (15%) of the Total Award Amount. For nonprofit organizations, this maximum dollar amount is calculated as 15 percent (15%) of the Total Award Amount.. Note: This limit applies to subrecipients of prime recipients that are not subject to a limitation.

The limitation on reimbursement for indirect costs does not apply to institutions of higher education as either a prime recipient or a subrecipient. It does, however, apply to subrecipients under an award to an institution of higher education. As a financial assistance policy, it has no applicability to entities that will not receive financial assistance awards, including other Federal agencies and DOE/NNSA National Laboratories.

The Total Award Amount is the sum of total direct costs and indirect cost amounts and comprised of the Federal and, as applicable, the required non-Federal cost share. The maximum indirect and fringe benefits cost reimbursement amount (limitation) applies to all budget periods negotiated at the time of the award and will be adjusted should a modification change the Total Award Amount. The limitation applies to the total award across all budget periods. For multiyear awards, applicants must ensure the indirect costs for each year collectively do not exceed the limitation of the Total Award Amount.

Applicants and recipients must ensure that the sum of indirect costs and fringe benefits in the proposed budget do not exceed the maximum percentage allowed against the total award. For example, a 15% reimbursement limit against a Total Award Amount of $100,000 means the total indirect costs and fringe benefits may not exceed $15,000, leaving $85,000 for direct costs. This limit applies regardless of an applicant's negotiated indirect cost rate agreement (NICRA), rate proposal, or the election of the de minimis rate (15% of modified total direct costs per 2 CFR 200.414(f)). If an applicant's NICRA or de minimis rate yields higher indirect cost amounts than the 15% limitation allows, the limited amount must be used.

Applicants should apply a consistent accounting methodology when allocating their indirect rates (e.g., NICRA, Rate Proposal, or de minimis rate per 2 CFR 200.414(f)), that the organization utilizes to develop the indirect rates, to the maximum extent possible without exceeding the reimbursement limit.

Subrecipients: The indirect cost reimbursement limit applies to the prime recipient and subrecipients, as applicable. Budgets for subawards must also comply with the limitation based on entity type (i.e., for-profit or nonprofit). The maximum amount of funds to be paid or reimbursed from the recipient to a subrecipient for its indirect costs and fringe benefits under a subaward will be calculated as a percentage (%) of the total subaward amount, inclusive of the Federal and applicable non-Federal cost share amount.

Key Definitions per 2 CFR 200.1:

Direct Costs are project costs which can be solely attributed to a specific project, award, or activity with a high degree of accuracy.

Indirect Costs are those costs incurred for a common or joint purpose benefiting two or more cost objectives (e.g., project, award, or activity) and not readily assignable to the cost

objectives specifically benefited, without effort disproportionate to the results achieved.

Calculating the amount of reimbursable indirect and fringe benefit costs:

Developing and applying the indirect cost and fringe benefit reimbursement limit as a percentage of the Total Award Amount requires a flexible and iterative approach during budget planning.

To remain compliant, the budget must be structured so that indirect cost and fringe benefit reimbursement does not exceed the applicable percentage of the Total Award Amount (e.g., "indirect costs cannot exceed 10% or 15% of the total award, as applicable"). This may require multiple rounds of budget adjustments to align the proposed costs with the allowable limitations.

Compliance

DOE will monitor indirect cost and fringe benefits expenditures throughout the award period to ensure compliance with the established limitation. Any costs that exceed this limitation will be considered unallowable and may result in repayment by the recipient or other corrective actions, as appropriate. Applicants are responsible for maintaining accurate financial records and reporting indirect costs and fringe benefits in accordance with 2 CFR 200.

Waivers to Indirect Reimbursement Limitation

Only in circumstances where the Secretary has determined it is necessary and appropriate, the dollar threshold for payment of indirect costs and fringe benefits may be modified.

14. How to Register in PAMS

After you submit your application through Grants.gov, the application will automatically transfer into the Portfolio Analysis and Management System (PAMS) for processing by the DOE SC. Many functions for grants and cooperative agreements can be done in PAMS, which is available at https://pamspublic.science.energy.gov.

You will want to "register to" your application: a process of linking yourself to the application after it has been submitted through Grants.gov and processed by DOE.

You must register in PAMS to submit a pre-application or a LOI.

Notifications sent from the PAMS system will come from the PAMS email address <PAMS.Autoreply@science.doe.gov>. Please make sure your email server/software allows delivery of emails from the PAMS email address to yours.

Registering to PAMS is a two-step process; once you create an individual account, you must associate yourself with ("register to") your institution. Detailed steps are listed below.

CREATE PAMS ACCOUNT:

To register, click the "Create New PAMS Account" link on the website https://pamspublic.science.energy.gov/.

- Click the "No, I have never had an account" link and then the "Create Account" button.
- You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the "Save and Continue" button.
- On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the "Create Account" button.
- Read the user agreement and click the "Accept" button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
- PAMS will take you to the "Having Trouble Logging In?" page. (If you have been an SC merit reviewer or if you have previously submitted an application, you may already be linked to an institution in PAMS. If this happens, you will be taken to the PAMS home page.)

REGISTER TO YOUR INSTITUTION:

- Click the link labeled "Option 2: I know my institution, and I am here to register to the institution." (Note: If you previously created a PAMS account but did not register to an institution at that time, you must click the Institutions tab and click the "Register to Institution" link.)
- PAMS will take you to the "Register to Institution" page.
- Type a word or phrase from your institution name in the field labeled, "Institution Name like," choose the radio button next to the item that best describes your role in the system and click the "Search" button. A "like" search in PAMS returns results that contain the word or phrase you enter; you do not need to enter the exact name of the institution, but you should enter a word or phrase contained within the institution name. (If your institution has a frequently used acronym, such as ANL for Argonne National Laboratory or UCLA for the Regents of the University of California, Los Angeles, you may find it easiest to search for the acronym under "Institution Name like." Many institutions with acronyms are listed in PAMS with their acronyms in parentheses after their names.)
- Find your institution in the list that is returned by the search and click the "Actions" link in the Options column next to the institution name to obtain a dropdown list. Select "Add me to this institution" from the dropdown. PAMS will take you to the "Institutions

– List" page.
- If you do not see your institution in the initial search results, you can search again by clicking the "Cancel" button, clicking the Option 2 link, and repeating the search.
- If, after searching, you think your institution is not currently in the database, click the "Cannot Find My Institution" button and enter the requested institution information into PAMS. Click the "Create Institution" button. PAMS will add the institution to the system, associate your profile with the new institution, and return you to the "Institutions – List" page when you are finished.

For help with PAMS, click the "PAMS Help" link on the PAMS website, https://pamspublic.science.energy.gov/. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: sc.pams-helpdesk@science.doe.gov. All submission and inquiries about this NOFO should reference the NOFO number printed on the cover page.

15. How to View Applications in PAMS

Each Grants.gov application submitted to the DOE SC automatically transfers into PAMS and is subsequently assigned to a program manager. At the time of program manager assignment, the three people listed on the SF-424 (R&R) cover page will receive an email with the subject line, "Receipt of Proposal 0000xxxxxx by the DOE Office of Science." These three people are the PI (Block 14), Authorized Representative (Block 19), and Point of Contact (Block 5). In PAMS notation, applications are known as proposals, the PI is known as the PI, the Authorized Representative is known as the Sponsored Research Officer/Business Officer/Administrative Officer (SRO/BO/AO), and the Point of Contact is known as the POC.

There will be a period of time between the application's receipt at Grants.gov and its assignment to a DOE SC program manager. Program managers are typically assigned two weeks after applications are due at Grants.gov: please refrain from attempting to view the proposal in PAMS until you receive an email providing the assignment of a program manager.

Once the email is sent, the PI, SRO/BO/PO, and POC will each be able to view the submitted proposal in PAMS. Viewing the proposal is optional.

Following are two sets of instructions for viewing the submitted proposal, one for individuals who already have PAMS accounts and one for those who do not.

If you already have a PAMS account, follow these instructions:

1. Log in to PAMS at https://pamspublic.science.energy.gov/.
2. Click the "Proposals" tab and click "Access Previously Submitted Grants.gov

Proposal."

3. Enter the following information:
   - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros (e.g., 00002xxxxx). Do not use the Grants.gov proposal number. Use the PAMS number previously sent to you in the email with subject line, "Receipt of Proposal …".
   - Email (as entered in Grants.gov application): Enter your email address as it appears on the SF424(R&R) Cover Page.
   - Choose Role: Select the radio button in front of the role corresponding to the SF-424 (R&R) cover page. If your name appears in block 19 of the SF-424 (R&R) cover page as the authorizing representative, select "SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer)." If your name appears in block 14 of the SF424 R&R cover page as the PI, select "Principal Investigator (PI)." If your name appears in block 5 of the SF424 R&R as the point of contact, select "Other (POC)."
4. Click the "Save and Continue" button. You will be taken to your "My Proposals" page. The Grants.gov proposal will now appear in your list of proposals. Click the "Actions/Views" link in the options column next to this proposal to obtain a dropdown list. Select "Proposal" from the dropdown to see the proposal. Note that the steps above will work only for proposals submitted to the DOE SC since May 2012.

If you do not already have a PAMS account, follow these instructions:

1. To register, click the "Create New PAMS Account" link on the website https://pamspublic.science.energy.gov/.
2. Click the "No, I have never had an account" link and then the "Create Account" button.
3. You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the "Save and Continue" button.
4. On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the "Create Account" button.
5. Read the user agreement and click the "Accept" button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
6. You will be taken to the Register to Institution page. Select the link labeled, "Option 1: My institution has submitted a proposal in Grants.gov. I am here to register as an SRO, PI, or POC (Sponsored Research Officer, Principal Investigator, or Point of Contact)."
7. Enter the following information:
   - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros

(e.g., 00002xxxxx). Do not use the Grants.gov proposal number. Use the PAMS number previously sent to you in the email with subject line, "Receipt of Proposal …".

- Email (as entered in Grants.gov proposal): Enter your email address as it appears on the SF424(R&R) Cover Page.
- Choose Role: Select the radio button in front of the role corresponding to the SF-424 (R&R) cover page. If your name appears in block 19 of the SF-424 (R&R) cover page as the authorizing representative, select "SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer)." If your name appears in block 14 of the SF424 R&R cover page as the PI, select "Principal Investigator (PI)." If your name appears in block 5 of the SF424 R&R as the point of contact, select "Other (POC)."

8. Click the "Save and Continue" button. You will be taken to your "My Proposals" page. The Grants.gov proposal will now appear in your list of proposals. Click the "Actions/Views" link in the options column next to this proposal to obtain a dropdown list. Select "Proposal" from the dropdown to see the proposal.

If you were listed as the PI on a prior submission but you have not previously created an account, you may already be listed in PAMS. If this is the case, you will be taken to the PAMS home page after agreeing to the Rules of Behavior. If that happens, follow the instructions listed above under "If you already have a PAMS account…" to access your Grants.gov proposal.

16. How to Register in Other Systems Before Submitting an Application

Systems to Register In

Applicants must register with FedConnect at www.FedConnect.net. The full, binding version of assistance agreements will be posted to FedConnect. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf

Recipients must register with the Federal Funding Accountability and Transparency Act Subaward Reporting System at https://www.fsrs.gov. This registration must be completed before an award may be made: you are advised to register while preparing your application.

Registering in Grants.gov

Applicants must register with Grants.gov, following the instructions at https://www.grants.gov/applicants/applicant-registration and described above.

WHERE TO SUBMIT AN APPLICATION

You must submit the application through Grants.gov at www.Grants.gov, using either the online webforms or downloaded forms, or a system-to-system service

Submit electronic applications through the "Apply for Grants" function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@Grants.gov.

Please ensure that you have read the applicable instructions, guides, help notices, frequently asked questions, and other forms of technical support on Grants.gov.

DOE SC PORTFOLIO ANALYSIS AND MANAGEMENT SYSTEM (PAMS)

Applicants must register in the Portfolio Analysis and Management System (PAMS) to submit letters of intent and pre-applications, to view merit reviewer comments, or to take a number of post-award actions.

C. Administrative and National Policy Requirements

1. Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR 200 as supplemented by 2 CFR 910 (DOE Financial Assistance Regulations). The administrative requirements for DOE other transactions and TIAs are contained in 2 CFR 930.

2. Availability of Funds

Funds are not presently available for this award. The Government's obligation under this award is contingent upon the availability of appropriated funds from which payment for award purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the DOE Contracting Officer for this award and until the recipient receives notice of such availability, to be confirmed in writing by the DOE Contracting Officer.

3. Buy America Preference for Infrastructure Projects

1. OVERVIEW

Made law via the passage of the Infrastructure Investment and Jobs Act (P.L. 117-58), the Build America, Buy America Act ("BABA") mandates that all iron, steel, manufactured products, and construction materials used in Federally-funded projects meet certain

domestic assembly and domestic content requirements. Applicants are strongly encouraged to read this section carefully, as this requirement may impact project budget and/or timeline; it is crucial that applicants properly understand the requirements of BABA as they scope out their projects.

As is detailed more thoroughly below, BABA applies to any project that is receiving Federal financial assistance where the prime recipient is a State, local, or tribal government, nonprofit organization, or institution of higher education. It does not apply to projects that have a for-profit organization serving as the prime recipient.

2. DEFINITIONS

There are several terms of art that are given specific definitions with respect to the application and execution of BABA. Full definitions of these terms can be found by following this hyperlink to the relevant section (2 CFR 184.3) of the Code of Federal Regulations. Any additional context not present in the Code of Federal Regulations definition for a given term is provided below.

a. *Buy America Preference* (Sometimes also referred to as the Buy America Requirement or Domestic Content Procurement Preference). Note that, despite the use of the word "Preference," this is very much a mandatory compliance requirement. The statute, implementing regulations, and OMB guidance characterize this requirement as the "Buy America Preference," and so that terminology is reflected here to ensure consistency with the statute and existing guidance.
b. *Component*
c. *Construction Materials*
d. *Infrastructure Project*
e. *Iron or steel products*
f. *Manufactured Products*
g. *Manufacturer*
h. *Predominantly of iron or steel or a combination of both*
i. *Produced in the United States* (Sometimes also referred to as the "Domestic Production requirement")
j. Section 70917(c) *Materials* (i.e., certain materials used in construction that are specifically excluded from being categorized as "construction materials"; as such, the Buy America Preference is not applied to these materials.

Additionally, the following terms are not defined in 2 CFR 184.3, but are important fora proper understanding of BABA and its application:

k. *Project* – means the construction, alteration, maintenance, or repair of public infrastructure in the United States.
l. *Infrastructure* – Infrastructure includes, at a minimum: the structures, facilities, and

equipment for roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; buildings and real property; and structures, facilities, and equipment that generate, transport, and distribute energy, including electric vehicle (EV) charging.

m. *Public infrastructure* – The Buy America Preference does not apply to non-public (private) infrastructure. For purposes of compliance with BABA, infrastructure should be considered "public" if it is:

(1) publicly owned (owned, operated, funded and managed, in whole or in part, by any unit or authority of a Federal, State, or Local government-including U.S. Territories and Indian Tribes); or

(2) privately owned but utilized primarily for a public purpose. Infrastructure should be considered to be "utilized primarily for a public purpose", and therefore "public", if it is privately owned but operated on behalf of the public or is a place of public accommodation.

3. Buy America Preference

A. The Buy America Preference

Absent an approved waiver, none of the funds provided under a federal award (i.e., whether paid for with federal share or recipient cost-share) may be used for a project for infrastructure unless all iron, steel, manufactured products, and/or construction materials are "produced in the United States."

In general, applicants should ask the following questions to determine BABA applicability to their award:

1. Is the recipient a State, local, or tribal government; nonprofit organization, or institution of higher education? (If the prime is a for-profit organization, BABA does not apply. Otherwise, move on to question 2);

2. Does the project include the construction, alteration, maintenance, and/or repair of infrastructure in the United States? ("Infrastructure" is defined in the BABA statute and regulations, and is quite broad; although the definition provides several specific items that are considered infrastructure, it also includes broad categories such as "buildings and real property," which casts a wide net. If the project does not include work on infrastructure, then BABA does not apply. Otherwise, move to question 3);

3. Is the infrastructure in question publicly-owned or privately-owned but utilized primarily for a public purpose? (Anything owned by a public entity is publicly-owned, by definition. "privately owned but utilized primarily for a public purpose" generally means privately-owned infrastructure that is operated on behalf of the public, or that serves as a place of public accommodation. DOE has the final say on

this determination, so applicants who do not think their infrastructure is "privately-owned but utilized primarily for a public purpose" should have justifications prepared supporting their determination).

If the answer to the above questions is "yes," then BABA applies to your project.

If a determination is made that BABA will apply to a project, recipients must then ensure that all iron, steel, manufactured products, and construction materials used in the project are "produced in the United States." Standards to satisfy this requirement differ based on the category a given material falls under:

a. All iron and steel used in the project is produced in the United States—this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
b. All manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation. (Note: 2 CFR 184.5 provides specific guidance for determining the cost of components for manufactured products); and
c. All construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. (Note: 2 CFR 184.6 provides additional standards that must be satisfied for some specified construction materials in order for those materials to be considered "produced in the United States").

Recipients are responsible for administering their award in accordance with the terms and conditions, including the Buy America Preference. The recipient must ensure that the Buy America Preference flows down to all subawards and that the subawardees and subrecipients comply with the Buy America Preference. The Buy America Preference term and condition must be included all sub-awards, contracts, subcontracts, and purchase orders for work performed under the infrastructure project.

B. Specific Application of the Preference

The Domestic Production requirement only applies to the iron or steel products, manufactured products, and construction materials used for the construction, alteration, maintenance, or repair of public infrastructure in the United States. Only items that are consumed in, incorporated into, or permanently affixed to the infrastructure in the project are required to meet the "produced in the United States" requirements. As such, this requirement does not apply to tools, equipment, and supplies - such as temporary

scaffolding - brought into the construction site and removed at or before the completion of the infrastructure project. This is likewise applicable to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

C. Section 70917(c) Materials

The BABA Statute at Section 70917(c) provides a list of materials which are specifically excluded from categorization as "construction materials," and therefore may be used without meeting the relevant "produced in the United States" standard.

Generally referred to as "Section 70917(c) Materials," these are:
- cement and cementitious materials;
- aggregates such as stone, sand, or gravel; or
- aggregate binding agents or additives as provided in Section 70917(c) of BABA.

Asphalt concrete pavement mixes are typically composed of asphalt cement (a binding agent) and aggregates such as stone, sand, and gravel. Accordingly, asphalt is also excluded from the definition of Construction materials.

Section 70917(c) materials, on their own, are not manufactured products. Further, Section 70917(c) materials should not be considered manufactured products when they are used at or combined proximate to the work site—such as is the case with wet concrete or hot mix asphalt brought to the work site for incorporation. However, certain Section 70917(c) materials (such as stone, sand, and gravel) may be used to produce a manufactured product, such as is precast concrete. Precast concrete is made of components, is processed into a specific shape or form, and is in such state when brought to the work site. Furthermore, wet concrete should not be considered a manufactured product if not dried or set prior to reaching the work site.

Further clarification is provided in 2 CFR 184 on the circumstances under which a determination is made that Section 70917(c) materials should be treated as components of a manufactured product. That determination is based on consideration of: (i) the revised definition of the "manufactured products" at 2 CFR 184.3; (ii) a new definition of "Section 70917(c) materials" at 2 CFR 184.3; (iii) new instructions at 2 CFR 184.4(e) on how and when to categorize articles, materials, and supplies; and (iv) new instructions at 2 CFR 184.4(f) on how to apply the Buy America preference by category.

4. Certification of Compliance

Recipients must request a certification from a product manufacturer that the iron, steel, manufactured product or construction material they are acquiring from the manufacturer were "produced in the United States" (i.e., that they meet the requisite standards outlined at the beginning of Section 3, above). DOE will not provide any sort of "certification template" for this purpose; recipients are responsible for ensuring that a certification contains enough information that it properly validates the BABA compliance of the item(s) listed within the certification.

Although DOE does not require a specific format for the certification, the following elements must be present:
- A listing of all products covered by the certification, including their category (e.g., iron, steel, manufactured product, or construction material);
- A recitation of the relevant "produced in the United States" standard for any categories (iron, steel, manufactured product, or construction material) provided in the above list, to ensure the manufacturer properly understands the standards to be met;
- A clear statement that the products listed meet the relevant "produced in the United States" standard(s);
- A signature from an authorized representative of the manufacturer certifying the contents of the compliance statement; and
- Any other information the recipient deems necessary for the certification to demonstrate compliance with the BABA requirements.

Recipients must also maintain certifications or equivalent documentation for proof of compliance that those articles, materials, and supplies that are consumed in, incorporated into, affixed to, or otherwise used in the infrastructure project, not covered by a waiver or exemption, are produced in the United States. The certification or proof of compliance must be provided by the suppliers or manufacturers of the iron, steel, manufactured products and construction materials and flow up from all subawardees, contractors and vendors to the recipient. Recipients must keep these certifications with the award/project files and be able to produce them upon request from DOE, auditors or Office of Inspector General.

5. Waivers

When necessary, recipients may apply for, and DOE may grant, a waiver from the Buy America Preference. In general, DOE will not review or consider waiver requests from applicants. Waiver requests are subject to review by DOE and the Office of Management and Budget, as well as a public comment period of no less than 15 calendar days.

Waivers must be based on one of the following justifications:

a. Public Interest- Applying the Buy America Preference would be inconsistent with the

public interest;
b. Non-Availability- The types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or
c. Unreasonable Cost- The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent.

Additional information on the submission and processing of a waiver request will be provided to applicants whose applications are selected for award negotiations. Alternatively, applicants can find more information about the process on DOE's Build America, Buy America home page.

4. Conference Spending (February 2015)

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States Government would otherwise exceed $20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

5. Commitment of Public Funds

(a) A DOE financial assistance award is valid only if it is in writing and is signed, either in writing or electronically, by a DOE Contracting Officer.

(b) Recipients are free to accept or reject the award. A request to draw down DOE funds constitutes the Recipient's acceptance of the terms and conditions of this Award.

6. Corporate Felony Conviction and Federal Tax Liability Representations (March 2014)

In submitting an application in response to this NOFO the Applicant represents that:
- It is not a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months,
- It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definitions apply:

- A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

7. Covered Individual Definition, Designation, and Responsibility

For the purposes of this NOFO, a Covered Individual means an individual who (a) contributes in a substantive, meaningful way to the development or execution of the scope of work of a project proposed for funding by DOE, and (b) is designated as a covered individual by DOE.

DOE designates as covered individuals any principal investigator (PI); project director (PD); co-principal investigator (Co-PI); co-project director (Co-PD); project manager; and any individual regardless of title that is functionally performing as a PI, PD, Co-PI, Co-PD, or project manager. Status as a consultant, graduate (master's or PhD) student, or postdoctoral associate does not automatically disqualify a person from being designated as a "covered individual" if they meet the definition in (a) above.

The prime applicant is responsible for assessing the applicability of (a) against each person listed on the application. Further, the prime applicant is responsible for identifying any such individual to DOE for designation as a covered individual, if not already designated by DOE as described above.

Individuals committing no measurable effort or "as-needed" effort are not automatically exempt from being designated as a covered individual. The prime applicant's listing of an individual in the "Senior/Key Person" section of an SF-424(R&R) budget serves as an acknowledgement that DOE designates that person as a covered individual.

DOE may further designate covered individuals during award negotiations or the award period of performance.

8. Digital Persistent Identifier (PID)

Individuals that are required to submit Biographical Sketch and/or Current and Pending (Other) Support disclosures must provide a digital persistent identifier (PID) in such disclosures as part of the application. Included PIDs must meet the common/core standards specified in an ORCID iD).

Include this information for each covered individual with the Current and Pending (Other)

Support submission as described above and in Section IX.

9. Environmental, Safety and Health (ES&H) Performance of Work at DOE Facilities

With respect to the performance of any portion of the work under this award which is performed at a DOE-owned or controlled site, the recipient agrees to comply with all state and Federal ES&H regulations, and with all other ES&H requirements of the operator of such site.

Prior to the performance on any work at a DOE-owned or controlled site, the recipient shall contact the site facility manager for information on DOE and site-specific ES&H requirements.

The recipient shall apply this provision to all subrecipients at any tier.

10. Evaluation and Administration by Non-Federal Personnel

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign a conflict-of-interest agreement and a certificate of confidentiality prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

11. Federal, State, and Local Requirements

With respect to the performance of any portion of the work under this award, the recipient agrees to comply with all applicable local, state, and Federal ES&H regulations. The recipient shall apply this provision to all subrecipients at any tier.

12 Foreign Travel

If international travel is proposed for your project, please note that your organization must comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. § 40118), commonly referred to as the “Fly America Act,” and implementing regulations at 41 CFR 301-10.131 through 301-10.143. The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a United States flag carrier, if service is available.

13. Framework for Nucleic Acid Synthesis Screening Requirement

Entities conducting life sciences R&D activities, or technical assistance to support life sciences R&D activities awards issued after October 2024 with synthetic nucleic acids – including but not limited to Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA), whether single- or double- stranded, as well as whole organism genomes (e.g., viruses, bacteria), or the use of any benchtop equipment capable of synthesizing nucleic acids are required to obtain synthetic nucleic acids or devices capable of synthesizing them – from Providers or Manufacturers that attest to implementing 2024 OSTP Framework for Nucleic Acid Synthesis Screening.

The attestation may be provided through: (1) a publicly posted statement (e.g., public website) or (2) directly to the Grants Officer and the prime recipient/subrecipient for subawards by the Provider or Manufacturer. The Provider or Manufacturer must ensure that the attestation is signed by an individual with authority to respond on behalf of the organization.

Flowdown of requirements to subrecipients. The prime recipient shall incorporate the substance of this term in its terms and conditions, including this paragraph, in all subawards in support of the award that may involve the procurement of synthetic nucleic acids and benchtop nucleic acid synthesis equipment.

14. Funding Restrictions

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

Cost Principles: Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation).

Pre-award Costs: Recipients may charge to an award resulting from this NOFO pre-award costs that were incurred within the 90-day calendar period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation). Recipients must obtain the prior approval of the DOE Contracting Officer for any pre-award costs that are for periods greater than this 90-day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

15. Government Right to Reject or Negotiate

DOE reserves the right, without qualification, to reject any or all applications received in response to this NOFO and to select any application, in whole or in part, as a basis for negotiation and/or award.

16. Implementation of Presidential Memorandum Simplifying the Funding of Energy Infrastructure and Critical Mineral and Material Projects

Pursuant to this Presidential Memorandum, DOE may share and use within the Government any application information provided by or on behalf of the applicant. Accordingly, in accordance with applicable law and notwithstanding any other provisions herein, by submitting an application or agreeing to a financial assistance arrangement with DOE under this NOFO, the applicant is providing consent for any properly marked trade secret, confidential, proprietary, privileged or otherwise sensitive application information provided by or on behalf of the applicant to be disclosed to the Executive Office of the President and relevant Agencies offering loans, grants, equity, guarantees or other federal funding, for the purposes of the Presidential Memorandum on Simplifying the Funding of Energy Infrastructure and Critical Mineral and Material Project.

17. Intergovernmental Review

This program is not subject to Executive Order 12372 Intergovernmental Review of Federal Programs.

18. Logos and Wordmarks

DOE created a logo that recipients may use. The logos and best practices may be found at https://www.energy.gov/management/pf-2023-19-department-energy-awardee-usage-branding-and-logo-guide. Information about the DOE logo, seal, and wordmark may be found at https://www.energy.gov/management/doe-logo-seal-and-word-mark. Information about the SC logo may be found at https://science.osti.gov/About/Resources/Logos.

19. Modifications

Notices of any modifications to this NOFO will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or a NOFO message is posted by registering with FedConnect as an interested party for this NOFO. It is recommended that you register as soon after release of the NOFO as possible to ensure you receive timely notice of any modifications or other NOFOs. More information is available at www.FedConnect.net.

20. National Environmental Policy Act (NEPA) Compliance

DOE would determine if NEPA applies to the proposal in accordance with Section 2.1 of the DOE NEPA Implementing Procedures [DOE NEPA Implementing Procedures (June 2025) | Department of Energy], by evaluating the information provided in question 4.a. on the "Research and Related Other Project Information" form. If NEPA applies, DOE would then determine the required level of NEPA review following the procedures described in Section 2.2 of the DOE NEPA Implementing Procedures. If DOE could not apply a categorical exclusion (CX) to the proposed action, DOE would evaluate the significance of the proposed action's reasonably foreseeable effects consistent with section 3.2 of the DOE NEPA Implementing Procedures:

1. If the proposed action is evaluated in a prior NEPA document by DOE or any other agency, DOE will consider relying on the existing document, or any pertinent part thereof, and supplementing that document as needed;
2. If the proposed action is not likely to have a reasonably foreseeable significant effect on the quality of the human environment, or if the significance of the effects of the proposed action is unknown, DOE will prepare an environmental assessment (EA), as described in chapter 6 of the DOE NEPA Implementing Procedures; or
3. If the proposed action is likely to have a reasonably foreseeable significant effect on the quality of the human environment, DOE will prepare an environmental impact statement (EIS), as described in Chapter 7 of the DOE NEPA Implementing Procedures.

This NEPA process would need to be completed prior to the applicant taking any action on the proposed project that could have adverse environmental effects or that could limit the choice of reasonable alternatives. The process would begin with a request from DOE for an environmental disclosure. If DOE is able to make a CX determination based on that disclosure, that would end the NEPA process. If DOE determines that an EA or EIS is necessary, it would need to be funded by the applicant. DOE has the expectation that the recipient will disclose the potential environmental effects, which would serve to initiate dialogue with DOE as necessary. The inability to satisfy the NEPA requirements after an award would result in cancellation of the award.

21. Nondisclosure and Confidentiality Agreements Representations (June 2015)

By submitting an application in response to this NOFO, the Applicant represents that:
(1) It does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.
(2) It does not and will not use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
    a. *"These provisions are consistent with and do not supersede, conflict with, or otherwise*

alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling."

b. The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

c. Notwithstanding provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States Government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States Government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

22. Notice Regarding Eligible/Ineligible Activities

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

23. Portable Document Format (PDF) Generation

The Project Narrative in an application must be one single PDF file that contains the DOE Title Page, Project Narrative, all required appendices, and other attachments. This single PDF file may not be scanned from a printed document and must be attached in Field 8 on the Grants.gov form. This must be a plain PDF file consisting of text, numbers, and images. The Project Narrative will be read by SC staff using the full version of Adobe Acrobat: Please ensure that the narrative is readable in Acrobat.

Do not submit files with editable fields, password-protection, encryption, redactions, comments, or any other advanced features in some PDF-compatible software. If a file cannot be opened and searched, an application may be declined.

If combining multiple files into one Project Narrative, ensure that a PDF portfolio or binder is not created.

If creating PDF files using any software other than Adobe Acrobat, please use a "Print to PDF" or equivalent process to ensure that all content is visible in the Project Narrative.

Once a Project Narrative has been assembled, please submit the combined Project Narrative file through a "Print to PDF" or equivalent process to ensure that all content is visible in one PDF file that can be viewed in Adobe Acrobat.

Review your submission to ensure that blank pages are not present.

24. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

As set forth in 2 CFR 200.216, recipients and subrecipients are prohibited from obligating or expending project funds (federal funds and recipient cost share) to procure or obtain; extend or renew a contract to procure or obtain; or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Section 889 of Public Law 115-232, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

See Public Law 115-232, Section 889, 2 CFR 200.216, and 2 CFR 200.471 for additional information.

25. Prohibition on Discrimination and Harassment

All people conducting, supporting, or participating in scientific research under this award must be able to do so on the basis of their abilities and without any unnecessary barriers. Recipients of awards resulting from this NOFO are prohibited from engaging in discrimination on any basis prohibited by law, including harassment (sexual or non-sexual) as contained in 10 CFR 1040, 1041, and 1042.

Recipients may contact the DOE's Office of Civil Rights for technical assistance in meeting their institutional requirements under these regulations, including assistance in addressing complaints of discrimination or harassment. DOE is committed to meeting its obligations under Title IV of the Civil Rights Act. The United States Equal Employment Opportunity Commission also makes a number of resources available at https://www.eeoc.gov/eeoc/publications/index.cfm to ensure that employees may perform their work without hindrance. Graduate students and post-doctoral researchers are

understood to have a dual role as both trainees and employees, in accordance with 2 CFR 200.400 (f).

26. Prohibition on Entities of Concern

Prohibition

No Entity of Concern as defined in Section 10114 of Public Law 117-167 (42 USC 18912), may receive any grant, contract, cooperative agreement, or loan of $10 million or more in Department of Energy funds, including funds made available by the Consolidated Appropriations Act, 2024 (Public Law 118-42).

In addition, for all awards involving Departmental activities authorized under Public Law 117-167, no Entity of Concern (including an individual that owns or controls, is owned or controlled by, or is under common ownership or control with an Entity of Concern) may receive DOE funds or perform work under any award, subject to certain penalties. See Section 10114 of Public Law 117-167 (42 USC 18912) and Division D, Title III, Section 310 of Division D of the Consolidated Appropriations Act of 2024 (Pub. L. No. 118-42) for additional information.

By submitting an application to this NOFO, the applicant is certifying that neither the applicant nor any of the project participants qualify as Entities of Concern.

Definitions

Entity of Concern is defined in section 10114 of Public Law 117-167 (42 USC 18912), also known as the CHIPS and Science Act, as any entity, including a national, that is—

(A) identified under section 1237(b) of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (50 U.S.C. 1701 note; Public Law 105–261);

(B) identified under section 1260H of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (10 U.S.C. 113 note; Public Law 116– 283);

(C) on the Entity List maintained by the Bureau of Industry and Security of the Department of Commerce and set forth in Supplement No. 4 to part 744 of title 15, Code of Federal Regulations;

(D) included in the list required by section 9(b)(3) of the Uyghur Human Rights Policy Act of 2020 (Public Law 116–145; 134 Stat. 656); or

(E) identified by the Secretary, in coordination with the Director of the Office of Intelligence

and Counterintelligence and the applicable office that would provide, or is providing, covered support, as posing an unmanageable threat—

(i) to the national security of the United States; or

(ii) of theft or loss of United States intellectual property.

27. Prohibition on Lobbying Activity

By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 USC 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

28. Prohibition Related to Malign Foreign Talent Recruitment Programs

Prohibition

Individuals participating in a Malign Foreign Talent Recruitment Program are prohibited from participating in this award.

Should an award result from this NOFO, the recipient must exercise ongoing due diligence to reasonably ensure that no such individuals participating on the DOE-funded project are participating in a *Malign Foreign Talent Recruitment Program*. Consequences for violations of this prohibition will be determined according to applicable law, regulations, and policy.

Further, the recipient must notify DOE within five (5) business days upon learning that an individual on the project team is or is believed to be participating in a malign foreign talent recruitment program. DOE may modify and add requirements related to this prohibition to the extent required by law.

Required Certifications

a. Each covered individual must certify that they are not party to a Malign Foreign Talent Recruitment Program.
b. The applicant and the subrecipients must certify that the covered individuals in their respective employment have been made aware of the Malign Foreign Talent Recruitment Program prohibition and have complied with their certification responsibilities identified in a.

Non-Discrimination

DOE will ensure that the Malign Foreign Talent Recruitment Program Prohibition is carried out in a manner that does not target, stigmatize, or discriminate against individuals on the basis of race, ethnicity, or national origin, consistent with title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et seq.).

DEFINITIONS

Malign Foreign Talent Recruitment Program. as defined in P.L. 117-167, Section 10638(4):

A. any program, position, or activity that includes compensation in the form of cash, in-kind compensation, including research funding, promised future compensation, complimentary foreign travel, things of non de minimis value, honorific titles, career advancement opportunities, or other types of remuneration or consideration directly provided by a foreign country at any level (national, provincial, or local) or their designee, or an entity based in, funded by, or affiliated with a foreign country, whether or not directly sponsored by the foreign country, to the targeted individual, whether directly or indirectly stated in the arrangement, contract, or other documentation at issue, in exchange for the individual—
   i. engaging in the unauthorized transfer of intellectual property, materials, data products, or other nonpublic information owned by a United States entity or developed with a federal research and development award to the government of a foreign country or an entity based in, funded by, or affiliated with a foreign country regardless of whether that government or entity provided support for the development of the intellectual property, materials, or data products;
   ii. being required to recruit trainees or researchers to enroll in such program, position, or activity;
   iii. establishing a laboratory or company, accepting a faculty position, or undertaking any other employment or appointment in a foreign country or with an entity based in, funded by, or affiliated with a foreign country if such activities are in violation of the standard terms and conditions of a federal research and development award;
   iv. being unable to terminate the foreign talent recruitment program contract or agreement except in extraordinary circumstances;
   v. through funding or effort related to the foreign talent recruitment program, being limited in the capacity to carry out a research and development award or required to engage in work that would result in substantial overlap or duplication with a federal research and development award;
   vi. being required to apply for and successfully receive funding from the sponsoring foreign government's funding agencies with the sponsoring foreign organization as the recipient;
   vii. being required to omit acknowledgment of the recipient institution with which the individual is affiliated, or the federal research agency sponsoring the research and

development award, contrary to the institutional policies or standard terms and conditions of the federal research and development award;

viii. being required to not disclose to the federal research agency or employing institution the participation of such individual in such program, position, or activity; or

ix. having a conflict of interest or conflict of commitment contrary to the standard terms and conditions of the federal research and development award; and

B. a program that is sponsored by—

i. a foreign country of concern or an entity based in a foreign country of concern, whether or not directly sponsored by the foreign country of concern;

ii. an academic institution on the list developed under section 1286(c)(8) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. 2358 note;[1] Public Law 115–232); or

iii. a foreign talent recruitment program on the list developed under section 1286(c)(9) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. 2358 note;[1] Public Law 115–232).

Consistent with applicable law (42 U.S.C. 19232), this provision does not prohibit, unless such activities are funded, organized, or managed by an academic institution or a foreign talent recruitment program on the lists developed under paragraphs (8) and (9) of section 1286(c) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. 4001 note; Public Law 115–232)—

A. making scholarly presentations and publishing written materials regarding scientific information not otherwise controlled under current law;

B. participation in international conferences or other international exchanges, research projects or programs that involve open and reciprocal exchange of scientific information, and which are aimed at advancing international scientific understanding and not otherwise controlled under current law;

C. advising a foreign student enrolled at an institution of higher education or writing a recommendation for such a student, at such student's request; and

D. other international activities determined appropriate by the federal research agency head or designee.

29. Proprietary Application Information

Department of Energy (DOE) takes very seriously the confidentiality of all applicants and will treat information submitted in applications, as well as the identity of applicants, as confidential to the fullest extent permissible under Federal law. In order for DOE to protect confidential information, the applicant must also treat the information as confidential and

properly mark it as described below. DOE will not be able to protect information that the applicant has released publicly or is in the public domain. For additional information on DOE's Freedom of Information Act (FOIA) regulations, see 10 CFR 1004.

Applicants should not include business sensitive information (e.g., commercial or financial information that is privileged or confidential), trade secrets, proprietary, or otherwise confidential information in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the NOFO. Applicants are advised to not include any critically sensitive proprietary detail.

If an application includes trade secrets or information that is commercial or financial, or information that is confidential or privileged, it is furnished to the Government in confidence with the understanding that the information shall be used or disclosed only for evaluation of the application. Such information will be withheld from public disclosure to the extent permitted by law, including the FOIA. Without assuming any liability for inadvertent disclosure, DOE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for merit review of the application or as otherwise authorized by law. This restriction does not limit the Government's right to use the information if it is obtained from another source.

Applications and other submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the FOIA or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose.

The cover sheet of the Application and other submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information:

> Notice of Restriction on Disclosure and Use of Data:
> Pages [list applicable pages] of this document may contain trade secrets, confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

The header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Trade Secrets, Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure." In addition, each line or paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

IMPORTANT GUIDANCE FOR COMPANY SUBMITTERS:

As per DOE's FOIA regulations and Department of Justice FOIA guidance, if DOE receives a FOIA request the following general steps will be taken:

1. DOE will review the request to determine whether your company's information is subject to the request. Only federal records are subject to FOIA requests. Depending on the circumstances, information submitted by an outside entity may be considered "federal records" for purposes of FOIA.
2. If your company information is determined to be a federal record and responsive to a FOIA request, DOE will review what was submitted in order to determine if DOE can make a determination whether the information is legally exempt.
    a. If DOE determines your information is fully exempt under an exemption and that it will not be released, DOE may not contact you.
    b. If DOE is unable to determine whether the information is exempt under an exemption or is planning on releasing some or all of your information, DOE will first contact you in order for you to have an opportunity to respond and provide additional justification as to why it may be exempt. DOE will do all that it can to work with company submitters to be in compliance with the law and maintain positive relations with company submitters.
    c. It is critical if DOE or DOE's contractors who are processing your FOIA contact you that you respond in a timely manner. DOE is under strict deadlines when processing a FOIA request.

30. Publications

The recipient is expected to publish scientific results in peer-reviewed journals or otherwise make publicly available the results of the work conducted under any award resulting from this NOFO. Publications and other methods of public communication describing any work based on or developed under an award resulting from this NOFO must contain an acknowledgment of SC support. The format for such acknowledgments is provided at https://science.osti.gov/funding-opportunities/acknowledgements/. The author's copy of any peer-reviewed manuscript accepted for publication must be announced to DOE's Office of Scientific and Technical Information (OSTI) and made publicly available in accordance with the instructions contained in the Reporting Requirements Checklist incorporated in all Assistance Agreements. Awards made under this NOFO are subject to DOE's Public Access Plan. Full-text versions of scientific publications must be made publicly accessible at no charge to readers.

31. Registration Requirements

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR 25 (See: www.eCFR.gov). Prime recipients must keep their data in SAM

current at www.SAM.gov. Subrecipients at all tiers must obtain UEI numbers and provide the UEI to the prime recipient before the subaward can be issued.

32. Research Misconduct

Scientific discoveries can only take place when scientific research is conducted in a fair, transparent, and honestly reported manner. Any form of dishonesty—whether plagiarism, falsifying results, or misrepresenting conditions—makes it impossible to advance our understanding of the physical universe.

Recipients are "responsible for maintaining the integrity of research of any kind under an award from DOE including the prevention, detection, and remediation of research misconduct, and the conduct of inquiries, investigations, and adjudication of allegations of research misconduct," and conducting appropriate administrative processes in response to allegations of research misconduct in accordance with 2 CFR 910.132. Allegations of any misconduct under an award resulting from this NOFO must be reported to the appropriate institutional officials in accordance with institutional policies against misconduct. Additional information on DOE research misconduct policies can be found at: https://science.osti.gov/grants/Policy-and-Guidance/Research-Misconduct.

33. Research Security Training Requirement

Covered individuals listed on applications are required to certify that they have taken research security training consistent with Section 10634 of the CHIPS and Science Act of 2022. In addition, an applicant who receives an award must maintain sufficient records (records must be retained for the time period noted in 2 CFR 200.334 and made available to DOE upon request) of its compliance with this requirement for covered individuals at the applicant/recipient organization and it must extend this requirement to any and all subrecipients.

Include this information for each covered individual with the Current and Pending Support submission as described above.

34. Rights in Technical Data

Normally, the government has unlimited rights in technical data created under a DOE agreement, including the right to distribute to the public. Delivery or third-party licensing of proprietary software or data developed solely at private expense ("Limited Rights Data") will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to ensure the commercialization of technology developed under a DOE agreement.

If software is specified for delivery to DOE, or if other special circumstances exist, e.g., DOE

specifying "open-source" treatment of software, then the DOE Contracting Officer, after negotiation with the recipient, may include in the award special provisions requiring the recipient to obtain written approval of the DOE Contracting Officer prior to asserting copyright in the software, modifying the retained Government license, and/or otherwise altering the copyright provisions.

35. Statement of Federal Stewardship

DOE will exercise normal federal stewardship in overseeing the project activities performed under DOE awards. Stewardship activities include but are not limited to conducting site visits; reviewing performance and financial reports; providing assistance and/or temporary intervention in unusual circumstances to correct deficiencies that develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the project objectives have been accomplished.

36. Subaward and Executive Reporting

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR 170. (See: www.eCFR.gov). Prime recipients must register with the new Federal Funding and Transparency Act Subaward Reporting System (FSRS) at https://www.fsrs.gov and report the required data on their first tier subrecipients. Prime recipients may be required to report the total compensation for their five most highly compensated executives as part of their registration profile in SAM.gov and for first-tier subrecipients' five most highly compensated executives as in FSRS.gov.

37. Title to Subject Inventions

Ownership of subject inventions is governed pursuant to the authorities listed below:

- Nonprofit organizations or small business firms: Under the Bayh-Dole Act (35 U.S.C. § 200 et seq.), nonprofit organizations or small business firms as defined by 35 U.S.C. 201 may elect to retain title to their subject inventions.
- All other parties: The federal Non-Nuclear Energy Act of 1974, 42. U.S.C. 5908, provides that the government obtains title to new inventions unless a waiver is granted (see below).
- Patent Waiver: DOE has issued Class Patent Waiver W(C) 2022-03 which allows domestic large businesses providing at least 20% cost share to elect to retain title to their subject inventions. Class Patent Waiver W(C) 2022-03 includes a U.S. Competitiveness provision requiring any products embodying or produced through the use of a subject invention first created or reduced to practice in the performance of work under this NOFO to be substantially manufactured in the United States. A domestic large business is any for-profit entity that does not qualify as a "small business" and is incorporated (or

otherwise formed) under the laws of a particular state or territory of the United States and is not owned, controlled, or influenced by a foreign government, agency, firm, corporation, or person. Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this NOFO, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784. For more information, see https://www.energy.gov/gc/office-assistant-general-counsel-technology-transfer-and-intellectual-property Nonprofit organizations and small business firms do not need a patent waiver in order to retain title to their subject inventions (see above).

- Determination of Exceptional Circumstances (DEC): On June 07, 2021, DOE approved a DETERMINATION OF EXCEPTIONAL CIRCUMSTANCES (DEC) UNDER THE BAYH-DOLE ACT TO FURTHER PROMOTE DOMESTIC MANUFACTURE OF DOE SCIENCE AND ENERGY TECHNOLOGIES. In accordance with this DEC, all awards, including sub-awards, under this NOFO shall include the U.S. Competitiveness Provision in accordance with Section IX of this NOFO. A copy of the DEC can be found at https://www.energy.gov/gc/determination-exceptional-circumstances-decs.
- Pursuant to 37 CFR § 401.4, any nonprofit organization or small business firm as defined by 35 U.S.C. 201 affected by any DEC has the right to appeal it by providing written notice to DOE within 30 working days from the time it receives a copy of the determination.
- DOE may issue and publish on the website above further DECs prior to the issuance of awards under this NOFO. DOE may require additional submissions or requirements as authorized by any applicable DEC.
- [IF APPLICABLE] DEC: QUANTUM INFORMATION SCIENCE TECHNOLOGIES DEC: On August 28, 2020, DOE approved a DETERMINATION OF EXCEPTIONAL CIRCUMSTANCES UNDER THE BAYH-DOLE ACT FOR QUANTUM INFORMATION SCIENCE TECHNOLOGIES, pursuant to 37 CFR 401.3(a)(2), which applies to agreements issued under this NOFO requiring each applicant to agree to a U.S. Competitiveness Provision. DOE has determined that exceptional circumstances exist that warrant the modification of the standard patent rights clause for small businesses and non-profit recipients under the Bayh-Dole Act, 35 U.S.C. 200 et seq., to the extent necessary to ensure that DOE "obtains sufficient rights in the federally supported inventions to meet the needs of [DOE]" and "to promote the commercialization and public availability of inventions made in the United States by United States industry and labor" and/or further promote other purposes of the Bayh-Dole Act. 35 U.S.C. § 200. In accordance with this DEC, all awards, including sub-awards, under this NOFO shall include the U.S. Competitiveness Provision in accordance with Section IX of this NOFO. A copy of the DEC can be found at

https://www.energy.gov/gc/determination-exceptional-circumstances-decs.

[IF APPLICABLE] Class Patent Waiver: DOE has issued Class Patent Waiver No. W(C) 2020-001 of Patent Rights Related to Quantum Information Science and its Technology Applications that applies to this NOFO for any domestic large business that is a recipient, or subrecipient at any tier to this NOFO and is providing at least 20% cost share. Under this Class Patent Waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class patent waiver, a domestic large business must agree that any products embodying or produced using a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States. Entities not eligible under the Class Patent Waiver are still able to petition DOE for rights under an Advanced or Identified Patent Waiver as described above.

Nonprofit organizations and small business firms do not need a patent waiver in order to retain title to their subject inventions (see above).

38. Trafficking in Persons

Awards resulting from this NOFO are subject to the requirements of 2 CFR 175 (https://www.ecfr.gov) which prohibit recipients, their employees, subrecipients, and their employees from severe forms of trafficking in persons; the procurement of a commercial sex act during the period of time that this award or any subaward is in effect; the use of forced labor in the performance of this award or any subaward; or acts that directly support or advance trafficking in persons.

39. U.S. Competitiveness

A primary objective of DOE's multi-billion-dollar research, development and demonstration investments is to cultivate new research and development ecosystems, manufacturing capabilities, and supply chains for and by U.S. industry and labor. Therefore, in exchange for receiving taxpayer dollars to support an applicant's project, the applicant must agree to a U.S. Competitiveness provision requiring to any products embodying any subject invention or produced using any subject invention will be manufactured substantially in the United States unless the Recipient can show to the satisfaction of DOE that it is not commercially feasible. Award terms, including the U.S. Competitiveness Provision, are available at https://www.energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards.

Please note that a subject invention is any invention conceived or first actually reduced in performance of work under an award. An invention is any invention or discovery which is or may be patentable. The recipient includes any awardee, recipient, sub-awardee, or sub-recipient.

As noted in the U.S. Competitiveness Provision, if an entity cannot meet the requirements of the U.S. Competitiveness Provision, the entity may request a modification or waiver of the U.S. Competitiveness Provision. For example, the entity may propose modifying the language of the U.S. Competitiveness Provision in order to change the scope of the requirements or to provide more specifics on the application of the requirements for a particular technology. As another example, the entity may request that the U.S. Competitiveness Provision be waived in lieu of a net benefits statement or U.S. manufacturing plan. The statement or plan would contain specific and enforceable commitments that would be beneficial to the U.S. economy and competitiveness. Examples of such commitments could include manufacturing specific products in the U.S., making a specific investment in a new or existing U.S. manufacturing facility, keeping certain activities based in the U.S. or supporting a certain number of jobs in the U.S. related to the technology. DOE may, in its sole discretion, determine that the proposed modification or waiver promotes commercialization and provides sufficient U.S. economic benefits, and grant the request. If granted, DOE will modify the award terms and conditions for the requesting entity accordingly. More information and guidance on the waiver and modification request process can be found in the DOE Financial Assistance Letter on this topic, available here at https://www.energy.gov/management/pf-2022-09-fal-2022-01-implementation-doe-determination-exceptional-circumstances-under. Additional information on DOE's Commitment to Domestic Manufacturing for DOE-funded R&D is available at https://www.energy.gov/gc/us-manufacturing.

The U.S. Competitiveness Provision is implemented by DOE pursuant to a Determination of Exceptional Circumstances (DEC) under the Bayh-Dole Act and DOE Patent Waivers. See Section IX.

40. Updating Your Portfolio Analysis and Management System (PAMS) Profile

All applicants are encouraged to update their profiles in the PAMS website at https://pamspublic.science.energy.gov regularly to ensure SC has your most up to date information. The PAMS profile allows individuals to provide responses to various fields, including selecting a "Do not wish to provide" option. Your individual information will not be shared with peer reviewers and the information in your PAMS profile is protected by the requirements established in the Federal Privacy Act of 1974.

D. Reference Material

Glossary of Useful Grants and Cooperative Agreement terms

Acquisition cost	*Acquisition cost* means the cost of the asset including the cost to ready the asset for its intended use. Acquisition cost for equipment, for example, means the net invoice price of the equipment, including the cost of any modifications, attachments, accessories, or auxiliary apparatus necessary to make it usable for the purpose for which it is acquired. Acquisition costs for software includes those development costs capitalized in accordance with generally accepted accounting principles (GAAP). Ancillary charges, such as taxes, duty, protective in transit insurance, freight, and installation may be included in or excluded from the acquisition cost in accordance with the non-Federal entity's regular accounting practices.
Administrative requirements	*Administrative requirement*s mean the general business management practices that are common to the administration of all grants, such as financial accountability, reporting, equipment management, and retention of records.
Advance payment	*Advance payment* means a payment that a Federal awarding agency or pass-through entity makes by any appropriate payment mechanism, including a predetermined payment schedule, before the non-Federal entity disburses the funds for program purposes.
Allocation	*Allocation* means the process of assigning a cost, or a group of costs, to one or more cost objective(s), in reasonable proportion to the benefit provided or other equitable relationship. The process may entail assigning a cost(s) directly to a final cost objective or through one or more intermediate cost objectives.
Allocability	*Allocability* means the principle which requires that an expense or service charged must directly benefit and be necessary for the performance of the project; when multiple projects are benefited reasonable proportions must be able to be assigned. See 2 CFR 200.405.
Allowable cost	*Allowable cost* means a cost incurred by a recipient that is: (1) reasonable for the performance of the award; (2) allocable; (3) in conformance with any limitations or exclusions set forth in the Federal cost principles applicable to the organization incurring the cost or in the award documents as to the type or amount of cost; (4) consistent with regulations, policies, and procedures of the recipient that are applied uniformly to both federally supported and other activities of the organization; (5) accorded consistent treatment as a direct or indirect cost; (6) determined in accordance with generally accepted accounting principles; and (7) not included as a cost in any other federally supported award (unless specifically authorized by statute). See 2 CFR 200.403.
Application	*Application* means a request for financial support of a project or activity submitted to DOE on specified forms and in accordance with DOE instructions. Also known as a proposal.
Appropriation Act	*Appropriation act* means the statute that provides the authority for Federal agencies to incur obligations to and make payments out of the U.S. treasury for specified purposes.

Approved budget	The *approved budget* for the Federal award summarizes the financial aspects of the project or program as approved during the Federal award process. It may include either the Federal and non-Federal share or only the Federal share, depending upon Federal awarding agency requirements. It must be related to performance for program evaluation purposes whenever appropriate. See 2 CFR 200.308(a).
Assurance	*Assurance* means a certification by an applicant, normally included with the application or State plan, indicating that the entity complies with, or that it will comply with, a particular requirement if awarded a Federal grant.
Authorized organizational representative	*Authorized organizational representative* means the individual, named by the applicant organization, who is authorized to act for the applicant and to assume the obligations imposed by the Federal laws, regulations, requirements, and conditions that apply to grant applications or grant awards.
Award	*Award* means the provision of funds by DOE, based on an approved application and budget or progress report, to an organizational entity or an individual to carry out a project or activity.
Award documents	*Award documents* means the entirety of the documents describing the legal relationship between DOE and an awardee or recipient. The award documents include an Assistance Agreement and other documents which may be incorporated by reference or as attachments to the Assistance Agreement. The award documents are the official, legally binding document, signed (or the electronic equivalent of signature) by a Contracting Officer that: notifies the recipient of the award of an award; contains or references all the terms and conditions of the grant and Federal funding limits and obligations; and, provides the documentary basis for recording the obligation of Federal funds in the DOE accounting system.
Bayh-Dole Act	*Bayh-Dole Act* means a law which encourages universities and researchers to develop their inventions into marketable products; formal citation is Section 6 of the Patent and Trademark Amendment of 1980, Pub. L 96-517 as amended.
Budget	*Budget* means the financial plan for the project or program that the Federal awarding agency or pass-through entity approves during the Federal award process or in subsequent amendments to the Federal award. It may include the Federal and non-Federal share or only the Federal share, as determined by the Federal awarding agency or pass-through entity.
Budget period	*Budget period* means the intervals of time (usually 12 months each) into which a project period is divided for budgetary and funding purposes.
Business officer	*Business officer* means the financial official of the recipient who has primary fiscal responsibility for the grant. Also known as authorized organizational representative.
Capital assets	*Capital assets* means tangible or intangible assets used in operations having a useful life of more than one year which are capitalized in accordance with GAAP. Capital assets include: (a) Land, buildings (facilities), equipment, and intellectual property (including software) whether acquired by purchase, construction, manufacture, lease-purchase, exchange, or through capital leases; and (b) Additions, improvements, modifications, replacements,

	rearrangements, reinstallations, renovations or alterations to capital assets that materially increase their value or useful life (not ordinary repairs and maintenance).
Carryover	*Carryover* means unobligated Federal funds remaining at the end of any budget period that may be carried forward to another budget period to cover allowable costs of that budget period (whether as an offset or additional authorization). Obligated, but unliquidated, funds are not considered carryover.
Change in scope	*Change in scope* means an activity whereby the objectives or specific aims identified in the approved grant application are significantly changed by the recipient after award. Contracting Officer prior approval is required for a change in scope to be allowable under an award.
Closeout	*Closeout* means the process by which a Federal awarding agency determines that all applicable administrative actions and all required work under an award have been completed by the recipient and the Federal awarding agency.
Competitive segment	*Competitive segment* means the initial project period recommended for support or each extension of a project period resulting from a renewal award.
Conference (domestic or international)	*Conference (domestic or international)* means a symposium, seminar, workshop, or any other organized and formal meeting, whether conducted face-to-face or via the Internet, where individuals assemble (or meet virtually) to exchange information and views or explore or clarify a defined subject, problem, or area of knowledge, a published report results from such meeting.
Consortium or sub-award agreement	*Consortium or sub-award agreement* means a formalized agreement whereby a research project is carried out by the recipient and one or more other organizations that are separate legal entities. Under the agreement, the recipient must perform a substantive role in the conduct of the planned research and not merely serve as a conduit of funds to another party or parties. These agreements typically involve a specific level of effort from the consortium organization's PD/PI and a categorical breakdown of costs, such as personnel, supplies, and other allowable expenses, including F&A costs. The relationship between the recipient and the collaborating organizations is considered a sub-award relationship.
Consultant	*Consultant* means an individual who provides professional advice or services for a fee, but not as an employee of the engaging party. To prevent apparent or actual conflicts of interest, recipients and consultants must establish written guidelines indicating the conditions of payment of consulting fees. Consultants also include firms that provide professional advice or services. See 2 CFR 200.459.
Continuation application/award	*Continuation application/award* means a financial assistance request (in the form of an application or progress report) or resulting award for a subsequent budget period within a previously approved project period for which a recipient does not have to compete with other applicants.
Contract	*Contract* means a legal instrument by which a non-Federal entity purchases property or services needed to carry out the project or program under a Federal award. The term as used in this part does not include a legal instrument, even if the non-Federal entity considers it a contract, when the substance of the transaction meets the definition of a Federal award or sub-award (see 2 CFR 200.1 Subaward).

Contractor	*Contractor* means an entity that receives a contract as defined in 2 CFR 200.1 Contract.
Contracting (or Grants) Officer	*Contracting (or Grants) Officer* means a DOE official responsible for the business management aspects of grants and cooperative agreements, including review, negotiation, award, and administration, and for the interpretation of grants administration policies and provisions. COs and GOs are delegated the authority to obligate DOE to the expenditure of funds and permit changes to approved projects on behalf of DOE.
Contracting (or Grants Management) specialist	*Contracting (or Grants Management) specialist* means a DOE staff member who works with a Contracting or Grants Officer and is assigned the day-to-day management of a portfolio of grants and/or cooperative agreements. These activities include, but are not limited to, evaluating grant applications for administrative content and compliance with statutes, regulations, and guidelines; negotiating grants; providing consultation and technical assistance to recipients; and administering grants after award.
Cooperative agreement	*Cooperative agreement* means a type of financial assistance used when there will be substantial Federal scientific or programmatic involvement. Substantial involvement means that, after award, scientific or program staff will assist, guide, coordinate, or participate in project activities.
Cost principles	*Cost principles* means the government-wide principles, 2 CFR 200 Subpart E (or, in the case of commercial organizations, the Federal Acquisition Regulation [48 CFR 31], or, in the case of hospitals, see Appendix IX to Part 200—Hospital Cost Principles, Appendix E, "Principles for Determining Costs Applicable to Research and Development Under Grants and Contracts with Hospitals"), on allowability and unallowability of costs under federally sponsored agreements.
Cost sharing or matching	*Cost sharing or matching* means the portion of project costs not paid by Federal funds (unless otherwise authorized by Federal statute). See also 2 CFR 200.306 Cost sharing or matching.
Deadline	*Deadline* means the published date and/or time that a grant application is to be submitted to the funding agency.
Debarment and suspension	*Debarment and suspension* mean the actions taken by a debarring official in accordance with OMB guidance at 2 CFR 180, "Non-procurement Debarment and Suspension," to exclude a person or organization from participating in grants and other non-procurement awards government-wide. If debarred or suspended, the person or organization may not receive financial assistance (under a grant, cooperative agreement, or sub-award, or contract under a grant) for a specified period of time. Debarments and suspensions carried out pursuant to 2 CFR 376 are distinct from post-award suspension action by an awarding agency. See 2 CFR 901 for DOE implementation.
Direct costs	*Direct costs* mean costs that can be identified specifically with a particular sponsored project, an instructional activity, or any other institutional activity, or that can be directly assigned to such activities relatively easily with a high degree of accuracy. See 2 CFR 200.413.
Disallowed costs	*Disallowed costs* mean those charges to a Federal award that the Federal awarding agency or pass-through entity determines to be unallowable, in accordance with the applicable Federal statutes, regulations, or the terms and conditions of the Federal award.
Domestic organization	*Domestic organization* means a public (including a State or other governmental agency) or private non-profit or for-profit organization that

	is located in the United States or its territories, is subject to U.S. laws, and assumes legal and financial accountability for awarded funds and for the performance of the grant-supported activities.
Effort	*Effort* means the amount of time, usually expressed as a percentage of the total, which a faculty member or other employee spends on a sponsored project. No one is allowed to spend more than 100% total commitment on all academic activities, including grant-sponsored research, university-sponsored research, teaching, administration, advising and other contracted duties. Effort is indicated on the budget in units of person-months.
Equipment	*Equipment* means tangible personal property (including information technology systems) having a useful life of more than one year and a per-unit acquisition cost which equals or exceeds the lesser of the capitalization level established by the non-Federal entity for financial statement purposes, or $10,000. See also 2 CFR 200.1 Capital assets, Computing devices, General purpose equipment, Information technology systems, Special purpose equipment, and Supplies.
Expanded authorities	*Expanded authorities* means authorization to recipients under certain research grant mechanisms which waives the requirement for prior agency approval for specified actions related to awards. Example: 90-day pre-award spending authority, no cost extensions for up to one additional year, and automatic carryover of unobligated funds from one budget period to the next. The expanded authorities are now contained in Uniform Guidance of 2 CFR 200 as being applicable to all research awards.
Expiration date	*Expiration date* means generally, the date signifying the end of the current project period, after which the recipient is not authorized to obligate grant funds.
Facilities and administrative costs	*Facilities and administrative costs* mean costs that are incurred by a recipient for common or joint objectives and that, therefore, cannot be identified specifically with a particular project or program. These costs also are known as indirect costs.
Federal financial report	*Federal financial report* means submitted on Standard Form (SF) 425, to indicate the status of awarded funds for the period covered. Frequency of reporting is specified in the Reporting Checklist provided as part of the award documents.
Financial assistance	*Financial assistance* means transfer by DOE of money or property to an eligible entity to support or stimulate a public purpose authorized by statute.
Financial status report	*Financial status report* means see Federal Financial Report.
Foreign travel	*Foreign travel* is meant to include travel outside of North America (Canada, Mexico, and the United States) and U.S. territories and possessions (Guam, American Samoa, Puerto Rico, the U.S. Virgin Islands. A trip is considered foreign travel for all legs of the itinerary if the traveler does not return to his or her post prior to departure for a foreign destination. Costs for foreign travel may be restricted by the language of a Funding Opportunity Announcement.

Grant agreement	*Grant agreement* means a legal instrument of financial assistance between a Federal awarding agency or pass-through entity and a non-Federal entity that, consistent with 31 USC 6302, 6304: (a) Is used to enter into a relationship the principal purpose of which is to transfer anything of value from the Federal awarding agency or pass-through entity to the non-Federal entity to carry out a public purpose authorized by a law of the United States (see 31 USC 6101(3)); and not to acquire property or services for the Federal awarding agency or pass-through entity's direct benefit or use; (b) Is distinguished from a cooperative agreement in that it does not provide for substantial involvement between the Federal awarding agency or pass-through entity and the non-Federal entity in carrying out the activity contemplated by the Federal award. (c) Does not include an agreement that provides only: (1) Direct United States Government cash assistance to an individual; (2) A subsidy; (3) A loan; (4) A loan guarantee; or (5) Insurance.
Grant-supported project or activity	*Grant-supported project or activity* means those activities specified or described in a grant application or in a subsequent submission that are approved by DOE for funding, regardless of whether Federal funding constitutes all or only a portion of the financial support necessary to carry them out.
Grants.gov	*Grants.gov* (https://www.Grants.gov/) has been designated by the Office of Management and Budget as the single access point for all grant programs offered by 26 Federal grant-making agencies. It provides a single interface for agencies to announce their grant opportunities and for all applicants to find and apply for those opportunities.
Indirect costs (facilities & administrative)	*Indirect (F&A) costs* mean those costs incurred for a common or joint purpose benefitting more than one cost objective, and not readily assignable to the cost objectives specifically benefitted, without effort disproportionate to the results achieved. To facilitate equitable distribution of indirect expenses to the cost objectives served, it may be necessary to establish several pools of indirect (F&A) costs. Indirect (F&A) cost pools must be distributed to benefitted cost objectives on bases that will produce an equitable result in consideration of relative benefits derived.
Institutional base salary	*Institutional base salary* means the annual compensation paid by an organization for an employee's appointment, whether that individual's time is spent on research, teaching, patient care, or other activities. Base salary excludes any income that an individual may be permitted to earn outside of duties for the applicant/recipient organization. Base salary may not be increased as a result of replacing organizational salary funds with grant funds.
Matching or cost sharing	*Matching or cost sharing* means the value of third-party in-kind contributions and the portion of the costs of a federally assisted project or program not borne by the Federal government. Matching or cost sharing may be required by statute or program regulation. Costs used to satisfy matching or cost-sharing requirements are subject to the same policies governing allowability as other costs under the approved budget.

Merit (or peer) review	*Merit (or peer) review* means the process that involves the consistent application of standards and procedures that produce fair, impartial, and objective examinations of applications based on an evaluation of scientific or technical merit or other relevant aspects of the application. The review is performed by experts (reviewers) in the field of endeavor for which support is requested. Merit review is intended to provide guidance to the DOE individuals responsible for making award decisions.
Monitoring	*Monitoring* means a process whereby the programmatic and business management performance aspects of a grant are assessed by reviewing information gathered from various required reports, audits, site visits, and other sources.
NEPA	*NEPA* means the National Environmental Policy Act (NEPA), Public Law 91-190, as amended. NEPA requires Federal agencies to assess the environmental effects of proposed major Federal actions prior to making decisions.
No-cost extension	*No-cost extension* means an extension of time to a project period and/or budget period to complete the work of the grant under that period, without additional Federal funds or competition.
Non-Federal share	*Non-Federal share* means when cost sharing or matching is required as a condition of an award, the portion of allowable project/program costs not borne by the Federal government.
Notice of Funding Opportunity (NOFO)	*Notice of Funding Opportunity (NOFO)* means a publicly available document by which a Federal Agency makes known its intentions to award discretionary grants or cooperative agreements, usually as a result of competition for funds. NOFOs may be known as program announcements, requests for applications, notices of funding availability, solicitations, or other names depending on the Agency and type of program. NOFOs can be found at www.Grants.gov. A NOFO may also be known as a solicitation. NOFOs were previously known as Funding Opportunity Announcements (FOAs).
Obligations	*Obligations,* when used in connection with a non-Federal entity's utilization of funds under a Federal award, mean orders placed for property and services, contracts and sub-awards made, and similar transactions during a given period that require payment by the non-Federal entity during the same or a future period.
OMB circulars	*OMB circulars* are government-wide guidance issued to Heads of Federal agencies by the Director of the Office of Management and Budget.
Other significant contributors	*Other significant contributors* mean individuals who have committed to contribute to the scientific development or execution of the project, but are not committing any specified measurable effort (i.e., person months) to the project. These individuals are typically presented at "effort of zero person months" or "as needed." Individuals with measurable effort may not be listed as Other Significant Contributors (OSCs). Consultants should be included if they meet this definition.
Program participant	*Program participants* are the recipients of service or training provided at a workshop, conference, seminar, symposium or other short-term instructional or information-sharing activity funded by an external grant or award, or the training beneficiaries of the project or program funded by an external grant or award. A participant is not involved in providing any deliverable to the recipient or a third party or would not be terminated or replaced for failure to perform.

Participant support costs	*Participant support costs* mean direct costs for items such as stipends or subsistence allowances, travel allowances, and registration fees paid to or on behalf of participants or trainees (but not employees) in connection with conferences, or training projects.
Person months	*Person months* is the metric for expressing the effort (amount of time) PD/PI(s), faculty and other senior/key personnel devote to a specific project. The effort is based on the type of appointment of the individual with the organization, e.g., calendar year, academic year, and/or summer term; and the organization's definition of such. For instance, some institutions define the academic year as a nine (9)-month appointment while others define it as a 10-month appointment.
Pre-application or pre-proposal	*Pre-application or pre-proposal* means a brief outline or narrative of proposed work and sometimes budget, for informal review by a sponsor to determine whether an application should be submitted. Three predominant reasons for requiring submission of a preliminary pre-application are: Reduce the applicant's unnecessary effort in proposal preparation when the chance of success is very small. This is particularly true of exploratory initiatives where the community senses that a major new direction is being identified, or competitions that will result in a small number of actual awards. Increase the overall quality of the submission. Distill the number of applications that will be submitted to the agency and the number of anticipated reviewers needed to review.
Pre-award costs	*Pre-award costs* mean any cost incurred prior to the beginning date of the project period or the initial budget period of a competitive segment (under a multi-year award), in anticipation of the award and at the applicant's own risk, for otherwise allowable costs.
Prior approval	*Prior approval* means written approval from the designated Contracting Officer.
Program Director/ Principal Investigator	*Program Director/ Principal Investigator* means the individual(s) designated by the applicant organization to have the appropriate level of authority and responsibility to direct the project or program to be supported by the award. The applicant organization may designate multiple individuals as program directors/principal investigators (PD/PIs) who share the authority and responsibility for leading and directing the project, intellectually and logistically. When multiple PD/PIs are named, each is responsible and accountable to the applicant organization, or as appropriate, to a collaborating organization for the proper conduct of the project or program including the submission of all required reports. The presence of more than one PD/PI on an application or award diminishes neither the responsibility nor the accountability of any individual PD/PI.

Program income	*Program income* means gross income earned by the non-Federal entity that is directly generated by a supported activity or earned as a result of the Federal award during the period of performance except as provided in 2 CFR 200.307 paragraph (f). (See 2 CFR 200.1 Period of performance.) Program income includes but is not limited to income from fees for services performed, the use or rental or real or personal property acquired under Federal awards, the sale of commodities or items fabricated under a Federal award, license fees and royalties on patents and copyrights, and principal and interest on loans made with Federal award funds. Interest earned on advances of Federal funds is not program income. Except as otherwise provided in Federal statutes, regulations, or the terms and conditions of the Federal award, program income does not include rebates, credits, discounts, and interest earned on any of them. See also 2 CFR 200.407 Prior written approval (prior approval). See also 35 USC 200-212 "Disposition of Rights in Educational Awards" for inventions made under Federal awards.
Program Manager	*Program Manager* means the DOE official responsible for the programmatic, scientific, and/or technical aspects of a grant. The same role is filled by Program Directors, Program Officers, or Project Directors at other Federal agencies.
Progress report	*Progress report* means periodic, frequently annual, report submitted by the recipient and used by DOE to assess progress and to determine whether to provide funding for the budget period that covered by the report.
Project/performance site	*Project/ performance site* means location(s) of where the work described in the research plan will be conducted.
Project period	*Project period* means the total time for which Federal support of a project has been programmatically approved as shown in the award documents; however, it does not constitute a commitment by the Federal government to fund the entire period. The total award period comprises the initial competitive segment, any subsequent competitive segments resulting from a renewal award(s), and extensions.
Proposal	See application.
Re-budgeting	*Re-budgeting* means reallocation of funds available for spending between approved budget categories to allow best use of funds to accomplish the project goals.
Real Property	*Real property* means land, including land improvements, structures and appurtenances thereto, but excludes moveable machinery and equipment.
Recipient	*Recipient* means the organization or individual awarded a grant or cooperative agreement by DOE that is responsible and accountable for the use of the funds provided and for the performance of the grant-supported project or activity. The recipient is the entire legal entity even if a particular component is designated in award documents. The recipient is legally responsible and accountable to DOE for the performance and financial aspects of the grant-supported project or activity. Also known as awardee or grantee.
Renewal application	*Renewal application* means an application requesting additional funding for a period subsequent to that provided by a current award. Renewal applications compete for funds with all other peer reviewed applications and must be developed as fully as though the applicant is applying for the first time.

Research	*Research* is defined as a systematic study directed toward fuller scientific knowledge or understanding of the subject studied. See 2 CFR 200.1 Research and Development (R&D).
Research misconduct	*Research misconduct* means fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results, but does not include honest error or differences of opinion. See 10 CFR 733.
SAM.gov	*SAM.gov* is the System for Award Management (SAM) a consolidated service that includes Entity Registration, Assistance Listings, and other services for making, managing, and receiving Federal awards.
Scope of work	*Scope of work* means the aims, objectives, and purposes of a grant; as well as the methodology, approach, analyses or other activities; and the tools, technologies, and timeframes needed to meet the grant's objectives. This includes the research or training plan included with the original grant application, along with any approved modifications.
Senior/Key Personnel	*Senior/Key personnel* means the PD/PI and other individuals who contribute to the scientific development or execution of a project in a substantive, measurable way, whether or not they receive salaries or compensation under the grant. Typically, these individuals have doctoral or other professional degrees, although individuals at the masters or baccalaureate level may be considered senior/key personnel if their involvement meets this definition. Consultants and those with a postdoctoral role also may be considered senior/key personnel if they meet this definition. "Zero percent" effort or "as needed" is not an acceptable level of involvement for Senior/Key Personnel.
Significant re-budgeting	*Significant re-budgeting* means a threshold that is reached when expenditures in a single direct cost budget category deviate (increase or decrease) from the categorical commitment level established for the budget period by more than 25 percent of the total costs awarded. Significant re-budgeting is one indicator of change in scope.
Small business concern	*Small business concern* means a business that meets the regulatory and size requirements established by the SBA at 13 CFR 121.
Solicitation	See Funding Opportunity Announcement.
Subaward	*Subaward* means a legal instrument by which a recipient provides funds (or property in lieu of funds) to an eligible subrecipient (or a lower-tier transaction) to perform a substantive portion of the grant-supported program or project. The term includes such financial assistance when provided by any legal agreement (even if the agreement is called a contract) but does not include any form of assistance which is excluded from the definition of a grant, including the recipient's procurement of property or services needed to carry out the project or program. The term includes consortium agreements.
Subrecipient	*Subrecipient* means a non-Federal entity that receives a subaward from a pass-through entity to carry out part of a Federal program; but does not include an individual that is a beneficiary of such program. A sub-recipient may also be a recipient of other Federal awards directly from a Federal awarding agency.
Supplement	*Supplement* means a request for an increase in support during a current budget period for expansion of the project's scope or to meet increased costs unforeseen at the time of the new or renewal application. A supplement may increase support for future years in addition to the

	current year. Supplements require applications and are subject to administrative and merit review.
Terms and conditions of award	*Terms and conditions of award* means all legal requirements imposed on a grant by DOE, whether based on statute, regulation, policy, or other document referenced in the grant award, or specified by the grant award document itself. The award documents may include both standard and special conditions that are considered necessary to attain the grant's objectives, facilitate post-award administration of the grant, conserve grant funds, or otherwise protect the Federal government's interests.
UEI	*UEI* is the Unique Entity Identifier, a twelve-digit alphanumerical sequence established and assigned by the System for Award Management at https://www.SAM.gov to uniquely identify an entity.
Unallowable costs	*Unallowable costs* mean costs that cannot be charged, directly or indirectly, to Federal awards because the costs are prohibited by law, regulation (including applicable cost principles), or the terms and conditions of award. Costs that are not allowable, allocable, or reasonable are unallowable.
Unliquidated obligation	*Unliquidated obligations* mean, for financial reports prepared on a cash basis, obligations incurred by the non-Federal entity that have not been paid (liquidated). For reports prepared on an accrual expenditure basis, these are obligations incurred by the non-Federal entity for which an expenditure has not been recorded.
Unobligated balance	*Unobligated balance* means the amount of funds under a Federal award that the non-Federal entity has not obligated. The amount is computed by subtracting the cumulative amount of the non-Federal entity's unliquidated obligations and expenditures of funds under the Federal award from the cumulative amount of the funds that the Federal awarding agency or pass-through entity authorized the non-Federal entity to obligate.
Validate	In the context of the data management plan requirements, *validate* means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses, comparing and contrasting the results against those of a new experiment or analyses, or by some other means.