

Funding @ ASCR

ASCR Program Structure

US Department of Energy (DOE), Office of Science (SC), Advanced Scientific Computing Research (ASCR)

<https://science.osti.gov/ascr>

Facilities Division

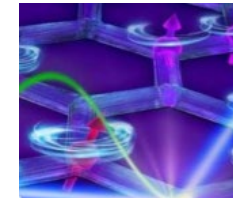
National user facilities: ALCF, OLCF, NERSC, ESNNet



Research Division

Advanced Computing Technologies (ACT) Division

Quantum, microelectronics, cybersecurity, emerging technologies (e.g., neuromorphic), etc.



Computer Science

- Software/tools to make high-performance computers and networks productive and efficient, workflows, FAIR data, etc.

Applied Mathematics

- Scalable numerical algorithms, machine learning, data analysis, uncertainty quantification, etc.

Computational Partnerships

- <https://www.scidac.gov/>
- SciDAC institutes, SciDAC partnerships, etc.
- Collaborations between math/CS and discipline scientists



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For more information, see our [FY22 budget request](#).

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ASCR Funding Entry Points

Funding Opportunity Announcements (FOAs)

- <https://science.osti.gov/ascr/Funding-Opportunities>
- Announced on [grants.gov](https://www.grants.gov) (hint: sign up for email notifications for 'ASCR')
- Read each announcement carefully to understand who can apply and other restrictions/requirements
- Depending on the announcement, supports 2–5-year projects
- University researchers can apply directly (please coordinate with your organization's sponsored-research office)
- Subcontracting is often permitted, and sometimes collaborative applications are permitted

Early Career Research Program

- <https://science.osti.gov/early-career>
- Research grants for five years
- Stays with PI if PI changes institutions
- Eligible within 10 years of Ph.D. (can apply up to three times)
- University-based researchers receive about \$150,000/year
- Topics released in the summer, pre-applications generally due in the fall

DOE National Laboratory Announcements

- <https://science.osti.gov/ascr/Funding-Opportunities> (bottom of the page)
- Open only to DOE Laboratories
- Often allow subcontracts to support collaborators at other organizations

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR)

- <https://science.osti.gov/sbir>
- Grants to for-profit US businesses with 500 or fewer employees (including affiliates)
- Phase I: ~\$200k for 6-12 months, Phase II: ~\$1M for 2 years
- Subcontracting is permitted, STTR: requires collaboration with a research Institution
- Topics released in the summer, pre-applications generally due in the fall

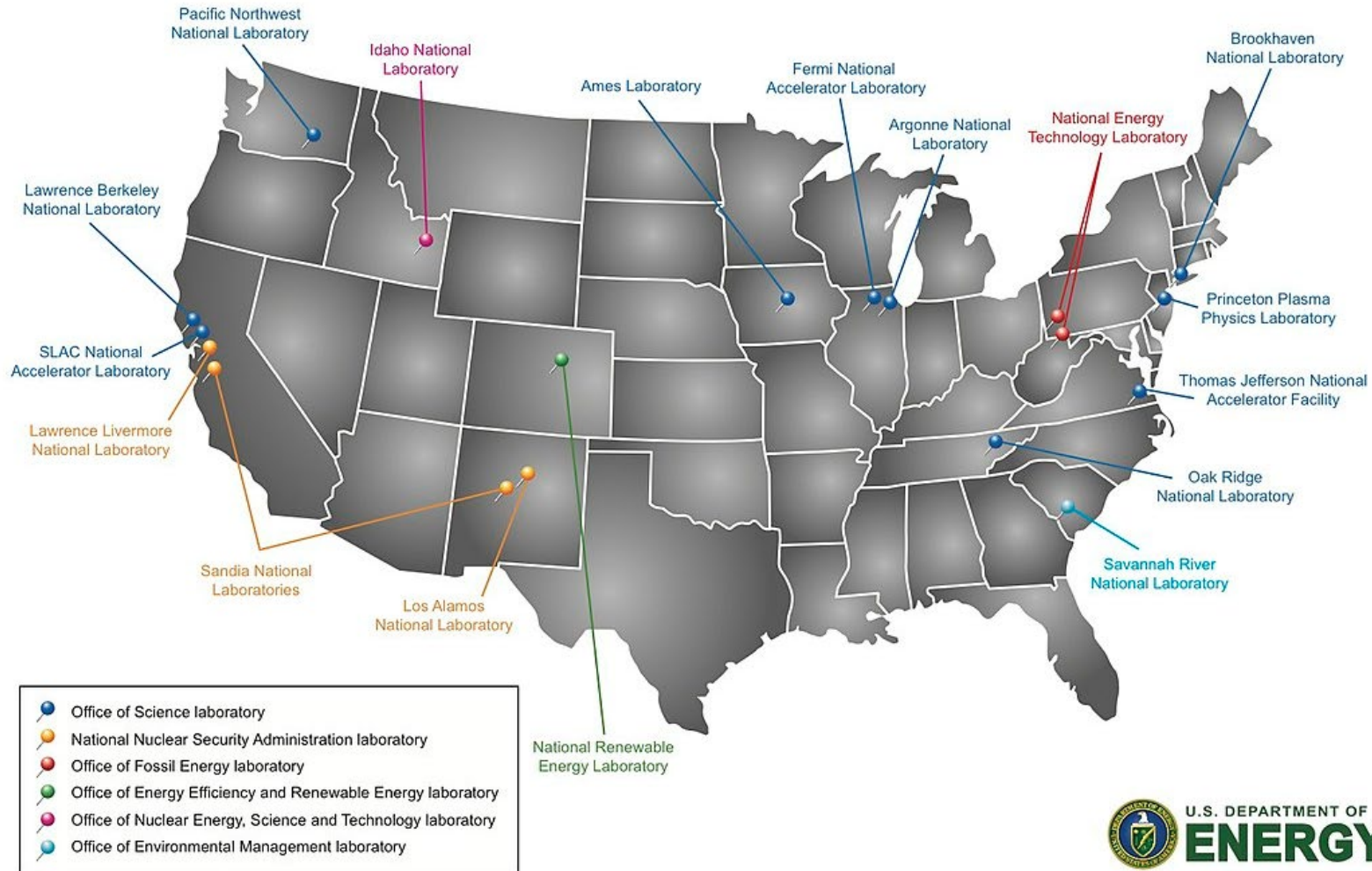
Computational Science Graduate Fellowship (CSGF)

<http://www.krellinst.org/csgf/>



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DOE National Laboratories



<https://www.energy.gov/maps/doe-national-laboratories>



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- Funding Opportunities**

Closed Funding Opportunity Announcements (FOAs)

Closed Lab Announcements

Award Search / Public Abstracts

Additional Requirements and

Funding Opportunities

Look at past opportunity announcements

...non-profit organizations as well as those germane to the mission of DOE, and solicitations for each research program. The selection of researchers to fund is based on merit solicitation. For the most current information, check the original posting dates, check the Office of Science Guidance

Office of Science Guidance on ASCR Website

Look at abstracts for current awards

Look at recent reports from ASCR-sponsored workshops. These reports discuss priority research directions, as identified by the research community, along with relevant background information, in various areas.

ASCR Program Documents

Provided below is a listing of relevant articles, plans and ASCR-sponsored workshop reports.

Select this link to view the ASCR Program Documents Archive

- ASCR@40: Four Decades of Department Of Energy Leadership in Advanced Scientific Computing Research**
In December 2017, the Advisory Committee for DOE's Office of Advanced Scientific Computing Research (ASCR) was asked to document some of the major impacts of ASCR and its predecessor organizations. The assembly simply required: kick-off of a multi-year process of information gathering, drafting, consulting, and editing. Input was provided by over 100 scientists.
Full Report
- Individual Story Summaries: Pathways for the People**
Building the Computational Workforce | Supporting Science through Open-Source Software | World-Leading Computing Facilities | Building Better Computers | Overcoming Scaling Challenges | Making Sense of Big Data | Grand Computing for High-Speed Collaborations | Moving Big Data | Uncertainty Quantification | Applying Equations to Complex Problems | Modeling and Simulation
- A Quantum Path Forward**
Today, many scientific experts recognize that building and scaling quantum-protected and enhanced communication networks are among the most important technological frontiers of the 21st century. The international research community perceives the construction of a first prototype global quantum network—the Quantum Internet—to be within reach over the next decade.
In February 2020, the U.S. Department of Energy (DOE)'s Office of Advanced Scientific Computing Research hosted the Quantum Internet Blueprint workshop to define a potential roadmap toward building the first nationwide quantum Internet. The workshop participants included representatives from DOE national laboratories, commercial industry, and other U.S. agencies with serious interests in quantum networking. The goal was to provide an outline of the essential research needed, detail any engineering and design barriers, and suggest a path forward to move from today's limited local network experiments to a viable, secure quantum Internet.
Workshop Report
- 5G Enabled Energy Innovation Workshop (5GEEIW)**
On March 10-12, 2020, the Office of Science (OS) organized a three-day workshop to deliver a consensus-based report highlighting 5G and beyond basic research, development, applications, technology transfer, infrastructure, and demonstration opportunities in support of the U.S. DOE mission. The brochure and report will help the DOE Office of Science understand both the challenges and the opportunities offered by 5G and emerging advanced wireless technologies in the areas of basic research, development, and integration into scientific user facility operations.
Cover | Brochure | Workshop Report
- Data and Models: A Framework for Advancing AI in Science**
On June 3, 2019, the Office of Science (OS) organized a one-day roundtable to focus on enhancing access to high-quality and fully traceable research data, models, and computing resources to increase the value of such resources for artificial intelligence (AI) research and development and the OS mission. In this report, we consider AI to be inclusive of, for example, machine learning (ML), deep learning (DL), neural networks (NN), computer vision, and natural language processing (NLP). We consider "data for AI" to mean the digital artifacts used to generate AI models and/or employed in conjunction with AI models during inference. In part, this roundtable was motivated by the recognition that a large portion of science data currently are not well suited for AI.
View Technical Report
- Storage Systems and I/O: Organizing, Storing, and Accessing Data for Scientific Discovery**
In September, 2018, the Department of Energy, Office of Science, Advanced Scientific Computing Research Program convened a workshop to identify key challenges and define research directions that will advance the field of storage systems and I/O over the next 5-7 years. The workshop concluded that addressing these continued challenges and opportunities requires tools and techniques that greatly extend traditional approaches and require new research directions. Key research opportunities were identified.
View Technical Report
- ASCR Workshop on In Situ Data Management**
In January 2019, ASCR convened a workshop on In Situ Data Management (ISDM). The goal was to identify priority research directions (PRDs) to support current and future scientific computing needs, which will necessarily incorporate a number of different tasks that need to be managed along with the main simulation or data analysis tasks. The



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Potentials Areas of Investment Highlighted by ASCAC

ASCR's federal advisory committee, the Advanced Scientific Computing Advisory Committee (ASCAC), released a report in October 2020, *Transitioning ASCR after ECP*, which highlighted the following areas for future research (see recommendation B.1 in https://science.osti.gov/-/media/ascr/ascac/pdf/meetings/202004/Transition_Report_202004-ASCAC.pdf):

- Computer Science
 - **Computer architecture** - specialization, complex heterogeneous nodes, and new devices
 - **Balanced computer architectures** – codesign of hardware and applications for cases with lower compute-to-data-movement ratios
 - **Performance portability** – compilers, libraries, and languages to enable automation and high-productivity human-guided mapping (placement, schedule, and resource management) from one architecture to the next
 - **Data management/workflows** - automated resource management, complex storage and memory hierarchies, complex (distributed) workflows, authentication
 - **Development and application of ontologies** – integrating knowledge and reasoning to power AI/ML systems
 - **Distributed Computing and Data Ecosystem** – cross-facility/cloud-federated HPC, storage, and high-speed networking
 - **Edge computing** – smart detectors and associated high-performance *embedded* computing at the edge, data management and advanced networking, 5G based distributed sensing
 - **Complexity, Correctness, and Reproducibility** – new tools for debugging and verifying both functionality and performance
 - **Enabling the use of mainstream languages and libraries** – Python, Julia, Ruby, and Go; Jupyter; PyTorch, Caffe, TensorFlow
 - **Security Research** - making distributed systems and operating systems secure
 - **Productivity research** – studying how people produce and use research software
 - **Networking** – new devices and stacks; transmission, routing, buffering, and flow-control protocols
- Mathematics
 - Areas include **Fast or low complexity algorithms, Sparsity, Non-convex optimization, Quadrature and the efficient representation of functions/solutions, Preconditioning, New algorithms and numerical methods for new devices, and New forms of PDE solving**

