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DOE EPSCOR Opportunities

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U.S. DEPARTMENT OF ENERGY | Office of Science

DOE EPSCOR Opportunities

Montana National Lab Day

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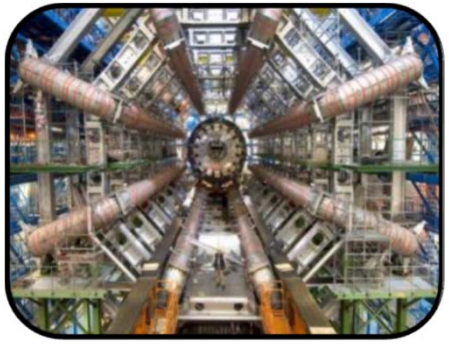
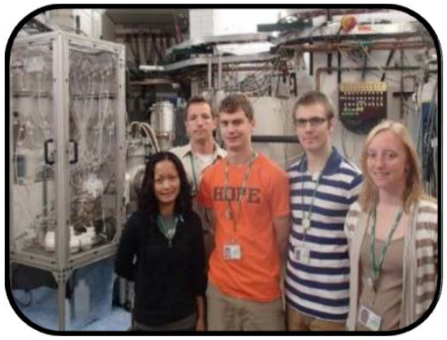
DOE Office of Science at a Glance

FY 2019 Enacted Budget: $6.585B



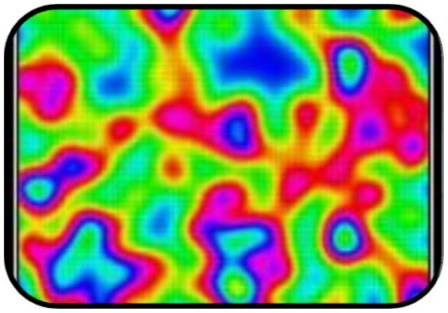
Largest Supporter of Physical Sciences in the U.S.

Funding at >300 Institutions, including 17 DOE Labs



Over 22,000 Researchers Supported

Over 32,000 Users of 27 SC Scientific Facilities



Research: 40.6%, $2.67B

~40% of Research to Universities

Facility Operations: 39.9%, $2.63B

Projects/Other: 19.5%, $1.28B

The Office of Science research portfolio

Advanced Scientific Computing Research	• Delivering world leading computational and networking capabilities to extend the frontiers of science and technology
Basic Energy Sciences	• Understanding, predicting, and ultimately controlling matter and energy flow at the electronic, atomic, and molecular levels
Biological and Environmental Research	• Understanding complex biological, earth, and environmental systems
Fusion Energy Sciences	• Building the scientific foundations for a fusion energy source
High Energy Physics	• Understanding how the universe works at its most fundamental level
Nuclear Physics	• Discovering, exploring, and understanding all forms of nuclear matter

Seventeen DOE National Laboratories

Office of Science Laboratories

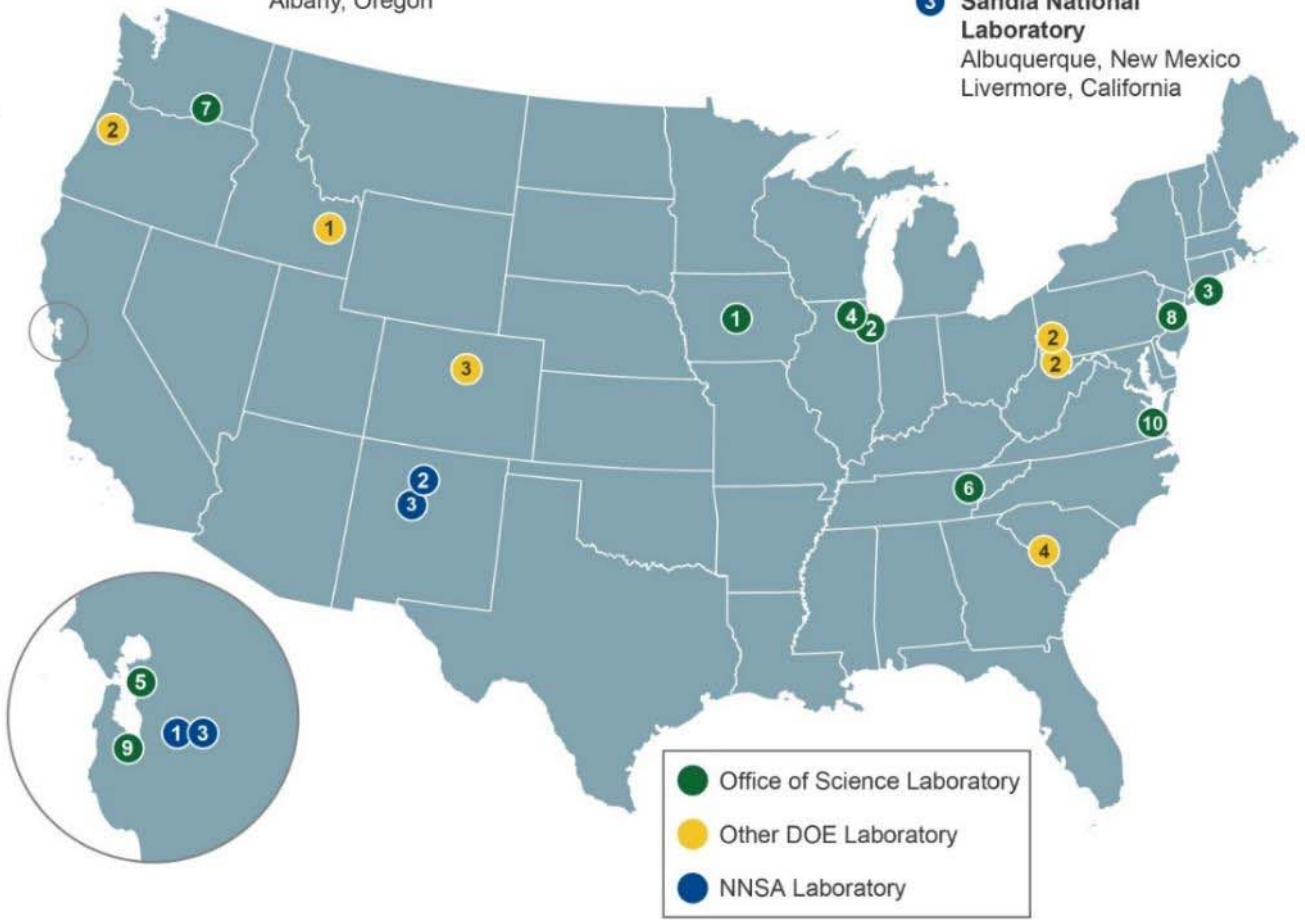
1. **Ames Laboratory**
   Ames, Iowa
2. **Argonne National Laboratory**
   Argonne, Illinois
3. **Brookhaven National Laboratory**
   Upton, New York
4. **Fermi National Accelerator Laboratory**
   Batavia, Illinois
5. **Lawrence Berkeley National Laboratory**
   Berkeley, California
6. **Oak Ridge National Laboratory**
   Oak Ridge, Tennessee
7. **Pacific Northwest National Laboratory**
   Richland, Washington
8. **Princeton Plasma Physics Laboratory**
   Princeton, New Jersey
9. **SLAC National Accelerator Laboratory**
   Menlo Park, California
10. **Thomas Jefferson National Accelerator Facility**
    Newport News, Virginia

Other DOE Laboratories

1. **Idaho National Laboratory**
   Idaho Falls, Idaho
2. **National Energy Technology Laboratory**
   Morgantown, West Virginia
   Pittsburgh, Pennsylvania
   Albany, Oregon
3. **National Renewable Energy Laboratory**
   Golden, Colorado
4. **Savannah River National Laboratory**
   Aiken, South Carolina

NNSA Laboratories

1. **Lawrence Livermore National Laboratory**
   Livermore, California
2. **Los Alamos National Laboratory**
   Los Alamos, New Mexico
3. **Sandia National Laboratory**
   Albuquerque, New Mexico
   Livermore, California



The DOE Established Program to Support Competitive Research (EPSCoR)

The DOE EPSCoR program was established in 1991 with objectives to:

- Enhance the competitiveness of the peer-review process within academic institutions in eligible states; and
- Increase the probability of long-term growth of competitive funding to investigators at institutions from eligible states.

DOE EPSCoR utilizes competitive research awards to assist those States that:

- Historically have received relatively little Federal research and development funding; and
- Have demonstrated a commitment to develop their research bases and improve science and engineering research and education programs at their universities and colleges.

Organizationally, DOE EPSCoR is managed by the Office of Science, Basic Energy Sciences

EPSCoR Program History (1)

- Initiated at NSF in 1979 as the Experimental Program to Stimulate Competitive Research
  - to broaden the geographical distribution of federal funding for academic research and development.
  - Seven agency programs have been authorized, five agencies are currently funded to improve research competitiveness in states and territories that have been less successful in competing for Federal research support: NIH, NSF, DOE, USDA, NASA
- Initial DOE funding FY1991
- Authorization: Energy Policy Act of 1992, codified at 42 U.S.C. §§ 13503(b)(3)(A) (P. L. 102-486, Sec. 2203)

  (i) The Director of the Office of Science shall operate an Experimental Program to Stimulate Competitive Research (in this paragraph referred to as "EPSCoR") as part of the Department of Energy's University and Science Education Programs.

  (ii) The objectives of EPSCoR shall be--

  (I) to enhance the competitiveness of the peer-review process within academic institutions in eligible States; and

  (II) to increase the probability of long-term growth of competitive funding to investigators at institutions from eligible States.

EPSCoR Program History (2)

(iii) In order to carry out the objectives stated in clause (ii), EPSCoR shall provide for activities which may include (but not be limited to) competitive research awards and graduate traineeships.

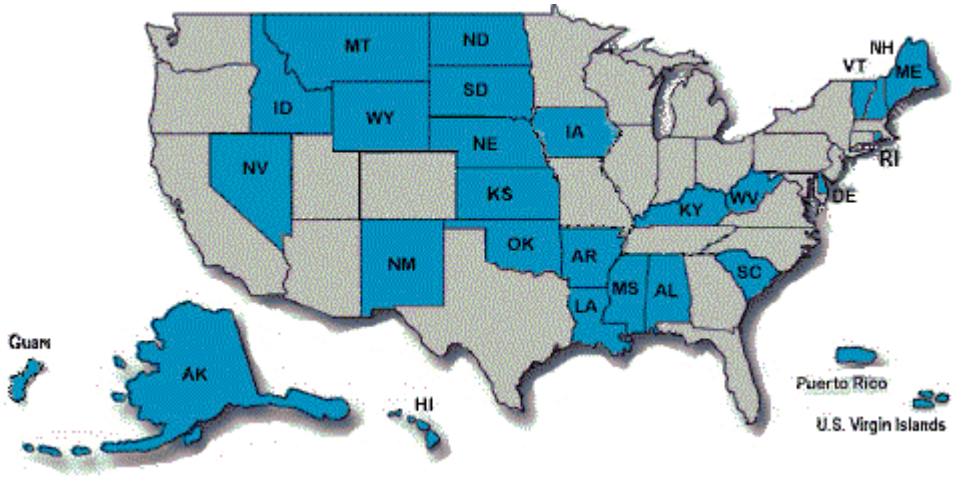
(iv) EPSCoR shall assist those States that--

(I) historically have received relatively little Federal research and development funding; and

(II) have demonstrated a commitment to develop their research bases and improve science and engineering research and education programs at their universities and colleges.

- Transition to Basic Energy Sciences FY1996 (H. Rpt. 109-275)
  - Increased focus on strengthening research capabilities relevant to energy research
  - Program management at the same technical level as other BES programs
- Name change from the Experimental Program to Stimulate Competitive Research to the Established Program to Stimulate Competitive Research
  - In response to language accompanying the American Innovation and Competitiveness Act (S. Rpt. 114-389)

DOE EPSCoR – Eligibility based on National Science Foundation Assessment



- Basis: NSF funding per jurisdiction. A 3-year running average is used. Jurisdictions receiving 0.75% or less of the total available funding are eligible to compete for EPSCoR funds.

- DOE follows NSF Research Infrastructure Improvement (RII) eligibility criteria. Current total DOE/NSF RII eligible entities: 23 states, Guam, Puerto Rico, and the US Virgin Islands.
- Eligibility has varied over time with Missouri, Tennessee and Utah having been eligible recently. Changes in eligibility are typically posted by NSF in February of each year.

Overview – DOE EPSCoR

- The DOE EPSCoR Program has three main objectives:
  - To enhance the research capabilities of designated states
  - To conduct competitive energy-related research
  - To develop science and engineering personnel to meet current and future needs in energy-related areas
- The program is proactively managed to meet these objectives through four award modes
  - EPSCoR Implementation Grants (up to $2.5M/year)
  - EPSCoR State – National Laboratory Partnerships (~$150K/year)
  - Participation in DOE Office of Science Early Career Research Program (Annual FOA)
  - Co-funding of new or renewal Office of Science grant awards
- All awards are selected based on peer review

Successful Projects Selected by Peer Review

- Standard Criteria used for all BES Grants
  1) Scientific and/or technical merit of the project
  2) Appropriateness of the proposed method or approach
  3) Competency of the personnel and adequacy of proposed resources
  4) Reasonableness and appropriateness of the proposed budget
- Additional EPSCoR Specific Criteria

  A) For Implementation Grants
  - Synergism among the PIs/Programmatic Focus and Likelihood of success of the Implementation Award

  B) For EPSCoR State – National Laboratory Partnerships
  - Likelihood of success of the collaboration between the EPSCoR Applicant and the National Laboratory Partner

Distinguishing Features of the DOE EPSCoR Program

Implementation Grants

2019 FOA; Next FOA anticipated in FY 2021

- Initial awards of up to $1,500,000 per year for two years. Maximum funding of $2,500,000 per year in future years for up to six years total support
- Closely focused research effort or cluster (group of scientists working on a common theme) per application
- Applicants may propose nominal human resource development activities coupled with research cluster
- Funding is provided only to institutions in EPSCoR jurisdictions

- 2019 FOA resulted in 9 awards, including an award to Montana State University on “Probing novel pathways of iron sulfide acquisition and trafficking in model biocatalytic systems” (PI Eric Boyd)

Distinguishing Features of the DOE EPSCoR Program

National Laboratory Partnership Grants

Last FOA was 2018; Included in the FY 2020 budget request

- Promotes interactions between the EPSCoR Community and unique scientific capabilities at the DOE National Laboratories in conducting collaborative research and training students
- Visit by Lab scientist to EPSCoR states encouraged
- Individual university principal investigator originated
- One three-year grant per topic per PI (not renewable)
- Maximum funding of $750,000 over three years (all to EPSCoR university PIs, no funds to DOE national laboratories)

Distinguishing Features of the DOE EPSCoR Program

Office of Science Early Career Research Program

- The inclusion of early career awards in the DOE EPSCoR portfolio (since FY 2011) has provided a mechanism to strengthen the attachment of well qualified early career faculty with EPSCoR institutions
- DOE EPSCoR participates in the Office of Science Early Career Award process on a funds available basis and considers only applications from academic institutions in EPSCoR jurisdictions
- General information and investigator eligibility for the Early Career Award application process may be found at the website - https://science.osti.gov/early-career
- DOE EPSCoR supports approximately 2/3 of the award. The remaining support is to be provided by the partner DOE Program to start the transition to their competitive opportunities for future support
- 10% of the FY 2019 SC Early Career Awards were to EPSCoR State recipients

EPSCoR Portfolio

EPSCoR projects cross a wide range of DOE programmatic areas

Science Programs: Advanced Scientific Computing Research, Biological and Environmental Research, Basic Energy Sciences, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics

Technology Programs: Electricity, Energy Efficiency and Renewable Energy*, Fossil Energy, and Nuclear Energy

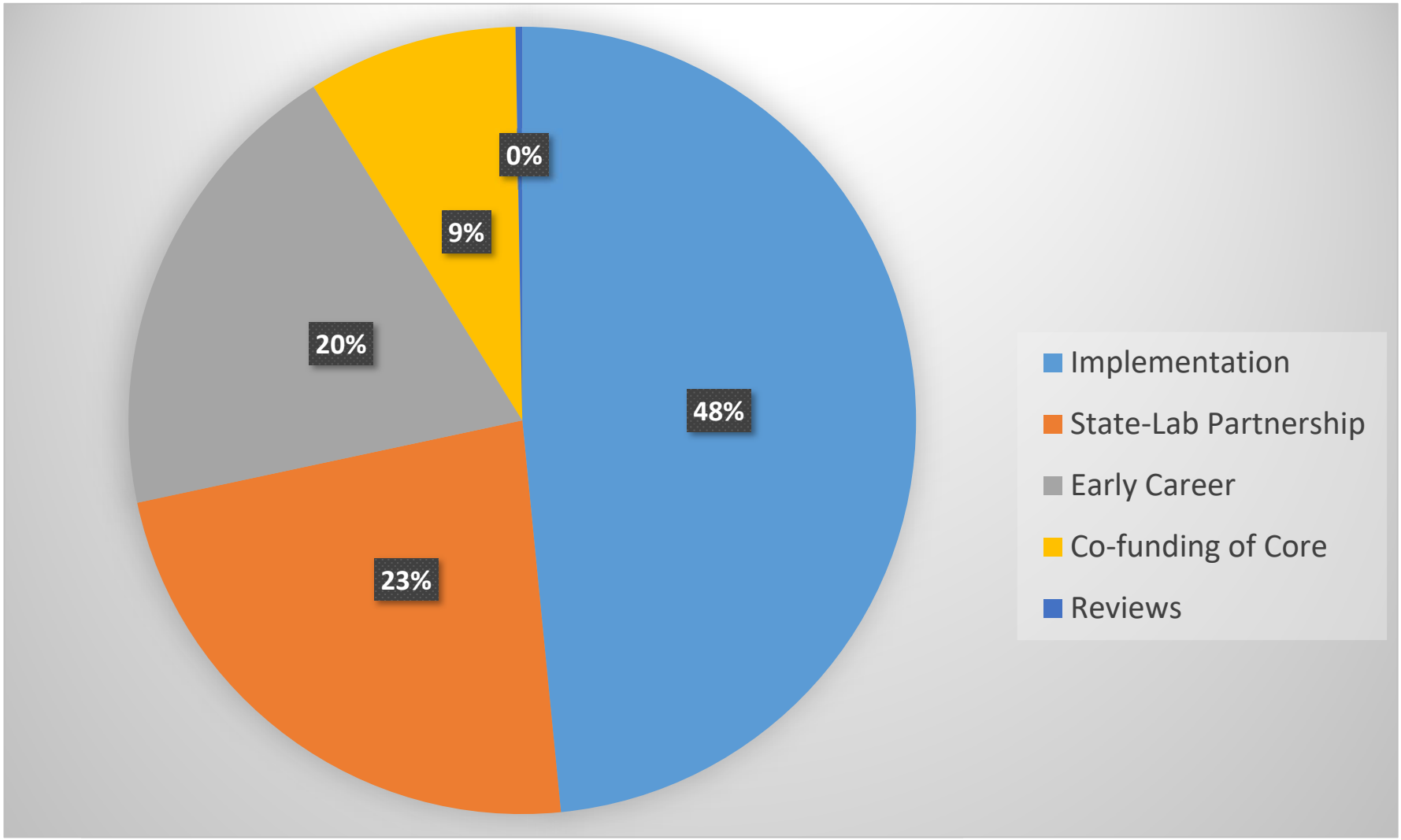
*including: Advanced Manufacturing, Bioenergy, Buildings, Fuel Cells, Vehicles, Solar Energy and Wind Energy Technologies

Collaborating National Laboratories

Ames, Argonne, Brookhaven, Fermi, Idaho, Jefferson, Lawrence Berkeley, Lawrence Livermore, Los Alamos, National Energy Technology Lab, National Renewal Energy Lab, Oak Ridge, Pacific Northwest, Princeton Plasma Physics, Sandia, Savannah River, SLAC

Over the past 4 years, 24 of the 25 EPSCoR states received awards.

EPSCoR Funding for FY 2018 and FY 2019
Annual Funding $19,270K



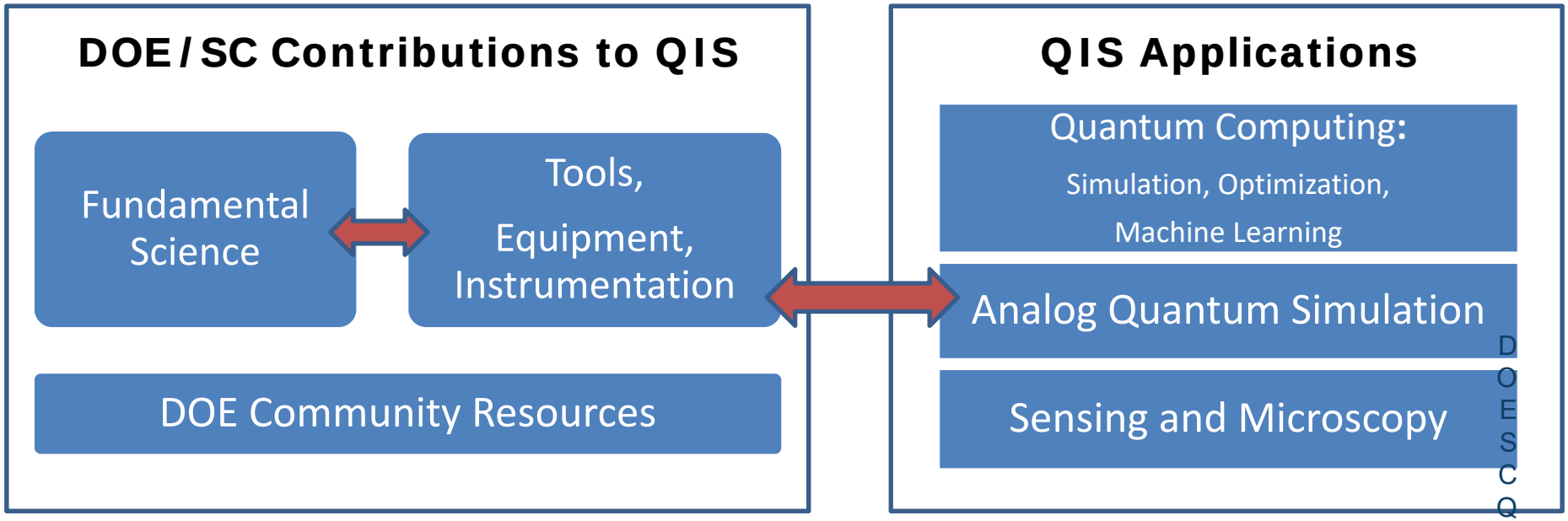
EPSCoR FOAs Include High Priority Science Areas

- Quantum Information Sciences
- Electronic Materials / Microelectronics
- Machine Learning / Artificial Intelligence

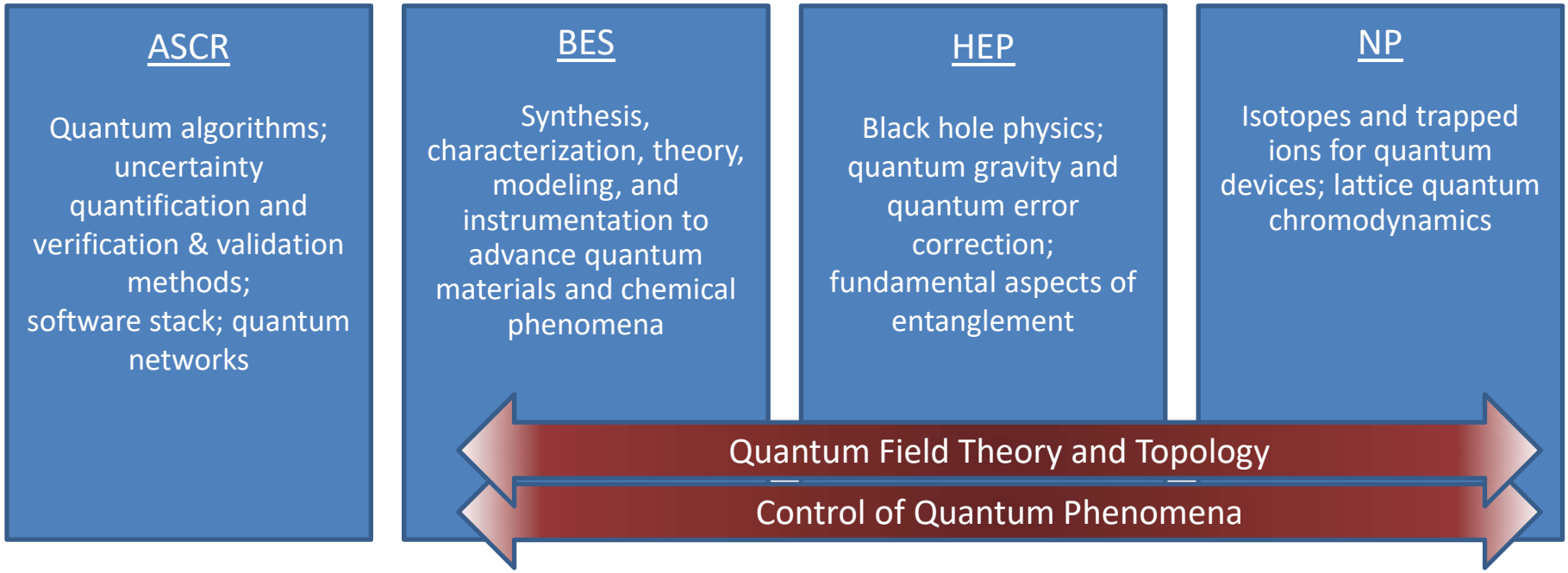
Questions?

SC's QIS Strategy

- ✓ **Builds on community input**
- ✓ **Highlights DOE/SC's unique strengths**
- ✓ **Leverages groundwork already established**
- ✓ **Focuses on cross-cutting themes among programs**
- ✓ **Targets impactful contributions and mission-focused applications**



Fundamental Science That Advances QIS



- **SC Unique Strengths**
  - Intellectual capital accumulated for more than a half-century
  - Successful record of interdisciplinary, focused teams for large-scale, long-term investments
  - Demonstrated leadership in launching internationally-recognized SC-wide collaborative programs
- **SC funding in QIS includes Quantum Sensors for imaging and particle detection**
  - ASCR, BES, and HEP funded QIS calls in FY 2018, and other programs funded some awards.
    FY 2019 QIS calls across SC are in process.
  - Quantum Sensors are of interest across SC. Highlights are select examples from BES, BER, HEP.

September

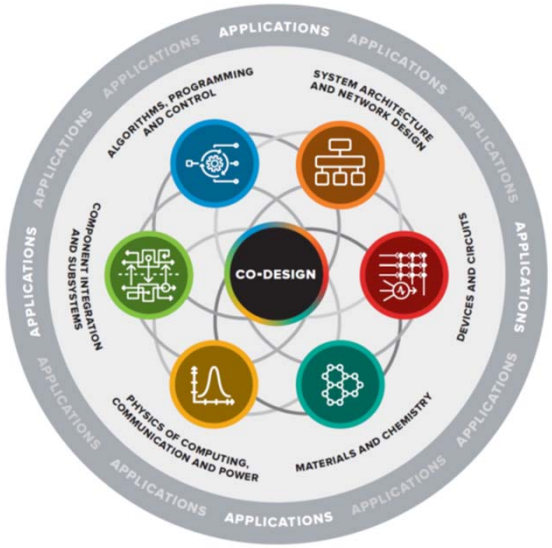
Quantum Information Science Centers

- **The FY2020 budget request includes funds in HEP, BES, and ASCR for at least one jointly-supported and multidisciplinary QIS Center, as per the National Quantum Initiative Act signed into law in December 2018**
- **DOE published a notice in the Federal Register on May 20th with two components:**
  - A Notice of Intent (NOI) indicating that DOE-SC is considering issuing a Funding Opportunity Announcement in FY2020 for Quantum Information Science Centers
  - A Request For Information (RFI) seeking stakeholder input on the topic areas, organization, requirements, review criteria, and assessment process for prospective QIS Centers
- **Comments closed on July 5th and are available via a link on the Federal Register page:**
  https://www.federalregister.gov/documents/2019/05/20/2019-10427/notice-of-intent-and-request-for-information-quantum-information-science-centers

Microelectronics Research

Basic Research Needs for Microelectronics Workshop

- Co-sponsored by ASCR, BES, HEP; October 23–25, 2018
- Workshop identified 5 Priority Research Directions:
  - Flip the current paradigm: Define innovative materials, device, and architecture requirements driven by applications, algorithms, and software
  - Revolutionize memory and data storage
  - Reimagine information flow unconstrained by interconnects
  - Redefine computing by leveraging unexploited physical phenomena
  - Reinvent the electricity grid through new materials, devices, and architectures



The workshop identified a critical need to move from traditional sequential design to an integrated Co-Design framework where each scientific discipline informs and engages the others, with multi-directional information flow .