U.S. DEPARTMENT OF ENERGY | Office of Science

Informational Webinar:

EARLY CAREER RESEARCH PROGRAM

DE-FOA-0002821

FOA Issue Date:	November 16, 2022
Submission Deadline for Pre-Applications:	January 5, 2023, at 5 PM Eastern Time
Pre-Application Response Date:	February 6, 2023, at 11:59 PM Eastern Time
Submission Deadline for Applications:	March 23, 2023, at 11:59 PM Eastern Time

John Mandrekas and the SC ECRP Working Group

November 30, 2022

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

The SC Early Career Research Program

- The Office of Science (SC) Early Career Research Program (ECRP), now in its 14th year, was established in FY 2010, with subsequent annual solicitations since then.
- The purpose of this program is to support outstanding scientists during their crucial early career years when many scientists do their most formative work, and to stimulate research careers in the areas supported by SC.
- SC's mission is to deliver the scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic, and national security of the United States. 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.
- Diversity, Equity, Inclusion, and Accessibility (DEIA) is an important aspect of this program.
- SC PECASE candidates are selected from ECRP awardees.

ECRP Background

- The ECRP invites applications in all areas supported by SC:
  - Advanced Scientific Computing Research (ASCR)
  - Biological and Environmental Research (BER)
  - Basic Energy Sciences (BES)
  - Fusion Energy Sciences (FES)
  - High Energy Physics (HEP)
  - Nuclear Physics (NP)
  - Isotope R&D and Production (DOE IP)*; and
  - Accelerator R&D and Production (ARDAP)*

*Added in FY 2021

Eligibility

- U.S. Academic Institutions**:** Assistant or untenured Associate Professors on the tenure track
- DOE National Laboratories & SC Scientific User Facilities: Full-time, permanent, non-postdoctoral employees
- To address special circumstances and challenges due to the COVID-19 pandemic, SC is extending the eligibility window for this competition from 10 to **12 years** for all applicants. SC intends to continue this extended eligibility window in next year's competition and then revert to the original 10-year eligibility window in subsequent competitions.
- For the present competition, those who received doctorates on or after **January 1, 2010,** are eligible.
- Extensions to eligibility will be considered for individuals who have had a major life event requiring an extended absence (three months or longer) from the workplace, including but not limited to active military service, an absence due to personal disability, or an absence covered by the Family Medical Leave Act.
- Principal Investigators may not participate in more than **three** SC ECRP competitions.
- For questions about eligibility, please contact SC.Early@science.doe.gov

Awards and Funding Levels

- **Awards to Institutions of Higher Education**:
  - Historically, the average award for an Institution of Higher Education had been $750,000 for five years. However, for this competition, the minimum award is raised to **$875,000** over five years to encourage these institutions to increase graduate student stipends.
- **Awards to DOE National Laboratories**:
  - The minimum request for awards to a DOE National Laboratory is approximately **$2,500,000** over five years. These awards must cover at least **50%** of the PI salary.
- Awards supporting PIs at **SC User Facilities** that do not fall under these two broad categories must use the guidance for the DOE National Laboratories.

Promoting Inclusive and Equitable Research Plan

- A new requirement this year for all SC proposals is the submission of a **Promoting Inclusive and Equitable Research** (PIER) plan
- The PIER plan reflects the SC commitment to Diversity, Equity, Inclusion, and Accessibility (DEIA)
- Reviewers will have to answer an additional merit review criterion on the "Quality and Efficacy of the Plan for Promoting Inclusive and Equitable Research."
- Additional information on the PIER plan is included in the FOA and in https://science.osti.gov/grants/Applicant-and-Awardee-Resources/PIER-Plans

Program Statistics

- SC has made **868** ECRP awards since 2010
  - 564 to universities and 304 to DOE national laboratories
- During the last few years, we have been receiving about ~1,000 pre-applications and ~600 full applications
- Global (across all SC programs) success rate: **14%**
- In FY22, SC made **83** awards for a total of ~**$55M** ($110M 5-year total) to **47** universities and **13** national laboratories
- Abstracts of all ECRP awards can be found in: https://science.osti.gov/early-career

Award History

Office	Number of University Awards												
FY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ASCR	5	3	3	3	3	2	2	4	4	4	3	6	6
BER	5	4	6	4	1	4	2	2	5	2	3	2	2
BES	18	24	21	26	10	17	16	19	29	24	25	27	31
FES	4	4	1	2	1	2	4	4	2	4	3	2	5
HEP	10	8	8	7	3	4	3	4	7	7	9	9	6
NP	5	4	5	6	3	4	3	5	7	5	6	4	5
ARDAP												0	0
DOE IP												1	1
Total	**47**	**47**	**44**	**48**	**21**	**33**	**30**	**38**	**54**	**46**	**49**	**51**	**56**

Office	Number of Laboratory Awards												
FY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ASCR	2	2	3	2	2	3	2	3	2	4	4	4	5
BER	3	3	3	3	3	1	5	5	3	5	4	4	3
BES	8	7	8	5	6	8	6	2	11	6	7	7	7
FES	2	2	3	2	2	2	2	2	4	2	3	5	4
HEP	4	5	4	2	3	1	4	7	7	7	5	6	5
NP	3	3	3	3	1	2	3	2	3	3	3	6	3
ARDAP	-	-	-	-	-	-	-	-	-	-	-	0	0
DOE IP	-	-	-	-	-	-	-	-	-	-	-	0	0
Total	**22**	**22**	**24**	**17**	**17**	**17**	**22**	**21**	**30**	**27**	**26**	**32**	**27**

Program Specific Information

- The next few slides, include program specific information
- It will be presented by the ECRP Program Office representatives:
  - ASCR: Ceren Susut
  - BES: Andrew Schwartz
  - BER: Tris West
  - FES: John Mandrekas
  - HEP: Bill Kilgore
  - NP: Ken Hicks
  - ARDAP: Eric Colby
  - DOE IP: Ethan Balkin

ECRP Research Areas – Advanced Scientific Computing Research

- Extreme-Scale Algorithms for Scientific Computing: contact Steve Lee, Steven.Lee@science.doe.gov
- Scientific Machine Learning, Data Analysis and Reduction: contact Bill Spotz, William.Spotz@science.doe.gov
- Programming Models and Environments; Operating and Runtime Systems; Performance Portability and Co-design: contact Hal Finkel, Hal.Finkel@science.doe.gov
- Data Management; Analytic Methods and Environments: contact Margaret Lentz, Margaret.Lentz@science.doe.gov
- Quantum Characterization and Control; Novel Testbed Prototypes: contact Claire Cramer, Claire.Cramer@science.doe.gov

ECRP Research Areas – Basic Energy Sciences

Chemical Sciences, Geosciences, and Biosciences

- Atomic, Molecular, and Optical Sciences
- Gas Phase Chemical Physics
- Computational and Theoretical Chemistry
- Condensed Phase and Interfacial Molecular Science
- Catalysis Science
- Separation Science
- Heavy Element Chemistry
- Geosciences
- Solar Photochemistry
- Photosynthetic Systems
- Physical Biosciences

Materials Sciences and Engineering

- Materials Chemistry
- Biomolecular Materials
- Synthesis and Processing Science
- Experimental Condensed Matter Physics
- Theoretical Condensed Matter Physics
- Physical Behavior of Materials
- Mechanical Behavior and Radiation Effects
- X-Ray Scattering
- Neutron Scattering
- Electron and Scanning Probe Microscopies

Scientific User Facilities

- Nanoscale Science Research Centers
- Accelerator and Detector Research
- X-ray Instrumentation and Technique Development
- Neutron Scattering Instrumentation and Technique Development

- Many of the core research areas rotate topics on an annual basis. Read the FOA carefully for this year's focus.
- The following overarching research priorities are relevant to multiple core research areas:
  - Clean Energy
  - Critical Minerals/Materials
  - Fundamental Science to Transform Manufacturing
  - Artificial Intelligence and Machine Learning
  - Quantum Information Science

ECRP Research Areas – Biological and Environmental Research

- Genomics-Enabled Plant Biology for the Determination of Gene Function
  - contact Pablo Rabinowicz, pablo.rabinowicz@science.doe.gov
- Plant Biosystems Design for the Production of Bioenergy, Bioproducts, and Biomaterials Under Abiotic Stress
  - contact Pablo Rabinowicz, pablo.rabinowicz@science.doe.gov
- Earth and Environmental Systems Modeling (EESM)
  - contact Renu Joseph, Renu.Joseph@science.doe.gov

ECRP Research Areas – Fusion Energy Sciences

- Spherical Tokamak Research
  - Contact Josh King, josh.king@science.doe.gov
- Stellarator Research in Magnetic Fusion Energy Sciences
  - Contact Samuel Barish, sam.barish@science.doe.gov
- Magnetic Fusion Energy Science Theory and Simulation
  - Contact Michael Halfmoon, michael.halfmoon@science.doe.gov
- Measurement Innovation
  - Contact Curt Bolton, curt.bolton@science.doe.gov
- High-Energy-Density Plasma Science
  - Contact Kramer Akli, kramer.akli@science.doe.gov
- General Plasma Science Experiment and Theory
  - Contact Nirmol Podder, nirmol.podder@science.doe.gov
- Fusion Nuclear Science, Materials Research, and Enabling R&D Programs for Fusion:
  - For FNS and Enabling R&D: contact Guinevere Shaw, guinevere.shaw@science.doe.gov
  - For Materials Research: contact Daniel Clark, Daniel.clark@science.doe.gov
- Artificial Intelligence and Machine Learning for Fusion Energy Sciences
  - Contact Matthew Lanctot, matthew.lanctot@science.doe.gov

ECRP Research Areas – High Energy Physics

- Energy Frontier Research: contact Abid Patwa
  - abid.patwa@science.doe.gov
- Intensity Frontier Research: contact Brian Beckford
  - brian.beckford@science.doe.gov
- Cosmic Frontier Research: contact Bryan Field, Kathy Turner
  - bryan.field@science.doe.gov, kathy.turner@science.doe.gov
- Theoretical High Energy Physics Research: contact William Kilgore
  - william.kilgore@science.doe.gov
- Accelerator Science and Technology R&D: contact Derun Li
  - derun.li@science.doe.gov
- Detector Research and Development: contact Helmut Marsiske
  - helmut.marsiske@science.doe.gov

ECRP Research Areas – Nuclear Physics

- Accelerator Physics R&D: contact Manouchehr Farkhondeh
- Computational Physics: contact Xiaofeng Guo
- Fundamental Symmetries: contact Paul Sorensen
- Heavy Ions: contact Ken Hicks
- Medium Energy NP: contact Spiros Margetis
- Nuclear Structure/Nuclear Astrophysics: contact Sharon Stephenson
- Quantum Information Systems: contact Gulshan Rai
- Theory: contact Astrid Morreale

ECRP Research Areas – Accelerator R&D and Production

ARDAP will support early career scientists and engineers who can **bridge the gap between basic research and industrial production** of particle accelerator technology in one or more of the following cross-cutting areas:

- Manufacture of superconducting accelerator technologies, including SRF accelerators, high-field magnets, SC undulators, and cryogenic systems;
- Development of software that leverages high-performance computing architectures and data science techniques to design and control accelerators;
- Engineering and manufacture of high-brightness particle sources and high-power targets;
- Engineering and production of high-power, high-efficiency radiofrequency (RF) power sources and high average power ultrashort pulse laser systems;
- Development of advanced materials for particle accelerators (e.g., permanent magnet materials, superconducting materials, high-field insulating materials);
- Development of high-performance, multi-scale software capable of predicting the performance of macroscopic, realistic materials (e.g., high temperature superconductors, RF breakdown) based on first principles.

For more information: Eric.Colby@science.doe.gov

ECRP Research Areas – Isotope R&D and Production

- Isotope Production Research: contact Ethan Balkin
- Isotope Processing, Purification, Separation and Radiochemical Synthesis: contact Ethan Balkin
- Biological Tracers and Imaging: contact Ethan Balkin
- Isotopic Enrichment Technology: contact April Gillens

For more information

- The FOA is the authoritative source for this competition:
  - https://science.osti.gov/fes/-/media/grants/pdf/foas/2023/SC_FOA_0002821.pdf
- A Frequently Asked Questions (FAQ) document is also available with answers to most common questions:
  - *https://science.osti.gov/-/media/early-career/pdf/Early-Career-FAQ-FY-2023-final.pdf*
  - If you still have questions, you can contact SC.Early@science.doe.gov for program rules or the Program Managers listed under each topical area in the FOA for technical questions.