



U.S. DEPARTMENT OF
ENERGY

Office of
Science

DOE Office of Science Graduate Student Research (SCGSR) Program

Advanced Scientific Computing Advisory Committee (ASCAC)

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Outline

- SC Office of Workforce Development for Teachers and Scientists (WDTS) Quick Overview (Jim)
- SCGSR (Ping):
 - Goal and Execution
 - Review and Selection
 - Outcome To Date
 - Q&A



WDTS

... to help ensure that DOE has a sustained pipeline of STEM workers ...

- Student and faculty programs placing more than 1,100 participants at DOE labs and facilities
 - Science Undergraduate Laboratory Internships (SULI)
 - Community College Internships (CCI)
 - Office of Science Graduate Student Research (SCGSR) Program
 - Visiting Faculty Program (VFP)

- The Albert Einstein Distinguished Educator Fellowship for K–12 STEM teachers, administered by WDTS for DOE, NASA, and NSF (P.L. 103-382)

- The National Science Bowl® (NSB) finals competition in Washington D.C., following four months of >100 regional events throughout the U.S.; regional events are staffed by volunteers. The NSB was established by Admiral Watkins, Secretary of Energy, in 1991. (>265,00 participants since 1991)
 - Recent NSB finals event outreach featured large scale computation and scientific modeling (2015) and big data (2016) as thematic topics.

- Other activities:
 - On-line business systems development and modernization
 - Program evaluation and assessment
 - Outreach



FY2016 Programs at DOE Labs Supports More than 1,100 Participants

In addition to SCGSR...

Science Undergraduate Laboratory Internship (SULI) places undergraduate students in paid internships in science and engineering research activities for 10 weeks during the Summer Term or for 16 weeks during the Fall and Spring Terms. In FY 2015, General Atomics in San Diego, California, home to DIII-D, the largest magnetic fusion facility in the U.S. and operated as an Office of Science user facility, was added as a host institution, for a total of 17 host DOE labs and facilities. (~800 participants annually; typically ~35 placements on ASCR funded projects)

- Open to undergraduate STEM majors attending 2 or 4 year institutions with participants placed in paid internships and work with laboratory staff scientists or engineers on projects related to ongoing research programs. This, or its predecessor programs, have been in operation since the early '90s.

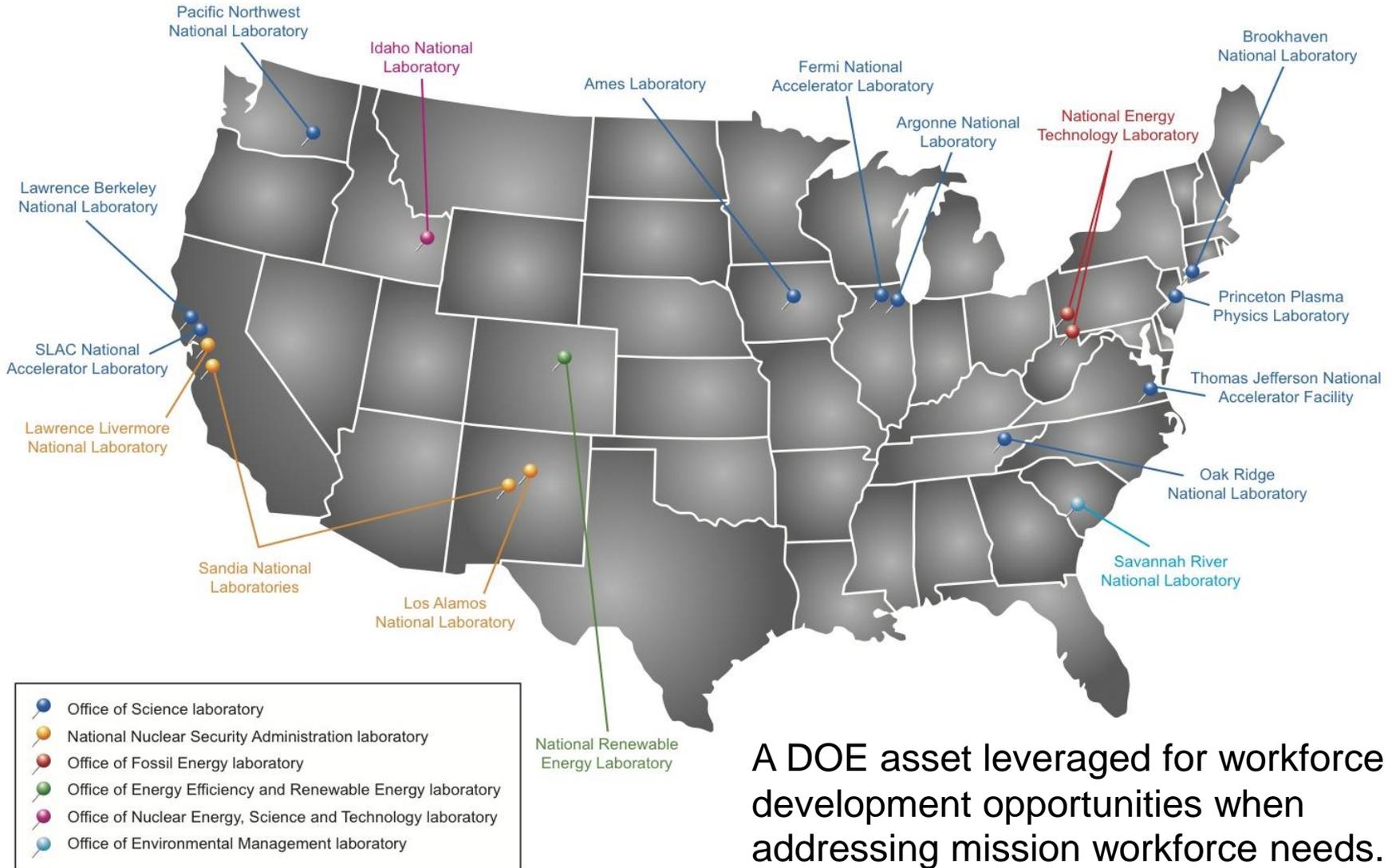
Community College Internship (CCI) places undergraduate students from community colleges in paid internships in technologies supporting laboratory work for 10 weeks during the Summer Term or for 16 weeks during the Fall and Spring Terms. (~100 participants annually)

- Open to undergraduate STEM majors attending 2 year institutions where participants are placed in paid internships in technology based projects supporting laboratory work under the supervision of a laboratory technician or researcher. This, or its predecessor program, have been in operation since 1999.

Visiting Faculty Program (VFP) places faculty and their students, if desired, at the labs to collaborate on research with laboratory principal investigators. The program seeks to increase the research competitiveness of faculty members and their students at institutions historically underrepresented in the research community. (~75 faculty and 30 students annually)



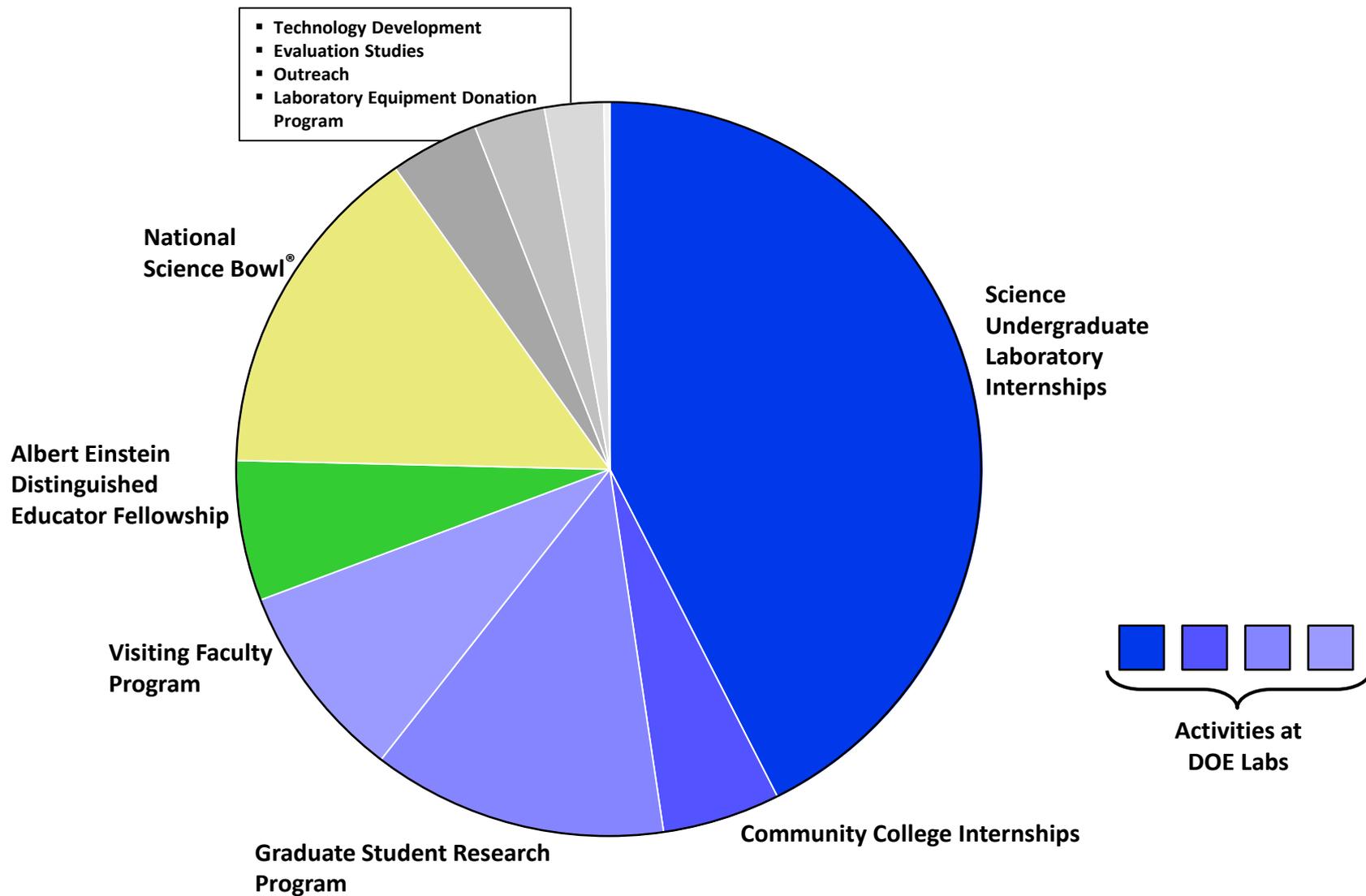
DOE Labs Employ ~32,000 S&E Staff



A DOE asset leveraged for workforce development opportunities when addressing mission workforce needs.



FY 2016 WDTS Distribution of Funding



SC's Assessment of Workforce Development Needs

- **In February 2014 - in response to OMB's requirement for an evidence based assessment of workforce needs - the Office of Science initiated a study to identify disciplines in which significantly greater emphasis in workforce training at the graduate student or postdoc levels is necessary to address gaps in current and future Office of Science mission needs.**
- **In this study, each of SC's six Federal Advisory Committees, six SC Associate Directors, and 10 SC Laboratory Directors were asked for their expert assessment on the following:**
 - (i) STEM disciplines not well represented in academic curricula;
 - (ii) STEM disciplines in high demand, nationally and/or internationally, resulting in difficulties in recruitment and retention at U.S. universities and at DOE laboratories;
 - (iii) STEM disciplines for which the DOE laboratories may play a role in providing needed workforce development; and
 - (iv) recommendations for programs at the graduate student or postdoc levels that can address discipline-specific workforce development needs.

Input on Workforce Needs

The input received identified Office of Science program-specific workforce development needs as well as crosscutting workforce development needs.

- Over 50 SC program specific disciplines recognized as needing greater emphasis for workforce training.
- Several crosscutting areas identified:
 - Computational Sciences (all 6 SC program areas; 6 SC labs)
 - Accelerator and Detector R&D (BES, HEP, NP; 4 SC labs)
 - Instrumentation (BES, BER, HEP; 4 labs)
 - Nuclear chemistry/Radiochemistry (BES, NP; 3 SC labs)
- Interdisciplinary sciences emphasized in several program areas and labs.

SCGSR Program Goal

The goal of the Office of Science Graduate Student Research (SCGSR) program is to prepare graduate students for science, technology, engineering, or mathematics (STEM) careers critically important to the DOE Office of Science mission, by providing graduate thesis research opportunities at DOE laboratories.

This research opportunity is expected to advance the graduate students' overall doctoral thesis while providing access to the expertise, resources, and capabilities available at DOE laboratories.

- Full program details, including eligibility and application requirements:

<http://science.energy.gov/wdts/scgsr/>

- Online application system:

<https://apps.orau.gov/SCGSR/Account/Login>

Currently accepting applications through **NOVEMBER 21, 2016 AT 5:00PM EASTERN TIME.**

SCGSR Program: Priority Research Areas (2016 Solicitation 2)

(based on SC's Assessment of Workforce Development Needs and evolving needs of SC programs)

Advanced Scientific Computing Research (ASCR)

- (a) Applied Mathematics
- (b) Computer Science
- (c) Next Generation Networking for Science
- (d) **Research and Evaluation Prototypes**

Basic Energy Sciences (BES)

- (a) Accelerator and Detector R&D
- (b) Heavy Element Radiochemistry
- (c) Neutron Scattering Research and Instrumentation
- (d) Predictive Materials Science and Chemistry
- (e) Fundamental Electrochemistry related to Energy Transduction, Storage, and Corrosion
- (f) Crystal Growth
- (g) Ultrafast Materials and Chemical Sciences
- (h) Electron and Scanning Probe Microscopy Research and Instrumentation
- (i) Basic Geosciences
- (j) **Gas Phase Chemical Physics**

Biological and Environmental Research (BER)

- (a) Computational Biology and Bioinformatics
- (b) Biological Imaging - Mesoscale to Molecules
- (c) Plant Science for Sustainable Bioenergy
- (d) Environmental Systems Science

Biological and Environmental Research (BER) – cont'd

- (e) Atmospheric Systems Research
- (f) Earth System Modeling
- (g) Regional and Global Climate Modeling

Fusion Energy Sciences (FES)

- (a) Burning Plasma Science & Enabling Technologies
- (b) Discovery Plasma Science

High Energy Physics (HEP)

- (a) Theoretical and Computational Research in High Energy Physics
- (b) Advanced Technology Research and Development in High Energy Physics
- (c) Experimental Research in High Energy Physics

Nuclear Physics (NP)

- (a) Medium Energy Nuclear Physics
- (b) Heavy Ion Nuclear Physics
- (c) Low Energy Nuclear Physics
- (d) Nuclear Theory
- (e) Nuclear Data and Nuclear Theory Computing
- (f) Isotope Development and Production for Research and Applications
- (g) Accelerator Research and Development for Current and Future Nuclear Physics Facilities



SCGSR Program Management

The SCGSR program is managed by the DOE Office of Science's Office of Workforce Development for Teachers and Scientists (WDTS) in collaboration with 6 SC research program offices and 17 participating DOE national laboratories. Oak Ridge Institute of Science and Education (ORISE) provides support for program administration.

Fiscal Year (Budget)/Solicitations		Awards
FY 2014 (\$2.0M appropriated), 1 Solicitation		65
FY2015 (\$2.5M appropriated), 2 Solicitations	2015 Solicitation 1	47
	2015 Solicitation 2	52
FY2016 (\$2.5M appropriated), 2 Solicitations	2016 Solicitation 1	43
	2016 Solicitation 2 (Due November 21, 2016)	~50
FY2017 (\$2.575M requested), 2 Solicitations		



SCGSR Program Key Elements

The SCGSR Program provides supplemental awards to outstanding graduate students to spend 3 to 12 months conducting part of their doctoral thesis/dissertation research at a DOE laboratory in collaboration with a DOE laboratory scientist.

- Graduate students must apply online through the online application system.
- The application requires a research proposal and letters of support from both the graduate student's thesis advisor and the collaborating DOE laboratory scientist.
- Student's research and proposed SCGSR project must be aligned with one of the identified SCGSR priority research areas defined by the SC Program Offices and specified in the solicitation.
- Applications proposing to use an SC user facility must apply for user facility time separately.

Award Benefits:

- A monthly stipend of up to \$3,000/month for general living expenses
- Reimbursement of inbound/outbound traveling expenses to/from the DOE laboratory of up to \$2,000.

(Award payments are provided directly to the student.)

Eligibility:

- U.S. Citizen or Permanent Resident
- Qualified graduate program & Ph.D. Candidacy
- Graduate research aligned with an SCGSR priority research area
- Establishment of a collaborating DOE laboratory scientist at the time of application



Two Solicitations Annually

Key Dates for FY2016 -2017

	2016 Solicitation 1	2016 Solicitation 2	2017 Solicitation 1***
On-line Application Opens	February 16, 2016	August 30, 2016	February 2017
Applications Due	May 11, 2016 5:00 PM ET	November 21, 2016 5:00 PM ET	May 2017
Offer Notification Period <i>Begins on or around</i>	September 2016	April 2017	August/September 2017
<i>Earliest*</i> Start Date for Proposed Project Periods	November 1, 2016	June 1, 2017	October 31, 2017
<i>Latest**</i> Start Date for Proposed Project Periods	February 28, 2017	October 2, 2017	February 28, 2018

*Proposed project periods may not begin before this date, and may be 3 to 12 consecutive months in duration.

** Proposed project period must begin no later than this date, and may be 3 to 12 consecutive months in duration.

*** All Dates are tentative.

<http://science.energy.gov/wdts/scgsr/key-dates/>

Merit Review and Criteria

Completed applications submitted to the SCGSR Program before the application deadline is evaluated using the DOE Office of Science's standard merit review processes.

- **Scientific and/or Technical Merit of the Proposed Research**
 - Is the proposed research well-conceived, and does it demonstrate a clear understanding of the scientific and technical challenges involved?
 - Is the proposed method and approach for the proposed research appropriate?
 - Is the applicant (graduate student) sufficiently well prepared to conduct the proposed research?
 - Are the DOE laboratory resources adequate? If applicable, has the necessary access to a scientific user facility been secured by the DOE laboratory collaborating scientist?
- **Relevance of the Proposed Research to Graduate Thesis Research and Training**
 - Does the proposed research have the potential to make a significant contribution to the applicant's (graduate student's) thesis research project?
 - Will the proposed research enhance the applicant's graduate training and research skills?

Outcome To Date

SCGSR Solicitation	Awards in Areas relevant to ASCR	Host DOE Laboratories
2014 Solicitation	5 (65)	LANL (2), LBNL, NREL, ORNL
2015 Solicitation 1	3 (47)	LBNL, SNL (2)
2015 Solicitation 2	1 (52)	LLNL
2016 Solicitation 1	3 (43)	ANL, ORNL, SNL
Total	12 (207)	



A SCGSR Success Story for Workforce Development

Christopher Forster, SCGSR Awardee from 2015 Solicitation 1, a Mechanical Engineering Ph.D. candidate at Georgia Institute of Technology.

- **SCGSR Research Project:** *Wavelet Adaptive multi-Resolution Predictive (WARP) Simulation: A GPU-based Solver for High Performance Computing*, with Dr. Guilhem Lacaze, Combustion Research Facility, Sandia National Laboratories.
- Relevant to **ASCR – Applied Mathematics.**
- **User Facility:** Oak Ridge National Laboratory Leadership Computing Facility
- The SCGSR award “has been a very good opportunity and allowed me to collaborate with a number of researchers here. It has resulted in a full-time staff position offer that will let me continue here and incorporate some of my work in preparing Sandia simulation codes to run on the next generation supercomputers.”

