U.S. DEPARTMENT OF ENERGY | Office of Science

Programs in the Office of Science / Office of Workforce Development for Teachers and Scientists (WDTS) / DOE

Opportunities for Undergraduates and Faculty at DOE Laboratories

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Workforce Development for Teachers and Scientists at a Glance

Ensuring a pipeline of STEM workers to support the DOE mission

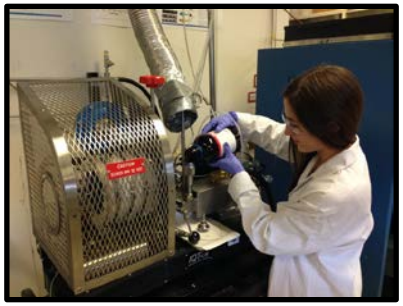
- At DOE labs and facilities, WDTS supports >1,000 students and faculty annually:
  - 800 Science Undergraduate Laboratory Interns (SULI) placed at one of 17 DOE labs or facilities
  - 100 Community College Interns (CCI)
  - 100 graduate students engaged in Ph.D. thesis research for 3-12 months at a DOE laboratory
  - 60 faculty and 25 students in the Visiting Faculty Program (VFP)

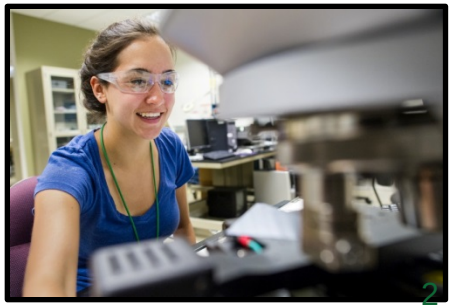
- Support for the National Science Bowl®
  - The Department of Energy (DOE) created the National Science Bowl® in 1991 to encourage students to excel in mathematics and science and to pursue careers in these fields. More than 250,000 students have participated in the National Science Bowl® throughout its 25-year history
  - The National Science Bowl® regional winning teams receive expenses-paid trips to Washington D.C. to compete at the National Finals in late April. SC manages the National Science Bowl®, provides central management of 116 regional events, and sponsors the NSB Finals competition

- Support for 6 Albert Einstein Distinguished Educator Fellows

- Support for on-line business systems modernization
  - This activity modernizes on-line systems used to manage applications and review, data collection, and evaluation for all WDTS programs.

- Support for program evaluation and assessment
  - This activity assess whether programs meet established goals using collection and analysis of data and other materials, such as pre- and post-participation questionnaires, participant deliverables, notable outcomes, and longitudinal participant tracking.





Why Office of Science (SC) sponsored internships?

In a word… **WORKFORCE***

The Workforce Development for Teachers and Scientists (WDTS) program mission is to ensure that DOE has a sustained pipeline of science, technology, engineering, and mathematics (STEM) workers. This is accomplished, in part, through support of undergraduate internships and visiting faculty programs at the DOE laboratories, administered by WDTS for DOE; and Nation-wide, middle- and high-school science competitions that annually culminate in the National Science Bowl® in Washington D.C. These investments help develop the next generation of scientists and engineers to support the DOE mission, administer its programs, and conduct its research.

WDTS activities rely significantly on DOE's 17 laboratories, which employ more than 30,000 workers with STEM backgrounds. The DOE laboratory system provides access to leading scientists; world-class scientific user facilities and instrumentation; and large-scale, multidisciplinary research programs unavailable in universities or industry. WDTS leverages these assets to develop and train post-secondary students and educators to enhance the DOE mission.

SC sponsors and operates these programs to help sustain the DOE's scientific and technical workforce pipeline.

**As a mission agency ,"education" programs cannot be supported. As a result, WDTS does not solicit or provide direct awards to campuses, and instead, offer experience based learning opportunities directly to students and faculty.*

The Office of Science (SC)

http://www.science.energy.gov

Some brief background on SC mission, programs, and facilities….because this is at the center of these experience based learning opportunities.

The Office of Science Mission is Research

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. 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 energy.

Office of Science Research Priorities

The frontiers of science - discovering nature's mysteries from the study of subatomic particles, atoms, and molecules that are the building blocks of the materials of our everyday world to the DNA, proteins, and cells that are the building blocks of entire biological systems; each of the programs in the SC supports research to probe the most fundamental questions of its disciplines.

The 21st Century tools of science **-** providing the Nation's researchers with 26 state-of-the-art national scientific user facilities, the most advanced tools of modern science, enabling the U.S. to remain at the forefront of science, technology, and innovation.

Science for energy and the environment **-** advancing a clean energy agenda through fundamental research on energy production, conversion, storage, transmission, and use and through advancing our understanding of the earth and its climate; targeted investments include the three DOE Bioenergy Research Centers (BRCs), the Energy Frontier Research Centers (EFRCs), two Energy Innovation Hubs, and atmospheric process and climate modeling research.

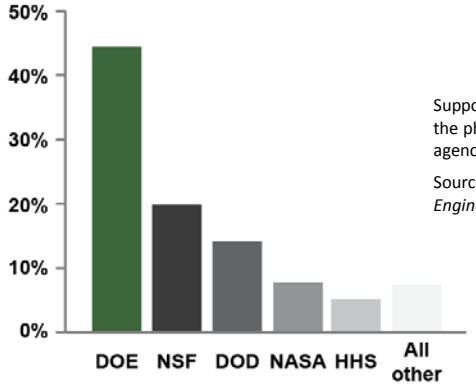
Office of Science
By the numbers ~ $5.5B budget

Shown is a portion of SLAC's two-mile-long linear accelerator (or linac), which provides the electron beam for the new Linac Coherent Light Source (LCLS) – the world's first hard x-ray, free-electron laser. For nearly 50 years, SLAC's linac had produced high-energy electrons for physics experiments. Now researchers use the very intense X-ray pulses (more than a billion times brighter than the most powerful existing sources) much like a high-speed camera to take stop-motion pictures of atoms and molecules in motion, examining fundamental processes on femtosecond timescales.

SC delivers scientific discoveries and tools to transform our understanding of nature and advance the energy, economic, and national security of the U.S.

Research

- Support for 47% of the U.S. Federal support of basic research in the physical sciences;
- ~22,000 Ph.D. scientists, grad students, engineers, and support staff at >300 institutions, including all 17 DOE labs;
- U.S. and world leadership in high-performance computing and computational sciences for open research;
- Major U.S. supporter of physics, chemistry, materials sciences, and biology for discovery and for energy sciences.



Support for basic research in the physical sciences by agency.

Source: *NSF Science and Engineering Indicators 2012*

Scientific User Facilities

- The world's largest collection of scientific user facilities (aka research infrastructure) operated by a single organization in the world, used by 31,000 researchers each year.

The Office of Science research portfolio

Advanced Scientific Computing Research	• **Computational and networking capabilities to extend the frontiers of science and technology**
Basic Energy Sciences	• **Understanding, predicting, and controlling matter and energy at the electronic, atomic, and molecular levels**
Biological and Environmental Research	• **Understanding complex biological, climatic, and environmental systems**
Fusion Energy Sciences	• **Matter at very high temperatures and densities and the scientific foundations for fusion**
High Energy Physics	• **Understanding how the universe works at its most fundamental level**
Nuclear Physics	• **Discovering, exploring, and understanding all forms of nuclear matter**

The Office of Workforce Development for Teachers and Scientists (WDTS) manages these programs

Mission: WDTS program mission is to ensure that DOE has a sustained pipeline of highly skilled and diverse science, technology, engineering, and mathematics (STEM) workers.

- WDTS undergraduate student intern programs (one for 2/4-yr institutions and one for community colleges) and a visiting faculty program at the DOE laboratories:
  - *Science Undergraduate Laboratory Internship (SULI) ~800/year*
  - *Community College Internship (CCI) ~100/year*
  - *Visiting Faculty Program (VFP) ~(60/25)/year*
- WDTS funds these programs, provides oversight, manages their national application systems, and ensures that a common set of core program elements are delivered.
- Host labs and facilities operate these programs locally; *e.g.* - identifying mentors and projects according to their mission overlap, reviewing & selecting candidates, and executing professional development activities per common programmatic baselines.

Science Undergraduate Laboratory Internship (SULI)

The SULI program places undergraduate students(from 2 or 4 year institutions) in paid internships in science and engineering research activities at 16/17 DOE Laboratories, and one National User Facility. Students 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.

- Appointments are for:
  - 10 weeks during the Summer Term (May through August) or 16 weeks during the Fall Term (August through December) and Spring Term (January through May).
  - Application process for the 2016 Summer Term is closed – The 2016 Fall Term application is planned to open in mid-March 2016.
- All interns have defined research projects that must be within the DOE mission space.
- All interns have required deliverables: A research report, an oral or poster presentation, a peer review, a general audience abstract, and pre- and post- participation surveys.
- Interns receive a $500 weekly stipend, travel to and from the laboratory, and possibility for a housing allowance.
- Laboratories also provide an array of seminars and professional development opportunities.
- Undergraduates from 2 or 4 year colleges, in their sophomore through senior year, or recent graduates, are eligible to apply.
- Must be at least 18 years old at the time of application; and a U.S. citizen or LPR.
- Must have a minimum cumulative GPA of 3.0.
- May participate as an intern a maximum of two times; May apply a maximum of three times.
- WDTS sponsors ~800 participants per year, majority (~600) in the Summer Term.

Please visit http://science.energy.gov/wdts/suli/ for full details and how to apply.

2007 SULI participant at Ames Laboratory; subsequently a 2009 DOE/SC Graduate Fellow; now a Director's Postdoctoral Fellow at Los Alamos National Laboratory

Andrew Fidler hiking in the mountains near LANL (above) and working in Dr. Ruslan Prozorov's lab at Ames Laboratory in 2007 (below).

- Andrew Fidler was a 2007 participant in the summer SULI program at the Ames Laboratory, where he conducted experimental studies of fundamental properties of superconductors in Dr. Ruslan Prozorov's lab. He coauthored a research paper on this work, published in Nature Physics in 2008.
- Fidler was then a 2009 recipient of the DOE Office of Science Graduate Fellowship, which he used for his Ph.D. work in physical chemistry at the University of Chicago.
- Fidler was named a Los Alamos National Laboratory (LANL) Director's Fellow in 2014. These laboratory-wide postdoctoral Fellowship Awards are highly competitive, and are based on academic and research accomplishments, as well as the strength and impact of the proposed research. Fidler is currently a member of LANL's Nanotechnology and Advanced Spectroscopy Team.
- "*I have nothing but good memories of my summer at Ames. The research opportunities continue to be of high caliber and offer a great opportunity for undergraduates to see what a career in science is like*," said Fidler.

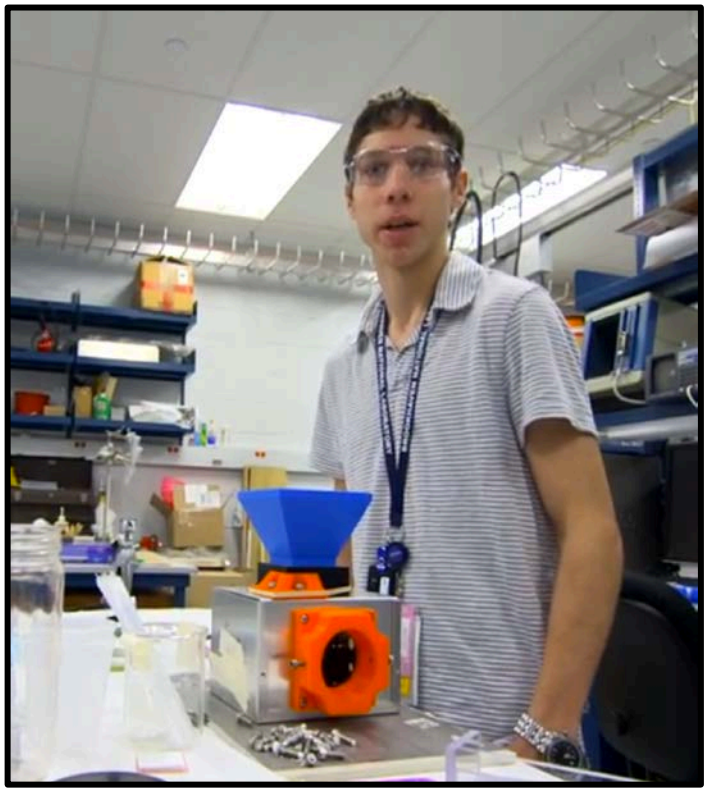
Gamma Ray Detection at DIII-D
SULI participant from General Atomics

Top: Victoria Riso calibrates the energy sensitivity of gamma ray scintillators using a cobalt-60 source. Bottom: Riso works with postdoctoral fellow Christopher Cooper to commission the new DIII-D Gamma Ray Imager diagnostic

- Undergraduate nuclear engineering student Victoria Riso (SUNY-Buffalo) spent ten weeks gaining hands-on experience with plasma physics and magnetic confinement fusion through one week of lectures at the Princeton Plasma Physics Laboratory and nine weeks of experimental work at the DIII-D National Fusion Facility. At DIII-D, she worked with research scientist David Pace (General Atomics) and postdoctoral researcher Christopher Cooper (Oak Ridge Associated Universities) to measure the gamma radiation spectrum of the reactor hall.
- Riso's measurements provide a gamma ray energy spectrum of relevance to the background level encountered by the new Gamma Ray Imager diagnostic at DIII-D.
- Riso will present the results of her work at the APS-DPP meeting in November. She will pursue a Master's degree in nuclear engineering next Fall.

Design of the sPHENIX Detector at the Relativistic Heavy Ion Collider (RHIC)

SULI participant from Brookhaven National Laboratory (BNL)



Spencer Locks assembling a prototype tungsten brick comprised of 3D printed components.

- Spencer Locks, a 2015 summer SULI participant from Stony Brook University, collaborated with Donald Lynch, a BNL engineer with sPhenix at RHIC, to design an essential component of the electromagnetic calorimeter to be used in sPhenix.
- The EmCal will allow scientists and physicists to analyze the electromagnetic particles that are emitted by quarks and gluons after a collision. The detector will do this by using 25,000 tungsten bricks that have 750 scintillating fibers.
- Spencer used Autodesk Inventor to design and 3D print molds using rapid prototyping. These printed molds were then used to create the first prototype bricks.
- "*While working with great scientists and engineers, I have increased my understanding of engineering and more importantly, collaboration. I am now more familiar with tolerances, composite properties, optimization, and manufacturing limitations.*"

Additive Manufacturing (AM) 3D Printing

SULI participant from Lawrence Livermore National Laboratory (LLNL)

Mr. Lemuel Perez-Perez, a senior from the University of Puerto Rico, Mayaguez, participated in the SULI 2015 Spring Term at the Lawrence Livermore National Laboratory.

"I gained a better understanding of the behavior of materials and compounds with physical and chemical changes in the micro scale. Also, by using the DIW system, I was able to learn more about computer numerical control (CNC) machines and the use of G-code language to control these types of machines."

- Additive manufacturing (AM) is the term used for what was previously called rapid prototyping or 3D printing. AM is the process of constructing 3D structures by consecutively layering one material on top of another in a desired pattern. AM incorporates various technologies for the development of 3D structures. The polymer AM team from Lawrence Livermore National Laboratory (LLNL) combines computer modeling with projection microstereolithography (PμSL), electrophoretic deposition (EPD), and direct ink writing (DIW) to design, build, and test new materials.
- The development of porous siloxane resin for DIW, which provide regulated porosity, can support a number of biomedical and mechanical applications, such as scaffolds and support cushions and pads. This project focused on the modification of a siloxane resin (Dow Corning® SE1700) by addition of polyethylene glycol (PEG) filler, which can be removed post-printing to achieve structures with both *inter* and *intra*strand porosity.

Synthesis and Characterization of Nanoporous Metal Foams

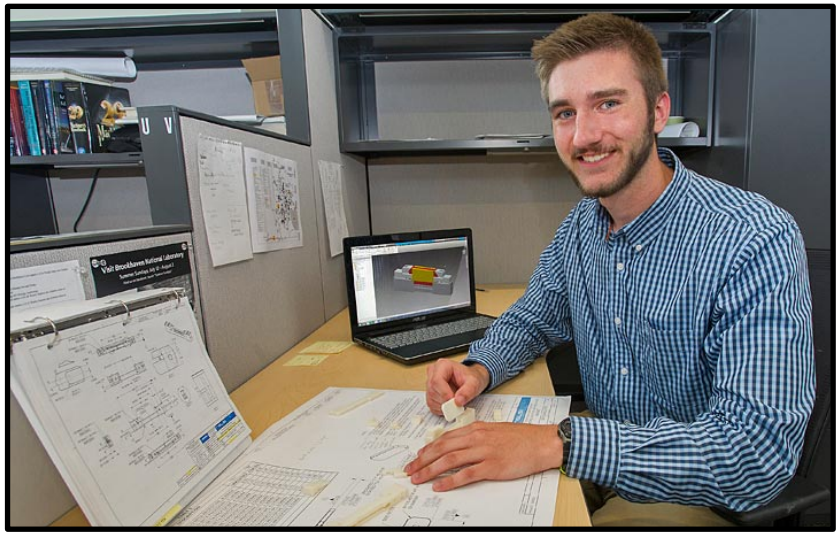
SULI participant from Lawrence Livermore National Laboratory (LLNL)

LLNL SULI Intern Mr. Angelo A. Kirchon, a rising senior of the Virginia Military Institute in Lexington, VA

"During this process of being an intern here at LLNL, I have learned an enormous amount of how to become a successful scientist and how to conduct myself in a professional manner. I have also gained a much better understanding of the behavior of materials with physical and chemical changes in the micro and nano scale."

- This project focuses on the synthesis and characterization of nanoporous metal foams (NMF) obtained through a novel freeze drying technique. While very desirable, such materials have not yet been commercially produced. Our approach offers a scalable, cost-effective route to producing nanoporous, very high surface area copper and silver metal foams; however, strategies to tune the nanoporous architecture are needed. Angelo has been working on developing a process that allows for the materials properties such as density to be controlled through simple synthetic changes. The flexibility of this process will allow for these ultra-low density metal powders to be more effectively incorporated in applications such as High Energy Density Physics (HEDP), catalysis, battery technology, hydrogen storage and much more.
- Angelo is currently a chemistry major at the Virginia Military Institute. He plans to go to graduate school to obtain a Ph.D. in chemistry. Angelo's research interests include the synthesis and characterization of novel materials.

Design of Magnet Assemblies for the National Synchrotron Light Source – II (NSLS-II) SULI participant from Brookhaven National Laboratory (BNL)



"The SULI program opened up a door for me… This project is so specific, but at the same time I've drawn so much from much broader areas like material science. It's given me a lot of insight about practical engineering design and application to my education. So whether I'm here again or not, wherever I go, I'll have this first experience actually doing engineering for a purpose at NSLS-II."

- Now a junior majoring in mechanical engineering at Worcester Polytechnic Institute, Brandon Bozeat spent this past summer at the National Synchrotron Light Source II (NSLS-II), an electron accelerator that generates beams of x-rays and other forms of light for studying all manner of materials.
- Bozeat was mentored by NSLS-II engineer Christopher Eng, who enlisted Brandon's help in designing the magnet assemblies that comprise NSLS-II's undulators - devices that wiggle the electron beam to emit brighter x-rays.
- "*The DOE SULI program is a fantastic program through which wonderful students with great potential like Brandon can turn from observer into collaborator in world-class research and development*," said Eng. "*This program strongly represents the idea that science is for everyone. As mentors, it reminds us of our responsibility and commitment to inspire and prepare future generations for working toward a better world. For the Lab it forms a solid foundation from which our work will be continued and from which science will be built upon in the future*."

Summer Interns at Ames Laboratory Participate in Roundtable with DOE Deputy Secretary

Participants from Ames Laboratory's SULI, VFP, and CCI programs were invited guests for a Roundtable discussion with Deputy Secretary of Energy Elizabeth Sherwood-Randall in June 2015.
Pictured (left to right), Steve Karsjen (Ames Laboratory education director), Jairah Shaikh (VFP), Nicole Jandick (SULI), Jacinta Misra (SULI), Lindsey Matheney (CCI), Deputy Secretary of Energy Elizabeth Sherwood-Randall, Justin Gonzales (SULI), Gavin Hester (SULI), and Daniel Bouk (CCI).

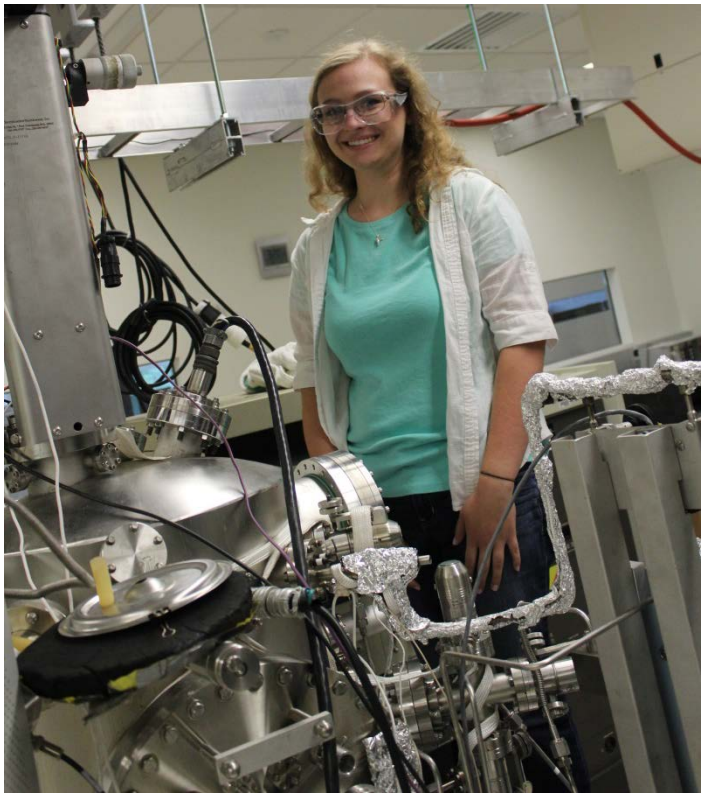
Community College Internship (CCI)

The Community College Internship (CCI) places students from community colleges 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.

- Appointments are for:
  - 10 weeks during the Summer Term (May through August) or 16 weeks during the Fall Term (August through December) and Spring Term (January through May).
  - Application process for the 2016 Summer Term is closed – The 2016 Fall Term application is planned to open in mid-March 2016.
- All interns have defined technical projects that are within the DOE mission space.
- All interns have required deliverables: A research report, an oral or poster presentation, and pre- and post- participation surveys.
- Interns are compensated as follows: $500 weekly stipend, travel to and from the laboratory, and a housing allowance.
- Laboratories also provide an array of seminars and professional development opportunities.
- Must be at least 18 years old; and a U.S. citizen or LPR.
- May participate as an intern a maximum of two times; May apply a maximum of three times.
- Must have a minimum cumulative GPA of 3.0.
- WDTS supports ~100 participants each Summer Term.

Please visit http://science.energy.gov/wdts/cci/ for full details and how to apply.

CCI Participant learns valuable chemical engineering knowledge, confirms career path



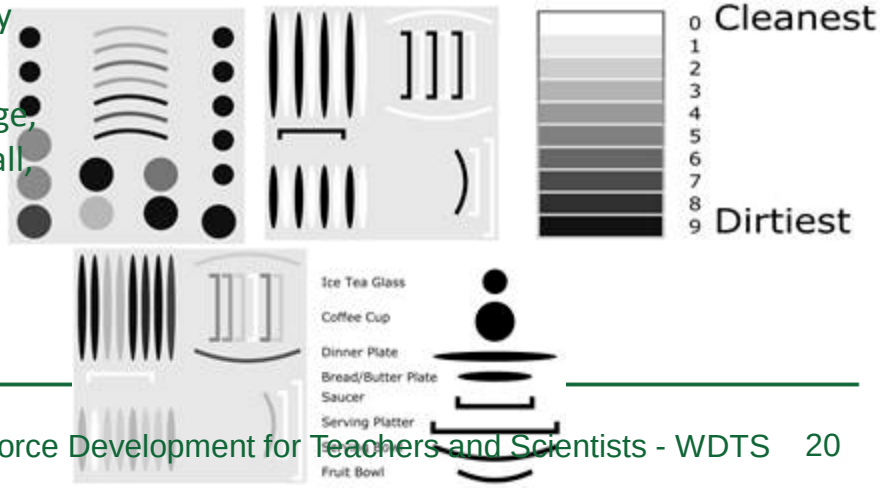
Stacie Schroll, a CCI Participant from Kellogg Community College in Michigan, is transferring to Michigan State University this fall and will begin immersing herself in chemical engineering classes. She feels she'll enter her classes more prepared after spending her summer at ORNL.

- Stacie Schroll's research under the direction of her mentor, Dr. Aditya Ashi Savari, focused on running temperature programmed reactions of 2-propenal in an ultra high vacuum environment, to produce 1,2-propadiene.
- If 1,2-propadiene production through the ultra high vacuum process can be confirmed, this discovery will aid all chemical engineering research using 1,2-dienes. 1,2-dienes are difficult to manufacture because their creation is not thermodynamically favored.
- Schroll had not taken organic chemistry before she began her appointment at the Lab, and her mentor, Dr. Savari, taught her how to name organic molecules, as well as other chemical concepts.
- When beginning her internship at ORNL through the CCI Program, Schroll was unsure whether she wanted to pursue chemistry or chemical engineering as her major field of study. But after her time at ORNL, she knows that chemical engineering is the path she wants to continue towards.
- *"I've really enjoyed being in the Lab, and making a contribution to science. Along with the practical research skills I've gained at ORNL, I can also move forward in my major feeling confident I've made the right choice, and will enjoy my profession."*

CCI Participant creates important scientific visuals for time-sensitive DOE Report

- Utilizing his passion for both art and science, Andrew Valesky spent his summer creating scientific visualizations of high efficiency dishwasher performance test results.
- Valesky played a critical role within the Building Tech Research Integration Center by preparing all of the dishwasher scientific visualizations used in an important ORNL report for the U.S. Department of Energy: "High-Efficiency Dishwasher Performance: Cleanliness, Water Use, and Energy Use." The visualizations were created by Valesky, and were representations of test results by Dr. Kyle Gluesenklamp, Dr. Mini Malhotra and Dr. Anthony Gehl, collaborators with Valesky's mentor, Dr. Jibonananda Sanyal.
- Before joining the CCI Program, Valesky had no knowledge of the client-side aspects of programming. But during his time at ORNL, he was able to learn Scalable Vector Graphics (SVG), JavaScript and Hypertext Markup Language (HTML), which are all programs that are beneficial to know for any open source web applications.
- As a former student of Pellissippi State Community College, Valesky transferred to the University of Tennessee this fall, and plans to finish his computer science degree in May 2017.

Andrew Valesky points to the scientific visualizations he created of various dish setups within a high efficiency dishwasher machine. Cleanliness of the dishes was illustrated through the color gradient scale.



Visiting Faculty Program (VFP)

Opportunities for faculty from academic institutions that are typically underrepresented in the DOE research community to engage in a jointly developed research project at a DOE laboratory during the Summer Term. The scope of the projects should be robustly connected to ongoing host lab research project activities. This, or its predecessor program, have been in operation since 2003.

- Faculty may optionally invite up to two students to participate, one of whom may be a graduate student. VFP- Students must meet SULI requirements, apply separately, and only if invited.
  - Students must have a minimum cumulative GPA of 3.0.
  - Student interns have required deliverables matching those for SULI: A research report, an oral or poster presentation, a peer review, general audience abstract, and pre- and post- participation surveys.
- Operates during a 10-week Summer Term (May through August) - Application process for the 2016 Summer Term is closed; reopens for 2017 in early October 2016.
- Faculty receive stipend of $13,000 for 10 week term, undergraduates receive stipend of $500/week; all participants are provided travel to and from the laboratory, and possibility for a housing allowance.

Please visit http://science.energy.gov/wdts/vfp/ for full details and how to apply.

Visiting Faculty Program (VFP), *cont.*

- Must be a full-time faculty member at an accredited U.S. degree granting, postsecondary, institution of higher education historically underrepresented in the U.S. research community, in an area of physics, chemistry, biology (non-medical), mathematics, engineering, environmental sciences, materials sciences, or computer / computational sciences (link to list of ineligible institutions from VFP webpages).
- Must be a U.S. citizen or PRA. Faculty may participate up to three terms.
- Faculty must, through their own efforts, establish a collaboration with a laboratory scientist to co-develop a 6-page research project proposal prior to applying to the program.
  - Faculty can contact host labs by using the POCs listed at: http://science.energy.gov/wdts/vfp/how-to-apply/selecting-a-host-doe-laboratory/
  - Proposal requirements are posted at: http://science.energy.gov/wdts/vfp/how-to-apply/submitting-a-proposal-to-doe/
- Students may only apply after receiving an invitation through the online system
  - Faculty, in their application, must list student(s) to receive system-generated invitation(s)
  - If a student had already applied to CCI or SULI, they must first "un-submit" this application
- WDTS supports ~ 60 faculty and ~25 students each Summer Term (this ratio is not prescribed).

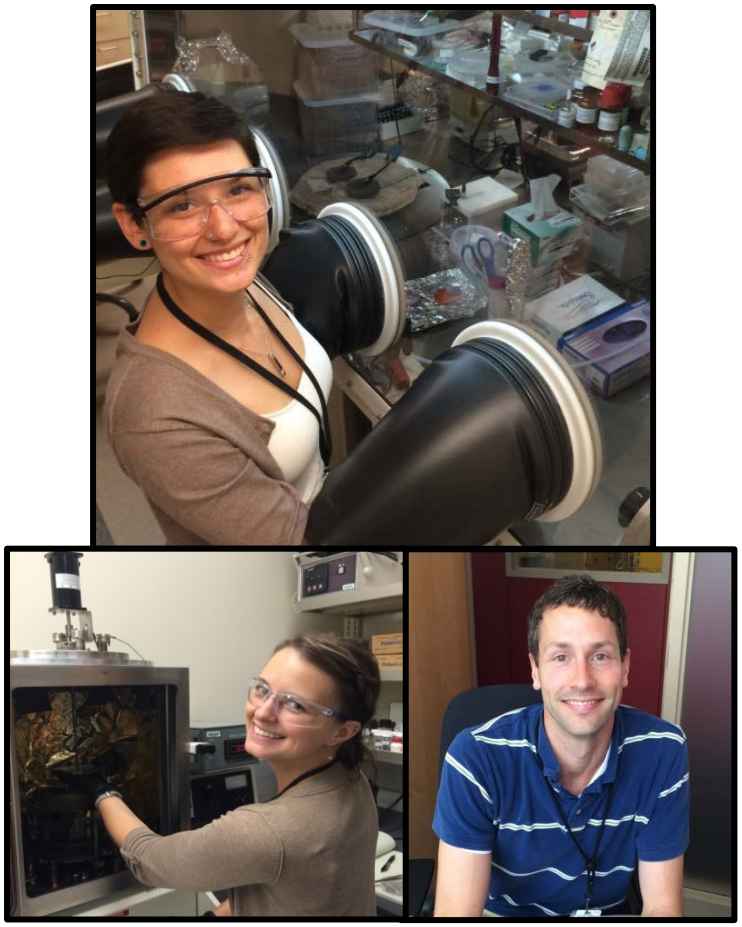
Please visit http://science.energy.gov/wdts/vfp/ for full details and how to apply.

Navigating the Online Application System

- Applications, and all required materials, must be submitted using the WDTS online application system:
  - Account creation is required for access (links are on WDTS website program pages)
  - When completing (student, not faculty applicants) an application, have available pdf copies of your most recent transcripts (and from all other institutions attended)
  - Have available names and email addresses for at least 2, but no more than 3, individuals able to complete a recommendation form on your behalf (the first two received recommendations by the online system fulfill this requirement)
    - The system sends a recommendation request email to your recommender proving them a link to its form
- The application, in addition to general information, includes:
  - Numerous elements that tie directly to the eligibility requirements
  - A cumulative GPA calculator
  - Inquires about your areas of STEM studies, specialization, and interests
  - Inquires about your skills and experience
  - Four short essay questions
- **Applicants** select a 1st and 2nd choice host DOE lab
  - Only these labs will view your application
  - Host labs do not all offer the same STEM specialization areas
  - Information on specific project opportunities may be available from host labs
  - Host labs do all offer similar professional development activities

Thin Film Photovoltaics and their Application in Devices

VFP student participant from Argonne National Laboratory (ANL)

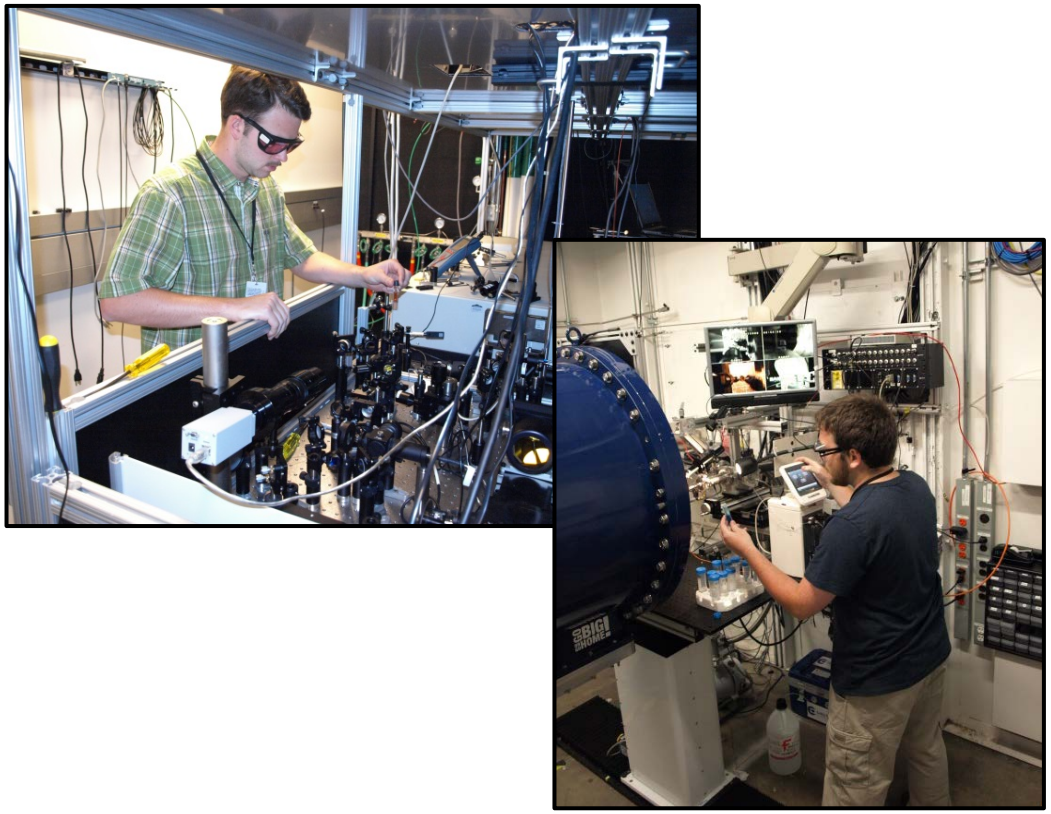


WDTS student intern Alexandra Koegel (upper) is pictured with her faculty mentor, Shannon Riha (lower left), and co-PI Alex Martinson (lower right), working in the Materials Science Division at Argonne National Laboratory.

- Working as a Visiting Faculty Program student participant with Professor Shannon Riha, Visiting Faculty mentor in the Materials Science Division at Argonne National Laboratory, Alexandra Koegel worked on thin-film photovoltaics, including fabrication and testing of photovoltaic devices. She used Atomic Layer Deposition (ALD), a technique that has shown to be useful for every component of a photovoltaic cell, and may be a viable route forward in implementing large-scale solar cell production.
- With the help of co-PI Dr. Alex Martinson, Alexandra assembled a Fourier Transform Infrared Spectrometer and tube furnace for future use in the laboratory.
- Alexandra will be graduating with a degree in Chemistry with American Chemical Society Certification in Spring 2016 from the University of Wisconsin – Stevens Point. Alexandra's experience as a Visiting Faculty Student Participant has allowed her to become a better researcher, a confident presenter, and a respected collaborator with leading scientists in the ALD solar cell technologies.

Artificial Photosynthetic Systems

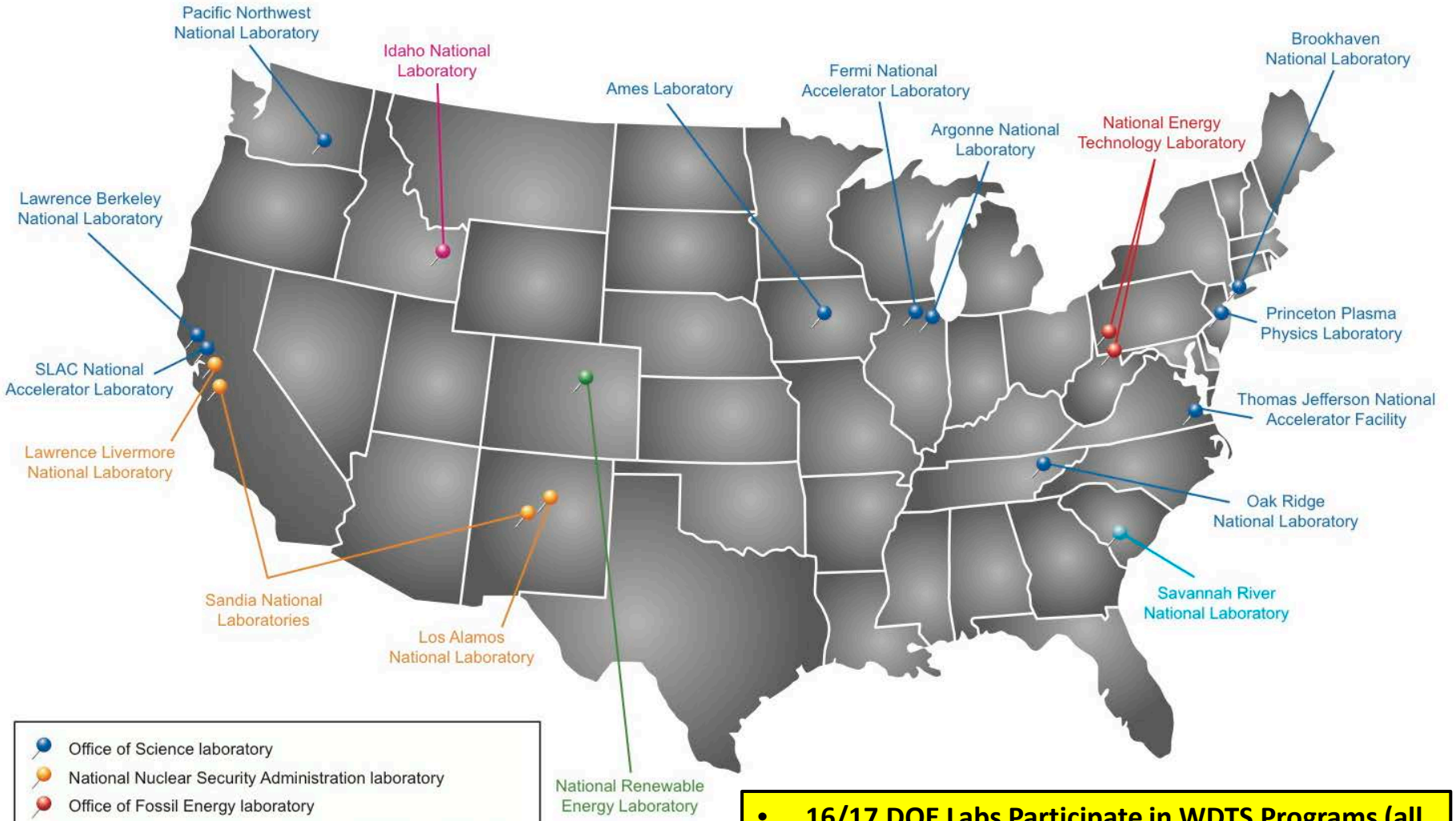
VFP student participants from Argonne National Laboratory, Advanced Photon Source



Daniel Marzolf (sophomore) and Aidan McKenzie (senior) both attend James Madison University in Harrisonburg, VA. Both students plan to attend graduate school and apply the skills they attained through the VFP program at Argonne National Laboratory.

- Working with Dr. David Tiede (CSE) and Professor Oleksandr Kokhan (James Madison University) in the Chemical Sciences and Engineering Division at Argonne National Laboratory, Aidan McKenzie (pictured to the left at the Center for Nanoscale Materials) and Daniel Marzolf (pictured below at the Advanced Photon Source) worked to purify and characterize PpcA, a cytochrome protein and electron transfer agent containing three hemes in order to develop a new generation of artificial photosynthetic systems.
- They conducted protocols of cysteine mutations in various positions within PpcA's three heme binding motifs and attached Ru(bpy)3, a photosensitizer, to the new cysteine residue. They conducted transient absorbance spectroscopy on the mutants to establish a relationship between electron transfer speed/signal strength and distance/orientation between the photosensitizer and the hemes.

DOE Laboratories (16/17 are WDTS Host Labs)



- **16/17 DOE Labs Participate in WDTS Programs (all except NETL)**
- **Project areas vary by stewardship and mission**

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SULI, CCI, and VFP Information Resources

- Review the WDTS program web pages, including the FAQs:
  - The left-hand navigation items provide links to information related to eligibility, compensation, obligation, applying, selecting a host lab, recommendations, key dates, notification, and FAQs

    Science Undergraduate Laboratory Internships (SULI)
    http://science.energy.gov/wdts/suli/

    Community College Internships (CCI)
    http://science.energy.gov/wdts/cci/

    Visiting Faculty Program (VFP)
    http://science.energy.gov/wdts/vfp/

- Visit the WDTS Outreach page for additional presentations and recorded webinars:

  http://science.energy.gov/wdts/outreach/

WDTS Points-of-Contact

Jim Glownia – james.glownia@science.doe.gov; (301) 903 2411

http://www.science.energy.gov/wdts

- SULI, CCI, & VFP:
  - **Cindy White** - Program Manager: cindy.white@science.doe.gov

    - http://science.energy.gov/wdts/suli/contact/
    - http://science.energy.gov/wdts/cci/contact/
    - http://science.energy.gov/wdts/vfp/contact/
    - sc.suli@science.doe.gov
    - sc.cci@science.doe.gov
    - sc.vfp@science.doe.gov

Closing Words and Tips for Applicants

Application deadlines and requirements are firm, including receipt of recommendations (**no exceptions!**)

- Don't wait until the last minute, especially for requesting recommendations
  - Recommendations may be requested as soon as an application is started
- Host labs offer additional information resources regarding their programs and opportunities - visit their websites listed on our program pages or ask us for their contact information
- Ask us any questions using the provided resources
- Technical support for the online system is available during regular business hours
- One application per program, per term (see eligibility information for other limitations)
- When determining the SULI applicant one-year completion requirement, we only count credits earned *while enrolled as a matriculating student*
- Only complete, compliant, and eligible applications are released to host labs
- One offer per term only, independent of acceptance or declination