

Office of Science User Facilities

Fiscal Year 2015

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The U.S. Department of Energy Office of Science provides the Nation's researchers with world-class scientific user facilities to propel the U.S. to the forefront of science and innovation.



Cover top

Simulation of the gravitationally confined detonation model of Type Ia Supernovae created at the Argonne Leadership Computing Facility. Credit George Jordan, Dean Townsley, Robert Fisher, Jim Truran, Don Lamb, Argonne National Laboratory

Above

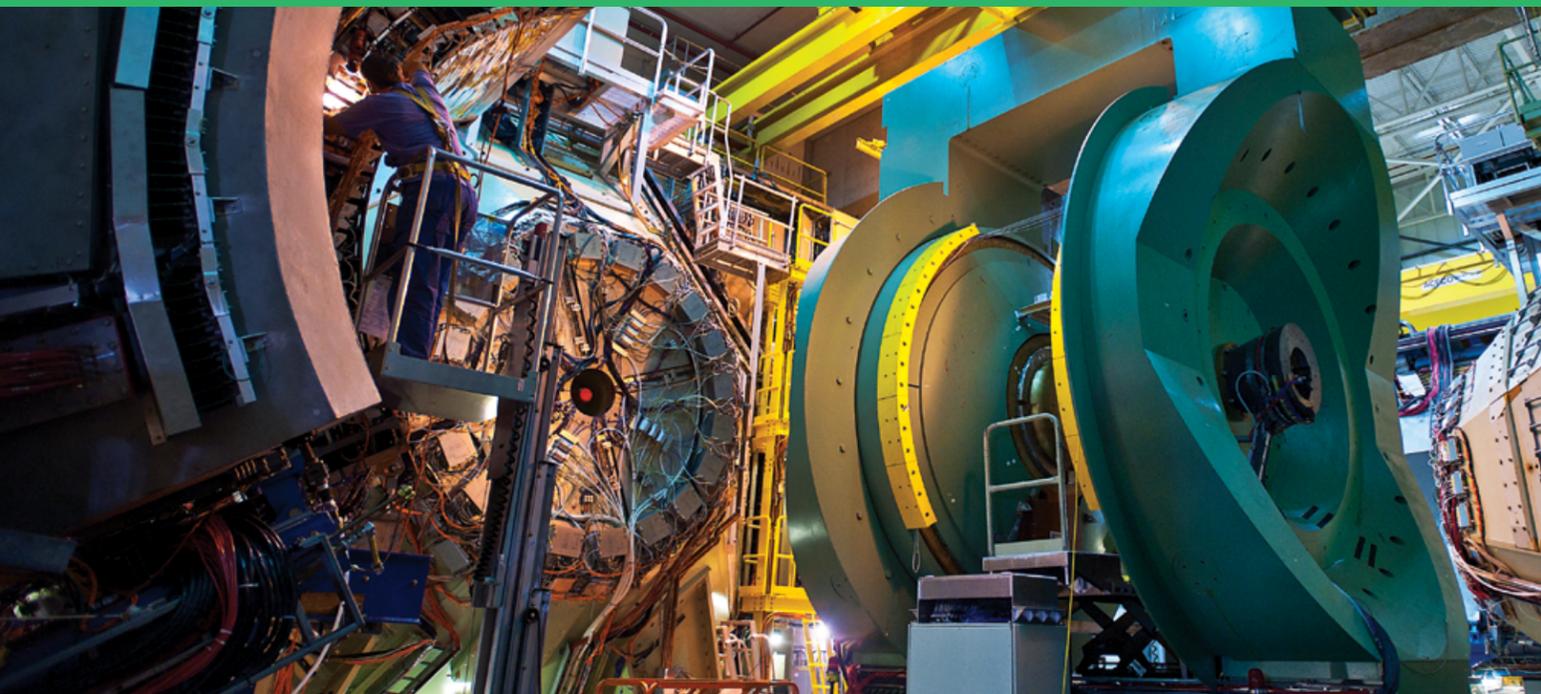
Researchers in the EVEREST visualization facility at the Oak Ridge Leadership Computing Facility. Credit Oak Ridge National Laboratory

Cover bottom

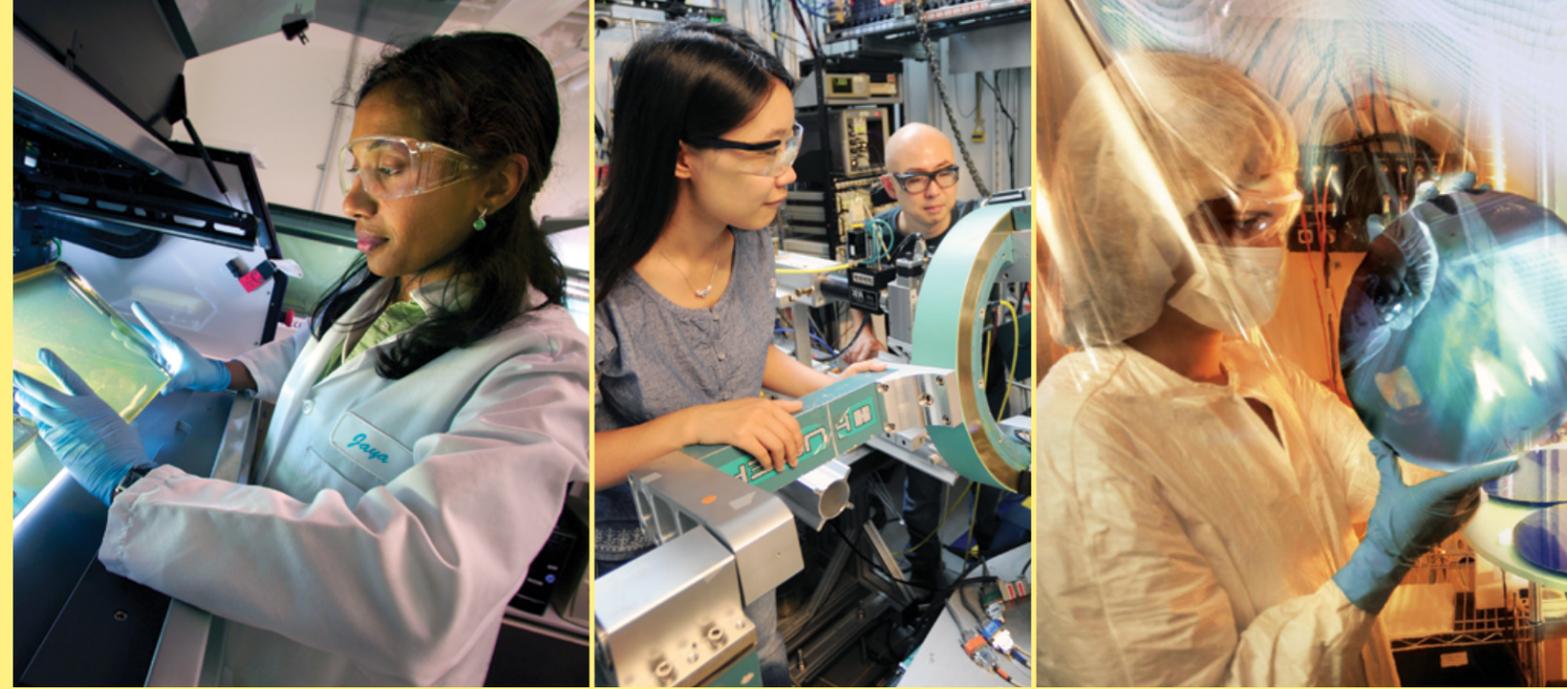
An aerial view of the National Synchrotron Light Source II at Brookhaven National Laboratory. Credit HDR Architecture, Inc. © 2014 Dan Schwalm/HDR

Below

The PHENIX particle detector at the Relativistic Heavy Ion Collider. Credit Brookhaven National Laboratory



A user facility is a federally sponsored research facility available for external use to advance scientific or technical knowledge under the following conditions:



Left The Genetix QPIX colony picker at the Joint Genome Institute. *Credit Roy Kaltschmidt, Lawrence Berkeley National Laboratory*
Center Advanced Photon Source users with a 6-circle diffractometer at Argonne National Laboratory. *Credit R. Fenner, Argonne National Laboratory*
Right Silicon wafers inspection at the Stanford Synchrotron Radiation Lightsource. *Credit SLAC National Accelerator Laboratory*

Open

The facility is open to all interested potential users without regard to nationality or institutional affiliation.

Accessible

The facility provides resources sufficient for users to conduct work safely and efficiently.

Free

User fees are not charged for non-proprietary work if the user intends to publish the research results in the open literature. Full cost recovery is required for proprietary work.

Collaborative

The facility supports a formal user organization to represent the users and facilitate sharing of information, forming collaborations, and organizing research efforts among users.

Competitive

Allocation of facility resources is determined by merit review of the proposed work.

Unique

The facility capability does not compete with an available private sector capability.

The Office of Science manages its research and user facilities portfolio through six core program offices.

Facility stewardship

The program office is responsible for cradle-to-grave support and stewardship of the facility, from conceptualization and design, to construction and operations, to termination and decommissioning. In the conceptualization phase, the scientific user community plays a major role in articulating the scientific justification for the facility and in determining the most impactful facility capabilities. The Office of Science utilizes project management best practices. Facility operations are funded through congressional appropriations directly to the program office. The facility depends on no other source of funds for core operations.

Core program offices

- ASCR** Advanced Scientific Computing Research
- BES** Basic Energy Sciences
- BER** Biological and Environmental Research
- FES** Fusion Energy Sciences
- HEP** High Energy Physics
- NP** Nuclear Physics

ASCR



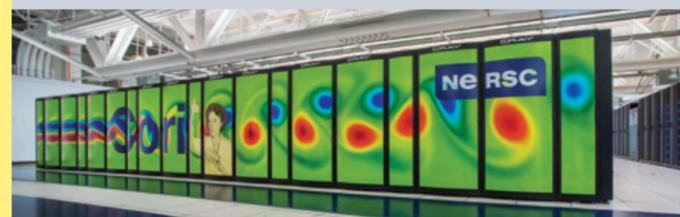
ALCF 990 Users
Argonne Leadership Computing Facility
Argonne National Laboratory



OLCF 1,107 Users
Oak Ridge Leadership Computing Facility
Oak Ridge National Laboratory



ESnet 48 Users
Energy Sciences Network
Lawrence Berkeley National Laboratory



NERSC 6,332 Users
National Energy Research Scientific Computing Center
Lawrence Berkeley National Laboratory

BES light sources



ALS 2,560 Users
Advanced Light Source
Lawrence Berkeley National Laboratory



APS 5,331 Users
Advanced Photon Source
Argonne National Laboratory



LCLS 837 Users
Linac Coherent Light Source
SLAC National Accelerator Laboratory



SSRL 1,626 Users
Stanford Synchrotron Radiation Lightsource
SLAC National Accelerator Laboratory



NSLS II 110 Users
National Synchrotron Light Source II
Brookhaven National Laboratory

Note The National Synchrotron Light Source II (NSLS II) commenced operations on March 19, 2015.

BES nanocenters



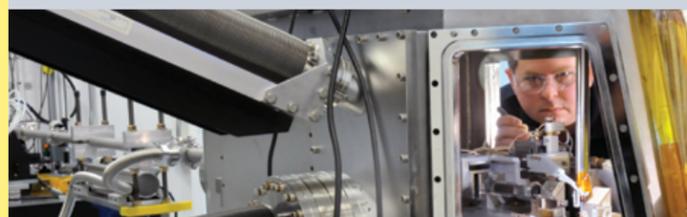
CFN Center for Functional Nanomaterials
493 Users Brookhaven National Laboratory



CINT Center for Integrated Nanotechnologies
513 Users Los Alamos and Sandia National Laboratories



CNMS Center for Nanophase Materials Sciences
575 Users Oak Ridge National Laboratory



CNM Center for Nanoscale Materials
529 Users Argonne National Laboratory



TMF The Molecular Foundry
677 Users Lawrence Berkeley National Laboratory

BES neutron sources



HFIR High Flux Isotope Reactor
491 Users Oak Ridge National Laboratory



SNS Spallation Neutron Source
843 Users Oak Ridge National Laboratory

BER



ARM Atmospheric Radiation Measurement Climate
1,121 Users Research Facility, Global Network



EMSL Environmental Molecular Sciences Laboratory
713 Users Pacific Northwest National Laboratory



JGI Joint Genome Institute
957 Users Lawrence Berkeley National Laboratory

FES



C-Mod Alcator C-Mod
224 Users Massachusetts Institute of Technology

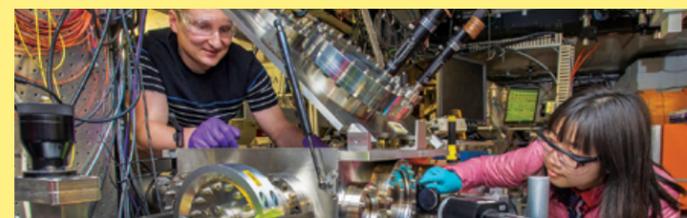


DIII-D DIII-D National Fusion Facility
557 Users General Atomics



NSTX-U National Spherical Torus Experiment Upgrade
356 Users Princeton Plasma Physics Laboratory

HEP



ATF Accelerator Test Facility
75 Users Brookhaven National Laboratory

Note The Accelerator Test Facility (ATF) was formally designated as a scientific user facility in fiscal year 2015.

HEP cont.

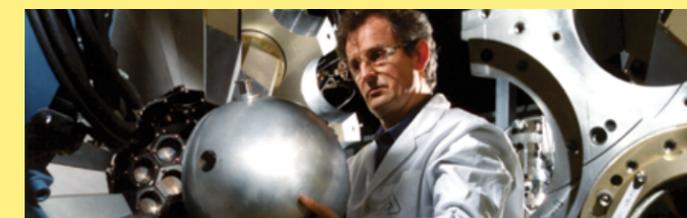


FACET Facility for Advanced Accelerator Experimental Tests
148 Users SLAC National Accelerator Laboratory



Fermilab AC Fermilab Accelerator Complex
1,924 Users Fermilab National Accelerator Laboratory

NP



ATLAS Argonne Tandem Linac Accelerator System
392 Users Argonne National Laboratory



CEBAF Continuous Electron Beam Accelerator Facility
1,510 Users Thomas Jefferson National Accelerator Facility



RHIC Relativistic Heavy Ion Collider
1,015 Users Brookhaven National Laboratory

Data collected for Fiscal Year 2015 reveal an interconnected and diverse research enterprise.



Above

A research scientist at the Center for Nanophase Materials Sciences. Credit Oak Ridge National Laboratory

Below

A postdoctoral researcher working on the Superconducting Solenoid magnet at the Continuous Electron Beam Accelerator Facility. Credit Thomas Jefferson National Accelerator Facility.



06

Users Around the Globe

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Diverse Experiences

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An Interconnected Enterprise

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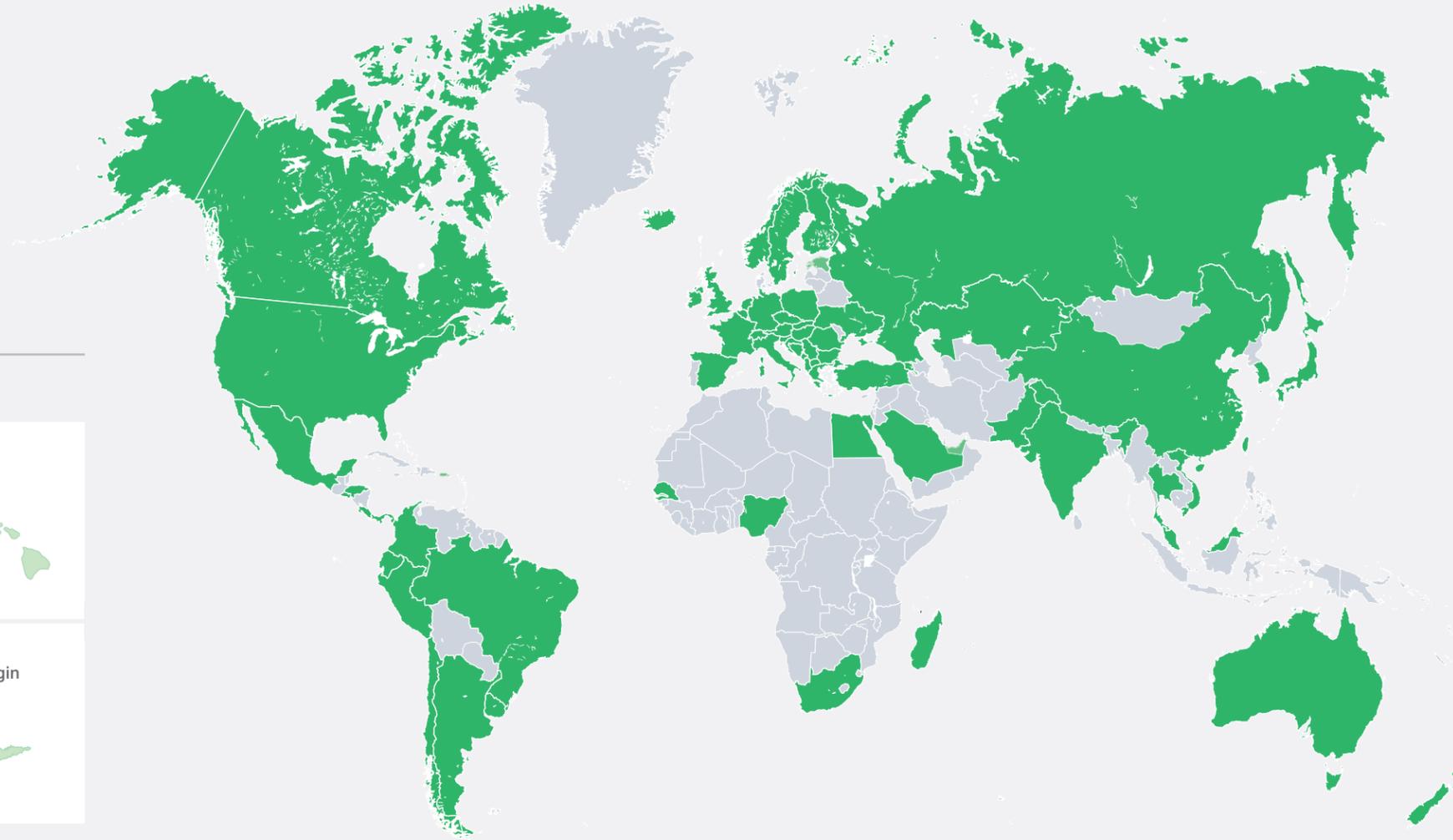
Multiple Methods of Access

14

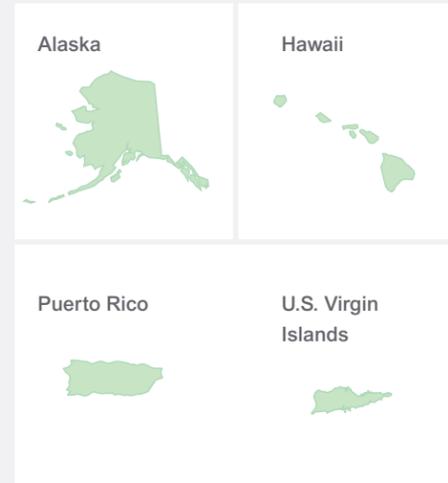
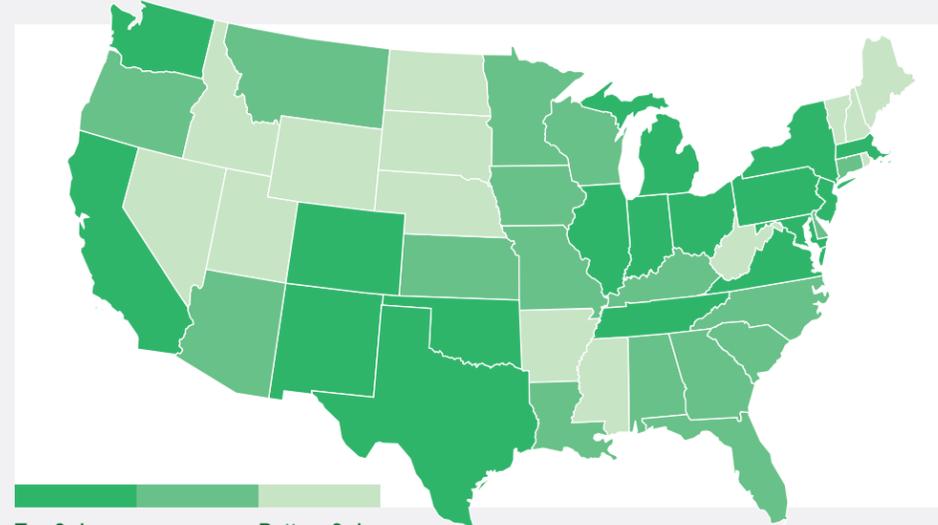
A Broad Impact

The 32,056 users span all 50 states, the District of Columbia, Puerto Rico and the U.S. Virgin Islands, and 68 countries on six continents.

International users



Number of users by state



Top 3rd Bottom 3rd

Alabama	118	Illinois	2,984	Nebraska	58	South Dakota	35
Alaska	14	Indiana	463	Nevada	81	Tennessee	1,762
Arizona	186	Iowa	247	New Hampshire	75	Texas	723
Arkansas	26	Kansas	87	New Jersey	699	Utah	144
California	6,774	Kentucky	88	New Mexico	827	Vermont	10
Colorado	554	Louisiana	130	New York	1,929	Virginia	737
Connecticut	334	Maine	18	North Carolina	418	Washington	890
Delaware	101	Maryland	476	North Dakota	24	West Virginia	23
District of Columbia	235	Massachusetts	990	Ohio	439	Wisconsin	372
Florida	325	Michigan	534	Oklahoma	530	Wyoming	22
Georgia	296	Minnesota	258	Oregon	184	U.S. Territories	31
Hawaii	32	Mississippi	52	Pennsylvania	645		
Idaho	31	Missouri	179	Rhode Island	62		
		Montana	38	South Carolina	138		

Quickfact

80%
of users come from
U.S. institutions

Africa	24	Europe	3,501	Greece	19	N. America	26,559
South Africa	20	United Kingdom	746	Slovakia	11	United States	25,993
Nigeria	2	Germany	682	Ukraine	11	Canada	515
Madagascar	1	France	427	Slovenia	10	Mexico	48
Senegal	1	Italy	316	Croatia	7	Panama	1
		Switzerland	221	Cyprus	6	Honduras	1
Asia	1,636	Sweden	137	Romania	5	Costa Rica	1
China	713	Denmark	110	Bulgaria	4		
Japan	356	Czech Republic	82	Iceland	2	S. America	210
South Korea	281	Poland	73	Serbia	2	Brazil	145
Russia	193	Netherlands	57	Estonia	1	Chile	36
India	175	Finland	46			Argentina	13
Taiwan	57	Norway	43	Middle East	108	Peru	7
Singapore	35	Austria	34	N. Africa		Colombia	5
Hong Kong	7	Hungary	32	Israel	82	Ecuador	3
Thailand	4	Portugal	25	Saudi Arabia	14	Uruguay	1
Pakistan	3	Armenia	24	Egypt	7		
Kazakhstan	2	Ireland	23	United Arab	3	Oceania	156
Malaysia	2	Belgium	22	Emirates	2	Australia	138
Viet Nam	1	Turkey	12	Qatar	2	New Zealand	18

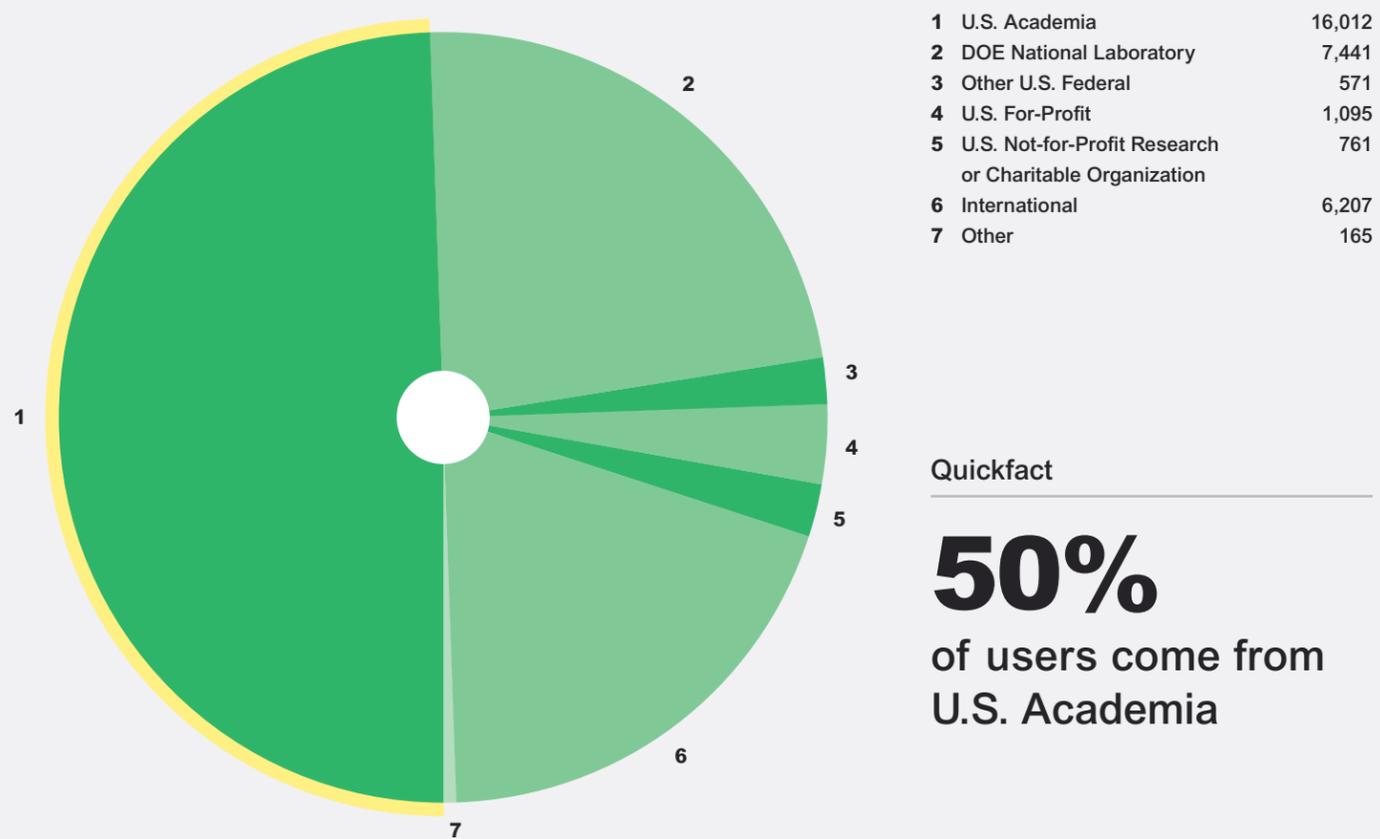
Quickfact

6,276
users from international
institutions

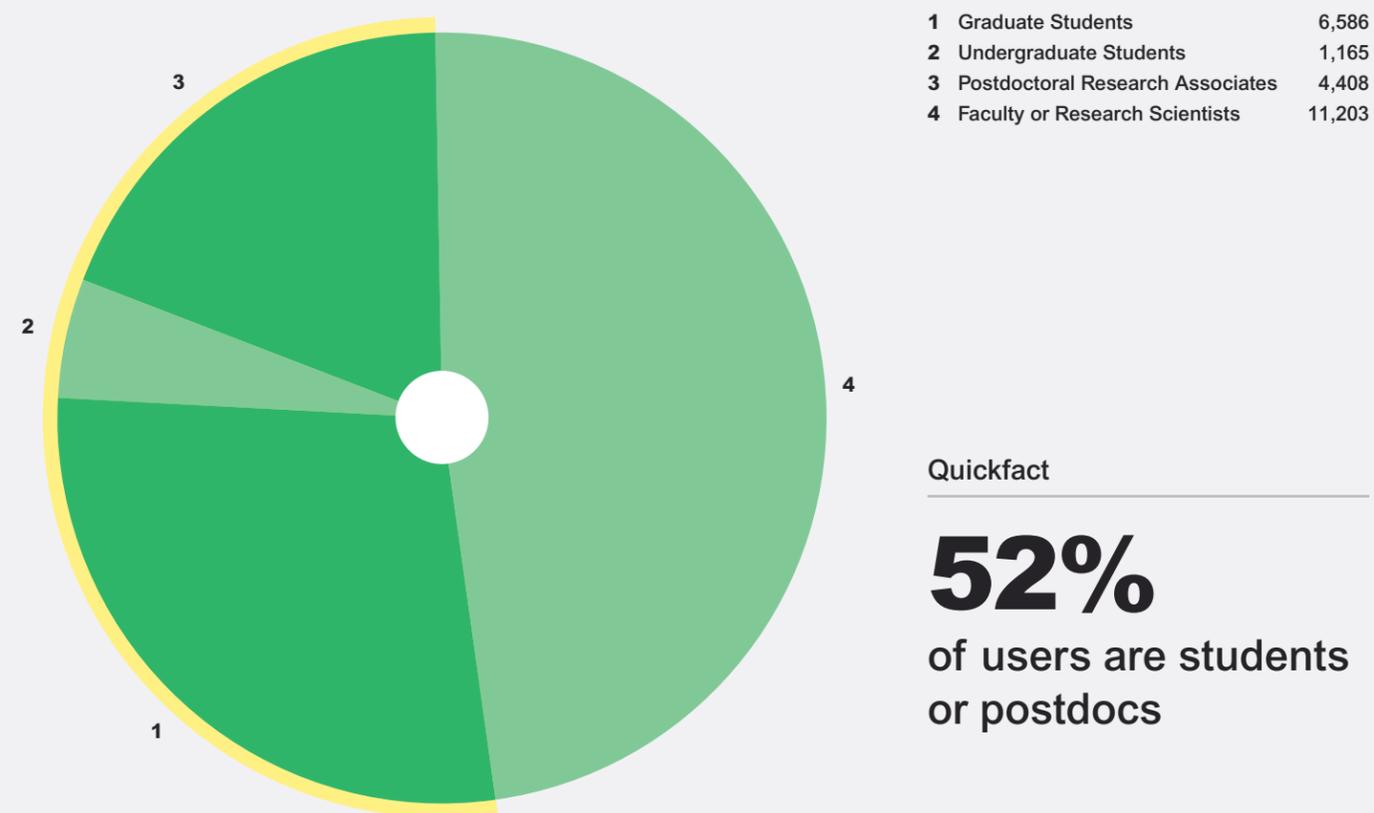
1,312
international
institutions

Users span the full spectrum of R&D institutions and career stages.

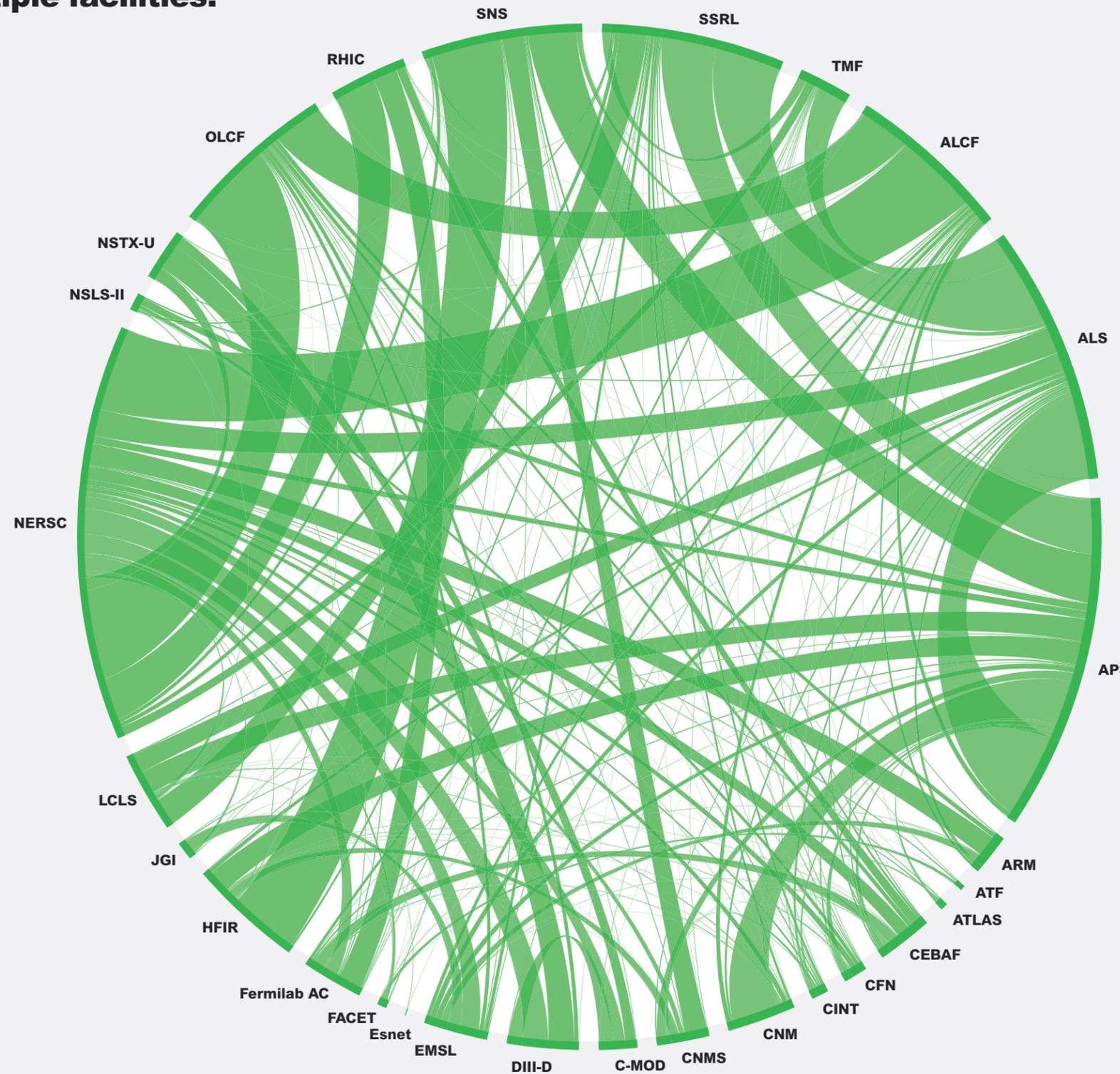
Number of users by institution type



Number of users by employment level



Each facility provides a unique scientific toolset. Users enhance their research by leveraging capabilities at multiple facilities.



User crossover among facilities

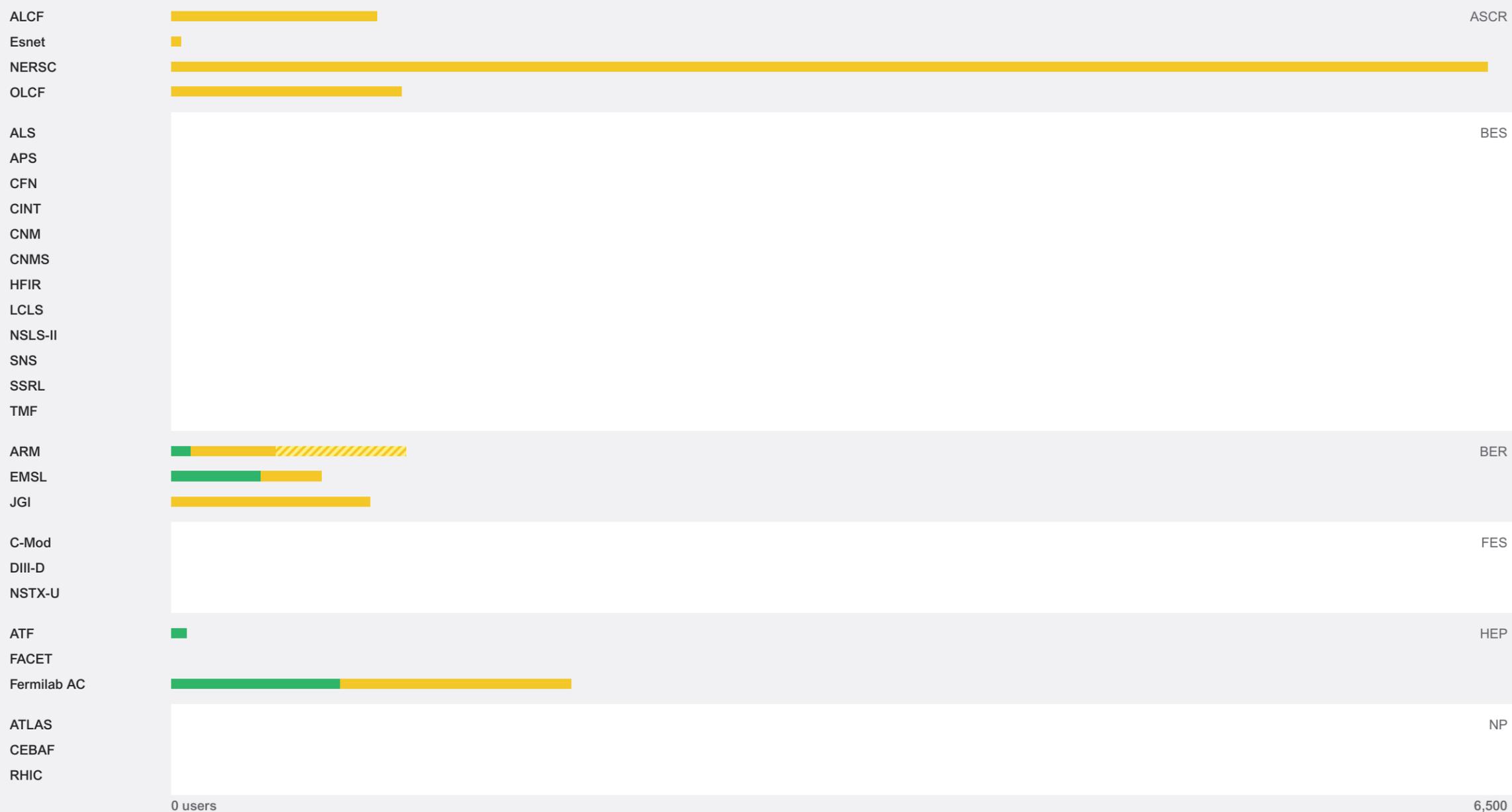
The width of the ribbon connecting two facilities corresponds to the number of users who utilized both of those facilities in FY 2015.

Quickfact

3,000+
users performed
research at two
or more facilities
in FY 2015

Users access a wide variety of research resources at the facilities. The majority of users come in person on site and many thousands more access resources and curated data remotely.

Users by facility



- **On-Site user**
physically present at the facility
- **Remote user**
remotely accesses the facility
- ▨ **Data user**
remotely accesses data from an electronic archive supported by the facility

Quickfact

52%
on-site users

46%
remote users

02%
data users

Many industrial and federal entities use Office of Science user facilities to advance their research and development goals.

Industrial institutions

297 U.S. For-Profit Institutions

155 U.S. Small Businesses

55 Global and U.S. Fortune 500

- | | | | | | |
|-------------------|-------------------|-------------------|--------------------|---------------------|---------------------|
| 3M | Caterpillar | Ford Motor | L-3 Communications | PPG Industries | Southern |
| ABB | Chevron | General Electric | Lockheed Martin | Procter & Gamble | Total |
| Abbvie | Cisco Systems | General Motors | Merck | Robert Bosch | Toyota Motor |
| Amgen | Colgate-Palmolive | Gilead Sciences | Micron Technology | SAIC | United Technologies |
| Apple | Corning | GlaxoSmithKline | Monsanto | Samsung Electronics | Western Digital |
| Applied Materials | Cummins | HP | NEC | Sanofi | |
| AstraZeneca | Dow Chemical | Honeywell Int. | Northrop Grumman | SABIC | |
| BASF | DuPont | IBM | Novartis | Schlumberger | |
| Boeing | Eli Lilly | Intel | Pfizer | Siemens | |
| BP | Exxon Mobil | Johnson & Johnson | POSCO | Sinopec Group | |

Federal support of user projects



Department of Energy
5,574 projects



National Science Foundation
1,783 projects



National Institutes of Health
1,182 projects



Department of Defense
371 projects



National Aeronautics and Space Administration
174 projects



Department of Agriculture
45 projects

Other federal sponsors

- Environmental Protection Agency
- Department of Transportation
- United States Geological Survey
- Department of Homeland Security
- Department of Education
- Department of State

- National Institute of Standards and Technology
- National Oceanic and Atmospheric Administration
- Centers for Disease Control and Prevention
- Nuclear Regulatory Commission

Quickfact

5,688
projects supported by
a non-DOE source

1,120
U.S. industrial users

For more information

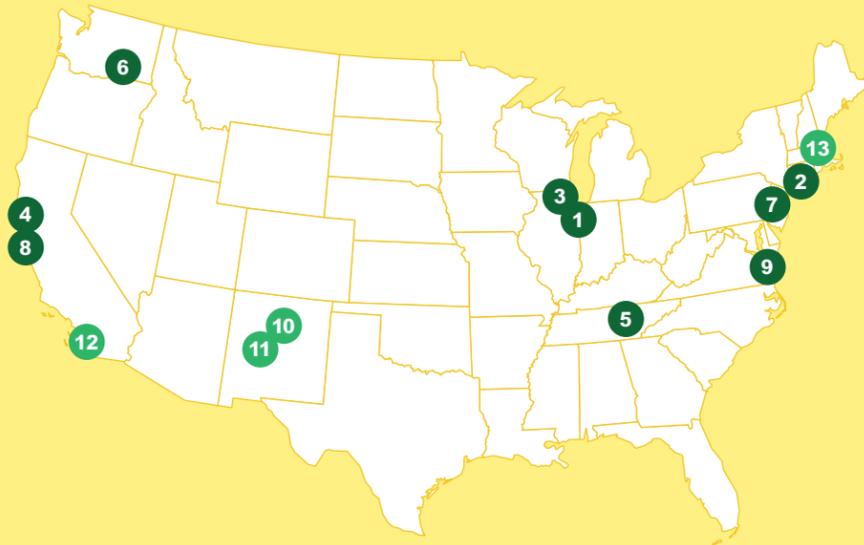
Download the report and view an interactive map of user projects at science.energy.gov/user-facilities

Credits

All the images on the user facility spread are courtesy of the host institution

Design: Sandbox Studio, Chicago

User facility locations

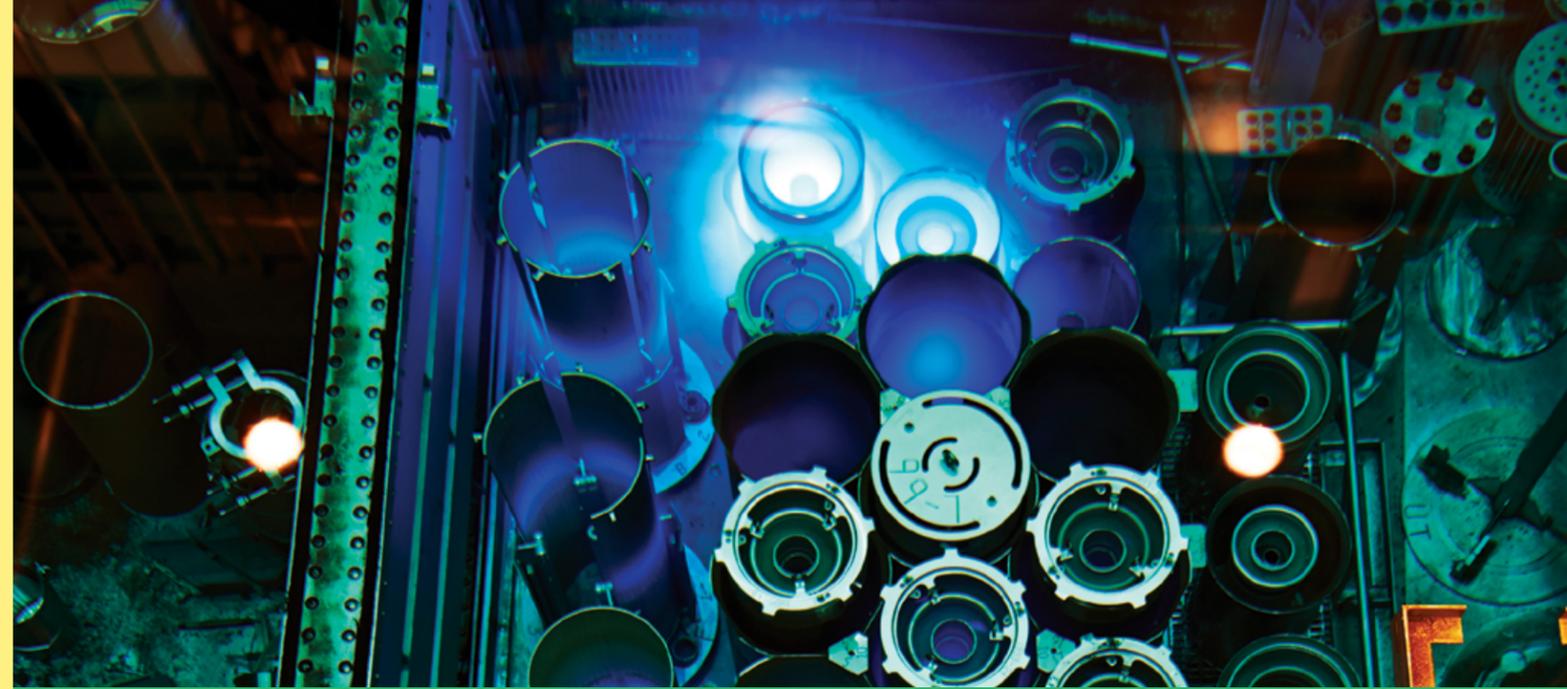


- Office of Science laboratories
- Other host institutions

- 1 Argonne National Laboratory
Argonne, Illinois
- 2 Brookhaven National Laboratory
Upton, New York
- 3 Fermi National Accelerator Laboratory
Batavia, Illinois
- 4 Lawrence Berkeley National Laboratory
Berkeley, California
- 5 Oak Ridge National Laboratory
Oak Ridge, Tennessee

- 6 Pacific Northwest National Laboratory
Richland, Washington
- 7 Princeton Plasma Physics Laboratory
Princeton, New Jersey
- 8 SLAC National Accelerator Laboratory
Menlo Park, California
- 9 Thomas Jefferson National Accelerator Facility
Newport News, Virginia
- 10 Los Alamos National Laboratory
Los Alamos, New Mexico

- 11 Sandia National Laboratories
Albuquerque, New Mexico
- 12 General Atomics
San Diego, California
- 13 Massachusetts Institute of Technology
Cambridge, Massachusetts
- Atmospheric Radiation Measurement
Climate Research Facility
global network (multiple sites)



Above

The Cherenkov radiation glow in the reactor pool of the High Flux Isotope Reactor from stored fuel elements.
Credit Enrico Sacchetti, Oak Ridge National Laboratory

Back cover top

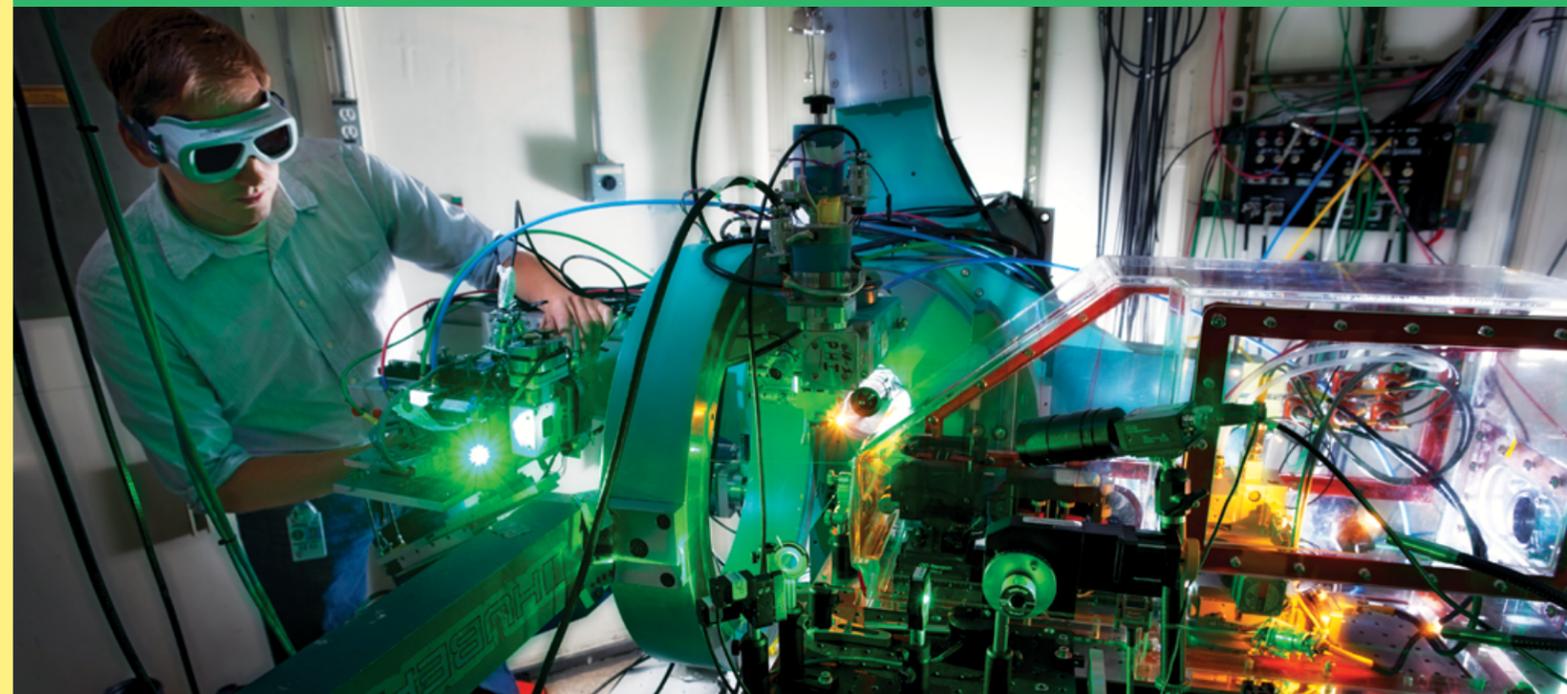
The Gammasphere at the Argonne Tandem Linac Accelerator System, the world's most powerful spectrometer for nuclear structure research.
Credit Argonne National Laboratory

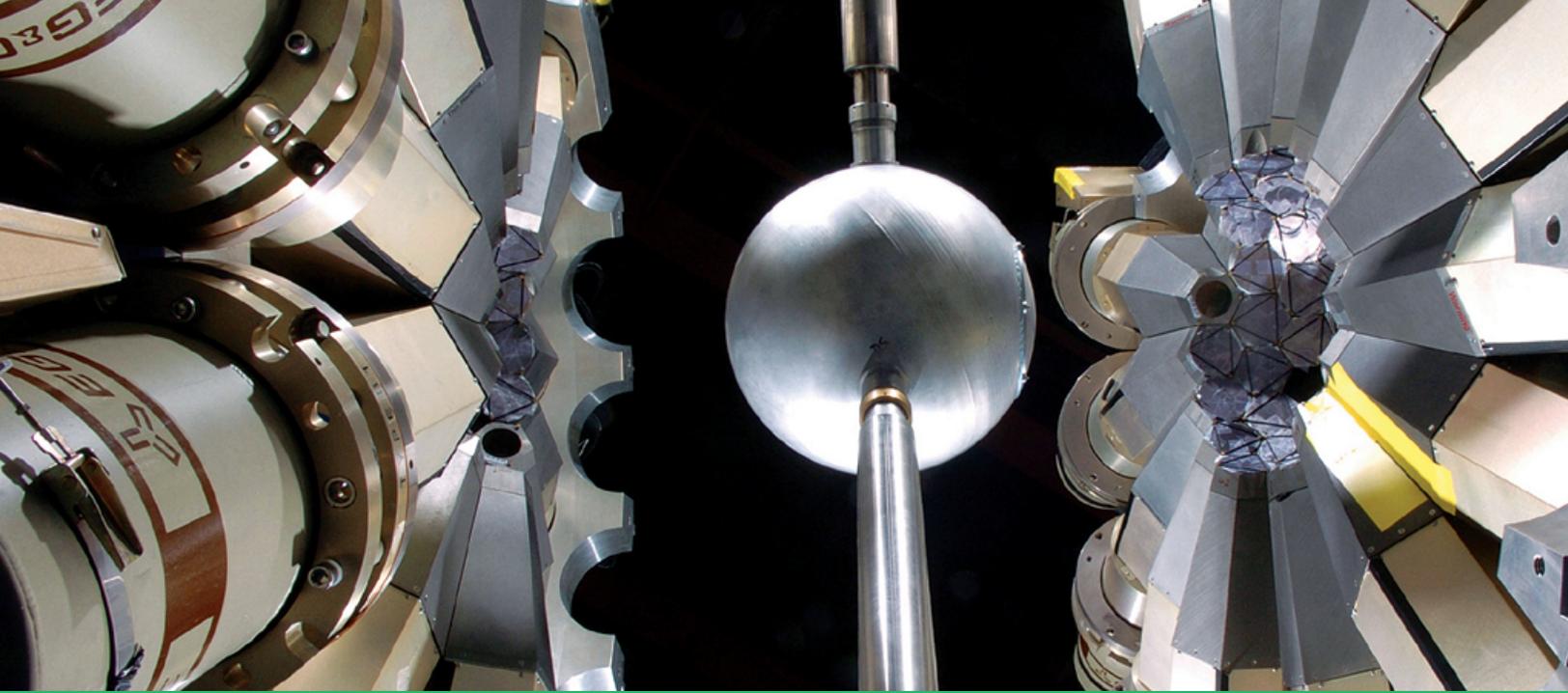
Below

A graduate student researcher at a beam line at the Stanford Synchrotron Radiation Lightsource.
Credit SLAC National Accelerator Laboratory

Back cover bottom

Simulation of the distribution of water vapor in the climate system produced at the Oak Ridge Leadership Computing Facility
Credit Oak Ridge National Laboratory





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Science

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