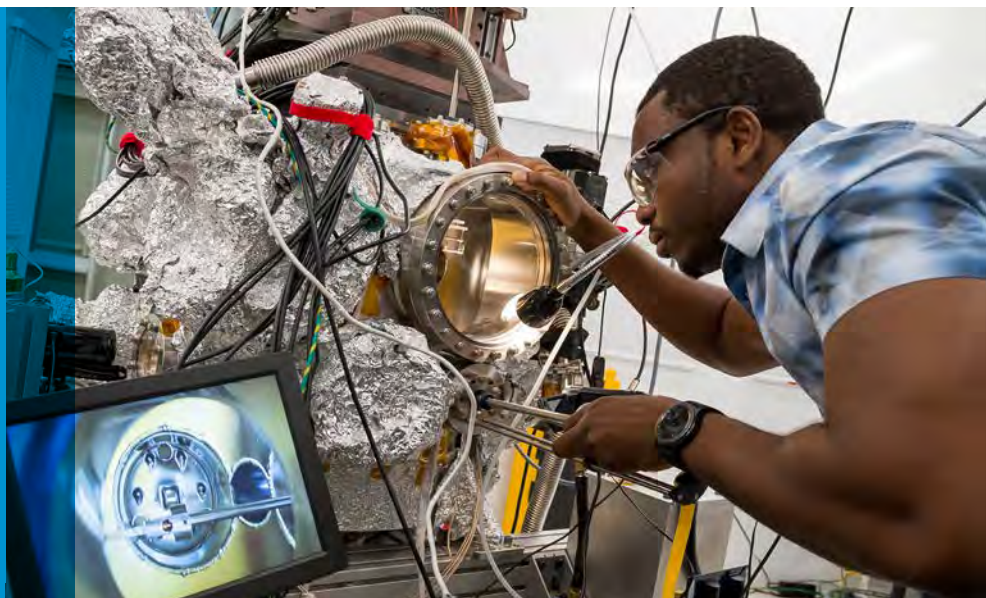


# USER FACILITIES AT ARGONNE

*Exceptional tools for tackling tough scientific problems*



- ❑ Advanced Photon Source
- ❑ Argonne Leadership Computing Facility
- ❑ Argonne Tandem Linac Accelerator System
- ❑ Atmospheric Radiation Measurement Facility—Southern Great Plains and Third ARM Mobile Facility
- ❑ Center for Nanoscale Materials
- ❑ Intermediate Voltage Electron Microscope

Argonne National Laboratory designs, builds, and operates a suite of national scientific user facilities. These facilities attract and serve researchers from industry, academia, and other government laboratories. These one-of-a-kind resources draw great minds from all over the country to solve complex scientific problems and enhance our nation's prosperity and security.



## ADVANCED PHOTON SOURCE

The Advanced Photon Source (APS) is one of the world's leading and most productive X-ray light source facilities, providing high-brightness beams to a diverse community of researchers who use them to investigate a wide range of materials and biological structures. Research at the APS is behind numerous scientific advances that improve our everyday lives, from new materials for stronger roads and

bridges to longer-lasting batteries for electric vehicles to new drugs. The extremely bright X-ray beams—more than one billion times brighter than those in a typical dentist's office—allow researchers to explore a vast array of different materials at close to the atomic scale, illuminating their molecular composition. Once complete, the APS Upgrade—currently underway—will cement the facility's position as a global leader among the next generation of storage-ring based X-ray light sources. With X-ray beams up to 500 times brighter than today's light source, researchers will see things at unprecedented scales, opening the door to new scientific frontiers and breakthroughs. Approximately 5,500 researchers use the APS in a typical year.



## ARGONNE LEADERSHIP COMPUTING FACILITY

The Argonne Leadership Computing Facility (ALCF) provides supercomputing resources and expertise to the research community to enable breakthroughs in science and engineering. The world-class simulations carried out at the ALCF go hand-in-hand with experiments, giving scientists the ability to understand physics and chemistry at scales from the subatomic to the galactic. Available to researchers from industry, academia and government agencies, ALCF computing resources accelerate discoveries in fields ranging from biology and materials science to physics and computer science.





The ALCF's Theta supercomputer supports large-scale computing projects aimed at solving some of the world's most complex scientific problems, from engine design to pharmaceutical development to cosmology. Aurora, the ALCF's next-generation supercomputer, will be one of the nation's first exascale systems when it comes online in 2023. More than 1,100 researchers use the ALCF every year.



### CENTER FOR NANOSCALE MATERIALS

The Center for Nanoscale Materials (CNM) provides expertise, instrumentation and infrastructure that enable interdisciplinary nanoscience and nanotechnology. By being able to design, characterize, and manipulate materials at the nanoscale, CNM offers researchers ways to create materials with never-before-seen properties. Discoveries at CNM are helping to solve critical problems in energy and the environment, from developing autonomous approaches to synthesis and processing of nanomaterials using AI and machine learning, to discovery of new quantum materials, to fabrication of exquisitely sensitive detectors used on the South Pole Telescope. CNM offers more than 150 tools and capabilities; from X-ray microscopy to cleanroom-based nanofabrication techniques. CNM hosts more than 700 users in a typical year.



### ARGONNE TANDEM LINAC ACCELERATOR SYSTEM

The Argonne Tandem Linac Accelerator System (ATLAS) is the U.S. Department of Energy's national user facility for nuclear physics at low energy. ATLAS is used for both basic nuclear physics and astrophysics research, and in R&D of nuclear physics applications in nuclear forensics, nuclear reactor safety, and medical isotope production. ATLAS produces unique neutron-rich beams for studies aimed at understanding the formation of heavy elements and in the development of nuclear safeguards. It is also used to study the effects of radiation on materials in next-generation nuclear reactors, and it is used to develop production methods for new medical isotopes for diagnostic and targeted therapy. ATLAS is used by approximately 350 researchers each year.



### ATMOSPHERIC RADIATION MEASUREMENT FACILITY

The Atmospheric Radiation Measurement Climate Research Facility (ARM) is a multi-platform scientific user facility with instruments at both fixed and mobile locations

around the world for continuously measuring the atmosphere to enrich our understanding the climate.

Argonne manages the Southern Great Plains (SGP) and third ARM mobile facility (AMF3). Scientists use data to gather information about cloud, aerosol, and atmospheric processes, which in turn leads to improvements in new climate models. The ARM-SGP observatory consists of embedded and remote-sensing instrument clusters spread out across approximately 9,000 square miles in north-central Oklahoma and south Kansas. Argonne also operates AMF3, which will soon move to the southeastern United States. ARM-SGP is used by approximately 400 researchers every year.



### INTERMEDIATE VOLTAGE ELECTRON MICROSCOPE

Argonne operates the Intermediate Voltage Electron Microscope (IVEM) facility to study how defects in materials form when they are irradiated, giving a view into the kinds of stresses experienced within nuclear reactors. The facility allows for the real-time study of defect formation and evolution, and can produce high-dose ion damage in hours as opposed to the years it takes in a nuclear reactor. Approximately 40 scientists use the IVEM each year.

Additional information about user facilities at Argonne National Laboratory is available at [www.anl.gov/user-facilities](http://www.anl.gov/user-facilities)