Argonne NATIONAL LABORATORY | Advanced Photon Source

Advanced Photon Source provides nation's most brilliant X-ray beams

The Advanced Photon Source (APS), a national synchrotron radiation research facility at the U.S. Department of Energy's (DOE's) Argonne National Laboratory in Illinois, provides the Western Hemisphere's brightest X-ray beams for science. Research by APS users extends from the center of the Earth to outer space, from new information on combustion engines and microcircuits to new drugs and nanotechnologies whose scale is measured in billionths of a meter. The APS, which is funded by DOE's Office of Basic Energy Sciences, enhances America's competitiveness in energy, pharmaceuticals, data storage, superconductors, semiconductors, polymers and catalysts — to name just a few — and promises to have far-reaching impact on our technology, economy, health, security and fundamental knowledge of the materials that make up the world.

The APS attracts researchers from nearly every U.S. state and many foreign countries for innovative experiments in materials science, chemistry, biological and life sciences, physics, and earth, planetary and environmental science. Each year, more than 3,000 individual scientists conduct research at the APS, many returning several times to bring the total visits per year to more than 10,000. Researchers using the APS have registered more biological protein structures than any other synchrotron X-ray facility in the world, including work that was instrumental in the 2009 Nobel Prize for Chemistry, and publish more than 1,000 scholarly articles each year in the open scientific literature.

In the coming years, the APS will open new research frontiers in such fields as imaging, bio-nanoscience, materials in extreme environments, interfacial science, microscopy and high-energy X-ray science.

The APS experiment hall — which is 2/3 of a mile in circumference and large enough to encircle a baseball stadium — houses a complex of machines and devices that produce, accelerate and store the beam of electrons that is the source of the intense APS X-ray beams, as well as the technical components that allow researchers to use those beams for cutting-edge research. Together, they make up a machine with a more complex technical system performing many more simultaneous tasks than a Boeing 777 jetliner.

Aerial view of the Advanced Photon Source.

Partnerships in science

The APS is a highly successful partnership between government, academia and industry. The Department of Energy funded construction of the APS facility and now provides its operating budget. UChicago Argonne, LLC operates the APS and Argonne for the DOE. Funding for construction of the X-ray technical components has been provided by the federal government, state governments, industry and universities.

Argonne National Laboratory is a U.S. Department of Energy national laboratory managed by UChicago Argonne, LLC