

THE ADVANCED PHOTON SOURCE UPGRADE PROJECT

Building the Next-Generation X-ray Light Source



The Advanced Photon Source (APS), which began operations in 1996, provides hard x-rays to more than 5,700 researchers each year from industry, universities, and federal and private research institutions.

The APS is a major driver of our nation's global scientific and technological competitiveness. Two Nobel Prizes have been awarded for research at the APS.

The APS Upgrade is a highly cost-effective revitalization of this facility, improving capabilities by orders of magnitude, maintaining our competitive advantage over other nations, and keeping the U.S. at the forefront of hard x-ray science for decades to come.

The Advanced Photon Source at Argonne National Laboratory is one of the most productive scientific facilities in the U.S.

The U.S. Department of Energy Office of Science's APS Upgrade Project at Argonne National Laboratory transforms today's APS into a high-energy, storage-ring-based, hard x-ray light source that equips scientists with a vastly more powerful tool for investigating and improving the physical and biological materials and chemical processes that impact nearly every aspect of our lives.

This new light x-ray source will make it possible to see changes at the molecular level that occur:

- before a steel girder starts to crack,
- before a healthy brain succumbs to Alzheimer's, or
- before an electric car's battery begins to fail.

By peering into this world, we will enable scientific discoveries to benefit human life and advance American technology and business.

The APS Upgrade will expand our ability to understand and manipulate matter at the nanoscale. With this versatile scientific tool, researchers will be able to observe individual atoms

moving and interacting – in real time – deep inside real samples, biological organisms, and complex engineered systems.

MAINTAINING U.S. LEADERSHIP FOR A NEW CENTURY

Next-generation x-ray light sources are being planned and constructed in other countries including China, Switzerland, France, Japan, Germany, Britain, Sweden, and Brazil. **The U.S. will cede leadership within the next 10 years without the APS Upgrade**, sacrificing a critical component necessary for American innovation, resulting in a major blow for American science and industry, particularly as this fantastic technology was essentially invented in the U.S.

A HISTORY OF TRANSFORMATIONAL DISCOVERY "MADE IN THE U.S.A."

In 1990, the United States invested \$500 million in building the Advanced Photon Source, which has been an immensely productive facility for users of synchrotron x-rays. This groundbreaking machine expanded researchers' concept of what was possible, by creating x-rays that are one billion times more powerful than the routine x-rays delivered at doctors' offices.

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