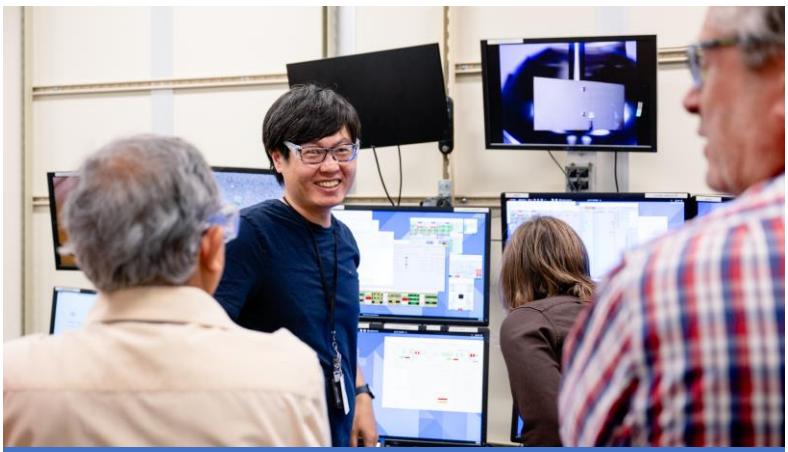
FIRST LIGHT AT THE UPGRADED ADVANCED PHOTON SOURCE

UPGRADED ADVANCED PHOTON SOURCE SEES FIRST X-RAY LIGHT FOR SCIENCE

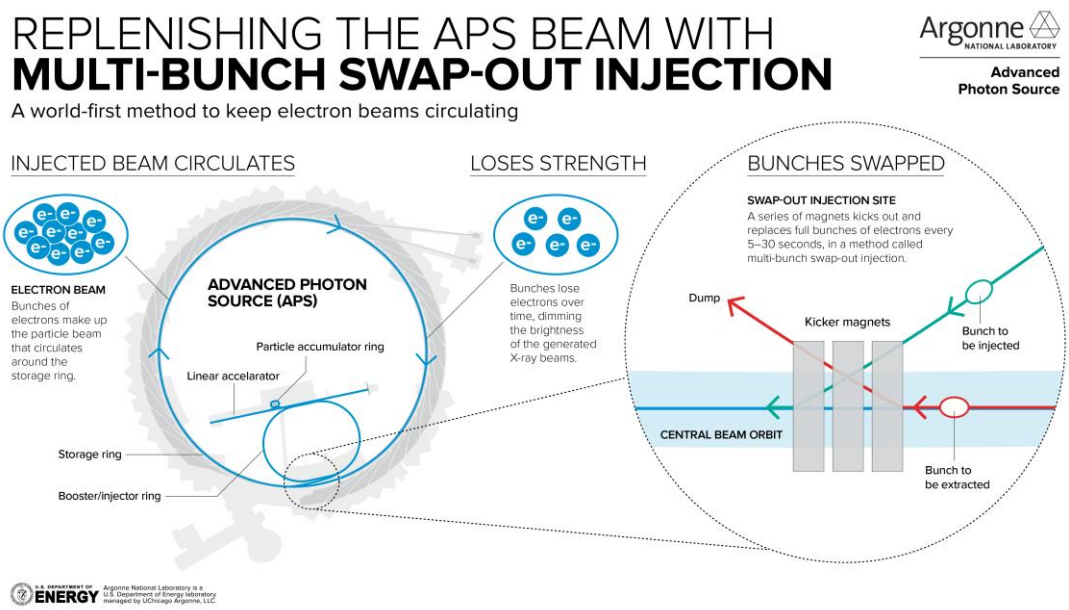
A new era of science at the Advanced Photon Source (APS) is ready to begin. On June 17, 2024, the facility at the U.S. Department of Energy's (DOE) Argonne National Laboratory delivered its first X-ray light beams to a scientific beamline as part of a comprehensive and complex upgrade project.

The APS, a DOE Office of Science user facility, has been a leading destination for X-ray science for nearly 30 years. Scientists from around the world use its ultrabright X-ray beams to learn more about our universe and lay the groundwork for more efficient batteries and solar cells and tougher materials for roads and bridges, to name a few. For the past year, operations have been paused at the facility while the original storage ring, was removed and a brand-new ring installed.

After more than a month of commissioning the new storage ring, the APS team has begun the process of bringing each of the experiment stations (called beamlines) around the ring into operation. The first scientific beamline to receive X-rays was 27-ID, home of the resonant inelastic X-ray scattering program at the APS. Scientists will be able to use 27-ID to study complex materials that may be used to power the devices of the future.



Argonne beamline scientist Jung Ho Kim smiles with his colleagues at beamline 27-ID after seeing the first monochromatic light at the beamline since the APS paused operations in April 2023.



The new storage ring is also pioneering the use of multi-bunch swap-out injection, a method of periodically replenishing electrons in the beam as it circulates. The APS is the first modern synchrotron X-ray light source in the world to make use of it.

Due to very strong non-linear focusing fields in the new APS, top-up injection is no longer possible. Instead, bunches of electrons are injected directly onto the nominal stored-beam trajectory, completely replacing the stored bunches.

This "swap-out" mode uses fast kicker magnets to extract and dump the stored bunch while bringing the injected beam from injectors and placing it in the stored bunch's place, all in a span of a few nanoseconds. The process will repeat every few dozens of seconds to keep the beam current constant.

Read more about the upgraded APS at aps.anl.gov

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The Advanced Photon Source is a U.S. DOE Office of Science User Facility operated for the DOE Office of Science by Argonne National Laboratory under Contract No. DE-AC02-06CH11357

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