

# National Synchrotron Light Source II

## Purpose

To provide extremely bright X-rays for basic and applied research in biology and medicine, materials and chemical sciences, earth and planetary sciences, and nanoscience and technology.

## Sponsor

U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences.

## Features

- State-of-the-art, medium-energy storage ring
- World-leading brightness from infrared light to hard X-rays
- 30 beamlines with unique, cutting-edge research tools
- Space to add another 29 beamlines, complementing and extending the existing suite
- Artificial intelligence and machine learning tools to enhance automation and experimental workflows

## User Community

- More than 2300 international researchers from universities, laboratories, and industry every year
- Annual user meeting with a range of workshops and networking opportunities

**The National Synchrotron Light Source II (NSLS-II) at Brookhaven National Laboratory is one of the most advanced synchrotron facilities in the world and a U.S. Department of Energy (DOE) Office of Science User Facility.**

As a state-of-the-art light source, NSLS-II opened its doors to users in 2015 and is enabling its growing user community to study materials with nanoscale resolution and exquisite sensitivity by providing cutting-edge capabilities for X-ray imaging and high-energy resolution analysis. Researchers from around the world come to NSLS-II to focus on the most important challenges at the nanoscale, including studies in condensed matter and materials physics, chemistry, and biology.

## Meeting Critical Challenges

Meeting the critical scientific challenges of our energy future requires advanced and unique capabilities. These are being provided by NSLS-II.

NSLS-II is a medium-energy electron storage ring (3 billion electron-volts) with a highly stable electron beam. It is designed to deliver world-leading intensity and brightness, enable studies of materials under real operating conditions (operando), and investigate complex problems using multiple techniques (multimodal experiments).

The facility also partners with Brookhaven's Center for Functional Nanomaterials—another DOE Office of Science User Facility—to integrate nanoscale synthesis and analysis tools with NSLS-II's capabilities, and to enable unprecedented exploration of the new materials that are expected to ensure energy security for the nation.



# Examples of Discovery-class Science

## Bio-inspired Materials

At NSLS-II, nanoscale imaging enables scientists to design large-scale structures from nanometer-sized building blocks, delivering advanced materials and devices that mimic nature's assembly methods simply, efficiently, and economically.

## Energy Security

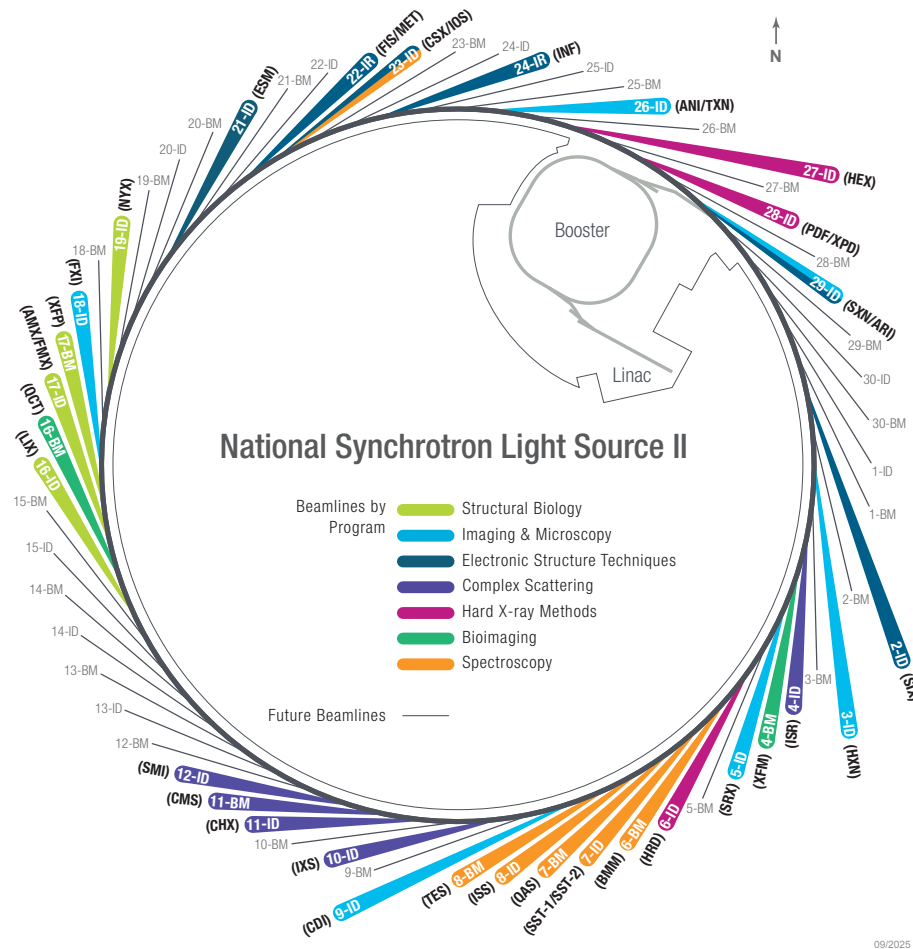
With cutting-edge X-ray imaging and electronic structure techniques, NSLS-II enables researchers to track nanoscale chemical changes in real time, driving the rapid development of next-generation, efficient, energy materials.

## Quantum Electronics

NSLS-II provides nanometer-scale resolution and atomic sensitivity that empower scientists to pioneer electronic materials beyond silicon and create smaller, faster, and more affordable devices with transformative impact.

## Biotechnology

At NSLS-II, researchers reveal the 3D structures of biological molecules in action, enabling the design of more effective therapeutics and breakthroughs in understanding complex diseases such as cancer.



## Tools for Discovery-class Science

- A hard X-ray microscope with world-leading nanometer spatial resolution
- High-throughput, robot-driven sample processing
- Coherent scattering with unprecedented spatial and temporal resolution
- Beamlines designed and built in partnership with on-site facilities, federal agencies, and industry

## Convenient Location

- 60 miles east of New York City
- Proximity to three major airports
- On-site housing for visiting researchers
- Close proximity to advanced partner research facilities such as the Center for Functional Nanomaterials



## Become a User

[www.bnl.gov/nsls2/userguide](http://www.bnl.gov/nsls2/userguide)

- Beam time at NSLS-II is available at no charge to researchers
- Granted through a peer-review proposal process
- Proprietary access available at a full cost-recovery rate

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