National Synchrotron Light Source

A Beacon for Research

Purpose:

To provide intense beams of infrared, ultraviolet, and x-ray light for basic and applied research in physics, chemistry, medicine, geophysics, environmental, and materials sciences

Sponsor:

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

Operating Costs:

$37 million per year

Features:

- Two synchrotron storage rings producing x-ray, ultraviolet, and infrared beams
- 65 experimental beamlines
- An array of sophisticated imaging techniques

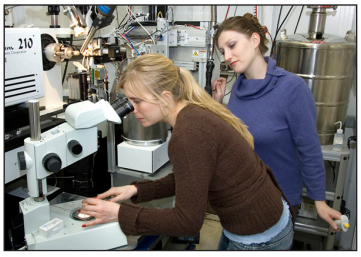
Users:

2,100 per year from more than 400 national and international universities, laboratories, and other research institutions

Complementary Facilities:

- Advanced Photon Source at DOE-Argonne National Laboratory
- Advanced Light Source at DOE-Lawrence Berkley National Laboratory
- Stanford Synchrotron Radiation Laboratory at DOE-Stanford Linear Accelerator Center

www.nsls.bnl.gov



Students prepare a biological crystal sample for study at an NSLS beamline

One of the world's most widely used scientific research facilities, the National Synchrotron Light Source (NSLS) is host each year to 2,100 researchers from more than 400 universities, laboratories, and companies. Research conducted at the NSLS has yielded advances in biology, physics, chemistry, geophysics, medicine, and materials science.

Brookhaven's National Synchrotron Light Source

Synchrotron light is produced by electrons when they are forced to move in a curved path at nearly the speed of light. At the NSLS, beams of light in the x-ray, ultraviolet, and infrared wavelengths are produced by two synchrotrons for use in experiments.

Powerful Light, Diverse Research

Since the intensity of synchrotron light can be 10,000 times greater than conventional beams generated in a laboratory, scientists can use these beams to gain information about the electronic and atomic structures of materials, analyze very small samples, or study surfaces at the atomic level.

Researchers at the NSLS use an array of sophisticated imaging techniques to get highly detailed "pictures" of a wide variety of materials, from biological molecules to semiconductor devices.

In conjunction with the Lab's Center for Functional Nanomaterials, the NSLS provides researchers with state-of-the-art capabilities to probe the unique properties of matter at an extremely small scale -- the nanoscale. Nanoparticles, particles with dimensions on the order of billionths of a meter, could have revolutionary impacts, from more efficient energy generation and data storage to improved methods for diagnosing and treating disease.

Experiments at the NSLS

Scientists have used the NSLS to study:

- the chemical origins of nerve impulses, the electrical activity that underlies all movement sensation, and perhaps even thought - work that led to the 2003 Nobel Prize in Chemistry.
- the crystal structure of new materials, such as high-temperature superconductors and "nanomaterials," that may lead to advanced electronic devices
- material dredged from the Port of New York/New Jersey, to determine the nature of pollutants in the sediment
- the chemical composition of bones, which may aid in the understanding of arthritis and osteoporosis
- electrolytes in lithium-ion batteries, with the aim of improving their performance
- techniques to make smaller, faster computer chips
- how the microstructure of magnetic recording media relates to the performance of the device
- how the size of gold nanoparticles affects their efficiency as a catalyst.

Upgraded Capabilities

In order to address the increasingly complex scientific challenges of tomorrow, plans to upgrade the NSLS are under way. The centerpiece of the proposed "NSLS-II" will be a state-of-the-art, medium-energy electron storage ring designed to deliver world-leading x-ray intensity and brightness, more than 10,000 times brighter than the current NSLS.

Scheduled for completion in 2015, NSLS-II is expected to lead to significant advances that will ultimately enhance national security and help drive the development of abundant, safe, and clean energy technologies.

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