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

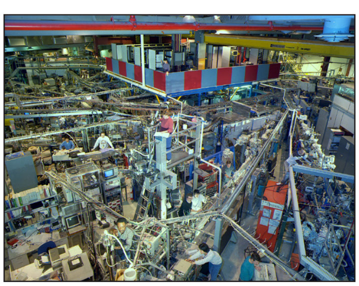
Operating Costs:
$36 million per year

Features:
- Two synchrotron storage rings that produce x-ray, ultraviolet, and infrared beams
- 80 experimental beamlines
- An array of sophisticated imaging techniques

Users:
About 2,400 per year from over 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



The experimental floor inside the NSLS

One of the world's most widely used scientific research facilities, the National Synchrotron Light Source (NSLS) is host each year to about 2,400 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.

Experiments at the NSLS

- studies of the crystal structure of new materials, such as high-temperature superconductors and "nanomaterials," that may lead to advanced electronic devices
- studies of material dredged from the Port of New York/New Jersey to determine the nature of pollutants in the sediment
- studies of the chemical composition of bones, which may aid in the understanding of arthritis and osteoporosis
- studies of electrolytes in lithium-ion batteries with the aim of improving their performance
- techniques to make smaller, faster computer chips

Studying Biological Structures

Each year, about 750 biologists use the state-of-the-art structural biology beam lines at the NSLS to determine the three-dimensional structure of biological molecules using a technique called protein crystallography. Discoveries include:

- understanding how the AIDS virus attacks a cell
- determining the structure of the large subunit of the ribosome, which makes proteins required for the structure and function of every living cell
- viewing how a virus that causes the common cold binds to human cells

Such discoveries can speed up the development of pharmaceuticals to resist disease.

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. This facility, which will also include full-energy injection for constant intensity as well as a dedicated infrared ring, is expected to have profound impact on a wide range of scientific disciplines and initiatives and lead to many exciting discoveries in the coming decades.

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