BROOKHAVEN NATIONAL LABORATORY

Laboratory Link

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What is the National Synchrotron Light Source?

Brookhaven National Laboratory is home to several large-scale research facilities that attract scientists from around the world. The National Synchrotron Light Source (NSLS), one of the world's most widely used scientific research facilities, annually hosts more than 2,500 users from more than 400 national and international universities, laboratories, and other research institutions. The NSLS is used for investigations in biology, physics, chemistry, geophysics, medicine, and materials science.

NSLS Experimental Floor

The NSLS operates two electron storage rings, an x-ray ring and an ultraviolet ring, which provide intense beams of light produced by electrons moving in a curved path at nearly the speed of light. The properties of this light and the specially designed experimental stations, called beam lines, allow scientists to perform experiments not possible with ordinary sources of light.

The Department of Energy provides funding for beam time for all users unless their research is proprietary. Most of the beam lines are operated by consortia of scientists from industry, universities, and government laboratories. These scientists can use up to 75 percent of the available beam time to further their own research; the remaining 25 percent is available for individual investigators.

Since synchrotron light can be 10,000 times more intense than conventional light, scientists can use these beams to gain information about the electronic and atomic structures of materials and study surfaces at the atomic level.

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Experiments at the NSLS

- **Computer Chips**

  The IBM Research Division has been studying micro-electronic computer chips and their component materials at the NSLS since its commissioning in 1982. Chips are tiny rectangular or square electronics plates that comprise the microprocessor and memory in computers and mobile phones. Each microprocessor chip contains many hundreds of thousands of electronic devices, mainly transistors. IBM researchers continue to look at ways to make these devices even smaller and faster.

- **Polymer Fibers**

  Fiber-spinning machines are designed to study new processing techniques for creating the strongest polymer fibers in the world. New fibers can add strength without additional weight to items such as seat belts and parachutes. Dow, DuPont, and Toyobo are conducting this research at the NSLS and the Advanced Photon Source at Argonne National Laboratory, another Department of Energy facility.

- **Medical Research**

  Albert Einstein Center for Synchrotron Biosciences is a shared resource facility at the Albert Einstein College of Medicine and the NSLS. Researchers at the Center are using infrared light produced at the NSLS to study molecular changes in bone composition. Their goal is to understand bone degradation in osteoporosis to further the development of effective therapeutic treatments.

  Investigators at Einstein have also deciphered the structures of proteins responsible for allergy, including rhinitis, conjunctivitis, and asthma. The structures of these proteins provide novel targets for the design of therapeutic agents blocking the allergic response. Einstein scientists are also collaborating on drugs to combat malaria, autoimmune disease, and graft rejection.

- **Turning Genomics Knowledge into Promising Drug Targets**

  The completion of the human genome sequencing project is only a starting point from which to ask questions about biological processes. While genes carry the blueprints for life, proteins perform the vital functions necessary for life to exist. Five New York research institutions recently joined together to study disease-related proteins with the aim of using the information gained to develop promising drugs and treatments. The member institutions of the consortium are Brookhaven National Laboratory, Mount Sinai School of Medicine, The Rockefeller University, Weill Medical College of Cornell University, and Albert Einstein College of Medicine. The NSLS will be key to this effort by helping scientists to understand the complex molecular structure of these important proteins.

Upcoming Events Open to the Public

Nnenna Ogwo, February 20, Noon, Berkner Hall. An encore performance of classical masterworks by a Nigerian-born star of the pianoforte. Free.

Swinging Moose, March 6, Noon, Berkner Hall. Traditional folk music on hammered dulcimer, guitar, pennywhistle, fiddle, flute, English horn, electric bass, and all kinds of percussion. Free

Zoe Browder, March 20, Noon, Berkner Hall. Zoe Browder is an advocate of contemporary music, and was our most popular pianist in 2000. She returns with an exciting solo program. Free

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