Purpose:

Provide U.S. scientists with facilities for the exploration of the fundamental properties of matter, energy, materials, and biological samples at the macro, micro, and nanoscales.

Sponsor:

The U.S. Department of Energy's Office of Science

Major user facility statistics:

The National Synchrotron Light Source hosts more than 2,200 users from 41 U.S. states and 30 other countries. **www.nsls.bnl.gov/**

The Center for Functional Nanomaterials hosts 140 users from 23 U.S. states and 7 other countries. **www.bnl.gov/cfn/**

The Relativistic Heavy Ion Collider hosts 1100 users from 24 U.S. states and 27 other countries. **www.bnl.gov/rhic/**

The ATLAS detector collaboration consists of 397 users from 24 U.S. states and 14 other countries. **www.bnl.gov/atlas/**

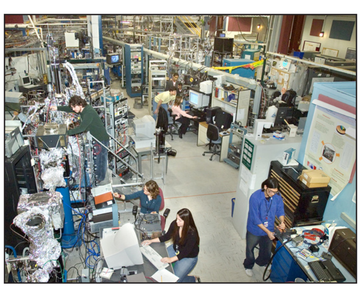
Other user facilities:

NASA Space Radiation Laboratory: 337 users. **www.bnl.gov/medical/NASA/NSRL_description.asp**

Tandem Van de Graaff: 125 users. **www.bnl.gov/bnlweb/facilities/TVdG.asp**

Accelerator Test Facility: 25 users. **www.bnl.gov/atf/**

Scanning Transmission Electron Microscope. **www.bnl.gov/bnlweb/facilities/STEM.asp**

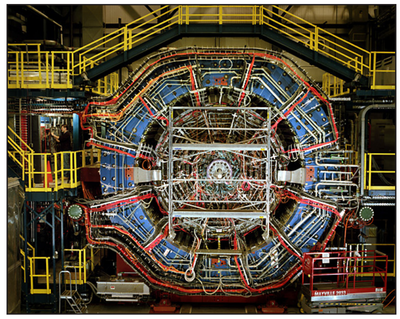


Users at a beamline on the floor of the National Synchrotron Light Source

National User Facilities at Brookhaven Lab

Unique equipment for exploring materials, matter, and medicine

Brookhaven National Laboratory is a multi-disciplinary research laboratory overseen and funded primarily by the Office of Science of the U.S. Department of Energy. Each year, more than 4,000 scientists from U.S. and foreign universities, industry, and other U.S. government laboratories use Brookhaven's unique facilites — machines available nowhere else in the world — to delve into the mysteries of physics, chemistry, materials, and biological processes.



The STAR detector at the Lab's Relativistic Heavy Ion Collider

National Synchrotron Light Source

Each year, thousands of scientists from the U.S. and abroad perform experiments using Brookhaven's high-intensity, focused beams of x-ray, ultraviolet, and infrared light generated at the National Synchrotron Light Source. Their research spans numerous scientific fields: from the structure of proteins, to the properties of new materials, to the fate of chemicals in our environment, resulting in well over 900 peer-reviewed scientific publications per year. This research has yielded advances in biology, physics, chemistry, geophysics, medicine, and materials science, including a possible explanation for superconductivity, new ways to use plants to clean up contamination, and a 2003 Nobel Prize for deciphering the structure of a protein essential to all nerve cell communication.

Center for Functional Nanomaterials

The Center for Functional Nanomaterials (CFN), a 94,500-square-foot facility for cutting-edge studies in nanoscience — studies on the scale of billionths of a meter — attracts researchers from around the world. The CFN's overarching research goal is to help solve the U.S.'s energy problems by exploring materials that use energy more efficiently as well as practical alternatives to fossil fuels, such as hydrogen-based energy sources and more affordable solar energy systems. Basic research on catalysts, biological and soft nanomaterials, and electronic nanomaterials will provide the know-how to design and build energy-efficient devices for manufacturing and transportation.

Relativistic Heavy Ion Collider

The Relativistic Heavy Ion Collider, RHIC (pronounced 'Rick'), is the world's only dedicated nuclear physics research facility. Since 2000, more than 1,000 scientists worldwide have been studying collisions of near-light-speed gold nuclei at this 2.4-mile-circumference particle accelerator to learn about conditions of the early universe. This research has offered deep insights into the fundamental forces and properties of matter, including a startling new view of the early universe as a "perfect" liquid. Further research to probe the properties of this new form of matter promises a better understanding of these fundamental forces and the matter making up the universe. Historically, every time something more fundamental has been learned about matter's structure, that knowledge has resulted in a benefit to humankind.

The ATLAS Detector

Brookhaven Lab is the host laboratory for the 42 U.S. institutions building one of the world's most ambitious scientific projects — a seven-story particle detector that will open up new frontiers in the pursuit of knowledge about elementary particles and their interactions. The detector, dubbed ATLAS, is one of four to be located at a powerful new accelerator, the Large Hadron Collider (LHC), now nearing completion at the European Center for Nuclear Research (CERN) near Geneva, Switzerland. ATLAS is designed to detect particles created by proton-proton collisions, and can also collide beams of heavy ions at 30 times RHIC's energy. The main goal is to find the source of mass. This may be a new particle called the Higgs boson or a completely new set of "supersymmetric" particles, which could be the source of dark matter in the universe. The LHC may also uncover extra dimensions in the universe.

(10/07)