LABORATORY FOR NUCLEAR SCIENCE

Research in the Laboratory for Nuclear Science (LNS) (http://web.mit.edu/lns) seeks to understand the structures and interactions of the fundamental constituents of matter. Nuclear physics experiments are performed with electrons at the Thomas Jefferson National Accelerator Facility and at the Mainz Microtron in Germany, and with neutrons at the Spallation Neutron Source at the Oak Ridge National Laboratory. The high-energy particle physics program involves experiments with both high-energy protons and heavy ions at the Large Hadron Collider at CERN in Switzerland, the search for antimatter and dark matter in space with the Alpha Magnetic Spectrometer on the International Space Station, an additional dark matter experiment, DarkLight, at the Jefferson Laboratory, and construction of a 1,000 liter Dark Matter Time Projection Chamber. Properties of neutrinos are being explored through experiments at Fermi National Accelerator Laboratory in Karlsruhe, Germany, at the South Pole, and with development of a new technique to measure neutrino mass through Cyclotron Radiation Emission Spectroscopy. Searches for extremely rare, neutrino-less nuclear decays are taking place underground in Gran Sasso, Italy. A theoretical program investigates the properties of high-energy plasmas.

LNS supports research interests of faculty in the Department of Physics by supporting and administering facilities for studies of nuclear and particle physics, including the Center for Theoretical Physics, the Bates Linear Accelerator Center, the Bates High Performance Research Computing Facility, and the MIT Central Machine Shop. Students participate in the entire range of research programs in fulfilling their graduate and undergraduate degree requirements or as participants in the Undergraduate Research Opportunities Program.

For further information, contact the director, Professor B. Wyslouch, Room 26-505, 617-253-2395.

The Center for Theoretical Physics is engaged in a broad range of fundamental research activities in theoretical nuclear and particle physics, including study of the fundamental constituents of matter and the theory that governs them, the structure and interactions of nuclei and hadrons, electroweak physics, lattice hadron physics, field theory, string theory and quantum gravity, many-body physics, mathematical physics, cosmology, and quantum computation.

For further information, contact the director, Professor E. Farhi, Room 6-300, 617-253-4871.

The William H. Bates Linear Accelerator Center is operated by LNS as a research and engineering center with particular emphasis on accelerator science and technology. Current efforts include the design, construction, and testing of new detector systems; the design, construction, and testing of a high-intensity polarized electron source for a future high-luminosity electron-ion collider; development and testing of an atomic beam source of polarized $^3$He for an experiment to search for the electric dipole moment of the neutron; and development of new accelerator-based techniques for screening cargo for dangerous materials.

For further information, contact the director, Professor R. Redwine, Room 26-453, 617-253-3600.