NATIONAL SCIENCE FOUNDATION

FY 2009 Budget Request to Congress

February 4, 2008

About the Cover:

In the spring of 2008, scientists and engineers will complete construction of the Large Hadron Collider, a 27-kilometer underground ring located at the European Centre for Nuclear Research (CERN) in Geneva, Switzerland. The LHC will be the premier facility for research in elementary particle physics and the world's most powerful high energy physics accelerator. Research at the LHC is expected to lead to a new understanding of science at the smallest scales ever investigated. Scientists predict that its very-high-energy proton collisions will yield extraordinary discoveries about the nature of the physical universe. The LHC experiments could reveal the origins of mass, shed light on dark matter, uncover hidden symmetries of the universe, and possibly find extra dimensions of space.

Because of its unprecedented size and complexity, the LHC project required a new paradigm of international collaboration, as it involves close to 10,000 scientists and engineers from more than 50 nations. The United States, with NSF and the Department of Energy support, is involved in the construction of two particle detectors, A Toroidal LHC Apparatus (ATLAS) and the Compact Muon Solenoid (CMS). Supported by NSF, researchers in over 40 U.S. universities are involved with the LHC project. The U.S. LHC collaborations are playing an important role in the development of the new so-called GRID-based cyber infrastructure being used by particle physics and other sciences requiring massive computational, networking, and storage resources. The GRID technology will enable the participation of U.S. faculty and students in the transformational discovery potential of the LHC.

Shown on the cover is the ATLAS Barrel Toroid Magnet, so enormous that a human is dwarfed at its center.

Image courtesy of CERN.