Division of Physics (PHY)

Mission

To support fundamental research across the intellectual frontiers of physics, to support research that has broader impacts on other fields of science and on the health, economic strength, and defense of society, to enhance education at all levels and share the excitement of science with the public through integration of education and research, and to steward the physics community so as to maintain the intellectual capital essential for future advances. Modes of support include single-investigator awards, group awards, centers and institutes, some interdisciplinary in nature, and several national user facilities, as well as research equipment/instrumentation development grants.

Physics research probes the properties of matter at its most fundamental level, the interactions between particles, and the organization of constituents and symmetry principles that lead to the rich structure and phenomena that we observe in the world around us. Physics seeks a deep understanding of processes that led to the formation of the cosmos, to the structure of matter at the very shortest distance scales where quantum effects dominate, and to the structure of atomic and molecular systems that shape and control the everyday world of chemistry and biological systems. Because of the breadth and scope of physics, it forms part of the core educational curriculum in most sciences and in engineering.

Workforce Development and Broadening Participation

The Physics Division strongly supports workforce development and broadening participation at all levels, from outreach efforts in large facilities and centers, to supporting efforts through groups such as the National Society of Black Physicists and National Society of Hispanic Physicists, to large scale projects such as QuarkNet, Center for High Energy Physics Research and Education Outreach (CHEPREO), Cosmic Ray Observatory Project (CROP), and Astrophysics Science Project Integrating Research and Education (ASPIRE), to individual Principal Investigator awards. Students involved in these projects gain skills and knowledge to become members of the nationally critical high-tech workforce.

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Credit: LIGO Laboratory.

Aerial view of the Laser Interferometer Gravitational-Wave Observatory (LIGO).

Credit: Photo by FIU student Jonathan Diaz.

Temperature and humidity sensors being installed on the endcap of the Compact Muon Solenoid (CMS) detectors' hadron calorimeter (HCAL). Florida International University (FIU) graduate student Luis Lebolo is shown at the above-ground staging area for the CMS experiment, connecting the sensors onto the detector.

PHY

Programs in Physics

Programs for Individual Investigators and Groups
Atomic, Molecular, Optical and Plasma Physics
Biological Physics
Elementary Particle Physics
Gravitational Physics
Nuclear Physics
Particle and Nuclear Astrophysics
Physics at the Information Frontier
Education and Interdisciplinary Research
Theoretical Physics (including Atomic, Molecular, and Optical Physics, Elementary Particle Physics, Nuclear Physics, Cosmology and Astrophysics, and Mathematical Physics)

Crosscutting PHY Programs
Physics Frontier Centers
National Facilities
- National Superconducting Cyclotron Laboratory (NSCL)
- Cornell Electron Storage Ring (CESR)
- Laser Interferometer Gravitational-Wave Observatory (LIGO)
- Large Hadron Collider (LHC), a joint NSF-DOE-CERN project
- IceCube Neutrino Observatory
- LArge Plasma Device (LAPD)

Research Experiences for Undergraduates (REU) and Teachers (RET)

A Guide to Programs / Browse Funding Opportunities is available at http://www.nsf.gov/funding/browse_all_funding.jsp.

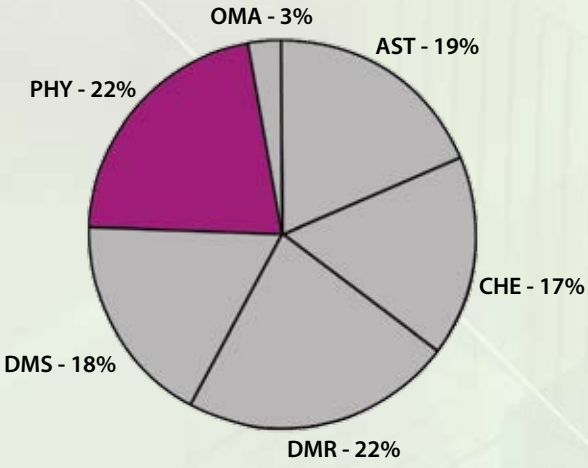
The Physics Frontier Centers
This program has been established to foster major advances at the intellectual frontiers of physics by providing needed resources, e.g., combinations of talents, skills, disciplines, and/or specialized infrastructure, not usually available to individual investigators or small groups. The program supports university-based centers and institutes where the collective efforts of a larger group of individuals can enable transformational advances in the most promising research areas. Activities supported through the program are in all sub-fields of physics within the purview of the Division of Physics. Interdisciplinary projects at the interface between these physics areas and other physics sub-fields and disciplines, e.g., biology, quantum information science, mathematical physics, condensed matter physics, and emerging areas of physics are also included.

Physics and the Global Community

The Physics Division participates in numerous international efforts, including large scale facilities such as LIGO, LHC and IceCube facilities, and large astrophysics detectors such as Borexino, Very Energetic Radiation Imaging Telescope Army System (VERITAS), the Pierre Auger Observatory, Milagro, and High Resolution Fly's Eye (HI-RES). In addition, the Physics Division also participates in the Open Science Grid (OSG), a distributed shared cyberinfrastructure which provides computing and storage resources for large NSF supported international projects and partners internationally with other grid projects such as Enabling Grids for E–sciencE (EGEE) in Europe and related efforts in South America and Asia.

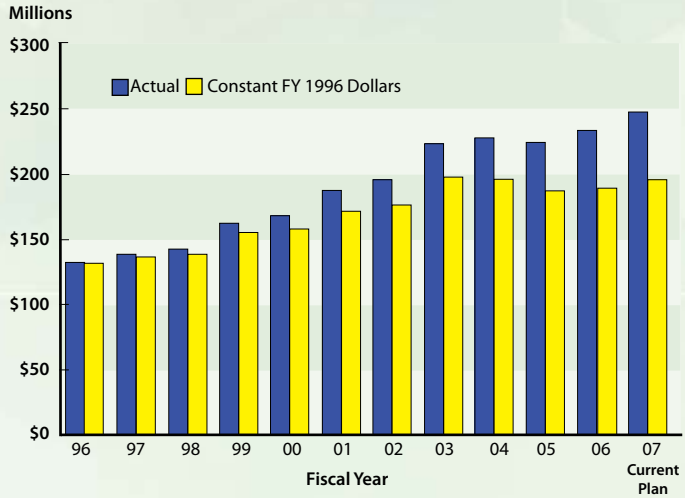
Division of Physics (PHY)

MPS Funding FY 2007 Current Plan



Pie chart showing divisional portions of MPS total budget for FY 2007. PHY will spend $249 million in FY 2007, which is 22% of the total MPS budget. *Totals may not add due to rounding.*

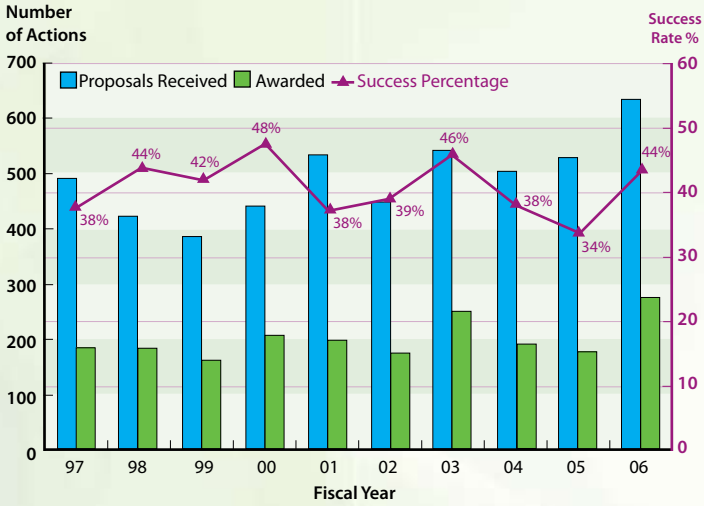
Budget in Actual and Constant FY 1996 Dollars



PHY annual budgets in actual and constant FY 1996 dollars. Constant dollars show the purchasing power of the PHY budget. Over this 12-year period, the constant dollar budget for PHY has increased 49%.

Data provided from FY 1998 to 2008 NSF Budget Requests to Congress, http://www.nsf.gov/about/budget/. Constant 1996 Dollar Deflator from Section 10 of the Gross Domestic Product and Implicit Outlay Deflators, Historical Tables of the U.S. Budget, FY 2005, http://www.whitehouse.gov/omb/budget/fy2008/pdf/hist.pdf.

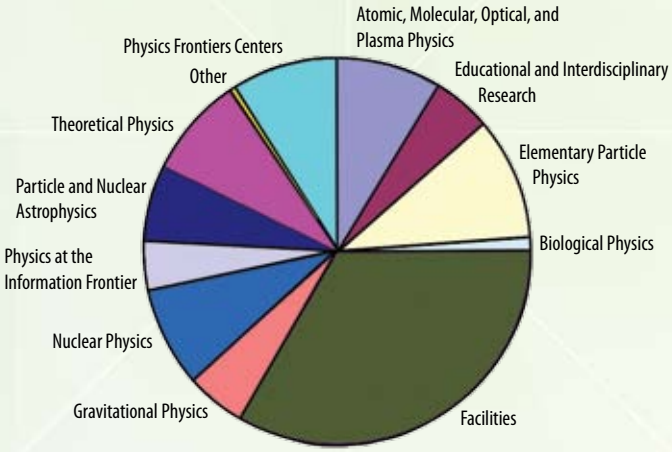
Success Rates and Number of Actions



Graph shows number of proposals submitted versus awarded for Research Grants as defined by NSF and resultant success rates. Success rate is defined as the number of new or renewal proposals awarded funding divided by the total number of proposals received. The number of proposals received by PHY in 2006 was 29% higher than in 1997.

Note: the distribution of success rates reflects the average for the Physics Division and may not represent success rates in individual programs.

Physics FY 2006 Funding



Pie chart showing breakdown of the FY 2006 PHY budget by program.