

**OFFICE OF INTERNATIONAL SCIENCE
AND ENGINEERING**

**\$49,000,000
+\$4,970,000 / 11.3%**

Office of International Science and Engineering Funding

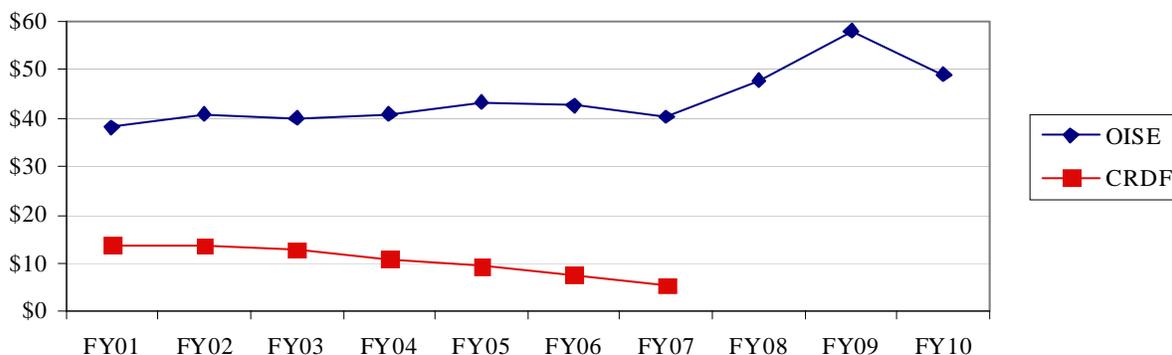
(Dollars in Millions)

	FY 2008 Actual ¹	FY 2009 Current Plan	FY 2009 ARRA Estimate	FY 2010 Request	Change Over FY 2009 Plan Amount	Percent
Total, OISE	\$47.77	\$44.03	\$14.00	\$49.00	\$4.97	11.3%
Major Components:						
Research and Education Grants	47.29	42.13	14.00	47.04	4.91	11.7%

¹ FY 2008 Actual includes \$5.46 million in funds provided by the U.S. Department of State for an award to the US Civilian Research and Development Foundation that was a carryover from FY 2007 and obligated in FY 2008.

The Office of International Science and Engineering (OISE) serves as the focal point, both inside and outside of NSF, for international science and engineering activities. OISE promotes the development of an integrated, Foundation-wide international strategy and manages international programs that are innovative, catalytic, and responsive to a broad range of NSF and national interests. Recognizing that scientific discovery is a global enterprise, OISE supports U.S. scientists and engineers engaged in international research and education activities in all NSF supported disciplines involving any region of the world.

OISE Funding
(Dollars in Millions)



The bottom line shows additional funds provided by the U.S. Department of State for an award to the U.S. Civilian Research and Development Foundation (CRDF) in FY 2001 (\$13.75 million), FY 2002 (\$13.66 million), FY 2003 (\$12.83 million), FY 2004 (\$10.99 million), FY 2005 (\$9.42 million), FY 2006 (\$7.73 million), and FY 2007 (\$5.46 million). The FY 2007 transfer from the Department of State was carried forward to and obligated in FY 2008. Beginning in FY 2009, NSF no longer receives a funding transfer from the U.S Department of State for a CRDF award.

OISE in Context

Science and engineering are international enterprises critical to addressing societal challenges, competitiveness, and security. Bold exploration at the frontiers of science and engineering increasingly requires international partnerships. NSF — as the Nation’s principal source of support to U.S.

universities for fundamental science and engineering research and education — plays a unique role in leading the worldwide efforts of the U.S. science, engineering, and education communities.

OISE programs and activities are designed to complement and enhance the Foundation's broad research and education portfolio and to overcome barriers involved in international collaboration. America's next generation of scientists and engineers must be able to work effectively in the global arena and marketplace. OISE supports programs that enable students and researchers to experience and engage in international research and educational activities across such areas as cyberinfrastructure, complex biological systems, natural hazards prediction and mitigation, nanotechnology, water resources, climate change, and energy sustainability. The Office carries out its functions by working closely with the other NSF directorates and offices as well as through its own programs. In addition, OISE manages NSF's offices in Beijing, Paris, and Tokyo that report on and analyze in-country and regional science and technology developments and policies, promote greater collaboration between U.S. and foreign researchers, liaise with foreign counterpart agencies and research institutes, and facilitate coordination and implementation of NSF research and education programs.

The future of international science and engineering research and education clearly includes the ability to communicate, interact, and share facilities across great distances without physically traveling to the remote site. To promote new directions in international scientific engagement, OISE is raising its support of Cyber-enabled Discovery and Innovation (CDI) by ten percent to \$550,000.

OISE will increase the size and duration of its awards in order ensure that OISE programs provide sufficient support for catalytic, innovative, and transformative research collaborations that will prove meritorious enough to be mainstreamed into NSF's disciplinary programs. The purpose is to increase the level of international activity in NSF as a whole.

OISE will continue to expand networks between U.S. researchers and those in developing countries. Under a Memorandum of Understanding between NSF and the U.S. Agency for International Development (USAID), OISE will use up to \$5.0 million of its \$14.0 million FY 2010 investment in new Partnerships for International Research and Education (PIRE) projects in a coordinated effort to support collaborative research activities. The PIRE program seeks to catalyze a higher level of international engagement in the U.S. science and engineering community by supporting innovative, international research and education collaborations. Under this arrangement, a comparable contribution by USAID will support research and infrastructure costs in developing countries where the research being funded can have a positive effect on development. Similar arrangements will be pursued with other U.S. government agencies and non-profit organizations that have interests that could be furthered by cooperative research activities.

OISE will continue to provide approximately \$8.50 million per year in support of U.S. participation in international organizations such as the Civilian Research and Development Foundation, the Global Science Forum, the Human Frontier Science Program, the International Institute of Applied Systems Analysis, and the International Council of Science.

Office-wide Changes and Priorities

Partnerships for International Research and Education (+\$4.0 million, to a total of \$24.0 million).

Partnerships for International Research and Education (PIRE) has become an NSF flagship program for enabling U.S. scientists and engineers to establish collaborative relationships with international colleagues in order to advance new knowledge and discoveries at the frontiers of science and to

promote the development of a diverse, globally engaged U.S. STEM workforce. Competitions are currently held every other year and proposals submitted in FY 2009 will receive their initial funding in FY 2010. OISE plans to contribute \$46.0 million over five years to fund five to 20 new PIRE awards. Of the \$24.0 million in FY 2010 funding, \$14.0 million will go to new PIRE awards. In addition to OISE funds, co-funding will be sought from other NSF offices and directorates. Outyear commitments for PIRE awards made in FY 2007 will amount to approximately \$10.0 million in FY 2010.

Cyber-enabled Discovery and Innovation (+\$50,000, to a total of \$550,000).

The international dimensions of Cyber-Enabled Discovery and Innovation (CDI) include connecting U.S. CDI scientists and their students with international researchers, expanding research cooperation internationally, and linking the resources of international institutes to U.S. research groups in pursuit of the three CDI themes (“From Data to Knowledge,” “Understanding Complexity in Systems,” and “Building Virtual Organizations”). OISE’s objectives are to promote international CDI research and education collaboration and to encourage intellectual partnerships involving investigators from academia, industry, and research organizations around the globe. As a result, OISE is raising its support of CDI by ten percent to \$550,000 in FY 2010.

Program Evaluation and Performance Improvement

The Performance Information chapter describes the Foundation’s performance evaluation framework, which is built upon the four strategic outcome goals in NSF’s Strategic Plan: *Discovery, Learning, Research Infrastructure, and Stewardship*. Performance evaluation is conducted at all levels within the Foundation, using both qualitative and quantitative measures – including an agency-wide annual review of research and education outcomes by an external expert committee and periodic reviews of programs and portfolios of programs by external Committees of Visitors and directorate Advisory Committees. Other performance indicators, such as funding rates, award size and duration, and numbers of people supported on research and education grants, are also factored into the performance assessment process.

OISE is working with the Division of Acquisition and Cooperative Support to contract with a firm that will evaluate the International Research Fellowship Program (IRFP) and the East Asia Pacific Summer Institutes (EAPSI) Program. These evaluations will focus on four tasks: 1) a study of the IRFP and EAPSI fellows’ experiences in applying for and participating in the programs; 2) a comparative data analysis of professional outcomes (educational and occupational) for EAPSI and IRFP awardees and other applicants; 3) an analysis of the impact IRFP and EASPI have on U.S. academic institutions and on the foreign institutions that host IRFP and EAPSI fellows; and 4) the bringing together of an advisory group to ensure the quality of the evaluation process.

Number of People Involved in OISE Activities

	FY 2008	FY 2009	FY 2009	FY 2010
	Estimate	Estimate	ARRA	Estimate
			Estimate	
Senior Researchers	1,152	1,224	252	1,404
Other Professionals	29	31	6	35
Postdoctorates	559	594	172	681
Graduate Students	1,920	2,040	420	2,340
Undergraduate Students	1,302	1,383	285	1,587
Total Number of People	4,962	5,272	1,135	6,047

OISE Funding Profile

	FY 2008	FY 2009	FY 2010
	Estimate	Estimate	Estimate
Statistics for Competitive Awards:			
Number of Proposals	911	843	936
Number of New Awards	358	349	247
Regular Appropriation	358	264	247
ARRA	-	85	-
Funding Rate	39%	41%	26%
Statistics for Research Grants:			
Number of Research Grant Proposals	475	500	457
Number of Research Grants	54	50	73
Regular Appropriation	54	40	73
ARRA	-	10	-
Funding Rate	11%	10%	16%
Median Annualized Award Size	29,664	40,000	50,000
Average Annualized Award Size	28,576	40,139	145,802
Average Award Duration, in years	2.0	2.0	2.2

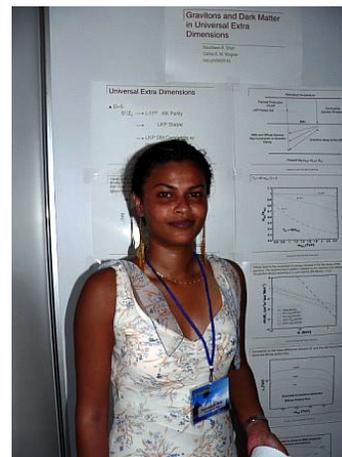
Recent Research Highlights

- **Looking beyond the Standard Model:** In the fall of 2006, 40 young physicists, half from the U.S.



Postdoctoral researcher Emerson Luna from the Institute of Physics, State University of Sao Paulo, Brazil, describing his poster "Large Rapidity Gaps in pp and ppbar collisions at the Large Hadron Collider" to Tatiana Rodriguez, a graduate student in experimental high energy physics at the University of Pennsylvania working on the CDF experiment at Fermilab. *Credit: Photo provided by Dr. Marleigh Sheaff.*

and half from Latin America, attended a series of lecture courses and seminars in the fields of cosmology, astroparticles and particle physics in Puerto Vallarta, Mexico, through a program supported by NSF and the Department of Energy. The topic selected was particularly timely in light of strong evidence gathered over the last decade which clearly shows that the standard model of particle physics is not complete despite its great success in explaining the results of experiments to date. This is an exciting time in particle physics, since many of these theoretical ideas make predictions that can be



Graduate student Nausheen Shaw in front of poster entitled "Gravitons and Dark Matter in Universal Extra Dimensions," presented at poster session. *Credit: Permission granted by Dr. Marleigh Sheaff.*

tested in experiments soon to come online at the Large Hadron Collider, the world's largest particle accelerator complex under the Franco-Swiss border near Geneva, Switzerland. The program's multidisciplinary approach was taken to make the students aware of the close connections between these three fields and to broaden their scientific perspective beyond the narrowly focused experience that is typical for physicists in these early stages of their careers.

► **In Search of the North American Monsoon:** A group of undergraduate and graduate students in the



U.S. and Mexican students at a high-accuracy precipitation gauge site within a high elevation oak savanna ecosystem in northern Sonora, Mexico. The three students (Luis Méndez-Barroso, Tonantzin Tarín, and Lorena Liuzzo) were dynamically calibrating the siphoning, tipping bucket rain gauge (while overlooking the mountainous landscape).
Credit: Photo provided by Dr. Enrique Vivoni.

Department of Earth and Environmental Science of New Mexico State University spent nearly three weeks in Sonora, Mexico, as part of a large international field campaign to study the North American Monsoon. The monsoon is a regional atmospheric phenomenon that controls hydrological and ecological conditions during the summer season in the southwestern U.S. and northwestern Mexico. Given its regional extent, ecohydrological studies of the North American Monsoon require coordinated research efforts between U.S. and Mexican scientists. All together, 21 students and researchers from the U.S. and Mexico participated this year in the Sonora Field Campaign, engaging in scientific and cultural exchanges. The students helped plan, organize, and carry out a series of ecohydrological experiments in a remote, mountainous region in northern Sonora. Predicting the North American Monsoon should prove very useful to communities affected by its weather patterns.

► **Graduate Student Tracks Avian Flu:** A graduate student from the University of Maryland organized a research team to outfit 30 bar-headed geese with GPS satellite transmitters in partnership with scientists at the newly opened Chinese Academy of Sciences' Qinghai Lake Reserve Joint Research Center. The research uses satellite telemetry to determine the timing, pathways, stopover locations and habitat use of bar-headed geese originating from the Qinghai Lake breeding grounds. Qinghai Lake was the site of a large outbreak of H5N1 avian influenza in 2005, where more than 6,000 birds died. The data expected from this study will be essential in tracking wild birds' interaction with domesticated poultry populations and thereby predicting the potential spread of avian influenza transmission in Asia. The research will provide important information with which to address the ecology and evolution of the H5N1 virus in relation to wild birds and domestic poultry in China, a global health concern.

► **Visualizing the African Superplume:** Through the Partnership for International Research and Education program, a partnership between Pennsylvania State University, several other U.S. universities, and collaborators in universities and geological surveys in southern and eastern Africa are studying the African Superplume, a structure under Africa where a huge mass of the hot and chemically distinct rock extends from the edge of the core farther up into the Earth's mantle than in any other place on Earth. AfricaArray has worked with dozens of countries across southern and eastern Africa to establish a network of seismic recording stations. These stations have generated a very rich new dataset that has allowed the U.S. and African geologists to detect an anomalous rock layer in the midmantle (650-680 kilometers deep) across eastern Africa. This indicates that the African Superplume extends from the lower mantle into the upper mantle and that it extends through the Earth's mantle, but not vertically. The structure initiates below southern Africa and then migrates to the northeast as it rises through the mantle, coming to the surface beneath eastern Africa.



Candra Gross, an undergraduate student from Fort Valley State University, helps to install a seismic station in Mpigi, Uganda, June 2007. *Credit: Andrew Nyblade.*

► **First U.S.-India Advanced Studies Institute in Nanoscale Science and Engineering:** The first U.S.-India Advanced Studies Institute in Nanoscale Science and Engineering in Chennai, India, enabled advanced graduate students and world-class researchers from both countries to meet about fundamental topics and cutting-edge developments in nanoscale science and engineering disciplines. The panel discussions ranged across physics, chemistry, materials engineering, chemical engineering, and economics. They included policy perspectives from academia, government and industry representatives.



Participants at the First U.S.-India Nanoscale Advanced Studies Institute. *Credit: Photos provided by G. Ramanath, RPI.*



Inauguration Ceremony for Nanoscale Advanced Studies Institute. *Credit: Photos provided by G. Ramanath, RPI.*

Senior researchers delivered state-of-the-art lectures covering scientific, technological, educational and societal aspects of nanoscience and engineering. According to first reports, the institute stimulated student interest in nanoscale science and engineering and strengthened connections between U.S. and Indian scientific communities. The 27 U.S. participants included advanced graduate students, postdoctoral researchers, early-CAREER faculty and industry researchers. Holding this Advanced Studies Institute in Chennai was a first for India.

It was co-funded by NSF and India's Department of Science and Technology.