UNITED STATES

National Science Foundation

FY 2015 Performance and Financial Highlights

Who We Are and What We Do

- The mission of the National Science Foundation (NSF) is to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes.
- NSF's vision is of a Nation that capitalizes on new concepts in science and engineering and provides global leadership in research and education.
- NSF is vital because we invest in basic research and people who make the discoveries that transform our future. This investment is a primary driver of the U.S. economy, enhances our Nation's security, and gives this country the competitive edge to remain a global leader.
- NSF seeks high-risk, potentially transformative projects that will generate pioneering discoveries and advance exciting new frontiers in science.
- NSF funds advanced instrumentation and facilities that enable state-of-the-art research, Arctic and Antarctic research and operations, cooperative research between universities and industry, and U.S. participation in international scientific efforts.

NSF by the Numbers	
$7.3 billion	FY 2015 appropriations (does not include mandatory accounts)
1,859	Colleges, universities, and other institutions receiving NSF funding in FY 2015
49,600	Proposals evaluated in FY 2015 through a competitive merit review process
12,000	Competitive awards funded in FY 2015
231,000	Proposal reviews conducted in FY 2015
350,000	Estimated number of people NSF supported directly in FY 2015 (researchers, postdoctoral fellows, trainees, teachers, and students)
51,800	Students supported by NSF Graduate Research Fellowships since 1952

From the Director

Credit: Sandy Schaeffer/NSF

I am pleased to present the third of the three reports that NSF prepares each year to demonstrate accountability to our stakeholders and the American people. NSF's investments in basic research have enabled breakthrough discoveries and transformative technologies that address key national and scientific priorities. NSF's investments combine research and educational resources to support the development of a world-class scientific workforce which has made profound contributions to the global science and engineering enterprise. The scientific discoveries made possible by NSF support today become the foundation of our shared future—driving our Nation's economy and enhancing its security while inspiring the next generation of Americans to push the frontiers of science to unprecedented heights.

In FY 2015, NSF's support fostered discoveries across a broad spectrum of scientific disciplines. An NSF-funded research team with CERN's Large Hadron Collider discovered a class of particles known as pentaquarks. Physicists have long speculated about the existence of pentaquarks, and their discovery could reshape our understanding of the basic properties of matter. In Antarctica, an NSF-funded drilling team gathered sediment samples from hundreds of meters below the surface of the ice, and these samples will provide clues about ice-sheet mechanics and their potential effects on increases in sea levels. Another team of NSF-funded researchers sequenced the first octopus genome, enabling new studies on brain function and development. NSF-funded researchers also advanced 3-D printing technology, developed next-generation robots that learn from human behavior, detected high-energy neutrinos that likely originated far away in our galaxy or beyond, and continued to shed light on critical ecological challenges such as the global decline of honeybees and other pollinators.

Financial accountability and effective business processes underpin NSF's programmatic activities and are critical to the achievement of the agency's mission. This report includes a summary of information on NSF's performance for the last year. As is noted, in FY 2015, NSF fully achieved 4 of 10 performance goals and made considerable progress on the other 6. All performance data have been independently verified and validated using guidelines for completeness and reliability from the Government Accountability Office. NSF's *Annual Performance Report* contains a discussion of NSF's data validation, including any limitations, and progress toward its annual performance goals.

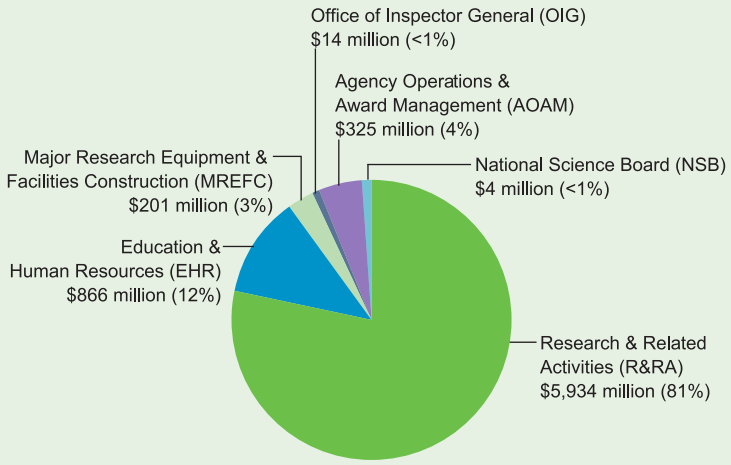
To learn more about NSF and the exciting results from our investments in science and engineering research and education I refer you to NSF's *FY 2015 Agency Financial Report* and NSF's website at *www.nsf.gov*.

France A. Córdova
February 16, 2016

Following the Money

Where It Comes From

FY 2015 Appropriations by Account—$7,344 million

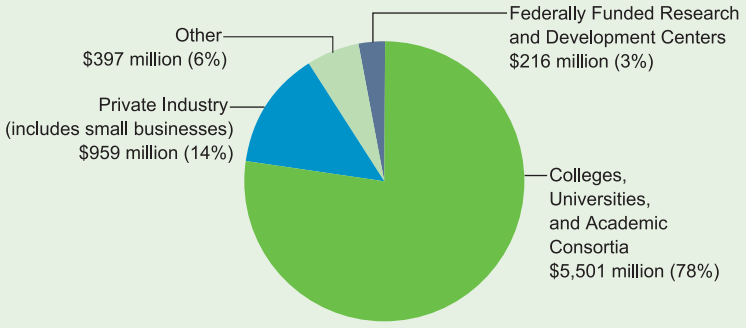


Note: Totals may not add due to rounding.

Where It Goes

Institutions Funded by NSF

FY 2015 Obligations for Research and Education Programs—$7,073 million

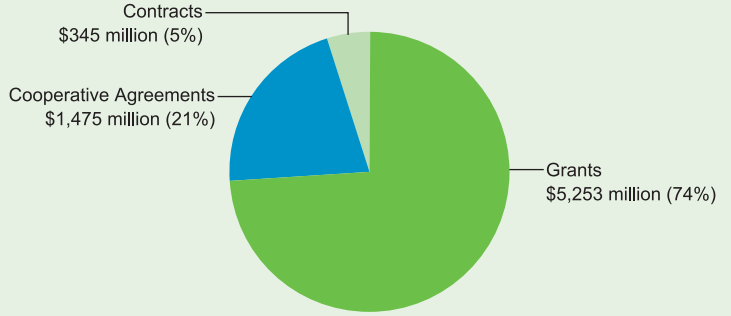


Notes: NSF Research and Education Programs include Research and Related Activities, Education and Human Resources, and Major Research Equipment and Facilities Construction appropriations. Other institutions funded include federal, state, and local governments; nonprofit organizations; and international organizations. Totals may not add due to rounding.

How It Gets There

NSF Award Mechanisms

FY 2015 Obligations for Research and Education Programs—$7,073 million



Notes: NSF Research and Education Programs include Research and Related Activities, Education and Human Resources, and Major Research Equipment and Facilities construction appropriations. Totals may not add due to rounding.

- NSF is funded primarily through six congressional appropriations, which totaled $7,344 million in FY 2015. R&RA, EHR, and MREFC fund the agency's programmatic activities and account for 95 percent of NSF's total appropriations. The AOAM appropriation provides funds to administer and manage those programmatic activities. Separate appropriations are provided to support the activities of the OIG and NSB.

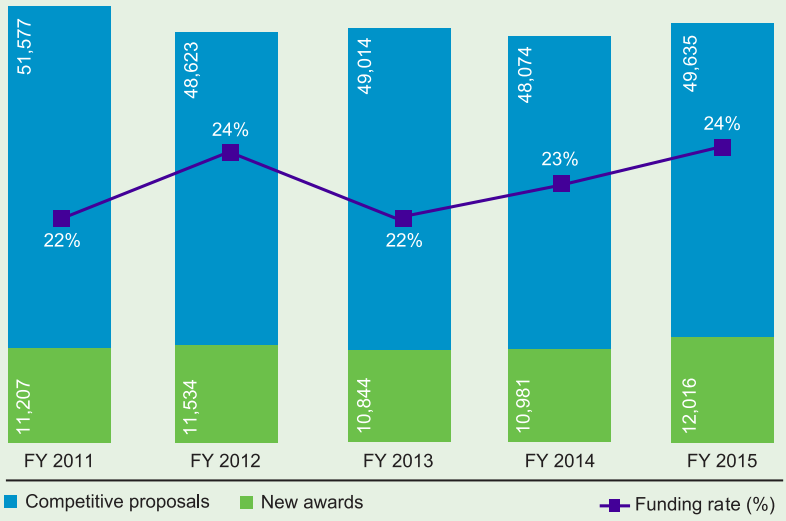
- In FY 2015, 89 percent of research funding was allocated based on competitive merit review. Over 35,000 members of the science and engineering community participated in the merit review process as panelists and proposal reviewers. Awards were made to 1,859 institutions in 50 states, the District of Columbia, and 4 U.S. territories. These institutions employ America's leading scientists, engineers, and educators, and they train the leading-edge innovators of tomorrow.

- Seventy-eight percent of NSF awards were made to academic institutions, including colleges, universities, and academic consortia. Awards were also provided to Federally Funded Research and Development Centers and private industry, including small businesses. Other recipients included federal, state, and local governments; nonprofit organizations; and international organizations. A small number of awards were for international research collaborations that add value to the U.S. scientific enterprise.

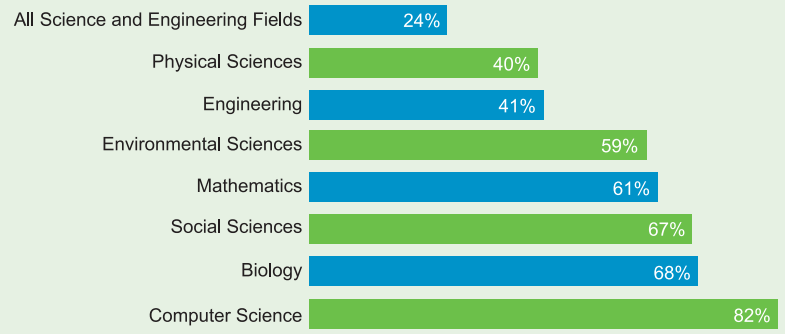
- Most NSF awards (95 percent) were funded through grants or cooperative agreements. Grants can be funded either as standard awards, in which funding for the full duration of the project is provided in a single fiscal year, or as continuing awards, in which funding for a multiyear project is provided in increments. Cooperative agreements are used when the project requires substantial agency involvement (e.g., research centers, multi-use facilities). Contracts are used to acquire products, services, and studies (e.g., program evaluations) required primarily for NSF or other government use.

How It's Spent

Number of NSF Competitive Proposals, New Awards, and Funding Rates



NSF Support of Academic Basic Research in Selected Fields
(as a percentage of total federal support)



Note: Biology includes Biological Sciences and Environmental Biology; excludes National Institutes of Health.
Source: NSF/National Center for Science and Engineering Statistics, Survey of Federal Funds for Research & Development, FY 2014

- In FY 2015, the number of competitive proposals reviewed by NSF rose 3.2 percent—an increase of 1,561, to 49,635.
- The number of new awards increased in FY 2015 by 9.4 percent (1,035), to 12,016. This total also represents an increase of 7.8 percent over the average annual number of awards (11,142) from FY 2011 through FY 2014. A major contributor to this trend is the 8.9 percent reduction in FY 2015 in the average annual award size.
- In FY 2015, an estimated 350,000 people were directly involved in NSF programs and activities, receiving salaries, stipends, or participant support. Beyond these figures, NSF programs indirectly impact millions of people. These programs reach K-12 students and teachers, the general public, and researchers through activities including workshops; informal science activities such as museums, television, videos, and journals; outreach efforts; and the dissemination of improved curricula and teaching methods.
- NSF accounts for approximately 24 percent of the total federal budget for basic research conducted at U.S. colleges and universities, and this share increases to nearly 60 percent when medical research supported by the National Institutes of Health is excluded. In many fields, NSF is the primary source of federal academic support.

FY 2015 Financial Management Performance Results	
	Results
Financial Statement Audit*	
• Unmodified opinion (18th consecutive "clean" opinion)	Yes
• Material weaknesses	None
Summary of Management Assurances	
• Effective internal control over financial reporting (FMFIA §2)	Yes
• Effective internal control over operations (FMFIA §2)	Yes
• Conformance with financial management system requirements (FMFIA §4)	Yes
• Compliance with Section 803(a) of FFMIA: system requirements, accounting standards, and U.S. General Ledger at transaction level	No lack of substantial compliance noted
Improper Payments Elimination and Recovery Act of 2010	Non-compliance**
Number of grant payments processed in FY 2015	22,860

* NSF's FY 2015 Independent Auditors' Report can be found in NSF's *FY 2015 Agency Financial Report*.
** See NSF's *FY 2015 Agency Financial Report* for more information.
FMFIA: Federal Managers Financial Integrity Act of 1982
FFMIA: Federal Financial Management Improvement Act of 1996

How We Are Doing: Performance Results

FY 2015 was the first full year of implementation of NSF's new Strategic Plan, *Investing in Science, Engineering, and Education for the Nation's Future: Strategic Plan for 2014–2018*. In FY 2015, NSF tracked progress toward its three strategic goals using 10 performance goals, of which three are agency priority goals (APGs).

- The Strategic Plan for FY 2014–FY 2018 contains seven Strategic Objectives, which are comprehensive of all agency program activities. These Objectives underwent an annual Strategic Review in FY 2015.
- NSF set three APGs in FY 2014 for achievement in FY 2015. APGs monitor progress in specific areas for which near-term focus on agency execution can have the most impact.
- In FY 2015, NSF tracked progress toward its three strategic goals through the 10 performance goals which includes three APGs. Of the 10 goals with targets in FY 2015, four were fully achieved and six did not achieve one or more targets.

NSF's *FY 2015 Annual Performance Report* (APR) in the *FY 2017 Budget Request to Congress* provides a full description of the strategic review process and all of the agency's performance measures, including descriptions of the metrics, methodologies, results, and trends, along with a list of relevant external reviews.

Goal Type	Strategic Goal	Strategic Objective
Mission-oriented	Transform the Frontiers of Science and Engineering	Invest in fundamental research to ensure significant continuing advances across science, engineering, and education.
		Integrate education and research to support development of a diverse STEM workforce with cutting-edge capabilities.
		Provide world-class research infrastructure to enable major scientific advances.
	Stimulate Innovation and Address Societal Needs through Research and Education	Strengthen the links between fundamental research and societal needs through investments and partnerships.
		Build the capacity of the Nation to address societal challenges using a suite of formal, informal, and broadly available STEM educational mechanisms.
Management	Excel as a Federal Science Agency	Build an increasingly diverse, engaged, and high-performing workforce by fostering excellence in recruitment, training, leadership, and management of human capital.
		Use effective methods and innovative solutions to achieve excellence in accomplishing the agency's mission.

FY 2015 Performance Goal	Result
1. Agency Priority Goal: Ensure Public Access to Publications. By September 30, 2015, NSF-funded investigators will be able to deposit versions of their peer-reviewed articles in a repository to make them available to the public within one year of publication.	Not Achieved*
2. Agency Priority Goal: Increase Data Scientists and Data Infrastructure. By September 30, 2015, implement mechanisms to support the training and workforce development of future data scientists; increase the number of multi-stakeholder partnerships to address the Nation's big-data challenges; and increase investments in current and future data infrastructure extending data-intensive science into more research communities.	Achieved
3. Agency Priority Goal: Optimize the Award Process to Level Workload. By September 30, 2015, meet targets to level distribution of awards across the fiscal year and subsequently improve awardee capacity to effectively manage research funding.	Not Achieved
4. Meet critical targets for key program investments.	Achieved
5. Ensure program integrity and responsible stewardship of major research facilities and infrastructure.	Not Achieved
6. Enable consistent evaluation of the impact of NSF investments with a high degree of rigor and independence.	Not Achieved
7. Foster an environment of diversity and inclusion while ensuring compliance with the agency's EEO and civil rights programs.	Partially Achieved
8. Use evidence-based reviews to guide management investments.	Achieved
9. Inform applicants whether their proposals have been declined or recommended for funding within 182 days, or six months, of deadline, target, or receipt date, whichever is later.	Achieved
10. Identify new approaches to keep NSF's world-renowned merit review process innovative, effective, and efficient.	Partially Achieved

* This goal was achieved in the first quarter of FY 2016.
STEM: Science, Technology, Engineering, and Mathematics.
All performance data have been independently verified and validated.

Management Challenges

For FY 2015, the NSF Office of the Inspector General (OIG) identified six management and performance challenges facing the agency:

- Establishing accountability over large cooperative agreements
- Improving grant administration
- Managing the U.S. Antarctic program
- Moving NSF headquarters to a new building
- Managing programs and resources in times of budget austerity
- Encouraging the ethical conduct of research

OIG's memorandum on FY 2015 Management Challenges can be found in NSF's *FY 2014 Agency Financial Report*. Management's report on the significant activities undertaken in FY 2015 to address these challenges is included in NSF's *FY 2015 Agency Financial Report*.

For More Information

NSF Budget and Performance Website
www.nsf.gov/about/performance

NSF FY 2015 Agency Financial Report
www.nsf.gov/publications/pub_summ.jsp?ods_key=afr

NSF FY 2015 Annual Performance Report
See Performance chapter of NSF FY 2017 Budget Request to Congress www.nsf.gov/about/performance.

Report to the National Science Board on NSF's Merit Review Process FY 2014
www.nsf.gov/nsb/publications/2015/nsb201514.pdf

NSF Research and Education Highlights and Discoveries
www.nsf.gov/discoveries

NSF FY 2015 Progress Report on OIG Management Challenges
www.nsf.gov/publications/pub_summ.jsp?ods_key=afr (See Appendix 3B)

Investing in Science, Engineering, and Education for the Nation's Future, NSF Strategic Plan for 2014–2018
www.nsf.gov/about/performance/strategic_plan.jsp

FY 2015 NSF Senior Management

Office of the Director
France A. Córdova, Director
Richard O. Buckius,
Chief Operating Officer

National Science Board
Dan E. Arvizu, Chair
Kelvin K. Droegemeier, Vice Chair

Directorate for Biological Sciences
James L. Olds, Assistant Director

Directorate for Computer and Information Science and Engineering
James F. Kurose, Assistant Director

Directorate for Education and Human Resources
Joan Ferrini-Mundy, Assistant Director

Directorate for Engineering
Pramod P. Khargonekar,
Assistant Director

Directorate for Geosciences
Roger M. Wakimoto, Assistant Director

Directorate for Mathematical and Physical Sciences
Fleming Crim, Assistant Director

Directorate for Social, Behavioral, and Economic Sciences
Fay L. Cook, Assistant Director

Office of Diversity and Inclusion
Rhonda Davis, Office Head (Acting)

Office of the General Counsel
Lawrence Rudolph, General Counsel

Office of Inspector General
Allison C. Lerner, Inspector General

Office of Integrative Activities
Suzanne Iacono, Office Head (Acting)

Office of International Science & Engineering (OISE)
Rebecca Keiser, Office Head

Office of Legislative and Public Affairs
Amanda Greenwell, Office Head

Office of Budget, Finance, and Award Management
Martha A. Rubenstein, Office Head

Office of Information and Resource Management
Joanne S. Tornow, Office Head

NSF Officers

Chief Financial Officer
Martha A. Rubenstein (Office of Budget, Finance and Award Management)

Chief Human Capital Officer
Joanne S. Tornow (Office of Information and Resource Management)

Chief Technology Officer
José Muñoz

Chief Information Officer
Amy Northcutt (Office of Information and Resource Management)

NSF Affirmative Action Officer
Rhonda Davis (Office of Diversity and Inclusion)

National Science Board Members in FY 2015

Dan E. Arvizu, *Chair*
National Renewable Energy Laboratory

Kelvin K. Droegemeier, *Vice Chair*
University of Oklahoma

John Anderson
Illinois Institute of Technology

Deborah L. Ball
University of Michigan

Bonnie L. Bassler
Princeton University

Roger N. Beachy
University of California, Davis

Arthur Bienenstock
Stanford University

Vinton G. Cerf
Google Incorporated

Vicki Chandler
Gordon and Betty Moore Foundation

Ruth A. David
Analytic Services Incorporated

Inez Y. Fung
University of California, Berkeley

Robert M. Groves
Georgetown University

James S. Jackson
University of Michigan

G. Peter Lepage
Cornell University

Alan I. Leshner
American Association for the Advancement of Science

W. Carl Lineberger
University of Colorado

Stephen L. Mayo
California Institute of Technology

Sethuraman Panchanathan
Arizona State University

G.P. "Bud" Peterson
Georgia Institute of Technology

Geraldine L. Richmond
University of Oregon

Anneila I. Sargent
California Institute of Technology

Diane L. Souvaine
Tufts University

Robert J. Zimmer
University of Chicago

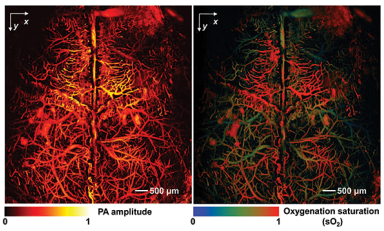
Maria T. Zuber
Massachusetts Institute of Technology

Member ex *officio*:
France A. Córdova
National Science Foundation

Michael L. Van Woert
Executive Officer and Director
National Science Board Office

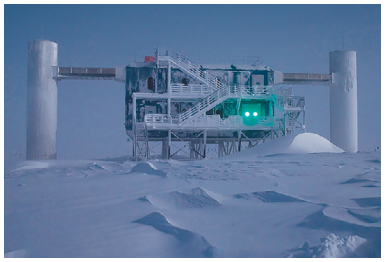
Research and Education Highlights

Imaging the Brain in Real Time: NSF-funded researchers at Washington University in St. Louis (WUSTL) use laser light to peer into the brain to unprecedented depths (nearly 3 inches). The approach they pioneered, termed photoacoustic imaging, combines laser light and sound waves. The technique allows the study of biological material, from cells to tissues and organs, in its natural environment, free of imaging agents. It detects single red blood cells as well as fats and proteins. The researchers are integrating the technique into a system to capture images every 1/1,000th of a second—fast enough to image action potentials (changes in electrical potential along a nerve fiber when a nerve impulse is transmitted).

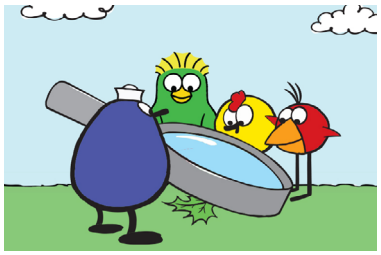


Credit: Junjie Yao and Lihong Wang, WUSTL

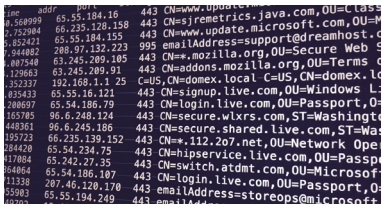
Cosmic Confirmation: Researchers using a massive, NSF-funded instrument buried deep in the ice at the South Pole observed high-energy neutrinos from beyond our solar system—and beyond our galaxy. Billions of the subatomic particles known as neutrinos pass through Earth every day but are difficult to detect. The IceCube Neutrino Observatory, a cubic-kilometer-sized detector sunk into the South Pole ice sheet, allows researchers to see byproducts of neutrino interaction with ice. A 2015 observation confirmed the discovery of high-energy neutrinos IceCube made in 2013. "Cosmic neutrinos are the key to yet unexplored parts of our universe and might be able to finally reveal the origins of the highest energy cosmic rays, including the rare 'Oh-My-God' particles," said IceCube Collaboration spokesperson Olga Botner.


Credit: Emanuel Jacobi, National Science Foundation

PBS Series Engages Latino Children in Math and Science: *Peep and the Big Wide World*, an NSF-funded Emmy award-winning Public Broadcasting Service (PBS) series, developed an outreach campaign to encourage greater family involvement in children's exploration of math and science. A Spanish-speaking character, "Splendid Bird from Paradise," was added to the animated cast, and parents, including Spanish speakers, are now featured in the live-action videos. A multipronged study found that Spanish-speaking parents who used *Peep* resources with their preschool-age children were better equipped to facilitate science and math exploration. The parents reported feeling more inclined to do math and science activities with their preschoolers and said the resources are easy to understand, fun, and help them learn science alongside their children.


Credit: WGBH

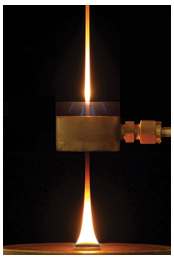
Supercomputer Cybersecurity: Computer networks at national labs, scientific computing facilities, universities, and large companies identify and block hundreds of thousands of hostile intrusions every month, thanks to a freely available cybersecurity software advanced by NSF-funded computer scientists at the University of California, Berkeley. The programmable code analyzes a network's unique data traffic patterns and tailors its defenses as needed, depending on the anomalies detected. The code played a critical role in identifying hackers trying to sell access to federal supercomputers. The NSF-funded Bro Center of Expertise provides resources for users to protect their cyberinfrastructure.


Credit: Bro Center of Expertise

Hunting for Gravitational Waves: In May 2015, NSF dedicated the Advanced Laser Interferometer Gravitational-Wave Observatories (LIGO) in Washington State. Researchers using the facilities seek to observe and record gravitational waves for the first time. Those discoveries would allow us to learn more about the phenomena that generate the waves, such as supernovae and colliding black holes. The Advanced LIGO project represents a major upgrade expected to enhance the sensitivity of LIGO's instruments by a factor of at least 10 and can see a volume of space more than 1,000 times greater than the initial LIGO. The existence of gravitational waves is a crucial prediction of the General Theory of Relativity.


Credit: Cfoellmi via Wikimedia Commons

Control of Soot Formation in Flames: Environmental soot, which is associated with respiratory illness and cancer, is a deadly pollutant and a leading man-made contributor to global warming. A ternary flame system developed to study soot oxidation could save thousands of lives and contribute to a cleaner environment. This novel flame system, developed by NSF-funded researchers at the University of Maryland, College Park, allows complicated flame processes to be separated and controlled. In ordinary flames, soot formation and oxidation regions overlap, preventing either process from being studied independently. The ternary system will allow soot oxidation to be studied in a region without soot formation, which could lead to more accurate computer models used in the design of engines and other combustors.


Credit: H. Guo, P.M. Anderson, P.B. Sunderland, A Ternary Flame System for Soot Oxidation Studies, Combustion Science and Technology 187 (2015) 1836–1840

4201 Wilson Boulevard, Arlington, VA 22230
USA Tel: 703–292–5111 FIRS: 800–877-8339 TDD: 800–281–8749
www.nsf.gov

We welcome your comments on how we can make this report more informative. Please submit them to *Accounta@nsf.gov*.

NSF–16–003