

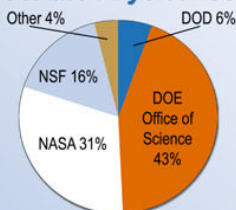


Office of Science

The U.S. Department of Energy's (DOE) Office of Science helps to maintain our Nation's scientific infrastructure and ensures U.S. world leadership across a broad range of scientific disciplines. It funds research and development programs that enable DOE to accomplish its missions in **national security, energy security, environmental restoration, and science.**

The Office of Science is the single largest supporter of basic research in the physical sciences, providing approximately 40 percent of all Federal funds in this area over the past decade.

Office of Science Provides 43% of Federal Support to the Physical Sciences



Source: NSF - Division of Statistical Research Services

The Office of Science is the steward, and by far the principal funding agency, of the Nation's research programs in high-energy physics, nuclear physics, and fusion energy sciences. It also manages important programs of fundamental research in basic energy sciences, biological and environmental sciences, and computational science.

The Office of Science is the Federal government's largest single funder of materials and chemical sciences. It also supports unique or critical pieces of U.S. research in climate change, geophysics, genomics, and the life sciences.

The Office of Science manages this research portfolio through five interdisciplinary program offices:



Advanced Scientific Computing Research

- High-end computing and networking for scientific leadership
- Fundamental research in applied mathematics and computer science
- Innovative software tools and libraries



Basic Energy Sciences

- Nanoscale science, engineering, and technology research
- Materials sciences and engineering
- Chemistry, geosciences, and molecular biosciences



Biological and Environmental Research

- Climate change research
- Life sciences
- Environmental remediation sciences
- Medical sciences



Fusion Energy Sciences

- Harnessing fusion energy through basic research in plasma and fusion sciences
- ITER, the international burning plasma experiment



High Energy and Nuclear Physics

- Exploring the fundamental nature of matter, energy, space, and time

In addition, the Office of Science sponsors a range of science education initiatives through its program,



Workforce Development for Teachers and Scientists

- Student internships at national laboratories
- Fellowships for distinguished science, technology, engineering, and mathematics teachers
- National Science Bowls for high school and middle school students

The Office of Science makes extensive use of peer review and Federal advisory committees to develop general directions for research investments, to identify priorities, and to determine the very best scientific proposals to support.

What Distinguishes the Office of Science?

"The Office of Science fills a unique and central role in the country's scientific endeavor. Our work is complementary to that of other government research agencies.

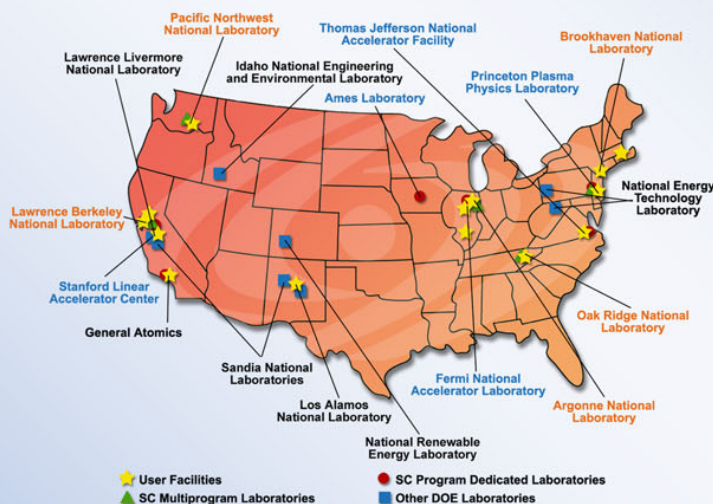
We distinguish ourselves by our emphasis on research that:

- takes the long view,
- is open and interdisciplinary,
- requires the use of large-scale facilities, and
- takes risks commensurate with the high payoffs we expect."

—Dr. Raymond L. Orbach, Director, DOE Office of Science

The Office of Science oversees 10 world-class laboratories. It also manages the construction and operation of some of the Nation's most advanced R&D facilities, located at national laboratories and universities.

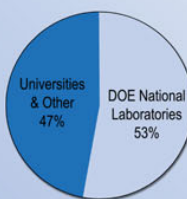
Office of Science Laboratories and User Facilities



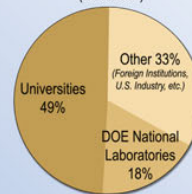
About 50 percent of the Office of Science's research funding goes each year to support research at 250 colleges, universities, and institutes nationwide. Each year, the Office of Science's facilities are used by more than 18,000 researchers from universities, other government agencies, and private industry.

University Participation in Office of Science Research

SC Base Research Dollars



Users at SC Facilities (2001/2002)



The Office of Science also manages a nationwide science education and workforce development program to help teachers improve students' knowledge of science and mathematics and to attract and encourage more of America's youth to choose an education and career in the sciences and engineering.

The Office of Science serves America's scientists, engineers, teachers, and students—and also the international community.



Office of Science

U.S. DEPARTMENT OF ENERGY

Today's Science – Tomorrow's Solutions

Historic Accomplishments

Ever since its inception as part of the Atomic Energy Commission following World War II, the Office of Science has blended cutting-edge research and innovative problem-solving to keep the United States at the forefront of discovery.

Office of Science Nobel Laureates

In fact, since the mid-1940s, the Office of Science has supported the work of more than 40 Nobel Prize winners, testimony to the high quality and impact of the work it underwrites.



Raymond Davis Jr, retired Brookhaven National Laboratory scientist, shared the 2002 Nobel Prize for Physics "for pioneering contributions to astrophysics, in particular for the detection of cosmic neutrinos."

Benefits of Federal Investments in Science

Estimates are that fully half of the growth of the U.S. economy in the last 50 years was due to federal funding of scientific and technological innovation. American taxpayers have received great value for their investment in the basic research sponsored by the Office of Science.

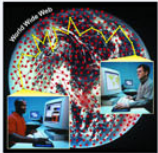
Indeed, Office of Science research investments have yielded a wealth of dividends, including significant technological innovations, medical and health advances, new intellectual capital, enhanced economic competitiveness, and improved quality of life for the American people.



Left to right: Director of the Office of Science Raymond Orbach, Secretary of Energy Spencer Abraham, and President Bush visit Argonne National Laboratory.

Here are some of the Office of Science's key scientific breakthroughs and historic accomplishments:

Helping to Develop the Internet



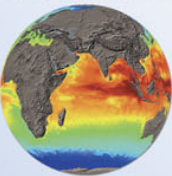
Helped develop the Internet, first connecting in 1974 its geographically dispersed researchers through a single network, a revolutionary, cost-effective mechanism that provided supercomputing power to civilian researchers and established a network model adopted by other Federal government agencies and states for their researchers.

Computing for Science's Sake

Pioneered the transition to massively parallel supercomputing, installed the first supercomputer available to the civilian research community that broke the peak performance barrier of 1 teraflop (one trillion operations per second), and developed the first civilian scientific application to achieve actual performance over 1 teraflop



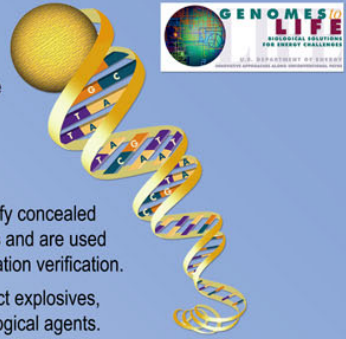
Improving the Science of Climate Change Research



- In 1978, launched the Climate Change Research Program, the first research program in the U.S. to investigate the effect of energy-related emissions of greenhouse gases, especially carbon dioxide, on climate and the environment.
- Developed software and computer systems to model and simulate environmental conditions and project climate change under varying emissions scenarios.

Pioneering the Human Genome Project

Initiated the Human Genome Project in 1986, developed DNA sequencing and computational technologies that made possible the unraveling of the human genetic code and published a complete draft of the DNA sequence of the human genome in 2001.



Enhancing National Security



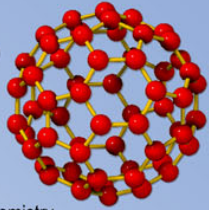
- Neutron detectors that can identify concealed nuclear weapons and land mines and are used for arms control and non-proliferation verification.
- Advanced sensors that can detect explosives, narcotics, and chemical and biological agents.

Improving Energy Security

- Lithium batteries offering high-energy storage capacity and an environmentally benign alternative to lead batteries;
- Superconducting wires that can lead to more efficient types of power generation, transmission, and electrical devices—and thereby save energy and reduce emissions.

Expanding the Frontiers of Discovery

- Funded research that led to the discovery of all but one (the electron) of the most fundamental constituents of matter, namely quarks and leptons, which confirmed the Standard Model, physicists' current theory of matter and the forces of nature—and resulted in 13 Nobel prizes.
- Supported the 1996 Nobel Prize-winning discovery of a new form of carbon, the "Bucky Ball," which has spurred a revolution in carbon chemistry and may lead to a profusion of new materials and drug delivery systems.



World-Class Research and Development Facilities

Throughout its history, the Office of Science has designed, constructed, and operated many of the most advanced research and development facilities in the world. These include

- neutron scattering facilities
- synchrotron radiation light sources
- the superconducting Tevatron high-energy particle accelerator
- the world's first linear collider
- the continuous electron beam accelerator
- the Relativistic Heavy Ion Collider (the highest-energy "atom smasher" in the world)
- the Tokamak fusion test reactor.



Advanced Light Source at Lawrence Berkeley National Laboratory



Relativistic Heavy Ion Collider at Brookhaven National Laboratory



Stanford Synchrotron Radiation Laboratory at Stanford Linear Accelerator Facility



Spallation Neutron Source at Oak Ridge National Laboratory (under construction)

As long as this Nation maintains its commitment to investment in scientific research, the Office of Science is poised for many more years of beautiful science—to benefit the United States of America and the world.

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