

## ASCR

### MISSION

The mission of the Advanced Scientific Computing Research (ASCR) program is to deliver forefront computational and networking capabilities to scientists nationwide that enable them to extend the frontiers of science, answering critical questions that range from the function of living cells to the power of fusion energy. In the past two decades, leadership in scientific computation has become a cornerstone of the Department's strategy to ensure the security of the nation and succeed in its science, energy, environmental quality, and national security missions. According to a number of authorities, ranging from the President's Science Advisor and the President's Council of Advisors on Science and Technology to the National Research Council and the Council on Competitiveness, this scientific leadership should be a priority for the nation.

ASCR supports DOE's mission to provide world-class scientific research capacity through peer reviewed scientific results in mathematics, high performance computing and advanced networks, and through the application of computers capable of trillions of operations per second (terascale computers) to advanced scientific applications. Computer-based simulation enables us to predict the behavior of complex systems that are beyond the reach of our most powerful experimental probes or our most sophisticated theories. Computational modeling has greatly advanced our understanding of fundamental processes of nature, such as fluid flow and turbulence or molecular structure and reactivity. Through modeling and simulation, we will be able to explore the interior of stars to understand how the chemical elements were created and learn how protein machines work inside living cells, which could enable us to design microbes that address critical waste cleanup problems. We can design novel catalysts and high-efficiency engines that could expand our economy, lower pollution, and reduce our dependence on foreign oil. Computational science is increasingly central to progress at the frontiers of almost every scientific discipline and to our most challenging feats of engineering.

### ABOUT THE OFFICE OF SCIENCE

The Office of Science is the single largest supporter of basic research in the physical sciences in the United States, providing more than 40 percent of total funding for this vital area of national importance. It oversees – and is the principal federal funding agency of – the Nation's research programs in high-energy physics, nuclear physics, and fusion energy sciences.

The Office of Science manages fundamental research programs in basic energy sciences, biological and environmental sciences, and computational science. In addition, the Office of Science is the Federal Government's largest single funder of materials and chemical sciences, and it supports unique and vital parts of U.S. research in climate change, geophysics, genomics, life sciences, and science education.

The Office of Science manages this research portfolio through six interdisciplinary program offices: [Advanced Scientific Computing Research](#), [Basic Energy Sciences](#), [Biological and Environmental Research](#), [Fusion Energy Sciences](#), [High Energy Physics and Nuclear Physics](#). In addition, the Office of Science sponsors a range of science education initiatives through its [Workforce Development for Teachers and Scientists](#) program.

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.

The Office of Science also manages [10 world-class laboratories](#), which often are called the “crown jewels” of our national research infrastructure. The national laboratory system, created over a half-century ago, is the most comprehensive research system of its kind in the world.

Five are multi-program facilities: [Argonne National Laboratory](#), [Brookhaven National Laboratory](#), [Lawrence Berkeley National Laboratory](#), [Oak Ridge National Laboratory](#), and [Pacific Northwest National Laboratory](#). The other five are single-program national laboratories: [Ames Laboratory](#), [Fermi National Accelerator Laboratory](#), [Thomas Jefferson National Accelerator Facility](#), [Princeton Plasma Physics Laboratory](#), and [Stanford Linear Accelerator Center](#).

The Office of Science oversees the construction and operation of some of the Nation's most advanced R&D [user facilities](#), located at national laboratories and universities. These include particle and nuclear physics accelerators, synchrotron light sources, neutron scattering facilities, supercomputers and high-speed computer networks.

Each year these facilities are used by more than 19,000 researchers from universities, other government agencies and private industry.

The Office of Science is a principal supporter of graduate students and postdoctoral researchers early in their careers. Almost 50 percent of its research funding goes to support research at more than 300 colleges, universities, and institutes nationwide.

The Office of Science also reaches out to America's youth in grades K-12 and their teachers to help improve students' knowledge of science and mathematics and their understanding of global energy and environmental challenges.

To attract and encourage students to choose an education in the sciences and engineering, the Office of Science also supports the National Science Bowl®, an educational competition for high school and middle school students involving all branches of science. Each year, DOE's National Science Bowl® attracts over 17,000 students nationwide. At the high school level, it involves more than 12,000 students, and at the middle school level, more than 5,000 students.

About DOE

**The Department of Energy's** overarching mission is to advance the national, economic, and energy security of the United States; to promote scientific and technological innovation in support of that mission; and to ensure the environmental cleanup of the national nuclear weapons complex. The Department's strategic goals to achieve the mission are designed to deliver results along five strategic themes:

- 1 Energy Security:** Promoting America's energy security through reliable, clean, and affordable energy
- 2 Nuclear Security:** Ensuring America's nuclear security.
- 3 Scientific Discovery and Innovation:** Strengthening U.S. scientific discovery, economic competitiveness, and improving quality of life through innovations in science and technology
- 4 Environmental Responsibility:** Protecting the environment by providing a responsible resolution to the environmental legacy of nuclear weapons production
- 5 Management Excellence:** Enabling the mission through sound management.

Within these themes there are sixteen [strategic goals](#) which are designed to help DOE successfully achieve its mission and vision.