About Fermi National Accelerator Laboratory

Fermilab is America's premier laboratory for particle physics and accelerator research, funded by the U.S. Department of Energy. Thousands of scientists from universities and laboratories around the world collaborate at Fermilab on experiments at the frontiers of discovery.

Wilson Hall is a landmark on the 6,800-acre site of Fermi National Accelerator Laboratory, located 40 miles west of Chicago in Batavia, Illinois.

Particle physicists aim to discover what the universe is made of and how it works. By building some of the largest and most complex machines in the world, scientists at Fermilab expand humankind's understanding of matter, energy, space and time, capturing imaginations and inspiring future generations.

Fermilab science

More than 3,500 scientists worldwide use Fermilab and its accelerators, detectors and computers for their research. About 2,600 researchers from 44 countries collaborate on experiments at Fermilab, keeping the United States at the leading edge of the international field of particle physics.

Fermilab produces the world's most intense beam of high-energy neutrinos, particles that may hold the key to understanding why the universe is made of matter.

Scientists from Fermilab and other U.S. institutions played key roles in the discovery of the Higgs particle at the Large Hadron Collider. They now are upgrading the LHC experiments to take data at higher energy.

Using the cosmos as a laboratory, Fermilab scientists explore dark matter and dark energy, which constitute 96 percent of the universe.

Fermilab innovation

Bold, innovative ideas and technologies from particle physics have entered the mainstream of society to transform the way we live. From enabling the development of MRI machines to building the first proton accelerator for cancer treatment, Fermilab helps overcome the greatest challenges of our time.

Fermilab is a world-leading R&D center for superconducting magnets and superconducting radio-frequency cavities, which are crucial technologies for particle accelerators. SRF technology has potential applications in medicine, nuclear energy and materials science.

Fermilab trains tomorrow's scientific workforce

Students trained in particle physics find their way to diverse sectors of the national economy in jobs that require highly developed analytical and technical skills, innovative use of computers and other technologies, critical thinking and the ability to solve unique problems.

Fermilab inspires the next generation of scientists through its student and teacher programs. Between 15,000 and 20,000 K–12 students participate in science education programs and tours at Fermilab every year, several hundred teachers receive training from experts in the field, and almost 1,000 university students participate in our research and programs each year.

How Fermilab transforms science and society

Neutrino experiments

A team of 800 scientists from 148 institutions in 27 countries is advancing plans for the Deep Underground Neutrino Experiment, which aims to discover differences in neutrino and antineutrino interactions, look for neutrinos from supernovae and search for nucleon decay. Fermilab would build a Long-Baseline Neutrino Facility to send a neutrino beam to the large DUNE detector at the Sanford Underground Research Facility in South Dakota. More scientists are expected to join.

The NOvA experiment will help answer some of the most important scientific questions about neutrino masses, neutrino oscillations and the role neutrinos may have played in the evolution of the universe. The 14,000-ton NOvA detector near Ash River, Minnesota, is one of the most sophisticated neutrino detectors built in the world. Its construction was completed in 2014, on schedule and under budget.

MicroBooNE is the first experiment of Fermilab's short-baseline neutrino program, which will search for sterile neutrinos and advance the liquid-argon detector technology proposed for DUNE.

Large Hadron Collider research and upgrades

The LHC in Geneva, Switzerland, is the world's highest-energy particle collider and enabled the discovery of the Higgs particle in 2012. Fermilab is a leader in this international project, serving as the U.S. hub for more than 1,000 scientists working on the CMS experiment at the LHC. Fermilab houses an LHC Remote Operations Center, provides a quarter of the computing power for the CMS experiment and designs and builds components for upgrades to the LHC and CMS.

Muon experiments

Fermilab has upgraded its accelerator complex to create beams of muons. More than 250 scientists are working on two experiments, Muon g-2 and Mu2e, that will study these heavy cousins of the electron. Muon interactions could reveal the existence of new particles, forces and laws of nature. The 50-foot-wide electromagnet for the Muon g-2 experiment arrived at Fermilab in the summer of 2013.

Dark matter and dark energy experiments

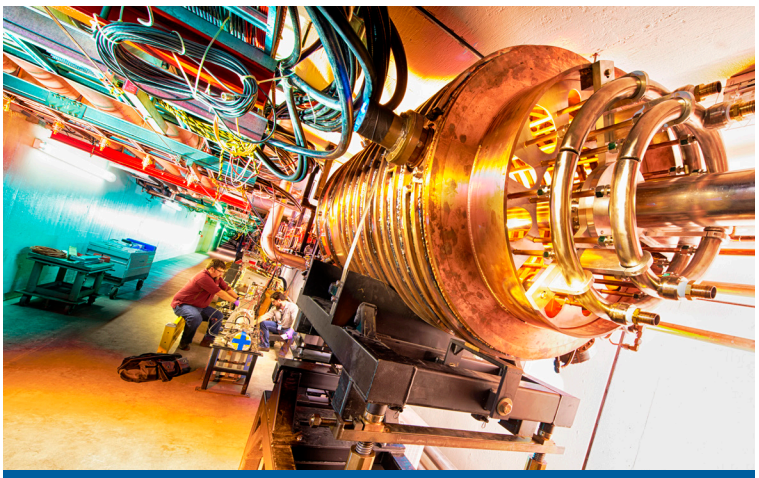
Scientists only understand about 4 percent of our universe; the rest is dark matter and dark energy, which remain a mystery. The Dark Energy Camera, designed and built at Fermilab, now takes images on a telescope in Chile. The heart of the Dark Energy Survey, it advances the quest to understand the nature of the dark energy that pushes the universe apart. Fermilab also is a leader in experiments that seek to be the first in the world to observe particles of dark matter.

Illinois Accelerator Research Center

More than 30,000 particle accelerators are in operation today across the world, most in the medicine and manufacturing sectors. The new Illinois Acclerator Research Center at Fermilab will fuel training and innovation in accelerator technology. It will bring scientists from Fermilab, universities and industry together to advance R&D for particle accelerators and transition the resulting technologies to the marketplace.

The Fermilab accelerator complex supports many different types of experiments and R&D projects. More than 3,500 scientists use Fermilab and its accelerators, detectors and computers for their research.

The new Illinois Accelerator Research Center is a state-of-the-art facility for accelerator research, industrialization and training. Funding is provided by the Illinois Department of Commerce and Economic Opportunity and the U.S. Department of Energy's Office of High Energy Physics.



Fermilab's Main Injector particle accelerator creates proton beams in excess of 400 kilowatts of power and produces the world's most intense high-energy neutrino beam.