SLAC National Accelerator Laboratory
At a Glance

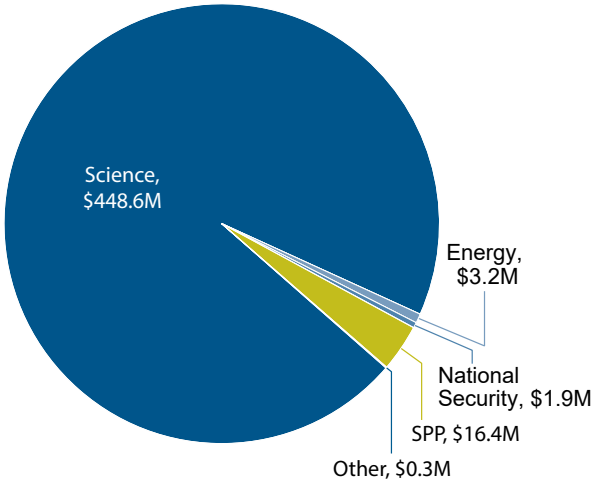
U.S. DEPARTMENT OF ENERGY

SLAC's mission is to be the world-leading laboratory for X-ray and ultrafast science, based on its leadership in electron accelerator physics and it's distinguished history in applications of X-ray science to materials, chemical, and biological sciences. We also play a primary role in elementary particle physics in areas of theory, simulation, instrumentation, high-repetition-rate, fast-readout-detector technology, and massive-scale data acquisition and analysis.

SLAC hosts more than 4,000 researchers each year at its facilities and in laboratory-hosted science programs. We also lead DOE efforts toward the construction and operation of the Large Synoptic Survey Telescope (LSST) and actively participate in the ATLAS detector at the Large Hadron Collider (LHC) in two dark matter searches and in experiments probing the fundamental nature of the neutrino.

SLAC's success depends on a robust partnership with Stanford University, which manages the Laboratory for the DOE. Stanford attracts and supports some of the world's best and most innovative scientists. In addition, SLAC jointly operates three institutes and a research center with Stanford: the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC); the Stanford Institute for Materials and Energy Sciences (SIMES); the Stanford PULSE Institute; and the SUNCAT Center for Interface Science and Catalysis.

FY 2016 Funding by Source



Lab operating costs: **$470.4M**
DOE costs: **$454M**
SPP costs (non-DOE/non-DHS): **$16.4M**
SPP as % total Lab operating costs: **3.5%**

Facts

Location: Menlo Park, California
Type: Multipurpose Laboratory
Year Founded: 1962
Director: Chi-Chang Kao
Contractor: Stanford University
Responsible Site Office: SLAC Site Office

Physical Assets

426 acres and **148** buildings and **39** trailers
1.689 million GSF in buildings
Replacement plant value: **$1.684B**

Human Capital

1,524 full-time equivalent employees (FTEs)
56 faculty
205 postdoctoral researchers
208 graduate students
2,789 facility users
35 visiting scientists

Core Capabilities

- Accelerator Science and Technology
- Large Scale User Facilities/ Advanced Instrumentation
- Condensed Matter Physics and Material Sciences
- Chemical and Molecular Science
- Plasma and Fusion Energy Science
- Particle Physics

Mission Unique Facilities

- Linac Coherent Light Source (LCLS)
- Stanford Synchrotron Radiation Lightsource (SSRL)
- Facility for Advanced Accelerator Experimental Tests (FACET)
- Instrument Science and Operations Center for the Fermi Gamma-ray Space Telescope (FGST)
- Leading the DOE contributions to the construction and operation of the Large Synoptic Survey Telescope (LSST)
- Leading the joint DOE-NSF construction of the next-generation dark matter experiment Super CDMS
- Enriched Xenon Observatory (EXO) at the Waste Isolation Pilot Plant (WIPP)

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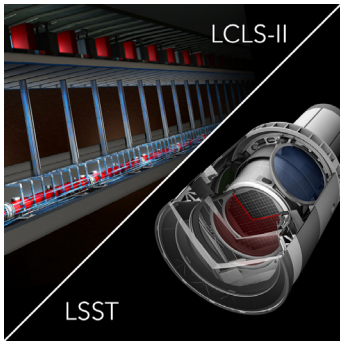
Accomplishments

U.S. DEPARTMENT OF ENERGY

Unique Facility

SLAC Leads Major Next-generation Projects for Ultrafast X-ray Science and Cosmology



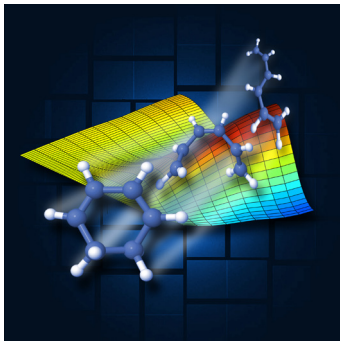
Construction has begun on a major upgrade to the world's brightest x-ray laser, the LCLS. LCLS-II will add a second x-ray laser beam that is 10,000 times brighter and fires 8,000 times faster. The project will greatly increase the power and capacity of the x-ray laser for experiments that sharpen our view of how nature works on the atomic level and on ultrafast timescales. SLAC is also leading construction of the 3.2-gigapixel digital camera (the largest digital camera ever built for ground-based optical astronomy) for the LSST in Chile. LSST will provide a definitive wide-field, ultradeep survey of galaxies for precision measurement of dark energy properties.

Research Highlights

GISMo: Partnering With Industry to Develop the 21st Century Electric Grid

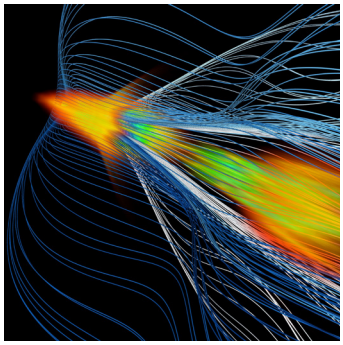
SLAC's new Grid Integration, Systems and Mobility lab, GISMo, is developing ways to collect data from power systems and grid-connected devices and use that data to better manage the electrical grid as it incorporates more sources of renewable energy. As an unbiased, highly technical partner, GISMo can test, benchmark and evaluate emerging technologies and help industry solve numerous other problems.

New 'Molecular Movie' Reveals Ultrafast Chemistry in Motion



Scientists for the first time tracked ultrafast structural changes, captured in quadrillionths-of-a-second steps, as ring-shaped gas molecules burst open and unraveled. Researchers using SLAC's x-ray laser compiled the full sequence of steps in this basic ring-opening reaction into computerized animations that provide a "molecular movie" of the structural changes. Ring-shaped molecules are abundant in biochemistry and also form the basis for many drug compounds. The pioneering study marks an important milestone in precisely tracking how gas-phase molecules transform during chemical reactions on the scale of femtoseconds.

Antimatter Catches a Wave at SLAC



Studies at SLAC's FACET (Facility for Advanced Accelerator Experimental Tests) demonstrated a new, efficient way to accelerate positrons, the antimatter opposites of electrons, by having them "surf" waves of hot, ionized gas in a technique known as plasma wakefield acceleration. The method may help boost the energy and shrink the size of future linear particle colliders that probe nature's fundamental building blocks.