LAB AT A GLANCE
LAWRENCE LIVERMORE NATIONAL LABORATORY

Science and technology on a mission – This is the hallmark of Lawrence Livermore National Laboratory (LLNL). In service to the Department of Energy/National Nuclear Security Administration and other federal agencies, LLNL develops and applies world-class science and technology (S&T) to ensure the safety, security, and reliability of the nation's nuclear deterrent. LLNL also applies S&T to confront dangers ranging from nuclear proliferation and terrorism to energy shortages and climate change that threaten national security and global stability.

Using a multidisciplinary approach that encompasses all disciplines of science and engineering, and utilizes unmatched facilities, LLNL pushes the boundaries to provide breakthroughs for counter-terrorism and nonproliferation, defense and intelligence, and energy and environmental security. LLNL was founded in 1952; Lawrence Livermore National Security, LLC has managed the Lab since 2007.

FACTS

- Location: Livermore, California
- Type: Multidisciplinary national security laboratory
- Year Founded: 1952
- Director: Kimberly S. Budil
- Contractor: Lawrence Livermore National Security, LLC (LLNS)
- Responsible Site Office: Livermore Field Office
- Website: www.llnl.gov

CORE CAPABILITIES

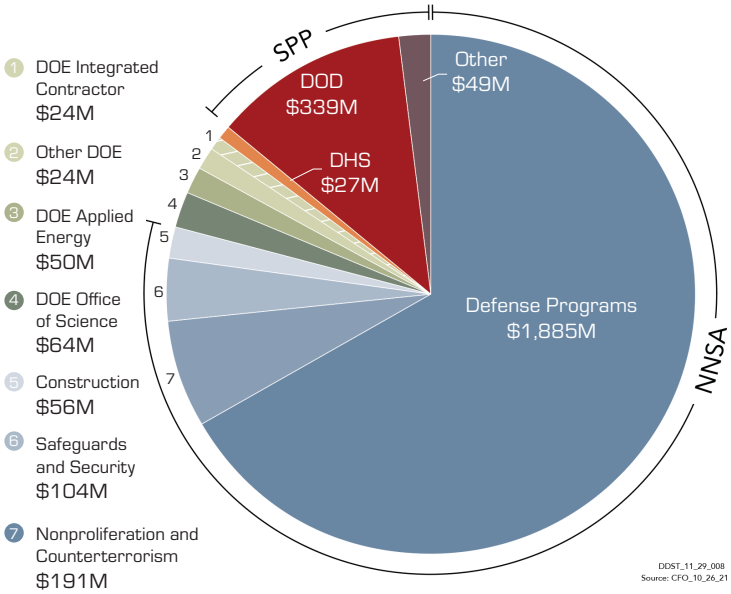
- Advanced Materials and Manufacturing
- High-Energy-Density Science
- High-Performance Computing, Simulation, and Data Science
- Lasers and Optical Science and Technology
- Nuclear, Chemical, and Isotopic Science and Technology
- All-Source Intelligence Analysis
- Nuclear Weapons Design and Engineering
- Bioscience and Bioengineering
- Earth and Atmospheric Sciences

MISSION-UNIQUE FACILITIES

- National Ignition Facility
- Livermore Computing Complex
- National Atmospheric Release Advisory Center
- High-Explosives Applications Facility
- Contained Firing Facility
- Forensic Science Center
- Center for Micro and Nanotechnology
- Center for Bioengineering
- Center for Accelerator Mass Spectrometry
- Advanced Manufacturing Laboratory

FY2021 FUNDING BY SOURCE

(Total: $2,822,825,448)



*SPP: Strategic Partnership Projects

FY2021 COSTS

- FY21 LLNL operating costs: $2.53 billion
- FY21 DOE/NNSA costs (incl. DOE IC): $2.2 billion
- FY21 SPP costs (excl. DHS, DOE IC): $323 million
- FY21 SPP (excl. DHS, DOE IC) as a % of operating costs: 12.8%
- FY21 DHS costs: $21 million

PHYSICAL ASSETS (FY21)

- 7,000 acres (owned) and 521 buildings/trailers
- 6.5 million gross square footage (GSF) in active buildings
- 0.48 million GSF in 71 non-operational buildings
- 17,000 GSF leased
- Replacement plant value: $22.9 billion

HUMAN CAPITAL (FY21)

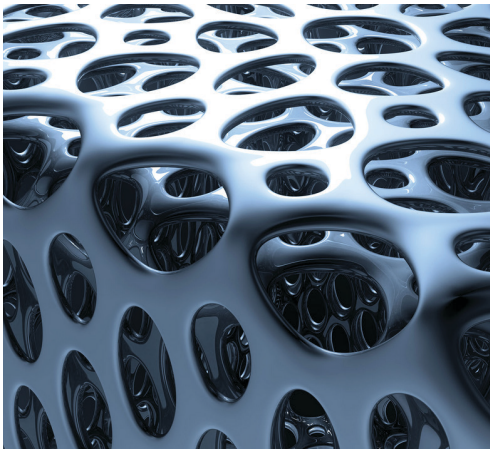
- 8,172 LLNS employees, including:
  - 19 joint faculty
  - 300 postdoctoral researchers
  - 120 undergraduate interns
  - 153 graduate students
- 431 contractors (non-LLNS employees)

LABORATORY HIGHLIGHTS

UNIQUE FACILITIES

One of the world's premier High-Performance Computing facilities

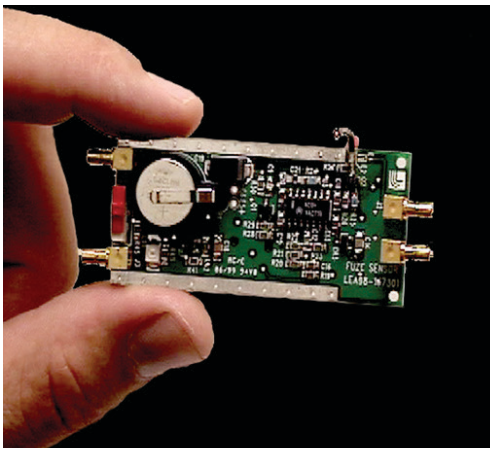
Lawrence Livermore is home to Livermore Computing (LC), one of the world's premier high-performance computing facilities. LC boasts more than 188 petaflops of computing power and numerous TOP500 systems, including the 125-petaflop Sierra. Continuing the long lineage of world-class LLNL supercomputers, Sierra represents the penultimate step on the road to exascale computing, which is expected to be achieved by 2023 with an LLNL system called El Capitan. These flagship systems are GPU-enabled and produce multi-physics simulations in 3D at never-before-seen resolutions for a variety of mission-critical needs. In 2020, LLNL and Cerebras Systems integrated the world's largest computer chip into the Lassen system, upgrading the top-tier supercomputer with cutting-edge AI technology. This combination creates a radically new type of computing solution, enabling researchers to investigate novel approaches to predictive modeling. The platforms are supported by our LEED-certified, innovative facilities for infrastructure, power, and cooling; a storage infrastructure including three varieties of file systems and the world's largest TFinity tape archive; and top-tier customer service. Our industry-leading software ecosystem showcases our leadership of many large open source efforts, from TOSS with Lustre and ZFS to the R&D 100 Award-winning SCR and Spack.



CUTTING-EDGE RESEARCH

Advanced materials and manufacturing

In support of national security applications and to meet broader national needs, Lawrence Livermore is making significant advances in capabilities to develop specialized materials together with processes and systems for product manufacturing and qualification. LLNL researchers are approaching advanced manufacturing as a fully integrated process from discovery and development of optimized materials to manufactured product. The goal is to achieve better products at reduced cost, infrastructure footprint, and development times. Specialized materials and improved fabrication methods are an important component of advanced manufacturing efforts. Successes include printed glass, aerospace-grade carbon fiber composites, and marine-grade stainless steel as well as micro-structured materials with unprecedented properties (e.g., graphene aerogels for supercapacitors). In addition, advances in underlying science, experimentation, and high-performance computing with machine learning are being combined to develop innovative means for improving fabrication, printing speeds, and product quality. Partnerships with industry and academia make vital contributions to these efforts. The newly opened 14,000-square-foot Advanced Manufacturing Laboratory at the Livermore Valley Open Campus is facilitating expansion of cooperative research and development.



TECHNOLOGY TO MARKET

Micropower impulse radar

The Laboratory's micropower impulse radar (MIR) is a compact, lightweight, inexpensive radar that uses very short electromagnetic pulses and can detect objects at much shorter range than conventional radar can. MIR has found use in a range of applications, including fluid level sensing, medical applications, nondestructive evaluation, motion detection, and devices to detect breathing through walls or rubble to assist in rescue after disasters.

The technology was the first truly portable radar system that SWAT and land-mine detection teams were able to use in the field. Search and rescue missions, including those on 9/11, have used MIR devices to detect lung or heart movements of people buried under rubble. Since 1994, MIR has held 197 patents and 44 licenses—more than any other technology in LLNL history and has achieved lifetime sales in the tens of millions of dollars. It was developed using $10 worth of off-the-shelf materials.

LLNL-MI-000000
This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.
December 15, 2021