

# Building 654

## MODULAR FACILITY GROWS TO MEET INCREASED NEED FOR HIGH PERFORMANCE COMPUTING

### B654 EXPANDS TO MEET COMPUTE NEEDS

Dual-level and modular from the start, LLNL's B654 was dedicated in June 2016 and is now undergoing the accelerated expansion of an additional 12,000 square-foot module. This new module will deploy the most efficient, up-to-date facility power management systems, minimize the use of cooling towers and chillers, and utilize closed-loop cooling concepts with expanded liquid-cooling temperature ranges.

B654 currently houses platforms that provide LLNL researchers and their collaborators greater access to the high performance computing (HPC) capabilities they need to perform their national security work. The expansion will be capable of housing and operating the most advanced computing technologies, which place high demands on power and cooling. It will continue to provide unclassified HPC system space suitable for supporting

the National Nuclear Security Administration's (NNSA's) Advanced Simulation and Computing (ASC) Program, other related national security missions, and collaborations with academia and industry.

### UNCLASSIFIED DEMAND EXCEEDS CURRENT CAPABILITIES

Why is this expansion necessary? The increased need for predictive weapons performance simulations and other high-priority national security missions at LLNL rely heavily on unclassified resources to run basic science simulations.

Without adequate unclassified tools, this puts basic science simulations in direct competition for classified computational resources and inhibits external collaborations with the wealth of research being done in basic science. The future of HPC simulation will emphasize complex orchestration of artificial intelligence (AI) assisted workflows to help guide, analyze, and optimize our simulation tools for open-science missions such as material discovery, advanced manufacturing, and clean-energy solutions. Partnerships with academia, industry, and the broader scientific community on our unclassified HPC systems will be an important driver to realizing that vision.



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“Unclassified HPC remains foundational to much of the work that the lab does, including major elements of the weapons program. This expansion will ensure that we don’t have to pull back on deploying future world-class computing platforms because we don’t have the floor space.”

—Rob Neely, *Program Director* | Weapon Simulation and Computing

## LIVERMORE COMPUTING COMPLEX SUPPORTS BOTH NATIONAL SECURITY MISSIONS AND SCIENTIFIC AND TECHNICAL APPLICATIONS

High performance computing at LLNL is central to its mission focus, and B654 is just one of several advanced facilities in the Livermore Computing Complex (LCC). Collectively, the LCC houses supercomputers that support the spectrum of national nuclear security enterprises, including ensuring the safety, security, and effectiveness of the nation’s nuclear

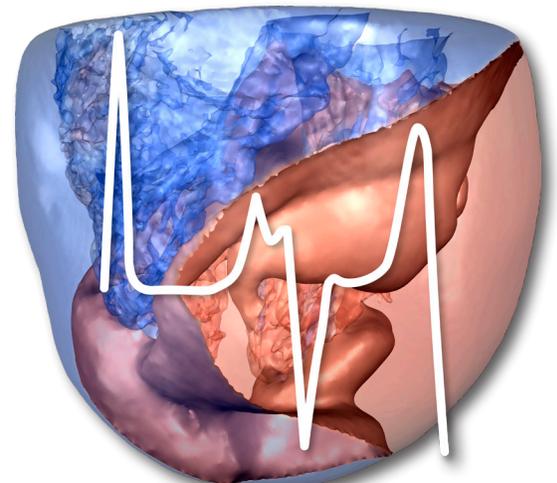
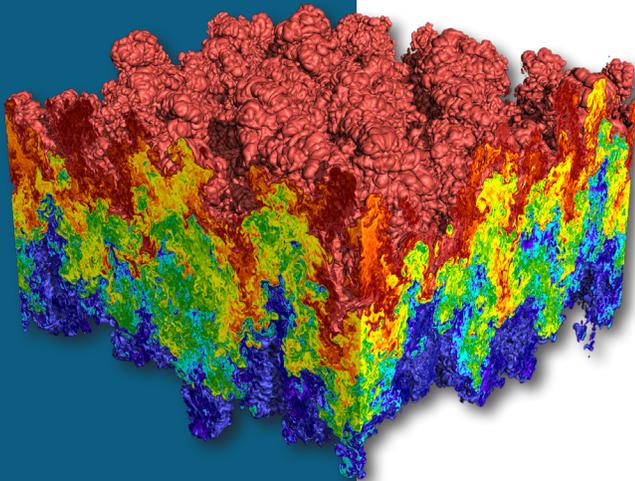
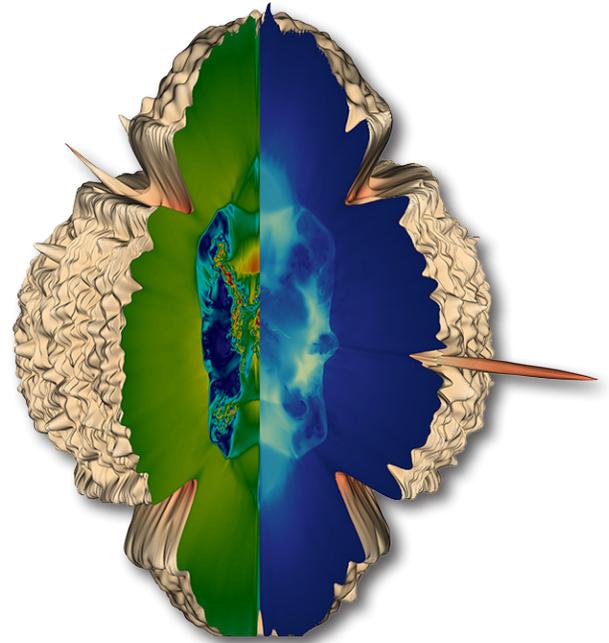
stockpile; investigating weapons’ science, performing modeling experiments, addressing non-proliferation and nuclear counterterrorism, and understanding hydrodynamics. Codes and computers developed by the weapons laboratories have been applied to other areas of national security, including projects for the Department of Energy, Department of Defense, and Homeland Security. Finally, HPC at LLNL spans a myriad of scientific and technical applications, including human health, energy and climate, and industry.

Accurate prediction of the behavior of any complex system, be it the human heart, the climate, or a combustion

engine, benefits from exascale and super-exascale capabilities. Adding B654 to the LCC helped LLNL to deliver on its national security mission and support of scientific research, and its expansion will accelerate a broad array of scientific research.

### SIMULATIONS

TOP RIGHT: Inertial Confinement Fusion capsule at peak compression. CENTER: Rayleigh-Taylor instability growth. BOTTOM RIGHT: Simulation of electrical propagation in the human heart.



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LIVERMORE WEB SITE:  
[HTTPS://ASC.LLNL.GOV/](https://asc.llnl.gov/)