Lawrence Livermore National Laboratory is home to the National Ignition Facility (NIF).

NIF’s 192 powerful laser beams, housed in a 10-story building the size of 3 football fields, can deliver nearly 2 million joules of ultraviolet laser energy in billionths-of-a-second pulses to the Target Chamber center. When NIF’s laser beams focus all of their energy on a target the size of a pencil eraser, they briefly produce extraordinary temperatures and pressures inside the target.

NIF’s chief goal is to conduct scientific research to help further our nation’s security, including ensuring the safety and reliability of the nuclear stockpile. But the laser facility also plays a vital role in understanding the universe and achieving nuclear fusion and ignition. When fired, the laser energy creates pressures and temperatures so intense that hydrogen atoms inside the target fuse—a process that mimics what occurs constantly inside the Sun and stars. Ignition will be achieved when the reaction releases as much or more energy than the energy lost in creating the reaction.

The powerful laser energy that bombards a NIF target begins as an initial laser beam that is too weak to power a single light bulb. The energy must be amplified a quadrillion times as the beams journey to the Target Chamber. The diagram illustrates the components that create, guide, amplify, and interact with the laser energy as it travels through NIF.

Learn more about how NIF works at lasers.llnl.gov

Lasers are used to support national security.

NIF is the world’s largest and most energetic laser.

NIF is a national resource—
a unique experimental facility addressing compelling national security, science, and energy missions.

Using Science to Support National Security

NIF is a national resource—a unique experimental facility addressing compelling national security, science, and energy missions.
NIF’s massive target chamber
192 laser beams enter through the square openings.

Thank you for visiting NIF

The National Ignition Facility (NIF) is the world’s largest and highest-energy laser system. By providing the capabilities to achieve fusion ignition and burn in a laboratory setting, NIF is a critical experimental facility for the National Nuclear Security Administration’s Stockpile Stewardship Program and is a key international scientific resource. NIF is used to understand issues about high energy density science and to explore aspects of astrophysics, material science, plasma physics, and many other areas of Discovery Science.

Additional information is available on the NIF & Photon Science web site at lasers.llnl.gov.

Please enjoy,

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Principal Associate Director
NIF & Photon Science