



# NEWS

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## **National Ignition Facility Sets World Record for Laser Performance**

LIVERMORE, CA – The National Nuclear Security Administration’s (NNSA) National Ignition Facility (NIF) at Lawrence Livermore National Laboratory recently produced 10.4 kiloJoules (kJ) of ultraviolet laser light in a single laser beamline, setting a world record for laser performance.

In recent weeks NIF laser scientists have also used the first four NIF beam lines to set records for infrared and green single beam laser energies with 21 kJ and 11 kJ of energy delivered, respectively. NIF researchers focused this light into a special diagnostic system designed to provide precise measurements of laser beam quality and performance at these different frequencies. The NIF laser system has now demonstrated ultraviolet laser energy equivalent to 2 million Joules (MJ) in 192 beams. This “full NIF equivalent” performance exceeds the design requirement of 1.8 MJ specified for NIF.

NNSA Administrator Linton Brooks said, “The NIF project has demonstrated excellent management and technical performance under very demanding circumstances. NIF continues surpassing expectations and is now breaking world records. It is well on its way to becoming one of the jewels of NNSA and the nuclear weapons complex.”

NIF Associate Director George Miller agreed, saying, “We have met or exceeded all current required milestones in the baseline established three years ago. We have now demonstrated on a per-beam basis the critical performance criteria of NIF. These accomplishments show that NIF is ready to fulfill the promise of its vital role in maintaining the viability of U.S. nuclear deterrent through the Stockpile Stewardship Program.”

NIF’s football stadium sized building will house 192 laser beams delivering ultraviolet laser light to millimeter-sized targets. The tremendous energy available in NIF can be used to produce conditions of extreme temperature and pressure, similar to those that occur in stars and in exploding nuclear weapons. NIF will also be used to achieve inertial confinement fusion ignition with energy gain, which will provide researchers with a better understanding of the processes that occur in nuclear weapons and will provide valuable data for future fusion energy power production.

When fully activated, NIF will provide 50 times more energy than any other laser system and will be a cornerstone of the NNSA’s Stockpile Stewardship Program without underground nuclear testing.

In the process of achieving this current milestone the NIF research team has met or exceeded a number of critical performance criteria including:

- Demonstration of 0.2 to 25 nanosecond shaped pulses
- Less than five hours between shots (providing capability for more than 700 laser shots per year)
- Better than required beam uniformity
- Beam relative timing to 6 picoseconds (trillionths of a second)

The achievement of this milestone and demonstration of NIF performance criteria continue a string of successes that have taken place in the past six months on NIF. The successful completion of this activity required the efforts of hundreds of workers in disciplines ranging from construction to precision optics. In the process all of the major systems required to demonstrate the operation of NIF were installed, activated, and commissioned to NIF specifications.

In the coming year NIF project personnel will use these first laser beams to characterize NIF's performance and to begin basic and applied science experiments. Experiments are planned to be fielded on NIF starting this year and will continue while the project is completed. Experimental capabilities will grow as additional laser beams are activated, culminating in the completion of all 192 laser beams in 2008.

NIF also continues to make significant progress in producing laser beams with significantly more energy sooner than scheduled, reaching milestones ahead of schedule and earning the high marks in a report recently released by the Department of Energy's Inspector General. The nine-page *Status of the National Ignition Facility Project* audit report says NIF administrators have instituted management controls that have kept the facility within cost baselines and able to meet and exceed its federally-mandated milestone dates.

NNSA is a semi-autonomous agency of the Department of Energy. It enhances U.S. national security through the military application of nuclear energy, maintains the U.S. nuclear weapons stockpile, promotes international nuclear non-proliferation and safety, reduces global danger from weapons of mass destruction, provides the U.S. Navy with safe and effective nuclear propulsion, and oversees national laboratories to maintain U.S. leadership in science and technology.

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