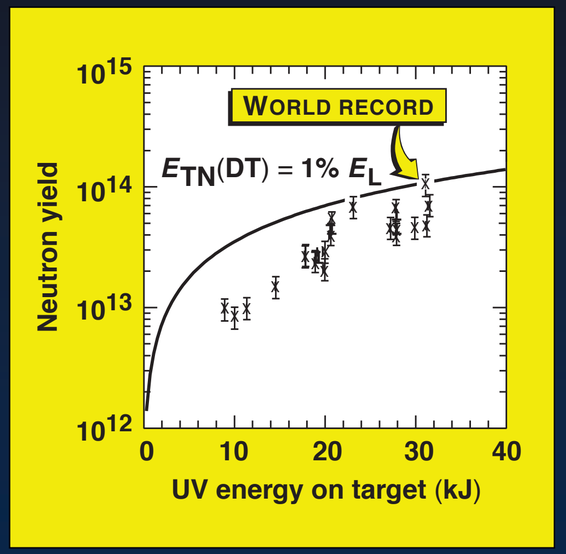
1996

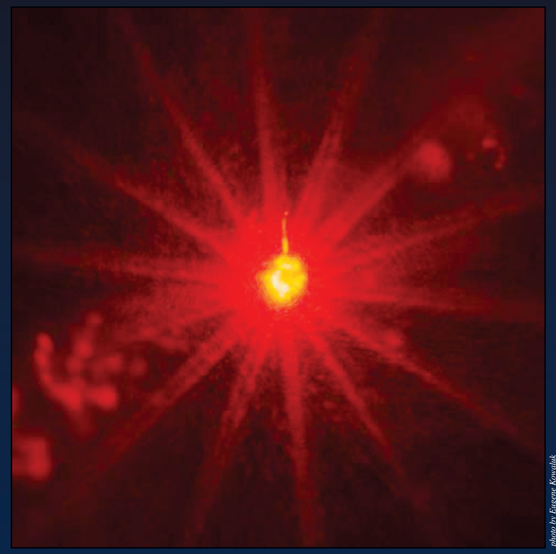
World-Record Laser-Fusion Neutron Yield Recorded



Neutron yield record

On 19 January 1996, an OMEGA direct-drive, high-yield target attained the highest recorded neutron yield to date on a laser ICF experiment 1.32×10^{14} (fusion energy release of 1.1% of the on-target laser energy).

OMEGA 60 Beam Becomes Fully Operational



OMEGA 60 Target Shot

Beginning in FY96, OMEGA began to provide shots, for indirect drive and other high-energy-density–physics experiments from the national laboratories (LLNL, LANL, and SNL). Two weeks of experiments were performed in June 1996 to demonstrate the utility of OMEGA for indirect drive. This campaign involved researchers from LLNL, LANL, and LLE. The main objective of these experiments was to verify the ability of the OMEGA system to perform hohlraum experiments, to reproduce results obtained with the Nova laser, and to demonstrate new capabilities not available on other lasers. All of these objectives were met.

These experiments took advantage of key capabilities added to the upgraded OMEGA including a new pulse-shaping system and a ten-inch diagnostic manipulator (TIM). The experiments were the first on OMEGA to simultaneously use three framing cameras. Most of these experiments were carried out using 1-ns square pulses, with 500 J per beam delivered to the target.

LLE Receives *Popular Mechanics* Award

Popular Mechanics Design and Engineering Award

LLE received the Popular Mechanics Design and Engineering Award for the OMEGA Laser System. Here is the write up that appeared in the January 1996 Popular Mechanics:

OMEGA LASER SYSTEM
Laboratory for Laser Energetics,
The University of Rochester

> *The world's mightiest laser. The Ultimate in ultraviolet light. Those are some of Omega's credentials. The Omega Laser System, in its entirety, is larger than a football field—and its pulse of light packs more power than the entire U.S. electrical grid at any given moment in time. Because Omega is a nuclear-fusion laser, its beams converge on a pellet of hydrogen fuel, heating and compressing it to duplicate conditions inside the Sun. Not some "Star Trek" superweapon, Omega will play a key role in our quest to develop nuclear fusion as a reliable energy source that all of the U.S. may eventually tap into.*

W. Oldham, "1996 Design and Engineering Awards," Popular Mechanics, January 1996, 45.

Hohlraum Targets

Hohlraum target

Hohlraum targets were used during a proof-of-principle series of indirect-drive experiments conducted in the summer of 1996. The "scale-one," thin-wall, Nova-type hohlraum target consists of a 100-μm-thick epoxy cylinder coated on the inside with 2 μm of gold. The cylinder is 2100-μm long and 1600-μm wide and has a 2100-μm-diam entrance hole. The thin attachment on the top is an alignment fiducial. This campaign, in which 42 high-quality shots were taken over a two-week period, validated the use of OMEGA for indirect-drive experiments.