

National Ignition Facility fires record laser shot

Powerful pulse a milepost on the way to fusion energy.

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The world's largest laser has just put a little more zing in its zap. On 15 March, the 192 laser beams of the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory in Livermore, California, fired a record 1.875-megajoule shot into the laser's target chamber, surpassing its 1.8-megajoule design specification. The shot, which was just a demonstration and did not incorporate a target, nonetheless represents a milepost in an effort to get past the break-even point — ignition — in coaxing fusion energy from a tiny frozen fuel pellet.

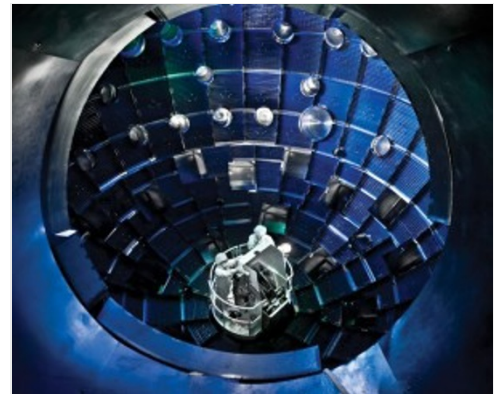
"It's a remarkable demonstration of the laser from the standpoint of its energy, its precision, its power, and its availability," says Ed Moses, NIF director. He adds that the shot was 2.03 megajoules after passing through the final focusing lens — making the NIF the world's first 2-megajoule ultraviolet laser. Final diagnostic and other optics reduced the energy to 1.875 megajoules at the centre of the target chamber.

Most of the NIF's recent shots have maxed out at 1.6 megajoules. As recently as December, the team was still only 10% of the way towards creating the overall conditions for ignition. Moses declined to say when he will test the 1.875-megajoule capability on a target, but he says that the extra energy will allow more leeway in target designs. He adds that the damage on the laser optics was less than models predicted, and that the laser was able to fire another shot about 36 hours after the record-breaking one.

Riccardo Betti, director of the Fusion Science Center at the University of Rochester in New York, says that the shot represents a "great performance" from the laser, but that it is unclear what effect the extra energy will have on the tiny, carefully designed targets. "The laser has been pretty much the star of the campaign — more so than the targets," he says.

The NIF is racing to achieve ignition before the end of the fiscal year, when a two-year ignition campaign ends. A larger question for the field of laser fusion is [who will support it as a possible energy source](#). The construction and operation of the NIF has been supported by the US Nuclear Weapons Complex, which uses the facility to test the physics of nuclear bombs, and the US Department of Energy's fusion-energy budget goes almost entirely to an alternative approach that uses magnets rather than lasers to induce fusion.

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Lawrence Livermore National Laboratory

The National Ignition Facility has unleashed the world's most powerful laser shot.