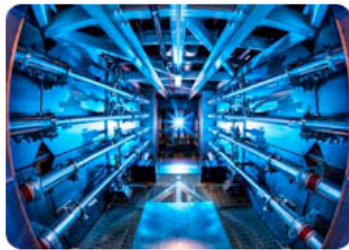


LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, July 9-13, 2012

'WATTS' NEW? NIF MAKES HISTORY



The preamplifiers of the National Ignition Facility are the first step in increasing the energy of laser beams as they make their way toward the target chamber. NIF recently achieved a 500 terawatt shot - 1,000 times more power than the United States uses at any instant in time.

Lawrence Livermore's National Ignition Facility (NIF) made history recently when the laser system of 192 beams delivered more than 500 trillion watts (terawatts) of peak power and 1.85 megajoules of ultraviolet laser light to its target.

Five hundred terawatts is 1,000 times more power than the United States uses at any instant in time, and 1.85 megajoules of energy is about 100 times what any other laser regularly produces today.

The shot validated NIF's most challenging laser performance specifications set in the late 1990s at the planning stages for the world's most energetic laser. This means that 15 years of hard work by the NIF team has paid off with an historic record-breaking shot.

"NIF is becoming everything scientists planned when it was conceived over two decades ago," NIF Director Edward Moses said.

To read more, go to LLNL.



Daniel Casey

Daniel Casey may be on the road to fusion. In 2010 after much preparation, Casey and an MIT team ran an experiment that used the Lawrence Livermore National Ignition Facility (NIF) to strike a millimeter-sized target, in less than a second.

Casey is now a postdoc in MIT's Plasma Science and Fusion Center.

He recalls: "You heard a little pop, but there was no other sight or sound in the control room." Yet if the moment itself proved an anticlimax, the experiment has paid off in spades, yielding data that has opened a window onto extreme conditions found nowhere else on Earth, and starting a new chapter in high energy density physics.

Casey has devoted his graduate and post-graduate years to designing and refining research related to the NIF, whose goals include reproducing the intense temperatures and pressures inside stars, and illuminating their vast energy-generating processes.

In a word, he's on his way to creating a little star on Earth.

To read more, go to [Nano Patents and Innovation](#).



Laboratory Director Parney Albright (left) and NASA Ames Research Center Director Pete Worden sign a formal agreement calling for collaboration on matters of national interest, including space missions, energy and advanced computing.

Lawrence Livermore and NASA's Ames Research Center (ARC) in Mountain View, have struck up a partnership that could be out of this world.

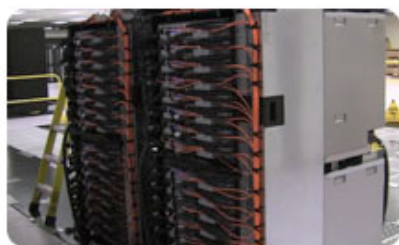
Lab Director Parney Albright and ARC director Pete Worden signed an agreement in Livermore recently. In addition, they heard from several researchers whose work could immediately benefit from the collaboration.

By sharing technology and resources, the partnership could assist space missions, energy and advanced computing.

Areas of joint interest include tracking orbiting space debris and using complex computer models to look at the feasibility of using lasers to nudge orbiting debris out of a collision course with spacecraft .

To read more, go to [Space Ref.](#)

WIRED GOING INTO BUSINESS



The first two racks of Vulcan have been installed. It will be open for business by early 2013.

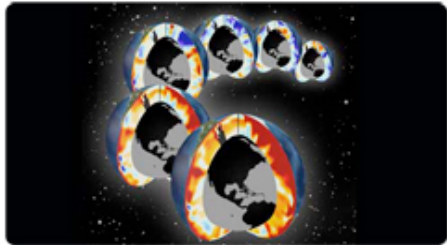
Lawrence Livermore is now home to Sequoia, a classified supercomputer and the most powerful in the world.

Only a few feet away is the future home of Sequoia's sibling -- Vulcan. The difference is that this computer is not for classified information and can be used by anybody.

This is all part of a new program at the Lab called Deep Computing Solutions, where big computer simulations will be made available to companies.

When Vulcan is up and running in 2013, businesses will be able to use its power -- all five petaflops, or five quadrillion calculations per second -- a capability that makes it No. 4 on today's list of the world's most powerful computers.

To read more, go to [Wired](#).



Pacific and Atlantic Ocean zonal average cross sections (surface to 700 meters) of temperature changes for 1955 to 2011. Each globe represents a decadal average. The foreground is the most recent decade and preceding decades are in the background. Red represents warming ocean, white no change, and blue for cooling with respect to a 1957-1990 average.

The world's oceans are warming up, and humans are the primary cause, according to a new report by a team of scientists at the Lab.

The research shows that the simultaneous warming of the upper layers of all seven seas over the past 50 years cannot be explained by natural events alone.

The scientists' computer modeling shows that human changes to the environment, such as observed increases in greenhouse gas, are causing the warming of the world's oceans, and as a result, affecting the natural climate cycles.

"We have taken a closer look at factors that influence these results," said Peter Gleckler, a Lawrence Livermore climate scientist and lead author of the new study that appears in the June 10 edition of the journal, *Nature Climate Change*.

"The bottom line is that this study substantially strengthens the conclusion that most of the observed global ocean warming over the past 50 years is attributable to human activities."

To read more, go to [Inhabitat](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the *Livermore Lab Report*, send e-mail.