LAWRENCE LIVERMORE
REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: May 26-June 1, 2009.

National Ignition Facility one step closer to experiments

Rep. Ellen Tauscher, Sen. Dianne Feinstein, UC Regent Chairman Richard Blum, Rep. Zoe Lofgren listen as National Ignition Facility Director Ed Moses explains how NIF operates.

The Lab's National Ignition Facility was officially dedicated Friday before federal, state and Congressional leaders. More than 1,000 invited guests and 2,500 Laboratory employees participated in the event.

California Sen. Dianne Feinstein and local Congressional Reps. Ellen Tauscher (Livermore), Jerry McNerney (Pleasanton) Zoe Lofgren (San Jose) and Gov. Arnold Schwarzenegger were among the special guests at the ceremony. They were joined by UC President Mark Yudof, LLNS Board of Governors Chairman Norm Pattiz, DOE Undersecretary of Science Steve Koonin and NNSA Administrator Tom D'Agostino.

The dedication set into motion the next chapter of one of the country's greatest scientific assets. NIF, the world's highest-energy laser system, consists of 192 laser beams that will focus nearly two million joules of energy and create temperatures and pressures that exist in the cores of stars and giant planets. By harnessing the massive power generated by its lasers, NIF will be able to create conditions and conduct a wide range of experiments never before

possible on earth.

Along with this vital national security mission, NIF also offers the possibility of groundbreaking scientific discoveries in planetary science and astrophysics. By creating the conditions that exist in supernovas, in the event horizons of black holes and in the cores of giant planets, NIF will help unlock the secrets of the cosmos. A large majority of these experiments will be unclassified and will provide a rich source of previously unobtainable data to the world-wide research community.

For more, go to https://publicaffairs.llnl.gov/news/news_releases/2009/NR-09-05-05.html

BBC dives into NIF

NIF can recreate the conditions inside an exploding star.

When the world's most powerful laser facility flicks the switch on its first full-scale experiments this month, a tiny star will be born on Earth.

The National Ignition Facility's (NIF) first goal is to achieve nuclear fusion in the Laboratory, the same reaction at the heart of the Sun, and a potentially abundant, clean energy source for the planet.

In creating fusion, Laboratory scientists can pursue three areas of interest: National security -- to study the conditions that exist in nuclear explosions and the way that nuclear weapons perform; the physics of fusion; and the study of distant phenomena, such as the formation of planets or the violent explosions of supernovae, from the comfort of the lab.

To read more, go to http://news.bbc.co.uk/2/hi/science/nature/8044620.stm

Carbon capture and sequestration hits Montana

The Shand power plant in Estevan, Saskatchewan, Canada.

Montana and Canada have agreed to build North America's first large-scale initiative to capture and store greenhouse gases from a conventional coal-burning power plant, according to the *Billings Gazette*.

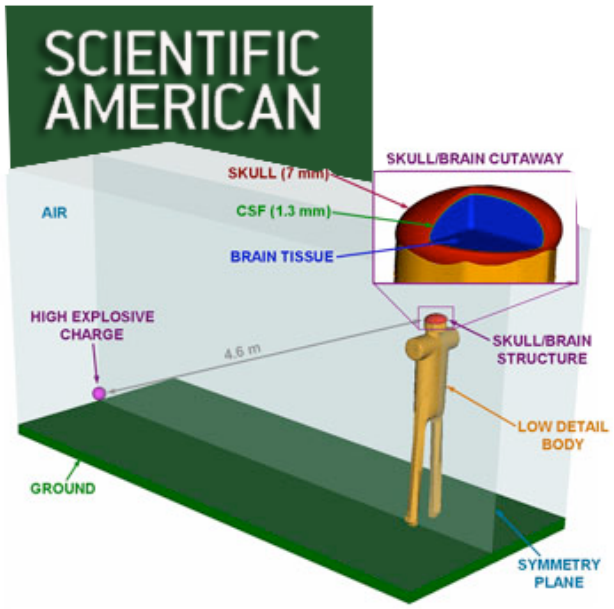
The Montana-Saskatchewan project would capture carbon dioxide from a Canadian power plant and pipe it across the border into northern Montana. The gas would then be pumped into deep geologic formations for storage.

The Lab's Julio Friedmann, head of LLNL's carbon management program, said the project could engender new support for coal, at a time when the "dirty" fuel is under assault.

However, "Coal has a bright future in power generation is North America if carbon capture and sequestration works," he said. The Montana-Saskatchewan project, he said, "will help assess that future quickly."

To read more, go to http://billingsgazette.net/articles/2009/05/08/news/state/49-co2project.txt

Brain injury research blasts into *Scientific American*



It is easy to understand how explosions involving shrapnel -- such as those caused by improvised explosive devices in Iraq -- could cause brain damage. But what about such injuries that seem to be caused by blasts themselves, rather than from being thrown or hit by shrapnel?

Researchers at Lawrence Livermore National Laboratory are using some of the world's most powerful computers to get a better answer. Willy Moss and colleague Michael King used available data on blast waves from explosions and the physical properties of the human skull, brain and cerebrospinal fluid to craft a three-dimensional simulation of a soldier standing less than 15 feet from an explosion of 5 lbs. of C4.

At a recent meeting of the Acoustical Society of America in Portland, Ore., Moss says their simulations suggest that the intense pressures of such blasts flex the skull and ripple the brain. Pressures as little as one atmosphere over normal atmospheric pressure can do that kind of damage.
To read more, go to http://www.scientificamerican.com/blog/60-second-science/post.cfm?id=how-do-explosions-cause-brain-injur-2009-05-22

Future looks bright for NIF in the *Economist*

The National Ignition Facility's target chamber.

What do you get when you focus 192 lasers onto a pellet the size of a match head and press the “fire” button?

The answer is: the most powerful machine on the planet. The National Ignition Facility, which officialy was dedicated Friday, is designed to create conditions like those found in stars -- and also in the explosions of hydrogen bombs.

To do that requires, for the brief instants when it is operating at full tilt (a total of three thousandths of a second a year), that it has a power of 500 trillion watts, about 3,000 times the average electricity consumption of the whole planet.

To read more, go to http://www.economist.com/science/displaystory.cfm?story_id=13726730

Photo of the week

We are family: Family members and guests of Lab employees visited the Laboratory over the weekend during a special open house event.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy's National Nuclear Security Administration.

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 mailto:labreport@llnl.gov.

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