LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: May 18-26, 2009.

New York Times Science Times probes NIF

A cathedral of light is to be dedicated this Friday. "Bringing Star Power to Earth" reads a giant banner that was recently unfurled across a building the size of a football stadium.

New York Times science writer William Broad wrote a feature about the National Ignition Facility that appeared in the Science Times section of the paper on Tuesday.

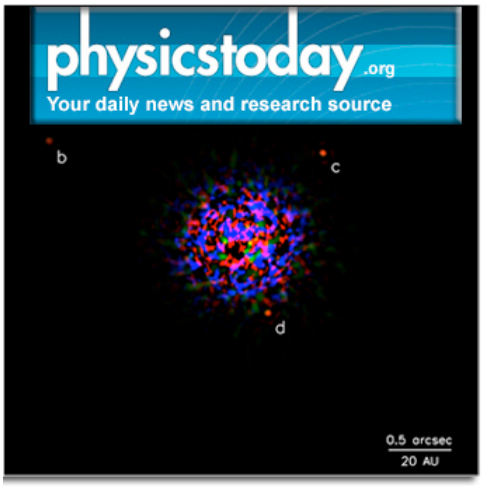
For more than half a century, physicists have dreamed of creating tiny stars that would inaugurate an era of bold science and cheap energy, and NIF is meant to kindle that blaze.

The facility's 192 lasers -- made of nearly 60 miles of mirrors and fiber optics, crystals and light amplifiers -- will fire as one to pulverize a fleck of hydrogen fuel smaller than a match head. Compressed and heated to temperatures hotter than those of the core of a star, the hydrogen atoms will fuse into helium, releasing bursts of thermonuclear energy.

NIF Project Director Ed Moses said that getting to the cusp of ignition had taken some 7,000 workers and 3,000 contractors a dozen years, their labors creating a precision colossus of millions of parts and 60,000 points of control, 30 times as many as on the space shuttle.

To read the complete story, go to http://www.nytimes.com/2009/05/26/science/26fusi.html?_r=1&ref=science

Exoplanets exposed in *Physics Today*



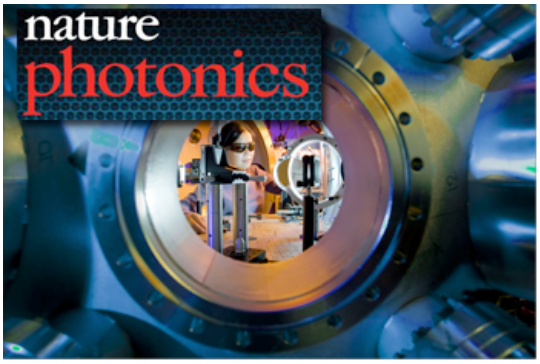
Near-infared images of three planets circling a star 140 light years away.

Since 1995, more than 340 planets around stars other than the sun have been discovered. The variety of methods by which planets beyond our solar system can be found will lead to the detection and eventual characterization of Earth-size bodies orbiting their stars at hospitable distances.

The techniques that have been used to accomplish those discoveries and to study the properties of the exoplanets are based on physical phenomena ranging from the straightforwardly simple -- planets tugging gravitationally at their host stars or blocking their light -- to the subtle general-relativistic effect of gravitational microlensing. But conceptual simplicity doesn't make it any less difficult to detect the tiny periodic effect of an orbiting planet on its host's motion or apparent brightness.

LLNL's Bruce Macintosh, who late last year for the first time took snapshots of a multi-planet solar system orbiting another star, and colleagues describe the variety of methods used to find distant Earthlike planets in a *Physics Today* article. To read more, go to http://ptonline.aip.org/journals/doc/PHTOAD-ft/vol_62/iss_5/46_1.shtml

Anti-matter research matters to *Nature Photonics*



Physicist Hui Chen sets up targets for the anti-matter experiment at the Jupiter Laser Facility.

The News and Views section of *Nature Photonics* recently highlighted LLNL's Jupiter Laser Facility experiments where Hui Chen and her colleagues reported on firing Titan laser pulses onto thin gold targets and creating a high-density positron source, otherwise known as anti-matter.

Her results were the first of 11 references within the *Nature Photonics* article. As the article states "After illuminating a millimeter-thick gold target with short, ultra-intense laser pulses, the researchers detected more than 1 million positrons, implying that in total around 100 billion electron-positron pairs were created in the material at previously unsurpassed densities. This enormous output substantially exceeds the positron yields generated in the laboratory by any other means."

For more, go to http://www.nature.com/nphoton/journal/v3/n5/full/nphoton.2009.56.html

LLNL's Friedmann visits the Commonwealth Club of California

Julio Friedmann, head of the Lab's carbon management program, recently served on a panel entitled "Clean Coal: Myth or Reality?" at the Commonwealth Club of California.

Friedmann begins his discussion talking about how most people don't have a clear idea of the scale of what it means to reduce carbon emissions. Globally, the world emits 32 to 34 billion tons of carbon dioxide a year. A billion tons is twice the mass of all the human beings on earth. So every year, the world emits something like 70 times the mass of all of humanity into carbon dioxide in the atmosphere.

To stabilize atmospheric concentrations at twice the preindustrial concentrations (550,000 parts per million), humans have to stop emitting 32 billion tons of carbon dioxide per year, Friedmann said. "But that still commits us to a very high level of climate change."

"This is not a kid's game," he said. "This is an extremely daunting task and we really need all hands on deck."

To hear the entire panel discussion, go to http://fora.tv/2009/04/28/Clean_Coal_Myth_or_Reality

Futuristic hand-held device could treat traumatic injuries

The pneumothorax detector

Emergency medical technicians will soon be testing a hand-held device right out of the future. Instead of X-rays, it uses radar to examine the lungs.

Instead of looking at X-ray film, EMTs will look at a screen: a simple diagnosis for pneumothorax, a life-threatening traumatic injury.

"A pneumothorax is an air gap between the chest wall and the lung," explains John Chang of LLNL who helped develop the miniature scanner. "The challenge in the field for field diagnosis of a life-threatening pneumothorax, is that you cannot determine it until the very end stage, when the person is about to die."

Chang works in search and rescue but also leads the group at LLNL that developed this miniature scanner.

To watch the story that aired on ABC, go to http://abclocal.go.com/kgo/story?section=news/drive_to_discover&id=6817696

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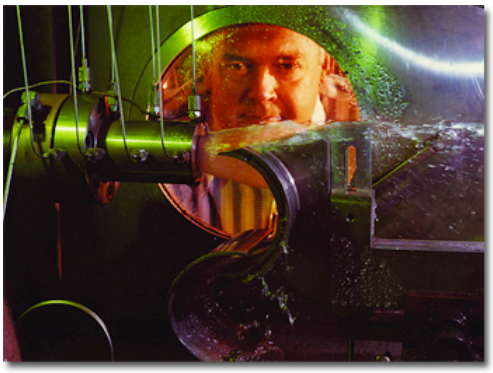
Photo of the week



Hot stuff: A Laboratory technician peers at an experimental apparatus used to analyze nozzle and turbine-blade designs. A geothermal turbine was developed at Livermore for generating energy using the flow of liquid and vapor from geothermal wells. Researchers tailored nozzles and turbine blades for maximum efficiency and operation in hot, corrosive brines.

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