

LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: March 30-April 6, 2009.

DOE certifies NIF completion; laser now operational



The National Ignition Facility

The Department of Energy last week announced that the National Nuclear Security Administration (NNSA) has certified the completion of the historic effort to build the world's largest laser -- the National Ignition Facility.

NIF is expected to allow scientists to achieve fusion ignition in the laboratory, obtaining more energy from the target than is provided by the laser. The completion of the project opens the door to scientific advancement and discovery that promises to enhance national security and could help break America's dependence on foreign oil.

With NIF, scientists will be able to evaluate key scientific assumptions in current computer models, obtain previously unavailable data on how materials behave at temperatures and pressures like those in the center of a star, and help validate NNSA's supercomputer simulations by comparing code predictions against observations from laboratory experiments.

Because of its groundbreaking advance in technology, NIF also has the potential to advance fusion energy technology, which could be an element of making the United States energy independent.

To read more, go to https://publicaffairs.llnl.gov/news/news_releases/2009/NR-NNSA-09-03-06.html

Reporter Bob Woodruff takes a look at NIF



The National Ignition Facility target chamber

ABC reporter Bob Woodruff profiled the National Ignition Facility on the program "Focus Earth" that recently aired on the Discovery Channel's Planet Green network.

The program focuses on California as leading the country in clean energy.

NIF is featured as the next generation of clean technology. It doesn't capture the sun as in solar energy, but instead recreates the sun in the laboratory by creating fusion.

The program features an interview with NIF director Ed Moses who talks about using hydrogen in water as the fuel to create fusion. "It's essentially limitless and it's clean, releasing no carbon," he said.

To view the program, go to

https://newsline.inl.gov/_rev02/articles/2009/apr/planetgreen_nif_28mar2009.mov

Healing heart attack victims, one cell at a time



By measuring the amount of carbon-14 in the atmosphere from above-ground nuclear testing in the '50s and '60s that is deposited in DNA, researchers have determined that cells in the human heart develop into adulthood.

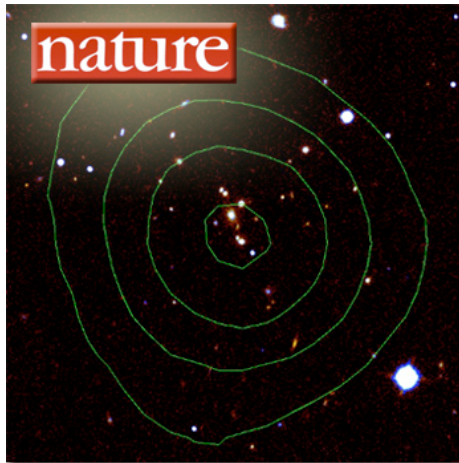
But as humans age, the percentage of new heart cells decreases markedly. By age 25, renewal of heart cells gradually decrease from 1 percent turning over annually to .45 percent by the age of 75. About 50 percent of the heart cells a human is born with will regenerate during a lifetime.

Myocardial damage often results in chronic heart failure because of the loss and insufficient regeneration of heart cells. But this new finding may mean that patients, who have suffered myocardial damage as a result of a heart attack.

Laboratory scientist Bruce Buchholz with colleagues from the Karolinska Institute, Université Claude Bernard Lyon, Lund University and Lund University Hospital, found that cells in a human heart can develop into adulthood and the age of heart cells is, on average, six years younger than the individual. Using the Laboratory's Center for Accelerator Mass Spectrometry, Buchholz measured the amount of carbon-14 in DNA to establish the age of cardiomyocytes (cardiac muscle cells) in humans.

The research appeared in last Friday's (April 3) edition of the journal, *Science*. To read more, go to <http://www.sciencemag.org/cgi/content/full/sci;324/5923/98>

Brightest galaxies burst into existence



An infrared image of a galaxy cluster seen at a distance corresponding to 65 percent back to the Big Bang.

Contrary to popular belief, the stellar mass of the largest galaxies, called brightest cluster galaxies, experienced an early period of rapid growth 9 billion years ago, some 4 billion years after the Big Bang.

In fact, the galaxies achieved more than 90 percent of their final stellar mass at the time they were observed, and are not significantly different from their stellar mass today.

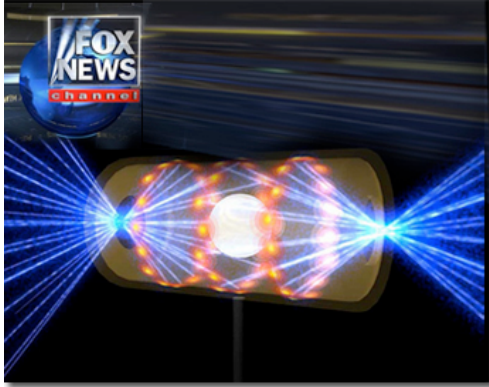
The scientific consensus is that galaxies began as small density fluctuations in the early universe and gained most of their weight more recently by swallowing up other galaxies that came too close. Stars begin to form relatively quickly within sub-galactic sized building blocks, which are subsequently assembled into galaxies. But exactly when this assemblage takes place has stumped the scientific community.

But new research by an international team of astronomers including Adam Stanford of Lawrence Livermore National Laboratory shows a new picture of galaxy assembly in which Bright Cluster Galaxies (BCG) experience an early period of rapid growth rather than a prolonged hierarchical assembly.

To read more, go to

<http://www.nature.com/nature/journal/v458/n7238/full/nature07865.html>

Fox News highlights NIF completion



Fox News recently aired a story on the Lab's National Ignition Facility. The host mentions that laser beams are the holy grail of clean energy.

NIF is the largest experimental science facility and home of the world's most powerful laser. The story goes on to explain how scientists plan to create fusion for the first time in the laboratory. Experiments are scheduled to begin in June.

NIF Director Ed Moses is featured on the program.

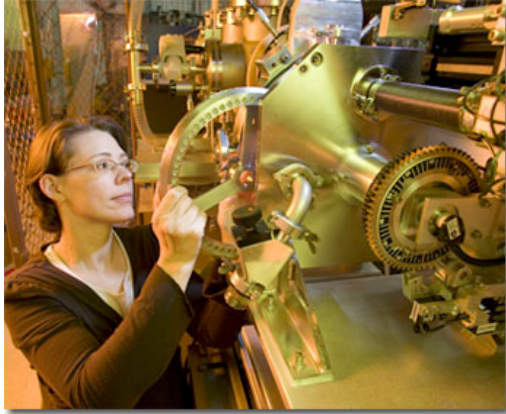
To see the story, go to https://newsline.llnl.gov/_rev02/articles/2009/apr/fox_nif-complete_01apr2009.mov

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Newsline provides the latest Lab research and operations news. See the most recent issue at https://newsline.llnl.gov/_rev02/index.php

Photo of the week



Load 'em up: Susan Zimmerman, a postdoctoral student, loads a sample of sediment in the Lab's large accelerator for mass spectrometry (AMS). The AMS uses isotopic ratios of carbon-14 to date the samples. Zimmerman and colleagues are studying records of drought over the last several thousand years preserved in California lakes.

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