

LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: May 11-18, 2009.

Livermore takes big step toward faster chips



A team of scientists and engineers from the Laboratory, Stanford and the University of Florida is the first to create one of two basic types of semiconductors using an exotic, new, one-atom-thick material called graphene.

The new research could help open the door to computer chips that are not only smaller and hold more memory -- but also are more adept at uploading large files, downloading movies and other data- and communication-intensive tasks.

Though the team admits there are still hurdles to overcome, they are hopeful this will lead to a new chip.

To read more, go to <http://www.sciencedaily.com/releases/2009/05/090507141355.htm>

Murray accelerates into the future



Ted Ognibene analyzes data at the Lab's NEC 1 MV tandem accelerator at the Center for Accelerator Mass Spectrometry (CAMS).

The Lab's Cherry Murray, principal associate director of Science and Technology and president of the American Physical Society, recently wrote an article for *Physics Today* about the future of accelerator science.

She discusses how accelerator science isn't just for high-energy physics and nuclear physics anymore. It goes beyond the two and into other areas of sciences, as well as medicine and industry.

Of the 35,000 researchers involved in accelerator science around the world, some 12,000 are based in the United States, working in 20 different fields with a growing number of users from industry.

To read more, go to https://publicaffairs.llnl.gov/news/lab_report/refs/PW_llnl_report.pdf

BBC lunges into the National Ignition Facility (BBC logo and NIF photo)



NIF's target chamber

The search for a clean source of energy to power the world's cities has never seemed more urgent.

But at Lawrence Livermore, scientists are reaching for the stars. The extreme heat and pressure at the center of a star causes atoms to fuse together and creates vast amounts of energy.

Otherwise known as nuclear fusion, LLNL is on the verge of creating a tiny star with a burst of laser light. But that tiny star will consist of density, temperature and pressure conditions hotter than the inside of the sun and that is when fusion happens.

Ed Moses, program director for the National Ignition Facility, calls it a game-changing technology, with limitless amounts of energy that is all carbon free.

To see the BBC video, go to

http://news.bbc.co.uk/1/hi/programmes/world_news_america/8035099.stm

Lab is *Wired* to atmospheric modeling



Maureen Alai, Ron Baskett and Matthew Simpson of the National Atmospheric Release Advisory Center (NARAC) at the Lab monitor gases emitted from Kilauea, the youngest and southeastern most volcano on the big island of Hawaii.

With this year being the 30th anniversary of the Lab's National Atmospheric Research Advisory Center (NARAC), *Wired* used the opportunity to take a look at the Lab's response to the Three Mile Island accident in 1979.

Though the limits of data collection and computation made precise predictions difficult, Lab scientists were on hand to respond to the incident. Using the latest meteorological data, this team of scientists cranked out calculations to produce a rudimentary model of the release from the incident and the danger zones.

Today, NARAC is an internationally known facility that provides computer modeling and expert staff that can map the probable spread of hazardous material accidentally or intentionally released into the atmosphere. NARAC uses near-real-time access to global meteorological data to produce three-dimensional atmospheric plume model predictions in minutes.

To read more, go to <http://www.wired.com/wiredscience/2009/05/threemile/>

***San Francisco Business Times* takes a look into NIF**



This artist's rendering shows a National Ignition Facility target pellet inside a hohlraum capsule with laser beams entering through openings on either end.

Though scientists have said nuclear fusion will be achieved in 50 years, it's always 50 years away no matter what year it is.

But for Ed Moses, director of the National Ignition Facility, Lawrence Livermore is on the verge of it.

After 12 years of construction on the NIF, scientists are attempting to create fusion by squashing together heavy isotopes of hydrogen with 192 lasers that converge to become the world's largest and highest energy laser beam. The reaction will fuse together hydrogen atoms to create helium, spinning off neutrons in the process at more than 100 million degrees Celsius. It is the same reaction that occurs at the center of the Sun.

The heat would be harnessed to make steam for electrical generating turbines.

The *San Francisco Business Times* recently published a feature on NIF. To read more, go to https://publicaffairs.llnl.gov/news/lab_report/refs/SF_Business_Times.pdf

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Photo of the week



"Livermore, we're near ignition": Scientists in the control room of the National Ignition Facility test the instruments to make sure they are in working order. The design of the control room is based on the NASA control room for space missions. NIF is scheduled to be officially dedicated on May 29 with ignition expected in 2010.

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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