

LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: June 16-June 23, 2008.

Oceans rising faster than previously thought



Melting glaciers are contributing to rising sea levels.

New research suggests that ocean temperature and associated sea level increases between 1961 and 2003 were 50 percent larger than estimated in the 2007 Intergovernmental Panel on Climate Change report.

The results are reported in the June 19 edition of the journal *Nature*. An international team of researchers, including Lawrence Livermore National Laboratory climate scientist Peter Gleckler, compared climate models with improved observations that show sea levels rose by 1.5 millimeters per year in the period from 1961-2003. That equates to an approximately 2.5-inch increase in ocean levels in a 42-year span.

"This is important for the climate modeling community because it demonstrates that the climate models used for assessing sea-level rise and ocean warming tie in closely with the observed results," Gleckler said.

For more on the report, see https://publicaffairs.llnl.gov/news/news_releases/2008/NR-08-06-07.html

Climate papers recognized as 'classics'



LLNL research papers are among three of 20 named "classic" science papers related to human-caused climate change through the year 1995.

The list, available on NSDLWiki, was based upon an examination of papers written between the years 1824 and 1995. NSDLWiki is a branch of the National Science Digital Library (NSDL).

Two of the LLNL papers are the most recent of the selected group of papers and a third comes in at No. 15.

The LLNL papers recognized are:

- "Interpretation of Cloud-Climate Feedback as Produced by 14 Atmospheric General Circulation Models," *Science*, 245, 513-516. This paper was the first major model intercomparison performed by the Lab's Program for Climate Model Diagnosis and Intercomparison. The research was actually done before PCMDI was formally established. LLNL researchers Gerry Potter and Karl Taylor are included among the co-authors.
- "Toward the Detection and Attribution of an Anthropogenic Effect on Climate," *Climate Dynamics* 12, 77-100. This paper, with LLNL scientist Ben Santer as lead author (Taylor was a co-author), led to the 1995 Intergovernmental Panel on Climate Change conclusion: "The balance of evidence suggests a discernible human influence on global climate."

- "Carbon Dioxide and Climate: A Scientific Assessment," Washington D.C., National Academy of Sciences, in which LLNL scientist Cecil "Chuck" Leath was a co-author.

All articles may be accessed on the NSDL Website,
<http://wiki.nsdsl.org/index.php/PALE:ClassicArticles>

Chip of the future



The EUVL laboratory

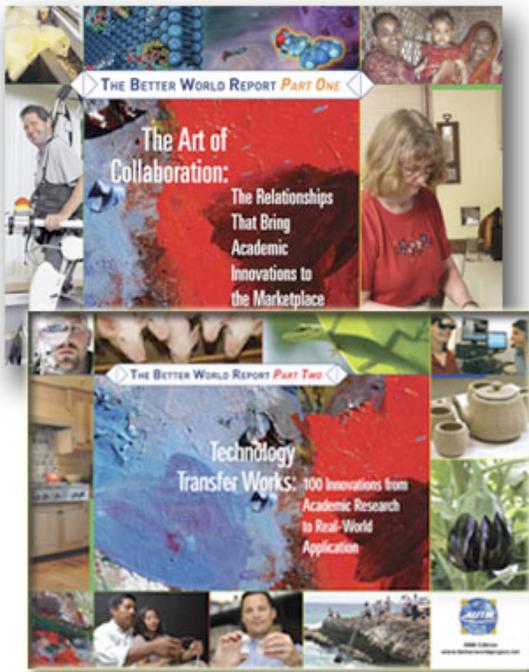
A new way of manufacturing computer chips, developed in large measure by researchers from Lawrence Livermore, Lawrence Berkeley and Sandia national laboratories, has won an important endorsement, according to *EE Times*.

Taiwan Semiconductor Manufacturing Company has taken new a position on extreme ultraviolet lithography (EUVL) and provided backing. It has placed both EUVL and maskless lithography on its roadmap for producing 15-nanometer and perhaps 22-nanometer feature-size computer chips in the future. (Currently, semiconductor manufacturers are producing computer chips with 45-nanometer feature sizes).

The EUVL technology offers the potential to manufacture computer chips with dozens of times more speed and hundreds of times more memory than today's integrated circuits.

For more on EUVL, see https://newsline.llnl.gov/articles/2008/jun/06.20.08_euwl.php

Lab technologies for a 'Better World'



Two Livermore Lab technologies that have been transferred to U.S. companies through industrial were featured in the 2008 issue of *The Better World Report*, a publication of The Association of University Technology Managers (AUTM).

In part one of the report, "The Art of Collaboration: The Relationships That Bring Academic Innovations to the Marketplace," LLNL's licensee UltraCell and the portable power source technology were highlighted. UltraCell is making the world's first micro-scale fuel cells, based on LLNL technology. The fuel cells run on clean energy methanol and due to their compact size, are highly portable.

The fuel cell delivers up to 25 watts of continuous maximum power, weighs 2.7 lbs. and is about the size of a hardback book. It can serve as a power source for computing, communications and sensing devices used in critical mobile and remote operations.

In part two of the report, "Technology Transfer Works: 100 Innovations From Academic Research to Real-World Application," LLNL's licensee Cepheid and the automated technology that speeds DNA identification from several hours to several minutes also were highlighted.

AUTM launched *The Better World Report* in 2005 to promote public understanding of how academic research and technology transfer have changed our way of life and made the world a better place.

For more on the report, see <http://www.betterworldproject.net/reports.cfm>

Plasma paper a physics heavyweight



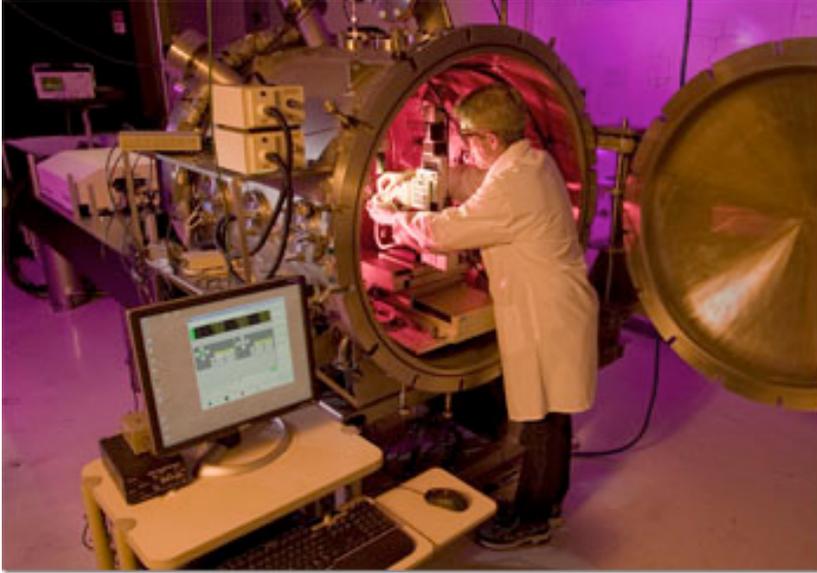
LLNL physicist and Edward Teller Fellow Dmitri Ryutov.

LLNL physicist and Edward Teller Fellow Dmitri Ryutov was recently notified by the publisher of *Plasma Physics and Controlled Fusion* journal that his paper, "Using Plasma Physics to Weigh the Photon," has been downloaded "an exceedingly large number of times" since being published online.

The photon is the elementary particle responsible for electromagnetic phenomena. It is the carrier of electromagnetic radiation of all wavelengths, including gamma rays, X-rays, ultraviolet light, visible light, infrared light, microwaves and radiowaves.

Ryutov's paper was originally presented at the 34th European Physical Society (EPS) Conference on Plasma Physics last July; it was published in December and has since been downloaded more than 200 times.

Photo of the week



Better science through femtoseconds -- Lawrence Livermore researcher Jerry Benterou works on the Femtosecond Laser, which can be used to machine high explosives for experiments at the Lab's High Explosives Applications Facility or HEAF. The laser provides pulses at billionths of one millionth of a second (by comparison a femtosecond is to a second what one second is to approximately 32 million years). The laser allows scientists to gain insight into the fields of materials science and plasma physics, and is one the Lab's many tools to verify the safety and reliability of the U.S. nuclear weapons stockpile.

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>.

**The Livermore Report archive, including today's issue, is available at:
https://publicaffairs.llnl.gov/news/lab_report/2008index.html**