LAWRENCE LIVERMORE
REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Aug. 17-24, 2009.

NIF is on the *Brink* of fusion

For decades, scientists have dreamed of recreating the power of the stars, otherwise known as nuclear fusion, right here on earth.

But hurdles exist, such as creating fusion that uses less energy than it produces and doing so in a safe, controlled environment.

But Lawrence Livermore scientists are on the brink of creating their own miniature stars at the National Ignition Facililty. Fusion experiments are set to begin in 2010.

To see more, go to https://publicaffairs.llnl.gov/news/lab_report/2009/aug/brink_nif_17aug2009.mov

The pros of proton therapy

New research being developed at the Laboratory, which could reduce the size of proton accelerator machines from that of a football field to that of a traditional X-ray machine, could soon make proton therapy more accessible to all.

Better-known X-ray radiation goes all the way through the body and can cause healthy cell death, which could be catastrophic depending on where the tumor is located, like near the spinal cord, neck or the sacrum. Proton therapy is different because the proton beam can be controlled to go only as deep as the tumor, precisely targeting it without damaging the surrounding healthy cells and, therefore, causing fewer side effects.

With only six proton centers in the United States and 25 to 30 centers in the world, most doctors don't readily recommend the treatment. In addition to their size, proton accelerator machines are up to three stories high and can cost $100 million to build.

But Lawrence Livermore's research, spearheaded by radiation therapy company TomoTherapy, could soon change this.

For more, go to http://news.cnet.com/8301-27083_3-10310349-247.html

***Nature* news tackles nanowires**

An artist's representation of a nanoelectronic device.

Lawrence Livermore Scientists have managed to send and receive signals through a lipid membrane similar to the one that surrounds a living cell using silicon wires just 20-40 nanometers thick.

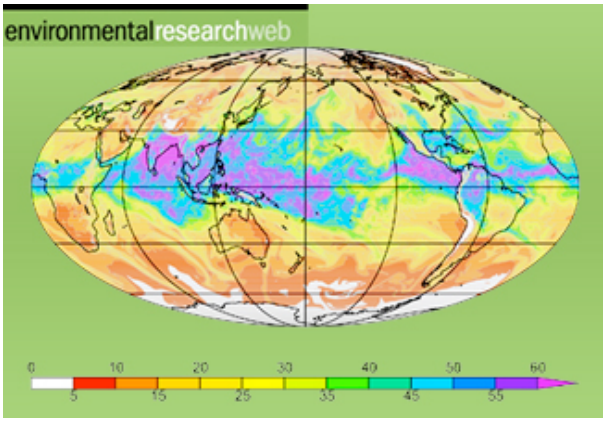
The work could help improve the integration of biological and electronic systems -- allowing, for example, the development of electrical probes that can monitor what is happening inside a cell without damaging the cells or disrupting internal biological processes.

Combining biological and manmade components has proved tricky. In particular, no one has been able to use electronic devices to control the flow of ions through biological membranes, a crucial process in cell communication.

Now, a team led by Aleksandr Noy, an LLNL chemist, has done just that by using a silicon nanowire embedded inside a lipid-bilayer membrane. The nanowire was also able to convert the flow of ions across the membrane into an electric signal.

For more information, go to
http://www.nature.com/news/2009/090811/full/news.2009.815.html

Climate models tell a consistent story about water vapor



Total amount of atmospheric water vapor over the oceans on July 4, 2009.

In 2007, a group of researchers showed that man's activities had boosted the amount of water vapor in the atmosphere. But some criticized the study for its use of a "one-model, one vote" system that did not take into account the quality of the 22 climate models involved.

Now the international team, led by Lawrence Livermore researchers, has repeated the detection and attribution analysis. This time the scientists used just the top 10 or bottom 10 models ranked according to varying criteria. The result? Again, man's activities appeared to have increased the amount of atmospheric water vapor.

"Our bottom-line finding was that model quality had very little influence on our ability to identify a human fingerprint in satellite records of water vapor changes," said Ben Santer of Lawrence Livermore.

To read more, go to http://environmentalresearchweb.org/cws/article/research/40151

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Photo of the week

Everyday people: Ma Gigi Lorega strums a tune in the Asian Pacific booth at the Day on the Green, the Laboratory's annual celebration of employee diversity.

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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.

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