

LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Feb. 6-10, 2012



WATCHING THE DETECTIVES



LLNL's Mike Singleton examines samples prepared for stable isotope analysis.

How do you look for clues as to who may be developing a chemical weapon? Call in the chemical detectives.

This new field is known as chemical forensics and the Laboratory is at the forefront. The goal is to take analytical techniques that have been used for forensic analysis and use them to attribute weaponized toxic chemicals or related substances to their sources. A chemical forensic analysis could, for example, trace a chemical threat agent back to the specific lot of the precursor that was used to make it.

Saphon Hok, a Livermore Laboratory chemist, has been using impurity profiling to link chemical threat agents to the method used to make them. Hok reported that he could differentiate among four production routes to make the nerve agent known as Russian VX. He has done similar work on sarin, VX, and the blister agent sulfur mustard.

"I go through all the possible ways an agent can be synthesized, and then I go into the laboratory and make these compounds on a small scale as crudely as possible," Hok explains. "We try to mimic someone who is trying to do this synthesis in their backyard or in their garage."

To read more, go to [Chemical & Engineering News](#).

physicstoday SPEAKING UP



Ben Santer

Climate scientists refuse to be intimidated by the climate change deniers. Instead, groups that provide moral support, legal counsel and swift rebuttals of misinformation are sprouting up.

The Lab's Ben Santer is one of those climate scientists who refuses to yield to climate change deniers, and demands that accurate information is distributed widely so people can make their own decisions on whether climate change is real.

"I think the community is finding a voice," said Santer, whose work has largely focused on identifying the human influence on global climate.

Santer was the lead author of chapter 8 of the 1995 IPCC Second Assessment Report, which looked at the causes of climate change. "The single sentence 'The balance of evidence suggests a discernible human influence on global climate' changed my life," he says. "I was the guy who was associated with this sentence. Those who did not like that finding did everything not only to undermine the finding, but undermine my scientific reputation."

To read more, go to [Physics Today](#).



NATION-AL ENERGY PLAN



Navajo Nation President Ben Shelly (left) and Laboratory Executive Officer Ron Cochran sign an agreement that will further mutual energy collaborations between LLNL and the Navajo Nation.

One of the country's largest American Indian tribes has partnered with the Laboratory to study what technologies would be best for developing natural resources on the vast reservation.

The Navajo Nation has large deposits of coal and uranium, along with potential for wind and solar energy, but it hasn't historically been a major player in developing those resources. Last week, the tribe signed a three-year agreement with Lawrence Livermore to look into carbon capture and sequestration, clean coal technology and renewable energy, among other things.

Navajo President Ben Shelly said the expertise of leading scientists and engineers will lead to better investments for the tribe.

To read more, go to [The Farmington Daily Times](#).

ComputerWeekly.com

A GIANT TO BEAT ALL GIANTS



Sequoia, the next giant among supercomputers.

There's a giant on the horizon and the Laboratory is going to use it to predict the path of hurricanes, analyze the ocean floor to discover oil, simulate nuclear weapons performance and decode gene sequences.

IBM announced its next generation supercomputing project, Blue Gene/Q, a project undertaken by software application developers and other computer scientists to build an "ultra-scale" technical computing platform.

And the logical name of the beast: "Sequoia," the tallest in the forest.

Due to go online later this year, Sequoia is expected to deliver 20 petaflops at peak performance levels, double the speed of the fastest system currently on the TOP500 list.

To read more, go to [ComputerWeekly](#).



LOOKING INTO OTHER WORLDS



The planet GJ 1214b, shown here in an artist's conception, is 40 light-years away from Earth. *Image credit: Center for Astrophysics/David Aguilar*

Laboratory scientists have come up with a new method to explore the world of exoplanets -- those objects beyond the realm of our solar system.

By deriving and testing the equation of state (EOS) of matter in exoplanets, the team was able to figure out the mass-radius and mass-pressure relations for materials relevant to planetary interiors.

Determining what exoplanets are made of is a step toward understanding whether they could be habitable for life.

Astronomers started detecting exoplanets 18 years ago and more than 700 have been found so far, the vast majority within the last two years. Interest is now growing in the structure and atmospheres of these worlds.

To read more, go to [Astrobiology Magazine](#).

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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