LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Jan. 16-20, 2012

GSN. Government Security News SUPER POWER ACTIVATE

The Sequoia supercomputer

The Laboratory is adding to its already formidable computing power with what is expected to be the most powerful supercomputer in the world.

The initial components of the Sequoia supercomputer arrived at the Laboratory recently. The 20-petaflop (a quadrillion floating operations per second) system is based on BlueGene technology and will help ensure the safety and reliability of the nation's aging nuclear weapons stockpile.

It also will help maintain U.S. leadership in high performance computing, promote scientific discovery and advance President Obama's nuclear security agenda.

To read more go to *Government Security News*.

SCIENCE TODAY at the University of California

SWAYING OFF THE COAST AND ONTO THE GRID

A schematic drawing of SWAY's deep offshore wind tower and turbine, which will be tested throughout the world.

The Laboratory has partnered with a Norwegian company, called SWAY, which has developed floating towers for wind turbines located in deep water. The goal: generate clean, reliable energy.

SWAY has developed a scale demonstration project that the company plans to test in various places throughout the world, including California.

Livermore Lab geophysicist Jeff Roberts says it's a mutually beneficial partnership between atmospheric scientists and engineers.

To listen to the full interview, go to *Science Today*.

PHYSORG.COM SCIENCE : PHYSICS : TECH : NANO : NEWS

THE ANSWER IS BLOWING IN THE WIND

Wind turbines like these in Suisan Bay can produce different amounts of power due to different "shapes" in the wind.

By looking at the stability of the atmosphere, wind farm operators could gain greater insight into the amount of power generated at any given time.

Power generated by a wind turbine largely depends on the wind speed. In a wind farm in which the turbines experience the same wind speeds but different shapes (such as turbulence) to the wind profile, a turbine will produce different amounts of power.

This variable power can be predicted by looking at atmospheric stability, according to Laboratory scientist Sonia Wharton and colleague Julie Lundquist of the University of Colorado at Boulder and the National Renewable Energy Laboratory.

Wharton and Lundquist examined turbine-generated power data, segregated by atmospheric stability, to figure out the power performance at a West Coast wind farm.

To read more, go to *physorg.com*.

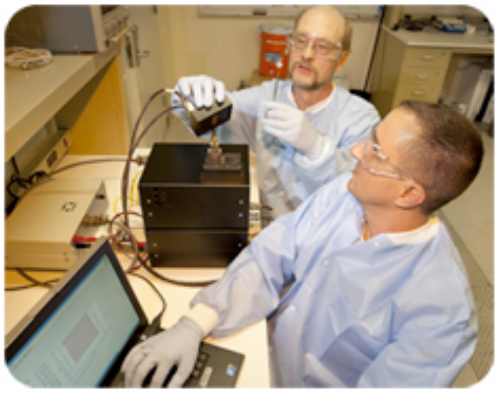
Natalia Zaitseva, an LLNL materials scientist, leads a team of Livermore researchers that has developed the first plastic material capable of efficiently distinguishing neutrons from gamma rays.

Detection of nuclear material just got a little easier after the Laboratory developed a new material for sniffing out nuclear bombs with what amounts to a cheap piece of plastic, and could be the future of nuclear detectors. It can tell the difference between neutron radiation and gamma radiation. That's important to people in charge of protecting ports of entry and borders. Neutrons indicate plutonium or uranium, material that can be used to make a bomb.

According to Steve Payne, head of the Lab's Radiation Detection Material division: "The additional small increase in neutrons will indicate that there is something amiss, and the inspector should look at this person or this vehicle more carefully."

However, most current devices are unable to separate this kind of radiation from less hazardous gamma radiation. To do that requires the use of expensive scintillators made from liquids or crystals that glow in the presence of radiation.

To see the full story, go to *KGO-TV*.



Mechanical engineer Reg Beer (right) and electronics engineer Gary Johnson test a new polymerase chain reaction (PCR) instrument developed at the Laboratory.

A stopwatch set to three minutes is all it takes to identify what ails you when you go to your doctor's office.

Why wait 24 to 48 hours for lab results, when Laboratory scientists and engineers have developed a polymerase chain reaction (PCR) instrument that can process biological samples in less than three minutes.

The idea came to mechanical engineer Reg Beer while he was waiting in a doctor's office to find out what the bug was that ailed his daughter. "It struck me that if we could make PCR fast and easy enough for use in doctors' offices, it would have a huge impact," he said.

PCR allows researchers and clinicians to produce millions of copies from a single piece of DNA or RNA for use in genome sequencing, gene analysis, inheritable disease diagnosis, paternity testing, forensic identification and the detection of infectious diseases**.**

To hear more, go to *KCBS*.

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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