LIVERMORE LAB
REPORT

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

Forbes THE NEW KID IN TOWN

The exterior of the National Ignition Facility, a 10-story building the size of three football fields, is pictured at sunset.

Imagine a clean energy source that would be safe and limitless and could power the nation with the same fuel that powers the sun and stars.

Despite fusion's tantalizing benefits, it has been largely ignored in energy policy discussions because it is viewed as a technology too immature to affect energy production over the next few decades, when it is most needed. But Lawrence Livermore is in a unique position to change this paradigm.

Fusion is different from fission, which is how today's nuclear reactors produce energy. Fission splits atoms apart whereas fusion combines them -- a process that in essence will eventually generate more energy than it consumes. The aim is to heat the hydrogen gas to more than 100 million degrees Celsius so that the atoms will bond instead of bounce off each another.

If scientists are ultimately able to achieve success, the end result would be the production of 10 million times more power than a typical chemical reaction, such as the burning of fossil fuels. And it would occur without the carbon emissions or the disposal of high-level radioactive waste.

National Ignition Facility scientists hope to achieve fusion ignition later this year.

To read more, go to *Forbes*.

MercuryNews COMBATING COVERT BUGS

When it comes to fighting cyber attacks, there's no better defense than a unified approach.

Much like in combat, public and the private sector are joining forces because fighting cyber threats is not something either can do on their own.

Such partnerships are widely considered essential, given how dangerously vulnerable the country is to computer incursions. Some experts say the U.S. could be crippled by adversaries in future cyberwars. Others say the technology that's already been pilfered amounts to a lost national treasure.

Several Bay Area corporations -- including Adobe Systems, eBay, Intel, Cisco Systems, McAfee and PayPal -- have joined with Lawrence Livermore to counter cyber villains through the Lab's Network Security Innovation Center, which opened in July. They exchange "threat information as well as best practices" to counter attackers, and their insights are relayed to other federal agencies, said the center's acting director, Robert Sharpe.

To read more, go to the *San Jose Mercury News*.

theENGINEER FROM BIG BANG TO GE WHIZ

Al Chu (left) and Ryan Braby check Sierra, which is housed in the Bldg. 451 computer room.

The Laboratory has partnered with GE so that the company can use the same computer, which helped scientists explore the Big Bang theory, to build a better fuel injector for its jet engines.

The team hopes to gain a better understanding of critical unsteady spray phenomena observed in fuel injectors used in today's liquid-fuelled engines. These unsteady spray phenomena are sometimes inaccessible to experimental measurements. Computer simulations can provide much-needed insight into the origin of the unsteadiness, but doing this requires very powerful supercomputers to accurately capture the underlying physics.

Using the supercomputer, dubbed Sierra, the team will apply a methodology called Large Eddy Simulation (LES) to model the fuel injector. The supercomputer will also give a 360 degree view of the inside of the injector.

To read more, go to *The Engineer*.

Team Venus is a group of 11 female engineering, computer science, and physics students who will be competing at the Student Cluster Competition at SC12, the International Conference for High Performance Computer Networking Storage and Analysis, this fall.

A team of University of the Pacific students later this year will get hands-on training with some of the fastest supercomputers in the world.

Through a partnership with the Laboratory, UOP's Team Venus, comprised of twelve female engineering, computer science and physics students, are working with LLNL to compete in the Student Cluster Competition at SC12, the International Conference for High Performance Computer Networking Storage and Analysis.

The competition is a real-time, 48-hour challenge to design and assemble a state-of-the-art cluster computer on the exhibit floor and use it to run scientific applications, competing to achieve the greatest performance on a limited power budget. In addition to the technical competition, students also perform an educational outreach mission by maintaining a booth on the exhibit floor.

University of the Pacific was invited by LLNL to assemble an all-female team of talented students for this endeavor. The team will be mentored by engineers from LLNL and University of the Pacific faculty,. The team has secured $50,000 worth of hardware for the competition and will be sponsoring a student co-op as well.

To read more, go to the Web.

IN THE SHADOW

Future biologists, (from left) Elizabeth Nichols, Aiden Long, Zakaraya Khater and Zyad Khater inspect a sample from Lake Haussmann taken by wildlife biologist Megan Lawler during a nature walk at "Take our Daughters and Sons to Work Day."

The median age of the Lab's population dropped Wednesday when hundreds of children and teens accompanied by their parents, came to the Lab for "Take our Daughters and Sons to Work Day."

The event coincides with the annual national program held this month whose goal is to acquaint girls and boys with the importance of what a parent or mentor in their lives does during the work day and also stresses the value of education. More than 40 spouses and 644 children attended the event.

Event goers boarded shuttle buses, took private cars or went by foot to the Bldg. 543, 551, 453 and Lake Haussmann, as well as NIF for a number of activities that offered something for every interest and age group. In addition to activities, children had the opportunity to shadow their parents for a day.

To read more, go to the Web.

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