DISCOVER LLNL

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LLNL dedicates its High Performance Computing Innovation Center

On June 30, Laboratory Deputy Director Thomas Gioconda welcomed Congressional Representatives John Garamendi and Jerry McNerney, Livermore Mayor Marshall Kamena, and other area community and business leaders at a ribbon-cutting ceremony for the High Performance Computing Innovation Center (HPCIC), Livermore Laboratory's first facility in the Livermore Valley Open Campus.

The Livermore Valley Open Campus, a joint venture between Livermore Laboratory and Sandia/California, is an area of federal property located on the eastern edge of both laboratory sites dedicated to collaborative research and development activities with industrial and academic partners.

The HPCIC will help facilitate collaboration by applying high performance computing to product design, development and manufacturing, data management and the operation of complex energy and communication systems. HPCIC's focus on public/private collaboration will make Livermore Laboratory's unique supercomputing expertise available to industry in order to boost the nation's standing in the international marketplace.

Industries expected to benefit from the use of high performance computing range from aerospace, automotive and transportation to utilities, energy, health care, finance, materials manufacturing, nanotechnology and consumer electronics.

The ribbon cutting at the High Performance Computing Innovation Center (HPCIC). From left, Sam Brinker, Livermore Site Office; Rep. John Garamendi; LLNL Deputy Director Tom Gioconda; Rep. Jerry McNerney; and Livermore Mayor Marshall Kamena.

The center is composed of three parts: A large classroom that will provide space for both on-site and distance learning, an open collaboration area for face-to-face or virtual meetings, and fixed office space available to partners who will be utilizing the facility on a regular basis.

Lab Director George Miller announces retirement

George H. Miller announced in April that he will retire as director of Livermore Laboratory in October.

Miller also will step down as president of Lawrence Livermore National Security, LLC (LLNS), which manages the Laboratory for the Department of Energy/National Nuclear Security Administration. "This is the best time for me personally and for the Laboratory to make this change. It has been my great pleasure and honor to be an employee at Lawrence

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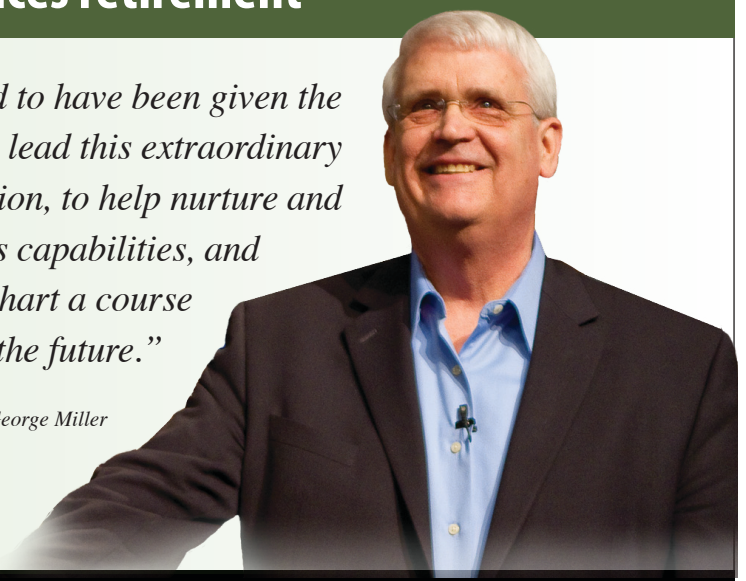
"I am honored to have been given the opportunity to lead this extraordinary institution, to help nurture and expand its capabilities, and to help chart a course for the future."

— *Director George Miller*



Laboratory researchers address traumatic brain injury

Researchers at Livermore Laboratory have found that soldiers using military helmets one size larger and with thicker pads could reduce the severity of traumatic brain injury (TBI) from blunt and ballistic impacts. Their results came after a one-year study funded by the U.S. Army and the Joint IED Defeat Organization (JIEDDO) to compare the effectiveness of various military and football helmet pads in mitigating the severity of impacts.

In 2009, Gen. Peter Chiarelli, of the Vice Chief of Staff of the Army, directed JIEDDO to review the mitigation capabilities of the U.S. Army's Advanced Combat Helmet (ACH) against impact injuries. LLNL researchers Willy Moss and Mike King were tasked to determine if the helmet pads used by the NFL might protect against militarily relevant impacts better than the pads currently used in the ACH.

"A review committee chose us to do this study based on our previously published work on blast-induced TBI. The committee concluded that LLNL had the best mix of skills and capabilities to quickly and effectively address the Defense Department's concerns," Moss explained.

Moss and King used a combination of experiments and computational simulations to study the response of the various pad systems to battlefield-relevant impacts to gain an understanding of how helmet pads provide protection against these impacts.

The impact response simulations made use of the PARADYN finite element analysis software, a parallel version of the DYNA3D software developed by LLNL in the 1970s and '80s to model the deformation of solid structures under impact. (DYNA3D has been commercialized as LS-DYNA and is used worldwide by automotive, aerospace, bioengineering, manufacturing and construction industries.)

The most important result of the study was that significantly increased protection could be attained by modest increases in pad thickness. The current military pad is about three-quarters of an inch thick. Moss and King found that increasing pad thickness by an extra eighth to quarter inch could make a large difference in reducing the accelerations imparted to the head. Implementing such a change would require no "system reconfiguration," but simply the use of a one-size-larger helmet with correspondingly thicker pads.

LLNL mechanical engineer Mike King (left) and physicist Willy Moss watch a compression test of a helmet pad. The pair has found a simple way to reduce the severity of traumatic brain injury from blunt and ballistic impacts.
Photo by Bob Hirschfeld/PAO

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Livermore National Laboratory, and to serve our nation for almost 39 years," Miller said.

"Our country is facing major challenges and I am firmly convinced that the Laboratory's capabilities and our employees' talents are ideally positioned to help solve some of the most significant problems," Miller added. "I am honored to have been given the opportunity to lead this extraordinary institution, to help nurture and expand its capabilities, and to help chart a course for the future."

Miller has served as Laboratory director since 2006, under the management of the University of California, and in 2007 he named LLNS President when NNSA awarded the contract to manage LLNL to LLNS.

Throughout his career Miller has been recognized as a leader in national security and the stewardship of the U.S. nuclear stockpile. Miller joined the Laboratory in 1972 as a physicist and in 1980 was promoted to program leader for all thermonuclear design and computational physics development. In 1985, he became an associate director in charge of the nuclear weapons program. He left the Laboratory in 1989 to serve as the special scientific adviser on weapons activities to then-Secretary of Energy Adm. James Watkins. Miller returned to the Laboratory in 1990, serving as associate director for Defense and Nuclear Technologies, associate director for National Security and associate director for National Ignition Facility Programs.

Miller received his bachelor's degree with high honors, his master's and his doctorate in physics from the College of William and Mary.

Laboratory honored for educational outreach efforts

This spring, Lawrence Livermore National Laboratory was honored for its community and education outreach programs by two local organizations.

Superintendent Kelly Bowers of the Livermore Valley Joint Unified School District (LVJUSD) recognized the Laboratory with the district's Partner in Education award. She commended the Laboratory for its community tours of the site, Super Science field trips, Fun with Science and Science on Saturday programs for youth and families. She also acknowledged LLNL's teacher professional development programs. In addition, she thanked Lawrence Livermore National Security (LLNS), the Laboratory's manager, for its generous donations through the LLNS community gift program to LVJUSD over the past several years.

The Tri-Valley Educational Collaborative (TEC) also recognized LLNS at its 20th anniversary program in Pleasanton, for being the only industry member on the TEC administrative council. The TEC is a grant-funded effort that has prepared students for college and careers since 1991.

Lab captures awards for top industrial innovations

LLNL researchers have captured two awards from the trade journal R&D Magazine for developing cutting-edge technologies with commercial potential.

This year's R&D 100 awards, sometimes called the "Oscars of invention," honored winners from a field of the top 100 industrial inventions worldwide for 2010.

"We are pleased by the Laboratory's continued success in producing innovations that benefit the nation and U.S. industry," said Erik Stenehjem, the director of LLNL's Industrial Partnerships Office.

With this year's awards, the Laboratory has captured a total of 137 such awards since 1978. The U.S. Department of Energy labs received 36 R&D 100 awards in this year's judging.

The first award was presented to a team of LLNL engineers and researchers that developed the world's fastest light deflector, which could help record details of the burning plasma inside fusion targets at the Laboratory's National Ignition Facility.

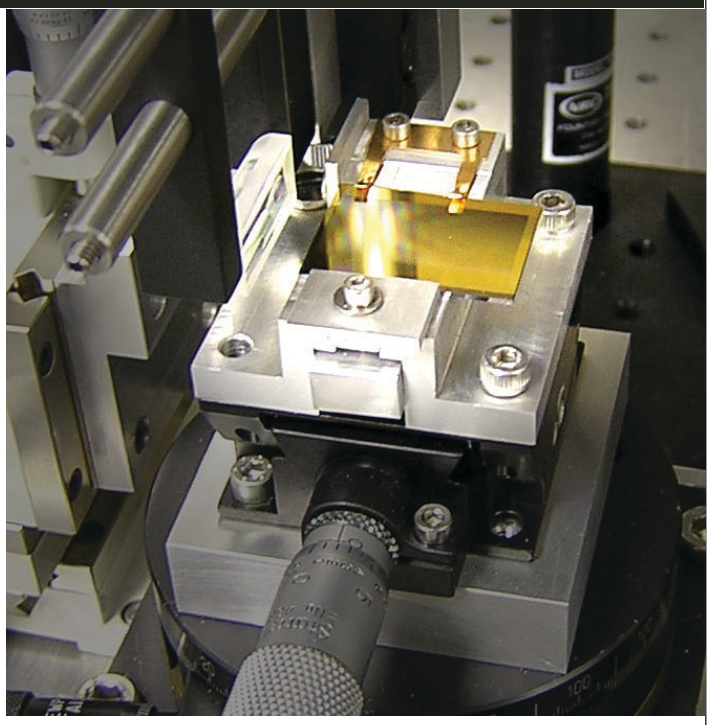
Dubbed Serrated Light Illumination for Deflection-Encoded Recording (SLIDER), the instrument makes use of a novel technique that can sweep a beam of light faster than ever before.

With the SLIDER system, a light beam is deflected at a rate of one resolvable spot per trillionth of a second, enabling a slow albeit high fidelity camera to record an ultrafast signal swept across it with a dynamic range spanning 3,000 levels.

The second award was given to a team of LLNL computer scientists that developed a highly scalable debugging tool for identifying errors in computer codes running on supercomputers with 100,000 processor cores and above.

Their work, done in collaboration with researchers from the University of Wisconsin and the University of New Mexico, produced a technology known as the Stack Trace Analysis Tool, or STAT.

Today's largest supercomputers contain hundreds of thousands of processor cores and cost hundreds of millions of dollars. Single faults that disable a small part of a computer code can bring the entire program to a sudden halt, introducing major costs.



An experimental testbed shows the Serrated Light Illumination for Deflection-Encoded Recording (SLIDER) mounted in a multi-axis coupling stage.

STAT is the first tool designed specifically to tackle the challenges of debugging at large scales with the goal of maintaining prompt response times.

"I want to congratulate this year's R&D 100 award winners," said Energy Secretary Steven Chu. "The Department of Energy's national laboratories and sites are at the forefront of innovation, and it is gratifying to see their work recognized once again.

California Lieutenant Governor Newsom visits LLNL

Lt. Gov. Gavin Newsom paid his first visit to the Laboratory in June. Deputy Director Thomas Gioconda led a briefing and roundtable discussion on the Laboratory's mission, Industrial Partnerships Office, Livermore Valley Open Campus, and high performance computing initiatives. Newsom also toured the Terascale Simulation Facility (supercomputing facility) and the National Ignition Facility, the world's largest and most energetic laser.

Lt. Gov. Gavin Newsom, right, peers into the target chamber at the National Ignition Facility. He is accompanied by NIF & Photon Science Principal Associate Director Ed Moses.

LLNL scientists win Early Career Research Program awards

Three Livermore Laboratory scientists have earned $7.5 million in funding through the Department of Energy Office of Science Early Career Research Program (ECRP).

Early career is defined as principal investigators (PIs) who are within 10 years of receiving a Ph.D. and are either untenured assistant professors on the tenure track, untenured associate professors on the tenure track, or full-time, non-postdoctoral, permanent DOE national laboratory employees. The PI must be employed by either a U.S. academic institution or a DOE national laboratory.

Yongqin Jiao, a scientist in LLNL's Biosciences and Biotechnology Division, earned the award for her research examining how microbes play a major role in the stability and transportation of uranium in natural aquatic systems. Peter Lindstrom, a computer scientist in the Data Analysis Group at the Laboratory's Center for Applied Scientific Computing, earned his award for his research in alleviating the data-movement bottleneck in extreme-scale computing to accelerate numerical simulation and data analysis.

Sofia Quaglioni, a scientist in the Laboratory's Computational Nuclear Physics Group, earned her $2.5 million award for providing the research community with the theoretical and computational tools that will enable an accurate prediction for the fusion reactions that power stars and Earth-based fusion facilities.

This year the Office of Science awarded 65 ECRP recipients. In comparison to other DOE laboratories, Lawrence Livermore tied with Oak Ridge and Lawrence Berkeley, which both won three awards each.

Discover LLNL is a publication of the Public Affairs Office at Lawrence Livermore National Laboratory. For more information, please contact Linda Lucchetti, lucchetti1@llnl.gov, or call (925) 422-5815.

Lawrence Livermore National Laboratory is managed by Lawrence Livermore National Security, LLC for the U.S. Department of Energy's National Nuclear Security Administration.