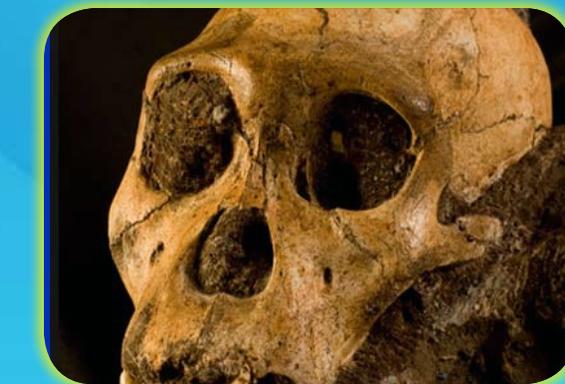
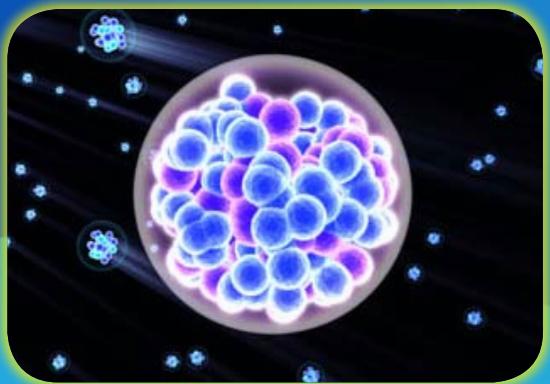


# NEWSLINE

Published for the employees of Lawrence Livermore National Laboratory

January 7, 2011

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# 2010

*Year in review*

# 2010: S&T achievement and building for the future

While delivering on its mission obligations with award-winning science and technology, the Laboratory also spent 2010 building for the future.

In an October all-hands address, Director George Miller said his top priorities are investing for the future in programmatic growth and the underpinning infrastructure, as well as recruiting and retaining top talent at the Lab.

“It’s an incredibly exciting situation we find ourselves in,” Miller said in an earlier talk about the Lab’s strategic outlook. “If you look at the set of issues facing the country, the Laboratory has experience in all of them.”

Defining “national security” broadly, Miller said the Lab will continue to make vital contributions to stockpile stewardship, homeland security, nonproliferation, arms control, the environment, climate change and sustainable energy. “Energy, environment and climate change are national security issues,” he said.

With an eye toward accelerating the development of technologies that benefit national security and industry, the Lab partnered with Sandia-Calif. to launch the Livermore Valley Open Campus (LVOC) on the Lab’s southeast side. Construction has begun on an R&D campus outside the fence that will allow for collaboration in a broad set of disciplines critical to the fulfillment DOE/NNSA missions and to strengthening U.S. industry’s economic competitiveness, including high-performance computing, energy, cyber security and environment.

By promoting collaboration between world-class scientists at the nuclear security labs and partners in industry and academia, LVOC will hasten the transfer of Lab breakthroughs to the marketplace and speed the development of solutions to pressing national challenges.

## Science and technology

The Lab continued to deliver on its stockpile stewardship obligations. The National Ignition Facility achieved critical milestones, including delivering more than 1 megajoule of laser energy to a fusion target, demonstrating the target drive conditions required to achieve fusion ignition, completing its first integrated ignition experiment, and beginning the next phase of the campaign to conduct fusion ignition tests.

The Advanced Simulation and Computing (ASC) program decommissioned Purple, the first supercomputer capable of routinely producing the three-dimensional simulations of nuclear weapons performance that underpin stockpile stewardship, paving the way for the next-generation high-performance computing system, Sequoia.

On the homeland security front, a new technology for detecting viruses and bacteria debuted. The Lawrence Livermore Microbial Detection Array is a valuable tool for law enforcement authorities seeking to detect bioterrorism attacks, doctors who must quickly diagnose diseases and regulatory agencies responsible for checking product safety.

Scientists and engineers continued a long tradition of achievement in the science and technology that supports the broad spectrum of the Lab missions. Lab researchers garnered six R&D 100 awards marking the top 100 technological innovations worldwide. (See pages 6-7 for a list of 2010 award winners.)

## Operations

The Lab continued to streamline business processes and institute cost-reducing efficiencies, notably in energy and water conservation. The Terascale Simulation Facility, for example, received Leadership in Energy and Environmental Design (LEED) gold level certification under the U.S. Green Building Council’s rating system. Bldg. 142 also received LEED certification.

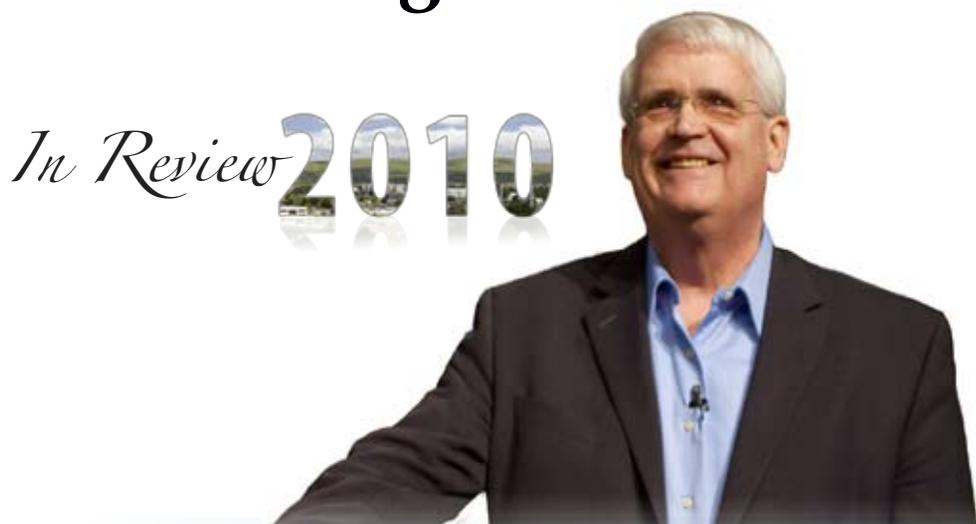
The NNSA recognized the Lab’s Water Conservation Test Bed and Ferrite Core and Power Conditioning Equipment Recovery Project with Environmental Stewardship Awards. In addition, the California Department of Resources Recycling and Recovery named the Lab a 2010 Waste Reduction Award Program (WRAP) winner.

Safety and security continued to be central themes of Lab operations. The Global Security Principal Directorate was recognized by the National Safety Council for achieving two million hours of operating without an occupational injury or illness requiring days away from work.

The Lab also continued to strengthen its security posture. A Lab computer security team proved its mettle, joining with Pantex and the Defense Information Systems Agency to win first place in a national laboratory cyber competition held at a workshop at Los Alamos National Laboratory. The Protective Force Division’s Special Response Team took first place in a special weapons and tactics (SWAT) competition in Connecticut and was among the top finishers in other 2010 competitions.

## Leadership

2010 saw some leadership changes at the Lab. Deputy Director Steve Liedle left to take a position with Bechtel in Tennessee. He was succeeded by Tom Gio-



“ If you look at the set of issues facing the country, the Laboratory has experience in all of them. ”

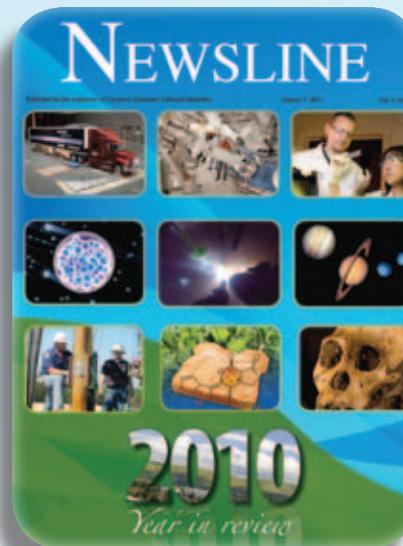
— Lab Director George Miller

conda, who had served as transition manager for LLNS in 2007. Tomás Díaz de la Rubia was named Lab deputy director for Science and Technology. He was previously acting principal associate director for the Science and Technology Principal Directorate.

Monya Lane was named associate director for Engineering, a position she had held in an acting capacity for several years. Linda Rakow, the Lab’s chief financial officer (CFO), left the Lab after more than 25 years to take a position at the SLAC National Accelerator Laboratory, and Al Moser was named acting CFO. Pam Smith was named associate director for Business Services, a position she had occupied in an acting capacity since 2008.

James “Buck” Koonce joined the Lab to lead the Livermore Valley Open Campus (LVOC) project. Koonce previously worked in the University of California Office of the President (UCOP) in roles related to the university’s management of national labs.

On the following pages are selected 2010 highlights divided into Science and Technology, Operations, People, and Awards and Recognition. As in past years, there is not enough room to provide a complete catalog of all of the year’s accomplishments.



## ON THE COVER

Some of the Lab’s research areas for 2010 included:

- Semi-truck fuel efficiency technology.
- NIF Dante diagnostics.
- Microbial detection array analysis.
- Element 117 discovery.
- Omega laser experiments.
- Hydrogen phase transitions.
- Carbon sequestration research.
- Aflatoxin poisoning discovery.
- New hominid species finding.

This issue of *Newsline* was produced by the Public Affairs Office.

# A month-by-month glance at the year's highlights

## JANUARY

### Science and technology

NIF delivers more than 1 megajoule of laser energy to a fusion target and demonstrates the target drive conditions required to achieve fusion ignition.

Research at the Center for Accelerator Mass Spectrometry reveals that small doses of chlorophyll or chlorophyllin, compounds found in green leafy vegetables, could prevent the deadly effects of aflatoxin, a potent toxin produced by *Aspergillus* molds that often infect corn, peanuts, tree nuts, and products made from those foods.

The Laboratory and UC San Diego's School of Medicine and San Diego Supercomputing Center launch a three-year, \$1.5 million project to pursue novel applications of high-performance computing to radiation therapy in

order to provide therapy regimes tailored to individual patients.

### Operations

Engineering and Human Resources partner to create Accelerated Candidate Hiring Events, a streamlined process in which pre-screened job candidates receive a hiring decision the same day as their interview.

The Lab and Sandia-Calif. begin joint operations in mail delivery, shipping and

receiving, bicycle repair and communications services as part of a "one site, two labs" effort to achieve efficiencies through consolidation and business synergies.

The Terascale Simulation Facility receives Leadership in Energy and Environmental Design (LEED) gold certification under the U.S. Green Building Council rating system.

Final reports issued by DOE's Office of Health, Safety and Security reflect positively on the Lab's Integrated Safety Management Program and its readiness for Phase II verification and on the implementation of comprehensive programs to effectively manage nuclear safety at the Lab.

### People

Desmond Pilkington is named Secondary Nuclear Design program director and AX division leader, with responsibility for managing the core scientific effort of thermonuclear weapon physics design and the challenge of achieving fusion ignition at NIF.

Director George Miller signs a five-year agreement with the Livermore Laboratory Employee Services Association (LLESA).

Newly elected Congressman John Garamendi (D-CA) makes his first visit to the Lab.

Trish Damkroger, former deputy associate director for Computation and current communications director for NIF, is elected to the steering committee for the annual Supercomputing Conference, the premier international technical gathering for high-performance computing.

## FEBRUARY

### Science and technology

The Lab hosts a media event in the world's largest wind tunnel at NASA Ames to highlight work with industry partner Navistar to develop and test devices for reducing the aerodynamic drag of semi-trucks. Congressman Mike Honda (D-CA) attends, along with numerous national and local media outlets.

Experiments using the Janus laser at the Lab and the OMEGA laser at the University of Rochester reveal that diamonds under shock-wave compression are much stronger than previously assumed, able to support almost a million atmospheres of pressure before they are crushed.

New research on comet Wild 2 indicates that inner solar system material was transported to the comet-forming region at least 1.7 million years after the formation of the oldest solar system solids, providing the first-ever actual measurement of the age of material from a known comet.

Lab scientists are featured speakers at the annual AAAS symposium in San Diego on topics ranging from advanced energy concepts to nuclear forensics to the U.S.-China lab-to-lab program.

### Operations

As part of the Lab's continuing effort to go green, salary/rank cards are electronically distributed to employees through LAPIS Self Service.

Supply Chain Management introduces the Web-based "Requestor Corner" to help employees more easily navigate the forms, processes and procedures associated with purchasing goods and services.

### People

In a paper in the journal *Micron*, Lab scientist Kevin Moore reviews a broad array of microscopy techniques and highlights advances made in actinide science through microscopy.

Lab physicist Ramona Vogt is elected vice-chair of the American Physical Society Topical Group on Hadronic Physics.

Global Security's Keith Bradley is tapped to lead DOE's Nuclear Energy Advanced Modeling Simulation (NEAMS) program, a one-year-old Office of Nuclear Energy effort to transform the department's modeling and simulation capability for advancing safe, secure and sustainable nuclear power.

"As the weather is expected to become more challenging over the next week, these predictions will become even more valuable to guide decision making. We look forward to further involvement to help mitigate this growing ecological disaster.

— Bruce Warner, head of the Lab's Gulf oil spill task force

## MARCH

### Science and technology

Lab-developed extreme ultraviolet multilayer mirrors are part of one of three instruments on board NASA's Solar Dynamics Observatory spacecraft.

# 2010 *In Review*

CONTINUED FROM PAGE 3

The NNSA recognizes two Lab teams — CASTLE, Collaborative Authorization for the Safety-Basis Total Lifecycle Environment, software suite and the Nondestructive Density Determination project — for their contributions to the Stockpile Stewardship Program's Readiness Campaign.

Lab research shows that the current rate of vertical soil formation in the Sacramento-San Joaquin Delta may not be enough to keep rising marshes from being flooded in the future.

Working with atmospheric measurements taken at two locations on the northern and southern California coasts, Lab researchers test and refine methods for calculating the location and quantity of atmospheric pollution sources, including greenhouse gases.

Lab researchers take a gold sample the size of the head of a push pin, shoot a laser through it, and suddenly more than 100 billion particles of anti-matter appear. The work is featured as a research highlight in the journal *Physics of Plasma*.

## Operations

A new initiative — “Let's Go Green” — evaluates and improves energy use in Bldg. 551E. The program aims to shrink the Lab's environmental footprint.

## People

Ashley Jackson, a dolphin trainer at Six Flags Discovery Kingdom and the daughter of Lab employee Susi Jackson, addresses more than 300 young women as the keynote speaker at the 31st annual Expanding Your Horizons conference.

Rick Ryerson, of the Physical and Life Sciences Directorate, is elected a fellow of the U.S. Geochemical Society and the European Association for Geochemistry.

Lab scientist Jay Zucca is featured in the National Geographic Explorer documentary episode “Inside the Nuclear Threat.”

Abdul Awwal, who works at the NIF, is selected as topical editor in the information processing area for *Applied Optics*, published by the Optical Society of America.

The Lawrence Livermore Laboratory Women's Association presents its annual scholarship awards totaling \$10,800 to 10 recipients.

## APRIL

### Science and technology

Participants in the Lab-Georgetown University Workshop on Policy, Law and Technology for Cybersecurity, examine ways to beef up security on the Internet.

Lab researchers are among the thousands of scientists around the world who celebrate the start of the Large Hadron Collider (LHC), research program at CERN near Geneva, Switzerland. Lab researchers are collaborators on several LHC experiments.

An analysis of vaccines undertaken by researchers from five institutions, including the Lab, finds that seven of the vaccines' DNA content were pretty much as expected, but surprisingly one also contained DNA of a benign pig virus.

More than 300 future scientists and engineers pack the Robert Livermore Community Center to discuss their projects in the Lab's 14th annual Tri-Valley Science and Engineering Fair.



More than 300 students present their projects at the Laboratory's 14th annual Tri-Valley Science and Engineering Fair. From left, Bryan Lent and Brian Cambra from Livermore's Granada High School are senior sweepstakes winners in the team project category with their project, “Effects of Creatine Monohydrate on Mice.”

Lab scientists in conjunction with a team of researchers from Russia, other DOE national laboratories and two universities discover the newest super-heavy element, element 117.

An international team of scientists, including the Lab's Dan Farber, finds a new fossil and a new species of hominid, *Australopithecus sediba*, thought to be at least 2 million years old, in an area of South Africa known as the Cradle of Humankind.

Director George Miller tells employees in an all-hands address that the Lab is receiving growing recognition from national leaders for its contributions not only to national security, but also to addressing challenges in energy and environment.

Using the OMEGA laser facility at the University of Rochester, scientists discover that dense helium, which is found in the atmospheres of white dwarfs and the deep interior of giant planets like Jupiter and Saturn, transforms from a transparent insulator to a moderately reflecting conductor.

## Operations

Johnson Controls is selected by the NNSA to develop an Energy Savings Performance Contracting project for the Lab's main site.

Computation partners with Global Security and Human Resources to host their first Accelerated Candidate Hiring Event.

The NNSA announces that the Laboratory has satisfactorily implemented its Integrated Safety Management System.

The Lab commemorates Earth Day by dedicating another green facility, Bldg. 142.

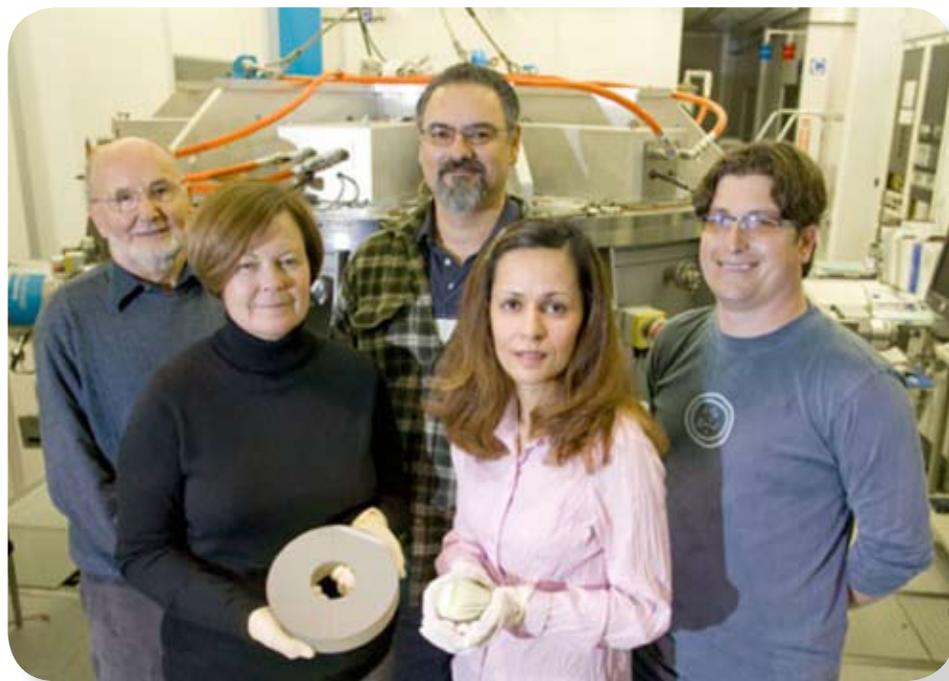
The Lab launches WorkingWell@LLNL, a new initiative to help employees achieve and maintain their best possible health.

## People

Mike Murphy, a 31-year veteran of the Lab's weapons program, is selected to head a new cooperative venture with the Pentagon that will include work with the Defense Threat Reduction Agency.

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**The Lab's Solar Dynamics Observatory team (from left): Eberhard Spiller, Sherry Baker, Jeff Robinson, Regina Soufli and Jay Ayers. The team built one of the three instruments that is flying on the NASA spacecraft.**

Terry Girill, who retired in 2007 after 29 years as a technical editor in the Technical Information Department, is honored for his volunteer work, particularly his "outstanding contributions" to the Tri-Valley Science and Engineering Fair.

The Lab's George Anderson holds three jobs — serving as the Lab's acting group leader for host pathogen biology within the Biosciences and Biotechnology Division, as chairman of the Institutional Biosafety Committee (IBC); and as the Laboratory's select agent manager.

Gen. Norton Schwartz, the U.S. Air Force chief of staff, visits the Lab for briefings and tours of Lab facilities.

## MAY

### Science and technology

A new Lab detection technology called the Lawrence Livermore Microbial Detection Array (LLMDA) helps law enforcement authorities seeking to detect bioterrorism attacks, doctors diagnosing diseases and regulatory agencies checking product safety.

With more than \$3.6 million in Recovery Act funding, Lab researchers, in partnership with the University of Illinois and Babcock & Wilcox, begin work to develop synthetic small-molecule catalysts that will enable new and existing coal-fired power plants to more easily capture carbon dioxide emissions.

A task force of Lab employees is formed to determine what Lab technologies might be of assistance in mitigating the effect of the massive release of oil in the Gulf of Mexico, resulting from the Deepwater Horizon well blowout.

Based on his installation of a GPS network in Peru to study post-seismic response, the Lab's Dan Farber and colleagues publish a *Nature* paper explaining that seismic slip on the Central Peru Megathrust is not only from quakes, but also from steady or transient creep between or directly after earthquakes.

Using the Lab's Center for Accelerator Mass Spectrometry (CAMS), Lab researcher Bruce Buchholz and colleagues at the Karolinska Institute (Sweden) look at dental enamel in victims' teeth to determine how old they were at the time of their death.

The Lab's Charles Westbrook and Sandia researcher Nils Hansen publish findings on the vastly diverse and complex chemical reaction networks of biofuel combustion.

## In Review 2010

### Operations

The Lab is recertified for chemical weapons analysis by the Organization for the Prohibition of Chemical Weapons (OPCW), which is responsible for implementing the Chemical Weapons Convention.

The Lab and VeriTainer Corp. enter into a three-and-a-half-year cooperative research and development agreement to refine and enhance VeriTainer's patented crane-mounted scanning technology to improve both gamma and neutron detection for cargo inspection.

### People

James "Buck" Koonce joins the Lab as a senior adviser to assist with the development and management of the Livermore Valley Open Campus (LVOC).

Lab employee Ida Shum is reelected as Far West regional coordinator for the Federal Laboratory Consortium, a technology transfer organization that links federal laboratories with the commercial marketplace.

## JUNE

### Science and technology

Electric resistance tomography, a technology developed for environmental and geologic applications at the Lab, is installed to track where a plume of injected carbon dioxide moves underground in an oil field near Natchez, Miss.

Scientists from the Lab and the Sausalito-based Marine Mammal Center begin working together to use the Lawrence Livermore Microbial Detection Array to diagnose several diseases that have struck California sea lions and harbor seals.

Using a new imaging technique on the Dynamic Transmission Electron Microscope, researchers at the Lab and UC-Davis achieve unprecedented spatial and temporal resolution of catalyst nanoparticles 3,000 times smaller than a human hair within nanoseconds.

Using quantum simulations, scientists at the Lab, the University of Illinois at Urbana-Champaign and the University of L'Aquila in Italy are able to initiate hydrogen phase transitions in the laboratory similar to how they would occur in the centers of giant planets.

"I was first brought out to Site 300 on a tour during my second week at the Lab. I just loved it. It beckoned to me. And I told Jim Lane, who was then second in command, 'I want your job when you retire.' Well, Jim was at the Lab for 40 years. I waited two decades, and I was finally lucky enough to be hired for the position."

Keith Graham, upon his retirement as deputy manager of Site 300.

2010

## TECHNOLOGY AWARDS



Natalia Zaitseva works with growth and characterization of new single-crystal materials, which are used in neutron detection equipment.

### Individual awards

**Lisa Poyneer's** work in adaptive optics and the development of the Gemini Planet Imager earns her induction into the Alameda County Women's Hall of Fame in the science category.

**Bryan Balazs**, associate B Program leader within the Weapons and Complex Integration (WCI) Principal Directorate, is named to the 2010 class of fellows by the American Chemical Society.

Physicist **Dmitri Ryutov** receives the Fusion Power Associates 2010 Distinguished Career Award for his contributions to fusion research.

The Department of Homeland Security's Domestic Nuclear Detection Office (DNDO) honors nuclear engineer **Frank Wong**, together with colleagues from DNDO and the FBI, with a Director's Award for contributions to the Office of the Director of National Intelligence's Summer Hard Problem Program in the area of nuclear forensics and attribution.

At a ceremony in Washington D.C., Secretary of Energy Stephen Chu congratulates Lab physicist **Omar Hurricane**, who receives DOE's prestigious Ernest Orlando Lawrence Award for his breakthrough work on a difficult technical issue involving two vastly different areas of physics.

**Natalia Zaitseva** of the Physical and Life Sciences Directorate is awarded the R. A. Laudise Prize of the International Organization for Crystal Growth for her work on "creating the technology and scientific basis of rapid growth of perfect crystals from solutions."

**Ed Moses**, principal associate director of the NIF and Photon Science, is a regional winner of a Jefferson Award for his volunteer work in the community.

**Tammy Ma**, a Lawrence Scholar and postdoctoral researcher at NIF, receives the 2010 Mechanical and Aerospace Engineering Award for Outstanding Graduate Student from the UC, San Diego.

Lab physicist **Prav Patel** is awarded the 2010 Excellence in Fusion Engineering Award by Fusion Power Associates.

For the second straight year, Lab Officer **Joseph Scott** earns "Top Gun" honors

for turning in the Best of the West competition's best individual performance.

**Kim Budil**, a Lab employee on assignment in Washington D.C. NNSA, receives a rarely bestowed honor, the Administrator's Award for Excellence Medal, for distinguished service in the national security interests of the United States.

For the second consecutive year, the Lab wins a coveted Editors Award at the annual R&D 100 Awards presentation, sponsored by *R&D Magazine*. This year, the honor goes to **Hyung Gyu Park** and **Francesco Fornasiero**, for their work developing nanostructured membranes for water purification.

Condensed Matter and Materials Division scientist **John Elmer** is awarded the McKay-Helm Award from the American Welding Society for his paper entitled "Heat Transfer and Fluid Flow during Electron Beam Welding of 304L Stainless Steel Alloy."

**Hye-Sook Park**, **Jon Eggert**, **Ramona Vogt** and **Olgica Bakajin** are named 2010 fellows of the American Physical Society for their career contributions to physics.

Lab physicist **Joseph Nilsen** is elected a fellow of The Optical Society of America for his "pioneering contributions to the development and understanding of X-ray lasers and their applications."



Lab engineer Lisa Poyneer was inducted into the Alameda County Women's Hall of Fame for her work on the Gemini Planet Imager, which will come on line in 2011.

"I'm always impressed by the tremendous breadth of technology that's recognized by the R&D 100 awards, everything from computer technology to laser technology to humanitarian inventions, such as the landmine locator."

—George Miller, Laboratory director

**Chris Keane**, of the Physical and Life Sciences Directorate and a former senior manager for the DOE fusion energy program, is named a recipient of the Board of Directors Special Award from Fusion Power Associates.

**Bruce Macintosh** is named a fellow of SPIE, the international society for optics and photonics.

**Grigory Bronevetsky** of the Advanced Scientific Computing Research Program and **Vsevolod Soukhanovskii** of the Fusion Energy Sciences Program win DOE Early Career Research Program Awards.

Lab researchers **Bruce Macintosh** and **Mike Fitzgerald** are co-authors on two papers that share this year's AAAS Newcomb Cleveland Prize for outstanding articles published in *Science*.

# AWARDS & EMPLOYEE RECOGNITION

**Ray Beach**, a physicist in the National Ignition Facility and Photon Science Principal Directorate, is awarded the rank of fellow by the international optics and photonics society SPIE.

NIF and Photon Science Principal Associate Director **Ed Moses** receives a special award commending his educational outreach from Congressman John Garamendi.

## Team awards

Sixteen Lab researchers receive DOE Outstanding Mentor awards from Director George Miller during a ceremony on site. The awards are coordinated through DOE's Office of Science.

Four teams receive 2010 Science & Technology awards, given to acknowledge, celebrate and reward recent scientific and technical accomplishments that have had a significant impact on the Lab, sponsors or mission. The awardees were: the Experiment Automation System, First Direct Images of Extrasolar Planets, PHOENIX, and Installation of the Dawn Machine and its Application to Simulations of Laser Beam Propagation

The Lab's Special Response Team takes first place in the Connecticut SWAT competition, held near Hartford.



**Joseph Nilsen is elected fellow of Optical Society of America.**

The collaborative team that includes Lab researchers who helped develop the Argus II retinal implant wins a *Popular Mechanics* 2010 Breakthrough Award.

We Be Dragon, the Livermore Laboratory Employee Services Association (LLESA) sponsored dragon boat team, paddles its way to a higher level of competition for the third year in a row, at the 15th Annual Kaiser Permanente San Francisco International Dragon Boat Festival.

A team of computer security specialists from the Lab, Pantex and the Defense Information Systems Agency win first place in a national laboratory cyber competition held during the Tracer FIRE 2 Workshop.

The Lab and the LLESA Golf Networking Group win the DOE Golf Challenge for the second year in a row.

## Institutional awards

The NIF wins the Project Management Institute's 2010 Project of the Year as one of the year's most innovative and successful projects.

The DTEM (dynamic transmission electron microscope) is recognized as one of 10 winning microscopy innovations in the 2010 *Microscopy Today* Innovation Awards competition.

Lab researchers receive six R&D 100 awards marking the top 100 industrial innovations worldwide in 2010. With this year's results, the Laboratory captures a total of 135 R&D awards since 1978.

For the second year in a row, the Laboratory wins a WRAP (Waste Reduc-



**Physicist Dmitri Ryutov receives the Fusion Power Associates 2010 Distinguished Career Award for his contributions to fusion research.**

tion Award Program) award from the California Integrated Waste Management Board.

NNSA recognizes the Lab's Water Conservation Test Bed and Ferrite Core and Power Conditioning Equipment Recovery Project with Environmental Stewardship Awards.

The Lab's online learning center U-Learn wins a 2010 Innovations in Learning Award in the category of "Best Technical Training."

Lab scientists and engineers, along with Industrial Partnerships Office (IPO) employees, capture an outstanding partnership award for the Environmental Sampler Processor and an outstanding technology development honor for the Lawrence Livermore Microbial Detection Array.

The Global Security Principal Directorate is recognized by the National Safety Council for achieving two million hours of operating without an occupational injury or illness involving days away from work.

The annual Director's Institutional Operational Excellence Awards are presented to 312 Lab employees for their "over-and-above achievements" in areas including science, environment, safety, business and human resources.

The Lab is named winner of a 2010 WRAP (Waste Reduction Award Program) award by the California Department of Resources Recycling and Recovery (CalRecycle).

"Publications are a cornerstone of the Laboratory's scientific foundation in the science, technology and engineering community. Strong papers validate to the external audience that we are a well-established scientific and technical laboratory that is respected internationally."

— Tomás Díaz de la Rubia in a column about publishing research

# 2010 *In Review*

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## Operations

The Lab coordinates activities in a major operational maritime exercise in San Diego involving more than 130 trained maritime law enforcement and first responder personnel from federal, state and local agencies.

Arnold Magnetic Technologies and the Lab sign an agreement to work together on a passive magnetic bearing system initially intended for bulk storage flywheel energy storage systems that may also be transferable to wind turbines and electric vehicles.

Two groups of students from the San Ramon Valley Unified School District, on two consecutive days, watch live video broadcasts to their classroom, as Lab scientists give a tour of the Center for Accelerator Mass Spectrometry and answered questions about the applications of carbon dating as part of a new outreach effort called, "Scientists in the Classroom."

Lawrence Livermore National Security, LLC (LLNS) kicks off its annual Community Gift Program to benefit local and area non-profit organizations.

## People

A reorganization of the Science and Technology Principal Directorate begins with the appointment of Tomás Díaz de la Rubia as Lab deputy director for Science and Technology.

Monya Lane is named associate director for Engineering.

Tom Gioconda is named the Lab's new deputy director.

Thomas Isaacs, the former director for the Office of Planning and Special Studies at the Lab, is named lead adviser to the Blue Ribbon Commission on America's Nuclear Future.

## JULY

### Science and technology

The Lab is one of the collaborating institutions in the first test to study the interaction of X-ray free electron laser pulses with single atoms under unprecedented ultra-high intensity radiation conditions.

The NIF is featured on the Discovery Channel in "The Energy Revolution," part one of a four-part special series titled "Powering the Future."

By imaging the cell walls of a zinnia leaf down to the nanometer scale, Lab energy researchers gain a better idea about how to turn plants into biofuels. The study appears online in the journal *Plant Physiology*.

### Operations

Deputy Director for Science and Technology Tomás Díaz de la Rubia addresses the Bay Area Innovation Symposium, hosted by Assemblywoman Joan Buchanan at Las Positas College.

Adding to its social media endeavors, such as Flickr, YouTube and Twitter, the Lab announces a presence on Facebook, viewable from off site.

In conjunction with Energy Secretary Steven Chu's Hybrid Vehicle Initiative, the Lab adds 108 fuel-electric hybrid vehicles to its fleet.

The Public Affairs Office conducts a special summer series of "Fun with Science" at the Discovery Center for family and friends of Lab employees.

A new series of free, lunch-time concerts for employees sponsored by Employee Services and Work-Life Programs kicks off.



**Klint Rose, center front, with his summer students. Standing are Mark Stambaugh, Joel Weinert, Emily Archibald and Michael Chinn. Seated are Karon Wynne, Rose and Michelle Packard.**

More than 700 participants in the Lab's 4th "Active for Life" celebrate successful completion of the 10-week program that promotes health awareness and physical fitness.

## People

Klint Rose, a mechanical engineer in the Lab's Center for Micro-and Nanotechnology, is selected to take part in the U.S. Frontiers of Engineering Symposium, an annual gathering of "the nation's brightest young engineers."

Hundreds of summer students representing universities as near as UC Berkeley and as far as Purdue gather in the Bldg. 543 auditorium for welcoming remarks and presentations by Director George Miller and Lab managers.

Engineers and scientists from the Lab and its two sister laboratories work closely for three months with the DOE and BP to help stem the massive Gulf of Mexico oil spill that started April 20.

Deputy Director Steve Liedle, who joined the Lab in 2007, bids farewell to colleagues, as he prepares to head back to Tennessee to take a senior position with Bechtel National, Inc. in Oak Ridge.

U.S. Strategic Command Commander Gen. Kevin Chilton visits the Lab to meet with leaders of the Lab's weapons program.

## AUGUST

### Science and technology

A team of Lab scientists uses radiocarbon dating to trace the pathway of carbon dioxide released from the deep ocean to the atmosphere at the end of the last ice age.

The Large Synoptic Survey Telescope, in which the Lab plays a large role, is ranked as the top priority for the next large ground-based astronomical facility by New Worlds, New Horizons in Astronomy and Astrophysics.

### Operations

Director George Miller announces the selection of Richard Robinson as the Lab's new chief information officer.

The annual Summer Student Poster Symposium takes place in the Bldg. 543 atrium, with 151 students participating.

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Director George Miller introduces Tom Gioconda as the new deputy director in an all-hands address to Lab employees.

The Lab holds the 12th annual Diversity Day on the Green with the theme of “Human Fusion — Celebrating the Power of Diversity.”

About 150 protesters observe the 65th anniversary of Hiroshima with an early morning rally and a march to the Lab’s East Avenue entrance.

The Livermore Valley Open Campus (LVOC) moves out of the planning stages and into reality, with approval of building designs and completion of road construction on East Avenue.

## People

More than 30 teachers participating in the Lab’s Teacher Research Academies present research posters describing their summer internships.

Superintendent Kelly Bowers of the Livermore Valley Joint Unified School District and Superintendent Parvin Ahmadi of the Pleasanton Unified School District visit the Lab for tours and briefings, and are hosted at an informal reception at the Lab’s Discovery Center.

Lab employees participate in “Feds Feed Families,” a government-wide food drive with a goal of raising 1.2 million pounds of food nationwide for those in need.

Don Boyd is named acting principal associate director for Operations and Business.

The Lab’s Page Stoutland accepts a high-level assignment with the Nuclear Threat Initiative, a Washington D.C.-based non-profit organization.

## SEPTEMBER

### Science and technology

New research from Lab scientists shows that comets that crashed into Earth millions of years ago could have produced amino acids — the building blocks of life.

Kalispell, Mont.-based Zinc Air Inc. announces that it has obtained exclusive rights from the Lab for the zinc air fuel cell invented by John Cooper, a retired Lab chemist.

Two consortia — one led by the West Virginia University that includes the Lab as a partner and another led by the University of Michigan — receive a total of \$25 million during the next five years under the U.S.–China Clean Energy Research Center.

### Operations

In order to strengthen interactions with the DOE Office of Science, Deputy Director for Science and Technology Tomás Díaz de la Rubia announces the creation of the position of program director for the Office of Science.

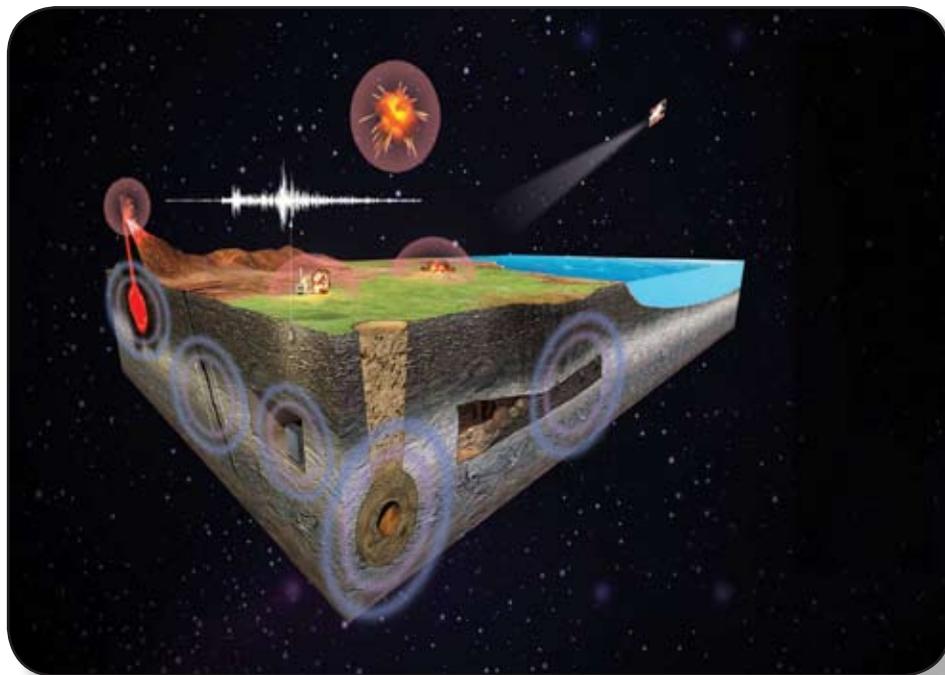
The Weapons and Complex Integration Principal Directorate hosts a senior delegation from the United Kingdom’s Ministry of Defense.

The annual Lawrence Livermore Lab Women’s Association scholarship fundraiser is held off site, with Marj Leider, Livermore city councilwoman and former Lab chemist, featured as the keynote speaker.

Senior Air Force officials, including Brig. Gen. Jeffrey Smith, Chief Scientist Christopher Yeaw and Executive Director for the Air Force Nuclear Weapons Center L. Wayne Brasure, visit the Lab to familiarize themselves with LLNL’s stockpile stewardship capabilities and other national security work.

The Lab hosts a visit by the California Department of Water Resources for a technical discussion and tour of Livermore site water conservation projects.

# In Review 2010



This cutaway view through Earth’s subsurface shows many of the disturbances recorded by sensors worldwide.

## People

Donald Cook, deputy administrator for NNSA Defense Programs, holds an all-hands briefing on the state of defense programs. Afterwards, he presents the 2009 NNSA Weapons Awards of Excellence.

Erik Stenehjelm, director of the Lab’s Industrial Partnerships Office, is the keynote speaker at a Tri-Valley Green Business Conference hosted by Congressman Jerry McNerney.

Rebecca J. Nikolic is named scientific editor of the Lab’s *Science & Technology Review*.

## OCTOBER

### Science and technology

The Lab signs a memorandum of understanding with AWS Convergence Technologies, owner of the WeatherBug® brand of weather products and services, to facilitate enhanced situational awareness for the National Atmospheric Release Advisory Center.

The Lab’s expertise in integrated physics modeling is tapped as part of the Greater Philadelphia Innovation Cluster for Energy Efficient Buildings.

The NIF completes its first integrated ignition experiment, beginning the next phase in the campaign to achieve fusion ignition.

Ron Soltz and Lab colleagues are part of an international team designing and operating “A Large Ion Collider Experiment,” or ALICE, one of the four principal particle detector experiments on the Large Hadron Collider at CERN. The Lab deploys a computer cluster dedicated to ALICE.

A team of Lab scientists develops a new, adaptable, precise technique to measure the speed of sound in materials that will help improve large-scale explosive testing.

A team of Lab scientists explores why metals in the Periodic Table of Elements can change crystal structure (phase) when they are compressed and alloyed with small amounts of a neighboring metal.

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The Lab's booth at the inaugural USA Science & Engineering Festival attracts big crowds.

The Lab joins forces with Cray, Data Direct Networks and Oak Ridge National Laboratory to form a non-profit corporation dedicated to addressing one of the great challenges facing high performance computing — data storage and management.

By using carbon-14 produced by aboveground nuclear testing in the 1950s and 1960s, Lab scientist Bruce Buchholz determines that the number of beta cells, which make insulin in the human body, do not replicate after the age 30.

The Lab's Darren Bleuel and Mathis Wiedeking are part of a team that discovers six new variations of superheavy elements on the bottom rung of the periodic table, pointing the way to the elusive "Island of Stability."

## Operations

The Lab's new external Web portal rolls out.

The weekly edition of *Newsline*, the Lab's news magazine, ceases. News content and features previously reported in *Newsline* migrate to the Lab's new external Web portal.

The Director's Office coordinates a Lab-wide canned food drive to benefit the Open Heart Kitchen as part of the Helping Others More Effectively (HOME) Campaign.

Lab-approved BlackBerry smart phones are allowed in some Limited Access Area buildings.

A new user-friendly Security Awareness for Employees (SAFE) Website is launched.

Sandia-Calif. opens a new access lane from the Greenville Road end of East Avenue leading to the Combustion Research Facility (CRF).

Webinars are offered as part of National Cyber Security Awareness Month.

Director George Miller announces that employees who selected the defined benefits retirement plan (TCPI) could be required to begin making contributions to that plan some time during calendar year 2011.

The Lab reviews its natural gas system after the San Bruno incident.

The Lab launches the pilot service Safeweb to provide employees with a secure, isolated environment in which to access external e-mail, social networking and other websites that are not accessible from their Lab desktop.

The Lab's Benefits Office sponsors a donation drive of old eyewear (prescription glasses, readers, and sunglasses) to give to Eyes of Hope, Vision Service Plan's donation program that distributes old eyewear to people around the world who cannot afford glasses.

The Lab holds its annual Open Enrollment benefits fair.

The Lab the International Cooperation on Cyber Security Workshop, attracting dozens of researchers and experts from government, academia and Internet companies.

Lawrence Livermore National Security, LLC (LLNS), the contract manager for the Laboratory, announces the recipients for the 2010 LLNS Community Gift Program.

The Run for Home kicks off to the Lab's annual Helping Others More Effectively (HOME) Campaign.

## People

In a first for the region, Lab seismologist Regin Gok takes part in a workshop in Amman, Jordan, as part of an effort to work more closely with seismology centers throughout the Middle East.



From left: Teresa Kamakea, Jeff Cunningham (seated) and Ron Soltz examine a map showing international ALICE collaboration on the Green Linux Compute Cluster.

Leaders of the new State of California Innovation Hubs, or iHubs, visit the Lab and Sandia/Calif. Representatives from Gov. Schwarzenegger's Office of Economic Development also participate.

Al Moser is named acting chief financial officer and Kathy Baker is named acting associate director for Planning and Financial Services.

Alison Burklund, a senior at the Athenian School in Danville, co-authors with her mother Ellen Raber, Lab deputy program director for Counterterrorism, an article published in *Applied and Environmental Microbiology* about research looking at ways to wipe out *Bacillus anthracis* spores in a large public water system.

Yazmin Rose Bauza and Carlos von Son, key leaders of the National Hispanic University, speak at the Lab in celebration of Hispanic Heritage Month.

Susan Wilbur, director of undergraduate admissions for the University of California system, discusses the application and acceptance process for UC for the 2011-2012 academic year as part of a Work-Life Living Well seminar.

## NOVEMBER

### Science and technology

The NIF sets world records for neutron yield from laser-driven fusion fuel capsules and laser energy delivered to an inertial confinement fusion (ICF) target.

Lab researchers publish an article about a way to improve Raman spectroscopy as a tool for identifying substances in extremely low concentrations.

The Lab showcases its technology at the International Atomic Energy Agency's (IAEA) safeguards symposium.

ASC Purple, the first supercomputer capable of routinely producing three-dimensional simulations of nuclear weapons performance is retired in a ceremony at the Terascale Simulation Facility.

NNSA announces that a Military Academic program will be implemented at the Lab in summer 2011.

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Representatives from the DOE, national labs, industry, and Japanese institutes gather at the Lab to discuss strategies with regard to rare earth elements.

By using *in-situ* synchrotron X-ray diffraction and high-resolution electron microscopy, Yinmin Wang of the Lab's Condensed Matter and Materials Division and his colleagues from Ames Laboratory and Argonne National Laboratory discover findings about the efficient defect storage and strain hardening in nanocrystalline solids.

## Operations

Las Positas College partners with the Lab to host a science lecture series.

The Director's Office of Strategic Diversity and the American Indian Activity Group kick off Native American month by hosting students from MESA (Mathematics, Engineering and Science Achievement) to visit the Lab.

DOE issues a consent order on beryllium findings.

Russell Gould, chair of the UC Board of Regents visits the Lab and receives briefings on UC/LLNL collaborations and Lab national security programs.

The Lab moves toward international certification of its Environment, Safety and Health (ES&H) systems.

As part of the new continuing Professional Scientific and Technical Staff job classification structure, the Lab moves to designate Distinguished Members of Technical Staff as a way to recognize employees who have made extraordinary scientific and technical contributions to the Lab.

Environmental monitoring of operations at the Lab in 2009 indicates no adverse impact to public health or the environment from Lab activities. The findings are presented in the Lab's Environmental Report for 2009.

The NNSA issues significant reforms to Lab security policies for Accountable Classified Removable Electronic Media (ACREM), vault-type rooms (VTRs) and the day-lock process.

Bo Kong, assistant professor at Johns Hopkins University's School of Advanced International Studies, describes how China is confronting energy issues by diversifying its energy sources and greatly expanding its use of nuclear power in a Lab-sponsored talk.

## People

NIF engineer Pat Coyle, founder and director of Belize Open Source -- Sustainable Development, a non-profit agency that promotes environmentally and socially sustainable development, presents an overview of the group's projects to Lab employees.

Lab researcher Kevin Moore,

an invited guest editor for the *Materials Research Society Bulletin*, helps put together the November 2010 issue titled, "Emerging Areas of Actinide Science."

Don Jedlovec of NIF hosts his fifth annual hummingbird photography presentation.

# In Review 2010



**Technician Terri Delima inspects an array. The Argus II retinal implant is designed to restore vision to people who are blind because of such degenerative retinal diseases as macular degeneration and retinitis pigmentosa.**

More than 100 Lab motorcycle riders take to the streets in honor of Veterans Day during Lab Ride 7. Organized by the Lawrence Livermore Laboratory Armed Forces Veterans Association, this is the seventh year riders have participated to support charitable organizations.

More than 50 Lab scientists and engineers are honored as they receive their R&D 100 award plaques for 2010 in a ceremony in the Bldg. 543 auditorium.

## DECEMBER

### Science and technology

In a study that may prompt the rewriting of textbooks, a team of astrobiologists and Lab chemists finds the first known living organism that can use arsenic in place of phosphorus in its major macromolecules. The new findings, published in *Science Express*, could redefine origins of life research and alter the way life as we know it is described.

Lab astronomers publish research in *Nature* on the discovery of a fourth giant planet, joining three others that, in 2008, were the subject of the first-ever pictures of a planetary system orbiting another star other than our sun.

The Global Security Principal Directorate hosts a post-directed review committee poster session presenting various projects in nuclear nonproliferation, arms control, and counterterrorism in the Bldg. 132 lobby.

A presentation on developing advanced radio frequency identification (RFID) systems by a Lab electronics engineer Faranak Nekoogar wins the best poster award in a technical session at an International Atomic Energy Agency symposium in Vienna.

Research by Lab scientists resolves a controversy between theory and experiment about the finite and low-temperature stability of calcium at very high pressures (between 40,000 and 1.1 million atmospheres of pressure), lending new insight into the electronic, structural and superconducting properties of calcium at high pressure.

The cover of a recent issue of the *Journal of Chemical Physics* highlights a paper coauthored by Condensed Matter and Materials Division researcher Tomas Oppelstrup with colleagues from the Royal Institute of Technology (Stockholm, Sweden) that looks into a plausible glass-forming system.

### Operations

Lab employees, along with Lawrence Livermore National Security, LLC (LLNS), raise more than \$3.4 million for local nonprofit organizations through the HOME Campaign.

**"Never in my memory have we been more at peril at home than we are now. We will be hit again by terrorists. It will be inside our own borders. It will be a weapon of mass destruction. And it will be horrible."**

James Olson, senior lecturer at the Bush School of Government at Texas A&M University, during a lecture entitled "Spies Among Us: How America Is Losing its Secrets"

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**Nan Ho, center, and Neal Ely, right, of the Las Positas College foundation, greet Lab Director George Miller during a gathering to announce the recipients of the community gift program.**

Energy Secretary Steven Chu announces a pay freeze for DOE/NNSA employees and contractors in line with President Obama's freeze on federal employee salaries.

Partnering with a local courseware developer and a public high school, Lawrence Livermore National Security (LLNS) announces its contribution of \$10,000 toward a one-of-a-kind pilot course in algorithmic geometry offered at Dougherty Valley High School in San Ramon. Thanks to a \$10,000 gift from LLNS, students at Hart Middle School in Pleasanton receive a mobile science Lab consisting of 16 laptop computers.

WikiLeaks documents posted on a number of Websites lead DOE/NNSA to remind employees and contractors throughout the complex of the importance of protecting sensitive and classified information.

The Lab's Protective Force Division announces that security police officers around the Lab will don new NNSA standard uniforms starting in January 2011.

## People

Dennis Murphy is appointed Lab Quality Assurance Officer by Director George Miller and Deputy Director Tom Gioconda.

Laura Stec, a San Francisco chef, environmental advocate and author of "Cool Cuisine — Taking the Bite out of Global Warming," delivers a talk and leads two cooking demonstrations in the Central Café.

Alameda County Supervisor Scott Haggerty, accompanied by his Deputy Chief of Staff Dawn Argula, visits the Lab for an update on the Livermore Valley Open Campus.

Sean McCoy of Carnegie Mellon University meets with Lab researchers and delivers a presentation entitled "Removing the Regulatory and Legal Barriers to Carbon Capture and Sequestration in the United States: Technical Considerations and Areas for Future Research."

Author Jeanne Liedtka, an expert in business organization development, presents "Ugly Babies, Pragmatic Idealists and the Virtuous Cycle" in a program sponsored by Global Security.

Tomás Díaz de la Rubia posts an internal column on the importance of publishing scientific research for scientists and engineers and the Laboratory.

## Notable quotes

"Breaking the megajoule barrier brings us one step closer to fusion ignition at the National Ignition Facility and shows the universe of opportunities made possible by one of the largest scientific and engineering challenges of our time."

— Tom D'Agostino, NNSA administrator

"We are delighted to host this important test that could help our nation save billions of dollars in fuel costs each year. This is an excellent example of what can be accomplished through collaboration with other federal laboratories and industry."

— Pete Worden, director of NASA Ames Research Center on aerodynamic drag tests on trucks

"The nation is finally recognizing that nuclear power has great promise for providing safe and reliable baseload electricity that can be generated without contributing to the nation's carbon footprint."

— Keith Bradley, NEAMS program leader

"Between the numerous unanswered scientific questions on basic physical properties and a potential resurgence of nuclear power due to rising energy demand, the actinides are an exciting and burgeoning class of materials."

— Kevin Moore, Condensed Matter and Materials division

"This is combining LLNL strengths in atmospheric modeling and inversion techniques and applying them to pollution monitoring. We are effectively running the codes in reverse from what they were intended so we can figure out where pollution, such as greenhouse gases, comes from."

— Lab scientist Philip Cameron-Smith

"We are recreating what the universe looked like microseconds after the Big Bang."

— Ron Soltz in discussing what he hopes to accomplish in the "A Large Ion Collider Experiment," or ALICE

"I love understanding this stuff. That's why I don't stop."

— Ken Kulander, a retiree who continues to collaborate in the field of light pulses

"This organisms' metabolic lifestyle suggests that life based on non-typical elements may be possible. This is important to scientists looking for clues to life on other planets."

— Felisa Wolfe-Simon on an organism that feeds on arsenic

"The most positive effects on the environment start on your dinner plate. But, remember: 'if it ain't fun, it don't get done.'"

— Laura Stec, chef and environmentalist, in LLNL cooking demonstration

"There are people in this community who have never had the opportunity to experience a live performance of any type in a theater. HOME contributions help us provide them with the chance to see a fully staged, professional quality production of the Nutcracker ballet at the Bankhead Theater, and, we hope, inspire them to participate in the arts."

— Michaele Kashgarian, LLNL chemist, on HOME benefit to the community

"The science department has wanted a mobile laptop lab for several years and this gift has made it possible. We are very excited about all of the online labs and simulations our students can now perform in our classrooms."

— Megan Lipman, chair of the science department at Hart Middle School

"Dougherty Valley High School (DVHS) has a large number of students and parents who value a strong math and science education. Algorithmic geometry teaches students how to solve complex problems using mathematics and then bring the solution to life using 21st century computational tools. DVHS is the perfect school to pilot this course."

— Gregory Duran, math teacher at Dougherty Valley High, on new course funded by LLNS

"It's downright exciting. This is technology that could be transferred immediately out of the labs and into private industries."

— Rep. John Garamendi, at a news conference about the Livermore Valley Open Campus

"Science and technology is one of the fundamental things we do for the country. It defines the character of the Laboratory and is what makes us so special."

— George Miller, while announcing the reorganization of the Science and Technology Principal Directorate

"I would like to encourage more young people to get interested in HEDP (high-energy-density physics) and fusion research. I believe this is a very exciting time to join this field."

— Andrea Kritcher, Lawrence postdoctoral fellow