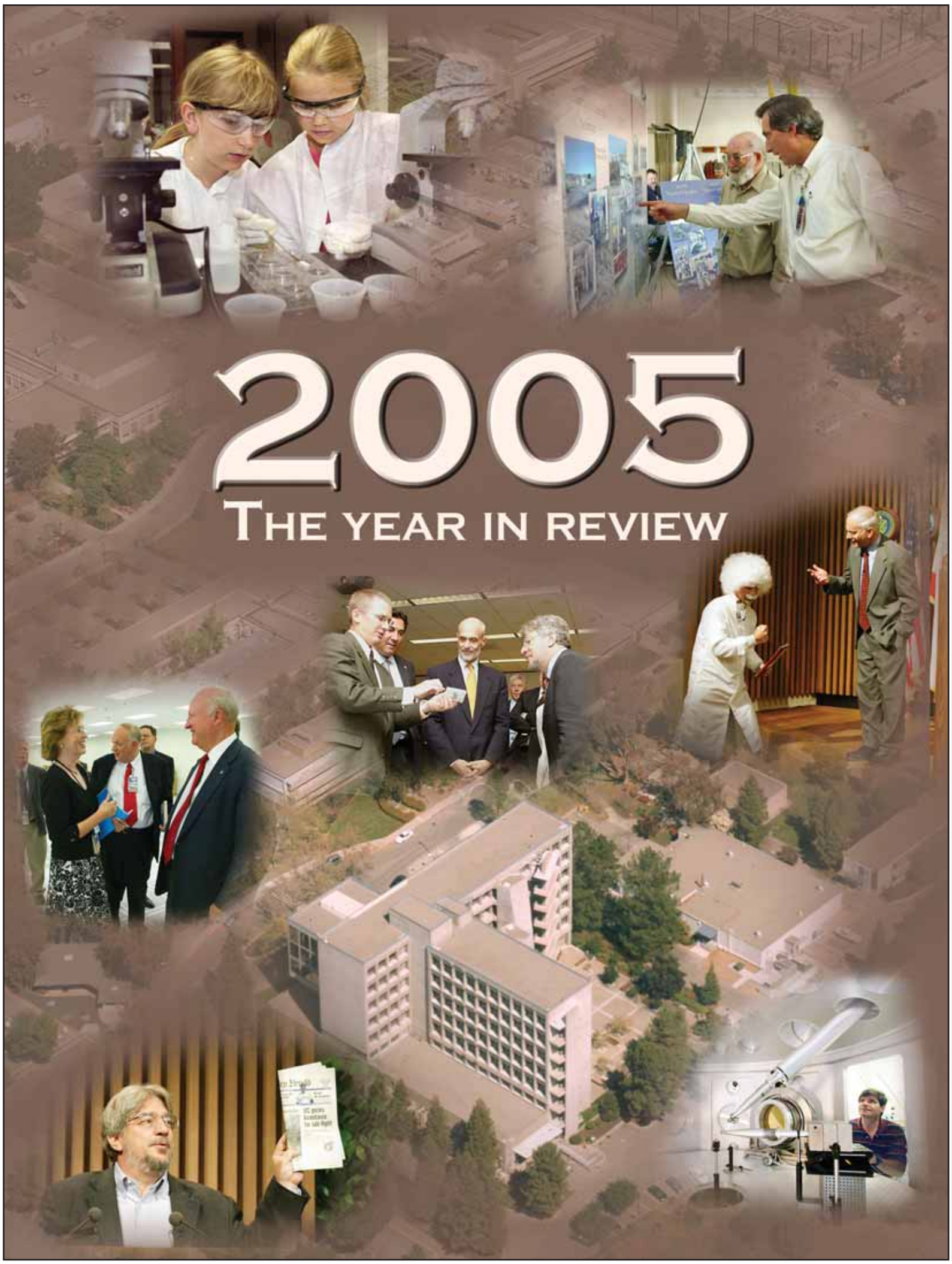
NEWSLINE

Published for the employees of Lawrence Livermore National Laboratory January 6, 2006 Vol. 31, No. 1



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Looking back at 2005

Laboratory proved equal to year of challenges

The Laboratory figured prominently in leadership changes across the Department of Energy/National Nuclear Security Administration complex.

Now former Director Michael Anastasio successfully led the University of California (UC) team in the competition for the contract to operate and manage Los Alamos National Laboratory (LANL) in New Mexico. As a result, Anastasio became director of Los Alamos. DOE announced Dec. 22 the award of the contract to Los Alamos National Security, LLC (LANS) — a partnership comprised of UC, Bechtel National Inc., BWX Technologies and Washington Group International.

"I have dedicated the bulk of my professional career to LLNL — from my early days as a physicist to my current position as director. I will leave this truly great Laboratory, with its 'passion for mission,' thinking especially of the great people who make the Lab so exceptional and the special friends and colleagues I have worked with for 25 years," Anastasio said in a message to Livermore employees after the Los Alamos contract announcement.

"It is important that you stay focused on mission, in spite of the uncertainty and anxiety ahead.

Director Michael Anastasio announces in May that he will lead the UC-Bechtel bid to manage Los Alamos National Laboratory.

LLNL's continuing role as one of the premiere science and engineering laboratories remains vital for the country. By continuing to focus on doing your job as effectively as possible, you will put the Laboratory in the strongest possible position for a great future."

Anastasio, who left for Los Alamos the evening of the announcement, tops a list of management/leadership changes in 2005. In May, UC Regents tapped former Laboratory Deputy Director for Operations Bob Kuckuck to serve as interim director at Los Alamos after the departure of retired Adm. Pete Nanos.

Wayne Shotts was named LLNL deputy director for Operations by UC Regents in January after serving in an acting capacity since the retirement of Glenn Mara. Ray Juzaitis was selected as associate director for Nonproliferation, Arms Control and International Security (NAI) and head of LLNL's Homeland Security Organization, the posts previously held by Shotts, in June.

George Miller, formerly associate director for the National Ignition Facility (NIF), was promoted to associate director-at-large in July and Ed Moses was appointed associate director for NIF.

Melissa Allain, an attorney with extensive experience in business enterprises, was selected as Laboratory counsel in June. She replaced Jan Tulk, who had continued to serve as Lab counsel on an interim basis after being promoted to associate director for the Administration and Human Resources Directorate.

Linda Rakow, a 20-year Lab veteran, was named the Laboratory's chief financial officer in May. She had served in an acting capacity since the retirement of Phil Schultz.

Mark Strauch, who has held a variety of leadership positions in his 26 years at the Lab, was named deputy associate director for the Safeguards and Security Organization and Laboratory Services Directorate in April by Associate Director Dave Leary.

Samuel Bodman became the 11th secretary of Energy in February, succeeding Spencer Abraham, who had announced he would step down in late 2004. Kyle McSlarrow, deputy secretary of Energy, resigned in January.

Science & technology highlights

2005 was another year of achieving major milestones for the Stockpile Stewardship, NNSA program to ensure the safety, security and reliability of the nation's nuclear deterrent without underground testing.

In October, NNSA's Advanced Simulation and Computing program marked its 10th anniversary by dedicating the world's fastest and third fastest supercomputers — BlueGene/L and Purple — in a ceremony held in the Terascale Simulation Facility and attended by Linton Brooks, NNSA administrator; Ray Orbach, director of DOE's Office of Science; and Nick Donofrio of IBM, as well as other dignitaries.

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QUOTEables

"This was a way to know what was going on and to satisfy my thirst for news because I'm something of a news junkie."

— Mike Newman, a Lab technician who spent more than eight weeks with U.S. troops in Iraq to help develop advanced surveillance technologies

"Some 20 years ago this kind of thinking was thought to be science fiction. It brings poetic justice to black holes because we think of them as sucking things in, but we've shown that when a jet emits from a black hole, it can bring new life by collapsing clouds and creating new stars."

— Wil van Breugel, after determining black holes can form new stars

"By the end of the trip, the first thing you want to do is take a nap and a hot shower."

— Jaime Marian of CMS, who spent three weeks at sea to win the trans-Atlantic Rubicon-Antigua Challenge

"The science of life is just now taking flight, and we want to be a part of it."

— Elbert Branscomb, associate director of the Biosciences Directorate, upon the renaming of BBRP to Biosciences

NEWSLINE

Newsline is published bi-weekly by the Public Affairs Office, Lawrence Livermore National Laboratory (LLNL), for Laboratory employees and retirees.

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Distribution: Mail Services at LLNL

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LOOKING BACK AT 2005

A month by month look at highlights from 2005

JANUARY

SCIENCE & TECHNOLOGY

Laboratory officials sign a two-year contract extension with the State Water Resources Control Board to help the state's effort in assessing groundwater quality.

Edward Wishnow of the Physics and Advanced Technologies Directorate participates in a study measuring the temperature, winds and chemical composition of Saturn, its rings and one of its moons, Phoebe.

The Laboratory plays a key role in the development of the new Large Synoptic Survey Telescope.

Astronomers Wil van Breugel and Steve Croft discover how black holes can create new stars, proving that jet-induced star formation may have played an important role in formation of galaxies in the early universe.

John Bradley, director of the Lab's Institute for Geophysics and Planetary Physics, studies carbon and silicate grains imbedded in interplanetary dust particles (IDPs) to determine how IDPs formed from interstellar materials.

Laboratory scientists Rick Ryerson and Bob Finkel determine the Karakorum fault in Tibet, a feature formed by the same tectonic "collision" that caused the tsunami in Indonesia, has slipped 10 millimeters per year during the last 140,000 years.

Laboratory scientists work to restore populations of the critically endangered large-flowered fiddleneck, a plant on the brink of extinction.

The Laboratory kicks off the World year of Physics 2005 with a special Up Close section in *Newsline* that focuses on the variety of physics work that is entwined in all aspects of scientific research.

PEOPLE

Laboratory technician Mike Newman works alongside the U.S. military in Iraq to develop advanced surveillance technologies.

Five Laboratory scientists — David Eaglesham, Tom Rognlien, Lou Terminello, Craig Tarver and Tina Back — are named American Physical Society fellows.

Federal appeals court judge Michael Chertoff is named the new Homeland Security secretary.

Wayne Shotts, longtime Lab physicist and former winner of the E.O. Lawrence Award for national security, is named deputy director for Operations.

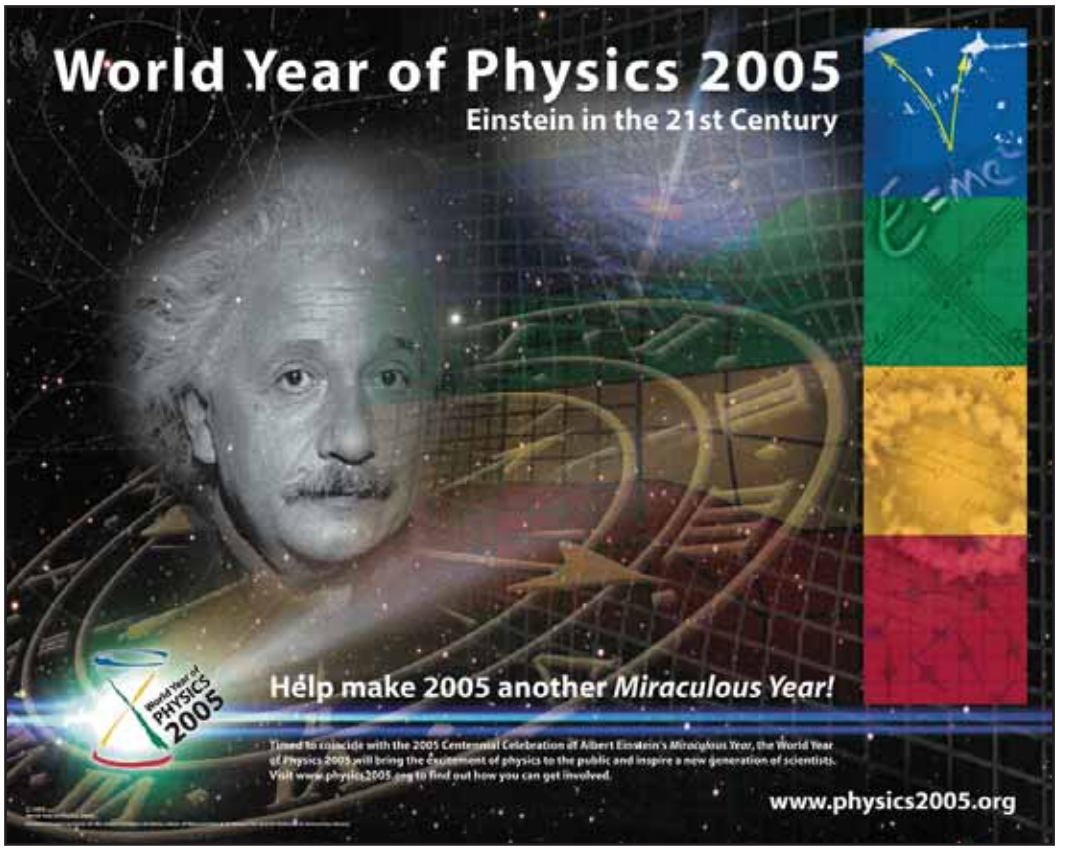
Camille Bibeau, head of the Mercury Laser project at the National Ignition Facility, receives the national 2004 Excellence in Fusion Engineering Award at the Fusion Power Associates annual meeting.

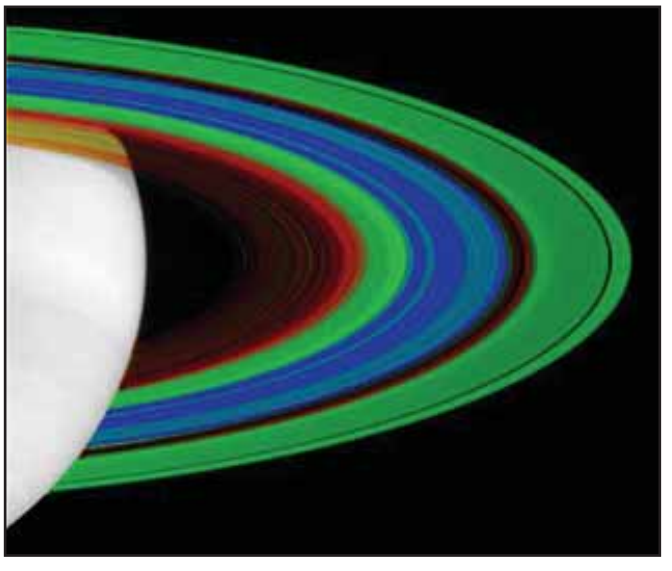
The Laboratory's Women's Association presents its annual scholarship awards to 12 employees who are pursuing their education while continuing their careers.

Jaime Marian of the Chemistry and Materials Science Directorate spends 21 days at sea in a race to win the Rubicon-Antigua Challenge, a trans-Atlantic adventure from the Canary Islands off the coast of Africa to Antigua in the Caribbean.

Christopher Edley Jr., dean of Boalt Hall School of Law at UC Berkeley, gives the keynote address during the Lab's annual Martin Luther King Jr. celebration.

Sheril Burke becomes the Laboratory's ombuds program coordinator and facilitator in the Employee Relations Office.





This false color image from the Cassini spacecraft represents the most detailed look to date at the temperature of Saturn's rings. Inner rings are slightly warmer than the outer green rings that are equivalent to -298 degrees Fahrenheit.

OPERATIONS

The more than 50-year-old Lab pool closes for good as engineers find it is beyond repair.

The Laboratory's Safeguards and Security Organization takes on significant physical security changes in and around the Superblock and Protective Force capability is upgraded. In addition, vehicle access changes including perimeter vehicle searches and gate standardization are instituted.

The Lab's Biology and Biotechnology Research Program is renamed the Biosciences Directorate. The directorate is reorganized with a new logo and a strengthened focus on making the Laboratory a more important player in the world of biological science and biodefense.

Travel Services no longer processes paper travel expense reports for domestic travel, registration fees and other reimbursement types. Expense reports will only be processed if submitted and approved online.

Employees who have upcoming or currently due training requirements receive an e-mail notice form the LTRAIN system indicating their "Monthly Summary of Training Action Report" is available online and ready for review.

FEBRUARY

SCIENCE & TECHNOLOGY

NNSA and the United Kingdom's Trade and Industry Ministry sign a memorandum of understanding to assist the permanent shutdown of the last operating weapons-grade plutonium reactor near Zheleznogorsk, Russia.

The Defense Sciences Engineering Division works with University of Florida researchers to test and learn the limitations of a new lightning measurement system.

From climate to fusion, Laboratory symposia are featured at the American Association for the Advancement of Science annual meeting in Washington, D.C. The symposia and lectures showcase talks by the best and the brightest members of the global scientific, engineering and technology communities.

The Laboratory demonstrates

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Looking back at 2005

QUOTEables

"…for hundreds of years the federal government has been responsible for the national security….that's been turned on its head by what it takes to do prevention in the U.S."
— Paul Stockton, director of the Center for Homeland Defense and at the Naval Postgraduate Schools in Monterey, speaking on domestic terrorism

"Postdocs have the energy and the enthusiasm and the new ideas. We need to make sure they have a good work environment so they can flourish…."
— Al Ramponi, Bioscience's principal deputy associate director

"We've observed warming of the Earth's land surface and oceans, cooling of the stratosphere, an increase in height of the tropopause, retreat of Artic Seas ice, and widespread melting of glaciers. These changes are difficult to reconcile with purely natural causes."
— Ben Santer of Livermore's Program for Climate Model Diagnosis and Intercomparison

"This is a great way for facilities that have trucks routinely coming on site to add a layer of protection."
— Lab engineer David McCallen discussing his prototype next-generation truck-stopping device that costs about $800

"The probability of a neutrino interacting with anything is very small. If you want to detect any neutrinos, you need something big."
— Livermore's Peter Barnes of the MINOS Experiment

"I still remember the day in 1996 when Mark Seager and I extrapolated the power and space requirements for TSF, and wrote them on the whiteboard in my office. After Mark peeled me off the ceiling, we went over to the DNT directorate and gave [then] AD Mike Anastasio the bad news: He needed a building with enough space on the floor to land an F-14 and enough power to run a small city."
— Mike McCoy of Computation

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Continued from page 3

the next-generation truck-stopping device, designed to protect sensitive facilities targeted by terrorists driving trucks laden with explosives, fuels or toxic cargoes.

Livermore's sixth annual ROTC Day hosts 60 undergraduate cadets and midshipmen from colleges and universities in California and Texas.

Ben Santer shows how access to the next generation of climate change experiments helps scientists obtain more comprehensive estimates of the expected "signal" of human influence on climate at the AAAS conference in Washington D.C. At the same AAAS gathering, Ed Moses joins participants in a session, "Fusion: Energy Source of the Future?" Moses explains key elements that must be resolved to establish the practicality of fusion as an energy source.

PEOPLE

Samuel Bodman becomes the 11th secretary of Energy at swearing-in ceremonies in Washington D.C. Bodman had served as deputy secretary of both the Treasury and Commerce departments.

"Science on Saturdays" returns to connect students with science. Ed Moses presents the first session, "Juggling the Power of Light: How Lasers Work," with Los Gatos High School teacher Dan Burns.

Paul Stockton, director of the Center for Homeland Defense and at the Naval Postgraduate Schools in Monterey, tells Lab employees that the nation needs to devote significantly more attention inside the country toward preventing terrorist attacks.

Legal's Matt Edwards leaves for a yearlong stint at the U.S. Army's Judge Advocate General (JAG) Corps at Guantanamo Bay, Cuba.

The Chinese American Networking Group banquet ushers in the Chinese New Year and the Year of the Rooster.

CSI crime investigation plays to a standing-room-only crowd of nearly 700 students and teachers in the second installation of "Science on Saturday," presented by the Lab's Allen Christian and Tracy High School biology teacher Kirk Brown.

Lab physicist Don Correll teams with Los Gatos High School teacher Dan Burns at "Science on Saturday" and explains how scientists use spectroscopic measurement of light to study the stars and conduct fusion energy research.

The remote control truck stopping device is demonstrated for a huge gathering of local news media at the Lab.

Erik Jones from the Defense Sciences Engineering Division discusses his unmanned air vehicles project with participants during the Lab's sixth annual ROTC Day held in February.

OPERATIONS

Employees and contractor employees are reminded that they may use DOE's ongoing Employee Concern Program to report concerns about — among others — environmental health and safety, or management of DOE programs and facilities.

The Lab and DOE complete shipment of 600 drums of legacy waste to the Waste Isolation Pilot Plant outside Carlsbad, N.M.

The Center for Disease Control's Toxic Substances and Disease Registry completes its assessment of Site 300 and delivers a finding of "no public health hazard."

New gate hours and vehicular security checks at the new Delivery Vehicle Inspection Station go into effect on Valentine's Day, as the Mesquite Gate closes indefinitely, all part of changes in security procedures.

Vision services offers laser eye examinations that let employees view the inside of their eyes.

March

SCIENCE & TECHNOLOGY

The Nevada Atomic Testing Museum opens its doors to the public, a tribute to those whose achievements and sacrifices con-

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Looking back at 2005

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tributed to winning the Cold War.

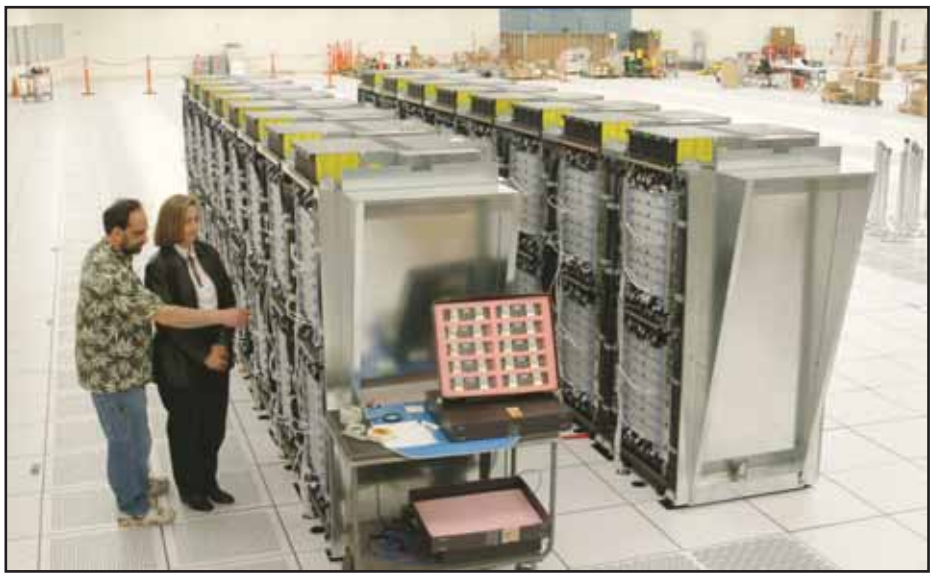
Using two giant detectors at Fermi Lab, Livermore scientists work to solve a 50-year-old question: Can neutrinos — a particle that is relatively without mass and has no electrical charge, yet is fundamental to the makeup of the universe — transform from one type to another? Studying neutrinos helps scientists understand how particles acquire mass.

The Joint Genome Institute introduces a new system for managing genome data of microbial sequencing, a collaboration of LBNL and JGI. The institute currently is producing nearly one-quarter of the microbial projects worldwide, more than any other institution.

The NuSTAR telescope begins helping scientists understand remnants of supernovae, including Cassiopeia A. The NASA-approved study provides a sensitive, high-resolution, high-energy, hard X-ray map of the sky.

The Lab's BlueGene/L sets a world speed record for processing the benchmark LINPACK computer code, clocking 135.3 trillion floating point operations per second — and that was with just one-half of the machine up and running.

The ninth annual Tri-Valley Science and Engineering Fair returns to the San Ramon Valley Center. Participating seventh through 12th grade students come from Danville, Dublin, Livermore, Pleasanton, San Ramon and Sunol. The Senior Sweepstakes winner goes on to the International Fair in Phoenix.



Pam Hamilton of Computation and Mark Campana of IBM examine the first racks of BlueGene/L installed in the TSF.

PEOPLE

Edward L. Wright, professor of physics and astronomy at UCLA, delivers a DDLS presentation entitled "Observing the Origins of the Universe."

"Science on Saturday" explores astronomy in "From the Big Bang in California: Observations of the Universe." This final lecture in the series features Lab scientist Wil van Breugel and Granada High School teacher Tom Shefler.

Lab engineer Jeff Wisoff delivers the keynote address, "Destination Space Station," during "Engineers' Day" at the Lab. The event draws 500 middle-school students and teachers from Oakland and Tri-Valley school districts.

Stan Hitomi, executive director of the Edward Teller Center, is selected to serve as chair of the newly formed California Teacher Advisory Council. Led by the California Council on Science and Technology, this effort hopes to strengthen math, science and technology in the K-14 curriculum.

Nobel laureate Hans Bethe, the last of the giants of the golden age of 20th-century physics and birth of modern atomic theory, dies at home in Ithaca, N.Y. Bethe was one of science's most universally admired figures.

Dolores Huerta, co-founder of the United Farmworkers' Union, addresses employees as part of Women's History Month and Cesar Chavez Day. Amigos Unidos, the Women's Association and the Worklife center sponsor the talk.

With collaborators at Livermore and the UC Davis Cancer Center, biochemist Rod Balhorn of Davis constructs tiny molecules, called SHALs, for synthetic high-affinity ligants, that bind to unique sites on protein surfaces. SHALs may aid the fight against cancer and bioterrorism.

Noted LBNL physicist Stuart Freedman delivers a DDLS presentation on "The Decade of the

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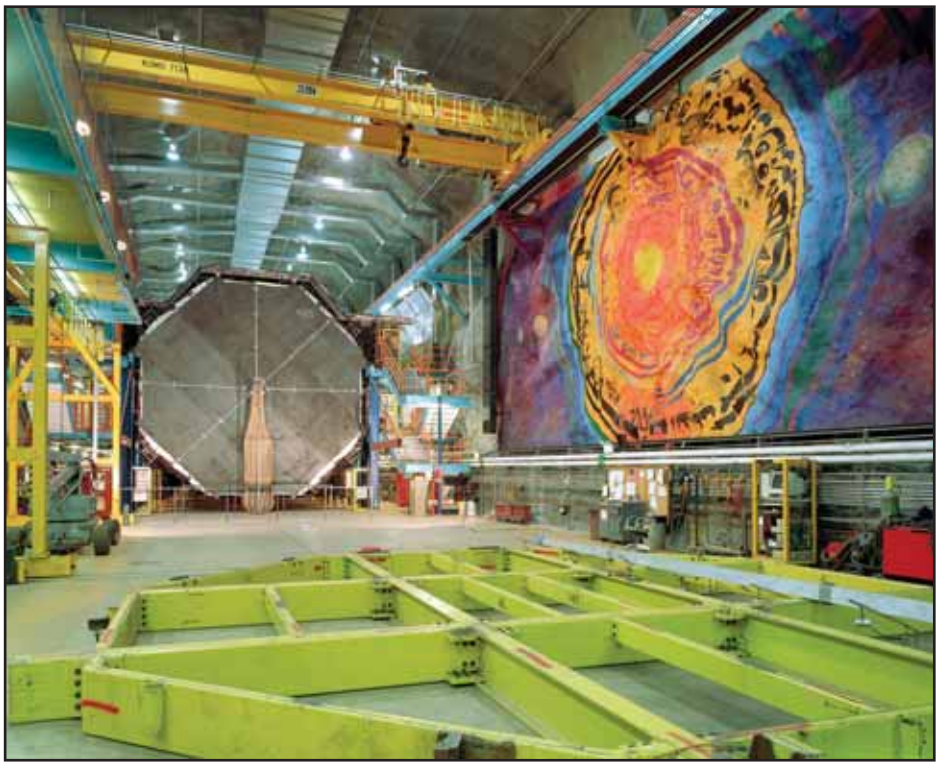

Excavations of the cavern and of the MINOS detector in Soudan, Minn. took four years. The University of Minnosota Foundation commissioned a mural for the MINOS cavern, painted onto the rock wall, 59 feet wide by 25 feet high.

QUOTEables

"This milestone demonstrates our continued commitment to revolutionize the way supercomputers are built, and to broaden the kinds of innovative applications we can run on them."

— IBM senior vice president of technology and manufacturing Nick Donofrio on BlueGene/L's record-setting performance

"These machines are the backbone of science and technology. The simulations performed on these machines will aid scientific discovery in many fields for decades to come."

— Computation AD Dona Crawford at her induction into the Alameda County Women's Hall of Fame

"He was easy. I did a good job."

— Officer-for-a-day Austin Perkins, after a mock arrest of PFD training coordinator Dave Hiltabidel. The 7-year-old Stockton cancer patient's visit to the Lab was arranged by Security Police Officer Scott Clark, a neighbor, with support from captains Gary Abundis and John Smalls

"There has never been direct evidence of a black hole."

— George Chapline, physicist, N Division

"It's vital to the nation that our science and programs are carried out with academic freedom and that our scientists and engineers are closely coupled to the broad scientific community."

— Cherry Murray, during the Year of Physics

"This work illustrates the power of the genome sequencing done at the Department of Energy's Joint Genome Institute to contribute to understanding the microbiological communities living at contaminated sites."

— DOE Office of Science Director Raymond Orbach, on a JGI study of gene expression

Looking back at 2005

QUOTEables

"Mike has shown a true understanding of the central role of science at the UC-managed national laboratories and has demonstrated, time and again, the depth of knowledge and expertise required to provide the best possible leadership for this competition."
— UC President Robert Dynes

"The World Trade Center attack changed our security perception dramatically enough about our own security — things that weren't previously possible became possible."
— Steve Cochran, who retired as acting AD for NAI

"I am honored to receive this reward. I came to Livermore to work on developing thermonuclear fusion as a safe and inexhaustible energy source 25 years ago. Now, more than ever, this continues to be a worthy goal and I am excited by our prospects of achieving it."
— Max Tabak, one of two 2005 Edward Teller Medal winners

"When you spend some time at the Lab, you see the enormous capabilities we bring to bear on some of the challenging threats the country faces from potential terrorist acts."
— U.S. Department of Homeland Security Secretary Michael Chertoff, making his first visit to LLNL

"This Lab is one of the department's most important resources. One of the reasons I'm here is to congratulate you and thank you for your effort on behalf of the country."
— Energy Secretary Samuel Bodman, during an all-hands address to Laboratory employees

"We basically carried her out. The stuff we had to move through and the things we've seen in it are just awful, but when you see someone who needs help you do what needs to be done."
— Capt. Arnie Brockmire, LLNL firefighter, on rescuing a stranded citizen from floodwaters in New Orleans

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Neutrino," in which he reviews the current understanding of the neutrino and speculates on the future.

Preston H. Carter is selected as director of Department of Defense Programs in the Lab's National Security Office.

Deputy Administrator for Defense Programs Everet Beckner announces he will resign on April 30.

OPERATIONS

A new era in computing dawns as Bldg. 543, the Terascale Simulation Facility, nears completion.

A review of administrative management positions nears completion. The study is part of the Integrated Performance and Pay Program, which assesses all Laboratory jobs and compensation to ensure they are competitive.

Sherry Hu of KPIX-TV, left, and Alameda County Supervisor Keith Carson, hand an award to Computation Associate Director Dona Crawford for being inducted into the Alameda County Women's Hall of Fame.

APRIL

SCIENCE & TECHNOLOGY

By re-creating extreme pressures and temperatures in the laboratory, Livermore scientists discover a "superionic" phase of water — neither ice nor liquid — that exists in the interiors and magnetic fields of icy large planets such as Neptune and Uranus.

Researchers in the Lab's Biosciences Directorate use a molecular dynamics computer program to simulate the movement of the protein "clamp" that keeps the DNA polymerase enzyme attached to a strand of DNA during cell replication. The simulation reveals that the clamp moves by alternating contacts with the DNA strand, much like a horse's hooves digging into a racetrack.

New insights into the mystery of "gene deserts" — long stretches of DNA that contain no protein-coding genes — are uncovered by LLNL scientists studying human chromosomes 2 and 4. The studies reveal that the location of some noncoding sections of DNA have remained constant over many centuries of evolution, even though the DNA sequence within the deserts has changed considerably, suggesting that these "conserved" segments may play a role in gene regulation.

By studying the oxygen and magnesium content of the components of a primitive meteorite, Livermore researchers determine that the lifetime of the solar nebula is roughly two million years, furthering understanding of how our solar system formed.

Scientists at the DOE Joint Genome Institute report on a new approach to determining the health of the environment by comparing snippets of the DNA of microbes living in particular habitats. The "metagenomics" approach holds promise for significant advances in environmental science.

Delivery of the Advanced Simulation and Computing Program's "Purple" supercomputer begins. The 100 TeraFLOP/s (trillion floating point operations per second) machine contains more than 12,000 next-generation IBM Power5 microprocessors.

Lab physicist George Chapline challenges the accepted theory of black holes, arguing that they consist of the same dark energy that makes up 60 percent of the mass of the universe.

PEOPLE

Environmental chemist Dorothy Bishop retires after 30 years of studying the makeup of contaminants and their effects on the Lab's environment.

Computation Associate Director Dona Crawford is inducted into the Alameda County Women's Hall of Fame.

Mark Strauch is named deputy associate director of the Safeguards & Security Organization and the Laboratory Services Directorate.

James Berryman of the Energy and Environment Directorate's Earth Science Division is awarded the 2005 Maurice A. Biot Medal of the American Society of Civil Engineers.

The National Ignition Facility's Siegfried Glenzer is awarded the prestigious Humboldt Research Award in recognition of his recent achievements in plasma physics.

OPERATIONS

In his semi-annual "Lab Update," Director Michael Anastasio announces the Aurora Project, a Labwide initiative to develop a 2025 strategic vision for LLNL. Five strategic vision 2025 planning teams are formed to identify initiatives that will shape the Laboratory in

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During Earth Expo 2005, Lab employee Dave Fuess demonstrates a Segway two-wheeler.

Looking back at 2005

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the future.

A three-year cleanup of Bldg. 251, the "Heavy Elements Facility," reaches a major milestone when it is downgraded from a Category 2 Nuclear Facility to a Radiological Facility.

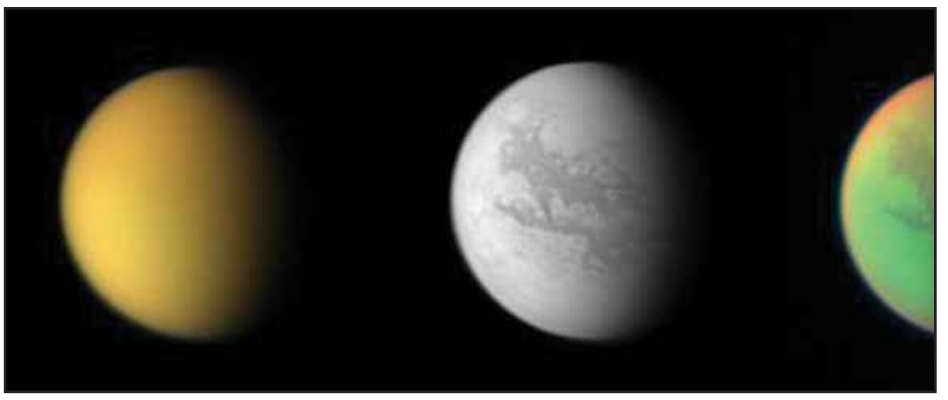
The Industrial Partnerships and Commercialization Office publishes a series of one-page fliers that provide information about the roles and responsibilities — and the pros and cons — of various contractual arrangements available to help Lab researchers bring their inventions to the marketplace.

Automated external defibrillators, or AEDs, are installed in the Lab's West and Central cafes. The easy-to-use devices can administer a potentially life-saving shock to the heart of a person suffering cardiac arrest.

In recognition of Earth Day, the Lab's Earth Expo 2005 celebration highlights Lab and community environmental efforts and introduces the new "We recycle Office Waste paper," or WOW, recycling bins.

The Department of Energy awards a new five-year contract to the University of California to manage and operate Lawrence Berkeley National Laboratory. The award is the result of the first competition of the LBNL contract since its inception.

From left: Bruce Tarter, Cherry Murray, Elbert Branscomb, John Nuckolls, Karl van Bibber and Leslie Rosenberg discuss the "Future of Physics" during a lively presentation in May looking at how the discipline might evolve over the next 20 years. The panel discussion is held in celebration of the Year of Physics.



These three views of Titan from the Cassini spacecraft illustrate how different the same place can look in different wavelengths of light.

MAY

SCIENCE & TECHNOLOGY

The Laboratory kicks off a week-long celebration in honor of the World Year of Physics, recognizing the 100th anniversary of Albert Einstein's "Miraculous Year," with "Science Day" talks, exhibits and a poster expo, and a panel discussion of the "Future of Physics" led by former Lab Director Bruce Tarter.

In the first comprehensive study of gene expression in a microbial community from an "extreme" natural environment, scientists from Livermore and Oak Ridge national laboratories, UC Berkeley, and Xavier University in New Orleans identify more than 2,000 proteins produced by five species of microbes living in a hot, highly acidic biofilm growing inside an abandoned mine at Iron Mountain, Calif.

Laboratory researchers participate in a study of Saturn's moon Titan, the only moon in the solar system with a substantial atmosphere, using data from the Cassini-Huygens spacecraft. The organic chemistry that occurs in Titan's atmosphere is an analog of the processes that may have been present in the early terrestrial atmosphere.

PEOPLE

Lab Director Michael Anastasio is named to head the University of California-Bechtel National team that will compete for the management of Los Alamos National Laboratory.

George Miller, the associate director of National Ignition Facility Programs, is appointed associate director-at-large. Miller's new position is focused on strategic issues, including the development of the Lab's role in the broader national security community.

Linda Rakow, a 20-year Laboratory employee, is selected as LLNL's new chief financial officer. She had been serving in the position in an acting capacity since July 2004.

Nuclear physicist Robert Kuckuck, a former LLNL deputy director, is named interim director of Los Alamos National Laboratory.

OPERATIONS

The Business Services Department's Food Services Group and Eurest Dining Service introduce signature-free rapid checkout for customers using an ATM or credit card for food purchases at the West and Central cafes.

The Aurora Project holds a series of "town meetings" to give employees an opportunity to provide their input on the Lab's strategic vision for 2025.

JUNE

SCIENCE & TECHNOLOGY

Warming of the world's oceans is a clear signal of human effects on global climate. This is the bottom-line conclusion of a joint study by scientists from LLNL's Program for Climate Model Diagnosis and Intercomparison and the Scripps Institution of Oceanography. Scientists from the University of Reading and the National Center for Atmospheric Research were involved in the study.

Scientists from the Department of Energy's Joint Genome Institute sequence DNA extracted from the bones and teeth of extinct cave bears. The results are published in an online edition of the journal *Science*.

Scientists from LLNL and the Linnaeus Centre for Bioinformatics at Uppsala University in Sweden develop a new bioinformatics technique for systematically analyzing key regions in DNA that help control gene activity.

A patent is issued to the Department of Energy for the work of two Lab scientists — Greg Rau and Ken Caldeira— who created a technique to capture carbon dioxide produced at power plants and place it in the ocean, a process that mimics a natural weathering and acid neutralization process.

Scientists track down the biological trigger that gives rise to Van Buchem disease, a hereditary, disfiguring bone disorder that can cause blindness and deafness. The research is performed by Lawrence Livermore and Lawrence Berkeley national laboratories, a Swiss research institute and the Joint Genome Institute.

Livermore's BlueGene/L reaffirms its ranking as the world's most powerful computer on the Top500 list, the leading industry benchmark for high-performance computing.

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Looking back at 2005

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PEOPLE

Lab researcher Max Tabak and former Lab researcher Joseph Kilkenny, vice president for Inertial Fusion Technology at General Atomics in San Diego, are named recipients of the 2005 Edward Teller Medals by the American Nuclear Society. The award honors LLNL's co-founder and former director, the late Edward Teller.

Melissa Allain, an attorney with extensive experience in business enterprises, is selected as Laboratory counsel.

Steve Cochran, the acting associate director for the Lab's Nonproliferation, Arms Control and International Security (NAI) Directorate and acting director of the Lab's Homeland Security Organization, retires after more than 30 years at the Laboratory.

Wei Cai, an assistant professor of mechanical engineering at Stanford University, is honored with a 2004 Presidential Early Career Award for Scientists and Engineers for work he did while serving as an Ernest O. Lawrence Fellow at the Lab.

Ellen Eagan-McNeill is selected as the Laboratory's Operations Security program manager.

OPERATIONS

The Laboratory's effort to eliminate waste receives two Pollution Prevention Awards from the Department of Energy/National Nuclear Security Administration.

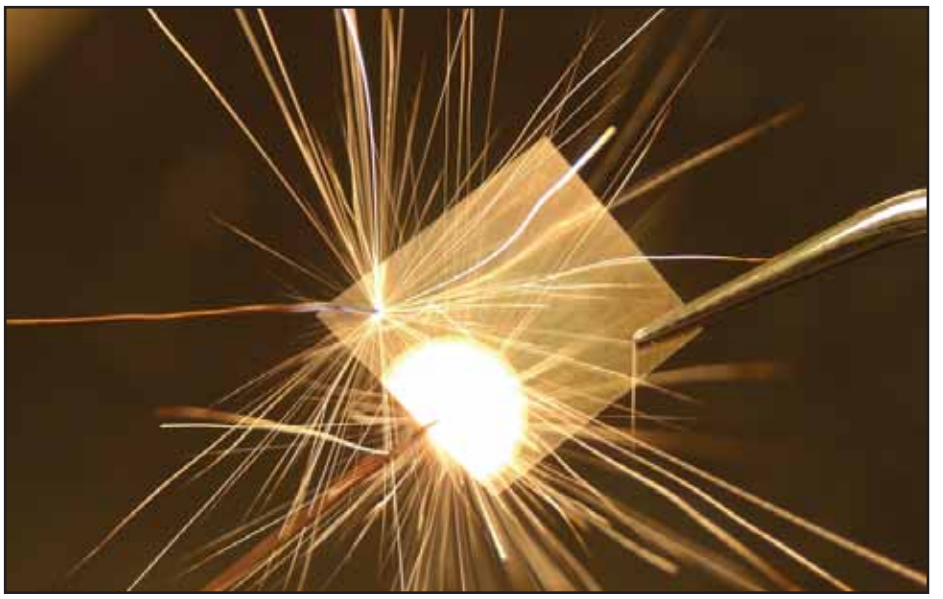
The Lab's Central Cafe installs a wireless network. Food service hours also are expanded, with pastries, pre-made sandwiches, salads, snacks and beverages available from 9:30 to 11:30 a.m. The Central Java Wave also sells sandwiches, salads and pastries from 1:30 to 2:30 p.m.

JULY

SCIENCE & TECHNOLOGY

Laboratory researchers garner four R&D 100 awards for developing advanced technologies with commercial potential. The awards include the Biological Aerosol Mass Spectrometry system for detecting biological threat agents, the Adaptable Radiation Area Monitor (ARAM) for radiation detection, the NanoFoil technology that allows the joining of materials in a new way, and VisIt, a visualization software.

Under funding from the Defense Advanced Research Projects Agency and in collaboration with the U.S. Army, gun truck armor kits developed by Lab researchers provide convoy protection for American troops on the roads of Iraq.



This R&D 100 winning Reactive NanoTechnologies (RNT) NanoFoil contains thousands of alternating nanoscale layers of nickel and aluminum. With foils formed in this manner, an electrical pulse applied to the foil will initiate a chemical reaction producing high temperatures.

The Amazon River basin isn't taking up and holding as much carbon dioxide as once believed. This conclusion comes from a study published in the journal *Nature* by the Lab's Center for Accelerator Mass Spectrometry, the University of Washington, the Stroud Water Research Center, Rice University and the University of Sao Paulo, Brazil.

PEOPLE

Ray Juzaitis, a nuclear and chemical engineer with extensive experience in weapons and computational physics, is named associate director for the Laboratory's Nonproliferation, Arms Control and International Security Directorate and acting director for the Lab's Homeland Security Organization.

Lab employee Mike Newman is presented with the Commander's Award for Civilian Service by the U.S. Army for his work during two stints in Iraq in 2004.

Physicist Joel Ullom, a former Ernest O. Lawrence fellow at the Laboratory, receives a 2004 Presidential Early Career Award for Scientists and Engineers, the nation's highest honor for professionals at the outset of their independent research careers.

Edward Moses is named associate director for the National Ignition Facility Program Directorate.

U.S. Department of Homeland Security Secretary Michael Chertoff extols the capabilities the Lab brings to bear in the war on terrorism during his first visit to Livermore.

Lab postdoctoral research fellow Bassem El-Dasher, along with a team of Carnegie Mellon colleagues, wins the ASM International's 2005 Henry Marion Howe Medal.

OPERATIONS

An ambitious new program for employee data is under way. Called the People Information Program, it is a Labwide effort to better integrate data across multiple business platforms, such as Human Resources/payroll, finance and budgets.

The University of California Board of Regents agrees to extend the term of LLNL's current operating contract until Sept. 30, 2007.

Participants in the Aurora Project conclude two days of meetings to discuss, perfect and prioritize initiatives proposed by five teams for moving the Laboratory toward a 2025 vision.

AUGUST

SCIENCE & TECHNOLOGY

IBM announces that the Advanced Simulation and Computing (ASC) Program's Purple system exceeds performance objectives in a milestone test at the manufacturer's Poughkeepsie, N.Y. facility.

NIF passes another milestone when two shots achieving energy output total 136.5 kiloJoules (kJ) surpass the highest levels ever reached on the deactivated NOVA laser or the 60-beam OMEGA laser at the Laboratory for Laser Energetics at the University of Rochester.

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From left: Allen Christian of LLNL explains the bio briefcase detection technology to Scott Weber of the U.S. Department of Homeland Security, Department of Homeland Security Secretary Michael Chertoff and Laboratory Director Michael Anastasio.

Looking back at 2005

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Continued from page 8

PEOPLE

Energy Secretary Samuel Bodman makes his first visit to the Laboratory, participating in briefings on stockpile stewardship, other national security programs and touring research facilities including NIF and TSF.

Ambassador Linton Brooks, administrator of the National Nuclear Security Administration, visits Site 300.

Gov. Arnold Schwarzenegger reappoints Biosciences' Jim Felton to the State Science Advisory Board's Carcinogen Identification Committee.

Lab scientists William Pitz of the Chemistry and Chemical Engineering Division and Charles Westbrook of the Chemistry and Materials Science Directorate are part of a team that receives the Society of Automotive Engineers (SAE) 2003 Arch T. Colwell Merit Award for their paper, "Effects of Oxygenates on Soot Processes in DI diesel Engines: Experiments and Numerical Simulations."

Two Lab employees, Celeste Matarazzo of Computation and Rose O'Brien of Defense and Nuclear Technologies, along with Janis Turner, a retired Livermore middle school teacher, depart on a cross-country bicycle journey to raise money for Tri-Valley Hope Hospice. The trio expects to cover 3,850 miles in 60 days.

OPERATIONS

The LLNL/Sandia Cancer Awareness Campaign kicks off with a memorial walk by more than 70 Lab employees and cancer survivors.

As part of the "World Year of Physics" activities, the Lab hosts "Science in the Movies," by special effects and stunt coordinator Steve Wolf. Two performances are given to packed houses at Pleasanton's Amador Theater.

Protesters gather near the Laboratory to mark the 60th anniversary of the Hiroshima and Nagasaki bombings.

Researchers peer into the NIF target chamber, with its newly installed protective wall. The laser surpasses another milestone – on its way to beginning ignition experiments in 2010.

SEPTEMBER

SCIENCE & TECHNOLOGY

The Large Synoptic Survey Telescope (LSST) receives the first year of a four-year $14.2 million award from the National Science Foundation to design and develop a world-class 8.4 meter telescope scheduled for completion in 2012. The Laboratory plays a key role in the development of the telescope.

Livermore scientists reveal the way nanotubes — molecules that are typically 10,000 times smaller than the diameter of a human hair — may grow.

A new technique is developed by researchers at the Lab's Center for Accelerator Mass Spectrometry (CAMS) and the Karolinska Institute in Sweden, to determine the amount of carbon 14 in tooth enamel. The method can be used in the identification of victims of Hurricane Katrina and other large-scale disasters.

Under a signed agreement, the Laboratory prepares to work with the Tajura Nuclear Research Center in Libya to help redirect the North African country's nuclear weapons research effort to peaceful applications under the Department of Energy's sister lab program.

PEOPLE

Two Lab firefighters — Arnie Brockmire and Kenneth Rinna — return from New Orleans after spending two weeks helping victims of Hurricane Katrina.

In the wake of Hurricane Katrina, a team of four Lab employees is dispatched to the Gulf Coast with detection technologies to assist in search and recovery operations.

Research scientist Christoph Niemann is selected to become the NIF assistant professor at UCLA, linking the academic community with LLNL's premier research facilities.

OPERATIONS

The Lab holds a "Frontiers of Physics Day," bringing more than 400 local high school students to the Lab for a day of tours and presentations. The event is part of he Lab's celebration of the "Year of Physics."

In an unprecedented move, the Lab's HOME Campaign gets off to an earlier than usual start at the request of employees who are eager to provide immediate aid to victims of Hurricane Katrina.

The Lab's Safety Fair and Health Service Open House draw crowds to an array of exhibits on a number of health, safety and environment topics.

More than 1,000 people tour NIF during that program's family open house.

The Work-Life Center and the LLNL Employee Networking Groups co-sponsor "Around the World @ Noon" — a celebration of culture and community showcasing exhibits from local museums, ethnic foods and music.

OCTOBER

SCIENCE & TECHNOLOGY

NIF installs its 1,000th line replaceable unit, beamline modules

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Energy Secretary Samuel Bodman speaks with local news reporters while DOE Office of Science Director Ray Orbach looks on.

From left, Matt Nolan, Cindy Thomas, Darlene Klein and Bree Klotter of Biosciences collect donations in the Central Cafe. Dick Post writes a check for hurricane victims.

Looking back at 2005

Director Michael Anastasio and Deputy Director Wayne Shotts (center) congratulate the Protective Force "Best of the West" sharpshooter team.

➤YEAR IN REVIEW

Continued from page 9

containing optics and instrumentation.

The Lab's intense short-pulse Titan laser is dedicated, becoming one of only three petawatt-class lasers in the world.

DOE officials are on hand to dedicate BlueGene/L, the fastest supercomputer in the world, and ASC Purple in a ceremony at the Lab's Terascale Simulation Facility.

Ambassador Linton Brooks, administrator of the National Nuclear Security Administration, and the head of DOE's Office of Science, Ray Orbach, join officials from IBM and the Computation Directorate to praise the Lab's success.

The sixth annual Laboratory Science and Technology Awards goes to a group of researchers who developed a device that can identify biological particles in real time (BAMS), and to the team that achieved NIF Early Light.

Laboratory environmental scientist John Ziagos warns that in order to restrain carbon emissions over the next 45 years, the United Sates must improve its electric generation, industrial, freight and aircraft efficiency by 50 percent, as well as hold petroleum consumption to 22 million barrels per day.

Lab scientists publish a study explaining how quartz and other silicates erode during geochemical weathering. Their findings may explain the rapid dissolution or demineralization of biological materials under some conditions.

Astrophysicists Christopher Mauche, Duane Liedahl and Diego Torres join astronomers and amateur stargazers in an intensive series of multi-wavelength observations of the mysterious binary star system AE Aquarii, known as a "magnetic propeller" because the spin period of its white dwarf is 33 seconds and its magnetic field strength is roughly two million times that of Earth.

PEOPLE

The Lab Security Department's Protective Force Division Competition Shoot Team takes first place overall in a statewide "Best of the West" Special Weapons and Tactics Competition, topping last year's second place finish.

Tony Carrano, who retired as associate director for Biosciences, dies of lymphoma at age 63.

Jane Long, associate director for the Energy and Environment Directorate, testifies before the U.S. Senate's Committee on Energy and Natural Resources, about the Lab's research and development activities regarding water treatment, quality and management.

Ben Santer wins the Office of Biological and Environmental Research (BER) Distinguished Scientist Fellowship.

The Lab's observance of National Hispanic Heritage Month concludes with an inspirational talk by David Lopez, president of National Hispanic University in San Jose.

Jim Candy, chief scientist in the Engineering Directorate, begins a six-month sabbatical in England at Cambridge University, where he will do research on non-linear signal processing techniques, such as using radiation detection to find bombs in cargo containers.

The Lab honors Gordon Burkhart-Schultz, director of AID Employment, Inc. (Advancement and Independence for the Disabled through Employment), for its 30-year partnership with LLNL.

OPERATIONS

Site 300 celebrates its 50th anniversary.

The HOME Campaign 2005 kicks off with the annual Run For HOME and agency fair. This year's theme is "There's No Place Like HOME."

The Lab conducts a self-help drill to ensure that employees both at Livermore and at Site 300 understand emergency preparedness procedures, including facility evacuation, personnel accountability, access control and communications.

NOVEMBER

SCIENCE & TECHNOLOGY

The Lab joins with the UC Davis Cancer Center to unveil a new and reliable technique that may help design more effective targeted drug treatments for cancer patients.

Lab scientists release a study showing that the earth will warm by eight degrees Celsius (14.5 degrees Fahrenheit) if humans use the entire planet's available fossil fuels by the year 2300.

The Lab joins with UC Santa Barbara in an effort to develop two separate bio-sensing nanosystems to defend the nation against biological events. The first project, called E-DNA, is being developed for the detection of pathogens that are relevant to national security.

According to research by astrophysicists from LLNL, UC Berkeley and Princeton, new stars form by gravitational collapse rather than the widely held belief that they come from the buildup of unbound gas.

Civil liberties should not be sacrificed in the war on terror, according to Don Prosnitz, deputy director of LLNL's Homeland Security Organization, in an article in *Science*. Hunting for weapons of mass destruction can be accomplished without violating the provisions of the Fourth Amendment of the Constitution, says Prosnitz.

The Lab receives two Departmental Energy Management Achievement Awards from DOE. One goes to LLNL's Energy Manager Blair Horst for his numerous energy and water saving efforts at the Lab since 1998. The other award goes to a group at NIF, whose work lowered energy con-

See YEAR IN REVIEW, *page 11*➤

Site 300 celebrates its 50th anniversary with a special gathering for its employees. Charlie McMillan, right, and Jim Wilson look over posters outlining the history of the Lab's experimental test facility.

Looking back at 2005

QUOTEables

"When you are blessed and have everything you need, it is a responsibility to give back, particularly in our own community."
— 2005 HOME Campaign Chair Patti Lann on the importance of participating in the HOME Campaign

"We definitely know we are going to warm over the next 300 years. In reality, we may be worse off than we predict."
— Govindasamy Bala of the Energy and Environment Directorate

"The unprecedented computing power of these two supercomputers is more critical than ever to meet the time-urgent issues related to maintaining our nation's aging nuclear stockpile without testing."
— Linton Brooks, administrator, National Nuclear Security Administration

"This dedication marks a milestone in the DOE Office of Science and NNSA partnership to revitalize the United States' efforts in high-end computing."
— Ray Orbach, Director, DOE Office of Science

"Our projections show that no one technology, and not even a combination of all the known technologies massively deployed, as well as aggressive efficiency and fuel economy improvements, can stabilize U.S. carbon emissions between now and 2050."
— Lab environmental scientist John Ziagos

"The best way to enhance effectiveness and efficiency is with some belt tightening uniformly implemented Labwide."
— Director Michael Anastasio, announcing how the Lab will cope with projected downsized budgets

"Competitive accretion is the big theory of star formation in Europe, and we now think it's a dead theory."
— Lab astrophysicist Richard Klein

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Continued from page 10

sumption and costs, as well as reducing greenhouse gas emissions.

Pioneering materials science simulations conducted on the BlueGene/L supercomputer at LLNL win a Gordon Bell Prize for a team led by physicist Fred Streitz.

Lab bioscientists, in collaboration with UCLA, uncover new evidence about protein folding, and why the process doesn't always happen. Their work may lead to better understanding of neurodegenerative diseases such as Alzheimer's, and possible prevention or treatment strategies.

The Lab assists with a four-and-a-half year NNSA program to help the Russian Navy protect its nuclear weapons grade materials. A new training center is established in Severomorsk on the Barents Sea, which will teach 40 separate courses to at least 600 Russian naval personnel annually.

PEOPLE

The Lab provides a research position for Robert Svoboda, a physics professor at Louisiana State University, whose home in New Orleans was destroyed by Hurricane Katrina. LLNL employees contribute in many ways to the relief effort in the wake of the devastating Gulf hurricanes, including bake sales, donations of needed supplies and cash. In addition, donations to the HOME Campaign raise $75,000 for Katrina relief.

More than 150 motorcyclists join LLNL Armed Forces Veterans Association, raising $3,800 for the Lab's Adopt-A-Platoon and Toys for Tots programs.

NNSA director Linton Brooks gives out Weapons Excellence Awards to three individuals and three teams for outstanding work performed in 2004. Thomas Healy, Omar Hurricane and Mordecai Rosen are honored, along with the Livermore Computing TSF Team, Livermore's National Hydrotest Plan Team, and Livermore's Tilt-Pour Furnace Development Team.

OPERATIONS

Site 300 retrofits most of its explosives work areas and magazines with Faraday cage technology to protect workers and equipment from lightning strikes.

Lab Director Michael Anastasio delivers a semi-annual Lab update, announcing to employees, "there inevitably will be change for the Laboratory" in light of DOE's decision on the Los Alamos contract. Anastasio announces the creation of four new executive councils to move forward with the Lab's strategic vision process for the upcoming 20 years, known as Aurora. They include: Programs/Science and Technology; Business and Facilities; Workforce; and Safety & Security/ Environmental Safety and Health. The councils will examine 17 initiatives that were developed by the Aurora teams.

After several weeks of negotiations, Congress approves the FY06 Energy and Water Development Appropriations bill, which provides funding for most Lab projects managed by DOE's Office of Science, and the National Nuclear Security Administration. Defense nuclear nonproliferation is funded at $1.63 billion, and $6.43 billion is allocated for weapons activities.

The Livermore city engineer notifies the Lab that the railroad trestle construction work along Greenville Road will continue until at least next February, far beyond the originally scheduled reopening day last May.

The Lab's Armed Forces Veterans Association led Lab Ride II this year. Cathy Kaplan, center, donates a toy as Chelle Clements, Lee Neely and firefighter Gordon Dakin watch.

DECEMBER

SCIENCE & TECHNOLOGY

DOE announces that the UC team led by Livermore Director Michael Anastasio has been awarded the contract to operate and manage Los Alamos National Laboratory. As a result Anastasio becomes the new director of Los Alamos (see page 2).

A team of Lab scientists demonstrates that a new measurement in quantum electrodynamics (QED) — an extension of quantum mechanics — is 10 times more precise than recent measurements. QED is a foundation of modern physics and the standard model of particle physics.

Washington University Professor of Physics Clifford Will delivers a DDLS presentation, "Was Einstein Right?" — concluding the Lab's International Year of Physics events.

The second annual Biosciences Symposium is held over two days. Subjects ranges from new ways to detect human and animal diseases to studies of the genomes of frogs and primates.

The Lab announces development of a new way to find earth-like planets — an externally dispersed interferometer or EDI. The project is in collaboration with UC Berkeley and Cornell University.

Working under the National Nuclear Security Administration's Materials Protection, Control and Accounting Program, Lab engineers serve on a team that installed nuclear materials protection upgrades at the Beijing-based China Institute of Atomic Energy.

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Looking back at 2005

➤HIGHLIGHTS

Continued from page 2

ASC Purple and BlueGene/L represent the fulfillment of the program's initial goal to deploy an entry-level 100 teraflop (trillion operations per second) machine for weapons performance simulations. A weapons-related simulation conducted on BlueGene/L earned a Lab team the 2005 Gordon Bell Prize, the most prestigious award in high-performance computing.

In his November Lab update, Director Michael Anastasio praised the "tremendous breakthrough" made by Lab scientists in understanding "energy balance" in nuclear weapons and noted important milestones achieved in resolving aging issues for plutonium using the JASPER gas gun at the Nevada Test Site and computer simulation.

He also highlighted technical and scientific progress on the National Ignition Facility (NIF.) Even though all 192 lasers will not be fully operational until mid-2009, four experimental campaigns already have been conducted, including an impressive series of shots to study laser-plasma interaction, equation of state, and the hydrodynamic effects of high-energy shock waves on metallic targets.

Other science and technology highlights from 2005 included: a neutron interrogation system for inspecting ship cargo and detecting nuclear materials in shielded containers, and important scientific milestones in understanding star formation near black holes. Laboratory researchers garnered four R&D 100 Awards in 2005.

Operations

The Laboratory continued to emphasize safety and security in operations and to put in place enhanced business practices for greater efficiency. Other highlights included:

• Plant Engineering achieved 1.4 million work hours without a lost work day.

• The Lab's procurement system was recognized as one of the best in the DOE complex. A recent peer review found eight best-in-class practices and 19 strengths. As a result, the Lab's signature authority was increased from $10 million to $20 million.

• The Chief Financial Officer's (CFO) office began implementing a rate restructuring project that will allow the Lab to better understand and strategically manage costs and thereby gain cost efficiencies.

• The Security Department graduated two academies of Security Police Officer cadets from its Protective Force Division. The department increased the importance, profile and communications of Operations Security or OPSEC in all aspects of day-to-day Laboratory operations. While in only their second year of participation, members of PFD's Special Response Team competed against peer law enforcement agencies in the annual "Best of the West" marksman competition and took first place.

The future

In April Anastasio launched Project Aurora, an effort to develop a vision for the Laboratory in the year 2025, strategic initiatives to move toward that vision and metrics to measure progress. Five teams met intensively for several months to identify initiatives shaping the Lab's future. The broader Lab population provided input via town hall meetings and a special Website.

Focus areas for the teams included:
Missions and Sponsors; Science and Technology; Operations and Infrastructure; Workforce and Environment; and Partnerships and Relationships.

Over the summer the goals and initiatives were "cross-fertilized," pared into key initiatives and prioritized. In November, Anastasio announced the Aurora initiatives selected:

• Predictive Knowledge Systems
• Energy Security
• High-Energy Density Science for the Future Fusion Laboratory
• Leadership Development/ Knowledge Transfer
• Central Ownership of Operations and Infrastructure
• Building the Biological Foundations for 21st Century National Security
• Open Space
• Support to the Warfighter
• California Collaboratory
• Reliable Replacement Warhead
• Center for Surety, Security and the Proliferation of Nuclear Systems and Materials
• Accelerated Inertial Fusion Energy
• Relationship Building
• Adaptable Facilities for Conceptual Science
• Revitalizing Sustainable Science
• Recruitment/Diversity
• Improving Employee Health 24/7

➤YEAR IN REVIEW

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Using climate models, researchers from the Lab and the Carnegie Institution's Department of Global Ecology, gain new insights into the effects of forests on global warming.

PEOPLE

Scientists Vasily Bulatov, Carlos Iglesias, John Moriarty, Harry Radousky and Joe Wong are named Fellows by the American Physical Society. This is the second year running that five Lab scientists earn the distinction.

The California chapter of the American Physical Society names a student award for Laboratory physicist Kennedy Reed. The Kennedy Reed Award for Best Research is given to three graduate students and/or postdoctoral researchers.

Joe Wong of Chemistry and Materials Science looks back on his life and fruitful career in a series of lectures.

R&D 100 winners receive their plaques from Director Michael Anastasio in a Laboratory ceremony.

Former Lab Department of Homeland Security intern Rahul Satija is chosen as one of 32 American Rhodes Scholars. Satija spent 10 weeks last summer working for mentor Tom Slezak and the pathogen bioinformatics team.

OPERATIONS

David Crandall, National Nuclear Security Administration assistant deputy administrator, presides over a ceremony honoring those who contributed to the planning, design and construction of the Terascale Simulation Facility (TSF) with TSF Line Item Awards. Also recognized are those responsible for the activation and the move into the new facility.

The Lab's new Executive Business Council solicits ideas from employees on efficiency and effectiveness for Lab business and operations. The council is an initiative of the Aurora Project.

A new mail server is introduced that allows secured classified electronic information exchanges between the Lab and other capable NNSA sites.

Members of the Lab's Cyber Security Program offer a series of brief tutorials to raise awareness of cyber security issues as part of National Computer Security Day.

The annual HOME Campaign concludes after raising more than $1.5 million. It is the seventh year in a row the campaign tops $1 million.

The Health Services Department offers flu shots to the general Lab population and distributes information about Avian flu.

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