NEWSLINE

Published weekly for employees of Lawrence Livermore National Laboratory *Friday, November 18, 2005* *Vol. 30, No. 45*

Formation of stars crystal clear

By Anne M. Stark
NEWSLINE STAFF WRITER

Through a series of theoretical calculations and supercomputer simulations, astrophysicists have determined that new stars form by gravitational collapse rather than the widely held belief that they come from the buildup of unbound gas.

In astronomy, there are two dominant models as to how stars form. In both scenarios, a star initially forms when a gravitationally bound gas core collapses. But what ensues after that is the crucial distinction between the two.

In competitive accretion, interstellar hydrogen clouds develop clumps in which several small cores form, the seeds of future stars. These cores, less than a light year across, collapse under their own gravity and com-

See **STARS,** *page 7*

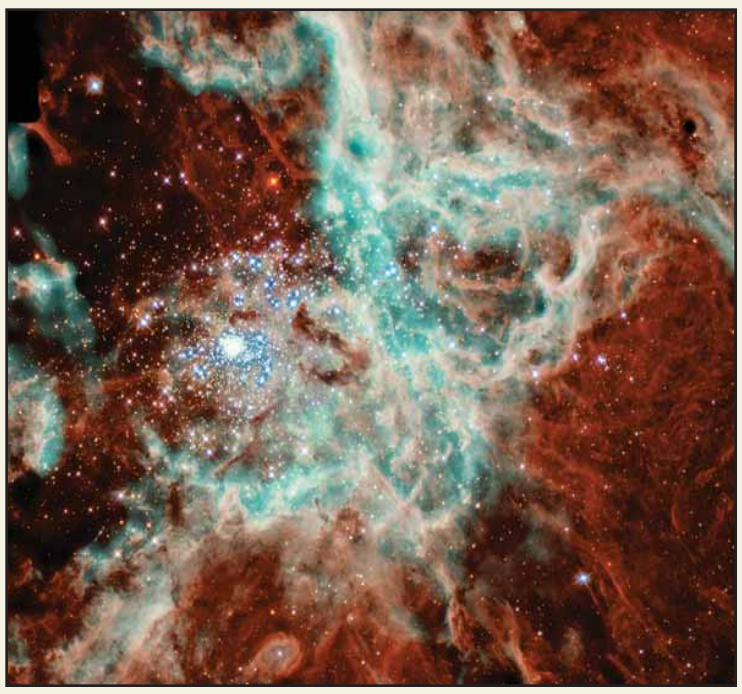


PHOTO COURTESY OF NASA, N. WALBORN, J. MAÍZ-APELLÁNIZ (SPACE TELESCOPE SCIENCE INSTITUTE, AND R. BARBÁ (LA PLATA OBSERVATORY, LA PLATA, ARGENTINA)

NASA's Hubble Space Telescope image shows a panoramic portrait of a vast, sculpted landscape of gas and dust where thousands of stars are being born.

Supercomputing 2005: Lab is home to the fastest supercomputers in world

By Don Johnston
NEWSLINE STAFF WRITER

The Laboratory is home to the first and third fastest supercomputers in the world, according to the newly released Top500 list.

BlueGene/Light and Purple, the IBM systems housed in the Terascale Simulation Facility (TSF), were ranked first and third on the list of the world's 500 most powerful supercomputers released Monday at Supercomputing 2005 (SC05) in Seattle, Wash., the annual gathering of world leaders in high performance computing (HPC). The two systems, dedicated in a Lab ceremony Oct. 27, serve the National Nuclear Security Administration's tri-lab Advanced Simulation and Computing (ASC) program.

BlueGene/L topped the list for the third time with a record-breaking performance of 280.6 teraflops (trillion operations per second) on the Linpack benchmark, the standard used by industry to measure computer performance. Installed at the Lab earlier this year, Purple made its first appearance on the list ranked No. 3 with a performance of 63.4 teraflops.

"Its not the ranking that's important, it's the simulation capabilities these machines bring to NNSA's stockpile stew-

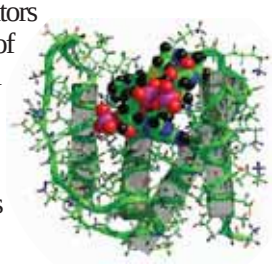
See **COMPUTER,** *page 7*

Protein folding may lend clue to risk factor genes tied to degenerative diseases

By Anne M. Stark
NEWSLINE STAFF WRITER

By learning how and why a protein occasionally folds incorrectly, researchers may be able to better treat victims of Alzheimer's, mad cow and other neurodegenerative diseases.

Working with collaborators from UCLA, Ted Laurence of the Laboratory's Physical Biosciences Institute measured varying distances within single protein molecules to understand the process of protein folding.



A protein cluster.

Using a technique called fluorescence resonance energy transfer, or FRET, the team measured distances between two specific points on the protein. Special fluorescent chemical groups — a donor and an acceptor — are attached to those points. If the donor and acceptor are within 8-10 nanometers apart, FRET occurs.

See **PROTEIN,** *page 3*

UCSB collaboration helps defend nation against bio agents

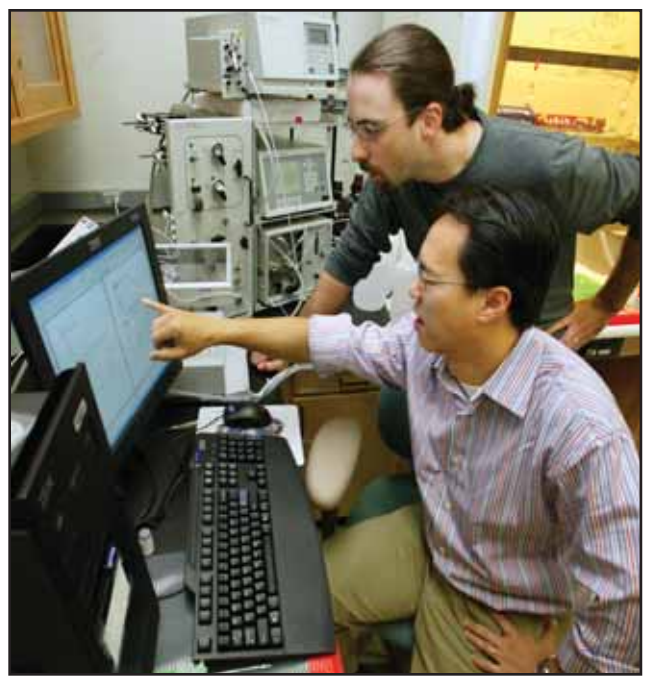
By Anne M. Stark
NEWSLINE STAFF WRITER

The Laboratory has joined forces with the University of California Santa Barbara to defend the nation against biological agents.

Through a joint development initiative funded through the UC Office of the President for $850,000, Livermore and UCSB will develop two separate bio-sensing nanosystems.

The goal is to integrate the scientific expertise of UCSB and Laboratory researchers in synthesis, fabrication and characterization into the Lab's development of next-generation biodetection systems.

See **UCSB,** *page 7*



JACQUELINE MCBRIDE/NEWSLINE

Jeff Tok, in foreground, points out to Nicholas Fischer how E-DNA — a label-free, reuseable geno sensor — works for detecting biological agents.

A major ceremony

— Page 3

HOME help

— Page 5

Turkey time

— Page 8

LAB COMMUNITY NEWS

Weekly Calendar

Technical Meeting Calendar, page 4

Friday 18

LLNL and Sandia postdoc employees are invited to attend a brown-bag career seminar sponsored by the Lab's Postdoc Advisory Council entitled "**How to apply for a faculty job. What is a teaching statement?"** by Robyn Wright Dunbar at 11:45 a.m. in Trailer 6675, at the computer lab. Dunbar will discuss the nuts and bolts of applying for teaching positions with a focus on preparing a teaching statement, which represents your teaching experience and interests. Bring your lunch and questions. For more information, contact Michaele Kashgarian, 2-3703, or kashgarian@llnl.gov

Tuesday 22

As part of this month's open enrollment, the Benefits Office will offer the last in a series brown-bag presentations to discuss **open enrollment** in Bldg. 571, room 2301 from noon to 1 p.m. No pre-registration is required.

Thursday 24

The Laboratory will be closed today and Friday for the **Thanksgiving holiday.** *Newsline* will not be published on Friday, Nov. 25.

Friday 25

The **Discovery Center,** located at East Gate Drive and Greenville Road, will be open today and Saturday from 10 a.m. to 2 p.m. Come in and experience hands-on exhibits about the earth and environment, on loan from San Francisco's Exploratorium.

Flu clinic coming Dec. 1 for high-risk employees

Health Services is expecting to receive a limited amount of flu vaccine and will hold a flu clinic for high-risk individuals on Dec. 1. The Centers for Disease Control defines high risk as individuals with chronic illness (e.g., heart disease, diabetes, kidney disease, asthma, cancer, HIV/AIDS), over the age of 65, or who are pregnant and past the first trimester. The vaccine is provided at no cost to employees.

The clinic will be held Thursday, Dec. 1, in the Bldg. 663 library (lobby) from 8-11:30 a.m. Clinics for other individuals are pending delivery of additional vaccine.

For questions, call Carol Turner at 4-4516, or check *NewsOnLine* for updates.

DOE may quiz Laboratory employees on EMS

A review of the progress the Laboratory has been making to enhance its Environmental Management System (EMS) will soon be conducted by the DOE Laboratory Site Office (LSO). The Lab is implementing an international environmental management standard, known as ISO 14001, to be compliant with new DOE requirements.

One part of that LSO review, which begins Nov. 28, may include asking employees about their understanding of their role in the Lab's EMS. "We have sent information out to individual employees to become familiar with EMS, in lieu of instituting a training requirement. We hope this process will be effective," said Ellen Raber, head of the Lab's Environmental Protection Department. EPD is taking the lead on instituting the EMS.

"Employees should be informed about the EMS, adoption of ISO 14001, and their individual responsibilities as environmental stewards," Raber added "The foundation of our EMS is the Laboratory's environmental policy. That policy commits all employees to provide responsible stewardship of the environmental resources in their care."

Academic, manufacturing and government organizations worldwide use ISO 14001 to help analyze and control environmental impacts from their operations. This includes considering technology options, operational processes as well as finance, and business concerns.

The Laboratory's adoption of ISO 14001, Raber said, will provide the Lab with an enhanced EMS and a system that is more consistent with major U.S. corporations and other DOE facilities. This will help the Lab fulfill environmental requirements of the UC-DOE management contract. All federal facilities are required by Executive Order to have an EMS in place by the end of December.

Adoption of ISO 14001 formally incorporates the consideration of resource conservation, source reduction and pollution prevention into day-to-day activities. That means new terminology and processes will become common to LLNL's work planning process, such as:

- Environmental Aspect — an element of a work activity, product, or service that interacts with the environment positively or negatively.
- Environmental Objective — an overall EMS goal based on the Laboratory's environmental policy.
- Environmental Target — a specific, measurable performance requirement set to achieve an Environmental Objective over time.

The Integration Work Sheet (IWS) Process, Raber explained, is the primary method the Laboratory will use to implement ISO 14001. The IWS process has been updated to include the ISO 14001 environmental requirements. These requirements include identification of environmental aspects, evaluation of those aspects for opportunities to reduce negative impacts and documentation of evaluations for proposed work activities.

"When planning new projects or activities, resulting environmental aspects must be evaluated to minimize negative impacts, capture positive impacts and document the evaluation," Raber said.

"Pollution prevention techniques and sustainable business practices also must be considered and incorporated, where practicable, into work activities. The environmental analysts assigned to ES&H teams will continue to work with responsible individuals (RI), authorizing individuals (AI), and program personnel to meet these requirements as we have done in the past."

In addition to material about EMS published in *Newsline, NewsOnLine,* and in pamphlets, EPD has put together an online orientation on the Laboratory's EMS and ISO 14001. This orientation, along with a full description of the LLNL EMS and a discussion of individual Laboratory employee responsibilities, can be found on the EMS Website, located on the MyLLNL Portal under the ES&H banner.

Where to go to find out more information about EMS

- The EMS Web page (http://www-epd.llnl.gov/ems/index.htm).
- LLNL's EMS e-mail at ems-iso@llnl.gov.
- Your environmental analyst (assigned to your ES&H team).
- LLNL's Pollution Prevention Team by e-mail at p2help@llnl.gov.

Celebrating Native American Indian Heritage Month

In honor of Native American Indian Heritage Month, the LLNL American Indian Activity Group and the Work-Life Center present "Climb Off Dead Horses: Mastering Change," by Cheewa James on Wednesday, Nov. 30 at noon to 1 p.m. in the Bldg. 123 auditorium.

James is a motivational speaker with experience in change management, leadership training and team motivation. She incorporates Native American thinking, music and storytelling in her presentations.

Pulling on the age-old philosophy of the Native American, her own heritage, James shows how wisdom from antiquity can guide contemporary lives and present lessons in self-growth.

In addition, there will be a brown-bag movie hour featuring episodes of the PBS documentary series "500 Nations" from noon to 1 p.m. in Bldg. 571, room 2003 on the following dates:

Monday, Nov. 21 (The Aztecs Rise and Fall of Mexico, Episode 2).

Monday, Nov. 28 (Clash of Cultures, Episode 3).

Newsline

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

Contacts:

Media & Communications manager: Lynda Seaver, 3-3103

Newsline editor: Don Johnston, 3-4902

Contributing writers: Bob Hirschfeld, 2-2379; Linda Lucchetti, 2-5815; Charles Osolin, 2-8367; David Schwoegler, 2-6900; Anne M. Stark, 2-9799; Stephen Wampler, 3-3107. For an extended list of Lab beats and contacts, see http://www.llnl.gov/pao/contact/

Photographer: Jacqueline McBride

Designer: Julie Korhummel, 2-9709

Distribution: Mail Services at LLNL

Public Affairs Office: L-797 (Trailer 6527), LLNL, P.O. Box 808, Livermore, CA 94551-0808

Telephone: (925) 422-4599; Fax: (925) 422-9291

e-mail: newsline@llnl.gov or newsonline@llnl.gov

Web site: http://www.llnl.gov/pao/

Edwards promoted to rank of major in National Guard

By Don Johnston
NEWSLINE STAFF WRITER

Matt Edwards, a Laboratory attorney currently serving in the National Guard at Guantanamo Bay, Cuba, has been promoted.

Edwards was promoted to the rank of major in a recent ceremony witnessed by friends and family in California via video teleconference. The ceremony was a triple promotion with two other guardsmen being promoted at the same time. Some 50 soldiers attended the ceremony, including Brig. Gen. John Gong, the Joint Task Force deputy general.

Edwards' promotion from captain to major is considered a big career step. Promotion to major means he is a field grade (more senior) officer, rather than a company officer.

A 13-year veteran, he mobilized in January and was sent to serve with the Joint Task Force, as chief of the Legal Assistance Office. His mission is to deliver legal advice and support to the troops of the Joint Task Force — services ranging from assisting troopers with lease agreements to family law. In addition, Edwards is teaching a course in business law for the college at Guantanamo that serves the local military and civilian community.

Brig. Gen. John Gong congratulates Lab attorney Matt Edwards after his promotion to the rank of major. Edwards is currently serving in the National Guard in Guantanamo Bay, Cuba.

"The eight months I have spent in Cuba have allowed me to pursue some interests that I didn't have time for back home," he said. "My law practice has broadened to include dealing with matters directly affecting soldiers' personal lives and it's very rewarding for me to help them. I greatly appreciate the Laboratory, the University of California, and my former boss, Jan Tulk, for giving me the opportunity to spend a year with the troops overseas. It has truly been a life-changing experience."

Edwards has resumed a daily running routine and recently placed first in his age category — over 40 — in a 5-kilometer race.

He also manages to enjoy his exotic surroundings. "My definition of family pets has changed somewhat in that I have a young female iguana in the yard near my quarters who plays with a large curly tailed lizard," he said. "They like the small desert island garden I have put together."

Chemistry programs offer unique capabilities for other departments

By Anne M. Stark
NEWSLINE STAFF WRITER

Inside Bldgs. 151 and 235 lies a treasure trove. And not that many people know about it.

But Cheryl Moody-Bartel and Art Nelson say they've got the coolest toys around and they are available to anyone working at the Lab.

"Our instrumentation is really unique," said Nelson, head of the Materials Characterization Group in the Materials Science and Technology Division (MSTD) of the Chemistry and Materials Science Directorate. "Our capabilities are better than going outside the Lab. Besides outside the Lab, you can't do classified work and here we can. There are a lot of unique materials."

MSTD focuses on:

- High-performance computational materials science and chemistry
- Nuclear materials
- Laser materials
- Metallurgy and ceramics
- Nanophotonics
- Nanoscience and technology
- Materials synthesis and nano-beam precision characterization.

As for Moody-Bartel, head of CMS Environmental Services (CES), her group is an integrated analytical and radioanalytical chemistry program focused on environmental needs.

"We work closely with our customers to provide them with analytical results and technical expertise," she said. "The technical expertise is value-added. If you go to an outside agency, you simply receive results, but here you can discuss the results with a scientist."

JACQUELINE MCBRIDE/NEWSLINE

CMS Environmental Services' Mark Sutton looks on as chemist Nora Briant uses an ion chromatography instrument.

CES is a State of California certified facility that offers analytical analysis to numerous directorates in addition to work performed for other Department of Energy facilities. CES performs about 8,000 tests per year.

Though the majority of analysis work is performed for the Environmental Protection Department (EPD), including the Radioactive and Hazardous Waste Management Division, and the Lab's Space Action Team, Moody-Bartel said CES services are available to everyone.

"We provide high quality analytical data in support of LLNL's environmental protection (monitoring, remediation programs), hazardous waste management and decontamination and decommissioning activities," she said. "This data must be timely and reliable. We get to do cool science and provide the customer with useful results."

CES performs or procures chemical and radiochemical analyses on:

- Hazardous and radioactive waste and treatment process waste
- Construction/Demolition debris
- Effluent (on-site retention tanks as well as sewer outflow)
- Swipes
- Air samples (filters, air moisture)
- Surface water, rainwater and groundwater
- Soil and sediment
- Biota
- Foodstuffs

Nelson said times were lean a few years ago and the services and equipment provided by MSTD were under threat of closing, so it was his staff's job to go out and do a little marketing.

"We just had to go out and hit the pavement," he said. "We made brochures and we stuffed some mailboxes. But the Website (http://www-cms.llnl.gov/about/mstd.html) has really been key."

Moody-Bartel said that business has continued to improve, particularly after CES and EPD established an agreement several years ago to ensure that the needs for environmental characterization and waste management are met. Moody-Bartel also said that many scientists who begin their careers in CES and later go on to different programs become "mini-ambassadors," promoting CES to other Lab employees and organizations.

PROTEIN

Continued from page 1

Laurence determined that the approximate fluorescence lifetimes of donors and acceptors in the protein are three nanoseconds and 1.5 nanoseconds, respectively.

The lifetime of the donor drops significantly when FRET occurs. "Knowing the lifetime of the molecules within a mixture is especially helpful for protein folding studies," Laurence said.

In this series of experiments, the group used FRET and ALEX (alternating laser excitation) to probe donors and acceptors on folded and unfolded protein sub-populations. They were able to separate the fluorescence lifetime of the unfolded proteins from the folded proteins.

"We got a better understanding of biopolymer structural dynamics, which have a large impact in biology and biosecurity," Laurence said.

In the study of proteins, researchers have not figured out what causes a protein to go from a folded to unfolded state.

But Laurence said the recent study sheds some light on the mystery.

"The structure in the energy landscape is what encourages it to fold or not to fold," he said. "You want to see what protein is doing in an unfolded state and why it folds. Then you can understand why the folding sometimes goes wrong."

Laurence said protein folding gone awry can provide some keys to as to why certain people are prone to Alzheimer's or other neurodegenerative diseases. In addition, understanding how and why protein folds can help scientists design proteins to perform specific tasks.

"In order to do that, we have to know how to build them first," he said. "Discovering these risk factor genes is essential for understanding the causes of Alzheimer's disease and pinpointing targets for drug development and other prevention or treatment strategies."

The research successfully demonstrates how new optical probe tools can be used to study protein folding and conformational dynamics of biomolecules.

The research appears in the *Proceedings of the National Academy of Sciences* online edition for the week of Nov. 14-18. It will appear in print in the Nov. 29 edition.

News you can use

R&D 100 awards are unforgettable

By Charlie Osolin
NEWSLINE STAFF WRITER

The next time somebody asks you for evidence of the Laboratory's leadership in science and engineering, or its value to society, just tell them: "Take a look at our R&D 100 awards."

Since1978 LLNL has earned more than 100 of these prestigious "Oscars of invention," presented annually by R&D Magazine to recognize the year's most technologically significant inventions. In many cases, the technology had already been transferred to the commercial marketplace and is providing tangible public benefits.

Whether to improve national security, enhance human health or the environment, improve industrial processes, or advance computing capabilities, the Laboratory's R&D 100 winners represent the work of some of LLNL's most creative scientists and engineers.

Pat Roberson of the Defense Sciences Engineering Division (DSED), who won an R&D 100 award in 2000 for helping develop a waste inspection tomography system using nondestructive assays, said receiving the award was "one of those events you never forget — it sticks with you for years.

"The whole experience was amazing," he said. "Being part of the international group of people that won awards, and realizing you're there with the best of them, was a very fulfilling moment in my career. I would strongly suggest to anyone who wins to go to the awards session — it's one of those milestones that you look back on and remember."

"It's important for researchers to be able to explain their research to a scientific audience, but not necessarily an audience that's focused in their research area," said Chris Ebbers of the Laser Science and Technology program, who won an R&D 100 award in 2003 for helping develop a thermally compensated Q-switch, which maintains the quality of a laser beam.

Preparing an R&D 100 application is valuable "even if you don't win," Ebbers said, because it's good preparation for a future submission and "you also have a very good publication which demonstrates some important aspect of the work that you've done.

"Winning is really, really great for the institution and it's great for your future career," he said. "It's not necessarily a great thing tomorrow, but in the future you end up putting it on your resume, and it prepares you for that next step as you rise in the career path."

"The award is big honor for the (development) team, as well as for the Laboratory," added LLNL engineer Ted Saito. "It's something that has broad recognition in the (research) field, and can really help the whole field know about what you've done."

For example, Saito said, an early award recognizing the Lab's success in developing diamond turning of optics helped turn the new process into a "major optic fabrication technique."

U.S. Department of Energy laboratories have garnered nearly 700 R&D 100 awards, among the highest numbers for any government agency or private company. Lab researchers who believe their work qualifies for a 2006 R&D 100 award can learn about deadlines, submission criteria and application assistance available through TID at a kickoff workshop, "How to Win an R&D 100 Award," on Wednesday, Nov. 30, beginning at 9:30 a.m. in the Bldg. 361 auditorium. Vincent Riot of DSED, who won two R&D 100 awards earlier this year, will share his experience during the workshop.

For more information contact Yvonne King (king26@llnl.gov) at 2-7299.

New crew of grads due to wear blue next week

The Security Department's Protective Force Division Training Group will graduate12 new security police officers on Tuesday, Nov. 22, at 3 p.m. Their basic security police officer training academy began Sept. 26, and will be completed Nov. 23. The graduation ceremony will take place in the Bldg. 453 auditorium, followed by a reception in the lobby for invited guests.

The required National Training Center's basic security police officer curriculum includes seven weeks of intensive classroom and field training on material control and accountability, information security, physical security, human and public relations, basic communications, bomb threat recognition, bomb searching, basic individual tactics, team tactics, firearms, impact weapons, self defense, vehicle stops, emergency vehicle operations and terrorist threats.

Two additional weeks of Livermore site-specific institutional training requirements follow the seven weeks of mandatory NTC courses. Finally, before a security police officer candidate assumes full duty, the candidate must complete 90 days of field training under the watchful eye of a certified Field Training Officer. During this time, each candidate's performance is closely monitored and evaluated.

According to Security Department head Russ Miller: "Only after this exhaustive, nearly six-month process can an individual be certified as a Security Police Officer here at the Laboratory."

Technical Meeting Calendar

Friday 18

INSTITUTE FOR GEOPHYSICS AND PLANETARY PHYSICS
"The Mystery of Ultra-high Energy Cosmic Rays," by Angela Olinto, University of Chicago. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

Monday 21

CHEMISTRY & MATERIALS SCIENCE
"Biomimetic Synthesis of Bone-like Composite Materials," by Jie Song, Lawrence Berkeley National Laboratory. 2 p.m., Bldg. 151, room 1209, Stevenson Room. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Roger Qiu, 2-1636, or Kathy Ricard, 3-8024.

Monday 28

ME/NEW TECHNOLOGIES ENGINEERING DIVISION
"Biological Shield Activation due to Beam Port Penetration of the Illinois Advanced Triga Research Reactor," by J'Tia P. Taylor, Department of Nuclear, Plasma and Radiological Engineering. 10 a.m., Bldg. 131, room 1079 Contact: Thomas Altenbach, 2-1285, or Becka Gordon, 2-2199.

Tuesday 29

COMPUTATION DIRECTORATE
"Overview of HDF5, a Scientific, Parallel I/O Library," by Mike Folk, HDF5, National Center for Supercomputing Applications (NCSA) and University of Illinois. 9:30 a.m., Bldg. 453, room 1012. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Linnea Cook, 2-1686, and Mark Miller, 3-5901.

Wednesday 30

CENTER FOR APPLIED SCIENTIFIC COMPUTING (CASC) / INSTITUTE FOR SCIENTIFIC COMPUTING RESEARCH (ISCR)
"Rapid Development of Efficient Codes for PDE Simulation and PDE-Constrained Optimization," by Kevin Long, Computational Sciences and Mathematics Research Department, Sandia National Laboratories. 2 p.m., Bldg. 451, room 1025 White Room. For additional information, go to http://www.llnl.gov/casc/calendar.shtml. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Radu Serban (CASC), 4-4852, or Erica Dannenberg, 3-2167.

INDUSTRIAL PARTNERSHIPS AND COMMERCIALIZATION
"How to Win an R&D 100 Award," 2006 kickoff workshop. 9:30 a.m., Bldg. 361 auditorium. The presentation will cover the submission criteria, assistance available through TID and experience from Vincent Riot, who won two R&D 100 Awards in 2005. Contact Yvonne King, 2-7299, or king26@llnl.gov.

Thursday 1

CENTER FOR APPLIED SCIENTIFIC COMPUTING (CASC)/INSTITUTE FOR SCIENTIFIC COMPUTING RESEARCH (ISCR)
"Elkhound, Elsa and Cqual++: Open-Source Static Analysis for C++," by Scott McPeak, Coverity Inc. 10 a.m., Bldg. 451, room 1025, White Room. For more information, go to http://www.llnl.gov/casc/calendar.shtml. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Dan Quinlan (CASC), 3-2668, or Erica Dannenberg, 3-2167.

Friday 2

PHYSICS AND ADVANCED TECHNOLOGIES/ INSTITUTE FOR GEOPHYSICS AND PLANETARY PHYSICS
"Measuring Black Hole Spin," by Ramesh Narayan, Harvard University. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

ASC ITS LECTURE SERIES
"Dynamic-Data-Driven Computational Decision Support Systems: Opportunities, Enabling Methodologies, and Significance," by Charbel Farhat, Stanford University. 2 p.m., Bldg. 543 auditorium. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: David Keyes, 2-1325, or Tiffany Ashworth, 4-3491.

The deadline for the next Technical Meeting Calendar is noon Wednesday, Nov. 30.

Please submit your meetings through the Technical Meeting Calendar form on the Web, located at http://wwwr.llnl.gov/tmc/index.html

Looking back

A season of caring at HOME

The 2005 HOME Campaign, sponsored by the Defense and Nuclear Technologies (DNT) Directorate, offered a new way to raise awareness of the agencies represented this year.

"Past home campaigns have either invited agencies to visit the Lab or have gone to the agencies," explained Patti Lann, committee chair. "This year, to inspire participation, we started the 'LLNL at HOME in our Community' projects that have allowed many Lab employees not only to learn more about the agencies, but to get involved in a variety of projects and help out. Thank you to those who have helped make this season of caring so successful and rewarding."

PHOTOS BY LINDA NULL, DAWN DARONCO AND LEE NEELY

Clockwise from top left: In November, to wrap up the "At HOME" activities, volunteers organized donations from a Labwide food drive that collected more than 2,200 lbs. of non-perishable items and supermarket gift certificates in support of the Tracy Interfaith Ministries. Pat Thielen (kneeling) and Barbara Pulliam helped Tracy's "People for Pets" organization on pet adoption day. Lab employees also donated dog and cat food and toys to the Tracy Animal Shelter. Barbara McDonald lent a hand at bingo night at the Livermore Veterans' Administration Hospital. Lab volunteers also helped purchase equipment for the hospital's bingo games and prepared and served a Veterans Day breakfast. Maria Shin brushed up on her painting skills on "all LLNL" day with East Bay Habitat for Humanity to help build homes in Livermore near East Avenue and Hayes Street. Cathy Kaplan helped a student select one of the backpacks donated by Lab employees at the Tri-Valley Jubilee's "Back to School" giveaway drive. School supplies and gift certificates for shoes also were collected for needy children in the area. Steve and Kelley Ellis delivered food items to Tracy Interfaith Ministries.

Employees donate more than $1 million to HOME Campaign

The HOME Campaign exceeded the $1 million mark this week. To date, the campaign has raised $1,035,888. If you haven't donated yet, there's still time to help those in the community who are in need.

The HOME Campaign lists an array of agencies that support employees' interests and concerns and are helping to make a difference. Go to http://home.llnl.gov/donation/ and scan the more than 400 organizations represented. It takes only a minute to donate online.

If you donate, you may win a prize. Winners will be randomly selected from among those pledging that week and from those pledges received earlier but who have not won a prize. If you make your donation electronically, you are instantly entered in all drawings that have not been completed yet. There is no need to return a pledge packet if you donate online.

After each drawing, winners will be notified where to pick up their prize. The earlier you donate, the more chances you have to win a prize. Prizes include gift certificates to restaurants, retail stores and sporting events.

Pledge packets that are submitted by noon today (Nov. 18) will be eligible for the next prize drawing on Wednesday, Nov. 23.

Last week's HOME Campaign incentive winners were: Rudy Bauer, N Division/PAT and Bo Pitsker, EETD/EE. Bauer, a Lab retiree who mailed his donation, received a $30 gift certificate from Chevy's Fresh Mex. Pitsker, who donated online, won a Sunday champagne brunch for two at the Club at the Hilton in Pleasanton.

Classified ads

See complete classified ad listings at https://www-ais.llnl.gov/newsline/ads/

Automobiles

2002 - Mitsubishi Spyder Eclipse, black convertible, 5 sp, leather, 73k miles, good condition. 10,900k 925-373-0998

1994 - Chrysler LeBaron Convertible - Cherry red w/new white top. 70,250 mi. Runs great, looks fantastic, lots of fun! Only $4,000. 415-430-5425

2002 - FORD EXPLORER 4WD, XLT, 3RD SEAT. REAL CLEAN. 108K $11,500 925-606-0480

1999 - GMC Suburban 1500 SLT Only $10,950 - Below Blue Book V8, 4WD Automatic 93,000 miles One Owner, Clean Loaded 510-797-2777

1963 - Dodge Dart GT Convertable. Project car. Slant 6, 3 on tree. $350. B/O 209-480-4963

2001 - VW Jetta V6 GLS Sedan 4D. 115K miles, a/t, a/c, power locks and windows, sun roof, CD player, alloy wheels. $8400 OBO 209-495-6957

2003 - Toyota Sienna LE,all power,leather int.,CD,very clean, non-smoker,desert-sand, 30K miles, $19,500, or BO. 925-516-2774

1997 - El Dorado in beautiful condition. All pwr, tires like new, leather pwr seats, low miles. Just under Blue Book 510-582-2938

1990 - Toyota Cressida 103K miles. Excellent shape. Running condition, misfires loses water. Good tires, registered July 06 passed smog test.$1,600. 925-449-9756

1985 - CJ7 Jeep, rebuilt I-6, less than 7,000 miles,new rear axle & shocks, new brakes, new seats, soft top, bikini top, half doors 5,500 OBO 209-239-4458

1988 Chev Caprice. Parting out complete less engine/trans. Old style ralley wheels. XLNT body / int. $300 for all. 209-480-4963

Automobile Accessories

LT-1 Alum Heads and Injection off 93 Chev Z-28. 1.94 intakes. $200. b/o 209-480-4963

Suburban Hatchbag Cargo Liner Fits w/3rd seat in & 2nd seat up $50, XLG Pet Net for Suburban or SUV $25, Adjustable Steel Vehicle Safety Barrier $35 925-449-5481

Cooler for car, plugs into lighter. Hold 6 cans. Great for road trips. Paid $32. New in unopened box. $20 925-648-0671

Ford fuel pump, tak unit $50 obo, New tire and rim 205x75x15, Snow tires, 2/13inch-2/14inch 2 for $25 Snow Chains 925-735-6002

Genuine Toyota Tacoma Bedliner, Under-Rail Style with Tailgate Protector, Fits 1995 to 2004 Short Bed, Great Cond., $300 New, $20 OBO 925-443-3970

Boats

Sea Doo 60 inch round ski tube with 4 handles and nylon cover. Paid $100 plus tax. New in unopened box. $60 925-648-0671

14 foot Aluminium V-Hull with 9.9 Honda 4 cycle and trailer $1300 OBO. 209-234-1366

Cameras

Olympus digital photo printer, 4 x 6 borderless prints. Paid $150 plus tax. New in unopened box. Makes great Xmas gift. $90 925-648-0671

Electronic Equipment

55 inch Magnavox Rear Projection TV, 3 yrs. old, a couple of moving dings but works great. $600 209-834-1835

Nice starter stereo equipment. Akai stereo cassette deck 50.00, Sony AM FM stereo receiver, 50.00. Excellent conidtion. Can bring to work. 510-537-7222

Giveaway

Hallicrafters SX71 communications receiver. Does not work but can be restored or used for parts, etc. 925-366-6797

PC, Packard Bell computer with MS Word, Excel, Works database, etc. and more, and Canon color printer. Excellent condition 925-447-4503

2 PC Microsoft Force Feedback Steering Wheels & foot pedal sets-both work fine. Also have misc PC cpmputer games & parts. 209-835-8008

Cannas - red/purple/green/yellow striped leaves with orange flowers. In a pot so easy to trnasfer. Too tropical looking for our yard. 925-828-2208

Two BSR Speakers w/subwoofer. Big and old, but still serviceable. Available 11/14/05. 925-443-7499

Household

2 uniquely hand decorated antique chairs. 1 is a dancing girl-very victorian. 2 is off-white velvet & chenille robe w/ bunny slippers. 925-443-3283

Moving: Amana refrigerator/top freezer, excellent condition, $150.00; GE washer, almost new, $100.00; White-Westinghouse dryer, $50.00. 925-366-6797

Pottery Barn Kids: Taylor Desk, low hutch, chair. Honey wood, good condition, $200. 925-294-9022

Industrial Sewing Machines. 2 for sale. $150 B/O each. 209-480-4963

Microwave, White with turntable, Samsung, excellent condition. $50 209-834-1835

Black & Decker convection heater, 25 inch long x 17 inch high, 2 heat settings, auto shut off. Paid $40 plus tax. New in unopened box. $25 925-648-0671

Oak Entertainment Center. Holds TV and stereo components. Great condition. $100 925-443-3775

White metal tube BUNK BED - full/twin with matresses. Used infrequently. $150. 209-833-9141

Antique cherry ladys desk $375 obo 925-447-6922

Rotisserie, Showtime in box, $145 obo, Push type lawn mower, like new, $55 obo 925-735-6002

Student Work Desk, Oak, 3 Drawer, Lower Printer Shelf, Brand New Cond., $125 obo 925-443-3970

Dryer, Electric, Kenmore deluxe super capcity, white, needs part installed, available from Sears and/or other websites, $700 new, yours for $20. 925-484-0697

Whirlpool Refrig, 19.1 cu. ft., reverseable handles, 65 inches by 32 3/4 inches, cream color. Runs great, very good condition. 80.00 OBO 510-582-2938

Waterbed-Super twin frame, matress, heater, and drawer unit that supports bed. Solid wood nice headboard & frame. Currently disassembled. $30 209-835-8008

55in Mitsubishi projection TV - 5 years old - had to have HD - great picture- exc condition $950.00 925-846-8857

Dining table (oak with 2 leaves) and 6 chairs. $125 925-455-8158

8 hp chipper/shredder, MTD brand, heavy duty, good condition, little use since new, works great to shred leaves and make mulch. $300 925-961-0462

General Electric Refrigerator, 22 cu. ft., cream color and in great working condition, $100. 209-239-4979

Lost & Found

Service pin found at S300 parking lot. Identify # of years and its yours. 925-516-2774

Jacket, Reversible. DarkGreen and black (microfiber)/ black (fleece). Lost at central cafeteria 11/09~1.45pm. Return to T2825 r106. Thanks. 925-931-0473

Miscellaneous

Twin Mattress (no box spring), $30 OBO. Will deliver to local area. 925-455-1842

2 tickets to the Sharks Dec. 6 game againt Atl. Thrashers. Sec. 226, Row 1, seats 11,12. $54 face value per ticket. 925-373-0272

GAS DRYER, Whirlpool Supreme, top of line, heavy duty, works looks good - white, Livermore $100 925-447-7070

Hasbro easy bake oven & snack center with mixes & untensils. Oven is 120 volts, 100 watts. Paid $25 plus. New in unopened box. Great gift. $15 925-648-0671

Like new SOFA, Seafoam Green, rarely used. Just moved and there is no room. Very comfortable. $100. Brad or Dawn @ 209-833-9141

Naugahyde, new off white, 54 x 13 $35 obo Gas lawn mower $55 obo, drapes various obo 925-735-6002

6 function rotisserie,broiler,toaster, bake, defrost with timer. Small in size.Hardly used. $40.00 510-537-7222

8 hp rear-tine rototiller, like new, good condition, works great, get your garden ready. $300 925-961-0462

Salesman sample sale. All new kitchen wares, cookbooks, wine accessories, etc. below wholesale prices.11/19 9-4,11/20 9-1 @ 422 Willow Ct. Livermore 925-699-9057

Motorcycles

2000 - Yamaha wr400F WIDE RATIO 4 STROKE GREEN STICKER TRAIL RIDEN ONLY BY SENIOR. $2600 209-529-1961

2001 - Suzuki RM-80 dirt bk, GREEN stkr; liquid cooled 2-stroke, GC, well maint. $1300 incld manual, extras 209-814-4064

2001 - HD Low Rider. rarely ridden, garaged, 210 miles, purple/Ice, transferable warranty, screaming eagle pipes, crash bars $13,500 925-784-8932

Pets & Supplies

Folding metal dog crate (black) 42x28x32H, w/ tray, $30. Auto pet barrier, adjustable, black metal tubes, $25. 925-294-9022

Large, cage type dog crate, 2 doors. $55.00 209-224-7988

Pet cage, great for guinea pigs, gerbels, hamsters, rats, mice. $20. 925-484-0697

Bird House, handmade. Never used. Can bring to lab if interested. 8.00 510-537-7222

Saddle, cover, stand, blanket, pad, bridle, misc. equipment. $600 takes all. 209-839-0872

AKC Golden Retriever Puppies, $450.00, available 11/19/05. Leave message. 209-575-9946

KITTENS! Male/female, spayed/neutered, FIV/FELV neg, FVRCP vaccinations. 8 weeks up to 6 months old. TVAR 925-961-0260

Mature Alaskan Malamute needs a new loving environment immediately. She is extremely loving and would be a great companion! 925-337-2692

Recreation Equipment

Jog stroller, light weight, portable, excellent shape. $150 925-606-0755

Poker set, 4 different color chips, 240 total, w/2 decks of cards store in cherry wood holder. Paid $40 plus tax. New in unopened box. $25 925-648-0671

Spa, energy efficient, foam filled, seats 6, 120v, ex. cond. except a slow leak at a defined level. Free to a good home. 925-443-8585

Weight machine, multi station, heavy duty, like new, white 226lbs bench press, floor space 3 foot 2 inch x 5 foot 6 inch $500 obo 510-481-1862

Brand new, never been used Burton Snowboard Bindings, fits mens boot size 5-8. $50.00. 209-836-4247

1996 1100 Kawasaki ZXI Jetski, great condition, R&D intakegrate, rideplate and sponsons, shorelander trailer, New cover. 925-354-3191 925-354-3191

Ridesharing

Express your commute, call 2-RIDE for more information or visit http://www-r.llnl.gov/ tsmp.

Modesto - Ripon - 14 Passenger van. Immediate openings for riders and/or part-time drivers. 8:00 - 4:30 shift, M-F. 209-544-6411, ext. 2-2727

Valley Springs - Wanted: Carpool M-F from Valley Springs-Linden to Lab. Flexible hours. 209-887-2353, ext. 2-9899

Services

Lauras Daycare in Tracy,Ca - First aid and CPR Cert.- 0-5 years old - 1 opening 209-834-0319

CONCRETE-Foundations, custom, stamped, colored, sealing, counter tops, restoration & more. Over 20 years experience. Free estimates. 408-806-9816

Daycare opening in my Loving and Caring Livermore home for your 1-2 children. Close to Lab, low rates, flexible, refs. Over 5 yrs experience. 925-447-0887

Storybook Murals: From small illustrations to full theme rooms, transform a room with the magic of paint. Free consultation. 925-449-4997

Shared Housing

Tracy - Room for Rent: $450 + 1/3 utilities + small deposit; no pets/children/smoking; full privileges. 209-835-8249

Trucks & Trailers

1983 - 18ft. Motor home, and a 1989 35.5 fifth wheel trailer. Both in very good condition. Call for more info. 925-447-7768

1985 - El Camino. 2 dr. 305 V8, auto. Runs. $550 B/O. 209-480-4963

1992 - Dodge B350 1-ton van; 12 bucket seats; tow package; ps; pb; pw; pl; ac; $1999 925-625-4677

2004 - GMC Sierra 2500 Dura Max Diesel, 4 Door, King Cab, Leather Interior, Short Bed, Loaded, Smoked Windows, XL Spray Bed Liner, 4-WD. 925-798-8473

2000 - Wilderness 5th Wheel, 33ft, 3 slide-outs; good condition; $22,000 OBO 805-720-7477

GMC Sieria Classic 2500 ton, towing package, pwr; windows, locks, cd player, AC, new tires, bed tool box, runs good, current reg. $2000 or B/O 925-487-4422

Vacation Rentals

Squaw Valley - Thanksgiving week (11/20-27). 1 bedroom timeshare condo available at Olympic Village Inn. Sleeps 4+, fully furnished, ski and hiking. Will deal. 415-335-8273

Kona, Big Island of Hawaii - Spacious equipped 5 bdrm/3 bath vacation home sleeps 10+ on secluded property near beaches/town. Call for info/website. 415-377-5361

Cozy mountain cabin near Arnold. 4bedr, 2bath, fully equipped kitchen, wood burning stove. Sleeps 10-12. Plan ahead for snowy winter fun. 925-245-1114

SOUTH LAKE TAHOE - 3 Bedroom 2 Bath Chalet,nicely furnished, quiet area,all amenities,close to all skiing, Some Holidays & Thanksgiving Still Open! 209-599-4644

Red Bluff / Platina - FOR SALE - R Wild Horse Ranch -Share $2000 ($3k discount). 925-455-8006

Tahoe-West Shore 3/2 Sleeps 6-8, Fireplace, deck w/large windows, easy walk to Lake/Marina, 25mins to Casinos. Reserve for the holidays & more info. 925-813-2597

Wanted

Portable record player wanted. Needs to play both 33 and 45s. Prefer one that plays a stack of records automatically. 209-836-5764

Gently used American Girl dolls, clothes and accessories for 10 yr old niece 925-426-5676

Wanted-To purchase pocket and wrist watches. Any condition. Lab retiree learning new hobby. Ask for Brian. 925-606-0226

Looking to buy used snow ski clothes & gear for 12 year old girl & 5 year old boy. 925-454-0330

Due to space limitations, *Newsline* may withhold ads that have already run. They will still appear on the Web.

SUPERCOMPUTING

Continued from page 1

ardship mission," said Dimitri Kusnezov, director of NNSA's ASC program, in accepting the certificate for the top ranking. "Reaching this point is not only a reflection of the importance of our industrial partnerships, but also of the sustained support of the Department of Energy, NNSA and Congress to the mission. With these new tools, the national laboratories are pushing the envelope in computational science."

"The complement of simulation capabilities BlueGene/L and Purple bring to the three national labs under the National Nuclear Security Administration's Advanced Simulation and Computing program is of critical importance," said Dona Crawford, associate director for Computation at the Laboratory. "These systems put us on the threshold of a new era in high-performance computing, where simulation is the integrating element of the scientific discovery triad. We're excited to have simulation capabilities that will help us to better understand the complex physical phenomena necessary to ensure the safety, security and reliability of the nation's aging nuclear deterrent."

The BlueGene machine at IBM's Thomas Watson Research Center is ranked No. 2 with a Linpack performance of 91.2 teraflops. In the new list, two systems at Sandia National Laboratory also made the Top 10 with rankings of five and six. NNSA/DOE completed a strong showing with Oak Ridge National Laboratory's Cray XT3 system taking the No. 10 spot.

Top500 officials noted a major shake-up of the Top 10 as well as the rest of the list. Four of the top 10 systems were displaced by new systems and Japan's Earth Simulator, which held the top ranking for five straight lists, dropped to No. 7.

In addition to dominating the Top 10, BlueGene/L made a near clean sweep of the first-ever High Performance Computing System's (HPCS) awards sponsored by the Defense Advanced Research Projects Agency.

LLNL's Tom Spelce, a driving force behind BGL's early performance successes, made three trips to the podium to collect awards. Calin Cascaval, an IBM research manager, also collected an award on behalf of an IBM team for work on BGL.

Work on BGL was the subject of a number of technical talks and presentations at SC05 by scientists at all three weapons labs: Lawrence Livermore, Los Alamos and Sandia national labs.

Mike McCoy, who heads the Laboratory's ASC program, noted that BGL has set a new standard in conducting materials modeling work important to stockpile stewardship. In a promising late summer demonstration of its work capability, BGL ran a record-setting materials science application at 101.5 teraflops sustained over seven hours on the machine's 131,072 processors. The simulation of the cooling in a molten actinide uranium system was the largest simulation of its kind ever attempted.

"The success of BGL and promising early performance indicators for Purple are achievements made possible only by the monumental effort of many people at the Laboratory, in the ASC program and IBM," McCoy said. "The recognition these systems have received at SC05 is a tribute to the dedication of all those people who sweated the details and put in long days bringing BGL and Purple to fruition."

Lab team garners SC05 Gordon Bell Prize

Pioneering materials science simulations conducted on the BlueGene/L supercomputer at Livermore won a Gordon Bell Prize for a team led by Lab physicist Fred Streitz. The winners were announced Thursday at the conclusion of the Supercomputing 2005 conference in Seattle, Wash.

Named for one of the founding fathers of supercomputing, the prestigious Gordon Bell Prizes are awarded to innovators who advance high performance computing.

Using a newly developed molecular dynamics code, the team investigated solidification in tantalum and uranium with simulations ranging in size from 64,000 atoms to 524 million atoms. They achieved a performance rate of up to 107 teraflops (trillion operations per second) with a sustained rate of 101.7 teraflops over a seven-hour run. This was the largest simulation of its kind ever undertaken.

Simulations of the solidification of metals such as tantalum and uranium under high temperatures and pressures provide valuable insights into the properties of these materials important to the National Nuclear Security Administration's stockpile stewardship program.

Team members included James Glosli, Mehul Patel, Bor Chan, Robert Yates and Bronis de Supinski of Lawrence Livermore, and James Sexton and John Gunnels of IBM.

Look for more information about Lab awards and achievements in the next edition of *Newsline* (Friday, Dec. 2).

The top 10 computers

1. BlueGene/L, LLNL
2. BlueGene/W, IBM Thomas Watson Research Center
3. ASC Purple, LLNL
4. Columbia, NASA Ames Research Center
5. Thunderbird, Sandia National Laboratory
6. Red Storm, Sandia National Laboratory
7. Earth Simulator, Japan
8. MareNostrum (IBM)
9. Stella (IBM BlueGene machine), ASTRON, University Groningen, Netherlands
10. Jaguar Cray XT3, Oak Ridge National Laboratory

UCSB

Continued from page 1

"This partnership will enhance the Laboratory's preexisting capability to address challenges in homeland security," said Jim De Yoreo of the Laboratory's Science and Technology Office. "We're using contract dollars to support work that will have a national impact."

Livermore has invested heavily in nanoscience, specifically in its capabilities in synthesis, fabrication and characterization in biology, chemistry and materials science to develop unique biosensing tools.

"However, we realized that, in contrast to the fields of nuclear materials and weapons physics, in nanoscience and bioscience, much of the leading research is taking place in universities across the country," De Yoreo said. To leverage the expertise in the nanoscience and biotechnology research and development taking place in the UC system, the Lab partnered with UCSB's Institute for Collaborative Biotechnologies to create an initiative in Biosensing Nanosystems, De Yoreo said.

The projects funded through the program include three basic components:

• Manipulating or mimicking biological systems to produce a diverse array of molecular-recognition molecules with environmental robustness and high affinity

• Combining these recognition elements with nanoscale transduction elements

• Testing their ability to function as pathogen detectors.

Two projects will be funded during the first year of the program.

The first project, led by UCSB's Professor Tom Soh and Livermore's Ted Tarasow of the Chemical Biology and Nuclear Science Division, is called E-DNA — a label-free, reusable, electronic genosensor. It's based on two technologies for biosensing that can be integrated into a range of micro to nanoscale platforms.

The E-DNA takes a microfluidic chip-based technology for automated selection of high-affinity molecular recognition elements comprised of short chains of DNA and combines it with an electrochemical biosensor technology that is based on reproducible changes in DNA structure. The biosensor is highly sensitive, specific, rapid, reagentless and reusable. The same sensor design can be used for both DNA and protein detection.

The sensor elements will be incorporated into the microfluidic chip and new sensor electronics will be developed for the detection of pathogens that are relevant to national security.

The second project, led by UCSB's Professor Martin Moskovits, dean of mathematical, life and physical sciences, and the Lab's Chris Hollars of the Chemical Biology and Nuclear Science Division, is a Surface-Enhanced Raman Spectroscopy-based sensor with a "smart linker."

The first part of the system is based on "smart linkers," which are made up of trifunctional molecules containing one function that serves as a molecular recognition element, while the other two ends are designed to link two gold nanoparticles. The second part of the system uses "smart scaffolds," in which DNA is used to coordinate and control the distance between gold nanoparticles and create recognition sites with very high spectral sensitivity.

The initial application will be to detect DNA binding proteins unique to target bacterial pathogens.

In addition to collaborating on technological advances, the initiative will bring UCSB students and postdoctoral researchers to LLNL and send LLNL researchers to UCSB.

STARS

Continued from page 1

pete for gas in the surrounding clump, often gaining 10 to 100 times their original mass from the clump.

The alternative model, often termed the "gravitational collapse and fragmentation" theory, also presumes that clouds develop clumps in which proto-stellar cores form. But in this theory, the cores are large and, though they may fragment into smaller pieces to form binary or multiple star systems, contain nearly all the mass they ever will.

The researchers from the Laboratory, UC Berkeley and Princeton University conclude that the "competitive accretion" model cannot explain what astronomers observe of star-forming regions studied to date. Their findings appear in this week's edition of *Nature*.

"Competitive accretion is the big theory of star formation in Europe, and we now think it's a dead theory," said Richard Klein, a Lab astrophysicist and adjunct professor of astronomy at UC Berkeley.

"In competitive accretion, the cores are seeds that grow to become stars; in our picture, the cores turn into the stars," said Chris McKee, professor of physics and of astronomy at UC Berkeley. "The observations to date, which focus primarily on regions of low-mass star formation, like the sun, are consistent with our model and inconsistent with theirs."

Competitive accretion theory goes on to explain that brown dwarfs — failed stars — and free-floating planets are protostars — the early phase of a star. These protostars are ejected from star-forming clumps and lose their encircling disks of gas and dust. In the past year, however, numerous brown dwarfs have been found with planetary disks.

"Competitive accretion theorists have ignored these observations," Klein said. "The ultimate test of any theory is how well it agrees with observation, and here the gravitational collapse theory appears to be the clear winner."

A theory of star formation is critical to understanding how galaxies and clusters of galaxies form, McKee said.

"Star formation is a very rich problem, involving questions such as how stars like the sun formed, why a very large number of stars are in binary star systems, and how stars 10 to 100 times the mass of the sun form," he said. "The more massive stars are important because, when they explode in a supernova, they produce most of the heavy elements we see in the material around us."

The model used by the team is a supercomputer simulation of the complicated dynamics of gas inside a swirling, turbulent cloud of molecular hydrogen as it accretes onto a star. This is the first study of the effects of turbulence on the rate at which a star accretes matter as it moves through a gas cloud.

"We have shown that, because of turbulence, a star cannot efficiently accrete much more mass from the surrounding clump," Klein said. "In our theory, once a core collapses and fragments, that star basically has all the mass it is ever going to have. If it was born in a low-mass core, it will end up being a low-mass star. If it's born in a high-mass core, it may become a high-mass star."

McKee noted that their supercomputer simulation indicates competitive accretion may work well for small clouds with very little turbulence, but these rarely, if ever, occur, and have not been observed to date. Real star formation regions have much more turbulence than assumed in the accretion model, and the turbulence does not quickly decay, as that model presumes. Some unknown processes, perhaps matter flowing out of protostars, keep the gases roiled up so that the core does not collapse quickly.

"Turbulence opposes gravity; without it, a molecular cloud would collapse far more rapidly than observed," Klein said. "Both theories assume turbulence is there. The key is, there are processes going on as stars begin to form that keep turbulence alive and prevent it from decaying. The competitive accretion model doesn't have any way to put this into the calculations, which means they're not modeling real star forming regions."

The work was supported by the National Aeronautics and Space Administration, the National Science Foundation and the Department of Energy.

Going wild over turkeys is a November tradition

LLNL's wild side

By Jessie Coty

As Thanksgiving approaches, it seems fitting to contemplate the wild turkey as the national symbol that it nearly became. Just after signing the Declaration of Independence, the Continental Congress appointed a three-member committee to design a national seal. Thomas Jefferson, John Adams and Benjamin Franklin all had different ideas; none included the bald eagle. Franklin wanted the wild turkey as the national bird and was disappointed by the decision made in 1782 to use the bald eagle, as he felt that the bald eagle was of "bad moral character." Despite this choice to overlook the wild turkey, it still runs high in our national attention every November.

A "down-to-earth" sort of bird

Anyone that walks, runs, or cycles the roads surrounding the Laboratory may be familiar with a heavily feathered rush of round-bellied birds flying suddenly and low across the road. With this low flight display, it's not a surprise that the wild turkey *(Meleagris gallopavo)* belongs to the order *Galliformes* (ground-nesting fowl). Except for roosting, it spends its time on the ground. Although the turkey doesn't fly often nor far, it reaches flying speeds of 45-50 mph; it also has a respectable 15-mph running speed.

LLOYD INGLES
©CALIFORNIA ACADEMY OF SCIENCES

2004 TOM GREER

Left: Wild turkeys investigating a new habitat, parking lots. Above: A displaying wild turkey *(Meleagris gallopavo)*.

The wild turkey is a highly gregarious flocking bird; it's not a rare experience to see a large group of turkeys standing together in a field or along the roadside. Breeding behavior is triggered with lengthening daylight in winter; males (toms or gobblers) gobble and display for females (hens). The hens lay an egg a day until reaching a clutch size of 10-12 eggs. Incubation is about 28 days and precocial poults quickly learn survival skills by imprinting on their mother and learning her behaviors. They fly and roost in trees by two weeks, reach adult size by three to four months and achieve sexual maturity by one year.

Wild turkeys look for two key components in their habitat: trees and open grasslands. The trees provide food, nighttime roost sites and cover; grasslands provide well-covered forage and nesting areas. Wild turkeys are omnivores and they consume a wide variety of plants (including agricultural crops) and animals (largely invertebrates).

Another Californian not from California

Although the wild turkey is native to North America and occurs widely across the United States, it was not present in California at the time of European settlement. Like many of us, the wild turkey is yet another transplant (non-native). To complicate matters, wild turkeys are comprised of six subspecies, of which California is now home to three: the Rio Grande, Merriam's, and eastern turkeys. A "California Hybrid" also occurs, a result of subspecies interbreeding.

The first known introduction of a wild turkey to California occurred in 1877 by private ranchers on Santa Cruz Island. Beginning in 1908, the California Department of Fish and Game (CDFG) purposefully released turkeys to establish populations across the state. A breeding stock was used for periodic releases; these domesticated birds lacked the survival and reproduction skills necessary for the wild. In 1951, the CDFG moved to a program of wild turkey releases (capture and translocation of wild birds), which proved successful at establishing sustainable populations. It released nearly 3,000 and 950 turkeys between 1959-1988 and 1989-1999, respectively. Estimates show that the birds now occupy approximately 29,000 square miles (18.5 percent) of the state with a density of 8.3 turkeys per square mile (approximately 242,000 wild turkeys).

Popular game species or unpopular nonnative nuisance?

The wild turkey is the largest game bird in the state. Maintaining this species for hunters and wildlife viewing is an important objective for the CDFG; sport hunting for wild turkey is popular and highly valued.

Historically, the first open season for hunting wild turkey occurred in 1968 (one county). As turkeys became more abundant, hunting season opened across remaining counties. By 1979, two-season (fall and spring) hunting occurred across the state. However, spring season hunting is considered more biologically sustainable for wild turkey populations. A harvest of up to 30 percent of males in spring is not considered to effect turkey population growth, yet harvesting more than 10 percent of the fall population often results in population declines (due to harvesting females). As a result, California changed its hunting regulations in 1998, to encourage spring hunting. By careful management of the spring and fall hunting seasons, the CDFG can ensure sustainable populations across California, without requiring further releases.

Yet, the distribution of turkeys varies quite a bit across the state. High densities of turkeys can have negative impacts in residential, agricultural and park lands. The turkey, once nominated for status as our national bird, is often considered a nuisance; it damages gardens and landscaping, defecates in public areas, exhibits aggressive behavior and incurs agricultural depredation. It eats wine grapes, although video cameras prove other species also are to blame. Finally, parks have a mandate to promote and protect native species; conflicts therefore arise with nonnative turkeys.

The wild turkey presents a common conundrum for environmental agencies who must balance their efforts to ensure sustainable populations of species for recreational purposes while minimizing their detrimental effects. For wild turkey management, this means reducing populations in problematic areas while enhancing populations in other areas. You can help this management effort by not feeding turkeys, not releasing domestic turkeys and by celebrating the turkey on Thanksgiving as "national bird" for the day.

Targeted visit

JACQUELINE MCBRIDE/NEWSLINE

NIF Associate Director Ed Moses shows a sample target to University of California Regent Norman Pattiz during a visit Tuesday. Pattiz came to the Lab for a number of briefings and program tours.

NON-PROFIT ORG.
U.S. POSTAGE
PAID
LIVERMORE, CA
PERMIT NO. 154

Newsline
UC-LLNL
PO Box 808, L-797
Livermore, CA 94551-0808