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Los Alamos
NATIONAL LABORATORY
Ideas That Change the World

G. Peter Nanos named permanent Laboratory director

For more information, see the July 17 Daily Newsbulletin at *www.lanl.gov/newsbulletin* online.

NewsLetter

Week of July 21, 2003 **Vol. 4, No. 15**

A team effort

Preparing the Lab's R&D100 Award submissions is a team effort that involves many in Information Management (IM) Division and other Lab organizations.

The following individuals provided text and graphics used in this issue:

Communication Arts and Services (IM-1)
Gail Flower, Anne Garnett, Andrea Gaskey, Annmarie Gorman, Faith Harp, Todd Heinrichs, Betty Katz, Sue King, Rich Leishman, Vin LoPresti, Judy Machen, Louise Mendius, Sheila Molony, Donald Montoya, Kelly Parker, Eileen Patterson, Octavio Ramos, Pete Sandford, Gloria Sharp, Kirsten Silvey, Caroline Spaeth and Shirley Veenis

Imaging Services (IM-4)
John Flower, Pete Martinez, Richard Robinson and Presley Salaz

Industrial Business Development (IBD)
Project Coordinator Cindy Boone, Marjorie Mascheroni and Kathi Parker

Los Alamos NewsLetter

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Editor:
Jacqueline Paris-Chitanvis, 5-7779

Associate editor:
Judy Goldie, 5-0297

Managing editor:
Denise Bjarke, 7-3565

Graphic designer:
Edwin Vigil, 5-9205

Contributing photographer:
LeRoy N. Sanchez, 5-5009

Contributing writers:
Judy Goldie, 5-0297
Berylene Rogers (DVO), 7-0414

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Los Alamos enhances global security by ensuring safety and confidence in the U.S. nuclear stockpile, developing technologies to reduce threats from weapons of mass destruction and improving the environmental and nuclear materials legacy of the Cold War. Los Alamos' capabilities assist the nation in addressing energy, environment, infrastructure and biological security problems.

National Nuclear Security Administration

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FROM THE TOP

Shaping the future of our nation

Laboratory Director G. Peter Nanos

The recognition Los Alamos National Laboratory receives through its participation in R&D magazine's annual, international, R&D 100 Awards competition calls attention to the broad scope of achievements that the Laboratory contributes to the technological innovation in this country and, indeed, the world. Our discoveries in science and the applications that result play an important role in shaping the future of our nation. When we transfer our inventions and technological advances from the Laboratory to the private sector for commercial development, we strengthen the nation's economic security by enhancing our industrial competitiveness.

I commend our researchers for the diligence and creativity they have applied to this year's competition. I am pleased with the diversity of applications, which range from data transmission and security enhancements to health and safety, manufacturing and energy sustainability. It is important to remember that these … award-winning technical and scientific innovations have been born out of Los Alamos' goal to create science that truly serves society. I believe every submission represented here is a winner for the Laboratory, the University of California and the American taxpayers.

Science is enriched by diversity

by Judy Goldie

Foreign nationals, from the Manhattan Project to the present time, have played an important role in the advancement of science, noted Ombudsman Bruce MacAllister in introducing the first in a series of brown-bag workshops designed for foreign nationals who work at the Laboratory.

The Lab's foreign nationals come from a variety of cultures and nations, but they all have similar concerns. These brown-bag sessions are aimed at providing a forum for information exchange, MacAllister explained. The Foreign National Initiative, coordinated by Camilla Scavenius-Lopez of the Ombuds Program Office, is truly a collaborative effort among several Laboratory organizations, including the Diversity Office (DVO), the Office of Equal Opportunity (OEO), Internal Security (ISEC) Office, Laboratory Counsel (LC), Human Resource (HR) Division, Science and Technology Base (STB) Programs, Theoretical (T) Division and Deputy Director for Science and Technology Bill Press' office.

Director G. Peter Nanos asked those present to gather a compendium of issues then segregate them into three categories: those within the Laboratory's processes; those that deal with statutes, laws, regulations, State Department issues — things we [the Lab] have little influence on; and those the Lab might be able to mitigate — to see what the Lab can do. Nanos offered to come back to report progress on issues raised.

Nanos went on to say that he was fully supportive of maintaining foreign nationals at the Laboratory and invited those viewing via Labnet or on computers to be present in person to contribute to the discussions. Nanos, though slated only to give introductory remarks, asked for and responded to several questions that ranged from duplicating background checks for security badges and crypto cards to the need to increase support to foreign nationals with visa and immigration paperwork.

Each brown bag will deal with a specific issue or theme; the initiative will be expanded to include other activities and forums of relevance for foreign nationals. This inaugural forum presented a panel of scientists and researchers who recounted their experiences and told what working at the Laboratory meant to them. On the panel were Rajan Gupta of Elementary Particles and Field Theory (T-8), Min Sung Park of Wright Langham Resource (B-2), Ton D. Shen of Structure/Property Relations (MST-8) and Steven Brumby of Space and Remote Sensing Sciences (NIS-2).

Since the brown bag, there has been a lively debate on *intersci@lanl.gov*, which is the electronic-mail venue for the foreign national community, said Scavenius-Lopez. The dialogue has culminated in a number of issues being identified for focused discussions at upcoming brown bags. Some of the topics raised are the 982 process and badging, the clearance process, computer access, and immigration and employment.

If you have any questions or would like to discuss the initiative, call Scavenius-Lopez or MacAllister at 5-2837. Information useful to foreign nationals — and others — can be found at *http://int.lanl.gov/worklife/international/* online. The next brown bag is scheduled for Aug. 14 on the topic "Computer Access." Check the online Daily Newsbulletin at *www.lanl.gov/newsbulletin* for details.

The Ombuds Office recently hosted the first in a series of brown-bag workshops designed for foreign nationals who work at the Laboratory. This inaugural forum presented a panel of scientists and researchers who recounted their experiences and told what working at the Laboratory meant to them. Pictured are, from left to right, Rajan Gupta of Elementary Particles and Field Theory (T-8), Ton Shen of Structure/Property Relations (MST-8), Laboratory Director G. Peter Nanos, Min Sung Park of Wright Langham Resource (B-2) and Steven Brumby of Space and Remote Sensing Sciences (NIS-2). *Photo by LeRoy N. Sanchez*

Laboratory garners eight R&D 100 Awards

For the past 25 years, Los Alamos National Laboratory has submitted descriptions of its most innovative technologies to R&D magazine's annual R&D 100 Awards competition. This competition is designed to honor significant commercial promise in products, materials or processes developed by the international research and development community. Technologies are nominated in open competition and judged by technical experts selected by the Illinois-based R&D magazine. The magazine uses technical criteria to select the 100 most significant, unique or promising entries from the nominations received. According to the selection panel, "The sole criterion for making the grade is demonstrable 'technological significance' compared with competing products and technologies. Issues such as smaller size, faster speed, greater efficiency and higher environmental consciousness have continued to gain importance in successful award submissions."

Los Alamos has been competing successfully for more than two decades with many of its winning technologies developed in collaboration with private-sector companies and other scientific institutions. The Laboratory won eight awards this year and has received 89 awards since it began competing in 1978. This year's winners were the most garnered of any laboratory in the Department of Energy complex.

And the winners are . . .

BASIS: High-Confidence Biothreat Detection and Characterization

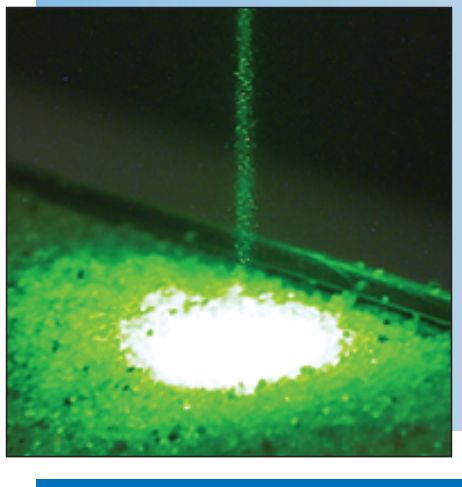
The Biological Aerosol Security and Information System (BASIS) is a technology for protecting civilian populations against terrorists using aerosol releases of microorganisms capable of inducing lethal infections. It enables the detailed identification, localization and time-of-release pinpointing of select aerosol-released organisms. In turn, this precise detection facilitates the expeditious treatment of exposed individuals before symptomatic onset, a medical response capable of saving lives. By reducing the rate of false positives to nearly zero, BASIS prevents the potential disruption of civilian life that such false alarms would likely provoke. It protects civilian populations by expeditiously mobilizing medical responses and providing detailed forensic evidence about organisms used in bioterrorism, thereby engendering a broader umbrella of readiness and facilitating criminal investigations. BASIS can be deployed in a broad spectrum of locations where population clusters could be targeted by bioterrorists.

Applications
- Population centers (e.g., transportation terminals/portals)
- Border checkpoints
- Seats of government
- Critical infrastructure nodes (e.g., power plants)
- Tunnels and bridges
- Sports and entertainment venues

Team members: J. Wiley Davidson of the Center for Homeland Security (CHS); Thomas Farish of Stockpile Complex Modeling and Analysis (D-2); Roy Goeller, Nicholas Olivas, Gary Salzman and Ralph Stiglich of Space Instrumentation and System Engineering (NIS-4); Norman Hamer, Stephen Mortenson, Patricia Nickel, Phillip Stroud, Thomas Wehner and Douglas Weiss of Systems Engineering and Integration (D-3); Julie Avila, Jacquelyn Cofield, Patsy Gilbert, Bruce Henderer, Robert Johnson, Paula McCready, Nancy Montgomery, Virginia Montgomery, Linda Ott, Richard Parker, Paul Sargis, Cheryl Strout, Thomas Slezak, Mark Wagner, all of Lawrence Livermore National Laboratory; Mark Weitekamp, consultant to LLNL; and Lauren Basch and Matthew Bivans of Rupprecht and Patashnick Co. Inc.

CARISS: Integrated Elemental and Compositional Analysis

Compositional Analysis by Raman-Integrated Spark Spectroscopy (CARISS) is the only field-deployable instrument that provides a complete chemical analysis (elemental and compositional) of a material at close, stand-off and remote distances. CARISS uses two laser beams to conduct such analyses. The rugged instrumentation, highly adaptable to real-world analysis situations, provides rapid — less than two minutes per sample — "hands-off" measurement, reducing analysis time and cost by at least a factor of 100. Designed for analysis in the field, CARISS can fit into a briefcase or a lunchbox, depending on the application. The versatility and portability of the instrument will allow it to sample Martian surface materials from a Mars rover; verify the composition of bobsled runners at the Olympic Games to enforce international rules and regulations; and detect carbon in soil for use in terrestrial carbon-sequestration programs aimed at reducing global warming.

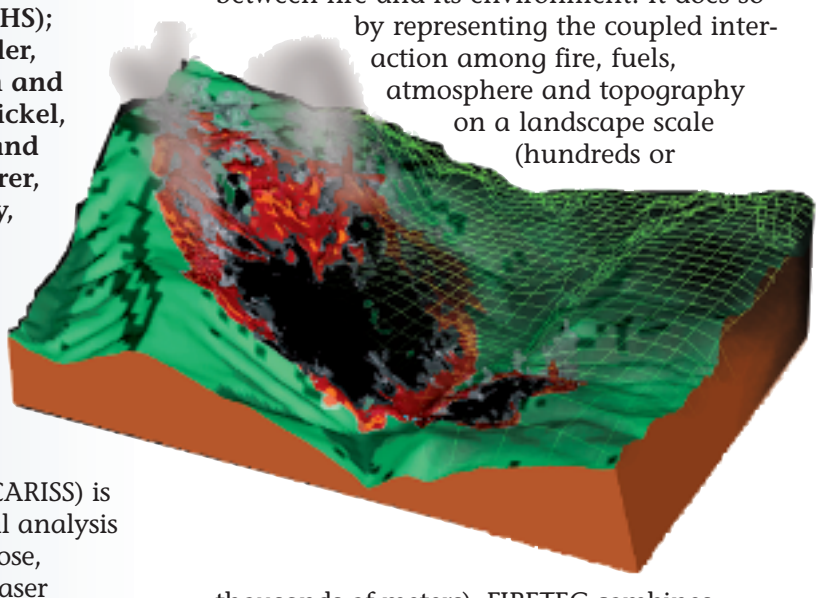


Applications
- Carbon detection (organic and inorganic) in soil
- Soil monitoring for the presence of toxic metals and harmful organic compounds
- Chemical-agent detection for homeland defense and customs-surveillance efforts
- Identification of materials used in weapons of mass destruction
- Industrial process control and mining operations

Team members: David Cremers and Monty Ferris of Advance Chemical Diagnostics and Instrumentation (C-ADI); Roger Wiens of Space and Atmospheric Sciences (NIS-1); and Paul Lucey and Shiv Sharma of the University of Hawaii

FIRETEC: A Physics-Based Wildfire Model

FIRETEC is the first physics-based, 3-D computer code designed to simulate the constantly changing, interactive relationship between fire and its environment. It does so by representing the coupled interaction among fire, fuels, atmosphere and topography on a landscape scale (hundreds or thousands of meters). FIRETEC combines physics models that represent combustion, heat transfer, aerodynamic drag and turbulence with a computational fluid-dynamics model that represents airflow and its adjustments to terrain, different types of fuel (vegetation) and the fire itself. Unlike the empirically based models currently used in the field, FIRETEC simulates the dynamic processes that occur within a fire and the way those processes feed off and alter each other.



continued on Page 4

Winners ...

continued from Page 3

FIRETEC provides a sophisticated analytical tool for fire, fuel and land managers and has significant potential to help prevent loss of life, property and natural resources.

Applications
- Predicting wildfire behavior in rugged terrain under various atmospheric conditions
- Optimizing fuel-management strategies
- Investigating how fire interacts with various fuels
- Determining causes of dangerous changes in a wildfire's behavior
- Providing realistic simulations for training inexperienced fire fighters

Team members: James Bossert, Jonah Colman, Rodman Linn, Jon Reisner, William Smith and Judith Winterkamp of Atmospheric, Climate and Environmental Dynamics (EES-2); Francis Harlow of Computational Fluid Dynamics (T-3); and Carleton Edminster, United States Department of Agriculture, Forest Service, Rocky Mountain Research Station

FlashCT™

FlashCT™ is a high-speed, industrial computed-tomography (CT) scanning system for producing high-resolution, 3-D images of the external and internal geometries of objects. Once appropriate only for laboratory use, its vastly improved software and off-the-shelf components now make it feasible for high-throughput, in-line manufacturing applications. As a result, FlashCT is being used in unforeseen ways, notably in the mass production of customized parts. New uses of FlashCT are beginning to make significant changes in the way manufacturing is done. FlashCT applies to any process that requires the nondestructive scanning of an object. Its use in prototyping mass-produced custom devices (mass customization) streamlines the manufacturing process, increases throughput, reduces overall manufacturing costs, is clean and eliminates environmentally harmful by-products used in other processes.

Applications
- Prototyping mass-produced, customized, orthodontic devices
- Inspecting parts or components for quality-assurance purposes
- Comparing "as-built" hardware to design intent
- Recreating parts when design drawings are no longer available
- Evaluating manufacturing errors
- Inspecting archaeological, geological and paleontological samples

Team members: Thomas Claytor and David Stupin of Applied Engineering Technologies (ESA-AET); Deborah Summa of the Industrial Business Development (IBD) Office; Anthony Davis, Scott Keating and David Phillips of Sensors and Imaging Group; and Tim Thompson of HYTEC Inc.

Flexible Superconducting Tape

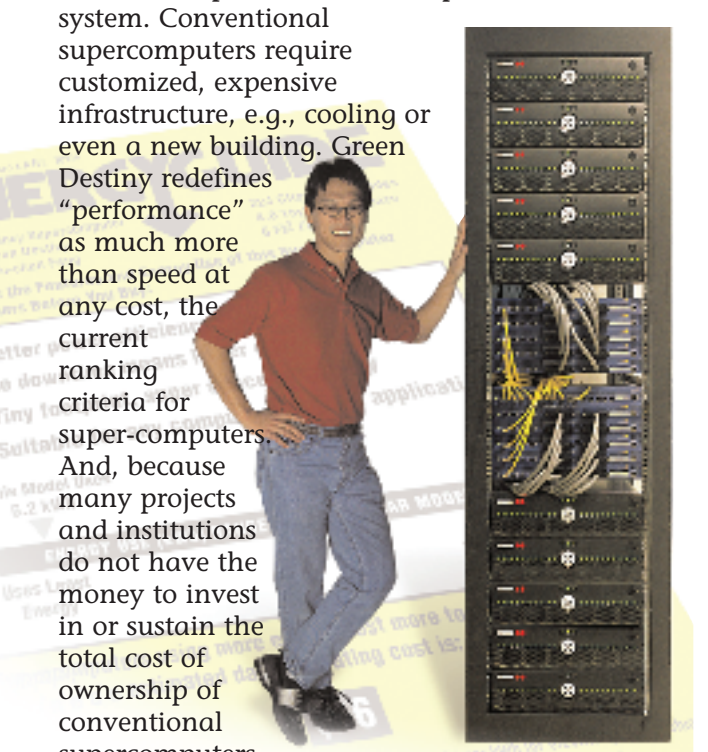
The world's need for electricity has led to rising power costs; dependence on oil and coal, both of which are becoming scarce; and rising pollution levels. An ideal solution to this problem would be a technology that can transmit electricity with no resistive losses. The Laboratory has developed a superconducting tape that carries high currents in high-magnetic fields at liquid-nitrogen temperatures. At such temperatures, the tape carries current with no resistance and is flexible enough to be wrapped into a tight coil with no loss of superconductivity. The innovative tape design can carry 200 times the electrical current of copper wire. Widespread use of this tape will reduce costs associated with electrical-power transmission and generation, and reduce the electrical requirements of the planet, thus conserving resources and reducing global pollution.

Applications
- Instruments that require large amounts of power, such as power transmission lines, motors, generators and transformers
- Magnetic-resonance imaging for medical diagnostics
- Superconducting magnets that can play a role in magnetically levitated trains and research accelerators and colliders
- Fault current limiters and current leads
- Nuclear magnetic resonance instruments used in the chemical industry

Team members: Paul Arendt, Raymond DePaula, Paul Dowden, Stephen Foltyn, Brady Gibbons, J. Randy Groves, Quanxi Jia, Sascha Kreiskott, Vladimir Matias and Dean Peterson of the Superconductivity Technology Center (MST-STC)

Green Destiny

Green Destiny is the world's most efficient supercomputer. For nearly a year, Green Destiny has run without any downtime in a dusty 85-degree Fahrenheit warehouse that has no facilities for cooling, humidification control or air filtration while occupying less than 6 square feet and drawing at most 5.2 kilowatts of power for the 240-processor system. Conventional supercomputers require customized, expensive infrastructure, e.g., cooling or even a new building. Green Destiny redefines "performance" as much more than speed at any cost, the current ranking criteria for super-computers. And, because many projects and institutions do not have the money to invest in or sustain the total cost of ownership of conventional supercomputers, the supercomputing capacity and efficiency provided by Green Destiny is recognized worldwide as an affordable and environmentally sustainable alternative. Green Destiny is a platform for high-performance computing tasks.



Applications
- Traditional Web hosting and Web-server farms
- E-commerce
- Financial services
- Space and satellite communications
- Scientific applications
- Desktop supercomputing
- Smart house

Team members: Wu-Chun Feng and Eric Weigle of the Advanced Computing Laboratory (CCS-1); and Michael Warren of Theoretical Astrophysics (T-6); with contributions from The RADIANT Team (Feng, Weigle, Mark Gardner and Adam Engelhart, all CCS-1)

PowerFactoRE — A Suite of Reliability Engineering Tools for Optimizing the Manufacturing Process

PowerFactoRE is a comprehensive methodology and an integrated suite (toolkit) of reliability engineering tools that introduces a new way of thinking about the manufacturing process. The result of an effective collaboration between the Laboratory and Procter & Gamble, it

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Winners …

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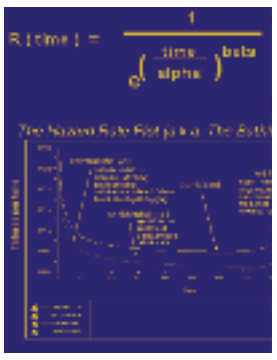


comprises a unique set of proven methods, statistical and analytical tools, simulation software, procedures and training that enable manufacturing-line managers to understand reliability losses and to correct seemingly isolated defects in the manufacturing process. PowerFactoRE gathers and analyzes production data; fits the data with accurate statistical distributions to build a simulation of the system; and validates the system model. It allows a manufacturer to improve the current system or to evaluate a completely new configuration. It can be applied across a wide range of businesses to increase productivity, guide capital investments and increase production. It is currently being used in more than 200 plants worldwide.

Applications
- Predicting, reducing and preventing manufacturing-equipment failures
- Improving product quality and increasing throughput
- Improving bottom-line results through higher reliability
- Reducing operating and capital expenses

Team members: Michael Hamada and Harry Martz of Statistical Science (D-1); and Arthur Koehler, Donna Caporale, Thomas Lange, Michael Looney and Jonathan Tan of the Procter & Gamble Co.

Super-Thermite Electric Matches

Have you ever attended an elaborate fireworks display choreographed to music and other special effects? To achieve such awe-inspiring shows, experts in pyrotechnics use electric matches, which consist of small ignition elements specifically designed to ignite fireworks remotely and with precise timing. Unfortunately, conventional electric matches use lead-containing compounds that are extremely sensitive to impact, friction, static and heat stimuli, making them dangerous to handle. In addition, these compounds produce toxic smoke. The Super-Thermite electric matches produce no toxic lead smoke and are safer to use because they resist friction, impact, heat and static discharge through the composition, thereby minimizing accidental ignition. They can be designed to create various thermal-initiating outputs — simple sparks, hot slag, droplets or flames — depending on the needs of different applications.

Applications

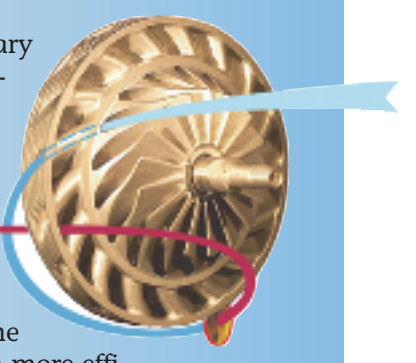
The principal application is in the entertainment industry, which uses fireworks displays for a variety of venues, such as sporting events, holiday celebrations and musical and theatrical gatherings. Secondary applications include
- triggering explosives for the mining, demolition and defense industries,
- setting off vehicle air bags and
- igniting rocket motors.

Team members: Michael Hiskey, Darren Naud and Steven Son of Materials Dynamics (DX-2); James Busse of Advanced Chemical Diagnostics and Instrumentation (C-ADI); and Kenneth Kosanke of PyroLabs Inc.

Those also nominated …

Editor's note: The following technologies were nominated this year for an R&D 100 Award.

Advanced, Single-Rotor Turbine Engine



The advanced, single-rotor turbine (ASRT) engine is a revolutionary centrifugal-turbine design featuring the compressor and turbine sections cast as a single piece. The design channels fresh, outside air through the hollow, turbine blades as the air travels to the combustion chamber — cooling the blades without mixing unheated air with the combustion products. This design also increases efficiency by preheating the air destined for the combustion chambers. The ASRT engine design can be used in any application that currently uses the centrifugal gas turbine. Because the ASRT engine design cools the critical turbine section, it allows the engine to operate either at higher temperatures, using its fuel much more efficiently, or conventional temperatures but be constructed from cheaper, lower-temperature alloys. Additionally, the one-piece compressor/turbine reduces engine complexity and weight, reducing manufacturing, operating and maintenance costs, and increasing the engine's standard operating lifetime.

Applications
- Jet engines for small aircraft
- Turboshaft engines for turboprop aircraft — helicopters, tanks and other vehicles
- Distributed-power generators at industrial — and commercial sites and aboard ships
- Residential distributed-power units
- Portable personal-power units

Team member: David Platts of Hydrodynamics and X-ray Physics (P-22)

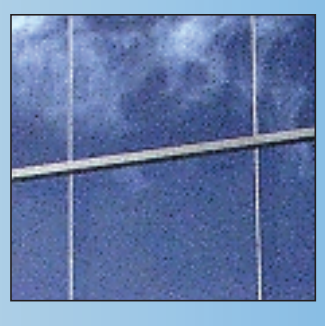
DSN-CC: Distributed Sensor Network with Collective Computation

DSN-CC, a distributed sensor network with collective computation, is an economical, portable and potentially concealable detection system. It consists of a set of smart sensor nodes that communicate with neighboring sensors to cooperatively solve a sensing problem. It can detect and locate events such as a gunshot or a vehicle passing through a tunnel, delivering detection to the source. Sensors near the event collect the raw data, "compare notes," negotiate a conclusion as to what the signal is and where it originated and propagate the conclusion across the network, eliminating the need for a central processing station. Users obtain DSN-CC conclusions by listening in to any part of the network. Because the information and subsequent conclusions ultimately exist everywhere on the network, only short transmissions are required. The sensors can be small enough to be disguised as a rock.

Applications
- Signal detection by military, federal government, commercial businesses and the general public
- Ground-based surveillance, weapons-proliferation detection, home-intruder detection and critical-facilities protection
- Medical diagnostics once miniaturization with nanotechnology becomes feasible

Team members: Jared Dreicer and Paul Johnson of Space Data Systems (NIS-3) and Robert Nemzek, Jerome Romero, Ryan Sanchez, Ralph Stiglich, Sarah Stokes and Anders Jorgensen of Space Instrumentation and System Engineering (NIS-4)

Electrotint: Reversible Tinted Windows



Keeping office buildings with thousands of windows comfortably cool, particularly during the spring and summer months, can be a daunting task. Electrotint windows, developed in collaboration with ElectroChromiX Inc., can quickly go from a colorless to a deeply colored — or mirrored — state and back again. The windows have been designed to let in 75 percent of visible light during fall and winter and block 90 percent of light during

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Nominated ...

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spring and summer. The proprietary dyes and chemical formulations used in Electrotint windows and mirrors do not rely on hazardous chemicals and will not degrade, swell, break down seals or evaporate — problems that are common to conventional electrochromic windows. Electrotint formulations integrate easily into modern architectural and vehicular designs and manufacturing processes and are cost-effective, reducing the price per square foot (base window excluding control systems) by 80 to 95 percent compared with solid-state electro-chromic windows.

Applications

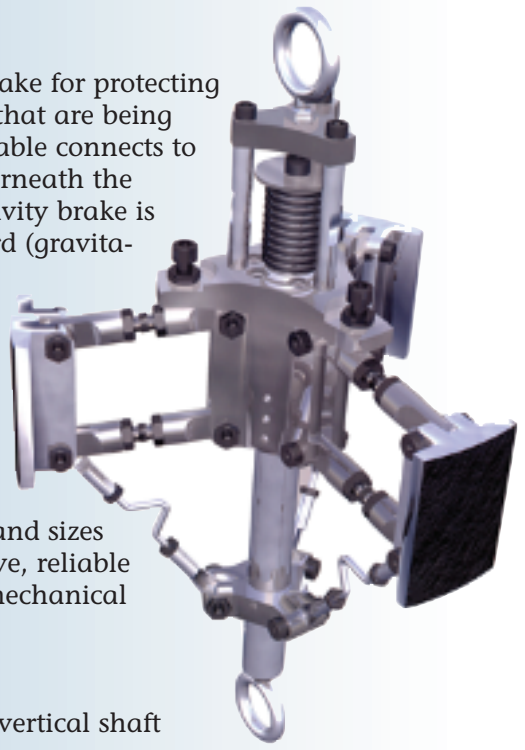
• Energy-efficient building windows — optimizing heat gains and losses through windows and enhancing the use of daylight can save the United States approximately 5 percent in energy consumption each year

• Rear- and side-view vehicle mirrors — elimination of headlight glare, can reduce automotive accidents

Team members: Anthony Burrell, Simon Hall, T. Mark McCleskey and Benjamin Warner of Actinide, Catalysis, and Separations Chemistry (C-SIC); and Anoop Agrawal and Gordon Goodyear of ElectroChroniX Inc.

Gravity Brake

The gravity brake is a simple, reliable mechanical brake for protecting and positioning hoisted loads, such as diagnostic tools that are being lowered or raised within a vertical shaft. The hoisting cable connects to the top of the gravity brake and the load attaches underneath the gravity brake. As the load is lowered (or raised), the gravity brake is subject to the lifting force of the hoist and the downward (gravitational) force of the load. A sudden loss of the lifting force causes the gravity brake to swing its brake pads outward until they contact the shaft walls. The brake uses the load's weight to generate the requisite braking force. If the sudden loss is accidental, the gravity brake prevents the load from free-falling down the shaft. If the loss is intentional, the brake precisely positions and suspends the load within the shaft. The gravity brake can be configured to work in varying shaft geometries and sizes and to support varying load weights. It is an inexpensive, reliable mechanical braking system that can provide fail-safe mechanical backup to electronic braking systems.

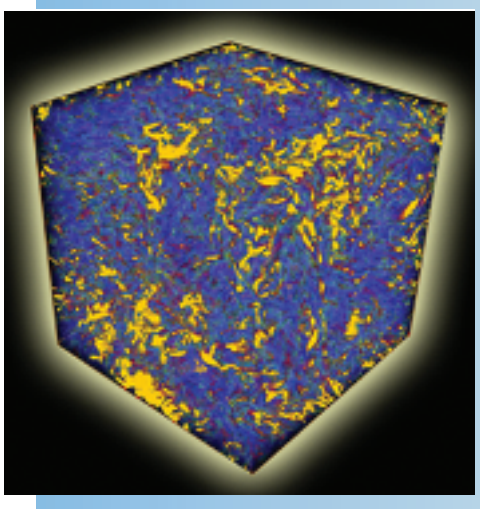


Applications

• Preventing hoisted loads from free-falling within a vertical shaft or tunnel

• Positioning loads, such as testing or diagnostic equipment, precisely within vertical shafts

Team member: Richard Lujan of Mechanical Systems (SNS-03)



LANS-alpha Turbo-Simulator — a new approach to simulating turbulence

The LANS-alpha Turbo-Simulator is a fast, accurate and very cost-effective modeling tool used for numerically simulating the effects of turbulence at a user-prescribed length scale (alpha). Its predictions agree accurately with classic turbulence experiments. Because it uses a novel mathematical approach, its capabilities are unique among existing turbulence simulators for preserving the essential properties of convection and circulation in numerical calculations of turbulent flow. In many comparison tests, its performance in speed and accuracy considerably exceeds that of other turbulence simulation methods. Scientifically, it is derived from basic principles that readily incorporate additional physical processes, so it is flexible and easy to learn and use. For numerically predicting turbulence effects, the LANS-alpha Turbo-Simulator provides benefits that are unavailable with any other turbulence simulation method.

Applications

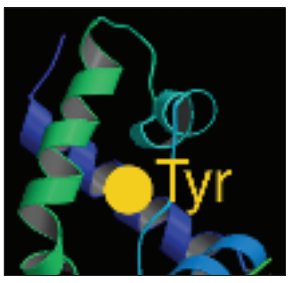
• Estimating the effects of turbulence at limited spatial and temporal resolution

• Extending the computational capability of existing numerical codes

• Modeling turbulence in areas such as global climate modeling; industrial design of wings, propellers and jet engines; control of production processes that use turbulent-fluid flows

Team members: Darryl Holm, Susan Kurien, Zhijun Qiao and Martin Staley of Mathematical Modeling and Analysis (T-7); Katharine Chartrand of High Performance Computing Environments (CCN-8); Christopher Jeffery of Space and Remote Sensing Sciences (NIS-2); Robert Malone, Jamaludin Mohd-Yusof, Balu Nadiga, Mark Taylor and Beth Wingate of Methods for Advanced Scientific Simulations (CCS-2); Len Margolin of the Applied Physics Division Office (X-DO); Ray Ristorcellim of Integrated Physics Methods; and Thomas Jensen of Flow Science Inc., International Turbulence Working Group

Molecular Tagging: The key to effective disease diagnostics and therapeutic intervention



Have you ever put a wrong word in a crossword puzzle? When this happens, it tends to throw off the entire puzzle, principally because one word can affect others. The same thing can happen when trying to unravel something infinitely more complex, such as the human genome, in which an unsigned base may hold the key to unraveling a disease-related gene. This unique molecular-tagging technique uses site-specific stable-isotope markers to enhance the specificity, accuracy, sensitivity and throughput of conventional mass spectrometry, a technique that could help "interpret" the human genome and functional proteome. Using such data, scientists can better understand how cells work and how diseases operate at a molecular level. Such knowledge will help doctors develop new pharmaceuticals and treatment options for a variety of genetic diseases.

Applications

• Large-scale DNA and protein analyses performed quickly, easily and cost-effectively

• Screening for genetic variants — may help scientists unravel the nature of many genetic diseases

• Identification and quantification of cellular proteins (particularly those whose expression levels are affected by disease), as well as any post-translational modifications (the sensitive markers for diseases)

Team members: Xian Chen, Fadi Abdi, E. Morton Bradbury, Sheng Gu, Thomas Hunter and Songqin Pan of the Wright Langham Resource (B-2); Vahid Majidi of the Center for Homeland Security (CHS); and Lloyd Smith of the University of Wisconsin-Madison

RESOLVE: automated software for protein research

Have you ever watched a television show with poor reception? The fuzzy picture on the screen often makes it difficult to discern the characters and the action, making for a

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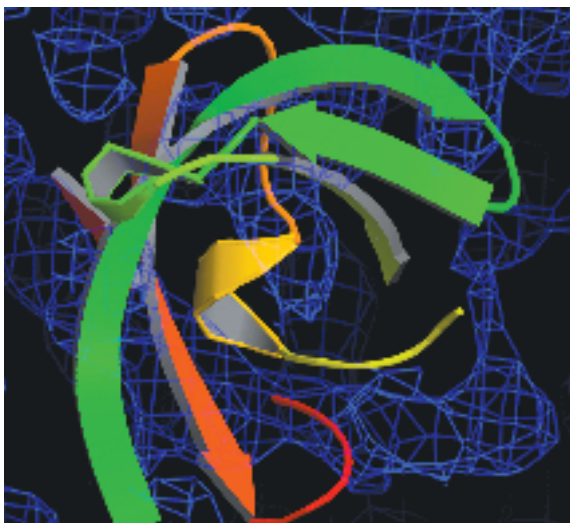

July service anniversaries

35 years
Steven Bourret, NIS-5
Robert Martin, HSR-4
Reynaldo Morales, STB-DSTBP
Lois Sylvia, X-DO

30 years
Evan Ballard, P-22
Joel Dendy Jr., T-7
Charles Hall, DX-1
Rudolph Henninger, CCS-2
Calvin Moss, NIS-6
J.S. Sandoval, DX-6
Kristine Smith, LANSCE-12
Alex Velasquez, LANSCE-5
Richard Werbeck, LANSCE-7

25 years
Francis Addessio, T-3
Eric Bjorklund, LANSCE-6
Clint Bowyer, ESA-GTS
Clemente Garcia Jr., NIS-6
Felix Garcia, MST-7
Antonio Gonzales, ESA-WMM
Hiroshi Hoida, NIS-7
Paul Johnson, EES-11
Floraida Martinez, ESA-WMM
Paul Mendoza, C-AAC
Velma Montoya, C-ACS
Lawrence Pratt, T-12
Alfredo Rey, NMT-6
S. Robert Goldman, X-1
Gerald Salazar, PM-DS
Karl Staudhammer, NMT-DO
Viola Vigil, STB-RL
Peter Walsh, P-24
David Whitfield, NIS-10

20 years
Sandra Baca, ADWEM
Richard Epstein, NIS-2
Brenda Espinoza, MST-STC
Janine Fales, ESA-EM
Michael Fehler, EES-11
Keith Fife, NMT-4
William Gregory, DX-3
Linda Hill, RRES-CH
Richard Macek, ESA-WR
Leroy Martinez, PM-DS
Judy Martinez, NMT-6
Sally Martinez, HSR-5
Richard Mason, NMT-11
James Matzke, RRES-EA
Augustine Ortiz, NMT-DO
Scott Parkinson, ESA-WR
Antonio Redondo, T-12
Ralph Riley, NIS-17
Alice Rodriguez, FWO-SWO
Benjamin Sanchez, LANSCE-6

15 years
Stephen Birdsell, ESA-TSE
Douglas Coombs, DX-7
Richard Ford, CCN-4
Clifford Fortgang, NIS-10
Paula Geisik, EES-6
Raphael Labauve III, HSR-5
Timmy Martinez, IM-8
Jane Nordholt, P-21
Douglas Ranken, CCN-12
Dolores Romero, LANSCE-6
Jeffrey Schinkel, P-23
Gary Shipley, NMT-3
Louise Trujillo, FWO-WFM

10 years
Scott Elliott, EES-2
Suzanne Johnston, ESA-WSE
Bryan Koehler, PM-DS
Aaron Koskelo, C-ADI
Maureen McGraw, EES-6
John Park, NMT-5
Victor Rutherford, PS-13
Philip Stauffer, EES-6
William Tumas, C-SIC
Douglas Wedman, NMT-15

5 years
Kathleen Alexander, MST-DO
Henry Alme, X-4
Curtt Ammerman, ESA-DE
Elsie Aragon, HSR-5
Dean Barr, LANSCE-1
Jeffrey Bedell, NIS-17
Gregory Boebinger, MST-DO
Michelle Borrego, PS-PI
Carl Brandenburg, ESA-AET
William Brazile, AA-2
John Bryhan, FWO-IIM
Robert Bustamante, NMT-6
Steven Capelli, PS-1
David Chavez, S-4
Harry Clifford, ESA-AET
Ronald Day, CCN-18
Delmar Duncan, FWO-DX-ESA
John Eklund, SUP-2
Kimberly Ellis, MST-OPS
Gary Gladysz, ESA-WMM
Michael Hatfield, PS-DO
Susan Heckethorn, STB-RL
Daleen Hendrickson, NMT-14
Lance Hill, ESA-WR
Carol Hoover, STB-RL
Donald Hush, CCS-3
Kathleen Jaramillo, CCN-4
Richard Kandarian, CCN-12
David Katonak, ESA-DE
Anthony Kaye, X-5
Clifford Keller, NIS-5
Sallie Keller-McNulty, D-1
Terry Knight, PS-PI
Dane Knowlton, MST-6
Tom Little, HSR-12
Samuel Loftin, RRES-ECO
Janet Lopez, DIR
Rick Martinez, FWO-SWO
Julie Meadows, DX-1
James Miller, HSR-1
Tammy Milligan, CFO-2
Sally Olguin, RRES-OEIM
Daniel Reisenfeld, NIS-1
Susan Roach, CCN-2
Raymond Romero, FWO-DECS
Bradford Storey, NMT-16
Bernadette Vigil, NMT-14
Ralph Vigil, HSR-4
Sylvia Williams, CFO-2

Cruise through the new diversity calendar and win lunch with the director

To mark this week's rollout of the new Weaving Our Worlds (WOW) diversity calendar, the Diversity Office (DVO) is sponsoring a Diversity Trivia Contest. The answers to the contest can be found in the calendar itself. The prizes? Six Lab workers will join Laboratory Director G. Peter Nanos for an ARAMARK catered lunch, paid for from morale funds.

Go to the diversity calendar through the Diversity Office home page at *http://www.lanl.gov/orgs/dvo/* online to view the calendar and to access the contest questionnaire. The final requirement is that you be lucky enough to have your e-mail pulled from the "hat" containing all the e-mails with correct answers.

The image of Mexican dancers, right, is from the new calendar. This cutting-edge calendar engages users through sound and video from sites such as the Smithsonian, Public Broadcasting Service, Discovery Channel and National Geographic, said Laurie Quon of Communication Arts and Services (IM-1) and calendar developer. No product, commercial or otherwise, provides the breadth and depth of content found in the new Lab diversity calendar, added Quon.

This month in history …

June

1776 – In Philadelphia, Pa., the Continental Congress adopts the Declaration of Independence from Great Britain and its king. The declaration came 442 days after the first volleys of the American Revolution were fired at Lexington and Concord in Massachusetts.

1804 — The uncle of one of this publication's editors slays Alexander Hamilton in a duel in Weehawken, N.J.

1898 — Isidor Isaac Rabi, Manhattan Project pioneer is born July 29. He was awarded the Nobel Prize for Physics in 1944 for his invention (in 1937) of the atomic and molecular beam magnetic resonance method of observing atomic spectra.

1933 — American aviator Wiley Post returns to Floyd Bennett Field in New York, having flown solo around the world in seven days, 18 hours and 49 minutes. He was the first aviator to accomplish the feat.

1945 — J. Robert Oppenheimer states, "I am become death, destroyer of worlds. [Often quoted as: I am become death, shatterer of worlds.] after first nuclear explosion, citing the Bhagavad Gita (... Death, the shatterer of Worlds).

1951 — Dan Bricklin is born July 16. He invents the computer spreadsheet while enrolled at Harvard Business School. He develops in 1975, a program called "VisiCalc" to run on the Apple II computer.

1955 — Disneyland opens.

1961 — As much as four inches of king-sized hail landed in Los Alamos leaving a trail of damage estimated at $75,000. Hailstones, most measuring about an inch and a half in diameter, but some found a big as two inches, were the largest ever recorded on the Hill.

1961 — Jackass Flats at the Nevada Test Site has been officially selected by the AEC-NASA Space Nuclear Propulsion Office as the site of the National Nuclear Rocket Development Center.

1976 — The United States Naval Academy admits women for the first in its history.

And this from the July 13, 1961 LASL News: "A new Office for Rover Flight Safety headed by L.D.P. King, former assistant K Division leader, has been established to work across Laboratory-division-lines to study the type and extent of problems connected with public safety and operation of nuclear rockets."

The information in this column comes from several sources including the online History Channel, Chase's 2002 Calendar of Events, the Newsbulletin and its predecessors, the atomic archive.com, Echo Vitural Center, Science & Technology and Real History Archives.

TO YOUR HEALTH

Blood pressure checks more important than ever

In the latest National Institutes of Health report on hypertension, a new category of prehypertension was added. Individuals with prehypertension in the 130-139/80-89 mmHg BP range are at twice the risk for developing hypertension as those with lower values. Talk to your doctor or health-care provider about lifestyle modifications to reduce your risk.

Nominated …

continued from Page 6

frustrating evening at home. In the world of proteomics, the new RESOLVE software helps researchers get clear pictures of protein structures, allowing the researchers to develop new pharmaceuticals and to understand how proteins work. A fully automated software package, RESOLVE, improves the accuracy and detail of protein images obtained from X-ray crystallography. RESOLVE then interprets these images and builds accurate atomic models of the proteins. Used across the globe by more than 20 pharmaceutical companies and more than 300 academic institutions, RESOLVE produces a detailed model of a protein's shape, which defines its biological activity. RESOLVE provides a quick and cost-effective means of generating high-quality models.

Applications
- Helping researchers develop more effective pharmaceuticals and treatments for genetic diseases ranging from epilepsy and hemophilia to asthma and many types of cancer
- Enhancing scientific understanding of protein functions ranging from defensive and hormonal to transport and enzymatic

Team member: Thomas Terwilliger of the Wright Langham Resource (B-2)

ROB: Reagentless Optical Biosensor

ROB quickly identifies and quantifies pathogenic proteins in complex fluid samples such as serum. ROB consists of two main components: a protein-specific assay cartridge and a sensor readout unit. Modeled on host-pathogen interactions, its membrane-based assay provides highly specific and sensitive detection of pathogens. The hand-held biosensor, based on evanescent excitation, minimizes background interference, greatly reducing the chance of false positives. ROB is battery operated, reagent free, simple to use (a single step) and fast (yields results in less than 15 minutes). Because the assay is contained in an inexpensive disposable cartridge, ROB can detect different pathogens with the quick switch of the cartridge. ROB requires little or no training for users and supplies robust sensitivity and specificity at lower costs than competing technologies.

Applications
- Detecting contamination in global water and food supplies
- Diagnosing infection resulting from biothreat agents or naturally occurring diseases in primary-care settings
- Monitoring the effectiveness of medical treatments
- Helping to track, in real time, the onset and spread of epidemics
- Surveying and identifying production facilities where illicit substances are being made (e.g., bioweapons)

Team members: Karen Grace of Space Instrumentation and System Engineering (NIS-4), Basil Swanson of the Bioscience Division Office (B-DO); the LANL Optical Biosensor Team [Roy Goeller, Mervyn Kellum, Jerome Kolar, Leland Morrison, Amelia Roybal, Gary Richardson, Gary Smith, Martin Sweet and Gary Wiig of NIS-4; W. Kevin Grace, Scott Reed, Andrew Shreve and James Werner of the Albert Michelson Resource (B-4); Daniel Hooks of Materials Dynamics (DX-2); Sabine Lauer of the Wright Langham Resource (B-2); Siegfried Lodwig, Jurgen Schmidt and Clifford Unkefer of the Leo Sziilard Resource (B-3); Jeane Shane (deceased)]; and Xuedong Song, Kimberley Clark, Walter Doherty, Sergio Mendez and Scott Saavedra of the University of Arizona; and John Bradshaw of Artel Inc.

Sonic Separator

The Sonic Separator is a new apparatus that uses sound waves to separate gas mixtures. A pure (single-frequency) tone sent through a gas mixture in a closed tube causes the mixture to separate, with one component of the mixture enriched at one end of the tube and the other enriched at the other end. The Sonic Separator requires only an off-the-shelf signal generator as well as amplifiers and speakers that can be purchased at any electronics outlet. The Sonic Separator is a simple, reliable and small-scale technology appropriate for high-tech industries that cannot use the traditional separation methods of distillation and diffusion. In addition, the Sonic Separator separates even notoriously difficult isotope and isomer mixtures. It operates at ambient temperature and atmospheric pressure and accomplishes gas separation with no release of toxic gases.

Applications
- Separating tritium from hydrogen for fusion energy, a potential source for a global-energy supply
- Supplying stable isotopes specifically for medical MRIs
- Expanding the currently limited supply of carbon-13, nitrogen-17 and oxygen-17 required by hospitals and biological- and medical-research facilities

Team members: Drew Geller of Tritium Science and Engineering (ESA-TSE) and Greg Swift of Condensed Matter and Thermal Physics (MST-10)

Take-Off™

Take-Off, a metabolic plant stimulant, increases plant photosynthesis rates by coordinating a plant's uptake of nitrogen from the soil and its use of carbon-dioxide for growth. As a synthesized version of a naturally occurring plant metabolite (an amino acid), Take-Off accelerates growth — thereby speeding plants to maturity and harvest — and enhances yield without the use of growth hormones. It can be applied as a spray to a plant's leaves or added to water and nutrient solutions to be absorbed by the plant's root system. Both application methods are equally effective. Some of the benefits Take-Off provides, minus the growth hormones that necessitate expensive compliance with Environmental Protection Agency regulations, include multiple crop cycles per acre in each growing season; reduced water and fertilizer requirements through shortened growing time; and a reduction in polluting nitrate runoff from fields through increased nitrogen uptake.

Applications
- Fresh vegetables
- Citrus fruits
- Fresh flowers
- Biomass (plants raised to be burned as fuel or used as quick-growing ground cover in areas damaged by mining or wildfire)

Team members: Pat Unkefer and Rudolfo Martinez of the Leo Sziilard Resource (B-3) and Thomas Knight of the University of Southern Maine

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P.O. Box 1663
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