Los Alamos NATIONAL LABORATORY EST.1943
NewsLetter
Week of December 31 2007 Vol. 8, No. 26

Collaboration yields 'the right glasses' for observing mystery behavior in electrons

Images provide clues to Mott transition in semi- and superconductors

by James E. Rickman

In collaboration with the Center for Integrated Nanotechnologies (CINT) at Los Alamos, an international team of researchers has, for the first time, viewed on a nanoscale the formation of mysterious metallic puddles that facilitate the transition of an electrically insulating material into an electrically conducting one.

The research may lead to a better understanding of superconductors—materials that conduct electricity without energy loss—or development of better materials for powering high-speed electronics.

In a paper published recently in *Science*, Los Alamos researcher Alexander Balatsky joins collaborators in describing a novel approach to viewing Mott transition in vanadium dioxide.

Materials such as copper metal contain electrons that are mobile enough to conduct an electrical current. In conducting materials such as copper or aluminum, electrons do not hinder one another and are free to move about the lattice structure of the material. In more complex crystal oxides, such as vanadium dioxide, electrons can become influenced by nearby positively or negatively charged particles, and their movement can become hindered. These materials are known by physicists as "correlated materials."

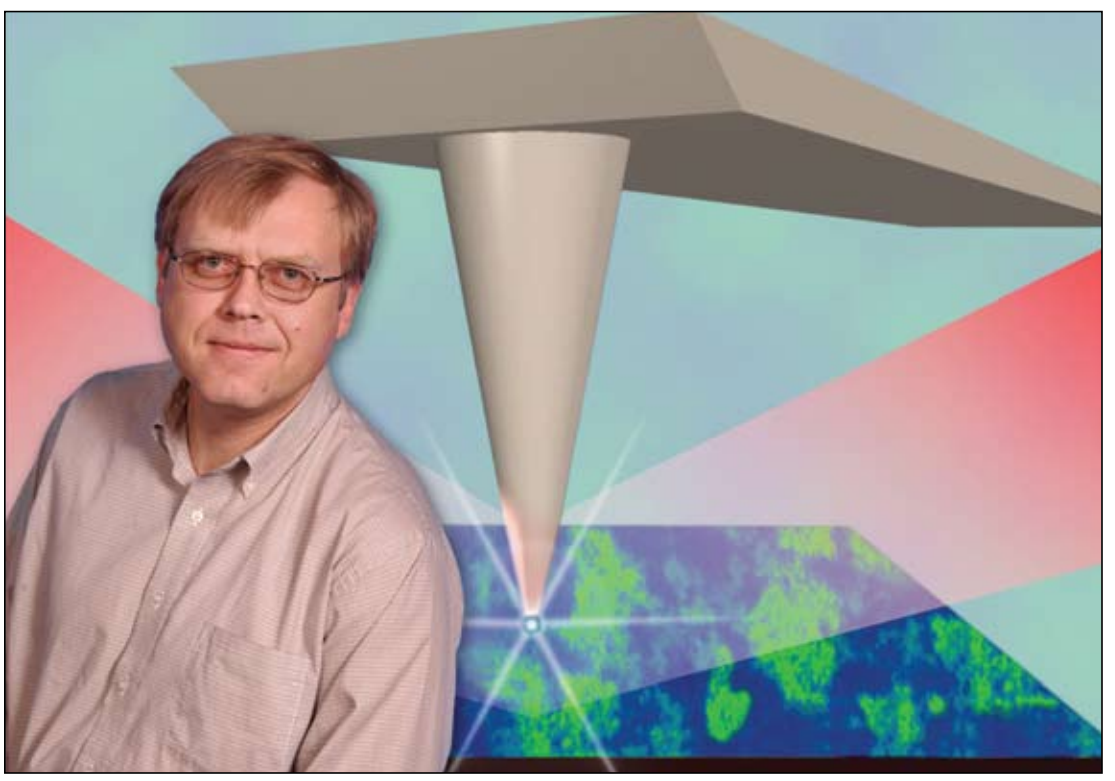
Correlated materials include superconductors or semiconductors—crystals peppered or "doped" with atoms that may donate mobile electrons to the solid. Correlated materials can exhibit extraordinary changes in their physical properties, such as transforming from an insulating material to a conducting material, when subjected to relatively small changes in pressure or temperature.

Vanadium dioxide begins to transform itself from an insulator to a conductor when heated above 341 degrees Kelvin (about 154 degrees Fahrenheit, or 68 degrees Celsius).

For decades scientists have puzzled over how this transformation to a fully metallic state—known as "Mott" metal-insulator transition —occurs. Balatsky, a Los Alamos condensed-matter theorist, believed, like many other scientists, that the transition begins when metallic puddles begin forming at sites of impurities or imperfections within the lattice. The puddles grow until they touch, and at that point, the material becomes conductive or superconductive.

"We had evidence to believe that metallic puddles were forming in an inhomogenous manner within the material at the transition phase, but we had no way of proving it," said Balatsky. "If you had the right glasses that could see something extremely small, you could see this process occurring."

The 'right glasses' came in the form of a microscopic viewing technique known as near-field scanning optical microscopy, which has been used to inspect viruses and nanotransistors. The microscope sees infrared light reflecting off a surface only 20 billionths of a meter (or 20 nanometers) wide. A single virus is less than 20 nanometers wide, while a typical human hair is about 100,000 nanometers wide.



Pictured behind Los Alamos researcher Alexander Balatsky is a stylized rendition of an infrared nanoscope. It illustrates how concentrated infrared illumination finely focuses upon a field just 20 billionths of a meter wide to view metallic puddles in vanadium dioxide as the material begins to transform from an electrically insulating state to an electrically conducting one.

Using this nanoscale viewer, the UCSD-LANL-Max Planck-ETRI team was able to watch metallic puddles form within vanadium oxide at the exact temperature where the Mott transition was expected to occur. These "infrared nanoscope" images have revealed for the first time a new type of metal "phase" existing only during the transition of the material from its insulating state to its conducting state.

The new findings will help researchers worldwide better describe and understand underlying physical laws of how charges propagate through correlated materials.

The research could help materials scientist understand how to precisely dope a material with specific atoms in order to optimize conducting or superconducting behavior or, conversely, to create materials impervious to electrical conductivity or magnetic influences.

"What is extremely exciting about this research is that four different laboratories with complementary disciplines cooperated to use this infrared nanoscope in its first successful application for solving a solid-state physics puzzle," Keilmann said.

Balatsky's co-authors include Mumtaz Qazilbash, Greg Andreev, Brian Maple, and Dimitri Basov of the University of California-San Diego; Markus Brehm and Fritz Keilmann of the Max Planck Institute for Biochemistry and Center for NanoScience in Munich, Germany; and Byung-Gyu Chae, Hyun-Tak Kim, and Sun Jin Yun of IT Convergence and Components Lab, Electronics and Telecommunication Research Institute in Korea.

Los Alamos NewsLetter
P.O. Box 1663
Mail Stop C177
Los Alamos, NM 87545

Pre-sorted Standard
U.S. Postage Paid
Albuquerque, NM
Permit No. 532

LALP-07-001

For Your Safety

Stressed out?

You're not alone. The holidays and the Laboratory's workforce restructuring efforts have added immeasurable stress to the workplace.

"There are real reasons why we may feel stressed. Giving yourself and others some room to breathe and checking in on each other are great places to start," said Theresa Cull, Industrial Safety and Health (IHS) Division leader.

Both emotional and physical disorders are linked to stress, including depression, anxiety, heart attacks, stroke, hypertension, and immune system disturbances that increase susceptibility to infections. In addition, the American Institute for Stress estimates 60 to 80 percent of all accidents on the job are stress related.

Cull recommends telling your supervisor or a co-worker, friend, or family member when you are feeling stressed and taking time to take care of yourself.

"Take a break, take a walk, take time for personal conversations," said Cull, adding that exercise is vital to alleviating stress.

A visit to the Wellness Center can help. Another resource is the Employee Assistance Program, which offers a broad range of mental health support, including stress-counseling services for Lab workers, contract employees, and family members, plus stress-reduction training such as biofeedback.

Because workplace stress is integral to the overall health of workers, the latest Safety Short—Take a Break and Take Care of Stress—shows the importance of taking a break to take care of stress at work.

For more information on stress, see the National Institute for Occupational Safety and Health's blog on workplace stress at *http://www.cdc.gov/niosh/blog/* or the American Institute of Stress Web site at *http://www.stress.org/job.htm*.

Los Alamos NEWSLETTER

The *Los Alamos NewsLetter*, the Laboratory biweekly publication for employees and retirees, is published by the Communications Office in Communications and Government Affairs (CGA). The staff is located at 135 B Central Park Square and can be reached by e-mail at *newsbulletin@lanl.gov*, by fax at 5-3910, by regular Lab mail at Mail Stop C177 or by calling the individual telephone numbers listed below. For change of address, call 7-3565. To adjust the number of copies received, call the mailroom at 7-4166.

Editor:
Jacqueline Paris-Chitanvis, 5-7779

Associate editor:
Steve Sandoval, 5-9206

Production editor:
Denise Bjarke, 7-3565

Graphic designer:
Edwin Vigil, 5-9205

Los Alamos National Laboratory is a multidisciplinary research institution engaged in strategic science on behalf of national security. The Laboratory is operated by a team composed of Bechtel National, the University of California, Babcock & Wilcox Technical Services Group Inc., and Washington Group International for the Department of Energy's National Nuclear Security Administration.

Los Alamos enhances national security by ensuring the safety and reliability of the U.S. nuclear stockpile, developing technologies to reduce threats from weapons of mass destruction, and solving problems related to energy, environment, infrastructure, health and global security concerns.

NNSA National Nuclear Security Administration

Printed on recycled paper. Please recycle.

NNSA announcement of preferred alternative

Editor's note: The following message from Laboratory Director Michael Anastasio refers to the announcement in December by Tom D'Agostino, administrator for the National Nuclear Security Administration, that NNSA proposes to create a nuclear weapons infrastructure that is smaller, safer, more secure, and more cost effective. The proposed plan is described in a draft Supplemental Programmatic Environmental Impact Statement that is scheduled to be issued in January.

National Nuclear Security Administration Administrator Tom D'Agostino announced on December 18, 2007, during a complex-wide presentation that our Laboratory has been chosen as the Department of Energy's preferred alternative site for plutonium research, development, and manufacturing; nuclear weapons design and engineering; and supercomputing. This action is part of a larger effort to transform the nation's nuclear weapons complex into a smaller and more responsive enterprise consistent with the security challenges of the 21st century.

The announcement confirms that Los Alamos is first and foremost a science, technology, and engineering R&D laboratory. The Laboratory is the nation's choice for materials-centric national security science that relies on effective integration of experiments with exceptional theory, modeling, and high-performance computing. Interdisciplinary excellence in theory, modeling, and simulation with experimental science and nuclear science continue to provide the Laboratory with innovative and responsive solutions to broad national security challenges through the agile, rapid application of key science and technology strengths.

The Laboratory's capabilities in the areas of weapons design, plutonium research, and research supercomputing as identified in the preferred alternative also support a broader set of national security challenges. As the preferred site, the Laboratory would continue its ability to respond quickly to emerging threats and support a broad spectrum of mission objectives in stockpile stewardship, nuclear energy research, nuclear forensics, nuclear safeguards, and counterterrorism. Large-scale modeling and simulations in conjunction with broad experimental science capability allow the Laboratory to address challenges such as bio-threats, energy security, and infrastructure security. At the same time, world-class nuclear facilities enable waste minimization and environmental cleanup.

This announcement presents an exciting opportunity for the Laboratory and supports our efforts to create opportunities and grow programs to continue to bring our outstanding science technology and e ngineering to bear on grand problems facing the country and world.

For more information, go to *http://www.lanl.gov/news/factsheets/complex_trans.shtml* online.

Generosity on display

Lab's Holiday Drive a major success

Top photo: Paula Kupay, left, of Cost, Schedule, and Estimating tries out one of the donated bicycles at the Los Alamos Neutron Science Center Division Office. For the 10th year, LANSCE sponsored its 100 Special Children program to purchase gifts for 107 children throughout Northern New Mexico. Also shown are Lisa Padilla, center, of the LANSCE User, Communication, and Training Office and Ginger Grant, right, of the LANSCE Division Office.

Left: Volunteers from Materials Management help load gifts onto a truck for delivery to partner agencies in Española at the Holiday Drive open house at the Community Programs Office. "It's been a record year. It amazes me that in this time of budget uncertainty we see all this generosity and giving from employees and contractors at the Laboratory," said Tim Martinez of Community Programs. *Photos by Dixon Wolf and Sandra Valdez, Records Management, Media Services, and Operations*

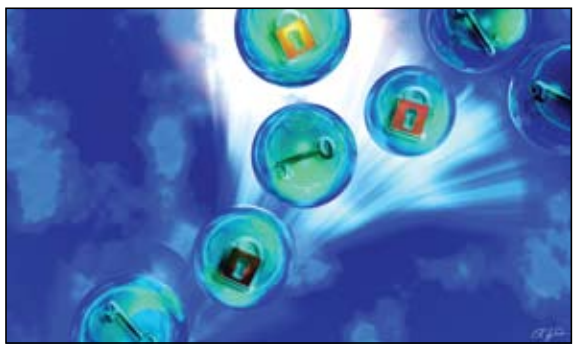
2007: Year in review

The year 2007 was both challenging and rewarding for the Laboratory. We reveled in some outstanding technical achievements and scientific breakthroughs, took pride in honors bestowed on coworkers and colleagues, welcomed distinguished visitors, celebrated milestones, endured budgetary uncertainties, and took unprecedented steps to position the Lab for the future.

The vast majority of employees ended the year much as they began it, dedicated to doing the best job possible on behalf of our nation. Some also ended the year by taking the voluntary separation package and moving toward a new chapter in their lives. Others welcomed the news that the Laboratory was chosen as the Department of Energy's preferred alternative site for plutonium research, development, and manufacturing; nuclear weapons design and engineering, and supercomputing.

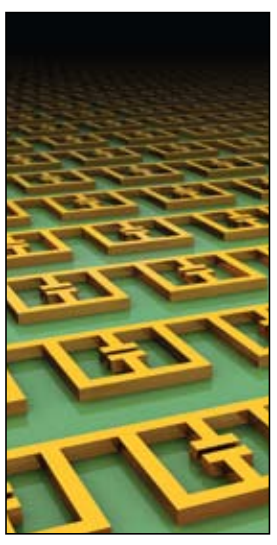
With a new year before us that no doubt will be filled with its share of challenges and accomplishments, it is important to recall some of the best moments of the year that was. The following is a summary of some of the Lab's technical and scientific accomplishments, awards, visitors, and events during 2007.

Technical/programmatic accomplishments



Laboratory scientists announce quantum cryptography advance

Scientists at Los Alamos and the National Institute of Standards and Technology in Boulder have demonstrated unconditionally secure quantum key distribution over a record-setting 107 kilometers of optical fiber. The work is a significant step towards enabling communication with an unprecedented level of security over long distances of optical fiber. In research published in *Physical Review Letters*, a team of scientists describes how they have implemented a decoy-state protocol that enables the creation of secure keys that are immune to certain kinds of interceptions and attacks.



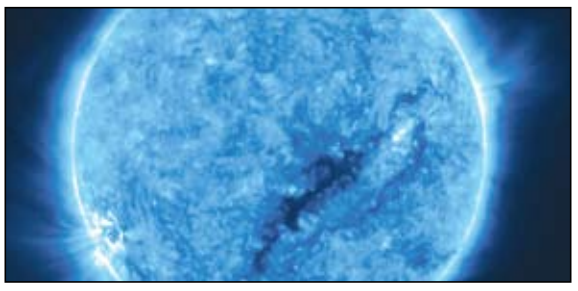
Bridging the terahertz gap

Tucked in along the electromagnetic spectrum between the lower frequency microwaves and the higher frequency infrared light is the region of terahertz radiation. Like microwaves, terahertz radiation has the ability to penetrate a wide variety of materials, including paper, cardboard, plastics, wood, and ceramics. Unlike X-rays and other higher frequency forms of radiation, terahertz radiation is nonionizing, which allows it to offer far greater potential for wider use around human populations for such things as imaging and communications. But being the wily wavelength that it is, terahertz radiation has proven difficult to control. Los Alamos researchers along with their colleagues from Boston College, Boston University, and the University of California, Santa Barbara, developed a device that can be used to efficiently control terahertz waves. The device could be the basis for a range of novel electronics and photonics applications ranging from new imaging methods to advanced communication technologies.

Laboratory researcher Doug ReVelle of Atmospheric, Climate, and Environmental Dynamics checks one of the infrasonic microphones in the woods near the Wellness Center.

Studying the sights and sounds of bolides

Los Alamos atmospheric scientist Doug ReVelle has been waiting a long time to capture both visual and audio scientific evidence of a bolide—a meteor exploding in Earth's atmosphere. Good things come to those who wait, and ReVelle's waiting came to an end after a two-year long analysis of data from ground-based photographic camera stations. The stations are being operated as a part of the European Fireball Network in Freyung, Germany, which provided important images of a very high-altitude meteor falling during the Leonid meteor shower that was definitively correlated with the ground-based infrasound arrival.



Solar wind slowed by helium, researchers suggest

Like a sea-anchor slacking the pace of a wind-driven ship, helium may be the drag that slows the solar wind in its million-mile-per-hour rush across the cosmos. And the biggest near-Earth disturbances caused by solar wind stem from solar flares that throw off massive amounts of helium. Those are the principal findings of researchers analyzing a decade's worth of data collected by the Solar Wind Experiment, onboard the NASA spacecraft Wind.

Lab launches new science magazine

A new science magazine hit desks from Washington, D.C., to Oakland, California, carrying with it the message that science at Los Alamos National Laboratory is better than ever. Dubbed *1663*, the new publication is named after the Laboratory's famous Post Office box address from the Manhattan Project era.

DARHT ushers in new era

The Dual Axis Radiographic Hydrotest facility successfully fired a first ever fully-contained, high-explosive experiment inside a steel containment vessel earlier this year. The test marks the beginning of an era of fully-contained tests at DARHT as virtually all future testing at the facility will be conducted inside huge steel vessels, eliminating nearly all environmental hazards.

New tool aids in understanding Moon's geology

Using a novel approach to data analysis, a sharper pair of "software glasses," scientists at the Laboratory are taking a closer look at spectroscopic Moon images to better understand how that body was formed. By perfecting their view of a naturally occurring radioactive element, thorium, Moon researchers now can distinguish details of lunar features that were just "blobs" in the earlier imagery.

Los Alamos builds first certified nuclear trigger in 20 years

In June, the Laboratory made good on a promise from the early 1990s: deliver to the nation's nuclear weapons deterrent a new, certified pit—alternatively called a primary or nuclear trigger—for the W88 warhead. Designed by Los Alamos, it is the most highly optimized weapon in the U.S. stockpile for yield-to-weight ratio, meaning it can unleash an unbelievable amount of energy from a very small package.

continued on Page 4

2007: Year in review ...

continued from Page 3

A test flight of the mini-helicopter with its payload in Bernalillo.

Lab technology may assist in structural analyses

When disasters like the bridge collapse in Minnesota occur, elected officials and the general public alike are often left wondering what can be done to avert such tragedies in the future. Los Alamos Engineering Institute staff are working on a technology using RFID (Radio Frequency Identification)-based sensing, in-situ data analysis, and model-based reasoning for the rapid, economical, and reliable assessment of changes and damage in large concrete and steel structures such as bridges.

Scientists model hepatitis C virus

One of the most common life-threatening viral infections in the United States today is hepatitis C virus. The standard treatment is successful in only about 50 percent of treated HCV chronic patients, with no effective alternative treatment for those who fail to clear the virus. Laboratory scientists, in collaboration with researchers from the Center for HCV Research at Rockefeller University, recently developed the first mathematical model of intracellular HCV replication.

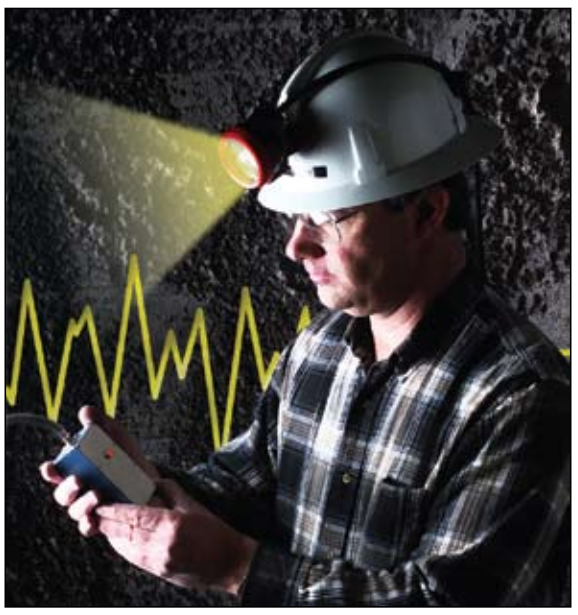
Understanding killer electrons in space

Settling a long-standing scientific debate, Laboratory scientists have demonstrated conclusively how electromagnetic waves accelerate ordinary electrons in the belts of radiation outside Earth's atmosphere to a state where they become "killer electrons," particles that are hazardous to satellites, spacecraft, and astronauts.

Using data from several satellites, Los Alamos scientists published a paper in the July issue of *Nature Physics* showing how interactions between electromagnetic waves and electrons are responsible for accelerating radiation-belt particles in the Van Allen radiation belts to the point they become "killers."

Cancer treatment gets software boost

Nearly a million cancer patients will undergo radiation therapy this year. And now thanks to a new software application, Acuros®, based on the Laboratory-developed Attila® radiation-modeling software, physicians will be able to focus their beams more precisely on specific tumor sites. Acuros has been released by Transpire Inc. (*http://www.transpireinc.com*), a Los Alamos spinoff company and exclusive licensee of the Attila software.

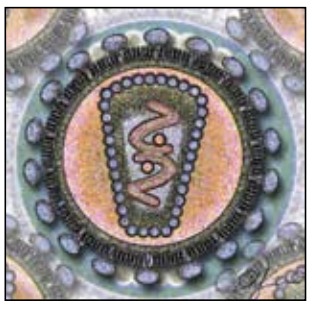


Test of Through-The-Earth Communication System™ exceeds expectations

Rigorous testing at the Lake Lynn Experimental Mine in July proved the viability of Vital Alert Technologies' system for emergency warning, evacuation, and rescue communications. Developed by the Laboratory, the Through-The-Earth Communication System™ proved capable of sending two-way, very-low-frequency voice signals from the surface of the mine to depths exceeding 300 feet at the experimental mine operated by the National Institute for Occupational Safety and Health.

Meet MaRIE

Laboratory Director Michael Anastasio and Principal Associate Director for Science, Technology, and Engineering Terry Wallace introduced Laboratory employees to MaRIE. MaRIE, an acronym for "Matter-Radiation Interactions in Extremes" and an allusion to Madam Marie Curie, would coalesce Laboratory capabilities and opportunities into a potential new Signature Science Facility. Key criteria for selecting a particular signature experimental facility for the Laboratory was its ability to support the investigation of a broad range of scientific questions relevant to the Laboratory's core mission, yet be flexible enough to accommodate future scientific needs.



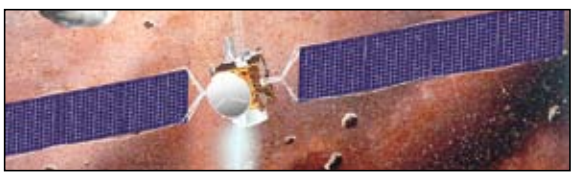
Immunodeficiency virus more prolific than previously thought

A mathematical model developed at the Laboratory has helped an international research team understand for the first time the number of offspring produced by a single Simian Immunodeficiency Virus (SIV), the first-cousin of the virus that causes AIDS in humans. The research indicates the immunodeficiency virus produces ten to a hundred times more progeny than previously believed. The research—by Los Alamos researcher Alan Perelson and colleagues from Aaron Diamond AIDS Research Center, the National Institutes of Health and the Chinese Academy of Medical Sciences—appears in a paper published this week in the *Proceedings of the National Academy of Sciences*.

James Sims of Applied Engineering Technology-1 loads a sample "3-1-1" baggie into the ultra-low-field magnetic resonance system.

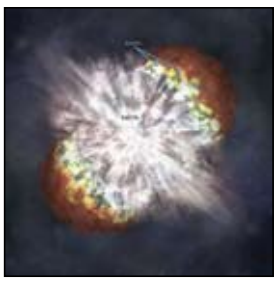
Homeland Security testing Laboratory baggage-screening technology

The Department of Homeland Security is testing a Los Alamos concept, a new airport baggage screening technology to differentiate between different types of liquids, gels, and lotions—everything you want to carry on the plane, but no longer can. Based on Physics (P) Division research into ultra-low-field Magnetic Resonance Imaging (MRI), the new MRI-SCREEN technology (formerly referred to as "SENSIT") can tell the difference between some 50 kinds of fluid-type products.



Dawn space mission is a go

NASA's Dawn mission launched early September 27 from Cape Canaveral, Florida. Dawn is carrying a Laboratory-built gamma ray and neutron detector instrument, GRaND. It is one of three science payload instruments on Dawn, which also includes a visual and infrared spectrometer and a framing camera, the mission's scientific imaging system. GRaND will measure the elemental composition of the asteroids' surfaces. The Dawn spacecraft is an 8-year, 3.2-billion-mile odyssey into the heart of the asteroid belt.



A one-two punch that makes you see stars

A Laboratory astrophysicist and his colleagues have discovered that a superbright supernova observed last year might have exhibited an unusual one-two punch. The discovery, published in the journal *Nature*, provides a new model for the behavior of the universe's largest and rarest exploding stars.

Los Alamos scientists at forefront of atmospheric research

From the tropical islands of the Western Pacific to the lush forests of Southwest Germany, the Laboratory is taking global climate research by storm as an integral player in the Department of Energy's Atmospheric Radiation Measurement Program. Building on the Laboratory's successful 10-year involvement in ARM's Tropical Western Pacific research, several Los Alamos engineers and technicians accompanied other ARM researchers to the Black Forest region of Germany for a nine-month deployment to study rainfall resulting from atmospheric uplift (convection) in mountainous terrain.

Operations

New access requirements begin

New access requirements went into effect January 8 when the Security Perimeter began full operation in and around Technical Area 3. Laboratory employees and other motorists now have to drive through Vehicle Access Portals, located at East Jemez Road (near the southeast corner of Diamond Drive and Jemez Road) and West Jemez Road (at the Camp May Road intersection).

Drilling helps Lab determine path forward

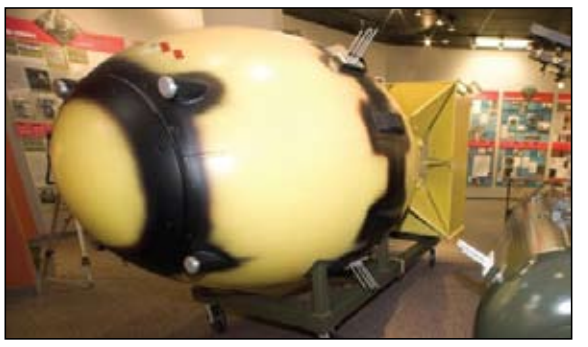
Subcontractors to the Environmental Programs (EP) Directorate take environmental samples during drilling between historic waste disposal pits at Material Disposal Area-C, located north of Pajarito Road near Technical Area 50. The drilling crews are wearing personal protective equipment with air supplied through lines (visible in the foreground) to protect themselves from possible exposure to contaminants buried at the site. MDA-C intermittently operated as the Laboratory's second waste disposal area from 1947 to 1974 and received radioactive and chemical wastes.

Upgrades completed at liquid waste treatment facility

Improvements to the Laboratory's Radioactive Liquid Waste Treatment Facility at Technical Area 50 clear the way for high-level radioactive liquid waste to be accepted. Improvements to the plant include maintenance of treatment equipment in Room 60, replacement of a 2,500-gallon caustic waste holding tank, replacement of a failing retaining wall, and installation and switch over to new underground waste lines.

New road closure process improves safety, brings cost savings to Lab

Beginning in May, drivers along the Pajarito Corridor saw road closures virtually disappear for the movement of hazardous material. A new process involves using convoys with enhanced safety features to transport hazardous material on roads that once would have required a full road closure.



A new Fat Man comes to the Bradbury

The newest model of the historic Fat Man bomb sits at the Bradbury Science Museum ready for setup and display. Fat Man is one of two nuclear weapons that were developed during the top secret Manhattan Project in Los Alamos.

New Super VTR open for business

Capitalizing on the digital revolution, the Laboratory recently opened a prototype Super Vault Type Room following certification of the facility for classified operations by the National Nuclear Security Administration. It's the first such security facility in the NNSA complex. The S-VTR turns the dynamic challenges of information technology into a solution for security.

Fading into the sunset

The Administration Building (SM-43), which for many years served as the anchor facility at Technical Area 3, is being prepared for eventual demolition, as most of the 51-year-old, four-story building closed in August. The building was first occupied in early 1956 and was home to about 1,000 people through most of its lifetime.

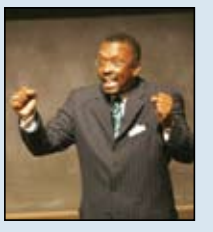
Laboratory dedicates National Security Education Center

Recognizing that the whole can be greater than the sum of its parts, the Laboratory's five Institutes—the Engineering Institute, Materials Design Institute, Institute for Multiscale Materials Studies, Information Science and Technology Institute, and Institute for Advanced Studies—were united into the National Security Education Center.

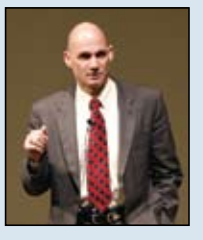
Facility upgrades will aid shipment of 'hotter' waste to WIPP

The Laboratory has completed much anticipated upgrades to its transuranic waste repackaging facility. The upgrades will facilitate shipment of nearly 30 percent of the radioactivity from transuranic waste held in storage at the Laboratory to the Waste Isolation Pilot Plant near Carlsbad for permanent disposal.

Visitors



Motivational speaker Derius Swinton addresses the Laboratory in January during a Martin Luther King Jr. Commemoration.



Thomas D'Agostino, administrator of the National Nuclear Security Administration, talks about his plans for managing NNSA.

Robert Goldston of Princeton explains how the United States can move into a leadership position on fusion research.

U.S. Senator Jeff Bingaman discusses Perspectives on Science and National Security from Washington, D.C., at the National Security Sciences Building Auditorium.

Bob Lawrence, a Tuskegee Airman, shares his experience when he fought for the United States during World War II as part of the first all-black fighter squadron. Lawrence passed away in November.

William Ostendorff, left, then acting administrator of the National Nuclear Security Administration, listens to Laboratory Director Michael Anastasio elaborate on some information about the Laboratory.

Laboratory Director Michael Anastasio and United States Rep. Heather Wilson chat during a briefing.

Anthony Mezzacappa of Oak Ridge National Laboratory talks about astrophysical modeling at a Director's Colloquium.

continued on Page 6

2007: Year in review ...

Visitors ...

continued from Page 5

U.S. Senator Pete Domenici talks to employees in the PF-1 Auditorium at Technical Area 55. Domenici was at Los Alamos as part of a day-long W88 pit delivery celebration.

Baldev Raj of the Indira Gandhi Centre for Atomic Research, Department of Atomic Energy in India, speaks to Laboratory employees about India's Fast Reactor program.

U.S. Sen. Bill Nelson, D-Florida, left, visits Los Alamos for a series of classified briefings on Laboratory programs. He also toured several Laboratory facilities.

Pulitzer Prize winning author Richard Rhodes talks about the history of nuclear arms control at a Director's Colloquium.

Lt. Governor Diane Denish listens to a presentation on climate modeling at University House.

History Channel producer Andy Papadopoulos, right, and cameraman Chris Laine interview Laboratory astrophysicist Chris Fryer of Computational Physics and Methods (CCS-2) for a documentary on supernovae for the History Channel program "Universe."

Robert Smolen, left, deputy administrator for defense programs with the National Nuclear Security Administration, greets Deputy Laboratory Director Jan Van Prooyen.

General Kevin Chilton, right, commander of the United States Strategic Command, attended briefings on Lab programs and toured several facilities.

Awards

NSSB Phase I project team receives DOE award

The Laboratory's National Security Sciences Building Phase I project team received the Secretary's Award of Achievement from the Department of Energy. The annual award is given to individuals or teams who have demonstrated "significant" results in completing a project within cost and schedule.

Park, Somma receive Postdoctoral Distinguished Performance Award

Tuson Park, left, of Condensed Matter and Thermal Physics (MPA-10) and Rolando Somma of Biological and Quantum Physics (P-21) and Complex Systems (T-13) are recipients of the annual Postdoctoral Distinguished Performance Awards. The Postdoctoral Distinguished Performance Awards recognize outstanding and unique contributions by Lab postdocs that result in a positive and significant impact on the Laboratory's programmatic scientific efforts and status in the scientific community.

Park also was named the 2007 Outstanding Young Researcher by the Association of Korean Physicists in America.

Two Los Alamos scientists receive E.O. Lawrence Award

Laboratory scientists Malcolm J. Andrews, left, and My Hang V. Huynh are recipients of the Department of Energy's E.O. Lawrence Award. "These brilliant scientists and their varied and important research inspire us," DOE Secretary Samuel Bodman said.

Los Alamos wins two Wall Street Journal Technology Innovation awards

Two technologies developed at the Laboratory in the areas of energy and semiconductor research are among the winners of the 2007 *Wall Street Journal* Technology Innovation awards. In the energy category, the winner is a team led by Gregory Swift of Condensed Matter and Thermal Physics (MPA-10) that has developed a method to liquefy natural gas through a thermoacoustic process that cools the gas with sound waves. In the semiconductor category, Kris Kwiatkowski of Neutron Science and Technology (P-23) won for developing a superfast camera on a chip, able to capture images of very fast events, like an explosive shock wave.

Four named 2007 Laboratory Fellows

From left to right, Laboratory scientists Jas Mercer-Smith, Harvey Rose, Roman Movshovich, and Richard Sheffield are the 2007 Laboratory Fellows, as selected by Director Michael Anastasio. The Fellows designation is the Lab's highest honor and is bestowed on selected technical staff members.

Los Alamos scientist named MacArthur Fellow

Laboratory scientist My Hang Huynh is one of 24 recipients of a 2007 MacArthur Fellow award from the John D. and Catherine T. MacArthur Foundation. MacArthur Fellowships offers the opportunity for Fellows to accelerate their current activities or take their work in new directions. MacArthur Fellows also receive a $500,000 grant over five years from the foundation.

Laboratory technologies capture R&D 100 awards

Los Alamos researchers win two of *R&D Magazine's* prestigious 2007 R&D 100 Awards. The award-winning Laboratory projects this year include the Camera on a Chip and the Portable Acoustic Cytometer. These latest winners bring the Laboratory's total to 105 awards since the Laboratory began entering innovations in the competition in 1978.

2006 Distinguished Performance Award winners selected

Seven individuals, four small teams, and six large teams are recipients of 2006 Distinguished Performance Awards. The annual awards recognizes individuals, small and large teams for job performance above and beyond what is normally expected.

Bashyam is 2007 Postdoctoral Publication Prize winner

Rajesh Bashyam of Sensors and Electrochemical Devices (MPA-11) receives the 2007 the Postdoctoral Publication Prize in Experimental Sciences.

2007 Laboratory Fellows Prize winners selected

Tom Vestrand, Scott Crooker, Dan Thoma, Juan Fernandez, and Jeff Bedell are the 2007 Laboratory Fellows Prize recipients. "These individuals embody the excellence in scientific research and leadership essential to the Laboratory's success; their contributions are indispensable to accomplishing our mission," Laboratory Director Michael Anastasio said.

Outreach

Laboratory business symposium a success

More than 200 vendors and suppliers from around the region and as far away as Virginia and Georgia attend the Laboratory's business symposium. The symposium brought together business owners, procurement management and staff, and technical end users from the Laboratory to learn more about the goods and services needs of the Laboratory.

Expanding Your Horizons introduces local girls to math and science

More than 100 girls from throughout Northern New Mexico participate in the 29th annual Expanding Your Horizons conference at University of New Mexico, Los Alamos. Expanding Your Horizons introduces eighth to tenth grade girls to a variety of different careers in math and science and provides female role models to the girls.

Laboratory assists in awareness walk

Youths carry this "Northern New Mexico Youth Against Drugs" banner 14 miles from Ohkay Owingeh Pueblo Church to the Santuario de Chimayo Church during the fifth annual Youth Against Drugs Walk. More than 500 residents, including Lab employees and their children participated in the walk.

Los Alamos scientists take genome science to the streets

Local middle-school and high-school students learn about genome sequencing through hands-on activities sponsored by the Laboratory's Joint Genome Institute outreach team.

Math and Science Academy graduates third class

Twelve teachers make up the third Math and Science Academy graduating class. The MSA program was developed to address the complex and challenging issues of teaching and learning. The program consists of intensive training during a three-week summer institute, site-based meetings after school every other week, cognitive coaching four to five times a year, development of individual reflective portfolios, and online discussions with the whole MSA community every other week.

HAZMAT Challenge

A participant in the Laboratory's HAZMAT Challenge is on top of an overturned tanker drilling an opening to transfer liquids into a secure container. Participating teams practice technical skills and learn new HAZMAT techniques under realistic conditions in a safe environment and have a chance to network with other hazardous materials professionals.

Liftoff for student built rockets

Tomas Teel, 9, left, gets some assistance with a parachute from Tom Beach, professor at University of New Mexico, Los Alamos, during a rocket building workshop at the Bradbury Science Museum. The workshops are part of the museum's Summer Adventures in Science program.

Fall Festival has something for everyone

Joseph Sarrao sees a reflection of himself at the Science on Wheels van during the Laboratory's Fall Festival at Sullivan Field. More than 5,500 Laboratory employees, their family members, and guests registered for the event, which included food, music, and games for kids.

High-Tech Halloween

A masked trick-or-treater stops for a look at the Bradbury Science Museum's resident bone expert, while making his way around the museum during High-Tech Halloween. High-Tech Halloween is held in conjunction with Los Alamos's Trick or Treat on MainStreet activities.

Record $1.7 million raised for local United Way programs

Laboratory employees and their employer once again demonstrated deep concern for their communities and those in need by contributing a record $1.7 million to United Way programs in Northern New Mexico and Santa Fe.

Q: The Laboratory has won 105 R&D 100 Awards since 1978. How important is it for the Laboratory to continue entering the competition—which honors significant commercial promise in products, materials, or processes developed by the research and development community worldwide—and winning awards?

Joseph Romero of Government Affairs (CGA-GA)

It is very important. The R&D 100 Awards show how the Lab continues to be a leader in our growing technological world. They also continue to improve the view that others have of the Laboratory.

John Bass of Records Managment/Media Services and Operations

The R&D 100 Awards are an indication of the value and quality of science done at Los Alamos. If we are to maintain scientific research here, we need to show and ensure that others see what we are capable of.

Robert Wilson of Space Science and Applications (ISR-1)

It is good for public relations to win awards. It is important also to win awards that congress recognizes and awards that can get us funding opportunities.

Kevin Sanbonmatsu of Theoretical Biology and Biophysics (T-10)

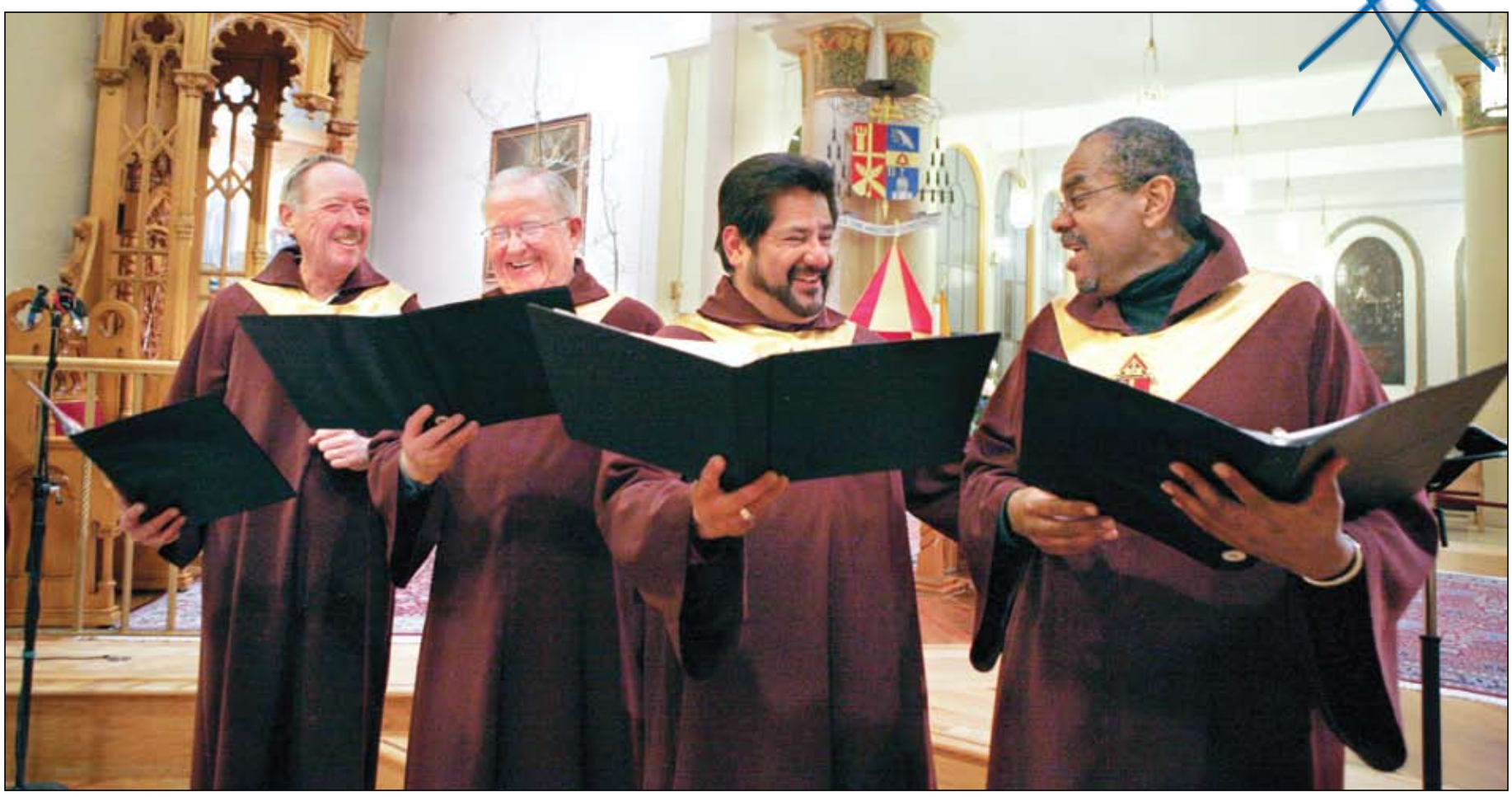
I believe the R&D 100 program is an excellent opportunity for tech transfer and encourages Laboratory researchers to patent their research. I know of several cases in which this competition has inspired ingenuity and outreach to other institutions. It also encourages students to pursue their projects when they go home to their universities.

Russell Olson of Hydrodynamics and X-ray Physics (P-22)

I think it is important that the Laboratory continues to participate because it is one of the ways the Lab can showcase the research and development activities that we are involved in, and it is a way to introduce them to the public.

Doug Beason of Threat Reduction (ADTR)

I think it is vitally important that we enter on several levels. Internally because we get the word out to our colleagues about our world-class work and externally because it validates the work we are doing and recognizes, to the larger scientific community, our people and the importance of the work they do. [The recognition] also serves as a magnet for attracting new talent.



From left to right, Laboratory retirees Steve Newfield and Patrick Dolin, Robert Gonzales of Plans and Programs, and Jeff Toliver of Workforce Data Analysis. *Photo by LeRoy N. Sanchez, Records Management, Media Services, and Operations*

Basking in the glow of Carnegie Hall

by Steve Sandoval

"This was the dream of a lifetime, a dream come true." That's how Robert Gonzales of Plans and Programs (SEC-PPS1) described singing recently at the world-famous Carnegie Hall.

Gonzales is a cantor with the St. Francis Cathedral Church choir in Santa Fe. Gonzales and several other members of the choir joined some 160 singers from around the country to perform *Handel's Messiah* on Thanksgiving weekend.

Composer and director John Rutter led the performance, conducting the choir and the New England Symphonic Ensemble.

The local contingent—about 40 strong—left Santa Fe Thanksgiving morning, dined together that evening at their hotel, rehearsed with the other invited choirs, and had a dress rehearsal with the New England Symphony Orchestra the morning of the performance. They performed that afternoon at the venerable hall that has hosted performances ranging from Pavarotti to Sinatra.

Laboratory employees Jeff Toliver of Workforce Data Analysis (HR-WDA), Peter Gary of Space Science and Applications (ISR-1), and retirees Patrick Dolin and Steve Newfield also are part of the St. Francis Cathedral choir, though only Gonzales, Dolin and Newfield traveled to New York.

When he walked into Carnegie Hall, Gonzales remembered being awestruck. "I was humbled at the same time. I realized how many great performers have been there. And then all of a sudden, you're walking backstage. You're just standing there wondering, 'who am I, what am I doing here?' You pinch yourself and ask if you're dreaming."

But Gonzales and all the other first-timers to Carnegie Hall had to quickly shake off their sense of wonderment and focus on the performance. "This is your shot at performing at Carnegie. Who knows if the next time will come around. You want to give the best performance you can," said Gonzales.

"From day one when we first got together with the different choirs, we had some extremely difficult rehearsals," Gonzales recalled. "But with Maestro Rutter working with us … to see him literally come to tears and to see the audience give us a standing ovation, I was on cloud nine. I was at an all-time high."

'I was on cloud nine. I was at an all-time high.'

On the classic piece the choirs performed at Carnegie Hall Gonzales said, "There are portions of *Handel's Messiah* that I can sing without having to refer to the music. They were committed to memory."

The cathedral's choir director, Carmen Florez-Mansi, also accompanied members of the cathedral choirs to New York as a performer from the cathedral's choir. It was Florez-Mansi who was contacted more than a year ago about the opportunity to perform at Carnegie Hall. The combined cathedral choirs began practicing last summer, Gonzales noted.

"What is so wonderful about Carmen is she builds her choirs as she builds a family. She doesn't just see you as a voice or the talent you bring. It's very spiritually motivated," said Gonzales.

"We're not just singing words. They are words that have profound meaning to us."

Gonzales started singing in grade school, sang in the choir at New Mexico Highlands University, and off-and-on with the cathedral choir. He also sings tenor.

The 23-year Lab employee said that music has helped him in his work as a security specialist. It also gives him an outlet for dealing with the stresses that come with his job. "Music is a way to release energy and comfort the body and soul. It was my escape. And it still is," he said.

"If I've had a real down day, a real tough day, I can get into my singing, and by the time we end rehearsals, all the things thrown at me are totally gone," said Gonzales.

Toliver, who came to the Lab in 2005, couldn't travel to Carnegie Hall but rehearsed with the combined choirs and said he felt the excitement. "It seemed like the fruition of a lot of work we've done," he said. "For them to be invited to this … It showed how much the choir has grown musically and spiritually.

"It was just a really powerful experience."

Like Gonzales, Toliver, who sings bass and tenor and occasionally accompanies the choir on piano and organ, said music has helped him in his job as a data analyst. "It's helped me look for relationships and patterns in the data. In terms of music, you have patterns and ideas you have to communicate," he said.

Added Gonzales, "Each day that I am singing at the cathedral, I ask that I touch someone's heart or spirit by raising my voice in song."