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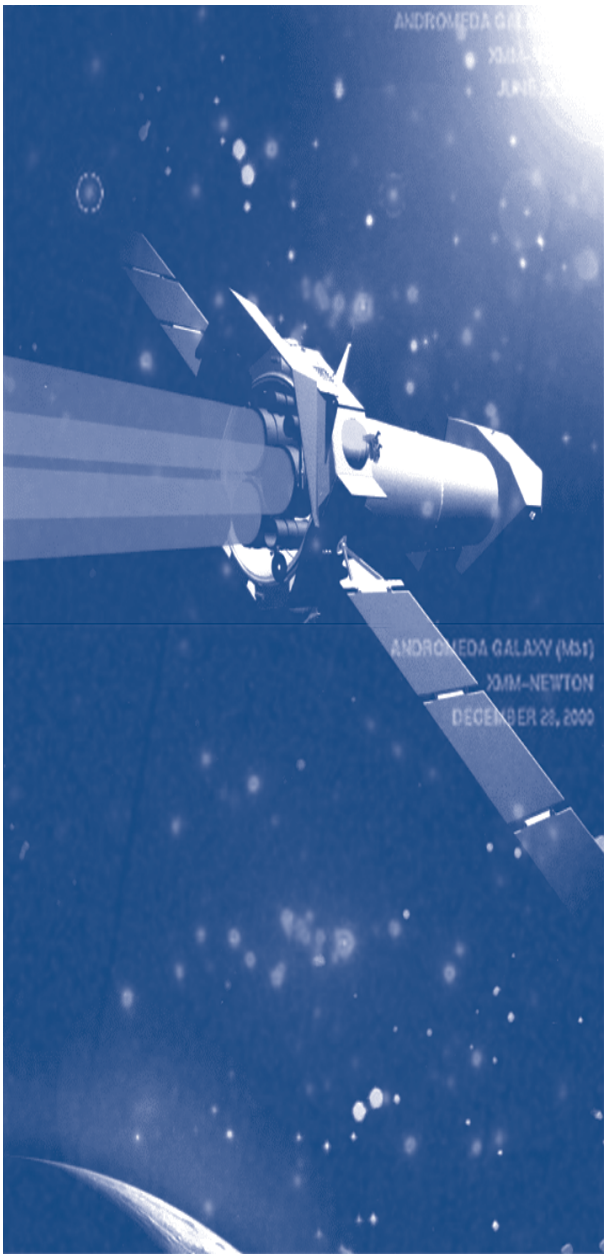
XMM-Newton makes unusual discoveries in Andromeda Galaxy



by Nancy Ambrosiano

In its first look at the Andromeda Galaxy, known as M31, the X-ray Multi-Mirror satellite observatory has revealed several unusual X-ray sources. In examining new satellite data, an international team of scientists, including researchers at the Laboratory, discovered an unusually bright spot created by an enormous X-ray nova outburst. Another mysterious object has been found as well: one of the "coolest" sources of the central region appears to be a luminous white dwarf with an extremely soft energy spectrum and the shortest X-ray pulsation period seen to date.

The report on these and other results was presented last month by Sergey Trudolyubov of Space and Remote Sensing Sciences (NIS-2) at the 198th American Astronomical Society Meeting in California.

The Andromeda Galaxy, the closest spiral galaxy to our own (2.6 million light years away), is a unique object for the study of X-ray astronomy. M31 is in many respects similar to the Milky Way and even called its "twin sister." The Andromeda Galaxy hosts hundreds of X-ray sources, which are observed at a nearly uniform distance, because of the favorable orientation of the M31, they are less obscured by interstellar gas and dust than those in the our galaxy.

"Because the solar system is situated in the galactic disk, we have a somewhat distorted view of our own galaxy, like that of a fly sitting on the elephant's ear," explained Konstantin Borozdin, also of NIS-2. "But we are in a good position to study the Andromeda Galaxy, which is very much like our own Milky Way."

XMM-Newton, the most powerful X-ray observatory ever placed in orbit, observed the central region of M31 in June and December 2000 during the performance verification phase of the mission. The international team of researchers detected more than a hundred discrete point X-ray sources, some of them previously unknown. Most of the detected sources were identified with X-ray binaries, accreting systems containing either a white dwarf, a neutron star or a black hole, fed by gas flow coming from a companion star.

One of the new sources, X-ray nova XMMU J004234.1+411808, was extremely bright in June but was not detected at all half a year later. In a previous 30 years, only two dozen similar outbursts have

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Director's News

I recently established a 45-day, special task force to review the Nuclear Weapons Directorate. This directorate represents more than 70 percent of Los Alamos' budget and impacts nearly every part of the Laboratory.

This "Director's Special Task Force" is headed by Hans Ruppel and will review the pros and cons of the present organization and the existing processes on planning, budgeting and executing the stockpile stewardship program. (See the June 1 Online Newsbulletin at *http://www.lanl.gov/newsbulletin*). The task force has asked the work force, through an online venue (*http://int.lanl.gov/taskforce/director/*), for help in developing solutions by soliciting comments and suggestions.

Topics of particular emphasis are

- leadership
- external relationships: improving the way we work with National Nuclear Security Administration and other laboratories
- organizational structure
- program/line interactions
- risk management: the balance between process and product

The task force is also open to suggestions on other categories for discussion.

The task force will issue its preliminary report and make recommendations to the Senior Executive Team July 16.

XMM-Newton …

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been detected in our galaxy. Scientists still argue on the physical origin of these events. However, it is recognized that they are usually caused by the sudden release of a huge amount of emitting matter spiraling into a black hole.

The observations of X-ray novae provide unique information on the processes in the immediate vicinity of the compact objects, which is why each outburst attracts a great deal of interest. Novae are bright not only in X-rays, but also in other parts of the spectrum. Thus, the simultaneous observations in the X-ray, optical and UV bands are of special importance to understanding of the structure of these objects.

Realizing the importance of the coordinated observations of the X-ray novae with different instruments, the XMM-Newton group at the Laboratory and the Chandra team at the Harvard-Smithsonian Center for Astrophysics have agreed to inform each other immediately of new sources within M31. In addition, another valuable space observatory resource, the Hubble Space Telescope, will follow up the nova imagery in a visible light and UV band.

The unprecedented sensitivity of XMM-Newton allowed a detailed study of spectral and temporal properties of several dozen X-ray objects. As a result, several main classes of sources were found. "This is the first time we are really able to study the individual properties of the binary systems in M31 millions of light years away and compare them with that of our own galaxy," said Trudolyubov.

One class includes relatively bright objects with extremely soft energy spectra, implying the temperature of accreting gas lower than 1 million degrees Kelvin, ten or even a hundred times lower than in the other sources detected in M31. It is likely that most of the emission of such "cool" sources is created by steady thermonuclear burning of enormous amounts of matter falling onto the surface of a white dwarf. Most exciting is that one of these sources, first detected by XMM-Newton, demonstrates X-ray pulsations with a period of nearly 900 seconds, the shortest ever observed in such systems.

The remaining classes of objects may be associated with either transient or persistent X-ray sources containing a neutron star or a black hole. Several bright objects are associated with globular clusters, compact spherical concentrations of tens or even hundreds of thousands of stars. The spectral properties of these objects are strikingly similar to the globular cluster sources observed in our own galaxy, proven to be the systems with neutron star primaries.

The identification of the discrete X-ray sources in M31 with various types of compact objects, which is based mainly on their spectral properties, needs further work. To finally resolve a debate on the mysterious nature of these systems, a greater number of

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LANL

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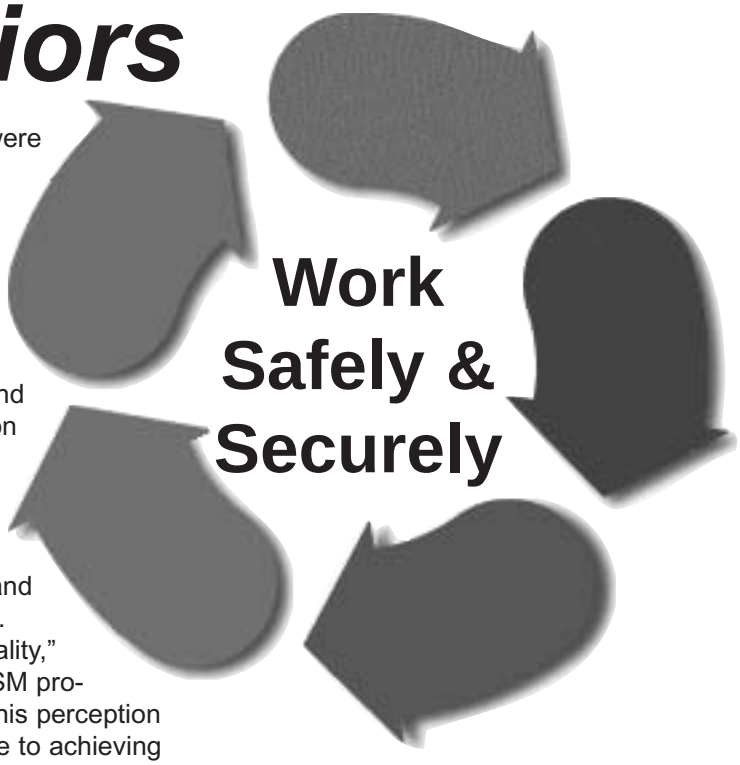
Report promotes positive security behaviors

by Kevin Roark

A report submitted by the Laboratory's Integrated Safeguards and Security Management Positive Security Behaviors Team calls for positive changes at the Lab to lessen any perceived "culture of fear and retribution" stemming from security events in 1999 and 2000 that prompted intense scrutiny by the Department of Energy, the FBI and the media.

Following the highly publicized "hard drive" incident of last spring, Laboratory Director John Browne reaffirmed the vital importance of ISSM and began an early rollout of the ISSM program that had been in the works since early 2000. One of the first steps in the rollout were group-level all-employee workshops to begin to engrain the ideals of ISSM into the everyday work of every employee.



These workshops were highly interactive and tailored to maximize their value. Employees teamed to use the ISSM five-step process and openly shared their questions, concerns and suggestions. A common theme of these questions, concerns and suggestions centered on the perception of a "culture of retribution and fear" at the Laboratory.

"Perceptions are reality," said Carl Ostenak, ISSM program manager. "And this perception poses a major obstacle to achieving the Labwide security behaviors essential to a healthy security culture that serves science and society. So I chartered the cross-directorate PSBT to identify the root causes of this perception and to recommend actions for overcoming it."

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ISEC Internal Security Knows

Is there really still an espionage threat?

by Kevin Roark

According to the National Counterintelligence Center, even though the focus of foreign espionage has shifted away from the traditional political/military model, the threat is real and continuing.

In a 2000 report to Congress on foreign economic collection and industrial espionage, the center wrote, "In a world that increasingly measures national power and security in economic as well as military terms, the United States continues to be threatened by the theft of proprietary economic information and critical technologies.

"The risks to sensitive business information and advanced technologies have dramatically increased in the post-cold war era as foreign governments — both former adversaries and allies — have shifted their espionage resources away from military and political targets to commerce.

"The information they seek is not simply technological data but also financial and commercial information that will give their countries a competitive edge in the global economy.

"During the past year, foreign governments, corporations and individuals have continued to collect economic technological and trade secret information through a variety of legal and illegal means.

"The global spread of technology and the corresponding increase in the value of trade secrets have contributed to a significant increase in both the incentives and opportunities for conducting such activity.

"Much of what these foreign rivals and allies seek is in the public domain. Just as with traditional political/military espionage, however, trends in the collection of open-source information can be important indicators of strategic objective that might ultimately be met by resorting to collection methods that are not legal."

For more information on foreign economic espionage and counterintelligence contact ISEC at 5-6090.

'Community Safety Days'

Laboratory retiree George Bjarke, left, looks on as Laura Schwartz of the Española Wildlife Center shows a Mexican Spotted Owl at the third annual "Community Safety Days" held last month. The community event is held in June of each year to coincide with National Safety Month. "The first Laboratory 'Safety Days' in 1996 consisted of a Labwide standdown to raise awareness and remind Laboratory and subcontract personnel of the need to practice safety on the job," said Environment, Safety and Health (ESH) Division Deputy Director Phil Thullen. But the regimented activities of that first "Safety Days" event bare little resemblance to the "Community Safety Days" begun in 1999 when the Laboratory literally took safety "across the bridge," inviting neighboring agencies and communities to participate. More than 700 people attended the event this year.
Photo by LeRoy Sanchez

Report …

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Ostenak asked long-time Lab employee Ed Heighway to lead the PSBT, and members were invited from all corners of the Lab. It was important to both Ostenak and Heighway to have representation from technical divisions as well as from the diversity and ombuds, human resources and security organizations.

The 18-member team's approach included meeting with small groups of employees directly involved in classified work. These fact-finding sessions led the team to make several observations about the Lab's security environment.

Listed in the PBST report are 11 principal perceptions of the security environment at the Lab that include the following: employees want to act responsibly and to be recognized and supported; the workplace is less hospitable — management is not adequately supportive; and the responses to security events are uneven. For more information on ISSM and the PSBT see the ISSM Web site at *http://int.lanl.gov/orgs/s/issm/index.shtml*.

The PBST reached the general conclusion that there are many factors in the workplace that, left alone, could deter positive security behaviors. The team offered a number of suggestions to help address these factors. The detailed suggestions are grouped under five categories and include management response, communication, consequences, classification direction and guidance, and operational support and workplace issues.

The path forward has included briefing the team's observations and suggestions to Lab management and to various employees. Suggestions will be addressed in the overall action plan for achieving ISSM.

"Ed led the team brilliantly and its report is a solid affirmation of where the Lab wants and needs to go," said Ostenak. "It's about promoting positive security values, attitudes and behaviors Labwide, including always soliciting employee input and feedback for continuously improving the security of day-to-day operations. This is at the heart of ISSM."

XMM-Newton …

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X-ray instruments is needed (for example, to detect short thermonuclear bursts from the neutron star sources).

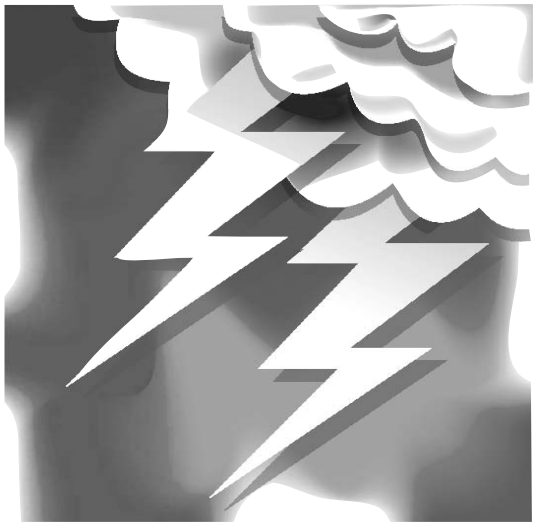
The European Space Agency's XMM-Newton was launched from Kourou, French Guiana, on Dec. 10, 1999. XMM-Newton carries three very advanced X-ray telescopes, each containing 58 high-precision concentric mirrors, nested to offer the largest collecting area possible to catch the passing X-rays. These mirror modules allow XMM-Newton to detect millions of sources, far greater than any previous X-ray mission.

Several more XMM-Newton observations of the Andromeda Galaxy are scheduled as well. It is expected that they will bring important insights into the nature of the X-ray sources in M31.

For more information on the satellite and its mission, see *http://sci.esa.int/xmm/* on the Internet. High-resolution digital versions of the X-ray images and other information associated with this release are available at *http://nis-www.lanl.gov/~tsp/pressrelease.html* online.

Watch out for lightning with the arrival of summer, rainy season

by Steve Sandoval



July typically signals the beginning of New Mexico's rainy season. With the showers and thunderstorms, however, come lightning and Lab workers should be particularly aware of the possibility they could be struck by lightning.

States along the gulf coast and the front range of the Rockies have the most recorded lightning activity and strike density, which is represented by the number of days of lightning and lightning strikes.

Lightning depends on the vertical development of clouds. During summer months, precipitation comes primarily from clouds that have vertical development caused by convection. Conversely, during winter months, precipitation comes primarily from clouds that are "stratiform," or more horizontally formed clouds, which means lightning development is less likely to occur because there is less heating of the surface to promote convection.

The Laboratory has a lightning stroke counter at Technical Area 6 that responds to cloud-to-cloud or cloud-to-ground strokes within a 30-mile radius depending on atmospheric conditions. A lightning flash may contain between one and 30 strokes with an average of four strokes per flash, said George Fenton of Air Quality (ESH-17). The stroke counter measures, on average, more than 100,000 lightning strokes per year, 95 percent of which occur between June and September.

Fenton said 80 to 90 percent of summertime lightning activity occurs between noon and 9 p.m.

In June 1990, three Laboratory employees were struck by lightning after they sought shelter under trees during a heavy rainstorm. According to the National Fire Protection Association, the employees should have avoided trees because trees are a good conductor of lightning.

When the threat of thunderstorms develop, the following precautions should be taken, according to the National Weather Service in Albuquerque:

☞ avoid projecting above the surrounding terrain as you would if standing in an open field or on a mountain top

☞ stay away from open water

☞ if indoors, avoid water and stay away from doors and windows. Don't use the telephone. Take off headsets. If possible, turn off appliances, computers, power tools and televisions because an exterior lightning strike of electric or telephone lines can induce shocks to indoor equipment

☞ stay off motorcycles and bicycles, tractors and other metal farm or construction equipment

☞ put down golf clubs and take shelter. Metal-spiked golf shoes increase the probability of being struck

☞ don't stand under natural lightning rods such as tall, isolated trees

☞ avoid taking shelter in small structures that are isolated in an open area

☞ if in a forest, seek shelter in a low area under a thick growth of small trees; if in an open area, seek a low place such as a ravine or valley but stay alert for possible flash flooding

☞ if a person's hair stands on end, lightning may be about to strike. If no shelter is available squat down with feet together and place hands over ears to minimize hearing damage from thunder. This also reduces your

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Laboratory phasing out secretarial pool

In recent years, the size of the Laboratory's secretarial pool has decreased considerably from its high of 90 to approximately 25 members. Many secretaries once in the pool have found regular secretarial and administrative positions within the Lab.

"The decision to phase out the pool and partner with The Plus Group, our current secretarial contract labor provider, recognizes the Lab's continuing need for a strong pipeline of trained, experienced and Q-cleared secretaries," said Carol Trask Beaulieu of Staffing (HR-5). "In view of persistent external hiring restrictions, this change will allow us to partner with other Northern New Mexico businesses in providing opportunities for the region and with Northern New Mexico educational institutions to provide career options for residents, while bringing about cost savings for the Lab."

A master management memo regarding the secretarial pool can be found at *http://int.lanl.gov/memos/MasterManagement/MM1441_ADS1584.PDF* on the Internet. For more information, call 5-1917 or write to *beaulieuc@lanl.gov* by e-mail.


Robert Benjamin


Liz Foltyn


Steven Girrens


Barbara Hargis


Roger Pynn


Mary Van Eeckhout

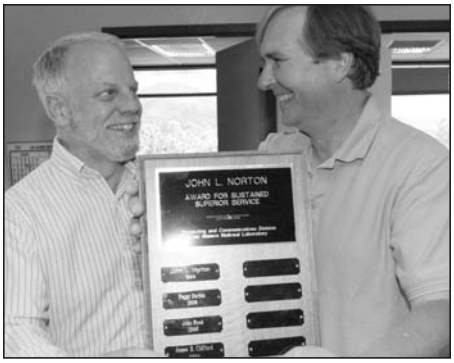
Six mentors from various Laboratory divisions recently were honored by the Women's Diversity Working Group for promoting the advancement of women in the workplace. Female nominators were asked to briefly describe the mentor they were nominating, circumstances or events that led to the relationship, specific things the mentor did to assist with career development and how life has changed as a result of such mentoring. Those receiving mentoring awards this year are **Mary Van Eeckhout** of Materials Management (BUS-4), **Roger Pynn** of the Los Alamos Neutron Science Center Division Office (LANSCE-DO), **Robert Benjamin** of Hydrodynamic Applications (DX-3), **Steven Girrens** of Engineering and Analysis (ESA-EA), **Barbara Hargis** of Industrial Hygiene and Safety (ESH-5) and **Liz Foltyn** of Power Source Technology (NMT-9).


Bob Reinovsky

Bob Reinovsky has been named Program Manager for the High Energy Density Hydrodynamics Program within the Nuclear Weapons Experimental Program Office (ALDNW-EP). Reinovsky has been serving as program manager in an acting capacity, leading efforts in the development and construction of the Atlas pulsed-power system. "Bob brings not only his technical strengths and national scientific recognition to this role, but adds a special teamwork, patience, persistence and attention to detail that have served the Lab well," said Joe Repa, program director for Experimental Programs. Reinovsky came to Los Alamos in 1986 from the Air Force Weapons Laboratory as associate group leader of the Shockwave Physics Group and later led the Athena pulse power project. He holds a doctorate in electrophysics from Rensselaer Polytechnic Institute.

Clifford recipient of John L. Norton Award

Jim Clifford of Network Engineering (CCN-5) is the fourth Laboratory recipient of the John L. Norton Award. The former Computing, Information and Communications (CIC) Division established the award in 1993 to recognize sustained, superior service to the Lab by a CIC employee. Some of Clifford's accomplishments include the introduction of workstations to the Lab, for which he and Phil Wood, also of CCN-5, received a Distinguished Performance Award, and driving the adoption of transmission control protocol over Internet protocol as a Laboratory standard for data transmission. The award's first recipient was its namesake, John Norton. Norton, a physicist who had come to the Laboratory in the late 1960s, was a pioneer in the development of software tools to increase the productivity of the users on the supercomputers of the time.



Jim Clifford (left) receives a plaque for the John L. Norton Award from John Morrison, acting Computing, Communications and Networking (CCN) Division director.

In Memoriam

Harry Ballance

Harry Ballance, 81, died June 5. Ballance was employed at the Lab as a chemical engineer in the old WX Division, formerly GMX-3, from 1953 until 1981. He held degrees from North Carolina State University and from Virginia Polytechnic Institute. He was born in Portsmouth, Virginia, and was at the Naval Mine Depot in Yorktown, Virginia, before coming to Los Alamos.

Allan Johnston


Allan Johnston

Allan Johnston, the Laboratory's Business Operations Division (BUS) director, died June 15 after a brief illness. He was 58. Johnston came to the Laboratory in 1993. He had been controller and director of finance of Batelle Memorial Institute at Pacific Northwest Laboratories before joining Los Alamos. A U.S. Army veteran, Johnston also was previously employed by Arthur Andersen & Co. and Union Carbide Corp. The nonprofit Los Alamos National Laboratory Foundation has established a scholarship in Johnston's name. The foundation address is 1850 Old Pecos Trail, Suite F, Santa Fe, N.M. 87505.

Lightning …

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chances of being struck or becoming a conductor for nearby lightning strikes

☞ remember the "30/30" rule. If lightning is sighted and its accompanying thunder arrives in less than 30 seconds, the lightning is within six miles and shelter should be taken. Additionally, suspend outdoor activities for 30 minutes after the last observed lightning or thunder.

People also should consider learning how to administer cardiopulmonary resuscitation because people struck by lightning sometimes can be resuscitated.

"It's hard to predict where lightning is going to strike," said Phil Romero of Industrial Hygiene and Safety (ESH-5). "People shouldn't take chances; they should seek shelter until the storm passes."

Romero said employees and subcontract personnel who work outdoors should be especially alert to the possibility of being struck by lightning. Heavy equipment vehicles and cranes serve as grounding paths for lightning because of their metal construction and girth, he said.

Tall metal poles, trees and structures actually attract lightning and should be avoided. "Employees need to be aware of the fact that if they see lightning even in a remote location they should take precautions and not expose themselves unduly," said Romero.

Romero said Department of Energy regulations require that Lab buildings have lightning protection systems, which are designed to safely dissipate lightning strikes through a grounding path within the facility.

According to the National Weather Service, between 1959 and 1993, New Mexico led the nation in the number of lightning deaths per capita with 65.8 deaths per 1 million people. Wyoming, Arkansas, Florida and Georgia followed New Mexico in order. And the NWS said between 100 and 200 people are killed every year from lightning. The national average is 20.1 deaths per 1 million people.

News from UC

Compact mileage from an SUV

A sports utility vehicle that gets up to 30 miles to the gallon, built by engineering students at the University of California, Davis, took first place in this year's national FutureTruck competition in Michigan.

The UC Davis winning entry was a Chevrolet Suburban with a gas-electric hybrid engine. Fully charged, the modified Suburban can drive up to 60 miles on battery power. As the batteries run down, the gas engine takes over to keep them charged. The competition showed that it is possible to build large vehicles that meet ultra-low emissions standards.

UC treasurer

The University of California Board of Regents earlier this spring appointed David Russ, the public markets managing director for the University of Texas Investment Management Co., as its new treasurer and vice president for investments.

Russ, 47, replaces Patricia Small, who resigned last August after having served as treasurer for five years. DeWitt Bowman, former chief investment officer for the California Public Employees Retirement System, had served as interim treasurer. Russ began his new position June 1, at an annual salary of $275,000.

Russ received his undergraduate degree in genetics from UC Berkeley in 1980 and a master's in administration, with a concentration in finance and accounting, from UC Davis' Graduate School of Management in 1986.

Scientists at UC Berkeley and LBNL create world's smallest laser

A University of California, Berkeley, chemist has grown the world's smallest laser — a nanowire nanolaser one thousand times thinner than a human hair. The nanolaser is about 100 times smaller than the gallium arsenide and gallium nitride lasers in use today.

Among the potential applications are chemical analysis on microchips, high-density information storage and photonics — transmitting information via laser light. The laser, one of the first real devices to arise from the field of nanotechnology, emits ultraviolet light, but can be tuned from blue to deep ultraviolet.

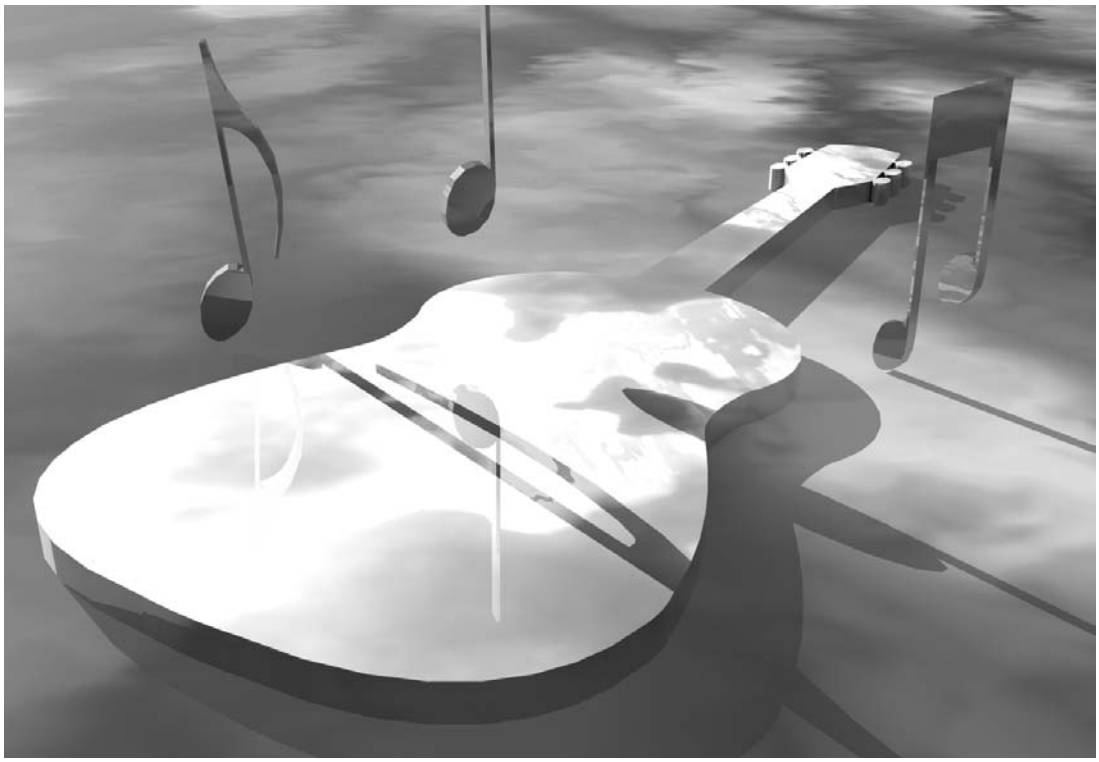
Scientists in the Department of Chemistry at UC Berkeley and at Lawrence Berkeley National Laboratory reported their development in a recent issue of Science. The research was supported by the Camille and Henry Dreyfus Foundation, the 3M Corp., the National Science Foundation, the Department of Energy and UC Berkeley.

Lab to open its doors in September

The Laboratory has scheduled a "Family Day" on Saturday, Sept. 15, from 8 a.m. to 3 p.m. Access to secure areas for employees and their families is from 10 a.m. to 2 p.m. (pre-registration required by Aug. 15).

For more information and for secure-site registration, see the Family Day Web site at *http://int.lanl.gov/orgs/cr/familyday/*.

From south to southwest:
Music transcends location



As part of a Southern Gospel group, Lab employees Don Norris and Chris Quihuis are working to bring the traditional sounds of the South to the Southwest through a quartet called River Jordan.

Southern Gospel incorporates such genres as the blues, black gospel, Dixieland, bluegrass and other musical styles. Unlike contemporary gospel, Southern Gospel uses instruments heard in today's traditional music sound that includes steel guitars, fiddles, mandolins and acoustic bass guitars, as well as keyboards, horns and full orchestras.

A native of Española, Norris started singing Southern Gospel in 1994 after attending the National Gospel Quartet convention in Louisville, Ky.

"I saw what they were doing and knew I had found the style I was looking for," said Norris of Maintenance, Operations and Support (CCN-18). He handles data storage needs for the Lab's supercomputing and sings bass and plays harmonica in the group.

"I studied Oahu style steel guitar under Paul Randahl in Tucson until I was about 15 but lost interest because of life's many distractions," said Quihuis of Detonation Science and Technology (DX-1). "I returned to it later, around '76 after moving to Northern New Mexico to work at the Labs. After playing with several local church choirs, I joined the local gospel band Amistad, playing traditional hispanic, country and contemporary gospel music. We performed throughout the Northern New Mexico area. I joined River Jordan about six months ago and have thoroughly enjoyed their style of gospel music. I consider myself very fortunate to be a part of such a talented and humble group of musicians.

River Jordan features other members of the Northern New Mexico community. Don Boaz sings lead and is a general contractor in Santa Fe. Dan Gavurnik plays bass, sings baritone and tenor; he works in maintenance at McCurdy Mission School in Española, N.M. Matt Nichols sings high tenor and teaches grades 7 and 8, while Miguel Soto plays the keyboards and teaches music at McCurdy.

They practice on most Thursday evenings in Española with performances at churches around New Mexico. Don Boaz has written all the original music they do, and many traditional songs are being incorporated as well. Recordings of their work will be available sometime this year on a Web site that is still under construction. The group also has plans to expand their touring to neighboring states, according to Don Norris.

For more information about the group, contact Norris at 7-1333 or e-mail him at *riverjordan@espanola.com*.

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