Reflections

Los Alamos National Laboratory
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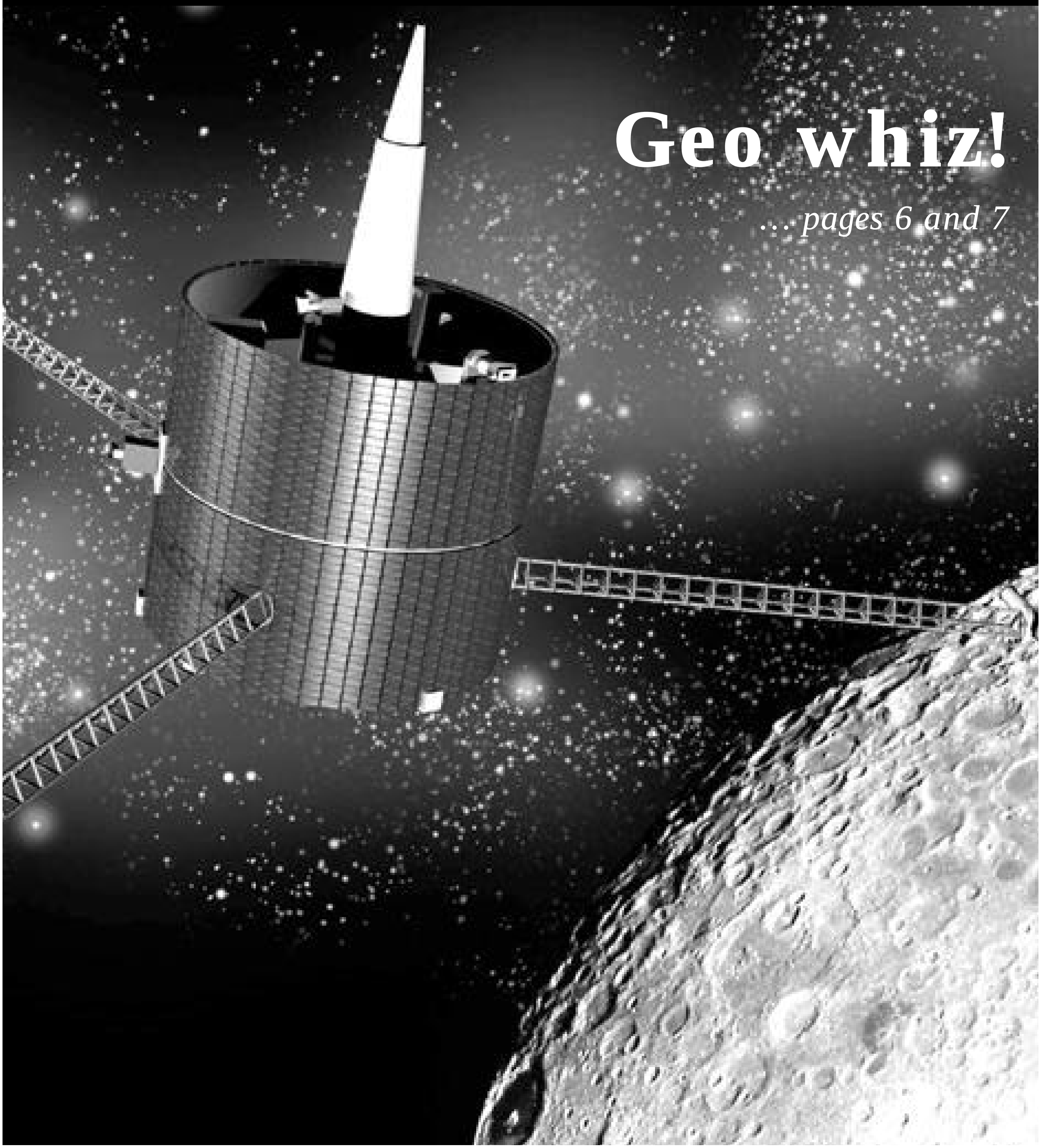

Geo whiz!

. . . pages 6 and 7

A Department of Energy/University of California Laboratory

Inside this issue ...

Cover photo courtesy of NASA

Reflections

Reflections, the Laboratory monthly publication for employees and retirees, is published by the Public Affairs (PA) Office. The staff is located at TA-3, Building 100, and can be reached by e-mail at *newsbulletin@lanl.gov*, by telephone at 7-6103, by fax at 5-5552 or by regular Lab mail at Mail Stop C318. The individual telephone numbers are listed below.

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editor's journal

Science is fun

Science is fun. While most Lab employees wholeheartedly agree with this statement, it's a message that often doesn't get through to many young people. You say "science," and they immediately think "difficult," "coney" or "boring." But once some of these young people take part in hands-on science activities, such as experiments or projects, they soon realize that science can be fun. And for some of them, this first fun exposure to science starts a lifelong love affair. That's why "Reflections" regularly features "Science Fun," a section that is primarily geared to children in grades four through eight.

"Science Fun" focuses on simple — and fun — experiments and activities that help take the mystique out of science. Employees are encouraged to share the material with their families and young friends in the hope of cultivating an early interest in science. Most of the "Science Fun" material that has appeared in "Reflections" is from "Science at Home," a publication developed by the Lab's Science Education (STB-SE) group. The activities culled from the book include experiments using soap bubbles to demonstrate Boyle's Law or showing the relationship between the volume of gas and the pressure it exerts. Another activity uses paper towels to demonstrate porosity and capillary action. And still another uses balloons to explain static electricity. Simple? Sure, but they're enjoyable ways of explaining some of the wonders of science to kids.

Lab employees Garry Franklin of the Bradbury Science Museum (CRO-2) and Robert Benjamin of Hydrodynamic Applications (DX-3) also are helping get across the science-is-fun message. Franklin, who prepares and demonstrates scientific facts and fun for hundreds of visitors to the Lab's museum, has supplied "Reflections" with several "Science Fun" activities and experiments, including one that explained refraction. And in this month's issue, Benjamin presents some fun activities that deal with the behavior of fluids.

Benjamin, who is collaborating with the AIMS (Activities Integrating Math and Science) Education Foundation on a book, "Spills and Ripples," recently was featured in the September issue of "Physics Teacher Today" magazine. That publication carries a longer version of the piece Benjamin provided for "Reflections," in which he offers some insights into ripples using a baby-food jar and water (see page 10).

But don't just stop at "Science Fun." Take a look at the other offerings in this month's issue, including articles on what's happening in the search for more knowledge about space geology (see pages 6 and 7), the Lab's observance of Breast Cancer Awareness Month (see Page 5) and our so-called "visualization theater" (see Page 3).

The latest Lab news

Daily NEWSBulletin
Los Alamos National Laboratory

Check out the Daily Newsbulletin

http://www.lanl.gov/newsbulletin on the World Wide Web.

X Division goes to the movies

by Steve Sandoval

"The Phantom Menace," last summer's blockbuster movie that has dazzled audiences across the country, and now overseas, is filled with flights of special effects fancy.

Some of those special effects were created using infinite reality graphics pipes, computer hardware that converts geometrical information about visible objects into images on high-resolution video displays built by SGI Inc.

At the Laboratory, Luke Skywalker isn't chasing intergalactic bad guys. Rather, scientists are using state-of-the-art technology to help visualize large sets of data generated from Laboratory supercomputers. The Lab's so-called visualization theater is a physics tool for scientists and researchers involved in stockpile stewardship and management, the Laboratory's principal mission.

In the weapons arena, scientists want to see what happens during the implosion process, Robert Kares of Plasma Physics Applications (XPA) explained. "We need to see what's going on in detail in a complex multiphysics calculation," he said. The visualization theater would help scientists do just that with the help of the Laboratory's vast supercomputing capabilities.

The facility is part of the Accelerated Strategic Computing Initiative, a key component of the Department of Energy's stockpile stewardship program involving Los Alamos, Sandia and Lawrence Livermore national laboratories.

Kares said Laboratory scientists needed better visualization techniques to analyze the large volumes of data generated by computer simulations, hence the visualization theater, which was dedicated earlier this year by Lab and DOE officials, as well as representatives from the companies that provided the hardware and software.

"We have built this facility for understanding what's happening with codes and for sharing it with other people," Kares continued. "We have built a world-class visualization theater."

The heart of the visualization theater is a system designed by Fakespace Inc. of Mountain View, Calif. The company built for the Lab large, custom-designed display panels that when joined together form a 15-foot-wide by 9-foot high visualization wall.

The high-resolution screen shows three-dimensional images flashed onto the screen by six rear projection screens, Kares explained. The screen is mounted and held in place on a steel frame. A desktop computer in the theater allows scientists to remotely manipulate images on the screen to view them from different angles.

The computer operator also can remotely control conditions in the air-conditioned theater, including projectors, audio and lighting. All told, the screens together have the capability to produce an image with a resolution of 3,840 by 2,048 pixels. And all the images can be viewed in a theater-like atmosphere, complete with theater-style seating and Surround Sound™ stereo.

"Through the infinite reality graphics pipes, [scientists] can read the simulation data and generate visualization

Ken Milder, left, of Network Engineering (CIC-5) and Jamie Painter of the Advanced Computing Laboratory (CIC-ACL) look at an example of a Rayleigh-Taylor mixing simulation in the Laboratory's visualization theater, which is a physics tool for scientists and researchers. *Photo courtesy of Imaging Services (CIC-9)*

data and transmit it via fiber optic cable to 18 locations in X [Applied Theoretical and Computational Physics] Division," said Kares.

In addition to the larger viewing wall, the visualization theater includes two immersive workbench virtual reality display devices, which immerse users "inside" the virtual world. The workbenches, also built by Fakespace Inc., provide a 6-foot-by-5-foot viewing screen to display data. Researchers can manipulate the data by using a virtual reality pinch glove, similar to a mouse on a computer.

When wearing virtual reality glasses, or goggles, researchers can see their manipulations of the data in three-dimensional form, Kares explained.

The Laboratory hopes to build a new visualization facility for viewing data; it would include four, 10-foot-by-10-foot screens and a virtual reality floor; the screens could be moved and pieced together in myriad ways, said Kares. "The present visualization theater is the outside-looking-in environment," he said. "We want to be able to look at data from the inside out."

Scientists could, for example, look at the individual cells in a 100-million cell calculation.

"These structures are very complex, and they depend on time," Kares said. "With this technology, we can find an aberration in a single computational cell in a computational problem with 50 million cells."

reaching out

Full muons over Los Alamos

by Nancy W. Ambrosiano

Getting right down to the nitty gritty of big science — that's what's been happening this summer, high on the far back end of the LANSCE mesa above Jemez Road. Students Craig Martin, Jay Pederson and Javier Martinez have had their hands in the very glue, foil, wires and packing material that go into creating muon detectors.

While it's unlikely that they were overly familiar with muons, or how to capture them, before arriving at the Lab, they're now part of a large, international project designed to analyze atomic particles produced at Brookhaven National Laboratory's Relativistic Heavy Ion Collider, known to its friends as RHIC.

The portion of the RHIC project to which the Laboratory students are devoted has an acronym of its own (of course, this is "Big" science, heavily dependent on "Big" acronyms), and this is the Pioneering High Energy Ion Experiment — PHENIX. Named for the mythical bird that is reborn from its own ashes, PHENIX is a very large detector system, designed to detect, identify and measure the momentum of each of the many different kinds of particles produced at RHIC. PHENIX comprises three electromagnets, four instrumented spectrometers or arms, and two inner detector systems for muon particles. One of the two muon detector arms will be taking data by October of 2000, the team hopes, and the other will follow in approximately a year's time.

Craig Martin, foreground, kneels to smooth a portion of a detector frame, preparing it for its central mylar sheet and layers of electronic circuits. Behind him, at the table, are Javier Martinez (left) and Jay Pederson (right). *Photo by LeRoy Sanchez*

It is these muon detector systems that have the team's attention, as under the guidance of mentors David Lee and Melynda Brooks of Subatomic Physics (P-25), the students have been building the anode and cathode frame detectors that will document the passing of each muon particle. The exactingly fine frames, layered with sheets of mylar foil, combine with electronic grids 5 times finer than a human hair to form each section of a detector. In Area B of the Los Alamos Neutron Science Center (LANSCE), a brick building strongly resembling a garage has become a factory, where Martin, Pederson and Martinez work with engineer Walter Sondheim of P-25 to perfect their pieces of the PHENIX puzzle.

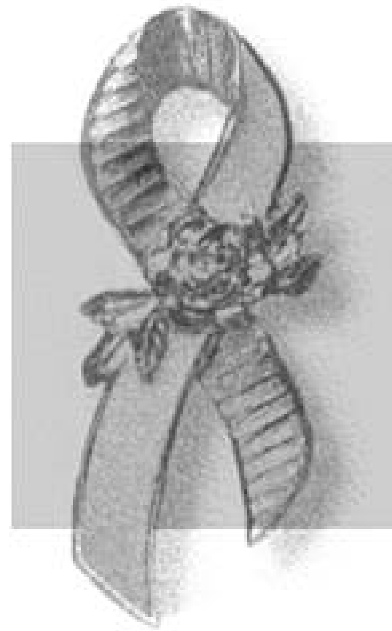
Pederson, 18, is a mechanical engineering student at the University of California, Santa Barbara, but has spent most of his life as a Santa Fe resident. He has enjoyed his time on the PHENIX team, he says, learning to perform the exacting work of building anode and cathode frames to register the passage of muons, and he has a whole new understanding of what it takes to develop scientific equipment on the scale of RHIC and PHENIX. After his undergraduate work is complete, he'll be entering the Army through the Reserve Officer Training Corps, serving four years, and then perhaps moving on to graduate school or perhaps even a return to the Lab.

Martinez is the team member with the most Lab history so far, as he originally came to the Lab in 1996, working on autocad drawings. Now, ending his third summer, the Española native and New Mexico State University civil engineering student says "I'm just excited to see what's going to happen with these," a comment that follows mentor David Lee's thought, that working on a big project such as PHENIX is "something you only do once or twice in your lifetime as a scientist."

Martin, the newcomer to the group, arrived at Los Alamos fresh from earning his physics bachelor's degree at Louisiana State University. One of his professors there, Richard Imlay, had suggested the Laboratory as an exciting venue for a physicist, and Martin so far has worked on the Liquid Scintillating Neutrino Detector and now the PHENIX muon detector factory. Other than a distinct longing for fresh seafood and well-made gumbo, Martin's been pleased with his experiences, although he says he lives in fear of a mistaken movement causing him to bump or damage one of the beautiful but fragile muon detectors. He's been involved in building and etching the frames, testing their continuity and electrical capacitance, all of which demands a steady eye and even steadier hand, manipulating the vanishingly thin wires and foil of the project.

The Undergraduate Student Program of which these students were a part is a year-round educational program that provides students with relevant research experience while they pursue an undergraduate degree. The program, operated by the Human Resources (HR) Division, is designed to complement the students' education with work experience related to their chosen field of study.

Lab to observe Breast Cancer Awareness Month



by John A. Webster

Dave Ballard doesn't mind making a pest of himself when it comes to talking about cancer and the need to check for its warning signs. He talks about it during meetings at work, around the water cooler, in casual discussions with friends.

Ballard has a ready-made topic — the importance of self-examination — since his wife was diagnosed with breast cancer three months after a mammogram that showed no sign of the disease.

"I do it everywhere I can," he says. "If I hear a group of women talking at the water cooler about their mammograms, I tell them how fast it hit my wife. During Safety Days, we talk about cuts and electric shocks, but I always say what are you going to do if you have cancer.

"You have to stop being bashful. If someone snickers, I tell them it's not a laughing matter. This is serious."

Regular self-examination is a key theme for Breast Cancer Awareness Month in October. At the Laboratory, plans for the month include a panel discussion focusing on families impacted by the disease; participation in the Oct. 19 "Tell A Friend" program, in which participants make five phone calls to encourage friends to have mammograms; and distribution of information about cancer in the Otowi Cafeteria lobby during the noon hour on Oct. 13.

"Study after study shows that early detection is the key to surviving breast cancer," said Georgia Pedicini of Computing (CIC-7) and the Women's Diversity Working Group. "We are encouraging people to practice it because this disease is highly treatable in its early stages."

Ballard, an alarms system technician for Protection Technology Los Alamos who works in Security Systems (S-3), said his wife Dee had a mammogram in November 1998 that showed nothing. In late January, she found a lump three centimeters in diameter in her left breast.

Dee Ballard, a registered nurse at Presbyterian Kaseman Hospital in Albuquerque, began chemotherapy to shrink the tumor, then underwent a lumpectomy in June. Other tumors not affected by the chemotherapy were discovered during the surgery, and, after consulting with doctors, she began a course of intensive chemotherapy that she is still undergoing.

"Chemotherapy is not only hard physically, it hurts you emotionally," said Dave Ballard. "You both [wife and husband] go through it. You have to be there for each other."

According to the American Cancer Society, some 175,000 women and 1,300 men will be diagnosed this year with breast cancer, and about 43,700 of them will die from the disease. It is the leading cause of death of women between the ages of 35 and 54, but if detected early, the five-year survival rate is more than 95 percent.

The ACS says that the most significant risk factors for contracting breast cancer are being female and getting older. Eighty percent of the women with the disease have no other known risk factors, and only 5 to 10 percent have a family history of breast cancer.

Dave Ballard talks about all kinds of cancer, not just breast cancer. "It's important for men to check themselves for testicular cancer," he said, "and skin cancer can kill you in a relatively short time."

In addition to self-examinations, he encourages people to talk frankly about cancer, buy and use a simple test kit if possible, and purchase cancer postage stamps, which raise money to fight the disease.

Ballard has become a cancer crusader, he says, because "I love my wife. And it's your duty as a friend to tell people about things that can help them."

More information is available at the World Wide Web sites of several organizations, including the American Cancer Society at *http://www.cancer.org* and the Susan G. Komen Breast Cancer Foundation at *http://www.komen.org*.

Local and state organizations that provide physical or emotional support to breast cancer patients and their families include the Breast Cancer Support Group in Los Alamos and Reach to Recovery in Santa Fe. In addition, a cancer resource directory is available from the Care Coordination Department of the Los Alamos Medical Center.

The Women's Diversity Working Group, which with Occupational Medicine (ESH-2) is coordinating Breast Cancer Awareness Month activities at the Lab, posts information about these and other resources at its Web site at *http://www.lanl.gov/orgs/dvo/wdwg/women.html*.

Geo Whiz!

by Todd Hanson

For thousands of years humankind has been fascinated with the Earth — its history, structure and composition. Inherent in this fascination is the idea that through a deeper understanding of our planet we might gain a better understanding of the history, composition and structure of our solar system.

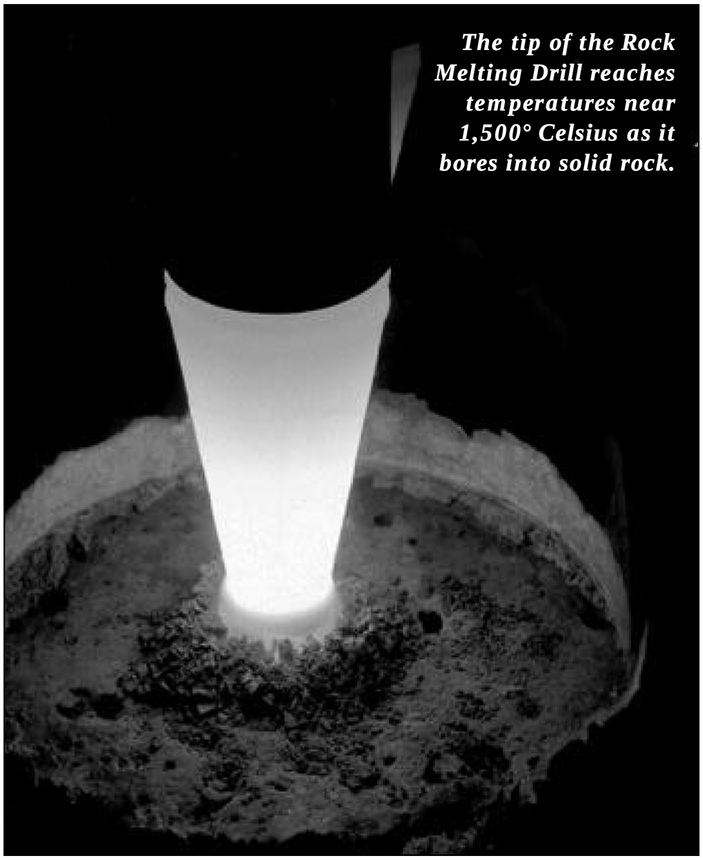
The search for geologic knowledge in space has, however, been hampered by the vastness of space itself. While interplanetary travel for humans is obviously feasible and might someday even become ordinary, today's geologic investigations of other planets, asteroids and moons must be a remote undertaking.

Laboratory scientists are extending many of the technologies once used to learn more about the Earth to create tools for exploring the solar system from afar. They also are building new compact instruments capable of gathering data both in space and on other planets.

Laser Learning

One example of how existing technologies are being adapted for space exploration is LIBS, or laser-induced breakdown spectroscopy. The LIBS technology has been around for years, but until recently has been applied principally for Earth-based purposes.

LIBS works by firing a brief, but intense, laser pulse at an object from a distance of about 50 feet. The laser vaporizes a small spot — about the diameter of a pencil's eraser — on the surface of the object. A telescope mounted on the laser captures the light given off by the glowing vapor and focuses it into a spectral analyzer. Since all elements, on Earth or in space, create unique spectral signatures, the intensity of the emissions created by the glowing vapor reveals the relative abundance of any elements in the object.



The tip of the Rock Melting Drill reaches temperatures near 1,500° Celsius as it bores into solid rock.

The prototype LIBS instrument is under development at the Lab for use in planetary exploration. The instrument combines a laser the size of a small flashlight, telescope and spectral analyzer into a compact, low-power package suitable for mounting on a planetary rover vehicle. By using the LIBS technology, the rover would not have to cross hazardous terrain to sample important rocks or strata. With its beam, LIBS could reach high cliff faces or peek inside cracks and crevices. The laser even can burn through the weathered surface of a rock to reveal the composition hidden beneath.

Akin to the LIBS project is the Remote Analyses by Mass Spectrometry and Emission Spectroscopy technology, or RAMSES. The RAMSES project is designed to conduct exploratory research to demonstrate that the elemental analysis technique of LIBS can be combined with Raman spectroscopy for mineral identification in a single compact instrument. Like LIBS, the RAMSES instrument will be for taking measurements at standoff distances of 20 meters or less.

A technology similar to LIBS is LIMS — Laser-Induced Ion Mass Spectrometry. LIMS also uses a high intensity laser to blast material away from the surface of an object. The freed, ionized atoms released by the laser enter an ion mass spectrometer that makes compositional measurements based on the mass of an ion. Like LIBS, the LIMS instrument can be mounted on a rover and reach areas otherwise inaccessible to other sampling technologies. The LIMS and LIBS techniques are so complementary that they could be combined into one package using the same laser to vaporize samples for analysis. Taken together, the data from the two instruments would give a fairly complete analysis of a sample.

Lunar Prospector

When Lunar Prospector plunged into Crater Mawson near the south pole of the moon last July, it ended one of Laboratory's most successful space exploration ventures. Laboratory scientists created three of the instruments aboard Lunar Prospector, including the neutron spectrometer whose measurements quantified the amount of hydrogen that might exist as ice in the numbingly cold lunar craters. While this single discovery brought the most attention to the Laboratory's scientific contribution to the Prospector mission, the remaining two spectrometers onboard Prospector — gamma ray and alpha particle — are arguably just as important.

Researchers used data from the gamma ray spectrometer, a device that counted and measured gamma rays as Prospector orbited the moon, to trace key elements in the lunar soil. Data describing these elements have offered new clues to the moon's formation and evolution.

The third Lab instrument aboard Prospector was an alpha particle spectrometer. Alpha particles are emitted in various radioactive decay processes, including that of radon, a gas that accumulates underground but also can be released in seismic ents. NASA scientists still are analyzing the Prospector alpha rticle data for signs of seismic activity.

Interestingly, the technology behind Lunar Prospector's ectrometers had its beginnings in the Lab's nuclear weapons ssion and was refined on satellites used for monitoring bal compliance with weapons nonproliferation treaties.

hemistry + Mineralogy = Knowledge

One instrument specifically designed to help unravel the mplex nature of our solar system is CHEMIN. Called CHEMIN reflect its ability to determine both the CHEmistry and Neralogy of a sample, the miniaturized X-ray diffraction/X-y fluorescence instrument was designed to remotely analyze h the elemental composition and constituent mineralogy of e-grained soils, rock, and even ice samples.

CHEMIN provides chemical information about a sample, like BS, but it also provides information on the types of minerals sent using a technique known as X-ray diffraction. Since ch mineral has a characteristic X-ray diffraction pattern, uch like a fingerprint, geologists use information on particular es of minerals present in rocks to determine how the rocks med and what processes may have shaped Earth's surface.

Having both chemical and mineralogical information is remely important. If a sample containing only silicon and ygen were chemically analyzed, we might know, for ample, that the material's chemical composition is silicon xide. However, a number of different silica minerals have s same chemical composition. One of them is quartz, which quite common on Earth's surface; another is opal, which is mparatively rare. Using chemical information, alone it would nearly impossible to determine which form of silicon dioxide sample represents.

Getting Under the Surface

Allied with the mission of gathering information aimed at a better understanding of geological structure and composition is the search for mineral and water resources on asteroids, moons and planets. While the discovery of minerals and water could provide valuable resources for any extraterrestrial human colonies, the primary intent of the research is to uncover clues to the history of life. The search for fossilized or extant life might begin with a peek beneath the rocky red Martian soil.

A technology originally developed at the Laboratory and under development for use as part of the search for life in the Martian subsurface is the Rock Melting Drill. The drill tip is electrically heated to about 1,500° Celsius and bores through the ground by partially melting rock surrounding its tip. There is no rotary motion or percussion to the drill.

Laboratory researchers are examining similar technology for the feasibility of exploring below the surface of Europa, a moon of Jupiter that may have a subsurface ocean beneath its 60-mile-thick crust of ice.

There are many projects and programs at the Laboratory whose work is directed in some manner toward understanding space geology. The projects described above represent only a portion of the research being done in this area and the work will continue.

The many talented scientists and technicians involved in the creation and ongoing development of these technologies are too numerous to mention. The collaborative research relating to space geology at the Lab spans numerous groups, divisions and directorates, and it spills beyond the Laboratory to several outside agencies.

Center for Space Science and Exploration

The Laboratory has been involved in pace exploration for nearly as long as ASA. In that time, the two agencies have orked together to create a noteworthy ecord of collaboration and cooperation. or the Lab, the story begins with Vela.

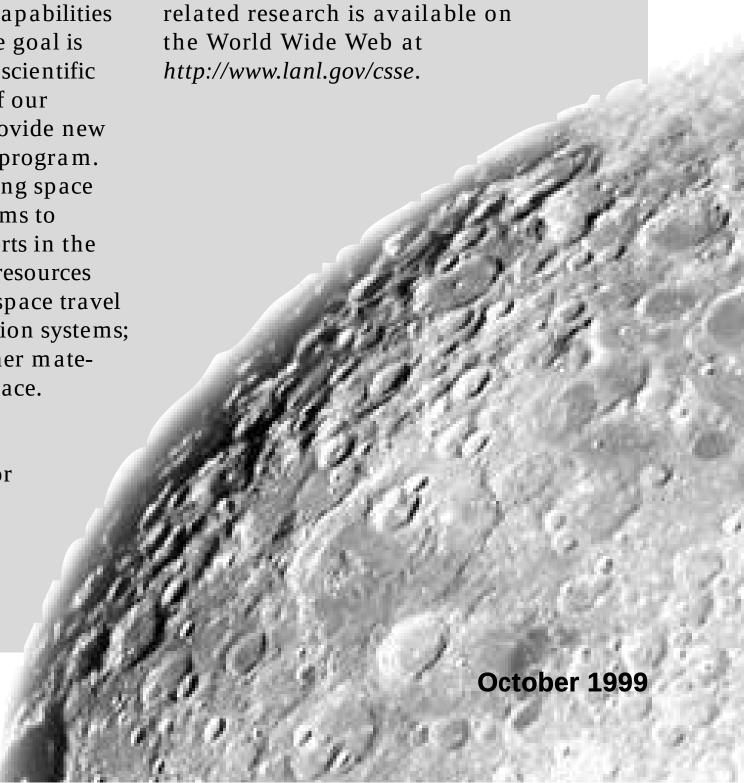
Vela satellites were deployed in support f the Limited Test Ban Treaty of 1963 and arried gamma-ray detectors designed at he Lab to detect nuclear explosions in the tmosphere and in space. The dozen Vela atellites were launched in pairs begin-ing in 1963, with the last pair being aunched in 1970. This was the aboratory's first venture into space work, ut certainly not the last. In time, the aboratory would create a special office to ncourage collaborations and oversee ASA-funded research projects. In 1999 he Center for Space Science and xploration (CSSE) evolved out of that ASA Program Office.

The mission of the CSSE is to promote cientific excellence in space science and exploration and to identify and promote interdisciplinary research between the space programs and scientific capabilities from across the Laboratory. The goal is that this will enhance both the scientific and technical underpinnings of our national security efforts and provide new resources to our nation's space program.

In addition to keeping ongoing space science research strong, CSSE aims to strengthen the Laboratory's efforts in the areas of planetary science and resources utilization; biological effects of space travel and nuclear power and propulsion systems; and new types of alloys and other materials and structures for use in space.

The Laboratory currently receives about $10 million in annual funding from NASA for space-research projects. In addition, CSSE also directs the investment of internal Laboratory funding relating to space research.

More information on the Lab's NASA-funded projects and other space-related research is available on the World Wide Web at *http://www.lanl.gov/csse*.



Booker named ASA Fellow

Jane Booker

Jane Booker of Statistical Sciences (TSA-1) has been named a Fellow of the American Statistical Association. She and the other new Fellows were recognized during an association meeting in Baltimore in early August.

Booker was cited by the ASA for her contributions in the area of eliciting and analyzing expert judgment and for her leadership in promoting and using statistics for problems of national security. Expert judgment, or information from qualified individuals responding to technical questions, is often used when other sources of information are difficult or expensive to obtain, sparse, hard to understand or unreliable.

She said she was surprised to be nominated for the honor by her group leader, Sallie Keller-McNulty, and even more surprised to be elected. "When Sallie and I found out," she said, "we both screamed with joy so loudly that I'm surprised the [Administration Building] guards didn't come rushing in."

Booker, who has been at the Lab since 1980, earned doctoral and master's degrees in statistics from Texas A&M University and a bachelor's degree in meteorology, also from Texas A&M. She co-authored a book, "Eliciting and Analyzing Expert Judgment: A Practical Guide," with Mary Meyer, also of TSA-1.

The 18,000-member ASA, which was founded in Boston in 1839, is the second oldest professional society in the United States.

Ruscetti receives Marie Curie Award

Tracy Ruscetti

Laboratory employee **Tracy Ruscetti** of DNA Damage and Repair (LS-6) has received the 1999 Marie Curie Award from the Radiation Research Society. The award is given to a young scientist conducting radiation-related research in the fields of chemistry, physics, medicine or biology. The award included $500 and was given at the 12th International Congress for Radiation Research held in Dublin, Ireland, July 18-23 where Ruscetti also received the Non-Tenured Scientist Award.

"It is always an honor to receive recognition from your peers, but when the award is named for such an important and famous scientist, it means that much more," said Ruscetti.

Ruscetti received a bachelor of science degree at New Mexico Tech in 1989 and a doctorate in microbiology, immunology from Louisiana State University Medical Center at Shreveport in 1995. She is an adjunct assistant professor at the University of New Mexico School of Medicine in the department of Molecular Genetics and Microbiology.

Ruscetti came to work for the Lab as a postdoc in 1995 with Cell and Molecular Biology (LS-4).

Nelson new group leader for NMT-15

Tim Nelson

Tim Nelson is the new group leader for Pit Disassembly and Surveillance Technologies (NMT-15), a new group in the Nuclear Materials Technology Division. The group's projects include the Special Recovery Line (SRL), pit surveillance, enhanced surveillance of plutonium, the U.S. Pit Disassembly and Conversion Program, which

continued on Page 9

Laboratory project leader honored by Defense Department

Mike Keleher, a technical project leader at the Lab, has been awarded the Defense Meritorious Service Medal by the Department of Defense for his service with the Defense Threat Reduction Agency.

Keleher, a former U.S. Army major who currently works in Electronic and Electrochemical Materials and Devices (MST-11), was presented with the medal and a citation recently by Kenneth McKenna, Laboratory manager for Department of Defense (DoD) programs.

The citation accompanying the award stated that from March 1997 to June 1999, while he was Arms Control Project Officer for the Arms Control Technology Division, On-Site Inspection Directorate, Defense Threat Reduction Agency at Kirtland Air Force Base, Keleher "managed seven highly diverse and technically challenging arms control technical development projects at a budget of over $5 million. These projects directly contributed to assisting the United States in being technologically prepared to meet its arms-control treaty obligation."

Earlier this month, Keleher was appointed project leader of the Lab's Weapons of Mass Destruction Countermeasures Program, which he will manage on a half-time basis under the DoD Program Office. The new program will focus on providing technology and technical assistance to the government agencies responsible for preventing and responding to threats posed by chemical, biological and high-explosive devices.

Mike Keleher of Electronic and Electrochemical Materials and Devices (MST-11) is presented with the Defense Meritorious Service Medal by Kenneth McKenna, program manager for Department of Defense (DoD) programs at the Lab, as Keleher's wife, Arleen, looks on. *Photo by LeRoy N. Sanchez* people

September employee service anniversaries

40 years
Donald Brown, EES-4

35 years
Steven Cushing, LANSCE-7
Jerry Wilhelmy, CST-11

30 years
Lois Dauelsberg, ESA-TSE
James Jett, LS-5
C. Michael Montoya, DX-DO
Robert Reedy, NIS-2
Joseph Tafoya, ESA-WMM

25 years
Johnny Alarid, NMT-1
Dolores Archuleta, NIS-4
Steven Archuletta, LANSCE-5
Judith Broste, CIC-4
George Carlson, ESA-WE
David Cartwright, T
Robert Day, MST-7
Edward Fenimore, NIS-2
Margaret Gautier, NMT-1
Siegfried Gerstl, NIS-DO
Gilbert Gonzales, ESA-WMM
Jose Gutierrez, ESH-12
Jerry Halladay, CIC-9
Philip Hay, T-12
John Haynie, ESH-10
Emil Homuth, EES-7
John Immele, ALDTR
Charles Johnson, ESA-DE
Stephen Kemic, X-TA
Kyu Chull Kim, NMT-DO
Joseph Ladish, P-22
Frances Leclere, PM-2
Jerry Longmire, NIS-4
Barbara Lopez, BUS-8
Horacio Martinez, ESA-EPE
Joyce Martinez, CIC-1
Edward Perez, LANSCE-2
Johnny Quintana, ESA-WMM
Linda Randolph, HR-7
Connie Rivera, BUS-3
Jesse Salazar, ESH-1
David Smith, NIS-9
Janice Taylor, S-6
E.H. Trujillo, BUS-5
Eugene Walter, NMT-10
William Wilson, T-2

20 years
Charles Bonner, NMT-4
Mark Byers, DX-1
Pamela Finkbiner, ESH-12
Earl Hadden, P-26
Stephen Hidalgo, ESA-WMM
Robert Hixson, DX-1
Geraldine Lujan, BUS-8
Lorraine Medina, NIS-7
Mark Montoya, DX-5
George Papcun, CIC-3
Lawrence Quintana, LANSCE-7
Marjorie Sigler, DX-3
David Vaniman, EES-1
Mark Wilke, P-23
Mary Williams, CIC-18

15 years
Richard Anderson, NIS-6
Emma Barefield, CIC-2
W.M. Brittelle Jr., PMDS
Kathryn Burris, TSA-7
James Cruz, CIC-1
Linda Dilsaver, ESA-FM-ESH
Virginia Duran, BUS-7
Cynthia Eaton, CIC-15
John Fellers, PM-3
Jerrell Fleming, CIC-4
Virginia Grant, HR-5
Thomas Gravlin, DX-5
Gloria Johnson, NIS-IT
Debora Kerstiens, LANSCE-8
Lucille Maestas, X-HM
Brady Means, FWO-SWO
David Morris, CST-18
William Murray, NIS-6
Bobby Quintana, LANSCE-8
Melva Quintana, BUS-5
Yolanda Sanchez, HR-5
Gerald Sondreal, CIC-13
Lisa Woodrow, MST-OPS

10 years
Thomas Archuleta, P-24
Scott Briles, NIS-3
Mary Coker, CIC-1
L. Jonathan Dowell, TSA-4
Robert Dye, MST-7
Kenny Espinosa, NMT-13
Stewart Fischer, NW-SS
Marcia Fraser, NMT-3
David Goggin, CIC-13
Timothy Hammock, CIC-4
Marvin Hasenack, NIS-9
George Heindel, ESH-3
Donald Hickmott, EES-1
Judith Hochberg, CIC-3
Margaret Hubbard, T-3
Gene Jacquez, NMT-5
Janet Langone, HR-6
Bruce Letellier, TSA-11
Ernest Martinez, NMT-5
Charles Peterson, P-23
Helen Smith, ALDNW
Wayne Smyth, NMT-2
Mary Stevens, HR-2
Angelina Trujillo, NMT-11

5 years
Rachel Arguello, ESH-5
Rae Bennett, CIC-14
Shi-Yi Chen, T-CNLS
Yixiang Duan, CST-9
John Erickson, ESA-DE
Jeanette Gray, P-21
Steve Hildebrand, EES-4
John Hogden, CIC-3
Madhav Marathe, CIC-3
Patrick McClure, TSA-11
Judson Morhart, HR-TI
Linda Nelson, ESH-17
Margaret Powers, ESH-20
Ira Pray, CIC-14
Jay Schecker, STB-DSTBP
Billy Vigil, P-26

Nelson ...

continued from Page 8

includes the Advanced Recovery and Integrated Extraction System (ARIES) Demonstration Line and the Pit Disassembly and Conversion Facility Project, the U.S./Russian Pit Disassembly and Conversion Program, and electrolytic decontamination technologies.

Nelson joined the Lab in 1990 as a postdoc in Advanced Technology (NMT-6), working with advanced fluorinating agents and gas-solid kinetics. He became a staff member in 1992 and a project leader for electrolytic decontamination technologies when the Lab changed to the project leader organizational structure. In 1995 he became the project leader for the U.S. program for Pit Disassembly and Conversion.

Nelson received a bachelor's degree in engineering from North Dakota State University in 1980 and a master's degree in chemistry from the University of Iowa in 1984. He received his doctorate in chemical physics from Kansas State University in 1990.

Lab employee wins first-ever Walter Haelg Prize

Ferenc Mezei

Neutron scattering pioneer **Ferenc Mezei** of the Lab received the first-ever Walter Haelg Prize from the European Neutron Scattering Association.

Mezei, the visiting John Wheatley Scholar working in the Los Alamos Neutron Science Center (LANSCE) Division, received the award, along with 10,000 Swiss Francs, about $6,000, last month during the association's four-day European Conference on Neutron Scattering in Budapest, Hungary.

The award is named for Professor Haelg, the initiator of neutron scattering in Switzerland, who made a generous donation to fund the award. It will be given every other year to a European scientist for outstanding work in neutron scattering with long-term impact on scientific or technical applications.

"I feel particularly honored in that I'm the first person to receive this award," said Mezei. He also was the first John Wheatley Scholar, a distinguished scientific position created by Los Alamos for visiting scientists who bring expertise to the areas of neutron scattering, thermal physics or condensed matter physics.

Mezei received his bachelor's degree and doctorate in physics from Eotvos University in Budapest. His scientific career includes posts at the Central Research Institute for Physics (Budapest), Institut Laue-Langevin (Grenoble, France), the Technical University and the Hahn-Meitner Institut (both in Berlin).

science fun

The mysterious entrapment of upside-down water

This month's science experiment was prepared by Robert F. Benjamin of Hydrodynamic Applications (DX-3), who is collaborating with the AIMS (Activities Integrating Math and Science) Education Foundation of Fresno, Calif., on a book, "Spills and Ripples," about the behavior of fluids. The book, scheduled for publication next April, includes experiments with fluids for students in grades 5 through 9. A longer version of this activity is in the September 1999 issue of "The Physics Teacher" magazine.

Water usually spills from an upside-down jar or bottle, but not always. Here are some experiments to learn why. First, take a clean, empty container like a baby-food jar. Fill it full with tap water and carefully turn it over, holding it over a sink, trying to keep the water within the inverted jar. By "carefully," I mean hold your hand or index card over the top, turn over the jar, then gently remove your hand or card. I find that water always spills out.

Now try the same test with a clean, empty, travel-size Scope® mouthwash bottle or a similar bottle. Water will stay in the upside-down Scope bottle if I'm careful. How can this be? If water spills out of inverted bottles because of gravity or "water is heavier than air," then the water should spill just as easily from the Scope bottle as the baby-food jar, but it doesn't!

The Ripple Effect

Something else must be happening. Ripples! Ripples on the water surface play an important role. The "water surface" is a "fluid interface" because it's the boundary between one fluid (air — a gas) and another fluid (water — a liquid). The growth of ripples on fluid interfaces is important in nature and in projects at the Laboratory.

The surface of a pond is a more familiar fluid interface, having air above water. When ripples form on a pond during a calm day, they die away. However, when water is above the air and ripples form, the ripples get bigger and bigger, and we observe their growth as "spilling." In the baby-food jar test, water is above air; ripples formed at the water surface near the mouth of the jar and grew rapidly, so the water spills out.

When the opening is small, like the Scope bottle, surface tension of the water keeps the surface smooth and ripples are not formed, so they don't grow and the water stays put.

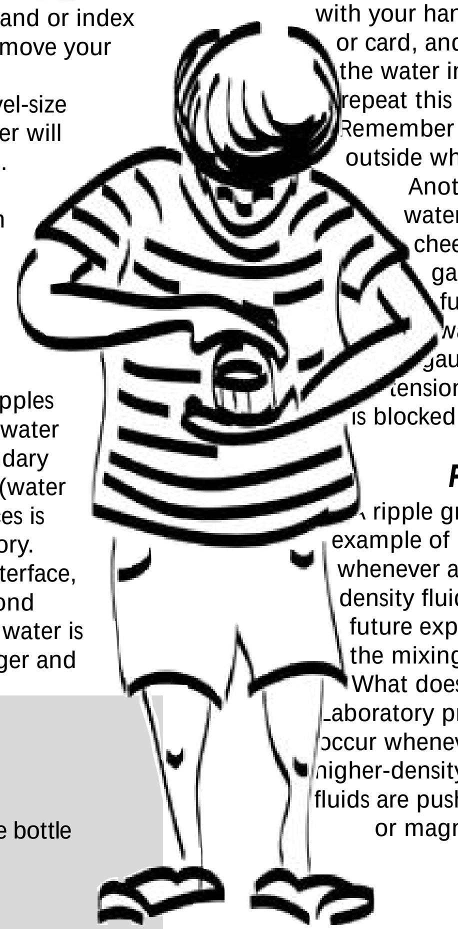
Diagram 1

Controlling ripples to contain water

Let's test this "ripple theory" on the baby-food jar. Surface tension alone will not keep the water surface smooth, but you can help surface tension with some simple materials. Fill the jar with water to the brim and cover it with a piece of facial tissue. Allow the tissue to get wet and smooth. You may want to use an elastic band to fasten the tissue to the jar, but that's not necessary. With the wet, smooth tissue covering the jar, carefully turn it upside down while supporting the opening with your hand or index card. Then remove your hand or card, and observe that the tissue amazingly keeps the water in the jar (Diagram 1)! You may want to repeat this experiment with larger jars and bottles. Remember to do the experiments over a sink or else outside where spilled water doesn't make a mess.

Diagram 2

Another material that can be used to keep water in the upside-down jar is gauze or cheesecloth. Cover the jar with a piece of gauze, fill the jar with water and then carefully invert the jar (Diagram 2). Again, water stays in the upside-down jar. The gauze in combination with water's surface tension keeps ripples from forming so spilling is blocked.



Rayleigh-Taylor Instability

A ripple growing at a water-above-air interface is an example of "Rayleigh-Taylor Instability," which occurs whenever a higher-density fluid is above a lower-density fluid like water above air. As we'll see in future experiments, Rayleigh-Taylor Instability affects the mixing of rivers and ocean water.

What does spilling water have to do with Laboratory projects? Rayleigh-Taylor Instability may occur whenever a lower-density fluid is pushing on a higher-density fluid. This occurs in experiments when fluids are pushed hard by explosives, intense laser light or magnetic fields.

Materials you will need:

- 1 empty, wide-mouth jar, like a baby-food jar
- 1 empty, narrow-mouthed jar, like a 1.5-oz Scope bottle
- Several index cards
- Several facial tissues
- Gauze and/or cheesecloth

This month in history

October

1492 — Christopher Columbus and his crew sight land in the present-day Bahamas

1859 — John Brown leads a group of 20 on a raid of the U.S. armory at Harper's Ferry, W. Va.

1896 — Dow Jones begins reporting an average price of certain industrial stocks

1933 — Albert Einstein arrives in the United States, a refugee from Nazi Germany

1945 — President Truman announces that the atomic bomb secret was shared with Britain and Canada

1956 — The International Atomic Energy Agency is established

1963 — The Limited Test Ban Treaty prohibiting atmospheric testing is signed by the United States, Soviet Union and United Kingdom

1972 — Vice President Spiro Agnew resigns and pleads no contest to tax evasion charges

1978 — Polish Cardinal Karol Wojtyla is elected pope, taking the name of John Paul II

1982 — The Tritium Systems Test Assembly at TA-21 is dedicated

1986 — The Weapons Neutron Research Facility is designated a national facility for neutron scattering

1995 — President Clinton accepts the final report of the Advisory Committee on Human Radiation Experiments

Syndicated material

Removed at the request of the syndicate

spotlight

The greyhounds of the horse world

by Nancy Ambrosiano

Kurt Sickafus and Hershey survey their trail-riding territory. *Photo courtesy of Sickafus*

Lanky and relaxed, with the long reach of a basketball player (and the knee brace of a battered athlete), Kurt Sickafus doesn't look like your average endurance racer. Sitting in his office in Structure/Property Relations (MST-8), where he's a project leader studying radiation damage to ceramic materials, he's just a tall, broad-shouldered man with a surprising number of computer monitors surrounding his workspace — and horse photos and ribbons on his door.

In fact, he's sort of a cross between pro basketballer Joe Kleine and the Marlboro Man. And since most top endurance horses are the greyhounds of the horse world, whiplike with slow-twitch muscle fiber and able to travel 100 miles in a day, it's a bit of a stretch to imagine him astride, burning up the desert for mile after mile. But hey, Sickafus, at 42, has enthusiasm, plenty of endurance and a big horse.

In a good summer, he says, he used to compete in four 50-mile rides, but that's diminished a bit as some of the rides have disappeared. Partly in reaction to the increasing loss of competitive opportunities, Sickafus and his wife, Talissa, have taken over organization of one ride. It's the annual "Chile Ride" competition that traverses 50 miles of trails in the Chimayó area trails and the Santa Fe National Forest.

The Chimayó Chile Ride is one of only two Northern New Mexico endurance rides now, offering a challenging choice of two trails: one 25-miler and one 50-miler, not for the faint of heart. And it's earned its stripes as a way to separate the gallopers from the plodders. The Chile Ride is a qualifying ride for the national endurance championships, making it a fairly hot tamale as these things go. Its riders come from New Mexico, Colorado, Arizona and Texas, ready to prove their mettle amidst the arroyos and the piñon forests.

Sickafus' description of the preparation of the trails, though, shows that the organizers' jobs are more grueling by far than merely racing the trail. It's months of trail clearing, coordinating with the various organizations over whose land they travel. The Frank Rand Boy Scout Camp, Bureau of Land Management, Santa Fe National Forest and Santo Domingo Cundiyo Grant are all part of the trail network set up by the Sickafuses.

In return for passing over the various owners' lands, the Sickafuses have built a team of trail blazers who take on the deadfalls, trash piles and underbrush, improving the land for users and owners alike. And according to Kurt Sickafus, the community is beginning to get into the event's activities. A banquet at Rancho de Chimayó is among the benefits of competing, and hotels and gas stations reap the benefits of serving traveling horsemen with their hungry, tired support teams and gas-guzzling trucks.

Talissa Sickafus has blazed her own trail as a serious competitor in this grueling sport. Her specialty is the five-day rides, where some 250 miles may be covered, often through some of the roughest territory in the country. "I'm too big to do those long rides, I wouldn't feel right about making my horse handle that much," says her husband. And besides, his noon basketball games are sufficient for general fitness, but it takes a full-time conditioning commitment to prepare for long-distance racing.

Kurt Sickafus has been enjoying the sport of endurance racing since just before he came to Los Alamos from Arizona in 1989. He was introduced to the sport "at a ride near Tucson where we were looking forward to seeing some hotshot woman from Los Alamos," who turned out to be Corry Clinton, a Pajarito Acres resident who remains a top competitor and who provided them with a mare from which they bred one of their first endurance horses.

The Sickafuses now own four horses, two current competitors and two semi-retired horses who've earned a rest. They are stabled in Chimayó.

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