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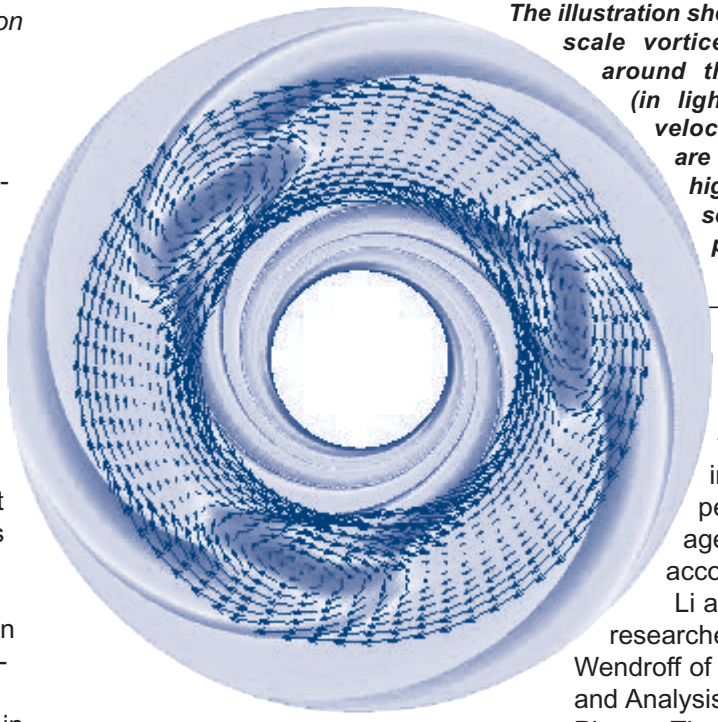
The magnetic universe

The following is a condensed version of an article that appeared in the Spring 2001 issue of "Xwindows."



The illustration shows the formation of large-scale vortices in an accretion disk around the black hole. Pressure (in light blue) is overlaid with velocity arrows. The vortices are anti-cylones enclosing the high-pressure region. Large-scale spiral waves also are produced in connection with the vortices.

Researchers in the Applied Physics (X) and Theoretical (T) divisions recently have compiled a sample of nearly 100 giant radio galaxies powered by black holes.

A typical giant black hole forms when 100 million solar masses are packed into a region the size of the solar system, creating an extraordinary deep potential well. Researchers have estimated that a total gravitational energy equivalent to nearly 10 billion of supernovae is released during a typical formation, garnering the prize of being the largest energy production process in the present universe. Modern astronomical observations suggest that giant black holes were more active in the past, when the universe was only a fraction of its current age.

So where did all that black hole energy go? Intense radiation, powerful winds and enigmatic magnetic fields are three of the most important channels for transporting this energy away from the black holes. Some models suggest that the radiation released when black-hole systems formed in the early universe is responsible for reionizing the universe after recombination. But to a large extent, radiation has very little dynamic impact once the matter becomes very dilute. Similarly, kinetic winds tend not to propagate very far before losing most of their energy within the galaxy.

But enigmatic magnetic fields are a different story. Working with the University of Toronto, Hui Li of Plasma Physics (X-1) and Stirling Colgate of Theoretical Astrophysics (T-6) have accounted for a significant fraction of a black hole's energy in magnetic fields.

The magnetic energy is carried away in the form of neatly lined-up columns of magnetic fields that propagated to a distance slightly larger than the average separation distance between galaxies. The field's unique nature of containing a large amount of energy while occupying a limited volume causes magnetic fields to remain dynamically important for a long time, perhaps as long as the age of the universe, according to Li.

Li and a team of other researchers, including Burt Wendroff of Mathematical Modeling and Analysis (T-7) and John Finn of Plasma Theory (T-15) have developed a comprehensive theory of the accretion process — an increase in the mass of a celestial object by the collection of surrounding interstellar gases and objects by gravity — and have confirmed the theory by extensive hydrodynamic simulations.

Li says that researchers are just beginning to understand the pieces of the picture and the results are encouraging. There is increasing evidence that we should view the evolution of the universe as a magnetohydrodynamic phenomenon rather than a process dominated only by gravity and hydrodynamics.

Director's News

Director presents integrated management at all-employee meeting

Becoming one customer-focused Laboratory is the challenge, and how we're going to do it was Director John Browne's message to employees at an all-hands meeting Aug. 22.

We are a can-do Laboratory, Browne noted in his viewgraphs. "When we get responsibility, authority and accountability aligned with resources, we are dynamite — we must create this atmosphere everywhere." This realignment is going to require some fundamental changes in the way the Laboratory manages its efforts, he said.

Browne said that those who are responsible for delivering the work will set the goals, priorities and metrics for carrying out programs assigned to the Laboratory under a more unified, customer-focused organization. There will be clearer internal lines of authority and responsibility and more direct relationships between those carrying out the work and customers, especially the National Nuclear Security Administration, he said.

The new system results from a recently completed study recommending five initiatives that include integrating line and program organizations, dividing the nuclear weapons program into smaller units and engaging those responsible for product delivery in work planning.

The study's recommendations and comprehensive discussions of related issues by Laboratory employees are available at *http://int.lanl.gov/taskforce/director/* online.

Browne said the goal of this new management system is four-fold:

• fix long-standing problems with the line and program management matrix;

• increase accountability at all management levels and in the workplace;

• improve customer relations and credibility so Los Alamos is seen universally as a "can do" laboratory; and

• develop current and future leaders by placing responsibility, authority and resources close to where the work is done, so employees can demonstrate capability to succeed.

Divisions will be aligned into six associate directorates: Weapons Physics, Weapons Engineering and Manufacturing, Threat Reduction, Strategic Research, Operations and Administration. Browne encouraged employees and managers to focus

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ISM Corner

Drive Safely Work Week is Sept. 10-14

The ability to do multiple tasks in the workplace is a skill most managers desire in their employees. However, when this skill is attempted behind the wheel, it can be deadly. That is why the Lab is participating in Drive Safely Work Week, Sept. 10-14.

Sponsored nationally by the Network of Employers for Traffic Safety and at the Lab by the Positive Health Directions Program of Occupational Medicine (ESH-2), the key safety issues targeted by the campaign are designed to combat distracted driving and encourage the use of safety belts and child passenger safety seats.

Those who complete an online "Get Your Car in Order Day!" checklist, will be eligible for a drawing. Three winners will receive an Auto Voice Memo Recorder.

Professional racecar driver and author Denise McCluggage will talk about driving distractions and traffic safety in the Administration Building Auditorium in Technical Area 3 at 10 a.m. Sept. 11. The talk is sponsored by the Integrated Safety Management (ISM) program office and the ISM Grassroot Safety Volunteers.

For some safe-driving tips, see "Stay alert — safe driving is a full-time job" on Page 3.

LANL

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Director …

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not on the organization-chart boxes but instead on the interactions between the boxes.

The typical Laboratory employee won't see major changes in his or her job or in group and team structures, but should see, through the functioning of Integrated Product Teams (IPTs), clearer assignments, clearer expectations and quicker decisions, Browne said. Management's chief responsibility will be to bring the right people into the IPTs and ensure they have the authority to make decisions.

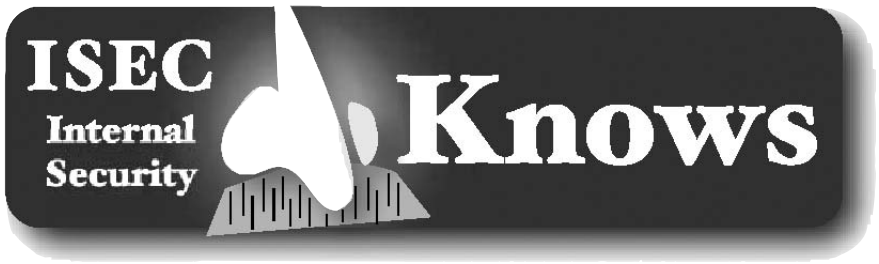
Browne will chair a Nuclear Weapons Council that will set and manage overall program directions, allocate resources in a more timely way, assess performance against deliverable work and set standards for leaders performance. Under the council's guidance, directorates, divisions, groups, teams and even principal investigators will join in specific, project-focused IPTs.

Also noting that at least 800 employees are projected to leave over the next five years, Browne said that placing responsibilities where the work is done will help achieve one of his key goals: developing the leaders of the future and ensuring they have the skills and flexibility required to complete projects and move to even greater challenges.

John McTague, the University of California's new vice president for laboratory management, heartily endorsed Browne's plan.

Browne said the realignment, which will include appointments of key senior managers from among internal candidates, should be completed by Oct. 1.

The director concluded that he plans to listen carefully to customer feedback and use a variety of metrics to steer the new process. "It has to start with me, and I have to start demonstrating that I will hold people accountable for their actions … Accountability to me doesn't mean chopping people's heads off. Accountability is about helping them achieve what [we're] all trying to do."



Elicitation, it's more than conversation

by Kevin Roark

In the espionage trade, elicitation is the term applied to subtle extraction of information during an apparently normal and innocent conversation. Conducted by a skillful collector, elicitation appears to be normal social or professional conversation and can occur anywhere, in a restaurant, at a conference, over the phone — sometimes called "social engineering" if the elicitor is trying to get a password or hack/crack into a computer system — or during a visit to one's home.

According to the handout from the Department of Energy's Office of Counterintelligence, "Elicitation, more than just a conversation," elicitation exploits several fundamental aspects of human nature, when used as an intelligence gathering technique.

Most people want to be polite and helpful, so they will often answer questions even from relative strangers. This is especially true when someone calls and asks for information over the phone. There is no way to guarantee that the individuals on the phone are actually who they say they are.

Most people want to appear well informed about their professional specialty and so may be easily tempted to say more than they should.

Everyone wants to be appreciated and to feel like they are doing something important and useful. As a result, people often talk more expansively in response to praise about the value or importance of their work.

Open and honest people are often reluctant to withhold information, lie or be suspicious of other's motives.

Because elicitation is so subtle and difficult to recognize, any suspicious conversations should be reported to Counterintelligence at 5-6090.

Stay alert — safe driving is a full-time job

Thoughts for the Road

• Distracted driving is estimated to be a factor in between 25 to 50 percent of all traffic crashes — that's between 4,000 and 8,000 crashes every day.

• Distracted driving is the presence of anything that can distract a driver's physical and mental attention from driving.

• Driver instructors estimate that a driver makes an average of 200 decisions during every mile they drive. This leaves no room for multitasking while behind the wheel.

• According to a recent survey, drivers in the United States now spend a total of 500 million hours a week in their vehicles.

Got Kids?

• Be sure they are properly secured in an age-appropriate, child passenger safety restraint.

• Provide them with things to do (books, travel games, etc.) to distract them so they're not distracting you.

• Don't hesitate to actually follow through with stopping the car. Just be sure to pull over where it's safe and legal to do so.

Hertz Foundation Fellowship Program s

by Leah Gardner

For three months this summer, 12 students from the Hertz Foundation Fellowship Program came to work at the Laboratory. For some of the students it would be the first time they traveled west of Buffalo, NY. For others, it would be the farthest and the longest they were ever away from home. Still for others, it would be the first time they had lived in a city with less than half-a-million people. For all the Hertz Foundation scholars, however, working at the Laboratory was a great experience and many of them said they would come back.

"My overall experience has been academically and scientifically fantastic," said Katherine Porter of Hydrology, Geochemistry and Geology (EES-6). "The Lab is awesome," said David Danielson of Electronic and Electrochemical Materials and Devices (MST-11). "It's a great place to do science."

The students worked at various places throughout the Lab. The organization and a brief synopsis of their work follows:

David Danielson, a California native, worked in Electronic and Electrochemical Materials and Devices (MST-11) under mentor Eric Brosha. Danielson completed his undergraduate studies in materials science and engineering at the University of California, Berkeley. He will start his first year at the Massachusetts Institute of Technology in the fall. Danielson is very interested in photovoltaics and eventually hopes to work on bringing renewable energy to underdeveloped nations. This summer at the Laboratory, Danielson worked on developing an electrochemical sensor that tests the amount of odorant (ethylmecaptan) in propane. "This group of students really represents a cross-section of the nation," said Danielson, "There are lots of different people from lots of different states."

Chris Hurst of Security Plans and Programs (S-1), who worked under mentor Bruce Layman this summer, is a graduate of the United States Military Academy at West Point. Hurst will be an engineering officer at Fort Leonard Wood in Missouri. Hurst, who is "looking forward to a career in the Army," has enjoyed working at the Lab this summer. "Bruce is one of the smartest people I've met. He challenges me in a lot of different ways," said Hurst. This summer Hurst has been working with S-1 to determine potential invasion routes at the Laboratory.

Seth Jonas of High Explosive Science and Technology (DX-2) worked under mentor Steven Son. He is studying explosives, shock wave analysis and materials detonation. Jonas has been attending the University of Central Florida. He will

Automotive baron fosters scientific spirit

"What do I owe my country?" is a question John Daniel Hertz, founder of the Hertz Foundation, often asked himself. Hertz came to the United States a poor Austrian immigrant, fleeing the oppression in Central Europe. After arriving in the United States, Hertz became a living testament to the "American Dream." Hertz transformed from a poor immigrant to a prominent leader at the advent of the automotive age. As a result of his good fortune, Hertz felt he owed a debt to his new country for the opportunities and privileges he never would have known in his home country.

The establishment of the Hertz Foundation in 1957, which provides graduate research money to the top science and engineering students, was Hertz's attempt to repay the debt he felt he owed the United States. Hertz felt that to preserve its greatness, America needed to attract the most competent engineers and applied scientists in the world.

Currently Greg Canavan of the Physics (P) Division is the chairman of the board of the Hertz Foundation. Lab Director John Browne also sits on the board of directors. Their association with the foundation, along with collaborative efforts on the part of the Education Programs Office in the Science and Technology Base Programs Office (EPO/STB), may continue to bring students from the Hertz Foundation Fellowship Program to the Laboratory.

The application process for a fellowship is grueling; it begins in August of every year. Step one includes completing an extensive online application. After applications are reviewed, approximately 250 of the 600 applicants are invited to a one-on-one interview conducted by a former Hertz Fellow. After completing the first interview, approximately 100 select students are invited to a second interview. Both interviews are extremely technically oriented consisting of questions such as, "Tell me how the Panama Canal works." Students are notified in April whether they received the fellowship or not. All fellowships are renewable for up to five years.

All selected fellows are required to make a moral commitment before they accept the fellowship to make his or her "skills available to the United States in times of national emergency." One example given of a time of national emergency was the Manhattan Project.

For more information on the Hertz Foundation or on the fellowship program, go to *http://www.hertzfoundation.com/* online.

students work at the Lab this summer

be starting his graduate schooling in the fall at Johns Hopkins University.

Alan Kastengren of Engineering Sciences and Applications Engineering Analysis (ESA-EA) was mentored this summer by Michael Prime to develop a method for measuring residual stresses. Kastengren completed his undergraduate studies in mechanical engineering at Iowa State and will attend the University of Illinois in the fall. Kastengren hopes to become a professor, but would also enjoy working at the Lab. "It's a great place to work," he said.

Originally from Memphis Tenn., **Amina Kinkhabwala** of Biophysics (P-21) recently graduated from Columbia University where she was a physics major. She plans to attend the State University of New York at Stony Brook in the fall. Kinkhabwala spent this summer working in P-21 under the mentorship of Robert Kraus and Michelle Espy. She was using Superconducting Quantum Interference Devices to measure the magnetic field corresponding to action potentials in lobster and crayfish. Kinkhabwala hopes to continue in both research and teaching.

Joe McKeown, a recent graduate in materials science from the University of California, Berkeley, is back at Berkeley as a graduate student. McKeown worked in Structured Property Relations (MST-8) this summer under mentors Harriet Kung and Amit Misra. He has been developing thin-film multilayers of copper and silver. He has been varying the thickness of the thin films and studying the effects on the strength of the thin films.

Joel Miller of Mathematical Modeling and Analysis (T-7) and former Hertz Fellow worked under mentor Mac Hyman this summer. Miller has plans to attend Cambridge University.

Katherine Porter of Hydrology, Geochemistry and Geology (EES-6) is a second year graduate student at Cornell University. She is studying geochemistry. Porter completed her undergraduate studies in geology at the University of Delaware. This summer Porter worked with George Guthrie in EES-6. Porter was working on carbon-dioxide sequestration using the platinum group elements in green minerals called serpentinites. The goal is to manufacture a power plant that uses coal, but produces no emissions. This summer Porter also presented a technical paper at the Student Symposium in Santa Fe. She won the "Best Technical Paper" presentation for materials science. Porter would like to teach after she receives her doctoral degree.

Joseph Rule of Actinide, Catalysis and Separations Chemistry (C-SIC) worked at Technical Area 48 this summer under mentor Tom Baker. He is working on the synthesis of ligands to make quantum dots water soluble, which may have technological implications. Rule completed his undergraduate studies at Alberton College of Idaho where he studied chemistry and math. He is attending graduate school at the University of Illinois, Urbana-Champaign. Rule is one of two students at the Lab this summer who received a Hertz Fellowship. Other program participants were semi-finalists for the fellowship. Rule hopes to be a professor or work in industry in research and development.

Erik Stauffer of Hydrodynamics and X-Ray Physics (P-22) worked with George Nickel this summer. His project for the summer was to try to send a high-definition television signal to a regular television. Stauffer was an electrical engineering major at the University of Illinois, Urbana-Champaign. He is attending Stanford University to begin graduate studies in electrical engineering. He would like to be a university professor.

Neal Tanner of Austin, Texas, is the second student at the Lab this summer who received a Hertz Fellowship. Tanner completed his bachelor's degree in mechanical engineering at the University of Texas. He will attend Stanford University in the fall in pursuit of a doctorate in mechanical engineering. This summer Tanner worked in Engineering Sciences and Applications Engineering Analysis (ESA-EA) with mentor Chuck Farrar. His project was to develop a wireless method for structural health monitoring. "My overall experience this summer has been incredible," said Tanner. "I would love to get a chance to come back here and work."

Brent Weinberg worked on image reconstruction this summer with his mentor John George in Biophysics (P-21). Weinberg graduated from the University of Tennessee with a bachelor's degree in engineering science. He will attend Case Western Reserve University to pursue a doctoral degree in biomedical engineering. He hopes to eventually conduct computational research in a medical field of some kind.

Neal Tanner of Engineering Sciences and Applications Engineering Analysis (ESA-EA) is one of 12 students from the Hertz Foundation Fellowship Program that worked at the Lab this summer. Tanner's project with ESA-EA was to develop a wireless method for structural health monitoring. *Photo by Leah Gardner*

Paul G. Weber

Paul G. Weber has been named the new division director of the Earth and Environmental Sciences (EES) Division. Weber's primary technical experience is in plasma physics, space and atmospheric sciences, and remote sensing. Weber worked most recently on a special assignment to the Threat Reduction Directorate Office. Before that, he served in a number of leadership positions in the Nonproliferation and International Security (NIS) Division. Before joining the Laboratory, Weber worked as a research associate in the applied physics and nuclear engineering department at Columbia University. Weber's bachelor and doctoral degrees in physics are from the Flinders University in South Australia.

Anthony Scannapieco

Anthony Scannapieco is the new group leader for Integrated Physics Methods (X-3), which combines theoretical and computational research in areas vital to the mission of the nuclear weapons program. He received his doctorate from Dartmouth and spent four years at the Naval Research Laboratory. He moved to Los Alamos in 1976 to join the Inertial Confinement Fusion group to work in theoretical and computational physics associated with fluid instabilities endemic to inertial fusion capsules.

Stradivari …

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department at the Smithsonian. The Newnams asked for a private showing of instruments in the collections.

At the Library of Congress, Robert Sheldon, curator of its collection, arranged for the Newnams to see and play the collection of instruments in a private session.

The Stradivarias they played were made between 1670 and 1730, said Newnam. Brian Newnam also played several Nicolo Amati violins and one viola, which were made in the mid 1600s.

Newnam said a Stradivarius violin today is worth an estimated $500,000 to $4 million, with the low-end figure for an instrument not in good condition.

Newnam also got to play a Guarneri violin, which was made in 1733. Giuseppe Guarneri made violins in Cremona, Italy, between 1710 and 1775.

Newnam said his favorite Stradivarius at the Library of Congress was the Betts Stradivarius, which he said was made in 1704. "It was in near perfect condition. Wonderful," said Newnam.

"I played a dozen of them before when I lived in Los Angeles. This time we saw and played 11 Stradivari violins. … They have variable sounds, but you could recognize the tone.

"Stradivari violins are very willing and easy to play. Everything is clear and ebullient. All the notes are there with no difficulties in different positions. Naturally, you handle them carefully."

BENEFITS BUZZ

The number of doctors in Northern New Mexico is almost exactly the median number expected based on the total population. Most of those doctors are concentrated in Los Alamos and Santa Fe.

In Memoriam

John Paul Brucker

Laboratory retiree John Paul Brucker died July 27. He was 64. Brucker received his bachelor's and master's degrees in mechanical engineering from the University of Colorado in 1966. He came to work for the Lab in 1983 as a staff engineer in mechanical design with the former Laser Pulse Power Systems (P-7). Brucker was responsible for designing numerous components and assemblies for the Antares pulse generators to improve performance and enhance maintainability. He retired as a technical staff member while working with Engineering Sciences and Applications (ESA-EPE).

Harry Earl Ballance

Laboratory retiree Harry Earl Ballance died June 5. He came to work for the Lab in 1953 as a chemical engineer in the former High Explosives and Implosion Systems (GMX-3). Ballance received his master's degree in chemical engineering from Virginia Polytechnic Institute in1950. He retired from the Lab while working as an associate group leader in the former Fabrication and Assembly (WX-3) in 1980.

Shay N. Dresback

Laboratory retiree Shay N. Dresback died June 19. Dresback served in the U.S. Army Air Corps as a Radio Operator from 1944 to 1946. He received a bachelor's degree in physical science with concentration in chemistry from Arizona State University in 1952. He came to work for the Lab in 1954 with the former High Temperature Chemistry (CMB-3) and became a staff member in 1961. Dresback retired from the Lab in 1984 while working with the former Quality Assurance (MST-9).

Laboratory celebrates Hispanic Heritage Month with series of talks

by Steve Sandoval

The Laboratory will observe national Hispanic Heritage Month with a series of lectures beginning in mid-September.

Hispanic Heritage Month is observed nationally from Sept. 15 through Oct. 15. The Laboratory's Hispanic Diversity Working Group is sponsoring several activities during Hispanic Heritage Month.

"One way to increase awareness of diversity at the Laboratory is by taking part in local, regional and national cultural observations such as Hispanic Heritage Month," said Eluterio Garcia of Tritium Science and Engineering (ESA-TSE) and chairman of the Lab's Hispanic Diversity Working Group.

The first lecture is tentatively scheduled Oct. 3 by historian and geneaological researcher Jose Esquibel of Santa Fe. Esquibel will talk about "New Mexico Genealogy and the Five Waves of Spanish Colonization, 1598-1821."

Esquibel has co-authored two books and contributed to three anthologies on New Mexico history. His research and writing has focused on the history and genealogy of New Mexico families.

In addition, Taos High School teacher and writer Larry Torres is scheduled to speak about the history of New Mexico.

"I think we can gain some knowledge or insight from hearing these two speakers. I'm personally looking forward to it," said Garcia.

Check the online Daily Newsbulletin at *http://www.lanl.gov/newsbulletin* for times, locations and dates of the scheduled talks. All of the talks are free and open to Lab workers.

"We hope that all Lab employees will join us in celebrating the traditions of the Hispanic people of Northern New Mexico," said Garcia.

More information about Hispanic Heritage Month can be found online at *http://www.lanl.gov/orgs/dvo/hdwg/.*

News from UC

University announces high-leverage collaborations between campuses and labs

The University of California announced the selection of 11 high-leverage research projects and exchanges to be carried out collaboratively between two of its national laboratories and several campuses.

The projects and exchanges were chosen competitively and will be funded at a level of $1.5 million total per year.

The laboratories are Los Alamos and Lawrence Livermore national laboratories, operated by the university for the National Nuclear Security Administration.

Five research projects were ultimately chosen from 60 proposed, and six exchanges were chosen from 17 proposed. The collaborations are the latest in a six-year program that was founded in 1995.

Following are the five projects selected:

• [under review] A study aimed at changing the characteristics and improving the performance of semiconductors by injecting electrical charge and magnetic orientation.

• A study of how low levels of unwanted radiation exposure that occur near a tumor during radiation therapy affect the genes and proteins in nearby healthy tissue.

• [under review] Through ultra-precise measurements using a technique called accelerator mass spectrometry, a study to better understand the interrelationship between human habitation, environmental change and impact on plant and animal life in the deep ocean.

• Development of noninvasive techniques for the diagnosis of breast cancer using optical lasers.

• Development of new capabilities in medical imaging using gamma-ray detectors that were originally developed for astronomy.

Following are the six exchanges:

• A materials science study with a range of applications: for example, radiation damage, solid exide fuel cells and ceramic reactor fuels.

• A study, in hopes of leading towards a vaccine, of the pathogenic characteristics of the bacteria chlamydia, which has been implicated in a range of illnesses from respiratory infections to heart disease, stroke, attacks on the central nervous system and Alzheimers.

• Development of catalytic flow technology for very small, long-lasting fuel cells to provide power for telemetry and other remote applications.

• A study using accelerator mass spectrometry of the means by which carbon can be stored in or released by the soil and the implications of such for climate change and global warming.

• Development of targeting agents to make cancer cells more susceptible to damage by radiation and thereby improve the effectiveness of therapy using injected radiopharmaceuticals.

• An integrated modeling study to promote smart growth in urban areas by taking into account emergency planning issues such as wildfires and storm runoff.

A 'Stradivari' experience at the Smithsonian

by Steve Sandoval

Brian Newnam of the Lab's Superconductivity Technology Center (MST-STC) and his wife Kay recently went to Washington, D.C., where they had the opportunity to play many of the violins in the collections of the Smithsonian Institution and the Library of Congress. *Photo courtesy of the Newnam's*

In 1965, Brian Newnam had a chance to purchase a Stradivarius violin for $20,000, a steal even 36 years ago.

But $20,000 was then a king's ransom for an undergraduate student getting ready to enter graduate school. He didn't purchase the violin.

That same violin today is probably worth anywhere between $1 million and $2 million, said Newnam, deputy director of the Lab's Superconductivity Technology Center (MST-STC) and an accomplished musician.

Newnam and his wife, professional musician Kay Newnam, know a lot about violins. Newnam began playing at age 5; his first performance before an audience was while in kindergarten at a Christmas concert.

"I've played almost all my life," Newnam said, noting that his brothers also played instruments and his mother played piano. "I was the most serious one of the family."

Newnam said he got his start when someone came to his childhood home in California selling lessons to the National Institute of Music and Arts, an association of teachers that provide violin lessons. His folks signed him up.

"I even thought of music as a career at one point, however, I was not really of the caliber to become a professional musician when you have to make that choice. And science was definitely an attraction to me," he said. So Newnam took his degrees in electrical engineering and physics and went to work for TRW and Douglas Aircraft Co. in California before joining the Laboratory in 1972.

"I was drawn here by the philosophical aspects of contributing to the energy solutions, plus the reputation of Los Alamos," said Newnam, who also has worked in free-electron laser and laser isotope separation programs here.

Newnam did play semiprofessionally with different orchestras in the Los Angeles area where he grew up, and at age 20, took lessons from a well-known teacher "who thought I could use some professional instruction," he said.

It was in Los Alamos where Newnam met his future wife. Kay was concertmaster and soloist for 20 years with the Orchestra of Santa Fe. She also played the last two years with the Santa Fe Opera and with Santa Fe Pro Musica's chamber orchestra, small ensembles, as well as for the popular coffee house concerts in Fuller Lodge.

The Newnams perform with local symphonies, in string quartets and enjoy impromptu chamber music evenings with musical friends in their Los Alamos home. "That happens fairly frequently," he said.

Brian Newnam plays in the Los Alamos Symphony, a community orchestra, and both Newnams play in the San Juan Symphony in Durango, Colo. Brian plays viola, Kay the violin.

Newnam said the Beethoven and Mozart symphonies and string quartets are his favorites to perform. "Many musicians will tell you that. Each person who's playing has one part for which you're entirely responsible," said Newnam. "How you play it is very important to the success of the piece. There's a blend of the four instruments, two violins, viola and cello. It's a very stable combination."

Recently, the Newnams were in Washington, D.C., where they got to play many of the violins in the collections of the Smithsonian Institution and the Library of Congress.

Kenneth Slowik, a cellist and conductor of the Santa Fe Pro Musica, is the director of the music instrument

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