February/March 2005

ON TARGET

THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY • A DEPARTMENT OF ENERGY FACILITY

# JLab plans Open House for Saturday, April 16

## *Call goes out for volunteers to staff Lab's World Year of Physics event*

Jefferson Lab is planning its World Year of Physics Open House for Saturday, April 16.

"What a great way to celebrate the World Year of Physics," says Linda Ware, Jefferson Lab Public Affairs manager. "Our last Open House was about two years ago. We always look forward to this event because it gives everyone here the opportunity to share their work and the Lab's accomplishments with the public." The event will be free of charge, open to the public, and start at 9 a.m., rain or shine.

Parts of every major area of the facility will be open. In addition to a section of the CEBAF accelerator, visitors will be able to enter Halls A & C, the recently renovated CEBAF control room, the Free-Electron Laser Facility and the Computer Center. A variety of displays will be set up in the Test Lab; and the Lab's data acquisition activities and tech transfer endeavors into medical imaging will be on display in the Applied Research Center. Also this year, participating universities will have several laboratories on the first floor of the Applied Research Center open.

In addition to highlighting the latest physics research and technology developments underway at Jefferson Lab, the event will include a variety of hands-on, science education-oriented activities for the young

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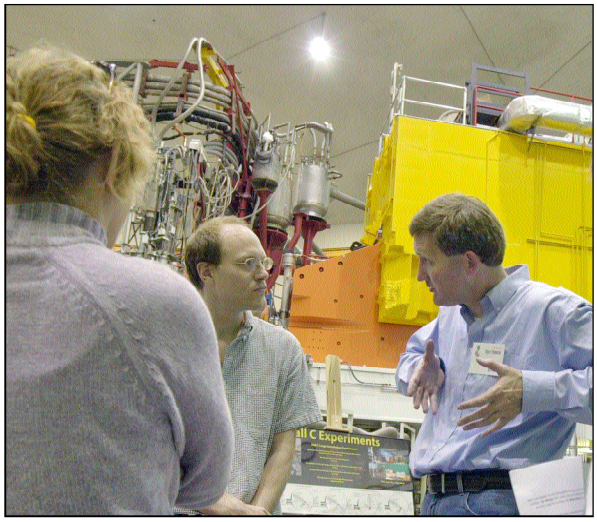

Above, Hall C Leader Rolf Ent discusses the dynamics of an experiment with visitors in Hall C; and below, Steve Gagnon, Science Education, pours liquid nitrogen during the 2003 Open House.

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and young-at-heart, provided by JLab, local universities that conduct research at Jefferson Lab, regional museums and government agencies.

"We've put out the call for volunteers among staff and their family members and our user community. Youth ages 13 and up may volunteer for selected postings," Ware adds. "We will need a large number of volunteers to staff a variety of posts for the day, or to assist with various activities. A partial list of volunteers includes bus stop monitors; hands-on activity assistants; cryo demo assistants; crowd control for the FEL, Halls A & C, ARC, CEBAF Center, tunnel and Test Lab; staffing the Information Desk; handling souvenir sales; greeters and runners. We need informed, outgoing individuals to ride the shuttle buses, greet our guests and tell them about the Lab and what they can see at the Open House."

For a list of all the volunteer positions and to sign up for a specific task, visit JLab's intranet Insider page, which is accessible by logging on from www.jlab.org/. Shifts will run from 9 a.m. to 4 p.m. The Director's Council has approved pay for hourly employees to work this event. For additional information about Open House volunteer positions, contact Janet Prater, Physics Division, at ext. 7587 or email prater@jlab.org. An Open House volunteer training and question & answer session will be scheduled for the week of April 11. Volunteer nametags and information packages will be handed out at that time.

Open House posters are available to anyone at the Lab who would like to help get the word out about the event. Stop by the Public Affairs office (B208 in CEBAF Center) to pick up posters for your scout troop, church, social group or professional organization.

Public parking for the Open House will be at the Canon Virginia parking lot located at 12000 Canon Boulevard. Free special-event buses will shuttle visitors from the Canon parking lot to JLab (about a 3-minute bus ride) on a regular schedule from 9 a.m. - 2 p.m. The last bus bringing guests to the Lab will depart the Canon parking lot promptly at 2 p.m. The last bus returning visitors to the Canon parking lot will leave JLab at 4 p.m. Handicap and group parking will be available on site. Handicap visitors and bus groups should contact Sarah Ingels, 269-7444, to make arrangements for parking. For more information and directions to public parking, visit www.jlab.org/openhouse/.

Christoph Leemann
Jefferson Lab Director

# Tight budget environment brings importance of science communication to forefront

# From the Director

Dear Colleagues:

President Bush plans to cut the U.S. budget deficit in half over the next four years by reducing discretionary funding. That means we can expect reduced or flat Department of Energy (DOE) budgets and consequently reduced or flat Office of Science and nuclear physics budgets for the next several years. In this time of tightening budgets, and increased competition for the fewer federal dollars that will be available, raising the importance of basic research through the use of science communication becomes ever more crucial.

Communicating JLab's science and communicating it well is no easy task, but it is something I and senior Lab management take very seriously. We have increased the number of visits we make to Virginia's local and regional elected officials to make sure they understand the short- and long-term benefits of Jefferson Lab's basic research program. We also regularly contact Virginia's Congressional Representatives and Senators, or their staff, to keep them informed of Jefferson Lab's accomplishments as well as apprised of funding projections for basic research and the impacts to the Lab. And to underscore the importance of nuclear research on a national level, Brookhaven National Lab Director Praveen Chaudhari and I are working to make a joint visit to Capitol Hill. Our state and federal officials have a firm understanding of the scientific, academic, technological development and economic benefits that the Lab brings not just to our local communities, but also to the Commonwealth and the nation.

Our User Community is highly organized and motivated and is working to increase the Office of Science research budget and funding for Jefferson Lab's research program. Individual users have begun contacting their own Congressional representatives. These critical efforts can bring about broad-based support in Congress for an increased science budget.

We are demonstrating the Lab's worth as a technological development incubator and a vital cog in the technology transfer process — communicating the possible commercial, industrial or defense applications for the technologies we use and excel in — the Lab's superconducting radiofrequency capabilities, the Free-Electron Laser, and the medical-imaging developments of our Detector Group, to name just a few.

Lab management is working diligently to maintain the Lab's visible profile within the Department of Energy's Office of Science and in our professional community. Lab staff and users must remain committed to conducting outstanding research and publishing the results in a timely manner and at the highest level of professionalism. Building momentum for the Lab's future is based on communicating the exciting research underway here today. Public Affairs staff can assist Lab scientists and our users with publicizing Jefferson Lab research results and other notable accomplishments in the local and national news media.

None of us should be shy about communicating the Lab's accomplishments to the larger scientific community. By participating in meetings and conferences such as the American Physical Society and the American Association for the Advancement of Science, volunteering to help with these conferences and other workshops, and developing top-notch posters and presentations for these events, you play a vital role in getting the word out on the Lab's research program. Many leaders in our field attend these professional events, and I encourage you to seek recognition for the great things we're doing here. That means taking the time to apply for APS fellowships, R&D 100 awards, patents and other forms of professional recognition.

*Continued on page 15*

The High Resolution Kaon Spectrometer collaboration posed for a group photo at a recent meeting at Jefferson Lab. In the front row (left to right) are collaborators Lulin Yuan, Victor M. Rodriguez, Osamu Hashimoto, Tanja Horn, Leon Cole, Mizuki Sumihama, S. Nue Nakamura and Toshinobu Miyoshi. In the back row (left to right) are Akihiko Matsumura, Pavlo Baturin, Yuichi Okayasu, Stephen A. Wood, Ed V. Hungerford, Liguang Tang, Joerg Reinhold and Hiroshi Nomura.

# Tohoku University leads HKS collaboration

## New experiment to create particles thought to be in neutron stars

*by Kandice Carter*

The spectacular Crab Nebula was created in the first supernova ever recorded. Noted by Chinese astronomers in 1054 A.D., the exploding star released so much energy that it remained visible in full daylight for more than three weeks; and during that time, it was the brightest star in the sky except for our own sun. The nebula, an expanding cloud of debris from the explosion, can still be seen with the naked eye in the constellation Taurus.

In 1968, astronomers discovered a neutron star, the remnant of the star that went supernova, at the center of the nebula. Neutron stars are the most dense objects known in the universe. For instance, the Crab's neutron star is only about 19 miles across, yet it is more massive than the Sun. Now Hall C users and scientists are aiming to recreate a microcosm of this crushing environment right here on Earth. Using CEBAF's electron beam in Hall C, Experiment E03-103 will create hyperons, strange particles thought to reside in neutron stars.

Matter inside a neutron star is different from that found on Earth. On the surface, you're likely to find normal atoms built of protons, neutrons and electrons. But some astronomers speculate that deeper inside the star, different combinations of the basic constituents of matter exist, including Lambda hyperons — the particles JLab researchers want to create.

According to Osamu Hashimoto, a Hall C user from Tohoku University in Japan and lead scientist on the experiment, "The Lambda hyperon is very similar to a proton or a neutron, but it has a strange quark, giving it so-called strangeness." Hashimoto and his colleagues aim to produce Lambda hyperons, or Lambdas, inside the nucleus of the atom to learn about the nucleus and about matter that contains strange quarks, like neutron stars.

By producing a Lambda hyperon inside a nucleus, the scientists will transform an ordinary nucleus into a hypernucleus. "The ordinary nucleus consists of protons and neutrons. That means, in quark terminology, that the ordinary nucleus is made up of up quarks and down quarks — just two kinds of quarks. The Lambda hypernucleus contains three kinds of quarks: up, down and strange quarks," Hashimoto explains.

### HKS & Evidence of Lambdas

The experiment, scheduled to begin in June 2005, will christen a new spectrometer: the High Resolution Kaon Spectrometer (HKS). The spectrometer was built at a cost of a few million dollars and was funded by Japan's Ministry of Education, Culture, Sports, Science and Technology. Hashimoto says HKS was designed to see particles called kaons. The presence of these particles will signal that the experiment has produced Lambdas inside nuclei.

In the experiment, researchers will send a 1.8 GeV (billion electron-volt) beam of electrons into a target. Individual electrons will strike the protons and neutrons in the nuclei of

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the target atoms. The researchers are interested in those electrons that collide with protons to form Lambda hyperons.

When an electron slams into a proton, a shower of elementary particles, including quarks and gluons, pop into existence. When two strange quarks appear (or more accurately, a strange quark and an anti-strange quark pair), the struck proton may become a Lambda hyperon by swapping an up quark for a strange quark.

The up quark spit out by the proton and the second strange quark (the anti-strange quark) created in the collision bind together to form a kaon. This new particle then travels out of the nucleus. "So the signature of producing hypernuclei is detection of this kaon," explains Satoshi Nakamura, an associate professor at Tohoku University and an experiment collaborator.

Hashimoto, Nakamura, and their collaborators conceived, designed and built the HKS specifically to detect these kaons with high precision. Hashimoto says, "In an earlier experiment, we showed that we could detect kaons with Hall C's short orbit spectrometer. But in this experiment, we're bringing in the new, big spectrometer, specially designed for kaon detection."

It took four years for the collaboration to build the HKS. The magnets were built in Japan and then shipped to Jefferson Lab for assembly. HKS' detector package was also built in Japan and tested at KEK, the High Energy Accelerator Research Organization and Laboratory of Nuclear Science, Tohoku University in Japan. The package was then taken apart and shipped to JLab for reassembly. Installation is currently underway in Hall C. Hall C staff and researchers are spending five months installing more than 40 pieces of equipment for the experiment, running beam tests and commissioning the apparatus, before the data run commences in June.

## How HKS Works

As particles created in the collisions in the target come flying out, many of them will enter the HKS. The first thing this beam of particles will encounter are HKS's magnets. "The HKS has a combination of three magnets. The two smaller magnets, Q1 and Q2, are quadrupole magnets. They act as sort of a lens to focus the beam," Nakamura explains. Then, the third magnet will bend the paths of the particles around a curve and into a drift chamber, a detector designed to measure the particles' position and angle. "By bending a particle's path, we can measure its momentum. We would like to measure kaons, but in reality, there will also be a lot of protons and pions, so we need to separate the kaon from these," he says.

The next series of detectors are designed to do just that. In the first chamber, the particles encounter a sub-

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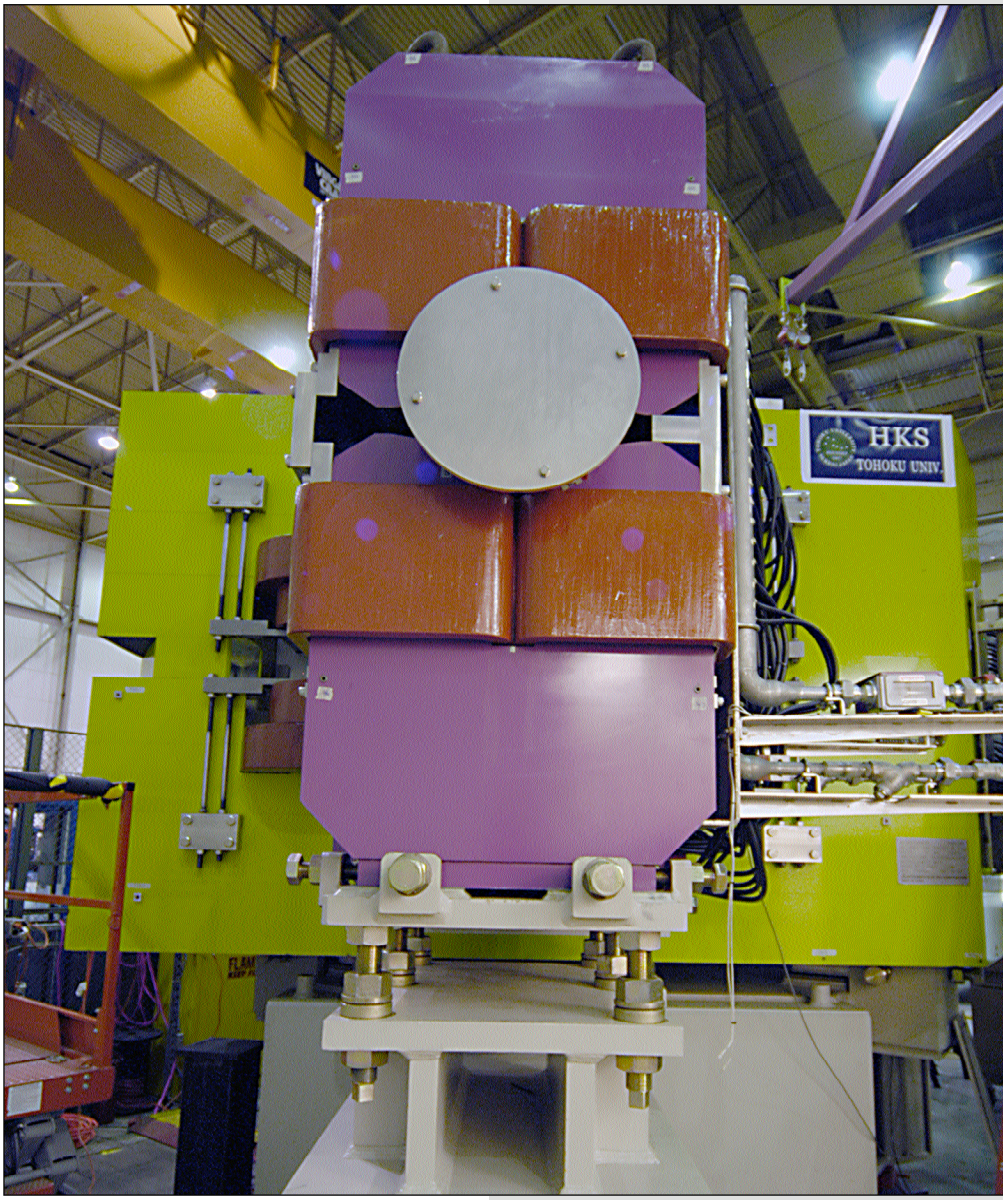


The High Resolution Kaon Spectrometer was assembled for testing in the Test Lab. It is now being reassembled in Hall C. The HKS Collaboration includes more than 50 researchers from six different countries, including 14 members based in Japan. The experiment is scheduled to run June 18 – Aug. 7.

# Detector Group develops new cancer imager

## Duke Medical Center successfully tests PEM device

*by Kandice Carter*

One in every seven women will develop breast cancer in her lifetime. For many women, regular mammograms allow doctors to diagnose breast cancer in its early stages. But now a positron emission mammography (PEM) unit developed by Jefferson Lab's Detector Group may one day allow doctors to catch tumors that mammograms miss.

A study published in the February issue of the journal "Radiology" shows that a positron emission mammography (PEM) device designed and built by JLab scientists is capable of imaging breast cancer tumors. In the pilot study, conducted by Duke University Medical Center researchers, the unit imaged 18 malignant tumors in 23 patients receiving additional screening due to suspicious mammograms.

For many women, regular mammograms allow physicians to spot breast cancer tumors as dense lumps in the breast. But mammography often fails in women who have dense breast tissue due, for instance, to genetics or scarring. According to Eric Rosen, M.D., a Duke University Medical Center physician and lead author on the study, "In women with dense breasts, it's very hard to pick out even large anatomic abnormalities."

Stan Majewski, Jefferson Lab Detector Group Leader and principal investigator on the instrumentation part of the project, led the team that designed and built the PEM unit. He says PEM imaging works differently than mammography. It reveals breast tissue that is showing higher metabolism than other areas. "The imager we built is a functional imager. That is, it indicates something about physiology, which can be different from anatomy," he says.

To fuel rapid growth, cancer cells use more glucose (sugar) than surrounding cells. In this imaging procedure, a small dose of radioactive molecules that look like sugar, called fluorodeoxyglucose (FDG), are injected into the body, where they're absorbed by cancerous tumors. The PEM device pinpoints tumors in breast tissue by detecting the location of FDG uptake. As the radioactive material in the molecule decays, it emits a particle called a positron. The positron is the anti-particle to the electron, so this positron is immediately attracted to the nearest electron. These particles collide and are annihilated, emitting two photons that fly away in opposite directions. The PEM device detects these two photons and uses a complicated algorithm to reveal where the original positron came from, revealing the location of the tumor the FDG's been gobbled up by. "By detecting areas that have increased glucose metabolism, you can often distinguish a cancer between normal surrounding tissue, which in general has low uptake of FDG," Rosen says.

For the study, Duke physicians recruited patients with suspicious mammograms who were scheduled for biopsies. "We recruited 23 patients that had 23 lesions that were highly suggestive of malignancy. PEM showed 20 lesions, 20 abnormalities, of which 18 were cancer and 2 were not cancer," Dr. Rosen says. The PEM unit missed three tumors, all of which were located very close to the chest wall, an area that PEM doesn't image well. And of the 20 lesions spotted by the PEM system, one was not picked up by mammography. A subsequent biopsy revealed that this additional lesion was cancerous.

"We wanted to make a difference with this imager. Our expertise in building detectors for Jefferson Lab's nuclear physics program allowed us to build a device that's sensitive to the presence of the radioactive molecule, FDG," Majewski says, "And now we're seeing the results of that. They detected an additional lesion that was not on mammography. That can directly impact patient care."

Dr. Rosen says the study was indeed a success, "What we concluded is that our PEM unit is capable of detecting cancer, it's capable of demonstrating small breast malignancies, and that it can be performed in

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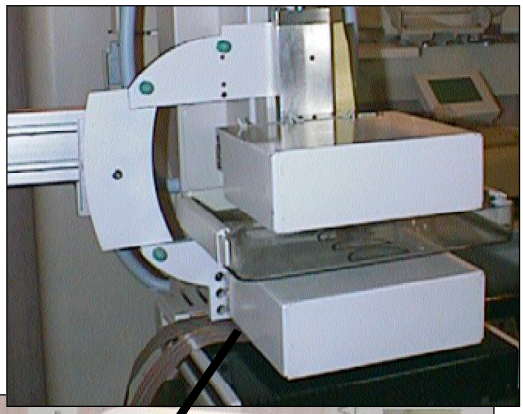
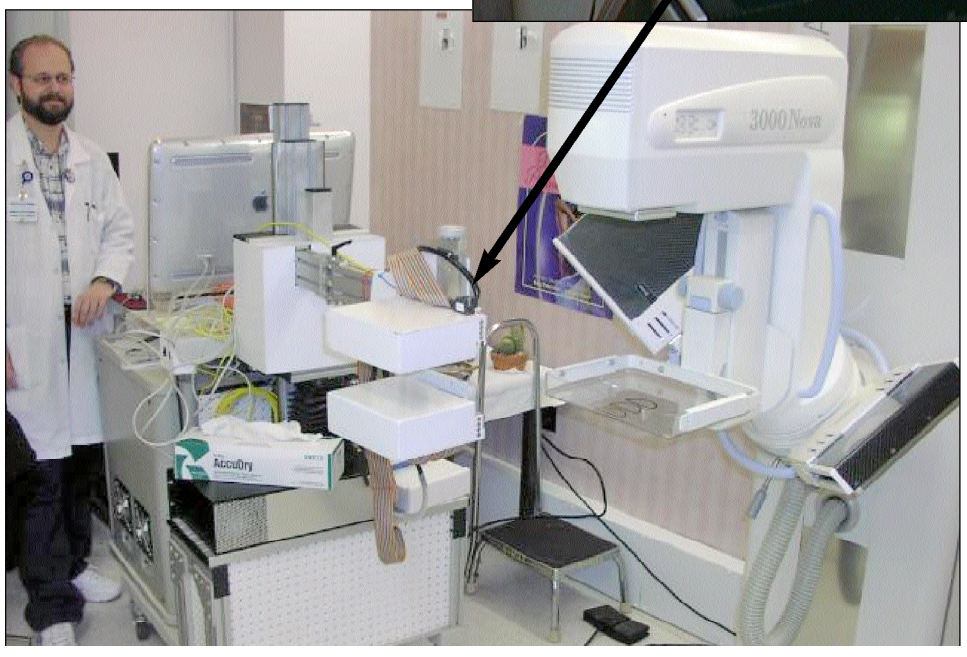
the breast clinic with a small dose of FDG and a very short, 5-minute acquisition time."

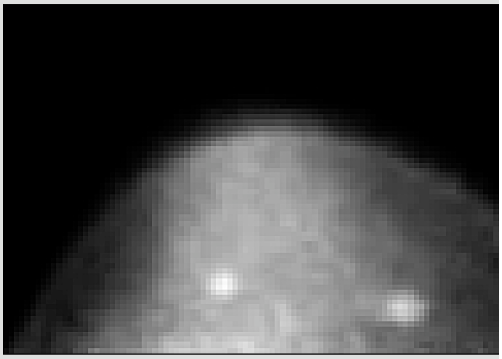
The Jefferson Lab/Duke team is now modifying the PEM system and imaging procedure to allow for better detection of lesions located near the chest wall. Dr. Rosen says the next step is to figure out what size and types of cancer tumors the unit is best capable of detecting, exactly how sensitive the unit is, and where it fits in the cancer screening process. "So now what we want to do is study a larger population and study a more representative population of patients," he says. The National Cancer Institute has funded a larger study that will include 200 patients to begin answering those questions.

JLab's Detector Group has taken on many projects that take advantage of their detector-building expertise. In addition to the PEM unit discussed here and the small animal imager at Case Western Reserve University, the Detector Group is also involved in a project to convert their PEM unit in to a heart imager, a prostate cancer-screening device and a brain cancer imager. Other projects include an effort to build an imager that will allow doctors to monitor delivery of high-dose radiation therapy to desperately ill cancer patients and a unit to image live animals in real-time. These projects are all funded via individual research grants from the DOE Office of Science's Office of Biological and Environmental Research, the National Institutes of Health, the National Science Foundation, the National Cancer Institute, and other agencies.






The PEM unit (shown on the left below, and up close in the inset photo at right) was designed and built by JLab Detector Group scientists. A recent study proved the unit is capable of imaging breast cancer tumors. A standard x-ray mammography unit sits to the right of the PEM device. Image courtesy of Tim Turkington, Duke University Medical Center



This PEM image shows two cancerous lesions. The one on the right was depicted by conventional mammography, but the one on the left was only identified by the PEM unit. Image courtesy of Eric Rosen, Duke University Medical Center

# JLab's Copy Center

## Staff always ready for the next job

*by Judi Tull*

From their tiny office on the second floor of the CEBAF Center lobby (room L203A), Scott Lucas and Kaydee Moore (and now Carlin Mills), the Lab's Copy Center subcontract staff, crank out about 200,000 copies a month. They also oversee and are responsible for the two-dozen copiers placed in work areas throughout the campus.

Lucas and Moore both work for Document Technologies, Inc., which staffs the Lab's Copy Center for Electronic Systems, Inc., the company that has the contract for the Lab's copy services. The machines are provided and serviced by Electronic Systems.

The responsibilities of the Copy Center are far reaching, Lucas said. "We do everything from drawings to posters, announcements, and research papers," he noted. "We also prepare binders and materials for presentations."

If it's on paper, they do it. They can also handle folding, hole-punching and sorting of materials. They make runs in their own golf cart four times a day to pick up and deliver orders, including delivering orders that have come in through the on-line job ticket system. With that system, anyone working at the Lab can upload their documents, tick off their requirements and order the work with a click of their mouse. Most of the work area copiers on site also are networked printers that collate, staple and print two sided (and are also cheaper per page than most laser printers). JLab employees and users can access the on-line job ticket and instructions for using the networked copiers through the Copy Services web page on the Lab's website. Lucas and Moore will provide training on how to use the copier network — as well as any of the copy machines on campus.

Although the copy machines and printers throughout the Lab only create black and white copies, the copy center has two color machines, including a big top-of-the-line Canon color printer/copier that can crank out a startling 50 color pages per minute. Unlike other color printers, this one

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From left: Scott Lucas, Carlin Mills and Kaydee Moore. Lucas recently received a promotion from DTI and no longer works at JLab. Moore is the new site manager for the JLab Copy Center contract. She is assisted by new staff member, Carlin Mills.

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uses a toner that is so fine it actually looks and behaves like water when its jug is shaken. The fineness of the toner and the super-heat used to fuse it to the paper prevent it from smudging, even if you try to smear it with a wet hand as soon as it comes out of the machine. "There's nothing faster or achieving better quality in the industry," Lucas added.

The high-speed black and white copier in the Copy Center turns out pages at a rate of 105 pages per minute, also the best performance in the industry.

The Copy Center uses all recycled paper, a Department of Energy requirement, for all its black and white work. Lucas and Moore regularly deliver paper to printers, copiers and fax machines across the Lab campus.

They came to JLab shortly after ESI secured the four-year contract in 2001. Having previously worked together as copy technicians at a law firm, they know each other's work styles well and can anticipate how a job should be approached. Each of them carries a two-way pager 24 hours a day so they can respond immediately to any situation. "We're here to accommodate the Lab staff," Lucas said. "In most cases, we can talk the person through whatever the problem is." Most of the problems that crop up are simply a case of someone pushing the wrong button.

As site manager for the contract, Lucas attends monthly quality meetings with representatives from ESI, DTI and JLab. They discuss any problems that have occurred in the previous month and new technology. "It keeps us all on the same page," he noted.

They're accustomed to producing rush jobs, but pushed the envelope of capabilities late in 2002 when special documents needed to be printed for the Director's Office. According to Lucas, during a 15-day period, they produced 125,000 color copies, something that a representative of Canon told them was likely a record for that machine.

With their high-end technology, Lucas can pull up monthly production reports from the remote networked copiers and check on problems right on his PC instead of having to go to each machine.

While Lucas and Moore rarely read the documents that come through the Copy Center, they do look copy and print jobs over for format problems; both of them have signed DTI confidentiality agreements prohibiting disclosure of any information they have access to.

"Sending your work to the Copy Center not only saves time but money as well, averaging 4-cents less per black and white copy and 40-cents less per color copy than if you use a laser printer. And, in the end, the quality you get is much better," Lucas said. "And with an e-document, each copy is an original, which can save even more money."

Scott Lucas and Kaydee Moore have a simple message for Lab staffers. "Use us, that's what we're here for."

*Editor's note:* Scott Lucas has recently received a promotion from DTI. His last day at JLab was Feb. 17. JLab wishes Scott the very best in his new job, and congratulates Kaydee Moore as the new site manager for the JLab Copy Center contract. Also, welcome aboard to Kaydee's new assistant and copy technician, Carlin Mills.

## For more info...

Jefferson Lab's Copy Services are managed by Electronic Systems, Inc. The contract provides the convenience copiers located throughout the Lab with related supplies and service. It also provides staffing and equipment for the Copy Center to perform high speed/volume copying services, including binding and color copying.

For more information about the range of services and training provided, visit: www.jlab.org/div_dept/admin/business/procurement/copy-service/


The Thomas Jefferson High School for Science and Technology Science Bowl 2005 team includes (front row, left to right): Coach Sharon Baker, Charlotte Seid, Sam Lederer and Lisa Marrone, and (back row, l. to r.): Matthew Isakowitz and Logan Kearsley. Image by Steve Gagnon

# Science Bowl champs get ready for Nationals

## Thomas Jefferson High School wins regional tourney

The intensity was palpable. Sixteen rounds of multiple choice and short answer science and math questions conducted over eight hours culminated in an academic face off between the reigning champs, Thomas Jefferson High School for Science and Technology (TJHSST) and Princess Anne High School on Feb. 12 at the Virginia Regional Science Bowl.

Once again TJHSST dominated the Virginia Regional High School Science Bowl. The team has won both the regional tournament and the national competition for the last three years. Now, with a fourth regional win under the team's belt, it is poised to defend its grip on the national title.

The day started with many of the 22 teams arriving before 8 a.m. By 9:20 the competition was underway. Seven round-robin sessions later the teams broke for lunch and the top eight teams moved on to the afternoon's double-elimination semi-final and final rounds.

Early in the afternoon the Charlottesville team faced off against TJHSST, and put up a hard fight but ceded to its opponents' lightning-fast reflexes on the buzzer and ability to correctly answer a higher percentage of the 10-point bonus questions. The final round started at 4:30 p.m., as Princess Anne took on TJHSST. Princess Anne had one loss during the afternoon action while TJHSST remained undefeated. Despite an intense effort, Princess Anne fell to TJHSST, 142 to 44.

Finishing in first, the TJHSST team, from Alexandria, Va., took home a check for $1,000 for its school, a team trophy, and individual medallions. The team will now compete at the Science Bowl Nationals in Washington, D.C., April 28 - May 2. The second place trophy and a $750 check for its school went to the Princess Anne team from Virginia Beach, Va. For third place, the Charlottesville High School team from Charlottesville, Va., received a $500 check and a team trophy. The fourth place trophy went to Kempsville High School, also from Virginia Beach.

Many of the 14 teams that didn't move into the semi-final afternoon rounds participated in a series of brainteaser math and science activities during the afternoon. Performing the best during this series of Stay All Day Activities and earning a $300 check for its school was the team from Piedmont Governor's School of Math and Science Technology from Collinsville, Va.

"The event went very smoothly and was a huge success. Our JLab volunteers did a great job," said Jan Tyler, Science Education manager. "We were delighted with the turnout and the number of teams competing for the first time this year. We hope they decide to come back next year."

"The scientific knowledge and understanding the students demonstrated was incredible," Tyler added. "An event like this is a great way to promote education, academic excellence and an interest in math and science. These events give us the opportunity to encourage and motivate young minds. By hosting the regional science bowl, Jefferson Lab is able to show support for science education in Virginia and to encourage our youth to pursue higher educations and careers in science and math. Again, thanks to all of the volunteers; we couldn't do these events without them."

This is the fourth year running that JLab has hosted the Virginia Regional Science Bowl. This nation-wide, academic competition among teams of students has been sponsored by the Department of Energy for the past 15 years. Each team is made up of four to five students and a teacher who serves as an advisor and coach. Contestants answer multiple choice and short answer questions in the categories of chemistry, biology, physics, mathematics, astronomy, and the general, earth and computer sciences.

*Editor's note:* The March 5 Middle School Science Bowl results are reported on page 13.

# In their own words


## with Hall B physicist Latifa Elouadrhiri

*as told to Judi Tull*

I was born in Mekenes, Morocco, and knew from the time I was a teenager that I wanted to be a physicist. I thought that I would be a physics professor because, at that time, I had no idea you could be a researcher. Teaching was as far as my imagination took me.

I studied in public schools in Morocco and attended the University of Rabat there for my undergraduate work. When it came time for my master's degree, I faced the first of many difficult decisions. I'd lived at home right through college — I am one of eight children — and I'd never been more than 20 kilometers from home, but I knew that the best place for me to study would be in France. So I entered Clermont-Ferrand for my Ph.D. program and made the switch then from theoretical to experimental physics.

I built many, strong collaborations at Clermont-Ferrand and it was there that I developed an enduring interest in the future of physics. And one of the many things I learned was that the future of physics is here, at Jefferson Lab. It's one of the most fascinating and unique places in the world to do this kind of physics.

After receiving my Ph.D., I faced yet another decision. I could return to Morocco, with its great food and great people, and I could teach there, but I wouldn't have the opportunity to do research. With encouragement from my professors and advisor, and an incredible amount of support from my family, I came to the United States and took a post-doc position at the University of Massachusetts at Amherst.

I grew up speaking French and Arabic, and spoke almost no English when I arrived. It was like learning to swim by jumping into the deep end of the pool. I didn't have time to take an English course, so I just avoided talking to people who spoke French or Arabic and immersed myself in speaking English. I gave myself six months — if I hadn't learned it by then, I would just leave. Everyone around me was so helpful to me and so supportive in explaining how you say things here. They were far more tolerant than people elsewhere are of people who don't speak their language.

I spent three years at Amherst, and then had another decision to make. I had applied and been accepted at Centre National de la Recherche Scientifique (France) where I would do full-time research but I was also accepted for a joint position here at the Lab and at Christopher Newport University. It was a risky step to take at that time, but I based my decision almost entirely on my dream of coming here to work.

So I came here in 1994. I found that I really loved teaching, especially the challenge of teaching introductory physics courses to young students who didn't particularly want to be there. I used peer instruction and a lot of interaction, and it was fascinating and wonderful to see them come to love physics. It gave me so much energy every day. Then my greatest dream came true — in 2001 I received a full-time staff position in Hall B. I get to work with a lot of post-docs and students, so there is still an opportunity to be involved in education, even though I'm not teaching in front of a class.

I am the coordinator of the detector calibration group and one of the spokespersons for the DVCS (deeply virtual Compton scattering) experiment that will take place in March. I'm also working on the analysis of the existing 6 GeV data with the standard CLAS (CEBAF Large Acceptance Spectrometer) set up. I'm also deeply involved with the upgrade process and I'm looking forward to playing a major role there.

Working in physics is demanding. It's not a job you do from 9 to 5, and young scientists must be aware of that. But if it's your passion, it's the thing for you to do. I believe that people have to do something they are passionate about. If you don't have that passion, you don't give it your all.

Although I don't have a great deal of free time, I do play volleyball and tennis. I've just started to run, and recently completed a half-marathon at

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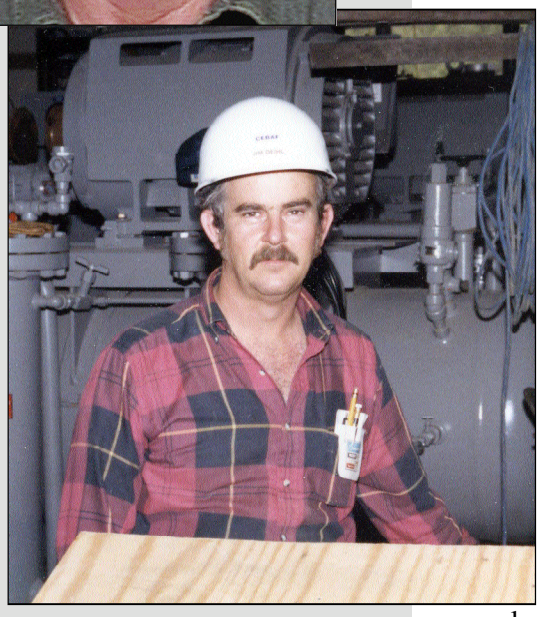
# In Memoriam

## JLab mourns death of Jim Deihl



Jim Deihl, 54, the Cryogenics Fabrication Shop Supervisor and a longtime member of the Accelerator Division, passed away Feb. 12 after an extended illness. He joined the Cryo group on Feb. 8, 1988.

"He worked his way up in the construction industry, from helper to journeyman to supervisor," reminisces Steve Knight, a JLab Senior Physics Technician and longtime friend and co-worker of Deihl's. "Jim was a pipefitting supervisor for Brown & Root Construction Company for 15 years before coming to work at the Lab. Even back then, he was a no-nonsense, 'old school' kind of guy. You were ready for work at 7, took a 30-minute lunch, and you worked until 5:30. If there was a job to be done, you did it, no excuses."

"He had a huge job in front of him when he started working here and very tight deadlines. Everywhere we have cryo piping, he worked it. Even when he became a supervisor, he was always in there getting dirty and doing the work. Jim always strived to do the very best he could," Knight continues. "He was the kinda guy who would wake up in the middle of the night with an idea on how to improve the cryo system or a new way to do something."

A couple of Deihl's first projects included commissioning the Cryogenic Test Facility behind the Test Lab and installing the transfer lines for the north and south linacs. Next, he was part of installing the transfer lines from the End Station Refrigerator to the halls. Then his work took him to the Central Helium Liquefier where the Cryo group was installing compressors, interconnecting piping, installing transfer lines, and fabricating the 2K (Kelvin) cold box and the standby refrigeration system. By the mid-90s, Deihl was supervising the team that was laying the cryogenic transfer lines for the Free-Electron Laser. "Jim was the 'installation' guy," says Brian "Smurf" Murphy, Cryogenic Associate Coordinator. "He really knew his stuff and was a hard worker, and he was always proud of the work he did."

"We were hired early on in the CEBAF construction process within a week of each other. Jim worked pipefitting and I handled the components and hardware," Murphy recalls. We were usually the first in and last out of an area. "Wherever liquid (refrigerant) needed to flow, we were there putting the system in. We did whatever needed to be done. It was an exciting time."

For a time, Deihl did a fair amount of traveling, going to places like Louisiana, Texas, New York and California to oversee the preparation and shipment of refrigerators for JLab. That was followed by an extensive amount of work by Deihl and the rest of the Cryo group, putting together Michigan State University's refrigeration system, including the cold box, integrated system piping and the cryo distribution system. Creating and building the cryogenic system for the Department of Energy's newest research facility — the Spallation Neutron Source in Oak Ridge, Tenn., has been among Deihl's and the Cryo group's most recent work.

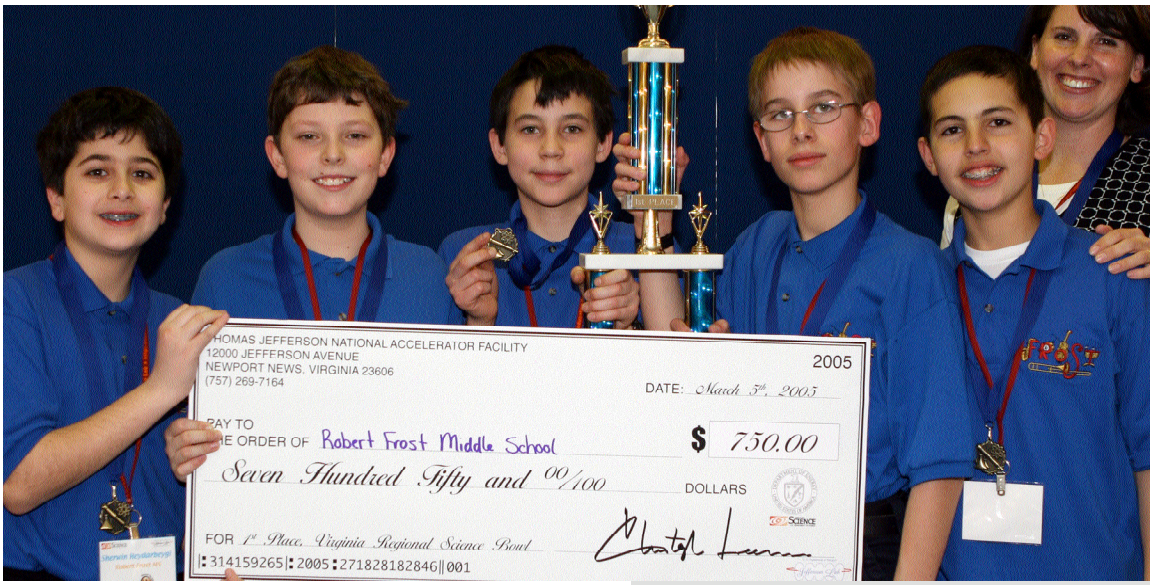
Away from the job, Deihl enjoyed tinkering with his cars, an El Camino and a Chevelle. He liked to power boat, and he dearly loved his wife, Robin. "Jim was a great friend and a good man," Steve Knight says. "We had a lot of fun times together. This has been a shocking loss."

"Jim's vision in arranging the work crews to bring out the best from every one, and his knowledge of rigging and handling of large equipment will be very hard to replace. We in the Cryo group depended a lot on his large construction experience. It is hard to imagine the JLab Cryo fabrication shop without his leadership. He will be sorely missed," says Rao Ganni, Deihl's supervisor and the Cryogenics Deputy Group Leader.

"The cryogenic core competency at Jefferson Lab is truly unique, special and precious — it is a national resource. Therefore, the loss of a talented member of the Cryo group is not only a loss for the Accelerator Division, but also for the entire Laboratory and beyond — a loss for the worldwide cryo community," says Accelerator Division Associate Director Swapan Chattopadhyay. "We will miss Jim dearly."

# Next stop is Nationals

## Maryland team wins Virginia/ Maryland Regional Middle School Science Bowl




Robert Frost Middle School won the Virginia/Maryland Regional Science Bowl hosted by Jefferson Lab on March 5. The team includes (left to right) Sherwin Heydarbeygi, Jacob Hurwitz, Christian Haudenschild, Krzysztof Franaszek, Zohair Asmail and team coach, Clara Asmail. Image by Steve Gagnon

Eleven middle schools from Virginia and Maryland competed in the Virginia/Maryland Regional Middle School Science Bowl, March 5 at Jefferson Lab. At the end of the day-long academic competition, Robert Frost Middle School from Rockville, Md., came away with first place. Salem Middle School, Virginia Beach, Va., took second; St. Pius X School, Norfolk, Va., placed third and Chancellor Middle School from Fredericksburg, Va. finished in fourth.

Finishing in first place earned the Robert Frost team a berth at the Middle School Science Bowl Nationals in Golden, Colo., June 27–29. There are two competitions at the National Middle School Science Bowl — an academic math and science competition and a model fuel-cell car competition. The academic competition is a fast-paced question-and-answer contest where students answer questions about earth science, physical science, life science, math, and general science. The model fuel cell car competition challenges students to design, build, and race model cars.

Robert Frost Middle School's first-place finish earned the team members individual medallions, a team trophy and a $750 check for their school. Salem Middle School took home a $500 check for their school and the second-place trophy. St. Pius X School went away with the third-place trophy and $400 for their school and Chancellor Middle School rounded out the top finishers with the fourth-place trophy and $300 for their school.

For more information about the Middle School Science Bowl Nationals, visit: http://www.scied.science.doe.gov/nmsb/default.htm/.

## In their own words...

*Continued from page 11*

Virginia Beach. I've taken up running because it's something you can always do, even if you're traveling, and you can do it alone so you don't have to look around for a partner or a coach. All you need is your shoes.

I haven't traveled much in America. When I have the time and money, I usually return home for a visit at least once a year. Living away from Morocco has given me a new view of many things, and has actually helped keep me closer to my family. You don't take people for granted when you don't see them every day.

I love working at Jefferson Lab. For me, it is the most exciting place to be. It is a place where everyone works very hard to create a research and educational environment — an environment where we continually learn, grow and adapt. It is an educational environment that is about critical thinking, team building and problem solving. In working with students, I learn about their unsolved challenges and work with them toward solutions. And I work with my colleagues to meet our daily challenges and to come up with the next exciting physics idea.

# Briefs

## Milestones
### for Jan./Feb. 2005

**Hello**

Gregory Nowicki, Computer Center Security Analyst, Physics Division

Kelly Krug, Projects Financial Analyst, Directorate

Joan Thomas, Free-Electron Laser Scientist, Accelerator Div.

Dennis Miner, Program Development Engineer, Directorate

**Goodbye**

Gordon Baker, Senior Technologist/Designer, Accel. Div.

Teresa Haagsma, Staff Administrator, Finance Office

Heather Singleton, Staff Administrator, Administration Div.

## Children to work day set for April 28: online registration starts April 4

Jefferson Lab's Take Our Children To Work Day (TOCTWD) — set for April 28 — follows on the heals of the Lab's April 16 Open House. "That's why we're starting early to get the word out about this popular, annual event. We don't want people to miss it or forget about it in the buildup for the Open House" notes Dave N. Abbott, Science Education.

"So we have adequate supplies for the number of youth that will attend, we ask everyone who plans to bring a child to register their children on line between April 4-25," Abbott requests. Web-based registration will be available through JLab's Insider page as well as the Science Education web page. TOCTWD is open to the children and grandchildren — in first through sixth grades — of JLab employees, contractors and users.

On April 28, sign in will take place in the CEBAF Center lobby from 12:30 to 1 p.m. The event will run from 1-5 p.m. with all activities taking place in or around CEBAF Center. This year's theme is "safety," Abbott adds. And we're planning activities to engage, entertain and inform the students.

Mary Jo Bailey, Office of Assessment, kicks off the afternoon talking to the youngsters about bike helmet safety, followed by a "smashingly" exciting demonstration. Over the course of the afternoon, students may develop protective packaging for a single potato chip or participate in activities involving bike safety, fire safety, electrical safety or food safety. Students will be grouped by age/grade and will spend about 30 minutes on an activity before rotating to a new activity.

A showing of the movie "Osmosis Jones", starting at 3 p.m. in the auditorium will round out the afternoon. Osmosis Jones, a PG-rated (bodily humor), animated, action/adventure demonstrates the perils of food poisoning.

"And we'll have popcorn for everyone to munch on," Abbott adds. "Parents are welcome to participate with their children during the afternoon activities. We do ask that parents who go back to their work areas for the afternoon pick their children up promptly at 5 p.m.

Parents may bring their children for the entire day and keep the youngsters with them during the morning. Child friendly lunch items will be included on the menu at Quark Cafe that day.

"We also need six to 10 adult volunteers so each group has an adult escort with them as they rotate through the activities," Abbott adds. To volunteer, or for additional information, contact Abbott, ext. 7633 or email davida@jlab.org.

## JLab holds successful United Way Day fundraising drive

JLab's 2004 United Way Day, held Oct. 27, was very successful, according to Tina Johnson, Human Resource assistant and United Way campaign coordinator. "The number of participants increased with 179 individuals submitting donation forms; and we raised $53,400.48 — nearly a $3,000 increase over 2003 donations. I want to thank everyone who contributed to JLab's United Way fund drive. This is money that will stay in our area and help a variety of deserving causes."

Johnson would also like to extend her gratitude to the people who helped her run the United Way Campaign Breakfast Carts that blanketed the Lab during the one-day event: Heidi Derby, Chief Finance Office; Heather Singleton, [then with the] Administration Division; Gloria Daniel, CFO; LaChelle Dozier, Director's Office; Tanya Fraites, CFO; Christine Hummel, Admin. Div.; Shannah Whithaus, Accelerator. Div.; Bonnie Madre, Accel. Div.; Dave DeVeau, CFO; Julie Maschke, Admin. Div.; Pam Turk, CFO; Cheryl Miles, Admin. Div.; Ken Johnson, Admin. Div. and United Way Representative April Lewton and Debra Brand, Admin. Div., who provided support during lunch hour that day.

"We also had 20 people from across the Lab volunteer for the Sept. 10 United Way's Day of Caring — 10 went to the Mariner's Museum and 10 went to the Virginia Living Museum to help with grounds clean up," she added "The feedback I got from the JLab volunteers indicated that the day was a great success, and they felt they were doing something worthwhile for the community."

United Way contributor, Ann Hageman, Accel. Div., sums up the United Way's annual appeal saying,

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"Giving to the United Way means giving back to the communities where I live and work. The United Way umbrella covers every thing from education, health, food distribution, and recreation to disaster relief, through non-profit agencies right in my community. I believe that helps make Hampton Roads a better place to live for everyone. My mother emphasized to me while I was growing up, to always share my good fortune. Giving to the United Way helps me do that."

## From the Director...

*Continued from page 3*

On the individual level, each of us must take every opportunity to keep the public informed of the Lab's important mission and its accomplishments. One such opportunity to do this is our upcoming Open House on April 16, and I encourage everyone to participate in this event. We will need more than 100 volunteers to staff the one-day event and anticipate 5,000-plus visitors.

Each of these forms of communication better positions Jefferson Lab during these lean budget times. This laboratory is a key resource for the nation and your enthusiastic support in communicating the Lab's vital and exciting scientific and technical results are critical to the Lab's success. If you have an idea or suggestion, please send it to the Public Affairs staff.

## New Hall C experiment...

*Continued from page 5*

stance called Aerogel. Some particles will be able to travel through the material at a speed faster than light can travel through it. These particles will emit light. "The pion is just over the light speed in this Aerogel, and the kaon is not. So the pion will emit the light, but not the kaon. So we can discriminate between pions and kaons," Nakamura explains. Now that the pions have been identified, the scientists will need to discriminate between the protons and kaons.

"After the Aerogel chamber, there is a water chamber. This is just a box filled with water and a few chemicals we've added," Nakamura says. In the water chamber, much the same thing happens. But this time, the kaons will emit light. "So we can discriminate the kaon and proton. The Kaon will emit light, but the proton will not. So now we know which particles are pions, which are protons, and which are kaons," Nakamura concludes. Computers will analyze this information in real-time and will only record information for the kaons.

The researchers will also need to know the speed and position of the specific electrons that struck protons in the target. For that, the experimenters have obtained an Enge spectrometer. After the electrons have collided with the target protons, many will bounce off the target and enter the spectrometer, where a drift chamber will be used to measure each electron's angle and position.

### Studying Hypernuclei

After the experimental run is complete, the scientists will combine the information about the electrons and kaons they've measured to reveal information about the nucleus of the atom and about the behavior of matter that contains strange quarks. The researchers say that theorists have made predictions about how Lambda will affect the behavior of the nucleus. Measuring that phenomenon will test those theories. "We can compare the prediction and our experimental result. Then we can also feed back to the knowledge about the interaction," Nakamura says.

Hashimoto says that the experimenters have carried out similar experiments at KEK and Brookhaven National Lab with meson beams. They came to Jefferson Lab to use CEBAF's electron beam, which they hope will provide better results than previous experiments. "This is the only place that we can produce the so-called hypernuclei using an electron beam," he notes.

# Bodman Sworn in as 11th Secretary of Energy

On Feb. 1, Samuel Bodman was sworn in as the 11th Secretary of the United States Department of Energy. Secretary Bodman was confirmed unanimously by the United States Senate on Jan. 31, replacing Spencer Abraham who resigned on Nov. 15, 2004.

"It is a great honor and personal privilege to serve President Bush and the American people as Secretary of Energy," said Secretary Bodman. "I look forward to working with the fine men and women of the Energy Department to advance this department's critically important missions, including preserving America's preeminence in the physical sciences, ensuring the responsible stewardship of our nation's nuclear weapons stockpile, advancing our international nuclear nonproliferation efforts, and ensuring reliable, secure, affordable and environmentally responsible supplies of energy for our growing economy."

Prior to being tapped by President Bush to lead the Energy Department, Bodman served as both Deputy Secretary of the Treasury (2003-present) and Deputy Secretary of Commerce (2001-2003). Before joining the Bush Administration, Bodman was Chief Executive Officer of Boston-based Cabot Corporation and President and Chief Operating Officer of Fidelity Investments. For six years prior to joining the private sector, Secretary Bodman served as an Associate Professor of Chemical Engineering at the Massachusetts Institute of Technology.

In nominating Secretary Bodman on Dec. 10, 2004, President Bush said, "In academics, in business, and in government, Sam Bodman has shown himself to be a problem solver who knows how to set goals and he knows how to reach them. He will bring to the Department of Energy a great talent for management and the precise thinking of an engineer."

Secretary Bodman holds a bachelor's degree in chemical engineering from Cornell University and a doctorate in science from the Massachusetts Institute of Technology. Secretary Bodman is married to M. Diane Bodman. He has three children, two stepchildren and eight grandchildren.

ON TARGET

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