DINITAR OF A DEPARTMENT OF ENERGY FACILITY

 Safety compliments from Director Christoph Leemann

Neutrino physics comes to JLab

Two young JLab researchers take part in World Year of Physics 'Quantum Diaries' project

► Meet JLab's CEBAF

Center Addition construction inspector

Accelerator crew chief

earns patent on High Voltage Load Resistor Array design

Quark Cafe gets

new manager

Jerry Draayer, Southeastern Universities Research Association (SURA) president (right), accepts the \$6000 royalty check for Jefferson Lab, from F. Lon Slane, president of Dilon Technologies, Inc., at the Feb. 23 patent recognition event.

# JLab recognizes 22 inventors for innovative work leading to 21 patents

Dilon Technologies presents Lab \$6000 royalty check

On Feb. 23 more than a dozen Jefferson Lab staff gathered with senior JLab leaders, SURA management and special guests at the Ferguson Center for the Arts at Christopher Newport University to recognize SURA/JLab's patent recipients for 2003 and 2004.

This was a first-of-its kind patent event for JLab because, in addition to recognizing the 22 inventors and their 21 new patents, the Lab received its first substantial royalty check for JLabpatented technology that had been commercially licensed.

President and CEO of Dilon Technologies, Inc., F. Lon Slane, was the evening's guest speaker. Successfully negotiating his company's licensing agreement with JLab/ Southeastern Universities Research Association to commercially develop a cancer-imaging device invented by

JLab, and completing the licensing paperwork was only Dilon Technology's first step. The job has just begun at that point, Slane explained. He recounted the arduous task of gathering the capital resources needed to create a successful commercial venture. The hardest part of the job, he noted, was finding venture capitalists willing to invest in a new, risky, unproven high-tech businesses. Dilon Technologies earned FDA approval to bring the cancer diagnostic tool to market. While the company experienced many disappointing turns during this years-long process, Dilon has arrived as a successful business. At the end of Slane's talk, he presented a \$6,000 check to Jefferson Lab for royalties from 2004 sales of Dilon's breast imaging camera.

The targeted use for the Dilon 2000 gamma camera is as a non-invasive

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## JLab 2003-04 Patent Awardees

Fernando J. Barbosa Pavel Degtiarenko **David Douglas** Mool Chand Gupta Curt Hovater David Kashy Cynthia Keppel Geoffrey A. Krafft **George Loutts** Stanislaw Majewski Ganapati Rao Myneni George R. Neil Matt Poelker Vladimir Popov Karl Smith Mark F. Smith Juan Vaguero Andrew Weisenberger Gwyn P. Williams Randolph F. Wojcik Chen Yan Byung C. Yunn

## JLab recognizes patent recipients...

Continued from page 1

breast-imaging device in performing scintimammography procedures. Scintimammography is a nuclear medicine technique that images the metabolic activity of breast lesions. Dilon licensed the technology from JLab/SURA under a Cooperative Research and Development Agreement. This technology was originally developed by JLab's Detector Group, led by Stan Majewski, for use in the Lab's nuclear physics mission.

Every patent recipient recognized at the Feb. 23 event received a plaque and a \$500 incentive check for every invention successfully patented. The SURA/JLab incentive checks are meant to encourage JLab staff to apply for patents on novel, commercially applicable ideas through JLab's Technology Review Committee.

The monetary awards for these inventions can continue in the form of royalty payments if the inventions or processes are licensed by commercial enterprises. The initial royalty payments (such as this first Dilon check) are used to reimburse JLab for patent research and fees, which can cost between \$6,000 and \$9,000 per patent. Once JLab is reimbursed for those costs, the inventor can start to share in the income from royalty checks.

Chief Technology Officer Fred Dylla said, "I'm extremely pleased with the Lab's success rate in turning discoveries into patents. The Lab's rate is well above average compared to our peer laboratories. I congratulate Lab staff for their efforts, and the creative and innovative ideas at this Lab that have commercial potential. I encourage Lab staff to continue their efforts in this area, which is highly valued by our local and state economic development partners."

The Department of Energy has consistently rated JLab "outstanding" for its efforts in technology transfer, and patents are a critical part of this contract rating metric. As of Sept. 30, 2004 (end of fiscal year 04) JLab patent applications totaled 113, with 51 patents awarded.



Patent awardees gathered for a photo at the Ferguson Arts Center during the Feb. 23 recognition event. Front row, left to right are Stanislaw Majewski, Ganapati Rao Myneni, Curt Hovater, Matt Poelker and Mool Chand Gupta; (middle row, I. to r.) Vladimir Popov, Andrew Weisenberger and Gwyn P. Williams; (back row, I. to r.) David Douglas, Geoffrey A. Krafft, Randolph F. Wojcik, Karl Smith, Mark F. Smith and Fernando J. Barbosa.

### Dear Colleagues:

I want to thank everyone at Jefferson Lab for your concerted effort to improve employee, user and contractor safety. We are making significant headway, and with your commitment to put safety first, the Lab can continue to realize safety improvements. We are progressing on many fronts related to safety and I wanted to bring you up to date on these actions.

First of all, we had a superb start to the fiscal year. Between August 19, 2004, and April 26, 2005, the Lab experienced no Department of Energy recordable accidents. During this time frame, JLab staff and our SURA employees, physics users, and subcontractors worked more than a million hours — that was 251 days — without a DOE-reportable injury. This is a new record for the Lab. In addition, as I write this, we have gone more than 270 days without experiencing a lost workday accident.

This improvement over last fiscal year's numbers reflects the changing attitudes making safety a part of the way we think and do our work on a day-by-day basis. We can't stray from our goal of zero accidents; we achieved it for over six months. We can do it again. A recent safety incident serves as a reminder that TRC and DART (Total Recordable Case and Days Away, Restricted or Transferred rates) are more than just numbers, they represent an injury to a friend or co-worker. We must examine each accident and learn from it to determine how to prevent a recurrence.

A recent management initiative was to name an interim safety director, reporting to me, whose primary responsibility would be the management of safety performance. Butch Meier of Perot Systems has been fulfilling that role over the last several months, and his contributions have helped us make real progress. Now, it is with great pleasure that I welcome Craig Ferguson as the Lab's new Associate Director of EH&S (Environment, Health & Safety). Craig joined us on May 2; he comes to JLab with a 20-year record of leading safety, health and environmental programs as well as cost containment in complex environments. He most recently held the position of Manager of Environment, Safety and Health with BWX Technologies' Y-12 project in Oak Ridge, Tennessee. Craig earned a bachelor's degree in nuclear technology and holds certifications as a health physicist as well as a safety professional. He has professional affiliations with the Health Physics Society, National Safety Council, National Registry of Radiation Protection Technologists and the American Society of Safety Engineers.

Another milestone in our effort to improve our safety performance is the Safety Culture Survey conducted in February. A five-slide summary of the results is available at www.jlab.org/ehs/wsc/ SurveyOverview.ppt. Detailed results of the survey, tabulated in a 112-page report, are available at: www.jlab.org/ehs/ wsc/SurveyResultsJan05.pdf.

Participation was excellent; 509 surveys were processed. In comparison with the large database of U.S. companies (including some DOE facilities), JLab's safety culture was evaluated as strong and positive; we ranked in the top 5 percent of the companies taking the survey over the past 15 years. The survey highlighted differences in safety culture perception among various work groups, and we will further examine statistically significant differences to better define areas for continuing improvement. The same level of involvement that gave us our safety culture survey results will be needed to identify and implement safety culture improvements. Thanks again to all of you for the excellent participation and input — your continued involvement will make this an effective tool for enhancing our safety culture.

As you can see, we continue to progress in making safety an extension of our commitment to excellence. I encourage your continued involvement and attention to ensure that each day is a safe day for all of us at Jefferson Lab.



Christoph Leemann Jefferson Lab Director

Lab is making improvements in safety arena

# From the Director

## Neutrino Physics comes to JLab

Scientists use Hall C to gain insight for international neutrino research



Hall C scientist, Cynthia Keppel, was a co-spokesperson for the neutrino engineering experiment recently conducted at JLab.



Geoff Mills, Los Alamos National Lab, and Antje Bruell, Hall C scientist, watch data come into the Hall C control room during the experiment's run.

### by Kandice Carter

The inner workings of the sun, the mysteries of dark matter and dark energy and the structure of the early universe all may be unlocked by one cosmic key: neutrinos. Now, new research being carried out in Jefferson Lab's experimental Hall C may help provide insight into neutrinos, the force that governs their behavior and, surprisingly, the structure of the nucleus of the atom.

Neutrinos are ghostly particles emitted by the sun as a byproduct of the nuclear fusion that powers it. These subatomic particles zip along through space, the Earth's atmosphere, and even the planet without ever interacting with any other matter they encounter. According to Geoff Mills, a JLab user from Los Alamos National Lab, "They're like little hermits; they don't want to have anything to do with anything else. They just want to go on their merry way." That's because neutrinos are chargeless particles that only interact with matter via a force called the weak force. "It's very weak, so that's why they don't interact very often," he says.

However, sometimes neutrinos do interact with other matter in the universe. Physicists have built massive detectors to monitor these rare events in hopes of learning more about the elusive particles. Some detectors are designed to catch glimpses of neutrinos streaming out of the sun or other sources. But others monitor precise beams of neutrinos created for experiments right here on Earth. Now neutrino physicists, some of whom are also involved in a neutrino oscillation experiment in Japan, the Main Injector Experiment v-A (MINERvA), which has received preliminary approval for running at Fermi National Accelerator Laboratory (FermiLab), and the MiniBooNE experiment, which is currently taking data at FermiLab, recently came to Jefferson Lab to help them better analyze these experiments.

Makoto Sakuda is a professor of physics at Okayama University and a member of the long baseline neutrino oscillation experiment from KEK to Kamioka (K2K) and Super-Kamiokande experiment teams in Japan. There are three types, or flavors, of neutrinos: electron-neutrino, muon-neutrino and tau-neutrino. One type of neutrino changes into another as time passes. This is called neutrino oscillation, he says.

In the K2K experiment, a beam of neutrinos was sent more than 150 miles, from the KEK facility near Tsukuba, Japan to the Super-Kamiokande facility in Kamioka, Japan. This experiment was aimed at confirming neutrino oscillations first seen by the Super-Kamiokande experiment in 1998.

Early neutrino experiments, designed to measure neutrinos coming from the sun, found fewer neutrinos than expected. In 1998, Super-Kamiokande experiment observed

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electron- and muon-neutrinos produced in the Earth's atmosphere by cosmic rays. It found that there were far fewer muon-neutrinos than expected. Some researchers theorized that perhaps they weren't seeing as many muon-neutrinos as expected because the muon-neutrinos had changed, or oscillated, into a different form before reaching the Super-Kamiokande detector.

"This can happen only when neutrinos have non-zero mass," Sakuda explains. Therefore, this discovery helped confirm that neutrinos have mass. The K2K team recently announced the observation of neutrino oscillations in the KEK beam.

In the MINERvA experiment, physicists will use a beam of protons generated with FermiLab's 120 GeV proton main injector ring to ultimately produce a beam of neutrinos. The researchers hope to learn about neutrinos by watching how the beam interacts with nuclei in the atoms of various target materials, including water and iron.

To help analyze the results of neutrino experiments, the researchers need to do what they call "neutrino engineering," a term coined by one of Mills' MiniBooNE colleagues, neutrino researcher Gerald Garvey. "Neutrino engineering is all the work you have to do in basic particle physics to actually do neutrino experiments well," Mills says. It turns out that neutrino experiments are very tricky to do because they contain a lot of unknown variables that can skew the results.

Richard Gran, a JLab user from the University of Washington, says researchers can minimize these variables by studying them in advance. "There are all these things we want to know. But some of it is very hard to study and some of it is very easy to study. And so, the trick is to get all the easy parts, at least from our point of view, tacked down so that you can then attack the difficult parts," Gran explains.

In the end, there are four main variables for neutrino researchers to look at: the characteristics of neutrino beams, the different ways neutrinos can interact with nuclei, how often neutrinos interact with the nuclei in one way versus another, and the physics of how neutrinos change flavor. The MINERvA team has already tackled the first variable for their beam. "I have been working in the past two years on an experiment that we did at CERN in Geneva to measure proton interactions on beryllium," Mills says. MINERvA will aim a beam of protons at beryllium to create a neutrino beam.

The second variable can be narrowed down here at Jefferson Lab, where researchers aim to learn how neutrinos interact with nuclei. Arie Bodek, a JLab user from the University of Rochester and an experiment spokesperson, explains, "If you want to study the properties of neutrinos, you have to understand how neu-

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Above: Geoff Mills, Los Alamos National Lab, takes a break from monitoring the experiment to explain neutrino research.

At left: Richard Gran, University of Washington, working a shift in the Hall C control room during the experiment.

Inset: Makoto Sakuda, Okayama University, is also among the international neutrino research collaborators using JLab data to enhance the group's work.

# In their own words

## *with experimentalist Sarah Phillips*



#### as told to Judi Tull

grew up in Fremont, New Hampshire, and, in so many ways, it was a nearly perfect start to my life. My parents home-schooled my younger brothers and me for part of our education, and they believed that travel was part of a well-rounded education, so we got to see a lot of the United States as part of our education. When we were studying American history, for example, we took off to Vicksburg, Mississippi, to see the [Civil War] battlefield there. We even found my great (many greats) grandfather's name on the memorial. When we were studying electricity, we went to see Thomas Edison's lab. For a science lesson, my mother, who's a registered nurse, would send us down to the nearby river and tell us to find organisms that we would look at under a microscope. And my dad was an electrical engineer with a shop at home; my brothers and I built our own cathode ray tube out there.

I was hooked on physics when I was seven. We went to the SEE Science Center in Manchester, N.H., and I won the physics trivia contest. I've still got the poster of Marie Curie that I won there. What really impressed me was that I had all these childish questions — Why is the sky blue? Why do bubbles have colors? and the people there could answer them for me! Some years later, the University of New Hampshire physics department was getting rid of a lot of old equipment and my dad went and bought a bunch of it for us to play with. So I've been in physics for a long time.

While I was in high school, my parents started doing volunteer work at a school in Mississippi and we'd spend part of our year down there. The school had an observatory, so I took up astrophotography. While I was there, I also learned how to play the piano, pipe organ and violin and I began to sing with a Madrigal group, a pursuit I continued in college. I graduated from Mississippi State University in 2000 with a degree in physics and math, and then I came to [The College of] William and Mary for my master's and, now, my doctoral work. My thesis is based on the G-

Zero forward angle measurement in Hall C, measuring parity-violating asymmetries in elastic electron-proton scattering. By measuring both the forward and the backward scattering angle asymmetries, the contribution of the strange quark to the charge and magnetic properties of the proton can be determined. We got some excellent data when we ran the experiment from November 2003 to May 2004, and we're analyzing that data now. That run is part of a series, and we'll be performing backward angle runs this fall.

One of the things I love most about physics is that physicists are so innately curious about just about everything, and other people are often curious about what it's like to be a physicist. I was asked to take part in a project called Quantum Diaries that is following physicists from all over the world as we experience 2005, the World Year of Physics. The purpose is to share not only our latest research findings and what's going on in our labs, but also our daily lives - families, hobbies, and our outside interests. As of the middle of February, there were 28 physicists from nine countries involved. I'm one of nine physicists from the U.S. who are participating through videos, photos, our bios and blogs. This is going to be a wonderful opportunity to share my life with physicists and non-physicists from around the world. People usually just see your work, not your daily life. The website where you can see the Quantum Diaries is http://interactions.org/quantumdiaries/.

I live in a little cottage in Williamsburg and love it there, even though the deer eat my flowers. I'm into hiking and biking and fencing and dancing. I've been studying Argentine tango, the original form of the dance and very complex; Gary Rutledge, another physicist here, is my dance partner.

I expect to complete my thesis by the end of this year, and then I'll probably be looking around for a post-doc spot. Going back to New England appeals to me, and I'll probably be looking at universities up there. I'm not sure what I'd like to be in physics in the long term, but I do have a pretty

#### by Kandice Carter

T wo young physicists participating in research at Jefferson Lab have joined nearly 30 other scientists in celebrating the World Year of Physics through web logs — or blogging — in "Quantum Diaries." Sarah Phillips, from the United States, and Claire Gray, from South Africa, have just begun their blogging adventures.

Quantum Diaries is a web site that follows the lives of physicists worldwide as they live the World Year of Physics, 2005. In blogs, photographs and video clips, and in half a dozen languages, the Quantum Diarists give readers a real-time picture of the lives of 21st-century scientists. Writing in French, English, Russian, Japanese, Italian, Dutch and German, among other languages, scientists from universities and laboratories in the Americas, Asia, Africa and Europe have volunteered to "blog" their experiences, thoughts, impressions, triumphs and disappointments as the year 2005 unfolds.

Sarah Phillips is pursuing a doctoral degree at The College of William and Mary in Williamsburg, Va. She received her master's degree in 2002 and is currently writing her Ph.D. dissertation. Her thesis research involves an experiment called G-Zero, being conducted in Hall C, which is measuring parity-violating asymmetries in elastic electron-proton scattering. One goal of the experiment is to help determine the contribution of the strange quark to the charge and magnetic properties of the proton. Phillips' thesis is focusing on data from the G-Zero forward-angle measurement taken last year.



**Claire Gray** 

Claire Gray is just starting her master's work at the University of the Witwatersrand in Johannesburg, South Africa. She's pursuing a degree in high energy physics and is participating in a Hall C experiment to measure Subthreshold J/Psi Photoproduction that finished taking data in December 2004. In the experiment, researchers hope to learn about the behavior of the nucleus through charm quark production. Gray aims to use data from the experiment in preparing her thesis.

The Quantum Diaries web site was developed and is jointly maintained by the InterAction collaboration, whose members represent the world's particle physics laboratories in Europe, North America and Asia, with funding provided by the science funding agencies of many nations.

*Editor's note:* See story about Sarah Phillips on page 6. Visit Quantum Diaries at www.quantumdiaries.org.

## JLab researchers join 'Quantum Diaries' bloggers

S. Phillips, C. Gray take part in World Year of Physics activity

### In their own words...

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long list of things I want to do with my life. First, I'd like to travel, to visit international friends I've made through school and the physics community, and to see what's left of the castle in Scotland where my family originated. I want to climb Mount Fuji, and walk along at least part of the Great Wall of China. I want to

visit the Louvre, the Vatican and a particular garden in Salzburg, Austria, where my parents went. I want to hike the Appalachian Trail — the whole thing; I've already done parts of it. And there's a mountain in Maine where you're so far east that you can be the first person to see sunrise in the United States. I want to do that too.

# Meet Russell Mattox, JLab's construction inspector

Handles safety, quality assurance, materials delivery to CEBAF Center Addition work site

#### by Judi Tull

Over his three-decade career in construction, Russell Mattox has come up through the ranks and held numerous positions before being hired in July 2004 as Jefferson Lab's construction inspector for the \$10.5-million CEBAF Center Addition project.

A Hampton native, Mattox has served as an apprentice, journeyman, and quality control inspector for several area companies. He is also a member of the International Brotherhood of Electrical Workers (IBEW). His work has taken him as far away as California to work on a cogeneration project and to Kentucky where he worked on the construction of a Toyota manufacturing plant. (Cogeneration is the simultaneous production of electricity, heating and cooling in a single process.) Most recently, he worked for CENTEX at Langley Air Force Base where the company is building facilities to support the new F/A-22 Raptors. "I thrive on the changes and the challenges this field offers." Mattox said of his varied career.

His 20-month term position here came to him in an unusual way through a classified ad in the local newspaper. Most industry positions, he noted, are found through recommendations and word-of-mouth. This one, however, jumped right out at him. "The ad said you could apply on-line and I thought, 'Well, that's easy enough,' so I did," he recalled. "I was quite surprised — and pleased — by the way the whole thing worked out."

In his position here, he is tasked with representing the Lab's interests as the construction proceeds, and overseeing all construction issues, including safety. Although the addition is essentially an office building, some aspects of it are unique, he noted, including the geo-thermal wells being used to provide heat and cooling for the office portion of the building, the cooling system for the Computer Center that will be tied into the central chiller plant located in the Test Lab, and the building management system and alarm systems.

"Having been in the industry this long, it's really just a matter of breaking it all down to the simplest form," he said. "The process is always the same. You start on the first page of the drawings, and keep turning the pages."

He's on site every day that work is going on, provides daily reports to Debra Brand of Facilities Management, and coordinates with the on-site superintendent for Mid-Eastern Builders (MEB), the contractor for the addition. He performs quality assurance inspections of materials delivered to the construction site and escorts visitors, such as the Department of Energy safety representatives that stop by the site on occasion. Visitors are strictly regulated due to safety concerns. "We limit

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the number of people coming on to the construction site," he said, "and we don't let anybody out there by themselves." Most Lab employees have honored the limited-access areas around the construction, he said, but some need to be reminded from time to time not to cut through the rear area of the project, near the fence.

Mattox lives with his wife, an elementary school teacher, and grown son, a musician and computer programmer, in Gloucester, in a house they built themselves. When they moved to the area above Gloucester Courthouse in the late 1970s it was still rural, with barely two stoplights between the Coleman Bridge and their home. "Those were the old days," he said with a laugh.

Their grown daughter is an architect and lives in Savannah, Ga. Mattox's spare-time interests have changed over the years as the children have grown. He still restores vintage automobiles — a hobby he started as a teenager — but has given up boarding and riding horses now that his daughter is no longer at home. He also

restores antique furniture and is currently working on a pool table from 1900. In addition to his work at the Lab, Mattox is an instructor for Hampton Roads Joint Apprenticeship Committee through which he works with 5th-year electrical apprentices.

Thus far, the CEBAF Center Addition work has proceeded safely, and Mattox intends to keep it that way. Part of the credit for that, he said, goes not only to the Lab's safety incentive provision in its contract with MEB, but also with MEB's internal safety incentive program through which they reward employees on a regular basis. "They've taken a very active role in impressing their people with the need for the utmost safety," he noted.

One of the differences between working at the Lab and on other construction projects, he said, is that all of the staff here has been far more responsive to his questions and concerns than sometimes happens. "It's a real change of pace," he said. "If there's a question, there's always someone willing to help find an answer."

struction.

Above: (from left) Debra Brand, capital projects manager and SOTR (Subcontracting Officer's Technical Representative) for the CEBAF Center Addition: Lab Director Christoph Leemann; Ralph Story, MEB superintendent; and Russell Mattox, CEBAF Center Addition construction inspector, look over the interior of the construction project.

# A patent first!

Monty Lehmann invents new type of High Voltage Load Resistor Array



Monty Lehmann, a Senior Jefferson Lab Accelerator Operations Crew Chief, was recently awarded his first patent for inventing a high voltage load resistor array. In devising the component to test the Free-Electron Laser's electron gun high voltage power supply, he called on his 20-plus years of experience in high voltage operations and design of pulsed power components.

Jefferson Lab/SURA is the first place Monty Lehmann has worked where he's been able to pursue a patent on something he created. "Jefferson Lab is very supportive of patent applications and was willing to absorb the fees to conduct the patent search and application process," he notes. Lehmann has invented numerous devices, components and processes in his many years of work for industrial and research needs. However, the companies he was working for at these times quickly adopted and put into use the inventions without following up with patent applications.

A couple years ago JLab's Free-Electron Laser facility, had a new 600,000-volt, 10-mA (microamperes) power supply arriving for a planned upgrade to the FEL, and there was a need to test it before installation. FEL staff contacted Lehmann and asked him if he could design a high voltage resistor to test the direct current, high voltage power supply. "You can't just plug something like that (the new power supply) in and put a several hundred thousand-volt load on it. You need to test it first, using a reliable resistive load device that can safely handle up to 600,000 volts at the applied power supply current," Lehmann explains. "And what the FEL needed wasn't the sort of device that was commercially available. This was a definite challenge."

With his extensive high-voltage experience and knowledge, coming up with the idea and developing the design only took a few days. Up front, he designed it to be adjustable in order to handle as many variable test conditions as possible. "My design was cheap, useful, innovative and able to handle the high voltage as well a larger direct current load," Lehmann says. "There was nothing available anywhere that could be compared to it. I sat down with one of our JLab draftsmen to draw up the electrodes and other parts that I needed, and the Machine Shop made most of them for me." He knew immediately that his high voltage load resistor array was an innovative idea and a very useful design.

"Initially, some staff members thought that the basic module might not work, but my calculations said it would handle the load. A really nice thing about this design is that it will be able to handle the planned, future upgrades to the FEL's high voltage power supply," he adds.

Despite being nearly 70 percent disabled, Monty assembled the components and delivered the load resistor array to the FEL on time. "I've got quite a list of problems," he says of his health concerns, most of them resulting from military service in Vietnam and a severe industrial accident. "My disabilities slow me down and I struggle from time to time, but this load resistor array design is very straight forward. I had it ready and waiting when the new power supply arrived. And when we hooked it up for the test, it worked perfectly. No arcing. No high voltage corona hissing," he says with a smile, "and this isn't even my main job at JLab."

There are several aspects that make this design preferable to any other type of load resistor array that Lehmann has ever seen or used. It is mobile, easy to repair, low-cost to make, easily modified to handle larger high voltage conditions or higher current loads, is environmentally friendly, and can be made with mostly offthe-shelf materials. Even its clean lines and smooth surfaces are designed to minimize the potential for high voltage flash over or arcing.

When the U.S. Patent and Trademark Office files were researched to check on the viability of



At left: Monty Lehmann with the High Voltage Load Resistor Array he designed and developed. The U.S. Patent and Trademark Office awarded a patent on the device Jan. 28, 2005. Facing page: The High Voltage Load Resistor Array invented by Lehmann stands a little more than 3 feet tall and sits on a wheeled base, making the device moveable.

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patenting his device, Lehmann was told that the Patent Office didn't have anything listed that was even remotely close in design to his High Voltage Load Resistor Array.

According to Lehmann, up to this point, the need for high voltage load resistors has been handled by equipment using solid carbon resistors, or high resistance metal alloy load banks that are very expensive and must be replaced if arcing damages them. In addition, some of the other load resistor type devices used to do this type of work contain environmentally hazardous materials (transformer oil, freon, etc.). His design uses pure distilled water or a distilled water solution with a trace amount of copper sulfate added.

Lehmann will present his device -U.S. Patent #6,844,806 - this summer at a poster session during a pulsed power conference. "I would like to be able to take it along, which would amaze the people there because normally these devices aren't easily transportable. They are typically too big and too heavy to readily move around," he says. His compact, efficient design rolls around on a small dolly. He has also begun work on extending the upper resistance range of the load array beyond the initial design, hoping to make the device even more useful in the future.



# Carolyn Henley is Quark Cafe's new manager

### by Judi Tull

Carolyn Henley, Quark Cafe's new manager, stepped into food service management almost by accident, but found a career she loves. She was looking for a part-time job while she was a student at J. Sargeant Reynolds Community College (Richmond, Va.) and found out that her neighbors ran the cafeteria at the local phone company. She signed on and never looked back. "That proved to me that it's all in who you meet," she said with a laugh.

After she received her associate's degree in management in 1983, she went into management with the same company. For a while, she lived in Atlanta, Ga., where the company had another cafeteria in a business. About eight years ago, she came to work for Compass Group USA, the largest worldwide food service company. Eurest Dining Services, which is in the third year of its five-year contract with Jefferson Lab, is a division of that Compass Group.

Henley's lived in a variety of places throughout her career, including northern Virginia, Tennessee, and Boca Raton, Florida, where, she said, she hated the weather but had lots of visitors from up north. Most recently, she lived in Pennsylvania and commuted to her job in Baltimore.

She is fairly familiar with the Hampton Roads area as she is originally from Goochland County (between Richmond and Charlottesville) and traveled as a manager for Eurest for several years in the Chesapeake, Suffolk, Washington and Richmond area. "All that traveling was fun at first, but enough is enough," she noted. "It gets you down after you've been on the road for a while."

Since coming to JLab in late November 2004, she's spent much of her spare time on weekends returning to Pennsylvania to oversee the sale of her house and visiting her parents and extended family in Goochland.

Here at the Lab, she oversees a staff of five, who are on site from 6 a.m. until 2:30 p.m. and keeps Quark Cafe open from 7 a.m. to 9:30 a.m. for breakfast and from 11:30 a.m. until 2 p.m. for lunch. When there's an event, such as the recent Program Advisory Committee meeting where the cafe staff whipped up a buffet for 42 people, everyone stays on until the work is done. Eurest has additional staff members available at other sites, she said, if a large event comes along that requires additional help.

Head chef Ed Bittenbender, who's been at the Lab six years, is tasked with developing the weekly menus to keep Lab employees healthy and happy, no small challenge when you're feeding a diverse group of people from all over the world and serving about 250 meals each day. He also plans the menus for special events and gets those approved through Staff Services.

As part of their commitment to customer service, the cafe staff members make sure that there are vegetarian *Continued on page 14* 



Quark Cafe staff (left to right) includes: Vera Arnold, Ed Bittenbender, Audrey Carter, Carolyn Henley, Sandra Graham and Gavin Dowd.

Don Baxter, Jefferson Lab Department of Energy Site Office staff member, retired April 1, 2005. While he describes his years with DOE as exciting, challenging and interesting, he adds with a smile, "I don't expect retirement to be dull or boring, either." Baxter is looking forward to spending time with family his wife, Helen, two grown daughters and their spouses and five rambunctious grandchildren. He also plans on traveling, restoring antique cars, and possibly even taking in a little whitewater canoeing or consulting work.

After finishing college, Baxter worked for Newport News Shipbuilding for several years before joining the Tennessee Valley Authority (TVA) in 1980. Then in 1991, he began working for DOE in Oak Ridge, Tenn. — mostly contracts and property management oversight for weapons production programs and environmental cleanup projects.

For a period, Baxter was the Oak Ridge Fleet Manager and responsible for 3,000 government vehicles. During government downsizing in the early 90s, he was tasked with reducing the Oak Ridge fleet. He looked at how much money would be lost in auctioning off the surplus vehicles and heavy equipment and decided there had to be a better way. While checking with other government agencies, he discovered that the U.S. Department of the Interior would be able to put many of the vehicles to good use. The project resulted in Baxter and his team receiving the [National Partnership for Reinventing Government] Hammer Award, signed by then Vice President Al Gore. During the 1990s, the award was given to federal agencies that exemplified the principles of making government work better and cost less.

When Baxter began working for the Office of Science, he found himself involved in contract work for CEBAF/Jefferson Lab and doing property oversight for this new facility. Baxter recalls, "I came up here several times for business." In 1999, he jumped when given the opportunity to join JLab's DOE Site Office staff. Newport News is where Baxter grew up, and returning gave him the opportunity to be near his parents. "I know the old cliché that says you can't return home, but I did," he says. "And I'm happy and very grateful that it worked out this way for me."

He now lives just two blocks from where he grew up, and even the JLab campus holds fond childhood memories. As a kid, Baxter often accompanied a friend's father who was the construction manager for the Test Lab when the facility was being built for NASA. "It was so neat," Baxter reminisces.

As the Site Office Deputy Business Manager, he provided backup for the Contracting Officer and Business Manager. Baxter's areas of oversight included procurements, property management, accountability of high-risk property and export control, budget and funds transfers, and human resources. He describes his job as "the economics and financial work supporting the Lab's scientific mission." "The federal government has an economic interest in the Lab doing good science," Baxter notes.

He has high praise for JLab's reorganized Property System. "Everyone was really committed to making the program work," he comments. "The Lab is now in the top 10 percent of the best Property Systems among SC (Office of Science) Labs. The Lab and the Site Office have a vested interest in each other. If the Lab looks good, we look good and vice versa. We're all in this together."

"People aren't islands. We don't generally accomplish great things as individuals. And the people here have been great to work with and know over the years," Baxter adds. As the Property Officer, one of the biggest compliments he was ever paid took place a couple months ago when a scientist personally thanked Baxter for facilitating Custom's property transfer work he did for research equipment coming from overseas.

"It is a great feeling to be a part of making something like this [JLab] work," he says. "And people are what make a place like this tick. The international and psychological diversity here is incredible." He describes the people as stimulating, and says, "It's exciting and always a challenge to understand and appreciate the thought processes going on here. This has been an eye-opening, mind broadening and gratifying experience."

## Don Baxter, DOE Site Office staffer, retires



### Neutrino engineering work at JLab...

Continued from page 5



Arie Bodek (left), University of Rochester, and Peter Bosted (right), Hall C scientist, watch the data-gathering process from the Hall C control room.

trinos interact with protons and neutrons, because that's how we detect them."

To understand that, neutrino researchers manned shifts in Hall C side-by-side with Jefferson Lab nuclear physicists in January to make precise measurements of how electrons interact with nuclei in carbon, hydrogen, deuterium and iron. Electrons interact with nuclei via the electromagnetic force. Though neutrinos interact with nuclei via a different force, the weak force, precise information on the electron interaction provides information about the neutrino interaction.

According to Mills, "It turns out that because of the unification of elec-

tromagnetism and the weak force, we understand that the force is really the same phenomenon — the electroweak force. So we can relate what we see here in electron interactions with certain nuclei directly to neutrino interactions." With the JLab results in hand, that leaves only the last two variables for neutrino physicists to deal with.

What's more, the neutrino experiments will feed back into JLab's main mission of studying the nucleus of the atom. At their core, these experiments are analyzing how neutrinos interact with nucleons (protons and neutrons) and nuclei. Bodek says, "Experimenters in nuclear physics and neutrino physics want to measure the same thing: they want to know how neutrinos interact with matter. One wants to understand the structure of the nucleon, and the other wants to know the structure of the nucleon to understand neutrinos."

Experiment co-spokesperson Cynthia Keppel, a JLab staff scientist and a university-endowed professor of physics at Hampton University, says that ultimately the research will provide extra information on the structure of nucleons that can't be obtained with research at JLab alone. "Neutrino research is complementary to Jefferson Lab physics; both involve pointlike leptons (electrons or neutrinos) scattering off of nuclear targets. Lepton scattering is what we do here at JLab — with electrons — to understand the structure of nucleons and nuclei. Because neutrinos interact only via the weak force, they can provide different information from the electrons, which interact primarily via the electromagnetic force," she explains.

Sakuda says neutrino experiments may also advance JLab's goal to go beyond the Standard Model, the theory that describes elementary particles. He says, "The discovery of finite neutrino mass is the only experimental phenomenon which contradicts the Standard Model. Thus, particle physicists expect that neutrino experiments will explore the physics beyond the standard model."

### Quark Cafe welcomes new manager...

### Continued from page 12

entrees available several days a week for people that don't eat meat. Even personal preferences are acknowledged, and the staff is always willing to hear from its customers, Henley said. "We had rice pudding for dessert one day," she recalled, "and someone said that he didn't like it with raisins. So now we put out two batches, one with, one without." And the staff remembers preferences. Whoever is at the grill starts preparing safety officer John Kelly's bacon and egg biscuit as soon as he walks in the door. "We're small enough that we can be interactive, and we like it that way," Henley commented.

Henley describes the Lab as just about the friendliest place she's ever worked. "I had three hugs the first day I was here, and that sure never happened before," she recalled. "Everybody here has been very open and receptive."

"We are delighted that Carolyn decided to leave the comfort of her home in Pennsylvania to join us here," said Marty Hightower, JLab Staff Services manager. "She brings with her a wealth of experience and knowledge that will breathe new life into the Quark Cafe. Carolyn runs a tight ship and we're all feeling very lucky to have her aboard!"

During the week, Henley relaxes after work with a good mystery or detective novel. But after being involved with food all day, she tends to grab something quick to eat. If she cooks at all, it's just on the weekend. And then, if she's lucky, she's visiting her family home and gets to eat mom's food.

# **Briefs**

## Milestones for April 2005

### Hello\*

Keith Royston, Facilities Management Construction Section Manager, Administration Division

Pavel Evtushenko, Center for Advanced Studies of Accelerators Staff Scientist, Accelerator Div.

### Goodbye\*

Byron Golden, Technician/Drafter, Accel. Div.

Ellen Dawkins, Technician/Drafter, Accel. Div.

James Breeding, Skilled Trades, Accel. Div.

Colleen Cassidy, Staff Administrator, Admin. Div.

Shannah Whithaus, Admin. Support/Secretary IV, Accel. Div.

Teresa Davis, Staff Administrator II, Admin. Div.

Pearl Carstens, Admin. Support/Secretary II, Directorate

Eric Hanson, Associate/Coordinator, Accel. Div.

Petra Radulovic, Staff Administrator I, Admin. Div.

Armenak Stepanyan, Technician/Drafter, Physics Div.

Jerry Stokes, Staff Administrator I, Admin. Div.

Patsy Morton, Staff Administrator III, Admin. Div., retired April 29, 2005

Leon Reynolds, Accelerator Operator, Accel. Div.

Kelly Teague, Crew Chief, Accel. Div.

\*Ordered by date from March 1 through April 29

### JLab invites families, groups to summer Physics Fest events

Jefferson Lab Summer Physics Fest dates include: Wednesday, June 8, Wednesday, June 29, Tuesday, July 12, Wednesday, July 27, and Wednesday, August 10.

A Physics Fest is a two-hour presentation (10 a.m. - noon) that includes a middle-school-level explanation of the research conducted at Jefferson Lab followed by the popular "Deep Freeze (cryogenics) and Hot Stuff (plasmas)" presentations, which demonstrate some of the technology used at Jefferson Lab to conduct experiments.

Parents, teachers and youth planning to attend a Physics Fest may wish to download the Physics Fest Classroom Activity Pack from JLab's Science Education website (http://education.jlab.org/). This file contains general information about Jefferson Lab, the anatomy of atoms, a vocabulary list with related games and puzzles, and data sheets and activities that can be used before, during and after attending a Physics Fest. The Activity Pack is about 2.1 MB in size, and can be downloaded with Adobe Reader software. The materials are written at the 6th-grade reading level.

Individual students and groups must be accompanied for the duration of the event by parents or authorized adult escorts. These events are free and take place in the CEBAF Center auditorium located at 12000 Jefferson Ave., Newport News. Seating is limited; reservations are required. Contact LaChelle Dozier, email dozier@jlab.org, or phone 757-269-7567 for reservations. For security purposes everyone over 16 is asked to carry a photo I.D. Security guards may inspect vehicles, bookbags, parcels, etc.

### 20th Annual JLab Run-A-Round

JLab's 20th annual Run-A-Round is set for Wednesday, May 25. All Lab employees, users, fulltime subcontractors and family members are invited. The run/walk starts and finishes in front of CEBAF Center. To register, visit room 340 in the ARC (Mary Jo Bailey), room 209 in CEBAF Center (Kandice Carter), or cubicle 14 in building 89 (Christina Krasche) during work hours, May 17 through May 24.

Day-of-the-event registration takes place in the CEBAF Center lobby from 11 a.m. to 2:30 p.m. The winning Run-A-Round JLab T-shirt design will be unveiled in front of CEBAF Center at 2:45 p.m. and <u>the run/walk race</u> <u>starts promptly at 3</u>. Food and beverages will be available at the Residence Facility field starting at 3:30 p.m. and awards presentations begin at 4. Plan to arrive early for food. This year's event includes an ice cream truck with frozen treats costing \$1 each.

Only two-legged members may participate in the event; pets aren't permitted. All Lab employees who registered for the Run-A-Round, as well as all volunteers, may pick up free T-shirts, according to Jefferson Lab Activities Group (JAG) chair, Dave Kausch. T-shirt distribution will be near the Experimental Equipment Lab (EEL) immediately after the race. After Run-A-Round day, T-shirts will be available for pickup or purchase at the CEBAF Center front desk.

"Dozens of volunteers are needed to make this event a success," says Mary Jo Bailey, JAG event coordinator, "everything from water station attendants to course marshals, finishline helpers and food service attendants."

Trophies will be presented for the overall men's and women's first, second, and third place finishers. Gold, silver and bronze medals will be awarded for the top men's and women's finishers in each age division. All children under the age of 10 who finish the race will receive a ribbon. This year's event has also added some novelty divisions: Kid-in-Tow, Stroller, Carry-a-Kid and Mercury/Athena. Volunteer positions and more information about the event and special divisions are posted on the JLab Insider and JAG web pages (www.jlab.org/intralab/ committees/jag/).

## Lab's Science Education website helps students prep for SOLs

The use of Jefferson Lab's Science Education website is climbing as Virginia students prepare to take the spring 2005 Standards of Learning tests.

"The most frequently accessed pages on our website include the Virginia Standards of Learning Science, Math and Technology Practice Tests and our 'Who Wants to Win \$1,000,000 Math and Science Quiz," says Steve Gagnon, JLab Science Education technician and webmaster."

The website includes the released 2004 SOL tests, and has an archive of the tests going back to 2000. Test categories include: 3rd grade math and science questions; 5th grade math, science and technology questions; 8th grade math, science and technology questions; high school algebra I & II, geometry, earth science, and chemistry questions.

"The SOL practice tests are a great resource for students, teachers, parents - or anyone interested in the information," Gagnon adds. The website is set up so a person can request 10, 20, or 40 random, multiple-choice questions from a single category. Or if desired, the site allows teachers and students to bring up nonrandom sets of questions. If a teacher wants the class to review a series of specific math subcategories, the teacher can have the students go to JLab's SOL index page and make an assigned series of selections from the "options" offered. Then all of the students will go through the same fixed set of questions. "We think this feature is very useful," Gagnon comments.

The interactive design of the site lets users select and submit their answer. They are told if their response is right or wrong. If correct, the answer page repeats the question/problem and the correct answer. If a question is answered incorrectly, the answer page provides the question with the correct answer.

"We expect use of this review tool to climb as the annual testing period starts. It is common for the website to have more than half a million pages hit in a 24-hour period this time of year," Gagnon notes. The other hot spot on the JLab Science Education Web site is the "Who Wants to Win \$1,000,000 Math and Science Quiz," which is also a fun way to review math and science information — even though contestants aren't playing for real money.

Check out the Science Education web page, at http://education.jlab.org/. To access the SOL practice tests or to play the \$1,000,000 math and science quiz, click on the Games & Puzzles icon.

**D**N TARGET

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