

# ON TARGET

THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY • A DEPARTMENT OF ENERGY FACILITY

## Roy Whitney named

Acting AD for Administration

## JLab improves safety

performance but must continue to keep it at forefront

## Thanks for job well done:

JLab's SNS cold linac undergoes successful commissioning

## JLab/W&M scientist

studies germ resistance of laser-treated fabrics

## CEBAF Center Addition

nears completion

## JLab wins R&D 100 Award FEL cited among most technologically significant products of 2005

Researchers and engineers at Jefferson Lab have been awarded an R&D 100 Award, R&D Magazine's selection of the 100 most technologically significant new products of 2005 based on a national peer review panel.

In the award citation, JLab's 10 kW FEL Upgrade (the Tunable Energy Recovered High Power Infrared Free-Electron Laser) is described as an unparalleled laser in its capability as a light source to open up new applications in materials science, photobiology, photochemistry and high sensitivity spectroscopy. These applications hold such exciting research potential that the JLab FEL is being copied at a number of institutions.

"This award demonstrates that DOE scientists and researchers are hard at work developing the technologies of the future," said Secretary of Energy Samuel W. Bodman. "In the past, breakthroughs like these have played

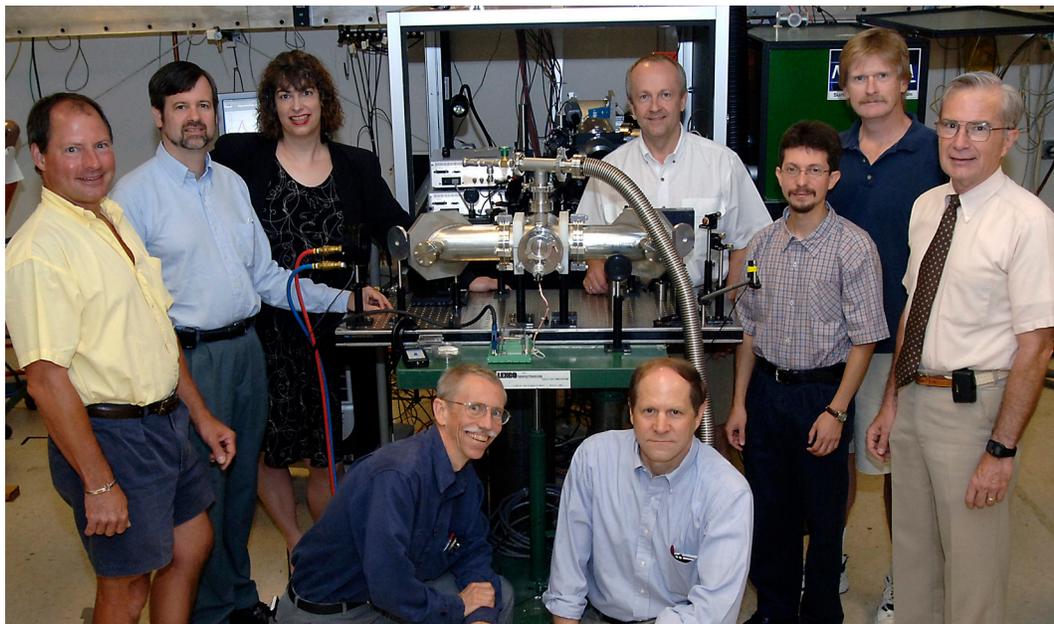
an important role in both our economic and national security."

"We're looking for products and processes that can change people's lives for the better, improve the standard of living for large numbers of people, save lives, promote good health, and clean up the environment," say the editors of R&D Magazine, which has handed out R&D 100 Awards annually since 1963.

The FEL is principally funded by the Department of the Navy's Office of Naval Research. Rear Admiral Jay Cohen, Chief of Naval Research says, "ONR has a long history of teaming with remarkable scientists, engineers, and technicians. We are pleased to be able to provide funding to JLab. We have every reason to expect that they will be dedicated to providing work that results in unique, high-power, tunable, 24-hour capability, that is well-suited for Department of the Navy, industrial and scientific applications."

*Continued on page 2*

Pictured is the design team for the 10 kW FEL Upgrade who accepted this year's R&D 100 Award on behalf of the entire FEL project team and project collaborators across the Laboratory who contributed to the FEL's construction, commissioning and operation. From left to right standing are: Kevin Jordan, Steven Benson, Michelle Shinn, George Biallas, Carlos Hernandez-Garcia, David Douglas, and Richard Walker, and kneeling: George Neil and Fred Dylla.





Roy Whitney



Kelly Mannsfeld

## Whitney named Acting AD for Admin. as Mannsfeld moves to Argonne

Effective Nov. 1, 2005, Roy Whitney, JLab's Chief Information Officer, was named Acting Associate Director for Administration. The change took place as JLab's previous AD for Administration, Kelly Mannsfeld, moved on to become a Deputy to Argonne National Lab Director Bob Rosner.

Whitney served as AD for Administration prior to JLab's 2002 reorganization that created the CIO office and therefore is familiar with the people and processes within the Administration Division. He will continue to maintain his role as CIO. "I am pleased that he has agreed to take on this additional responsibility during a time of transition and urge all of you to work with him in a collaborative and cooperative manner," wrote JLab Director Christoph Leemann in a recent email announcing the change in senior management.

Mannsfeld joined JLab in 2000 as Director of Human Resources and Services. In 2002, Leemann appointed her as AD for Administration. In an email announcing Mannsfeld's move

to Argonne, Leemann noted: "...this is a source of both great pride and deep regret for me. ...To me as the Laboratory Director, Kelly provided invaluable help and advice and was a constant source of inspiration and encouragement in difficult situations. Her work at JLab and her diligent building of bridges to other Labs and the DOE has given her high visibility. I am proud to see that her work at JLab has opened for her one of these 'once in a lifetime' career opportunities."

According to an article in the Oct. 24 Argonne News: "Mannsfeld will strengthen the directorate, will help to maintain strong laboratory management during the upcoming competition for the Argonne contract and will play a key role in implementing the directorate's vision for the post-competition laboratory."

In the article, Argonne Director Rosner said, "Kelly brings a deep and genuine concern for employees through a wealth of experience within the national laboratory system and in the private sector. That experience will be vital as we strive to make Argonne the best laboratory it can be."

## FEL wins R&D 100 Award...

*Continued from page 1*

JLab's FEL, which is based on the superconducting radiofrequency (SRF) technology developed for the Department of Energy nuclear physics program at JLab, provides a scalable path for high laser output power. Materials processing with lasers is now a \$1 billion a year industry but is still limited in many applications by the availability of cost effective high power lasers. The development of the Jefferson Lab FEL technology substantially expands the capability of production lasers and enables new applications, which were in the past not considered due to economic considerations.

The R&D 100 Award was presented to JLab's 10 kW FEL Upgrade design team at an October 20 ceremony at Chicago's Navy Pier Auditorium that included over 650 attendees.

This is Jefferson Lab's second R&D 100 award. JLab received its first R&D 100 nod in September 1995 in a partnership with NASA and Digiray Corporation of San Ramon, Calif., for developing a transportable system for real-time x-ray imaging to find cracks and corrosion in oil refinery piping.

Since 1963, the prestigious R&D 100 Awards have been helping companies and research institutions provide the important initial push a new product needs to compete successfully in the marketplace. Winning an R&D 100 Award provides a mark of excellence recognized by industry, government and academia as proof that the product is one of the most innovative ideas of the year. Winners of the 2005 R&D 100 Awards are listed in the September issue of "R&D Magazine."

Dear Colleagues:

Jefferson Lab ended fiscal year 2005 with excellent safety numbers and was recognized by the National Safety Council (NSC) with three safety excellence awards. Not only did JLab exceed the Department of Energy's Office of Science fiscal year goals, the Lab finished the year leading the way in safety among the 10 Office of Science labs. This is a remarkable accomplishment, considering that JLab was tied for last at the end of FY 04.

Getting to that point was the result of a concerted effort between Lab management, employees, users and contractors, and I thank you for your efforts. Unfortunately we've started the new fiscal year with a number of mishaps; but I'm sure that with our combined diligence we can get to the source cause of these incidents and get our safety record back on track.

Safety is our highest priority, and we must continue to emphasize safety in all aspects of our work. It is imperative that safety remains a priority whether we are doing something we don't usually consider risky — such as lifting a tool box or walking across a parking lot — to activities that can stretch both physical and mental limits — such as creating a one-of-a-kind piece of equipment, setting up a new process in a laboratory, or conducting world-class research with CEBAF.

In an effort to improve JLab's Environmental, Health and Safety (EH&S) program, the Lab has actively embraced a number of activities over the last 18 months to help guide us toward a more cohesive, comprehensive EH&S program. Some of the more visible changes have included:

- Working with a safety consultant to help us identify critical safety concerns;

- Completing a focused look at the Lab's safety practices and procedures in three critical areas: electrical activities, materials handling, and use of personal protective equipment, and implementing several suggestions to improve safety in these areas;

- Conducting a Lab-wide safety survey to better understand and manage our safety culture;

- Creating a Director's Safety Council that meets weekly where senior managers collectively address safety matters;

- Forging a centralized EH&S Division and hiring Craig Ferguson as the Lab's first Associate Director of EH&S; and

- Installing a new Workers Safety Committee to provide senior management and me with safety feedback from employees.

As a result of everyone's dedication and attention to safety, JLab performance earned the National Safety Council Perfect Record award in October for operating 12 months (1,200,000 employee hours) without an occupational injury or illness involving days away from work (Aug. 3, 2004 – Aug. 3, 2005). In addition, the Lab received the Million Work Hour award for operating 1,000,000 employee hours without an occupational injury or illness involving days away from work (Aug. 3, 2004 – Jul. 27, 2005), and also earned the Green Cross for Safety Excellence that recognizes participating institutions reporting illness and injuries involving days away from work equal to, or less than, 50 percent of the Bureau of Labor Statistics rate for their industry and have had no fatalities during a year.

We can all be proud of these accomplishments and I congratulate you for making them possible. I also caution us to not become complacent and fall back into unsafe habits or mindsets. Recent events involving JLab staff, and the tragic fatal accident at CERN, reinforce the message that safety must continuously have our attention. The only way to prevent mishaps and near misses is for each of us to remain dedicated to maintaining the safest possible workplace — each and every day. In the end, what makes JLab a safe place is each of us coming to work with a mind ready to identify hazards, the determination to address those hazards and to maintain a vigilant eye on our and our coworkers' safety.

Please continue to give safety the highest priority in all that you do. Be vigilant and urge your colleagues to be safe. If you see a danger or an opportunity for danger, tell your supervisor and division safety staff. The Holiday Season is here, bringing added activities, stress, and certainly more traffic, which brings more opportunity for injuries, accidents and near misses. We should never hesitate in our daily activities to make the choice to be safe.



Christoph Leemann  
Jefferson Lab Director

**Safety: We've made significant progress, but must keep it a priority**

**From the Director**

# Accelerating JLab's SRF expertise

The Spallation Neutron Source  
'cold linac'  
undergoes successful  
commissioning in  
Oak Ridge

The Spallation Neutron Source (SNS) under construction at Oak Ridge National Laboratory (ORNL) met a crucial milestone this summer on its way to completion in June 2006 — operation of the superconducting section of its linear accelerator (linac).

The SNS linac has two sections: a room temperature or "warm" section, which completed its commissioning last January, and the superconducting or "cold" section built by Jefferson Lab, which operates at cryogenic temperatures. The cold section's central helium liquefier — or refrigeration plant — achieved its design temperature of 2 K (Kelvin) on Aug. 29. The cold linac provides the bulk of the power that drives the linac, and by late October had achieved an energy level of 912 MeV (million electron volts). The SNS linac is the world's first high-energy, high-power linac to apply superconducting technology to the acceleration of protons.

"The successful operation of the cold linac is a major step toward the 2006 completion of the SNS and demonstrates the success of the collaboration of national labs in keeping the project on time, on budget and on scope. It represents, technically, one of the most complex systems of the SNS facility," said Thom Mason, ORNL's Associate Director for the SNS.

"This successful test is just another indicator of the outstanding team of men and women that ORNL has

brought together to build and operate the SNS facility. They can be justifiably proud of this accomplishment," said Les Price, DOE's project director for the SNS.

Jefferson Lab, part of the team of six DOE national laboratories collaborating on the DOE Office of Science project, was responsible for the superconducting linac and its refrigeration system. Los Alamos National Laboratory in New Mexico provided the radiofrequency systems that drive the linac. The other DOE national laboratories supporting ORNL in the SNS collaboration are Argonne, Lawrence Berkeley, and Brookhaven.

For JLab, the SNS project was a five-year effort that used the full range of the Lab's expertise in superconducting radiofrequency technology.

The SNS will produce neutrons by accelerating a pulsed beam of high-energy protons down the 1,000-foot linac, compressing each pulse to high intensity, and delivering them to a liquid mercury target where neutrons are produced in a process called "spallation." The SNS will increase the intensity of pulsed neutrons available to researchers nearly tenfold, providing higher quality images of molecular structures and motion. Together, ORNL's High Flux Isotope Reactor and SNS will represent the world's foremost facilities for neutron scattering, a technique pioneered at ORNL shortly after World War II.

When completed next year, SNS will become the world's leading research facility for study of the structure and dynamics of materials using neutrons. It will operate as a user facility that will enable researchers from the U.S. and abroad to study the science of materials that forms the basis for new technologies in telecommunications, manufacturing, transportation, information technology, biotechnology and health. For more information about SNS, visit [www.sns.gov/](http://www.sns.gov/).

This image shows a section of the Spallation Neutron Source's cold linac, which was built by Jefferson Lab. (Image courtesy of Oak Ridge National Lab)





Clockwise from top: On April 8, Thom Mason, SNS Director; Norbert Holtkamp, Head of SNS Accelerator Systems and Carl Strawbridge, SNS Project Manager, visited JLab to thank the Lab for its contribution to the SNS Project. Here they pose with Accelerator Division Associate Director Swapan Chattopadhyay and Claus Rode, Director of the Office of Project Management and JLab's Senior Team Leader for the SNS Project, and many of JLab's key managers for the project.

## Congratulations JLab team! *Dedication, creativity, hard work result in significant contributions to SNS*

The successful commissioning of the SNS linac marks a major milestone in the large-scale application of SRF technology, and as we extend our congratulations to all the other members of the SNS team, we also take great pride in our contributions to this significant event. Construction of the SNS cryomodules was a major challenge to the people, facilities and systems of Jefferson Lab, and our on-time, on-budget delivery of technical systems that met or exceeded their performance specifications took tremendous dedication and creativity, not to mention a lot of hard work.

As we honor past accomplishments, we should also look to the future: I have no doubt that our achievement was an important factor in the selection of SRF technology for the proposed International Linear Collider, and the commissioning success we are now celebrating is a clear validation of that selection. In the wake of the ILC decision and the SNS success, we in the Institute for SRF Science & Technology are seeing an explosion of interest from around the world in our core technology, which bodes well for both the technology and Jefferson Lab's role in its development. The Institute is responding to that interest with major technical innovations, in the application of single-crystal/large-grain niobium to cavity fabrication, and in the investigation of a fresh proposal for layered superconductors: a thin film of Nb<sub>3</sub>Sn, MgB<sub>2</sub> or NbN on a thin layer of insulator on a niobium base. The former developments may yield better performance and reduced costs, and if the theory behind the latter proposal is sound and the fabrication challenges can be overcome, it could lead to a quantum increase in the accelerating fields achievable in superconducting cavities.

These developments clearly enhance the Institute's support for JLab's nuclear physics program, both in securing robust 6 GeV operation and in realizing the 12 GeV Upgrade. They also strengthen the technical foundations of the Free-Electron Laser program, illustrating once again the strategic complementarity of the Lab's core scientific and technical programs. Successful commissioning of the SNS linac is a truly noteworthy event for what it says about past achievements, present status and future prospects. Well done, y'all!

Warren Funk  
Deputy Senior Team Leader for JLab's SNS project, and  
Director of the Institute for Superconducting Radio-Frequency  
Science & Technology



Dozens of the JLab employees who performed SNS cryogenic and/or cold accelerator work gathered at the CEBAF Center auditorium on April 8 to meet the Oak Ridge SNS leadership and attend the Thank You reception.



On March 14, JLab employees took a few minutes out of their day to acknowledge completion of the last JLab-built SNS cryomodule. Many signed the cryomodule before it was shipped to Oak Ridge March 16 (bottom). JLab fabricated, assembled and tested 23 superconducting cryomodules for the SNS.



# SURA Thesis Prize winner

## Karl Slifer receives award at annual users meeting



by Judi Tull

Karl Slifer, a post-doc from the University of Virginia, was awarded the Southeastern Universities Research Association (SURA) Thesis Prize for 2004 during the JLab 2005 Users Workshop & Annual Meeting held this summer.

“Karl’s was the unanimous choice of the four readers for the final,” said John Domingo, JLab Senior Physics Fellow and one of the award committee readers. “His was the clearest, best written and had excellent knowledge of the necessary details.”

Slifer’s thesis “Spin Structure of He-3 and the Neutron at Low Momentum Transfer” was one of 11 submitted. Judging is based on a combination of four factors, including the quality of the written dissertation, the student’s contribution to the research, the impact of the work on the field of nuclear physics, and how the work benefits Jefferson Lab and/or other experiments.

Slifer said he was stunned when he got the news of the award, which includes a \$1,500 cash prize. “I had read the other submissions, and they were all very, very good,” he commented.

Born in Philadelphia as the youngest of six children, his parents always taught him respect for education, and expected all their children to get good grades at the schools they attended. He was set on a degree in English when he was admitted to Temple University on a full scholarship, an offer he says with a laugh, that he couldn’t refuse. But a fascinating course in astronomy turned his head toward physics. “I thought, ‘Wow! This is interesting!’” he said. “I remember thinking, ‘I can do this.’”

He’d taken few science and math courses in high school because friends had warned him that classes such as calculus were incredibly hard. “Other people scared me off,” he said with a shake of his head. “Once I got into it, it wasn’t so bad.” So he loaded up on math and science courses and graduated from Temple in 1995 with a degree in physics.

After graduating, he took a year off, dabbling as a computer free-

lancer, and working in a family business. During his undergraduate years he had worked with the JLab-bound, Helium-3 target hardware being built at Temple. After graduation, he stayed in touch with his advisor, who ultimately encouraged him to return to Temple for his doctorate. He first came to Jefferson Lab in 1998 to work on Experiment E94-010 in Hall A, which he found challenging.

“This experiment was the first at Jefferson Lab to use the Helium-3 target. There have been five since then, and several more are scheduled, so it’s opened up a whole range of new physics. I was fortunate to be involved from the beginning,” he noted, “so I learned a lot.”

He returned to Temple and passed his qualifiers in 2000, then came to live in Newport News full time in the summer of 2001. “I’d been coming here once every month or two for analysis meetings,” he said, “and living here makes it much more convenient for me.”

He’s currently working in Hall C on the Resonant Spin Structure (RSS) experiment, and has just begun the second year of his three-year post-doctoral position. He is working with collaborators on a proposal to measure the GDH (Gerasimov-Drell-Hearn) sum rule for the deuteron. “My job now is to prove my own value to the work that’s going on here at the Lab,” he said.

Slifer said he would be remiss if he didn’t thank three people who have been instrumental in the success he’s had so far at JLab: Zein-Eddine Meziani, his advisor at Temple; Seonho Choi, who was a post-doc at Temple when Karl was a student (“Whenever I had a question about physics or coding, I asked Seonho,” he recalled.); and J.P. Chen, his on-site advisor, who Slifer credits with helping him establish the direction he’d like his work to go in.

In what little spare time he has, Karl enjoys hiking through the park at the Mariners’ Museum and doing local volunteer work. But most of his time these days is about physics, and he hopes to be able to stay at the Lab. “My life is here,” he says. “It’s the coolest place on earth.”

The 2004 American Physical Society (APS) Fellows were announced at the APS meeting in Tampa this past April, and several physicists conducting research at Jefferson Lab were recognized, including JLab's Hall B Leader, Volker Burkert.

The APS Fellowship Program recognizes members who have made advances in knowledge through original research and publication or made significant and innovative contributions in the application of physics to science and technology. Each year, no more than one-half of one percent of the current members of APS are recognized by their peers for election to the status of Fellow.

Burkert was honored for "experimental research in the area of strong Quantum Chromodynamics (QCD) and confinement, especially studies of nucleon excitations, their transition form factors, and the nucleon spin response in the resonance region."

"I am honored. The American Physical Society is trying to recognize people they feel should be honored, and it's a very important citation. I'd like to thank the organization for nominating me and for the recognition," he says.

As Hall B leader, Burkert oversees a team of 40 physicists, engineers and technicians in the implementation and operation of Hall B and its unique CEBAF Large Acceptance Spectrometer (CLAS) and the shaping of Hall B's physics program.

Before coming to JLab in 1985, Burkert conducted research at the University of Bonn, where he began his research career in 1976 as a postdoc studying nucleon excitations involving high energy polarized electron beams and/or polarized hydrogen and deuterium targets. Since coming to JLab he has been involved with the development, construction and operation of CLAS and was appointed hall leader in 2003.

Looking to the future, Burkert says he's excited about Hall B's experimental program, which includes deeply virtual Compton scattering, high-statistics pentaquark searches and short-range correlations work. And since his citation recognizes his work in the area of

nucleon excitations, Burkert is especially excited about the  $N^*$  program. Those experiments are focused on further elucidating nucleon excitations/resonances.

Four JLab users were also bestowed with Fellow status.

Ken Hicks, Ohio University, was recognized for his "leadership role in experiments which have opened the new field of exotic pentaquark baryon study and for his sustained contributions to nuclear physics." He notes, "Whether or not a narrow pentaquark state exists, the search for this state is important. We should continue to push forward the boundaries of our understanding and reexamine established principles. In the end, higher precision experiments, like those we have done at JLab, are the key to better understanding."

Curtis Meyer, Carnegie Mellon University, received the nod for his "contributions to and his leadership in the experimental study of the light quark spectrum and the role of gluonic excitations." "It was an incredible pleasure and honor to have people recognize the work that I've been doing for 15 years on this. A lot of people that I've worked with over the years have helped me get this honor," he says.

Zein-Eddine Meziani, Temple University, was voted in for his "leadership of the neutron/polarized  $^3\text{He}$  spin structure program in Hall A at JLab and at End Station A at SLAC." He comments, "I am honored and humbled by the recognition of our work including that of many of my collaborators from SLAC and Jefferson Lab who made it all possible. My hope is that this is just a beginning, and that exciting times lay ahead of us especially as we plan to further unravel the nucleon spin structure with the future 12 GeV program at JLab."

Larry Weinstein, Old Dominion University, was honored for his "original contributions to the study of nucleon-nucleon correlations in nuclei." "This award is a wonderful recognition of the quality of the ODU and JLab Physics programs. It is also a great chance to sound pompous in an official setting. Thanks to everyone who made this possible," he laughs.

# APS Fellowship

## Program recognizes Jefferson Lab staff, researchers



Volker Burkert  
Hall B Leader

# Spin Structures of Protons and Neutrons

Theorists ponder impact of environment surrounding quarks, gluons



Ian Cloet

by Kandice Carter

Just as a top spins on a table, the tiny quarks inside protons and neutrons also spin. Now a complex calculation by theoretical nuclear physicists at Jefferson Lab has revealed that a quark's spin may be altered by the surroundings of the proton or neutron in which it resides. This surprising result, recently published in the journal *Physical Review Letters*, may lead to new insights about how ordinary matter is constructed.

Normally, we think of building blocks as static objects. For instance, the brick and mortar used to build the local bank remain pretty much the same from the day it's built to the day it's torn down. But the building blocks of ordinary matter are different. These bricks are particles called quarks, and the mortar is made up of particles called gluons. Quarks and gluons are in constant motion, taking part in a complicated dance to build protons and neutrons (also called nucleons).

Ian Cloet, a theorist at Jefferson Lab and the Special Research Centre for the Subatomic Structure of Matter at the University of Adelaide, and his colleagues wondered how this quark-gluon dance was affected by the environment around the nucleons in which the quarks and gluons reside. In particular, they wanted to know how the spin of the quarks and gluons may be modified by the environment around the nucleons they're embedded in and

how this modification may affect the spin of the nucleons themselves.

To find out, Cloet and his colleagues, Wolfgang Bentz at Tokai University in Japan and JLab's Tony Thomas, calculated the spin-dependent structure functions of nucleons. These probability distributions provide information on how the quark spins are organized inside the nucleon, and from these distributions, it is possible to determine what fraction of the nucleon spin comes from the quarks and what fraction comes from the gluons.

"The spin-dependent structure function tells us about the spin content of the nucleon. So we know the proton has spin one-half. All the constituents have to add to give you spin one-half, and the structure functions give you information on how that happens," Cloet says.

The calculations took into account two different environments where nucleons are commonly found: inside the nucleus and outside. The researchers calculated the spin-dependent structure functions for a nucleon inside the nucleus and for a free nucleon outside the nucleus. They then compared these structure functions in ratio form. This method revealed that the spin content of a nucleon inside the nucleus is different from one outside.

"So what this is telling us is that how the gluons' and quarks' spins add together to give spin one-half is dif-

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ferent for a bound nucleon than it is for a free nucleon,” Cloet says. That means that while a nucleon’s spin may remain constant, the proportion of that spin contributed by its constituents, the quarks and gluons, may change as the environment around nucleons change. “The spin of the nucleon has to be spin one-half, but how you can get one-half can vary,” Cloet explains.

This result comes as something of a surprise. “It was thought that the skin of the proton would expel this force from the other nucleons. It just really wouldn’t get inside and affect the quarks. People expected the small-scale structures of the nucleon to remain mostly the same whether they’re inside or outside the nucleus,” Cloet remarks.

He says the presence of other nucleons inside the nucleus causes this difference. One model, the Quark-Meson Coupling Model, assumes that the quarks inside nucleons in a nucleus interact through the exchange of mesons. This model regards nucleons inside a nucleus less like billiard balls and more like squirmy bags that may be modified by other nucleons in the nucleus around them.

“The idea is that this meson field generated by all the other nucleons is felt by the quarks inside the original proton. And this is changing their properties, and therefore changes these structure functions,” Cloet explains,

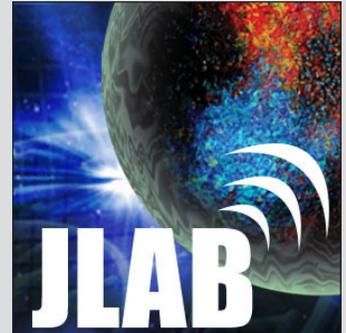
“Outside the nucleus, there are no mesons really interacting with these quarks.”

He says that while the new calculation shows a clear difference in how quarks and gluons contribute to a nucleon’s spin, it doesn’t reveal the exact makeup of these contributions. And the finding hasn’t yet been backed up by experiment. But that could change. One of the goals of the 12 GeV Upgrade project at Jefferson Lab is to measure the origin of the basic properties of nucleons, including mass, size, electric field, magnetic field, and spin.

In the meantime, Cloet says this is the first calculation of the spin-dependent structure functions of nucleons inside the nucleus. He says this discovery is giving theorists new insight into Quantum Chromodynamics (QCD). QCD is a theory that describes the force, the strong force that binds quarks into nucleons and nucleons into nuclei.

Cloet says this newest calculation demonstrates that the nucleus isn’t a dull, well-understood object: it still has many secrets, and investigating its properties is pushing the boundaries of physicists’ understanding of QCD. It also indicates that the nucleus is far from a simple collection of protons and neutrons, but is truly a complex system of interacting quarks and gluons.

For the full paper visit <http://arxiv.org/abs/nucl-th/0504019>.



## Now hear this!

Jefferson Lab is now recording audio versions of select web page stories. A small MP3 icon located just below the title of a JLab web page story indicates the availability of an audible version of the story. To access the MP3 file, click on the icon and make sure your speakers are turned on. Beginning Dec. 15, all JLab MP3 files will be posted at [www.jlab.org/rss/podcast.html](http://www.jlab.org/rss/podcast.html).

To reach new audiences with these audio-format stories, JLab is also placing these files — called podcasts — on iTunes. iTunes subscribers will find JLab’s podcast icon (above) when they log on to iTunes’ science section.

# Killer clothing may provide germ resistance!

JLab/W&M  
scientist set to  
treat, test  
antimicrobial  
fabrics

Jefferson Lab has received a \$192,000 grant from the Dept. of Homeland Security to test germ-killing fabrics for police and fire-fighter garments. The Lab will work with the Newport News Office of Emergency Management to perform the tests.

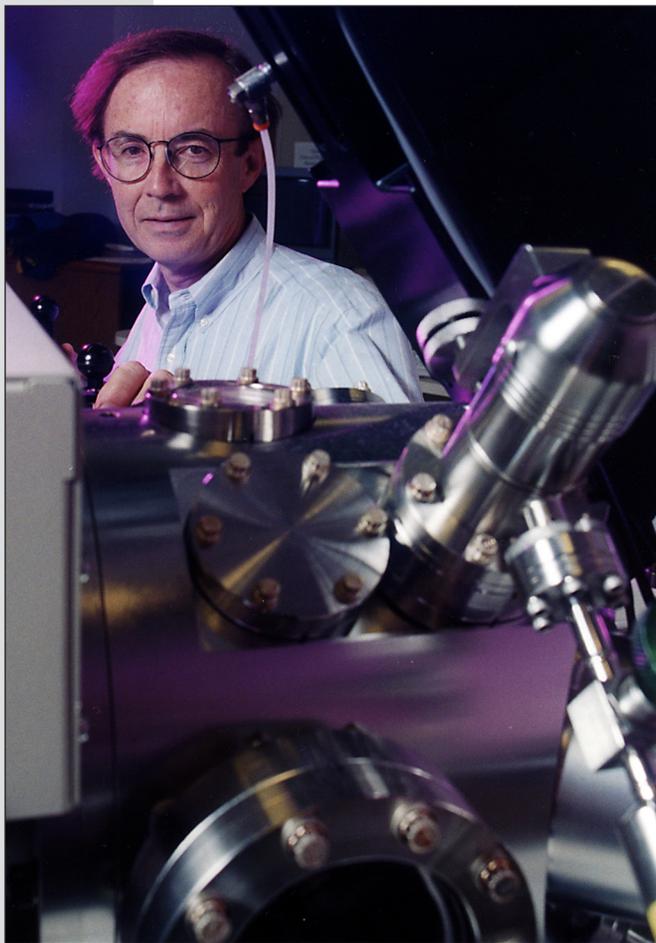
Will the laser-treated nylon that kills all microbes in the lab perform as well in the real world? Working with the Newport News Office of Emergency Management, Jefferson Lab Scientist Michael J. Kelley will check microbe activity before and after the cloth samples spend months in high-heat environments and in police vehicles and stations to get the answer. If “killer nylon” passes the test, the next step will be making garments, air filters and room furnishings. Treated and untreated items will be placed together to show if the treatments keep surfaces free of microbes,

such as hospital-specific germs in healthcare settings.

“Durable, affordable antimicrobial fabrics for garments and furnishings will help protect against disease transmission. Antimicrobial packaging films could also help reduce food-borne illness. While possible bioterrorist attacks and deadly new viruses are in the public eye, antibiotic-resistant germs may actually be the bigger danger. Making sure those germs die wherever they land will help stop their spread,” says Kelley, Jefferson Lab Project Leader and Principal Investigator, who also has a joint appointment with the College of William and Mary as a Professor of Applied Science.

The antimicrobial nylon being used for this real-world study was discovered 15 years ago by a team of DuPont inventors, including Kelley, who was a DuPont scientist at the time. The treatment process involves exposing the nylon to ultraviolet light to change the chemical structure of the nylon at the molecular level. At the time of discovery, the cost of treatment with available ultraviolet lasers was high, and the perceived need for the fabric was low. However, the changing biological threat environment and the expected availability of radically cheaper ultraviolet light from JLab’s Free-Electron Laser (FEL) has recently renewed interest.

Researchers have sought ways to make surfaces kill germs for more than 50 years. Their chief strategy has been to attach materials known to kill germs to various surfaces. However, high cost, low durability and lack of environmental friendliness blocked the path to broad distribution of these applications. “The strategy for killer nylon is to activate the fabric, not an applied coating, by transforming an exceedingly thin surface of the material. Because this surface is part of the fabric and not an applied coating, it cannot wash off or wear off easily. Because the entire process consists only of shining deep ultraviolet light on the fabric in the absence of oxygen, there are no chemicals used in the process, thus making it environmentally safe. Treated fabric looks, smells and feels just like untreated fabric,” Kelley notes.



Michael Kelley poses for a photo in the Applied Research Center (ARC) with a surface analysis instrument that he uses to examine his test materials.

Jefferson Lab management has put in place a new project management tool designed to help employees and the Project Management team, involved in the 12 GeV Upgrade and other projects across the Lab, to be more proactive in engaging potential problems or concerns before those issues could have a major impact on a project.

This should help us prevent or at least minimize “surprises” that can cost a project both critical time and money, according to Dennis Miner, Project Management staff member.

On Sept. 1, senior leadership approved the Project Control System (PCS) Manual for use by Lab employees in planning and executing projects. This manual is a major update to the original project management process document developed for managing construction of the Continuous Electron Beam Accelerator Facility. With the start of the 12 GeV Upgrade, the Lab needed to revise its project management processes in line with current Department of Energy policies and guidance, Miner notes.

The PCS Manual describes the process and procedures for implementing an Earned Value Management System (EVMS) on projects conducted at JLab. Earned

Value Management is a systematic framework for communicating project progress and performance across all levels of the project management team and to the project customer. The manual is organized along the EVMS guidelines established in the American National Standards Institute/Electronic Industries Alliance Standard 748-A-1998. This project management standard defines 32 “best practice” criteria for implementing the Earned Value Management process.

By incorporating an EVMS, project leadership is able to “manage by exception” and focus their attention on the critical issues of a project. The earned value indicators provide quantifiable project data for identifying, analyzing, understanding, and resolving problems.

The Project Control System Manual is maintained by the Jefferson Lab Office of Project Management.

The full text and individual sections of the PCS Manual can be viewed on the PCS Manual web page: [http://www.jlab.org/div\\_dept/directorate/proj\\_mgmt/manual/](http://www.jlab.org/div_dept/directorate/proj_mgmt/manual/).

Questions, comments, and suggested revisions concerning this manual can be addressed to Office of Project Management staff member Dennis Miner ([miner@jlab.org](mailto:miner@jlab.org)).

# Proactive project management

New tool helps prevent ‘surprises’

## JAG announces children’s holiday party; Toys for Tots drive

The JLab Children’s Holiday Party is set for Saturday, Dec. 10 from 10 a.m. to noon in the CEBAF Center lobby. The JLab Activities Group is planning crafts, entertainment, treats, videos and a visit from Santa Claus for the event. All children of Lab employees, contractors and users are invited to attend. Each family is asked to bring a new toy for the Toys For Tots toy drive. Refreshments will be provided. All children must be accompanied by an adult.

For more information, or to help with the party, contact Dave Abbott at [davida@jlab.org](mailto:davida@jlab.org).

The annual U.S. Marine Corps Toys for Tots toy drive is underway. Bring in your donation of new, unwrapped toys for youth ages 1-12 by Friday, Dec. 9. Local Marines will pick up the toys to distribute to needy children after the Children’s Holiday Party Dec. 10. Drop boxes are located near the main entrances of CEBAF Center, VARC, ARC, Trailer City, Test Lab and MCC.

# CEBAF Center Addition update

## Project nears completion; moves being planned



by Judi Tull

A little over a year after site work started on the \$10.5 million CEBAF Center (CC) Addition, the project is on schedule, with the first tenants scheduled to move in during December 2005, according to Debra Brand, the Project Manager.

By the end of October, construction of the new 61,000 square foot addition project was about 88 percent complete. The exterior is almost complete and landscaping has started. The interior is shaping up nicely with wallpaper, painting and carpet complete on the second and third floors, and the ceiling tile is being installed. The same work is also progressing on the first floor. Start-up and commissioning of the electrical and mechanical systems is underway. Telecommunications and data cabling have been installed in preparation for installation of the systems furniture, which includes cubicle walls and workstations which started arriving in mid-November.

New occupants of the addition will include individuals from Trailer City, Trailers 11A, and 11B, and the ARC, as well as from the existing CEBAF Center. With new office space in the addition opening up, removal of 22,000 square feet of trailer space has begun, and will include over 60 percent of Trailer City, the remaining 11-series-trailers, and two of the 34-series-trailers. Some of these trailers have already been removed from the site, with the rest scheduled for demolition or removal by April 2006.

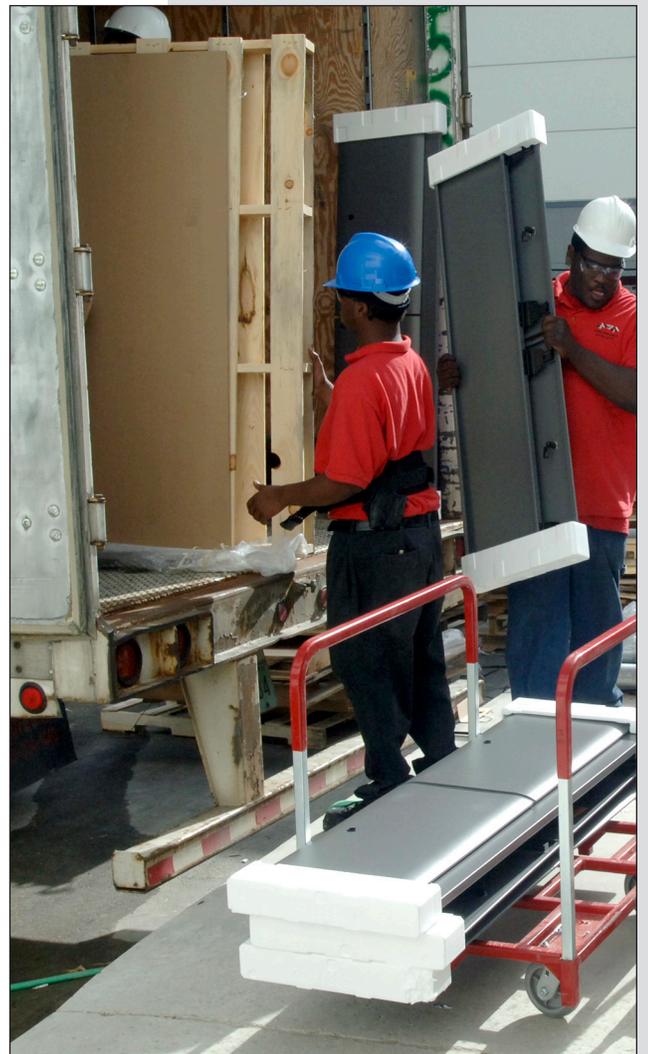
Planning for the upcoming moves is well underway. David Fazenbaker, Facilities Management, is serving as the overall move coordinator. Each group moving into the addition has appointed a move coordinator to facilitate planning. Working through these coordinators, workspace is being assigned to individuals. Coordination also includes the Systems, Telecommunications and Networking groups in the Computer Center. The physical move will be performed by contracted commercial movers, with the goal of having a smooth transition between existing and new space.

Throughout all phases of the construction project, safety has been of the utmost importance. Since the project began, Debra Brand and Administration Division Safety Officer John Kelly have given weekly 90-minute presentations for all new workers on the construction site. The material covers items such as basic safety requirements, reporting requirements, and general OSHA construction practices such as personal protective equipment and ladder safety. Since individual workers on the construction site do not carry JLab badges, each person who completes the presentation is given a yellow sticker for his hard hat so it's easy to determine who's had the training and who hasn't.

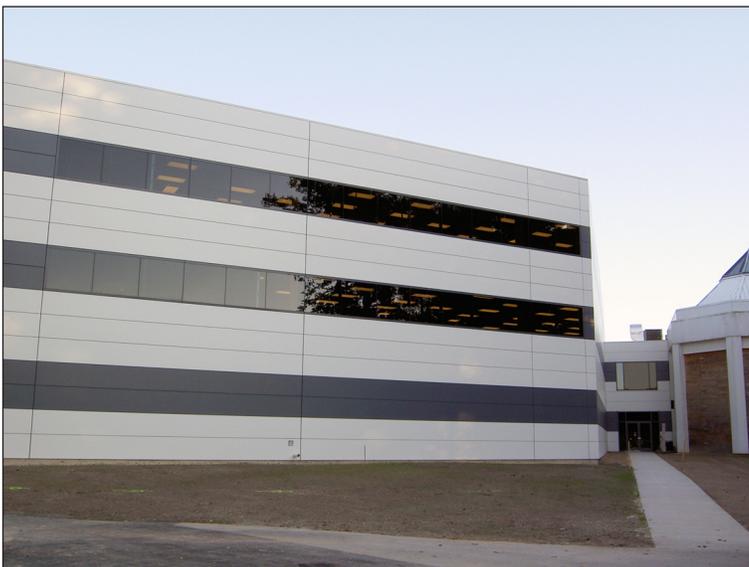
Another safety program that's been implemented is called "Stop for Supervision." The program was developed by DuPont, and Director of Facilities Management Rusty Sprouse trained all the SOTRs (Subcontracting Officer's Technical Representatives) in the Facilities Department in its implementation; they, in turn, train others. "Stop for Supervision is about acknowledging people for the things they're doing right," Brand explained, "and how to talk with them if there are areas that could be improved upon." It empowers any of the more than 30 people who have been trained in the non-confrontational method to speak with workers about how they're doing their jobs. "The idea," Brand said, "is that if everybody is looking and commenting, we can communicate safety better."

All people moves for the project are expected to be completed in January 2006. Following the set up of networking and telecommunications in December, the Computer Center will begin the first phase of systems installations in January. The High Performance Computing Group is planning to install a new cluster of several hundred nodes in the new computer room in February.

More information about the move will be in the next "On Target."



Top: A panoramic view of the 2nd floor of the CEBAF Center Addition before the arrival of its systems furniture. Middle, left & right: The systems furniture began arriving in mid-November with assembly immediately following. Bottom: A look at the freshly poured sidewalk leading to the new doorway that will connect the addition, rear atrium and cafeteria.



# Briefs

## Milestones for Aug./Sept. 2005

### Hello

Kostas Orginos, Theory Center Senior Staff, Chief Scientist Office

Balint Joo, High Performance Computational Scientist, CIO

Sandra D'Souza, Information Resources (casual), CIO

Tim Fox, Accelerator Operator, Accelerator Division

Geoffrey Johnston, Accelerator Operator, Accel. Div.

Steve Pierson, Accelerator Operator, Accel. Div.

David Anthony, Accelerator Operator, Accel. Div.

### Goodbye

Diana Smith, Front Desk Receptionist, Administration Div.

Jeffrey Faulkner, Accelerator Operator, Accel. Div.

Anthony Day, Diagnostics Systems Coordinator, Accel. Div.

Sandra Prior, EH&S Officer, Accel. Div.

Mostafa Keraachi, Project Planner, Office of Project Management

Sherlon Kauffman, Electronics Engineer, Accel. Div.

Deborah Gruber, Electronics Coordinator, Accel. Div.

Michael Davenport, Mechanical and Controls Inspector/Evaluator, Admin. Div.

Vladimir Sapunenکو, Computer Scientist, Physics Div.

Lee Ann Zelesnikar, Human Resources Assistant, Admin. Div.

Julie Roche, Hall C Post Doctoral Fellow, Phy. Div.

Dia Williams, Electronics Assembler/Technician, Phy. Div.

## Chef Ed earns 2nd Eurest 15-year pin

Chef Ed Bittenbender received his second 15-year pin with Eurest on Sept. 30. In a small ceremony after breakfast service, Regional Director of Eurest Dining Services Dwayne Parris presented Chef Ed with the company's 15-year pin and watch. Bittenbender also received tokens of appreciation for his service from the Quark Cafe staff and Staff Services.



After receiving the pin and opening his gifts, Chef Ed thanked his co-workers, Eurest and JLab. "I love it here. I don't want to go anywhere else. Thank you, thank you, thank you!" Chef Ed worked for Eurest for 15 years before going in to private catering. Afterward he rejoined Eurest, which led to his current position as head chef of JLab's Quark Cafe and his second 15-year pin.

## DOE Site Office welcomes two new staffers

Jefferson Lab's Department of Energy Site Office staff added two to its ranks this summer.



Contract specialist Jim Hudgens is the new Site Office Deputy Business Manager. He joined the Site Office staff on Aug. 8, taking over for Don Baxter, who retired earlier this year.

As deputy business manager, Hudgens' primary responsibilities include oversight of DOE's Contract with SURA, contracting and property management, financial and budget management, and operational awareness and oversight. He has 38 years

service with the Federal Government, which includes 22 years with the Department of the Navy in Norfolk, Va.; seven years with the Department of Agriculture; five years with the Department of State; and four years active duty in the Navy.

Hudgens can be reached at ext. 7144, or via email at [jhudgens@jlab.org](mailto:jhudgens@jlab.org), and is located in room C211 in CEBAF Center.

The Site Office's new Environment, Safety & Health Program Manager, Patricia "Tricia" Sumner, joined the staff on Aug. 22, taking over the ES&H oversight responsibilities formerly held by Barbara Morgan, who retired earlier this year. Sumner has 15 years of environmental management experience and comes to JLab from the Army Corps of Engineers in Concord, Massachusetts.



As the ES&H Manager, Sumner's primary responsibilities include:

- Ensuring that contractor-executed functions are carried out in a manner that protects government and contractor personnel and the general public against all environment, safety and health hazards arising from the performance of the contract work.
- Overseeing the contractor's compliance with all federal, state and local environmental, safety and health laws and requirements (including radiological requirements).
- Overseeing the contractor's Emergency Management program.
- Primary point of contact for anyone at Jefferson Lab with unresolved ES&H concerns — for reporting those unresolved concerns to the DOE Employee Concerns Management System for investigation.

Sumner can be reached at ext. 7139 or via email address [psumner@jlab.org](mailto:psumner@jlab.org). Her office is C208 in CEBAF Center.

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## **JLab user wins 2005 Tom W. Bonner Prize**

Jefferson Lab User Roy Holt, from Argonne National Laboratory, is the 2005 winner of the American Physical Society's Tom W. Bonner Prize. The award citation reads: "In recognition of his pioneering role in experimental studies of the structure of the deuteron and especially for his innovative use of polarization techniques in these experiments."

This annual prize, which currently consists of \$7,500 and a certificate citing the recipient's contributions, was established in 1964 as a memorial to Tom W. Bonner by his friends, students and associates.

The purpose of the prize is to recognize and encourage outstanding experimental research in nuclear physics, including the development of a method, technique, or device that significantly contributes in a general way to nuclear physics research.

"I am both honored and delighted to be selected for the Tom W. Bonner Prize," Holt remarks. "It came as a complete surprise. I am extremely grateful to have the opportunity to work with so many outstanding collaborators who contributed enormously to the success of the experiments recognized by this prize. We have been extremely fortunate to have had the opportunity to perform these experiments at extraordinary laboratories including Jefferson Lab, SLAC, Novosibirsk, MIT-Bates, IUCF, LAMPF and Argonne."

Holt received his Ph.D. from Yale University in 1972 and served on the research staff there until 1974, when he joined the Physics Division at Argonne National Lab (ANL). While there he conducted experiments at ANL, LAMPF, MIT-Bates, SLAC and the BINP at Novosibirsk. In 1994 he became a professor of physics at the University of Illinois at Urbana-Champaign, where he also served as a director of the Nuclear Physics Laboratory and continued his research at Jefferson Lab, DESY-Hamburg

(HERMES experiment) and IUCF. He returned to Argonne in 2000, and serves as chief of the Medium Energy Physics group in the Physics Division. His present research interests include the structure of the nucleon and nucleus as well as tests of the Standard Model.

Holt is a Fellow of the American Physical Society and of the Institute of Physics (U.K.). He has served on program advisory committees for several accelerator facilities, Nuclear Science Advisory Committee subcommittees, panels for the Department of Energy and the National Science Foundation, and editorial boards of Physical Review C, Nuclear Physics A and the Journal of Physics G.

## **BEAMS seeks volunteers for spring program activities**

Mark your calendar for 2006 BEAMS training; more volunteers needed for Dec./Jan. classroom activities

Bring a co-worker with you, invites Stacy DeVeaue, Science Education, for second semester BEAMS volunteer training on Wednesday, Jan. 11, 2006. Two training sessions are scheduled for volunteers' convenience: 11 a.m. and 1 p.m. in the VARC classrooms (72A & 72B). Orientation will be presented for both third- and fourth-quarter activities (Weather Tools: Building a Barometer and Scale of the Solar System).

Extra volunteer help will also be needed in the classrooms for a hurricane tracking activity Science Education will be presenting to the students. Call DeVeaue, ext. 7560, or email [stacy@jlab.org](mailto:stacy@jlab.org) for more information about the training sessions or to reserve a spot. She is also happy to provide more information to prospective volunteers about JLab's long-running BEAMS (Becoming Enthusiastic About Math & Science) program.

The Science Education staff currently has a number of BEAMS volunteer classroom activity openings for December and January. Anyone interest-

ed in helping with or conducting the UV Radiation and/or Reflection/Absorption activities may contact DeVeaue for time/date/activities openings.

## **Deadline nears for SURA fellowship applications**

The Southeastern Universities Research Association (SURA) plans to award up to eight fellowships in March 2006 to doctoral program graduate students at SURA member universities for research at Jefferson Lab. The application deadline is Jan. 27, 2006. Seven fellowships are available for advanced training related to the theoretical and experimental research programs of JLab, including nuclear and related particle physics, accelerator physics, and in associated scientific and engineering fields. One additional fellowship is available for basic or applied research related to the Free-Electron Laser (FEL) program at the Lab.

Awards are based on competitive evaluation of academic qualifications, references, plan of study, research potential and relevance to the JLab research program. For application requirements and additional information, visit [www.jlab.org/user\\_resources/usergroup/](http://www.jlab.org/user_resources/usergroup/).

## **End-of-year TLD badge change-out nears**

The end-of-year TLD (thermoluminescent dosimeter) change-out will occur over the holiday shutdown period. Radiation Control staff asks that everyone with a JLab TLD be sure to put his or her badge in its assigned place in the rack before leaving for the holiday break. The last day of work before the holiday shutdown will be Friday, Dec. 23, 2005. Please do not leave your TLD in your car, at home or on your desk, asks Becky Mosbrucker, RadCon. Call her at ext. 7236 if you have any questions.

# DOE audit of JLab's EMS planned for December

You may be contacted when the Department of Energy (DOE) conducts its audit of JLab's Environmental Management System (EMS) in early December.

This audit is to verify that JLab (as with all DOE national labs) has a working EMS. The DOE deadline to have an EMS in place is Dec. 31, 2005. An EMS helps assure that JLab is formally addressing operations and activities that have or could have a significant impact on the environment, and that specified goals and objectives have been set and actions taken to reduce or minimize those impacts.

Jefferson Lab has informed the DOE Site Office that the Lab's EMS

is in place. The next step in JLab's EMS implementation process is to have DOE perform an audit to confirm the functioning of the Lab's EMS. Once confirmed, the Site Office will declare to DOE Headquarters that Jefferson Lab has an Environmental Management System.

The DOE audit will be conducted here the week of Monday, Dec. 5. During the audit, depending on your work responsibilities, you may be interviewed to determine your understanding of the environmental impacts of your work area and the work you perform, what steps you take to reduce any negative environmental impacts, and the Standard Operating Procedures

(SOPs) for your work area that have environmental aspects associated with them.

If you have any questions or would like more information about JLab's EMS, contact Linda Even, JLab Environmental Engineer, ext. 7308, or Mary Erwin, JLab CFO and EMS Management Representative, ext. 7027. Background information on the EMS is available on page 2 of the July/August 2005 "On Target."



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