December 2000

ON TARGET

THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY • A DEPARTMENT OF ENERGY FACILITY

IMR team rates
JLab Outstanding

GEP-II experiment
underway in Hall A

David Ernst joins
JLab Theory Group for year

ARC team uses
light as weapon in battle against infectious disease

Success achieved, challenges ahead

Leemann discusses past year, future opportunities during annual Lab Address

The successes achieved during 2000, changes in leadership and the challenges and opportunities of the future were among the topics discussed by Interim Director Christoph Leemann during Jefferson Lab's State of the Lab Address held November 28.

"We have a very good year behind us and unprecedented opportunities and challenges ahead," Leemann said at the outset of the annual event — combining employee Service Awards and the State of the Lab Address. "The Lab's successes and accomplishments are due to each one of us and what we bring to the Lab."

Leemann and the Associate Directors of the Lab's three Divisions recognized 110 employees for five, 10 or 15 years of dedicated service to the Lab.

He began the Lab Address by applauding the great strides in the Lab's physics program during 2000, completing 30 experiments and partially completing another 47. He also cited the 143 Ph.D.s awarded in experimental and theoretical physics based upon work done at the Lab, and the 117 faculty that the Lab shares with 23 universities through joint appointments.

He went on to discuss the just-published, first draft of the White Paper pre-

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Jefferson Lab's Interim Director, Christoph Leemann, has the rapt attention of employees during his recent State of the Lab Address.

Leemann discusses JLab's past year, future opportunities

Continued from page 1

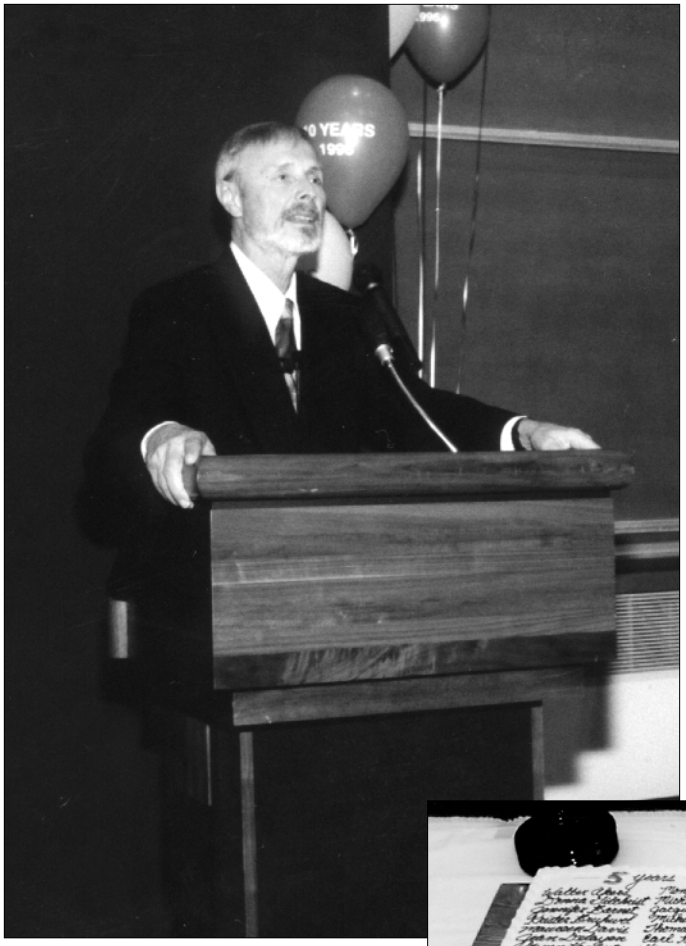
senting the Lab's need for an accelerator upgrade to 12 GeV in order to continue conducting frontier physics. And, he highlighted the importance of the activities underway to prepare the Lab for its part in building linear accelerator superconducting radiofrequency components and the cryogenic refrigeration and transport system for the Spallation Neutron Source at Oak Ridge National Laboratory. Leemann gave the standing-room only crowd the latest information on the search for a new Accelerator Division Associate Director and on the newly formed SURA (Southeastern Universities Research Association) committee just starting its search for a new Jefferson Lab Director.

He mentioned the outstanding results of the Lab's recent Institutional Management Review (see story on page 3), and provided an update on the City of Newport News' efforts to build a second office building behind the now-full Applied Research Center.

Leemann delved into the problems showing up in the klystrons after the Lab's first 6 GeV test run; and he commended the many Lab employees who participate in community service activities such as the quarterly Red Cross Blood Drives and those who volunteer their time in the BEAMS (Becoming Enthusiastic About Match and Science) program. In the area of technology transfer, he pointed out recent experiments taking place in the Free Electron Laser User Facility and the 27 patents that have been awarded for unique processes and components developed by Lab staff.

"We have a promising future with a lead role in the field of hadronic physics," Leemann said. "We are world leaders in superconducting radiofrequency technology. We are leaders in recirculating and energy-recovery linacs and polarized beam. We are developing a basic research program for the FEL and hope to create an R&D program around our unique accelerator technology and capabilities.'

"This is an exciting time; stay focused on the challenges," Leemann urged. "I'll do my best to give you what you need to do the job. Please proceed as the dedicated professionals I know you are. I always have an open door for each of you. Let me know how you are doing — stop by or send me an e-mail."



Christoph Leemann during his State of the Lab address to all staff.

Many names in the 5, 10 and 15 year service categories grace the Service Awards cake.

A small delegation from the Lab visited with the Honorable John Warner, Virginia's senior senator, in Washington, D.C. on December 14. They delivered copies of the Lab's new video to Senator Warner. Here Fred Dylla (left), Free Electron Laser program manager, and JLab's Interim Director Christoph Leemann discuss how the Lab's research continues to produce excellent results.

Rated Outstanding

Lab impresses Institutional Management Review team

Outstanding was the rating earned by Jefferson Lab during November's Institutional Management Review with few exceptions.

The biennial review is conducted to evaluate the management and operation of the Lab, as part of the performance-based contract between the Department of Energy (DOE) and the Southeastern Universities Research Association (SURA). The Nov. 1–2 review assessed the Lab's strategic planning, managerial effectiveness and organizational culture.

According to the report, sent to SURA President Jerry Draayer, by review committee chair, John McTague, "The Lab's performance with respect to Strategic Planning exceeded expectations (rated Outstanding), Managerial Effectiveness exceeded expectations (rated Outstanding) and Organizational Culture greatly exceeded expectation (rated High Outstanding)." With the overall performance rating judged to be Outstanding.

Although this is just one of several reviews conducted in accordance with the JLab contract, both DOE and SURA view this assessment with particular importance as an evaluation of the overall effectiveness of Laboratory leadership and management.

In the area of Strategic Planning, the committee applauded the Lab's production of scientific results and its current world leadership in experimental capabilities in its energy range, as well as in superconducting radio frequency technology. They cited the Lab for its productive relationship with its user community and for the work so far on the proposed 12 GeV upgrade.

Under Managerial Effectiveness, the Lab was complimented for its efficient and effective use of resources to enhance scientific outcomes at the Lab. Specifically, the Lab's "superb" attention to environmental safety and health, and the "excellent processes and utilization goals to sustain performance." It was suggested that more attention be paid to succession planning since the Lab is "relatively lean" and "activities are staffed only one or two people deep."

Organizational Culture rated a High Outstanding by the committee. They described the Lab as "stand[ing] out among its DOE peers for its sense of community, both internal and external. …[S]taff members identify with the Lab and its mission and have pride in contributing to its success. There is broad appreciation of the benefits of having a diverse staff. …Perhaps the most concrete manifestation of the superb organizational culture is the extensive volunteer work that the staff performs in the local community, particularly with respect to K–12 education. The committee also noted with regard to user communications "the availability of information on the processes and rationale of resource allocations can be improved."

Overall, the six-member committee was impressed with the overall high quality of the Lab, including both its science program and its cost-effective approach to management.

GEP-II takes off

Hall A experiment peers deeper into proton's structure

by James Schultz

For particle physicists, the best holiday present would be a complete understanding of the inner workings of the atomic nucleus. But that's one gift even Santa Claus can't manage. Not that Hall A researchers aren't trying — at least as far as the proton is concerned.

The Hall's latest investigation, begun on November 3, is slated to conclude December 19. Known to originators as GEP-II, the experiment aims to learn more about what physicists call the electric form factor of the proton. A more complete understanding of this key subatomic constituent is essential as scientists seek to accurately represent nuclear structure. Knowing the proton's form factor, says Hall A experiment co-spokesperson Edward Brash, should substantially advance nuclear and particle physics theory.

"The electric form factor is one of the most important parameters one can measure. This is a crucial experiment in this field," he says. "In a sense, there's no way that this [Hall A experiment] could fail. If it deviates from theory, that tells us something. If we don't see any deviation, that also tells us something."

A predecessor experiment, GEP, ran in Hall A in the summer of 1998. Results from that study, already published, paint a different picture of the proton's structure than theorists had expected. The outcome was significant enough to send experimenters back to extend these measurements to higher energies.

"The previous measurements and ours differed," Brash says. "The first thing we did was to go back and reanalyze the data. We confirmed that we had done it right. Our results stand, and at a high level of scrutiny. Based on our results, the current theory based on the quark picture of the proton is incomplete."

Peeling the Onion

Theoretical depictions of the subatomic level have rough analogues in the macroscopic world. Two objects made of the same material, with the same density and mass, can nevertheless have differing "matter distributions" in space: among these a sphere, cube or pyramid.

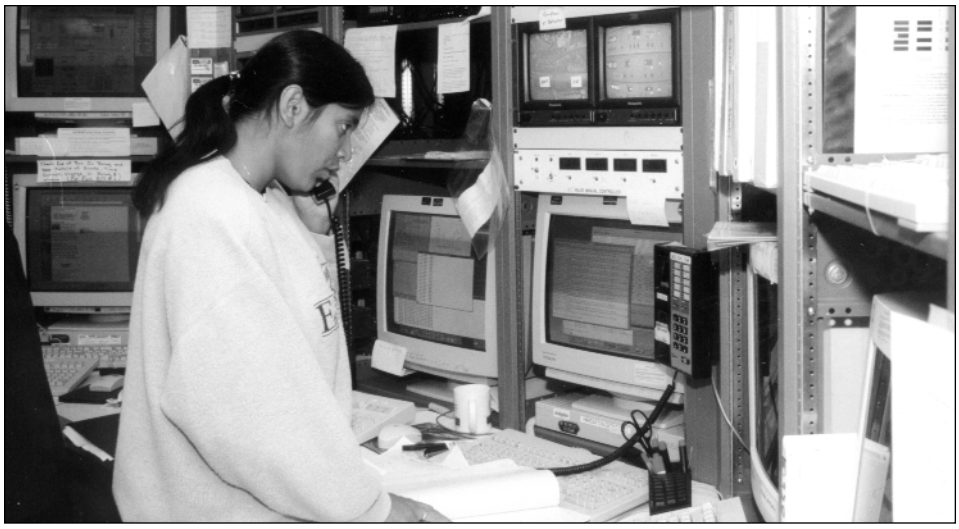
"It's like looking into an onion. As you peel deeper, you realize there are sublayers," Brash explains. "If you're going to understand bigger systems, then you need to start with the simplest. One of the simplest is a proton with its three quarks. What we want to do is see how electrical charge, and the quarks, move around inside that proton. We want to understand at what energies the effects of the quarks on the proton form factor become important."

To accomplish this, Hall A experimenters are using a method known as polarization transfer. In essence, researchers use an electron beam generated by the JLab accelerator in which the spins of most of the electrons are aligned with beam direction. When the beam strikes a liquid hydrogen target, spin is transferred from the electrons to the protons. With beam energies approaching six billion electron volts, or 6 GeV, the electrons are vigorous enough to interact with individual quarks, in specific ways that can then be analyzed to indicate the proton's charge and current distributions.

Without an exceptional electron beam, however, Brash says research results would likely be inconclusive. He credits the Lab's technical prowess in enabling GEP-II to succeed as well as it has. "[Beam] quality is so good, of such high quality and energy, that it makes experiments like this possible," he says. "You can't call the work done here world-class. It's world-beating. There's no comparable facility like this anywhere."

A follow-on experiment, GEP-III, is envisioned, although not yet approved by the Lab's Program Advisory Committee. While one version could be conducted at current beam energies, GEP-III may not take place until after JLab's anticipated energy upgrade to 12 GeV.

"Our picture of the proton is incomplete," Brash asserts. "New data for the proton form factor will provide severe tests of both low and high energy models of proton structure. In this sense, the interplay between experiment and theory is crucial.



Krishni Wijesooriya, a post doctoral candidate from Argonne National Lab, pulls a shift in the Hall A control room during the run of GEP-II.

Welcome aboard!

Ernst: Man of many talents, interests joins Theory Group

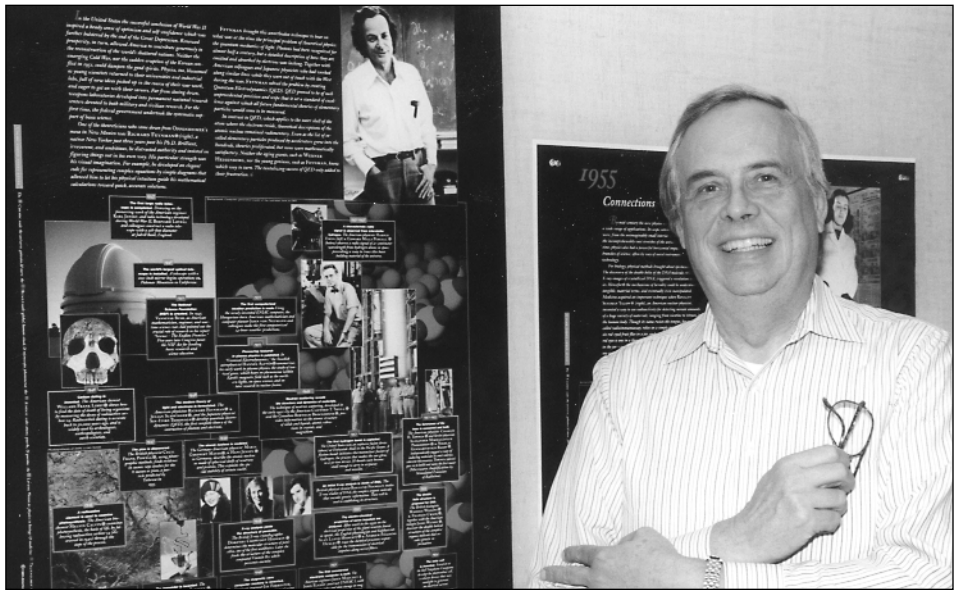
David J. Ernst is taking a year off from his academic and managerial duties at Vanderbilt University to pursue his interests in nucleon structure at Jefferson Lab. He's also providing the Lab with assistance and guidance in several areas of expertise.

He's been assigned to the Theory Group since August and will stay through September 2001. The physicist describes his research interests as overlapping with much of the experimental program found at JLab. He is currently working on meson contributions to the structure of baryons and developing collision models for Brookhaven's Relativistic Heavy Ion Collider (RHIC).

One particular area of interest for Ernst is the Free Electron Laser. He is working with Gwyn Williams, FEL Basic Research Program manager, to develop a Department of Energy supported science research program for the FEL.

In addition to his research interests in JLab, Ernst is chair of the Southeastern Universities Research Association Board of Trustees — the 53-university strong consortium that oversees the Lab.

Ernst also serves on a joint committee of the National Society of Hispanic Physicists, the National Society of Black Physicists and the Committee on Minorities of the American Physical Society that is studying the lack of minority senior physicists at DOE laboratories. Ernst is working to establish a constructive dialogue between this committee and Jefferson Lab.



David Ernst was instrumental in bringing to JLab the antique instruments on display in CEBAF Center. Many of the instruments were used to conduct physics experiments at Vanderbilt University, Nashville, Tenn., in the late 1800s.

The physicist is enjoying his work and collaborations at the Lab. "Coming here has been a great opportunity to pursue my interests," he said, "and a nice change of pace." Before leaving Vanderbilt he was the physics department chair, an associate dean for research, and the interim director of the W.M. Keck Foundation Free Electron Laser Center.

Ernst and his wife, Vicki, are enjoying eastern Virginia's many parks, events, and historic attractions.

Check it out

DOE web page takes on new address, user-friendly format

In October, the Department of Energy's Internet web page took on a new look and a new name. The publications and features are still there, but now the web page boasts improved topical navigation to help the public find information more easily.

"We want to put www.energy.gov to work for you," says DOE's Kathy McShea. "You may want to reset your bookmarks using the new name and consider making energy.gov your homepage." Since October 2, visitors to the www.doe.gov page have been automatically redirected to the new site, www.energy.gov.

The new design has created an informative, relevant and user-friendly site that appeals to the general public, according to McShea, helping them find over 800 select web pages across DOE. Featured sites will change monthly and all other links will be very dynamic, keeping the page fresh and current.

The new doe.gov web site is in step with the White House Directive on e-Government and the recent launch of the http://www.Firstgov.gov portal.

The web site is designed to be of benefit to the public and to the Department of Energy by making it easier for people to find DOE's web-based information, products and services.

Questions about the new web site should be directed to McShea, at (202)586-1908, or e-mail kathleen.mcshea@hq.doe.gov.

Using light to fight old foes

ARC team goes to war against infectious disease

by Zhengmao Zhu

A research collaboration between Jefferson Lab and the College of William and Mary, and led by Michael J. Kelley, is interested in a relatively novel approach to infectious disease control. They are turning material surfaces that would normally support microorganisms into antimicrobial environments.

These antimicrobial surfaces could be used on everyday products to destroy a segment of the path that a disease-inducing microorganism might travel to reach a victim. Such strategic positioning includes the medical garments and furnishings in hospitals, air conditioning filters and food packaging. Turning such surfaces into antimicrobial surfaces could help prevent infectious disease transmission.

The war against infectious diseases — one of the most formidable enemies of mankind — is getting tougher and tougher. As we win battles by prescribing patients antibiotics, microbes are evolving to become invulnerable to the most frequently deployed of these medications: antibiotic resistance. As disease-inducing microorganisms gain resistance, infectious disease specialists and pharmaceutical researchers must work harder to develop novel agents to win further battles.

The costs of discovering, developing, testing, and approving new antibiotics continue to escalate while success is never guaranteed. Moreover, the life span of new antibiotics is getting shorter and shorter with faster emergence of resistance. As keeping pace with antibiotic resistance becomes more difficult, some people have posed the question, "Will humans eventually lose the war against infectious disease?" "If there is no effective treatment, how can we control the spread of dangerous microbes?"

Fortunately, this is where the research being done here could pay off with a new weapon in our defense arsenal. Kelley, a joint appointee of JLab and William and Mary, and his team are delving into infection control techniques. By these means, humankind finds or devises ways to prevent our miniscule but potentially deadly enemies from expanding their territory. Infection control techniques include such simple things as washing hands more often and more thoroughly, in addition to the antimicrobial surface research.

Michael Kelley sets up an experiment in his ARC laboratory.

Making an antimicrobial surface isn't a new idea. Decades ago, we could make antimicrobial surfaces by adding toxic entities. These antimicrobials work very much like antiseptic-soaked wipes. Since these toxic agents are free to move about, these antimicrobial surfaces cannot be made into clothes or used to wrap food. Such applications require safely binding the harsh chemical to a material's surface.

The team's challenge is to create and determine ways to economically produce safe surface-bound antimicrobials. Their current research subject is a widely used commercial polymer, nylon, which can be found nearly everywhere including garments, packaging materials, or home furnishings. The research initiative is based upon findings that intense ultraviolet light could induce certain chemical processes and create antimicrobial entities on a processed nylon surface. These antimicrobials are surface bound and thus will not contaminate materials on contact.

Using a highly intensive ultraviolet laser, the research team has successfully converted nylon into an antimicrobial polymer, which has proved effective in killing microorganisms. However, the high cost of laser processing currently prevents this antimicrobial polymer from being used in commercial products. In contrast to lasers, ultraviolet lamps operate at much lower cost. Now the question becomes, "Can an intensive ultraviolet lamp do the same job?" The research team is still trying to find the answer and extensive microbiological tests of the antimicrobial polymer are yet to be done. The war against infectious disease continues. Nevertheless, we can hope we will win the battle of the polymer surface.

Editor's note: Zhengmao Zhu is a William and Mary applied science program graduate student currently working for Michael Kelley. Other partners in the project include DuPont, Kellogg, and Temple University Hospital.

Milestones
for December 2000

"Milestones" highlights the achievements of JLab staff and users, full-time and term new hires, separations and retirements. To submit staff or users' promotions, special honors and awards send information to magaldi@jlab.org or call ext. 5102.

Hello

David B. Bigelow, Mechanical Vacuum Technician, Accelerator Division

Jonathan A. Crist, Mechanical Vacuum Technician, Accelerator Division

Christopher Slominski, Control System Computer Scientist, Accelerator Division

Darrell A. Spraggins, Accelerator Operator, Accelerator Division

Robert M. Staron, Database Programmer/Analyst, Physics Division

Catherine Thomas, Accelerator Physicist (SRF), Accelerator Division

Sherman R. White, Systems Administrator (Support), Physics Division

Goodbye

Paulo S. Medeiros, Hall C Designer, Physics Division

Michael D. Steigerwald, Electron Injector Scientist, Accelerator Division

Dunxiong Wang, Accelerator Physicist, Accelerator Division

Should I come to work after the storm?

Virginia's ever-changing winter weather is with us once again. Which leads to the question, "If the weather gets bad, how will I know if I should come to work?"

In the event of snow, sleet or freezing rain, you may turn to the following media for JLab work cancellation or delay announcements: WTKR-TV (CBS), WAVY-TV (NBC), WVEC-TV (ABC), or tune in radio stations WNIS-AM (790), WTAR-AM (850), WCMS-AM (1050), WCMS-FM (100.5), WWDE-FM (101.3) or WHRO-FM (89.5) If you're still not sure what you should do, call the Lab at 269-7100.

W-2 forms to be mailed no later than Jan. 31

Business Services reminds all Lab staff that W-2 tax forms will be sent out by Wednesday, January 31. W-2s will be mailed to the same address as the one shown on your paycheck or direct deposit slip.

To ensure you receive your W-2, verify that the address listed is correct on these documents.

Anyone needing to update their mailing address should see Kisha Owens, Human Resources, room 40-A in the VARC to fill out a change-of-address form.

Federal and state W-4 withholding forms can be obtained from Owens or outside room 18 in the VARC for anyone needing to change their federal or state withholding rate. As a reminder, any employee claiming tax exempt status on their W-4 must complete a new form and submit it to the Payroll section (room 18, VARC) no later than February 15, 2001.

Flu vaccine is here

Medical Services has influenza vaccine available.

Anyone interested in receiving the vaccine (while supplies last) may do so by calling Medical Services at ext. 6269 to make an appointment. As in years past, requests are handled on a first-come, first-served basis.

For more information contact Vicki Barnett, Medical Services, ext. 6269 or vbarnett@jlab.org.

More than 250 Lab employees and users turned out for the November 16 Admin Fair. Informational booths staffed by members of Plant Engineering, Procurement, Payroll, Accounts Payable, Travel, Information Resources, Telecommunications, Training and many other offices filled the atrium and great hallway of CEBAF Center. Informational presentations ran all day in the auditorium and a steady stream of people took advantage of the mild weather to visit the Residence Facility.

DMV-On-Wheels

Mobile customer service center provides quick, convenient service

The Department of Motor Vehicles mobile customer service center will make monthly visits to Jefferson Lab throughout 2001.

Take advantage of this convenient opportunity to take care of a number of your driving and vehicle needs, urges Cela Callaghan, Accelerator Division. "Using this service allows you to save your vacation time and Saturday mornings for other activities," she points out.

People may visit the mobile unit to:

- Take driver's license written tests
- Obtain an original driver's license
- Get a duplicate driver's license
- Renew their driver's license
- Get a copy of their driving record report
- Take the Commercial Driver's License written test
- Update driver information (address, name changes, etc.)
- Obtain photo identification cards
- Register, renew and title vehicles
- Turn in license plates and vehicle registrations
- Obtain vehicle license plate decals

Individuals with other types of DMV-related questions are welcome to stop by the mobile customer service center for information.

The scheduled visit dates for 2001 are: January 22, February 26, March 26, April 23, May 21, June 25, July 23, August 27, September 24, October 22 and November 26. DMV won't visit JLab in December 2001. The visits are scheduled for the fourth Monday of each month, except for the May visit, which is the third Monday.

On visit days, the DMV mobile unit sits in the parking lot behind the Forestry Building (#19) from 9 a.m.– 4 p.m.

At a Glance

Calendar of JLab activities and events

Jan. 22: DMV mobile unit visits Lab from 9 a.m.– 4 p.m. in the parking lot behind the Forestry building. See brief on this page for more information.

Jan. 25: Red Cross blood drive at JLab from 10 a.m.–4 p.m. in CEBAF Center L102/L104. Call Vicki Barnett, ext. 6269 for more information or to help with the activity.

Feb. 28: DMV mobile unit visits Lab.

March 26: DMV mobile unit visits Lab.

ON TARGET

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