

AGS Experiment 787 Discovers Rare K Decay 'Inside the Box'

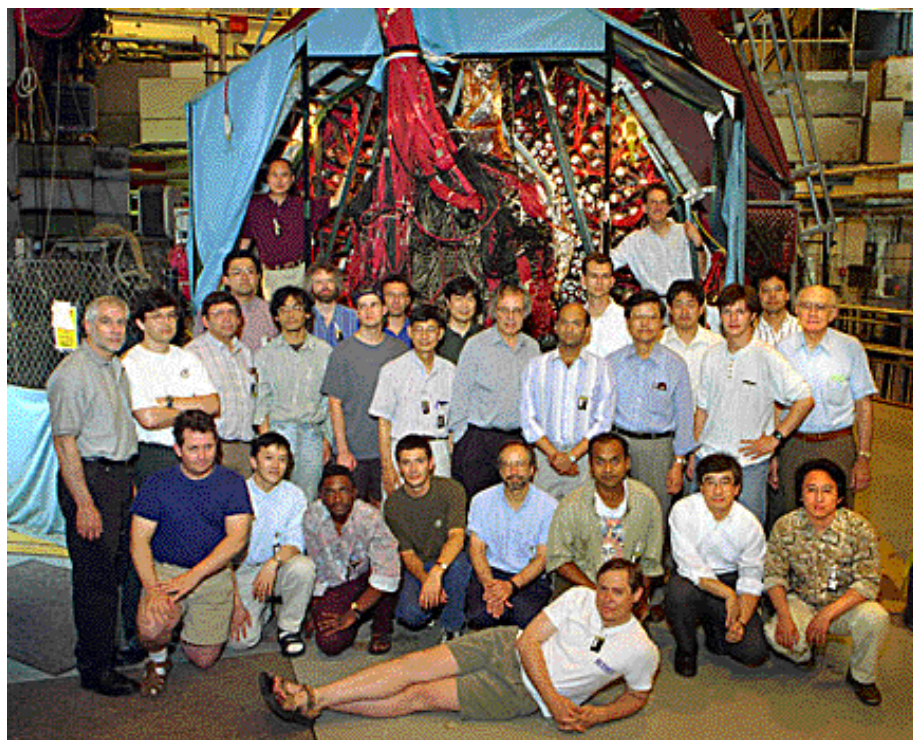
After ten years of searching through the remains of the decays of 1.5 trillion particles, an international collaboration of physicists working at BNL's Alternating Gradient Synchrotron (AGS) believes it has seen the rarest, or least common decay of a subatomic particle ever detected.

When subatomic particles decay, as almost all types do, they break down into other, more stable particles, usually very predictably. For, example, about 80 percent of the time, the unstable subatomic particle known as a positively charged kaon, or K meson (K^+) decays either to a muon and a neutrino or to a positively charged pi meson and a neutral pion.

In the recently observed rare K decay, however, AGS Experiment 787 (E787) observed a positively charged kaon breaking down into three particles: a positively charged pi meson, or pion (π^+); a neutrino (ν); and an anti-neutrino ($\bar{\nu}$) — a phenomenon thought to happen only once or twice in every 10 billion self-destructions.

Because of this rare K decay's power to shed light on the elemental forces and basic constituents of matter, the knowledge gained in studying it is expected to be exceptionally important to particle physicists.

The E787 team, made up of 50 researchers from Brookhaven, Canada's TRIUMF laboratory and the University of Alberta, Japan's KEK laboratory and Osaka University, and Princeton University, described its findings in a paper in the September 22, 1997, issue of *Physical Review Letters*, entitled "Evi-



Some of the 50 collaborators on Experiment 787 at BNL's Alternating Gradient Synchrotron pose in front of their detecting apparatus, which allowed them to spot the rarest particle phenomenon ever seen.

dence for the Decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$."

One month before publication, on August 20, two members of E787 had presented the results at a special Physics Department seminar crowded with physicists eager to hear the details of the long-sought rare K decay. Fittingly, the last names of both speakers began with K.

Of course, this was another rare coincidence. Both physicists were at the podium because of their expertise and involvement in E787: Steve Kettell

of BNL, along with Japanese collaborators, was in charge of designing and implementing a major aspect of the huge detector that found this elusive quirk of nature, and TRIUMF's Akira Konaka had overseen the painstaking analysis of the data that proved it.

The speakers were introduced by BNL Senior Physicist Laurence Littenberg, Leader of Physics' Electronic Detectors Group and one of three co-spokesmen for the collaboration, along with Douglas Bryman of

TRIUMF and A.J. Stewart Smith of Princeton. Project Manager for building the detector was BNL Physicist Kelvin Li.

Christmas in April

As Littenberg summed it up, "The experiment's state-of-the-art apparatus is sensitive enough to examine one million decays per second. We collected thousands of gigabytes of data, and, out of all that data, we saw one event that was completely unexplainable — unless it were the rare kaon decay we were searching for."

The data showed that the branching ratio, or the relative likelihood of the observed decay, was the smallest ever measured: 4.2×10^{-10} , with an uncertainty of $+9.7$ or -3.5×10^{-10} .

During his half of the almost-two hour presentation, Konaka discussed how — in order to determine the validity of this one rare K decay — the team members had to sift through over one trillion ordinary decays, searching for the one that would have all the attributes consistent with the expected signature of the rare decay.

They were single-mindedly looking for a K^+ emitting a π^+ unaccompanied by any other observable particles, since neutrinos are elusive and not detected.

Systematically, the scientists analyzed the data that had been collected on 4,000 eight-millimeter computer tapes — some 150 million candidate events in all — in the process eliminating more common decay modes and other sources of background, and cross-checking their work.

(continued on page 2)

Pumping to Begin Soon to Remove Contaminated Water in BGRR Air Duct

Pumping will start within a week or two to begin the several-week process of removing some 60,000 gallons of contaminated water which has collected 25 feet underground in a concrete-encased steel air duct, which had been used in the past to cool the Brookhaven Graphite Research Reactor (BGRR).

Discovered on September 15 as part of the site-wide Facilities Review begun this April, the water that is pumped out of the duct will be stored in tanks having what is called secondary containment, in a paved, curbed and isolated area of the site, until it is processed and/or shipped off site for disposal.

Investigation is under way to determine whether or not any of the contaminated water has leaked from the air duct. Regardless, the contaminated water presents no hazard to anyone at BNL or off site, while it is in the air duct, if it has leaked into the ground, or while it is in storage.

The BGRR operated from 1950 to 1968, after which it was partially decommissioned to prohibit its further use. The BGRR complex includes an empty spent-fuel pool, inactive underground sumps, tanks, lines and ducts, which are all known to be contaminated with radioactivity resulting from the BGRR's operation. All these BGRR facilities were listed as environmental concerns in an interim report issued on September 10 as part of the site-wide Facilities Review.

One of the Superfund projects on site being managed by BNL's Office of Environmental Restoration, the con-

tamination associated with the BGRR and its facilities is being evaluated. Thus, removal, storage and disposal of the contents of this underground air duct and any necessary remediation of the area surrounding will be performed under Superfund.

While the exact source of the water will be determined, at present the most likely possibilities include past leaks from the BGRR's cooling coils and/or intrusion by rainwater. To prevent further water accumulation, the cooling coils have been blocked off and methods are being evaluated to prevent rainwater from entering the duct.

The standing water is contaminated with radionuclides, which analyses has revealed to include cesium-137, strontium-90 and tritium. The water in the duct contains: 4 million picocuries per liter (pCi/L) of cesium, 10 million pCi/L of strontium and 50 thousand pCi/L of tritium. Radiation measurements made at ground level above the duct show normal background levels.

Previous groundwater samples taken over the past several years directly east of the air duct and about 500 feet south show strontium-90 concentrations up to approximately 50 pCi/L and tritium of less than 1,000 pCi/L.

Because cesium and strontium tend to bind to soil, the movement of these radionuclides in groundwater is slow: Strontium in groundwater moves less than 25 feet per year, while cesium travels at less than one foot per year. For that reason, if the air duct has leaked, then contamination is expected to be localized near the BGRR.

BWIS Seminar Exploring the Link Between Transposable Elements, Enzymes

Her discovery that all genes on chromosomes do not stay put, that is that some genes are mobile, earned Barbara McClintock the 1983 Nobel Prize in medicine or physiology.

While most genes are fixed, these "transposable elements" — which are more commonly known as jumping genes or, by biologists, as transposons — were found first by McClintock in maize corn, but were later found in the cells of almost every organism, from *Drosophila*, or fruit flies, to human beings.

Known to cause genetic mutations and thought to account for 5 percent of the genome, transposons have been thought of as "selfish DNA" because they, until now, didn't seem to have a function other than to reproduce themselves.

Transposable elements, however, have been located at the specialized ends, or telomeres, of *Drosophila* chromosomes, which play a part in the duplication and division of a cell's nucleus. In this location within *Drosophila* chromosomes, these transposons do appear to have a purpose.

To discuss "*Drosophila* Telomeres: Evolutionary Links Between Telomerase and Transposable Elements?" biologist Mary-Lou Pardue, the Boris Magasanik Professor of Biology at the Massachusetts Institute of Technology, will present the first seminar this fall sponsored by Brookhaven Women in Science (BWIS). A Trustee of Associated Universities, Inc. (AUI), Pardue will speak on Monday, October 20, at 1:30 p.m. in the seminar room of the Medical Department, Bldg. 490. All are invited.

As Pardue will explain, her collaborative work has shown that, in *Drosophila* chromosomes, transposable elements and telomerase, the enzyme that they produce, "earn an honest living" by mediating the part played by *Drosophila* telomeres in nuclear division. As a result, her work raises the possibility that transposable elements evolved from normal cellular elements, such as the telomerase enzyme.

Mary-Lou Pardue has been a member of the National Academy of Sciences since 1983, a fellow of the American Academy of Arts & Sciences since 1985, and a fellow of the American Association for the Advancement of Science since 1978. She has served on the AUI Board since 1995.

Those who wish to have dinner with the speaker at an off-site restaurant may contact Eena-Mai Franz, Ext. 7103, to make reservations. — Marsha Belford

Rare K Decay (cont'd.)

When all this was done, Konaka said, one event remained "in the box," meaning that, after all the cuts, it remained a candidate for a rare K decay.

"It was like a Christmas present that you have long anticipated but hesitate to open," said Konaka. So, before "opening the box," the scientists shared months of discussion about how to check all the characteristics of any signal to see if they fit within the parameters that theory had predicted for such a rare decay.

"Finally," said Konaka, "everyone agreed we could look." And when they did, they were not disappointed: The length of time that the decay took — 23.9 nanoseconds — as well as its momentum, range and energy all supported its fleeting existence. Christmas in April!

Rare and Important

The spotting of this rare kaon decay sheds new light on the universe's most elemental forces and most basic building blocks, as explained by the extraordinarily successful theory of subatomic particles known as the Standard Model. It may also suggest new phenomena that cannot be explained by the Standard Model.

"This is a phenomenon that physicists have been looking for since the 1960s, but that nobody knew for sure we would see," said co-spokesman Bryman. "Now, after years of searching, we believe we have seen it."

"From here," added Littenberg, "it is up to us and others to test the belief that we have seen this decay, through further exploration and experimentation. We plan to collect and analyze ten times more data in order to gauge its consistency with the Standard Model, and to test the possibility that the event we've seen could even involve entirely new particles or forces."

The usual decays seen in particles and radioactive atomic nuclei occur by the transmission of one massive par-

ticle, either a W or Z boson, both of which are carriers of the weak force in the same way that the photon, carries the electromagnetic force.

The Standard Model predicts that the decay of a kaon to a pi meson and a pair of neutrinos sometimes involves the momentary creation of both a charged W boson and a neutral Z boson (which itself instantly decays into the two neutrinos), rather than the more easily produced exchange of a single W or Z.

It most often also involves the recently discovered massive top quark, and, thus, gives a window into the relation between that exotic object and the normal quarks that make up our everyday world.

Understanding such complex forms of decay is especially important to

physicists who are attempting to learn how matter behaves at the most fundamental level. The one-in-ten-billion probability of a kaon's decaying to a pi meson and a neutrino pair is a remarkable prediction of the Standard Model — and one that the experimenters set out to test.

Catching a Shooting Star

Finding the rare kaon decay required an accelerator powerful enough to produce kaons in vast numbers, making the AGS the best choice for the job.

Three Nobel Prizes have been awarded for discoveries made at the versatile AGS during its 37-year history. Now, as Kettell explained, upgrades completed from 1992 to 1995, have made the 33-billion-electron-volt accelerator capable of producing the

world's most intense, low-energy separated kaon beam. The kaon flux has been increased from 300,000 to 1.2 million each time a particle burst heads for E787's target.

But equally important was the team's array of detectors, which are sensitive enough to catch the particle equivalent of a shooting star: Kaons last only about 12 billionths of a second before decaying, and they can decay a multitude of different ways, creating showers of particles that can only be seen with specialized equipment.

So, to catch a fleeting pion, the E787 team in 1995 built a new "catcher's mitt," located in a strong magnetic field and made up of sophisticated particle detectors used to measure as much as possible about each pion that passed by. These detectors included scintillating fibers, tracking chambers and several other devices used to determine the energy and momentum of the pion and to observe its characteristic decay into other particles.

With better momentum resolution by a factor of two, the improved equipment increased the chances of seeing the rare kaon decay and vastly reduced the chances of confusing it with other phenomena that send out nearly the same signal but happen billions of times more often.

Tradition of Discovery

The discovery that a positive kaon does decay in this exceptionally rare mode ties together both past and future research at BNL's accelerators.

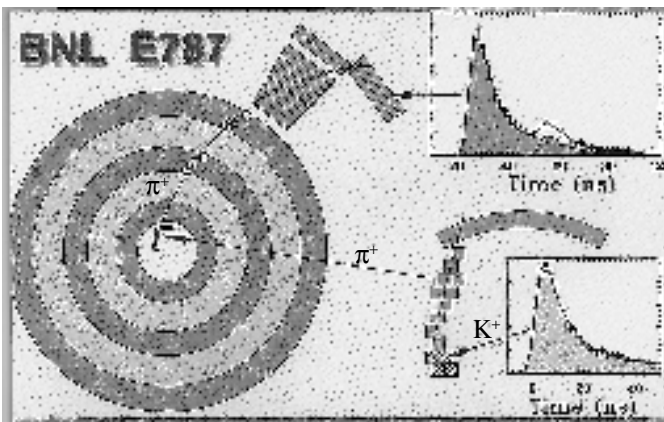
"It's especially fitting we should see this phenomenon at the AGS, since kaon decays have figured centrally in past important discoveries there," said Bryman. "The most notable example, of course, is the 1963 work on CP violation that won the 1980 Nobel Prize for James Cronin and Val Fitch. That discovery, which among other things may help explain why there's more matter than antimatter in the universe, was an unanticipated rare kaon reaction which had a revolutionary impact."

And, Bryman added, the E787 collaboration anticipates continuing the present study of rare kaon decays for the next several years, even after the AGS becomes the injector for BNL's Relativistic Heavy Ion Collider when it begins operations in 1999. There are also plans to study the closely related decay of the long-lived neutral kaon into a neutral pi meson and a pair of neutrinos, a process that may offer the single best window into the still-mysterious phenomenon of CP violation.

— Anita Cohen & Kara Villamil

The rare event found by Alternating Gradient Synchrotron (AGS) Experiment 787 (E787): The stack of boxes topped by an arc near the bottom center of this drawing represents the stopping target detectors activated by this event. The target-like circles at left represent E787's central drift chamber. The arrow pointing from the stopping target detectors to the center of the drift chamber shows the actual location of these detectors in E787. At bottom right — unaware that it is on the first leg of a historic journey — a positively charged kaon (K^+) from the AGS

enters the E787 detectors (striped boxes), where it spontaneously decays into a positively charged pion (π^+), a neutrino and an antineutrino. The pion travels swiftly through the remaining detectors, emerging from the stopping target and entering the central drift chamber (the small circles in the drift chamber are tangent to the pion's path). The pion then penetrates the range stack, an array of scintillators (stacked rectangles, center top) and chambers, and it loses energy until it stops. The signal in the scintillator where it stops is shown at top right. The double pulse is characteristic of a pion. After examining 1.5 trillion events, E787 found the rare, hitherto undetected decay in which a pion is completely unaccompanied by other detectable particles, since neutrinos are too elusive to be seen.



BNL's New '800' Number: Dial Ext. 8800 to Report ES&H Concerns

Have you ever had a concern about the environment, safety or health (ES&H) at the Lab, but you didn't know how to have it resolved? While there are several existing mechanisms, the newest one is to call Ext. 8800 — BNL's Employee Safety Concerns Hotline.

For instance, an employee recently called Ext. 8800 to report that a cable anchoring a telephone pole was loose — and, as a result of the call, the situation was taken care of immediately.

"Ext. 8800 is a perfect solution for ES&H situations on site where an employee, visitor or guest is unsure of who is responsible for correcting a problem," explains Bob Casey, Head of the Safety & Environmental Protection (SEP) Division.

To remind you of this number, stickers are being distributed to all employees and guests through their department or division's safety coordinators.

BNLers are then asked to place these purple and white, 1-inch by 2¼-inch stickers on or near all telephones on site.

"All employees, guests and visitors have the obligation to help carry out the Lab's responsibility to protect the environment, and ensure worker and public safety and health," says Employee Concerns Coordinator Susan Foster, Human Resources Division. "So, all those who do research and work at BNL are asked not only to report any workplace or on site condition that violates ES&H, but also to share their suggestions for improving the Lab's ES&H."

Actually, BNLers may report ES&H problems and make suggestions through several other avenues besides the new Employee Safety Concerns Hotline.

First, a BNL worker may discuss the situation with his or her supervisor. If, however, the employee is uncomfortable approaching the supervisor with an ES&H matter or is not satisfied with the supervisor's response, then the second avenue is to turn to the department or division ES&H coordinator or representative from SEP. For the name of your coordinator or representative, call SEP, Ext. 4207.

The third alternative is to discuss the situation confidentially with Foster, Ext. 2888. Now, the fourth option is to call Ext. 8800, the Employee Safety Concerns Hotline. Of

course, employees covered by labor agreements may have their ES&H concerns addressed through the labor-grievance process.

Within 48 hours of registering a question or concern with a supervisor, ES&H coordinator or representative, Foster or the hotline, the concerned employee is to receive a response. If more time is required to investigate and resolve the situation, up to 20 more days are allowed before a final report must be issued.

In addition, employees, guests and visitors who have access to the World Wide Web may ask ES&H questions and express ES&H concerns by going to http://www.sep.bnl.gov/esh_mail/esh_mail.htm. Questions and concerns that are logged in here are automatically sent to John Deitz, Associate SEP Head, who then directs them to appropriate staffers for their responses.

Finally, BNLers have the option of calling upon the on-site Brookhaven Group of the U.S. Department of Energy, Ext. 2405, for answers to ES&H questions and concerns.

"We have tried to make it as easy as possible for employees to express their ES&H concerns," says Foster. "Establishing all these ES&H reporting mechanisms is one way the Lab's management is demonstrating its commitment to environmental and property protection, and to the safety and health of workers and the public."

Being responsible and accountable for Lab safety was formally made part of every BNLers' job this April, when the Safety Responsibility & Accountability Policy was issued. In part, it states: "The responsibility for carrying out this policy is a line responsibility extending from the Laboratory Director through each level of the management chain to each employee, guest and visitor."

This policy was augmented this May, when the Stop Work Policy was reissued, to remind all Brookhaven employees, visitors and guests that they "are authorized and are responsible to immediately stop a BNL work process that creates an imminent danger," which is a hazard presenting an unacceptable risk of death, serious injury, environmental harm or significant property damage.



Carl Dover Memorial

As part of the 1997 Conference on Hypernuclear & Strange Particle Physics, to be held on site October 13-18, a remembrance will be held to recollect the distinguished career of BNL's late Carl Dover.

Dover was a senior physicist, the Leader of the Nuclear Theory Group in the Physics Department and an international hypernuclei authority who died in 1996 (see Brookhaven Bulletin of June 16, 1996).

At the conference's banquet next Wednesday evening, a book of remembrances will be presented to Sylvia Dover, Carl Dover's widow. Therefore, before this event, those interested in contributing their memories of the life and work of Carl Dover should contact Isabel Harrity, Ext. 2524, who can also provide more information about the conference.

Volunteers Wanted For Pine Barrens Day

BNL will be one of the exhibitors at the first Pine Barrens Discovery Day, to be held at Suffolk Community College's Eastern Campus in Riverhead from 8:30 a.m. to 5 p.m. on Saturday, October 25, rain or shine.

The day will be filled with educational workshops, nature walks and presentations for the whole family — including information about Brookhaven's relationship to the Pine Barrens.

If you would like to help staff the Lab's booth for an hour or so that day, contact Mona Rowe, Public Affairs Office, Ext. 5056. For more information about the day or to receive a registration packet, call The Nature Conservancy, 329-3981, Ext. 23.

Service Awards

The following employees celebrated service anniversaries during the month of September:

- 40 Years**
Charles B. Meinhold.....Adv. Technology
- 35 Years**
Donald F. Bastedo.....AGS
Richard W. Hogue.....RHIC
Keith H. Thompson.....Biology
- 30 Years**
Raymond C. Atkins.....AGS
Albert M. Casper.....AGS
Theodore A. Daniels.....Comp. & Comm.
Michele E. Haller.....Contracts & Proc.
Alan V. Kuehner.....Safety & Env. Prot.
Richard E. Machnowski.....Adv. Tech.
John H. Maddock.....Instrumentation
Clarence C. Pittenger.....Comp. & Comm.
William C. Venegas.....RHIC
- 25 Years**
Harold L. Bolling.....Admin. Support
Peter D. Bond.....Director's Office
Michael J. Creutz.....Physics
Serban D. Protopopescu.....Physics
Craig E. Thorn.....Physics
- 20 Years**
Peter J. Bonti.....Safeguards & Sec.
Ora A. Colson.....Reactor
Susan C. Foster.....Human Resources
Peter R. Garcia.....Safeguards & Sec.
Sheryl A. Golden.....Reactor
Louise K. Hanson.....Director's Office
George R. Hendrey.....App. Science
Kevin J. Kobus.....Plant Engineering
Jean Logan.....Chemistry
Arthur H. Nintzel.....Physics
Mark A. Sardzinski.....RHIC
Richard J. Tulipano.....Reactor
Marilyn A. Zane.....Plant Engineering
- 10 Years**
Lonny E. Berman.....NSLS
Vincent Bonafede.....Comp. & Com.
Joseph I. Braverman.....Adv. Tech.
Tina R. Bryd.....Contracts & Proc.
Michael J. Furey.....Director's Office
Julie La Roche.....App. Science
Kathleen M. Nasta.....Adv. Tech.
Joseph Pagano.....Plant Engineering
Philip Pagano.....Reactor
Young Ji Park.....Adv. Tech.
Karen M. Savino.....Adv. Tech.
Arthur M. Scholtz.....Plant Engineering
Katherine J. Vivrito.....Info. Services
Nora D. Volkow.....Medical
Christopher P. Weaver.....Comp. & Comm.
James F. Wishart.....Chemistry

DOE Investigation of On-Site Fatality: Conclusions In, Report Available

The "Type A" Accident Investigation Board, which was called to BNL following the on-site death of a contract construction worker on June 20, presented the results of its work to the U.S. Department of Energy (DOE) in July. The 34-page report is now available in BNL's Research Library, Bldg. 477, or at http://nattie.eh.doe.gov:80/web/eh2/acc_inv/acc_investigations.html on the World Wide Web.

Established by Tara O'Toole, who was then DOE's Assistant Secretary for Environment, Safety & Health, the six-member Board was charged with analyzing the accident's causal factors, identifying the root cause and any contributing causes, and making judgments of need based on the lessons learned from the accident to prevent such or similar accidents from occurring, all in accordance with the appropriate DOE order.

As a result of the Board's analysis, it determined that there was a single root cause for the accident, "the elimination of which would have prevented the fatality." The root cause was deemed to be a lapse of judgment both on the part of the operator of the front-end loader that was backed over the worker and on the part of the laborer, who was not aware of the proximity of the front-end loader, thought he was clear of the equipment's path, or stumbled while trying to get out of its path.

As was discussed in the report, the one barrier that did not work to control all the hazards involved with the work that the two were performing was the "administrative system" whereby laborers and heavy-equipment operators are required to maintain a safe working distance between those on the ground and any heavy equipment in operation. "Successful performance of this barrier would have prevented the accident," noted the investigators.

"This barrier failed in that a safe distance was not maintained between the wheel loader and the laborer, [and it] may have failed for many reasons. . . . The Board concluded that there was a lack of visual contact between the operator and the laborer."

As a result, the investigators concluded: "The routine nature of the . . . work may have led to complacency and reduced attention to the back-up hazard of heavy equipment."

Also, the Board members judged that: "There is a need for all BNL organizations and [its] contractor/vendor orientation to emphasize and reinforce the fact that any operation involving heavy equipment can inflict serious or fatal injury despite the existence of [a] functioning reverse-signal alarm or the use of a spotter."

Free Flu Shots

The Occupational Medicine Clinic is offering free flu vaccine to all eligible employees. If you haven't yet made an appointment for an injection, you may do so by calling Ext. 3670.

In Memoriam

The following retirees passed away recently:

John T. Niemczyk, who had been with the Lab for 31 years when he retired on March 28, 1996, died on August 17. He was 59 years old. He had joined the Plant Maintenance Division as a janitor on March 1, 1965, and, through the years, took on various positions in the division, which later became Plant Engineering. After serving as a laundry operator, laborer and building & grounds utility man, he became a heavy equipment operator in 1967. At the time of his retirement, he had been the Heavy Equipment Maintenance Supervisor since 1981.

Stefan Dopierala, formerly a machine maintenance mechanic A in the Central Shops Division, died on September 8, at the age of 78. He had joined BNL on January 16, 1978, and retired on June 2, 1983.

Arrivals & Departures

- Arrivals**
Michael G. Greene Director's Office
- Departures**
 This list includes all employees who have terminated from the Lab, including retirees:
Michael H. Brooks..... Director's Office
Kevin J. Carney Safety & Env. Prot.
Stephen E. Eiseman Physics
Josephine Fanizza Adv. Technology
Ramesh Gupta RHIC
Pamela J. Montag Plant Eng.
George J. Munoz Physics
Karen G. Natoli Financial Services
Clyde T. Newson ... Safety & Env. Prot.
Arthur H. Nintzel Physics
Lucy J. Oblonsky Applied Science
Laura Reina Physics
Michael D. Rowe Applied Science
Sonja Santos Adv. Technology
Harold W. Sauter Physics
Matthew T.J. Surico.....Safety & Env. Prot.
Stanley L. Ulc Physics
Xilin Wu NSLS
Yuan-Liang Wang Applied Science
Wolfgang Wulff Adv. Technology
Nicolae V. Zamfir Physics

Coming Up

Leo Sachs, the Otto Meyerhof Professor of Biology at the Weizmann Institute of Science in Israel, will speak on "The Control of Hematopoiesis and Leukemia: From Basic Biology to the Clinic," in a Donald Van Slyke Distinguished Lecture, to be held on Tuesday, October 21, at 4 p.m. in Berkner Hall.

BWIS Wine & Cheese

All are invited to the Brookhaven Women in Science (BWIS) Wine & Cheese Party — on Friday, October 24, from 5:15 to 7 p.m. in the Recreation Building.

This free, informal get-together is held annually to acquaint prospective BWIS members — women and men — with BWIS members and officers, and with the group's accomplishments, which have benefited the entire Lab community. So come to enjoy a social afternoon and explore what BWIS has to offer.

Free English Classes

The Laboratory offers ongoing English as a Second Language (ESL) classes for employees, guests, visitors and their spouses every Thursday evening from 6:30 to 9:30 p.m. The free classes are open to all and held in the Personnel Training Room at the rear of Bldg. 459.

Those who are new to the program should attend at 6:30 p.m. for information and a special assessment of their skills. For more information, call Starr Angelos, Ext. 7631, or Marilyn Pandorf, Ext. 5251.

Come Join Aerobics & Stretch Classes!

If you had fun stretching before the Healthfest walk or run, then join the BERA Aerobic Dance & Stretch Club. All are welcome, and no prior experience is needed.

Aerobic dance classes are held on Tuesdays and Thursdays, while stretch classes are held on Wednesdays. Both are held at 5:15 p.m. in the Recreation Building in the apartment area. The cost is \$4 per class or \$35 for any ten classes plus one makeup class. For more information, call Pat Flood, Ext. 7886, or Kara Villamil, Ext. 5658.

Quit Smoking

Quit smoking on Wednesday, October 22 — after the Green Seminar.

From 4:30 to 6:30 p.m., the seminar will be presented in the Brookhaven Center to all employees and their dependents who wish to kick the smoking habit with hypnosis and behavior modification.

The cost is \$10 per person for new attendees or free for repeat participants. To register, call Health Promotion Specialist Mary Wood, Ext. 5923.

BNLers Give 173 Units

The additional blood drive held at BNL on Friday, September 26, yielded 185 BNLers who volunteered to give blood, 173 who were able to donate and 173 units of blood to replenish Long Island's blood supply.

"It was a great day," said the Lab's Blood Drive Chair Susan Foster of the Human Resources Division. "Our new phone or e-mail registration procedure combined with the on-site location made it convenient for our routine donors to give during this extra drive."

AUI Trustee Scholarships Discontinued; Eligible H.S. Seniors to Apply Regardless

Although AUI Trustee Scholarships will not be offered again to the children of BNL employees, BNL's management advises students who would have applied for the 1998 scholarship program to sign up anyway, in the event that the new contractor selected by the U.S. Department of Energy decides to offer similar college scholarships to this and following years' classes of high school seniors.

Therefore, scholarship application forms are now available for the class of 1998 at the Office of Scientific Personnel (OSP), Bldg. 185A. OEP will hold the applications until the new contractor decides whether or not to offer such a scholarship, and all candidates who submit application forms to OSP will be kept informed.

To apply, candidates must use the code #0442 when completing the score reports section of the SAT test registration card. The next SAT I test date in New York is November 1, but the September 26 registration deadline has passed. While October 4 test date has also passed, students should consult with their school officials about late registration of codes.

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ANITA COHEN, Editor
 MARSHA BELFORD, Assistant Editor

Bldg. 134, P.O. Box 5000
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School's Back in!

Please, give lunch stuff!

TUNA PEANUT BUTTER Jelly Mayo

To The **BNL FOOD DRIVE**

Don't forget! Pickup is all next week. Or, send checks to: BNL Food Drive, c/o R. Kito, Bldg. 460; or D. Wadman, Bldg. 129.

Classified Advertisements

Placement Notices

The Lab's placement policy is to select the best-qualified candidate for an available position. Candidates are considered in the following order: (1) present employees within the department/division and/or appropriate bargaining unit, with preference for those within the immediate work group; (2) present employees within the Laboratory; and (3) outside applicants. In keeping with the Affirmative Action Plan, selections are made without regard to age, race, color, religion, national origin, sex, disability or veteran status.

Each week, the Human Resources Division lists new placement notices, first, so employees may request consideration for themselves, and, second, for open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people.

Except when operational needs require otherwise, positions will be open for one week after publication.

For more information, contact the Employment Manager, Ext. 2882; call the JOBLINE, Ext. 7744 (344-7744), for a complete list of all job openings; use a TDD system to access job information by calling (516) 344-6018; or access current job openings on the World Wide Web at <http://www.bnl.gov/JOBS/jobs.html>.

SCIENTIFIC RECRUITMENT - Doctorate usually required. Candidates may apply directly to the department representative named.

POSTDOCTORAL RESEARCH ASSOCIATE OR ASSISTANT SCIENTIST (depending on experience) - Trained in experimental nuclear chemistry, nuclear physics, or high-energy physics, to join the PHOBOS experiment at the Relativistic Heavy Ion Collider (RHIC). PHOBOS is one of the four major experiments at RHIC dedicated to studying nuclear matter at extremely high temperatures and searching for the quark-gluon plasma. Experience on large accelerator-based experiments is required, and experience in data analysis and/or data acquisition software is preferred. Appointment may be made in either the Chemistry or Physics Department. Contact: Louis Remsberg, Chemistry Department.

POSTDOCTORAL RESEARCH ASSOCIATE - Trained in chemistry with a strong background in chemical kinetics, aqueous chemistry and redox catalysis to perform studies on experimental aspects of peroxydinitrate chemistry, including radiolytic generation of peroxydinitrate and catalytic oxidation of organic and inorganic materials. Practical experience in fast kinetic techniques (stopped-flow, pulse radiolysis or flash photolysis) and chromatographic methods (HPLC, GC) is preferred. Familiarity with small-particle size analysis is desirable, as is experience with computer molecular modeling and analysis of reaction mechanisms. Contact: Sergei Lyman, Chemistry Department.

POSTDOCTORAL RESEARCH ASSOCIATE - Trained in condensed matter physics or physical chemistry, with a background in crystallography or x-ray/neutron scattering, to work in the materials chemistry program. Will participate in studies geared toward determining the structure and dynamics of systems such as the imaging of Rayleigh Benard convective flows in helium mixtures, monolayer and multilayer adsorption on surfaces, and liquids entrained in porous media. Experience with low temperature (dilution-refrigeration operation) and ultrahigh vacuum techniques is desirable. Contact: John Larese, Chemistry Department.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees.

NS4067. GENERAL SUPERVISOR, BUILDING MAINTENANCE - Will be responsible for control and efficient operation of building maintenance functions. Through first-line supervisors, coordinates the tasks of building maintenance units to ensure expeditious completion of assigned projects. Provides assistance to supervisors and acts as replacement in supervisors' absence. Furnishes technical information to department for which work is being done. Plant Engineering Division.

DD 8633 OFFICE SERVICES POSITION - (term appointment) Requires an AAS in secretarial science or equivalent experience, and excellent oral and written communication skills, as well as strong organization skills. Must work well under pressure while handling multiple assignments. Experience with word processing is required. As directed, will provide clerical support to the Public Affairs Office. Director's Office.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

NS3573. ACCOUNTING POSITION - Requires a bachelor's degree in accounting, finance or business administration, several years' of professional accounting experience and knowledge of generally accepted accounting principles. Experience in accounts receivable and collections is highly desirable, as is knowledge of spreadsheet programs (Lotus/Excel), proficiency with PCs, extensive experience with computerized business systems and processes, and proven analytical skills. Financial Services Division.

Time Capsule Countdown

Wanted: Countdown Clock Inventors

To be buried on site this December as one of the final events of the Lab's year-long 50th-anniversary celebration, two time capsules full of BNL memorabilia from 1997 will be unearthed during the Lab's 100th anniversary in 2047. To mark the time at the spot, a countdown clock is to be erected — after it is designed and built.

Therefore, the time-capsule project committee is seeking a countdown-clock inventor to design a 50-year clock meeting the following specifications: The clock must be self-powered, weatherproof and maintenance-free; its job is to count down 50 years starting this December 17 through that date in 2047.

Inventors who can come up with designs incorporating those specs are invited to submit them to the time-capsule project coordinator Patti Bender, Bldg. 134C, Ext. 3145, by November 7. The inventor of the selected design will have the option of having his or her name engraved on the marker designating the ground under which the time capsules can be found.

NS9074. TECHNICAL POSITION - Requires a bachelor's degree in electrical engineering, physics, computer science or equivalent, and the ability to work with scientists, understand research problems and apply electronic or computer-based technology solutions. Will troubleshoot and repair electronic (digital/rf) equipment, and design and implement computer-based data acquisition and experiment-control systems, including hardware, software and graphical-user interfaces. Chemistry Department.

NS4772. PHYSICS ASSOCIATE POSITION - Requires a BS in physics or related field and excellent communication skills. Background in high-power pulsed power supplies, digital electronics, computer controls and programming, as well as in laboratory test and measurement techniques, is desirable. Primary duties, as part of a rotating shift team, include the operation and troubleshooting of the AGS accelerator complex for the experimental physics program. Alternating Gradient Synchrotron Department.

MK4843. PROGRAMMING ANALYST POSITION - (part-time, term appointment) Requires a BS/MS in computer science or equivalent, and experience with NASA SeaDAS software. As part of a group, will analyze SeaWiFS images of ocean color and manage a database of satellite maps. Department of Applied Science.

DD3137. TECHNICAL POSITION - (term appointment) Requires an AAS degree in a technical field or equivalent experience. Knowledge or experience in one or more disciplines such as mechanics and/or electromechanical assembly also required. Must adhere to written procedures and follow quality-assurance standards in all work procedures and assignments. Responsibilities will include but are not limited to magnet-assembly assignments that require developed skills and performance of functions with minimal supervision. Knowledge of superconducting magnet-assembly procedures highly desirable. RHIC Project.

DD3138. DESIGN POSITION - (term appointment) Requires the ability to check mechanical design projects, and a working knowledge of engineering fundamentals, machine design, shop practices, welding and vacuum systems. Must have thorough knowledge of ANSI Y14.5-1982 and AutoCAD release 12 or higher, and must be familiar with design-room practices. Will be responsible for checking mechanical design projects from conceptual layouts to detailed working drawings. RHIC Project.

DD 3139 TECHNICAL POSITION - (term appointment) Requires AAS in electromechanical technology or equivalent experience. General mechanical-construction and assembly experience required, as well as the ability to fabricate and assemble electronic I/O and control hardware used for process control of large cryogenic systems. Experience in wiring, harnessing, and pc board construction also required. RHIC Project.

Volleyball Team Fees

At the second Captains' Meeting held October 1, this year's fees per team were agreed upon, as follows: Open League \$145, League I \$145, League II \$160, and League III \$160

All captains must have their team fees to the Volleyball League Treasurer Joe Greco no later than noon on Monday, October 13. Contact Greco, Ext. 7528, for more information.

Cooking Exchange

The next Cooking Exchange meeting for apartment area residents will be held on Thursday, October 16, 12-1:30 p.m. Bring a favorite dish, salad or dessert to share. Beverages and utensils will be provided.