BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

At RHIC Study, Nuclear Physicists Gather to Ask Tough Questions

What do you get when you bring 60 nuclear physicists together for two weeks of intense study?

Answers, organizers hope, to some of the intriguing questions confronting researchers regarding RHIC, BNL's Relativistic Heavy Ion Collider.

The RHIC Summer Study, which started Monday and continues through Friday, July 19, was designed as a theoretical meeting, explained BNL Senior Physicist Sid Kahana. Leaders in the field from many different institutions were invited to help clarify what will happen once RHIC goes on line in 1999.

"It is a workshop that is intended to help us define and understand what RHIC is going to do," said Kahana, co-chair of the two-week workshop. "That is not a trivial job."

While the meeting is mostly theoretical, some experimentalists were invited to explain how the current detectors will measure what theorists

(continued on page 2)

Organizers and conveners of the RHIC Summer Study include: (front, from left) co-chair Sid Kahana, BNL; William Zajc, Columbia University; Norman Christ, Columbia; Edward Shuryak, State University of New York at Stony Brook; Michael Creutz, BNL; (middle, from left) Berndt Mueller, Duke University; co-chair Tom Ludlam, BNL; Jorgen Randrup, Lawrence Berkeley National Laboratory (LBNL); Flemming Videbaek, BNL; (back, from left) Michael Tannenbaum, BNL; Miklos Gyulassy, Columbia; Larry Trueman, BNL; Alfred Mueller, Columbia; and Wit Busza, Massachusetts Institute of Technology. Not pictured: Victor Emery, BNL; John Harris, LBNL; Joseph Kapusta, University of Minnesota; Klaus Kinder-Geiger, BNL; Robert Pisarski, BNL; and Wang Pang, Columbia. **—Photos in this issue by Roger Stoutenburgh**

Trucks, Barges Bring Huge RHIC Experiment Parts to BNL

With conferences and colleagues in cities around the world, physicists need to travel quite a lot. So, too, it seems, does some of their equipment — namely, these giant experiment components for the Relativistic Heavy Ion Collider (RHIC).

Built in Canada and Russia, they've traveled to BNL by flatbed truck, ship and barge, the most recent arrivals in a parade of parts for the house-sized STAR and PHENIX experiments. Once they're installed into their respective experiments, these parts will help physicists capture the signals of particle showers produced in collisions at RHIC.

— Kara Villamil

This 24-foot, 35-ton steel outer ring for the STAR experiment made its way from Quebec, Canada, to RHIC Bldg. 1006 in early June on a flatbed truck — an overnight journey that closed down the George Washington and Throgs Neck Bridges while the super-wide cargo passed through. Watching from the balcony as BNL riggers prepare to lift the ring with a crane are Liz Mogavero, Physics Department, and Ralph Brown, a RHIC project engineer. The outer ring and its concentric partner in the background are key components of a steel structure designed to contain a 0.5-tesla magnetic field for particle detection. The rings were made of French steel by GEC ALSTHOM of Tracy, Quebec, for Precision Components Corp. of York, Pennsylvania, the prime contractor for STAR steel.

A crane hoists crates containing some of PHENIX's steel parts off a barge in Shoreham in early June. Nearly 2,600 tons of steel, some pieces as tall as 35 feet and as heavy as 100 tons, came to Long Island from Philadelphia on five barges after being shipped from St. Petersburg, Russia. The carefully shaped electromagnets and steel plates were made and machined in St. Petersburg's Izhora Steelworks, one of the few steel mills in the world capable of making such large objects, for PHENIX collaborators at the Petersburg Nuclear Physics Institute and the Efremov Institute for Electrophysical Research. The steel is now being installed in PHENIX's assembly hall, Bldg. 1008, located at the 8 o'clock position in the RHIC ring.

AGS — Fertile Field for Groundbreaking Research

July 29, 1996, marks the 36th anniversary of the Alternating Gradient Synchrotron's (AGS) first reaching its design energy of 33 billion electron volts. With about 800 experiments under its belt — three of them Nobel Prize winners — the AGS continues to provide scientists with a fertile field for groundbreaking research, even as it is readied to be the injecting accelerator for BNL's Relativistic Heavy Ion Collider near the decade's end.

The Neutral Meson Spectrometer, recently commissioned at the AGS for research by the Medium Energy Physics Group shown below, is the subject of a story on page 2 — the first in a series of stories that the Brookhaven Bulletin will run this month highlighting the variety of current research at the AGS.

The Medium Energy Physics Group (MEPG): (from left) John O'Donnell (back), University of Minnesota stationed at Los Alamos National Laboratory (LANL); Rick Wall (front), BNL; Mohammed Ahmed, University of Houston; X. Cui, Houston; Gen Shei Peng, MEPG co-spokesperson, LANL; Robert Chrien (front), MEPG Leader, BNL; Reyad Sawafta (back), North Carolina Agricultural & Technical State University; Miro Furic (front), University of Zagreb, Croatia; Anthony Remirez (back), Arizona State University; and Dieter Dehnhard, Minnesota. Not shown: Ed Hungerford, co-spokesperson, Houston; James Gerald, Minnesota; Adam Rusek, BNL; Ed Meier, BNL; Richard Sutter, BNL; Phillip Pile, BNL; Joseph Scaduto, BNL; Carla Edwards, LANL; Henry Thiessen, LANL and Carole Goulard, Arizona State.

AGS — A Fertile Field for Groundbreaking Research

The Neutral Meson Spectrometer: A New Game in Town

The pool player lines up his shot and fires the cue ball into a cluster of stripes and solids. A solid-colored ball that is knocked out of the group splits suddenly, and the two pieces enter the two pockets on the opposite end of the table with unique precision. The player is now free to observe the new relationships of the balls on the table.

But the pool player is a physicist and the game, which takes place in the new Neutral Meson Spectrometer (NMS) at the Alternating Gradient Synchrotron (AGS), is just too small and too fast to see with the naked eye.

The NMS, which arrived at BNL from Los Alamos National Laboratory last November and had its first run on May 1, will allow physicists to create a whole new class of nuclei and explore the strong forces between nucleons.

This exceedingly accurate piece of equipment will modify the fundamental structure of protons with a technique that is analogous to a high tech game of pool.

The cue ball is a negative kaon which is fired at a target nucleus containing "stripes" and "solids" — protons and neutrons. The kaon collides with a proton, forming a hypernucleus and a by-product — a neutral pion (π^0). The π^0 decays immediately into two photons that fly apart at opposite angles towards the "pockets" of the NMS.

This will not be the first time hypernuclei are created for study. In fact, hypernuclei were discovered more than 40 years ago when two Polish physicists exposed nuclear emulsions to cosmic rays in a high-altitude balloon. But this will be the first time hypernuclei will be created by modifying the protons in a nucleus.

Learning the Rules

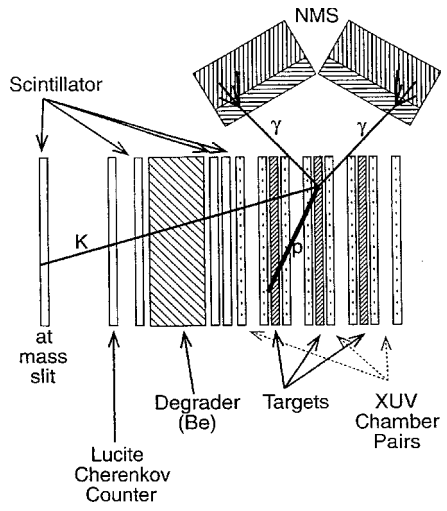
The study of hypernuclei can provide unique information about the forces and the relationships between nuclear components. The fundamental reason for these new experiments, therefore, is to study the strong forces that bind baryons — neutrons, protons, and hyperons — by altering the previously inaccessible nuclear components, specifically the protons.

"We will basically double the number of nuclear species we can study," said Robert Chrien, Leader of the Medium Energy Group in BNL's Physics Department.

Previously, scientists were unable to transform protons because the residues of the proton quark replacements were hard to detect.

"There was a whole class of reactions we couldn't touch," said Chrien. The NMS now has changed this.

A proton is composed of two up quarks and a down quark. In the NMS, the kaon, which is composed of a strange quark and an anti-up quark, is accelerated towards a target. The strange quark in the kaon replaces an up quark within the proton, creating a lambda particle, and, therefore, a hypernucleus. The π^0 is a by-product of this reaction, but, because the π^0 is neutral, it does not ionize and is difficult to detect.



The Neutral Meson Spectrometer receives a 650-million-electron-volt negative kaon beam (K), which enters from the left. After passing through a Lucite Cerenkov counter and timing scintillator, which help identify the beam particles as kaons, the beam enters a degrader containing beryllium (Be). There, the kaons are slowed down so they interact more easily with the target nuclei (p). Then the beam enters the active target, which is separated into slabs of target material and layers of tracking chambers. These chambers track the interacting kaon and measure the position of the stopping point. The neutral pion from the reaction immediately decays into a pair of photons (γ), which are caught and detected by the cesium iodide crystals.

However, the π^0 decays quickly into the two photons, and the NMS has been designed to detect these photons using crystals of cesium iodide. The direction and the size of the photon pulses, which can be measured to a precision of about one million electron volts, reveal whether the photons are from a π^0 particle and determine the particles' energy.

These new hypernuclei also are distinguished by a change in the charge of the atom. When a quark is replaced in a neutron, the atom does not lose its essential chemical properties. However, when a proton quark is replaced, the atomic number changes by one unit of charge.

Practice Makes Perfect

In AGS Experiment 907, researchers will use three different nuclear targets — carbon (^{12}C), lithium (^{7}Li), and silicon (^{28}Si). Replacing a quark within a proton of these targets will create boron, helium and aluminum hypernuclear isotopes, respectively.

The unique properties of these isotopes, which, in the case of carbon and lithium, have never been observed before, are what the physicists hope to understand. Carbon will be the first target to be tested. Then, the lithium target studies will be done to determine the electron shell structure of helium containing a lambda particle (^{17}He), and the silicon target will be used to push these studies to higher mass numbers.

The speed at which the kaon is accelerated is a delicate compromise between smashing the nucleus into fragments and creating the desired effect. The kaon is much heavier than the resulting π^0, so a lot of energy is transferred to the hypernucleus, which can fission into several fragments. If the nucleus breaks apart, the NMS is equipped to view the fragments (see diagram).

Physicists explore the forces within the nucleus by taking careful measurements of all energy of the particles entering and leaving the target. The precise measurements made by the NMS at various points before and after the collision of a kaon with the nucleus allow nuclear forces to be better determined.

"This device has the potential of reaching a high resolution," said Chrien. "It is expected to be three times better than that of a magnetic spectrometer it replaces. . . . The NMS is limited only by the running time of the AGS and the energy and enthusiasm of the scientists."

— Sarah Gilbert

RHIC Summer Study (cont'd.)

propose, according to physicist Tom Ludlam, Associate RHIC Project Head who is co-chair of the Summer Study.

"There are some leading experimentalists present to keep the theorists honest," Ludlam joked.

The workshop began with a keynote speech by Columbia University professor and Nobel laureate T.D. Lee. His talk, entitled "To Know the Smallest, We Need the Largest," outlined many of the questions facing RHIC and prompted fervent discussion.

"You know it is going well if we have started arguing already," Kahana commented.

BNL Director Nicholas Samios presented the history of RHIC, for which construction began in the mid-1980s. After RHIC is commissioned, researchers hope for a momentary glimpse of the beginning of the universe in the form of a new kind of matter.

Everyday matter consists of protons and neutrons, the particles that make up the nuclei of atoms. Protons and neutrons are made up of quarks and gluons, which are the basic particles of nature.

At RHIC, heavy ions will be accelerated until they collide at energies more than ten times greater than energies in any other heavy-ion accelerator to date. Heavy ions are made by stripping the electrons off of heavy atoms, leaving just the nuclei.

The particles' great speed, along with the high temperature and pressure achieved in the collision, should break down the structure of these particles. What is left should be a soup of quarks, called a quark-gluon plasma, which no one has ever observed.

Because it has not been observed, there are many questions about what will happen at RHIC, Ludlam said.

The meeting is divided into four parts to represent different areas of interests for the researchers:

• **Thermodynamics** — looks at what the quark-gluon plasma might look like and what kind of phase transitions might take place when the nuclear matter changes to quark matter.

• **Hard Processes** — examines what may happen where there are direct quark-on-quark collisions.

• **Phenomenology** — looks at simulations of the collisions and what will happen to the high-temperature plasma.

• **Chiral symmetry and coherent effects** — speculates on a crucial symmetry and the unexpected phenomena that might occur in this plasma.

The mornings begin with a longer talk that serves as an overview of the subject and brings people up to date on new results, Ludlam said. Afternoons are designed to be more discussion oriented, though shorter talks are scheduled.

Visitors may observe the sessions, which continue next week. For more information, contact Doris Rueger at Ext. 5663 or the conference desk at Ext. 3283 or 3873.

Kahana said it is important to have this kind of meeting now because start-up for RHIC is just three years away. He hopes the meeting will eventually evolve to include a summer school session for students of nuclear and particle physics.

Tom Kirk, BNL's Associate Director for High Energy & Nuclear Physics, convened the meeting by sharing his hope that the meeting would be a historical turning point in physics.

"My hope is that 20 years from now or ten years from now, people can look back and say 'I was at RHIC '96.' "

— Andrea Widener

Translators Wanted

If you are fluent in another language and are willing to act as a translator and/or interpreter for another member of the Laboratory community, then you are invited to register your name with the Office of Scientific Personnel (OEP), Bldg. 185A. OEP maintains a registry of on-site translators and interpreters, which is printed and distributed quarterly. For more information about registering or obtaining a copy of the registry, call Janice Dell, Ext. 5877.

Visit 'Secret' Garden, Art Treasure

A breathtaking garden in the Bronx? It's not really a secret, but not everyone has heard of Wave Hill, a 28-acre glory of flowers of all kinds, arranged in different settings on the banks of the Hudson River. Visit it on Saturday, August 3, on the next Art Society-sponsored bus trip. Also on the agenda is the Caramoor Center for Music and Art, a Mediterranean-style private mansion built near Katonah, New York, in the 1930s. Caramoor houses the excellent Rosen collection of paintings, sculpture and furniture, and incorporates entire rooms taken from European chateaux and reassembled on the site.

The bus will leave BNL's tennis-court parking lot at 7:45 a.m., and after a coffee stop, arrive at Wave Hill about 9:45 a.m. Revel in the gardens, then lunch in the cafeteria or picnic in the park grounds. Leaving at 1 p.m., the bus will get to Caramoor at about 3 p.m., where you can wander in the grounds and garden until the guided tour of the mansion-museum at 4 p.m. By 5:30 p.m., the bus will head back to BNL, returning by about 9:30 p.m. with one snack-style stop.

The cost of $30 per person ($28 for seniors) covers bus-with-bathroom, Wave Hill and Caramoor. For information and reservations, call Liz Seubert, Ext. 2346 or 286-8563, evenings.

50 YEARS AGO THIS WEEK

This series, which recounts the earliest days of Associated Universities, Inc. (AUI), and BNL, will run as appropriate throughout 1996 and 1997, the 50th anniversary years of AUI and BNL, respectively.

• **July 18, 1946** — Associated Universities, Inc. (AUI) is incorporated as a New York corporation, chartered by the Board of Regents of the State Education Department.

Although a New Jersey corporation had been formed on July 8, in anticipation of siting the new laboratory in that state, AUI decided to seek incorporation in New York once the resolution to request Camp Upton as a site was made.

Thus, on this date, AUI is granted an absolute charter, with George Brakeley, George Pegram, I.I. Rabi, Henry Smyth and William Watson as incorporating trustees. *(To be continued on July 26.)*

Leaving the Lab — After 35 Years or More: Lewis Friedman

After 47 years and at least a hundred published papers, Lewis Friedman has retired from BNL's Chemistry Department.

Friedman came to BNL as an associate scientist in October 1948, disregarding the recommendation of his advisors. He was told to stay at the Fermi Institute for Nuclear Studies at the University of Chicago because there were more Nobel prize-winning chemists in Chicago, but Friedman saw more opportunities at BNL.

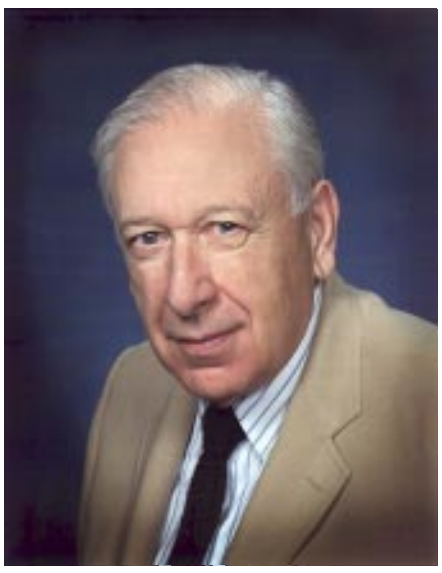
"BNL was a pretty exciting place at that time," Friedman said. "Everyone was young and enthusiastic. . . . It was a fantastically rare opportunity for me to provide support for other peoples' research."

In fact, collaboration defined Friedman's entire career.

Friedman's work began by assisting Frank Long from Cornell and, later, Geoffrey Wilkenson from Harvard in pioneering the field of structural mass spectrometry. In 1966, two years after he became a senior chemist at BNL, Friedman, with Tom Moran and Jacob Leventhal, invented a gaseous ion technique that improved mass-spectral analysis.

"Mass spectrometry became the analytical balance of the 20th century," said Friedman, explaining this was a result of major advances in the field, many of which occurred at BNL.

In operation, a mass spectrometer sends a beam of ions though a combination of electric and magnetic fields. This creates a mass spectrum, a type of ordered "photograph" that shows the mass of a molecule and the masses of molecular pieces. The applications of mass spectrometry include: use in isotopic and chemical analysis, structural studies, industrial process control and analysis, geochronology, research on the reactions of gaseous ions and molecules, and environmental studies.



Lewis Friedman

"We were the first to recognize and demonstrate that you can keep extremely fragile molecules intact by controlling the rate at which they are converted to a gaseous form," Friedman explained. As a result, the field of mass spectrometry expanded to include analyses of materials that were formerly destroyed by evaporative processes.

Mass spectrometry has gone from being just a chemistry technique to a multimillion dollar industrial application, Friedman said. Conferences on mass spectrometry used to include only 30 to 40 participants; now, these conferences draw thousands.

Over the following years, Friedman collaborated with colleagues in many BNL departments, including Biology, Medical, Physics and Chemistry.

"I probably set a record for collaboration," said Friedman with a chuckle.

In 1989, Friedman, Gerhart Friedlander and Robert Beuhler, all of the Chemistry Department, thought they might have discovered a type of very low energy fusion — cluster fusion. This result turned out to be a false alarm, but Friedman and Beuhler received a patent for their invention of a method and apparatus for producing large cluster ions, which were previously difficult to isolate.

Cluster ions are groups of atoms or molecules that carry one or more units of electrical charge. Scientists accelerate them to discover the nature of electronic and nuclear energy exchanges in condensed matter.

"Cluster fusion has had the least impact of anything I've done," said Friedman, but the patenting of a number of cluster-ion techniques proved very worthwhile.

For example, in 1986, Friedman, Beuhler, Michael Matthew, a former BNL employee, and Myron Ledbetter, now retired from Biology, patented a cluster-ion technique that modifies the surface layer of an object. This microelectronic technique allows surfaces to be cut and milled on a microscopic scale — a type of minature carpentry. This technique is more controlled and efficient than previous methods.

"I've had a lot of fun," said Friedman, who described the environment at BNL as one of the Lab's biggest assets.

"I came because of the facility's intellectual environment," commented Friedman, and he plans to stick around for the same reason.

Friedman's emptied office in Bldg. 555 makes it clear that he officially retired on April 30, but he now is beginning work as a consultant with BNL's Department of Advanced Technology (DAT) on problems related to underground hazardous waste-storage tanks at the U.S. Department of Energy's (DOE) Hanford site in Washington.

"Environmental cleanup is probably one of the most important problems DOE faces," Friedman concluded.

— Sarah Gilbert

Volunteers Needed

Women and men who are 20 years and older and in good health are needed to participate in brain-imaging studies. Subjects will be paid for their participation, and supervisory approval is required. For more information, call Naomi Pappas, Ext. 2694.

Trump This!

During the summer, the BERA Bridge Club will play duplicate bridge at 7:30 p.m. in the South Dining Room of the Brookhaven Center on the following dates: Wednesday, July 17; Wednesday, July 31; Tuesday, August 13; and Wednesday, August 28. Summer visitors and students are invited to play. For more information, contact Morris Strongson, Ext. 4192, or e-mail mms@bnl.gov.

Give a Helping Hand At Healthfest *'96*

Healthfest '96 — BNL's fourth celebration of health, fitness and safety — is again scheduled for October, but volunteers are needed to make it happen. So, if you would like to help on the days of the walk, run or health fair with such tasks as setup, registration, course patroling, etc., then call Mary Wood, Ext. 5923, to volunteer.

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Tennis Anyone?

Summer Tournament

Employees, guests, summer visitors and their spouses are reminded to sign up for the 1996 Tennis Tournament. Running from July 20 through August 16, the tournament may include men's singles and doubles, women's singles and doubles, and mixed doubles, depending on interest.

Sign up by Tuesday, July 16, at the BERA Sales Office. The draw will be posted by Wednesday, July 17, at the Sales Office and courtside.

For more information, call Rudy Alforque, Ext. 4733; Joe Carbonaro, Ext. 5139; Rita Kito, Ext. 3320; or Om Singh, Ext. 5332.

Skin Cancer Screening

A board-certified dermatologist will screen employees for skin cancer on Thursday, July 25, from 9 a.m. to noon in the Occupational Medicine Clinic.

To obtain one of the 40 available appointments, send a note with your name, building number and extension to Mary Wood, Bldg. 490. For more information, call Wood, Ext. 5923.

Free Children's Lessons

Free, informal tennis lessons will be given to children of BNL employees and visitors.

Taught at the BNL tennis courts by Matt Hershcovitch, lessons are being offered Mondays through Thursdays, from 3 to 4 p.m. No lessons are scheduled from July 22 to August 2.

No signup is necessary: Children who wish to attend should show up at the courts with their own racquets and balls, ready to play.

Arrivals & Departures

Arrivals

Alexander I. Pikin.....AGS
Peter W. Stephens.....NSLS

Departures

This list includes all employees who have terminated from the Lab, including retirees:

Katherine G. Becker.....Advanced Tech.
Charles Briening.....RHIC
Debabrata Goswami.....Chemistry
Fred E. Izzo III.....Plant Eng.
Peter M. McHugh.....Financial Serv.
G. Chris Pappas.....AGS
Frank J. Redding.....Contracts & Proc.
John J. Romeo.....RHIC
Maureen H. Sacker.....Occ. Med. Clinic
John J. Strasser.....App. Science

Starting Monday: 4-Way Stop At Brookhaven & Center

As of today, the improvements at the intersection of Brookhaven Avenue and Center Street are complete. All that remains is the unveiling of two new stop signs on Brookhaven Avenue — turning the intersection into a four-way stop.

The new stop signs — and two new signs warning "stop sign ahead" — are scheduled to be unveiled at 8 a.m. on Monday morning, July 15. Effective at that time, drivers approaching this crossroads should obey New York State law regarding four-way stop sign intersections: When you arrive at a stop sign, you must yield to all drivers already there; if you arrive simultaneously with another car or cars, you must yield to the car(s) on your right.

Pedestrians and drivers should exercise caution at this intersection while drivers adjust to the change from two to four stop signs.

In addition, drivers should be aware that parking has been eliminated along parts of both Brookhaven Avenue and Center Street, as designated by yellow curb paint. Also, signs have been installed in the parking lot north of Bldg. 179, reserving three parking spaces for the Director's Office and allocating four spaces for 30-minute parking only.

Talk on Reactors Open To Employees, Public

Employees and members of the public are invited to a presentation on BNL's reactors — the High Flux Beam Reactor and the Brookhaven Medical Research Reactor —that will be held on Monday, July 15, at 7:30 p.m. in Chemistry's Hamilton Seminar Room, Bldg. 555.

Arranged by Kathy Geiger, BNL's Community Relations Liaison, this overview of BNL's reactors will include general descriptions, as well as discussions of experimental programs, environmental monitoring, safety analysis, emergency planning and future plans. A question-and-answer period will follow.

Speakers will include John Axe, Head of BNL's Center for Neutron Science; Michael Brooks, Deputy Associate Director for Reactor, Safety and Security; Raymond Karol, Reactor Division; Frank Marotta, Safety and Environmental Protection Division (SEP), Emergency Services; and Gary Schroeder, SEP.

Computing Corner

The Computing & Communications Division (CCD) offers the following. For more information about classes and/or to register, call Pam Mansfield, Ext. 7286, or e-mail pam1@bnl.gov.

MIX Meeting

The next Monthly Information eXchange (MIX) meeting will be held at 11 a.m., on Wednesday, July 17, in Room B. Berkner Hall. Topics for discussion include "The Web, CCD and You" and the NT WinCenter.

Intermediate PowerPoint

A class in intermediate PowerPoint is set for August 6, for a $150 per person fee. To register, contact your group's training coordinator or Mansfield.

Visual Basic

Classes in visual basic programming are being scheduled for August and September. If you are interested, contact Mansfield by Friday, July 19.

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position. Consideration is given to candidates 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, handicap or veteran status.

Each week, the Human Resources Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Human Resources, and second, for general recruiting under 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, or call the JOBLINE, Ext. 7744 (344-7744), for a complete listing of all openings.

Current job openings can also be accessed via the BNL Home Page on the World Wide Web. Outside users should open "http://www.bnl.gov/bnl.html", then select "Scientific Personnel Office " for scientific staff openings or "Employment Opportunities" or "BNL Human Resources Division" for all other vacancies.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

NS 7170. PROJECT PLANNING SPECIALIST - (term appointment) Requires a bachelor's degree in engineering or management/business, and several years' experience in cost and schedule control for major technical programs. Experience with project-management tools such as Excel and Microsoft Project and excellent communication skills are required. Experience with large DOE project management is highly desirable. Physics Department.

NS 3216. ADMINISTRATIVE POSITION - (term appointment) Requires a bachelor's degree or equivalent experience, and excellent written and oral communication skills to assist in community relations program relating to environmental restoration activities. A minimum of three years' demonstrated writing experience is required, as is proficiency using a PC. Responsibilities will include assisting in updating a community relations plan, coordinating public meetings, and preparing fact sheets and a newsletter. Will also assist with other administrative duties as needed. Office of Environmental Restoration.

DD 4528. DRAFTER POSITION - Requires an AAS in electronics or equivalent with an emphasis in electronic design. Must be able to prepare schematics and assembly drawings from a layout for the manufacture of printed-circuit boards and assemblies. Working knowledge of IPC-D-275 and ANSIY14.4 also required. Knowledge of PADS LOGIC, along with PADS WORK or similar program and a recent revision of AutoCAD, is desirable. National Synchrotron Light Source Department.

11:30 a.m. to 1:30 p.m.
in the parking lot opposite Berkner Hall, between the tennis courts and the Science Education Center

Read the

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