

Collaboration Hopes to Have Big EMPACT at Texas SSC

The fate of the proposed EMPACT/TEXAS detector — one of three experiments competing to be one of two major detectors at the national Superconducting Super Collider (SSC) — could be decided as early as tomorrow.

Tomorrow is the end of a three-day meeting of the SSC Program Advisory Committee (PAC), during which its members have been listening to presentations of "letters of intent" from the three collaborations that wish to propose formally their SSC experiments.

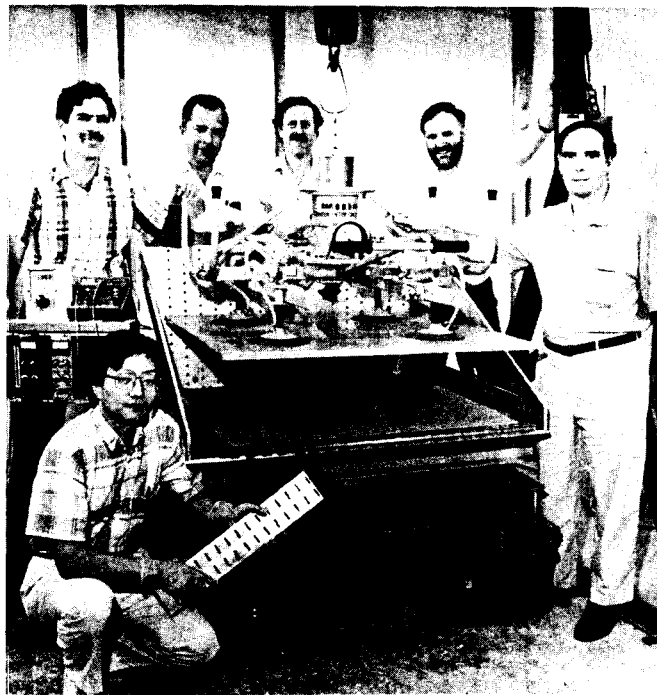
At this meeting, the intentions of the almost 350 scientists who want to build the 6,000-metric-ton EMPACT/TEXAS detector for almost \$500 million were put forth on Thursday by BNL Guest Physicist Michael Marx. He is a professor of physics at the State University of New York at Stony Brook who heads the collaboration of 56 institutions, including Brookhaven.

Also making EMPACT/TEXAS's intentions known to the SSC PAC were BNL Senior Physicist Howard Gordon, one of Marx's three deputies, who heads the Physics Department's Omega Group and its involvement in this intended SSC experiment; and Senior Physicist Frank Paige of the high energy theory group in Physics.

Nineteen members of BNL's Physics and Alternating Gradient Synchrotron Departments have contributed to EMPACT/TEXAS's development, by undertaking physics and computer simulation of the detector, and design of the calorimeter and the muon systems.

When built in Texas, the SSC will have 20 times the energy of the world's highest energy collider, the Tevatron at Fermi National Accelerator Laboratory. By 1998, the SSC is scheduled to begin smashing two protons beams together, each with an

Some of the Brookhaven members of the EMPACT/TEXAS collaboration: (standing, from left) Howard Gordon, Frank Paige, Stephen Kahn, William Morse, Michael Murtagh, and (kneeling) Hong Ma. They are gathered around a lead-liquid argon stack that will be tested at BNL's Alternating Gradient Synchrotron as part of the calorimeter research useful for EMPACT/TEXAS.



Roger Stoutenburg

energy of 20 trillion electron volts (TeV), at four intersecting points around the 53-mile rings.

By that time as well, one general and one specific detector are scheduled to be in place in experimental halls at least 150 feet underground, ready to measure the energy and direction of new particles emerging from the 100 million 40-TeV proton-proton collisions to occur within the SSC every second.

Brookhaven and the 55 other institutions making up the collaboration intend EMPACT/TEXAS to be the SSC's specialized detector, with a balanced emphasis on electromagnetic and hadron calorimetry to measure electrons, photons, jets and missing transverse energy, and on muon detection using an innovative system of superconducting air-core toroid magnets.

"As a high-resolution detector, EMPACT/TEXAS will be capable of utilizing the SSC's ultimate luminosity, which is a measure of the number of interactions and which will allow us to explore higher mass regions," Howard Gordon explained to the Bulletin last Tuesday.

EMPACT/TEXAS is the joint venture of three enterprises that had submitted "expressions of interest" to the SSC Program Advisory Committee last May: EMPACT (Electrons, Muons, Partons with Air Core Toroids) coordinated by Marx; TEXAS (Totally hermetic Experiment At the Supercollider) headed by Larry Sulak of Boston University, Steven Reucroft of Northeastern University and Robert Webb of Texas A&M University; and 10^{34} from the University of California, Davis.

As a result of the merger, the

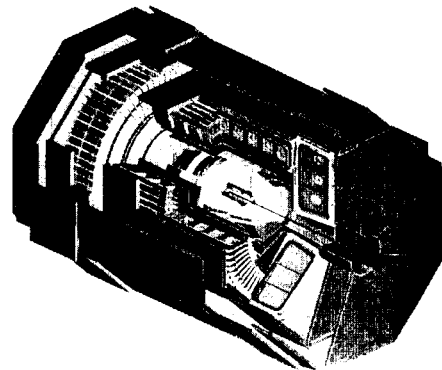
collaboration's primary improvement to their detector design would allow a search from 80 million electron volts up to the SSC's limit of 1.2 TeV for the evasive Higgs boson, a particle predicted by certain theories of weak and electromagnetic interactions.

The two detectors that EMPACT/TEXAS is competing against are: L*, a very large solenoid set forth by a team headed by Samuel Ting of the Massachusetts Institute of Technology; and SDC, a magnetic solenoid detector proposed by a group under George Trilling of the Lawrence Berkeley Laboratory.

Unlike the others, EMPACT/TEXAS is a nonmagnetic detector. It is considered so because the innermost component of the detector, called central tracking, has no magnetic field. In this regard, EMPACT/TEXAS resembles the D0 detector, which Brookhaven is collaborating in building as the second major experiment at the Tevatron.

Tracking devices often have a central magnet, which deflects charged particles. The effect of the magnetic field on charged particles is seen by their curved and spiraling tracks as they make their way through central tracking.

"But, at such high luminosity as expected at the SSC, it is difficult to do tracking if there is a magnetic field," said Gordon. "So, in balancing the physics losses caused by not having a central magnet against utilizing the high luminosity to the fullest,



Cutaway view of EMPACT/TEXAS detector.

EMPACT/TEXAS opted to take advantage of the luminosity, simplify the tracking, and optimize calorimetry without having a central magnet."

Surrounding the combined transition radiation detector and central tracker is the second component of this detector: the calorimeter, which measures the energy of electrons, photons, jets and noninteracting particles. The collaboration is considering two calorimetry options: using either scintillating fibers or liquid argon as the active medium, with lead plates as the absorber. The liquid-argon option is being pursued by Brookhaven.

Because heavy particles such as the elusive top quark and the Higgs boson are thought to decay into both muons and electrons, EMPACT/TEXAS's goal is to measure muons with a resolution similar to that achieved in measuring electrons with the calorimeter. So, to measure muons, which pass through central tracking and the calorimeter without much notice, the muon chambers are the final, enveloping detector system.

For EMPACT/TEXAS, the muon spectrometer is based on a large system of superconducting air-core toroidal magnets from which the detector derives part of its name. While they have not previously been

(continued on page 2)

First Full Cell of RHIC Magnets Aces Tests

The first "full cell" of prototype superconducting magnets for BNL's Relativistic Heavy Ion Collider (RHIC) successfully passed its initial tests on November 1. At that time, the dipole and quadrupole magnets of the cell



Standing at the end of the first full cell of prototype magnets being tested for the Relativistic Heavy Ion Collider are: (from left) Al Prodell, full-cell coordinator; Bill Carapezza, who supervised mechanical installation of the full cell; Ed Weigand, who supervised electrical installation; and George Ganetis, who was responsible for the electrical engineering.

— Photo by Roger Stoutenburg.

were operated to currents that exceeded the design value for RHIC by 40 percent.

Within the 12 arcs that will make up the two magnet rings of the collider, 288 dipoles, 276 quadrupoles, 276 sextupoles and 276 corrector magnets will focus and bend the heavy-ion beams, maintaining them in their orbits around the two rings.

When RHIC is commissioned in 1996, the superconducting dipole and quadrupole magnets will be operated to a current of 4,980 amperes (A), which will generate a magnetic field of 3.45 teslas (T) in the dipole magnets.

A full cell is the smallest grouping of magnets that can bend the particle beam and focus it both vertically and horizontally. One RHIC full cell is 98 feet long and made up of a dipole magnet, a corrector-quadrupole-sextupole combination, a second dipole and a second combination. RHIC's two rings will have 144 full cells.

During full cell testing, the first natural quench, which occurs when the magnet conductor makes the transition from the superconducting to the normal resistive state, was at a current of 6,168 A.

A few quenches later, a quench current of 7,017 A was attained, which is equivalent to a magnetic field of about 4.6 T in the dipole magnets.

"The results are about the same as those we obtained from tests with single RHIC magnets — so we are very pleased," reports Physicist Albert Prodell, who is coordinating RHIC full-cell testing within the Magnet Division of the Accelerator Development Department.

Full cell testing is taking place underground in Bldg. 902, in a section of a service tunnel remaining from BNL's first accelerator, the Cosmotron. Plans for continued testing include cycling the magnets a number of times from room temperature to the low operating temperature of 4.3 kelvins and back to room temperature, and ramping the magnets when they are cold up to operating current and back down again as many times as the schedule permits.

A second pair of dipoles, now being constructed, will replace the two dipoles now in the full cell, after the two are tested individually.

— Marsha Belford

Recycling Even More Critical With Closing of Lab Landfill

Although the BNL site is federally owned, the Lab's landfill is regulated by New York State (NYS) — and subject to the NYS law calling for the closure of all Long Island landfills by the end of this year.

To comply with this law, BNL will officially close the site landfill on December 18. After that date, all Lab-generated refuse that is both nonhazardous and non-recyclable will be transported to the Brookhaven Town waste management facility for disposal. Until this time, BNL shipped only household wastes from the apartment area and the Cafeteria to the Brookhaven Town facility.



For each ton of refuse brought to this facility, BNL must pay Brookhaven Town a \$45 tipping charge. "In addition to helping conserve valuable natural resources, the Labwide recycling program we began last month will reduce the amount of this refuse and thus reduce these costs," said program coordinator Nelson Tyler, Plant Engineering Division.

Brookhaven Town is currently completing a state-of-the-art material recycling facility, expected to begin operating next month. As the town will charge no fee for materials brought to this facility, Tyler said that BNL will probably take advantage of its proximity for recycling metal, glass and plastic.

In addition, sometime this month, apartment area residents should be supplied with red Brookhaven Town containers for the initial collection of metal and glass, which will be labeled with pickup time and date. When the time comes to begin recycling these materials on site, special collection cans will be issued to all work areas, similar to the cans now being used for the collection of papers.

For its current effort in recycling paper, BNL has a contract with Brookhaven Recycling and Waste Inc. In this arrangement, the Lab is paid \$50 for each ton of white paper and \$140 per ton for computer paper.

"But this translates into much more than money," said Tyler, "Each ton

of paper that we can recycle means that much less that we have to deplete our natural resources."



This recyclable paper was collected in Physics, Bldg. 510, in just one morning last week by Custodians Bill Robinson (left), John Quigley (second from right), and Jim Callahan (right), who are supervised by Phil Baker (second from right). With them are (center four, from left) Nelson Tyler, coordinator of the Lab's recycling program; Site Superintendent Roy McWilliams; Sharon Smith, recycling coordinator for Bldg. 510; and Oscar Blevins, Supervisor of Custodian Services.

Last Day for SERS Students

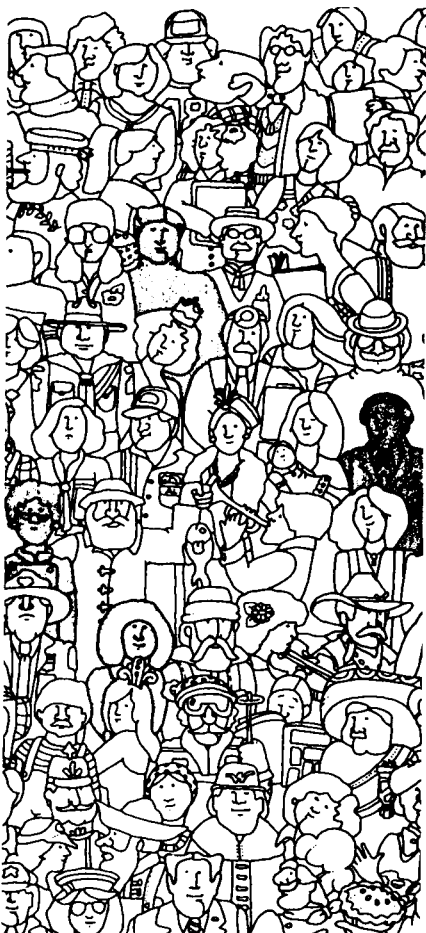
Today is the last day at BNL for the 14 undergraduates from across the U.S. who spent the fall semester on site participating in the Science and



Engineering Research Semester (SERS) program. Administered by the Office of Educational Programs (OEP) and sponsored by the U.S. Department of Energy, the SERS program lets students experience the real world of science by doing research tailored to their academic needs and supervised by BNL scientists, whose names are in parentheses.

Shown here with OEP's Robert Thomas (back right) are: (back, from left) Alfredo Palmer, University of Florida (Meyer Steinberg, Applied Science [DAS]); Lars Ensign, Washington State University (James Hainfeld, Biology); Patrick Breen, College of William and Mary (Kelvin Lynn, Physics); Steven Boege, Hamline University (Laurence Littenberg, Physics); John Lydick, University of Vermont (Samuel Morris, DAS); Steven Smallwood, University of North Carolina (Jerome Barancik, DAS).

Also, (front, from left) Scott Owens, Clark University (Ramesh Budhani, DAS); Robyn Quartero, University of LaVerne (Ralph Fairchild, Medical); Catherine Kocarek, University of Cincinnati (Betsy Sutherland, Biology); Matthew Bromberg, University of California, Berkeley (Michael Tannenbaum, Physics); Rosemary Speers, Wright State University (Seiichi Yasumura, Medical); Sandra Roth, University of Notre Dame (Victor Bond, Medical); Yee-Li Chan, West Virginia University (Robert Lambiasi, Accelerator Development); and Yen-Ning Chuang, State University of New York at Binghamton (Carl Anderson, Biology).



EMPACT (cont'd)

used in high-energy physics experiments, these toroids have been used in plasma-confinement fusion research.

EMPACT/TEXAS and the other proposed detectors have profited from some earlier SSC work done at Brookhaven and elsewhere. Since 1986, predating BNL's involvement with EMPACT/TEXAS, members of the Lab's Physics Department and Instrumentation Division have been participating in both generic and subsystem detector research and

development for the SSC.

Detector technology such as fast calorimetry, monolithic circuits and semiconductor detector processing, radiation effects on detector components and event simulation have been examined through the generic program. Many subsystem projects grew out of the generic program, including liquid-argon calorimetry, transition radiation detectors, front-end detector electronics, silicon drift detectors, and triggering and data acquisition. — Marsha Belford

Photos on these pages by Roger Stoutenburgh.

In Memoriam

Robert W. Zane, a custodian in the Plant Engineering Division, died on December 5, at the age of 39.

Zane originally came to BNL in January 1977, as a technician in the Accelerator Department. When he left the Lab in September 1979, he was a senior drafter. He returned to BNL in April 1990 as a temporary custodian.

Zane was a resident of Centereach, and he is survived by his wife Marilyn Zane, who also works in Plant Engineering.

The Goal Is in Sight for United Way

In an unprecedented outpouring of generosity, BNLers have donated \$80,000 to the United Way Fund Drive in less than three weeks. Today is the last day of the Labwide campaign, so the BNL team is calling on all the reserves to help with one last push towards the \$100,000 goal.

Shown here are a few of those who have helped to carry the United Way ball down the field so far. By returning their pledge cards early, they were eligible for last week's prize drawing sponsored by the United Way Fund Drive Committee — and they all turned up winners: (from left) Piyush Joshi, Accelerator Development Department, won a turkey, which he is going to donate again, to the BNL Food Drive; Steven Gill, Associated Universities, Inc., won a gift certificate to the Smithaven Mall; Donald Barton, Alternating Gradient Synchrotron Department, will enjoy three days in Williamsburg, Virginia; and Anita Cohen, Director's Office, won a gift certificate for dinner at Danford's Restaurant in Port Jefferson.

Pledge cards received today are eligible to join those of previous donors in the final drawing. In addition to a dinner at the South Shore Restaurant, a gift certificate to Smithaven Mall and another turkey, this week's prizes include a spring weekend in Atlantic City.

Don't miss out on this chance to be winner and to be part of a winning team. Send or bring your pledge card

to Betty Pergan, Bldg. 179A. For additional cards, call Pergan, Ext. 2937.



Nationally, only 4 people out of 100 who are able to donate blood do so!

PLEASE DONATE BLOOD: Wednesday and Thursday, December 19 and 20
For information call: Susan Foster, Blood Drive Chair, Ext. 2888

For Last-Minute Holiday Gifts, Try the . . .

BERA Sales Office

Looking for the perfect holiday gift for that connoisseur of fine food and entertainment on your list? How about one of the discount dining and entertainment plans available at the BERA Sales Office.

Entertainment '91 and *Long Island '91* are each sold locally for \$30, but BERA is selling them for \$25 each. The coupons inside offer additional savings — up to half price — at restaurants, theaters and more.

Other gift ideas include: assorted balloons — including "Merry Christmas" — at \$1.50 each, film, greeting cards, T-shirts at \$7 each, sweatshirts at \$13 each, Long Island postcards, and BNL postcards and mugs.

The BERA Sales Office in Berkner Hall is open weekdays from 9 a.m. to 2 p.m. While you're there, you can also pick up:

- **Tickets** — Magic Kingdom membership cards for Disney World, Epcot Center, Disneyland and MGM, free to employees and good for a discount at local Disney stores; tickets for the Metropolitan Opera and NY Islanders 1990-91 seasons.

- **Handouts** — Twofers for some Broadway shows; travel brochures and flyers; magazine subscription information.

- **Participation Awards** — The Sales Office is the official redemption center for BERA participation awards.

For more information, call Louisa Barone, Ext. 3347.



Winter Holiday Sales at the Science Store

Only two more shopping days left at the Winter Holiday Sales at the Science Store. From 10 a.m. to 3 p.m. today and next Friday, you can join the other BNLers who are finishing their holiday shopping with intriguing, science-oriented gifts — many priced under \$5.

For example, the large crystallite that Penny Byrne of Public Affairs' Tour Program is displaying here costs \$3.25, while its smaller companion goes for \$2. They're two of the new items you'll find at the Science Store this year, along with lots of old favorites.

The Science Store is on the west side of Bldg. 701; please park in the north parking lot. For more information, call Ext. 4495.

Social Club

The Social Club has scheduled the following events in the new year:

- **Wrestling** — Nassau Coliseum, Friday, January 11, 8 p.m., \$13, money due January 2.

- **Ski Trip** — Lake George, February 1-3, \$184 per person/double, \$174 per person/triple, \$164/quadruple; transportation, four meals, free beginner's lesson; total due January 11.

- **Ice Capades** — Barbie & the Simpsons, Nassau Coliseum, Saturday, February 9, 11 a.m., \$12.50, only 25 discounted tickets available, money due by Jan. 11.

- **Ski Trip** — Davos, Switzerland, March 7-15, \$1,149 per person/double, or March 21-29, \$1,049 per person/double; includes round trip by Swissair, breakfasts, four-course dinners, indoor pool and sauna, transport from airport to hotel.

- **Hawaii Trip** — Honolulu, Pearl Harbor and Maui, departure October 31, \$1,549 per person/double, \$1,529 per person/triple, \$2,049 per person/single; round-trip air, four breakfasts, four dinners, hotels and tours; deposit of \$100, final payment August 27.

- **Skiing** — Discount coupons to Cata-mountain Ski area Hilldale, New York, available in the BERA Sales Office.

For more information, call Doris Terry, Ext. 7610.

Amateur Radio Club

The Amateur Radio Club will meet in Berkner Hall, Room D, on Thursday, December 20, at noon. The agenda includes election of club officers for 1991 and a holiday party.

BNL employees and guests who have or wish to obtain amateur radio licenses are invited to attend. For more information, contact Andy Feldman, Ext. 3264, or Alan Bieber, Ext. 2928.

Cafeteria Menu

Luncheon served 11:15 a.m. to 1:30 p.m., grill open to 3:45 p.m., Cafeteria closes 4 p.m.

Monday, December 17

Soup: Cream of Mushroom	.75/.95
Entree: Chicken a la king w/rice	3.10
Entree: Chef's choice	3.10
Fitness: Baked broccoli quiche	3.10
Carvery: Pastrami	2.85
Grill: Grilled patty melt w/fries	2.00

Tuesday, December 18

Soup: Chicken gumbo	.75/.95
Entree: Beef stroganoff over noodles	3.10
Entree: N.Y. shell steak	3.10
Fitness: Chef's choice	3.10
Carvery: Roast beef	2.85
Grill: Double burger w/fries	2.95

Wednesday, December 19

Christmas Special

Complete dinner: soup, salad, one entree, 3 veg., any dessert, small beverage	4.95
Soup: Cream of broccoli	.75/.95
Entree: Rock Cornish game hen	3.75
Entree: Prime rib of beef	3.75
Entree: Baked ham	3.10
<i>Enter the holiday SPICE drawing to win a chocolate Christmas house.</i>	

Thursday, December 20

Soup: Lentil	.75/.95
Entree: Chef's choice	3.10
Entree: Baked chicken w/1 veg.	3.10
Fitness: Osso buco w/1 veg.	3.10
Carvery: Baked ham	2.85
Grill: Hamburger cordon bleu w/fries	2.20

Friday, December 21

Soup: New England clam chowder	.75/.95
Entree: Cayman Island shrimp w/1 veg.	3.10
Entree: Italian-style tortellini w/1 veg.	3.10
Fitness: Chef's choice	3.10
Carvery: Hot roast turkey	2.85
Grill: Fish fillet sandwich	2.50

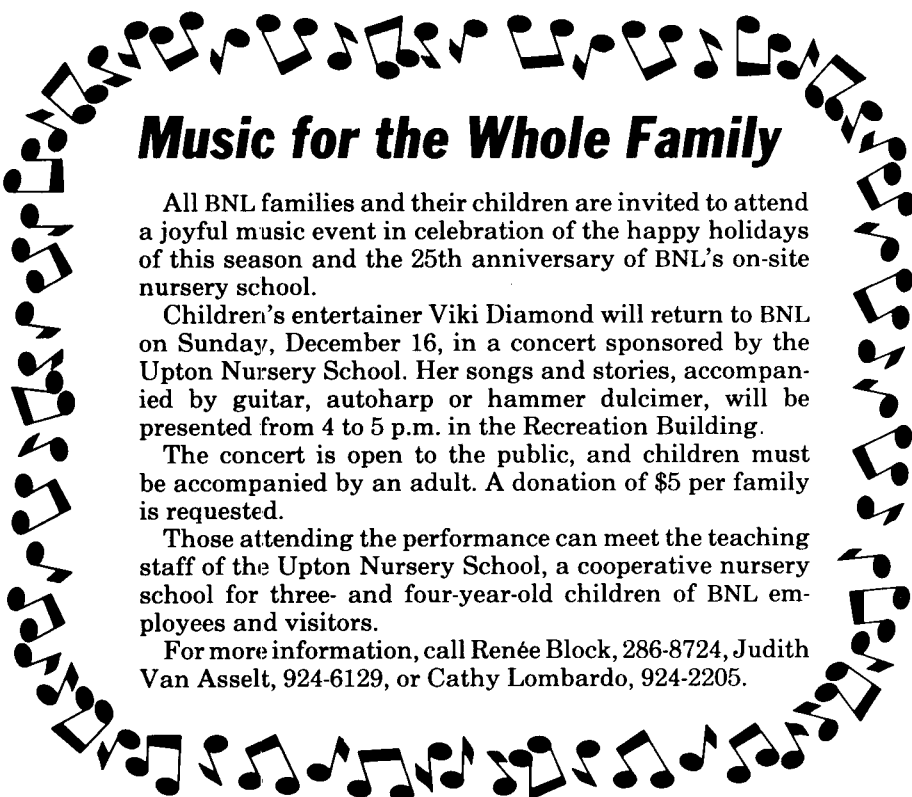
Arrivals & Departures

Arrivals

Christopher M. Harris.....Reactor
Philip D. Plunkett.....Reactor

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

Elaine Hassinger.....App. Science



Music for the Whole Family

All BNL families and their children are invited to attend a joyful music event in celebration of the happy holidays of this season and the 25th anniversary of BNL's on-site nursery school.

Children's entertainer Viki Diamond will return to BNL on Sunday, December 16, in a concert sponsored by the Upton Nursery School. Her songs and stories, accompanied by guitar, autoharp or hammer dulcimer, will be presented from 4 to 5 p.m. in the Recreation Building.

The concert is open to the public, and children must be accompanied by an adult. A donation of \$5 per family is requested.

Those attending the performance can meet the teaching staff of the Upton Nursery School, a cooperative nursery school for three- and four-year-old children of BNL employees and visitors.

For more information, call Renée Block, 286-8724, Judith Van Asselt, 924-6129, or Cathy Lombardo, 924-2205.

Bowling

Red/Green League

C. Bohnenblusch had a 265, T. Prach 250, L. Jacobson 224, R. Eggert 221, K. Asselta 214, E. Sperry IV 211, A. Warkentien 203, R. Sick 202.

White League

Caryl Macdougall had a 225, Jim Goode 220, Jim Petro 218, Ed Meier 214, Joe Mayeski 205, John Weiner 202, Debbie Keating 182, Gerry Riker 180, Mary Addressi converted the 4/7/10 split.

Purple League

Kay Conkling had a 187.

Local Users Group

At the next meeting of the Upton Local Users Group on Wednesday, December 19, at 10:30 a.m., in the auditorium at Berkner Hall, a status report on BNL's Computing and Communications Division will be presented. All interested users are welcome. For more information, call Zohreh Parsa, LUG Chairperson, Ext. 4748, or send E-mail to LUG@BNL.

Volleyball

Women volleyball players are needed for the Monday and Wednesday mixed leagues. Contact Kathi Barkigia, Ext. 7661, for further information.

Santa (Firefighter Rich Richard) and his elf helper (Sergeant Chuck LaSalla) will visit BNL early this year — on Friday, December 21. Children in the apartment area should look for them on BNL Fire Engine #2 at about 4 p.m.. As usual, they will be handing out candy canes — compliments of the members of BNL's Fire & Rescue Group. Santa and his elf will already have made their rounds of the Lab's offices at around 1 p.m.

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 Personnel Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Personnel, 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.

The vacancies listed below have been exempted by the Director's Office from the current freeze on open requisitions.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

4348. SECRETARIAL POSITION - Requires AAS in secretarial science and a minimum three years' experience in a major business office environment. Excellent typing, communication and telephone skills are required, as are excellent word-processing skills. WordPerfect experience preferred. Shorthand and IPAP/JCARS experience highly desirable. Staff Services Division.

4349. SECRETARIAL POSITION - Requires AAS in secretarial science or equivalent, and a knowledge of Laboratory policies and procedures. Will provide secretarial support to CNF and Research Coordination Group. Duties will include preparing procedures, correspondence and reports, arranging travel and maintaining files. Ability to obtain and maintain security clearance is required. Reactor Division.

4350. ENGINEERING POSITION - Requires BS or equivalent in a scientific or technical field and three years' health physics experience. Knowledge of internal dosimetry practices is required. Previous computer programming experience or high-level computer language experience is desired. Responsibilities will include developing and integrating formal internal dosimetry program into Personnel Monitoring operations and will include setup, calibration and operation of the whole-body counter. Safety & Environmental Protection Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

4351. OFFICE SERVICES POSITION - Requires excellent computational skills, a solid background in a payroll-type environment and experience that demonstrates an aptitude for figures and accuracy. Proficient use of calculator

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