BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

New Mode of Optical Laser Electron Accelerator Succeeds at BNL's Accelerator Test Facility

Performance to Be Enhanced by New High-Power, Short-Pulse Laser

Electrons can be used to amplify light, or, conversely, light can be used to accelerate electrons.

The former idea is the concept behind the free-electron laser, which was invented in 1971. The latter notion, originated in 1972 by BNL's Robert Palmer, is the foundation of the *inverse* free-electron (IFEL) laser and was originally proposed as a novel electron accelerator.

IFELs have been found to be suitable for two applications: first, small, lower-energy accelerators, which would be so compact that they could fit on a table top; and, second, preaccelerators for other, higher-energy, nonconventional electron accelerators. The IFEL principle was first demonstrated at microwave frequencies at Columbia University in 1992.

With the goal of developing a small IFEL accelerator, a team from BNL, and Columbia and Yale Universities has been working since 1990 at the Lab's Accelerator Test Facility (ATF) to develop the first optical-frequency IFEL module prototype. A sequential number of IFEL modules would make up an IFEL electron linear accelerator.

Using the ATF's 5-gigawatt (GW) carbon-dioxide (CO_2) laser to accelerate 40-million-electron-volt (MeV) electrons from the ATF's linear accelerator, an IFEL interaction within the accelerator module was first seen last October. At the end of January, the data from that interaction revealed that 1 GW of laser power boosted the 40-MeV electron beam by 0.9 MeV.

At the October contract signing are some of those who have facilitated the agreement between BNL and the OPTOEL Corporation of St. Petersburg, Russia, for the latter to provide the Lab's Accelerator Test Facility (ATF) with a 1-terawatt laser: (standing, from left) Larry Smith, Division of Contracts & Procurement (DCP); John Skaritka, National Synchrotron Light Source (NSLS) Department; ATF Head Ilan Ben-Zvi; Igor Pogorelsky, NSLS; DCP Manager Mary-Faith Healey; (seated, from left) BNL Assistant Director for Management & Physical Plant Michael Bebon; and Igor Meshkovsky, OPTOEL Corporation.

"The observed energy-enhancement factor is approximately a factor of two from the calculated value -- truly an amazing result for such an early stage of experimental verification," states guest Senior Physicist Arie Van Steenbergen, who is spokesman of the experiment.

In addition to Van Steenbergen,

(continued on page 2)

BNL Lecture: Laser Accelerators Surf Into the Future

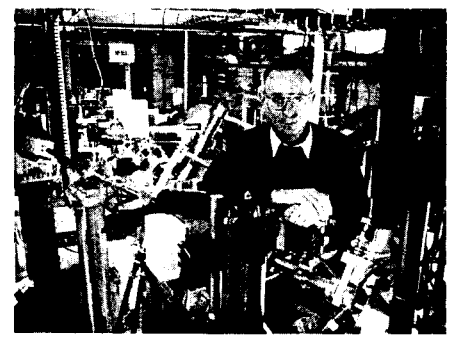
Imagine the staggering, tiny-to-huge ratio between a human hair and the Empire State Building.

Immense as it is, that difference is considerably smaller than the difference in the ratio of peak power in one of the world's highest powered beams, at the National Synchrotron Light Source (NSLS) — tiny — and a futuristic x-ray free electron laser (FEL) — huge.

FELs, long under study at the NSLS and considered to be the next generation of light sources, will have to use very bright electron beams produced by linear accelerators (linacs) to reach x-ray wavelengths. These beams are basic to advanced accelerator research and development, including laser accelerators relying on terawatt lasers.

Forefront investigation of this vital field is ongoing at BNL's Accelerator Test Facility (ATF), which, since March 1995, has held the world's brightness record for electron linacs, and researchers are developing FELs, *inverse* FELs (see story at left) and other prototype devices.

To describe the excitement and achievements of this research, Ilan Ben-Zvi, Deputy Head of the Center for Accelerator Physics (CAP) and



Ilan Ben-Zvi in the experimental hall at the Accelerator Test Facility of BNL's Center for Accelerator Physics.

ATF Head, will give the 315th Brookhaven Lecture on Wednesday, April 17. A physicist in the NSLS Department, Ben-Zvi will talk on "Catching Waves and Making Waves: Laser Accelerators and Their Inverses," beginning at 4 p.m. in Berkner Hall. He will be introduced by NSLS Chairman Michael Hart.

As Ben-Zvi will explain, modern terawatt lasers can achieve electric fields of a million megavolts per meter. Since linacs use these fields to accelerate beams of particles, at just 0.5 percent of a peak laser power, a linac as powerful as the 50-gigawatt, two-mile-long Stanford Linear Accelerator would need to be only about one meter long.

Such superpowered, miniature machines of the future promise to speed research into the next realm of new physics. But laser accelerators present many challenges, such as producing their enormous acceleration over distances of a meter or more, instead of the present few millimeters. And all variations of these devices must resolve the same problem: perfectly synchronized coupling between the "surfer" electrons and the "surging waves" of the electric field that accelerates them.

Ben-Zvi received his Ph.D. in physics from the Weizmann Institute of Science, Israel, in 1970. He then went to Stanford University, where he

(continued on page 2)

This Year, 'April Is the Cruelest Month . . .'

In "The Wasteland," the poet T.S. Eliot dubbed April "the cruelest month" for "breeding lilacs out of the dead land . . ." But in this cruelest of Aprils, we have rarely seen *any* land, covered as it has been by so much snow.

Even the cruelest month, however, has some redeeming feature. This April, for example, brought Long Island into the record books. BNL's meteorologists have been keeping track of the Island's weather since the Lab opened in 1947. So, as the 1995-96 snow season has dragged on, all eyes on Long Island have turned to BNL for definitive measurements of snow accumulation.

BNL meteorologist Victor Cassella (left) and retired BNL meteorologist Bob Brown use an official National Weather Service yardstick to measure the snowfall of March 29, which left the season's total just shy of the record that was broken with the first of two April snowfalls this week. To arrive at official snowfall accumulation totals, Cassella and Brown take an average of several measurements in level areas that are free of drifts. **— Photos in this issue by Roger Stoutenburgh**

When meteorologists Victor Cassella and Bob Brown measured the snowfall at BNL on Friday, March 29, they found that it brought the 1995-96 season's total to 74.75 inches — just 0.15 inches shy of the record of 75.9 inches set over the 1966-67 season.

This was good news for Brown, a BNL retiree who was a meteorologist in the Department of Applied Science (DAS) during that last record-setting season and who came to the Lab on that day hoping that "his" record would hold.

But current DAS meteorologist Cassella was not discouraged: He knew that measurable snow had fallen on BNL as late as April 19 in 1983. And he knew that the long-range forecasts showed some activity that could develop into snow under the right conditions.

And develop it did — starting on Sunday, April 7, another 3.5 inches drifted down on BNL, putting the 1995-96 season into the record books with 78.25 inches total snow accumulation. But it wasn't over yet.

On the afternoon of Tuesday, April 9, snow began falling again, and by the time it ended on Wednesday morning, a record-breaking 12.5 inches of snow covered the Lab, hoisting the season's total to a whopping 90.75 inches. According to Cassella, who received a phone call Wednesday morning from Brown crying, "Uncle!", the last snowfall is also the latest and most snow ever received in April. The previous record was 11 inches on April 6, 1982.

But is it over now? Probably, says Cassella, who doesn't expect to reach his personal goal of 100 inches this season. "The only storms I see in the forecast are mostly in other areas and should bring warmer temperatures and rain," he said. On the other hand, he added, if any more snow should fall before summer sets in, it would be considered part of the 1995-96 season, which began with the first snow last fall — 4.5 inches on November 29, 1995.

— Anita Cohen

Inverse FEL (cont'd.)

others on the experiment are: Juan Gallardo, BNL's Physics Department; Jack Sandweiss, Yale University; and J.M. Fang, Columbia University.

The IFEL collaboration credits the following ATF staff for their support of the experiment: Ilan Ben-Zvi, Marcus Babzien, Ken Batchelor, Alan Fisher, Karl Kusche, Robert Malone, Igor Pogorelsky, Joe Qiu, Thomas Romano, Joesph Sheehan, John Skaritka, Triveni Srinivasan-Rao, and Xie-Jie Wang.

New Acceleration Methods

Having begun final construction during 1995, the IFEL experiment is the first to be performed at the ATF's third and final beam line, which was installed in 1994. Located in Bldg. 820, the ATF was commissioned in 1992, as a long-term accelerator R&D facility for BNL's Center for Accelerator Physics, which is headed by Palmer, and for the National Synchrotron Light Source (NSLS) Department.

Staffed by about 20 physicists, engineers and technicians from the Instrumentation Division, the NSLS and the Physics Department, the ATF is used by accelerator physicists from BNL and around the world to research new methods, such as the IFEL, of accelerating high-brightness electron beams, and to look into novel ways of producing intense, coherent, short-wavelength electromagnetic radiation.

In fact, the ATF is the only user facility in the world dedicated to accelerator research and synchrotron-source development.

Performed with collaborations of researchers from industry, universities and the national labs, ATF experiments are approved by peer review. These experiments, in the areas of high-energy physics and basic energy sciences, often involve Ph.D. students, who go on to become the next generation of accelerator physicists after completing thesis projects at the ATF.

In addition, of the world's linear electron accelerators, the ATF holds the record for beam brightness.

That high-brightness and high-current beam begins when ultraviolet light from a neodymium-yittrium-aluminum-garnet (Nd:YAG) gas laser illuminates the copper surface of the photocathode of an electron gun, which emits 5-MeV electrons.

These electrons are then accelerated up to 50 MeV by a very high-intensity radio frequency electric field as they travel down a 20-foot-long linear accelerator (linac). Attached to the linac is a 100-foot-long transport line, which delivers electron beam to the three beam lines at the end of which sit experiments.

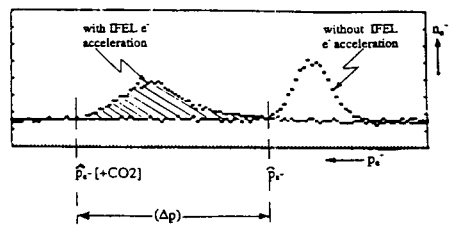
Another ATF laser makes it possible to test new ways of accelerating the ATF's electron beam beyond 50 MeV, including the IFEL experiment: a 200-picosecond (ps), 5-GW CO_2 laser, which can be synchronized to within 1 ps of the pulses of the ATF's electron beam.

Successful IFEL Test

For the IFEL accelerator-module test, the experimenters used a 200-ps-long pulse from the CO_2 laser at a power of 1 GW and a wavelength of 10.6 microns. It was synchronized with 5-ps pulses of the ATF's 40-MeV electron beam.

The light from the CO_2 laser and the electron beam from the ATF linac were aligned with a pulsed, variable period wiggler, which makes up the interaction domain within the IFEL module.

The IFEL module has an innovative but a simple design, since "an important and essential part of our approach was to keep the ultimate cost of an IFEL accelerator low and to test the limits of the IFEL concept," Van Steenbergen explains.



A graph of the inverse free-electron laser interaction in a module prototype first observed at the Accelerator Test Facility in mid-October. The curve at right shows the spread of the momentum of the electrons in the beam without their interacting with light from a carbon-dioxide (CO_2) laser; the curve at left shows how the electrons' momentum changes as a result of the electron beams' interaction with the laser light.

With the laser and electron beams aligned within a sapphire dielectric waveguide and synchronized, IFEL interaction was observed on Saturday, October 14, at 9 p.m.

"By reducing the laser-pulse length and increasing the vacuum pumping speed, we expect higher CO_2 laser power to become available, which should result in even greater electron acceleration," states Van Steenbergen.

Using the full power of the existing CO_2 laser, Van Steenbergen and company expect to reach a mean acceleration gradient of 25 MeV per meter with the present IFEL module. However, even higher CO_2 laser power is in the ATF's future.

"A one-terawatt CO_2 laser in combination with the present IFEL accelerator module should result in exciting developments in linear electron accelerators," concludes Van Steenbergen.

Terawatt CO_2 Laser

To meet such demands for more power and shorter pulses by the IFEL and other experiments on laser-driven particle acceleration, the ATF is developing a compact 1-terawatt (TW), 10-ps CO_2 laser, "which is beyond state-of-the-art technology," explains ATF Head Ilan Ben-Zvi.

Under a contract signed with Brookhaven in October, the OPTOEL Corporation of St. Petersburg, Russia, is fabricating the components for the 1-TW laser. Delivery is expected by the end of the year; after being integrated into the ATF, the new laser is expected to be operational by the end of 1997, "at which time it will considerably expand the ATF's capabilities as a user facility for strong-field physics studies," says Ben-Zvi.

While the active medium, CO_2, is the same for the 5-GW and the 1-TW lasers, the latter will use a 10-atmosphere pressure, x-ray pre-ionized isotopic gas mixture, instead of the 3-atmosphere, ultraviolet-preionized regular gas used now. As a result, the new laser will have a pulse length of less than 10 ps, which is significantly shorter than the 200-ps pulse length of the existing laser.

To date, TW-ps laser light has ranged from ultraviolet to near-infrared (IR), with wavelengths less than 1 micron; the new ATF TW-ps laser will extend this range to the middle IR, which has wavelengths around 10 microns. Increasing the wavelength by one order of magnitude results in a two orders of magnitude increase in the potential energy of the electrons within the laser field, which will benefit many experiments concerned with laser-electron interactions.

"By having a factor of 10 longer wavelength light than other tabletop terawatt lasers, our new laser will, for experiments such as the generation of short x-ray pulses and plasma-wake-field accelerators, be equivalent to one hundred times more peak power," concludes Ben-Zvi. —Marsha Belford

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.

• **April 14, 1946** — The Initiatory University Group's (IUG) Subcommittee on Electronuclear Machines holds its first meeting. Chaired by Jerrold Zacharias, Massachusetts Institute of Technology (MIT), this subcommittee includes M. Stanley Livingston, MIT; Norman Ramsey, Columbia; Louis Ridenour, Pennsylvania; Julian Schwinger, Harvard; and Milton White, Princeon.

The subcomittee agrees to consider electro-nuclear machines for the new laboratory in three categories: equipment too expensive for construction or maintenance by a single institution, supplementary equipment needed for a research program in fundamental physics, and supplementary equipment required by biologists and chemists and for other research in the application of nuclear science. The type of accelerator to be built at the new laboratory depends on other accelerator construction in the northeast.

• **April 15, 1946** — At a meeting of the Planning Committee of IUG:

•• Planning Committee members George Kistiakowsky, Harvard; William Watson, Yale; and Robert Bacher, Cornell, chairman of the Subcommittee on Reactors, meet with Thomas Drew, Columbia; Morris Soodak, Oak Ridge; subcommittee member Eugene Wigner, Princeton; and Wallace Zinn, Metallurgical Laboratory, to discuss proposals for a nuclear reactor for the new laboratory, as well as reactors planned for the Metallurgical Laboratory and for the Clinton Laboratories at Oak Ridge. Other subcommittee members include: Charles Coryell, MIT: Philip Morrison, Cornell; and Hood Worthington Jr., E.I. DuPont de Nemours & Co., Inc.

•• The Subcommittee on Site submits its first report. Chaired by Norman Ramsey, this subcommittee includes: Robert Bacher; Henry Smyth, Princeton; and Jerrold Zacharias.

The subcommittee had been instructed to look at sites that are: as near as possible to New York City, at least one square mile in area, adjacent to a good community or communities, and a promising resort for summer vacations and weekends.

In the 55th Brookhaven Lecture, which he delivered on March 30, 1966, Ramsey recalls, "As a compromise, it was agreed that the site could be within one hour's drive from some major station on the coastwise lines of the Pennsylvania or New Haven Railroad . . . This one hour drive criterion incidentally caused me to receive my first ticket for speeding. One of my duties as chairman of the Site Committee was to demonstrate that the different sites considered really were within one hour's drive from the railroad station, but no specification was given as to the speed, and it had to be quite fast for most of the sites. Unfortunately, there was no way in which I could be reimbursed for this speeding fine by the [IUG].

"The sites seriously considered for the new laboratory," Ramsey continues, "were obtained by suggestions from the university representatives, from my studies of maps of the various areas concerned, and from suggestions from the Manhattan District conveyed by Major [Emery] Van Horn, the Army's liaison officer with the Site Committee. As might well be imagined, each university chiefly advocated a site which was close to its own institution. After some initial elimination, 17 sites remained and were seriously considered."

With this report, the committee reduces the original 17 sites by rejecting regions north of Bear Mountain, on the Connecticut shore, and in Saddle River, New Jersey, as not sufficiently accessible. The committee was most favorable toward: Fort Slocum, near New Rochelle, New York; Untermeyer Lake and Bear Lake, both in the New Jersey mountains; Rocky Hill, near Princeton; two locations on New Jersey's Passaic River; a site on the Palisades; and Lake Zoar in Connecticut.

• **April 16, 1946** — IUG meets and approves a letter written by the Planning Committee to the Manhattan District expressing interest in three sites: Fort Slocum, Untermeyer Lake and Bear Lake. However, investigation of other sites continues.

Subcommittee activity at this meeting includes:

•• A recommendation by the Subcommittee on Contract to form a corporation under the Education Law with the supervision of the Board of Regents in New York State, and/or a similar law in another state. They propose that each university should underwrite the project to the extent of $100,000.

This subcommittee also proposes by-laws providing for a board of nine trustees to oversee laboratory operations; a scientific panel responsible for policy and undertakings, with membership not limited to underwriting universities; a Laboratory Director; and a business organization to handle financial matters.

•• A report by the Subcommittee on Reactors concluding: Since reactor construction for the laboratory should be for physical experimentation, preparation of special radioactive materials, and the study of reactor design and engineering, the long-range program on reactors must lead to the construction of more than one such unit; the first nuclear reactor should be of intermediate power, about that of the pile at Oak Ridge, and it should be primarily for physical experimentation, but with provisions for irradiation of materials.

Some specific design proposals are also made, and the subcommittee recommends the immediate establishment of a working design group, headed by Eugene Wigner, to give its first attention to a reactor using somewhat enriched material, a water moderator, and, accordingly, operated in the moderate temperature range

•• The formation of a new Committee on Incorporation, chaired by George Pegram, Columbia, to study legal aspects and submit articles for incorporation in New York, New Jersey and Connecticut.

•• The first report of the Subcommittee on Personnel Policy, headed by Columbia's I.I. Rabi, which included Lee DuBridge, Rochester; Robert Fowler, Johns Hopkins; George Kistiakowsky; Wheeler Loomis, Illinois; and Milton White.

The report outlines problems this subcommittee faces in obtaining the necessary personnel for the laboratory. Scientists, especially in nuclear science, are returning from the war laboratories to aid in establishing enlarged programs in their own research institutions. So many obvious research problems call for immediate investigation that there is an appreciable reluctance among scientists to join a program where research cannot begin for at least a year. Thus, a great deal of attention is being given to provisions for part-time work with consultants and visitors from the staffs of other institutions.

(To be continued on May 3.)

BNL Lecture (cont'd.)

helped develop the earliest stages of superconducting linear accelerators. In 1975, he founded the Cryogenic Technology Laboratory at Weizmann. As a visiting associate professor of physics at the State University of New York at Stony Brook, 1980-82, he participated in establishing its heavy-ion superconducting linac, inventing and developing systems now widely used around the world.

After working on the HERA proton ring at DESY in Germany, the University of Washington's heavy-ion booster and the INFN linac in Legnaro, Italy, Ben-Zvi came to the NSLS as a visiting scientist in 1988. In March 1989 he joined BNL as a physicist and was named ATF Head and Deputy Head of CAP six months later. He is an adjunct professor of physics at Stony Brook and a fellow of the American Physical Society.

After the lecture, all are invited to join Ben-Zvi for discussion and refreshments. Those wishing to have dinner with the speaker at a restaurant off site may call Kathy Loverro, Ext 7188. — Liz Seubert

Two BNLers Will Bowl You Over

Middle Island has a unique distinction in the world of bowling: It's the home of two bowling champions who also happen to work at BNL. Here are their stories:

Ray Edwards, a 31-year-old technician in the Department of Applied Science, is also a professional bowler. In fact, he captured the Professional Bowlers Association (PBA) National Resident Pro Championship last December10, winning $6,800 and a return trip to the prestigious Brunswick World Tournament of Champions (T of C), scheduled for April 27.

Edwards earned his first trip to the T of C in 1992, by winning the 1991 El Paso Texas Open. He finished fifth in

Ray Edwards

this event, which is open only to winners of PBA tournaments.

At that time, Edwards was still a "touring" pro, following the PBA's circuit around the country for 40 weeks each year. "I did pretty well," says Edwards, "but I kind of got tired of traveling, spending so much time on the road." Money was another factor: Edwards had backers and was making money for them, but when they withdrew their support, he could not continue touring, which costs about $40,000 a year.

So, after five years on the tour, Edwards decided to come back to Long Island, moving to Middle Island, not far from his native Centereach — where he had first competed at the age of 12 in a junior league at Centereach Lanes. During his high school years, Edwards worked and practiced at the lanes and starred on his school's bowling team.

After graduating high school, Edwards joined the Air Force. Then, when he was discharged in 1990, he joined the PBA tour. Though he left the tour in 1995 and got a job at BNL, Edwards didn't give up pro bowling.

As a "resident" pro, rather than a touring pro, Edwards was eligible to compete in last December's tournament, an annual event that brings together top players from the PBA's seven geographical regions. As the third seed, he beat three opponents on his way to victory, with scores of 214-203, 234-157 and 204-173.

Since he'll be the only non-touring pro in the T of C, Edwards may not be as prepared for the pressure and the lights of this televised event as those who have been on the tour all year. Fortunately, the schedule will permit him to compete in another major PBA event just a week before the T of C.

Edwards will try to recapture his winning rhythm during the week of April 15, when he competes in the Bud Light Championship at the Sayville Bowl. The T of C will be held the next week, in Lake Zurich, Illinois. The finals of both the Bud Light Championship and the Tournament of Champions will be broadcast live on ABC-TV, channel 7, on the afternoons of April 20 and 27, respectively.

Bryan Hanlon, a special services assistant in the Administrative Support Division (ASD), has lived in Middle Island for all of his 35 years, but he's only been bowling for the last six years. Nevertheless, in that short time he became a champion in that sport: On Sunday, March 3, Hanlon bowled a 216 and won the Brookhaven Town Handicapped League's tournament, as part of the Special Olympics.

Hanlon, who has a learning disability, works in ASD's Conference Support Services. On the job, says Hanlon's supervisor Christine Ronick, "Bryan is so tireless and meticulous that I wish I had 100 of him. He loves nothing more than to do his job well."

Bryan Hanlon

That love of his job is shown in the fact that Hanlon had perfect attendance throughout calendar year 1995.

Hanlon started at the Lab in 1982, in the housekeeping section of the then Staff Services Division (SSD). After nine years, he left SSD temporarily to spend the summer working for the then Supply & Materiel Division before returning to SSD, which became part of ASD in February.

In his present job for just over four years, Hanlon delivers coffee as requested around site, sets up all the conference rooms in Berkner Hall, Bldg. 488, and performs that building's custodial work. He just finished training his group's newest member, Tom Johnson, who recently transferred from the mailroom to work with Hanlon, Ronick and Ronick's assistant, Pat Carrollo.

"I like what I do very much," Hanlon says, "and most people know me around here."

When he's not working, Hanlon likes to bowl, which he does every Saturday morning with the Brookhaven Town Recreation League. In league play, he has a 140 average, and, until last March, his highest game had been a 212.

So the 216 that Hanlon bowled in the tournament was his highest score ever, thanks to a string of seven strikes in a row! "I do well under pressure," says Hanlon, who will receive his championship trophy at a league awards dinner in May.

Hanlon also takes advantage of another activity offered by Brookhaven Town Recreation: once-a-month dances. He's a faithful attender because, he says, "I like to dance, any kind of dancing."

Besides bowling and dancing, Hanlon likes to maintain his home, meticulously, inside and out.

— Anita Cohen

Strength Training

The second part of a three-part strength-training workshop will be held on Monday, April 22, from noon to 1 p.m. in the Brookhaven Center. There, exercise physiologist Laura Tipaldo will go over strengthening moves for the chest, back and arm muscles. Participants are asked to bring a mat or towel, and wear comfortable clothes; bringing weights is optional. To register, call Health Promotion Specialist Mary Wood, Ext. 5923, by Friday, April 19.

Menopause Workshop

A couple of places remain open for a three-session workshop on the biomedical, psychological and social issues involved in menopause. Offered by the Health Promotion Program and the Employee Assistance Program, the workshop is open to female BNLers and will be held on Tuesdays, April 16, 23 and 30. To register or for more information, call Mary Wood, Ext. 5923, or Dianne Polowczyk, Ext. 4567.

Microcomputer Club

At the next meeting of the BNL Microcomputer Club on Thursday, April 18, from noon to 1 p.m. in Room C, Berkner Hall, Ron Peierls, Department of Applied Science, will discuss "Literate Programming," an approach to programming combining documentation and source material so it can be read. Peierls will talk about the advantages of this approach in developing complex software and introduce some literate programming tools that are available publicly.

All are invited to attend. For more information, call Steve Stein, Ext. 5694, or visit the club's World Wide Web page at http://www.bnlmcc.bnl.gov/~bnlmcc.

Coming Up

The 1995-96 BERA concert series season will end with a program by the internationally acclaimed ensemble from Switzerland, the Amati Quartet. The concert will be held on Wednesday, April 24, at 8 p.m. in Berkner Hall.

At $14 each, $9 for students and senior citizens, and $5 for those under 18, tickets may be purchased at the door the night of the performance.

Correction

Last week's story, "Incredible (and Useful) Shrinking Compound Discovered at HFBR," contained an error in the second paragraph. The maximum temperature at which zirconium tungstate was found to shrink was stated correctly in kelvins, but the temperature in degrees Fahrenheit should have been 1430.33.

Daughters-to-Work Day '96

On Thursday, April 25, 200 girls age 9 to 15 will be on site for the day, learning what work is done at the Lab and what their parents do. These girls will be 200 daughters of BNLers whose employee-parents were the first to have registered them for BNL's second consecutive Take Our Daughters to Work Day, organized nationally by the Ms. Foundation for Women.

The girls' day on the job begins at their parents' regular reporting time, in their parents' or host parents' workplace. Not only will the girls be able to see what their parents and coworkers do all day, but some departments and divisions will offer their own demonstrations and/or tours so the girls can also gain an understanding of the field in which their parents work.

After a brown-bag lunch for daughters, parents and hosts at the Brookhaven Center, courtesy of Associated Universities, Inc., the girls will tour the site, with stops tentatively scheduled at the Alternating Gradient Synchrotron, National Synchrotron Light Source, Relativistic Heavy Ion Collider, National Weather Service and BNL's firehouse. The 40 youngest girls will get a special treat: a visit to the BNL Science Museum.

"This is a great day for the girls to see how limitless their opportunities can be, given the right mixture of personality, interests and dreams with education, training and experience," explains the day's organizer, Susan Foster, Human Resources Division. "It should also give them more answers to chose from when they answer the question, 'What do you want to be when you grow up?' "

Flyers were mailed this week to employees, inviting all to sign up their daughters, first-come, first-served, by Friday, April 19. Those parents whose jobs preclude them from bringing their daughters into their workplace are encouraged to find host parents for their girls for the first half of the day.

If help is needed in finding a host parent; or if you want to volunteer as a host, chaperone or tour leader; or if you need another registration form, contact Foster, Ext. 2888.

— Marsha Belford

Arrivals & Departures

Arrivals

Dmitri N. Bassov.....Physics
Mary G. Dernbach.....Envir. Restoration
John P. Donohue.....AGS
Timothy J. Hallman.....Physics
Li Liu.....Chemistry
Ante Ljubicic.....Physics
Nebojsa S. Marinkovic.....App. Science
Jaehoon Park.....NSLS

Departures

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

Robert W. Burns.....RHIC
Douglas Hunter Jr......Medical
Ivan A. Samel.....RHIC

Volleyball

Standings as of April 4

Open League - Final		League I	
Monday Maulers	56-16	**Playoffs**: No Names 3, Underdogs 1	
Pass, Set & Crush	53-19		
Far Side	33-39	**Semifinals** (best of 5):	
Spikers	29-43	Bikers 'n' Spikers 3, No Names 0; Rude Dogs 2, Scared Hitless 3	
Bud Hitters	9-63		

League II			
Spiked Jello	51-9	Jolly Vollies	27-33
Safe Sets	46-14	Nuts & Bolts	23-37
Fossils	35-25	Volley Folly	16-44
Monday Nite Live!	32-28	Night Court	10-50

League III

Quarterfinals: Joy of Sets 0, DO-DAT 2; Just 4 Fun 1, High Volley'em 2; Silver Bullets 2, New Comers 0; Harlem Knights 2, Upton Ups 0
Semifinals (best of 5): Silver Bullets 3, Harlem Knights 0; DO-DAT 3, High Volley'em 0 (forfeit)

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A Toast to Five Years

The BNL Toastmasters Club will celebrate the fifth anniversary of its charter, on Tuesday, April 16, at 5:20 p.m. in the main conference room, Bldg. 475. Refreshments will be served, and prizes will be awarded. All are invited to attend. For more information, call Ronnie Evans, Ext. 2851.

Golf Tournament

The BERA Golf League will host a four-person scramble on Monday, April 29, at the Calverton Links. Nonmembers are invited to play. For more information and entry forms, contact Gordon Rawn, Ext. 7095, or e-mail rawn@mail.sep.bnl.gov.

Broadway Bound

Give your regards to Broadway on Saturday, June 1, when BERA returns to New York City to see the hit revival of the musical *Showboat*.

The per-person price of $105 includes round-trip bus transportation, orchestra or mezzanine seats for the *Showboat* matinee, a full-course dinner at a theater-district restaurant, and a visit to South Street Seaport.

A $50 deposit to reserve your tickets is due now at the BERA Sales Office, Berkner Hall, weekdays, 9 a.m. to 1:30 p.m. For more information, call Andrea Dehler, Ext. 3347, or M. Kay Dellimore, Ext. 2873.

Bowling

Red and Green League

H. Arnesen 226/205/201/632 scratch series, R. Prwivo 224/214/201/639 scratch, E. Larsen 219/213/203/635 scratch, J. Griffin 218/209/203/628 scratch, G. Weresnick 214/208/204/626 scratch, R. Mulderig Sr. 233/226/626 scratch, R. Larsen 233/215/625 scratch, W. Powell 223/214/603 scratch, K. Asselta 224/203, T. Prach 214/211, J. Goode 247, R. Mulderig Jr. 242, A. Warkentien 233, R. Raynis 220, R. Wiseman 218, E. Gill 210, K. Koebel 204, H. Dawson 201.

White and Purple League

E. Meier 204/201/181, P. Callegari 222/213, G. Mehl 219/211, S. Frei 202/190, P. Manzella 183/170, Diana Fisher 177/172, Don King 241, R. Picinich 211, E. Sperry IV 211, E. Sperry III 207, K. Mack 201, R. Wiseman 201, M.G. Meier 194, M. DiMaiuta 193, K. Riker 193, M. Musso 190, J. Pinelli 182, M. Picinich 182, K. Botts 181, T. Mehl 174, Diana Fisher converted the 5/10 split, Donna King converted the 6/7/9/10, T. Meier converted the 3/7 split.

Basketball

Games on March 28

Magic 82		Mustangs 50	
Terry Buck	27	Wayne Cummings	22
Troy Mayo	25	Jim Desmond	9
Robert Singleton	10	Charlie Edwards	8
Ray Jackson	6	Greg Mack	8
Mitch Williams	6	Hal Van Dereof	2
Ed Gregory	3	Bill Gunther	1
Al Langhorn	2		
Fred Maier	2		
Pat Browne	1		

Three-point shots: Cummings (4), Buck (2), Mayo (2), Williams (2), Desmond, Gregory

Bulldogs 83		Storm Troopers 45	
Doug Aichroth	17	Hector Machado	20
Jerry Gaeta	11	John Jones	15
Louis Lalor	11	Kevin Murray	4
Tracey Fountaine	9	Ron Simpson	4
Jeremy Middleton	8	George McKillon	2
Charles Bennett	6	*Three-point shots:*	
Mike Mallardi	6	Machado (6), Mallardi	
Simon North	6	(2), Aichroth, Fountaine,	
Pete Ratzke	6	Gaeta, Hobson, Jones,	
Brian Hobson	3	Lalor	

End of Regular Season Standings:

1 - Magic 2 - Bulldogs 3 - Mustangs 4 - Scram 5 - Storm Troopers

Playoff games on April 4

Mustangs 76		Bulldogs 67	
Wayne Cummings	21	Tracey Fountaine	17
Kiley Reynolds	19	Jerry Gaeta	15
Jim Garrison	12	Brian Hobson	11
Charlie Edwards	8	Doug Aichroth	10
Greg Mack	8	Chuck Bennett	8
Jerry Cook	4	Simon North	6
Hal Van Deroef	4		

Three-point shots: Garrison (3), Hobson (3), Fountaine (2), Gaeta (2), Bennett, Cummings

Magic 55		Scram 43	
Terry Buck	22	Tim Powers	16
Troy Mayo	13	John Duggan	13
Ray Jackson	9	Jim Rank	7
Pat Browne	4	Gerry Shepherd	5
Mitch Williams	4	John Skonieczyny	2
Robert Singleton	3		

Three-point shots: Buck (2), Powers (2), Rank

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.

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

POSTDOCTORAL RESEARCH ASSOCIATE - Trained in physical chemistry or chemical physics, with experience in experimental measurements of the kinetics of gas-phase chemical reactions. Experience in the use of high-resolution laser systems and mass spectrometric sampling is preferred. Will play a key role in developing a program to measure rates and product branching ratios of radical-radical reactions in the gas phase, with an emphasis on reactions important in combustion. Contact: James Muckerman, Chemistry Department.

POSTDOCTORAL RESEARCH ASSOCIATE - Trained in physical chemistry or chemical physics, to join a program exploring the energetics and dynamics of molecular collision phenomena, and the microscopic factors affecting the structure and dynamics of short-lived intermediates in gas-phase chemical reactions. Experience preferred in the use of high-resolution laser systems applied to problems in molecular spectroscopy or gas-phase dynamics. Using both experimental and theoretical methods, will investigate spectra of small free radicals, the dynamics of photodissociation, and the state-to-state dynamics of gas-phase reactions and energy-transfer processes. Contact: Trevor Sears, Chemistry Department.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

DD 4004. ELECTRICIAN A - (temporary position) Under minimum supervision, lays out, constructs, installs, maintains, repairs and operates electrical systems, equipment, controls and related devices, in accordance with the National Electrical Codes or as otherwise directed. May be required to perform similar duties on other-than-maintenance-division equipment and facilities. Plant Engineering Division.

DD 3835. HAZARDOUS WASTE TECHNICIAN - (term appointment) Under general supervision, performs work related to the operation of the hazardous waste-disposal facilities of the Safety & Environmental Protection Division. Duties include, but are not limited to, the pickup, storage, packaging and bulking of hazardous waste. Responsible for completing and maintaining any certifications required for the operation of these facilities. Safety & Environmental Protection Division.

Motor Vehicles & Supplies

94 MUSTANG GT COUPE 5.0 - ac, am/fm cass., a/t, p/l, p/w, red, 19k mi., $14,600. 722-8719.

94 HARLEY DAVIDSON SPORTSTER 1200 YLH - red, showroom cond., 1.6k mi. $8,500. 462-1978.

94 PROBE GT - red, gray leather int., loaded, 24k mi., under warr., excel., $15,000 neg. Rich, Ext. 2434.

92 MITSUBISHI DIAMANTE - pearl white, 46k orig. mi., all power, mint, $12,500. Ext. 3428 or 878-6007.

91 FORD TAURUS GL - 6-cyl., 76k mi., a/t, ac, p/s, p/b, excel. cond., $5,400. Ext. 7830/1021 eves.

91 NISSAN SENTRA - 5-spd., ac, p/b, alarm, cruise, 68k mi., excel., must sell, $5,000. Donna, 878-2425.

90 NISSAN PATHFINDER - 4-dr., red, 88k mi., a/t, p/w, ac, like new in/out, $11,500. Pat, 878-9117.

90 FORD TAURUS - excel. cond., moving, must sell, $4,800 neg. Melissa, Ext. 3677/1234.

90 MUSTANG 5.0 - 40k mi., one owner, fully equip., mint cond., asking $8,000. Ext. 2310.

90 NISSAN SENTRA - white, 4-cyl., 4-spd., 86k mi., ac, am/fm cass., excel., $3,800. Charlotta, Ext. 6222.

89 COLEMAN POP-UP CAMPER - sleeps 6, awning, new tires, sink, stove. Tom, Ext. 7287 or 744-4535.

88 CHEVROLET SPECTRUM - 4-dr., 5-spd., new brakes, high mi., runs well, $1,400. Ext. 3884.

88 PONTIAC GRAND AM - 4-dr., a/t, ac, 85k mi., Quad 4, 2.3L, orig. owner, $2,600. Tony, Ext. 3637.

87 HONDA CRX - 5-spd., m/t, am/fm cass., ac, new tires, batt., timing belt, excel. gas mi., $2,000. Marc, Ext. 5248.

86 CHEVY CAVALIER Z24 - sunroof, loaded, looks great, $1,550. Pam, 474-2792.

86 PORSCHE 944 - turbo, red/black, loaded, 86k mi., mint cond. Jim, Ext. 2183.

85 BUICK LE SABRE - 80k mi., excel. cond., $3,000. Bill, Ext. 4413.

85 VW JETTA GL - excel. cond., $1,600; '82 Plymouth Horizon, v.g. cond., $500. Mark, 924-0960.

85 CADILLAC ELDORADO - high mi., excel. cond., $2,200. Debbie, Ext. 7218 or 288-1823.

84 MERCURY MARQUIS - 6-cyl., 4 new tires, runs well, $775; '82 Buick Century, 6-cyl., good tires, runs well, $695. Jeff, Ext. 2703 or 491-3040.

84 PONTIAC FIREBIRD TRANS AM - black w/gold trim, 5.0 liter eng., V-8, 5-spd., $1,700 neg. Rich, Ext. 5893 or 744-4816.

84 TOYOTA CAMRY LE - 4-dr., a/t, p/s, p/b, p/w, p/l, p/moonroof, 107k mi., needs some work, $1,000 obo. Kevin, 331-4487.

82 GMC VANDURA 86 - 350 V-8, rebuilt a/t, p/s, p/b, am/fm stereo, many new parts, excel. work van, $1,800 obo. Bob H. Ext. 7802 or 654-3989.

77 BUICK ESTATE WAGON - p/s, p/b, p/w, ac, am/fm cass., runs well $400 obo. Doug, Ext. 345-6992.

RAG TOP - for a '93 Geo Tracker, white, excel. cond., $120. John, 395-5922.

BUG DEFLECTOR - Concept II, contoured, for Nissan 4x4 hood, excel cond., $20. Pat, Ext. 4265.

Boats & Marine Supplies

29' THOMPSON DAYTONA - 1987, sleeps 6, Loran, radar, twin Mercruisers, orig. owner, excel. cond., $19,900 obo. Ext. 3428 or 878-6007.

16' STARCRAFT - 50-h.p. Evinrude, tilt trailer, $850. Peter, 475-0831.

15' SAILBOAT - w/trailer & 8-h.p. long-shaft outboard motor, $1,000. Bob, Ext. 2503.

9' BANTAM BASS BOAT - 4-yr.-old elect. motor, excel. cond., $300. 924-0705.

INTERLAKE DAY SAILER - 1969, fg, 4-h.p. outboad w/trailer, $1,100. Richard, 924-4895.

Furnishings & Appliances

BOXSPRING - & mattress, new, $175; flip sofa bed, $50. Josh, Ext. 6295.

DRYER - Maytag, elec., used 2 yrs., v.g. cond., $100. Pete, Ext. 5105 or 399-2813 after 5 p.m.

DRYER - Kenmore, $85; young girl's desk lamp w/night-light, pink shade w/pink & white hearts. Tom, Ext. 7287 or 744-4535.

ENTERTAINMENT CENTER - 3-pcs., Broyhill, oak, 8'x14"x6'6"high, back light, panel doors, roll-out shelves, $800; Mikasa stoneware, $70. Rich, 929-8514.

KITCHEN SET - table w/leaf, Formica top, chrome legs, 4 wicker-back chairs, $70. Jim, 689-8284.

REFRIGERATOR/FREEZER - Amana, 20 cu. ft. w/icemaker, like new, $450. Chris, Ext. 4163.

SOFA - Sealy, sleeper, full-size, excel. cond., $375. Ext. 5873.

TABLE - 40"w x 60"l, Queen Anne style, cherry finish w/leaf. 4 chairs, $125. Gerry, 447-6528.

TABLE - 36" round, glass top, w/black pedestal & 2 match. chairs, $175. Linda, 874-8259.

Tools, House & Garden

CABINET - double door, steel gray, wardrobe bar & shelf, excel. cond. Doug, 345-6992.

DOORS - louvered bi-fold, set of 4, unpainted , for 6' opening, $35; parson's tables, oak parquet, $15/ea. or $25/2. Sue, Ext. 7235 or 399-7997 after 5 p.m.

LAWN MOWER - Murray, 21" cut, rear bag, 3½-h.p. engine, 2 yrs. old, excel. cond., $85. Dan, Ext. 2012 or 698-7322.

LAWN TRACTOR - 10-h.p., $450. Tom, Ext. 7287 or 744-4535.

PANSIES - $10/flat, $5.50/½ flat. Ray, 727-6818 after 4 p.m.

PATIO SET - 6-chairs w/cushions & matching umbrella table, 40"x90", green PVC, covers for all, light fix., orig. $2,000, now $1,000. John, 395-5922.

WATER HEATER - elec., 30-gal., new, in box, $75 obo. Roy, 727-6714.

TREES - spruce, white pine, cedar, Doug. fir, b&b, sheared, excel. for yd./priv., 4'-8', $20-$75/ea., depending upon selection, quantity. Tom, 878-1060.

TREES/SHRUBS - white pines, $2/ft.; Greek arborvitaes, $3/ft.; dwarf Alberta spruces, $4/ft., all nursery grown. John, 744-5867.

STEEL - heavy-gauge, workable, 6'x3', good cond., storage shelf under table, $100. Rich, Ext. 2434.

Sports, Hobbies & Pets

CLARINET - student model w/mouthpiece & case, good cond., $225 neg. Peter, 821-2652.

CLARINET - Alpine, asking $175. Tom, Ext. 7287 or 744-4535.

GUITAR - bass, w/amp, $400. Jeff, 821-6867.

GUITAR - 1982, Ibanez custom 355, stereo, mint, w/case, $500; roller blades, women's, Geo-Blade, size 6, new bearings, $40. Rich, Ext. 2434.

Miscellaneous

CRIB - Childcraft, oak, w/mattress, v.g. cond., $125. Ext. 5868 or 924-5230.

GIRL'S JEANS - various colors, blue, black, green, purple, beige, sizes 8 & 10, excel., $5/ea. Ext. 4247.

SANDBOX - Little Tykes, plastic w/folding doors, $15; Raleigh 10-spd. Supercourse, good cond., $50. Rich, Ext. 2434.

TICKETS - 2, Broadway for kids, *Beauty and the Beast*, Stony Brook University, April 28, 3 p.m., row C, $7.50/ea. 924-5505.

Yard & Garage Sales

MOVING SALE - washer, dryer, woodstove, cedar clapboard, drafting table, large boat cleat, blinds, etc. 924-0705.

Lost & Found

LOST - woman's gold watch in vicinity of Bldg. 460, reward. Carol, Ext. 3325.

Free

COAL - approx. 1-ton. Ext. 4247.

Real Estate

Real Estate advertised for sale or rent is available without regard for the race, color, religion, sex, age, national origin, disability or veteran status of the applicant.

For Rent

BELLPORT - house to share, priv. room, eik, large l/r, laundry, refrig., special $350/mo. while house is listed for sale, includes all. David, 286-1633.

CENTER MORICHES - 1-bdrm. apt., full bath, large l/r & kit. combo, sliding glass door to deck, priv. ent., off-street parking, no pets, $750/mo. incl. all. Pete, Ext. 4028 or 878-6505.

MANORVILLE - 2-bdrm. townhouse, 1½ bath, gar., fp, cac, d/w, w/d, skylights, pond view, very bright, 1 yr. old, $1,100 + util. Eric, Ext. 5875.

MASTIC - 2-bdrm. basement apt., priv. ent., l/r, mod. kit, 15 min. to Lab, no smoking, $600/mo. + 1 mo. sec., incl. all util. & cable. Ext. 3426 or 399-3381.

MIDDLE ISLAND - large 1-bdrm co-op, cac, pool, tennis, patio, excel. cond. $625/mo. Larry, Ext. 5462.

MIDDLE ISLAND - 1-bdrm. garden apt., upper w/terrace, full bath, new appl., tennis, pool, laundry, ac, $650 incl. heat, will rent w/option to buy. 821-5484.

MILLER PLACE - own bdrm. in Colonial house, quiet neighborhood, nonsmoker. 744-8386.

MILLER PLACE - 1-bdrm. apt., brand-new, kitchen, 15 mins. to Lab, immed. occupancy, nonsmoker, Ext. 7598 or 395-4220 after 3 p.m.

ROCKY POINT - large 2½-rm., 12'x22' l/r, kitchen, very small bdrm., decorated, carpeted, ceiling fans, blinds, oil heat incl., suitable single, short drive to Lab, priv. ent., $450 + util. Ronnie, 821-1246.

ROCKY POINT - large 1-bdrm. apt., l/r, eik, cable, wall-to-wall, priv. ent., parking, near trans., no pets/kids/smokers, $550/mo. for all. Ext. 7496 or 744-5895.

ROCKY POINT - studio apt., priv. ent. & yard, off-street parking, quiet neighborhood, $425/mo. + elect., 1-mo. security deposit required. 744-5077.

WADING RIVER - large studio apt., unfurn., full kit., near beach, driveway parking, quiet neighborhood, 15 min. to Lab, elec. & heat incl., $500/mo. Bill, 722-4489.

WADING RIVER - 1-bdrm. cottage, wood stove, walk to beach, $700/mo + util. Mike, Ext. 4202.

W. PATCHOGUE - 1-bdrm., l/r, kitchen, bath, newly renovated, single preferred, no pets, $600/mo. incl. all. Beth, Ext. 4120.

YAPHANK - Whispering Pines, 2-bdrm. townhouse, gar., bsmt., l/r, d/r, fp, w/d, pool, clubhouse, short/long-term lease, $900. Ramesh, Ext. 4805 or 924-8113.

KEY WEST, FL - ocean front timeshare, 5-star Coconut Beach Resort, sleeps 2-6, ac, TV, Jacuzzi, fish, swim, nightlife, week of 7/27-8/3. Ralph, Ext. 2539.

HILTON HEAD, SC - condo, sleeps 6, fully furn., 2-bdrms., 2 baths, pool, beach, golf nearby, April through Sept., $500/wk. Guy, Ext. 3147 or 689-5378.

For Sale

BAYSHORE - Brightwater Farms, 3 to 4-bdrm., Col. l/r, eik, fdr, den, ldy, 2 full tiled baths, bsmt., nice yard, Andersons, fenced, 5 appl., nice area, $121,900. Bill, Ext. 2762 or 665-3782.

BELLPORT - 4/5-bdrm., 2½ bath, 2 fp, 1 block from bay, walk to village, schools, gas heat, water, renovated huge kitchen, hall, bath, mature landscaping, asking $325,000. Susan, 286-0064.

E. SETAUKET - 5-bdrm, 3 bath, 3 levels poss. M/D, sliding door, wraparound deck, cul-de-sac, hardwood floors, 2½ C.G., 3VSD, opt. for rent, $1,700/mo. 689-6495.

FARMINGVILLE - 5-rm., 2-bdrm. house, modern kit., new appl., new bath, new carpet, new windows, siding, ½ bsmt., w/d, OHW, detached gar., taxes $2,430, $104,000. Mark, 654-0268.

MEDFORD - 3-bdrm. raised ranch, fin. playrm., gar., 10 min. to Lab, asking $91,900. Bill, Ext. 2564.

MILLER PLACE - 4-bdrm. Col., 0.53 acre, 2½ baths, eik, l/r, d/r, fp, den, remod. kit. & baths, 16'x32' ig pool, deck, patio, gar., full bsmt., cul-de-sac, N. of 25A, limited access area, $189,900. Nick, 744-5021.

N. SHIRLEY - 3-bdrm. ranch, 2 baths, large eik, l/r w/cathedral ceilings, alarm sys., full bsmt., gar., fenced ½ acre, 2 large decks, pool. John, 395-5922.

RIDGE - 3-bdrm. ranch, 2½ baths, country kitchen, den, large fenced yard, close to Lab, ideal M/D, $112,000 or rent w/option to buy. Carol, 744-8632.

ROCKY POINT - 3-bdrm. Colonial, 16 yrs. old, cedar inside/out, qual. construction, 3 decks, 2 baths, full bsmt., 0.77 acres, motivated/transferred owner, will assist w/closing fees, $149,000. Ruth Ann Lutz, Ext. 7774.

ROCKY POINT - 3-bdrm. ranch, l/r, eik, fin. bsmt., OHW, public water, 100'x100', $115,000. Mike, Ext. 3434.

SETAUKET - 2-story Colonial, 4-bdrm., bi-level decking, cac, igs, hot tub, screened-in porch, new custom kitchen, wood floors, cul-de-sac, more, $339,000. 751-3298 eves.

SOUND BEACH - 3-bdrm. cedar ranch, new windows, doors, skylights, cathedral ceilings, l/r w/fp, det. gar., fenced 80'x125', landscaped, MPSD. 744-5387 eves.

WADING RIVER - Clarendon, custom 4-bdrm. Colonial, 2½ baths, encl. porch, 1 acre, hardwood floors, mint cond., SWRSD, asking $295,000. 929-6984.

YAPHANK - 3-bdrm. Colonial Woods townhouse, 2 baths, full bsmt., oil heat, cac, $90,000. 924-5272.

HOMASASSA, FL - 3-bdrm. ranch, large rooms, Florida room, 2 acres, residential neighborhood, near beach, great fishing, $49,990. Ken, 281-5565.

PORT CHARLOTTE, FL - ¼-acre bldg. lot, developed neighborhood, ready to build, $9,000. 929-8323.

ATLANTIC CITY, NJ - 1-bdrm. timeshare, Flagship 5-Star Boardwalk Resort, all amenities. red week #25, $10,000. Pat, Ext. 3275.

POCONO MOUNTAINS, PA - Woodledge Village, ½ acre lot in a development, priv. lake, clubhouse, pool, tennis courts, $22,000. Bob, 744-3224.

Car Pools

LIE EXIT 36 - fourth needed. John, Ext. 5181.

Wanted

AMPLIFIER - for guitar, must have adjustable distortion; drum set, snare, bass, highhat, rides, toms, etc. Peter Nagy, 821-2652.

APARTMENT - 1-bdrm., Bethpage/Hicksville area, young professional couple, nonsmokers. Rich, Ext. 3354 or 589-9103.

COMPANION(S) - for retired BNL physicist, single/couple, live in, in exchange for free housing in waterfront home. Larry, Ext. 5462.

HOMES - for BNL visitors/guests, furn. apts., condos, houses for short-term rentals. Marie, Ext. 4489.

HOUSE/CONDO - for retired couple for month of August, furnished, nonsmokers, excel. refs., North Shore area preferred. Linda, Ext. 5763.

HOUSEMATE - share large waterfront home available mid-May, 10 mi. from Lab in Center Moriches, rent $290+ util. Sigi, Ext. 2175, or Skip, Ext. 3806.

PICKUP/VAN - clean, good running. 467-1343.

TRUNDLE/DAY BED - reasonable. Ext. 2280.

In Appreciation

To all my coworkers – Thanks for the memories. I will miss you. — Doug Hunter Jr

Ads left out of this issue due to lack of space need not be resubmitted to appear in the next issue.