BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

CAP Gun to Shoot Electron Beam With Highest Energy, Lowest Emittance

Not only will this gun shoot electrons faster than a speeding bullet, but it will accelerate them faster over a shorter distance than does any other electron gun.

This gun is the electron gun designed for the Accelerator Test Facility (ATF) in Bldg. 820. ATF is the experimental installation for BNL's Center for Accelerator Physics (CAP), which was established a little over a year ago to coordinate accelerator and synchrotron research and development going on in several Laboratory departments.

An electron gun produces electrons in either a continuous stream or intermittent bunches. It increases the velocities of electrons until they are shot into, for example, an electron accelerator, which then greatly increases their rate of motion.

More Energetic, Less Costly

Ultimately, the ATF electron gun will yield a short-pulsed, well-collimated, very intense electron beam with an energy of 4.5 million electron volts (MeV) — 45 times more energy than a conventional electron gun used in electron linear accelerators, such as the one used at the National Synchrotron Light Source (NSLS).

As well, the ATF gun will also be the most powerful, lowest emittance electron gun in operation.

If such a gun were to be used in existing accelerators, electrons could be accelerated to higher energies over the same distances. If the electron gun were to be used in a new accelerator, it could be designed to go to higher energy over a smaller distance than is now possible, and, as a result, the accelerator would cost less to build and operate.

When the Accelerator Test Facility is completed in 1990, the 4.5 MeV electron gun will provide the electron beam to be accelerated in two ten-foot-long, electron linear accelerator (linac) sections. A 100-foot-long electron-beam transport line is to be attached to the ATF linac. At the end of the line, the electrons will interact with an experimental target, and the results will be recorded by electron and x-ray spectrometers.

A Novel Concept

The first experiment will study the novel concept of a laser accelerator, which will use a CO_2 laser to increase the rate of motion of electrons faster over shorter distances than is now possible with a conventional linac. It was proposed by Senior Physicist Robert Palmer, who is Assistant to the Director and who heads CAP along with Claudio Pelligrini, NSLS Associate Chairman.

The first working ATF electron gun, which will be made of copper, will shoot electron beam by the end of the summer. In the meantime, a full-scale, brass model of the gun has just been completed to test the radio frequency parameters and the waveguide coupling system that will power it.

"Some type of electron gun is the key element in all accelerators, whether they accelerate electrons or protons," explains Senior Physicist Kenneth Batchelor, NSLS, and ATF linac construction coordinator. "The quality of beam in an accelerator is very much determined by the quality of the beam produced by the electron gun."

Mort Rosen

The brass model of the electron gun for the Accelerator Test Facility is being examined by Kenneth Batchelor (left). Looking on at the result of their combined efforts are: (standing, from left) Joseph Sheehan, Harold Kirk, Harry Ackerman, Cyrus Biscardi and Leonard DeSanto. Attached to the electron gun is its waveguide feed.

The work on the gun was begun last November. Batchelor, Physics Associate Harold Kirk, of Physics, and Guest Physicist Kirk McDonald, from Princeton University, carried out the computations required to specify the gun's design parameters. Project Engineer Martin Woodle, NSLS, was responsible for the mechanical design. Electrical Engineer Joseph Sheehan, NSLS, designed the microwave test equipment, along with Batchelor. Senior Technical Specialist Cyrus Biscardi, Technical Specialist Harry Ackerman and Principal Technician Leonard DeSanto, all of the NSLS, are assisting with measurements being made on the brass model.

Within a Television

An electron gun can be found in most everyone's home: It is one of the basic elements within a television. Most electron guns, including those found in TV sets, have what is called a thermionic cathode, which is a wire filament that is the source of the electrons in the beam. By passing a current through the wire, the filament is heated to emit electrons from its surface.

The first working model of the ATF gun will also have a thermionic cathode as its electron source. In the final version of the ATF gun, however, the electron source will instead be a photo-

(Continued on page 2)

BNL Lecture: Experimental Modeling Of Reactor Accident Phenomena

In the 1979 nuclear reactor accident at Three Mile Island (TMI) in Pennsylvania, probably half of the reactor core was severely disrupted and relocated. Despite that — thanks to the presence of water in the reactor vessel — none of the reactor fuel, or melt, escaped to the containment building surrounding the vessel. About 98% of the melt was retained in the reactor vessel itself, while the remaining 2% was found in the associated plumbing.

Mort Rosen

In Bldg. 820, where the Experimental Modeling Group (EMG) performs severe accident simulation experiments, Ted Ginsberg looks at a 1/40-scale model of a portion of a large dry, pressurized water reactor containment building. Designed by EMG member Narinder Tutu, the model is being used for multiphase fluid flow simulations of flow patterns in the containment building, information which will be useful for those developing computer code simulations.

Because the containment building was untouched, TMI is classified as a low-risk accident to the public. But what if the containment building in a pressurized water reactor were breached? Specifically, what if the core melt from a nuclear reactor accident left the reactor vessel and entered the "large dry" containment building of a light water reactor (LWR)?

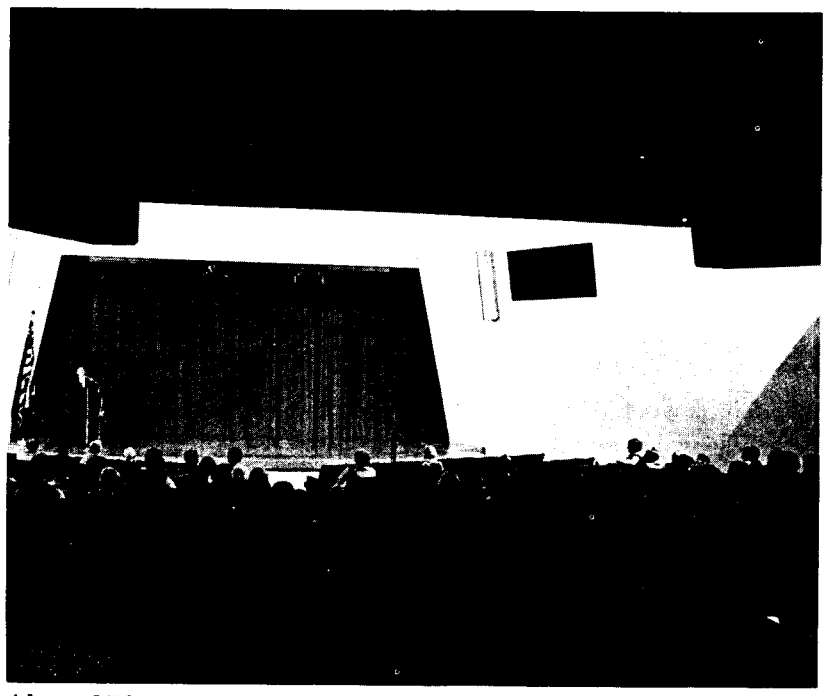
This is the main question currently being addressed by the Experimental Modeling Group (EMG) in the Department of Nuclear Energy. Ted Ginsberg, a Mechanical Engineer and Group Leader of EMG, will discuss this work in the 242nd Brookhaven Lecture, on Wednesday, March 16, in Berkner Hall. Ginsberg's talk on "Experimental Modeling of Severe Nuclear Reactor Accident Phenomena" will begin at 4:30 p.m.

Though this type of accident has a low probability of occurring, any risk, however slight, should be addressed and understood. That is why, within DNE, there has been considerable work in the development and application of computer simulation codes for LWR risk assessment and accident analysis. Such codes might be used to predict the radiological consequences of a core meltdown in a LWR.

In order to develop these codes, researchers need to know something

(Continued on page 2)

BNL'ers Turn Out for Town Meeting



Mort Rosen

About 250 BNL employees attended a special Town Meeting held by U.S. Congressman George Hochbrueckner in Berkner Hall on Monday, March 7. During the hour-long meeting, Hochbrueckner had time to answer nine questions ranging from the prospects for Long Island's energy future to the future of science and engineering education in America, as well as prospects for future projects at the Laboratory.

CAP Gun (cont'd)

cathode. This is a light-sensitive metal disk that emits electrons from its surface when exposed to suitable electromagnetic radiation.

The photocathode disk will be a pure metal, like yttrium or tungsten, that easily gives up electrons from its surface. The light to be shined at the photocathode will come from a neodymium-yttrium-silver gas laser.

By flashing a three-millimeter spot of laser light for two to five picoseconds at the photocathode every second, electrons will be emitted in bunches of up to a billion, to form an intense, well-collimated beam having an eight-millimeter radius overall. On the other hand, shining a 20-micron radius laser beam at the photocathode produces a lower intensity beam, on the order of one million electrons. However, this beam will be more finely collimated, having a radius of only a few microns at the target.

Overcoming Repulsive Forces

"Our goal is to accelerate the electrons very rapidly very early on, so as to overcome the repulsions among the electrons that cause a collimated electron beam to diverge," explains Batchelor.

To achieve this very rapid, early increase in velocity without increasing the size of the beam significantly, radio frequency (rf) waves will be used as the energy source to accelerate the electrons emitted from the photocathode.

Using rf of 2856 megahertz, this gun will have the high accelerating field strength of 100 megavolts per meter at the cathode surface — which is five times above that of conventional electron accelerators and 20-30 times above that of a conventional electron gun. The electron beam from the ATF gun will grow two orders of magnitude less in radius than it would were it accelerated in the conventional manner.

The ATF gun is composed of one and a half rf cavities with a drift space between the two. The cathode is positioned in the half cavity, which is a quarter of a wavelength long. The second is half a wavelength long, and, together with the drift space, they total eight centimeters.

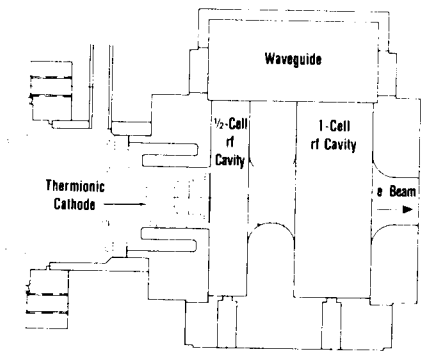
Small, but Mighty

"With the thermionic cathode, we will accelerate electrons during half cycles of the rf in the cavities, so we'll get long pulses of electrons about five centimeters long every half cycle," says Batchelor.

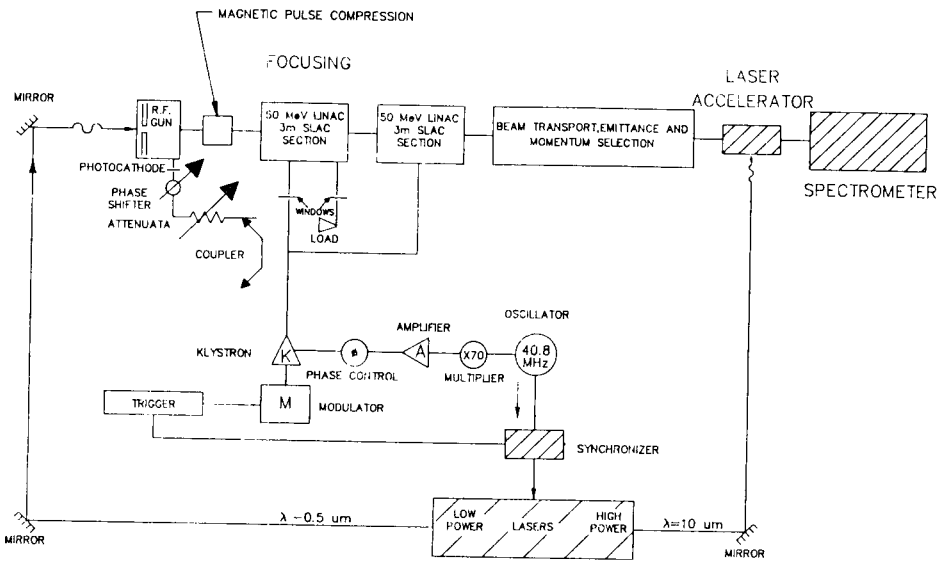
While the 1½-cell gun is small enough to hold in one hand, the waveguide attached to it is much larger. The waveguide is a tube used to propagate the rf waves, which are generated by a high-power klystron, an electron beam tube used as the source of rf power.

"Conventional guns have limited beam quality because only much smaller voltages can be applied, which results in much lower surface field strength," explains Batchelor. "We will overcome this by using high-power, pulsed rf from the klystron."

He adds, "We may be able to go beyond 4.5 MeV with the proper cleaning and conditioning of the gun's rf cavities or with specific design changes to future models, but right now 4.5 MeV is the electron beam energy to be attained with the 100-megavolt-per-meter surface gradient that we are shooting for with the first working model." — Marsha Belford



Section Through the Electron Gun for Accelerator Test Facility



Schematic Diagram of the Accelerator Test Facility

Melanin: From Moles to Melanomas

Melanin is the black or brown pigment that gives color to the dark malignant lesions or cancers known as melanomas, as well as to moles, skin and eye parts. Melanin's role in these phenomena will be addressed by Biologist Helene Hill on Tuesday, March 22, when she speaks at a Brookhaven Women in Science dinner meeting, in Room B, Berkner Hall. Her talk on "The Photobiology and Radiobiology of Melanin" will begin at approximately 6:15 p.m.

Peter Horton

Helene Hill

Hill is currently doing research in BNL's Biology Department while on sabbatical from the New Jersey Medical School in Newark, where she is Professor of Radiology and Microbiology, and Head of the Section of Cancer Biology. At Brookhaven, she is studying DNA damage as a function of melanin concentration in cells treated with light of various wavelengths.

After receiving an undergraduate degree from Smith College and a Ph.D. in biology from Brandeis University, Hill participated in two postdoctoral research studies: At Harvard Medical School, she looked at protein synthesis in regenerating rat liver, and she investigated mammalian cell genetics at the University of Colorado.

Hill has been an Assistant Professor in the Biophysics and Genetics Department of the University of Colorado Medical School; an Associate Professor in the Department of Radiology at Washington University, St. Louis; and Professor at Marshall University Medical School in Huntington, West Virginia.

The entire BNL community is invited to attend the lecture and the dinner. Dinner will begin at 5:15 p.m. and the cost is $13 (tax and tip included). Reservations are requested; checks, payable to WIS, should be sent to Mary Kinsley, Bldg. 426, Ext. 5232, by Thursday, March 17.

Note to Diners

The Cafeteria will be closed on Saturday, March 12. On that day, snack bar service will be available from 9 a.m. to 2 p.m. at the Brookhaven Center.

PSI News

Eric Vinokur, an ophthalmologist from Port Jefferson, will give a slide presentation on "How Important Your Eyes Are to You," at the next monthly meeting of the Upton Chapter of Professional Secretaries International (PSI). The meeting will be held on Wednesday, March 16, at 6 p.m., in Berkner Hall, Room C.

To Your Health

Tuesday, March 15, is National Diabetes Awareness Day, and the Health Promotion Program of the Occupational Medicine Clinic would like all employees to become aware of the symptoms and risk factors for this disease.

As it is estimated that up to five percent of all Americans have undiagnosed diabetes, that means that up to 160 BNL'ers could have the disease and ignore or not recognize its symptoms. The following symptoms and risk factors are associated with diabetes:

Symptoms	Risk Factors
• increased thirst, urination, hunger	• being overweight
• blurred vision	• having diabetic relatives
• itchy skin or slowly healing wounds	• being over age 40
• sudden weight loss	• women who gave birth to over-nine-pound babies
• extreme fatigue, especially after meals	• tingling in fingers & toes

If you have any of these symptoms, see your physician. To see how you score on an American Diabetes Association's self-test for the disease, look for it by your mailbox next week.

BNL Lecture (Cont'd)

about the actual phenomenon of a core melt accident, from its thermodynamics to the way radiological materials may be transported in and out of a plant. That's where EMG comes in.

On a small scale, using low temperature fluids, the group conducts simulations of specific accident phenomena. For a given area of uncertainty, their experiments are designed to simulate the basic physical processes, such as melting or freezing of materials and heat transfer.

Such experiments have been used to determine whether the large dry containment building of an LWR would, in fact, be able to contain the radiation from a core melt accident if the melt should escape the reactor vessel during an accident.

With temperatures of perhaps two thousand degrees, the molten material could interact with the containment building in a number of ways: by building up pressure as it interacts with and transfers thermal heat to water; by transferring the energy from the melt to the structural material, particularly the concrete, which would ultimately produce hot gases and contaminate the containment atmosphere; or by the melt becoming fragmented into small droplets, which would transfer energy to the containment atmosphere.

Using videotapes and slides of work being done at BNL and elsewhere, Ginsberg will show the impact of such low probability scenarios and explain current thinking as to whether they are a threat to containment integrity.

After earning his bachelor's degree in Chemical Engineering from Pratt Institute in 1963, Ted Ginsberg went to the Pennsylvania State University, where he received his M.S. and Ph.D. degrees in nuclear engineering, in 1966 and 1969, respectively.

From 1969-72, Ginsberg was at Argonne National Laboratory, where he studied the forced-convection mixing characteristics of liquid metal fast breeder reactor (LMFBR) assemblies. In 1972, he left for the Technion in Haifa, Israel, where he spent two years as a lecturer and researcher in the Department of Nuclear Engineering.

When Ginsberg came to BNL in 1974, he was involved with safety evaluations of LMFBRs. He joined the EMG in 1976 and became its group leader in 1980. Ginsberg is a member of the American Nuclear Society and the American Society of Mechanical Engineers.

All those interested in getting together after the lecture are invited to go with the lecturer to a restaurant off site. To be part of this group call Les Fishbone, Ext. 5180.

New Contribution to BWIS Scholarship

The Renate W. Chasman Scholarship for Women, sponsored by Brookhaven Women in Science (BWIS), is made possible through a combination of fund-raising events and corporate contributions. Now, BWIS gratefully acknowledges receipt of a $200 contribution from Barclays Bank.

The 1988 scholarship presentation of a one-time award of $1,000 will be made in August to a Nassau or Suffolk County resident who is currently enrolled in or who has applied for a degree-granting program at an accredited instituion. Her program of study for 1988-89 must be at the junior or senior undergraduate level or first year graduate level, to be pursued on a half-time or greater basis.

The application deadline is June 1. For forms and further information, call Ext. 3336, or write to: Chasman Scholarship Fund, P.O. Box 183, Upton, NY 11973.

Equipment Demo

The Computer Factory, representatives of Apple, Compaq, NEC and Hewlett Packard, will host a computer show on Friday, March 18, from 10 a.m. to 2 p.m., in Berkner Hall. Demonstrations will include Apple to IBM connectivity, Apple's new laser printers and Compaq's Deskpro 386/20.

Desktop Publishing

The Desktop Publishing Group will meet on Wednesday, March 16, at 2 p.m., in the Applied Math Seminar Room, Bldg. 515. Gordon Smith will speak on the use of mainframe computers in text preparation. Other topics, including the result of a survey, will be discussed.

Two to Be Elected to BERA Board

Elections for two new members to serve on the BERA Board will take place during the week of March 21. They will replace outgoing Board members Lois Maracia and Richard Schiedet.

Those eligible to vote in the BERA Board election include employees of BNL, AUI and DOE, as well as all other permanent on-site employees.

Absentee votes for employees who will not be on site during voting week will be accepted if a signed memo is sent with candidate selections to the Recreation Office, Bldg. 185. Memos must be received no later than 5 p.m., Thursday, March 24.

Ballots may be cast as follows:

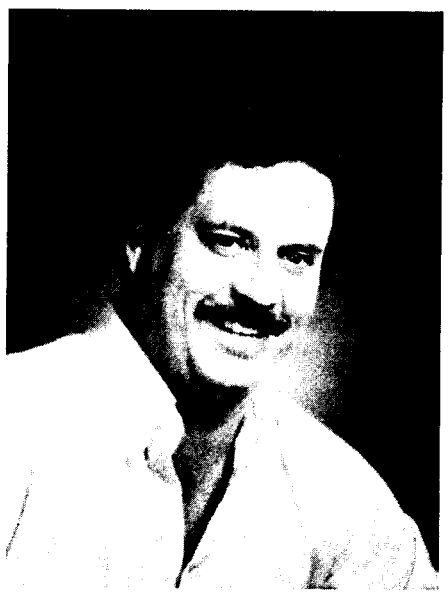
Date	Time	Place
Monday, 3/21	11:45-1:15	Cafeteria
Tuesday, 3/22	11:45-1:15	Cafeteria
Wednesday, 3/23	11:45-1:15	Cafeteria
Thursday, 3/24	1:00-2:30	Barclays Bank
Friday, 3/25	9:00-3:00	Barclays Bank

BERA Board Candidates

Robert Brown

Robert A. Brown, an Administrative Services Assistant in the Medical Department, was previously on the BERA Board from 1976-79 and served one year as its vice president. In addition, Brown, who has been at BNL for 23 years, is a member of the Afro American Culture Club, and he has served on the Special Events Committee for about eight years.

Among the BERA sports of which Brown is a member are the Basketball, Football, Volleyball and Softball Leagues. During his 20 years of participation in BNL softball, he has played on both the mixed and men's leagues, been a team captain and served as a BNL softball umpire.

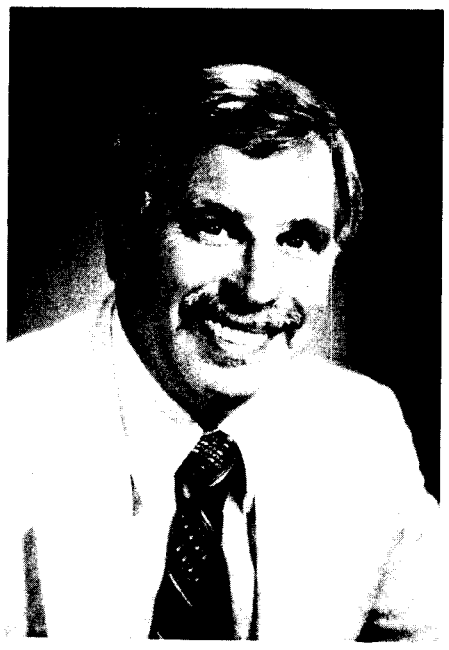


Martin Leach

Martin J. Leach, a Meteorology Associate in the Department of Applied Science, got involved in BERA sports shortly after he arrived at the Lab ten years ago.

He has played volleyball and been a team captain since 1979; currently he is a volleyball referee. That same year, he also joined the mixed and men's Softball Leagues, and he has been a team captain since 1985; currently he is a softball umpire and has been the League III representative to the Softball Board since 1986.

Leach was treasurer of the Singles Club in 1985, before it evolved into the Social Club, to which he now belongs.



Lawrence Musso

Lawrence Musso is a Patrol Officer in the Safeguards and Security Division. Shortly after joining the Lab 21 years ago, he began playing in the Softball League. He has also managed and organized both men's and mixed league teams in softball and volleyball, and served as Softball League vice president for two years.

Other BERA sports in which Musso has participated have been Bowling, men's and mixed leagues, 10 years; Football, five years; Golf, since 1987; and Volleyball, men's and mixed leagues, 14 years. In addition, Musso was a member of the BERA Dance Committee in 1978.

Jean D. Ramirez, an Administrative Services Assistant in the Department of Nuclear Energy, was also a nominee for the BERA Board in 1987.

Among the BERA credentials she has accumulated during her eight years at BNL are participation in the Bowling, Softball and Volleyball Leagues. From 1986-88, she served as secretary for the Volleyball League. During that same period, she was also secretary for the Social (Singles) Club, of which she became treasurer in 1988.

Jean Ramirez

—photos by Mort Rosen

Bowling

Red/Green League

R. Mulderig had games of 247/214/208 for a 669 scratch series, L. Jacobson 235, C. Bachsmith 223, H. Dawson 216, N. Combatti 215, T. Holmquist 209/202, M. Kelly 207.

Pink League

Donna McCambridge bowled a 198, Maryann Reynolds 185, Renie Rosati 175, Sandy Asselta 170.

Purple League

Carl Murray rolled a 225, Dick Adams 216, Joe Sheehan 205, Gene Hassell 202, Sharon Smith 197/192, Caryl MacDougall 189/187, Mary Addessi 182.

White League

The Looney Tunes bowled a 950 gross game, 2640 series. Ken Asselta rolled a 220, Paul Calligari 216, Jim Vogel 202, Jim Griffin 202, Alice Alberico 193/193/550 series, Karen Vogel 188, Pat Manzella 186, Mary Scheidet 185.

Scotch Doubles

The Scotch Doubles Bowling Tournament, open to all, will be held Sunday, March 20, starting at 1:30 p.m., at Port Jeff Bowl. This is strictly a fun affair, and, participants need not be bowlers. The cost is $24 per couple, which includes bowling, prizes and buffet, Applications can be obtained at the BERA Sales Office or by calling Maria Apelskog, Ext. 3138.

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Runners' Corner

This spring, the BNL Roadrunners Club will enter women's and men's teams in the corporate division of several races. The members of the BNL teams will range from fun runners to serious competitors. If you'd like to join the Roadrunners for any of the following spring runs, please contact the person listed for race applications and details:

Race	Distance	Date	Contact	Ext.
Dix Hills	4 miles	March 26	Sharon Zuhoski	3359
Plainview-Old Bethpage	6.2 miles	April 9	Skip Medeiros Sharon Zuhoski	2665 3359
New Jersey Waterfront	6.2 miles	April 24	Mel Cowgill Skip Medeiros	2082 2665

The Roadrunners participate in the first two events annually because they are very well organized, have a wide range of competition and awards, and are rich in raffles.

The New Jersey Waterfront race is being held at the same time as the Olympic Trials Marathon, but the Waterfront race is organized so that participants can watch both the start and finish of the Olympic Trials. As this is a rare opportunity to see America's best marathoners together and so close to home, the Roadrunners look forward to your company at this race, whether to watch the Olympic preview or to run along the waterfront.

Golf

There will be an organizational meeting of the BERA Golf Association on Friday, April 8, at 5:15 p.m., in the lounge of the Recreation Building. Membership applications have been mailed to last year's members. Prospective members may obtain an application by contacting either Ron Webster, Ext. 2845, or Bob Mills, Ext. 5043. The deadline for returning membership applications is Friday, March 25.

Arrivals & Departures

Arrivals

Gary T. McIntyre ..... AGS
Keith A. Power ..... Accel. Devel.
Julie A. Teuber ..... Reactor

Departures

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

James M. DeVito Jr. .... Sfgrds. & Sec.
Masami Torikoshi ..... Physics

In Stormy Weather:
Dial 282-INFO

Volleyball

Standings as of February 29

League I		League II	
Upfagrabs	40-5	Nuts & Bolts	28-11
Dinkers	34-11	Set Ups	27-12
Xrayted	27-18	Chunga's Revenge	23-16
Phoubars	15-30	Fossils	22-17
Cannonballs	13-32	Slammers	18-21
Bumpers	6-39	Upton Ups	11-28
		Photons	6-30

League III		Open League	
Sourcerers	34-11	Dakota	33-6
Printouts	32-13	Phoenix	32-7
Spikes	30-15	Serendipity	30-9
Renegades	22-23	Not Too Bad	15-24
Screwballs	22-23	Rowdy Radicals	11-28
MISfits	20-25	Duituits	7-32
Airheads	13-32	Leftovers	7-29
Good Times	7-38		

The Upton Nursery School Presents: Music for the Whole Family

Children's entertainer Viki Diamond will perform at BNL on Sunday, March 20, in a concert sponsored by the Upton Nursery School. Diamond, who first delighted audiences at the Lab over ten years ago, provides entertainment for the entire family. Her songs and stories, accompanied by guitar, autoharp or hammer dulcimer, will begin at 2 p.m., in the Recreation Building.

The concert is open to the public. A donation of $3 per family is suggested.

Those attending the performance can be introduced to the teaching staff of the Upton Nursery School, a cooperative nursery school open to children of BNL employees and BNL visitors. At the concert, applications will be distributed for September enrollment in the school's classes for three- and four-year-old children.

Cafeteria Menu

Week of March 14

Monday, March 14

Beef barley soup	(cup)	.75
	(bowl)	.95
Baked ham w/raisin sauce & 1 veg.		2.85
Hungarian goulash over noodles		2.95
Julienne salad plate (lite-weight)		2.25
Hot deli: Roast breast of turkey	(bread)	2.75
	(roll)	2.85
	(hero)	2.95

Tuesday, March 15

Corn chowder	(cup)	.75
	(bowl)	.95
Braised Swiss steak w/gravy & 1 veg.		2.95
Chicken pot pie w/1 veg.		2.85
Seasonal fresh fruit plate (lite-weight)		2.25
Hot deli: Two chili dogs		2.75

Wednesday, March 16

Split pea soup	(cup)	.75
	(bowl)	.95
Roast turkey w/dressing & 1 veg.		2.95
Baked stuffed fish w/lemon butter & 1 veg. (lite-weight)		2.95
Hot deli: Baked ham	(bread)	2.75
	(roll)	2.85
	(hero)	2.95

Thursday, March 17

U.S. Senate bean soup	(cup)	.75
	(bowl)	.95
Baby beef liver w/fried onion & 1 veg.		2.85
New England boiled dinner		2.95
Chef's salad plate: spinach, bacon & egg (lite-weight)		2.25
Hot deli: Pastrami	(bread)	2.75
	(roll)	2.85
	(hero)	2.95

Friday, March 18

Fisherman's chowder	(cup)	.75
	(bowl)	.95
Fried fisherman's platter: fried fish, calamari rings, fried clams & french fries		3.45
Baked fish w/lemon & 1 veg. (lite-weight)		2.85
Baked macaroni & cheese w/1 veg.		2.75
Hot deli: Corned beef	(bread)	2.75
	(roll)	2.85
	(hero)	2.95

Help Wanted At Cafeteria

Marriott Corporation, which runs the Cafeteria, needs several new employees to fill utility and general positions. Marriott Corporation is an equal opportunity employer. Anyone interested may apply in person at the Cafeteria, Ext. 3541.

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position, with consideration given to candidates in the following order of priority: (1) present employees within the department and/or appropriate bargaining unit, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants. In keeping with the Affirmative Action plan, selection decisions are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all non-scientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment.

Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Employment Manager, Ext. 2882.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

2806. PLANNER/ESTIMATOR - With a minimum of supervision, investigates, estimates, plans and schedules maintenance work for the mechanical trades. Must be able to satisfactorily complete formal program in the application of predetermined performance standards. Requires considerable maintenance and services experience and proven ability equivalent to that of a Craft Supervisor. Uses professional judgment in determining performance standards appropriate to each individual job and its circumstances. Plant Engineering Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2807. TECHNICAL/SCIENTIFIC ASSOCIATE POSITION - Requires BS in biology, chemistry, agriculture, an equivalent field, or the appropriate working experience. Work involves technical assistance with mechanical and electronic equipment and hands-on involvement in agricultural field studies. Must be willing to work out of town 4-5 months per year, outdoors, in hot climates. Department of Applied Science.

2808. TECHNICAL POSITION - Requires an AAS degree in mechanical technology and/or a minimum of 5 years' equivalent experience. Familiarity with the construction, operation and maintenance of heat exchangers and pressurized gas systems is necessary. Requires experience using conventional shop and power tools and the ability to carry out brazing, silver and soft soldering operations. Department of Nuclear Energy.

2809. DESIGNER POSITION - Requires a minimum of ten years' mechanical/drafting/design experience. Must have the ability to perform professional-level design functions, including a basic knowledge of engineering fundamentals, machine design, machine shop procedures, CAD experience and understanding of Mil-Std-100 and ANSI Y 14.5 1982. (Reposting of Job No. 2785). Alternating Gradient Synchrotron Department.

2810. TECHNICAL POSITION - Requires an AAS degree in mechanical technology and/or a minimum of 5 years' experience as a mechanical technician working in an experimental environment. Must be experienced in the construction and assembly of particle detectors from blueprints and sketches. Requires ability to work independently. Expertise in standard shop practices is required. Experience in the fabrication of wire chambers, calorimeters and scintillating counters is desired. Physics Department.

2811. TECHNICAL POSITION - Requires an AAS degree in electronic technology or equivalent experience and background in complex electronic and electromechanical equipment, including vacuum systems. Will construct, repair, modify, and operate equipment and facilities at the Tandem Van de Graaff Accelerator. Must be willing to work shifts. (Reposting of Job. No. 2731). Physics Department.

2812. ENGINEERING POSITION - Requires a BS degree in electrical engineering or a related field. Experience and education with strong emphasis on microwave techniques, electromagnetics communication and signal processing is necessary. Should have a strong desire to be involved in research and hardware development. Department of Nuclear Energy.

Motor Vehicles & Supplies

81 RABBIT - 4 speed, new clutch, clean in/out, am/fm cass. 286-4507, 6 p.m.-9 p.m.

84 FORD MUSTANG - am/fm tape, p/s, p/l, a/c, sunroof, alum. wheels, 61k mi., excel. cond., $6,200. Ext. 4846 or 363-6940.

TRUCK TIRES - 2, Uniroyal, land-trac, 10-15 Lt, on Ford 5-lug rims, good cond., $50. Ext. 3499.

78 PINTO WAGON - factory custom, no rust, many new parts, runs well, body good, $600. Walter, Ext. 3499 or 757-6392.

NISAN P/V RIMS - 4, 14", $50. Frank, Ext. 3499 or 736-2575 eves.

83 BUICK REGAL - a/c, p/s, am/fm, beige landau top, excel. cond., $5,800 neg. Ext. 2964.

84 OLDS CUTLASS CIERRA - 4 dr., p/s, p/b, a/c, p/l, am/fm stereo, cruise, tilt, etc., 69k mi., excel. cond., $4,600. 567-0480 after 6 p.m.

79 HONDA ACCORD - carburetor not working, rebuilt motor, body dents, 34k mi., $300. Ext. 4295.

TIRES - 4, Goodyear Vector, new, P235/75-R15, $75/each. Ext. 5152.

77 CADILLAC SEDAN DEVILLE - white, red vinyl roof, leather int., new tires, excel. cond., $2,300. Ext. 4040 or 289-0876.

83 FORD FAIRMONT - 4 dr., 6 cyl., 70k mi., good cond. Ext. 7121 or 277-9417 after 7 p.m.

82 DATSUN 200SX - a/c, p/s, p/b, am/fm stereo, $2,100 or best offer. 261-1794.

80 HONDA ACCORD - 2 dr., 5 speed, 71k mi., excel. cond., $1,300. 744-6668 after 6 p.m.

FORD - 390 cubic inch engine. 727-0082 after 6 p.m.

76 TOYOTA COROLLA - reliable, runs well, $400. Nick, Ext. 3836.

82 DATSUN 200SX - 5 speed, a/c, loaded, 99k mi., excel. cond., asking $2,600. John, Ext. 7770 or 4480.

70 CHEVY PICKUP - ½ ton, 350 V8, good cond., $1,000 or best offer. Ext. 4407 or 924-2865 eves.

82 MUSTANG GT - new eng., 3 year/36k mi. warranty by Ford, mint in/out, asking $6,800. 363-5170.

79 MUSTANG - p/s, p/b, a/c, am/fm cass., 8 cyl., good cond., asking $2,000. Ext. 2175 or 399-0224.

83 FORD T-BIRD HERITAGE - a/c, p/s, charcoal w/wine int., loaded, excel. cond., asking $4,500. Ext. 5061.

80 SUZUKI GS 550L - orig. owner, black, oil cooler case, guards, sissy bar, 12k mi., excel. cond., $750. Ext. 4446 or 654-3969 after 5 p.m.

78 OLDS CUTLASS - 2 dr., 260 V8, a/t, p/s, p/b, many new parts, like new, $2,000. Ext. 4708.

30 MODEL "A" FORD - 4 dr. sedan, good cond., $12,500. Garry, Ext. 5289.

88 VOLVO DL240 - 4 dr., silver, brand-new, extras, relocating, must sell, $15,000. Ms. Taylor, 744-1833, 9 a.m.-5 p.m.

86 CHEVY CAVALIER - 4 speed, 27,500 mi., am/fm cass. stereo, a/c, $5,300. Diane, Ext. 2456.

87 JEEP PIONEER - p/s, p/b, a/t, 6 cyl., loaded, low miles, excel. cond., $15,500. 325-1756.

57 FORD DEL RIO RANCH WAGON - completely rebuilt body, good cond., $2,700. Ext. 2385.

80 VW RABBIT - 2 dr., fuel injection, 59k mi., mint cond., garaged, $2,250. Howard Jewett, 878-0514.

82 CHEVETTE - body damaged, many excel. parts, 45k mi., best offer over $300. Dave, Ext. 3093 or 281-0062.

VW PARTS - rebuilt cyl. heads, new Weber carb., assorted studs, $100 for all. Fred, Ext. 4407 or 4435.

74 VW SUPER BEETLE - $375. 821-0686.

84 RENAULT ENCORE - very good cond., $3,200. Ext. 3134, 6 p.m.-8 p.m.

85 BUICK REGAL - V6, 30k mi., p/s, p/b, a/t, a/c, am/fm, $7,495. Fred, Ext. 3155.

85 HONDA MAGNA - 700cc, 1300 mi., w/accessories, $2,600. 821-2687.

85 HONDA ODYSSEY - mint cond., used 20 hours, asking $1,900. Steve, Ext. 2310.

85 CAMARO BERLINETTA - p/s, p/b, p/w, p/l, fully loaded, T-tops, mags, excel. cond., $9,000. 289-1585.

75 PLYMOUTH VALIANT - runs well, many new parts, $500 or best offer. Susanna, Ext. 3959.

ALUMINUM WHEELS - 5½x13 OZ, used one month, fits Datsun & Toyota RWD, $230/set. Dave, Ext. 5454 or 475-2626.

BUG DEFLECTOR SHIELD - fits 1981-86 Ford pickup or Bronco, excel., $25; early Chevy 8 cyl. heads, 327, $25/pair. Dan, Ext. 4987 or 698-7322.

Boats & Marine Supplies

20' IMPERIAL - 1984, cuddy, 140 h.p. I/O, excel. cond., low hours, full canvas, extras, $8,500. Dennis, 736-5736 after 5 p.m.

17' BOAT & TRAILER - w/100 h.p. 1974 Johnson, all need work, $400. Doug, 732-1868 eves.

16' BOWRIDER - rebuilt 70 h.p., trailer, canvas, many extras, good cond., asking $2,200. Dan, Ext. 2075 or 737-8124.

22' SEAFARER SAILBOAT - 1974, 3 sails, Volvo outboard, full keel, asking $4,000. Fred, Ext. 4407/4435 or 499-1214.

16' STARCRAFT - 1983, w/trailer, 50 h.p., full canvas, mint, w/winch, parking jack, more. Ext. 5061 or 584-6365.

150' ANCHOR LINE - nylon, $15; two 7' oars, leather oarlock stops, $20; 4 surf rods; 3 boat rods; 5 Penn reels; 2 Daiwa reels; 3 anchors. 924-3082.

Miscellaneous

SOFA & CHAIR - $100; chair & ottoman, $85; table w/4 chairs, $100; coffee table, $100; punch bowl, $25; blender $20. Ellie, Ext. 3395 or 325-1537.

SOUND MOVIE CAMERA - projector & screen, $175; full-size bed, dresser w/mirror, tall dresser, night table, $250. Jim, Ext. 4758.

SOLAR PANELS - SolarPak, 2, excel. cond., make offer. 286-8448.

7' SNOW PLOW - $75; steam cleaner, $75. Dick, Ext. 3499 or 589-9103.

BEDROOM SET - Ethan Allen, 7 pieces, excel. cond., orig. $2,100, asking $975. 286-1213 eves & wknds.

TWIN FRAME - w/bookcase headboard, asking $10; two-way fan, 23"x19"x36", asking $5. Ext. 7505.

LIVING ROOM FURNITURE - couch & loveseat, contemporary, beige, like new, $225. Jim, Ext. 4758.

COLLIE PUPPY - tricolored, champ-sired male, gorgeous, great disposition, wonderful with children. 924-3756.

BOY'S BEDROOM SET - dresser w/mirror, headboard w/frame, night table, $125. Ext. 2888 or 286-0422.

FUJI 12-SPEED BICYCLE - great cond., leather handle bar grips, asking $145. Dave, Ext. 3653 or 878-8541.

COUNTERTOP STOVE - w/built-in oven, electric, $50; Kenmore washer w/dryer on top, 120 volt, almond color, good cond., $295. Ext. 4843.

VITAMASTER EXERCISE SYSTEM - model 5000, 110 lb. wt., like new, orig. $120, sell for $60. 289-3808 eves.

HOPPER FOR COAL STOVE - used once, asking $60. 689-9234.

BUNK BED - built-on bookshelves, drawers, cabinets & closet, solid oak, stained walnut, must see. Jack, Ext. 4447 or 744-3919 after 5 p.m.

COLOR TV - 21", UHF/VHF, good cond., $100. Birgit, 878-1210.

TWINS BEDS - 2, mattresses & springs, w/frames, almost new, $70/each. Ext. 5076 or 744-4615.

MAN'S UNDERSHIRTS - Jockey, new, 42-44 large, $3; Photo Annuals, 1957-66, $10. Susan, Ext. 4267.

REFRIGERATOR - 19 cu. ft., white, frost-free, $300; upright freezer, 17 cu. ft., $50. 369-2716.

POOL - 3'x12' round, filter, vacuum, chlorine, test kit, cover, $175; Mr. Coffee Junior, 4-cup, extra decanter, $20. All brand-new cond. 589-4407 eves.

POLAROID CAMERA - Auto 250, w/case, flash, cable release, $35. Ernie, 588-4987.

SEA SHELLS - $5, $10 & $15; Kenmore sewing machine, $100; merrowing machine, $350. 736-6580.

DRUM SET - good cond., $150. Carol, Ext. 2673 or 744-8632 after 6 p.m.

CARVED ANTIQUE SOFA - off-white, beautiful, down cushion, excel. cond., asking $1,500. Frank, 878-8072.

HAMMOND SPINET ORGAN - double keyboard, foot pedals, good cond., $150. 475-7891.

SCHWINN BICYCLE - man's racer, $20; carpenter vise, new, metal, $12; rubber raft, two-man, w/paddles, $20. 924-3082.

STEAM CLEANER - Steamex professional carpet machine, 600 psi, all accessories, $975. 928-9568 days/eves.

GENERATOR - 1350 watts, Sears, portable, excel. cond., $300. Joe, Ext. 2898.

CAMERA LENS - Tokina 80, 200mm zoom, for Olympus OM. Herb, Ext. 3611.

40" RANGE - custom-built, gas, 5-burner, grill, 2 broilers, oven, storage, very good cond., comes apart for cleaning, $75., 878-6637.

SOFA/BED - single or double, $125. Ext. 4144.

AQUARIUS COMPUTER - w/16k memory, data rec., printer, file form., etc., good starter system, $120 neg. Ernie, 588-4987.

WELL PUMP - ½ h.p., 1 year old, excel. cond., $120; 50-gallon water tank, $25. Ext. 2881 or 286-3372.

MITUTOYO DIGITAL MICROMETERS - 3, 0-1" & 1-2", $30 or best offer. Mark, Ext. 2043.

SLIDE - for kids, elephant shape, used in room, $20. Aoki, Ext. 3748 or 3176.

Free

BABY ITEMS - Ext. 7505.

MANUAL - for 1983 Toyota Tercel. Dave, Ext. 2622.

Car Pool

BOHEMIA/OAKDALE - needs 2 drivers for car pool. Frank, Ext. 2314.

Real Estate

Real Estate advertised for sale or rent is available without regard for the race, color, creed, sex or national origin of the applicant.

For Rent

HILTON HEAD, SC - sleeps 6, beach, pool, golf, tennis, March $320/wk., April $420/wk. Ext. 3147 or 585-9149.

ROCKY POINT - 1 bdrm. apt., self-contained, $400/mo. + util. & 1 mo. sec. Ext. 4516 or 744-8901 eves.

HAMPTONS - summer rentals, share Victorian house in the heart of the Hamptons. Leonid, Ext. 3761 or 718-646-8598.

HOLTSVILLE - 3 room basement apt., $500/mo. incl. util. 475-8219.

EAST MORICHES - 4 bdrm. Victorian house, 2 baths, d/r, l/r, eik, parlor, porch, waterview, prime location, $900/mo. 828-4243 eves.

MIDDLE ISLAND - 3 bdrms., 2 baths, eik, f/p, 2-story, wooded 2 acres, carport, avail. April 1, $900/mo. + util. John, Ext. 3675 or 924-3528.

BELLPORT VILLAGE - 1 bdrm. cottage, couple preferred, no pets, non-smoker, references required. Ed, Ext. 2700 or 286-7539.

SOUND BEACH - spacious 2 bdrm. apt., new kitchen, 3 blocks from beach, avail. immed. 821-6883 or 223-1261.

NORTH SHIRLEY - 3 bdrm. apt., 1 mile to Lab, excel. cond. 215-758-3930 or 861-2660 before 5 p.m.; 215-867-8064 after 5 p.m.

BAITING HOLLOW - 5 bdrm. contemporary, new, $1,500/mo. + util. 821-2002 or 331-7060 eves.

For Sale

WINDHAM, NY - ski chalet, 3 large bdrms., sleeps 10, 2 baths, fp, all appliances. 744-9746 eves.

PORT JEFFERSON - Harbor Hills, 3 bdrm. ranch, 3 baths, wooded golf course setting, balcony, deck, patio, 2-car garage, 3-zone gas heat, $259,900. Ext. 3791 or 928-7154 eves.

STONY BROOK - north of 25A, in village, private, 4 bdrm. Colonial, large eik, new appliances, den w/fp, full bsmt., 2-car garage, deck, $275,000. 751-3442 after 6 p.m. & wknds.

MOUNT SINAI - north of 25A, 3-4 bdrms., 2 baths, l/r, d/r, eik, prof. landscaped, sprinklers, covered patio, garage, den w/fp, a/c units, ⅓+ acre, excel. schools, near beaches, $169,900. Ext. 2494.

PORT JEFFERSON - Harbor Hills, 4 bdrm. split ranch, d/r, eik, family room w/fp, brick patio, winter waterview, excel. cond., $199,000. Ext. 4474 or 473-3689.

RIVERHEAD - mobile home in adult park on Peconic River, 2 bdrms., 1½ baths, new carpeting & floors, new bath, woodburning stove. 369-2838 or 744-9802.

HILTON HEAD, SC - 3 bdrm. condo, sleeps 8, 2 baths, washer/dryer, wet bar, 6 tennis courts, 3 pools, whirlpool, golf, ocean view, asking $89,000 or will rent. 929-8912.

LAKE GROVE - 3 bdrm. hi-ranch, possible M/D, custom-built, brand-new, must see, $179,000. 732-7695.

PATCHOGUE - large 1 bdrm. co-op, 2nd floor, w/w, new kitchen, appliances, d/r, l/r, lots of closets, a/c, balcony, near all, immaculate, must see, $69,000. Ext. 2679 or 472-0392.

WEST PALM BEACH, FL - 2 bdrms., 1 bath, good cond., $49,500. 363-7032.

MASTIC BEACH - 3 bdrm. ranch, eik, d/r, l/r, stone f/p, walk to beach & marina, public water, 5 appliances, $125,000 neg. 399-1249 eves/wknds.

SHOREHAM - 3 bdrm. ranch, l/r, d/r, partially finished bsmt., detached 22'x24' 2-car garage, patio, a/g pool, city water, fenced ⅓ acre, SWR school district, $150,000. Judy, Ext. 5263 or 821-3290 eves.

SETAUKET - north of 25A, 6 rm. cape, 2 baths, 2-car garage, wooded area, 3 Village schools, asking $190,000. 751-1401.

BELLPORT - 4 bdrm. Colonial, 3½ baths, l/r, d/r, kitchen, pantry, sunroom w/jacuzzi, 3 screened porches, attic, 2-car garage, walk to village & bay, asking $675,000. 286-0269.

NORTH SHIRLEY - 5 bdrm. hi-ranch, 2 kitchens, d/r, l/r, family rm., 3 baths, garage, ½ acre, fenced, 20x20 deck, 9 months old, extras, $155,000. 395-5188.

BAYSIDE, QUEENS - 1 bdrm. co-op apt., easy commute to Manhattan, 12th floor, view of Long Island Sound. 718-224-5730 eves.

RIDGE - 3 bdrm. ranch, eik, cedar skylight, bath, newly finished bsmt. w/bar & w/w carpet, 1 acre, energy efficient, 5 min to Lab, $149,000. 924-7677.

Wanted

SCREEN - for projecting slides, cheap. Anne, Ext. 5055.

BABYSITTER - on-site or close to Lab, for 14-mo.-old boy, 4 days a week, 8 a.m.-5 p.m., start immed. Ext. 2276 or 727-1412 eves.

HOUSE TO RENT - 3 bdrm., in SWR shcool district, for BNL physicist w/family. Ext. 3009 or 2707.

FENDER & HEADLIGHT - L/S, for 1982-83 Honda Civic, 4 dr. 473-4767.

GAS LAWN MOWERS - old, complete, any type. Dan, Ext. 4987 or 698-7322.

COLEMAN CANOE - Pete McHugh, Ext. 3297 or 821-9547.

ROOMMATE - to share 2 bdrm. house in Sound Beach, $350/mo. + util. 821-2875.

SUMMER HOUSE - for visiting couple, furnished, 1-2 months, starting May or June. Tang, Ext. 3869 or 5186.

BOOKCASE - or shelves, any size, not fancy, sturdy. 929-3795.

SINGING CANARY - w/cage & stand, reasonable. 363-7032.

In Appreciation

I want to thank everyone for their support during my mother's illness and death.

— Clarence Wilkins

Classified Ad Policy Deadline is 4:30 p.m. Friday for publication Friday of the next week.