BROOKHAVEN BULLETIN
Vol. 35 - No. 45 November 20, 1981
BROOKHAVEN NATIONAL LABORATORY

Optimizing Optics At NSLS

The National Synchrotron Light Source is a highly specialized machine designed for one job: to produce light in the form of synchrotron radiation. This kind of radiation is "white," that is, it covers a wide range of wavelengths — from infra-red, through the visible and ultra-violet, to x-rays. To be useful for experiments, the white radiation coming from the machine must first be narrowed down to one wavelength and then delivered to a sample. This function is carried out by a series of optical components, says Malcolm Howells, a physicist with the Light Source specializing in the design of optical instruments.

Howells is not talking about ordinary windows, lenses and prisms. Those devices would not work because they are not transparent at most of the wavelengths produced by the Light Source. Instead, he is referring to mirrors, diffraction gratings and crystals — all devices that work by reflection. Mirrors are used to direct radiation into an instrument, aptly named a monochromator, which contains gratings or crystals which can select radiation of a particular wavelength and send it toward a sample.

Ideally, says Howells, the perfect optical system would deliver monochromatic radiation to the sample without any losses, and would survive perfectly in the rigorous vacuum and thermal conditions which are needed. In practice, real optics always fall short of this ideal.

One problem is damage due to heat or radiation exposure. Howells and his collaborator Peter Takacs, physicist with the Instrumentation Division, have been working on two solutions to the problem. Looking promising, although still being studied, is silicon carbide, a ceramic material. Takacs characterizes it as practically indestructible — a material that is unaffected by radiation and will not distort under intense heat. But he says it's a relatively new optical material, and few manufacturers have experience working with it.

Using existing technology, the other solution to the heat problem is metal mirrors that can be water cooled. Howells and Takacs have been using an approach based on a technique called diamond turning. This uses a single crystal diamond to cut shapes out of metal turned on a special lathe. The machined surface of the metal, usually aluminum, copper or nickel, has minute groove patterns left by the cutting tool, but proper post-polishing can give a finish as smooth as glass.

A big advantage of diamond turning over conventional mirror fabrication techniques is that it can produce surfaces of any shape. The Light Source will require over a hundred optical elements, most of them having exotic shapes like ellipsoids (picture an egg), paraboloids (remember those old-fashioned bullet lamps), and toroids (donuts). The optical pieces are being manufactured commercially, and Takacs spends considerable time testing them to make sure they meet specifications. He is also commissioning optics in the beam lines and most of the monochromators for the Light Source's ultra-violet ring, which will be ready soon for experiments.

The UV ring produces most of its useful radiation at wavelengths ranging from 2,000 angstroms in the ultraviolet down to eight angstroms in the soft x-ray region (one angstrom is a ten-billionth of a meter or roughly the width of an atom). For experiments using wavelengths longer than 300 angstroms, conventional mirrors are satisfactory. These operate at normal incidence (light going perpendicular to the surface). At wavelengths shorter than 300 angstroms, there are no materials which reflect well at normal incidence, and grazing incidence must be used. For this arrangement, the rays hit the surface at a shallow glancing angle like skipping stones across water.

Takacs says the problem with grazing incidence is that images get more distorted as the angles get more shallow. The only solution is to use very exotic shapes for the reflectors, and this is partly why manufacture of synchrotron radiation mirrors is so challenging.

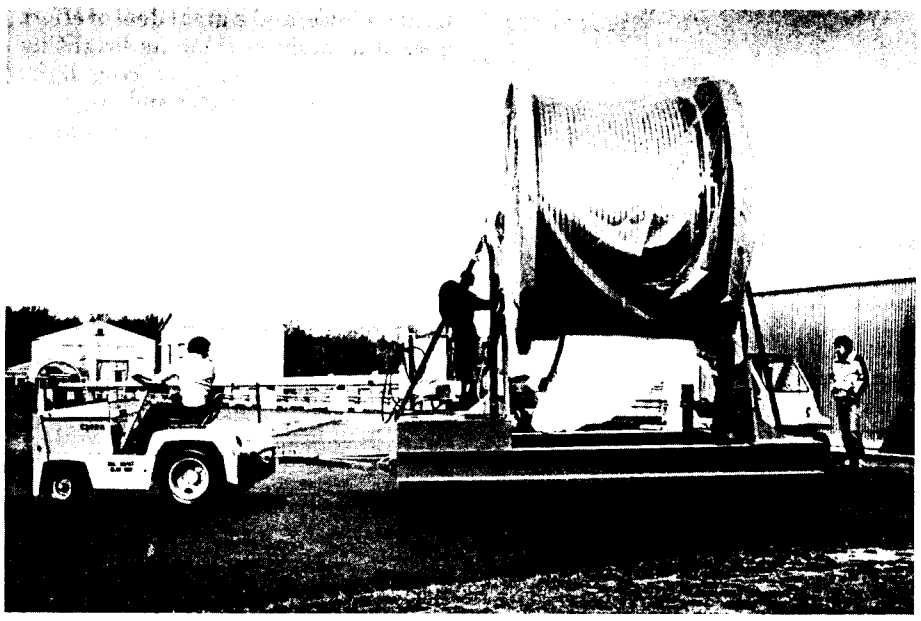
The problems of using extremely grazing incidence reflectors are particularly severe for x-ray applications, says Howells. A large number of x-ray experiments are planned at the Light

(Continued on page 2)

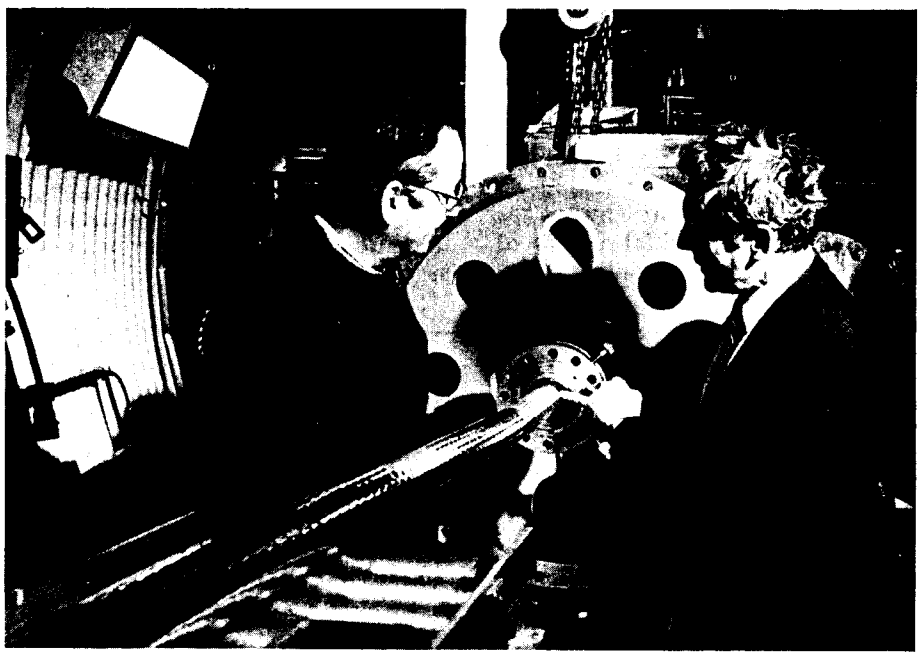
Reflections On The Light Source

A conference on "Reflecting Optics for Synchrotron Radiation" was held at Brookhaven Lab this week. The meeting was the first of a pair of conferences, the second one being on "High Resolution Soft X-Ray Optics." Both are relevant to the general issue of designs for optical systems for the National Synchrotron Light Source (see accompanying story), and both were co-sponsored by the Society of Photo-Optical Instrumentation Engineers and by the NSLS, in cooperation with the Optical Society of America. The purpose of the first meeting was to provide a forum for contacts between scientists in the synchrotron radiation community who use optical components and technologists from the optical manufacturing industry who make them. Pictured is a panel discussion involving (from left) Joseph Haeg, Contracts and Procurement Division; Bruce Flint, Acton Research, Inc.; Victor Rehn, Naval Weapons Center, China Lake; Malcolm Howells, NSLS; and Margaret Bogosian, BNL Patent Counsel.

A Long Step



The Power Transmission Project took a major step Tuesday when superconducting cable was successfully threaded through two 430-foot cryogenic pipes. The cable was made in one 1,000-foot length and wound around a 10-foot diameter reel which was carried to the site by (from left) Thomas Muller, mechanical engineer in charge of cable construction; Kurt Minati, senior mechanical engineer; and Kevin Stevenson, electrical technician. There, the cable was attached to a steel wire and pulled through the first pipe, a process that took about an hour. At that point, the cable was cut, a new pulling head was attached, and the remaining length was pulled through the second pipe. John Wilcenski (left), technical supervisor, and Project Manager Eric Forsyth examined the 2-1/4-inch diameter cable as it emerged. Forsyth commented that the five-year plan written in 1976 called for pulling the cable through by the end of fiscal 1981, a deadline that was missed by only weeks. —photos by Humphrey



BNL Lecture

Particle Beams: A Military Option?

This lecture departs from the usual format of Brookhaven Lectures in that it is not concerned with research done at BNL. Rather, it is to be a discussion of several issues concerning the possible application of accelerator particle beams to missile defense problems.

The lecturer, Mark Q. Barton of the Accelerator Department, will speak on "The Particle Beam Weapon Controversy" on Wednesday, December 9, at 8 p.m., in Berkner Hall. It is the first lecture in the 1981-82 series.

Since 1969, Barton has been studying this application in various workshops sponsored by the Department of Defense. During 1980, he served on a task force under the Defense Science Board reporting to the Undersecretary of Defense for Research and Engineering. This task force was charged with an in depth evaluation of the technology relevant to the development of such weapons.

His lecture will review the history of the studies of particle beam weapons and will develop some of the technical issues that must be resolved in order to develop such weapons. All of these studies have been intensely criticized and the opposition views will be described. The implications of such weapons on defense systems and on disarmament negotiations will also be discussed.

Doug Humphrey

Mark Barton

Mark Barton, a Sr. Physicist, has been with the Accelerator Department since 1955 and served as its chairman from 1974-78. He is head of the Accelerator Division of Project ISABELLE.

Doug Humphrey

Malcolm Howells

NSLS Optics (Cont'd)

Source, and the larger of two storage rings is dedicated to x-ray research. Commissioning of the larger ring will follow that of the UV ring. For the x-ray optical systems, the bulk of the design work has been done by different people. Physicist Jerome Hastings has developed a series of beamline designs which are unique to Brookhaven and which will represent an advance in the way x-ray synchrotron light sources are utilized. In arriving at these designs, he has leaned heavily on computer simulations of the complicated ray patterns involved. This geometrical analysis has been carried out by physicist Steve Heald of the Metallurgy and Materials Sciences Division of DEE, in collaboration with Hastings, and resembles in many ways a similar analysis used by Howells and Takacs for their UV work.

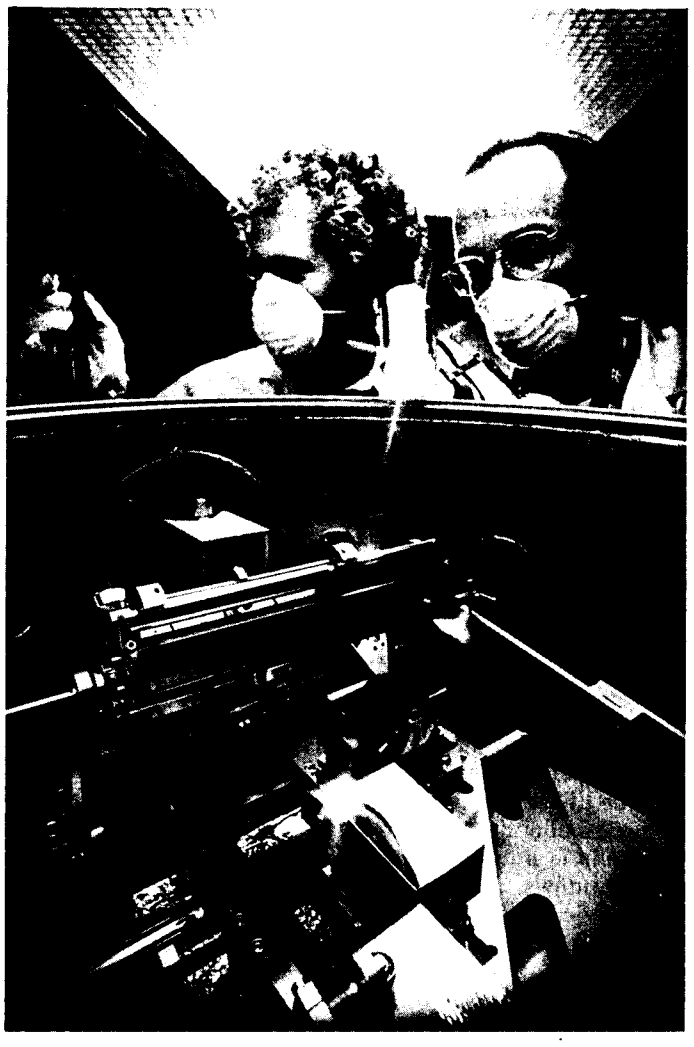
Howells' feeling is that from a world-wide perspective, the x-ray ring at the Light Source is "more unique than the UV ring and will put Brookhaven in a pivotal position in the x-ray research community." The Bulletin will carry stories on this subject in the future.

Howells sums up the challenges faced by designers and fabricators of synchrotron radiation optics: "For many years, electron accelerators have been used as sources of synchrotron light, but in general, they were not built for that purpose and were not especially good light sources. For those cases, the optics were not usually a limitation and traditional methods could often be used.

"In recent years, dedicated machines like the NSLS have been designed and built exclusively for use as light sources, and a great deal of effort goes into making them as bright as possible. As the storage ring light source becomes brighter and brighter, it places greater and greater demands on the accuracy of optics. The design of components and instruments which can fully utilize the present generation of storage rings is a new and challenging branch of optics."

Photographs like this one are used to measure the quality of an optical surface. Briefly, a laser beam is split into two. One part goes to the optical device being tested and the other goes to a reference mirror that is known to be accurately flat. Both laser beams are reflected back and combined together to produce an interference pattern that can be photographed. The beam bouncing back from the optical surface has been distorted by the imperfections in that surface, and the interference pattern shows these distortions in visible form. In this case, the picture is of a toroidal diffraction grating, 2"x1", made of fused silica with a gold coating. The center pattern, resembling Saturn surrounded by rings, is caused by the curvature of the grating's surface. Errors in the surface shape would show up as irregularities in the pattern. This particular grating meets specifications.

Physicist Peter Takacs (left) and technician Michael Kelly adjust mirrors in a monochromator. They wear gloves and face masks to avoid contaminating the system. The mirrors at the bottom are examples of diamond-turned, grazing incidence paraboloids, made of aluminum coated with nickel.



Doug Humphrey

Equipment Demo

On Monday, November 23, B&K/Precision and Louis W. Keller & Associates will exhibit a full line of test instruments in the field of logic and signature analysis. The display will be set up in Room C, Berkner Hall from 9 a.m. to 4 p.m. and will feature logic analyzers, signature analyzers, multifunction instruments, and a 100 MHz quad trace oscilloscope. Coffee and cake will be served.

I.B.E.W. Meeting

Local 2230, I.B.E.W. will hold its regular monthly meeting on Monday, November 30, at 6 p.m. in the Knights of Columbus Hall, Railroad Ave., Patchogue. There will also be an afternoon meeting at 2 p.m. for shift workers in the Union office at 31 Oak Street, Patchogue. On the agenda will be regular business, committee reports and the President's report. *Please note date.*

NYC Train Trips

The Hospitality Committee is planning two group railroad trips to New York City: a regularly scheduled trip on Wednesday, December 2 and a special trip on Saturday, December 12. For both trips, round-trip fare for adults is $3.50 and children under six years ride free. Reserve a ticket by sending your fare through the U.S. mail to P.O. Box 322, Upton, New York 11973. Please make checks payable to "Brookhaven National Laboratory" and put the date of the trip on your check. Tickets will be given out on the train. Details for each trip are as follows:

Regular Trip
Trip date — Wednesday, December 2
Departure — 7:55 a.m. from Patchogue LIRR station
Reservation deadline — Wednesday, November 25
Cancellation/refund deadline — Monday, November 30

Special Trip
Trip date — Saturday, December 12
Departure — 8:31 a.m. from Patchogue LIRR station
Reservation deadline — Monday, December 7
Cancellation/refund deadline — Tuesday, December 8

CREF Values

October	49.13	November	53.19
December	51.77	January	50.20
February	51.21	March	52.85
April	52.39	May	52.56
June	51.94	July	51.19
August	48.26	September	45.89

October $47.61

Diners Note

The Cafeteria will operate only the Snack Bar Service from 9 a.m. until 2 p.m. daily over the Thanksgiving holiday weekend, Thursday, November 26 through Sunday, November 29.

The Center will be closed on Thursday, Friday and Saturday, reopening at 5 p.m. on Sunday, November 29.

The Vended Food Service in Building 912 will be in operation throughout the Thanksgiving holiday.

Service Awards

The following employees will receive service awards during the month of November:

Thirty Years
Robert Jones .. Energy & Environment
Harold Schwarz ..... Chemistry
Thomas Scheuerer ..... Accelerator

Twenty Five Years
Edward F. Meier ..... Accelerator
Edward Heins ..... Physics
Orazio Barone ..... Plant Engineering
Donald Sacker ..... Medical

Twenty Years
Eric Forsyth ..... Accelerator
Joseph Mayeski ..... Accelerator
Franklin Timm ..... Accelerator
Robert Hulliger ..... Accelerator
Manfred Thomas ..... Accelerator
Carl Eld ..... Accelerator
Edward Gill ..... Accelerator

Ten Years
Marion Blennau ..... Nuclear Energy
David McChesney ..... Medical
Gisella Murphy ..... Staff Services
Joseph Skelly ..... Accelerator
Claire Lamberti .... Energy & Environ.
Linwood Johnson ..... Staff Services

Music By Calliope

Save yourself a trip to Manhattan. The same program of Christmas music which will be performed at the Metropolitan Museum next month will also be presented at Berkner Hall on December 8, at 8:30 p.m. The concert will be given by Calliope, a Renaissance band now in its fifth season. Joining the ensemble will be guest artist Lucy Shelton, soprano.

The Christmas program will include religious and secular music from England and Burgundy, spanning four centuries of one of the richest cultural periods of history.

Members of Calliope, Lucy Bardo, Lawrence Benz, Allan Dean and Ben Harms, play more than 35 instruments among them, including viols, sackbuts, tambourines, krummhorns, recorders and a straw fiddle. The percussionist, Mr. Harms, also plays the pipe and tabor, a recorder-drum combo designed as a medieval one-man band. The group improvises on stage, which gives their performances a flavor of classical, folk and jazz elements all interwoven. They also talk to their audiences, believing that Renaissance music is best appreciated with interspersed explanations and demonstrations throughout the program.

Joining Calliope in concert on December 8, soprano Lucy Shelton has built her career almost entirely as a recitalist. She has appeared frequently with chamber groups such as Calliope, in festivals at Marlboro, Caramoor, Aspen and Spoleto, and in solo recitals throughout the country. Miss Shelton is the only artist to have twice received the prestigious Naumburg Award — as winner of the 1980 Solo Voice Competition and as a member of the 1977 award-winning Jubal Trio.

Tickets for the Christmas program are $7 for adults, $4 for students and senior citizens, and $3 for those under 18. The concert is the second in a series of five sponsored by BERA, and season tickets, at $25 a subscription, will be on sale the night of the performance. They still represent a savings over adult single admission tickets for this and the remaining concerts in the series.

Lucy Shelton

Calliope: A Renaissance Band

BROOKHAVEN BULLETIN

Published weekly
for the employees of
BROOKHAVEN NATIONAL LABORATORY

BERNICE PETERSEN, Editor
MONA S. ROWE, Assistant Editor
ANITA COHEN, Reporter

35 BROOKHAVEN AVE., UPTON, N.Y. 11973
Telephone (516)282-2345

BERA Contest

The BERA Board is looking for an eye-catching design to be used as an imprint on BNL souvenir T-shirts and sweatshirts, which will eventually be sold at the BERA Sales Office. To find that design, the Board is sponsoring a contest and inviting all Lab employees to submit their creative ideas.

Contest rules and other information:

- Entries must be original designs representative of the Laboratory and its environs.
- Design entries must not incorporate anything that would outdate the imprint, since plans are to sell the shirts for an indefinite period.
- Entries must be received by Contest Coordinator Nelson Tyler, Building T-87, no later than January 29, 1982. Judging by the BERA Board will take place on February 4.
- The contest winner will be awarded a cash prize of $25, plus a choice of T-shirt or sweatshirt.
- Address any questions to Nelson Tyler on Ext. 2303.

Hospitality News

A morning get-together will be held Tuesday, December 1, from 9:30 to 11:30 a.m. in the Brookhaven Center. All wives of Laboratory employees and guests are welcome. Please come and bring the children. Babysitting will be provided free of charge.

Betty Mazzarella will display a collection of her Christmas craft decorations and offer assistance to those who may be interested in making some of these lovely decorations.

Coffee, tea and danish will be served.

Cooking Exchange

Some new as well as traditional dishes will be prepared and sampled on November 25, as the Cooking Exchange celebrates Thanksgiving. The Cooking Exchange is a club open to all BNL employees, visitors, and their families. Meetings are held on the second and fourth Wednesday of each month from 12:30-2:30 in the Recreation Building. Admission fee is $1.00; this includes copies of the recipes prepared, a sample of each, coffee and/or tea. Babysitting is provided at 50¢/child. For more information, call Adrienne Usher, 289-7658, or Ruth Fernow, 928-8465.

Mountain Club

The Mountain and Canoe Club will have a lunch time meeting on Tuesday, November 24, at 12:15 in room A, Berkner Hall. All are invited. Discussion will center on early winter plans such as a ski trip or skating. Other ideas are welcome.

Bulletin On Vacation

Because of the Thanksgiving holidays, the Bulletin will not be published next Friday. Publication will resume on December 4.

Att: Young Artists

If you're a child, age 6 to 12, whose parent is a Lab employee — the Bulletin needs your help. We're looking for original drawings of holiday scenes for possible publication in our issue of December 18. Whether your drawing is about Christmas or Hanukkah or the winter season, it should be no larger than 12"x17". Submit your artwork to the Bulletin, Bldg. 134, by Friday, December 4, and please don't forget to sign your name and age on the drawing. Thanks for your help and happy holidays!

On The Aisle

"It's part of the local charm," says Crane Hammond, fittingly played by Penny Baggett, in the first act of Fred Carmichael's "Exit the Body." Local charm it is... a local production, local participants, and local innuendoes.

Although the limitations of the stage determine the design of the set, Karl Swyler performed a magnificent job in providing warmth, coziness and depth to a small area. The closet, which is an important area to the play, is beautifully accessible to the audience.

The action of the play centers about a group of "stereotyped characters" who have reason to be interested in the summer house of a mystery writer. Bill Love expertly plays the role of a curmudgeon with many responsibilities and many hats. Angela Castellano, as the hard-hitting, barb-throwing secretary, is superb. Rita Straub plays the naive "little-old-lady" real-estate saleswoman brilliantly. Red Sands portrays a gangster with humor and aplomb. The rest of the cast — Neil Baggett, Jane Love, Mitzi Lampert, Joe Indusi and Gary Smith — also gave enjoyable performances.

Although the play moves slowly through the first two acts, enabling the audience to establish the personalities of the characters, it finishes with a crescendo of laughs and well-timed antics in act three.

The show, currently in production at Brookhaven National Laboratory in Berkner Hall, is well directed by Joseph Skelly. See it and participate in a local effort. Final performances are November 20 and 21 at 8:30 p.m. Tickets are $3 for adults; $2 for senior citizens and students under 18.

— Sally Munson

Arrivals & Departures

Arrivals

Dao-Shan Chui ..... Biology

Departures

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

Donald E. Hicks ..... Plant Engrg.
Charles M. Newstead .... Nuc. Energy
James G. Stangby ..... Nuc. Energy

Bowling

Red & Green League

High games for the night were bowled by B. Kristiansen 210/205, K. Riker 205/204, C. Bachsmith 219, J. Petro 212, R. Larsen 207, R. Jones 203, B. Barberich 203, M. Iarocci 203, L. Jacobson 203, J. Ferrero 202, J. Morris 201.

White League

High rollers were J. Griffin 252/201 for a 602 scratch series, B. Belligan 216, J. Roesler 211, G. Hassell 204, N. Carter 202, D. Adams 201. S. Smith rolled a 195/536 scratch series which is high for the women.

Purple League

C. MacDougall had games of 193/186/213 for a 592 scratch series. Other good games were bowled by M. Haller 195, M. Connelly 190, G. Riker 173, I. Sperry 171, R. Sheehan 170, B. Jones 194, E. Sperry 192, B. Bergoffen 188, J. Austin 187.

Pink League

C. Beckner rolled a 163, R. Rosati 160/166, M. Connelly 163, D. Johnson 185/160, A. Donegain 162, M.G. Meier 172, H. Keeley 163.

Come To The Fair

Looking for a gift for your youngster that will last long after the holiday trimmings have been put away? Books have that kind of staying power, and if they are well chosen, they can be entertaining as well as educational.

The Upton Nursery School is having a Book Fair from December 1-3. Hours for the fair are 11 a.m. to 1 p.m. all three days, but the fair will be held at Berkner Hall the first day, December 1, and then move to the Recreation Building in the housing area for December 2 and 3. Children's books and some adult books will be on sale. Teachers at the school have selected the children's books.

Origami demonstrations will be featured during the fair, and instruction books and origami paper will also be on sale.

Doug Humphrey

The Book Fair is a benefit for the Nursery School, and no sales tax will be charged on books purchased.

Swimming Pool

No shut down next Monday evening

The normal evening schedule of the swimming pool and gymnasium will not be affected by the Lab total drill evacuation on Monday, November 23. Users may enter the Lab at 5 p.m. or when the drill is officially completed.

Annual shutdown starts December 7

The annual shutdown for pool maintenance service is scheduled to begin on Monday, December 7. Season tickets are valid through Sunday, December 6.

Reopening date will be announced in a later issue of the Bulletin.

Basketball

The 1981-82 season of the BNL Basketball League will begin on Thursday, December 3. Any new players who would like to join the league should call Chairman Stan Gilbert, Ext. 3978.

Cafeteria Menu

Week Ending November 27, 1981

Monday, November 23		
Beef barley soup	(cup)	.55
	(bowl)	.65
Cheddar beef steak & 1 veg.		1.65
Quiche Lorraine & 1 veg.		1.65
Hot Deli — French dip sandwich		1.80
Tuesday, November 24		
Vegetable soup	(cup)	.55
	(bowl)	.65
Sauteed chicken breasts over rice		1.65
Sweet and sour pork over rice		1.65
Thanksgiving Special		
Prime Rib of Beef		
Baked Potato		
Vegetable		
$3.50		
Wednesday, November 25		
Split pea soup	(cup)	.55
	(bowl)	.65
Braised beef short ribs and kraut		1.70
Fillet of fish Parisienne & 1 veg.		1.65
Hot Deli — Grilled Reuben		1.70
Thursday, November 26		
Snackbar Service, 9 a.m. — 2 p.m.		
Friday, November 27		
Snackbar Service, 9 a.m. — 2 p.m.		

Volleyball

Mixed League standings as of 11/16/81

A Division	
Teddybares	11-1
High Society	7-5
Dinkers	6-3
Mixed Ups	6-3
Nuts & Bolts	6-6
Las Bolas	0-9
Leftovers	0-9
B Division	
Semi Tough	11-1
Puff & Stuff	9-3
TNT	7-5
KMA	5-7
Quirks	4-8
Big Boopers	1-11

Theater Group

The Theater Group will meet at 8 p.m. on Wednesday, December 2, in Berkner Hall auditorium.

The group will continue to discuss possible plays for the next production. Anyone who has a play to nominate should select a scene or two from it for the group to read; contact the program chairman, Kurt Fuchel, at Ext. 4116 to schedule time for the reading; and make copies of the scenes for each character.

Afro-American Party

Tonight the Afro-American Culture Club is sponsoring a festive Pre-Thanksgiving Party in the Recreation Building from 5:30 until 11. All BNL employees and their guests are invited. The party will feature a cash bar with dinner and sandwiches available for sale. And, of course, there will be excellent music.

Marathon Fever

On Sunday, October 25, a unique event occurred in BNL marathon history when BNL runners were simultaneously running across the Verrazano Narrows Bridge in New York City and the Golden Gate Bridge in San Francisco. Nine runners challenged the New York City Marathon. Led by Mike Bergkamp with an excellent time of 2 hours, 38 minutes, 53 seconds, all finished, with Mike Paquette, Wen-Shi Yu, and Skip Medeiros setting personal records for the event. Carrying the BNL colors to San Francisco, Bill Thomlinson set a personal record for a marathon in the Golden Gate YMCA Marathon. These performances followed by one week another best effort by Ed Gallagher in the Pepacton Paleface Marathon (Margaretville, NY). Not to be outdone, two BNL runners traveled to Newport, Rhode Island on November 1 for the Ocean State Marathon. There, Dennis Nordstrom ran his best race to date. All eyes are now on Gus Prince and Jerry Hastings as they travel to Philadelphia on November 29 for the 1st Annual Greater Philadelphia Independence Marathon.

Pepacton Paleface	
Ed Gallagher	3:13:38
New York City	
Mike Bergkamp	2:38:53
Gus Prince	3:10:23
Mike Paquette	3:18:43
Wen-Shi Yu	3:24:40
Skip Medeiros	3:36:06
Sushil Satija	3:53:29
Brian Morris	3:56:43
Tom Clifford	3:58:45
Terry Whitledge	4:31:00
Golden Gate	
Bill Thomlinson	3:14:05
Ocean State	
Terri Frei	3:29:00
Dennis Nordstrom	3:31:00

Classified Advertisements

Autos & Auto Supplies

73 MAZDA - sta. wgn, weak rotary engine, L.R. door damaged, for rebuilding or parts. $250. 727-4884 eves.

SNOWS - (2) w/rims for Chevy vega, 13". $25. Artie, Ext. 2697.

72 CHEVY - 1/2 ton pick up, 350, a/t, a/c, am/fm 8 trk, v.g. cond, needs engine. $1,000. 286-2964 before 3 p.m.

79 PLYMOUTH VOLARE - 4 dr, 6 cyl, a/t, a/c, p/s, p/b, 3,600 miles, good MPG. $3,300. 499-8377.

80 FORD VAN - fixed for camping, good cond. $5,600. 10,000 miles. 737-0246.

75 DODGE BROUGHAM - Sta. wgn, 9 pass, loaded, v.g. cond, new valve & trans. job. $1,300. Larry, Ext. 3935 or 727-1412.

74 GRAN TORINO - sta. wgn, p/b, p/s, 57,000 mi, mint cond, radial snows. $1,500. 744-4086.

79 BMW - R65 motorcycle, 650cc fairing, touring bags, 7,000 mi; 1978 Hosgvarna 250CR dirt bike, raced 1 season, lighting coil, excel enduro, accessories. Ext. 7696.

81 HONDA CIVIC - 12,000 mi, available mid December. $4,800. Ext. 3112.

TIRES - (3) 6.85-15, 2 snows, 1 reg; also shop manual for 1971 Volvo. $25. all together. 941-9242.

RIMS - (2) 14" 5 hole from Plymouth Volare. $5. ea. Ext. 2493.

78 FORD FUTURA - p/s, p/b, a/c, a/t, am/fm stereo, 21,000 mi, mint cond, good gas mileage. 473-1967.

80 FORD BRONCO XLT - p/s, p/b, a/t, V8, 9,000 mi, Dunlop radials, stereo, much more, excel cond. $8,500. 473-1967 or Ext. 2192.

72 PLYMOUTH DUSTER PARTS - windshield, $20; hood, $20; both doors, $25. Ray, 727-3608.

76 BUICK CENTURY - 57K miles. $2,500. Ext. 3619.

80 KAWASAKI KX125 - dirt bike, excel cond. 477-2269 after 5.30 p.m.

75 HONDA WAGON - excel running cond. $1,500. Firm. 744-2295 after 4 p.m.

73 CHEVY MALIBU - clean, p/s, p/b, a/t, $750. Fred, Ext. 3703 or 298-8173 after 6 p.m.

71 MERCURY MARQUIS BROUGHAM - a/c, p/s, a/t, 90,000 mi., excel cond. 581-7656.

73 AMC GREMLIN - 6 cyl, a/t, runs good. $450. Firm. Ext. 4731 or 924-0585.

79 GMC SIERRA - 1500 ½ ton pick up truck, cap, insert, dual gas tanks, excel cond, many extras. 475-0331.

73 SUPER BEETLE - am/fm stereo, cassette, excel running cond. Asking $2,000. Debi, 212-331-9548.

TIRE - 78.15 w/rim. $5. Dick, Ext. 4781.

77 AMC PACER - sta. wgn, orig. owner, many extras. $2,500. Ext. 2070 or 283-0223.

67 PLYMOUTH VALIANT - 6 cyl, good exterior, 20 MPG, good station/2nd car. $200. Bill, Ext. 3239 or 399-0002 eves.

73 CAPRI - V6, running cond. $500. 286-9606 after 5 p.m.

68 FIREBIRD - conv. p/s, chrome mags, some custom work, body good, engine good. 727-7806 eves.

81 FORD ESCORT - 4 spd/overdrive, trans. 30 + MPG, excel cond, low miles. $6,100. 589-4555.

76 TOYOTA COROLLA - a/c, new tires, excel cond, low mileage. $2,700. 475-6772.

81 DODGE ARIES-K - custom, 4 dr, 4 spd, 8,000 mi, best offer over $6,000. Blue. George, Ext. 2982 or 588-1713.

79 CHEVY PICK UP - 4 WD, short bed, 350, 4 spd, dual tanks, Scottsdale package, rear sliding window, rust-proofed, economy rear, 8,000 mi, like new. $7,200. Paul, Ext. 7130 or 727-1464.

76 CHEVY VAN - orig. owner, 6 cyl. stick, p/s, good cond, 79K miles. $2,700. Weirshousky, 757-5478.

73 AMC HORNET - 66,700 mi, 8 cyl, excel cond, a/t, a/c, extras. $950. 585-6271 call 6 p.m. - 9 p.m.

76 FIAT 128 - 2 dr, 4 spd, 43K miles, good MPG. $1,400. Ext. 2259 or 744-6294 eves.

80 SUZUKI RM80 - 20 hrs. on motor, like new. $625. 473-3626.

DUCATI DIRT BIKE - 250cc, good cond, extra parts included. Norma, Ext. 5064.

78 FORD VAN - 351 V8, 4 spd overdrive heavy duty susp. & electrics, am/fm stereo, carpeting, 39,000 mi. Ext. 7696.

SNOW TIRES - (2) A78-13, mounted 4 stud rims, '72 Pinto, etc., excel cond. Best offer. Jim, Ext. 3501 or 751-0476.

77 SR5 TOYOTA - pick up, long bed, w/cap, very good cond. 475-5789 after 6 p.m.

Boats & Marine Supplies

24' TYLERCRAFT - fiberglass sloop, shoal draft standing headroom, enclosed head, new sails 81 Honda. $5,800. Ext. 4232.

10' SNARK SAILBOAT - like new. $150. 472-1473.

18' GARVEY - 40 HP Johnson (1973) good cond. Must sell. $800. John, 286-1348 or Ext. 3292.

Free

FISH - 3 African Cichlids & 1 African catfish, need good home, tank not included. Bill S., Ext. 4434.

KITTENS - 6 wks. old, 3 all gray, 1 with stripes. Paul, Ext. 4037.

BABY CARRIAGE - free. Ext. 3107.

BULL TERRIER - male AKC registered, friendly, 3 yrs., fawn color, needs fence. 331-1780 after 6 p.m.

Yard Sales

GARAGE SALE - Sat. Nov. 21, 10 to 4 p.m., 2 Pilgrim Dr, Pt. Jeff., 331-3445. Many Fisher Price toys, small appliances, stereo, clothing.

MOVING SALE - Colonial 3 pc. sofa set, $495; Kenmore washer/dryer, $295; more. Available December. 399-2286.

Miscellaneous

BICYCLE - 2 seater w/child's seat, $75; red contemporary chair, $25. Ext. 7138 or 732-4224 eves.

FIREPLACE - zero clearance, w/chimney, like new, must sell. $100. 286-3565.

CAMERA - Minolta SRT-201, 50mm lens, skylight filter, brand new. $200. Peter, Ext. 4414 or 475-8406.

KITCHEN TABLE - w/leaf, 2 chairs. $30. 744-9822 after 6 p.m.

GOLF CLUBS - lefty Jack Nicklaus Dorado woods 1, 3, 4. $45. Mike, Ext. 4728.

DINING ROOM SET - Drexel contemporary, 4 chairs, table w/leaves, china closet, side table. $300. 929-4942 eves.

BEDROOM LAMPS - color brown & bone, 34" high, $50/pr; large recliner, good cond, $50. 928-0297.

AQUARIUM STAND - measures 30" height, base is 10"x36", $15; storm/ screen door & frame, approx. 32"x81", top & bottom inserts, white, hinges, latches. $45. 878-0717.

MOVIE PROJECTOR - Super/Regular 8mm Bell & Howell, plus screen. Ext. 7696.

BIKE - 13" childs w/training wheels, shiny red, like new. $20; red tricycle, $15. Ext. 2888.

VIDEO GAME - Atari, controls, 6 tapes. $100; Prodovit 35mm slide projector by Leitz. Ext. 7696.

FIREPLACE SCREEN - & andirons, black & antique gold, 38" wide x 31" high. $30. Ext. 4413.

DINNERWARE - Mikasa, 8/service, plus completer set, blue/green pattern, excel cond. $50. Ext. 5274 or 281-2767 eves.

OIL BURNER - gun & motor, excel cond. $45. 732-5445.

CHRISTMAS TREE - 7 ft. artificial Scotch Pine, $25. Barbara, Ext. 3437.

PANASONIC - portable 8 track player, new, yellow, operates on battery, and AC volume control. Ext. 2950.

FULL SIZE BED - mattress, box spring, frame, barely used. $70. Ext. 4743 or 924-8481 after 6.

DEEP WELL PUMP - Gould 1 HP, 2 stage. Asking $50. Louis, Ext. 2302.

SKIS - (2 pr.) 140 cm, $20/pr; 1 pair Caber boots, size 7, $25; white canopy bed, dresser/mirror, nightstand, $250. Ext. 4481 or 567-1272 eves.

LASER VIDEO - disc player Magnovox VH8000 w/2 discs, excel. $320. 929-6646.

FREEZER - upright 12 cu. ft. new cond. $170. 473-7902.

ROUND GLASS TABLE - top 46" in dia. $15. 878-2239.

ATTRACTIVE WOODEN CURIO CABINET - w/ glass shelves, mirrored back, lighted, 5'5"x2'. $150. 331-3721.

STOVE - airtight wood or coal w/grate, $100; baby crib, $25. Pete, 732-3824 eves.

WALLPAPER PASTES - worth approx. $300, will sacrifice for $45; also have installation tools. Don, Ext. 2225.

LEAF MULCHER - Craftsman, excel cond. $25. 588-7006 after 6 p.m.

DEHUMIDIFIER - $50; electric shop shine kit, $10. 821-9438 after 6 p.m.

BEDROOM SET - Sugar Hill pine, queen bed, double dr, 2 night tables, armoire, $1,500. Dave, Ext. 7764 or 698-7213 after 5 p.m.

ICE SKATES - women's size 7, $8. Ext. 7509 or 924-0569 eves.

DESK - 28"x54", 5 drawer, $85. Ext6. 4748.

POINTSETTIA - several sizes, all red, deliver week of Dec. 7th. Ray, 727-6818 after 6 p.m.

UNICEF 1981 CHRISTMAS CARDS - gifts, stationery, for catalogs & order please call Ext. 4959.

GENERAL ELECTRIC - electric counter top/stove, 4 burner, GE oven, perfect cond, timer & clock, Avocado green. $250. T/both. Ext. 2964.

ENLARGER - 35mm, 2¼x3¼, 2 lenses included, good for beginner, $20; picture frames, 8x10, wood, black w/silver, $4.50 ea; slide projector, 35mm, Airequipt electronic focus, $45; Bell & Howell, $35. trays incl. Lew, Ext. 5193.

NECK TRACTION APPARATUS - $20; shower head extension, $25; embroidered leather bag from India, $25. Marj, Ext. 3396.

TV - Magnavox 25" color, console w/brand new stereo turntable & am/fm radio, rebuilt TV chassis, beautiful wood cabinet. $300. 878-1688.

TV - color, 25" console, XL-100 RCA beautiful cond. Asking $350. Helen, Ext. 3069.

DINING ROOM - Contemp. glass 48" dia. table w/6 chairs, $350; oil burner, Sundshand 1725 RPM, $25. 331-9349.

COUNTER TOP RANGE - Hotpoint deluxe w/push button switches, 20"x20" yellow 4 burner electric. $75. Jack, Ext. 4447 or 744-3919 eves.

POOL TABLE - balls, rack & cues. $40. Dick, Ext. 4781.

1979 SEARS RIDING MOWER - Model #625, like new. $200. 472-1473.

DEEP WELL WATER PUMP - 42 gallon glass lined tank - oil burner motor. 585-7448 anytime.

MINK STOLE - sable brown, new orig. $600. Asking $275. 475-0144 eves after 6 p.m.

BLANK CASSETTE TAPES - quality C-90 FeO, FeCr & Cr02, $2.75 ea. Ext. 2521 or 928-8379 eves.

12" CRAFTSMAN - radial arm saw, blades, on steel legs w/wheels. $375. 744-8919.

EARN EXTRA MONEY FOR CHRISTMAS - w/your own Ceramic Business. Kiln w/hook ups, molds, paints & macrame supplies. 289-3917 after 3:30.

WASHER & DRYER - both in good working order, Kenmore washer & GE 220 Volt dryer (white) $100. ea. Terry, Ext. 3284 or 281-0360.

FIREWOOD - oak, 4'x8'x16-18", $55. 924-3236.

SPACE HEATERS - brand new, $25. ea. 2 for $45; traverse rods, (3) size 48-84", never used, $10. ea; high chair, excel cond. S. Spark, Ext. 4111.

WORK BENCH - bookcase, oak 6'Hx3'W, $100; 2 Lane burl wood cubes 11" square, 1-20"H, 1-30"H, $40/both. Louisa, Ext. 4207 or 286-2251.

REFRIG - Kenmore top freezer, $150; gold sofa 8', excel cond. $200. 281-4140.

MUST SELL - Andrea 23" B&W w/rolling cart, v.g. cond. $30. firm. Azzara, Ext. 4758.

DINING ROOM SET - round table, 4 chairs, china closet. $300. Tony, Ext. 3354.

SONY B/W VIDEO CAMERA - w/AC power supply, all cables & acessories. Hardly used. $125. 421-1402 eves.

CHRISTMAS SALE - wheel thrown pottery, brooms, wreaths, Christmas ornaments. Dec. 4, 5, 6. Linda, 732-5454.

"OLD MILL" WOOD STOVE - w/blower in mint cond, used one season. Best offer. 331-1572.

DELICIOUS FLORIDA FRESH - navel oranges, 40-50, $9.50; pink grapefruit 18-24, $7. Dana, 751-8899 after 3 p.m.

OUTDOOR CHRISTMAS LIGHTS - approx. 70 bulbs & sockets. Ann, 286-2280.

BARBIE DOLL CLOTHES - all handmade, beautiful, in time for Christmas Holidays. 286-1416.

Real Estate

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

For Rent

MT. WASHINGTON VALLEY CHALET - new, 3 bdrms, 2 baths, all appliances, near 6 major ski areas. 12/14 - 12/20, 1/11 - 1/17, 2/22 - 2/28. $400/wk, partial wks or wkends avail. 744-5161 after 6 p.m.

BELLE TERRE - wooded privacy, no lawn upkeep, renovated 1980. $800/mo. Available Jan. 15. 928-0281 after 7 p.m.

MIDDLE ISLAND - 2 bdrms, l/r, d/r, fp, carpeted, a/c, gas heat. Sublet. Available immediately. $350/mo. + util. Ext. 2626 or 924-4815 after 5 p.m.

VERMONT - hike, XC or downhill ski, Cape Cod, fully equipped, 3 bdrms, 2 baths. fp, garage, rent wkends or weekly. Reasonable. 732-6499 after 6 p.m.

SHIRLEY - 2-room apt., furnished, 5 min. to BNL, priv. entr., incl. util. For info, call Mrs. Mayer, 281-6099.

MASTIC BEACH - 4 bdrm Cape, eik, l/r, d/r, porch & shed, large property, walk to stores, 10 min. to BNL. $350/mo. (1 mo. security). Terry, Ext. 3284 or 281-0360.

STONY BROOK - 4 bdrm, 2½ baths, l/r, d/r, f/r, Colonial, 2 car garage, all appliances, partially furnished, walk to Univ. $700/mo. + util. Ext. 4273.

SHIRLEY - furnished 3 bdrm, 3 baths, l/r, d/r, f/r, full bsmt, garage, freezer, refrig, dishwasher, on wooded acre, 8 mi. from BNL. Available Jan. 1st. $350/mo. Lewis, 281-7547.

YAPHANK - 5 room Modern Duplex apartment, 3 mi. from BNL, l/r, d/r, kitchen, 2 bdrms, full bsmt & patio. $425/mo., 1 mo. security. includes heat & water. 581-2909.

For Sale

POCONO CAMPSITE - vacation place, own your own site, located on 400 acres, lake view site, includes W/E/S, easy terms. 928-0066.

MASTIC BEACH - 4 bdrm Cape, eik, d/r, 160x100 prop., low taxes, gas hot water and cooling, elec. heat, l/r w/wood burner, existing 8½% Farmers Mortgage. $28,000. 281-0360 after 6 p.m.

Wanted

GASOLINE ENGINE - 5 hp Briggs & Stratton, horizontal shaft. 281-8274.

FORD RIMS - (2) 14" to fit 1979 Ford Fairmont w/4 lug pattern. Artie, Ext. 2697.

HOUSE TO RENT - working couple looking for house in Bellport/E. Patchogue area. Well trained dog. 929-6980.

INFORMATION - on Theory & Operation of the Breathalyzer. Will pay money for. Mark, Ext. 4372.

DONATIONS - used & repairable musical instruments for Children's Music Fund, tax deductable. Nina Stewart, 286-9616.

HOUSE TO RENT - Bellport Village or Brookhaven Hamlet. Ext. 5055 or 286-0919.

AMBITIOUS PERSON - $200/$300/mo., 6-8 hrs./wk. 698-5861 after 7:30 p.m.

USED PING PONG TABLE - w/accessories, good cond. Kristin, Ext. 3372.

TRAINS - Lionel, American Flyer, accessories, any cond. brings good price. Carole, Ext. 3362 or 924-4097 eves.

USED ELECTRIC TYPEWRITER - also used banjo. Reasonable. Lee, Ext. 7629 or 929-3023.

WIDE ANGLE LENS - w/screw mount. Rick, Ext. 3051.

ROOMMATE - to share comfortable 3 bdrm Condo in Strathmore Ridge, w/w, washer/dryer, 5 min. to BNL. $200/mo. + ½ util. Neil, 924-0309.

HOUSE SITTER - 2 mos., starting January, reliable, pay utilities. 928-8071.

FENTONWARE THUMBPRINT GLASSES - dishes, sizes, colors, any amount. Karl, Ext. 4192 or 744-2461 after 5:00 p.m.

MCDONALDS CONTEST STAMP - #657 also #667. Ext. 3642 or 727-0364.

FILE CABINETS - 4 or 5 drawer, for church. Don, 286-1396.

USED DOUBLE STROLLER - in good cond; also high chair & automatic baby swing. Maryanne, 399-0039.

CHILD CARE - on site, Jan. - June 1982, for infant, mother working on site. Karen, 286-0428.

PERSONS INTERESTED - in skiing weekend of Jan. 29th or Feb. 26th. For info call Bea, Ext. 3571.

HOUSEMATE - to share 2 bdrm house, female, please. Four appliances. $200/mo. includes all. Ext. 2048 or 281-0184.

Car Pools

PATCHOGUE/LIRR STATION - ride wanted every Monday to BNL (8:10 train arrival). Jim, Ext. 3372.

COMMACK RD/EXIT 52 LIE - park & ride, additional drivers, existing car pool. B. Peterson, F. Ferraro, Ext. 3284 from 8:30 to 5:00 p.m.

BABYLON/WEST ISLIP - driver needed for 4 person car pool. Ext. 2493.

RIDE WANTED - for reliable paying rider from Bellport on Mon., Wed., Fri. mornings, arriving at Lab 8:15 a.m. 286-8724.

Lost & Found

LOST - white knee pads at gym Monday Nov. 2nd. Ext. 7509 or 924-0569 eves.

Services

Services are listed as a courtesy to BNL employees. They are neither screened nor recommended by the ***Bulletin.***

PLUMBING - Lab discount. John, 654-8189.

RUBBER STAMPS - plastic laminating, pressure sensitive tapes & labels, desk, nameplates, badge engraving. 286-3377 after 6 p.m.

FIREWOOD - split, seasoned oak 4'x16'x18'. $110 delivered. 924-4284 or 924-3919.

BABY SITTING - capable & reliable mother, English & Mandarin speaking, on-site apartment. Louise, Ext. 3131.

TUTORING - experienced in learning disabilities. Math and reading. Carol, 929-3529.

LIMO SERVICE - luxury chauffeured for proms, weddings, airport, all occasions. Roy, Ext. 4664 or 744-8779.

FIREWOOD SPLIT - and delivered. 4'x4'x8' cord. $130 unseasoned, $140 seasoned hardwood. 698-0592.

SEND GREETING MESSAGES - to your friends & relatives free by amateur radio. Call Dave, 472-2394 eves.

ASPHALT PAVING - and sealing. Bob, 475-4382.

SMALL APPLIANCE REPAIRS - vacuums, sewing machines, typewriters, etc., North Patchogue. 654-3900.

HOUSE PAINTING - interior/exterior, professional quality materials, insured. Bob, 289-7657 after 6 p.m.

FIRESIDE CHIMNEY SWEEPS - fireplaces, wood, coal & oil flues, professionally cleaned, Lab discount, insured. Bill, 584-6425.

SKI GORE MT. - Feb. 5 - 7th, chartered bus, interested? Sue Norton, Ext. 2050 or Wally Hughes, Ext. 4679.

RESUME PREPARATION - low cost, professional service. Bill Polvent, 821-9081.

CHEESE CAKES - quiches, pear tarts, apple streusel pie, pecan pie. Order now, 821-1039

FLOOR COVERING SPECIALS - Congoleum, Mannington. Material & insulation, $95. 265-4513.

CARPENTRY REPAIRS - and modifications. No job too small. 929-4251.

Classified Ad Policy

Deadline is 4:30 p.m. Friday for publication Friday of the following week.

1. The Brookhaven Bulletin's classified section may be used only by active and retired Laboratory employees.
2. All items for sale or rent must be the advertiser's property.
3. Ads for material acquired for resale in association with a full or part time business cannot be accepted.
4. Ads for the sale or trade of firearms will not be accepted.
5. Ads not carried because of space restrictions will be held for publication in the next issue.
6. Ads are run only once and must be resubmitted if they are to be repeated. One ad per person per week.
7. **Property for sale or rent cannot be accepted on this form. Special Real Estate Ad Forms are available at the office of the Brookhaven Bulletin, Building 134.**

☐ For Sale: Autos & Auto Supplies ☐ For Sale: Boats & Marine Supplies ☐ For Sale: Miscellaneous ☐ Car Pools ☐ Lost & Found ☐ Services ☐ Wanted ☐ Free

Please print your ad below in 15 words or less using one word per block. Include name and phone number to call.

Note: The following must be completed for your ad to appear.

NAME (Please Print) .....

Employee's Signature ..... Life No. ..... Ext. .....

Send to Brookhaven Bulletin, Building 134 (Ext 2345)

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