BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

Second STEM

In October, the scanning transmission electron microscope (STEM) group of the Biology Department acquired its second high resolution STEM microscope, which is on long-term loan from Professor Michael Beer at Johns Hopkins University. The second STEM, which is worth approximately one million dollars, is essentially a copy of the prototype instrument built by biophysicist Joseph Wall and others while he was a graduate student under Albert Crewe at the University of Chicago in the late 1960's. Along with the BNL STEM, it is one of three in the world capable of easily imaging single heavy atoms.

"We were planning to build another instrument for development work," says Wall, "so we were fortunate to obtain one from Johns Hopkins." In addition to the working STEM, Johns Hopkins has loaned a liquid helium temperature cold specimen stage. Keith Monson from Johns Hopkins has joined the BNL STEM group as a senior research associate.

"We very much wanted to have another microscope on which we could do component testing," explains Wall. "We have some new components for the BNL STEM which will dramatically improve operations once they are tested thoroughly. Anytime we make changes, we face the possibility of being shut down for a couple of months."

One of the components to be tested on the new STEM is a new electron gun, which was built at BNL, has a field emission tip and generates a variable intensity beam of electrons in an extremely high vacuum (10^{-10} torr). "It should allow us to do low-dose microscopy much more conveniently," says Wall.

The new STEM will also permit the group to do electron energy-loss spectroscopy (EELS). "As an electron goes through the specimen, two things can happen to it," explains Wall. "The electron can collide with a nucleus and be deflected to a large angle. We have a detector that measures all of those scattered electrons and gives a signal that is proportional to the molecular weight of the specimen.

"On the other hand, an incident electron can collide with an electron in an atom of the specimen and give up a certain amount of energy to the atomic electron, exciting it to a different energy level," continues Wall. "The amount of energy that is lost by the incident electron is characteristic of the bonding energies of the atom it hits, so it tells you chemical information about the specimen. Thus, we are interested in doing energy-loss spectroscopy for elemental mapping, and discrimination between aromatic and aliphatic regions of a specimen, for example DNA versus carbohydrate."

Using EELS, the STEM group will attempt to find out where nucleic acid is in various complexes such as ribosomes and viruses. "We will use tobacco mosaic virus (TMV) for our initial experiments and as our standard because we already know from x-ray studies that its RNA is a single strand running from one end of the virus to another at a radius of 40 angstroms," says Wall.

"We are already doing mass mapping and radial density mapping using the mass measurement detector," adds Wall, "but the energy-loss spectroscopy will tell us what elements are contributing to the mass and density profiles."

Using the density profile of their TMV specimens, the STEM group is working on a specimen preparation rating system. "Specimen preparation is more art than science," comments Wall. "To make it a science, we need some objective rating scale which would allow us to quantitatively measure the changes in the image resulting from changes in the prep. Using this scheme, we have been able to demonstrate the superiority of a new specimen preparation protocol developed by biology associate Kristin Chung.

"We hope that in a year or so, we can upgrade the new STEM to the same level as the BNL microscope, and to the point where we can use it for some of the experiments which are normally done on the BNL STEM," states Wall. To do the upgrade, the STEM group has applied to the National Institutes of Health (NIH) for a supplemental grant. Technical associate Frank Kito will supervise the upgrade work.

The BNL STEM is operated under a NIH Biotechnology Resources grant as a user facility. About 30 groups from the U.S. and Canada regularly use the microscope to look at proteins, DNA, membranes, viruses and other biological structures.

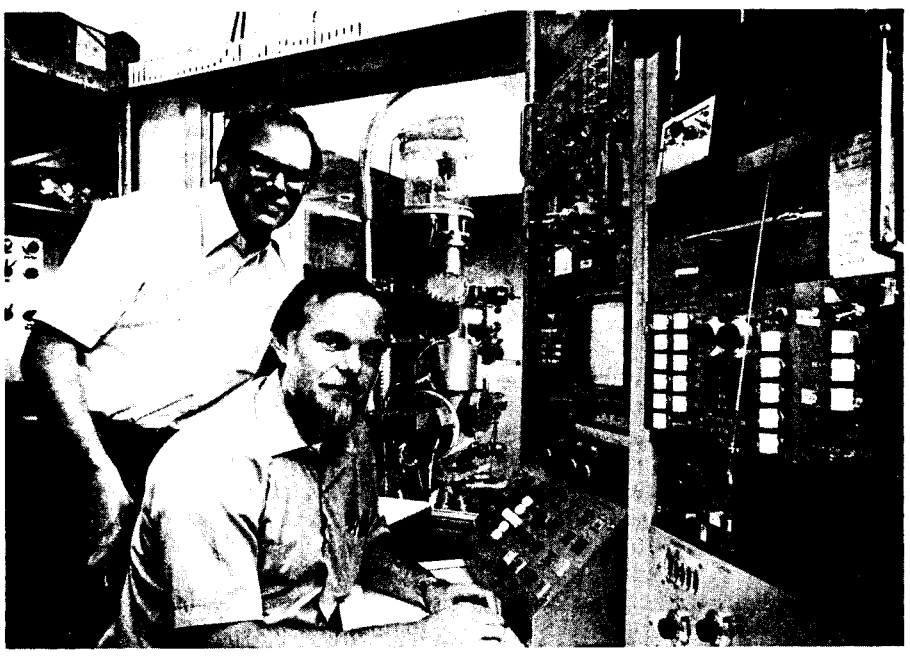
A scanning transmission electron microscope scans a specimen instead of irradiating it all at once as does a transmission electron microscope, and it forms its image of the specimen from the transmitted electrons instead of the secondary electrons used by a scanning electron microscope.

Instead of illuminating an entire specimen at once, STEM irradiates one spot at a time with its two-angstrom beam, scanning 512 spots by 512 spots in a square array. By changing the distance between spots, the apparent magnification is changed. A computer controls the time the beam dwells at each spot and the size of the steps in between spots.

The electrons are focused before they hit the specimen and are collected afterwards. While going through the specimen, some of the electrons interact with it, losing energy to whatever they hit and changing their course. Detectors count every electron, and each electron contributes to the picture. As a result, fewer electrons are needed to record an image than with other electron microscopes, so the radiation damage to the specimen is minimized.

The actual image of the specimen is the collection of counts on the detectors which are combined in a computer to produce an image on a TV monitor, and the data can be stored on magnetic tape for later analysis.

Concludes Wall, "Our group is looking forward to a highly productive year during which we expect to place the second microscope on-line, upgrade the current STEM, and make substantial advances in specimen preparation, heavy atom labeling and image analysis." — Marsha Belford



Mort Rosen

(From left) Joseph Wall and James Hainfeld with the BNL STEM in the background.

The L-shaped object in the lower right corner magnified at 750,000×, is a chain of ten protein molecules, (avidin). The black dots are clusters of 11 gold atoms labeling the sites where biotin is bound to avidin. This is the first time molecules have been labeled to such a high resolution.

Techniques for Better Resolution

How to make an image with enough contrast, but without destroying the biological specimen is the catch-22 of high resolution electron microscopy.

A certain number of electrons are necessary to see an unstained specimen, and more electrons make images with less "snow" or noise, permitting more structural detail to be seen. If the magnification is high enough and enough electrons irradiate a specimen, individual atoms can be seen.

However, the more electrons focused on an area, the greater the damage to a specimen. So the total dose of electrons each specimen receives must be limited. Such low-dose images can be very noisy, and though STEM is capable of high resolution, it cannot distinguish much detail at low dose.

To overcome this problem, biophysicist James Hainfeld and senior research associate Paul Furcinitti are using Fourier techniques and computer image processing to align and average many noisy images of the same structure. In creating this average, they are increasing the signal to noise ratio, making higher resolution details visible.

Using a dose low enough not to destroy protein, single platinum atoms cannot be visualized. However, by aligning and superimposing numerous images of the molecules, the signal to noise ratio is high enough to see where a platinum atom is bound to the protein. To mark a specific site on a protein, research associate James Lipka, collaborating with NIH scientists, has chemically attached a complex containing a single platinum atom.

Biology associate George Latham and Lipka have been working on similar techniques to label specimens for the microscope using clusters of metal atoms. They have succeeded using a compound containing 11 gold atoms and one with 11 tungsten atoms. These labels are ten times smaller than conventional electron microscope labels and are thus able to define structures to a much higher resolution.

"We are attempting to change the electron-scattering ability of proteins by modifying them with inorganic reagents containing metal atoms," explains Lipka. "We are interested in developing reagents that will react in the same way standard biochemical reagents do, but which have heavy metals. The heavy atoms are markers which can be visualized directly in our microscope, showing up as bright spots."

The 11 gold atoms are surrounded by amino groups, and Latham and Lipka have found a way to attach it to carbohydrates bonded to proteins. The STEM images of the gold atoms show where the carbohydrates are bound to the proteins. "We have also been able to attach this gold cluster directly onto an amino acid residue of proteins," adds Lipka.

"The problem is choosing the right organo-metallic," continues Lipka. "For conventional electron microscopy, thousands of heavy atoms can be attached to cells. Our labels have to be much smaller because we are working on the molecular level, yet they have to be dense enough to be seen directly and stable in water."

These heavy atom reagents will be made available to STEM users and collaborators as they are developed and better characterized.

Inside Info

Nuclear engineers Dimitri Cokinos, Partha Neogy, and John Carew of the Department of Nuclear Energy won the Best Paper award given by the Reactor Physics Division of the American Nuclear Society at a meeting held last November. The name of the award-winning paper is "Comparison of a Center and Off-Center BWR Control Rod Drop Accident."

A Visitor's View

Meet This Year's Fulbright Scholars

They come from different countries. They have different research interests. And they are at different stages in their careers. But Francisco Botella-Olcina and Detlef Gabel have much more in common than their differences would indicate: Both wanted to come to the United States and continue their research at BNL. And both realized their ambitions by being appointed visiting Fulbright scholars for the 1984-85 term.

In 1946, Senator J. William Fulbright introduced the legislation which resulted in the establishment of the Fulbright Program, with the broad purpose of increasing "mutual understanding between the people of the United States and the people of other countries." This is done through grants, which enable teachers, students and post-graduate scholars from the U.S. to go overseas for advanced research, university teaching and graduate studies, while their counterparts from abroad come to the U.S. for similar reasons.

Under the visiting scholar program over 900 post-graduate scholars were named to visit the U.S. at some time during the 1984-85 term. For Detlef Gabel, being one of them is "a great honor." A professor of chemistry at the University of Bremen, West Germany, Gabel, who attained his Ph.D. in 1973, wanted to come to BNL to take advantage of the facilities available here for his research in boron neutron capture of tumors.

Having been at the Lab several times before — his first visit was two-and-a-half years ago — Gabel was familiar with Brookhaven and, in fact, had established a collaboration with the Medical Department.

Gabel's work at BNL centers on boron-10 (^{10}B). Though boron-11 is the more predominant of the two isotopes of boron that exist in nature, only ^{10}B has the ability to capture neutrons, a feature that Gabel, a protein chemist, would like to exploit as a therapy for tumors. "The idea of this therapy," he explained, "is that, if one can incorporate boron-10 in a tumor and irradiate the tumor and its surrounding area with slow neutrons, the slow neutrons will be captured by the boron-10, depositing a very high local dose in this tumor and nowhere else."

But how do you get ^{10}B to settle in a tumor? Like salmons returning to their breeding grounds, some molecules unerringly find their way to a tumor. If ^{10}B is attached to such a molecule it may go along for the ride. "That's my largest effort now," Gabel said. "We know of molecules without boron that end up in the tumor. I'm working mostly as a synthetic chemist, trying to synthesize molecules with boron that will also end up in the tumor. These molecules include antibodies, porphyrins and several melanin-seeking agents. We have several ways of approaching this, and we hope that sooner or later, perhaps within a couple of months, we can synthesize some compounds that have those properties we are looking for."

In the Medical Department, Gabel works with program administrator Ralph Fairchild for the biology and physics parts of the process and with Donald Borg for the chemistry parts. He also confers with boron chemist Manny Hillman of the Department of Applied Science.

Working with these people was part of the attraction for Gabel, whose Bremen group consists of several Ph.D. and graduate students. "But there's nobody there with whom I can talk on an equal basis, because they are still learning things. Here, I can talk with people who have different backgrounds in this wide area of radiation therapy."

A second attraction was Brookhaven's facilities. Explaining their rarity, Gabel said, "I would say there are only two places in this country where radiation biology and neutron capture therapy can be carried out — Brookhaven and the MIT reactor."

A third positive aspect, said Gabel, is living on site, "because you meet so many different people from so many different countries. It's a stimulating cultural exchange."

Gabel and his wife will return to Bremen at the end of March, when his Fulbright expires. "I have to go back to my permanent position," he explained, "but I think that there will be a continuing cooperation between Brookhaven and Bremen for several years to come."

While Gabel's career is well-established, Francisco Botella-Olcina is just at the beginning of his. That's why it was important for him to become a visiting Fulbright scholar. Botella, a teaching assistant in theoretical physics at the University of Valencia, Spain, explained, "I finished my Ph.D. in Spain one year ago. Then I had to go outside to learn and to develop if I wanted to continue. In Spain, there are not too many facilities. You spend all your time in class with teaching and things like that."

Two years ago, theoretical physicist Ling Lie Chau of BNL's Physics Department spoke about weak decays and CP violation at a meeting in Spain organized by Botella's supervisor. Then last winter, Botella attended an international conference on weak interactions organized by Chau at Erice, Italy. From what he learned at those meetings, Botella's interest in coming to BNL grew. With Chau's consent to act as his advisor at BNL, he applied for a Fulbright, submitting a program of work in a high energy physics field: the phenomenology of electroweak interactions.

Alex Reben

Francisco Botella-Olcina

Alex Reben

Detlef Gabel

Phenomenology, as Botella explains it, "is essentially to make a study of some physical phenomenon, some process, and to try to learn if it is possible to get information on some fundamental theory."

In Botella's case, the theory of interest is the electroweak theory, which joins the weak interaction, which is associated with radioactive decay, and the electromagnetic interaction, which accounts for the force that holds electrons and nuclei together to form atoms, into a single unified theory.

The way to verify such a theory is by experimentation. And that's where phenomenology comes in, answering such questions as: What do experimental results mean to the theory? What kind of an experiment should be undertaken to test the theory? "Sometimes you can calculate something that it's impossible to measure, at least for the moment," said Botella. "Therefore, with this calculation, there is no chance to make an experiment. So it's important to have people who say, 'O.K. That's possible to make; that's not.' Or, 'That's difficult, but you're going to learn a lot from this type of experiment.' "

Brookhaven is an ideal place for this type of work because theorists and experimentalists work side-by-side. In addition, said Botella, "The AGS has a long tradition of kaon physics, which has been very important in the understanding of the quark sector of the Glashow-Weinberg-Salam standard model of electroweak interactions. At the suggestion of Dr. Chau, we are working in rare kaon decays —what we can learn to get deeper insight into the standard model and beyond. And here you have the facilities. People are doing this type of experiment and you can ask them. Such interaction is a possibility that this type of laboratory offers. You cannot imagine it in Spain."

Botella, who is living on site with his wife and young son, is already looking beyond August when his Fulbright will expire. "I'm planning to apply for an extension, to spend another year here," he said. "The stimulating environment provided by the High Energy Theory Group and the possibility of interaction with experimentalists makes BNL a very good place to learn new things and to work in new fields. So it would be very fruitful to stay here one more year."

Although BNL's records have not separated visiting Fulbright scholars from other visitors over the years, Glenn Price of the Office of Scientific Personnel said that Brookhaven has served as a host institution regularly, for a long time, adding, "I would imagine that we've had Fulbright scholars here for as long as there's been a Lab."

— Anita Cohen

Alex Reben

Last week, BNL was presented a Small Business Award from the Department of Energy in recognition of outstanding performance and exceptional program support in FY 83. In that year the Lab awarded 55.3% of its contracts and procurement to small businesses. At the ceremony were (from left) Richard Chester, Contracts & Procurement; Vincent O'Leary, Assoc. Director; Gregory Ogeka, DOE; James Desmond, Business Mgr.; and David Schweller, Mgr. of DOE's Brookhaven Area Office.

WIS Meeting

Deputy Director Martin Blume will discuss future directions of the Laboratory in a talk, "The Ghost of Christmas Future," at the next Brookhaven Women in Science meeting. The dinner meeting will be held on Wednesday evening, January 30, beginning at 5:30 p.m., in Room A, Berkner Hall. A short business meeting will precede Blume's talk at 6:15 p.m.

Those who plan to attend should send a check for $10.50, payable to Brookhaven WIS, to Angela Boccio, Bldg. 490, before January 29. All are welcome.

Arrivals & Departures

Arrivals

Marian Cholewa ..... DAS
Rodney T. diGirolamo ..... Physics
Douglas J. Dittrich ..... AGS
Andris Garsils ..... Contr. & Proc.
Aron Korostyshevsky ..... Physics
Richard W. Rothe, Jr. ..... Physics

Departures

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

Lynn E. Roberts ..... AGS

PR Wants You

If you're a scientist or engineer, and you can trace your interest in your work back to when you read Popular Mechanics magazine as a child, then the Public Relations Office is looking for you. Wondering why? Call Anne Baittinger, Ext. 5055, to find out.

Doublespeak

When you substitute "unlawful or arbitrary deprivation of life" for "killing," you win the 1984 Doublespeak Award.

The National Council of Teachers of English cited the U. S. State Department as its winner.

Other nominees:

- "controlled flight into terrain," for airplane crash — National Transportation Safety Board.
- "permanent pre-hostility," for peace — The Pentagon.
- "a pre-dawn vertical insertion," for the invasion of Grenada — U.S. State Department.
- "collateral damage," for civilian casualities in nuclear war — The Pentagon.

—Communication Briefings, January 1985.

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CREF Values

January	66.50	February	64.21
March	65.37	April	65.34
May	60.81	June	61.71
July	60.35	August	66.91
September	66.75	October	66.70
November	65.69		

December $67.04

Indoor Gardening

Light is one of the limiting factors for growing houseplants successfully indoors, especially in winter. With the heating system on, heat and low humidity can be problems too. One solution is to choose plants that are happy with low light while demanding little care. Such plants will thrive as long as the roots are kept moist. Cooperative Extension suggests:

- Chinese Evergreen (Aglaonema spp.). This plant can grow directly in water. It prefers warm temperatures, about 70° F.
- Cast-iron plant (Aspidistra elatior). It grows as an expanding clump, about 18 inches tall.
- Holly Fern (Cyrtomium falcatum) does best in the shadowless light of a north window. Cool temperatures preferred (50 - 55° F).
- Nerve plant (Fittonia spp.). Prefers warm room temperatures. Very sensitive to drafts. Provide additional humidity. A good terrarium plant, too.
- White flag or snowflower (spathiphyllum spp.). Prefers warm room temperatures. Likes humidity. Will flower in medium light.

Cafeteria Menu

Week Ending January 25

Monday, January 21		
Cream of chicken soup	(cup)	.65
	(bowl)	.85
Veal patty scallopini with egg noodles		2.20
Western omelet & 1 veg.		2.10
Hot Deli — B.B.Q. top round of beef	(bread)	2.10
	(roll)	2.30
Tuesday, January 22		
Vegetable beef soup	(cup)	.65
	(bowl)	.85
Roast turkey with bread stuffing & giblet gravy		2.20
Hungarian noodle bake & 1 veg.		2.10
Hot Deli — Chili dogs		2.15
Wednesday, January 23		
French onion soup with croutons & grated cheese	(cup)	.65
	(bowl)	.85
Baked meatloaf with mushroom gravy & veg.		2.10
Ham & broccoli roll		2.10
Hot Deli — breaded chicken breast	(bread)	2.15
	(roll)	2.35
Thursday, January 24		
Split pea soup	(cup)	.65
	(bowl)	.85
Breaded turbot filet & 1 veg.		2.10
Spaghetti special "All you can eat" with garlic bread (sorry, no take-out orders)		2.30
Hot Deli — turkey breast	(bread)	2.10
	(roll)	2.30
Friday, January 25		
Manhattan clam chowder	(cup)	.65
	(bowl)	.85
Old-fashioned beef stew on rice		2.20
Tuna-noodle casserole & 1 veg.		2.10
Hot Deli — Baked ham	(bread)	2.00
	(roll)	2.20

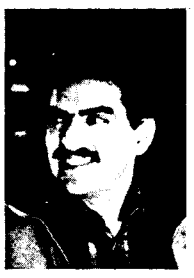
Speaking Out

Reporter: Bernice Petersen
Photographer: Alex Reben

The Lab has developed a new policy which prohibits smoking in certain areas and is to take effect February 1. We asked employees what they thought about this policy:

Tom Tully (GTE on site) — I gave up smoking about two years ago, and I think this is a good policy. As it happens, nobody in my whole office smokes.

Michael Pick (DAS) — It's excellent. One thing I would add, though, is to have a smoking section in the cafeteria. I notice the smoke particularly at breakfast.

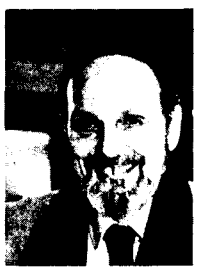


Dan Spandau (DAS) — I think it's a good idea since it conforms to Suffolk County regulations. In my section of the building, there's only one smoker, and it's really no problem.

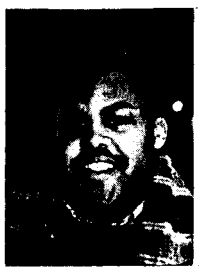
Joann Langan (Applied Math) — I think the policy shows awareness of the strong feelings non-smokers have on this subject. I am fortunate because the people in my building have always honored the no-smoking sign in my office.

Phil Metz (DAS) — I think it's a great idea. I am a non-smoker, and there's a lot of smoking in my area. I hope this policy will reduce the smoking at meetings and other public spots, which will help.

Pradip Saha (DNE) — This is a good policy, and for those people who are bothered by smoke, their rights are preserved. In our group, it is not a problem because we don't have that many smokers. I see fewer smokers these days than four or five years back.



John King (C&P) — I am a heavy smoker, and I think it's an excellent policy. It gives smokers an incentive to quit. As it is, I do not smoke around non-smokers. Us "bad people" are losing ground every day.



Alex Heard (Semester Student) —I think it's perfect because, you know, smoking messes some people up. I get congested, and I think no smoking is a good policy anywhere. At my school, Knoxville College, they don't have a smoking policy — yet.

Eleanor Dahl (DNE) — I'm a smoker, and I think the policy is right. I have given up several times, but sometimes the stress of giving up is as harmful as smoking. But when I am smoking, I don't think I should impose it on others. At the Lab, there isn't that much smoking, and I find that, generally, it's not the men who smoke, it's the women who do.

Brian Culwick (NSLS) — I am entirely in favor of it. I've never been a smoker, so it's easy for me. But it is an official discouragement of people who are still smoking and should make a difference at meetings and conferences.

Elaine Rowland (Chemistry) — I have mixed feelings about it. I am now a non-smoker, wasn't always, and I feel that the non-smokers have had to suffer the consequences of smoking everywhere for too long. I hope a compromise can be worked out to most people's satisfaction.

NYC Train Trip

The Hospitality Committee is planning a group railroad trip to New York City on Wednesday, January 30. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is $5.00; children under five years ride free.

Reserve a ticket by sending your fare through the U.S. mail to BNL, P.O. Box 322, Upton, New York 11973. Please do not send cash. Checks or money orders, payable to BNL, must be received by Thursday, January 24. Put the date of the trip, your BNL life number and your phone number on the back of your check or money order. Tickets will be given to you at the railroad station on the day of the trip. Refunds will be made only if cancellations are received by the Monday morning preceding the trip.

Attention Visitors

The International Hospitality Committee of New York is able to provide free tickets to City events for visiting foreign scholars and their families. Now available are tickets to a concert by The National Orchestra of New York at Carnegie Hall on Tuesday, January 22 at 8 p.m. The program will consist of works by Stravinsky and Sibelius. Foreign scientists visiting Brookhaven can obtain tickets by calling the Office of Scientific Personnel, Ext. 3338.

Ski Trip

The Singles Club has some openings left for the Gore Mountain ski trip, February 22-24. The bus will leave from BNL approximately 5:30 p.m. Call Doris Terry, Ext. 2228.

—BERA News—

Cooking Exchange

On Wednesday, January 23, members of the International Cooking Exchange will demonstrate some vegetarian dishes including lentil walnut loaf, sesame bars and spinach casserole.

Cooking Exchange meetings are held in the Recreation Building on the 2nd and 4th Wednesdays of each month from 12:30 to 2:30 p.m. Meetings are open to all employees and their immediate families. A $1 donation entitles those present to a copy of the day's recipes, samples of the prepared dishes and coffee or tea. Babysitting is provided at 50¢ for each child.

For more information contact Susan Sears, 744-7831, or Dee Polychronakos, 744-3578.

Microcomputer Club

A talk on "The IRS and Personal Computers" will be given by Frank Federmann, Chief Internal Auditor, on Thursday, January 24, from noon — 1 p.m. Issues such as what expenditures qualify for a deduction, depreciation and tax credit will be discussed. Meeting place is in the Biology Department library, first floor.

Theater Group

The BNL Theater Group will meet in Berkner Hall on Friday, January 25 at 7:30 p.m. After some socializing, a business meeting will be held at 8 p.m., followed by a reading of portions of "The Physicists" by the Swiss playright, Friedrich Durrenmatt. All those interested in theater, whether members of the Theater Group or not, are invited to attend.

Volleyball

	W-L
A League	
Dinkers	6-0
UpFagrabs	6-0
Semi Tough	5-1
Mixed Ups	1-5
Nuts and Bolts	0-6
Teddy Bares	0-6
B League	
TNT	5-1
Fossils	4-2
Set Ups	4-2
Chungas Revenge	2-4
Phoubars	2-4
Servers	1-5
C League	
Tigers	5-1
Capt. Midnight	4-2
Couples	3-3
Screw Balls	3-3
Craw	2-4
Quarks	1-5
Open League	
Phoenix	6-0
Odds & Sods	5-1
Half Lifes	3-3
Rowdy Radicals	2-4
Generic	1-5
Team 6	1-5

Bowling

Red/Green League

High games were bowled by E. Meier 269/619 scratch series, J. Morris 231, J. Muller 231, K. Asselta 223, J. Ferrante 222, N. Combatti 222, H. Arnesen 222, T. Prach 212, R. Larsen 211 202/600, E. Sperry IV 204/203, E. Sperry 204.

Purple League

Ed Meier rolled a 214, Bob Jones 209, Joe Ferrante 201, Elaine Zukowski 194, Sharon Moore 187, Mary-Grace Meier 181/179, Marge Stoeckel 178. Four Of A Kind are the winners of the first half.

White League

Bob Barberich had a 234, Paul Callegari 220, Gene Hassell 217/200, Steve Gushue 208, Joyce Pinelli 202, Jeannette Thiede 198, Jeanne Penoyar 190. The Gropers are the winners of the first half.

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, 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.

2169. SECRETARIAL POSITION - Requires AAS degree in secretarial science or its equivalent and a broad knowledge of Laboratory policies and procedures. Excellent organizational ability and oral and written communication skills are necessary. Word processing experience is desirable. Will perform various secretarial functions within the Division. Personnel Division. Reposting of Job #2165.

2170. RIGGER, GROUP LEADER - Plant Engineering Division.

2171. DRIVER - Must possess a class 3 license or be able to obtain one within three months. Supply and Materiel Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2172. P&GA SPECIALIST - Requires one to two years' experience operating a shared logic word processing system. Photography and Graphic Arts Division.

2173. PHYSICS ASSOCIATE - Requires a BA degree in physics or the equivalent experience in the design, construction and operation of detector systems used in High Energy Physics. Responsibilities will include assisting in the analysis of data and the operation of experiments in the Relativistic Heavy Ion Program at the AGS. Chemistry Department.

2174. SECURITY ENGINEER - Requires engineering degree or applicable technical expertise and military background. Will provide a systematic approach to total security planning and in addition will be responsible for all other aspects of technical security including classified documents. Excellent oral and written communication skills and demonstrated planning capabilities are necessary. Must be able to obtain a DOE "Q" clearance. Safeguards and Emergency Services Division.

Autos & Auto Supplies

77 CHRYSLER CORDOBA - a/c, p/s, p/b, a/t, new tires & battery, good cond., $2,200. JU8-3775.

77 PLYMOUTH VOLARE - 4 dr., 6 cyl., good cond., stick, $1,000 firm. Ext. 4605 or 281-5456 eves.

73 FORD PICKUP CAP - good cond., $1,300. 331-5118 5 p.m. to 9 p.m.

75 MONZA - hatchback, sunroof, am/fm cassette, new snow tires, 80,000 mi., $1,500. Leslie, 878-0375.

74 VEGA - 4 cyl., runs great, $900 or best offer; 1970 Ford, dependable, $300 or best offer. John, 878-0939 after 6 p.m.

69 FORD MUSTANG - fastback, V8 engine, good running cond., some body work, $650. 724-4607 eves.

81 EL CAMINO - excel. cond., low mi., V6, stand. trans., covered bed. 727-1342 after 6 p.m.

71 VW BUG - rebuilt eng., runs well, needs some work, $600. Pat, Ext. 4255.

SNOW TIRES - (2) G78-15, mounted on Ford rims, excel. cond., $25. Ext. 2423.

79 CHEVY MONZA - V6, 4 spd., p/s, p/b, a/c, am/fm stereo, good mpg, $2,800. 878-0012.

72 CADILLAC - new tires, good running cond., $750. 924-8213.

75 OLDS CUTLASS SALON - loaded, high mi., depend. transp., $1,200. 728-0939 or 727-3115 weekends.

82 DATSUN - GX coupe, 5 spd., overdrive, a/c, p/s, am/fm stereo, silver & black, grey int., $4,100. 281-7397.

77 PINTO SEDAN - body excel., new tires, exhaust heater, battery, needs engine work, $700. Ext. 3351.

84 FIERO - orig. owner, 6,000 mi., must sell, like new, 4 spd., black/camel int., stereo, $8,900 firm. 298-4047 after 5 p.m.

PIRELLI-P3 TIRES - (2) 175SR14, low mi., $75/pair. Ext. 2253.

67 VW BEETLE - sunroof, needs body work, best offer. 689-9289.

72 KARMEN GHIA - any reasonable offer. 286-0570 after 5 p.m.

73 CHEVY WAGON - good motor and trans., $200. Ext. 3925 or 286-9121 after 7 p.m.

78 MERCEDES BENZ 300 - diesel, clean, very good cond., $10,500. Ext. 7959 or 727-5803.

75 SKYHAWK - V6, p/s, p/b, 4 spd., runs well, needs some work, $300 or best offer. Bruce, Ext. 7203.

75 VW RABBIT - 4 dr., runs well, good tires and battery, body rusted, best offer. Ext. 4587 or 929-8443.

75 CHRYSLER STATION WAGON - p/s, p/b, a/c, am/fm, new battery, new exhaust, good tires, runs well, asking $750. Ext. 4570 or Ext. 3104 after 6 p.m.

78 PINTO - am/fm cassette, 4 spd., good cond., $1,000. Diane, 878-0655 after 5 p.m.

SEATS - Mustang, front & back, black, $10; ET mags on 60 tires for Pinto, 2/$45. 231-6690.

TRUCK CAP - w/dinette insert converting to bed, carpeting, two cabinets, vent, insulated, excel. Tom, 924-0893.

WHEELS - (4) for 1985 Jaguar XJ6, brand new, boxed, original cost $1,100, asking $600. 266-1688.

79 PLYMOUTH SAPPORO - excel. cond., 44K miles, good mileage, a/t, a/c, am/fm cassette, $2,900. Ext. 3077 or 4603.

CAR LIFT - post type, 220V, perfect for the home mechanic, $850. 286-1829.

RADIAL - 205/P75R15, $20; Chervolet wheel cover, $5. Morris, Ext. 4192.

82 CHEVY PICKUP - eight foot bed, undercoating, green, excel. cond., plus cap, $700. 281-7206.

80 TOYOTA COROLLA - 1.8 liter, 2 dr., 5 spd., sedan, $3,000. Carl, 744-2069.

71 VW - new tires, brakes, engine, asking $500. 698-9572 after 5 p.m.

74 OLDS SUPREME - good cond., new carb., asking $1,000. Ext. 2964.

74 MUSTANG - 4 cyl., 4 spd., asking $1,100. 698-9572 after 5 p.m.

74 MUSTANG - new exhaust, new tires, auto., some rust, runs well, $600. Diane, 724-2563.

79 YZ100 DIRT BIKE - Yamaha, $400. Ken, 473-7460.

VALVE HEAD ASSEMBLY - for '74 Ford, rebuilt, 240 C.I., 6 cyl., $150. Sanchez, Ext. 3848 or 281-6498.

82 MAZADA PICKUP - longbed, deluxe interior, rustproofed, 28K mi., $4,300. 751-8240 eves.

Boats & Marine Supplies

23' O'DAY - 1982, 7.5 HP Mercury, 4 sails with lots of extras, great step up boat, asking $14,650. 473-1067.

23' PUMA - keel, sloop, sleeps 4, privacy head & galley, 6 HP, many extras. Walter, Ext. 4605.

20' FRIENDSHIP SLOOP - sleeps two, glass over oak construction, new deck, $7,500. Ext. 7225 or 929-6748.

25' O'DAY - sailboat, 1979, VHF, knotmeter, depth gauge, 3 sails, excel., best reasonable offer. 472-4196.

Miscellaneous

RECLINER - Berkline wall-away model, excel. cond. 473-8387.

DUMBELLS - 6.6 lbs., $10/ea.; Electrolux floor polisher; shop vac; smoke detector; door knobs. Paul, Ext. 4156.

SKI BOOTS - Raichle, men's size 12, like new, $45. Ext. 3604 or 878-0516.

AUTO SPEAKERS - rear mount, Sears, new, 6 x 9 oval, mag. 10, $5/ea.; Corelle cups. Susan, Ext. 4267.

HAY - for mulch, $2/bale. Ext. 3841 or 286-9450.

SKIS - boots, men's size 9, Lange look, Nevada bindings, $50. Bob, Ext. 7197.

CAMERA - Minolta 110, instamatic, elec. flash, $25. 472-1585 or Ext. 4438.

TYPEWRITERS - (2) Olympia elec., manual return; old Smith Corona, portable, best reasonable offer. Jane, 473-0961.

BICYCLE ROLLERS - Weyless, with steps and speedmeter, $50. Ext. 4112.

MOVIE PROJECTOR - 16 mm, Sound Singer model, new cond., $250. 878-9256.

WALL UNIT - walnut, 57 x 54, excel., $25; redwood picnic table & benches, $25; Broil King broiler, $10; blue swag lamp, $5; desk, 48x20, $10. 732-5004.

ELECTRIC SHAVER - Remington, rechargeable; Sears hot shaving cream dispenser; Hamilton Beach Little-Mac burger maker, $5/ea. Victor, Ext. 2395.

COUCHES - 8' & 4', gold velvet, contemporary, corner table with walnut trim, excel. cond., $300. Lydia, Ext. 2380.

RECORDS - new, sealed, Telarc, Ravel/Bolero, Daphne & Chloe, Beethoven Symp., 3, Eroica, $17 value for $11. Ext. 2830 or 543-0487.

GAS RANGE - Caloric Ultra-Ray, hi-low, lower with rotisserie, avocado, $175. Ellie, Ext. 3395 or 325-1537 after 6.

COYOTE JACKET - with collar, mint cond., $600. 744-7073.

BED FRAMES - (2) twin size, with headboards, $30. 744-1234.

CHILD'S CAR SEAT - Strolee, new $70, asking $35. 654-2041.

ELECTRIC GUITAR - never used, great for aspiring rock star, w/cord, $50. Jim, Ext. 5160.

WOODBURNING STOVE - heavy duty, $150 completed. Ron, Ext. 3238 or 744-1194.

MPI DISK DRIVES - 5-1/4", ds/dd, IBM compatible, new $100; coronet, Olds Ambassador, w/case, $100. Jim, Ext. 3372.

BMX MONGOOSE BIKE - alloy cranks, proneck, KKT lightening pedals, zap pads, $115. Dave, 821-0250.

TODDLER'S CAR SEAT - $7. Ext. 3107 or 7164.

VERTICAL BLIND - standard size, sliding door, neutral color, excel. cond., asking $150. 289-3047 after 5 p.m.

FIREWOOD - split, seasoned oak, 4' x 16' x 20-22" pieces, $110 delivered. 732-2849.

MARQUIS DIAMOND RING - beautiful, total 1 pt., appraised at $3,125, sell for $1,850. Maryann, 286-2435.

NIKON FE - 35 mm, body only, full auto./man. operation, perfect cond., $100. Phil, Ext. 7934 or 5212.

HANG GLIDER - Quick Silver B., flown once, $500. 286-1829.

WOMEN'S BIKE - Schwinn, 26" balloon tires, coaster brakes, w/auto. carrier, $50. John, Ext. 4153 or 744-1845.

POCKET DOOR - 30" x 6'-8", complete w/frame, track, and trim, excel. cond., $50. Tom, Ext. 4084 or 878-1060.

REFRIGERATOR/FREEZER - Bradford, 19 c.f., good running cond., $100. Ext. 7505 or 689-8605.

GIRL'S ICE SKATES - 6 pairs, sizes 4-13, $2/pr. Ext. 4846.

STEP STOOL & CHAIR - white, $20; yellow ceramic sink & vanity cabinet, excel. cond., $25. Ext. 4607.

STORM WINDOWS - (6) 72H x 48W, good for greenhouse, $20/all; (3) new exterior doors, (5) glass, 32" x 80", $25/all. 878-6637.

WURLITZER ORGAN & BENCH - double keyboard, rhythmer, many voices, excel. cond., $600. Ken, 281-6070.

SKI BOOTS - Hansen, size 10, $25; Lange size 9M, $30; Reiker size 10-1/2, $20; hockey skates, good cond., size 10, $15. 941-4328.

WALKIE/TALKIES - (3) pair, $5/pr.; (3) model plane engines, $5/all; 110 V car alternator power converter, $5; UHF TV converter, $5; (20) rf chokes, Miller air core 1 mh to 100 mh, $5/all. Victor, Ext. 2395.

COUNTRY STYLE COUCH - and two convertible love seats, best offer over $75/ea., will deliver. 929-8287.

DIAMOND RING - 1 karat, excel. color and quality. Dan, Ext. 3275.

BRASS TABLES - (1) coffee, (2) end, $100/all; (2) oversized den chairs, $25/ea. or best offer. Ext. 7128 or 472-4196.

TRESTLE TABLE - pine, bench, chairs, $120. 286-0795.

Free

DOG - male Siberian Husky, AKC, for adoption, needs loving family with fence. Barbara, Ext. 5165.

DOG - Chesapeake Bay Retriever, 1-½ years old, papers. 286-1829.

DOG - Airedale mixed, trained, friendly, loyal, protective companion, 9 years old, can't keep in my new apartment. Adrienne, 286-8424.

Car Pools

PLAINVIEW/BETHPAGE/HICKSVILLE - 8:30-5:00, nonsmoker, on time, drive, ride or both. Walter, Ext. 4605.

STONY BROOK - interested in starting car pool from University area. Kim, Ext. 7110.

ELWOOD/E. NORTHPORT - 4 driver pool looking for 5th driver. Paul, Ext. 4156.

PORT JEFFERSON VILLAGE - will drive or ride. Pierrick, Ext. 3464.

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

MASTIC - 3 rm. apt., on the water, 10 min. from BNL, $450 mo. + elec. 399-6367.

BELLPORT VILLAGE SOUTH - near bay, shops, fully furnished, modern house, incl. all appliances & piano, Jan.-May/June, adults only, rent neg. to reasonable tenant. 286-0379.

CORAM - attractive studio apt., sublet 3-5 mos., compl. furnished, golf, 10 min. from Lab, $375 neg. 878-1204.

MASTIC BEACH - studio apt., furnished, private entrance, all util., 1 mo. security. 281-7460 or 281-8144 after 5.

SOUTH BLUE POINT - studio apt., $475. Ext. 4846 or 363-6940 after 5 p.m.

SETAUKET - ranch, walk to University, all appliances, newly renovated, new energy-efficient heating system, full basement, 1 acre, $750 mo. + util., 1-½ months security, no pets. 751-8240 eves.

NORTH SHIRLEY - large, furnished studio, w/kitchen, private entrance, utilities included, 5 min. from Lab., stores, 1 person only, nonsmoker, no pets, security, $390 pay all. 281-8044.

EAST YAPHANK - 2 bdrms., large living room, kitchen and bath, separate entrance, 3 people, $200/ea., couple, $525 month. 924-9429.

NORTH PATCHOGUE - 1 bdrm. apt., private entrance, wall to wall, cable hook up, single only, no pets, references, $430 includes all. Carol, 289-3917.

E. PATCHOGUE - S. of S. Country Road, 2 bdrm. apt., living room, eik, private entrance, avail. Feb. 1st, (no pets), $410/mo. + util. Walt, Ext. 2907 or 698-0576.

ROCKY POINT - good location, clean, young 3 bdrm. ranch, fenced yard, full basement, ready now, $750/mo. + utilities. 744-4611 after 6 p.m.

For Sale

YAPHANK - Colonial Woods, 2 bdrm. condo., 5 appl., w/w, central a/c, garage, basement, $82,000, assum. 8-½% mort. 281-6984.

NO. CORAM - townhouse, w/w carpet, washer & dryer, redwood deck, fenced yard, $74,900, no calls after 9 p.m. 331-5118.

MILLER PLACE - colonial, 4 bdrms., formal l/r & d/r, country kitchen, 4 baths, fam. rm. w/brick fireplace. 331-1718.

HAUPPAUGE - 9 room hi-ranch, m/d, separate entrance, prime area, low taxes, 80 x 200, many extras, 3 min. from L.I.E., $139,000. 724-4268 after 6 p.m.

Wanted

CHILD'S AUTO BOOSTER SEAT - for 3 yr. old. Ext. 4475.

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

SEWING MACHINE - good cond. Ext. 3186.

TRAINS - Lionel, any "0" gauge or "027" gauge cars, track and equip.; records, 45 rpm & some LPs of the 50's and 60's era. Frank, Ext. 3120.

PORT-A-CRIB - 475-1494 after 5.

DUST COVER - for Dual turntable, 1200 model series. T. Ginsberg, Ext. 2620.

TAPE REELS - ¼ for type recorder reel to reel. George, 589-0819.

CHEVY - 4 spd., alum. case transmission. 727-3185 after 5 p.m.

PLAY PEN - good cond. Ext. 3486.

SINGLE MATTRESS & BOX SPRING - used, for needy family, will pick up. Ed, Ext. 2362 or Ext. 3925.

AUTOMATIC RICE COOKER - working cond., reasonable. Ext. 4607.

OLD CAMERAS - 127, 35 mm, and smaller formats. Frank, Ext. 5105 or 473-3364 eves.

HOUSEMATE - to share large house, 8 min. from Lab., nice property, $200/mo. + ¼ utilities. Roland, Ext. 3969 or 924-3669.

BABYSITTER - dependable, daytime hours, for care of two small children, while I substitute teach. Barbara VanDerlaske, 399-4929.

RUGBY ANYONE? - all ages, all sizes, no experience necessary. Pierrick, Ext. 3464.

Lost & Found

FOUND - Swiss army knife, in front of Research Library. Jim, Ext. 5160.

FOUND - (1) large pearl post earring, outside Staff Services. Ralph, Ext. 4171.

FOUND - blue bracelet outside Bldg. 134. Ext. 2345.

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
☐ 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)