BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

First Mössbauer Spectroscopy With Synchrotron Performed at BNL Using NSLS X-Ray Ring

The world's first use of a synchrotron to perform direct Mössbauer spectroscopy occurred last August, on beam line X27 of the x-ray ring of the National Synchrotron Light Source (NSLS).

The announcement of this spectroscopic first was published in *Physical Review Letters* on February 11, by the X27 team led by BNL Physicists Jerome Hastings and D. Peter Siddons, both of the NSLS. Their collaborators on this experiment were: Uwe van Bürck of the University of Munich, Germany; Uwe Bergmann, State University of New York at Stony Brook; and Ralph Hollatz of the University of Hamburg, Germany.

"Synchrotron-based Mössbauer spectroscopy not only allows us to study materials without radioactive parents, but also permits us to look at time-dependent phenomena," explains Hastings.

One of the first to recognize the significance of this accomplishment was Nobel laureate Rudolf Mössbauer, who won the 1961 Nobel Prize in physics for discovering the Mössbauer effect upon which Mössbauer spectroscopy is based.

In an October 1990 letter to BNL Deputy Director Martin Blume, Mössbauer noted, "Congratulations on the beautiful experiment by Hastings, Siddons, van Bürck, Hollatz and Bergmann, which has demonstrated for the first time that synchrotron radiation can be used in direct Mössbauer-type experiments without the need for resonance filtering. This certainly is a beautiful step forward."

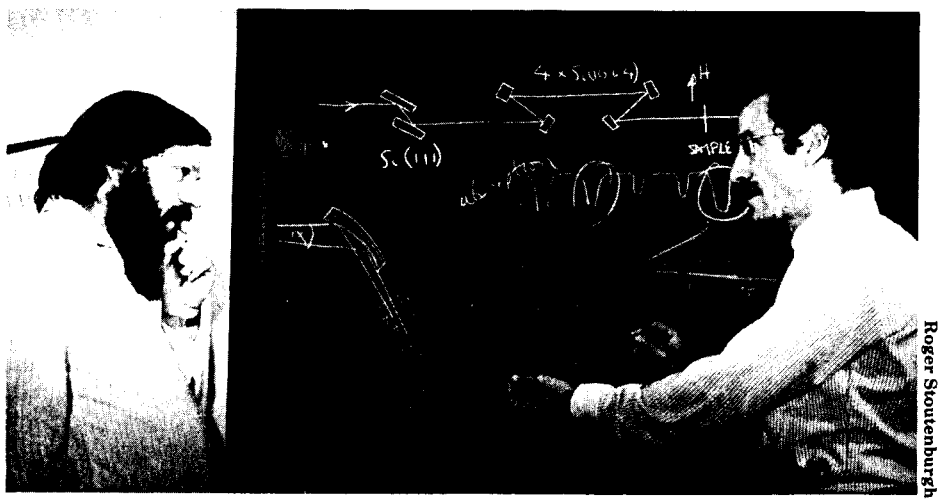
Mössbauer Effect

Mössbauer received the Nobel Prize for his 1957 discovery of recoil-free, gamma-ray resonance emission and absorption.

In Mössbauer's experiment, he used the solid platinum-191, which is the radioactive parent of the daughter isotope iridium-191. Following the radioactive decay of platinum-191, the nucleus of the daughter iridium-191 was in an excited state — that is, the nucleus was at a higher energy level than normal.

In making the downward transition to the ground state, the daughter iridium-191 nucleus emitted a gamma ray. If the experiment had been conducted at room temperature, the daughter nucleus would have recoiled and lost energy in the process. Thus, when absorbed by a separate sample of iridium-191, a gamma ray emitted by the daughter iridium-191 nucleus would be too low in energy to excite the sample iridium-191 nucleus to a higher nuclear state.

Mössbauer, however, conducted his experiment at low temperatures near absolute zero, where the thermal motions within the atomic lattic are minimized. As a result, the probability that the daughter iridium-191 nucleus would not recoil, but would emit a resonant gamma ray was significantly increased.


Roger Stoutenburgh

D. Peter Siddons (left) and Jerome Hastings.

Thus, a recoil-free daughter nucleus emitted a gamma ray of the correct resonant energy. Because the iridium-191 sample too was kept at low temperature, the probability increased for recoil-free absorption of that resonant gamma ray. And that is what Mössbauer observed.

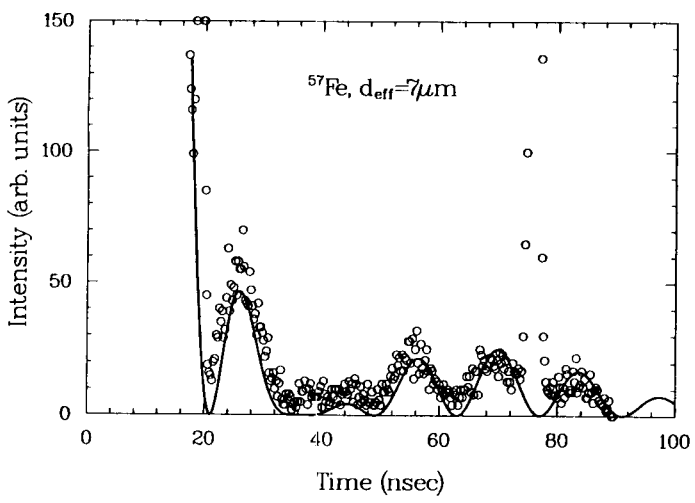
"As a nuclear physicist, Mössbauer was interested in the experimental demonstration of the existence of this nuclear effect and its theoretical explanation — but not so much in the application of the Mössbauer effect as a spectroscopic technique to measure the absorption of gamma rays by different materials," explains Siddons.

However, when the Mössbauer effect at 14.4 thousand electron volts (keV) was demonstrated in iron, which is much more common in nature than iridium-191, scientists in fields such as solid-state physics, chemistry and biology became interested in performing absorption spectroscopy experiments in iron-containing materials.

Among others working in the field, BNL Physicist Ottmar Kistner and the late BNL Senior Physicist Andrew Sunyar in 1960 demonstrated that Mössbauer spectroscopy reveals electric field, magnetic field and chemical properties in materials containing iron-57.

As a result of this and other work, Mössbauer spectroscopy was born as an analytic technique in the early 1960s, and it expanded as more atomic nuclei having Mössbauer resonances were found. Since resonant energy is a function of the electric field gradient and magnetic field at the absorbing nucleus, the absorption spectrum produced by Mössbauer spectroscopy provides much information.

Therefore, this spectroscopic technique has been used for many things, including: measuring excited-state lifetimes in nuclear decay; studying magnetic interaction in iron-containing materials; investigating high-pressure effects on the chemical properties of materials; examining the superconducting transition states; and understanding metal atoms within biological molecules.



First graph showing time-dependent intensity for a seven-micrometer-thick, enriched iron-57 foil. This smooth curve results from a calculation, which also yields the Mössbauer-effect parameters of the sample.

Signal-to-Noise Problem

"About ten years ago," recalls Hastings, "researchers in the field began to hope to replace radioactive parent sources — which are continuous, unpolarized point sources emitting photons in all directions — with the synchrotron, and thereby be able to do Mössbauer spectroscopy with materials that don't have radioactive

(continued on page 2)

Coming Up

William Thomlinson, Associate Chairman of the National Synchrotron Light Source Department, will present the next Brookhaven Lecture, on Wednesday, March 20, at 4 p.m., in Berkner Hall. His topic will be "Coronary Angiography at the NSLS."

When It Comes to the Crunch

This year, over 500 high school students studied specifications, then designed and constructed basswood and glue bridges to enter the 1991 BNL Model Bridge Contest, held on Saturday, March 2.

The goal, as usual, was to find the bridge that supported the greatest load compared to its own weight. And, again as usual, the crunch of the stress tester, operated by Don Horne, Department of Applied Science, and Carl Klamut, BNL retiree and consultant, drew attention to some very well-designed bridges.

BNL's contest was organized by Eloise Gmur and Janet Tempel of the Public Affairs Office's Tour Program. This year's contest engineer was Marty Woodle, National Synchrotron Light Source Department, assisted by James Cullen and Bill McGahern, both of the Alternating Gradient Synchrotron Department.

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Marty Woodle and Bill McGahern check the condition of a bridge in the bridge stress tester.

The large number of entries made it most practical to divide the contest into two sections, each with separate prizes. Suffolk County schools formed the East Region, while Nassau County and New York City schools made up the West Region. First- and second-prize winners from both regions are eligible to enter the 1991 International Bridge Contest to be held in Chicago on May 4.

And the winners are. . .

First in the East Region, for the second consecutive year, was Brad Terris, a junior at Ward Melville High School, Setauket. His 22.75-gram bridge supported a staggering load of 168 pounds — 3,368 times its own weight.

Placing second was Billy Sellerberg, St. Anthony's High School, South Huntington, with a bridge that weighed 18.18 grams and held 104.8 pounds, or 2,615 times its own weight.

In the West Region, Daniel John of Elmont Memorial High School, Elmont, came in first with a 21.26-gram bridge that held a load of 117.9 pounds, or 2,515 times its weight.

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Janet Tempel, who heads BNL's Tour Program, hands a check for $150 to East Section winner Brad Terris, Ward Melville High School, Setauket.

Then came a most unusual happening: Two bridges weighed different amounts, but each supported a load exactly 2,371.03864 times its weight. The second-prize winners were Kin Pan Szeto from Brooklyn Technical High School, whose 23.32-gram bridge supported 121.9 pounds; and Ray Corpuz, Herricks High School, New Hyde Park, with a 22.88-gram bridge that held 119.6 pounds.

— Liz Seubert

Women at BNL: Careers in Computers

During the national observance of Women's History Month, it is interesting to note that today, there is a higher percentage of women at Brookhaven than at any other time in the Lab's history.

Women make up approximately one quarter of the BNL work force, and they can be found in all major job classifications. They are engineers and secretaries, technicians and scientists, police officers and accountants, administrators and custodians. Along with their male colleagues, they help keep Brookhaven at the forefront of science.

On April 20, BNL will host a Career Day for Women to which students from all over Long Island are being invited. A major aim of this event is to provide role models for young women who may be exploring careers in science and engineering.

To introduce some of the young BNL scientists and engineers who will be interacting with students at the Career Day, and to celebrate Women's History Month, the Bulletin is running a series of articles throughout March profiling a range of Lab women in science and technology.

This series continues by focusing on two women whose expertise is in the computer field.

Rosario Enriquez-Leder, AGS

As the Booster project begins operations this spring, detection of radiation due to beam loss will be assessed via a computerized system designed and implemented by Rosario Enriquez-Leder of the Alternating Gradient Synchrotron Department (AGS).

A Programmer Analyst with the AGS Diagnostics and Controls Group, Enriquez-Leder has also worked on a system for routing signals generated within the AGS to the operators in the AGS control room.

In addition to these major projects, Enriquez-Leder assists her group in maintaining the AGS computer network and providing technical support to experimenters.

Though her focus is computer science, Enriquez-Leder can approach her work from a physics perspective. That's because physics is the field in which she earned her Licenciado en Fisica at the Universidad Nacional Autonoma de Mexico in 1975. It is also the field she first came to the State University of New York at Stony Brook to pursue further in 1975.

"I was always interested in technical things," she explained, "but it was difficult to make a career choice between physics and the history of art. I decided on physics because I could do art history as a hobby but not necessarily the other way around."

After earning her M.A. in physics at Stony Brook in 1977, Enriquez-Leder "went into computer science to make a living." She worked in this field in two companies, one large and one small, before coming to BNL in 1988.

Since coming to the U.S., Enriquez-Leder has found it "wonderful to interface with all kinds of people from so many different cultures." But she has also found that there are obstacles to women being accepted as professionals.

"In Mexico," she recalled, "there were few females in my classes, but we were accepted as capable people. Here, very often, there is a perception of women as nonprofessional individuals.

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Rosario Enriquez-Leder

"As more females join male-dominated fields, then attitudes toward women will have to change," Enriquez-Leder continued. "Science is an ever-changing field, and as more different people enter it, we will see greater creativity. We must recognize the importance of diversity and the acceptance of that diversity."

— Anita Cohen

Note to Employees:

Attendance at lectures, meetings and other special progams held during normal working hours is subject to supervisory concurrence.

Commodore Users

All owners or potential owners of AMIGA, C64 or 128 computers are invited to join the Commodore Users Club and participate in the use of club computer equipment, program libraries, and bulletin-board service. Meetings are held on the second Tuesday of every month in the Biology conference room at noon. Contact Edith Thornhill, Ext. 7813, for membership information, or Pat Dwyer, Ext. 4561, for general information.

Susan Eng, Computing & Communications

Susan Eng is hard to find in her office on the second floor of Bldg. 515. If she's there, the phone is a constant interruption that she welcomes.

"I'm part of a support and trouble-shooting team," says Eng, a computer analyst I in the Distributed Computing Section of BNL's Computing & Communications Division. "We provide support services to the scientific and engineering community throughout the Lab, making it easy for them to use the computers so they can do their jobs faster and better. Initially, we began with the engineers and designers, introducing them to CAD/CAM workstations that have the capability of producing extremely accurate designs with less effort. The proliferation of workstations has grown considerably since then."

Roger Stoutenburgh

Susan Eng

To keep up with all this, Eng must stay abreast of such powerful graphics computer workstations as SUN, IBM and 386 PCs.

She explains, "I learn how the user works and configure each workstation to their needs, suggesting software such as networking packages and distributed databases. I develop backup, archival and retrieval strategies for their data, and I help them network their stations to aid in the sharing of data and to access other resources."

BNL has been Eng's only employer since she was graduated from the State University of New York at Stony Brook in 1979, with a bachelor's degree in computer science. Six months later, she began taking advantage of Brookhaven's tuition reimbursement program, earning her master's in computer science from the Polytechnic Institute of New York in January 1984.

She first considered the computer-science field as a sophomore in college, after discovering that it would be more practical to enter the working world with an undergraduate degree in computer science than with one in her first love, astrophysics.

"Computer science was still relatively new at the time and very intriguing because it could lead me into any field in which I wanted to apply my computing skills, including astrophysics," comments Eng.

Though Eng says she has not experienced discrimination either at school or at BNL, she does have one major concern. "In the rapidly changing field of computer science, women who take time off for family reasons can quickly fall behind their male peers," she says. "It is important that employee policies provide for these situations, helping women to have the same opportunities as men for a well-cared-for family and a fulfilling career."

— Marsha Belford

Mössbauer (cont'd)

parents. In addition, by using a synchrotron as the radiation source, we could take advantage of its pulsed, polarized and focused beam."

At that time, however, there was a signal-to-noise problem in switching to a synchrotron as the radiation source. In other words, the narrow energy band absorbed by a material as a result of the Mössbauer effect would not be seen within the broad energy spread emitted by the synchrotron.

The first step to overcoming this problem was taken in 1985, when Erich Gerdau from the University of Hamburg, Germany, was the first to perform synchrotron-based nuclear Bragg scattering.

To see only nuclear scattering, however, Gerdau had to eliminate the scattering of photons off the electrons surrounding the atoms within the crystal lattice. He was able to do this by limiting his choice of materials to study — by using a perfect crystal of what is known as an antiphase ferrimagnet. In this case, he used a perfect crystal of garnet containing yttrium and iron-57, which is not a conventional Mössbauer sample.

High-Resolution Monochromator

In 1986, Hastings, Siddons and company passed the preliminary milestone erected by Gerdau, but via a different route — "and with a lower signal-to-noise ratio by a factor of 3,000," reports Hastings.

They accomplished this significant reduction by employing a high-resolution monochromator within their experimental set-up then on beam line X12A and later moved to X27. Their monochromator reflects the broad-spectrum "white" sychrotron beam six times on the surfaces of perfect silicon crystals, filtering the narrow energy-width, resonant-energy x-rays out of the white beam coming off the electrons circulating around the NSLS x-ray ring.

Then, at a Gordon conference last August attended by Hastings and Siddons, Gerdau discussed his plans of doing a synchrotron-based Mössbauer experiment — but only once he devised an improved filter. Because their existing setup already had the necessary high resolution, Hastings and Siddons decided to do the same experiment — using a more conventional Mössbauer sample, an enriched foil of iron-57.

Synchrotron as Radiation Source

The nuclei in the ferromagnetic iron foil have two ground states and four excited states; thus, six transitions from ground to excited state are possible. To select the two specific transitions that the iron nuclei were to make, Hastings and Siddons' collaborator Uwe van Bürck proposed the direction of the magnetic field to which the material was exposed.

As a result, a time-dependent interference pattern of these two nuclear transitions was first seen last August (see graph). Using a simple calculation, this time-dependent interference pattern was transformed into an energy spectrum.

With this experiment, the X27 team was the first to demonstrate that Mössbauer spectroscopy can be performed with any iron-containing sample using a synchrotron as the radiation source.

Without a Parent Source

In the near future, the X27 team will use synchrotron-based Mössbauer spectroscopy to study other conventional Mössbauer samples, such as tin and gold.

"Now that Mössbauer spectroscopy can be done without a parent radiation source, we think that interest in this technique will be stimulated at synchrotrons around the world," concludes Hastings.

— Marsha Belford

Though the War Is Over, The Need for Blood Goes On

Before the cease-fire was declared in Operation Desert Storm, a special blood drive had been scheduled by Long Island Blood Services at BNL to draw blood for American troops wounded in the Persian Gulf war.

Since blood is no longer being shed, an emergency call for blood and its components is no longer foreseen. However, blood — especially types B and O — is always needed by sick and injured Long Islanders.

Therefore, the blood drive will be held as scheduled, on Monday, March 11, from 10 a.m. to 3 p.m. in the Brookhaven Center. The goal is to draw 225 pints, so make your appointment today by contacting Blood Drive Chair Susan Foster, Ext. 2888.

Next BERA Concert: The Mannes Trio

"They played the music, not just the notes," is the way *The New York Times* critic described the inspired performance of The Mannes Trio at its debut in the Chamber Music series at the 92nd Street Y in 1985.

Now chamber music enthusiasts at BNL will be able to hear The Mannes Trio perform at the next BERA concert on Wednesday, March 13, at 8 p.m., in Berkner Hall.

Formed in 1983 as ensemble-in-residence at the Mannes College of Music in Manhattan, where each member of the trio is on the faculty, the young chamber music group consists of violinist Hiroko Yajima, cellist Melissa Meell and pianist Diane Walsh.

Since its debut, the ensemble has gained increasing critical and popular acclaim. In 1986, they won the Naumberg International Chamber Music Award, and, soon after, they gave their prize-winning concert at Alice Tully Hall. They were invited to return there in 1989 to present the world premiere of the trio by Betsy Jolas, a work that they commissioned with the Naumberg Foundation and the National Endowment for the Arts.

The Mannes Trio has performed at the Library of Congress in Washington, D.C.; the Gardner Museum in Boston; the New School Concerts; and the New York Academy of Sciences in Manhattan. They also gave concerts as part of a chamber music series in Pittsburgh, Miami, Philadelphia and Cleveland.

The program for the fourth BERA concert of the 1990-91 season will include Beethoven's Trio in E-flat major, Op. 1, No. 1; the contemporary composer Rebecca Clarke's Trio; and a virtuosic Trio by the French composer Maurice Ravel.

Tickets for the concert can be purchased at the door the night of the performance. Ticket prices are $12 for admission, $9 for students and people over age 65, and $5 for children under 18.

The Mannes Trio

Weight Watchers Classes to Continue

Summer is coming, so lose weight this spring by signing up for eight weeks of on-site diet classes given by Weight Watchers.

Starting Monday, March 18, one class will meet Mondays, noon to 1 p.m. The other will be held Wednesdays from 5-6 p.m., beginning Wednesday, March 20. Both classes will be held in the Brookhaven Center.

Since the Lab pays $10 of each member's registration fee, the cost for new members is $70, while the price for continuing dieters is $65.

To register for the Monday classes, bring the payment to Berkner Hall on Monday, March 11, between noon and 1 p.m. Registration and fee collection for the Wednesday classes will be held on Wednesday, March 13, from 5-6 p.m. in the North Room of the Brookhaven Center.

If questions arise, contact Health Promotion Specialist Mary Wood, Ext. 5923 or 4567.

PSI Meeting

Test your knowledge and skills regarding office procedures on Tuesday, March 12, when the Upton Chapter of Professional Secretaries International (PSI) will host a Quiz Night. Come to the Recreation Building at 6:30 p.m. to have fun and get together with friends and members.

Cooking Exchange

A Cooking Exchange demonstration will be held at the Recreation Building in the apartment area on Wednesday, March 13, at 12:15 p.m.

A donation of $2 per adult is requested to cover expenses for the ingredients and a light lunch. There is a $1 charge per child for babysitting.

All are welcome. New ideas and participation are encouraged. For more information, please call Louise Bunicci, 744-5867; Barbara Kowalski, 744-3569; Miryam Rothenstein, Ext. 3092; or Eiko Tanaka, Ext. 3017.

BWIS Seminar

Donna Friedman, Staff Psychologist with BNL's Employee Assistance Program, will talk about "The Psychology of Sexual Harassment," at the next Brookhaven Women in Science (BWIS) lunchtime seminar. The seminar will be in the Hamilton conference room of Chemistry, Bldg. 555, at noon on Thursday, March 14.

For more information, call Dorry Tooker, Ext. 2078.

Basketball

Games of February 28

Runaways	78	Deep Six	60
J. Belz	14	B. Brown	17
L. Walcott	13	E. Tucker	16
J. Desmond	12	D. Eleazer	12
P. Ratzke	9	J. Kutschera	10
J. Garrison	8	R. McMillian	5
G. Shepherd	8		
R. Wells	8		
G. Smith	6		

Three-point shots: Garrison (2), Walcott

Celtics	53	Scram	37
G. Mack	14	T. Powers	14
B. Turner	11	S. Nappi	11
R. Schullman	8	V. Cassella	4
P. Browne	7	E. Gregory	4
A. Jones	6	M. Davis	2
J. Wells	3	J. Barkwill	2
N. Schaknowski	2		
L. DiMauro	2		

Three-point shots: S. Nappi, T. Powers

Trail Blazers	44	Bulls	29
D. Evans	17	F. Ligon	14
T. Mayo	12	S. Gilbert	6
C. Edwards	6	L. Furenlid	4
R. Garapolo	3	P. Bruhwiler	3
R. Domenech	3	B. O'Brien	2
S. Springston	3		

Three-point shots: R. Domenech, R. Garapolo, T. Mayo

League Standings as of February 28

Trail Blazers	6-1	Runaways	3-4
Celtics	5-2	Scram	2-5
Bulls	4-3	Deep Six	0-7

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ANITA COHEN, Editor
MARSHA BELFORD, Assistant Editor
LIZ SEUBERT, Reporter

35 Brookhaven Ave., Upton, N.Y. 11973
(516) 282-2345

Equipment Demo

To introduce the Tektronix VXI product line, which features card-modular instruments, representatives of Tektronix Inc. will hold a VXI Instrumentation Seminar on Wednesday, March 13, in Berkner Hall, Room B. Sessions will be held from 9 a.m. to noon and from 1 p.m. to 4 p.m. To sign up, call Lynn Precht, 231-9400.

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The brightly painted Silicon Graphics "Magic Bus" will be parked next to Berkner Hall on Thursday, March 14, offering ongoing demonstrations all day of high performance RISC-based project supercomputers including the eight-processor 4D/380; VGX graphics system featuring 1 million polygons and 3D vectors/second; scientific data visualization and analysis tools for 3D rendering and modeling of complex objects; molecular design and simulation technology for materials, polymers and crystals; visual and analysis tools for x-ray diffraction and NMR data; and parametric mechanical design and analysis, and 3D-driven solids modeling.

Cafeteria Menu

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

Monday, March 11

Soup: Cream of spinach	.75/.95
Entree: Zesty tacos	(each) .90
Entree: Lemon baked chicken & 1 veg.	3.10
Fitness: Beef & vegetable stew w/rice	3.10
Carvery: Hot pastrami sandwich	2.85
Grill: Grilled Reuben	2.85
SPICE: Croissant sandwich special	

Tuesday, March 12

Soup: Hearty lima bean	.75/.95
Entree: Buffalo wings & 1 veg.	3.10
Entree: Baked fish & 1 veg.	3.10
Fitness: Chef's choice & 1 veg.	3.10
Carvery: Hot roast beef sandwich	2.85
Grill: Zesty pizza burger	2.35

Wednesday, March 13

Soup: Cream of broccoli	.75/.95
Entree: Crispy fried fish & 1 veg.	3.10
Entree: Chili con carne w/chips	3.10
Fitness: Sauteed chicken Marsala & 1 veg.	3.10
Carvery: Hot Black Forest ham sandwich	2.85
Grill: Grilled turkey melt	2.35

Thursday, March 14
St. Patrick's Day Special

Friday, March 15

Soup: Shrimp gumbo	.75/.95
Entree: Baked fish & 1 veg.	3.10
Entree: Pasta primavera & 1 veg.	3.10
Fitness: Beef sukiyaki & 1 veg.	3.10
Carvery: Hot turkey sandwich	2.95
Grill: Fried seafood basket	2.95

Meeting Today About Disney Trip

To answer questions about the group trip that the Brookhaven Employees Recreation Association (BERA) is sponsoring to Walt Disney World in Florida on October 10-15, a Disney representative will be in Berkner Hall, Room B, today at lunchtime.

A video preview of the Walt Disney World attractions will be shown at 11:45 a.m. and at 12:45 p.m. Door prizes will be awarded, and reservations will be taken.

For more information, call Louisa Barone, Ext. 3347, or M. Kay Dellimore, Ext. 2873.

Sliding Into 1st, 2nd & 3rd

Roger Stoutenburgh

The top three prizes in the slide category of the University Hospital Auxiliary's Fourth Annual Photography contest were won by BNLers (from left) Krsto Prelec and Ripp Bowman, both of the Alternating Gradient Synchrotron Department, and Anne Baittinger, Public Affairs Office. They are shown here holding their prizes — mounted reproductions of their colorful prize-winning photos.

First place went to Prelec for his slide, taken in the Swiss Alps, entitled *On Top of the World.* Baittinger took second place for her study of *Colored Pencils.* Bowman's third place prize was awarded for his photo of *Hampton Summer Fields.*

A total of 500 photographs was entered in this year's contest in two categories, slides and prints. From each category, three top winners and 20 honorable mentions were chosen. In addition to these top awards for slides, Prelec took two honorable mentions and Baittinger garnered one. All these photos will be permanently exhibited at the University Hospital of the Health Sciences Center at the State University of New York at Stony Brook.

The winning photos shown above are now on temporary exhibit in Berkner Hall, on the Camera Club's photo display near the Cafeteria. Stop by soon to enjoy their full color and impact.

Arrivals & Departures

Arrivals

Donald MacKay .....Sfgrds. & Sec.
Wuzheng Meng .....AGS
Kaumudi I. Pandya .....DAS
Dieter Roehrich .....Physics
Thomas R. Thurston .....Physics

Departures

None

Bowling

Red/Green League

R. Eggert had a 219/214/202 for a 635 scratch series, K. Riker 219, R. Larsen 218, N. Franco 213, M. Guacci 212, D. Jesaitis 211, E. Sperry IV 210/209/200 for a 619 scratch, K. Asselta 205, E. Meier 204, E. Carter 202, R. Jansson 201, N. Parrinello 201.

White League

Jim Petro had a 235, Dick Adams 230/213 for a 606 scratch, Ken Riker 206/201, Annamarie Spira 209, Jim Goode 201, Caryl MacDougall 191, Maryann Reynolds 189 and converted the 6/7/10 split, Debbie Keating 188.

Purple League

Vito Manzella had a 218, Frank Gaetan 201, Sharon Smith 190, Mary Scheidet 182, Kay Conkling 181, Dennis Klein converted the 6/7.

Volleyball

Standings as of February 28

Open League		League I	
Phoenix	43-14	Cannonballs	34-11
GTEAM	44-16	Upfagrabs	33-12
Me & the Boys	39-21	Dinkers	25-20
Magnum	38-22	Rude Dogs	23-22
Dig It	27-30	Network News	16-29
Penetrating Vollies	11-46	Upsetters	4-41
Jet-Setters	3-54		

League II		League III	
Fossils	39-6	Nutcrackers	28-17
Net Wits	34-11	High Volley'em	26-16
Nuts & Bolts	33-12	NoKaOe	26-19
Pteropods	26-19	Renegades	19-26
Upton Ups	17-28	Good Timers	19-26
Chunga's Revenge	14-31	Undertakers	17-25
Slammers	13-32	Sourcerers	18-24
Aces	4-41		

When the trees bow their heads to the March winds next week, let them see a vast amount of food being blown into the bins of the BNL Food Drive! Personal checks and receipts from King Kullen and Finast, which give rebates, can also be sent to Carole Kerr, Bldg. 460, who will gladly do the shopping!

Classified Advertisements

Placement Notices

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

Each week, the Personnel Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Personnel, and, second, for general recruiting under open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people.

Except when operational needs require otherwise, positions will be open for one week after publication.

For more information, contact the Employment Manager, Ext. 2882, or call the JOBLINE, Ext. 7744 (282-7744), for a complete listing of all openings.

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

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

DD 3273. SECRETARIAL POSITION -(part-time) Requires AAS in secretarial science or equivalent. Duties will include assisting in all aspects of office procedures such as preparing manuscripts, correspondence and travel vouchers, processing POs and ILRs, and maintaining records and filing. Previous word-processing experience required; Macintosh Microsoft Word preferred. IPAP/JCARS experience desired. Department of Applied Science.

DD 0910. TECHNICAL POSITIONS - Require AAS in mechanical technology or equivalent experience. Will fabricate, assemble and operate cryogenic systems. Previous piping and mechanical assembly experience is desirable. RHIC Project. Accelerator Development Department.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

NS 0912. ENGINEERING POSITION - Requires BS/MSME, or equivalent, and experience in mechanical design and stress analysis, with emphasis on finite element techniques. Knowledge of ASME Pressure Vessel and Pressure Piping Codes required. IDEAS/CATIA experience desirable. Will design pressure and vacuum vessels, piping and other particle accelerator hardware. Accelerator Development Department.

DD 8556. SAFETY ENGINEERING POSITION - Requires a BS in safety engineering or a related field, several years' relevant work experience, and experience in job safety analysis, accident investigation and conducting safety awareness training. Will be responsible for the development and implementation of industrial safety programs for the Operations and Maintenance Division of Plant Engineering. In addition, will conduct safety inspections and safety audit compliances. Plant Engineering Division. (Reposting of #4266).

MK 0019. STAFF PSYCHOLOGIST - (part-time) Requires a Ph.D. in clinical psychology, clinical experience in diagnosis, intervention and referral, and a New York State license. Responsibilities include assisting the Employee Assistance Program Manager with ongoing EAP programs and the development of new programs. Must be able to obtain and maintain a security clearance. Occupational Medicine Clinic.

Motor Vehicles & Supplies

86 MAZDA SE-5 PICKUP - bedliner, am/fm, fiberglass cap, 5-spd., 74k mi., orig. owner, excel. cond., $3,200. 862-7821.

86 PONTIAC 6000 - 54k mi., p/s, ac, $3,500. Ext. 3763.

85½ FORD ESCORT - 5-spd., 76k mi., am/fm, new brakes & tires, tilt steering wheel, excel. cond., $1,900. Ext. 5364 or 632-5117.

85 TRANS AM - burgundy, tinted windows, T-top, fully loaded, 67k hwy. mi., immac. cond. in/out, ask. $6,900. Sharon, Ext. 2689 or 698-2798.

85 GMC CARGO VAN - good cond., $2,500. Ext. 2411 or 331-4840.

85 CHEVY S-10 PICKUP - 6-cyl., good body, 108k mi., needs engine work, $1,350. 698-8514.

85 FORD LTD WAGON - 6-cyl., ac, a/t, 68k mi., excel. cond., $3,800. Barbara, Ext. 2456.

84 COLT VISTA - 115k mi., driveable, needs engine work, $100. Jon, Ext. 4378.

84 BUICK SKYHAWK - 4-dr., ac, p/b, p/s, clean, $1,850. 286-3357.

83 BUICK - s/w, fully loaded, ac, p/s, p/b, roof rack, third seat, $2,295. 475-1608.

82 CHRYSLER LEBARON - perfect station/shopping car, $750 neg. 363-7032.

81 TOYOTA COROLLA - 4-dr. sedan, 98k mi., ac, p/s, p/b, Kenwood digital fm cass., runs well, $890. Ext. 2647.

81 ACCORD - 5-spd., runs but rust has upper hand, $500 or best offer. Alison, 369-4922.

80 CHEVY MALIBU - s/w, well maintained, good second car, $800. 924-4206, 9 a.m. to 9 p.m.

80 CHEVY MALIBU - 4-dr., p/s, p/b, a/t, V-8, small 267, blue/blue, gauges, all factory, orig. owner, garaged, $2,000. Al, Ext. 3992 or 331-1003 eves.

79 DATSUN - s/w, a/t, 73k mi., excel. mech. cond., reliable, some body rust. Kong, Ext. 3867.

79 PONTIAC CATALINA - 2-dr., V-8, 301 eng., many new parts, runs well, p/s, p/b, ac, $400 neg. Mike, 585-6254.

79 AMC SPIRIT LX - ac, p/s, a/t, many options, new engine, springs, radiator & rear, better than new, $1,500. Doreen, Ext. 7043.

78 FORD VAN - 6-cyl., captains' chairs, couch, windows, runs, needs work, $200. 878-1178.

77 BETHANY POP-UP TRAILER - sleeps 6, opens from sides, gas stove, sink, icebox, $900. Bill, 732-8793.

75 BMW 2002 - red, sunroof, v.g. cond., asking $1,400. Doug, 286-7406.

71 DATSUN 510 - s/w, ac, a/t, no rust or rot, excel. cond., $675. Kevin, Ext. 4843 or 281-8031.

63 FORD F-100 PICKUP - fine cond., born & raised in Arizona — no rust, ideal for classic restoration, $1,000. Takacs, Ext. 2824.

62 CHEVY NOVA - 4-dr., 6-cyl., runs well. Bob, Ext. 4428 or 467-4222.

BUMPER - rear-step, new, for pickups, $65. Ron, 878-4089.

TRAVEL TRAILER - 24', & carry-all van, combined $4,500. 281-7806.

CAP - 7', aluminum, for Toyota pickup, good cond., $125. Bert, Ext. 5156 or 581-4436.

Boats & Marine Supplies

25' MORGAN SAILBOAT - recent sails & outboard, good bay boat, $5,000. 821-0686.

14' SEARS BOAT - 40-h.p. Johnson, w/trailer, extra parts in box, needs little work, $500. Ray, Ext. 2082.

MOTOR - 1986, 9.9-h.p. Evinrude, short-shaft, w/brand-new 6-gal. gas tank & hose, excel. cond., $650. Sorin, Ext. 2765.

Furnishings & Appliances

BED - twin-size, high riser w/mattress, like new, $75. Leo, Ext. 7898.

BEDROOM SET - Burlington, girl's, desk, dresser, hutch, cheval mirror, day bed, hand-painted detail, light pine. Bill, Ext. 7625 or 732-9102.

COUCH - grey velour-like material, comfortable, asking $65; dresser, solid wood, antique, 22"x30", 3 large drawers, asking $100. Jean, 929-4522.

DINING ROOM - maple table w/3 leaves, 2 arm chairs, 4 side chairs, $500; china closet, $375, or $800/both. Arleen, Ext. 4519 or 924-6051.

DRESSING TABLE - antique, $25; 3-panel mirror, gilt frame, $25. 473-7739.

HUTCH - Colonial, 72" table, w/2 leaves, 4 captain's chairs, asking $500. 929-4962.

RUG - beige, wool, Oriental design, 9'x12', excel. cond., $95. Tom, Ext. 2550.

SOFA - 90", quality furniture, v.g. cond., multi-colored print, $150. Bill, Ext. 7961 or 929-3082.

SOFA - w/matching loveseat, southwest design, earth tone colors, 2 lamp tables, $325. 654-0812.

Tools, House & Garden

FIREWOOD - seasoned, hardwood, cut, split, delivered, $125/full cord. Dave, 331-4629, leave message.

LAWN TRACTOR - Sears ride-on, 10-h.p., 38" cut, $225. Neal, Ext. 2254.

WELDER - 200A Lincoln, 4-cyl., Continental engine, asking $1,500. 744-3204 after 6 p.m.

WORK BENCH - Sears revolving workstation, mounts 3 bench-top tools, $50. Bill, Ext. 4986 or 563-1940.

Sports, Hobbies & Pets

BICYCLE - Giant carbon fiber w/105, Colnago master frame set, 56cm. Oscar, Ext. 3499.

BIKE - Vista, girl's, 24", single-speed, blue, $25. Joe, Ext. 2898 or 728-1859 eves.

CAMERA LENS - Tokina 35-200, Nikon mount, $90; telescope adapter, $7; plastic photo pages for prints & slides, 15¢/ea. Irv Meyer, 929-4326.

ELECTRONIC TYPEWRITER - antique spindle-back chairs; Gibson upright freezer, all reasonable. 363-7032.

GOLF CLUBS - Tur model II irons, stiff shafts, new cord grips, 1 iron through sand wedge. Ernie, Ext. 2677.

LABRADOR RETRIEVERS - AKC, classic blacks, 9 wks., 1 male, 1 female. Mary K. Baker, 286-8552.

POOL PUMP - Columbia series, 1-h.p., used ½ the season, orig. $1,260, now $175/neg. Ernie, 588-4987.

POOL TABLE - 4'x8', slatene w/subways, needs cushions, $100 or best offer. Ken, Ext. 5110.

ROWING MACHINE - Precor 612, hardly used, asking $150. Victor, Ext. 4424.

WESTERN SADDLE - $125/neg. Jean, 929-4522.

SKI BOOTS - woman's, size 8, $30; child's ski poles, $5; kayak, high volume, pvc, excel. cond., $150. Sue, Ext. 3492.

SKIS - cross-country, 180cm, Kneissel w/poles, excel. cond., $80. Les, Ext. 2920.

Miscellaneous

CALCULATOR - elect., $20; end table, $20; child's walker, $10; exercycle, $40. Kathy, 744-2203.

CHRISTMAS PLATES - Goebel Hummel, 1971-1978, $1,500. Herb, 924-5621.

SLACKS - men's, spring & summer, size 34-34, almost new, excel. cond. Ext. 2833 or 744-7172.

Free

TREE - 25' blue spruce, you dig. Susan, Ext. 5149.

PUPPIES - only to loving home; healthy, sweet disposition, mother AKC golden retriever. 751-2917.

Lost & Found

FOUND - wire-frame eyeglasses, in front of Chem., Bldg. 555, about 3 wks. ago. Ext. 4301.

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

BAY SHORE - 2-bdrm. apt., $650/mo. + elect. Ext. 2411 or 331-4840.

EAST PATCHOGUE - 1-bdrm. house, bath, huge l/r & kitchen area on picturesque waterfront, $850/mo. + sec. & refs. 475-4199.

EASTPORT - 3-bdrm. house, 2 baths, l/r, d/r, kit., large fam. rm., 2-car gar., unfurn., $950/mo. incl. lawn/yard maint., walk to school, 20 min. to Lab. Ray, Ext. 2012 or 325-0928.

E. SETAUKET - 3-bdrm. house, 1 mi. from SUNY, l/r, d/r, w/d, fp, gar., quiet area, lots of trees, backyard, $1,160/mo. Ext. 2215 or 689-7719.

HOLBROOK - 1-bdrm. house, unfurn., avail. now, 20 min. from Lab., near RR & MacArthur AP, no pets, $670/mo. + util. & light maint. Fred, Ext. 7947 or 588-2268.

LAKE PANAMOKA - 2-bdrm. ranch, deck, large property, eik, d/r, l/r w/fp, full bsmt., w/d, priv. beach rights, 5 min. to Lab., avail. immed., $725/mo. + util. 929-3407.

MATTITUCK - 1-bdrm. apt., large l/r & closets, full bath, kitchenette, sep. ent., quiet wooded area, near water, nonsmoker, $450/mo. Ext. 7657 or 298-9560.

MIDDLE ISLAND - 2-bdrm., 4-yr.-old condo, 1½ baths, partially furn., 5 min. to Lab., $875/mo. + util. 751-8351.

PATCHOGUE VILLAGE - 1-bdrm. apt., full bath, kitchen, fenced-in yard, priv. ent., quiet neighborhood. 289-7902.

PORT JEFFERSON STATION - 1-bdrm. apt., l/r, eik, bath, quiet area, 30 min. from Lab., priv. ent., single pref., $500/mo. all. 757-1973.

SHIRLEY - 1-bdrm. apt., 2nd floor, l/r, eik, full bath, w/w, 15 min. from Lab., quiet residential block, single preferred, no pets, $575/mo. includes util. Carla, 281-1840.

SHIRLEY - 2-bdrm. apt., l/r, eik, full bath, priv. ent., walk to beach, near all, $750/mo. includes all, sec. & refs. 15 min. to Lab. Lorraine, 281-1658.

SMITHTOWN - 3 bdrm., l/r, d/r, eik, den, 2 baths, full bsmt., gar., gas heat, ¼ acre, $1,000/mo. + util. Bawa, Ext. 3499 or 331-8128.

SOUND BEACH - 1-bdrm. apt., full bath, kitchen-l/r combo, cable, priv. ent., $600/mo. incl. all; also, 2-bdrm. apt., bath, l/r, eik, near all, $675/mo. + elec. Ext. 2671 or 744-3284 after 4 p.m.

SOUND BEACH - 3-bdrm. ranch, eik, full fin. bsmt., 2-car gar., 2 baths, deck, fenced yard, all appl., Miller Place SD, 15-20 min. to Lab., $1,000/mo. + util. 744-4185.

S. JAMESPORT - new cottage, eik, l/r, bdrm., bath, deck, no pets, $750/mo., sec. & refs; also summer rental, furn., sleeps 4, deck, no pets, 6/1-9/2, $4,500/season, sec. & refs. 654-0812.

For Sale

BROOKHAVEN HAMLET - 4-bdrm. Cape Cod, 2 baths, d/r, l/r, eik, 2-car gar., 20' deck, patio, more, close to bay, ¾ acre, red. to $219,000. Vera, Ext. 7108 or Carl, 214-708-2058.

CENTEREACH - 3-bdrm. Cape, country eik, new bath, w/w, Andersens, recessed lighting, bsmt., full fenced, gar., agp, low taxes, family neighborhood, walk to all, $125,000. 588-9452.

CENTEREACH - 4-bdrm. hi-ranch, l/r, d/r, eik, 2 baths, large fam. rm. w/fp, deck, large fenced yard, $131,900. 698-8514.

CORAM - Les Jardins, 1-bdrm. co-op, 5 appl., den, 2nd floor balcony, walk to shopping, 15 min. to LIRR Ronkonkoma, 20 min. to Lab., $78,500. Rich, Ext. 5540.

CORAM - Strathmore East, 4-bdrm. ranch, 2 baths, cathedral l/r, 2-car gar., gas heat, fenced corner lot, $120,000. Ext. 3791 or 928-7154.

MASTIC - 3-bdrm. ranch, 2 baths, ½ acre, low taxes, city water, 2-car detached gar., 6 mi. to Lab., 3 miles to beach. 281-2002.

MASTIC - 3-bdrm. ranch, 3 yr. old, 2 baths, full bsmt., eik w/skylight, golden oak cabinets, appl., fenced yard, assumable mtg., $114,000. Barbara, 399-5051.

MIDDLE ISLAND - 3-bdrm. ranch, eik, den w/fp, d/r, l/r, 1½ baths, screened porch, patio, full bsmt., wooded ½ acre, $149,500 neg. 924-6051.

PORT JEFFERSON VILLAGE - Harbor Hills, 4 bdrm., 2½ baths, ⅓ acre, l/r, d/r, eik, den w/fp, $199,000. 473-7739.

RIDGE - 2-bdrm. house in adult community Leisure Knoll, ac, newly carpeted & decorated, walking distance to rec. hall, pool, tennis, lots of extras, 5 mi. to Lab, $135,000. 744-3366.

RIDGE - 3-4-bdrm. ranch, eik, d/r, l/r, fam. rm., skylight, oak floors, full bsmt., deck, new pool, carport, shed, Andersens, 1½ acres, 5 min. to Lab., $164,00. Gerri, 924-0287.

RIDGE - Lesiure Knoll, 1-bdrm. duplex, all appl., walk to clubhouse, tennis, etc., low taxes, immed occupancy, over 55 only, $89,000. Ext. 4589 or 475-8581 eves.

SHOREHAM - 3-bdrm. California ranch, stone fp, den, l/r, d/r, 1¾ baths, atrium, cac, all appl., ig sprinkler, $149,500. Ext. 2833 or 744-7172.

SMITHTOWN - 3-bdrm. brick house, l/r, d/r, eik, den, 2 baths, full bsmt., gar., gas hot air, 2 zones, Andersen windows, ¼ acre, ask. $160,000. Bawa, Ext. 3499 or 331-8128.

GLEN OAKS - 2-bdrm. co-op, upstairs, corner apt., large l/r-d/r, attic, kit., appl., gas heat/cooking, walk to shops, near LIE & Northern Pkwy., ask. $89,00. Ext. 2679 or 472-6922.

OCALA, FL - 18 lots. Eddie, Ext. 2951.

Wanted

EXERCISE BIKE - good cond., reasonable. Fran, Ext. 4215.

GAY MEN & WOMEN - join us at our next on-site meeting Fri., March 15, dinner to follow. Call for details, 758-0930 after 5:30 p.m.

HOUSEMATE - to share 2-bdrm. condo, 1½ baths, partially furnished, clean & quiet, 5 min. to Lab., $450/mo. + util. 751-8351.

HOUSEMATE - share 2-bdrm. house, 10 min. to Lab., lakefront, priv. beach, large l/r-d/r-kit. area, $375/mo. + ½ cook. gas. Ext. 4940 or 929-3464.

IRISH MUSIC - for fund-raising dinner for nonprofit organization, will be returned. 874-2614.

JET SKI - 1982-84 Kawasaki, 550 cc, any cond., for parts. 878-1178.

MOTHERS OF 3-YR.-OLDS - for occasional weekday outings. Maribeth, 724-3825, leave message.

SKIERS - for bus trip to Windham, March 13, $43 for bus + lift, space limited. Augie, Ext. 3884.

In Appreciation

I thank all my friends who attended the party to celebrate the upcoming birth of my first child. I felt really special. Thanks to you all.

— Michele Cummings

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