BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

MPS II Is 10x MPS I

MPS II doesn't look much different from MPS I but the results of initial tests begun last month have confirmed that there is considerable difference between the two versions of the Multiparticle Spectrometer. The upgraded MPS II can yield ten times more data per hour of AGS time than could its predecessor.

MPS II is still in the process of being tested by the High Energy Particle Spectrometer Group, a collaboration of the Physics and Accelerator Departments. "The tests have worked out better than anyone could reasonably expect and the results have been gratifying," said Sam Lindenbaum, group leader. "The speed with which the results were attained was unusual for an apparatus of this complexity which uses new devices that go beyond the state-of-the-art."

Deputy Group Leader Ken Foley led the chamber construction effort to replace the spark chambers used in MPS I with narrow cell drift chambers, modified to meet the special requirements of MPS II. One such modification was the addition of 4000 four-channel, high speed memory elements designed by physicist Ed Platner, who was in charge of electronics development. Replacing over 100,000 feet of cable and more than 16,000 different wires used in MPS I, these tiny integrated circuits send information back to the MPS control room where physicist Bill Love oversees software and data analysis. "So far," said Lindenbaum, "our testing has shown that the entire MPS II drift chamber system is performing beautifully."

In addition to these improvements, MPS II retains the unique features of MPS I. At its core is the same 700-ton, C-shaped magnet which can rotate 30° to make use of two different AGS beam lines: A1, a high energy unseparated beam, and B2, a medium energy separated beam. The very powerful triggering techniques developed for MPS I continue to enable experimenters to select for study only those events which appear significant. In fact, MPS II's increased rate of operation makes the trigger more important than ever. With each burst of protons released from the AGS ring, the MPS II can handle 2,000,000 incident particles. Out of those, perhaps no more than 20 to 50 would be triggered as significant. "If you ran the MPS without a trigger," said Foley, "and if you could possibly write out that much data, one AGS pulse-worth of information would keep your computers busy for about one year."

MPS upgrading took place over a two-year period. Initial development of MPS II took place while MPS I was running. MPS I ceased operation at the end of 1980, after completing six years and 13 experiments. Early physics on MPS II is expected to begin later in the spring, after further tests are completed.

Testing of MPS II involves making it work as a system, then attempting to detect and analyze well-defined physical events such as K°. Of course," said Lindenbaum, "the early physics will be the ultimate test."

A number of experimenters are looking forward to doing that testing. Lindenbaum explained, "The MPS is the only general user high energy facility at BNL." Any university can apply to the High Energy Advisory Council (HEAC) for time on MPS II. Once a user group is approved, the MPS support staff is made available to assist in carrying out the research. Four projects proposed by user groups have already received approval from HEAC. Each project involves several different experiments related to the basic program established for MPS II: quark spectroscopy, searches for glueballs and eventually glueball spectroscopy, and study of the general characteristics of QCD. (See box this page.)

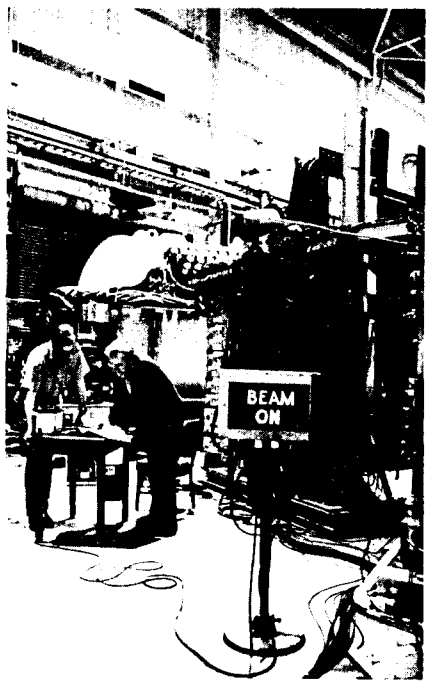
Besides preparing for experiments, Lindenbaum said, "A number of user groups contributed to various phases of the MPS upgrade. In particular, physicists Martin Kramer and Yoshiki Teramoto of the CCNY group made important contributions as did their technical personnel. In fact, the highly successful tests and early operation of MPS II is due in great part to the dedication and exceptionally resourceful activities of all the members of the groups mentioned."

Other members of the High Energy Particle Spectrometer Group include physicists Asher Etkin, Ronald Longacre, Thomas Morris, Satoshi Ozaki (on leave to KEK, Japan), Venetios Polychronakos, Alfred Saulys, and C. Dean Wheeler; engineers William Dieffenbach, Stephen Eiseman, Carl Jacobs, John Koehler, and Charles Zein; technicians Henry Arnesen, David Brady, Thomas Cannizzo, Robert Chmiel, Matthew Conforte, Don David, Leigh Hawkins, Thomas Mogavero, Charles Nielson, Lawrence Toler and Robert Wheeler; secretary Sharon Smith; and data aide Elizabeth Russell.

—Anita Cohen

Doug Humphrey

In the MPS Control Room, Sam Lindenbaum (left) works with CCNY graduate student Jamy Goo.



Doug Humphrey

Ed Platner (left) and Ken Foley consult a logbook in the downstream area of MPS II. To their left is the beam, surrounded by MPS equipment including Cerenkov counters and hodoscopes.

The Search For Asymptopia

In the late sixties, physicist Sam Lindenbaum coined the phrase "Asymptopia" to describe the physicist's Utopia — a theoretically promised land where critical physical laws are proved correct all the way to infinite energy.

The road to Asymptopia has been long and winding, with new discoveries appearing around every bend, from nuclear physics to elementary particles. Now physicists have come to the crossroads of Quantum Chromodynamics, or QCD. Basically, this theory supposes that quarks are the basic building blocks of matter and that they are held together by massless particles called gluons. Gluons literally glue quarks onto one another, but they are also capable of self-interacting.

The only way to prove or disprove QCD is by doing experiments aimed at finding these things which are theorized to exist. And, says Lindenbaum, the MPS II is geared to do just that. "Its enormous increase in sensitivity makes it the best instrument in the world for doing conventional quark and glueball spectroscopy experiments and some of the critical checks contemplated for QCD," he says. Those checks include searches for rare particles, including exotic mesons and glueballs.

Mesons are relatively common particles consisting of a quark (q) and an antiquark ($\bar{q}$) bound by gluons. Theory says there is no reason why this $q\bar{q}$ arrangement cannot be repeated to form an exotic meson with a $q\bar{q}q\bar{q}$ configuration.

As predicted by QCD, glueballs are collections of two or three gluons. Like quarks, gluons cannot exist in a free state, so if glueballs can be shown to exist, they will prove the existence of gluons.

Many important things that QCD predicts are expected to show up in the energy regions obtainable by the AGS. There, the MPS II, a huge electronic computerized device, is designed to assist experimenters in detecting them. After testing of the upgraded MPS II is completed later this spring, four user groups will begin experiments aimed at testing QCD.:

- Experiment 747 — Lindenbaum represents both Brookhaven and City College of New York on this BNL/CCNY collaborative effort which will be the first to run on MPS II. Essentially, this search for glueballs will be a repeat of Experiment 679, the first MPS I experiment ever run on the high energy unseparated beam. "That experiment gave indirect evidence for glueballs," says Lindenbaum, "and we hope to explicitly identify glueballs in the new experiment." Like others who plan to repeat previous projects, the researchers involved in Experiment 747 are counting on the higher rates of MPS II to provide them with twenty times more statistics than they were able to obtain earlier.

- Experiment 751 - Brandeis/Duke/Notre Dame/Southeastern Massachusetts U./Indiana are joining to conduct tests of QCD which they call "Measurement of Hyperon Radiative Decay."

- Experiment 769 - Participants in this Notre Dame/ Brandeis/BNL/CCNY collaboration will "Search for Glueballs and Other Meson States."

- Experiment 771 - Do glueballs exist in the E-meson region? A collaboration of BNL/Florida State/SMU will try to answer that question in a "Study of E-meson Characteristics in $\pi^- p$, $K^- p$ and $\bar{p}p$ Interactions."

— A.C.

No Qualms About 1st Quad

ISABELLE's first quadrupole magnet was successfully tested last week. On the first quench, it reached 4,143 amperes, which would correspond to 57.1 kilogauss (kG) in a dipole magnet. On the fourth quench, it reached 4,268 amperes, corresponding to 58.6 kG. The design current for ISABELLE quadrupoles is 3,600 amperes, equivalent to 50 kG.

The magnet tested is the first quadrupole built. Because the iron yoke that surrounds the coil is a dipole yoke, the magnet was named QM0. The names QM1 and QM2 have been reserved for the next quadropoles to be built, which will use quadropole yokes.

QM1 and QM2 will be strung together with six dipole magnets now being constructed, and together they will form the first cell in the ISABELLE tunnel. Installation in the tunnel will begin this summer.

In Nelson's Time

The fleets assembled by the European powers at the end of the eighteenth century were the ultimate development of a technology soon to be swept away by the introduction of iron hulls, steam engines and breech-loading guns. The flagships of these fleets were massive wooden vessels carrying more than 100 cannon and weighing over 2000 tons. To build a first-rate flagship required all the oak trees in a 50 acre forest. The logistics of building and operating a fleet, and finally joining in battle, presented enormous problems in those days of limited transportation and communications.

A man who is well qualified to give a fascinating insight into these problems will speak at Berkner Hall next week. Dudley Pope, writer and yachtsman, will talk on "Naval Technology in the Late Eighteenth Century" at a Lab-wide colloquium, Wednesday, April 28, at 3:30 p.m. A reception will be held at 3 p.m.

(Continued on page 2)

Sandia's Don Behr shows participants the weapons they will be using in the exercises and how they work.

Sgt. Bob Gwathney (BNL).

A member of Suffolk County's SWAT team.

P.O. Susan Morahan (BNL) crawls through the grass wearing standard dress for the exercises — a jump suit, headband and harness and laser-equipped weapon.

—Photos by Humphrey

P.O. Rex Garcia (BNL) bore-sights an automatic rifle equipped with a laser transmitter.

Spring Maneuvers

Four days of intensive training end today for the BNL Police who have been crawling through briar patches and "taking" buildings in a series of tactical exercises. The exercises have been designed to provide as real a situation as possible for the participants. "It is a true learning experience," said Capt. Patricia Cahill, who led her squad in the first day's program. "It is authentic as to sound and the guns have to be reloaded as in regular weapons. It's very intense." The program is conducted by Sandia Laboratories personnel for DOE which encourages such training at all its laboratories.

The shotguns, rifles and hand guns the trainees use are equipped with blanks and laser transmitters which send out optically coded laser light pulses. Each participant wears a harness and headband which have detectors embedded in them. When a participant hears a continuous buzz, it means a hit and that person is out of commission. A near miss is indicated by an intermittent signal which alerts the team member to be wary.

In the first day's exercises, there were two teams of eight police each, drawn from BNL and a Suffolk County SWAT team. The object of the first exercise each day was to capture a large red can sitting in the middle of a field near the Igloo area without being "shot" by the opposing team. The teams were allowed five minutes before they took to the field to devise a strategy. Each team was equipped with two-way radios, on separate bands, for communicating during the exercises. In the first day's exercise, BNL Sgt. Bob Gwathney, a Korean veteran, was able to crawl slowly to the target, retrieve it, and in lightning moves get back to his team without taking a hit.

In the afternoon, five members were put inside the Waste Management Bldg. and seven were outside with the object of "taking" the building from the "bad guys." It was a long and arduous procedure before the "good guys" got the building and, as one Suffolk policeman was heard to say before leaving the shell littered area, "this is a great exercise, because you can get careless and take chances. But when you hear that buzzer in your ear, you realize it could have been your life."

Thermostat For Supercold

What's a bimetallic strip? Take apart a conventional thermostat, and you'll see one coiled for action.

A bimetallic strip is what makes a thermostat work. It's made of two metals that respond differently to temperature changes — one metal expands and contracts more than the other. Glued together, the metals curve into a coil. In response to temperature changes, the coil gets tighter or looser, switching a heating or cooling device on and off.

Conventional bimetallic strips are only sensitive at ordinary temperature ranges. But recently, BNL researchers developed a strip for extremely low temperature use. Physicist David Welch, metallurgist Masaki Suenaga and former BNL employee Jean Bussiere, all of the Metallurgy and Materials Sciences Division of DEE, were granted U.S. Patent 4,291,105 for their joint invention.

According to Welch, their work on this project was a spin off. They were studying composite superconductors. (A superconductor is a material that has zero resistance to electricity at low temperatures.)

"One way to make a good superconductor is to combine three niobium atoms with one tin atom to make an intermetallic compound, niobium-tin. But it's very brittle," says Welch. "We can give it strength, and other desirable qualities, by making it part of a composite — sandwiching it between two layers of bronze."

What actually happens, he says, is that the tin in the bronze reacts with the niobium to form a layer of niobium-tin. So the superconductor sandwich is actually multi-layered, starting from the top with bronze, then niobium-tin, niobium in the middle, niobium-tin again, and bronze at the bottom. The composite is made at 800°C, with the parts all the same length. When it is cooled down to a few degrees Kelvin (around -250° C), if the layers were not joined together, the bronze would be much shorter than the niobium and niobium-tin. Joined together, then, the bronze is greatly stretched and the inner layers are under compression.

Welch says this mismatch is good in that it prevents cracks. On the other hand, the internal strain degrades superconducting properties. To study the strain state more carefully, the scientists needed a way to measure it. They discovered that by etching away from the composite everything but the layer of niobium and one layer of niobium-tin, they ended up with a bimetallic strip that curved in response to temperature change, just like bimetallic strips in thermostats. By measuring the radius of curvature with a ruler and camera, they could measure the strain in the niobium/niobium-tin composite. This method was then used to study some of the fundamental elastic properties of the niobium-tin compound.

"It occurred to us that the bimetallic strip we were working with could be made into a thermostat for use at super cold temperatures," says Welch. "Right now, with superconducting magnets and superconducting power transmission lines being developed, work in that temperature range is becoming more common."

The researchers applied for a patent, confident that no one else had thought of this application. Says Welch, "It was so far removed from what we were working on. Niobium and niobium-tin are widely studied for their electrical properties at low temperature. We had never heard of anyone exploiting their thermal mechanical properties."

—Mona S. Rowe

Nelson's Time (Cont'd)

Pope has written nine books on naval history as well as several novels based on the adventures of a fictional hero in the Napoleonic wars. He served in the British merchant service in World War II and was wounded in the Battle of the Atlantic. He then became naval correspondent and deputy foreign editor of the London Evening Standard. In 1959 he resigned to become a full-time writer and since 1965 he has lived with his family on their yacht "Ramage" in the Caribbean. He has lectured and appeared on television in Europe and Canada. His latest book, "Life in Nelson's Navy" was published in the U.S. this year under the auspices of the Naval Institute.

Cooking Exchange

The next meeting of the Cooking Exchange will be held on Wednesday, April 28 from 12:30 to 2:30 p.m. in the Recreation Building. Luscious luncheon foods will be prepared and sampled. Lab employees and their immediate family members are invited to attend. Admission is $1 and babysitting is provided at 50¢ per child. For more information call Bernie Benz, 928-1068, or Ruth Fernow, 928-8465.

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NYC Train Trip

The Hospitality Committee is planning a group railroad trip to New York City on Wednesday, May 5. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is $3.50; 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, no later than **Thursday, April 29.** Please make checks payable to "Brookhaven National Laboratory," and put the date of the trip, your BNL life number and your telephone number on the check. Your tickets will be given to you on the train. Refunds will be made only if cancellations are received by the Monday morning preceding the trip.

Spring Ahead

Daylight Saving Time goes into effect at 2 a.m., Sunday, April 25, so remember to set your clocks ahead one hour.

Garden Plots

Behind the laundry in the apartment area are 40 garden plots, each 10'x10', just waiting to be assigned to on-site residents. If you live at BNL, all you need to do to reserve a plot is to call Yoshie Yonekura, Ext. 3175. And to help you get started, tools and storage room are also available upon request.

CREF Values

March	52.85	April	52.39
May	52.56	June	51.94
July	51.19	August	48.26
September	45.89	October	47.61
November	49.61	December	48.33
January	47.49	February	44.88

March $44.48

Motorcycle Club

All are welcome to come to the annual spring tune-up of the Motorcycle Club on Saturday, April 24 at 10 a.m. in the cafeteria parking lot. Pictures will be taken and a ride out east is planned.

Rain date is May 1.

Pedaler's Palm

Some long distance bike riders have occasionally reported the temporary development of numbness, muscle weakness, and loss of coordination in both hands. This problem may be caused by prolonged pressure on nerve branches in the palm of the hand. Some simple preventive measures might help to avoid the problem.

- Use gloves when riding any long distance.
- Pad bicycle handlebars well.
- Change hand position frequently.
- Make sure bike seat and handlebars are properly adjusted.

— Caroline Kramer, R.N.
Occupational Medicine Clinic

Swimming Pool

A new four-month pool season will begin on Monday, May 3. Season tickets may be bought at the pool during scheduled open hours starting on that day.

Fees:

Season Tickets (fees not prorated)

Individual Membership	$23.00
Family Membership	33.00

Daily Admissions

Employee/Family Member	1.25
Guest	1.75

Schedule:

Monday through Friday
(Employees Only)
11:00 a.m. to 1:30 p.m.
(Employees/Families/Guests)
5:00 p.m. to 9:30 p.m.

Saturday and Sunday
(Employees/Families/Guests)
1:00 p.m. to 6:00 p.m.

Note: The swimming pool is closed on all Laboratory holidays.

Guest Ruling (Applies to all recreation facilities)

One Guest - An employee is allowed to bring one guest per visit without special permission or prior arrangement. The guest must be accompanied by the employee.

Two to Five Guests - Advance arrangement for two to five guests may be made at the Recreation Office. (No more than five guests per employee is ever permitted.) When such an arrangement is made, the Recreation Office issues an admission card stating the sponsor's name and life number, the number of guests permitted, the date of visit, and the facility to be visited. Guests must be accompanied by the employee, who will be requested to show the admission card at the main gate and at the swimming pool ticket desk.

Sponsoring employees are responsible for their guests during the entire time they are on site.

Softball

The Softball Leagues are now formed and play will begin the week of May 10. We are still in need of women players in the mixed league. Why not consider joining in on the fun and recreation? You don't have to be an expert. Interested women should call either Mickey Haller, Ext. 3218, or Dru Feitler, Ext. 3158.

Cafeteria Menu

Week Ending April 30, 1982

Monday, April 26		
Spinach egg drop soup	(cup)	.55
	(bowl)	.65
Batter fried steak & 1 veg.		1.85
Pork & cabbage crisp on toasted Chinese noodles		1.70
Hot Deli: Baked ham	(bread)	1.75
	(roll)	1.85
Tuesday, April 27		
Chicken and rice soup	(cup	.55
	(bowl)	.65
Poached fish fillet & 1 veg.		1.70
Breaded pork chop & 1 veg.		1.85
Hot Deli: Knockwurst & kraut on rye		1.75
Wednesday, April 28		
Navy bean soup	(cup)	.55
	(bowl)	.65
Western-style chili on rice		1.75
Top round of beef & 1 veg.		1.85
Hot Deli: 8-foot hero		.85/inch
Thursday, April 29		
Minestrone soup	(cup)	.55
	(bowl)	65
Beef Stroganoff over egg noodles		1.85
Ziti w/meat sauce and garlic bread		1.70
Hot Deli: Monte Cristo		1.80
Friday, April 30		
Manhattan clam chowder	(cup)	.60
	(bowl)	.70
Breaded fish fillet & 1 veg.		1.75
Meatloaf & 1 veg.		1.75
Hot Deli: Veal pattie & pepper hero		1.85

Salad Bar — Tuesday, Wednesday & Thursday 11:30 a.m. — 12:30 p.m.

Who Else Noticed?

All over the world, the violin is fingered with the left hand and bowed with the right. Last week, the Bulletin carried the photograph on the right, sent to us as is, and an astute reader wrote in to point out that the picture had been reversed. His clues were the reversal of the hands, strings and tuning pegs. On the left is the vioinist in proper position, as she will appear in the Academy Award-winning film "From Mao To Mozart: Isaac Stern In China," which will be shown tonight, April 23, at 8:30 p.m. in Berkner Hall. General admission is $4; students and senior citizens, $3; and those under 18, $2.

Afro-American Club

The Afro-American Culture Club invites all BNL employees and friends to their "Spring Fling," Friday, April 30, at the Recreation Hall. At the dance celebrating the arrival of spring, there will be fun, prizes, surprises, food, drink and music by "Mr. T."

Those who have attended our dances in the past know what a good time they are, and those who have not are in for a treat.

The festivities start at 5:30 p.m. Admission is free. There will be a cash bar, with dinners and sandwiches (by "The Duke") available for purchase.

Arrivals & Departures

Arrivals

Scott D. Keimig ..... Safety & Env. Prot.
John M. Kuzow ..... Plant Engrg.

Departures

None

Volleyball

Final Standings — Mixed League

A Division

	W	L
Teddybares	44	10
Dinkers	40	14
Mixed Ups	35	19
High Society	32	22
Nuts & Bolts	23	31
Las Bolas	9	45
Leftovers	6	48

Congratulations to Teddybares: Ted and Nancy Erickson, Randy and Debbie Johnson, Ray and Lynn Tice, Amy Kronenberg, Alan Packard, Doug Poquette, and Liz McKenna as champions of the A Division Volleyball Season.

B Division

	W	L
Puff & Stuff	45	15
Semi Tough	43	17
TNT	38	22
KMA	22	38
Big Boopers	19	41
Quirks	13	47

Congratulations to Puff & Stuff team members: Michele Henderson, Lois Caliguiri, Judith Berman, Becky Bishop, Conrad Koehler, Richard Sautkulis, Lee Walcott, Janice and Mike Bergkamp, Saed Mirzadeh, and Mark Sutherland as champions of the B Division Volleyball Season. They were undefeated in the Playoffs.

Bowling

White League

The Gropers remain in first followed by the Flounders and the Portsiders. G. Spira converted the 6/7, S. Smith rolled a 245, G. Hassell 204/218/606 scratch, T. Erickson 205, N. Carter 214, G. Fales 222, J. Griffin 202/ 227/221/650 scratch.

Pink League

High games were bowled by J. Thiede 165, D. Johnson 165/177/175, M-G Meier 167, H. Keeley 165, C. Beckner 169/165, E. Kristiansen 165/169, M. Connelly 168.

Red & Green League

A. Almasy had games of 200/221/ 211 for a 632-719 series, R. Larsen 257 for a 624-654 series, E. Sperry IV 246/201, C. Bohnenblusch 212, J. Connelly 206, H. Arnesen 204, J. Ferrante 203, R. Jones 201, J. Petro 200.

Purple League

E. Sperry rolled a 207/566 scratch series, B. Brown 202, E. Meier 199, B. Benson 196, J. Sheehan 195, C. MacDougall 195.

Runner's Corner

A meeting of the Runner's Club will be held at noon on Thursday, April 29 in the Conference Room of Building 318 to finalize plans for the Spring Race — 5 K and 15 K — on Sunday May 16 at 10 a.m. Anyone who can't make the meeting, but wants to help at the race or needs applications, call Ext. 2614.

Congratulations to Mike Bergkamp, Gus Prince, Gary Struve and Wen-Shi Yu on running the Boston Marathon.

Calendar of Races

May	A.M.			
Sat. 1	10:30	5 K	Windmill Run	Southampton
Sun. 2	10:30	10 mi.	Trevira Twosome	Central Park
Sun. 2	8:00	26.2 mi.	Newsday/L.I. Marathon	Eisenhower Park
Sat. 8	9:30	5 mi.	Oyster Bay PBC	Oyster Bay
Sat. 15	9:00	5 K & 15 K	Amer. Heart Assoc.	Eisenhower Park
SUN 16**	10:00	5 K & 15 K	SPRING RACE	BNL**
Sat. 22	10:00	3.1, 6.2, 13.1 (5 K, 10 K, 1/2 Marathon)	Great North Fork	Greenport
Sun. 30	9:00	5 mi.	Weeple Day Race	Belle Terre
Mon. 31	10:30	10 K	L'eggs Mini-Marathon (Women Only)	Central Park
June				
Sat. 5	9:00	10 K & 1 mi.	Center for Interpersonal Growth Race	Setauket
Sun. 6	9:00	4 mi.	Nor' East T.C. Road Race	Miller Place

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 Personnel Placement Supervisor, Ext. 2882.

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

LABORATORY RECRUITMENT: Opportunities for present Laboratory employees.

1682. SCIENTIFIC ASSOCIATE POSITION - Requires BS or MS in a scientific or engineering discipline and experience in some of the following: ultra-high vacuum components, precision instruments, electronics, and computer control. Position will lead to responsibility for the scientific utilization of one or more beam lines at the NSLS and also for the instruction and supervision of beam line users. National Synchrotron Light Source Division.

1683. PROJECT ENGINEER - Requires a minimum of a BS in an engineering or scientific discipline. Must have substantial knowledge of basic accelerator/storage ring technology and its subsystems, i.e., electronic/electrical hardware and mechanical hardware. Will be responsible for the day-to-day operations of the NSLS facility as it relates to the two high intensity storage rings injection system and experimental beam lines. Excellent communication skills are essential. National Synchrotron Light Source Division.

1684. TECHNICAL POSITION - Requires AAS or equivalent and basic knowledge of physics and math. Experience in the use and maintenance of electronic and mechanical instruments is required. Experience with ultrahigh vacuum systems is desirable. Individual will assist in radiation physics and dosimetry experiments. Safety & Environmental Protection Division.

1685. TECHNICAL POSITION - Requires AAS in engineering or physical science or equivalent. Responsibilities include the monitoring of radiation and contamination at the AGS and accurate recordkeeping of personnel exposure. Prior training or experience in health physics very desirable. Shift work. Safety & Environmental Protection Division.

1686. TECHNICAL POSITION - Requires AAS in electronic or mechanical technology or equivalent experience. Background should be in electronics, electromechanical and/or computer control or in the assembly, alignment and testing of precision instrumentation. Vacuum or machine shop experience desirable. Shift work. National Synchrotron Light Source Division.

1687. SECRETARIAL POSITION - Requires excellent secretarial and communication skills. Will function as primary secretary for scientific research group. Responsibilities include typing of high technical manuscripts, preparation of reports, handling travel arrangements and the ability or willingness to learn word processing. Department of Nuclear Energy.

1688. SECRETARIAL POSITION - Requires excellent secretarial and communication skills. Individual will function as primary secretary for a large research and engineering group. Diverse duties include typing of technical manuscripts utilizing a word processor. National Synchrotron Light Source Division.

1689. REACTOR OPERATIONS TRAINING SPECIALIST - Requires BS in enginering or science discipline and some teaching experience. Individual will assist in developing and implementing training program for Reactor Operations Personnel. Position includes part-time assignments in QA programs. Reactor Division.

OPEN RECRUITMENT: Opportunities for present Laboratory employees and outside applicants.

1690. PLUMBER A - (Two positions temporary - 6/1/82 to 10/1/82) - Requires successful completion of a four year apprenticeship program and substantial experience in the commercial/industrial sector as a plumber. Will be responsible for the layout, construction, installation, repair and maintenance of water, sewage and gas systems, related facilities and auxiliary equipment. Plant Engineering Division.

1691. ELECTRICIAN A - (Temporary - 5 months) - Under minimum supervision lays out, constructs, installs, maintains, repairs and operates electrical systems, equipment, controls and related devices. Requires minimum of five years industrial electrician experinece. Plant Engineering Division.

1692. STEAMFITTER A (Temporary - 6/1/82 to 10/1/82) - Requires successful completion of a four year apprenticeship program and substantial experience in the commercial/industrial sector as a steamfitter. Will be responsible for the layout, construction, installation, maintenance and repair of heat, steam and water distribution systems, related facilities and auxiliary equipment. Plant Engineering Division.

1693. CARPENTER (Temporary to 10/1/82) - Under minimum supervision lays out, constructs, modifies and maintains buildings and component parts from construction drawings, rough sketches or verbal instructions. Works with wood, wood substitutes, and combination materials and flooring, roofing and wall materials. Plant Engineering Division.

Autos & Auto Supplies

77 CAMARO - 6 cyl., auto, p/s, 24 mpg, low mi., mint. 231-8479.

PICK-UP CAP - 8 ft, white, all aluminum, 4 bubble windows, new $400, $200. 325-8186.

77 TRUCK CAMPER - 11½' Aristocrat, loaded, mint condition, must sell. Mike, 878-1325.

DUNLOP TIRES - 185VR15, radial w/rim, Semperit 155SR15, plus DR78-14 & 700-14. 369-2151 after 6 p.m.

74 YAMAHA - 250RD, 9,000 mi., orig. owner, excel. cond., $450. 281-8031.

73 MOTOR HOME - open road, sleeps 4, 24,000 mi., good cond., $7,000. John, Ext. 4520.

73 HONDA MOTORCYCLE - 500cc, fairing, saddle bags, trunk, airhorn, $650. Frank Rumph, Ext. 4581 or 588-3565.

75 FIAT 128 - sport coupe, new brakes, muffler, clutch, rebuilt trans., extras, $1,100. 231-8479.

GOODYEAR A-T TRACKERS - (2) L(LT), 15", only 3,000 miles on tires. Greg, 399-4213.

SNOW TIRES - (2), new w/rims, P165/80R13 w/w, steel belted radial, Sears Road Handler, $80. Ext. 5200.

74 CHRYSLER NEWPORT - 8 cyl., 4 dr. sedan, well kept, $800. Ext. 3798 or 929-8462.

71 VW BUG - rebuilt eng., new trans., good rubber, $550. 878-2681 eves.

79 HONDA - CM400T, 2,000 mi., garaged, must sell, $1,300. 981-0181.

73 FORD 1/2 TON PICK-UP - w/cap, extra wheels, 103K mi., 6 cyl., standard, asking $1,500. 265-3731.

HONDA MOTORCYCLE - 750cc, many extras, must sell, $1,600. 698-5088.

79 HONDA - Mod. Hawk, 400cc, almost new, $1,200. 588-0805 eves.

80 FIAT STRADA - am/fm stereo, 5 speed, new radial tires, extras, $4,100. Ext. 2231 or 369-2557.

12 BOLT CHEVELLE AXLE - drum to drum, posi, 4.11, wide wheels, tires, springs, $50. 363-6673.

73 FORD GRAN TORINO - 351 ci, auto, air, p/s, p/b, am radio, good tires, clean body, $1,000. 331-2969.

78 TRANS AM - gold, 6.6 LT, beige int., new brakes & exhaust, p/s, p/b, DE, 4 spd., am/fm 8-track, t-top. Roy, Ext. 4664 or 744-8779.

72 TOYOTA WAGON - 30 mpg, body rusted, eng. excel., reliable, 125,000 mi., $400. Ext. 4771 or 286-8747.

78 HONDA - 400cc, well maint., 6,000 orig. mi., some extras, must see, $1,000. Ext. 2926.

80 SCIROCCO - 4 spd., am/fm, dark metallic green, 29,000 mi., excel. cond., very good mpg, $6,395. Joan, Ext. 2549.

68 FORD - 2 dr., very clean, only 59,000 mi., good mileage, 2 sets of tires, $1,395. Joan, Ext. 2549.

74 CHEVY VAN - Beauville, 8 pass., clean in/out, runs well, orig. owner, $2,100. Dave, Ext. 4234 or 472-2394 eves.

SHOCKS - (2) rear load levellers. Chris, Ext. 3919.

73 PINTO WAGON - just inspected, runs well, high mileage, $300. Alan, Ext. 2928 or 821-1389.

76 VW DASHER - 4 dr., a/t, am/fm, $2,800 or best offer. Arnie, Ext. 2606.

DEALER REPAIR MANUAL - for 70-72 Dodge van, $8. John, Ext. 3292 or 286-1348.

DEALER SERVICE MANUAL - for 78 F14 Datsun, $10; wheel & tire for same car (new), $35; both for $40. John, Ext. 3292 or 286-1348.

70 CHEVY IMPALA - 4 dr. sedan, $250. Mike, Ext. 4293.

80 VESPA - 125cc, 110 mpg, 800 mi., extras, $1,200. 928-8060.

65 PLYMOUTH VALIANT - good running cond., body good, asking $450. 924-5192 eves.

73 HONDA - CB-350, good cond., low mi., $500. 878-8847.

75 OLDS CUTLASS SUPREME - auto, 260 V8, stereo cassette, powder blue/white int., excel. Ext. 3381 or 286-1024.

69 FORD LTD WAGON - 390 eng., good for parts, etc., not running, make offer. Ext. 7737 or 286-8611 after 6 p.m.

69 FORD LTD WAGON - 390 eng., a/c, p/b, p/s, body very good, runs, $150. Ext. 7737 or 286-8611 after 6 p.m.

Boats & Marine Supplies

8' DINGHY - fiberglass, new, extremely strong, teak trim, bronze oarlocks, under thwart stowage, $450. Ext. 4745.

19' REINKEN BOW RIDER - 1978, 85 HP Evinrude, trailer, skis, coast guard package, $4,200. 744-4595.

20' BAYLINER - 1976, Liberty 130 Volvo I/O, cabin, trailer, extras, $5,500. John, 541-4792.

16' PEN FISHERMAN'S ALUMINUM BOAT - "vee" style, 40 HP, elect. start, outboard & mfg trailer, $900. 924-6751 eves.

16' RUNABOUT - mod. V with 65 HP Merc. w/power trim, trailer w/spare and power winch, boat used 6 times, like new, asking $4,000. 929-4522 after 5 p.m.

15' FIBERGLASS BOAT - 40 HP Evinrude, pull start eng., trailer, $400. 325-1499.

16' GLASTRON - Tri-Hull with 55 HP Johnson, elec. start incl., trailer, clean, running, $4,000. 757-3178 eves.

18' GARVEY - clamming boat w/40 HP Johnson eng., both good cond., $800. John, Ext. 3292 or Jeff, 286-1348.

22' FIBERGLASS CUDDY CABIN - I/O V6 & trailer, plus extras, $3,500. Charlie, Ext. 3942 or 325-0968.

16' GARVEY CLAM BOAT - 60 HP Johnson, plus many extras. Ext. 7148 or 363-2522 after 6 p.m.

26' STEELCRAFT - 1947 antique, 115 Chrysler, sleeps 4, galley, head, extras, best offer. George, 581-4318 after 5 p.m.

12' KOLIBRI SAILBOAT - fiberglass, (2) sails, Highlander trailer, 1.5 HP Sears motor, $1,500. 821-9659.

PROPELLER - 22"x22", left hand, good cond., $100. 878-8847.

ANCHOR - Danforth 85, 50', 3/8" nylon line. Ext. 4727.

Free

LARGE COLD FRAMES - (4), about 3'x7'. Ext. 2362.

KING WHITE SHEPHERD - 8 yrs. old, needs home desperately, outside dog. Kathy, 727-6534.

Yard Sales

YARD SALE - April 24, 10 a.m. to 4 p.m., 122 Sharp St. (off Rte. 112), furniture, appliances, etc.

YARD SALE - Jeep top, books, misc. items, April 24 & 25, 30 Fairview Dr., Shirley. 399-2135.

Miscellaneous

HIGH PRESSURE WATER PUMP - Homelite, good for marine, pool, jetting use, extras, $400. Bob, 924-6435.

RANGE HOOD - G.E., 30", ducted w/ducting, never used, $49. John, 281-8021.

STEREO CABINET - walnut veneer, 65" wide, 30" high, excel. cond., $35. Ext. 4110 or 698-3856.

CABINETMAKERS - hardened steel woodscrews #8, flathead, various lengths. Ext. 7154.

WIDE ANGLE LENS - 28mm Sakkar f2.8 for Canon AE 1, $70. 286-3377 after 6 p.m.

ADULT FOLDABLE TRICYCLE - $50; pine queen size headboard, $50. 289-1585.

BENCH TYPE PIPE VISE - $10; vacuum, Craftsman, home/shop, wet/dry pick-up w/casters, Sears Best, $60. Pete, 399-2813.

STEREO TURNTABLE - AR-XA, $30. Ext. 2041.

MINOLTA CAMERA SRT102 - 35mm, 50mm 1:17 lens, shutter 0-1000, good cond., $125 firm. 281-0360 eves.

SEARS AIR CONDITIONER - 8,000 BTU, window unit, 110V, $150; king size mattress, foam rubber, firm, Posturpedic w/two box springs, like new, $180. Ext. 4333 or 929-6984.

20" ROSS CONVERTIBLE BIKES - (2), great for beginners, $35 & $45. George, Ext. 4460.

TUMBLING BARRELS - machine and 2 rubber liner barrels (110V), $100. Fred, Ext. 4407.

VERMONT MAPLE SYRUP - $20/gal., $12/half gal., $7/qt. P. Wanderer, Ext. 7687.

ROLLER SKATES - sz. 10, $10. Frank, Ext. 3372.

CAMERA - Konica T3 Autoreflex 35mm SLR, with 50mm f1.7 lens, leather case & Vivitar flash, $160. Ext. 4483.

CHAISE LOUNGE - for bedroom, very good cond., $45; 25 cu. ft. chest freezer, excel. cond, $235; power reel mower, needs engine, $15. 929-4522.

DISHWASHER - Caloric, harvest gold, excel. cond., $150; living room set, burnt orange, velvet, contemp., (2) couches, $150; bedroom set, king size, contemp., Pecan wood, excel. cond. 744-6628.

HIGHCHAIR - $6; Swingomatic, $4; circular walker, $4; fir and spruce trees, u-dig, 20" to 40", 2/$7. 727-1617.

HALF CARAT DIAMOND - perfect, $800, loose; in 14K ring, $860. Jim, Ext. 3055 or 584-7290.

PIANO - antique, upright, Weber. Henry, Ext. 3499 or 728-8798 after 5:30 p.m.

KENWOOD TURNTABLE - belt driven, excel. cond., best serious offer. 924-6021.

NIKON NIKKER 50MM LENS - f1.4, best offer takes it. Ext. 4452 or 543-0079 after 7 p.m.

FREEZER - Wards, 25 cu. ft. chest, very good cond., $235; powered reel mower, needs motor, $15. 929-4522.

CHAIR - w/ottoman, high-back, tufted, Mediteranean style, cranberry, excel. cond., $60. 744-2404.

BOWLING BALL - and bag, $10. Nick, Ext. 2524.

APACHE POP-UP - 1970, sleeps 6, stove, heater, sink, icebox, attached screenroom, $650. 286-2435.

REFRIGERATOR - GE Deluxe no-frost, 19 cu. ft., avocado, perf. cond., price negotiable. Ext. 4959.

STEREO CONSOLE - Spanish design, solid oak, 60" long, 30" wide, Fischer 160 tuner, Garrard turntable, excel. cond. 363-2070.

PIONEER RECEIVER - 35 watts per channel, like new, $150. Bob, Ext. 4758 or 862-6109.

AMERICAN HOLLY - 3 to 5 ft., $2/ft., U-dig; Alberta spruces, 1 to 3 ft., $7/ft., I-dig; push mower, $25. 744-5867.

ATTIC/WINDOW FAN - w/speed controls, "Diehl" unit, 27"x25", good cond., asking $35. 744-3218.

ITALIAN MARBLE TABLES - (1) end table, (1) coffee table, black marble, orig. $800, sale $350; Italian provincial couch, olive green, 3 pc., $250. 289-5704 after 5 p.m.

TWIN BED - complete, $50; lamp, $3; kitchen table & (2) chairs, $25. 698-5861.

OIL BURNER GUN - good working cond., recently serviced, $15. 744-2404.

MAGNAVOX COLOR TV - 23", needs some work, $50. 654-5609.

ALUMINUM SLIDER WINDOWS - complete w/storms & screens, (1) 8'x4', $100; (1) 5'x4', $50; (6) 34½"x34½", $25/ea. 979-6816.

FURNITURE - liv. rm. couch, (2) chairs, good cond. Franz, 744-3235.

BEDDING - (2) sets, (4) pieces, DeLux Shifman, twin size, good cond., $45/set. 475-8658 after 6:30 p.m.

B&W TV - 18" Zenith, recently serviced, excel. cond., $45. Anand or Mani, 246-9165.

ATARI GAME - w/approx. 12 games, used, good cond., $200. John, Ext. 3292 or 286-1348.

Ads left out of this issue due to lack of space need not be re-submitted to appear in next week's issue. Please note that ads may not be more than 15 words long and must be received in the Bulletin office by 4:30 p.m. Friday, for inclusion in the following week's Bulletin.

TOYS - and other items, used, good cond., in Shirley area. Helen, 281-8848.

END TABLES - (2) glass/chrome, (1) cocktail table, (1) bookcase. 924-6104 eves.

SLOW COOKER - iron, hair dryer, baby's high chair, JR-78-15 tire. 924-4991.

BIANCHI BRIDAL VEIL - exquisite, Ivory illusion w/Venetian lace, fingertip length, mantilla style. Kathy, Ext. 3406 or 924-7665.

TRS80 COMPUTER - model 1, (2) disks, line printer, 48K memory, matching table and stand, $1,800. Ext. 2504.

MOVIE CAMERA - Bell & Howell, 8mm, $8; 8mm projector, $8; Hardwick combination gas/kerosene kitchen stove, $100; Westinghouse gas dryer, L.P. gas, $50; also camping equipment: Coleman catalytic heater, like new, $25; stove, $15; lamp $15. 924-3082.

TYPEWRITERS - (4), portable, electric, manual, range of prices. Ext. 2358 or 286-0497 after 6 p.m.

BICYCLE - Huffy Thunder Road, excel. cond., 3 mos. old, cost $120, sell for $60. 732-6678.

QUARRY TILES - new, 6"x6"x½", 22 sq. ft. w/mortar bag, $50; 5/8" dia. wire ropes, 20 ft./$10, 70 ft./$25. Tom, Ext. 4084 or 878-1060.

SEMI LIVE FLAT TRUCKS - (6), with (2) jack handles, like new, $275 firm. 286-8921.

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 Sale

MASTIC BEACH - 4 bdrm. cape, d/r, eik, large l/r, gas hot water & cooking, 160x100 prop., low taxes, shed & full porch, near stores & bay, 8% Farmers mort., $28,000. 281-0360 after 6 p.m.

YAPHANK - 1 acre land, 6 rm. house, fenced, garage, basement, w/w carpet, hot water heat, Florida rm., $35,000. 924-7761.

N. PATCHOGUE - high ranch, l/r, d/r, kitchen, 3 bdrms., 1 bath, large paneled family rm., garage, util. rm., prime area, walk to schools, assumable 6% mort., low taxes, $39,000. Owner, 929-6984.

BAYPORT SOUTH - 1851 landmark, fully modern, 3 bdrm., study, studio, eik, l/r, fireplace, d/r, 1½ baths, city gas/water, barn/loft, excel. cond., treed, prime area, near bay, bus, stores, schools, 2/3 acre, $130,000. Owner, 472-1397.

CONDOMINIUM - Birchwood at Blue Ridge, 15 min. from Lab, 3 bdrms., many extras, facing golf course, low 60's. 698-7213.

BELLPORT VILLAGE - sunny 7 rm. cape, 18x24 l/r w/fireplace, 2 baths, bsmt., 2-car garage, excel. cond., near golf/tennis, $65,000. 286-8972.

For Rent

SOUND BEACH - furnished room, share kitchen, bath, l/r, walk to private beach, room has phone, full size bed & TV in 2 bdrm. apt., $200/mo. incl. util. Roy, Ext. 4664 or 744-8779.

CENTER MORICHES - furnished room, private home, bath, kitchen privileges, $160/mo. incl. util., female only. 878-8472 eves.

BERKSHIRES CHALET - 3 hrs. from NYC, 3 bdrms., 2 baths, fully equipped kitchen, elec. heat, deck w/spectacular view, near lake, hiking trails, avail. weekly or weekends. 929-6946 after 6 p.m.

MASTIC PARK - large studio apt., security, references, $275/mo. with heat & elec. 281-7844.

FURNISHED ROOM - private ent., fireplace, very large and bright, serious female only, $60/wk. 732-5864 after 5 p.m.

Car Pools

RONKONKOMA - driver to join 3-person pool, LIE exits 59, 60, 61. Victor, Ext. 2395.

Lost & Found

FOUND - gloves, catalog section of Bldg. 211, men's medium. Ext. 2969.

Wanted

WOMAN'S COASTER BRAKE BIKE - (2) in good cond., reasonable. 281-2002.

CAMPBELLS SOUP LABELS - for St. Mary's School, East Islip. Send to F. Chandler, Bldg. T-89.

BENCH SEAT - for Ford van, 1976-1982, black or gray. Rick, Ext. 3803.

RELIABLE HOUSE SITTER - to take care of house and dog (friendly), recommendations please. Ext. 4333.

16MM PROJECTOR - 289-1085 after 1 p.m.

HOT PLATE - ceramic, Corning model P54 only. 473-5585.

HOUSE - buy or rent, South Bellport or Brookhaven, 1/1/83 or before. Ext. 4388 or 286-5879.

TRAINS - Lionel, any "O" gauge or "027" gauge cars, track and equip. Frank, Ext. 3120.

ELECTRICIAN - for fuse box related work. Ext. 2073.

AMBITIOUS PERSON - $200-$300/mo., 4-6 hrs./wk. 698-5861 after 7:30 p.m.

CASSETTE PLAYER/RECORDER - portable, working, inexpensive. Kathy, Ext. 3406 or Jim, 924-7665.

JUNK BIKES - or bike parts, any kind, any cond. Alan, Ext. 2928 or 821-1389.

POSTAGE STAMPS - especially foreign. Mail to Leonhardt, Bldg. 911A.

BABYSITTER - 9 a.m.-6:30 p.m., Westhampton Beach area, my home, mature person, own transportation preferred. Pauline, 288-6367 after 7 p.m.

HOUSE TO RENT - 3 bdrms., reasonable rent, refs. avail. 288-6367.

CAMPING EQUIPMENT - tent, sleeping bags, lantern; rolltop desk; girl's 20" bike; Barbie doll collection; car vacuum cleaner. 924-4991.

TANGO STUDENT - seeks persons with enthusiasm for ballroom dance, Cha Cha, Lindy, etc. P.O. Box 600, Upton. Ext. 4395.

PERSON SEEKING BUSINESS OPPORTUNITY - with unlimited potential. Call for appointment. 732-6647.

FOR RENT - 3-4 bdrm. home, Center Moriches area, by May 1st. Ext. 3755 or 878-0929.

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