BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

On The Beam With Positrons

Imagine a world which is an opposite counterpart to this one, so that if the two were to meet, they would annihilate each other with a great burst of energy. Is this the stuff of science fiction? In fact, physicists have evidence of antimatter, a form of matter in which the electrical charge of each particle is opposite that of the usual matter of our universe. When matter meets antimatter, they cancel each other out and give off energy in the form of light (gamma-rays) — a case of mass converting to energy.

Kelvin Lynn, a BNL Physicist, has always been fascinated with antimatter, and chose to work with it as an Applied Physics/Materials Science graduate student in the early 70's at University of Utah. "I admit it was more a romantic rather than a scientific choice," he says. "But when I settled on working with positrons, a form of antimatter, it was because I knew they could be an excellent probe." Later on at Brookhaven he realized that a slow positron source with controllable energy could open up new ways to study surfaces of materials, interfaces between materials, and thin films coating surfaces.

Positrons are anti-electrons. They have the same properties as electrons, except they are positively charged. Lynn says what has been done with electrons for the past 20 years can also be done with positrons. They are much more difficult to generate, however, so he thinks they should only be used if they can provide new information.

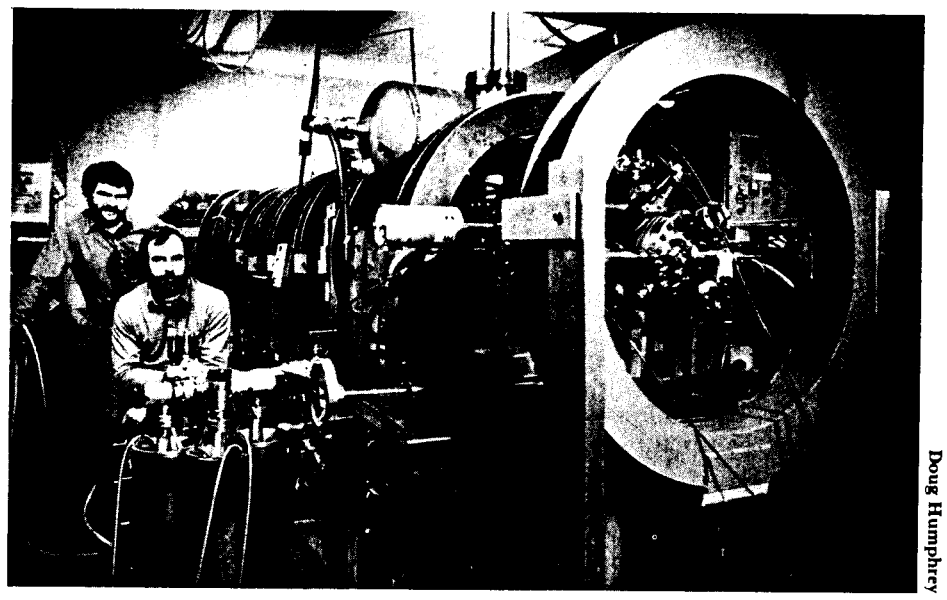
This is so in the study of solid materials like metals and semiconductors, but according to Lynn, success hinges on the production of high intensity, mono-energetic positrons. In the past, people had been unable to produce intense positron beams, and he, too, had tried and failed soon after coming to the Lab in 1974. But that experience taught him how to do the next experiments right, and in 1977, he started to build another beam in an ultra-high vacuum system.

"It was a low-budget operation," he recalls. "Besides borrowing some surplus pieces of equipment, I also built some parts from scratch. I even wound the magnets myself over a few weekends."

In a year and a half, the beam was generating good data. Lynn's first paper, proving that positrons could occupy surface states, was published in early 1979.

Briefly, this is how Lynn's beam line is constructed. A radioactive source sits on one end of an ultra-high vacuum system and emits positrons as it decays. The positrons come out at high speeds and they don't have time to annihilate with electrons before they pass into a metal, single-crystal moderator, which slows them down. Some of these slow positrons are re-emitted from the moderator and are finally guided by magnets toward a sample. Lynn points to the moderator as being the most critical part of the line.

Today, there are only two other positron beams in the world used for surface studies. One is at Bell Labs in Murray Hill, New Jersey, built at the same time as Lynn's, and the other is at Brandeis University in Boston. Lynn's beam can produce positrons in an energy range from one electron volt (eV) to ten thousand electron volts (keV). At 10 keV, it has slightly more energy than the other two beams.



Doug Humphrey

Kelvin Lynn (foreground), BNL Physicist, and Harold Jorch, a graduate student from Guelph University in Canada, do surface studies using a positron beam built by Lynn. One of three operating in the world, the beam is twelve feet long and sits upstairs in a room at the Physics Department.

Because the BNL beam works so well, Lynn has collaborated with many researchers, among them Allen Goland, Physics Department, Lewis Snead, Department of Energy and Environment, and I.K. McKenzie, Guelph University in Canada. Currently, he has visitors from Yale and from England, and in the coming months, he expects scientists from Italy, Denmark and Finland. A number of graduate students also work on the beam, doing research for their doctoral theses. Peter Schultz, Guelph, and Dan Fischer and Larry Granatelli, SUNY at Stony Brook, work with slow positrons. Harold Jorch, also a student at Guelph, uses the beam to study defects in semiconductors.

Jorch's research is particularly applicable, considering that every piece of electronic equipment contains semiconductors. A semiconductor is a material whose electrical conductivity is between that of a metal and an insulator. A transistor, for example, is a semiconductor.

Of the semiconducting elements carbon, silicon and germanium, the latter two are most important in solid-state device technology. Jorch is doing his thesis on germanium and silicon.

"People have been trying to make

(Continued on page 3)

Washington Visitors

On Saturday, Representatives William Carney (1st CD-NY) and Douglas Bereuter (1st CD-Neb.) visited the Lab for a briefing on our research programs. They were accompanied by Stephen Lanes, Minority Counsel for the Subcommittee on Natural Resources, Agriculture, Research and Environment, of the House Science and Technology Committee, and Rick Schmidt, aide to Congressman Carney. Above, James Christenson (NYU) explains his experiment, No. 726 at the AGS, to Mr. Bereuter (far right) and Mr. Carney. Christenson is searching for hadronic production of charmed particles. At the AGS, the party also visited the control room and the neutrino experiment.

Emerging from the 12 o'clock entrance of the ISABELLE tunnel, Jim Sanford (left), ISABELLE Project Head, continues a discussion of the project with the Congressmen. From the site they proceeded to the magnet floor of the ISABELLE project for an update on the magnets.

At the Research Hospital, Medical Dept. Chairman Donald Borg (right) discussed the current state of medical research programs. During their day-long stay, the Congressional delegation also visited the Brookhaven House, the National Synchrotron Light Source, the HFBR, and the Power Transmission Line.

—photos by Humphrey

Hello GTE

Last week before the new telephone system went into operation, Bill Webster, head of Staff Services, said he was glad the time had come, and it was just like waiting for a baby to be born. You knew that there might be complications, but you prayed that everything would be basically o.k.

Telephone operator Marion Dorfer was on duty last Friday when the cut-over took place at 5 p.m. She had been anticipating that time with some trepidation, but with a GTE instructor by her side, she said "it was not nearly as bad as I thought it would be." According to the operators, their work is not too different and it is mostly a question of learning a new terminology. They do like the read-out on their consoles which tells them where the calls are coming from.

When Monday rolled around, confusion was evident in some departments, there was controlled hysteria in others, but most were functioning normally.

The Personnel Office had a quiet first day. Apparently their phones were ringing, but not so that they could hear them. This situation was rectified by Tuesday and they were back in business. The Physics Department also reported the same problem. One person said it was quiet as a tomb in there, but it was expected that by week's end, all the bells would be ringing.

Reaction to the new phone system depended largely on whether or not you like change. Wails of "oh, I'll never get used to this," were heard, as well as "hey, this is interesting; let's try a station camp-on with call-back!" In fact, many employees were delighted with the latter feature. They considered it a joy not to have to keep redialing a busy number. Also, having the computer decide the best route for a call offsite was considered a definite plus.

Now that the new system is in effect, Bill Webster says he is generally pleased with the whole operation, and that telecommunication experts from DOE consider it to have been a "good cutover." Trouble calls are to be expected when 3500 lines in nearly 200 buildings are involved. This is equivalent to wiring a small town. GTE's trouble line, extension 4031, processed 167 calls on Monday but were down to about 40 calls on Tuesday. They will man the trouble line through April, after which, such calls will again be handled by BNL, extention 2529.

Over 200 lines on site are used for alarms which are set off by motion, temperature, fire, etc. Formerly, the lines were leased, now they are in our own cable system.

Webster was particularly appreciative of the patience most people exhibited in waiting for problems to be corrected. Beginning next week, he says his office plans to tackle the ILR's that have been coming in. These are requests for new installations, and changes in features or treatment.

Women In Science

Joan Gittleson, financial planner, columnist and adjunct faculty member at Adelphi University, will speak about "Financial Planning" at the WIS dinner meeting Tuesday, April 14, at 5 p.m. in Room A, Berkner Hall. Today is the last day to make reservations. Send a check for $7, made out to SAGA Corp., to Eena Mai Franz, Bldg. 830, Ext. 7103.

Pictured in their own recently renovated design room in Bldg. 134 are the architectural designers and their co-workers of Plant Engineering's Design & Construction section (from left): Ron Engel, Pete Boyle, Eugene Cummings, Art Worthington, Ken Kowalski (supervisor), Ben Rifkin (structural), Pierre Mercier, Roger Bailey, Marcie DuBrul, Bob Stauber, Ray Regan (structural), Robert Mele and Tony Sheschowitz (construction inspection).

—photo by Humphrey

Giving New Life to Old Buildings

Renovation has been a way of life at Brookhaven since 1947 when the barracks of Camp Upton provided a sturdy base on which to adapt the ex-army camp to serve as a laboratory.

Today renovation is undertaken either to modernize badly outdated surroundings or to accommodate changes in an area's function. Even a newer building may have to be redone when it will house a new experiment or become home to a different department.

All requests for architectural or structural renovations come to Harold Euler, assistant superintendent of the Design & Construction section of Plant Engineering's Architectural Division. He and supervisor Ken Kowalski then assign the project to one of the architectural designers in their section: Roger Bailey, Peter Boyle, Eugene Cummings, Marcie DeBrul, Ron Engel, Robert Mele, Pierre Mercier, Bob Stauber, or Art Worthington.

"Working at BNL is fascinating," Stauber said, "because of the 'soup to nuts' nature of the existing construction." Lab structures run the full gamut from frame buildings to those built of masonry and steel. Areas to be renovated could be anything from furnished office areas with low ceilings to large, open areas which are crisscrossed with cranes. "You won't get bored here," said Stauber.

Stauber speaks from the 15 years experience he had before coming to BNL. While working with architects and general contractors who were heavily involved in renovations, he said, "I became one of those people who didn't want to see another garden apartment, shopping center or bank. But this is different!"

Just how different is evident by some of the architectural designers' recent projects. Along with their counterparts in the D&C sections of the Mechanical and Electrical Divisions of Plant Engineering, they have been responsible for such diverse and complex assignments as giving a "facelift" to the exterior of the Research Library, revamping Contracts & Procurements (Bldg. 355), and thoroughly refurbishing Building 134 which houses several offices including those of Public Relations, Fiscal, and Plant Engineering. They have also been called upon to re-cover the sofas in Berkner Hall and to design the gazebo near the ball fields using scrap lumber.

Before coming to the Lab in 1975, Roger Bailey had been doing architectural design for skyscrapers in New York City and Toronto. He will admit that he thought the renovation work at BNL would be "elementary" compared to those projects. But Bailey found there's nothing elementary about the challenges posed by the variety of work at BNL. On the contrary, he said, "Our work requires creativity, versatility, and a closet full of hats!"

Dipping into that closet, a designer will don an architect's hat to review projected requirements with the user and to develop the new layout from a simple sketch to a precise engineering drawing. Having consulted along the way with other engineers regarding the structural, mechanical and electrical aspects of the layout, the designer then puts on a salesman's hat to "sell" the user on any changes that were made to accommodate the engineers' suggestions regarding heating, lighting, fire alarms, and so on.

Once the layout is "sold" and approved, the designer switches to a decorator's derby to select furniture, carpeting and colors for the area. The choices that look good in the layout and color scheme must also stand up to scrutiny when the designer dons a safety hat. Finally, the designer must put on a budget beret to estimate the cost of the proposed layout and decor.

If the estimate is too high, Bailey said, "It's back to the drawing board to look for methods and materials that are less expensive but just as safe, just as durable and just as aesthetically pleasing." If the estimate is on target, however, renovation can be scheduled.

Renovation begins only when it can proceed with a minimum of bother to the building's inhabitants. Building 134 is an example of the coordination this involves. To alleviate the overcrowding, part of Building 109 was moved and added onto 134. To vacate areas so refurbishing could take place, groups had to be moved to temporary quarters. These major steps had to be carefully planned and coordinated before any changes could occur. As Euler explained, "Building 134, like all projects, was a combination of efforts and involved many of the designers, as well as the building trade mechanics and supervisors from the Operations & Maintenance Shops. They all deserve a lot of credit for a smooth operation."

Obviously then, moving people and rearranging buildings doesn't just happen. "It's a little frustrating," Bailey said, "when people complain that a renovation is proceeding too slowly or that it's too expensive. They just don't realize that the effort from the first nail to the placement of the last ashtray is not what it seems to be. There was just as much effort prior to the first nail."

— Anita Cohen

Service Awards

The following employees received service awards during the month of March.

Thirty Years

David A. McCutcheon ..... Accelerator

Twenty-Five Years

Barry G. Galen ..... Energy & Env.
Harold W. Marshall ..... Biology
Henry F. Peters ..... Energy and Env.
Richard K. Stoehr ..... Accelerator
Allen J. Weiss ..... Nuclear Energy

Twenty Years

Gino Aurelio ..... Plant Engineering
Francis W. Drell ..... Instrumentation
Edward A. Fowler ..... Medical
Helen L. Masem ..... Plant Engineering
Robert T. Nicholas ..... Medical
Stanley A. Staron ..... Accelerator
Robert C. Zigrosser ... Plant Engineering
Edna W. Zollo ..... Medical

Ten Years

John M. Nicolellis ..... Instrumentation
Joyce L. Tichler ..... Energy & Env.

Garden Plots

Spring has arrived and it's time to begin gardening! Ten-foot square plots have been set aside for on-site residents who wish to grow their own flowers and vegetables. Gardening equipment is also available. To secure a plot, contact Yoshie Yonekura, Ext. 3175, Apt. 5A.

Arrivals & Departures

Arrivals

Daniel A. Hagan ..... Energy & Env.
Joe V. Michael ..... Energy & Env.

Departures

Eric P. Frak ..... Plant Eng.
Joanne Meyers ..... Central Shops
Raymond G. Regan ..... Plant Eng.

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CARL R. THIEN, Public Relations Officer

Aviation Club

The BNL Aviation Club will hold its next meeting on Wednesday, April 15 at noon in Room A, Berkner Hall. All are welcome to attend the meeting at which the club's upcoming events will be discussed. These include an evening of movies on April 30 which will feature the film "To Fly" and an FAA Pilot Safety meeting on April 22. For more information call Ron Dobert, Ext. 4989 or Ed Schwaner, Ext. 4846.

Diners Note!

The Cafeteria will be closed on Saturday, April 11. On that day, Snack Bar service will be available from 9:00 a.m. to 2:00 p.m. at the Brookhaven Center.

Cafeteria Menu

Week Ending April 17, 1981

Monday, April 13		
Mulligatawny soup	(cup)	.55
	(bowl)	.65
Baked ham w/raisin sauce & 1 veg.		1.55
Beef chow mein & rice		1.55
Hot Deli - Knockwurst	(on bread)	1.65
	(on roll)	1.75
Tuesday, April 14		
Old fashioned lentil soup	(cup)	.55
	(bowl)	.65
Braised brisket of beef & 1 veg.		1.65
Poached fillet of fish & 1 veg.		1.55
Hot Deli - Roast beef	(on bread)	1.65
	(on roll)	1.75
Wednesday, April 15		
Mushroom soup	(cup)	.55
	(bowl)	.65
Roast turkey & stuffing w/cranberry sauce		1.60
Meatloaf and gravy w/1 veg.		1.55
Hot Deli - Tacos w/refried beans		1.75
Thursday, April 16		
Corn chowder	(cup)	.55
	(bowl)	.65
Veal Madeline w/1 veg.		1.60
Western bean & beef bake		1.55
Hot Deli - Monte Cristo		1.70
Friday, April 17		
Seafood chowder	(cup)	.60
	(bowl)	.70
Breaded fish fillet w/1 veg.		1.55
Moussaka & 1 veg.		1.55
Hot Deli - Fried clam roll		1.70

French Cuisine

The next meeting of *LeCercle Francais de BNL* will take place at 8 p.m. on Friday, April 10, in the Recreation Building. The evening will be devoted to the culinary arts; in particular, several members will demonstrate their favorite dessert recipes. In keeping with the motto: "The proof is in the pudding *(Le pouf est dans le boudin)*," the desserts will be served at the end of the meeting, together with tea and coffee. There will also be a discussion of such culinary tricks as how to avoid feeding curdled Hollandaise sauce to the cat. If you are a frustrated Julia Child or Galloping Gourmet, this is your chance. For further information, phone Julia Walenta (928-4926). Non-members of The French Group will be asked for a donation of $1.50.

Table Tennis

Sam Cheng and Jorge Schvartzman won top honors in their respective groups in the BTTC's annual Handicap Tournament. The seventeen players who participated were divided between two groups based on their level of play. The handicaps which were assigned also added to the close, exciting nature of the matches.

This was the second year in a row that Cheng emerged as the top player in the BTTC tournament. This year he had to overcome a strong challenge from John Lee. Lee was winning their match one game to none when, at match point, Cheng turned the tables. Cheng went on to defeat Lee two games to one.

Final standings were: Group I — S. Cheng, 22; P. Blacher, 17; J. Lee, 17; K. Li, 15; C. Zein, 10; J. Dalal, 9; D. Cox, 7; K. Rohatgi, 6; J. Hanson, 5. Group II — J. Schvartzman, 10; Y.N. Lee, 9; L. Neymotin, 6; R. Occhiuzzo, 4; B. Chan, 1.

All club members are urged to attend the next meeting on Friday, April 17 when elections will be held for new officers.

A Double Tournament is now in the planning stages. Those interested in participating should contact S. Cheng, Ext. 2611 or P. Blacher, Ext. 5149 before Friday, April 17.

Great Adventure

Great Adventure combination tickets, including admission to the Amusement Park and Safari, are on sale at the BERA Film Service Office in Berkner Hall.

Tickets are valid for any day during the 1981 operating season and are priced at $12.00 each. Children aged three and under are admitted free.

Positrons (Continued)

smaller and smaller integrated circuit chips, which is all semiconductor material," says Jorch, "But the smaller the conducting path, the more problems are encountered with surface and near-surface defects, because the surface area increases relative to the bulk."

Jorch says slow positrons are an ideal probe to look for defects at or near the surface. In defects, atoms have been displaced in the crystal structure, leaving behind a region with a net negative charge. Since they are oppositely charged, the positrons are attracted to the defect. When they meet electrons, they annihilate, and the annihilation products are recorded by gamma-ray detectors.

The idea of using slow positron beams to study solids is fast becoming popular, and a lot of new areas have opened up now that the technique has been relatively perfected. Kelvin Lynn says an international workshop at BNL is planned for this coming September. Scientists will gather to talk about all the interesting physics that can be done with this technique. Many are also eager to build their own beams, so they are coming to learn the technology.

By then, Lynn may even have some new tips for everyone. He is now working on another beam, in which the positrons will be electrostatically instead of magnetically accelerated, guided and transported toward the target. "With it, we'll be able to do different physics, but it's only another stage," he says.

Lynn is already mapping out the next step — a positron microscope. He sees it as complementary to electron microscopes. "I've done the calculations, and the physics is correct," he says. When the positron microscope is built, it will be the only one in the world, and again, one more probe for unraveling the physics of solid materials.

Family Camping

The BNL Family Camping Club invites all who are interested in camping and family-style outdoor living to use the spacious, free campsite located west of the BERA field area on 5th Street.

Camp-outs are scheduled on site during the spring, summer and fall. Special events are usually planned for these meets. In the past, these have included pancake breakfasts, spaghetti suppers, pot luck dinners, wine and cheese parties and nightly gatherings around the campfire. Equipment for volleyball, badminton, bocce and horse shoes is available and field events are often arranged for children of all ages.

Indoor meetings are held at the Recreation Hall every third Thursday of the month from September to May at 8 p.m. Films of mutual interest are shown and refreshments are served. The December meeting is reserved for a Christmas party.

Membership in the BNL Family Camping Club is open to all BERA members and their immediate families. For more information, contact Chuck Watson, Ext. 3254 or George Scott, Ext. 3284.

Racquetball

Last fall, Wally Hughes and John Read of A.G.S. formed a mixed racquetball league with all the interested employees they could find. After twenty weeks of competition on Thursday nights champions for the 1980-81 season were determined:

1st. Place Mixed Doubles - Rolf Beuttenmuller & Jane Russell
2nd Place Mixed Doubles - Wally Hughes & Janet Tempel
1st Place Singles - Rolf Beuttenmuller & Janet Tempel
2nd Place Singles - Pete Eterno & Colleen Niederstein

The Racquetball League would like to extend an invitation to BNL employees who would like to join us next season. To join call Wally Hughes, 924-5938 or John Read, 744-1941.

Motorcycle Club

The club will hold its regular monthly meeting on Monday, April 13, at 5:15 p.m. in the Recreation Building. A spring tune up session is scheduled for Saturday, April 18. Besides getting organized for that event, we also have to talk seriously about the Motorcycle Safety Foundation instructor course.

Softball

Any Lab employee not now on an existing team, but who wishes to participate in the 1981 BNL Softball Program, should contact Larry Musso, Ext. 7924, or Charlie Bohnenblusch, Ext. 4758, for information.

Volleyball

Standings as of 4/6/81

A Division	
No Names	12-0
High Society	8-4
Las Bolas	8-4
Mixed Ups	7-5
Nuts & Bolts	1-11
Kings Court	0-12
B Division	
TNT	9-3
Leftovers	8-4
Oh No's	7-5
Lemufs	5-7
Puff & Stuff	4-8
Semi Tough	3-9

No Names over Las Bolas, 15-8, 15-6, 15-13; this clinches the fourth quarter for them in the A Division. High Society over Kings Court, 15-4, 15-10, 15-2. Mixed Ups over Nuts and Bolts, 15-4, 15-13, 15-6.

TNT over Puff & Stuff, 15-1, 15-4, 15-7. Leftovers over Semi Tough, 15-5, 15-11, 15-5. Oh No's over Lemufs, 15-13, 15-3, 10-15.

Degree Days

March		April				
30	31	1	2	3	4	5
14.0	9.7	17.0	17.5	17.0	10.7	10.7

Runners Corner

For the second year in a row, the BNL Roadrunners captured first place in the Relay Race sponsored by the Northport Running Club. By edging out the Sperry Roadrunners in the February 28 race at Sunken Meadow State Park, BNL has gained a second leg on permanent possession of the winner's cup.

The BNL Roadrunners have scheduled the Annual Spring Races for Sunday, May 17 at 10:00 a.m. for distances of 5 km and 10 km. For those who preregister by Wednesday, May 13, the entry fee is $1 for adults, 75¢ for children 15 and under. For those who register later (up to 9:30 a.m. on race day), the entry fee will be $2 for adults, $1.50 for children 15 and under.

Applications will be sent to those on the BNL Roadrunners' mailing list. For information, call Jeanne Penoyar, Ext. 2614, Ted Landry, Ext. 2959, or Bill Thomlinson, Ext. 3937.

Bowling

Purple & White League

The Gropers won all 7 and are tied for first place with the Flounders. Jim Griffin's 670 series with games of 244/231/195 was high for the night and the season. John Connelly rolled a 635 series with games of 237/166/232 and Caryl MacDougall a 613 series with games of 166/214/233. Other high games were bowled by Richard Scheidet 214, James Petro 209, Millie Connelly 202, Sharon Smith 184, Mary Grace Meier 182.

Pink League

High series was bowled by Helen Keeley with a 494. High games were rolled by Deb Johnson 186, Denise Miesell 153, Fran Nusz 152. The Pinsplitters are in first by 1 point.

Red League

The 76'ers (3063 pins) took the Old Timers 8-3. R. Larsen (257/245) rolled 686-727 series, J. Morris (210-214) 658 gross, H. Frei (219) 629 gross, J. Connelly 605 gross and J. Roesler 602. Isa Team won 11-0 over the Strangers. J. D'Amera grossed 665, M. Iarocci (201) 609. The Sandbaggers (3069 pins) shut out the Blue Jays 11-0. R. Jones (211) grossed 674, K. Riker grossed 632, E. Meier 620, C. Bohnenblusch (213) 603. The Freon Loaders took 8 from the Trouble Shooters and the Designers took 7 against the Pinball Wizards with E. Sperry grossing 600.

Green League

The Light Source extended their lead to 27 points as they downed the Old Timers II 8-3. K. Batchelor rolled a 205. The Blue Jays lost 11 to the Sandbaggers. For the losers, N. Parrinello bowled 204/213/590 series. The Sparks took 11 from the Phoubars. The Pinball Wizards could only take 4 from the Designers. The Trouble Shooters could only manage 3 from the Freon Loaders.

Classified Advertisements

Autos & Auto Supplies

ROLL BARS - white, excel cond, fits all mini pickup. $100. 698-3030 after 7 p.m.

69 VW BUG - parting out. Ext. 7947 or 2024.

70 BUICK SKYLARK - p/s, a/t, a/c, Craig sound system, 4 tires plus 2 snows. $450. Roy, Ext. 2384.

76 MOTOR HOME - Holiday Rambler, p/s, p/b, a/t, loaded w/extras, 11 MPG, good cond, must sell. $11,500. Ext. 4661 or 924-3269.

TIRES - set Delta Trans-Am raised white letters H60x15, $65. Kevin, Ext. 4261.

74 CHEVY 3/4 TON - 4x4 Pick Up, roll bar, H.D. suspension, plow attachments, am/fm 8 trk stereo. 727-2861 after 5 p.m.

77 DODGE - Club Cab Pick Up, a/t, V8, cap, new tires, 39,000 mi. $3,000. 736-3112.

AXLES — 2 sets; 4 tires w/springs, good for utility trailers. Bob, Ext. 4672 or 929-4753.

66 BRONCO ENGINE - 4 WD trans running, 6 Corvette wheels 4/W B.F. T/A's. $200. 473-2318 or 744-3968.

80 SUZUKI GS850L - Vetter Fairing, extras, under warranty, absolutely as new. Larry, Ext. 7979 or 261-5030.

WINNEBAGO 8' - slide in cap, insulated, roof-vent, jalousies, paneled removable front windows. $275. 286-9700.

TWO WEBER - 40 carbs, $250; also adapter manifold for 2000cc Datsun. Ext. 4068.

73 TOYOTA - Carina, excel cond, new tires/paint-/carpet, 65,000 mi, a/t. Asking $1,500. 231-4566.

69 CAMARO - $800. or parts, custom int., custom glass, needs nose. 234-3519 eves.

76 VOLARE - 4 spd trans, p/s, a/c, am/fm stereo cassette, fold-down rear seat, other extras, good cond. 286-1214.

70 FORD LTD WAGON - p/s, p/b, a/c, roof rack, mechanically sound, some body rot. $400. Firm. 277-1284.

78 HONDA CIVIC - Brown, 4 spd, radials, good cond. in and out, am radio, 60,000 mi, good MPG. 399-4767 after 5 p.m.

HUSQVARNA 250CR - Moto-X air forks, complete ground-up restoration new motor, $600; Parting out '70 MGB-GT, 5 true spoke rims, w/tires & knock-offs, Bob, Ext. 4857 or 744-3289.

70 DART - for parts, fender; 4 doors; trunk lid; rear end; auto trans; glass. Ken, Ext. 4514 or 289-8212.

UTILITY TRAILER - 4x6, good cond, $75. takes it. Kevin, 281-8031.

DODGE TRUCK TIRES - G78-15 mounted on five bolt rims, balanced, only 500 mi. $225. Firm. Gerry, Ext. 4597.

74 HARLEY DAVIDSON - Sportster, low mileage, kickstand, stock. $3,000; 76 HARLEY DAVIDSON Sportster, low mileage, elect. start, black "stock". $3,200. 732-3118 at 6 p.m.

77 FORD LTD II WAGON - V8, a/t, p/s, a/c, 28,000 mi, good cond. $3,300. Ext. 4045 or 289-5770 after 6 p.m.

74 FORD GALAXY - good cond, p/s, p/b, a/c, radio, reg. gas, high mileage. 363-6940 after 5 p.m.

71 AMC JAVELIN — light blue w/vinyl top, bucket seats, am/fm, new tires, spoke hub caps, excel car. $900. Ext. 7317 or 475-8632.

15" FORD RIMS - and spoke hub caps, T-Bird style, best offer. Ask for Vinny, Ext. 7317.

71 NOVA SS - black, orig. cond, a/t, p/s, excel running, needs bodywork, many extras. $1,200. Ext. 7317.

74 HARLEY SPORTSTER - XLCH, rigid frame, Girder 6" over, Barnett clutch, $2,900. 727-7920 eves.

75 VW BUG CUSTOM - am/fm radio, new upholstery, 55,000 mi, good cond, good gas mileage. $2,500. Ext. 4622 or 929-4840.

78 DODGE ASPEN - white, 6 cyl, a/t, a/c, landau roof, like new. 732-8241.

73 SUPER BEETLE - red, good cond. inside and out, mechanically good. Asking $1,100. Ext. 4351 or 221-6636.

SPARK PLUG WIRES - 4, 6, and 8 cyl, $5. a set. Bill S. Ext. 4434.

WHEELS - 13" for Pinto, 2 for $10. 289-0413.

80 SUZUKI - Moped, 400 mi, excel cond. 80-100 MPG. $350. 266-1581.

80 SUNBIRD - 4 cyl, a/t, vinyl top, am/fm radio, 22,200 mi, 24 MPG local. $4,300. Lou Licalzi, Ext. 3354.

78 KAWASAKI - 175cc, excel cond, extras. $675; motor cross boots, good cond, Canam 9½, $25. Laurence, 744-5079.

CHEVY 4 SPEED TRANS - w/253 first gear, Zoom clutch, ram pressure plate and flywheel, $350; 1968 PONTIAC 350 engine w/4 spd trans. and posie rear, all in excel cond. $350. Ext. 4034.

302 FORD ENGINE - 80,000 mi. good cond., as is $175. 399-4213.

80 HONDA - motorcycle, Twinstar, brand new, many extras. Ext. 5221.

65 VW BUG - Gabriel air shocks, Hurst shifter, extra parts off road. $100. 475-3792 after 6 p.m.

79 CHEVY MALIBU - 200 V6, a/t, p/s, p/b, am/fm 8 trk, 23,000 mi, good MPG, excel cond. $4,400. Ken, 2350 or 758-9334.

UTILITY TRAILER - 4x8, high sides, good tires, storage space underneath. Sacrifice, $100; tire L78-15, brand new, recap by Firestone, never used, unmounted, good spare. $15. Mike, Ext. 2528 or 399-4636.

STOCK CAR - '69 Chevelle, roll cage, 4:11 rear, Hoosier Racemasters, less motor and trans, excel cond. Eddie, Ext. 4095.

77 HONDA - Super Sport, 10,000 mi, clean, runs excel. Ext. 4095.

71 VW SUPER BEETLE - am/fm radio, excel in and out, good MPG, must see. $1,400. Marcie, Ext. 2514.

80 AMC CONCORD DL - 4 spd, manual, 6 cyl, 15,000 mi, light blue. $5,400.. 473-1388.

72 BUICK LE SABRE - 455, a/t, a/c, p/s, p/b, runs good. $375. 472-4228.

73 AMC MATADOR - excel. running cond, no rust, needs paint, great 2nd car. $500. Joe Bush, Ext. 3284 or 736-2728.

6' TRAILER - Stepside Pick Up Bed, very good cond, need completion. $200; rims 8"x15" six bolt for Chevy 4 WD, marginal 1100/15 tires. 4/$50. Bob, Ext. 4434.

71 CHARGER - S.E. 65,000 mi, 3 spd, a/t, new paint, excel int/ext. Asking $1,400. Henry, 727-0216.

Boats & Marine Supplies

1976 20' BAYLINER - 4 cyl, IO cabin w/accessories, trailer w/braking system. $7000. John, Ext. 4973.

PADDLE BOAT - w/trailer, fiberglass two seater, best offer. 698-3030 after 7 p.m.

16' SKEEC - wood outboard 40 HP Evinrude, galvanized trailer. 298-4057.

SAILBOAT - O'Day Widgeon 12½ fiberglass, excel cond, includes mooring. $900. Tom, Ext. 2963 or 689-9228.

318 CU. CHRYSLER MARINE ENGINE - fresh water cooled, heat exchanger included, runs very well. $50. Don M., Ext. 2022 or 878-2215 after 6 p.m.

23' GLASS CUDDYCABIN - 225 Chrys. slant 6, I.O. all re-built, needs exhaust mani. and minor parts. (nice boat) $2,500. Firm. Joe Bush, Ext. 3284.

AIR ROLLERS - 1 pr., new $25. store price, $30. ea. Ext. 3992 or 298-4172.

TWO QUARTS - "Interlux" bottom kote, just purchased, $19. ea. 821-9483.

1931 31' RICHARDSON - cabin cruiser, good cond, 6 cyl, Gray Marine, excel fuel economy. $1,800. 878-8847.

16' WORK BOAT - w/35 HP Evinrude. Ext. 3084.

MERCURY OUTBOARD - 4½ HP, good cond., $200. Michael, Ext. 2081 or 878-9384 after 6 p.m.

Yard Sales

GIGANTIC YARD SALE - from Grandma's attic, #118 Foster Road, Lake Ronkonkoma. April 11 and 12, 9 a.m. to 4 p.m. 588-2477.

YARD SALE - 4 families, 121 Huntington, Mastic Beach, April 10 to 12, 10 a.m. to 4 p.m. Margie, 281-1169.

Miscellaneous

STRAWBERRY PLANTS - ready now for planting, healthy, best 2 varieties, 10 plant min. $2. Chris, 878-0621.

DOORS - exterior, new 2'8"x6'8"x1¾" (3) windows L & R prehung Fir $110. ea. 924-6582.

JAPANESE HOLLY - (Ilex Convexa) 20"-24", U-dig, 2 for $7. 589-4363 after 6 p.m.

TURNTABLE - Dual model #1019 w/new Shure cartridge (78,45,33-1/3 RPM) Sell as is. $50. Alyce, Ext. 2902.

FLOOR WAXER — 16" Commercial complete w/brushes, rug shampoo tank, etc; chain link fence, 65 ft. vinyl coated, posts, gate, 4' high, $200. 281-0287.

TRAMPOLINE — Nissen 4½x9 ft. bed, chrome frame, transporters incl. $220. 281-4080.

SWIMMING POOL - motor/pump & filter, new $130; child float, $5; adult float, $20. Steve, Ext. 4615.

BEE HIVES - (2) lively occupants & equipment for handling same, $175. Ext. 3400.

DAIWA 212A - light action rod, 4-8# line, 1/8-1/4 ounce lure, new. $8. ea. George, Ext. 2296.

COLOR TV - 25" Zenith "portable" w/cart. color "soft", 1973 model. $75. or best offer. Alyce, Ext. 5203.

CHANDELIERS - beautiful crystal (several); dresser, large in good cond; desk & chair; kitchen or dinette set. Ext. 4532 or 277-4091.

NATIONAL GEOGRAPHIC MAGAZINE - all issues from Feb. '55 thru Oct. '78, best reasonable offer. Ext. 3563 or 286-0478 after 6 p.m.

POOL - 18 ft. by 4 ft., filter & accessories incl. for $150. good cond. Jack, 281-6745.

DIAMOND CHIP EARRINGS - $8; heart-shaped charm holder 14K, new - $25. was $40; 2 piece Danskin skirt & bodysuit, new, rust $18. Ext. 7187.

DINING TABLE - 42"x30" w/four chairs, good cond. $25. Ext. 4211 or 744-2499.

BICYCLE - ladies 6" 3 spd w/child carrier. $45. Al, Ext. 7588.

TYPEWRITER - Alder electric, fully equipped, excel cond. 744-1022.

POOL FILTERS - (2) Hayward DE EC40, like new, $45. ea; (1) double stainless kitchen sink, 22x34. $10. Ron, Ext. 3682 or 289-1003.

WHITE PORCELIN KNOBS - self closing cabinet hinges, various sizes. Walt, Ext. 7154.

GE REFRIG - 19 cu. ft., 4 yrs. old, Avocado, side by side, perfect cond. Best offer. Ann, Ext. 4959.

RECORDS - 16" electronic transcriptions 40's music, make offer. John, Ext. 7611.

MINOLTA GADGET BAG - holds camera, 2 lens & misc. accessories, like new cond. $20. 281-0360.

FOOSBALL TOURNAMENT TABLE — butcher block construction, hardly used, like new cond. Asking $375. 277-9325.

COAL STOVE - Surdiac 60,000 BTU, excel cond, used 4 months. $875. 289-8479 eves.

POOL - oval 18'x4', 3/4 hp sandfilter, needs liner. Asking $200. 399-1117 after 5 p.m.

SWIM POOL - 10'x2' new liner, cover, $20; red tricycle, good cond, $7. 286-2788.

JUST IN TIME FOR EASTER - boy's 3 pc. grey suit, size 16, like new $30; 24' pool w/filter, ladder, vinyl cover, etc. $300. 331-1162.

BICYCLE - girl's 20" 3 spd, good cond. $35; learner bike and wheels, $15. Ext. 7317.

BUMPER JACKS - (2) Bi-pod screw type, 1 ton, $25. for both. Ext. 3992 or 298-4172.

REINDEER SKIN - approx. 3'x5', best offer. Dennis, Ext. 4259 or 736-2534 after 6 p.m.

BICYCLE - 21" Motorbecane, brand new cond. Ext. 2482.

PING PONG TABLE - fair cond, $25; wood storage closet, good for coats or other clothing, $30; black vinyl lounge chair, good cond, $30. 265-5361.

OIL TANK - 275 gal. used. $25. 744-5096.

TV - 19" B&W, Zenith, good cond. $45. Ext. 4333.

BEDROOM SET - queen size bed w/mattress; (2) bureaus, night tables, excel cond. 744-4838.

LIVING ROOM SET — Contemp. 3 pc. w/slip covers; 2 end tables; one wall unit; 2 lamps; 2 pr. drapes 144"x90". $850. 588-7917 after 4 p.m.

DWARF ALBERTA SPRUCES - extremely dense, 20 yrs. old & 3 ft. tall, $20. ea; American Holly 4-5 ft. $10; blue spruces 5', $15; white pines to 4 ft. $8. You-dig them. 744-5867 after 6 p.m.

AIR COND - 7500 BTU Emerson, $50; men's/ladies, skis, boots, poles, size 10 and size 6. $40. per set. Ext. 7291.

FIR & SPRUCE EVERGREENS - 20" to 40", U-dig, 2 for $7; roof racks, like new $10. 727-1617.

LAWN MOWER - needs some work, $20. Ext. 2616 or 751-5868.

BICYCLE BASKET - new cond. 12½x17½x6" deep, $6. 727-3608 after 5 p.m.

ATLANTA COAL STOVE - all cast iron, never used. $125. Ray Ceruti, Ext. 2012 or 325-0928.

WOOD SHUTTERS - used but serviceable, (2) 80"x18" (5) 40"x18" (4) 41"x18". 588-3999.

RACCOON COAT - nice markings, size 40-42. $185. 281-9298.

DINING TABLE - 42"x30", with 4 chairs, good cond. $25. Ext. 4211 or 744-2499.

COFFEE TABLE - Lane Meditt., $50; Bicent. pewter plate set, procelain revolution inserts. $75. 698-9648 eves.

MICROSCOPE - B&L Compound student type, monocular $65. Sy, Ext. 3639 or 289-8182.

BROOKHAVEN TOWN RECORDS - 1880 edition 3 volumes, good cond, best offer over $50. Linda, Ext. 2816.

WALL OVEN - Tappan gas, $50; turntable - Dual 1215, $25; Panasonic am/fm cassette (Dolby) $260. 473-3604.

TV - portable B&W 9" RCA w/batteries, $100. Ask for George, Ext. 7168.

LIVING ROOM - semi/formal, sold separately or as a unit, 3 tables, 3 chairs, 3 table lamps, 7 ft. sofa, 2 commodes, mint cond. Best offer. Ext. 2065 or 981-1327.

WALL OVEN - $75; counter top stove, $75. Ext. 7785.

BABY BOUNCER - $3; golf clubs #9, $2. ea; tire w/rim 7.50-14, $10. Susan, Ext. 4267.

ZODIAC BOOTS - size 7m, never worn, 3" heel, russet. $50. Ext. 3482.

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

ROCKY POINT - 2 bdrm, l/r, eik, and screened porch, near village & beach. Low taxes, ideal starter or retirement home. $23,000. 581-1993.

PORT JEFF STATION - 3 bdrm slit level house, w/garage, 8½% assumable mortgage. $31,500. 928-7926 after 12 noon.

NORTH SHIRLEY - custom built Colonial on 100'x217 land, 9 rms, garage, bsmt, din. w/fp plus extras. $12,000 cash over $29,000 9½% no additional fees. Just move in. 924-0960.

SHOREHAM VILLAGE - Claradon custom ranch 4 bdrm, 1½ bath, lg. country kit, deck, finished playroom, 2 car garage, secluded wooded $^{2}/_{3}$ acre. Immediate. $88,000. 744-6606

POQUOTT - remodeled older home on landscaped $^{2}/_{3}$ acre, 2 + bdrm, 1 bath, eik, LD, woodstove, fruit trees, lg. veg. garden, priv. beach. Low 70's. Tom, Ext. 2963 or 689-9228.

MEDFORD - $^{1}/_{3}$ acre, Cape, 4-5 bdrm, 2 bath, den w/fp, l/r with coal stove, lg. eik, formal d/r, 18x36 in ground pool, assume 7% $20,000 mortgage, $43,900. Jack, Ext. 4254 or 289-6708.

BLUE POINT - 5 bdrms, 2 baths, handyman special, must sell to settle Bumstead estate. $35,000 firm. Ext. 3482.

For Rent

BELLPORT VILLAGE - 4 bdrm, 1½ bath, l/r, f/r, eik, deck, single attached garage, hi ranch, walk to Kreamer St. Schools. $450/mo. (option to buy) Ext. 3502 or 286-8166 after 4 p.m.

E. SETAUKET - Near SUNY, att. studio apt. in priv. home, own entr, a/c, carpeted, & fp. $275/mo. pays all. 751-7491 eves.

MIDDLE ISLAND - Condo, share 2 bdrm, 2 bath, furn. $200. + ½ util. (gas, water incl) Non-smoker. Jacki, 924-4611 eves. (4 mi. from Lab.)

BERKSHIRES CHALET - 3 hrs. from NYC; 3 bdrms, 2 baths, fully equipped kit, elect. heat, deck w/spectacular view, near lake, hiking trails, near ski areas, cross-country skiing on property, ½ hr. from Tanglewood Theater (summer stock) 929-6946 after 6 p.m.

BELLPORT VILLAGE - Lg. furn. room in quiet neighborhood. Some privileges. 286-8356.

YAPHANK - Townhouse, 5 min. from Lab., l/r, kit, dinette, 3 bdrms, 1½ baths, bsmt, garage, all appl, rec. facilities. 765-2102.

MIDDLE ISLAND - Furnished room(s), 12 min. from Lab., a block from Spring Lake Golf Course. Priv., entr., util., refrig., washer/dryer, furn., cooking facilities can be arranged. 924-7972.

Wanted

WASHING MACHINE - and dryer, reasonable. Dan, Ext. 3867 or 698-6120 after 6 p.m.

HOUSEKEEPER - Mon. thru Fri, 7:30 a.m. thru noon. Shoreham area, own transp. required. 744-4611 eves after 7 p.m.

COMBINATION PLANE - & accessories. Don, Ext. 3493.

SUNFISH TRAILER - 744-8595.

BUSINESS ASSOCIATE - Develope excellent second income part time, no investment. Call for appt. 698-5861 after 7:30.

WHEELCHAIR - in working cond, must be reasonable. 286-0247 or 286-3249 state make price.

GE REFRIG/FREEZER - 14 or 17 cu. ft. white in good cond. Louisa, Ext. 4207 or 286-2251.

SOFTBALL TEAM - to play on Brookhaven Town Leage. Gary, Ext. 2066.

LOVING HOME - for female cat, spaying done at my expense. Kathy, Ext. 4615.

PUPPY - small breed, adopt/purchase reasonably. Need to replace deceased dog. Children heartbroken. 281-2471.

McDONALD COUPON - number 500 - 541 - negotiable on winnings. Jim, Ext. 3436.

GO CART - in good cond, reasonable. 727-7761 after 6 p.m.

PLYMOUTH DUSTER - '71 to '74, 2 dr, 6 cyl, clean inside & out. Fred, Ext. 4988.

MIRRORS - (2) for '68 Chevy C-10 Pick up. Leon, Ext. 2973 or 698-5759 eves.

PORT-A-CRIB - Jim, 286-0796.

LUGGAGE CARRIER - molded plastic for auto roof, reasonable. Dennis, Ext. 4259 or 736-2534 eves.

TRAINS - Lionel, any "0" gauge or "027" gauge cars, track, and equip. Frank, Ext. 3120.

POP UP CAMPER - good cond. Joe, Ext. 4255 or 289-1831 eves.

HOUSE TO RENT - 3-4 bdrm, 1 yr. beginning Sept. Visiting scientist & family. Ext. 3786.

Car Pools

EAST ISLIP - 3 man desires other rider/drivers. Ext. 4532.

FARMINGVILLE - daily or occasional, 8:30 to 5 p.m. shift. Ext. 2913 or 2907 Walt. 698-0576 eves.

MATTITUCK - have car, wishing to join 4-5 person car pool. Bill Stars, Ext. 4278 or 298-9648 eves.

EXIT 21 SOUTHERN STATE - will consider pickup to exit 32. Vic, Ext. 4605.

Found

ROSS BIKE - in woods behind Bldg. 493. Tom Kelly, Ext. 3700.

Services

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

CYLINDER HEAD VALVE - and seat grinding, $7. per cyl; Heli Arc welding. Pete, Ext. 3273.

SANDBLASTING - trailers Chassis, any kind equipment w/wo primer coat, reasonable rates. 744-3968 after 4 p.m.

LOG SPLITTING - by machine, no job too big or small, very reasonable. HR 2-1875 after 5:30 p.m.

PROFESSIONAL TYPING - Ext. 2484 or 289-9560 after 6 p.m.

CONSUMER'S UNION SUBSCRIPTION GROUP - Renewing now, $8.75. For info call Alyce, Ext. 2902.

PIANO TUNING - and repair, reasonable rates & conscientious service. 751-4985.

CARPETS INSTALLED - quick dependable service, free estimates. Jim, 821-0187 after 5 p.m.

ROTOTILLING - new or existing gardens, lawns, $15/hr. Dave, Ext. 7517 or 288-3011 eves.

ROTOTILLING - $15/hr. free PH test, garden planning & planting tips. 878-4556.

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

MOTHER WILL BABYSIT - in own home w/care. 282-3176.

TAXES - prepared by Tax consultant, your home or mine, reasonable. John, 732-2472.

PROFESSIONAL TYPING - 727-5475.

PROFESSIONAL INCOME TAX SERVICE - by experienced preparer. Jack, Ext. 7942/864-2236.

SILK FLOWERS - A lasting momento for Communion, Confirmation, Mothers Day, Weddings, etc. Order now. 929-3130 or 929-3431.

SIGHT SEEING FLIGHTS - Aerial photogr. Long Island, Conn., New York, Modern all weather aircraft. Ron. Ext. 2491.

ROTOTILLING - gardens new lawns, up to 1,000 sq. ft. only $23.50. Any area. Tom, 325-1033 or Ext. 2011.

BABYSITTER - and odd jobs for 17 yr. old, after 1:00 p.m. wkdays & wkends. Wading River area. Loretta, 929-8287.

ROTOTILLING - Lawn maintenance, pruning, yard clean-up, gardening. Tony, 281-0350 after 6 p.m.

1980 INCOME TAX - prepared by experienced tax accountant, low fee, p.m. & wkends. Bob, 475-3981.

YARD, CELLAR, GARAGE CLEANING - Tree service, removal, pruning trimming, within 10 miles from Lab. 727-1617.

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