



Lithium Blanket Research



Dick Wiswall, Jim Powell and Ed Wirsing with lithium blanket research readout.

Brookhaven and the Energy Emergency — II

John P. Blewett

Two weeks ago we presented an introduction to Brookhaven's energy program and promised that the next article in this series would be about Brookhaven's part in the controlled thermonuclear research (CTR) programs of the Atomic Energy Commission.

The goal of the CTR program is development of a major new energy source based on nuclear fusion. Fusion reactors for production of electric power would have many advantages. The principal fuel, an isotope of hydrogen, exists in virtually limitless abundance in water. In addition, the environmental and safety aspects of fusion reactors are expected to be very attractive. The difficulty is that no one has yet made a fusion reactor work. But its prospects are regarded as sufficiently bright that AEC Chairman Dixy Lee Ray recommended to the President a couple of months ago that fusion research and development in FY 1975 (beginning next July) should be supported to the extent of \$145 million.

Fusion is the process which, on the one hand, is used in the hydrogen bomb and, on the other hand, keeps the sun and stars at elevated temperatures. Simply stated, it involves combination of light nuclei into heavier nuclei with conversion of a small fraction of the original mass into large amounts of energy. The main problem is that the fuel must be heated to some millions of degrees before the reaction begins. At such temperatures all available containment materials would vaporize and, if the reaction is to go, it must be contained by something other than conventional structural materials. On the sun, the reacting components are held together by the sun's strong gravitational force. In the hydrogen bomb, inertia holds the components together long enough for the reaction to take place. One possible method for obtaining fusion power involves the explosion of a sequence of tiny "bombs" of frozen hydrogen isotopes, suddenly heated to fusion temperatures by blasts of laser light or by intense electron beams. A second method for control of fusion would rely on containment in specially shaped magnetic or electric fields.

Much progress has been made and "feasibility experiments" are being prepared in four centers - Los Alamos, Livermore, Oak Ridge and Princeton. Most of these experiments are on containment in various sorts of "magnetic bottles." The earliest magnetic bottles tried in a wave of optimism in the early 1950's proved to be very leaky, consequently new and complex systems have been evolved and are under test. An increased understanding of the behavior of "plasma" (highly ionized gas) has led to a cautious optimism and to a belief that a successful fusion experiment may very well work by 1980.

Our activities in the CTR field fall under two headings. First are programs already

under way with support from the AEC's CTR Division. Second are proposed programs for which we are requesting support, or which are in the early stages of preparation.

Most active in the ongoing programs are the leaders of the Department of Applied Science including particularly Warren Winsche, Jim Powell and Dave Gurinsky. More recently several members of the Accelerator Department and the Physics Department, who will be mentioned later, have become involved.

Programs Now in Progress

The Brookhaven program which has had the greatest impact on the national CTR effort probably is the one on "minimum activity blankets." When fusion reactors are in operation, much of the energy will appear in the form of dense fluxes of fast neutrons. Originally it was thought that the best absorber of neutrons would be flowing liquid lithium (a rather active light metal that melts at relatively low temperatures). The lithium would serve two functions, one as a converter of neutron energy into heat that then could provide steam for conventional electrical generating equipment, and the other as a source of tritium (a hydrogen isotope) by neutron disintegration of lithium nuclei. This is desirable since tritium is one of the fuels considered most promising for fusion reactors. It is not found in nature in any appreciable quantities since it is radioactive with rather a short half life.

To separate the flowing lithium from the reacting components, it was felt that a reasonably rugged metal was necessary; for a time niobium was in favor. This is a metal whose nucleus under neutron bombardment will become very radioactive. More desirable would be a lighter metal like

(Continued on page 2)

Official and Special Events

- Monday, March 11**
College Chemistry Day
Low Level Radiation Effects Meeting - Berkner Hall, Rooms A and C
- Tuesday, March 12**
Biology Search Committee Meeting (March 12-13) - Berkner Hall, Room C
- Wednesday, March 13**
IEEE Academy of Aeronautics Tour
Navy Meeting - Brookhaven Center
- Thursday, March 14**
AUI Executive Committee Meeting - Washington, D.C.
- Wednesday, March 20**
Chemistry Department Visiting Committee (March 20-22) - Chemistry Building
Navy Meeting - Brookhaven Center
- Thursday, March 21**
Columbia University Science Writers (March 21-22)
- Friday, March 22**
Methodist Hospital Radiologists Tour
- Tuesday, March 26**
Supervisory Development Seminar (March 26-29) - Berkner Hall, Room B
- Thursday, March 28**
USSR Superconducting Power Team

Technology Transfer

At the request of the AEC, the Director is establishing an Office of Technology Transfer. This Office will operate a systematic program to help bring about beneficial applications, in industry and government, of scientific discoveries and technological developments, especially those made in this Laboratory.

The duties of the Technology Transfer Officer are to keep well informed on activities at the Laboratory that have potential for transfer; to establish and maintain widespread contacts in industry and in state and local governments, particularly in the northeast; to publicize Laboratory developments within this community of potential users and bring scientists at the Laboratory into contact with the community; and, conversely, to bring specialized needs of industry and government to the attention of the Laboratory.

In addition, two existing functions of the Director's Office will, because of their close relation with technology transfer, be brought under the Office of Technology Transfer, namely the function of patent review and the more technical component of what has previously been called Public Information. The Office will be given responsibility for coordinating the Laboratory's contributions to technical exhibitions and fairs and for producing selected technical documents on the work of the Laboratory aimed at governmental and industrial users.

Candidates for this position should have a doctor's degree or its equivalent in a technical field and, ideally, should have had some industrial experience.

For further information please contact H. Kuper on extension 3311.

AEC Certificates Awarded

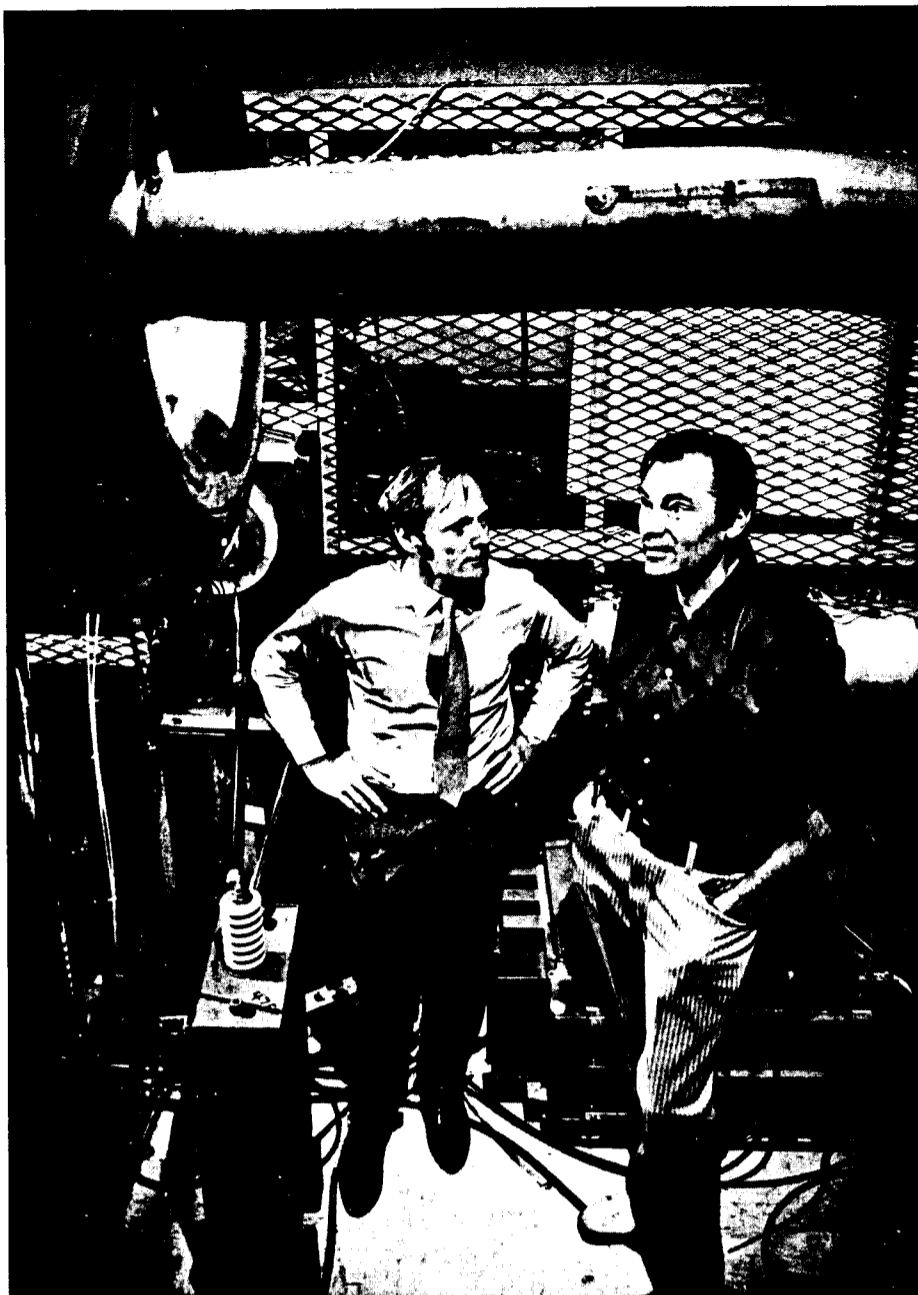


BNL Director George Vineyard looks on as John Jewett, Manager of the AEC's Brookhaven Area Office, presents AEC certificates to (seated, L-R) Jerry Kinne, Director's Office; Chuck Osborne, Reactor; and Clemens Auerbach, DAS, for their participation in AEC declassification efforts at Hanford and Savannah River. The certificate reads: "In appreciation of your outstanding contribution to the Atomic Energy Commission's Declassification Review Program which has enhanced the Commission's policy for providing valuable information for public use."

FTS Correction

Please make the following addition in the recently issued FTS book, calendar year 1974:

Page 283 - Texas
All Other Cities - 214 749-1011



Theo Sluyters and Krsto Prelec have developed a negative ion source which will increase the intensity of the AGS beam.

Energy Emergency (continued)

aluminum, but it was considered not to be durable enough in such service.

The Brookhaven contribution to this problem has been the suggestion of using solid blankets of lithium-aluminum alloys cooled by flowing gases such as helium. With the solid blanket, aluminum alloy containers can be used and the radioactive waste problem can be virtually eliminated. A number of possible solid blanket materials have already been studied and a prototype minimum activity blanket may be constructed during the coming year. As a result of this work, fusion reactors seem much more attractive than they did a few years ago.

Another field in which we are active is that of superconducting magnet design. Magnetically contained fusion reactors will require magnetic fields throughout volumes several meters in diameter, so strong that they can be produced only by superconducting magnets. Enormous quantities of energy will be stored in these magnetic fields and, if the magnet is not correctly designed, local overheating may occur, a region may cease to be superconducting and the magnet may destroy itself with its own stored energy. Our experience with one of the world's largest superconducting magnets - the magnet for the 7-foot bubble chamber - and with the design of magnets for use in AGS beams and in the ISABELLE project, qualifies us to assist in magnet design for fusion reactors, and one of our projects with Washington support is "an investigation of safety requirements for large fusion magnets." This will include detailed studies of magnet design, evolution of methods for safe dispersion of magnetic energy, and investigation of the distribution and containment of the large forces exerted by the magnetic fields on the superconductors. This program is in the hands of Jim Powell of the DAS, Gordon Danby and Dave Kassner of the AD.

Particularly in fusion machines of the sort under study at Los Alamos (the "theta pinch" reactor) insulating materials will be exposed to temperatures up to 800°C and to intense neutron and ionizing radiation. Jay Dienes and Allen Goland of the Physics Department are undertaking a study of the behavior of such materials as aluminum oxide under such conditions by heating

them up to temperatures as high as 1000°C and bombarding them with electron beams from the 3-MeV Dynamitron. Of particular interest are the electrical and mechanical properties after such severe treatment - do the insulating properties deteriorate? and does the insulator's resistance to electrical breakdown become poor? The answers to these questions may be vital for operation of fusion devices.

Accurate information about cross sections for nuclear reactions will be needed for design of blankets and to evaluate effects of radiation on structural materials to be used in fusion reactors. This information is being collected, evaluated and supplied to CTR laboratories by Sol Pearlstein of the Neutron Cross Section Center.

Fusion reactors can be used as producers of many other forms of energy than heat. Other possible outputs include ultra-violet radiation, hot ionized gases, high energy neutrons, high temperature fluids, X-rays, and various forms of electricity. Some of these will offer unique capabilities for various processes in use by the chemical and materials processing industries. Meyer Steinberg of the DAS is surveying this field, identifying promising candidates, making cost and efficiency estimates and forecasts of time frames for applications of fusion technology. Special attention will be given to possible use in liquid hydrocarbon fuel production.

A recent development at the AGS has triggered still another project. Theo Sluyters and Krsto Prelec have been developing sources of negative ions for injection into the AGS; it is hoped that use of negative ions will give higher AGS intensity than has been reached with the presently used positive ions. Recently we became aware of the fact that negative ion beams, which rather easily can be converted into beams of neutral atoms, are just what is needed in a new method of heating up the plasma in a fusion reactor. Energetic neutral atom beams are injected into the reactor and, being unaffected by the magnetic field, can penetrate deep into the plasma where they serve as an atomic blowtorch. The reader will remember that temperatures of millions of degrees are needed for the fusion reaction to occur. One of the centers where neutral atom beam heating is being tested is the

Plasma Physics Laboratory at Princeton. We are now in active contact with the Princeton group and a new program has been started in the AGS ion source laboratory, aimed at supplying ion beams which will meet Princeton's requirements.

Possible New Programs

An intense source of neutrons with energies up to 14 MeV is badly needed for tests of blankets, containment materials, and structural members to be used in fusion reactors. One of Brookhaven's most ambitious gleams in the eye is a plan for construction of such a source, the heart of which would be a 30-MeV deuteron linear accelerator. A one-tenth ampere continuous deuteron beam will bombard a target of flowing liquid lithium. There the deuteron will disintegrate into a proton and a neutron both with energies of about 15 MeV; the proton will be stopped in the lithium but the neutron will pass on through. This will yield a beam of more than 10^{16} neutrons per second; spread over an area of 100 square centimeters this will give 10^{14} neutrons per square centimeter per second which will closely simulate the neutron environment around a fusion reactor. Preliminary design of this facility has been a joint project between Dave Gurinsky and Don Parkin in the DAS, and Ken Batchelor and the linac design group at the AGS. A proposal including a cost estimate of \$19 million has been submitted to the CTR Division of the AEC. We would locate the new linac near the AGS injector so that both linacs could be serviced and operated by the present linac team.

Another realm where work is badly needed is the development of new superconducting materials for use in fusion reactor magnets. Presently available materials will be inadequate for the high fields that will be necessary. Bill Sampson of the AD and Mas Suenaga of the DAS have been pushing such a development for several years and have had a number of successes with such high-field materials as finely stranded niobium-tin and vanadium-gallium. But progress has been slow because the budgetary support has been modest. At Princeton there is considerable interest in our development program; fusion experiments there are rapidly approaching the point where the new materials will be necessary. Incidentally, the new materials would improve the performance and de-

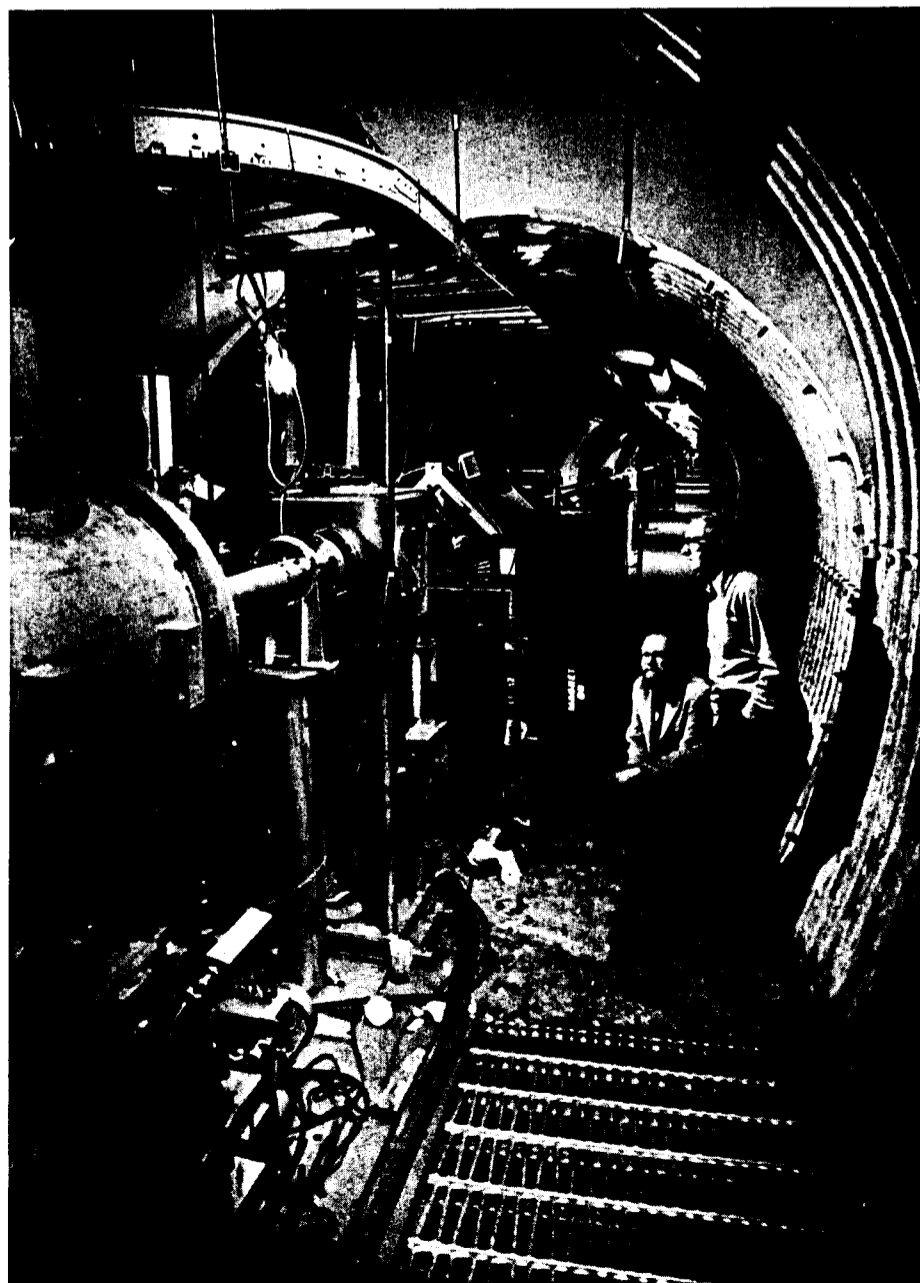
crease the cost of our proposed ISABELLE colliding beam system which we hope will be the Laboratory's new high energy physics facility.

Several members of the group that built the 7-foot bubble chamber, including Ralph Shutt, Dave Kassner, and Carl Goodzeit, would like to initiate a program leading to construction of large superconducting magnets suitable for fusion reactors. This program would begin with studies of structural requirements and conductor configurations, and would proceed to construction of scaled models and, finally, to prototype magnets. The Princeton fusion group is developing magnet test facilities which we are invited to use for projects like this one.

Finally we mention two rather far-out schemes that still are in an early stage. The first relates to the possibility that colliding beams of deuterium and tritium ions might be made dense enough that appreciable numbers of fusion reactions would take place. The beams would be focused to high density by superposed electron beams. Various possible configurations of the beam are under study - but a good deal more analysis will be required before we are ready to propose construction of a test device. The second, due to Al Maschke of the AD, relates to the possibility of producing very strong confining magnetic fields, perhaps a hundred times as high as any yet produced, by stacking in storage rings very intense beams of electrons and positrons. The field would be produced at a point where electrons and positrons were brought to a very sharp simultaneous focus. It would persist for perhaps a billionth of a second, but this might be sufficient for a concentrated fusion reaction to take place.

The above list of ideas is by no means complete. A number of proposals are on hand for studies of radiation damage to probable reactor materials or superconductors, using reactor or accelerator produced neutrons.

An encouraging aspect of our relations with the AEC's CTR Division is an increase in our total CTR budget which, in FY 1975, will be about twice what it is in FY 1974. The budget for FY 1975 is expected to be more than three quarters of a million dollars and we can feel that we are beginning to play a respectable role in the nation's CTR program.



Gordon Danby (kneeling) and Joseph Allinger look at superconducting magnets installed in beam line of AGS leading to 7' Bubble Chamber.

Scientist-Fellow Program

The American Association for the Advancement of Science has announced the 1974-75 Congressional Scientist-Fellow Program. Information about and applications for this Program is available in the Office of Scientific Personnel. Deadline for application to the Program is April 5, 1974.

The Program is designed to place outstanding younger scientists and engineers with congressional staffs for approximately one year. The scientists and engineers who will serve as fellows will be assisting Congress through direct involvement in staff activities, while deepening their understanding of the decision-making process. An orientation program and a year-long set of seminars with various governmental and non-governmental leaders will add a greater breadth to the internship. The entire experience of the program should be helpful to them personally, beneficial to the Congress, and of value to the scientific and technical professions, whether the fellows remain in government work or return to positions in teaching and research.

The principal value of this program to Congress and to the scientific community may be through the eventual development of closer working ties between the two groups. It has frequently been noted that there is a gulf which often separates the political decision making communities and the scientific and technical communities on matters they should consider jointly. This program should help to build the necessary new links between the scientific and engineering communities and the legislative branch of the government. It should strengthen staff capability in an area where many congressmen have acknowledged the need for help, and thereby make practical contributions to the more effective use of scientific knowledge involving public use of technical information. It should, therefore, also enable the eventual recruitment of some of the interns for permanent government positions.

Bowling News

Grace Fales

Red League

The high series for the night again goes to R. Larsen 223/225/201/649 scratch. This helped to keep the Neutrons in first place with a record of 52/25, followed by the Sparks 4829, and the Charlie Brown's 47/30. Other highs for the night were R. Rasmussen 211, J. Eriksen 210, N. Carter 214, J. Scesny 212, and J. Ferrante 222.

Green League

Congratulations to C. Bohnenblusch for his award winning 212/206/610 series. It's about time - right, Charlie? Other 200's were rolled by J. Cain 223, E. Meier 213, J. Ferrero 213, D. Vail 202, G. Speidel 202, D. Klein 200, and W. Kollmer 200.

Pink League

It was Kay Hunt's night for rolling her second 200 game. This one was really a beauty - 236, which is 103 pins over her average, and wins her a WIBC Award. Congratulations, Kay! High games: Mary German 185, Ellie Murgatroyd 171, Marge Stoeckel 170, Betty Jellet 170, Audrey Blake 169, Helen Caisey 167, Renie Rosati 162, and Rosalie Piccione 161.

Cafeteria Menu

Week Ending March 15, 1974

Monday, March 11	
Cream of Celery	
Pork Chow Mein & 1 Veg.	1.00
Beef Liver & 1 Veg.	1.00
Tuesday, March 12	
Scotch Broth	
Braised Meatballs on Noodles	.95
Sauerbraten & Potato Pancake	1.20
Wednesday, March 13	
Turkey Noodle Soup	
Southern Fried Chicken & 1 Veg.	1.00
Broiled Filet & 1 Veg.	1.05
Thursday, March 14	
St. Patrick's Day Special Luncheon	1.75
	Tax Inc.

Juice or cup of soup	
Choice of Irish Beef Stew or	
Corned Beef & Cabbage	
w/Boiled Potatoes	
Choice of any 25¢ Dessert	
Served w/small beverage	
Friday, March 15	
Fish Chowder	
Stuffed Flounder & 1 Veg.	1.05
Braised Short Rib of Beef & 1 Veg.	1.15

It's the Law

The New Jersey State Police and Turnpike Authority have warned that under state law and turnpike regulations it is illegal in New Jersey to carry gasoline in automobiles anywhere except in gasoline tanks. Anyone caught carrying containers of gasoline is subject to fine and imprisonment.

The New York State Police say it is not illegal to carry containers of gasoline in New York, although it is potentially dangerous. However, motorists spotted carrying gasoline in containers can be put off the New York State Thruway.

New York City has a regulation saying no one can sell, transport, or store more than one gallon of gasoline without a permit, and station owners who dispense more than one gallon of gasoline into anything other than a gasoline tank are liable to a fine of up to \$500.00 or 60 days in jail.

Report Available

The following report is now available to the Laboratory Staff and to affiliates of the AEC, AUI, and BNL. Others may purchase it from the National Technical Information Service, U.S. Department of Commerce, 3285 Port Royal Road, Springfield, Virginia 22151. Staff members should call Ext. 3484:

BNL 50404 \$4.00
BROOKNET-2: A guide to the Brookhaven Online Computer Network. January 1974. Graham Campbell, Kurt Fuchel, and S. Lawrence Padwa.

SPI Quote

"All persons who operate a Government vehicle at anytime, either on-site or off-site, must possess a valid Government Motor Vehicle Operator's Identification Card (Standard Form 46)."

Underwater Photographer At Camera Club Meeting

The Camera Club will meet on Tuesday, March 12, at 8:00 p.m. in the Recreation Building. Featured at the meeting will be a talk by Mike LeVine on Underwater Photography, illustrated by color slides taken in the Virgin Islands. LeVine will also exhibit his underwater photography equipment. New members and interested kibitzers are welcome.

Stony Brook Events

A theatre arts production, an International Art of Jazz concert, and various films, exhibits, and lectures highlight this week's events at the State University of New York at Stony Brook. Unless otherwise noted, the events are open to the general public without charge.

Theatre and Music

Chekhov's play "The Cherry Orchard" will be presented by the Theatre Arts Department from March 6-16. Performances are set for the evenings of March 6, 7, 8, 11, 13, 14, 15 at 8 p.m. and March 9 and 16 at 8:30 p.m. One matinee is scheduled for March 16 at 2 p.m. Tickets are \$2 for the general public and can be reserved in advance by calling 246-5681 from 9 a.m. to 5 p.m. A limited number of tickets may be available at the door prior to each performance.

The Professional Series sponsored by the Theatre Arts Department will offer Julian Olf speaking on "Stanislavski the Mystic" on March 13 at 4 p.m. in Room 114 of Building B on the South Campus. Refreshments will be served.

The International Art of Jazz is sponsoring a concert on March 10 from 4-6 p.m. in the Stony Brook Union Auditorium by the Ray and Mousy Alexander Quartet featuring Dr. Lyn Christie and Lou Forestieri. Admission is \$3.50 for non-members; \$2.50 for members; \$2 for student non-members and \$1 for student members. For information and reservations call 246-6125, Mon.-Fri. 9 a.m. to 5 p.m. All other hours call 261-5582.

A graduate degree recital will be given by Randall Ellis on the oboe on March 10 at 8:30 p.m. in Room 105 of the Lecture Center.

Paula Bailey, soprano, and Ronald de Hart, baritone, will give an undergraduate recital on March 11 at 8:30 p.m. in Room 105 of the Lecture Center.

A graduate degree recital will be given by Constance Wells on the bassoon on March 14 at 8:30 p.m. in Room 105 of the Lecture Center.

Films, Demonstrations, and Exhibits

The University Museum, sponsored by the Anthropology Department, will exhibit "Photographs of a New Guinea People" by J.C. Dark, anthropologist from Southern Illinois University, in Room 142 of the Social Sciences Building from 10 a.m. to 7 p.m. until March 27. The exhibit is on loan from the Smithsonian Institute.

The Stony Brook Volunteer Ambulance Corps is sponsoring an American Red Cross Advanced First Aid Course on Tuesday nights from 7-8 p.m. in Room 100 of the Biology Building. For further information call Steve Isaacs, 444-2285.

The First Floor Gallery in the Administration Building will present an exhibit by staff of the Guidance Services Bureau of the University, March 8-22. The office project features photographs, paintings, crafts and other art work and can be viewed from 9 a.m. to 5 p.m. daily.

COCA Spring Movies will show "The Heartbreak Kid" at 7, 9:30 and midnight on March 8 and 9 in Room 100 of the Lecture Center. Admission is \$1 and a limited number of tickets may be purchased at the Stony Brook Union Main Desk from 6 p.m. to midnight on the night of the movie.

COCA Sunday Series will show "Nosferatu" on March 10 at 8 p.m. in Room 100 of the Lecture Center. Admission is \$.50 and tickets may be purchased at the door.

The International Cooking Exchange, sponsored by the Stony Brook Union, will demonstrate the baking of health breads by Bob Miller (with samples) from 12:30-2:30 p.m., March 12 in the Stony Brook Union Gallery.

Tuesday Flicks will show "Red Desert" on March 12 at 8 p.m. in the Stony Brook Union Auditorium.

Tournament Bridge, with Master Points awarded, will be held every Tuesday at 8 p.m. in Room 226 of the Stony Brook Union. Admission is \$1.

Rainy Day Crafts will feature natural materials artwork on March 13 from 1-4 p.m. in the Stony Brook Union Main Lounge.

The Family of Women Film Series will show "Game" from 12:30-1:30 p.m., March 14 in the Stony Brook Union Auditorium.

"The Cinema" sponsored by the Center for Continuing Education will show "Adrift" at 8:30 p.m. in Room 100 of the Lecture Center, March 14.

COCA Spring Movies will show "Malcolm X" on March 16 and 16 at 7, 9:30 and midnight in Room 100 of the Lecture Center. Admission is \$1 and a limited number of tickets may be purchased at the Stony Brook Union Main Desk from 6 p.m. to midnight on the night of the movie.

UPS Deliveries

The Laboratory is a subscriber to United Parcel Service for use in its official receiving and shipping operations.

All employees and guests (except those living on site) are reminded of the Laboratory policy regarding the shipment of personal property to the Laboratory.

Items of a personal nature should be addressed to your home address, not to your Laboratory work station.

All future UPS deliveries will be assumed to be official Laboratory business. They will be received, inspected and processed through normal Laboratory receiving procedures.

Classified Advertisements

Each week, the BROOKHAVEN BULLETIN lists personnel placement requisitions currently being processed. The purpose of these listings is, first, to give notice of all non-scientific staff positions being filled and, second, to give employees an opportunity to request consideration for themselves or others whom they wish to recommend to BNL. In filling vacancies, the Laboratory's objective is to give first consideration to present employees, as follows: employees within the immediate group having the vacancy, employees within the department or division, employees within the Laboratory as a whole.

For further information regarding a placement notice, please contact Supervisor, Personnel Placement and Development, extension 2879 or 2882.

Placement Notices

FIREFIGHTER (1) Health Physics & Safety. Application deadline: March 14, 1974.

TECHNOLOGY TRANSFER OFFICER - Contact Dr. H. Kuper. Director's Office, Ext. 3311.

RESEARCH SERVICES ASSISTANT - Temporary part-time position. Chemistry Department.

RESEARCH SERVICES ASSISTANT - Temporary position. Biology Department.

SECRETARY - Department of Applied Science.

POLICE CAPTAIN - Health Physics & Safety.

PATROLMAN TRAINEE - Health Physics & Safety.

REACTOR OPERATIONS ENGINEER - B.S. degree or equivalent in electrical, mechanical or chemical engineering with 2-3 years' industrial experience. Reactor Division.

PHYSICS OR MATHEMATICS ASSOCIATE - B.S. or equivalent in physics or mathematics. Background in computer programming and data library research. Neutron Cross Section Group, Department of Applied Science.

Auto & Auto Supplies

70 PONTIAC LEMANS - Good cond. \$950. Ext. 3776.

HOLLEY 700 - Dbl pumper carb, just rebuilt, \$40; Holley 650 spreader bore, used only 3 yrs, \$55; 14-15" tires, good rubber, \$2 ea. Ray, 878-2486.

69 FALCON - 6 cyl, auto trans, 2 dr, 49,000 mi, looks and runs like new. \$1095. 286-9260 eves.

72 MERCURY MONTEREY - 2 dr htdcl, climate air cond, am/fm radio, radial tires, excel cond. \$2500. 475-9790.

CAR WHEELS - 1 pr Ford 4 lug 13", \$5/pr; 1 pr Ford 5 lug 14", \$5/pr. Ext. 4502.

WHEELS - 14" Chevy, good cond. \$5/pr. R. Glasman, Ext. 4288, 289-0357.

65 CHEVY - 2 dr, 6 cyl, auto trans, r/h, new batt & radiator, good cond. \$200. Mike, 751-2149.

SNOW TIRES - 8.25x14 w/w on Ford 5 lug rims, almost new. \$40/pr. 286-8119.

68 EL CAMINO - Ps/pb, air cond, 327 eng. \$875. Pat, Ext. 3376, 281-1364.

71 FORD PINTO - 100 hp, 200 cc, air cond, disc brakes, 4 spd trans, snows on rims, excel cond. 698-2169.

54 CHEVY - Ice cream truck, uses dry ice, good body. \$350. 277-2425 after 6.

66 VW - Low gas mileage car, good for 2nd car w/ some repair, good tires, clutch, etc. 286-1493 eves.

TIRE & WHEEL - E70-14 glass belted/red stripe wide oval, full rubber. \$20. Ext. 4689.

TIMING LIGHT - Neon bulb, RCA make. Dale, Ext. 2022.

72 VW - White, 10,000 mi; 66 Plymouth Valiant, lt blue, good cond. 286-3709.

65 RAMBLER AM WAGON - 6 cyl, manual trans, passes gas lines, no rust, few wrinkles. \$150. Ext. 3752, 744-9699.

65 COMET - 4 dr, 6 cyl, auto r/h, economical, good 2nd car, needs minor work, 1/4 tank of gas. \$125. 744-6148 eves.

Boats & Marine Supplies

SCORPION - Fiberglass sailboat, excel cond, fun, safe. \$350. 286-0798.

LIGHTNING #11604 - Fiberglass, main, jib, spinaker, trailer, daysailer or racer, excel cond, many extras. Ext. 4032, 751-1660.

27' CONCORDE 1969 - 225 hp FWC fiberglass S/F, sleeps 4, bimini & camper tops, much more! \$11,000. Joel, 286-8633.

12' ALUM DEEP V BOAT 1972 - W/Sears 7 hp outboard motor, w/all access, Tee Ne trailer incl. 929-6424 eves.

EVINRUDE 2 HP - Brand new 1973 model, outboard. Ext. 3120.

16' STARCRAFT - Vee bottom w/trailer & 25 hp Johnson, extras, must sell. 924-4250 after 6.

Arrivals & Departures

Arrivals

David W. Doroski Applied Science
Laurence S. Littenberg Physics
Tung S. Wang Applied Math

Departures

None.

In Memoriam

Robert Daniel Brown, a Postdoctoral Research Associate of the Medical Department from May 24, 1971 through August 4, 1972 died February 21, 1974. Dr. Brown came to Brookhaven after receiving a B.S. from North Carolina Agricultural and Technical College, a Ph.D. from Howard University, and serving as a Lecturer at Towson State College. Since leaving Brookhaven for the National Institutes of Health he continued as a Research Collaborator of the Medical Department. He is survived by his parents, Mr. and Mrs. J. J. Brown, 222 East Varick Street, Ayden, North Carolina 28513.

Camping Club

The Camping Club members were saddened to learn of Al Ellis' death last week. Services were held on Friday night at the Raynor Funeral Home in West Sayville with Club members in attendance.

Al, a Charter member of the Club, was one of the organizers when the club was established early in 1966. He is the only Lab retiree who has remained active in the Club activities. His wife, Martha, presently holds the office of Secretary.

Al was employed at Brookhaven from June of 1948 until he retired on March 28, 1969.

BROOKHAVEN BULLETIN

Published Weekly for the Employees of Brookhaven National Laboratory

CARL R. THIEN, Editor
 CLAIRE LAMBERTI, Editorial Assistant

40 Brookhaven Ave., Upton, N.Y. 11973
 Telephone (516) 345-2345

Classified Advertisements

Miscellaneous

PROP PITCH ROTOR - W/xfmr. \$25. Bill, Ext. 4641.
 RCA 25" COLOR TV & STEREO CONSOLE - TV needs fine tuner, cabinet very good cond. 585-4040 after 6.
 FISH TANK EQUIPMENT - 1-100 w heater; 1 piston pump, needs belt; 3 vibrator pumps; 1 inside filter; all in good to excel cond. Jerry, Ext. 3303 after 4.
 DOG HOUSE - Lg, brown shingle, \$35; beautiful play house w/porch, windows, \$30; boy's 26" bike, \$20. 929-8129.
 FURNITURE - 3 pc liv rm set, sofa & 2 swivel rocker arm chairs, gold velvet, excel cond. \$250. A. Blake, Ext. 3489, 727-7142 after 6.
 CUSTOM 150 AMP - W/2-12" spkrs, 1 yr old, \$275; Realistic 60 stereo amp, \$30; Saint George amp, 75 w w/tremolo & reverb, \$75. Ray, 878-2486.
 PR LIV RM LAMPS - 37" h, traditional style, gold shades, perf cond. \$15 ea. Claire, Ext. 2346, 281-8306 after 5:30.
 COAT - Beige, fur collar, \$30; slacks, 30W-30L, \$4 ea; sports jackets, 12-20, \$4-5. A. Munsterman, Ext. 3462.
 BUREAU - Birdseye maple w/mirror, antique. \$35. A. Munsterman, 744-5871.
 POOL - 12x3 1/2' w/ladder, pump & filter. \$125. C. Heinrich, 744-6211.
 COAT - Brown suede w/zip-out lining, size 8. \$50. June, 473-5987.
 MAPLE DRESSER - Good cond, \$25; antique pitcher & bowl set, \$40; antique oak table, refinished, \$25. 363-6597.
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 SKI BOOTS - Zenith, size 7, worn once. \$6. Joan, Ext. 2340, 475-5150.
 SEWING MACHINE BENCH - W/sewing compartment in seat; brass record stand; elec space heater, portable. M. Weinmann, Ext. 2313, 744-2004 after 5.
 HEDGE ELEC CUTTER - Lawn Rite; grass trim elec cutter, Disston; snack tables w/matching hostess serving tray on wheels. M. Weinmann, Ext. 2313, 744-2004 after 5.

3 WOOD WINDOW VALANCES - 2-48", 1-51", \$10; wardrobe trunk, \$20; tweed stair runner, \$15; GE hair dryer, \$10. Borg, 286-0428.
 BATHRM SLIDING MIRRORS - Tracks & side frames by Miami-Carey, still in cartons, for wall opening 59 1/2 x 37 1/2. Borg. 286-0428.
 ROBERTS REEL TAPE RECORDER - 4 track, make offer; pwr table saw, 7 1/2" mtr & bench, \$35. Ron, 289-1003.
 DINER EQUIPMENT - French fryer, stainless steel sink, meat slicer, refrig, etc. 727-0920 after 6.
 TV - RCA 19" b/w portable, old, works, w/cart. \$25. E. Norton, Ext. 4355.
 REFRIG - W/freezer on top, white, excel cond. \$50. Dick, Ext. 4447.
 LIV RM SET - Danish contemporary, 7' green sofa, 1 chair, 1 rust chair. \$35. 744-7322.
 6 RM HUMIDIFIER - Good working cond. \$20 or best offer. J. Schirmer, Ext. 4720.
 ELEC CAN OPENER - \$2; elec knife sharpener, \$1. Barbara, 286-8633.
 LIV RM CHAIRS - Hi-back, upholstered, good cond, \$25; elec iron, \$2; Royal portable typewriter, good cond, \$25; child's portable safety gate, \$1. 286-2280.
 TRAVEL TRAILER - Blazion 15', fully self-contained, sleeps 6, excel cond. \$1050. 281-9097.
 WINDOWS - For cold frames, 2-28x60, 2-29x31. \$1. J. Olson, 289-8629 after 3.
 FOOT LOCKER - Scuffed but strong, lift-out tray. \$7. 281-7844.
 ORLON YARN - All colors, will deliver to Lab or pick up at my home. \$2.50/lb. Ann, Ext. 3143, 732-9384 after 6.
 AKS DALMATIONS - Whelped 1/26/74, sire & dam top winners, parents on premises. Jeff, 286-1231.
 BOWLING BALL - 10 lb, good cond, bag incl, \$10; jr golf clubs & bag, good cond, \$10. Ext. 4758, 744-5811 after 5.
 BIKE - Girl's 3 spd hi-rise, excel cond. \$50. Adams, 744-5448.
 GREEN BALLET TUTU - Used only once, \$1.50; girl's shoe ice skates, dbl runner, size 12, \$2. Ginny, 475-7227.
 ANDIRONS - Set 20" h, blk w/brass tops, \$10; Romex, 8-35 copper, 30' long, new, \$10. P. Sparrow, Ext. 4680, 727-4859.
 SM REFRIG - Old but works well. \$20 or best offer. P. Sparrow, Ext. 4697, 727-4859.

FULL SIZE MATTRESS - Firm urethane foam, 1 yr old, excel cond. \$10. Sue, Ext. 3675, 473-6570.
 BABY THINGS - Crib w/matt; changing table w/4 wicker baskets beneath; walker & stroller; all used 1 yr or less, \$30. Juanita, Ext. 3639.
 GE FM TRANSMITTER/RECEIVERS - 40-50 MHZ, fire dept crystals, dual freq, 12 v, tube type. \$35. Ext. 4103.
 LIV RM FURN - Sectional sofa, lt brown, very good cond; Basset mediterranean oak coffee table, excel cond. Both/\$200. MY4-5669.
 TRAILER HITCH - Compl, fits 1964-67 Buick Special, Chevelle, Olds F-85, Tempest cars. \$10. R. Skelton, Ext. 3463/2006.
 ANODIZED ALUM S/S - Grover alum delux model, 4-32" w x 54 1/2" l, \$4 ea; 2-18" w x 54 1/2" l, \$2 ea. R. Skelton, Ext. 3463/2006.
 HAIR DRYER - Handy Hannah (Swirl); wall mirror, 24" x 24" in gold & white frame. M. Weinmann, Ext. 2313, 744-2004 after 5.
 RUG - Almost new, gold, 7x10, \$25; 3 chest drawers, \$20 ea; 2 book cases, \$6 ea; 2 student desks, \$15 ea; fishing rod, \$10; squash racket, \$4. 286-3709.
 GIRL'S 20" STINGRAY BIKE - Almost new, \$25; lawn mower, \$25; redwood table & bench, \$25; 2 twin beds, \$50 ea. 286-3709.
 TAPPAN DISHWASHER - Working cond, refinishing kitchen. \$20. Bob, Ext. 4288, 289-0357.
 FILL YOUR FIREPLACE - Old trams chain saw. \$25. 727-0920 after 6.
 CALORIC 30" GAS RANGE - Coppertone, 6 yrs old, good cond; beginner's accordion, made in Germany. Toni, 281-0243.
 KING SIZE MATTRESS - Used but clean. \$20. 286-3540 eves.

GE PARTYTIME PHONOGRAPH - Model V420/V421, needed for parts, does not have to work. John, Ext. 4143, 286-1348.
 RIM - 14" for 67 Chevy Camaro. R. Hill, Ext. 2463.
 ROOM TO RENT - Patchogue or N. Patchogue area, needed starting March 10 for 1 middle-aged woman. Ext. 4156, 924-4573.
 CHIHUAHUA - Puppy, male, smooth coat, AKS. Chris, Ext. 4278, 265-0163.
 SM GASOLINE MOTORS - Not working, to be used in school shop course. P. Michael, Ext. 2264.
 ORIENTAL RUGS - Scatter or room size, any cond. Borg, 286-0428.
 HOME - For male puppy, mostly beagle, about 6 mos old, house trained, very friendly & affectionate. 281-5289.
 PIANO - American made in good cond, fairly new. 878-2239.
 HEAVY DUTY MIXER - W/bread hook attachment, any cond. 744-5022.
 VW ENG - In good working order, '63-65, for about \$50. Ext. 3084.
 USED PIANO - Prefer sm upright, cheap. 286-3540 eves.
 ELEC TYPEWRITER - Std, prefer elite type, good cond, reasonable. F. Brown, Ext. 3651.

Carpools

JOIN OR FORM CARPOOL - From Patchogue/Blue Point, approx 3 days/wk, no smokers. P. Coleman, Ext. 3373, 363-8914.

Lost & Found

FOUND - Wristwatch, found on Thurs 2/28 near south side of Physics Bldg. G. Schiro, Ext. 3743.

Services

FISHERMEN - Do you want your catch deliciously smoked? 744-9411 after 5:30.
 ORGAN LESSONS - Experienced teachers, beginners & advanced, your home. Wilma Jo, 924-3236.
 INCOME TAXES - Prepared by experienced knowledgeable professionals, honestly interpreted w/maximum return assured. 924-3236, 924-6408.
 TENNIS CLASSES - Registration now open for spring instruction, class size 5, 8 wks, 10 hrs, Shoreham. \$40. 744-1906, 5-10 p.m.
 TYPING - Term papers, manuscripts, etc. Claire, Ext. 2346, 281-8306 after 5:30.
 TAXPAYERS - Federal & State income tax forms prepared in the privacy of your home or mine. 475-8330.
 TENNIS CLASSES - Registration now open for summer children's instruction, 5 yrs & up, July-Aug, Shoreham. 744-1906, 5-10 p.m.
 OAK FIREWOOD - Full cord 4'x4'x8', stacked, delivered. \$55. Richie, 588-5221.
 ROTOTILLING - Gardens, lawns & flower beds. Call for appointment - Bob, 732-9517 after 6.
 TV Repairs - Reasonable prices. Pete, Ext. 4434.
 WOMAN WILL SIT - For school children in her home. 924-5077.
 PRESSED CANING DONE - Old oak chairs repaired & refinished. Call for estimate, 363-6597.
 SNOW PLOWING - Yards cleaned, Patchogue & Shirley area. Bob, 281-8695.
 GARAGE SALE - Baby items, lumber, sm appliances, etc., owner moving, 9-10 March, 10 am - 3 pm, 86 Biesel Rd. 286-0147.
 CHAIN LINK & WOOD FENCE - Buy direct from installer & save. Russ, Ext. 4592, 744-8787 after 6.
 CERAMIC TILE/CEMENT WORK/TERRAZZO - Professional work at reasonable prices, call for estimates. John, Ext. 4143, 286-1348, 281-8848.

Classified Ad Policy

Deadline is 12 noon Monday for publication Friday of the same week.

- The Brookhaven Bulletin's classified section may be used only by active and retired Laboratory employees.
- All items for sale or rent must be the advertiser's property.
- Ads for material acquired for resale in association with a full or part-time business cannot be accepted.
- Firearms offered for sale or trade may not be brought on site.

- Ads not carried because of space restrictions will be held for publication in the next issue.
- Ads are run only once and must be resubmitted if they are to be repeated.
- Ads should be restricted to 20 words or less and typed or printed on the form provided, and must bear the employees signature.

- For Sale: Auto & Auto Supplies
 For Sale: Boats & Marine Supplies
 For Sale: Miscellaneous

- Wanted
 Carpools
 Lost & Found
 Services

Check the heading applying to your ad. Print or type your ad in 20 words or less.

Ads concerning property for sale or rent cannot be accepted on this form. Special Real Estate Ad forms are available at the Office of the Brookhaven Bulletin, Room 111, 40 Brookhaven Avenue.

Employee's Signature Life No. Ext.
 Send to: Brookhaven Bulletin, Building 460, 40 Brookhaven Avenue (Ext. 2345).