BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

Light Source, Bright Source

The National Synchrotron Light Source (NSLS) is the brightest light in the world. The vacuum ultraviolet (VUV) ring gives off the most intense ultraviolet and soft x-rays of the 20 synchrotron radiation machines worldwide. Its brightness, reliable performance and the long lifetime of its electron beam have attracted new users and their experiments from across the United States.

The x-ray ring has been running at 2.4 billion electron volts (GeV), up from 2 GeV, since April. It is being operated to meet the needs of its users, and most of the work involved in commissioning the ring has been done. Fifteen ports are illuminated and 18 beam lines are now in use for experiments. Seven more beam lines are expected to have light by the end of the year, and 17 more are planned.

Here are notes on how these machines are currently operating, gathered at the annual NSLS general users meeting held last month:

Operating 24 hours a day, seven days per week, the VUV ring circulates single bunches of electrons up to an energy of 750 million electron volts (MeV) and 700 milliampere (mA) current — 50 MeV above design energy and the largest current ever obtained in a storage ring in a single bunch.

The higher current and higher brightness resulted from stabilizing the motion of the VUV ring beam, a job which fell to Physicist John Galayda and the diagnostics group he heads. One measure of the brightness of the electron beam is the current divided by the height and width, and the smaller the dimension, the brighter the beam. The VUV ring was designed to have a beam height of 0.3 millimeters (mm) and a width of 1 mm. When the beam was turned on following the last shutdown, the height and width were measured by electricl Engineer Roman Nawrocky and Physicist Li-Hua Yu and found to to be 0.12 mm and 1 mm, respectively — 250% of the design brightness.

The average lifetime of a single bunch beam at present is two hours at 100 mA. The lifetime of the beam can be traded off for beam brightness, so VUV users can choose a bright beam having a shorter lifetime or a longer lived beam that is less bright. Operating conditions are decided by the users at weekly meetings.

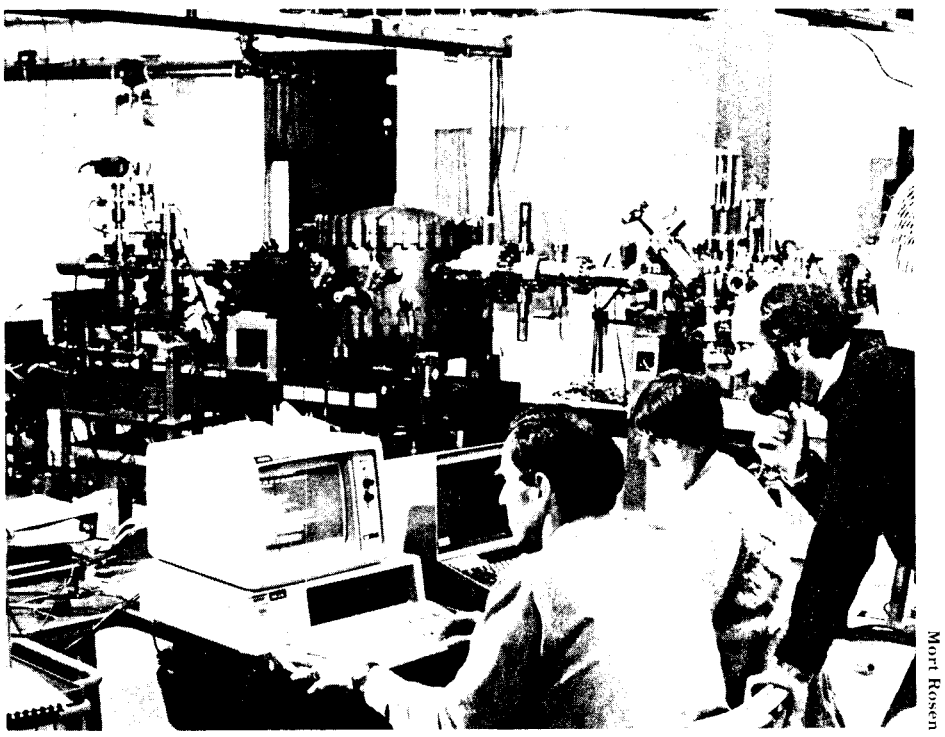
According to Senior Physicist Claudio Pellegrini, head of NSLS accelerator physics, the lifetime of the beam at high brightness is being limited by several factors, including ion trapping. When the negatively charged electron beam goes around the storage ring, it creates positively charged ions out of residual gas atoms within the ring. The electrons attract the positive ions and scatter off of them, causing the beam to lose focus and current.

To eliminate the ion trapping problem, NSLS Department Chairman Michael Knotek would like to see positrons used instead of electrons. "From experience at synchrotron radiation facilities around the world, when positrons are used instead of electrons, they produce beams with lifetimes up to an order of magnitude better."

To generate positrons, a new electron linear accelerator (linac) having at least 200 million electron volts (MeV) energy would be needed. These positrons can then be injected into the rings after being accelerated to 750 MeV, says Physicist Richard Heese, who is in charge of the NSLS injection system. If a 750 MeV linac were built, it could be used to inject electrons or positrons directly into both rings, bypassing the booster now used.

Fifteen of 16 ports at the VUV ring have been assigned and 18 beam lines are in use, reports Physicist Gwyn Williams, coordinator of VUV beam lines. All the beam lines are fully illuminated thanks to the realignment of the storage ring vacuum chambers and beam ports performed by Mechanical Engineer Hank Hsieh and

(Continued on page 2)



Mort Rosen

The University of Nebraska's soft x-ray detector was the first experiment built at another institution to be brought to the NSLS. This signifies that the VUV ring of the Light Source is now operating brightly and reliably enough to make its use worth the journey from a distant institution.

At left is Physicist Gordon Angel of the University of Nebraska, who drove his experiment 1300 miles in three days from Lincoln, Nebraska. His experimental chamber is before him on the U-14A beam line, which is heading right to the VUV ring. With him are Physics Associate Norene Lucas, who assists users of U-14, and Physicist Gwyn Williams. General users, who, like Angel, are not a part of a participating research team, are assigned time on beam lines that are appropriate for their experiments.

At the Light Source for 16 hours a day over 12 days, Angel calibrated his detector, which uses gas jets to measure how many photons per second of soft x-rays were coming from the VUV ring. Such a spectroscopy detector is a new device that eventually will be used in many experiments using soft x-ray synchrotron radiation.

Tales from TRISTAN:
Users, Lasers and Short-Lived Isotopes

A team from Texas A&M University has recently employed Brookhaven's TRISTAN (the Terrific Reactor Isotope Separator To Analyze Nuclei) at the High Flux Beam Reactor (HFBR) to provide exact information about the properties of short-lived nuclei by using on-line laser spectroscopy techniques. "Not enough is known about the basic nuclear force which holds a nucleus together," explains Professor Hans Schuessler, leader of the group, "and the team is excited about the progress it has made here at Brookhaven."

Schuessler, his research associate Klaus Doerschel and the one graduate student on the team, Ulrich Trebus, are originally from Germany; the two remaining members working on site are visiting research scientists from China, Jianhua Zhang and Shouhua Chen.

The work they are doing at the HFBR with the TRISTAN isotope separator involves a technique for using a laser to pick just one isotope at a time so that they can study its "hyperfine structure interaction." In other words, they use a laser to monitor the communication between a nucleus and its outermost atomic electrons to learn how the excitation of the nucleus affects energy levels.

Their experiment runs like this: TRISTAN makes the isotopes which are transported through an ion optics system to the laser setup at the HFBR. By using an argon-ion laser to pump a state-of-the-art ring dye laser in what is known as the "collinear fast beam method," Schuessler *et al.* are able to utilize the large optical absorption cross-section of laser light in order to achieve the high sensitivity required to observe even minute amounts of nuclei produced by fission of uranium-235. In this way, the group uses the laser to study the isotopes by exciting atomic resonances and observing the light emitted as they de-excite. The result is a combination of atomic physics and laser technology employed to help determine the magnetic and electrical moments of barium, lanthanum and xenon isotopes, as well as to give accurate descriptions of the geometric shapes of their nuclei.

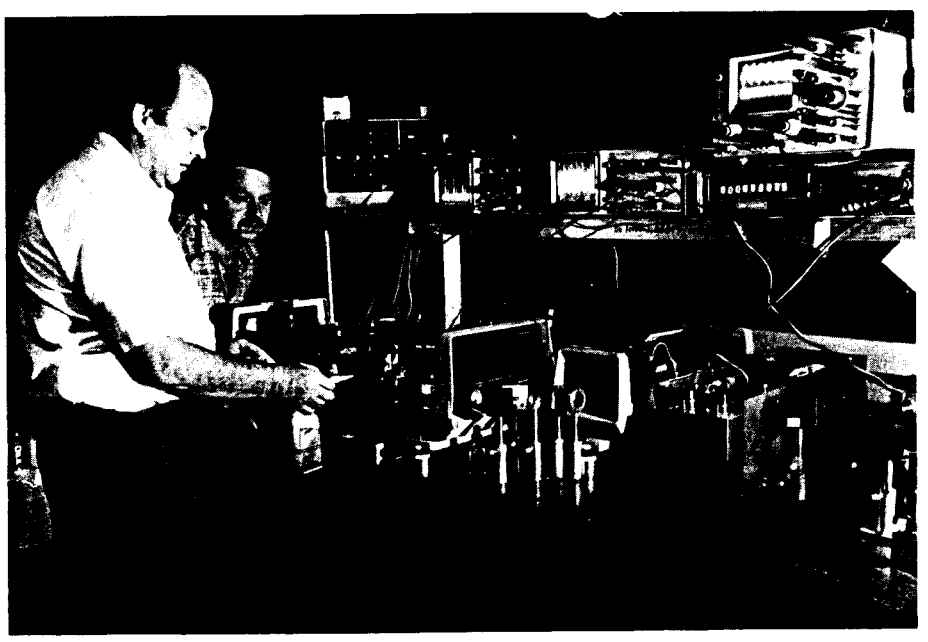
The Texas A&M group is planning to return to BNL in the near future. To this end they are in the process of designing another type of experiment they hope to perform when they come back. The experiment would be unique in its design as well as in its implementation since nobody has ever before conceived of carrying out a similar test. What Schuessler has in mind involves the construction of a quadrupole "ion trap" which would allow ions emitted from TRISTAN to be decelerated to appropriate injection energies and then caught in flight and stored for long periods of time. "Such a system," claims Schuessler, "will make it possible to study even low yield nuclides by storing enough ions to get a good signal or by re-exciting the same ion many times."

The TRISTAN isotope separator is considered a world-class facility for pure and applied research since it can produce all neutron rich isotopes in the fission region with different ion sources. In general, isotope separators can either be put at a reactor or an accelerator. They both provide the beam of particles — in the former case, neutrons, and in the latter, protons — that break up the nuclei and produce isotopes. TRISTAN is the only reactor-based, on-line isotope separator in the United States, and, in combination with the Brookhaven HFBR, can yield intense beams of short-lived isotopes.

As a user oriented facility, TRISTAN serves researchers from universities in the U.S. and abroad and provides many graduate students with the opportunity to obtain training in nuclear physics.

All of the experimental equipment (outside of TRISTAN, of course) was constructed at Texas A&M and transported to Brookhaven by the user group. The work of Schuessler and his associates is supported by the U.S. Department of Energy, the Robert E. Welch Foundation and the Center for Energy and Mineral Resources at Texas A&M University.

— Alexander Laszlo



Peter Horton

Hans Schuessler (left) and his research associate, Klaus Doerschel, work with the laser equipment they brought up from Texas A&M University. The complex electrical equipment above the laser setup monitors feedback from the experiment as the visiting scientists conduct on-line laser spectroscopy with isotopes produced by TRISTAN at the HFBR.

Light Source (Cont'd)

the NSLS engineering section he heads.

In the x-ray ring during 16-hour days, the average life of the beam at 2.4 GeV is five hours at 50 mA current, and the maximum current at 2.4 GeV has been 120 mA. Two new radio frequency cavities, which contain the electromagnetic fields that transfer energy to the electrons in the ring, were installed during the shutdown, thus permitting the energy of the ring to be increased from 2 to 2.4 GeV. "In the last three months, we have run three times more ampere-hours at 2.4 GeV than we ran all last year at 2 GeV," says Physicist Samuel Krinsky, who is head of x-ray ring operations.

The rate of filling the x-ray ring with electrons was quadrupled by the improvements in the injection system, which were suggested by Heese. The electrons are injected in bunches into the rings; the VUV ring can hold up to nine bunches, and the x-ray ring up to 30. These bunches now can be placed in any configuration, thanks to the development of a computer controlled timing system by the NSLS computer group. In placing the bunches close to one another, the beam lifetime has been substantially improved by eliminating ion trapping.

A dipole power supply that is preventing the machine from operating at its design energy of 2.5 GeV will be attended to in a shutdown next year. Ion-glow discharge, a way of cleaning and conditioning the distributed vacuum pumps in dipole magnets, is being considered to increase the pumping speed and thus increase the lifetime of the beam.

"We are operating very respectably," says Knotek, who has been chairman of the NSLS since April, "and now can offer users longer periods of quality experimental time."

— Marsha Belford

Service Awards

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

James M. Constanzo ..... Reactor
Donald J. David ..... Physics
Ralph J. Giallorenzo ... Accel. Dv. Br.
Gertrude H. Neuhoff ..... Applied Sci.

Twenty-Five Years

Robert A. Dagradi ..... Accel. Dv. Br.
Joseph Ferrante ..... Accel. Dv. Br.
Kurt Fuchel ..... Applied Math
Michael A. Guacci ..... S&M
Theodore G. Robinson ..... Physics
Thomas A. Wild ..... H.E.F.

Twenty Years

John W. Baum ..... S&E Prot.
Richard E. Watson ..... Physics

Ten Years

Harry Ackerman Jr. ..... Light Source
Brian F. Briscoe ..... AGS
Ralph J. Giordano Jr. .... Plant Eng.
Roger W. Klaffky ..... Light Source
Stephen F. Lenski ..... Applied Math
Susan N. Rackett ..... S&E Svcs
Regina W. Tracy ..... Budget Office
Jorge Ubiles ..... Physics

Discussion Group on Nuclear Arms

The Discussion Group on Nuclear Arms will meet at noon on June 28, in Room B, Berkner Hall. Bring your lunch. For further information call Mark Sakitt, Ext. 3812.

In Memoriam

It has been learned that Norman Elliott, who retired as a Senior Chemist in the Chemistry Department in 1972, died on June 24. He was 77 years old. He is survived by his wife, Muriel of Blue Point, a daughter, Jean Daphne Howard, Denver, Colorado and a son, John, Colorado Springs, Colorado.

Peter Horton

Somebody stole your brand new Chevrolet? Then hop a ride to the Neutron Dance in Ken Asselta's '56 Chevy with (from left) Darlene Reeves, Adrienne Usher, Pat Webster and Pat Aud.

Rock Around the Clock

Hey, all you of who remember atoms for peace and the Brookhaven Graphite Reactor — have you ever seen a neutron dance?

Well, those who came of age during the 50's, babies of the 50's boom and you who were born too late to personally experience doo-wop and American Band Stand, bobby socks, saddle shoes and poodle skirts, DAs and pony tails, and Ike, McCarthy and Checkers — take heart. You can see the neutrons rock 'n roll and relive the good ol' days of the 1950's for one night — the night of the Neutron Dance.

On Friday, July 19, from 8 p.m. to midnight, a neo-50's dance will be held at the Brookhaven Center. The theme is the Neutron Dance and will feature a song of the same name by the Pointer Sisters. Dee Jay "ET" (alias Ed Taylor of AMD) will spin the 45 rpms of the 50's and any other record you want to dance your neutrons to. There will be a cash bar and door prizes.

Tickets are $5.00 per person and are available now at the BERA Sales Office in Berkner Hall and from ticket sellers listed below.

The Neutron Dance is being sponsored by Brookhaven Women in Science to benefit their Renate W. Chasman scholarship fund. The scholarship was established to encourage Long Island women to continue their studies in the science and technical fields. Chasman was a physicist at BNL from 1963 until her death in 1977 and was responsible for the design of the electron storage rings at the National Synchrotron Light Source.

This may be the 1980's, but somethings haven't changed from the 50's — like good music, dancing and great company. After working so hard just to make it every day, you'll be so happy doing the Neutron Dance.

Neutron Dance Ticket Sellers

Mary Phillips	DAS	Bldg. 426	Ext. 3282
Vicki McLane	DNE	197D	2902
Penny Baggett	AMD	902B	5154
Harriet Martin	TID	477A, 911C	3487,4853
Gail Williams	DO	460	3338
Sharon Spark	AMD	515	4111
Florence O'Brien	Med.	490	2837
Bonnie Weslowski	Chem.	555A	4301
Rae Greenberg	Phys.	510A	3743
Mary Ann Castrogivanni	S&EP	535	3898
Pat Webster	HEF	911A	4628

Checks on Chemicals

In recent years, workers have expressed considerable interest in learning more about the chemicals they are making or using. This has led to laws at the state level and, later this year, at the Federal level, requiring that workers be informed of the properties, health effects and physical hazards associated with the chemicals they are handling. The Federal standard, which goes into effect on November 25, requires that all manufacturers and importers of hazardous materials must have updated material safety data sheets available for anyone ordering their products.

Even though Federal facilities, such as the national laboratories, are exempt from these laws, a program advising employees of chemical hazards has been in effect at Brookhaven for a number of years. The Center for Assessment of Chemical and Physical Hazards (CACPH), of the Safety & Environmental Protection Division(S&EP), has pulled together health and safety information on about 900 chemicals and commercial products, from a variety of sources: the manufacturer's material safety data sheet, searches of on-line data bases and scientific literature. This information is useful not only to employees, but to DOE facilities and contractors. Access to the information can be made by computer, or, if a terminal is not available, by calling the staff of the Center on their hotline.

Laboratory employees who have requisitioned a hazardous substance receive a computer printout outlining health and safety information on the substance. Also, Management Information Systems (MIS), working in tandem with S&EP, sends computer printouts to CACPH of all chemical purchases made by the Lab and all hazardous chemicals withdrawn by employees. The information is entered into a data base and, if a new requisitioner is identified, the information is sent to that person. If the requisitioner is not the user of the chemical, the information should be forwarded to the proper person. Other employees who wish to know more about the chemicals they are working with may contact their safety coordinator or building safety representative.

In the spirit of the state and Federal regulations, the Laboratory is developing more formal procedures for employee access to chemical health and safety information and more specific training programs for users of hazardous chemicals.

Science Quiz

Two Cultures (Cont'd)

9. Benjamin Franklin is not usually characterized as a literary figure, but his autobiography, a classic, certainly qualifies him as one. His scientific works include **a)** the development of a theory relating heat and electricity **b)** the invention of an electric heater **c)** the measurement of the force between electric charges **d)** the invention of the lightning rod.

10. John Milton was very much affected by the science of his time, and *Paradise Lost* shows the influence of the contemporary cosmology. When Milton wrote of the Tuscan artist looking through his glass, the "glass" referred to a telescope. The Tuscan artist was the scientist **a)** Tycho Brahe **b)** Evangelista Torricelli **c)** Galileo Galilei **d)** Giordano Bruno.

11. Newton's discovery that white light is composed of the different colors of the spectrum had a great influence on a style of painting known as **a)** fauvism **b)** impressionism **c)** expressionism **d)** chiaroscuro.

12. Sir Arthur Conan Doyle is best known for his authorship of *The Adventures of Sherlock Holmes.* He had another vocation, however, which was **a)** mathematics **b)** medicine **c)** paleontology **d)** drug synthesis.

13. The title of Ray Bradbury's *Fahrenheit 451* refers to the temperature at which **a)** alcohol vaporizes **b)** human beings cannot survive **c)** paper burns **d)** thermometers melt.

14. The title of Josef Strauss's waltz, "Music of the Spheres," refers to **a)** music so heavenly that, listening to it, one is transported to other spheres **b)** ancient cosmology in which the heavenly bodies made music as they traveled in their orbits **c)** the delicate clanging made by little spheres in a kind of scientific pinball game, popular at the time **d)** the sounds made by the spheres in a glass harmonica.

15. A work in which one of the main characters is a computer is **a)** *The Age of Uncertainty* **b)** *2001: A Space Odyssey* **c)** *The End of the Road* **d)** *The Money Game.*

16. The union of art and science in a single work might be epitomized by *Aristotle Contemplating the Bust of Homer.* The work was executed by **a)** Rembrandt **b)** David **c)** Michelangelo **d)** Praxiteles.

17. The modern term for the biblical *brimstone* is **a)** carbon monoxide **b)** calcium carbonate **c)** sulfur **d)** molasses.

18. A work for chamber orchestra that may have been inspired by contemplation of the revolution of the Earth about the sun was written by **a)** Antonio Vivaldi **b)** Arcangelo Corelli **c)** Johann Nepomuk Hummel **d)** Orlando di Lasso.

19. *Density 21.5,* by Edgard Varèse, was composed for **a)** an obese violinist **b)** a thick-headed pianist **c)** a platinum flute **d)** an electronic instrument.

(Answers on page 4.)

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Arrivals & Departures

Arrivals

Jeffrey R. Appling ..... Chemist
Derek A. Dezaro ..... DA
Albert DiLorenzo ..... Plant Eng.
Michael W. Nugent ..... Plant Eng.
Yong-Nian Tang ..... Medical

Departures

None

BROOKHAVEN BULLETIN

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WIS Meeting

Marion Metivier, Special Assistant to the President, for Equal Opportunity and Affirmative Action, will speak at the next luncheon meeting of the Brookhaven Women in Science. She will speak on "Tough Stuff: Bureaucratic Survival in Rough Times," at noon in Room A, Berkner Hall, Tuesday, July 2. All are welcome. Come and bring your lunch.

NYC Train Trip

The Hospitality Committee is planning a group railroad trip to New York City on Wednesday, July 17. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is $5.00; children under five years ride free.

Reserve a ticket by sending your fare through the U.S. mail to BNL, P.O. Box 322, Upton, New York 11973. Please do not send cash. Checks or money orders, payable to BNL, must be received by Thursday, July 11. Put the date of the trip, your BNL life number and phone number on the back of your check or money order. Tickets will be given to you at the railroad station on the day of the trip. Refunds will be made only if cancellations are received by the Monday morning preceding the trip.

Diners Note

The Cafeteria will be open only from 9:00 a.m. until 2:00 p.m. on Thursday and Friday, July 4 and 5, because of the holiday. The Center Club will be closed on Thursday, July 4, but will reopen Friday, July 5, at 5:00 p.m. Food from vending machines in Building 912 remains available.

Cafeteria Menu

Week Ending July 5, 1985

Monday, July 1

Beef Barley soup	(cup)	.65
	(bowl)	.85
Turkey broccoli primavera on rice		2.15
Western omelet & hash browns		2.10
Hot Deli: Sausage Reuben		2.05

Tuesday, July 2

Canadian cheese chowder	(cup)	.65
	(bowl)	.85
Barbecue spare ribs & 1 veg.		2.15
Top round of beef & 1 veg.		2.25
Hot Deli: Turkey breast	(bread)	2.10
	(roll)	2.30

Wednesday, July 3

Garden vegetable soup	(cup)	.65
	(bowl)	.85
Beef stroganoff on egg noodles		2.25
Southern fried chicken & 1 veg.		2.10
Hot Deli: Philadelphia steak w peppers & onions	(bread)	2.10
	(roll)	2.30

Thursday, July 4
Snack Bar Service 9:00 - 2:00

Friday, July 5
Snack Bar Service 9:00 - 2:00

Notice: Salad Bar for July 2&3 will be a yogurt & fruit bar.

N.Y. State Tax Cut

New York State has issued new tax tables to calculate the amount of state tax to be withheld from employees' wages paid after June 30, 1985. The new rates will result in less tax being withheld, and consequently more money showing up in paychecks.

Weekly employees will spot the increase in net pay in the July 3 paychecks, and monthly employees on July 31.

Specials for Summer Visitors

Roller Skating: July 18, 8 p.m. Cost $4.50 (paid in advance) includes transportation, admission, skate rental, wine and cheese. Deadline for bus reservation is July 12.

Great Adventure: August 10, leave at 7 a.m. Cost $25 (cash only) includes transportation, admission (six hours of fun, amusement park, safari) and breakfast, snacks and beverages. Limited seats, money due on or before July 19.

For further information and reservations, contact Renee Flack, Ext. 3316, Bldg. 460.

T-Shirts — white with blue printing. Cost $5, cash or money order. Send to T-Shirts '85, Renee Flack, Bldg. 460.

Hospitality News

A morning coffee get-together will be held Tuesday, July 2, from 9:30 to 11:30 a.m. in the Brookhaven Center. Wives of employees and guests are welcome. Please come and bring the children. Babysitting will be provided free of charge. Bring a toy for your child to play with.

A formal program will not be presented so that there will be plenty of time to welcome newcomers and summer visitors to the Laboratory and to greet old friends. Coffee, tea and danish will be served.

—BERA News—

Spanish Fiesta

The BNL Hispanic-American Society is selling tickets to a Spanish Fiesta to be held at Theatre III in Port Jefferson on Saturday, July 29. The program will consist of a matinee featuring Mariachi music, Flamenco dancers and Spanish singers. Mexican and Argentine food will be sold at the cabaret from noon to 7:30 p.m. At 8:00 p.m. a Spanish play entitled "Cafe con Leche" will be presented.

Combination tickets for the day's happenings are priced at $12. However, tickets may also be bought for individual events; that is, matinee alone for $5, and evening play alone for $10.

Contact Jose Medina, Ext. 7636, Lucy Sanchez, Ext. 4399, or call Theatre III directly at 928-9100.

Softball

Week of June 17

League I
Moles 14 - Cool 'n Gang 13
Ravens 11 - Scram 6
Blue Jays 15 - Six Pax 2

League II
Dirty Sox 10 - AMD 8
Magnuts 12 - Faze II 11

League IV
Septembers 15 - Mole-Esters 14
Turkeys 5 - Farmbusters 2

Makeup game from 5/9:
Turkeys 9 - Farmbusters 8

League V
Underalls 13 - No Feedback 8
Foul-Ups 16 - Simply Awesome 3

Model Plane Club

The R/C Model Airplane Club will hold its regular monthly meeting on Tuesday, July 2, at noon at the Club field. Those interested are welcome to come along.

All film badges will be changed tomorrow. Please place your badge in its assigned rack space before leaving work today.

Notice

Because of the holidays, the Bulletin will not publish on July 5. Classified ads for the July 12 issue should be at the Bulletin office by noon, July 3.

"OH, WHAT IS IT NOW."

Classified Advertisements

Placement Notices

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

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all non-scientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment.

Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Employment Manager, Ext. 2882.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees.

2279. ADMINISTRATIVE POSITION - Requires excellent organizational and communications skills, extensive knowledge of complex Laboratory procedures and policies and an employment history which demonstrates experience in work that requires accuracy, precision and flexibility. With frequent time constraints, will function as office manager and administrative aide to office management. A limited amount of overtime is involved. Secretarial skills (MICOM and shorthand), and the ability to expertly set priorities is required. Prior supervisory experience is preferred. Budget Office. Director's Office. (Reposting of Job #2269).

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2280. SECRETARIAL POSITION - Requires an AAS degree in secretarial science or equivalent and excellent communications skills to perform group secretarial duties. Responsibilities include the typing of technical manuscripts on a word processor, the preparation of domestic and foreign travel arrangements and maintenance of group files. Shorthand helpful. Physics Department. (Reposting of Job #2237).

2281. DESIGNER POSITION - Requires AAS degree or equivalent and 15 years' broad experience in power and process piping system design. Knowledge of plumbing, fire protection and HVAC systems highly desirable. Will develop and prepare mechanical as-built drawings, do field investigations and design systems associated with utilities, research labs and power plants. Plant Engineering Division.

2282. CLERICAL POSITION - Requires excellent recordkeeping and computation skills. Will prepare and process vouchers for payment, mail vendors' checks and maintain data regarding payment. Experience with typing and use of calculator required. Fiscal Division.

2283. TECHNICAL POSITION - Requires an AAS degree or equivalent in electronics. Demonstrated systems troubleshooting abilities and good communications skills are necessary. Background experience in high/low level rf systems, high power pulsed power supplies, digital electronics and/or computer operation is desirable. Rotating shift work required. Alternating Gradient Synchrotron Department.

Autos & Auto Supplies

82 RM125 - new top and bottom end, metzlers, chain and sprockets, DG pipe, $750 firm. 722-4821.

74 CHRYSLER NEWPORT - 4 dr., high mi., $300 or best offer. 727-5912.

CASSETTE DECK - Mitsubishi, am/fm, $50; Lafayette twin 40 channel CB, $50. Bergoffen, Ext. 2760.

64 FAIRLANE 500 - Sports Coupe, 289-V8, a/t, p/s, buckets, console, recent insp., dependable, $500. 929-3566.

74 OLDS CUTLASS SUPREME - p/s, p/b, a/c, am/fm 8-track, excel. running cond., $650, neg. Ext. 7717 or 589-8394 eves.

76 COUGAR XR7 - p/w, p/s, p/b, radials, am/fm, CB, $1,000. Dan, Ext. 4987 or 698-7322.

73 LINCOLN CONT. - town car, 4 dr., leather seats, loaded. Ext. 4927.

73 CAMERO - body & interior good cond., $900; 72 trailer, Tandem wheels, sleeps 6, good cond., $2,100. Ext. 2964.

83 DATSUN 200SX - 5 spd., 2-tone silver, mint cond., must see. Carrie, 728-0334 morn. and eves.

75 DUSTER - white, 6 cyl, $950. Vic, Ext. 3357 or 736-0351.

DE-CLUTCHING FAN - 7 blade for V-8, $10. Joe, Ext. 4212.

73 CHEVY CAPRICE - V8, am/fm, good cond., runs well, $700. Manfred, Ext. 3190.

TIRES - (4) Michelin, 14" steel belted radials, brand new, $100. 286-0939.

RIMS - 6.00-13; 8.25-14; 5.50-16. Ext. 2950.

80 BUICK REGAL - a/t, a/c, p/s, p/b, p/w, V6, $4,700. Fred, Ext. 3155.

83 DATSUN STANZA - 4 dr., hatchback, a/c, XE pkg., 25k, $6,450. Ed, Ext. 2362 or 3925.

RADIOS - 59-62 and 64 Chevy, sell or trade; tail light lenses, new, in box. Joe, Ext. 2556.

(Continued on page 4)

Autos & Auto Supplies (Cont'd)

73 OLDS CUTLASS - Supreme, take whole or parts, good trans. & motor. Scott, Ext. 2669 or 473-5965.

75 FIAT 128 - 4 spd., am/fm, good eng., (2) new tires, needs work, best offer. Ext. 3714.

75 TRIUMPH SPITFIRE - convertible, excel. cond., 33k mi., hardtop, am/fm, $2,750. Brian, 744-2169.

71 BLAZER - 4x4, blue, 4 spd., 36" tires, rollbar, V8, good cond., $2,500. Vera, Ext. 5064.

74 VOLKSWAGON BEETLE - Champagne edition, sunroof, needs body work, 6k mi., rebuilt eng., runs excel., $675. Ext. 7745 or 878-2844.

78 KZ400 - low mi., very good cond., dealer maint., asking $750. Ext. 7148 or 281-0360 after 6 p.m.

78 FORD FIESTA - 75k mi., excel. cond., good mpg., $1,200. Ban, Ext. 3098 days/eves.

82 TOYOTA PICKUP - 4x4, cap, low mi., grey/black, lift kit, many extras, $8,400. 289-9238 eves.

76 TOYOTA CELICA GT - 70k mi., 5 spd., am/fm, clean, $1,895. 363-5090.

81 FIAT SPYDER 2000 - silver, red/black int., convertible, clutch, brakes, Pirelli tires, f/m cassette, $5,000. Ext. 7132 or 878-6456.

75 OLDS VISTA CRUISER - wagon, 1 owner, good transp., recent insp., $550. 289-0012.

68 POPUP CAMPER - sleeps 6, icebox, indoor/outdoor stove, needs work, $100. 878-0487.

82 DATSUN 210 - 4 dr. sedan, deluxe, 29k mi., orig. owner, $5,000. Kimura, 246-9327.

75 MUSTANG PARTS - driver door, rear glass, heater core & box, much more, cheap. Ext. 7160.

72 FIAT 850 - convertible, very good cond., $750. 298-4475.

72 SAAB 99 - excel. cond., am/fm Blaupunkt, $1,200. Ext. 4575 or 473-3604.

83 FORD ECONOLINE 150 - 17k mi., sunroof, (2) Aviator windows, running boards, Mitsubishi stereo, excel., $9,200. Bob, 588-0677.

78 PINTO WAGON - 5 spd., body excel., 67k mi., $1,100. Joe, 878-2203.

71 TRIUMPH TR-6 - good cond., 4 spd., new top, green, 89k mi., $2,500. 473-8292 or 928-0297 after 6 p.m.

79 FORD PINTO - 4 spd., fantastic shape in & out, must sell, $1,100. Ext. 4605 or 281-5456 eves.

72 DODGE DART - 4 dr., a/t, a/c, p/s, p/b, am/fm stereo, 20 mpg, good cond. Sandy, Ext. 3369 or 286-1022.

84 PLYMOUTH TURISMO - 2.2 litre eng., hatchback, 2 yr. warranty, rust proofed, like new, $5,500. 563-2847.

82 CHEVY CHEVETTE - low mi., a/c, a/t, p/s, p/b, excel. cond., must see, $3,800. 689-7259 after 6 p.m. & weekends.

74 AUDI - (4) new tires, motor overhaul, stick shift, sunroof, 2 dr., $1,150. Ext. 3330.

73 MGB - very reliable, looks good, no rust, many extras, $2,100. Ext. 2928 or 821-1389.

69 FORD BRONCO - 4 WD, 302 eng., 3 spd., $1,500. 286-3623.

80 CHEVROLET - station wagon, a/c, am/fm cassette, p/s, p/b, small V8. Ext. 2435 or 3188.

77 DIRT BIKE - Yamaha GT/MXC, good cond., runs well, $350. 878-0480.

Boats & Marine Supplies

WATER SKIS - 2 sets, tow-rope, life belt, $60. Tony, Ext. 4605.

22' RHODES - 1981, with trailer, 1983 Honda outboard, VHF radio, completely outfitted. Ext. 4213 or 269-5627 eves.

17' SPORTSCRAFT - 1973/74, 65 HP Evinrude, trailer, extras, ski equip., excel. cond., $1,800, neg. Ralph, Ext. 2368 or 928-6654.

16' WOOD DILLY - 20 HP, trailer, water ready, $950. Stewart, 273-6993.

22' CATALINA SLOOP - 1982, 7.5 HP Honda, aux., extras. 589-5490.

26' PACEMAKER - 1968, SF, 318 cu. Chrysler, f/w cooled, sleeps 4, standup head, stove, ac/dc ref., VHF, d/f recorder, excel. cond. Don, Ext. 5329 or 878-2215 eves.

MERCRUISER MANIFOLDS - and risers, fresh water, uses Chevy 350, $150. Bill, Ext. 2434.

24' GARVEY - 1975, 8' beam, planked, glassed, 70 HP Evinrude, $1,500. 586-8431 after 6 p.m.

24' CHRYSLER - 115 HP Evinrude, power trim & tilt, sleeps 2, new rug, good cond., $1,900. Jim, Ext. 7772.

23' F/G SLOOP - sleeps 4, head & galley, 3 sails, 6 HP Evinrude, 8' dinghy, many extras, in water, draws 4', must sell. Walter, Ext. 4605 or 938-8353.

26' PEARSON - 1972, 5 sails, 15 HP Evinrude, d/f, sleeps 4, many extras. Ext. 4099 or 689-9214.

28' OWENS - sleeps 4, sink, stove, head, new canvas & hardtop, engine needs minor work, $2,400; 11' rowboat, needs paint, plywood, $60. 281-0360 after 6 p.m.

14' ALUM. BOAT - outboard, 9.5 HP eng., trailer. Ed, Ext. 2362 or 3925.

24' WINNER - I/O Mercury, flybridge, galley, porta-potty, sleeps 4, dual batt., outriggers, full canvas, VHF, CB, stereo, d/f, $8,000. 277-5531.

Miscellaneous

TRESTLE TABLE - 2 leaves, 6 chairs; lamp table; chairs; snack trays; other furn.; bathroom things, sink, toilet, medicine cabinet, etc. Gary, Ext. 2350 or 567-9617 after 5 p.m.

KEROSUN KEROSENE STOVE - like new, $75. 727-1518.

HIDE-A-BED - Simmons, queen size, Colonial-style, $250; brown recliner, $50; coffee table, $20; child's chest of drawers, $5. Ext. 4425 or 751-6781.

CANOPY BED - $75; trumpet, student model, w/case, $75. Jim, Ext. 3372.

COLOR TV - Zenith 19", $140. Marian, Ext. 3999 or 282-3008 eves.

BASKETBALL BACKBOARD - semi-pro, fiberglass, lifetime guarantee, heavy duty concrete-filled pole, rim included, $75. 698-1362.

HEDGE TRIMMER - Craftsman, 22", electric, used once, on one bush, $30. 744-3744.

KITCHEN TABLE - w/leaf and 4 chairs. Frank, Ext. 3120.

ROTOTILLER - 5 HP, snowplow, large wheels and chains, $375. Otto, 472-0339.

TAPE DECK - Sony reel-to-reel, Ferrite heads, mike mixer, 3-spd., excel., asking $199; (40) reel-to-reel tapes, recorded, $3 ea. Ron, Ext. 3238.

COLOR TV - 17", Toshiba, just serviced, $80. Ext. 7130 or 929-8323.

ELECTRIC GUITAR - Ovation, acoustic, beautiful, instrument, brand-new, $400. 929-8603.

BALDWIN ORGAN - model 2000, full pedalboard, 2 manuals, church model, $2,000; 2 bicycles, 10 spd., man's lightweight; woman's Schwinn w/luggage carrier, $50 ea. Ext. 4505 or 928-2803.

SOFA - Ethan Allen, colonial style, 90", very good cond., $200. 929-3566.

MOTO-X EQUIP. - Bell helmets, kidney belts, goggles, chest protectors, pants, boots, some brand new. 722-4821.

STEREO CASSETTE DECK - Onkyo, Accu-Bias control, Dolby NR, top line model, excel. cond., $85. Ext. 4153 or 732-5829.

WASHER - Sears Kenmore, heavy duty, 4 cycles/water levels, like new. 475-6582.

TRICYCLE - Big Wheel, good cond., $10. Ext. 3369 or 929-6442.

POOL LADDER - for in-ground pool, like new. Sal, Ext. 2460.

BEDROOM SET - hutch, dresser, armoire, (2) night stands, double bed, dark pine, $700. 475-0002 after 5:30 p.m.

12" TV - B&W, almost new, $45; infant's car seat, $10; infant rocking seat, $8. Annette, Ext. 3190.

OTTOMAN - converts to single bed, rust fabric, used once, excel. cond., $210. Ext. 7686 or 878-0897.

FLOOR POLISHER - Electrolux, $75; assorted new door knobs, $15. Paul, Ext. 4156.

TANDEM BIKE - Schwinn, twin delux, 5 spd., $100. 472-2394 eves.

DINING CANOPY - 12' sq., a must for family camping, $25. Bob, Ext. 4201.

CHILD'S TOYS - Tonka, Masters of the Univ., Hot Wheels, trike bike, $12.50. Joe, Ext. 4212.

MOVIE CAMERA - Kodak Ektrasound 160, power zoom lens, range finder, brand new, $85. Lenny, Ext. 2091.

CHAIN LINK FENCE - 9 gage, 100 ft. green vinyl, 100 ft. galv., $1.25 ft. 924-0960.

CYCLONE FENCE GATE - 4 ft. high, with latch, good cond., $40. Dan, Ext. 4987 or 698-7322.

CHINA CABINET - colonial, solid hard rock maple, or sell buffet separate, excel. cond., $1,100. Ext. 5042.

LADIES COAT - dk. blue, leather/vinyl, size 12, $5; ladies hooded jacket, size 12, $3; Toastmaster toaster, $3. 281-7844.

ENGLISH SWEATERS - top quality. Ext. 3403.

TELEX TENDER - screw mount, Pentax thread 2x; bar books for making drinks. Susan, Ext. 4267.

PROTHUNDER BIKE - 20", new paint, pads, grips, mag wheels, new tires, tubes, $75. Joey, 929-8321.

DESK - large, steel, $25. 744-9677.

DRAFTING TABLE TOP - no legs, $10. Tony, Ext. 4605.

CURTAIN ROD - traverse, 7-12 ft., gold, $35; rust curtains, $10; women's bowling ball, bag, $5. John, Ext. 5279.

P.A. SYSTEM - Peavey, (2) cabinets, (4) 10" speakers, must sell, $95. Bob, Ext. 4758.

COLECOVISION - plus 2 cartridges, hardly used, excel. cond., $75. 878-0480.

RIDING MOWER - Mustang, 25", completely rebuilt incl. brand new eng., $325. Tom, Ext. 4084 or 878-1060.

CARVING KNIFE - elec., Hamilton Beach, new, never used, $7.50. Joe, Ext. 4212.

DOUBLE WINDOW - 6 over 6; rear entry door, both for $20. Charlie, Ext. 3950.

ANTIQUE DESK - oak, office size, 31-1/2"x49-1/2", compl. restored, $450 neg. Pat, Ext. 2452.

KITCHEN TABLE - pine, $25; loveseat, $20; Deacons bench, $20; end tables, $15. Ext. 2119.

STORM WINDOWS - alum., white, (2) 24"x50-3/4", (1) 47-3/4"x50-3/4", $25 set. 567-9025 after 6 p.m.

TENNIS RAQUET - Bancroft Borg, wood, good cond., $20. Ext. 3133.

VACUUM CLEANER - Kirby, all attach., excel. cond., $200; dining light fixture, (5) lights, wood & brass, $15. 929-4753 eves.

FLOUR MILL - goes on top of Bosch kitchen machine, with slicer/shredder/wire whip/dough-hook/blender, $280. Ext. 3107.

GRAND PIANO - Yamaha, 6', satin walnut, 7 yrs. old, perfect, $7,200. Ext. 2865 or 286-5879.

UPRIGHT FREEZER - Sears, 17', works well, looks good, $95. Ext. 2180 or 286-3937.

PUPPIES - Doberman, male champ. lines, show & obedience potential, AKC, $300. 669-1431.

POOL HEATER - Teledyne, good cond., needs thermostat replacement, $100. Ext. 2429 or 689-8987.

RADIO - Panasonic, 8 band shortwave superhet, am/fm, brand new, $125. Ext. 2434.

BOY'S BICYCLE - Presto, 5 spd., $35 neg. Ext. 3357 or 758-9268 eves.

Free

VACUUM CLEANER PARTS - Kirby, never used. Joan, Ext. 2922.

COPY MACHINE - IBM, older model but working. Ext. 7160.

CAR SEAT - Ext. 3107.

Lost & Found

FOUND - key at Blood Bank, 6/20. Ext. 2345.

Yard Sales

CENTER MORICHES - July 4-7, 8 Orchard Neck Road, 10 a.m.-6 p.m.

CENTER MORICHES - annual antique auction, Moriches Bay Historical Society, July 6, 10 a.m. inspection, 11 a.m. auction, Montauk Hwy., West of Taylor's Pond.

Car Pool

LIE EXIT 37 OR 39 - summer visitors. Marvin, Ext. 2102.

COMMACK - 8:00-4:30. Don, Ext. 2043.

Real Estate

Real Estate advertised for sale or rent is available without regard for the race, color, creed or national origin of the applicant.

For Rent

MASTIC/SHIRLEY - 1 bdrm., unfurnished apt., working person or couple, $450/mo. incl. util. Nancy, 281-5142 after 5 p.m.

SETAUKET - large 1 bdrm. apt., full bath, priv. ent., near SUNY, $600 pays all. 689-9132.

HILTON HEAD ISLAND, S.C. - 2 bdrm. condo., 2 baths, tennis, golf, swimming pool, beach, $400/wk. Ext. 3147 or 585-9149.

WHITE MOUNTAINS, N.H. - new condo., 3 bdrms., 2 baths, private deck, f/p, heated pool, clubhouse, Jacuzzi, tennis courts, hiking trails, near all area attract., $375/wk. (914)232-4039.

ROCKY POINT - furnished studio apt., full kitchen & bath, good residential area, mature single non-smoker, priv. ent., $425 incl. all. 744-8659.

For Sale

CORAM - Townhouse ranch, excel., elec. heat, central a/c, 2 bdrms., l/r, d/r, kitchen, bathroom, fenced-in patio, club house, swimming pool, $85,000. Ext. 3967 or 928-1363 after 6 p.m.

DUNNELLON, FLORIDA - near Ocala, 2 acres, Rainbow Lakes Estates, new development, new roads, water, electricity, flat land, ready to build, $9,000. Judy, Ext. 5263.

SOUND BEACH - 2 bdrms., full bath, den, deck to above ground pool, 1/2 block from beach, $80,000. 821-0187 before 2 p.m.

YAPHANK - 2 bdrms., 1-1/2 bath condo., 2 mi. to Lab., new mint interior, bsmt., pools, tennis, club house, $82,000. Henry, Ext. 4547 or 924-6688.

NO. SHOREHAM - 2 bdrm. cape, mint cond., priv. beach, l/r, f/p, country kit., 1 bath, fin. basement, garage, expan. attic for possible mother/daughter, low taxes, $115,000. 744-9832.

BAITING HOLLOW - 1/2 acre lot, wooded, beach rights, very private, $49,500. Ken, Ext. 2008 or 928-5875 after 6 p.m.

STRATHMORE EAST, CORAM - W section, 3 bdrm. ranch, w/attached 3 rm. apt., move-in cond. 928-8071 eves.

ADIRONDACKS - waterfront property, 600', on Schroon River, 6 acres, 20 min. from Lake George, fishing, boating, swimming, terms avail., owner will hold mort., $19,000. Ext. 3376 or 924-3674.

Wanted

CANOE - for 2 adults, 2 children. Peter, Ext. 3469, 4267 or 271-5774.

GIRL'S BEDROOM SET - white enamel dresser, desk, hutch, canopy or headboard, mirror, etc., good cond. Ext. 2242.

HOUSE - or apt., to rent for low income working woman, 2 children, will share, prefer Riverhead. 821-0089.

BABYSITTER - on site, 1 or 2 days a week for summer. Terri, Ext. 2484.

HOUSEMATE - to share 4 bdrm. house, 3 baths, 20 min. to Lab, washer/dryer, sundeck, $233/mo. plus 1/3 util. Ext. 2521 or 928-8379.

EQUIPMENT - for wood working, to set up shop, 10" H.D. table saw, unisaw, powermatic, etc., 8" jointer, 3/4" H.D., shaper and misc. 878-0071 after 6 p.m.

USED POSTAL STAMPS - for kid's library stamp club; windup watches, clocks & old jewelry, any cond. Al Campbell, Ext. 2043, Bldg. 903A.

SCUBA EQUIPMENT - for novice diver. Bob Foley, Ext. 4028.

HOUSE TO SIT - exp., caring, resp., free, any period between June 23-Sept. 15. J. Allentuck, Ext. 2412.

ANSWERING MACHINE - looking for good offer. Maurice, Ext. 5056 or 928-6930.

TROPICAL FISH - for free. Ext. 3280.

SOCCER TEAMS - to play in East End Soccer League. Pat Foley, 878-0031 after 5:30 p.m.

Quiz Answers

9. d

10. c. Tuscany is a region in Italy. Brahe was a noted Danish astronomer. Bruno, a philosopher, was burned at the stake in 1600 for stating that the universe is infinite. Torricelli invented the barometer.

11. b. The impressionists used small strokes of primary colors to simulate actual reflected light. Impressionism, expressionism, and fauvism were movements in art; chiaroscuro, from the Italian for light, *chiaro,* and dark, *oscuro,* is a representation in terms of lights and darks rather than colors.

12. b

13. c. In the novel, books are burned.

14. b

15. b. The computer in Arthur C. Clarke's and Stanley Kubrick's screenplay is known as Hal. *The Age of Uncertainty* is a book on the history of economics and economic theory, by John Kenneth Galbraith; *The End of the Road* is a novel by John Barth; and *The Money Game* is by the modern Adam Smith, an investment analyst who writes under that name.

16. a. The title of the work has suggested some humorous twists. A newspaper is alleged to have carried a photograph of Aristotle Onassis seeking a Hollywood home and considering one that had belonged to Buster Keaton. The photograph was captioned, "Aristotle contemplating the home of Buster."

17. c. Sulfur is the fuel of hellfire.

18. a. Vivaldi wrote *The Seasons,* also called *The Four Seasons.*

19. c. The density of platinum is 21.5 grams per cubic centimeter.

Classified Ad Policy

Deadline is 4:30 p.m. Friday for publication Friday of the following week.

1. The Brookhaven Bulletin's classified section may be used only by active and retired Laboratory employees.
2. All items for sale or rent must be the advertiser's property.
3. Ads for material acquired for resale in association with a full or part-time business cannot be accepted.
4. Ads for the sale or trade of firearms will not be accepted.
5. Ads not carried because of space restrictions will be held for publication in the next issue.
6. Ads are run only once and must be resubmitted if they are to be repeated. One ad per person per week.
7. **Property for sale or rent cannot be accepted on this form. Special Real Estate Ad Forms are available at the office of the Brookhaven Bulletin, Building 134.**

☐ For Sale: Autos & Auto Supplies ☐ For Sale: Boats & Marine Supplies ☐ For Sale: Miscellaneous ☐ Car Pools ☐ Lost & Found ☐ Wanted ☐ Free ☐ _____

Please print your ad below in 15 words or less using one word per block. Include name and phone number to call.

Note: The following must be completed for your ad to appear.

NAME (Please Print) .....

Employee's Signature ..... Life No. ..... Ext. .....

Send to: Brookhaven Bulletin, Building 134 (Ext. 2345).