

## W-Particle Candidates Sighted by D-Zero Detector; Collaboration Includes Brookhaven

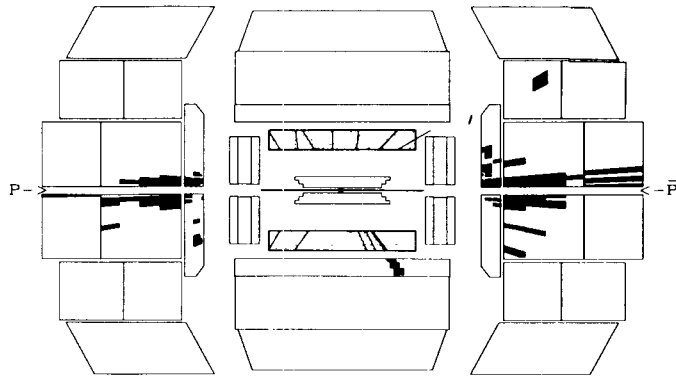
Even before the official start of its first run of data-taking at the end of July, the D0 (D-zero) detector — one of two major experiments in the Tevatron collider at Fermi National Accelerator Laboratory — has begun to accumulate evidence of W particles.

The primary evidence for the W candidates was collected in D0's calorimeters and analyzed by D0's computer software — both of which were developed with major contributions from a BNL team.

D0 spotted the first possible Ws in preliminary data taken on May 31 and June 1, during Tevatron commissioning.

On May 12 — the first day of proton-antiproton collisions within the Tevatron following a two-year run as a fixed-target accelerator — D0 recorded its first events, showers of particles called jets.

"We saw two-jet events right away, and they were so characteristic of the high-energy proton-antiproton collisions that they were unmistakable," explained BNL Physicist Serban Protopopescu, the member of the Omega Group in the Physics Department who leads the effort in devel-

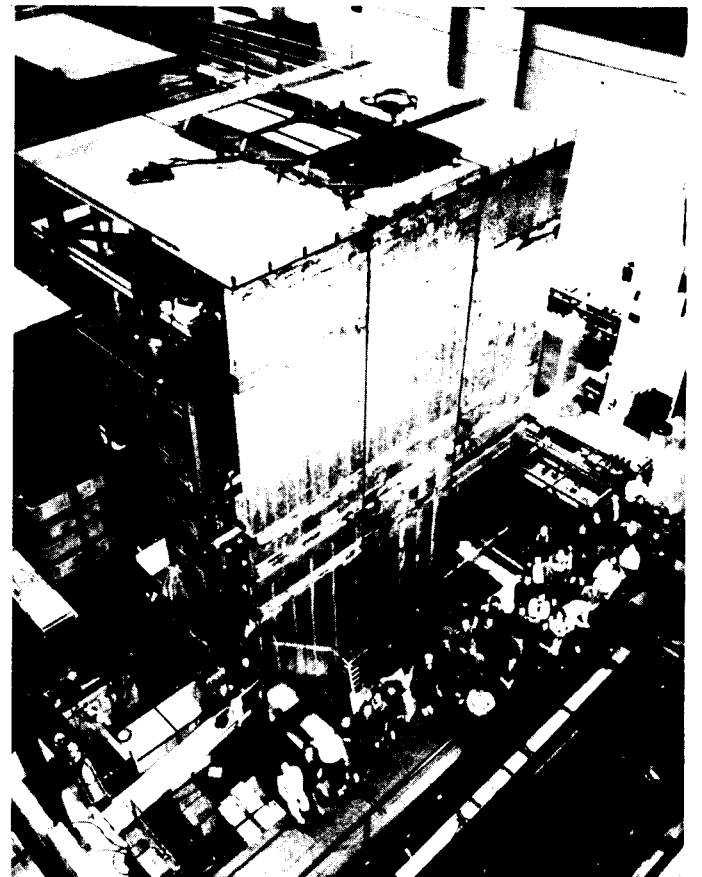


A computer schematic of the central tracking system, and the central and end calorimeters of the D0 detector, showing the signature of the first W-particle candidates seen by the D0 detector at Fermilab's Tevatron. Note the high-angle electron registered in the central calorimeter (center, lower right); the "missing energy," that is the lack of any particle found in the central calorimeter opposite the electron (center, upper left); and the low-angle jets in the end calorimeters (sides), resulting from the fragmentation of quarks produced by the proton (p) - antiproton ( $\bar{p}$ ) collisions in the center.

oping off-line software that analyzes all D0 data. "Since then, we have seen many Ws that we believe in and some others that are not so clear."

Including BNL, the D0 collaboration involves 323 researchers from 34 institutions, and it is headed by BNL Guest Physicist Paul Grannis, a

professor of physics at the State University of New York at Stony Brook. In addition to Protopopescu, (continued on page 2)



The completed D0 detector, pictured before it was moved into the Tevatron beam line at Fermi National Accelerator Laboratory.

## BNL Signs New CRADA With Second Long Island Firm

Under an agreement signed last month, BNL will be working with Plasma Physics Corporation, a small Long Island firm in Locust Valley, to improve the electronic properties and microstructure of a novel silicon material for use in high-speed computers.

This work will be done under Brookhaven's second Cooperative Research and Development Agreement (CRADA). Instituted by the U.S. Department of Energy, CRADAs seek to transfer the scientific expertise and technology of national labs to industry, with the aim of improving American competitiveness and creating more jobs.

According to Margaret Bogosian, Deputy Manager of the Office of Technology Transfer, both parties in a CRADA — the federal laboratory and the non-federal party — provide personnel, services, facilities and/or equipment toward the specified research or development goals.

The Lab's first CRADA was signed in February with Basic Aircraft Research Corrosion Facility, another small Long Island firm. In both the first and the new CRADA, the principal BNL researcher is Keith Jones, Department of Applied Science.

Under the new CRADA, Jones and other BNL staffers will be working with John Coleman, President of Plasma Physics, as well as other scientists from the company, to understand the detailed microstructures

of a unique material known as silicon on defect layer (SODL). Their goal is to develop improved semiconductor materials.

"This joint enterprise will benefit both parties," Jones said. "BNL will gain understanding of problems in integrated-circuit fabrication that require further basic research, and Plasma Physics will be able to develop the technology for production of the material on a commercial scale — and perhaps make many megabucks on all the megabits."

According to Jones, SODL is formed by implanting low-energy protons in silicon so that they form a layer close to the surface of the silicon wafer. After annealing, hydrogen bubbles are formed in the layer. They scavenge impurities and isolate the integrated circuit region from the bulk material.

The work under the CRADA will be aimed at understanding the process so that SODL can be used in the commercial production of integrated circuits.

If this collaboration shows that SODL is easier and cheaper to fabricate than other materials, this should offer significant commercial opportunities in the multibillion dollar semiconductor device market. For example, SODL may vastly increase the storage capacity of computers by making possible the development of 256-megabit and one-gigabit dynamic random-access memory devices.

— Diane Greenberg

## New Lecture Series Honors Memory of Young Physicist

Following the untimely death of BNL Assistant Physicist Aditya Sambamurti last March, his family,



John Haggerty holds the smart controller for E787.

colleagues and friends established a lecture fund in his name at Brookhaven. Under this new lectureship, each year an outstanding young researcher in one of the areas of Sambamurti's professional interest will be chosen by a committee composed of members of BNL's Physics Department to give a lecture to students working at the Laboratory.

To deliver the first Aditya Sambamurti Memorial Lecture, the committee has selected BNL Physicist John Haggerty. Open to both students and staff, his talk on "Rare Kaon Decays at the AGS" will be delivered on Thursday, July 30, at 11 a.m., in the Physics Seminar Room, Bldg. 510.

Haggerty has been associated with Physics' Electronic Detector Group and its rare kaon decay Experiment 787 at the Alternating Gradient Synchrotron (AGS) since 1986, when he came to the Lab as an assistant physicist. He met Sambamurti two years later, when the young postdoc from Indiana University came to

BNL as a research associate with E787.

In his lecture, Haggerty will talk about Sambamurti's contribution to the development of the so-called smart controller, a single-board computer that the two young physicists developed for use in E787, along with engineer Chu Ng and computer analyst Bob Strzelinski.

It is common for subatomic particles known as kaons to decay into other charged particles. But, as Haggerty will explain, the standard model of weak and electromagnetic interactions predicts that perhaps once in every ten billion decays the transition will be very uncommon —  $K^+ \rightarrow \pi^+ \nu \bar{\nu}$  — a rare kaon decay in which the kaon yields three particles:



Aditya Sambamurti

a positive pion, a neutrino and an antineutrino.

To run the smart controller now used in E787's search for this decay, Haggerty and Sambamurti developed a trigger algorithm that allows the device to reject the common events and select the rarer ones that are of interest to the researchers.

As Haggerty will relate, the smart controller was tested successfully during the 1990 AGS run, after which it brought E787 smoothly through its next run in 1991. It was shortly after that run ended that Sambamurti was diagnosed with the non-Hodgkins lymphoma to which he succumbed at the age of 31.

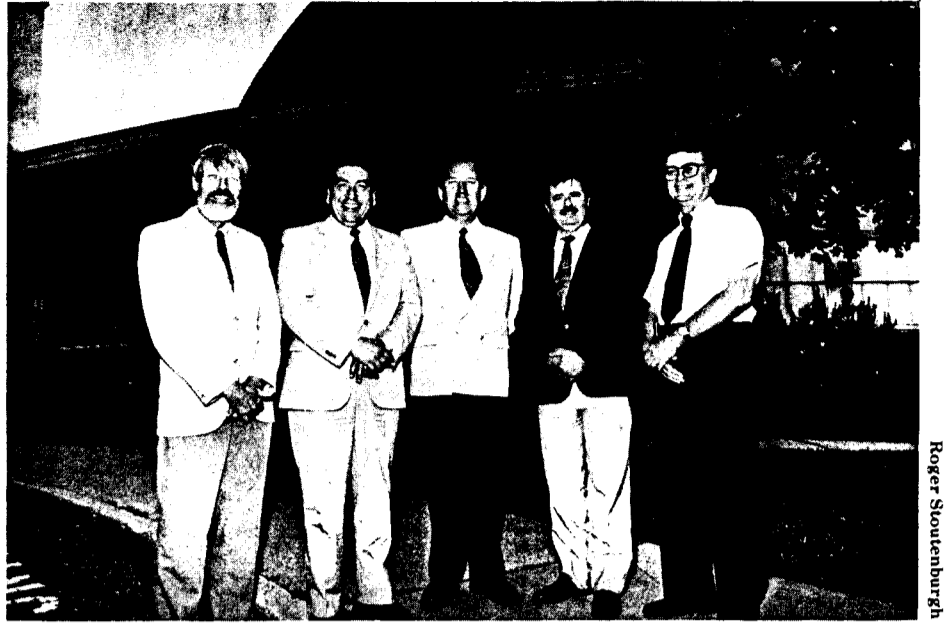
After obtaining his Ph.D. degree at Harvard University in 1981, John Haggerty became a research associate, first at Fermi National Accelerator Laboratory, then at Lawrence Berkeley Laboratory in 1983. Since coming to BNL in 1986, he has been promoted twice: to associate physicist in 1988 and physicist in 1990.

## Chileans Tour Research Reactors

The President of the Chilean Nuclear Energy Commission (CNEC), Eduardo Bobadilla (second from left), and German Piderit (center), CNEC Executive Director, recently toured BNL's two research reactors to review their scientific programs. Their goal is to import to Chile ideas from Brookhaven for further developing the research program at Chile's own small research reactor outside of Santiago.

The CNEC officials' first stop was BNL's High Flux Beam Reactor (HFBR), where they are pictured with fellow Chilean Eduardo Saravia (second from right), a senior scientist at Interscience, Inc., of Troy, New York, and their BNL hosts: John Axe (left), Associate Director for Basic Energy Science, and David Rorer (right), Deputy Head of the Reactor Division. At the HFBR, they discussed neutron powder diffraction techniques, which could be used in Chile to characterize novel ceramic coating materials being developed there.

The Chileans then went on to the Brookhaven Medical Research Reactor, where Medical Department Scientist Jeffrey Coderre updated them on the use of an epithermal neutron beam for boron neutron-capture therapy, an experimental treatment being developed for cancer.



Roger Stoutenburgh

## Winners' Circle

Employees with ideas for enhancing Lab safety or saving BNL money in areas outside their own job responsibilities should consider submitting their suggestions to the Employee Suggestion Program (ESP). ESP forms are available in department and division offices and through Personnel, Bldg. 185. An original idea could win 10 percent of the estimated savings, up to a maximum of \$10,000.

Congratulations to the following BNLers who have entered the ESP winners' circle:

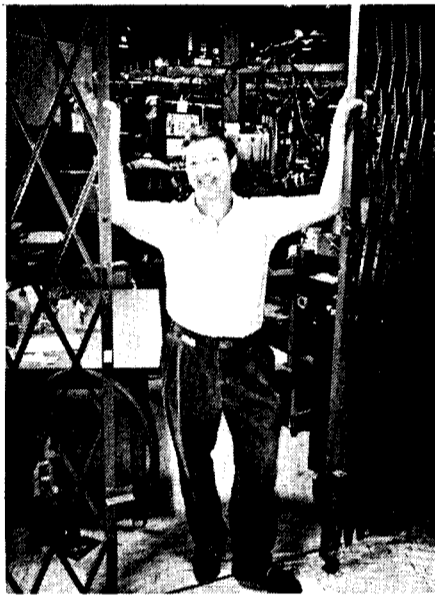


• **Judith Williams** (above), a technical secretary in the Department of Applied Science, won \$40 for designing a way to cover address labels on outdated medical claim envelopes so that they did not go to waste.

• **Carmen Benkovitz** (right), a senior environmental science associate in the Department of Applied Science, was awarded \$161 for her idea of creating a BNL Traveler Data Bank containing information on the Lab's 300 most frequent travelers and accessible by life number.

— Photos by Roger Stoutenburgh

• **William Cahill** (below), a senior technical specialist with the National Synchrotron Light Source (NSLS) Department, suggested the installation of permanent folding security fences, to isolate the NSLS' vacuum ultraviolet ring during testing shut-downs. He was awarded \$145.



## In Memoriam

**Jane Seybolt**, a senior office services assistant in the Safety & Environmental Protection Division, (SEP) died on June 5 of cardiac complications following an earlier stroke. She was 49.



Seybolt began her nine-year association with BNL on December 13, 1983, as a clerical assistant in the Personnel Division. She transferred to the Alternating Gradient Synchrotron Department in December 1984, as an office services assistant. After moving to the Safeguards & Security Division in April 1985, she was promoted to her final title in September 1987.

In December 1987, Seybolt joined SEP's Hazardous Waste Management Section, which stationed her in Bldg. 445, the Hazardous Waste Management Facility. There, according to her supervisor, Len Emma, she started and maintained the database that tracks BNL's handling of its hazardous waste, from pick up to disposal. Seybolt took a leave of absence from her job for her long-term disability on April 8.

Having resided in Ridge, Jane Seybolt is survived by her son Richard Seybolt, her brother Dennis McGovern, and her niece Deanna McGovern.

Retiree **James Keegan**, who ended his 20-year Lab career as a technician IV in the Alternating Gradient Synchrotron Department in September 1972, died following a long battle with cancer on May 20, three days before his 78th birthday. Keegan started work at BNL on May 5, 1952, as a pile operator for the Brookhaven Graphite Research Reactor. He retired on September 8, 1972, to Ormond Beach, Florida.

Keegan is survived by his daughters, Kathleen Hopper of Center Moriches and Virginia Gavin of Ormond Beach, and their children, Jeffrey Hopper, Rebecca Hopper, Kelly Gavin and Kaitlin Gavin.

• **Robert C. Brown**, who retired from the Lab in April 1970 after eight years as a janitor in the Plant Engineering Division, died on June 15. He was 85 years old. Brown started at the Lab on February 12, 1962. A Riverhead resident, he is survived by two sons, Ollie Brown and Robert Treadway; four grandchildren; and two great-grandchildren.

• Retired Technical Specialist **John M. Roecklein**, who had left the Physics Department on June 30, 1967, died on May 23. He was 90 years old. He began his 15-year association with the Lab on February 11, 1952, as a Physics technician A. He resided in Blue Point and is survived by seven children, including Joseph Roecklein, Alternating Gradient Synchrotron Department, and Grace Volkman, a Personnel Division consultant; 24 grandchildren, who include Dawn Mosoff, Office of Educational Programs, and Beth Schwarner, Director's Office; 28 great-grandchildren; and two great-great grandchildren.

• Retired Storeskeeper **Florian Swan**, who worked in the Supply & Materiel Division for 24 years before retiring in April 1985, died unexpectedly on July 9, at the age of 70. Swan started at the Lab on February 13, 1961, as a warehouseman. Having retired to Holmes Beach, Florida, Florian Swan is survived by his wife, Sarah Swan, and their daughters, Karen Clerkin of Florida and Patricia Neumann of California.

• **Correction:** Retiree **Irene G. Steele**, who died on May 13, spent her entire 36-year Lab career in the Biology Department.

## D-Zero Detector (cont'd)

those working on D0 from Brookhaven are: Samuel Aronson, Mirek Fatyga, John Featherly, Bruce Gibbard, Howard Gordon, Jan Guida, Wlodek Guryn, Stephen Kahn and Peter Yamin.

### Top Quark Search

Along with the  $Z^0$  particle, the  $W$  particle with either a plus or minus charge mediates the weak interaction, the force that is responsible for the radioactive decay of atomic nuclei. Since the 1983 discovery of the  $W^+$ ,  $W^-$  and  $Z^0$ , high energy physics has turned its search to looking for the sixth and seemingly last quark — the top quark.

"You have to be able to find the  $W$  before you can find the top quark because the  $W$  is one signature of the top," says Protopopescu.

Quarks are thought to be truly elementary particles that, in triplets

or pairs, make up the likes of the proton and neutron or the pion and kaon, respectively. Since it is thought that an infinite amount of energy would be needed to separate quarks, no isolated quark has been or is expected to be seen.

When the top quark reveals itself to physicists, they don't expect to see only one: When the top quark is produced in high-energy proton-antiproton collisions, it is expected to occur with its antiparticle, the anti-top quark.

Each of these top quarks may then decay into a  $W$  particle plus a bottom quark jet. These  $W$ s may then each decay into an electron or a muon, which will be detected as the cleanest signatures of the top quark. However, the  $W$ s may also decay into jets, "which make the signature more complicated," says Protopopescu.

### D0 vs. CDF

Weighing in at 5,500 tons, the D0

detector was proposed to complement the CDF experiment, the first major Tevatron detector, which was installed in 1985. As a result of advances in detector technology since then, D0's design has certain advantages over that of its rival. These include its calorimeter, the central part of which was built at Brookhaven.

The job of the liquid-argon calorimeter is to measure the energy and direction of particles emerging at large angles from the quarks and gluons produced by the collision of protons and antiprotons within the Tevatron. In addition to the calorimeter, D0 consists of two other major components: a central tracking system surrounding the Tevatron beam line and a muon detection system surrounding the rest of the detector.

### End-of-July Official Start

Fully assembled in January 1991, the central calorimeter was then

tested for six months using cosmic rays. The central calorimeter and the other components were assembled into the detector this January, and the completed detector was moved on February 14 into the beam line in the D0 hall for which it was named.

When the Tevatron officially comes on line at the end of July for an initial five-month run, D0 will formally begin taking data and competing with the rival CDF experiment to find the top quark — or whatever else may be found within the collisions.

"Ten percent of the data with the most likely candidates will be analyzed immediately after it is taken, but we will look at all the data eventually," concludes Protopopescu. "While the computer can do most of the work, we'll select any events that interest us and zoom in on them on the computer screen to look at them in detail — and to convince ourselves that the computer didn't miss anything important." — Marsha Belford


## Inside Info

Suresh Srivastava, Head of the Radionuclide & Radiopharmaceutical Research Division in the Medical Department, was elected President of the Radiopharmaceutical Science Council of the Society of Nuclear Medicine, at the society's 39th annual meeting, held in Los Angeles in mid-June. After serving as president-elect for one year, Srivastava will begin a one-year term as President of the Council next June.

The Radiopharmaceutical Science Council is a 700-member body that assists with policy decisions regarding the preparation and use of radionuclides and radiopharmaceuticals. The council also advises the Society of Nuclear Medicine, organizes teaching and educational programs, and represents the radiopharmaceutical community in various activities. Srivastava previously served on the council's Board of Directors, 1985-87.

## You're invited! Annual Picnic

**Afro-American Culture Club  
Refreshments! Fun!  
Games! Music by E.T.!**

Saturday, August 15  \$5 adults; \$3 children 12 & under  
By the Gazebo Noon to 6 p.m.; food served to 2 p.m.  
Tickets: Bob Brown, Ext. 3569; April Donegain, Ext. 2459; Bruce Penn, Ext. 7213; Barbara Simpson, Ext. 3888.

## Equipment Demo

LeCroy Corporation and National Instruments will show their products in Berkner Hall from 8 a.m. to 3 p.m., on Tuesday, July 28. This demonstration will be accompanied by free doughnuts while they last.

LeCroy will display its new model 9310, 9314, 9450A, and 7200A digital oscilloscopes, 9210 pulse generators, 9100 arbitrary signal sources, ADCs, TDCs and high voltage supplies.

National Instruments will present its instrument-control and data-analysis software: LabWindows for the PC and LabView for the Macintosh. The software includes over 300 instrument drivers for LeCroy and other vendors' GPIB, CAMAC and VXI instruments.

## Softball Standings

League 1 (7/10)		League 2 (7/10)	
Blue Jays	7-2	Titans	8-1
Cool'n Gang	5-4	Dirty Sox	5-4
Phoubars	5-4	Cocoon	5-3
Ravens	5-4	Scram	5-3
Up & Atom	5-4	Phase Out	4-4
Magnuts	4-5	Lights Out	3-5
Revised Edition	3-6	Antiques	2-6
Six Pax	2-7	Lunatechs	1-7
League 3 (7/17)			
Big Sticks	6-0	<i>*Dangerous Curves, the first all-women team competing in the Employees League, had its first victory this week, beating the Bombers, 10-7.</i>	
Surefire	5-2		
Bombers	5-2		
Quantum	4-3		
DocNuts	2-5		
Medical	2-6		
Dangerous Curves	1-7*		

## Close-Up on BERA: White Water Rafting Club



Still shots of some members of the White Water Rafting Club, prepared by BNL Video from a tape



of last year's trip down the Gauley River in Virginia.

Do you look for experiences that are fun, exciting and adventurous? Well, now's your chance! Join BNL's White Water Rafting Club (WWRC) and challenge nature down some of the best rivers on the East Coast.

According to Walter Hughes, president of the WWRC, Lab employees have been organizing white water rafting trips for several years. The WWRC, however, was only made an official BERA club last year.

"I became interested in white water rafting when I went on a trip down the Lehigh River in Pennsylvania. There's nothing like the feeling of approaching a rapid, hearing the sound of the rushing water and knowing that you cannot turn back," says Hughes. "I started planning white water rafting trips at the Lab in 1985, with eight people joining me. Each year, the club has built up more."

Hughes adds, "Basically, people join the club for excitement. Novice or expert — after someone goes once,

they always come back."

The success of the WWRC can be attributed to careful planning. "The club sends out small groups of people to test various rivers on the East Coast," says Hughes. "If a group approves a river, then we'll use it on a future rafting expedition. No one has ever been disappointed with one of our trips."

The WWRC's current goal is to have at least two rafting trips a year. Each weekend trip includes hotels, rafting and meals. Buses leave early Friday and arrive back late Sunday, and the rafting expedition takes place on Saturday.

Generally, members spend five hours on the river — breaking for lunch halfway through their trip down the rapids. Each raft includes nine people plus an instructor. "No one goes down alone, and everyone is properly instructed," says Hughes.

Some of the rivers the WWRC has challenged are the Hudson and the

Moose Rivers upstate, and the Cheat River in West Virginia. This year, the club will be taking 70 employees, along with their families and friends, down the Gauley River in Virginia on September 12.

"The Gauley is one of the best rafting rivers in the world. In fact, it is rated number seven in the world. The river is always a good ride," says Hughes.

Unfortunately, this year's trip to the Gauley is already filled, but the club promises another trip soon. Anyone interested is invited to come to the WWRC's next monthly meeting today, July 24, at 5 p.m. in the Brookhaven Center; or call Doris Johnston, Ext. 4669, for more information.

In addition to Hughes, WWRC officers are: Sue Norton, vice president; Madeline Windsor, secretary; Ken Sutter, treasurer; and Tom O'Neil, information gatherer.

— Lorraine Madigan

## Train to Search Inspec Database

Free training classes will be given to those interested in learning how searches are conducted on Inspec, the electronic database that contains the information printed in *Physics Abstracts*, *Electrical and Electronics Abstracts*, and *Computer and Control Abstracts*. Containing over 4 million records, from 1969 to the present, this database abstracts and indexes more than 4,000 journals and conference proceedings.

Offered by the Technical Information Division, an advanced class for experienced searchers and those familiar with either Inspec or its

corresponding print publications will be held on Thursday, July 30, from 9:30 a.m. to 4 p.m. The introductory class will be held on Friday, July 31, from 9:30 a.m. to 4 p.m. Both classes will be held in the PC Training Room in Bldg. 475.

For more information or to register, call Louise Heusinkveld, Ext. 3648.

### Note to Employees:

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

## Amateur Radio Club

The Amateur Radio Club will meet in Room D, Berkner Hall, on Thursday, July 30, at noon. There will be a discussion of Field Day activity results, as well as the status of the FM voice-repeater system, the digital packet switch and the radio station in the Recreation Building.

All employees, guests and licensed amateur radio operators are invited to attend. For more information, call John McNeil, Ext. 4572, or Gary Utz, Ext. 5903.

## Cafeteria Menu

**Monday, July 27**  
Soup: Turkey noodle .80/1.00  
Entree: Baked fish 3.45  
Entree: Chef's choice 3.20  
Fitness: Stir-fried beef & broccoli 3.35  
Carvery: Hot pastrami sandwich 2.95  
Grill: Cheese quartet 2.95  
Special: Hot dogs by the ounce

**Tuesday, July 28**  
Soup: Cream of broccoli .80/1.10  
Entree: Chicken Kiev 3.45  
Entree: Salisbury steak 3.35  
Fitness: Chef's choice 3.35  
Carvery: Hot roast beef sandwich 2.95  
Grill: 1/4-lb. burger w/ mushrooms 2.95  
Special: Fruit by the ounce

**Wednesday, July 29**  
Soup: Minestrone .80/1.10  
Entree: Spaghetti w/meatballs 3.20  
Entree: Beef fajitas 3.25  
Fitness: Chef's choice 3.20  
Carvery: Hot baked ham sandwich 2.95  
Grill: Hot ham & cheddar on a bun 2.95  
Special: Pasta bar (plate) 3.00

**Thursday, July 30**  
Soup: Cream of cauliflower .80/1.10  
Entree: Boneless breast of chicken Dijon 3.45  
Entree: Spinach fettucini Alfredo 3.20  
Fitness: Chef's choice 3.20  
Carvery: Corned beef sandwich 2.95  
Grill: French dip 2.95  
Special: Nachos by the ounce

**Friday, July 31**  
Soup: Manhattan clam chowder .80/1.10  
Entree: Baked fish 3.45  
Entree: Chef's choice 3.20  
Fitness: Pork Creole 3.35  
Carvery: Turkey sandwich 2.95  
Grill: Boneless breast of chicken on roll 2.95  
Special: Hot dogs by the ounce

## It's Blatantly Unofficial!

These Blatantly Unofficial BNL Records were set since our last report:  
**Most Kens in one department with consecutive middle initials, ABC.**  
*Ken A. Sexton, Ken B. Jones and Ken C. Vogel.*

— *The Three Kens, Accelerator Development Department*  
**Most full-time staff members called for jury duty and serving on juries in one month.** *For the monthly time period ending October 31, 1991, five members of the total full-time staff of forty in the Engineering Technology Division of the Department of Nuclear Energy served on juries.*

— *Sue Monteleone, Department of Nuclear Energy*

If you think you can top one of these records, or if you have another record to report, submit your entry to the Brookhaven Bulletin, Bldg. 134. While all entries must have some relation to the Lab, the categories and superlatives are limited only by your imagination and experience — and whether the claim can be corroborated by someone else. A copy of the Blatantly Unofficial Record Book is available for inspection in the Public Affairs Office, Bldg. 134.

### Entry for "Blatantly Unofficial BNL Records"

(Please print) Name .....

Department ..... Ext. ....

Corroborator's name .....

Department ..... Ext. ....

Proposed record .....

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Date proposed record was set .....

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