BROOKHAVEN BULLETIN
Vol. 47 - No. 29 July 23, 1993
BROOKHAVEN NATIONAL LABORATORY

Fingerprinting Chemicals From Afar — DAT Researchers Develop Remote Sensor Technique

Identifying chemicals in the laboratory presents few problems to modern scientists. But how about chemicals outside?

In a project that combines the latest laser and detector technology with a known phenomenon — Raman scattering — researchers in BNL's Department of Advanced Technology (DAT) are examining a method of detecting and identifying chemical effluents at a distance.

This remote sensor technique has broad applications that range from detecting the production of chemical weapons or illegal narcotics to verifying environmental cleanup.

The Raman Effect

When a molecule is irradiated with light, it can scatter some of that light inelastically, that is, with the incoming and outgoing radiations having a different wavelength. In Raman scattering, the wavelength of the scattered light is shifted by amounts related to the vibrational structure of the molecule.

Because each chemical has its own vibrational structure, the pattern of the shifted wavelengths is unique to that chemical. Therefore, when the outgoing light is recorded in a spectrometer, the pattern it forms — the Raman spectrum — gives a unique "fingerprint," characterizing that molecule.

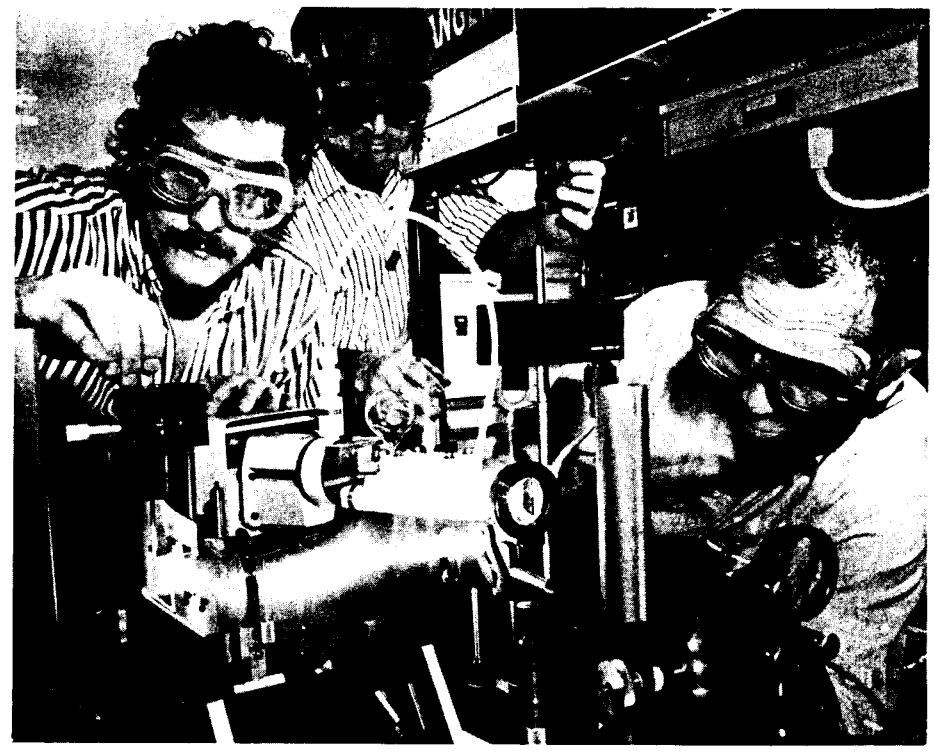
Thus, the patterns provide the data needed to detect and identify chemicals in a single measurement. The chemicals can be solids, liquids or gases, in pure form or in mixtures. Also, where several fingerprints appear at once, they can be analyzed electronically, one by one, and the chemicals identified and measured.

Usually, however, the intensity of the Raman scattered light is too low to be useful at distances of more than a few tens of meters. The technique was used with some success in the early 1970s — for example, sulfur dioxide at concentrations of 30 parts per meter was detected leaving a factory stack 200 meters away. But widespread use of the Raman effect was restricted by the limitations of technology at that time.

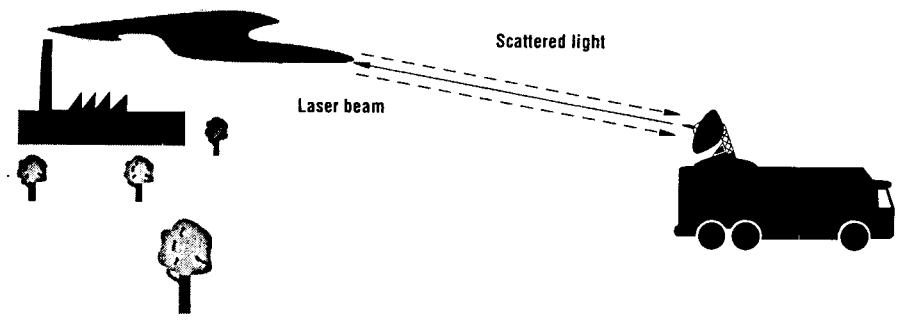
Phenomenal Changes

"Now, the situation has changed," said DNE's Cheng-lin Chen. "With a variation of the Raman method, we can remotely detect, identify and monitor trace quantities of a wide variety of chemicals." Chen and Arthur Sedlacek III, also in DAT, work on the basic research for the project.

Chen explained that, in addition to advanced spectrometers and computers, which make the signals easier to record and analyze, the key ingredients for the recent success have been more efficient detectors and more varied and powerful lasers.



In their Department of Advanced Technology laboratory, (from left) Arthur Sedlacek, David Harder and Cheng-lin Chen prepare to find the spectral fingerprints of a chemical sample using resonance-enhanced Raman spectroscopy. —Photo by Roger Stoutenburgh



In this example of detecting and identifying chemicals by remote Raman scattering, laser light (solid arrow) is directed from a mobile lab toward the area being investigated. The light hits molecules and is scattered. Part of the scattered light (dashed arrows) is analyzed by a spectrometer in the mobile lab. The resulting spectral patterns provide the unique "fingerprints" of chemicals present in that area.

Laser light has several features useful in Raman spectroscopy. It is monochromatic — of one color or wavelength — so that very small changes in energy can be detected when that wavelength is altered, as in Raman scattering. It is very intense so more light is available to be scattered. Also, current lasers are tunable, much smaller than before and can operate at ultraviolet wavelengths, allowing the use of resonance Raman scattering.

Incoming light that irradiates a molecule can cause one of the molecule's electrons to jump to a higher energy state. This is called an electronic transition, which, for many chemicals, falls among the ultraviolet wavelengths. When the energy of incoming light matches the energy of an electronic transition, the intensity of the Raman scattering can be enhanced up to a million times, and is called resonance Raman.

"It is this resonance enhancement that we are exploiting for our project," commented Sedlacek. "If the laser is tuned correctly, we can detect spectral fingerprints of chemicals in smaller quantities or at greater distances than have previously been possible."

A Raman Window

Another great natural advantage of this process is that it can be used in daylight.

Since the ozone layer in the Earth's upper atmosphere blocks all the sun's light at wavelengths below 300 nanometers (nm), scattered laser light below this level can be detected in daylight with no interference from the sun.

As Sedlacek explained, however, "At the Earth's surface, atmospheric absorption due to surface-level ozone, oxygen and nitrogen limits the use of wavelengths below about 250 nm. But this still gives us a spectral window ranging from about 300 nm to approximately 250 nm in the ultraviolet portion of the spectrum. When the molecular resonances fall within that window — which is the case of most of the chemicals we're investigating — we can get excellent results."

"Using resonance Raman scattering to detect chemical agents was suggested in a paper by Bob Barletta [of DAT]," recalled Chen. "Then Joseph Indusi, as DAT's Safeguards, Safety and Nonproliferation Division Head, asked Bob and David Dougherty [also of DAT] to write a proposal on using this technique for laboratory sample analysis and remote sensing. The U.S. Department of Energy's Office of Arms Control recognized a potential use for arms control, and, by spring 1991, the project was funded." (continued on page 3)

Sambamurti Memorial Lecture
Rare K Decays at the AGS

The Sambamurti Lecture Series was created in 1992 in memory of Aditya Sambamurti, a BNL particle physicist who, tragically, died young.

The lectureship recalls the promise of Sambamurti's youth in two ways: first, by honoring the achievements of a high energy or relativistic heavy-ion experimentalist under the age of 40, who works largely in areas of Sambamurti's interest; then, by having this speaker present a talk to BNL summer students, as well as to other interested members of the Laboratory community.

Selected to deliver the second Sambamurti Memorial Lecture is Jack Ritchie, an assistant professor in the Physics Department at the University of Texas (UT) at Austin and co-spokesman for experiment 871 at BNL's Alternating Gradient Synchrotron (AGS). His talk on "Rare Kaon Decays at the AGS," will be held on Tuesday, July 27, at 1:30 p.m., in the Large Seminar Room in the Physics Department, Bldg. 510.

In his lecture, Ritchie will describe the motivation for rare kaon decay experiments and the way they are done, with emphasis on the two he has worked on — E791 and E871.

After earning his Ph.D. in physics from the University of Rochester in 1984, Ritchie went to Stanford University as a postdoc. There, he participated in the planning and proposal of AGS E791, to search for rare decays of particles called kaons (K).

Once created in the collision of the AGS proton beam with a target, kaons are relatively short-lived, usually decaying into one of a few combinations of lighter particles. These common decay modes have been well studied experimentally.

Currently, however, there is great theoretical interest in certain of the *uncommon* decay modes that occur only once in a great while, if at all.

With its very high intensity, the AGS can provide experimenters with great numbers of kaons, increasing the chances that a rare decay can be detected.

Under a collaboration that included both Stanford and UT Austin, where Ritchie became an assistant professor in 1988, E791 was designed to look for three rare K decays: $K_L^\circ \to \mu e$, $K_L^\circ \to \mu\mu$ and $K_L^\circ \to ee$. Ultimately, the study achieved the best sensitivities for rare K decays of an experiment ever performed.

Jack Ritchie

To follow up on these results, several of the E791 collaborators decided to attempt another experiment, with the goal of about a factor of 20 improvement over E791. The resulting experiment — AGS E871— is now being installed and an engineering run will be conducted at the end of the summer.

All Fired Up About the New Fire Truck

Not only have five members of the Fire/Rescue Group been commended for developing the specifications for BNL's newest fire truck, but also, because of the truck's innovative design, the manufacturer now calls that version the BNL model and features it front and center in its sales literature.

In service since March, the new $207,000 pumper replaced a 14-year-old Ward LaFrance pumper, which had outlived the 10-year lifetime expected of this vehicle.

The new 1,500-gallon-per-minute (gpm) pumper has been so successful over its four months on the job that a second one was ordered on July 15. To be delivered within four to five months, the second new fire truck will replace another aging pumper, a 1980 American LaFrance.

Manufactured by E-One, one of four U.S. fire-truck manufacturers approved by the General Services Administration, BNL's new fire trucks are 16-ton Cyclone pumpers, each with a 6-cylinder, 350-horsepower turbo diesel engine and a four-speed transmission. Standard features of each include the rustproof all-aluminum construction of its over 32-foot-long body, and a 500-gallon water tank and a 30-gallon foam tank made of polypropylene.

The new pumpers also have such regularly available options as a cab that tilts forward to reveal the engine for easy maintenance, and a 360-degree-vista dome roof over the firefighters' compartment, which allows the area to be used as an operations center and lets the tallest Fire/Rescue Group member — 6-foot-5-inch-tall Captain Michael Carroll — stand up straight while on duty.

What makes the Lab's custom-made trucks the deluxe BNL model are the additional compartments built into the truck's body and the cabinets built into the back of the cab. These compartments allow the group to organize its equipment better, improving its on-the-scene efficiency. They also ensure the firefighters' safety while en route to a call, since less equipment is now carried in the cab and whatever is still inside the cab is secured behind doors.

Since BNL's Fire/Rescue Group usually has a crew of six to eight on duty, the Cyclone's standard 10-person cab could be modified to accommodate the cabinets. As a result, BNL's pumpers each seat a total of six: a driver and the captain on duty in the front, and four firefighters in the back of the cab.

The 1,500-gpm replacements can out-pump their 1,000-gpm predecessors by 50 percent. Instead of two, they were each specified with three preconnected hose lines — two 1¾-inch diameter and one 2½-inch diameter. So the engines can be pulled straight up to a fire scene, a five-inch suction is mounted on their front bumpers. And, what is known as a trash line, for fighting the likes of car fires, is also mounted there, while a booster line for handling small brush and grass fires is positioned on the back bumper.

Designed as Engines No. 1 and No. 2, the new pumpers complement Fire/Rescue's existing vehicles: a 1984 rescue truck, a 1988 ambulance, a 1965 brush truck, and a command and hazardous-material trailer. The Motor Pool of the Staff Services Division will perform all routine maintenance on the new fire truck, as it does on all other Fire/Rescue vehicles.

— Marsha Belford

Standing before the newest pumper and being congratulated by Fire Chief James Roesler (right front) on behalf of Safety & Environmental Protection Division Head Robert Casey, the developers of the BNL-model fire truck are: Captain Russell Dunn (left front), and (back, from left) Firefighter Kenneth Licata, Fire Protection Engineer Joseph Levesque, Firefighters Frank Palmeri and Kevin Cosgrove.

—Photos on these pages by Roger Stoutenburgh

New BNL Address: P.O. Box 5000

For almost 46 years, all BNL's mail has been coming to the U.S. Post Office at Upton, New York.

Then, in 1963, the Lab's mailing address was amended to include a Zip code — 11973.

Now, the destination of mail bound for Brookhaven is being narrowed even further — to P.O. Box 5000, Upton, NY 11973-5000.

In effect, P.O. Box 5000 is BNL's mailroom, which has always been the first recipient of all mail addressed to the Laboratory. Since this will not change, why the change in address?

The change is necessary, said Staff Services Manager Ron Manning, "to take advantage of the increased efficiency in the processing and delivery of mail offered by the U.S. Postal Service's (USPS) computerized mail-processing machines."

USPS' automated system is based on optical character readers (OCR) and barcode sorters (BCS). If the mail's address label is compatible with OCR and BCS equipment, the system can read, code and sort up to ten pieces of mail per second.

Most important is a complete mailing address in a proper format and location. For delivery to a post office without letter-carrier delivery, such as the Upton Branch, the correct mailing address is a P.O. box number.

For domestic mail, the last two lines are the key to machine readability, while the last three lines are critical for international mail. In the following example of a typical BNL address, the last line would be added only for international mail:

Mr. James Jones
Brookhaven National Laboratory
Bldg. 179B, Staff Services Division
P.O. Box 5000
Upton, NY 11973-5000
USA

Now that P.O. Box 5000 has been chosen to fulfill the address requirement, Manning says, "implementation will be gradual, to allow for an orderly transition." All groups should use up existing supplies of pre-addressed stationery, and, when new supplies are requested through the Photography & Graphic Arts Division, the address will be updated.

But don't hesitate to use the new address. Use it immediately on your outgoing correspondence, and, where practical, start using it for newsletters, subscription renewals, telephone conversations, etc.

For more information about the automation process and its criteria, consult the USPS pamphlet "Addressing for Success," which is available through department and division offices. If you have other questions, call Joan Perullo, Ext. 2549.

Note to Employees:

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

Computer Security Now a Stock Item

One of BNL's computer security guidelines states that any computer holding sensitive or missive critical information and/or one located in an unattended area must be secured in some manner to prevent its removal.

The Lab's Computer Protection Program Manager, Peter Pohlig, Safeguards & Security Division, says that a product to be demonstrated in Berkner Hall on Tuesday, July 27, from 10 a.m. to 2 p.m. — and which is now a stock item — fulfills this requirement.

Manufactured by North American Chemical Industries and called The Pad, this device (pictured) fits most computers, including all IBM, IBM clones, Macintosh, as well as all laser printers and other electronic equipment. The Pad costs $179 and its stock number is S98210.

SEP Announces New Approach: RADCON Training

Laboratory staff who work with radiation are required to demonstrate that they are qualified in the radiation protection elements that are identified in DOE's Radiation Control — or RADCON — Manual.

Until now, fulfilling this requirement has meant attending one of the training courses offered by the Safety & Environmental Protection (SEP) Division. Now, however, these employees have two choices: Take the appropriate course — or pass the challenge exam for that course.

As an alternative to formal classroom training, challenge exams are useful for individuals who have had prior radiological training, earned qualifications at another facility or completed formal education in health physics or radiological controls. Study guides for these exams will be available in August.

The challenge exams will parallel the new series of training courses that SEP is initiating as of August 1. Mandated by DOE to meet new standards, this RADCON series will replace courses currently being presented.

Intensive and Informative

According to SEP Division Head Bob Casey, the new training "is more intensive and provides more information." Over the next two years, all those requiring radiological training will have to take one of the three new RADCON courses — or pass its challenge exam: General Employee Radiological Training (GERT), Radiological Worker I (RWI) and Radiological Worker II (RWII).

About 1.25 hours long, GERT is designed for people who have minimal radiation contact — those who may require unescorted access to controlled areas or who may come in contact with radiological postings, signs or barriers.

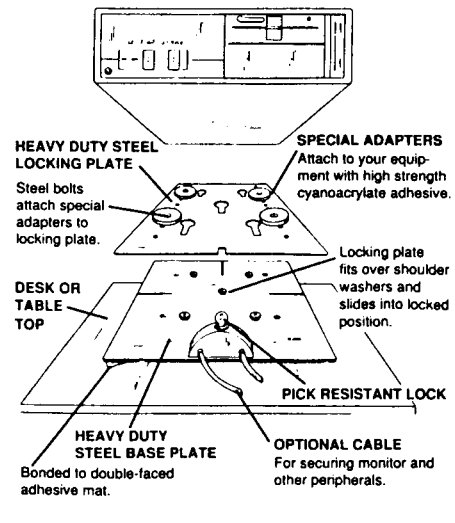
RWI and RWII are for individuals who are likely to encounter radiation areas most often. Those who require unescorted access to radiation or radiological buffer areas must take the almost 6-hour RWI course; to qualify for unescorted access to high radiation, very high radiation, contamination, high contamination or airborne-radioactivity areas a person must pass the 12 -hour RWII.

Each course concludes with an exam for which a passing grade is 80 percent.

The new training series will start out in the classroom, but, later this fall, SEP plans to offer the courses on an interactive video, which, Casey said, "will allow people to learn at their own pace."

For scheduling and other information about the courses or challenge exams, contact your department/division training coordinator, SEP representative, or Paul Bernard, SEP Training Group, Ext. 4520.

Diagram of The Pad



'A Real Honor' for Travel Office

Congratulations to the staff of BNL's Travel Office in the Staff Services Division. They have been selected to receive the 1992 SABRE Star award. SABRE is the computer-reservation system the Travel Office uses to conduct official BNL business travel with American Airlines. Here, Barbara Jo Fiorino, American Airlines SABRE Specialist, presents the award to the winners: (from left) Susan Simpson, Paula Pozzoli, Pat Johnson, Fiorino, BNL Travel Supervisor Sylvia Mouzakes, Jane O'Brien-Fox and Kelly Bornhoft. About being one of two AA SABRE accounts to be honored with this award — out of a total of 75 — Mouzakes says, "It's a real honor." — Adrienne Beasley

Chemicals (cont'd)

Dougherty, Chen and David Harder, also of DAT, immediately began designing an appropriate laboratory. Then, in January 1992, Sedlacek joined the group and started definitive experiments on measuring the resonance Raman scattering signals for the chemicals of interest.

"With this data available," said Sedlacek, "investigators will be able to identify chemicals by matching an unknown fingerprint to a library of resonance Raman spectra, using pattern-recognition software in a laptop computer."

Future Uses

When the fundamental research is complete, the researchers will concentrate on practical considerations — selecting the best lasers, computers and software for field portability.

"The equipment will have to be rugged, self-operational for fairly long periods, and fit on a small truck or airborne platform," said Chen. "All this is feasible with present advanced technology."

This mobile detective lab would be useful in checking for chemicals that indicate the production of chemical weapons. A list of such chemicals was provided by the Chemical Weapons Convention signed in Paris in January of this year.

"Other chemicals we are investigating would be of environmental interest," added Chen. "A chemical plant could install equipment to detect emissions at various points. The information could then be fed back through fiber-optic links to a central computer. This technique appears to have great potential for pollution control and environmental monitoring." — Liz Seubert

BROOKHAVEN BULLETIN

Published weekly
by the Public Affairs Office
for the employees of
BROOKHAVEN NATIONAL LABORATORY

ANITA COHEN, Editor
MARSHA BELFORD, Assistant Editor

35 Brookhaven Ave., Upton, N.Y. 11973
(516) 282-2345

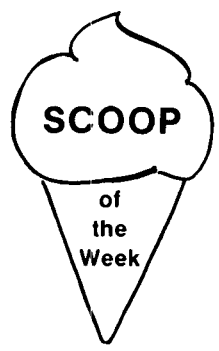
Inside Info

BNL Director **Nicholas Samios** was the recipient of the Long Island Distinguished Leadership Award for May 1993, presented by *Long Island Business News*.

Samios was featured in the publication's issue of May 24, which noted: " . . . your distinguished career has been devoted to high energy particle physics and you have made many vital contributions to that field. . . . In addition to your contributions to this country's understanding of high energy particle physics, you have served on committees with other countries, such as Japan and Russia, to advance world science."

After outlining Samios' major contributions to BNL — overseeing the expansion of the National Synchrotron Light Source, the establishment of the Center for Accelerator Physics and the construction of the Relativistic Heavy Ion Collider — as well as his many awards, membership in professional and scientific organizations, and involvement in efforts to better the Long Island community, the article concluded, "Dr. Samios, you are truly deserving of this Distinguished Leadership award."

Scoop of the Week



The third Scoop of the Week for this sixth contest season goes to Peter Wanderer, RHIC Project, for suggesting a story on Frank Cullen's latest creation.

During the summer, if you can scoop all of the Bulletin's informed sources and the Bulletin publishes a news or feature story based on your idea, then you too may win a Scoop of the Week. It will be awarded as an official certificate, suitable for framing or redeeming at the Cafeteria for a free frozen dessert of your choice, compliments of Service America Corporation.

To enter the Scoop of the Week contest, send your hot tips to the Brookhaven Bulletin, Bldg. 134, or call Ext. 5053.

IBEW Meeting

Local 2230, IBEW, will hold its regular monthly meeting on Monday, July 26, at 6 p.m., in the Knights of Columbus Hall, Railroad Avenue, Patchogue. There will also be an afternoon meeting at 2 p.m. for shift workers in the Union office at 31 Oak Street, Patchogue. On the agenda will be regular business, committee reports, the president's report and the report of the Negotiation Committee. A strike vote will be taken.

Golf Tournament

The fifth tournament of the BGA season will be held on Thursday, August 5, at the Swan Lake Golf Club in Manorville. For tee times, which begin at 11 a.m., contact Rick Jackimowicz, Ext. 3803, Bldg. 197H.

There is a $1 entry fee for BGA members and a $2 entry fee for nonmembers. Deadline for signing up is July 30. Greens fees are $27, due in advance. The tournament will be stroke play with gross and net winners by flight.

Amateur Radio Club

Results of the field day will be discussed at the next meeting of the Amateur Radio Club, on Thursday, July 29, at noon, in Berkner Hall, Room D.

All Lab employees, guests and licensed amateur radio operators are invited to attend. For more information, contact Chris Neuberger, Ext. 4160, or Nick Franco, Ext. 5467.

Splish Splash on 8/7

The BNL Swim Club still has tickets available for its group trip on Saturday, August 7, to Splish Splash, Long Island's coolest water park, located off LIE Exit 72 in Riverhead. Tickets cost $11 each, but children under two are admitted free. Parking is $3 per car, payable to the lot attendant.

Paid reservations are being taken by Marsha Belford, club president, Bldg. 134, Ext. 5053. Tickets will be distributed in the Splish Splash parking lot at 9:30 a.m. sharp on the day of the trip. The rain date is Sunday, August 8.

Softball

League I		League II	
Phoubars	9-3	Cocoon	9-0
Six Pax	6-6	Revised Edition	9-2
Up & Atom	6-6	Dirty Sox	5-3
Blue Jays	5-5	Titans	5-3
Ravens	5-7	Phase Out	3-5
Magnuts	3-7	Scram	3-6
		Big Sticks	3-6
		Older Butt Wiser	2-6
		Lights Out	2-6
		Hy Tech	1-7
	League IV		
Sting Rays	11-0	Personnelities	4-7
Snakebites	9-2	Park Avenue	3-7-1
SimplyAwesome	7-3-1	Roustabouts	3-8
Just 4 Fun	5-6	Molson Express	2-9

Leagues III & V not available.

Arrivals & Departures

Arrivals

Ivan Horvath.....Physics

Departures

This list includes all employees who have terminated from the Lab, including retirees:

Pieter Kuiper.....Physics
Lloyd A. Schairer.....Con. & Proc.
Wade Sisk.....Chemistry

Recycling Scrap to Sculpture

To someone else, a couple of steel rings, a copper ball and the bottom part of an old nitrogen dewar might have looked like scrap. After all, every item had been retrieved out of various scrap piles around Bldg. 902. But, to Frank Cullen, they seemed like the perfect pieces out of which to create a functional work of art.

Cullen, a cryogenics technician with the RHIC Project, likes to make things out of odds and ends. "It's something to do during my lunch break," he says. And Cullen is also a plant lover.

That combination led to the striking planter that now graces the lobby of Bldg. 902. A lush Boston fern is nestled in the copper dewar, now polished to a shine, and the dewar perches on a stand made of the various-sized rings. Hanging from the base of the dewar, by a length of nearly invisible fishing line, is the copper ball, adding just the right touch to the finished piece.

Charlie Vogel, a welder in the Central Shops Division assigned to the RHIC Project, welded the rings together on one of his breaks and added a Japanese character to the base. Cullen is fond of Japanese designs.

In Cullen's five-and-a-half years here at BNL, he has created several planters and a handful of miniature gardens tucked in corners around the building. "The secretaries have a regular supply of cut flowers," he says. — Mona S. Rowe

Camera Club to Hold Live Model Shoot

The Camera Club invites all photographers at BNL to attend a two-part photo session on portraiture, during which award-winning professional photographer Pat Clancy Kriss will share some techniques.

At the first meeting, Kriss will talk about lighting using her own published work and that of Ripp Bowman of BNL's Camera Club. At the second meeting, participants will photograph volunteer BNL models.

The first meeting will be in Berkner Hall, Room A, on Wednesday, July 28, at 5:30 p.m. The live shoot will be the next day, July 29, at a location to be announced at the first meeting. For more information, call Ripp Bowman, Ext. 4672.

Last Call For Disney

Openings are still available for BERA's third annual trip to Disney World in Florida, October 6-12. To sign up, bring a deposit of $100 per person to Recreation Supervisor M. Kay Dellimore, Personnel, Bldg. 185.

The seven-day, six-night trip includes round-trip airfare, six nights at Disney's Polynesian Resort and much more.

For trip costs or other information, call Dellimore, Ext. 2873, or Carolann Zebrowski, Ext. 3347.

Cafeteria Menu

Monday, July 26	
Soup: Chicken noodle	.80/1.10
Entree: Chicken fajitas	3.45
Fitness: Steamed pasta marinara	3.20
Carvery: Pastrami sandwich	2.95
Grill: Reuben platter	2.95
Fitness Salad: Pineapple boat	
Tuesday, July 27	
Soup: Cream of mushroom	.80/1.10
Entree: Spaghetti w/meatballs	3.45
Fitness: Baked fish w/lemon & tomato	3.55
Carvery: Hot roast beef sandwich au jus	2.95
Grill: Western omelette w/French fries	2.35
Fitness Salad: Chef's bowl w/seafood	
Wednesday, July 28	
Soup: Bavarian lentil	.80/1.10
Entree: Boiled knockwurst & sauerkraut	3.55
Fitness: Tomato & broccoli casserole	3.25
Carvery: Virginia ham sandwich	2.95
Grill: Italian cheesesteak w/fries	2.95
Fitness Salad: Fresh fruit entree	
Thursday, July 29	
Soup: Cream of spinach	.80/1.10
Entree: Italian steak pizziola	3.75
Fitness: Tarragon-lime chicken	3.50
Carvery: Corned beef sandwich	2.95
Grill: Ham & broccoli cheese-melt	2.75
Fitness Salad: Cantaloupe bowl	
Friday, July 30	
Soup: New England clam chowder	.80/1.10
Entree: New Orleans Cajun catfish	3.65
Fitness: Display cooking special entree	
Carvery: Turkey sandwich w/gravy	2.95
Grill: Fried shrimp boat	3.25
Fitness Salad: Chef's salad	

Burger, deli & taster's bar specials daily.

Classified Advertisements

Placement Notices

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

Each week, the Personnel Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Personnel, and, second, for general recruiting under open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people.

Except when operational needs require otherwise, positions will be open for one week after publication.

For more information, contact the Employment Manager, Ext. 2882, or call the JOBLINE, Ext. 7744 (282-7744), for a complete listing of all openings.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees.

DD 5528. SECRETARIAL/ADMINISTRATIVE POSITION - Requires an AAS or equivalent, significant administrative experience at the Laboratory, and excellent communication and organizational skills. In addition, must have knowledge of office procedures and Laboratory policies and procedures, and be familiar with WordPerfect and the IPAP travel system. Will be responsible for providing secretarial support to Division Head, staff and groups, and will supervise clerical staff, maintain personnel records and arrange travel. Computing and Communications Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

DD 5527. DATA SERVICES POSITION - Requires an AAS in data processing or equivalent, several years' experience in support of UNIX distributed systems and databases, and the ability to work independently. Knowledge of DOS, Windows and PC applications desirable. Will be responsible for providing complex computer-programming services for computer analysts and dealing with non-routine problems. Computing and Communications Division.

NS 2363. ENGINEERING POSITION - (term appointment) Requires a BSME and experience in the areas of mechanical engineering and nuclear power-plant systems design, operation, testing or maintenance. Substantial commercial nuclear-facilities experience, or equivalent required, and familiarity with ASME codes and standards are highly desirable. Requires excellent communication skills and willingness to travel to commercial and DOE nuclear facilities as needed. Department of Advanced Technology.

Motor Vehicles & Supplies

91 MERCURY TRACER LTS - 10k mi., 4-dr., a/t, ac, 1991 *Road & Track* 10 best list, excel. cond., $8,995. Eric, Ext. 5875.

90 TOYOTA COROLLA DX - 4-dr., 5-spd., white, ac, stereo, new tires, $6,850; '84 Delta 88 Olds, V-8, a/t, ac, 2-dr., more, $1,984. Tom, 744-8338.

89 BMW 325I - convertible, m/t, heated seats, 42k mi., perfect cond., dealer serviced, gar. kept, $20k. Bob Tallon, 821-5801.

89 FORD PROBE - 5-spd., fully equipped, sunroof, 74k mi., excel. cond., $5,000. 878-8865.

89 HONDA CIVIC WAGON - 4-dr., 5-spd., ac, excel., ask. $6,000. Rob, Ext. 3032 or 862-0341.

89 JEEP WRANGLER - 4-cyl., 4wd, 33k mi., soft & hard tops, great cond., must sell, $7,500 neg. Ext. 3783 or 732-2236.

86 LEBARON GTS - turbo h/b, maroon, 4-dr. sport premium, int. leather, Clarion audio sys., fully loaded, $5,800. Ann, Ext. 5740 or 744-8386.

84 OLDS CUTLASS CIERA BROUGHAM - burgundy, velvet seats, ac, a/t, am/fm, new brakes, 94k mi., runs well, ask. $2,500. Joann, 472-6742.

83 NISSAN SENTRA - sunroof, cass., runs well, asking $1,000. Yun, Ext. 4268.

82 PLYMOUTH RELIANT - 4-cyl., 4-dr., a/t, am/fm, ac, runs well, body good, tires good, needs tune-up, 77k mi., $300. 289-0687.

82 CADDY COUPE DEVILLE - body & int. good, needs eng. work, make offer. 475-8888 after 5 p.m.

82 PROWLER - $7,000; '77 Dodge Maxi van, camper equipped, $4,000; both for $10,000, extras, mint cond. John, Ext. 5813 or 667-1407 eves.

82 SUBARU WAGON - fwd, a/t, ac, am/fm radio, p/w, new tires, 91k mi., $450 or best offer. Paul, Ext. 5287.

81 CADILLAC DEVILLE - 4-dr. sedan, silver gray, new tires, $700. Doug, Ext. 7698.

81 LINCOLN TOWN CAR - 4-dr., runs well, good cond. 878-1178.

78 DODGE DIPLOMAT - 318 V-8, 4-dr., a/t, 100+k mi., reblt. trans., new rad., needs rear end work, $150. Don, Ext. 7237 or 744-2921 after 5:30 p.m.

73 MERCURY BROUGHAM - 460 c.i., 4-dr., white walls, 85k mi., $600. 286-2857.

73 HOLIDAY VACATIONER TRAVEL TRAILER - 23', sleeps 6, dual axle. Mark, Ext. 5350.

71 CHEVY NOVA - 4-dr., a/t, 6-cyl., heavy-duty battery, inspected, runs well, $600. Barbara, Ext. 3437.

YAMAHA YZ 125 - mint cond., asking $600. Mike, 878-1617 after 4 p.m.

TIRES - 2, P205/70R14, M&S, good tread left, $10 ea. Ext. 5080.

RACKS - for 8' bed truck, custom-made of heavy gauge steel by prof. welder, freshly painted, excel. cond., $400. 589-2338.

TIRES - 2, Goodyear, P225/75R14; 2 Uniroyal, P225/75R15; 1 Firestone, P215/7014, like new $25 ea. Tony, 698-9274.

Boats & Marine Supplies

RIVIERA DOWN RIGGER - 12 Vdc, depth counter, auto retrieve, 4½' boom, $100; Elec-Tra-Mate elec. fishing reel, model 600, 12 Vdc, $100. 732-9118.

Furnishings & Appliances

AIR CONDITIONERS - 2 window units, $150 & $85; GE range, w/self-cleaning oven, v.g. cond., $170. Ext. 3701 or 751-8128.

BEDROOM - 4 pieces, 6-drawer high dresser, 8-drawer low dresser, 2 side tables, walnut, $550 neg. Hurst, Ext. 3844 or 475-8252.

BEDROOM - Atlantic, Formica, teen, 3 yrs. old, orig. $4,000, sell for $1,500; 10 pieces, tan & wood grain. Sue, Ext. 3492 or 734-2593.

CABINET - Hoosier, oak, restored, good cond., 69"H x 43"W x 27"D, $475. Wink, Ext. 874-2762.

CAPTAIN'S BED - w/3 drawers, Sealy Extra Quantum twin mattress, 1 yr. old, $250. Carol, Ext. 2673 or 744-8632.

CHAIRS - 4 thatched seat, ladderback, new, $35/ea. Theresa, 289-0898.

COFFEE TABLE - pine, 47"L x 25"W x 21"H, $40; screen door, sliding, 36"W x 79"H, w/dog door, $10. Klaus, Ext. 3677 or 924-2062.

CONVECTION OVEN - Farberware, brand-new, $75. 744-0892.

DESK - metal, 7 drawers, good cond., $35; upright freezer, good cond., runs, $40. Phil, 924-6790.

DESK - student's, w/chair, $20. Alex, Ext. 3723/4407 or 341-1018.

DESK - computer, $50; infant's walker, $50; brass floor lamp, $25; 4 cane & chrome chairs, $35. Bob, Ext. 4446 or 654-3989.

DINING ROOM - This End Up table, 8 chairs, orig. $800, sell for $200; upright freezer, $100. Dennis, 929-5914.

DINETTE SET - smoked glass table, 6 cushion chairs, $100; 4 dining room chairs, $10/ea; 7' sofa w/cushions, wood trim, beige, $100. 744-5422.

DRESSERS - one 3-drawer, one 5-drawer, light oak coloring, Sears, $150/both. Henry, Ext. 5725 or 727-7227.

LOVE SEAT - early Amer., coffee table, lamp table, excel. cond., make offer. Esther, 821-2619.

LOVE SEATS - 2, dark brown; walnut coffee table, like new; walnut entertainment center, good cond., $200/all. Jeanne, 286-1290.

MOVING SALE - 2 desks, $350 & $60; 2'x9' butcher block, 3½'x3½' coffee table; antique bookcase, $250. Bob, 261-3890.

REFRIGERATOR - Kenmore, 19.1 cu. ft., almond, excel. cond., $75. 473-7667.

ROCKING CHAIR - antique, solid oak, reupholstered seat, $200. Donna, Ext. 2716.

SOFA BED - queen size, excel. cond., $250 or best offer. Penny, Ext. 2625 or 467-8297.

STOVE - Whirlpool, self-cleaning, 5 yrs. old, excel. cond., white w/black door, timer clock, window. Ron, Ext. 3713.

TABLES - 1 cocktail, 2 end tables, glass tops, $25/ea. Keith, 924-5062.

WASHER & DRYER - Sears, apt. size, 2 yrs. old, $400. Mauro, 265-6542.

WASHING MACHINE - portable, hooks up to sink, w/wheels, $70. George W., Ext. 4584.

WATER BED - Somma, regular sheets, queen, new, $400. 924-3414.

WATER BED - Somma II, queen size, mattress & boxspring 1 yr. old, $350. 821-8347.

BEDROOM SET - black lacquer w/gold trim, 9 pieces, $700; dinette set, white, table w/leaf, 6 chairs, 8 mo. old, $200. 878-5917.

FREEZER - Whirlpool, upright, white, $200 neg.; Sharp Carousel II microwave/convection, $200 neg., moving, must sell. 395-5813. Joe, 395-5813.

REFRIGERATOR - full size, no frost, works well, needs cleaning, $25. Sharon, 924-5505.

SOFA - Scandinavian, $60; 2 armchairs, $25/ea.; queen boxspring, mattress, frame, $85; more. Klaus, Ext. 3677 or 924-2062.

TRASH COMPACTOR - KitchenAid, KCS-200, white, fits under cabinet, v.g. cond., $30. Ext. 3103 or 728-0992.

WATER BED - mattress, king, semi-waveless, w/heating pad, excel. cond., $75. Phil, Ext. 5669.

Tools, House & Garden

LAWN TRACTOR - 11-h.p., 36" cut, elec. start, headlights, manual, $500. 878-1617 after 6 p.m.

MAPLE TREES - Japanese red, $10-$45+; Sears riding tractor, 12-h.p., 4' deck, snow blower, battery start, tow trailer. Mauro, 265-6542.

PATIO UMBRELLA - large, $25; wood medicine cabinet, $25; range hood, $10; Kodak carousel, $10; 36" oval metal table. Kathy, 744-2203.

PUMP - deep well, ¾-h.p., Starite, 115/230 volt, 450 gal. f/g tank, 11 mo. old, make offer. John, Ext. 4414.

SHOWER DOOR - 30" max., silver trim, never used, in box, $40. Henry, Ext. 5725 or 727-7227.

TRACTOR - Sears, 36" cut, engine, tires, excel., needs gear replacement, $250; mattress, king, almost new, $25; gas grill. Nancy, 261-2719.

WATER TANK - Sears, 82 gal., vertical, corrosion resistant, glass-lined, 62"Hx20" dia., brand-new, $100. 732-9118.

WINDOWS - 2, white, vinyl sliders, w/screen, 34"x34½", never been installed, $50/ea. Donna, Ext. 2716.

WOODWORKING LATHE - w/stand & tools, perfect cond. Nancy, Ext. 4177 or 289-0072 eves/wknds.

DEHUMIDIFIER - good cond., $30. Yan, Ext. 3069.

POOL VACUUM - auto, works well, used once, orig. $500, ask. $150. Ady, Ext. 4531 or 331-3785.

WINDOW - Andersen-type, patio door, 4'x6½', double glazed w/trim, almost new, $200 or make offer. Hughes, 286-3301.

Sports, Hobbies, & Pets

BIKE - 14", children's, good cond., asking $25. Mike, Ext. 3189 or 341-1086 after 6 p.m.

BIKE - 3-spd., $15; large crank umbrella, $25; TV/VCR table, $30; pine hutch, $30; microwave, $45. Kathy, 744-2203.

DRUM SET - Remo, 1 yr. old, 5-piece, double base pedal, 5 Zildjian, hardware, pop-off lugs, wine red, $1,150. 924-3710.

EXERCISOR - turns any 10-spd. into turbo trainer, $40. S.R. Springston, 924-5510.

EXERCISE BIKE - Sears, dual action, good cond., $50; child's bike, good cond., $20. Alex, Ext. 3723/4407 or 341-1018.

GYM MASTER - Weider E5500 Flex Stack, 1 yr. old, $190. Donna, 924-3704.

HEAVYBAG & BARBELL - w/70 lbs. of weights, good cond., also golf bag. Kathy, Ext. 2267.

HELMET - new, face mask, black, $30. Ext. 5080.

KENNELS - med., X-large; playpen; dryer; bookshelf; bikes; tables; folding chairs; Little Tykes, Fisher Price toys. Rick, Ext. 4149.

MOUNTAIN BIKE - Canondale SM500, Blackburn rack, 3 yr. old, excel., $275/firm. 744-0892.

WEIGHT MACHINE - D.P., bench, good cond., best offer. Keith, 924-5062.

BACKPACK - alum. frame, $15. Stephen, Ext. 4477.

BICYCLE - Mongoose, 20", chrome & black, new black GT rims, new Predator tires, good cond., asking $125. Joe, 399-4169.

PIANO - spinet, walnut, nice sound, good cond., $600 neg. Lori, Ext. 7036.

PIANO - Shultz and Baur, upright, great cond., needs tuning, must sell, $150 or best offer. Sue, 341-1068.

R/C CAR - Optima, belt drive, ball bearing, racing stock motor, $225; r/c Big Bear truck, 2 sets tires, $125, both w/batt. & radio. Carole, Ext. 4151.

TORTOISES - African, rare, young, spur-thied, red-footed, all access., $700. Ext. 4567.

Audio, Video & Computer

COMPUTER - 286 PC, coprocessor, extended memory, high-resolution color display, mouse, $600. Ext. 3922.

COMPUTER - IBM XT, 10 meg HD; IBM XT, 30 meg HD, monochrome monitor. Kathy, Ext. 2267.

COMPUTER - Eagle 1600, 1630 HD, 5¼ floppy, 12" monochrome monitor, Sanyo PR 5500 daisy wheel printer, best offer. 751-5712.

COMPUTER - Commodore 64, Star NX10 printer, 1541 drive, color mon., joysticks, lots of software, games, $300. Bob H., Ext. 4446 or 654-3989.

COMPUTER - Commodore 64, monitor, printer, disk drive, many role-playing games, software, will sell separately, make offer. David, 878-4880.

MINI PA SYSTEM - Holmes Fender, 12", 2 horns, 3-channel mixer, spring reverb, 100 W, rms, w/mike & stand, never used, $350. 589-2338.

VIDEO GAMES - Nintendo, 4 cartridges, 2 controllers, zapper gun, $30; SEGA Game Gear, ac adapter, $80. Lev, Ext. 2100.

RADIO/PHONOGRAPH - Magnavox am/fm, maple cabinet, needs repair. Nancy, Ext. 4177 or 289-0072 eves/wknds.

SATELLITE DISH - Uniden model UST9900P, all accessories, asking $1,500. Joe, 585-1722.

STEREO - Mitsubishi, 110 W, CD, tape, tuner, equalizer, 210 speakers, $650. 924-3414.

TV - Sharp, 19", color, $100. Dong, Ext. 3056.

TVs - Sharp, 13", cable ready, remote, 18 mo. old, $100; 13" non-cable ready, color, $35. Brian, Ext. 2369.

TV - Quasar, color, 25", contemporary console, stereo, cable ready, remote, excel. cond., $200. Mary, Ext. 399-4857.

COLOR TVS - Sharp, 13", $150; Panasonic, 19", $175; SEGA Genesis game, $80; Panasonic VCR, $150. Alex, Ext. 3723/4407 or 341-1018.

COMPUTER - IBM XT compatible, turbo, floppy drive, HD, Herc card, mono. display, must sell. Gao, Ext. 5603 or 7139.

COMPUTER - Commodore 128, color mon., floppy drive, games, $150 neg; Sanyo MDX600 music syst., port., detach. speakers. Vinny, 732-2427.

TAPE RECORDER - reel-to-reel, Sony model TC 270, w/microphone, needs repairs, $25. 744-5871.

Miscellaneous

CONCERT TICKETS - 3, Dwight Yoakam, 7/31, Hunter Mt., NY, $25/ea. Mary, 369-7938.

COPIER - uses 3M #263 paper, $5; iron, $5; electric weed wacker, $5; motorcycle helmet, XL, $10; electric BB targets, $3. Bill, Ext. 4000.

DOG COLLAR - also tote bag, gowns. Ext. 5938.

WOODEN PORCH SWING - $20; microwave, $50; microwave cart, $30; room-size rug, $20; 3-spd. bike, $15. Kathy, 744-2203.

ALARM - home & car. Ken, 289-5821.

LETTERING SETS - K&E pen & ink, full sets, Greek & English, extras, $100/set. Sue, Ext. 3492.

T-SHIRTS - scientists' names, 45 names in montage, white or black, one of ea. M, L, XL, unique, $10. Ralph, Ext. 2180.

Free

AIREDALE - male, 5 yrs. old, great companion for loving family w/no small children, altered, all shots current. Marvin, Ext. 7155 or 791-4342.

BUNNY - dwarf, gray and white, needs love, comes w/cage, food, litter and bunny toy. Sue or Todd, 341-1068 eves.

PUPPIES - Doberman-Shepherd mix, 6 weeks old. 924-3528.

SHOP BENCH - heavy duty, 3'x7'x44" high; 16-drawer unit, 5'x2', 40" high. Bob, 261-3890.

Yard & Garage Sales

MIDDLE ISLAND - 7/24-25, furn., clothing, toys, bikes, etc., 16 Woodville Rd., off Middle Country. Mary, 924-6235.

Lost & Found

LOST - eyeglasses w/brown rims, at softball fields. Sharon or Phil, Ext. 5919 or 722-3010.

Car Pools

BOHEMIA-E. ISLIP-OAKDALE-SAYVILLE - need 1 more driver. Frank, Ext. 2314.

BALDWIN-WANTAGH - traveling on Southern State Parkway w/stops at Exit 20 and 28, space avail. Ken, Ext. 5296.

Wanted

AQUARIUM - 30 gal. or larger, preferably wide, need not be watertight, cracks ok. Kim, Ext. 3504.

BLUE JEANS - blue denim scraps, from ready-for-garbage to cut-off legs. Doreen, Ext. 2470.

BED - or mattress and boxspring, old table, chairs, desk, no matter how old, will re-do or paint. Sue, Ext. 1068.

HOUSE - 4 bdrm. w/storage, within 15 min. of Lab. Mark, Ext. 3880.

MARINE FISH - looking for healthy, inexpensive, tropical, saltwater fish. Jim, Ext. 4617.

NORDICTRAK - any model, good cond. John, Ext. 5181.

PEOPLE TO JOIN - nondenominational Christian fellowship group, every Thurs. at noon in the Rec. Bldg. (apt. area). Pete, Ext. 3297.

PNEUMATIC TOOLS - nailers, compressor, etc. Adele, Ext. 2437 or 667-8337.

TIRES - excellent to good, P205/75R14. Susan, Ext. 7647.

WAVE RUNNER - or wet bike, used, any cond., reasonable. George, 878-1178.

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