

# FERMILAB NEWS

 Fermi National Accelerator Laboratory

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## KEEPING A CLOSE COUNT ON FERMILAB

Ever wonder how they count the number of protons in a beam? Or for that matter, did you know that it's relatively easy to take a photograph of the beam?

Those are routine responsibilities of the Safety Section, but it requires sophisticated equipment and up-to-the-minute knowhow. It's all done at 14 Shabbona in the Village. That's where the nuclear counting laboratory is located and that's also where Sam Baker, the physicist in charge of the Laboratory's Environmental Protection Group, can frequently be found.

Yet, there is another and much broader aspect to the counting laboratory and the work that goes on there. Samples of soil, water, vegetation, silt and other materials are constantly being monitored. Baker explained that this procedure helps the Safety Section keep an eye on the environment throughout the site. Bob Allen administers the sampling program and John Phillips collects most of the samples.

But back to counting protons. A three-by-three-inch square of copper foil is inserted into the path of the beam at the location scientists wish to determine the count. The beam is turned on and interacts with the foil. The foil is then taken to the counting laboratory where the activity in the foil is determined and this in turn translated into the number of protons that struck it in a given period of time.

To get a picture of the beam's cross section, the foil is taped to a sheet of Polaroid film for a predetermined time. After the foil is removed, the film is developed, and what emerges is a clear view of the beam, head on. Anyone who ever doubted that the beam is usually circular in cross section and pencil-thin in diameter needs only to look at these films to be convinced. (Readers with a sense of history will recall the world-famous work of the Curies began with film being exposed in an analogous manner.)

Baker pointed out that the foils can



*Jay Baldwin places a sample in the automatic sample changer. The germanium gamma ray detector and associated controls are in the unit in front of Baldwin.*

count the number of protons in slow and fast spill beams. The foils serve the valuable purpose of helping to calibrate secondary emission monitors and ion chambers, instruments that remain in beam lines and report the number of protons in slow spill beams. (When it comes to fast spills, see the companion story on page 2 for a dramatic use of the foils.)

The heart of Fermilab's modern counting laboratory would have to be its germanium gamma ray detectors and the man who runs them (as well as other equipment in the building), Jay Baldwin. The detector was recently updated by installing an automatic sample changer that makes sample processing more convenient and frees the operator--in this case, Baldwin--to do other things while the samples are being run. The other major component of the detection system is a multichannel analyzer.

The three units work together. The sample changer automatically inserts a sample into the detector, which analyzes the sample for its gamma ray activity. The  
(Continued on Page 2)

## FOILS WITH AN INTERNATIONAL MISSION

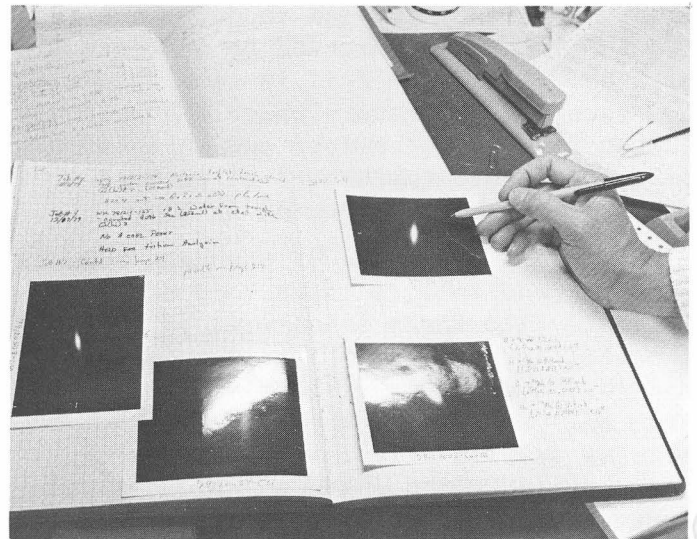
Thin sheets of copper foil, three-by-three-inch squares, are being counted on to have an important mission in the international collaboration of Experiment 631 scheduled to begin running soon at Fermilab.

Scientists from Fermilab, Brookhaven National Laboratory (BNL) and CERN are involved in the collaboration, and these humble foils will help them calibrate their equipment and agree on a calibration standard. (Foil is used to count protons in slow and fast spill beams: see companion story on page 1.)

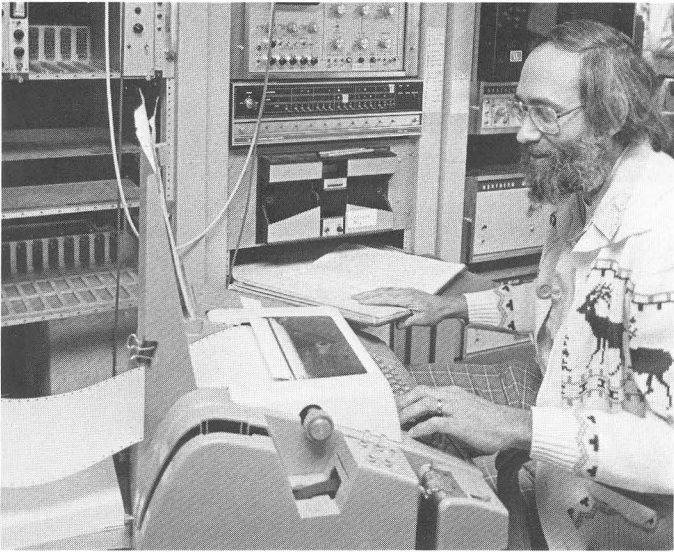
These particular foils will be calibrated against toroids, which are current transformers that themselves can be calibrated by running a measured amount of current through them. The toroids can only operate in fast spill beams. Cordon Kerns of the Physics Section has developed new toroids for this experiment. The calibrated foils will be sent to the various experimenters who will use them to calibrate their own equipment and reach consensus on a calibration standard. Jay Baldwin and John Smalley of the Safety Section will aid the calibration at Fermilab.

Sam Baker, spokesman for E-631, said, "When ISABELLE becomes operational at BNL, experiments at the three highest energy proton accelerators in the world would then report results based on the same calibration for the number of protons, a highly desirable result."

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*Polaroid prints of cross-sections of beams. They are pasted in the Counting Laboratory's log books. The top two prints show elliptical cross sections.*



*Sam Baker works with an analyzer connected to another germanium gamma ray detector in the Counting Laboratory. This system he described as the laboratory's "work horse."*

raw data is then fed into the analyzer. At the push of a few buttons, the analyzer prints out the concentration and type of activity.

To make sure the analyses are accurate, the Laboratory periodically receives calibration sources from the National Bureau of Standards. Furthermore, the Environmental Measurements Laboratory in New York, NY, a unit of the Department of Energy, sends test samples to Baker. These samples are analyzed on the equipment in the Fermilab counting laboratory and the results are returned to New York for evaluation.

The modern equipment is a considerable step forward in making Baldwin's work and the operation of the laboratory more efficient, said Baker. In the no-so-recent past, much of this work was laboriously done by hand, even to the extent of looking up the final results in thick volumes on radio-nuclides. Now this data is stored in the analyzer's memory for instant retrieval.

The counting laboratory also contains a variety of other equipment, much of it older, but still there to be used when needed. That equipment primarily is used to quickly screen samples that come into the laboratory to determine which ones need more sophisticated analysis, Baker explained. Overall, most of the equipment in the laboratory is quite sensitive and geared for very low levels of activity. It's compatible with the type of activity associated with accelerators.

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## SECOND COLLIDING AREA

by Leon Lederman

In 1978, Fermilab commissioned the Colliding Detector Facility (CDF) group to design a major detector for  $\bar{p}p$  collisions at 2 TeV. This collaboration, under the leadership of Alvin Tollestrup and Roy Schwitters, is close to completion of the design of a large solenoid-calorimetric detector to be installed in the B0 interaction region.

The Laboratory is now considering the second area devoted to colliding proton-antiproton beams. The area available is D0, normally assigned to extraction from the Tevatron during fixed-target running. Constraints of both time and funding place serious limitations on the size of the interaction and staging area around D0. For these and other reasons we are interested in user reactions to the following plan. The Laboratory proposes to construct a second area which will have overall dimensions of 7m x 7m centered on the Tevatron beam pipe. The dimension parallel to the pipe will be 10m long. Any detector designed for this region would have to be removed during fixed-target operation and will have the Main Ring vacuum pipe (21 in. above the Tevatron) as an additional obstruction. Removal of the detector could be by rolling sideways and then disassembly to 20-ton units for crane removal to a staging laboratory or by direct disassembly and lift. The outer dimensions of the detector would

have to fit comfortably into the interaction hall with space for access all around. Our present understanding of the collider mode indicates a somewhat lower luminosity for D0 than for B0.

The purpose of this note is to stimulate reactions from the user community in order to refine the area drawings. Thus, preliminary input is sought from all interested parties before April 10. This could be in the form of a comment, a letter of intent, or a criticism, constructive or otherwise. These letters would be useful feedback, but would not be treated as proposals. Proposals for a D0 colliding-beam detector will be called for by a date to be set by the PAC. The Laboratory wishes to stress the fact that the small D0 area calls for a modest detector built by a modestly sized group. Stress should be placed on ease of installation, minimum debugging time, and maximum innovation. The effort would be modest enough to be discontinued after one or two runs (or 3 to 4 months) to be replaced by a newer device or (eventually) by an e-p adventure.

Proposers should also consider the virtue of being ready for possible low-luminosity measurements of  $\approx 2$  TeV collisions by the end of 1983.

This area represents a challenge to the community to propose an imaginative detector that is complementary to or competitive with the major detector.

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## NEXT SIGMA XI SPEAKER

Dr. Stanley L. Jaki, distinguished professor at Seton Hall University, will deliver the Sigma Xi lecture April 2.

His talk on "Cosmic Connections" will begin at 8:15 p.m. in the Science Lecture Hall at Wheaton College. The college is co-sponsoring the talk along with the Fermilab and Amoco Research Center chapters of Sigma Xi.

Jaki's lecture is free and open to the public. It will be preceded by a banquet at 6:30 p.m. in the North Party Room dining hall at the college. Reservations for this banquet at \$7.15 each must be made by March 30 by calling the Wheaton College Physics Department, (312) 260-5007.

Dr. Jaki is participating in a two-day program on "The Big Bang Creation of the

Universe," April 2 and 3. Subjects that will be covered by him and other speakers in lectures and panel discussions include "Let There Be Light" and "Will the Universe End With a Bang or a Whimper?" Additional details may be obtained from the college.

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## COLLOQUIUM SPEAKER IS LAUTERBUR

Prof. Paul Lauterbur of State University of New York at Stony Brook, will be the Physics Colloquium speaker March 18.

His talk on medical imaging will begin at 4 p.m. in Wilson Hall auditorium. Linda Stutte will be his hostess. The weekly series is sponsored by the Physics Colloquium Committee. The aim is to present the latest research findings in a number of disciplines.

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## "A CLOCKWORK ORANGE" IS COMING

The next movie presented by the Fermilab International Film Society will be Stanley Kubrick's classic "A Clockwork Orange," a devastating satire on some of society's most cherished mores.

The film will be shown March 13 at 8 p.m. in Wilson Hall auditorium. Tickets are \$2 each for adults and 50 cents for children 12 and younger. Released in 1971, the color film runs for 137 minutes and is rated R.

The movie earned for Kubrick the New York Film Critics award for best picture and best director and was nominated for Academy Awards in both areas.

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## THAW OUT AT SPRING WARM UP PARTY

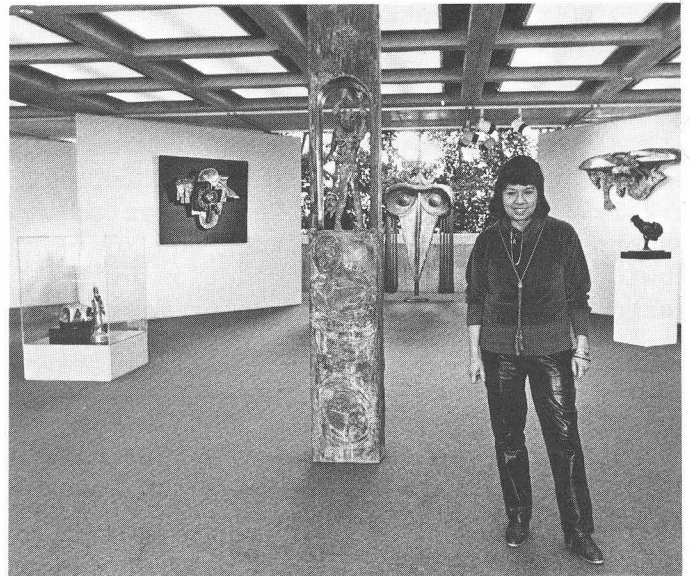
One nice way to thaw out from the Chicagoland's erratic winter is to come to NALREC's Spring Warm-Up Party.

It will be held from 5:15 to 9:30 p.m. in the Village Barn March 20. There you can mingle amid warm friendships and enjoy cheese-sausage pizza and plain pizza as well as beverages. And there'll be something for everyone as disc jockey Homer Cunningham plays a variety of recorded music. An event for the Fermilab community and their friends, admission is free.

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*Spring Warm-Up Party Committee (L-R) Sharon Koteles, Kim Chans and Mary Baaske. Not shown, Joe Morgan.*



*Sculptress Geraldine McCullough of Oak Park, Il., with some of the combined metal and polyester forms now on exhibit at Wilson Hall, WH2S. The exhibit will remain here through March. She is Chairman of the Fine Arts Department at Rosary College, River Forest, Il.*

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## EMPLOYEES HELP PIO

A number of Fermilab employees helped the Public Information Office with tours during February. During that month, 443 visitors in 13 guided tours went through the Laboratory. Giving orientations and helping lead the groups were Chuck Ankenbrandt, Joe Biel, John Cumalat, Gene Fisk, Herman Haggerty, Bruce Hanna, Vic Kuchler, Tom Peterson, Pat Rapp and Marv Warner.

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## REMINDER ABOUT CANDLELIGHT BOWL

March 20 is the deadline for getting your tickets for NALREC's Candlelight Bowl. The event will be held March 28 at 9 p.m. in the Warrenville Bowl at Route 59 and Batavia Road. For tickets, contact Pat Yost, Ext. 4365, or Rose Muth, Ext. 4445.

The cost of \$8 per ticket includes four games of Scotch doubles and red pin bowl as well as a beef and chicken buffet after bowling. Only 72 tickets are available, with a limit of two for an employee. Door prizes will be awarded.

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## FOR SALE:

1962 Gibson Melody Maker guitar w/case. A collectors item in excellent condition. Call Ext. 4880 or 851-0968 after 5 p.m.

1-20" red and blue "Murray" girls bike; very good condition, \$35.

1-20" blue "Free-spirit" girls bike; like new, \$40. Call Gerry Davis at Ext. 3615 or 312-552-7644.

Midland C.B. base station, 110 AC/12V DC 23 channel; 25' antenna.

Excellent condition, \$75, or best offer. Suzuki TS-185 trail bike, rebuilt engine and trans. Excellent condition, \$350 or best offer. Call Art Streccius, 548-0712 or Ext. 4438.

Sears dishwasher; 6 cycles; portable; harvest gold; butcher block top, \$80. Call 815-436-7211.

B & K model 1470 triggered sweep, dual trace, oscilloscope; like new; pr. 20 probes, Hewlett-Packard model S228 electric counter; Hewlett-Packard model 202A low freq.func.gen.; call 898-4336 evenings, ask for Ozzie.

354 Hemi Chrysler engine; rebored; reringed; new valves; \$1000 or best offer. Call Chief Wolf or Lt.Lill, Ext. 3438 or 312-364-4236.

Rider mower, 7hp; reasonable condition; lawn sweeper included. \$120 or best offer. Call F. Cole, Ext. 3801.

30" gas stove; Avocado w/hood; cont.cleaning; \$250. Small yellow bathroom sink w/legs, \$25. Call Ext. 3754 or 355-6290.

Boat trailer; easy loader; 800 lbs. w/12" tires and manual wench, \$350. White Oak - 4' x 4' x 8' - \$200. Call Ext. 3011.

## MOVING

SALE: 10 a.m. to 5 p.m., Saturday and Sunday - March 14 and 15. Kitchen appliances, furniture, some antiques, super 8 movie equipment, clothing and much more. 113½ N. Batavia Ave., Batavia, Ill. Yellow house, corner of Houston and Rt. 31, Batavia. F. Ullrich, Ext. 3351

CARS: 1979 Ford Bronco, factory executive model; quad shocks; AC, PS, PB, AM/FM; 6 rims, and radial tires; 17-18 mpg. Contact Jeff Meisner, Ext. 4447 or 4455. \$7000.

1978 Ducati 'Darmah' 900cc. Like new w/extra equipment. Must sell. Contact Alan Thomas, Ext. 4081 or 892-9689.

1977 Ford Granada; PS, PB, AC. Good condition. Asking \$2600. Call D. Kiro, 815-436-7211.

HOUSES: Farmette; 3 bdrm ranch; 2 car garage; new barn; fenced yard; fruit trees. 1.3 acres; 5 mi. south of Aurora; 11% interest available. Asking \$69,900. Call 815-436-7211.

Efficiency apt. for rent in West Aurora. Partly furnished; \$165 plus deposit. Utilities separate. Call D. Kiro, 815-436-7211.

For Rent: 2 bedrm.house on San Carlos Bay, Pine Island, Fla. Available April 15th by week or month. Call Art Streccius, Ext. 4438 or 896-8298.

Investment property for sale. 3-unit apt.house. Good location in West Aurora. Call D. Kiro 815-436-7211.

LOST: In Central Lab. building, prior to Xmas holidays; large souvenir postcard from Birdland, New York City. Call Don Blatchley, Ext. 3700.

NOTICE: Certified Suzuki mechanic - will tune up motorcycles, chain saw, and other gasoline motor equipment. Call Len Davis, Ext. 3557.