

The Village Courier



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15-FOOT CHAMBER GOES PHYSICS



...Possible neutrino event with three charged tracks, one V^0 and two e^+e^- pairs, photographed for Experiment 45A in the 15-Foot Bubble Chamber...



...250 GeV/c $\pi^- + p$ interaction producing at least 8 charged tracks and 2 photons converting to e^+e^- pairs, photographed for Experiment 234...

The FermiLab 15-Foot Hydrogen Bubble Chamber ran 2,000 pictures for two experiments on July 30 and 31 in the first operating run of the chamber since its commissioning September 29, 1973.

Largest of its kind, the FermiLab 15-Foot Chamber has undergone months of research and development to improve and tune the many systems that are a part of such a large, complicated machine. Under the leadership of physicist George Mulholland, crews of the 15-Foot Chamber pursued one course after another to understand problems and incorporate changes as the result of the commissioning run. Now, the chamber is back on the air for high energy physics studies.

The 15-Foot Chamber, located at the end of the Neutrino line, is a large metal sphere, holding 30,000 litres of hydrogen cooled to very low temperature (25 degrees above absolute zero). A large piston, six feet in diameter, rises from the bottom of the chamber. It holds the liquid hydrogen under pressure until a beam of high energy particles arrives from the accelerator. The piston is then rapidly pulled out, releasing the pressure and the liquid hydrogen is ready to boil. The liquid boils where the passage of the charged particles has created tiny regions of heat when electrons are knocked out of the hydrogen atoms in their path. Bubbles of hydrogen gas form along the tracks of the particles.

Taking photographs of the bubbles at this precise moment gives a graphic record of what the particles are doing. Several cameras, located at the top of the chamber, are used to take pictures so that three dimensional reconstructions can be built up later. Lights flash, the cameras take pictures, the piston is plunged in again to snuff out the bubbles, and the chamber is ready to receive its next burst from the accelerator. A large superconducting magnet encloses the chamber to provide a high magnetic field so that the charged particle trajectories are curved just as they are in the accelerator. This helps to identify the particles and to deduce their energy. The piston-photo cycle recurs every accelerator cycle.

Hans Kautzky, Wes Smart, and other staff members of the 15-Foot Chamber staff have had several intense efforts underway in their recent work on the chamber. One of the more involved projects has included extensive research of many brands of epoxy available on the commercial market. The extremely cold temperature inside the chamber demands a type of epoxy that has

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15-FOOT CHAMBER (Continued)

minimum shrinkage and is not brittle, especially on the seals of the windows through which pictures are taken and also when used as an adhesive for the fiberglass-teflon covering of the piston. The present run of the chamber will be a critical test of the type that has been applied.

The FermiLab crews' work was greatly aided by the experience and cooperation of the CERN bubble chamber staff. Wes Smart spent three months at CERN studying chamber operations there. Gert Harigel, physicist from CERN, then came to the FermiLab for several months to help as the FermiLab chamber resumed operation. FermiLab crews work in three shifts as they have since the commissioning.

A rich array of experimental possibilities is anticipated by Experiment 45A in the 15-foot FermiLab chamber. The collaboration of FermiLab, University of Michigan, and U.S.S.R. scientists concluded the first part of its run with pictures of three good candidates for neutrino events. As *The VILLAGE CRIER* went to press, a successful run of over 10,000 pictures was obtained on August 4 and 5. The experimenters are scheduled to receive 300,000 pictures taken by the chamber's cameras in the first phase of the experiment. The group has installed several devices in the Neutrino Line to refine the data to be collected by their experiment.

Studies with neutrinos give one of the most powerful handles on the nature of the weak force. Neutrinos found naturally in cosmic rays interact so infrequently that they can pass through the entire earth without being deflected or without interacting. Up to this time acquiring a volume of data on high energy neutrino interactions has been almost impossible.

On the FermiLab neutrino line, beams of neutrinos are generated so intense (that is, so rich in particles) that in an experiment such as #45A one picture out of every 100 recorded will contain a neutrino event. This rate will be increased to 1 in 20 soon. The film should give insights into the weak force that were not possible before. It will be studied for many years by many different people looking for a variety of phenomena.

Experiment #234, on the other hand, will study the interactions of hadrons (particles such as the protons accelerated at FermiLab) and the strong force, in the 50,000 pictures that will be taken in the FermiLab 15-foot chamber for this experiment. The surprises that may come here could be just as interesting and enlightening as those of the weak force studies.

Another experiment, #155, utilizes so-called muon identification techniques in its equipment mounted on the back of the chamber. The bubble chamber alone cannot distinguish muons from hadrons. However, a hadron can not pass through the downstream material in the bubble chamber while a muon sneaks through easily. The muon identifier tags each particle that gets through using a set of wire chambers that blanket the back of the bubble chamber. Muon identification is extremely important in the neutrino experiments.

Months, perhaps years, of further refinements of the chamber are ahead for the 15-foot staff. However, Russell Huson, head of the Neutrino department, is able to say now, "It is very exciting to anticipate the physics that will soon come from the 15-foot bubble chamber." William Fowler, who came to FermiLab in 1970 to organize the design and construction of the 15-foot chamber, told *The VILLAGE CRIER* that he "extremely appreciates all the hard and dedicated efforts of all the chamber and of all others at the Laboratory who have contributed to the bubble chamber effort, thereby making possible this major accomplishment."



...15-Foot Chamber leaders. Top, George Mulholland (L), Gert Harigel. Bottom, (L) Hans Kautzky, Wes Smart...

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(Photos by FermiLab photographers)

HAVE YOU TRIED BILL ROSS' SOUP AND SANDWICH SPECIAL?

Bill Ross is the man in charge of the new food combinations in the FermiLab cafeteria. Trying to meet the demand for a good lunch at less money, Bill and Sal Cuomo, Food Services Manager, now offer a lunch special, a choice from two soups and a sandwich for 95¢. "We hope this will meet the needs of our customers who don't want a full meal at noon," Sal advises.

Bill Ross came to the FermiLab just before the beginning of the year to help finish the new cafeteria in the Central Laboratory. Bill is a professional chef -- one who knows good food, good cooking, and good administering -- no small responsibility in times of sharply rising food costs. But Bill thinks that even with the necessary economies, there will be new selections on the food lines. "Our new cafeteria facility gives all of the staff a chance to try things they couldn't do before," Bill comments. He would welcome new recipes, and suggestions, and comments toward making the cafeteria service the pleasant place many people have waited for. Mae Riggs works with Bill and Sal as Food Services Supervisor in the cafeteria. Food service is provided in the Central Laboratory cafeteria on the following schedule:

Monday -- Friday

Breakfast	7:30 a.m. - 11:30 a.m.
Lunch	11:30 a.m. - 1:30 p.m.
Grill open	1:30 p.m. - 8:00 p.m.
Supper	5:00 p.m. - 8:00 p.m.

Saturday -- Sunday

Breakfast	8:00 a.m. - 10:30 a.m.
Lunch	11:30 a.m. - 1:30 p.m.
Supper	5:00 p.m. - 8:00 p.m.

A cafeteria committee gives assistance in making plans for the food service. The committee is always interested in the comments of cafeteria customers, whose suggestions are folded into the ideas, plans, and realities of the committee's deliberations. Members of the committee are: J. Campbell, Ext. 3218; R. Carrigan, Ext. 3792; T. Kirk, Ext. 3613; T. Nash, Ext. 3693; L. Teng, Ext. 3805 (chairman of the committee); D. Tober, Ext. 3401.

Meanwhile, keep an eye on Bill Ross's cafeteria lines. You might like his swedish cabbage rolls. Let him know how you like his new special.

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ANOTHER FERMLAB KARATE CHAMPION? WHY NOT!

James Parker, Neutrino section; Wayne Waldon, Magnet Measurement, and James O'Hair, Meson Department, competed in the 2nd Annual Universal Karate Tournament held in Elk Grove, Illinois on Sunday, July 28.

Parker won seven bouts in the Kumite (free fighting) division to win first place in the white belt division. Most of his opponents suffered defeat by Parker's secret technique, the "gaiter kick," a Parker fan reports. Parker has studied under Black Belt Chuck Johnson, Support Service, for two months. He had been free fighting for only three weeks prior to this win.

Waldon and O'Hair finished in the top ten in their division in the same tournament. O'Hair won five bouts before defeat. Last Sunday, Parker took first place in the white belt free fighting at the 1st U.S. Karate and Kung Fu Tournament at North Park College, Chicago.

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...Sal Cuomo (L) observes Bill Ross's gourmet touch to a chicken dish...



...Mae Riggs bakes a cake for special occasions at FermiLab...

NAL

Auditorium

8:00

\$1.

The CONFORMIST

ITALY

COLOR

1971

DIRECTED BY BERNARDO BERTOLUCCI

This adaptation of Alberto Moravia's novel about the psychology of an upper-class follower of Mussolini is set principally in 1938. Bertolucci (The Last Tango in Paris), because of the phenomenal ease of his sweeping romanticism, is ideally suited to period pieces such as this; he moves into the past with a lyrical freedom almost unknown in the history of movies. He was a prize-winning poet at twenty-one, and he has a poet's gift for using objects, landscapes, and people expressively, so that they all become part of his vision. It is this gift that makes The Conformist a sumptuous, emotionally charged experience.

CLASSIFIED ADS

FOR SALE - 1970 Ford Falcon, 6 cyl., 2 door, p/s, auto. trans., radio, w/w tires + 2 snow tires, \$750; a Sears B/W portable TV, 16", 1 yr. old-\$40; a steam iron-\$5; 2 vaporizers-\$2 ea. Call Bob Brown, Ext. 3201 or 393-1788 after August 11th.

FOR SALE - 1971 CL 350 Honda - best offer. Call Don Sorenson, Ext. 3886 or 879-2687 after 5 p.

FOR SALE - 1 pair of C78 x 14 snow tires; man's 3 spd. bike. DRIVER WANTED - to drive 1968 VW to New Jersey area late August. Call William Lee, Ext. 3803 or 848-6630.

FOR SALE - A GE dishwasher-\$95; a sewing machine-\$30; Sofa-\$95; Desk-\$20; Table & 4 chairs-\$25; low tables, blender, toaster, typewriter, steam iron & board, lamps, crib, toys, etc. Call M. Bourquin, Exts. 3187/3911 or 231-7663.

FOR RENT - Spacious 3 bdrm. house, complete w/carpeting, furnished (or unfurnished), air cond., in the Naperville area. Call E. Paschos, Ext. 3578 or 357-1665.

FOR SALE - 3 box seat tickets to Cubs/Giant game, 8/11/74. Call Dick Figlik, Ext. 3281.

WANTED TO RENT - Small travel trailer for week of 8/18-25/74. Call R. Bingham, 543-3933.

WANTED - Used (but usable) VW tires & parts. Call Bob Sorber, Ext. 3174.

FOR SALE - 1965 Buick Special, 4 door, p/s/b, exceptional car. Call Bob McCracken, Ext. 4077.

TO GIVE AWAY - A 2 pc. sectional sofa, good for kids' playroom. Call M. Pearson, Ext. 3351.

STAG PARTY - For Steve Everett, Friday, August 16, Sugar Grove American Legion, tickets-\$3.00. Call Dick Zych, Ext. 3575.

TO GIVE AWAY - Gentle German Shepard, loves kids, very friendly. Call J. Arko, Ext. 3555/896-4970.

FOR SALE - 1968 Buick Skylark, 6 cyl., 2 door, p/s, gold w/blk. vinyl top, new carburetor, clean interior, Diehard battery, runs good, \$750. Call Doris Ferrell, Ext. 3211 or 896-8679.

FOR SALE - Six Cragar Mags, 4-6" reverse, 2 shallows, fits all GM, \$28 ea. Call Dave Hovey, Ext. 3381 or 859-2448.

FOR SALE - 1967 Ford Falcon Sedan, 2 door w/fac. air, 289 C.I.D., runs well, \$300; A 1965 Ford Galaxie 500, 4 door Sedan, clean, 352 C.I.D. w/new holley dual quad (carb. is worth \$120), \$250. Call Dave Oprondek, Ext. 3467 or 859-1181.

FOR SALE - A.K.C. Cocker Spaniel pups, champion lines, best quality & disposition, gold female, \$95, silver male, \$100; also red-gold male & stud. Call Colie Pitts, Ext. 3353 or 838-4418.

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