

# The Villager

 national accelerator laboratory

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## NAL, CALTECH JOIN IN NEUTRINO STUDIES (EXPERIMENT 21)

NAL is about to undergo an interesting, significant and challenging transitional phase -- from early construction to operations; from building to research; from bricks and mortar to scientific investigation.

One of the first assignments before the world's most powerful particle accelerator will be to assist in the complex search for a new particle that would help describe nature's mysterious weak nuclear force.

Discovery of such a particle would indicate striking similarities between the weak force and at least two of the three other fundamental forces of nature -- the strong nuclear force and the electrical force. Both of these forces have specific particles associated with them, and perhaps the remaining one, gravity, does also.

Experiment 21, the goals of which are described in simple terms above, will be an NAL-California Institute of Technology collaboration. It is a novel experiment of Barry C. Barish, 35 years old, and Frank Sciulli, 32, associate and assistant professors, respectively, at Caltech. They are working with Alfred W. Maschke, head of NAL's Beam Transfer section, in what will be one of the first experiments to be undertaken on the proton synchrotron at NAL. They have been selected to investigate neutrino physics during the initial operation of the accelerator and continuing until January, 1973. The Caltech-NAL researchers plan to carry their studies on neutrinos up to about 300 BeV. Presently, data exists only up to about 10 BeV.

The nature of the weak force, which they will study, remains something of a mystery. It is associated with radioactive decay, and its interactions are many billions of times slower and weaker than those of the strong nuclear force, which binds together the protons and neutrons in an atom's nucleus.

It is the research team's plan to seek a particle that could carry the weak force. Although such a particle never has been found, it already has been named. It is called variously the "W," the "U<sub>1</sub>l," or the "intermediate vector boson." One may exist, just as a particle -- the photon -- exists for carrying the electrical force.

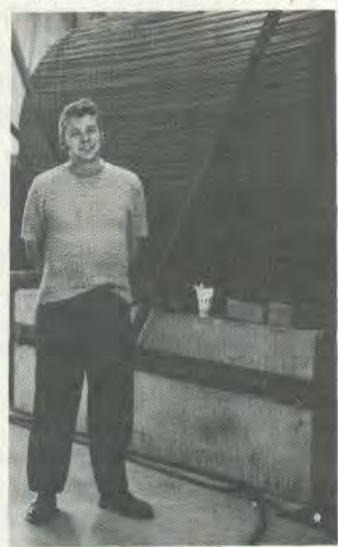
If the W exists as a particle, present evidence suggests it will have a mass greater than that of two protons; this means that the weak force interacts over the extremely short distance of four quadrillionths of an inch or less. The higher the mass of the W, the more difficult it is to produce.

The Caltech-NAL experiment, supported by the U.S. Atomic Energy Commission, hopes to produce and detect the particle if its mass is less than about 20 proton masses. The high energy of NAL's new accelerator system makes this possible -- if the particle exists.

Says Dr. Sciulli: "We also will be able to probe more deeply than hitherto possible into the proton and the neutron. This could help us understand more about their structures and the forces associated with them. We may learn more about the electrical force because indications are that the weak force is related to it."

A small but distinguished group of physicists will conduct the experiment at NAL with

(Continued on Page 2)



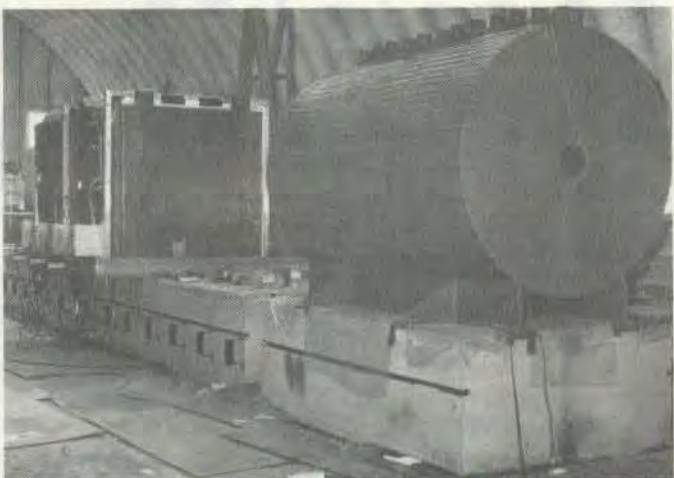
...Frank Sciulli, one of the Caltech professors associated with Experiment 21...

Photo by Tim Fielding,  
NAL



...An aerial view of the "Wonder Building" located near the intersection of Wilson and McChesney Roads, where Caltech experimenters are at work...

Photo by Tony Frelo, NAL



...Neutrino detectors (left) plus iron core toroidal magnet designed and being installed inside the Wonder Building by the Caltech group for initial measurements of neutrino interactions as soon as the NAL beam is available...

Photo by Tim Fielding, NAL

Barish, Sciulli and Maschke. They include Les Oleksiuk of the NAL Beam Transfer section; and from Caltech: Charles Peck, associate professor of physics; Yorikiyo Nagashima, senior research fellow; William Ford, Dennis Shields (research fellow) and Tom Humphrey, thesis student. George Krafczyk, NAL technician, has been assisting in installing the experiment.

Members of the Caltech physics faculty and several Caltech students have been at NAL since March, preparing for this early experiment. They are housed in what was a cornfield between Batavia and McChesney Roads and to the east of Wilson Road. The lights rarely go off at the "Wonder Building"; they are on day and night, weekdays and weekends, as the team completes the special equipment designed and built for this experiment. The "Wonder Building" has a dirt floor, no framing, features bottled water and chemical toilets. It is truly an austere "Wonder Building" but it contains some of the most advanced scientific equipment for elementary particle research in the world.

During the school term at Caltech, the faculty members commuted from California to NAL, in order to maintain their teaching commitments and to prepare for the experiment at the same time. The Barish, Nagashima, and Sciulli families are now residing in the Surrey Hill apartments in St. Charles; the Caltech students working with the project are living at "The Pad" -- a dormitory-type facility located at 32 Sauk in the NAL Village. The professors and their families will return to California in the fall and will resume their commuting-teaching-experimenting schedule.

Robert R. Wilson, NAL Director, told the NAL Users' Organization, at their annual meeting, that the first aim of experiments on the NAL accelerator system will be at detection of a neutrino. "I feel that we then will be in business to do experiments on our accelerator, and I feel that this detection will come in the Caltech-NAL experiment. The Caltech installation excites my envy -- their enthusiasm and improvisation gives us a real incentive to provide them with the neutrinos they are waiting for."

The new accelerator will make it possible for the first time to observe the behavior of the weak nuclear force at high energies. Present knowledge of this force is based primarily on decays of heavy particles at low energies. Drs. Barish, Sciulli and Maschke will develop a very high energy beam of neutrinos -- a product of weak force interactions -- for this investigation. The beam will be unique in that its design allows the experimenters to specify the energy of the neutrinos that they wish to investigate.

Summarizing the progress of the NAL-Caltech experiment preparations, Barish commented, "We're on schedule; we'll be ready when the beam goes on, but not before, I hope, because it would be hard to wait."

### NEW PLAN TO PROVIDE SAFETY GLASSES FOR NAL EMPLOYEES

A new program to provide safety glasses for all NAL employees who enter or work in hazardous areas on the site will be established in July, Charles Marofske, Personnel Manager, announces.

Drs. Eugene and Harold Cutler, optometrists with offices in Niles, will visit the Laboratory twice a month in their mobile unit which is fully equipped to examine employees' eyes and to prescribe safety glasses. It is expected that their visits to the Laboratory will take place on Wednesdays with the first visit scheduled for Wednesday, July 21.

Appointments for these examinations must be made through Mrs. Dorothy Poll, First Aid, at Ext. 232. NAL will pay for the safety glasses and the examinations.

Non-prescription safety glasses may be obtained through the NAL First Aid Department. They will be properly fitted by the Drs. Cutler during their visits to the site.

Marofske noted that the regular physical examination program for the Laboratory, under the direction of Robert Cornell, M.D., calls for an "E" chart screening of vision. If the medical group is not satisfied with the results of this preliminary examination or it is felt that safety lenses are required, an appointment for further screening will be made with Drs. Cutler.

The advantages of the new program, Marofske noted, are that there will be centralized and more complete medical records, improved fitting and distribution of safety glasses, and a quicker response to safety glass needs. For further information, please call Mrs. Poll.

**DUSAf GOLF SCORES:** Here are some scores from the annual DUSAf golf tournament held on June 26th at the Wooridge Golf Club in Lisle: First Prize with a low gross score of 78 went to Walter McMahon; second prize with a score of 79 went to Ray Knox; Sam Sublett won third place with an 80. In the Women's division, prizes were awarded as follows: First, Helen Stearns; second, Lucille Heide; third, Dolores Snodgrass; fourth, Frankie Peterson, and fifth, Edyth Mates. Bob Scott achieved the longest drive closest to the pin. A social hour followed the matches.

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### PROPER FORMS NECESSARY FOR MEDICAL INSURANCE PAYMENTS

If you expect to require payments under the NAL health insurance program, please obtain the proper forms for physicians and surgeons to complete from the Personnel office at 21 Sauk. Mrs. Mildred Meyer, Personnel, points out that such forms must be completed before payments are made by the insurance carrier. The forms, when completed, should be returned to Mrs. Meyer along with other relevant papers on each claim.

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### YOUR ARGONNE CREDIT UNION

Did you know that you win twice when you borrow money from the A.C.U.? Yes, indeed! First, you save money because the A.C.U. loans are usually cheaper. Then, you win again when the returns from the loans are distributed among the shares, namely, the deposits in the saving accounts.

To find out how much you can win both ways, call Ralph Wagner on Ext. 396.

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**WEDDING BELLS:** Wedding bells are still ringing for the Ronald Stadtfelts (Cheryl Sabo, Photography) who were married in Aurora on May 14 and for Mr. and Mrs. Robert Wirth II (Gayle Notle Site Management) who were married in St. Mark's Episcopal Church of Glen Ellyn on June 12th. The Stadtfelts are living in Aurora where Ron is a city policeman and the Wirths reside in DeKalb where Bob is a student at Northern Illinois University.

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## NAL BLOOD DONOR PROGRAM NEEDS 75 MORE PARTICIPANTS

You can help the sick and the injured -- and yourself -- by giving blood. About 6,000,000 patients require blood or a blood product each year.

By giving blood through the American Red Cross, you can protect yourself and your family's needs for one year. If someone in your family becomes ill or injured and requires blood or a blood product, he will receive all he needs -- anywhere in the U.S. -- provided one of the family members is a blood donor.

Mrs. Dorothy Poll, First Aid, emphasized those points this week as she sought more and more participants for the first annual blood program for NAL employees. The plan must be subscribed to by at least 20 per cent of the total number of NAL employees if every member of the NAL family is to benefit for one year from the program.

Mrs. Poll said that she would require about 170 blood donors from NAL to take full advantage of the program. At present, she has 95 men and women signed up to take part as blood donors. So, about 75 more are needed to meet the 20 per cent requirement.

It is presently planned to have the Red Cross blood donor team visit NAL Wednesday, September 1, and Thursday, September 2. Blood donors will be handled by the expert group between 10:00 a.m. and 3:00 p.m. on each of those dates. It will require about 30 minutes for each appointment and only less than 10 minutes for the actual donation.

Said Mrs. Poll: "If NAL gets enough participants, the entire NAL employee group and their family members (living in the same household) are covered. Otherwise, only the donors' families will be covered. Wives and adult children also can donate blood under the program, which, it is hoped, will be renewed annually."

Mrs. Poll noted that the blood donor program was a form of "insurance." In case of serious illness or accidents, blood would not be charged for under the major medical provisions of the NAL health insurance policies.

Less than a pint of blood is all that is taken, Mrs. Poll said. Your body manufactures new blood constantly. The volume you give can generally be replaced by your body's natural processes within a few hours. After donating, most people go about their usual activities.

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SOFTBALL LEAGUE SCORES: Tuesday, Personnel 29, Machine Shop 9; (forfeit) Radio Frequency over Main Ring. Thursday, (forfeit) Personnel over Main Ring; (8 innings) Beam Transfer 16, Physics Research 15.

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HOLE IN ONE: Ralph Wagner, Personnel, accomplished the virtual impossible Saturday afternoon, June 26, at the Old Oak Country Club. He scored a hole in one in the 16th hole, which is a 136-yard shot, by using a six-iron. Witnesses to the event were Ernie Barrick, Transportation, and Pat Herin, Bubble Chamber. For the 18-hole go-around, Wagner scored 84 while Barrick and Herin each shot 95. "It was quite a day," recalls Wagner.

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## CLASSIFIED ADS

FOR SALE: Appaloosa horse, 5 yrs. old, 15 hands high, well broke, \$325. Call Hope Rihel, Dial 6, Ext. 5127.

FOR SALE: Motorcycle, '70 Harley Davidson Sprint SS, 350 cc, 2800 miles, \$500. Call Ed Hurst, Ext. 235 or 279.

FOR SALE: '67, 283 Camaro, Vet glass hood, spoiler, Hooker Headers, Hurst Linkage, completely rebuilt. \$1200 or best offer. Call Judy at Ext. 555.

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