The VILLAGE CRIER

fermi national accelerator laboratory

Operated by Universities Research Association Inc.
Under Contract with the United States Atomic Energy Commission

Vol. 6 No. 29 August 1, 1974

BACK FROM LONDON

The following article was written at the request of The VILLAGE CRIER by Brian Southworth, editor of the CERN Courier, who is visiting at the FermiLab for a few weeks.

...Brian Southworth...

On Friday, July 26, a joint experimental-theoretical seminar was held in the Auditorium to carry to all the scientists at the Fermi Laboratory the news from the Conference held in London at the beginning of July. This Conference (the XVII International Conference on High Energy Physics) is the World Series of the scientific league in which the FermiLab plays. They are often known as the Rochester Conferences since the series started in Rochester, USA. Nowadays, every two years, they rotate between the USA, the Soviet Union and Europe. The FermiLab and the University of Chicago were hosts in 1972, and this year it was the turn of Europe.

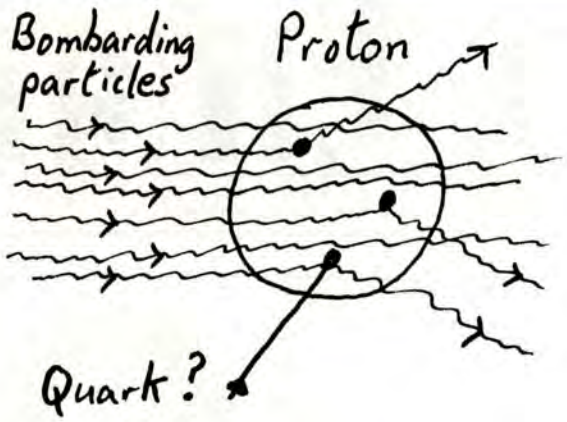
From among the many scientists associated with the FermiLab who attended the Conference, Henry Abarbanel, Brad Cox, Jean Marc and Mary Gaillard, E.L. Goldwasser, Russ Huson and Roy Rubinstein spoke at the Friday seminar. For the first time, there were lots of fine results from experiments at the 400 GeV accelerator to spread on the table and some of them have been described in recent issues of The VILLAGE CRIER. Once again, it has proved true that when higher energies become available, completely new aspects of the behaviour of matter are uncovered. Since the 1972 Conference, the high energy proton and secondary particle beams at the Fermi Laboratory, the colliding protons in the CERN Intersecting Storage Rings, and the colliding electrons and positrons in the SPEAR Storage Ring at SLAC have given us fascinating information which is transforming our understanding of what particles are and how they behave. Let's take a look at a few of the things which were important topics at London.

First, the proton and all its other relatives, known as hadrons, that are sensitive to the most powerful of Nature's forces, the strong force: We now know, following the experiments with kaons at Serpukhov, with protons at CERN, and the experiments with protons, pions and kaons in the total cross-section experiment at the FermiLab, that the particles grow fatter as their energy goes higher. It had been expected that, by 100 GeV or so, their size, (their region of influence where they affect other particles via the strong force) would become constant. But, to the highest energies we have reached so far, they are steadily growing with no sign of levelling off. This was described in more detail in The VILLAGE CRIER of July 5.

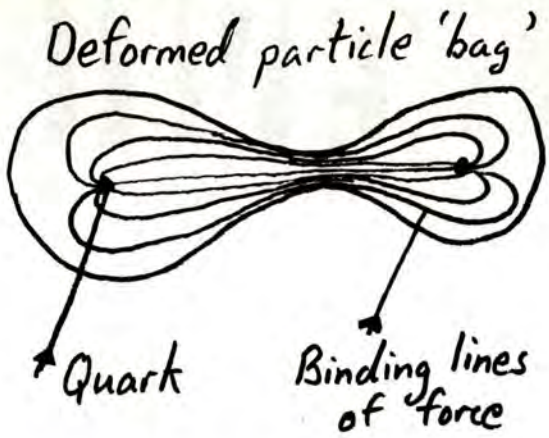
Just as intriguing is all the experimental data which indicates that the proton is not a 'solid' lump but that there are bits and pieces inside it. If we were shooting at something in the dark, we could get some clues as to what it was if we see how the bullets bounced off. With our high energy beams, we are shooting at the proton in the dark and whether our bullets are electrons (as at SLAC), neutrinos (as at CERN and in the CAL TECH experiment at the FermiLab) or protons (as at CERN) they bounce off as if there were three tiny hard grains within the proton. These could be the particles called "quarks" of which all the hadrons may be made.

But no one has ever succeeded in knocking a quark out of a proton, no matter how hard they have shot at it. One of the new topics at the London Conference was 'quark confinement' -- theoretical ideas on how the quarks cling together so that they are not knocked out. Two variants of what we might call the 'floppy bag theory' of the hadrons have come from MIT and

(Continued on Page 2)



...*Firing various particles at the proton gives scattering patterns which suggest three internal grains -- perhaps quarks...*



...*How quarks might stick together inside a particle no matter how hard we try to knock them out - binding lines of force holding them firmer when the particle 'bag' is deformed...*

(Sketches - R. Savit, B. Southworth)

and from SLAC. They suggest, for example, that when we hit a proton hard, we may deform the floppy bag containing the three quarks but as soon as we compress part of the bag in a way which could break off part of it containing a single quark, then the forces holding the quarks together grow infinitely strong in the narrow neck of the bag.

We have so far considered the nature and behavior of hadrons - the strongly interacting particles. The things recently learned about leptons - the weakly interacting particles - are just as fascinating. In particular, the Conference brought together completely convincing evidence that neutral currents exist. They have been observed in experiments with beams of neutrinos at CERN, the FermiLab in experiments, CAL TECH and Experiment #1A, and at Argonne.

Only the weak force affects the neutrinos. They can fly easily through the entire earth without ever being lured into mixing it with any other particles. Nevertheless, they can now be produced in such profusion at the high energy accelerators that enough of them interact in the big detectors for some of their properties to be determined. Until less than a year ago, every time they interacted they were seen changing into another of the leptons - the muon or the electron. As far as was known, the neutrino could not mix it without losing its identity and converting to a charged particle. This is described as a 'charged current' interaction. Now we have seen many examples of the neutrino interacting, for example, with a proton, knocking it about considerably and yet still flying on as a neutrino. This is described as a 'neutral current' interaction. We know next to nothing about these interactions so far, except that they exist, so there is a wide open field of fresh information to investigate.

Finally, the disruptive experiments that were reported before in The VILLAGE CRIER on July 18. At SLAC and at the now closed-down Cambridge colliding beam facility, we have seen leptons getting together to produce hadrons. At Serpukhov, in the Soviet Union, and at the FermiLab, in Experiments #1A, 70 and 100, we seem to have seen leptons emerging from hadron interactions in surprisingly high numbers. These things do not make sense under any of the present ideas we have about how Nature operates and yet they may be telling us something that everyone wants to hear -- that all particles are part of the same family and governed by the same laws.

There is a lot of work to be done on these topics in the coming years and, with the highest energy synchrotron in the world, the FermiLab is in there with a flying start to tackle many of them. By the time of the next Conference in the Soviet Union, we may gather enough new information to have a very different view of the proton and its relatives.

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MACHINE SHOP APPRENTICES COMPLETE TRAINING

...(L-R) B. Murphy, B. Flores, W. Jones, R. Gorski, R. Johnson at award of certificates to Murphy, Flores on completing apprenticeships...

Two members of the FermiLab Machine Shop staff recently completed apprenticeship training as part of a continuing training program in the Machine Shop.

Brian Murphy is now a journeyman welder, after finishing 2½ years' training in instrument welding. He is a graduate of Batavia High School. Brian studied welding at the Kaneland Vocational Center and at the Hobart Welding School, Troy, Ohio. Brian's father, "Spud" Murphy, whom many FermiLab people know through his work with Belding Engineering, is an instructor in welding at Waubonsee Community College, Sugar Grove.

Baliariano, "Bale," Flores has completed four years' apprenticeship as a machinist. His course training included studies at the Argonne National Laboratory and at the College of DuPage (COD). Numerical control machining was among his subjects at COD. Bale has also completed three years of college courses and is trained in commercial art.

The FermiLab men were presented certificates at a luncheon held in their honor. Bill Jones, head of the FermiLab Machine Shop, remarks, "It is a pleasure for me to see these young men complete their apprenticeships. I know they will make a valuable contribution to the work that will be done at this Laboratory."

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YOU CAN HELP SPEED THE MAIL IN THE CENTRAL LABORATORY

To speed and ease the mail delivery in the Central Laboratory, all correspondence should be addressed according to the locations listed in the new interim phone directory. For example, Joe Smith, whose office is in the Central Laboratory west wing, first floor, administration section should be addressed: Joe Smith, CL-1W, Section A. Putting the section or department on the envelope will be helpful, as some floors have several sections with the same general address.

Continuous pick-up of both inside and U.S. mail is now effective through the chutes on the north end of each floor, each tower, of the Central Laboratory. Only mail and packages too large for the chute will be picked up by mail carriers.

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....Call Ext. 3171 for on-site taxi service at the FermiLab. The taxi service operates from 8:00 a.m. to 11:30 a.m., and 1:30 to 5 p.m. During the noon hours, two bus routes operate between the Central Laboratory, the Village and the experimental areas. The bus schedule appeared in the July 25 issue of the VILLAGE CRIER.

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FERMILAB GOLF LEAGUE NEWS

With the '74 season more than half-way, competition in the FermiLab Golf League is very intense. Team #10 (Ellery Cook, captain; Bob Kocanda, Al Kruml, and Harvey Berghuis) is in first place with a total of 77 points. Second place is held by Team #2 (John Ramus, captain; Leroy Bowker, Earl Bowker, and Bill Fray) with 75 points. Team #12 (Ed LaVallie, captain; Jesse Guerra, Jerry Johnson, and Grover McIntyre) is close behind in third place with 72 points. Seven of the 16 teams in the League have 60 or more points which means standing will probably change each week.

The FermiLab Golf League is sponsoring its Second Annual 18-hole tournament on Saturday, September 14, at the Arrowhead Country Club. All FermiLab, AEC employees and visiting experimenters are invited to participate. The first foursome will tee off at 1:30 p.m. Call Bob Kocanda, League Chairman, Ext. 3734, to make a reservation. Price for the outing, including greens fees and dinner in the evening at the Village Barn, is $8.00 per person. Because League members have established handicaps, they are the only ones who will be eligible for prizes, but fun is guaranteed for everyone!

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FERMILAB BLOOD PROGRAM CONTINUES

Enough employees donated blood on Friday, June 7, to continue the Laboratory's blood coverage program for employees and their families. Employees who were unable to donate on June 7 but who still wish to donate, should call the Aurora Area Blood Bank, 516 S. Lincoln, Aurora, 892-7055, for an appointment. Donations should be credited to the FermiLab account.

The next scheduled day for blood donations at the Laboratory will be November 18, 1974. Call Dorothy Poll, Ext. 3232 for further information.

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CLASSIFIED ADS

TENNIS LESSONS - A 13 yr. old boy is willing to give tennis lessons to beginners & advanced beginners; has experience under top New England pro, lives on site, reasonable rates ($1 per ½ hour). Call or visit Friedel Von Goeler, 11 Potawotomi (Village), Ext. 4237.

FOR SALE - Super 8 movie projector & camera w/zoom lens, screen & lights. Used twice, $125. Call K. Borneman, Ext. 3222 or 879-1844.

FOR SALE - A set of 8 Mac Gregor "MT" irons (2-9), excel. cond., $65; three woods and seven irons in fair shape, $25. Call E. Cook, Ext. 3734.

FOR SALE - 48" white formica pedestal table w/5 fibreglass molded bucket swivel chairs, $90; one chest & corner desk, $15. Call Art Streccius, Ext. 3580 or 392-4905.

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 - Kalamazoo metal cutting band saw, Model 610-D, excel. shape-$100; a Jarvis Torqomatic tapping head cap #10-3/8, very gd. cond., $75; an Air Compresser, large tank, tested at 250 psi, $35. Call Del Hoffman, Ext. 3074 or 879-2377.

FOR SALE - SAILBOAT, Sandshark high-perf. 12' scow, easy cartop, fully equipped-$595 or offer. A PIANO, classic A.B. Chase upright, excel. cond., fine tone & action-$295 or offer. Call Jim Johnson, Exts. 4097/3216 or 653-7017.

FOR SALE - Green beans, beets, turnips and greens available Tuesday, Aug. 6. Also, a Ford 8-N tractor, 3 pt. hitch, 2 row cultivator, P.T.O., fluid in rear tires, gd. cond. Hines Farm, 1st farm south of Rt. 56 on Eola Rd. 357-3847.

FOR SALE - 1965 Buick - answers to name 'Ruby' - needs muffler, best offer. Call Betty Kastner, Ext. 3836 or 357-3881 after 5 p.m.

FOR SALE - 1974 Omega, 3,000 miles-$2800, p/s automatic trans., radio, white wall tires. Call Bill Schumate, Ext. 3654 or 851-6210.

WANTED - Someone to cut down two old trees & haul away for firewood, will pay. Call Gregory Lawrence, Ext. 3677 or 393-9540.

TO GIVE AWAY - Pure white Persian kittens. Call Richard Zych, Ext. 3575.

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THE VILLAGE CRIER is published by the Public Information Office of the Fermi National Accelerator Laboratory, P.O. Box 500, Batavia, Illinois 60510. Margaret M. E. Pearson, Editor