

The Village Critic



fermi national accelerator laboratory

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POP AE COLLIDING BEAM DESIGN STUDY ANNOUNCED

A design study for a 1000 GeV on 1000 GeV colliding proton beam storage ring facility to be located at Fermilab has recently been completed. The design study was the result of a collaboration between Argonne National Laboratory and Fermilab, which began in the fall of 1975 under the direction of Robert Diebold of Argonne.

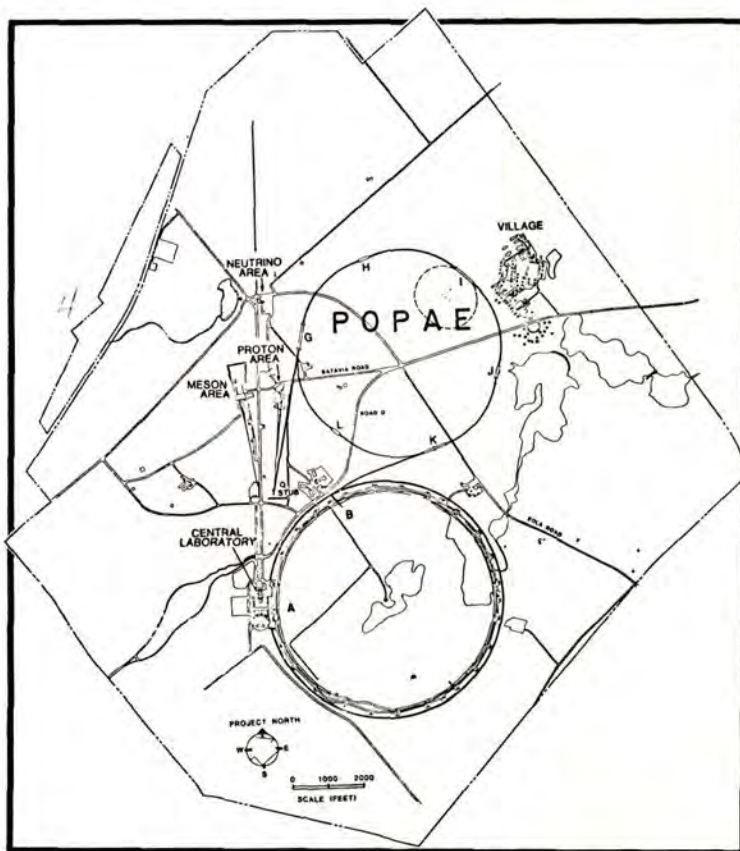
The construction of such a colliding beam facility (denoted by the acronym POPAE: Protons On Protons And Electrons) at Fermilab would take advantage of the substantial national investment in the facilities of the Laboratory. The present accelerator is itself a uniquely suitable device for filling storage rings with high energy protons, and in a few years the Energy Saver/Doubler will increase the available proton energy to 1000 GeV. The research capabilities of Fermilab would be extended in a natural and complementary way by the addition of the proposed proton storage rings.

High energy storage rings are being considered at other laboratories. Brookhaven National Laboratory has proposed a 200 GeV on 200 GeV proton-proton colliding beam facility, Isabelle, which would accelerate the protons from a 30 GeV injection energy. CERN has studied the possibilities of 400 GeV on 400 GeV storage rings, which like POPAE would receive protons from an accelerator at the desired energy.

At present, the ISR at CERN is the world's only proton-proton colliding beam machine. This facility gave an enormous increase in useful energy over that previously available, up to an energy equivalent to that of a 2000 GeV fixed-target accelerator. However, this energy has since been approached by Fermilab.

For further energy increases, however, colliding beams quickly outstrip the useful energy of fixed target machines, even those that might conceivably be built as part of a World Collaboration. In terms of equivalent fixed-target machine energy, POPAE would provide a factor of 1000 increase over the ISR. An equivalent fixed target machine would circle the North American Continent. The phenomena found in the energy range spanned by the previous factor of 1000, going from 2 GeV up to 2000 GeV at the ISR, have profoundly changed our understanding of nature and indeed encompasses the whole history of elementary particle physics. There are some ideas of what may be found as the frontier advances beyond present energies, but considering the surprises in the previous factor of 1000 it seems probable that these expectations will pale beside the phenomena which will actually be discovered.

The interest in colliding beams at Fermilab goes back to the site-selection days when



...Proposed location of POPAE...

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one of the site-selection criteria was that space be available to accommodate future storage rings. Indeed, the State of Illinois went to great expense to provide this capacity in the land purchase.

In the fall of 1975, Robert Sachs, the Director of Argonne National Laboratory, suggested that Argonne and Fermilab collaborate in a joint design study for POPAE. This suggestion was welcomed by Robert Wilson, the Fermilab Director, and since that time a joint Argonne-Fermilab team has been actively developing the detailed conceptual design. Although the present design does not include detailed provisions for electron-proton collisions, these provisions can be incorporated by the later addition of an electron storage ring with a minimum of disruption and cost.

The design study proposes that the two rings of POPAE be housed in a common tunnel of circumference 5.5 km (slightly smaller than the 6.3 km of the Main Ring). The machine would be located on the Fermilab site in an area bounded by the Main Ring, the Proton Laboratory, and the Village, a region rather level and free of obstructions. This location results in nearly straight injection lines to the storage rings. These lines would consist mainly of buried vacuum pipe with quadrupole doublets every 150 meters for focusing, and would be relatively inexpensive both to build and to operate. One of these lines would originate at the "Q stub", located in the Proton Laboratory beam line, and the other from a new extraction point at the B straight section. Each storage ring would be composed of six 720-meter long curved sections, separated by 200-meter long straight sections where the beams are focused and intersect one another.

To fill one ring to the design value of 5 A would take 6×10^{14} protons, 66 accelerator pulses at 10^{13} per pulse. The time to do this would range from a few minutes at low energies to about one hour at 1000 GeV. Each ring would be able to store high beam currents at energies between 100 GeV and 1000 GeV, and unequal-energy operation would be possible as required by experiments.

Superconducting magnets have been specified for POPAE in the design study. Superconducting magnet technology has been moving ahead in the past few years to the point where one can confidently predict its successful application to high energy storage rings. A field of 60 kG at 1000 GeV has been used in the design study. This field is somewhat higher than the 40 to 45 kG design of the Energy Saver/Doubler. A 60-kG dipole magnet of a design rather similar to that considered for POPAE has been built and operated by H. Desportes and his colleagues at Saclay, and this field strength would appear to be a reasonable goal for the next step in accelerator technology.

The design study estimates the total construction cost of the facility, including engineering, architectural costs and contingency to be \$245 million in 1976 dollars.

ANY SUGGESTIONS?

Bright yellow suggestion boxes have been placed in the Fermilab Cafeteria, in the Atrium by the east elevator bank, in the Cross Gallery Control Room, and in the vending area in the Village.

Signed or unsigned suggestions for Fermilab improvements would be welcome from anyone who has something constructive to offer.

Suggestions are collected weekly and reviewed by John McCook, Associate Director for Administration, and by R. R. Wilson, Director.

Normally a period of about four weeks is required to review a suggestion and obtain a satisfactory answer which will then be posted on the Cafeteria bulletin board. Where several similar suggestions are submitted answers will be made which are representative of the general trend.

Present plans are to acknowledge receipt of signed suggestions and distribute answers to individuals once they have been approved.



...Ron Walker (L) and Bill Fowler, Assistant Head, both of the Superconductor Group, were on hand last week when the first piles were driven for the start of construction of a central helium liquefying plant at Fermilab. Located west of the Magnet Facility, the 50' x 180' plant will be similar to the plant in California (see photo at right) from which surplus Air Force equipment is being obtained. The plant, scheduled for completion in the fall of 1977, will provide liquid helium for the energy doubler superconducting magnets...

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BUBBLE CHAMBER GROUP RECEIVES SPECIAL COMMENDATION

Members of the Fermilab 15-ft. Bubble Chamber Group received special commendation from Deputy Director Edwin L. Goldwasser recently when the group completed a run that included recording the first 500 BeV interactions. He said to them:

"There are no words which can express the appreciation of Bob Wilson, myself, and many others inside Fermilab as well as out, for the skill, dedication, commitment and just plain dogged determination of the 15-ft. Bubble Chamber Group over the past six months. You have brought us to the long-sought successful termination of an extremely difficult and often frustrating bubble chamber run. You have our gratitude.

"I am convinced that a great deal of very important physics will be forthcoming from the data which have been accumulated during the course of the recent run. I know you must be tremendously pleased and satisfied (as well as tired) as the run has finished in a blaze of glory. I am sure that the new knowledge and understanding that will be forthcoming from this run will amply justify the blood, sweat and tears that I know each of you has invested in carrying it through. Thanks once again."

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NALREC PLANS SECOND TRIP THIS YEAR

Munich, Germany is NALREC's second destination this year. A trip is planned to coincide with the exciting Oktoberfest. The group will depart Chicago on September 14 and return on September 29. This trip is offered on an "air-only" basis, and the price is \$299.00 per person, a real bargain for travel to Europe that time of the year. Arrangements have again been made through Elkin Tours. Information is available on car rentals and rail travel through Europe, and assistance is available on hotel accommodations.

If you are thinking about participating on this trip, don't delay. The deadline is fast approaching and there are only a limited number of seats available. The trip is offered to all Fermilab employees, visitors, subcontractors and their friends and relatives. There is no minimum number required for participation. Contact Liz Foster, Ext. 3396, for further information and reservation forms.

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EMPLOYEE NEWS AND NOTES

The employee's section of the claim form must be completed in full each time a new claim is submitted for reimbursement under the group medical insurance policy. This is the portion found in the center to the bottom of the front page of the form. The Personnel Office will answer the questions at the top of the page.

Be sure to indicate if you or your dependents are covered under any other group insurance. If there is other coverage a claim must be submitted to the other company also. The two insurance companies must have these forms to determine which of the companies has primary responsibility for paying the claim. It also assures the employee of receiving all available benefits from the two insurance firms.

When you or your dependents are hospitalized, you must have your doctor complete the reverse side of the claim form as soon as possible. The employee then completes the employee's section and attaches all bills related to the claim. The bills should be itemized, giving description of the services rendered, not simply paid receipts. Submit everything to the Employees Benefit Office, CL-6E. Claim forms should not be submitted to the hospital. Obtain claim forms at the Personnel Office, receptionist, CL-6E.

If you have any questions about preparing a claim or determining coverage, call the Employee Benefits Office, Ext. 3395.

...A SUPPLEMENT to the Employees Benefits Handbook, 1975, has been issued by Charles Marofske, Personnel Manager. The supplement updates information issued a year ago and all employees are encouraged to review the supplement and the outline that accompanies it. If you have not received a copy, contact Janet Gregory, CL-6E, Ext. 3324.

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...EMPLOYEES currently enrolled in the TIAA-CREF program should have received a bulletin announcing a new policy for withdrawal of funds from CREF accounts. The new policy allows individuals participating in the plan to make a partial cash withdrawal of no less than \$1,000 once every six months from their CREF resources. For further information contact the Employee Benefits Office, Ext. 3395.

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...DONORS ARE NEEDED for the visit of the Bloodmobile to the Laboratory on Thursday, July 8. Call the Medical Office, Ext. 3232, to make an appointment. Fermilab employees have always responded generously to the call for blood donations, giving all employees and members of their families insurance that a blood supply is available to them in case of emergency.

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...CONGRATULATIONS to Laura and Jim Thompson (Personnel) on the birth of their daughter, Janelle Lynette, May 1, 1976 at Copley Hospital.

NALREC'S HARD TIMES PARTY

Wednesday, June 30 - 6:30-11:30 p.m.
VILLAGE BARN

Celebrate the end of the fiscal year, forget the budget crunch for one night of fun -- music for dancing, food, depression-price drinks.

CLASSIFIED ADS

FOR SALE - Size 9 clothes, shoe size 6½, best offer. Call 377-1190.

FOR SALE - 2 Kennedy tool boxes complete w/machinist tools. Asking \$425 or offer. Ext. 3233.

FOR SALE - Oscar Schmidt 15 chord autoharp, Newport model 15B w/instruction books, exc. cond., \$60. Call R. Parry, Ext. 3724 or 892-8346.

FOR SALE - Volvo, 1974, 142, yellow, AM/FM, 4 spd., 2 new radials, \$3450. Judy Ward, X3211.

FOR SALE - 1972 Datsun 2402, perfect mech. cond., stripped to bare metal. \$3200 or offer. Must sell! Call 682-3787.