

RESEARCH FACILITIES AND PROGRAMS

New Proton Synchrotron

According to a joint announcement by Princeton University, the University of Pennsylvania, and the Atomic Energy Commission, the recently completed Princeton-Pennsylvania Proton Accelerator has successfully produced a beam of protons at its design energy of 3 BeV. The machine, a uniform-gradient synchrotron, is located at the Forrestal Research Center in Princeton and was built at a cost of \$12 million, most of which was supplied by the Atomic Energy Commission.

Construction of such a machine was first suggested nine years ago by Milton G. White, who is now director of the accelerator project, and his colleagues Frank C. Shoemaker and Gerard K. O'Neill, all of the Princeton physics faculty. In 1956, the AEC awarded a contract to Princeton to build the accelerator, and construction began in 1958 with a staff of forty physicists and engineers and eighty technicians. Julius Halpern of Pennsylvania's Physics Department has been active in arranging for that University's participation, and many of the machine's components were fabricated there by members of the Physics Department and the Moore School of Electrical Engineering.

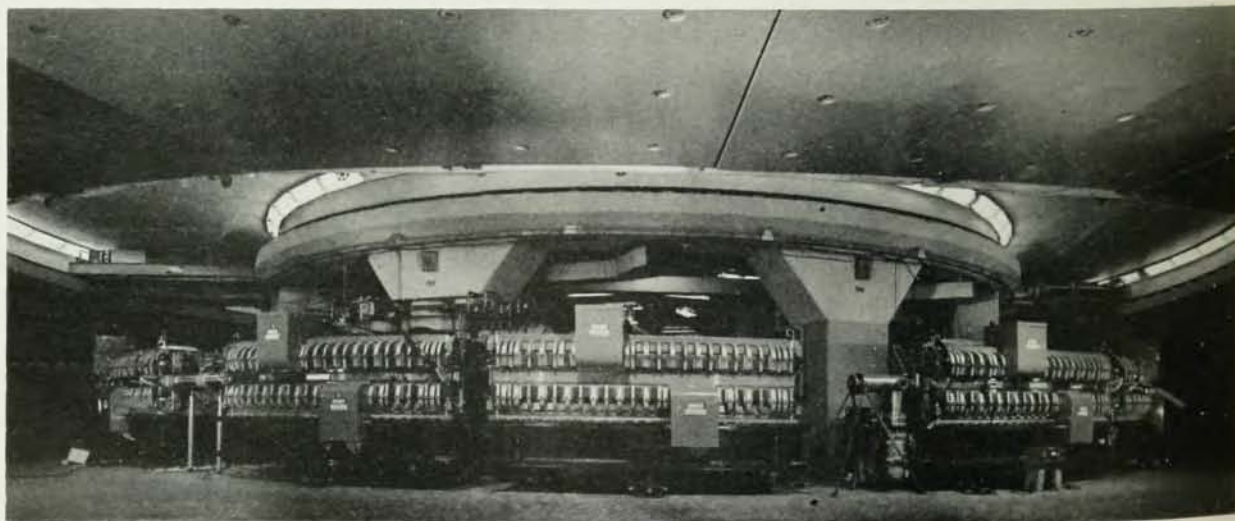
The initial beam, in addition to having reached the energy level that had been predicted, has achieved the desired frequency of 19 pulses per second. Other machines in this energy range (at the Lawrence Radiation Laboratory and at Brookhaven) produce pulses at approximately five-second intervals. Beam intensity, after the initial tune-up period, is expected to reach a level of about 10^{10} protons per pulse. The protons will be employed in the production of π and K mesons. Although no accurate count of π and K flux

from 3-BeV protons has been made, the Princeton-Penn machine is expected by its designers to produce more copious beams of these particles than any other accelerator in its energy range.

A full experimental program is expected to be in progress by autumn. According to proposals already submitted, work will probably center around experiments requiring intense beams of high-momentum pions (500 MeV/c to 2 BeV/c) and those involving the stopping of positive K -meson beams. Measurements of the total cross section of the (π , p) interaction, leptonic modes of kaon decay, and charge-exchange scattering of pions have been mentioned as being potentially valid subjects of future investigations.

In May, construction was begun on the accelerator's external-beam facility, a separately financed project which will triple the available experimental space. Three new buildings, two additional electric-power substations, and additional access roads will be built, and an initial supply of experimental equipment and movable shielding will be installed. The funds, something over \$8 million, will be provided by the Atomic Energy Commission.

The target building will be one story high, measuring 140 ft by 145 ft by 50 ft. A tunnel for the proton beam will connect it to the synchrotron. The building will have ample supplies of cooling water and electric power and will be provided with a ventilating system engineered for the safe use of liquid hydrogen in bubble chambers and targets. A crane spanning the entire interior will be used to move the equipment. A storage yard for shielding blocks will adjoin the building. Abutting the target building will be the mechan-



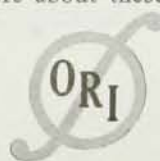
The magnet ring of the Princeton-Pennsylvania Proton Accelerator



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Principal staff scientists are now sought. Very brief descriptions of these positions follow below. For more detailed information and to discuss your own professional interests, we invite you to communicate directly with Dr. Raymond Guard, Principal Staff Scientist, at the Aerospace Research Center.

SOLID STATE PHYSICIST

Principal staff scientist will be responsible for the development of programs on new materials and new techniques for evaluation of materials. Research programs will encompass work in solid state and crystal physics and experimental analysis using x-ray and electron diffraction techniques and electron microscopy. Background should include experience in electroluminescence and photo-conductivity. PhD plus 3 years' related experience required.

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ical building, which will provide 7000 square feet of space for mechanical and electric service equipment and controls.

The third building will be known as the laboratory building and will have an area of 70 by 277 feet. It will be used for setting up and testing experimental equipment prior to use and will contain a large two-story bay with a crane, plus 6400 square feet of smaller laboratories and offices. Completion of the buildings is scheduled for late next year. Planning for the facility was in the hands of a committee consisting of faculty members of both universities and members of the accelerator staff.

National Magnet Laboratory

Dedication ceremonies for the new National Magnet Laboratory at Cambridge, Mass., were held on April 30. The laboratory, directed by Benjamin Lax, will be operated by the Massachusetts Institute of Technology and will serve as a center for basic research involving magnetic phenomena and strong magnetic fields. Its facilities will be available to scientists from universities, governmental and industrial laboratories, and other research organizations throughout the United States. The laboratory's research operations will be sponsored by the Air Force Office of Aerospace Research, which also provided the funds (\$6 million) for its establishment. The NML is located in a former bakery at 120 Albany St. The five-story building has been completely remodeled to suit its new occupant.

Central to the Laboratory's experimental capability is its power supply, consisting of two motor-generator units. Coupled together, they can produce a continuous direct current of 40 000 amperes at 250 volts. If fed to a single magnet, this amount of power can produce a continuous field to a maximum of 250 000 gauss. (The strongest magnetic field previously reported was 152 000 G at the Naval Research Laboratory during the summer of 1962.) Each of the motor-generator units is equipped with an 85-ton flywheel, and, when their stored energy is applied, current pulses of a few seconds' duration can be achieved at a power level of 32 million watts. Pulsed magnetic fields of 400 000 gauss or higher are anticipated with this arrangement.

The building is fitted with ten test stations, each with individual power and coolant connections; the magnets are mounted on wheels for easy transport to any desired station. The distilled-water coolant is run through a central piping system, which puts it through a heat exchanger where it passes its heat to water from the Charles River.

Nuclear-Structure Laboratory

The University of Rochester is currently planning the construction of a nuclear-structure laboratory to be equipped with an MP two-stage Van de Graaff accelerator that is now being designed by the High Voltage Engineering Corporation. Funds for the ac-