much weaker in their interactions with matter than are protons.

For accelerating protons, the U. S. now has two large machines in operation, a three-Bev synchrotron known as the cosmotron at Brookhaven National Laboratory and a 6.2-Bev synchrotron called the bevatron at the University of California's Lawrence Radiation Laboratory in Berkeley.

Besides the 30-Bev Brookhaven machine, two other large ones are under construction in the U. S.

One, a joint venture of Princeton University and the University of Pennsylvania, will be a three-Bev proton synchrotron. It is scheduled for completion by the end of 1960. Although similar to the cosmotron, it is designed to provide a much higher number of protons per second in its beam, thus making possible experiments on nuclear events that otherwise occur too rarely for successful study.

The second is a 12.5-Bev proton accelerator under construction at Argonne National Laboratory, Lemont, Ill. It is scheduled for completion in 1962.

The Soviet Union has scheduled a seven-Bev proton synchrotron for operation in 1960.

From this summary it can be seen that, excepting the 50-Bev machine proposed by the Russians about which little is known, the U. S. will have the largest and most sophisticated atom smashers of the world in operation by the end of this year.

It is noteworthy, however, that the 13 nations forming CERN are also building rather large machines on their own. The 13 nations are Austria, Belgium, Denmark, France, West Germany, Greece, Italy, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom and Yugoslavia.

In the United Kingdom, a seven-Bev proton synchrotron is under construction by several British universities. In France, a three-Bev proton accelerator was placed in operation in 1958 and a one-Bev linear accelerator is nearing completion. In Italy, a 1.2-Bev electron accelerator began operation in 1959. In the Netherlands, a proton synchrotron is being built. Electron accelerators are under construction in West Germany and Sweden.

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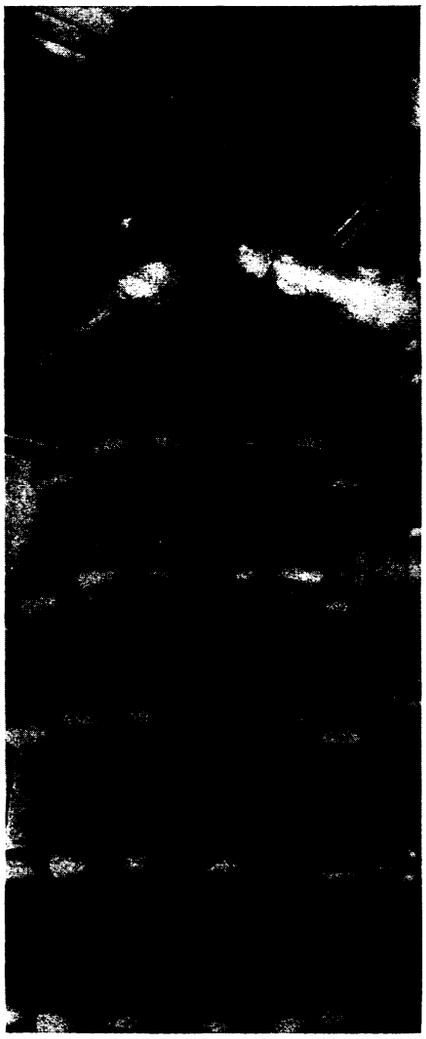

INITIAL ACCELERATION — This Cockroft-Walton generator provides the initial acceleration of 750,000 electron volts to protons that are shot into a 50-million-electron volt linear accelerator. The protons then enter the orbit of the Brookhaven 30 Bev alternating gradient synchrotron.

METEOROLOGY

Natural Air-Conditioning

SAN FRANCISCO has a completely automatic, built-in air conditioning system that not only gives it cool summers and mild winters but also results in substantial economic advantages to commercial jet aircraft operators.

San Francisco has mean summer temperatures lower than those of any other large city in the United States.

In July, the average maximum temperature is a cool 64 degrees. In September, the warmest month, highest temperatures average a comfortable 68 degrees, Halbert E. Root of the U. S. Weather Bureau at the San Francisco International Airport reported.

Mild weather in the San Francisco Bay area is due to its particular location on the eastern shores of the Pacific Ocean and to its topography. These combine to provide what amounts to a natural air-conditioning system, Mr. Root reported in the current issue of Weatherwise, 13:47, 1960, published for the American Meteorological Society in Boston.

In the present age of jet-powered aircraft, the cool temperatures and brisk winds of this air-conditioned region provide great advantages for air travel. These result from the fact that the thrust of a jet engine depends directly on the density of the air, the density being greater at lower temperatures, and that each mile per hour of headwind on take-off means less speed need be provided by the plane's engines in order to reach flying speed.

When compared to a nearly inland location, jet planes departing from San Francisco International Airport could carry an average of as much as 12,000 pounds more per flight, Mr. Root reported.

San Francisco's air-conditioning system also supplies sailing enthusiasts with exciting sport to test their skill. At the peak of flow on a normal ebb tide, the water is rushing out under Golden Gate Bridge at a rate of about 4,600,000 cubic feet per second, about seven times the flow of the Mississippi River.

Science News Letter, June 18, 1960

PHYSICS

Strained Metal Foil Shows Structure

USING AN ELECTRON transmission microscope and motion picture techniques, research workers at the University of Cambridge, England, are now able to watch what actually happens to metal foils when they are strained to breaking point.

Dr. P. B. Hirsch and Prof. A. H. Cottrell, both of Cambridge, have found that structures "virtually down to the atomic scale can be seen for the first time."

They hope the method will enable scientists to understand thoroughly how the engineering properties of solids result from atomic structures.

The new technique has been used, for example, to watch what happens when a pure metal is suddenly cooled from high temperatures, to find out how nuclear radiation damages metallic crystal structures, and to follow the arrangements and dislocations that occur when a metal foil is gradually strained to its breaking point.

Science News Letter, June 18, 1960

MILITARY SCIENCE

Device to Stage Battles With Nuclear Subs

THE NAVY'S Submarine School in New London, Conn., is getting a $3,600,000 nuclear submarine training center that will provide realism in waging mock sea battles. To be built by Minneapolis-Honeywell Regulator Company, the new training facility will utilize a giant computer and electronic techniques to duplicate, in color, the attack centers of three nuclear submarines.

Science News Letter, June 18, 1960

TECHNOLOGY

Largest Nuclear Power Reactor Operating Well

THE NATION'S largest operating nuclear power reactor has performed "outstandingly well" during its initial test run, the General Electric Company and Commonwealth Edison Company have reported.

The reactor forms the heart of the huge Dresden Nuclear Power Station at San Jose, Calif. It produced nearly 25,000,000 kilowatt hours of electricity while operating at power levels up to 90,000 kilowatts for its two-week test.

Science News Letter, June 18, 1960