They were assisted primarily by Drs. Robert Serber, Wilson Powell, A. C. Helmholz and by George Farley and Leslie Cook, all of the Radiation Laboratory scientific staff. Walter Gibbins was in charge of the work crew.

Science News Letter, February 12, 1949

NUCLEAR PHYSICS

Beam of Atomic Bullets

➤ THE world's most powerful beam of protons, a special kind of atomic bullet, has been fired by the giant cyclotron at the University of California. The protons pack 350,000,000 electron volts of energy.

This was reported to the meeting of the American Physical Society in Berkeley, Calif., by Dr. Kenneth MacKenzie, who collaborated with William Brobeck, assistant director of the Radiation Laboratory, in designing new equipment for the machine.

The 4,000-ton cyclotron has been the world's most powerful since it went into operation in 1946. But heretofore it accelerated only deuterons, the nuclei of heavy hydrogen atoms, and alpha particles, the nuclei of helium atoms. Protons are the nuclei of ordinary hydrogen.

New equipment installed in the machine in December makes it possible now for Berkeley scientists to switch at will from one to another of the three types of atomic bullets. Operation of the machine is a part of the University's research program for the Atomic Energy Commission.

In a second scientific paper, Dr. Robert Thornton, physicist in charge of the big machine, said that neutrons produced in bombardments by the protons range in energy up to 350,000,000 electron volts. The previous top energy for neutrons was the 100,000,000-electron-volt-beam produced by deuteron bombardments with the same cyclotron.

When the protons strike target atoms, the smash-up produces mesons, the penetrating cosmic ray particles first made in the laboratory at Berkeley in alpha particle bombardments.

Research with the protons will enable scientists to penetrate farther into the atomic nucleus and to learn more about its structure.

Acceleration of protons was made possible by changes in the oscillator, which supplies the radio frequency power to drive the atomic bullets around the cyclotron chamber. The change was necessary partially because the proton, only one half the weight of the deuteron, travels faster.

With protons, the oscillator starts out by giving the particles a push 50,000,000 times a second. By the time the bullets reach their top energy they have become somewhat heavier and begin to lag; to compensate for the lagging, the pushes at this point come 30,000,000 times a second.

For deuterons, the accelerations at the beginning are 25,000,000 per second and 17,000,000 a second when they reach their top energy.

At 350,000,000 electron volts, the protons have a velocity of 125,000 miles per second (two-thirds the velocity of light). About 1,000,000,000,000 emerge from the atom-smasher each second.

The new oscillator is capable of putting out 100 kilowatts of high frequency power, comparable to a high-powered radio station.

Dr. Thornton said the 10-foot wall of concrete surrounding the cyclotron is sufficient protection for personnel against the high energy radiations.

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Question Box

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INVENTION

Weight On Casting Line Is Made Expendable

➤ BAIT-CASTING fishermen know that a weight is an advantage in getting a good, long cast; but then there's the nuisance of dragging the thing back through the water. Henry L. Oliver of Durango, Colo., and Mina B. Anderson of Albuquerque, N. Mex., provide an expendable weight that tears loose at the end of the cast. On this they have received patent 2,460,526.

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