

They were assisted primarily by Drs. Robert Serber, Wilson Powell, A. C. Helmholtz 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 lab-

oratory 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.

Science News Letter, February 12, 1949

# 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.

Science News Letter, February 12, 1949

## SCIENCE NEWS LETTER

Vol. 55 FEBRUARY 12, 1949 No. 7

51,300 copies of this issue printed

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., North 2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change, please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Copyright, 1949, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service. Science Service also publishes CHEMISTRY (monthly) and THINGS of Science (monthly).

Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C. under the act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to periodical literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566 and 360 N. Michigan Ave., Chicago, State 4439.

# SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: Edwin G. Conklin, Princeton University; Karl Lark-Horowitz, Purdue University; Kirtley F. Mather, Harvard University. Nominated by the National Academy of Sciences: Harlow Shapley, Harvard College Observatory; Warren H. Lewis, Wistar Institute; R. A. Millikan, California Institute of Technology. Nominated by the National Research Council: Hugh S. Taylor, Princeton University; Ross G. Harrison, Yale University; Alexander Wetmore, Secretary, Smithsonian Institution. Nominated by the Journalistic Profession: A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Baltimore Sun Papers; O. W. Riegel, Washington and Lee School of Journalism. Nominated by the E. W. Scripps Estate; H. L. Smithton, E. W. Scripps Trust; Frank R. Ford, Evansville Press; Charles E. Scripps, Scripps Howard Newspapers.

Officers—President: Harlow Shapley, Vice President and chairman of Executive Committee: Alexander Wetmore, Treasurer: O. W. Riegel, Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Frank Thone, Jane Stafford, A. C. Monahan, Marjorie Van de Water, Martha G. Morrow, Ron Ross, Lydia Schweiger. Science Clubs of America: Joseph H. Kraus, Margaret E. Patterson. Photography: Fremont Davis. Sales and Advertising: Hallie Jenkins. Production: Priscilla Howe.

## Question Box

### AERONAUTICS-PHOTOGRAPHY

How does the airborne dark room operate? p. 108.

### CHEMISTRY

What are some of the newest fire-fighting weapons? p. 106.

### GENERAL SCIENCE

How is UNESCO working for world peace? p. 101.

### NUCLEAR PHYSICS

What do the French propose to do with the second atomic pile soon to be built? p. 103.

Photographs: Cover, University of California; p. 99, Penn. State College; p. 101, UNESCO; p. 103, U. S. Air Force; p. 106, Eastman Kodak Co.; p. 107, Standard Oil Co.

What goes on in the heart of the atom? p. 108.

What is the significance of having mesons created by the synchrotron? p. 99.

### NUCLEAR PHYSICS-CHEMISTRY

What new source of energy may have been discovered? p. 103.

### PSYCHOLOGY

What are some of the opinions of Stalin's proposal to meet Truman? p. 108.

### SAFETY

What causes most of the accidental deaths on farms? p. 104.