PHYSICS

New Particle Discovered

➤ THE DISCOVERY of a new elementary particle, omega meson, made at the University of California's Lawrence Radiation Laboratory, and the finding of unidentified additional "particle systems" in the subatomic realm are believed to make it possible to push on in the next decade or two to a better explanation of how matter is put together. More than 30 so-called elementary particles are known.

The new elementary particle discovery gives important insight into the structure and behavior of the atomic nucleus. It plays an important role in the structure of protons and neutrons, the basic building blocks of atomic nuclei.

The mass of the omega is 1540 electron masses. Like the neutron, the omega has no electrical charge. The research is reported in Physical Review Letters, 7:178, 1961. The responsible researchers are Dr. B. C. Maglic, visiting scientist from Yugoslavia, and Drs. Luis W. Alvarez, A. H. Rosenfeld and M. L. Stevenson, physics professors on the Berkeley campus. The research program of the Laboratory is supported by the Atomic Energy Commission.

The discovery was made by means of a three-part high energy particle research system at Berkeley: the 6.2 billion electron volt (Bev), bevatron; the 72-inch liquid hydrogen bubble chamber in which particle tracks are photographed; and an extensive analytical complex.

Identification of the particle was achieved through precise measurement and analysis of bubble chamber photographs of the tracks of particles created when antiprotons and protons come together and annihilate.

The omega, predicted several years ago on theoretical grounds, was found only through a highly sophisticated approach. The difficulty arose from the fact that the particle has an extremely short lifetime (about ten thousand billion billionths of a second or more precisely, ten raised to the minus 22nd power). Because of this short lifetime and its electrical neutrality, it does not make a track of its own in the photographs. Essentially, the omega breaks up into three pi mesons (or pions, the lightest weight mesons). Immediately afterward it emerges from the annihilation zone.

The problem of the scientists was to select photographs in which the event seemed possible, to work back from the observable particles toward the annihilation, and to prove that three observable pions came from the break-up of an unobservable omega.

Some 30,000 photographs were analyzed. In 90, analysis showed that the presence of omegas was essential to explain the observable phenomena.

Two years ago scientists at Stanford University measured the size of the electrical cloud of the proton and neutron by means of high energy electrons, and the "electrical size" proved to be smaller than the "nuclear size."

Theoretical physicists suggested that the smaller electrical size could be explained if there existed in the cloud of mesons, in addition to pions, two heavier types of mesons. Rho and omega were the names given to the two predicted mesons.

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TECHNOLOGY

No Peaceful A-Tests Soon

➤ A SPEEDY END to the current United States ban on nuclear tests would not mean that Project Chariot, the proposal for using atomic bombs to dig an Alaskan harbor, would be undertaken soon, John S. Kelly, chief of the Atomic Energy Commission's nuclear explosives branch, said in Washington, D. C.

Mr. Kelly said biological and environmental studies to determine fallout effects on the northwest Alaskan coast, site of the venture, are still in progress, with "gaps in our knowledge" as yet unfilled.

Even if the project is cleared and authorized, construction work that will take more than a year is necessary before the blast can be set off.

"Even if somebody said, 'Go as fast as you can,' it would still be quite some time before Chariot is ready," he told SCIENCE SERVICE (See SNL, 79:375, June 17, 1961).

Another project in the AEC's Plowshare program for peaceful uses of atomic energy is "well ahead of Chariot" from the planning and construction standpoint, Mr. Kelly said. This is Project Gnome, a thermal energy experiment in New Mexico.

Project Gnome will employ a 10-kiloton device detonated underground in a dry salt deposit near Carlsbad, N. M. It will test the practicality of pumping steam or other superheated gases from a blast-created "fireball" cavity.

A shaft 1,200 feet deep connects with a lateral tunnel leading to the "fireball." Water will be pumped into the cavity, converted into steam and used to operate a generator.

The original power production conception for Gnome has been expanded to include tests of instruments recently developed to detect and monitor underground blasts.

The Chariot project was criticized by the Committee for Nuclear Information, St. Louis, last June as a potential threat to the entire Alaskan "food chain" of plants, animals and men. The St. Louis committee said fallout might affect lichen eaten by caribou, which are in turn eaten by humans.

AEC established Plowshare in 1957, but the first shot in the program has yet to be fired. The U. S. ban on nuclear testing was announced on August 22, 1958, following a Russian test ban on March 31 of that year.

Mr. Kelly and his AEC group are optimistic about the industrial possibilities of well-placed bombs. They believe, for example, that the nation's water resources could be increased by blasting surface lakes for storage, or canals to divert water from a "wet" area to a dry one. In arid regions where normally dry streams reach seasonal flood stages, an explosion could be planned to create a permanent "rubble zone," rather than a crater. When the man-made basin overflows, the water would soak into the permeable rubble and be stored, instead of first flooding the surrounding plain and then evaporating.

A nuclear blast might be used to strip natural barriers from an ore deposit to make it accessible for open-pit mining.

The Canadian government and oil interests would like to see nuclear blasts tried as a means of getting at the Athabasca Tar-sands oil deposits, mixed with sand and silt under 17,000 square miles of land in Alberta province. It cannot be profitably pumped now, although the potential yield is gauged at twice the known reserves of recoverable liquid oils in the world.

Underground blasts, Mr. Kelly said, might cause the silt and sand to settle to the bottom of newly made cavities and shoot the liquid oil to the surface for recovery from pools.

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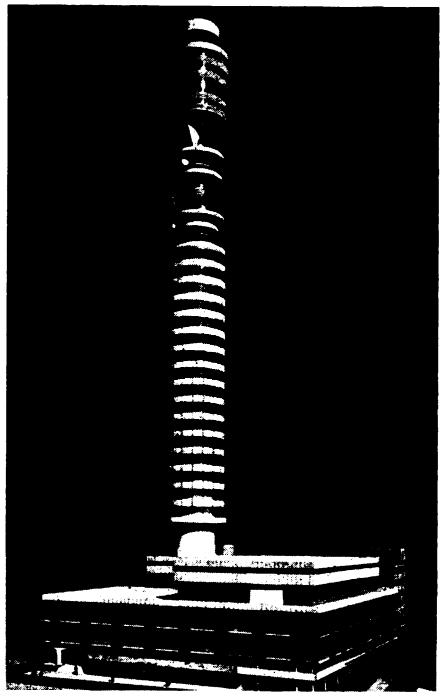

TALLEST TOWER—The new post office building in London will have the tallest tower in the city, 563 feet, when completed. At the 500-foot level, a restaurant will provide visitors with a bird's eye view.