

PHYSICS

New Theory of Matter

Dirac advances classical, non-quantized way of describing motion of charged matter. Discovery of a new kind of atomic particle, the K meson, is reported.

➤ A NEW theory of matter gives promise of predicting that all electricity in nature will necessarily be collected into elementary particles.

Dr. P. A. M. Dirac, the noted mathematical physicist of the University of Oxford, England, presented this new way to describe the motion of charged matter at the conference celebrating the 30th anniversary of the Institute of Theoretical Physics in Copenhagen presided over by Prof. Neil Bohr.

The new Dirac treatment is so far classical. It takes no account of the quantum nature of matter and energy (that they can be considered particles as well as waves). Dr. Dirac hopes that the introduction of the quantum into his new equations will automatically make the equations predict that all electric charges in nature will collect into elementary particles. They should also in their quantum form predict the charge on the electron from the values of Planck's quantum constant and the speed of light.

The characteristic feature of Dr. Dirac's equations in their present classical or un-

quantized form is that they do not now leave open the possibility of describing anything but the continuous distribution of matter and electricity. In this way they differ fundamentally from the equations now ordinarily used to describe the electromagnetic behavior of matter. These usual equations have the notion of "elementary point charge" introduced into them from outside, as required by experiment, and not as an inner consequence of the structure of the equations themselves.

The usual theory gives rise to infinite forces and other infinities in the neighborhood of these artificially introduced point charges. Dr. Dirac hopes these infinities will be automatically avoided in the quantum form of the new theory.

Leaders in theoretical physics from all over the world attending the conference expressed interest in the new Dirac theory, but since his ideas were only two weeks old, they have not received investigation by others as yet.

Discovery of a new kind of atomic particle, an addition to the meson family,

has been made in the laboratory of Prof. C. F. Powell of the University of Bristol, England, by C. O'Ceallaigh of Cork, Eire. Mesons are particles found in cosmic rays bombarding the outer atmosphere of the earth with great energies.

The new K meson was reported to the same meeting as a singly charged particle with a mass about 1,000 times that of the electron. Its track in a photographic emulsion showed that it had been brought to rest and undergone radioactive decay into the familiar mu meson plus at least one and perhaps two neutral particles.

At this conference, held to commemorate the establishment of Niels Bohr's institute 30 years ago with Rockefeller Foundation-International Education Board support, 260 invited participants heard also discussion of the so-called V meson particles.

New evidence of the V particles was presented by Prof. Powell and by Dr. C. C. Butler of the Manchester University group headed by Prof. P. M. S. Blackett. Neutral V-particles break up into a positive and a negative particle. Charged V-particles break up into at least one neutral particle and a charged particle. Dr. Butler presented a letter from Dr. Robert B. Leighton and Dr. Carl D. Anderson of the California Institute of Technology which did not uphold the notion that a proton and a negative meson are occasionally the products of decay of the neutral V-meson. Dr. Butler himself reported that he was inclined to believe that some of the tracks he had observed showed protons as decay products.

Several physicists at the conference expressed the hope that the discovery of negative protons is not far away.

There was considerable discussion of the nature of the motions of neutrons and protons within the nucleus and of the distortions of the nuclear surface due to these motions. There is indication that there is an approach being made toward a synthesis of the independent particle or atom-like model of the nuclear interior with the model that pictures the nucleus as a liquid drop.

Science News Letter, August 4, 1951

PLANT PATHOLOGY

Sugar Beet Virus Disease Suspected Menacing U. S.

➤ VIRUS YELLOWS, a disease which drastically cuts sugar beet growth, is now suspected for the first time to be present in the United States. The disease is considered the most damaging menace to Europe's sugar beet crop.

Dr. George H. Coons, U. S. Department of Agriculture plant pathologist, got a positive serological test for the virus on beets grown in Michigan. Although now in a latent, or inactive state, if the virus spreads, it could become a serious menace to the U. S. sugar beet crop. Dr. Coons is now in Europe studying methods of combating the disease.

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METEOR CRATER?—Canadian scientists are now studying information collected in the region near Brent, Ontario, where this Royal Canadian Air Force photograph was taken from a height of 35,000 feet. They want to learn, states George Prudham, Mines and Technical Surveys Minister, whether the curious circular depression, visible in the center of the picture, is a meteoric crater.