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(For oral presentation at meeting of American Physical Society at Pasadena, June 24-26, 1948)

Observation of Mesons Produced by the 184-inch Cyclotron

and Eugene Gardner.

1. Background Problems

In the arrangement used for detecting mesons at the 184-inch Berkeley cyclotron the photographic plates are placed in a region where the flux of neutrons is high. Tracks arising from neutron-proton collisions and neutron-initiated stars make a "background" which slows down the study of the meson tracks. During the early exposures the ratio of background tracks to meson tracks varied from 10 to 10,000, and the reason for the variation was not understood. Some progress has been made toward an understanding of the factors which affect the background, and exposures have become more reporducible; but the general problem is not yet completely solved. At least a part of the difficulty is associated with deuteron contamination in the alpha-particle beam. Operation has been improved by the installation of a double probe which will read alpha-particle current and deuteron current separately. This enables the cyclotron operator to set the arc pulse at the correct place in the frequency modulation cycle to get the maximum ratio of alpha-particle current to deuteron current.

2. Study of Meson Tracks

An important question to be answered is whether the light mesons all come from decays of heavy mesons, or whether they are produced in a primary process at the target. In order to investigate this question

we are measuring the ratio of light mesons to heavy ones for different energies of the initiating alpha-particles.

An example has been found of a positive meson decay in which the track of the secondary meson ends in the emulsion. The range of the secondary meson is 630 microns, in agreement with the observations of Lattes, Occhialini, and Powell[1]. A more extensive study of the positive meson disintegration is thought to be worth while to give information about the mass of the hypothesized neutral meson involved in the disintegration.

The energy spectrum of the mesons produced in the cyclotron is being studied by means of photographic plates placed at various distances from the target.

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[1] C. M. G. Lattes, G. P. S. Occhialini, and C. F. Powell, Nature 160, 453, 486 (1947).

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