first forbidden of the first type; but this indication is not quite peculiar to our theory. The above argument concerning the spectrum suggests that the same conclusion would be reached in any choice of invariants except, perhaps, in certain special cases. This general result may be interpreted to mean that the long-lived elements are not long-lived for the most part because of forbidden spin or parity change, or it may mean that the application of beta-decay theory must be further refined.

Second forbidden transitions in this theory show no change of parity and $\Delta i = \pm 2, \pm 3$. The shape of these Kurie plots is concave to the axis at high energy for all matrix elements.

We are indebted to Professors Konopinski and Uhlenbeck for helpful discussions of this subject at the Washington Conference and to the former for access to his review article on beta-decay before publication.

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The Second Maximum of the Rossi Curve

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SINCE Schmeiser and Bothe[1] reported that the second maximum in the Rossi transition curve at about 17 cm of lead is due to small angle showers a number of investigations have been made on this maximum. The results have been somewhat contradictory as to the height of the maximum and angular divergence of showers responsible for the maximum. In view of this contradiction in data taken mainly with counters, it was thought worth while to investigate this problem with a cloud chamber. This method would eliminate the uncertainty in angle inherent in counter measurements as well as the masking effect of counter background.

The apparatus used consisted of a vertical, counter-controlled, cloud chamber and a vacuum tube time delay control circuit. By means of a mirror system a camera took two pictures 54° apart. All lead was placed above the top counter so that non-ionizing particles as well as ionizing particles might cause an expansion.

The results obtained are shown in Fig. 1. More than 200 showers were recorded for each point near the maximum so that the probable error for these points is less than 5 percent. The Rossi curve for the total showers recorded has a definite maximum at about 17 cm of lead. The rise in the curve (nearly 30 percent) is well above the probable error as computed from the number of showers. The second curve is for two-particle showers with angular divergence greater than 20°. The similarity of the two curves suggests that the maximum is mainly due to this component. So few narrow angle showers were obtained that it was impossible to construct a similar curve for them or to draw any conclusions as to whether or not they exhibit a different behavior in the neighborhood of the maximum. A curve of total intensity on a different scale is included for purposes of comparison. It was obtained from the photographs used in obtaining the shower curves.

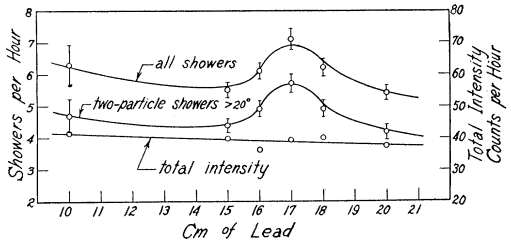

FIG. 1. Total intensity and shower intensity of cosmic rays.

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Production of Mesotrons by Ionizing Radiation

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IN a series of 3881 random expansions of a large Wilson cloud chamber containing five horizontal lead plates each 1 cm thick one photograph was obtained which can be interpreted as the production by a heavy particle of a shower containing at least four heavy particles and possibly more. (Fig. 1).

The incoming particle must pass through a half-inch of cold rolled steel to enter the chamber. If it were an electron it is extremely unlikely that it would be unaccompanied by shower particles. The energy of the incoming particle must be quite great to produce such a shower, and this would almost insure the presence of shower particles if it were an electron.

The short heavy track appearing directly under the top plate is either a mesotron or a proton. The track which

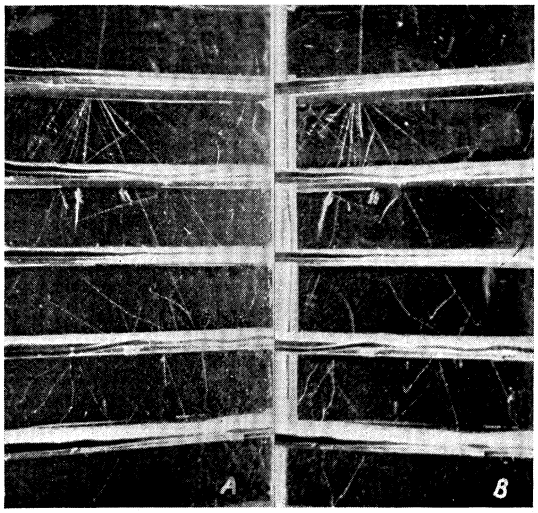

FIG. 1. Wilson cloud-chamber photograph. Each lead plate is 1 cm thick. Figures *A* and *B* were taken at 30° to the left and right of normal.