Letters to the Editor

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Example of the Cascade Decay of a Negative Hyperon*

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AN example of the cascade-type decay of a negatively charged hyperon has been found in a magnetic field cloud chamber operated at Echo Lake, Colorado. This event is reproduced in Fig. 1. Track 1 is unmeasurable both as to momentum and sign. It decays into a slow-moving light meson, track 2. A V^0 particle (tracks 3 and 4) is seen to decay at a point 1.1 cm from the hyperon decay point. All four tracks are ionizing at less than twice minimum. The pertinent measurements on this event are given in Table I.

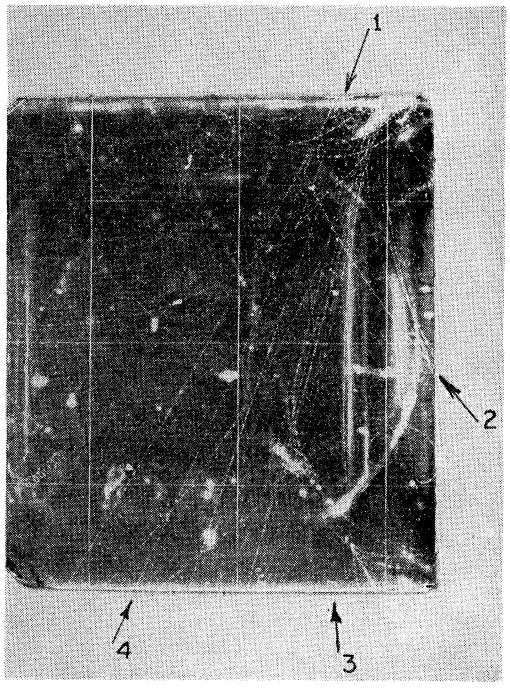

FIG. 1. A negative hyperon, track 1, decays into a light meson, track 2, and a Λ^0 which then decays into a positive and a negative particle, tracks 3 and 4. The blob at the point of first decay is a delta ray.

TABLE I. Momenta, signs, and space angles of particles observed in the cascade decay.

Track number	Sign	Momentum (Mev/c)	Space angle
1	?	?	41.3°±0.3°
2	···	116± 6	
3	···	220± 25	26.7°±0.7°
4	+	1540±200	

The measured Q value of the V^0 decay on a Λ^0 scheme is 33±6 Mev.

Since most of the uncertainty is in the momentum of track 4, the following procedure was used to obtain the Q value of the cascade particle. The Q value of the Λ^0 was assumed to be 37±1 Mev, which is within the value quoted by several observers.[1]

The momentum of track 4 was raised to 1690 Mev/c so as to give this Q value in conjunction with the central value of the momentum of track 3. The momentum of the Λ^0 itself and its position in space was then calculated from the corrected data of track 4, the measured values of track 3, and the space angle between them. This turned out to be 1890±175 Mev/c, and the error reflects only the error in the momentum of track 3, in the total angle between 3 and 4 and in the assumed uncertainty in the Λ^0 Q-value. The momentum of the Λ^0 as calculated from transverse momentum balance with track 2 was consistent with the above value, but has very large errors due to uncertainty of the space position of a line drawn through the two decay points.

The Q value of the cascade was then calculated on the assumption that track 2 was a π^- meson. The result then is the decay scheme:

$$V^- \rightarrow \Lambda^0 + \pi^- + 63\pm 9 \text{ Mev}$$
$$\searrow$$
$$p + \pi^- + 37\pm 1 \text{ Mev}.$$

The Q value for the cascade is in good agreement with the two previously published values.[2]

The blob seen at the apex of the first decay, when viewed in stereo, is a spiral whose axis is in the direction of the magnetic field in that part of the chamber. It is therefore assumed to be a delta ray.

A search was made for visible origins of the Λ^0 other than the decay point of the cascade. The only such origin was that of the cascade itself, but this was not consistent with the two-body decay of the Λ^0.

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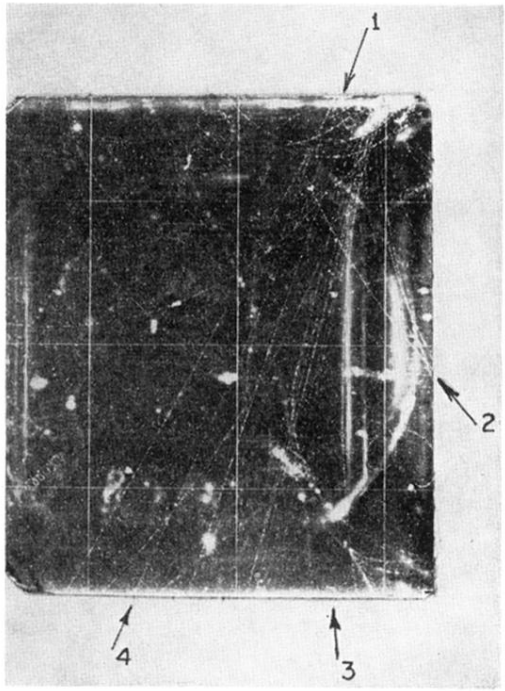
† Now on active duty with the U. S. Army.

[1] R. W. Thompson, *Proceedings of the Second Rochester Conference* (University of Rochester, Rochester, 1952); Bridge, Peyrou, Rossi, and Stafford, Phys. Rev. **91**, 362 (1953); Van Lint, Trilling, Leighton, and Anderson, Phys. Rev. **95**, 295 (1954); Friedlander, Keefe, Menon, and Merlin, Phil. Mag. **45**, 333 (1954).

[2] W. B. Fretter and F. W. Friesen, Phys. Rev. **96**, 853 (1954); E. W. Cowan, Phys. Rev. **94**, 161 (1954).



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