ticles are produced; f_{TS} is the statistical weight, taking account of the spin and isotopic spin of the particles in the final state; $W(E_0)$ is the phase-space volume for a total center-of-mass energy E_0. For comparison with experiment we use Barashenkov's hypothesis[3] that the pions and baryons are formed in the volume V_π, but that the K mesons are produced in a smaller volume V_K ($\xi = V_K/V_\pi = 0.0232$). If there are k K mesons in the final state and $-l\,(k+l=n)$ pions and baryons, then V^{n-1} in (1) must be replaced by V_1^{n-1}:

$$V_1^{n-1} = \frac{(k+l\xi)\,\xi^{k-1}}{n} V^{n-1}. \qquad (2)$$

From (1) and (2) we obtain the following relations between the cross sections for 8 Bev pions:

$$(\pi^- + p \to \Omega^- + 3K)/(\pi^- + p \to 2K + \overline{K} + \Sigma) = 3.3\cdot 10^{-2}, \quad (3)$$

$$(\pi^- + p \to \Omega^- + 3K)/(\pi^- + p \to \Xi + 2K) = 4.3\cdot 10^{-3}, \quad (4)$$

$$(\pi^- + p \to \Omega^- + 3K)/(\pi^- + p \to \pi + N) = 0.86\cdot 10^{-4} \quad (5)$$

and for 4-Bev antiprotons

$$(p + \bar{p} \to \Omega + \bar{\Omega})/(p + \bar{p} \to \Xi + \bar{\Xi}) = 0.43. \quad (6)$$

It is assumed in the calculation that the particles in the final state are nonrelativistic. Since the results in the statistical theory depend strongly on the choice of the volume V, the calculated ratio (3) is more reliable, since it does not depend on V.

If we use the experimental data on the cross section of the reaction $\pi^- + p \to \pi + N$ for π^- energies ~ 8 Bev ($\sigma \sim 6$ mb),[4] we get for the reaction $\pi^- + p \to \Omega^- + 3K$ at the same energy $\sigma \sim 0.5\ \mu$b.

The cross section for $\pi^- + p \to \Xi + 2K$ is obtained as $\sigma \sim 120\mu$b. This value is significantly larger than the experimental one,[5] which has $\sigma = 2.3^{+3.5}_{-1.6}\ \mu$b for 5 Bev negative pions. It is possible, therefore, that the absolute values of the cross sections calculated above for the production of Ω^- particles are overestimates. Since at present only two cases of Ξ^- obtained in an accelerator are known, it seems natural from (4) that the Ω^- particle has not yet been observed, if indeed it even exists.

On the basis of formula (6), searches for Ω^- and other possible heavier hyperons can be usefully made in reactions involving nucleon-antinucleon collisions.

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MEASUREMENT OF THE ANGULAR CORRELATIONS OF 298 — 880 kev AND 298 — 966 kev GAMMA CASCADES OF Dy^{160}

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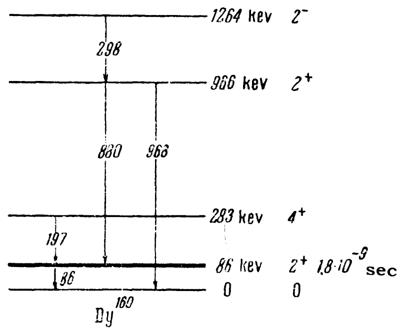
THE decay of Tb^{160} and the decay scheme of the Dy^{160} nucleus have repeatedly been investigated by various methods, with particular detail in references 1 — 6.

It can be assumed that the sequence of the most intense γ transitions and the spins and parities of the normal and excited states of Dy^{160} with energies 86, 283, 966 kev (the figure shows the corresponding part of the decay scheme of Dy^{160}) have been reliably established. The information on the spins and parities of the other levels is contradictory. To the level with energy 1264 kev there is assigned a spin 3^-,[1,2] 4,[3] and 2^-.[4-6]

Bertolini and his co-workers[3] measured the an-



gular correlations between the γ transitions with energy 298 kev and with energy above 750 kev. Ofer[5] measured the angular correlation separately for a number of γ cascades and particularly for the 298 — 880 kev and 298 — 966 kev cascades. The obtained results, especially for the 298 — 966 kev cascade, show that the 1264-kev level has the characteristic 2^- and dipole transition with energy 298 kev; the possible admixture of quadrupole radiation is less than 1/1000. The data for the 298 — 880 kev cascade obtained in the same paper lead to the transition sequence 2 (D), 2 (D+Q) 2 for $\delta^2 = 3600$, i.e., the intensity of the quadrupole radiation is 3600 times that of the dipole. There are no indications in the paper, however, of any correction for the contribution of the angular correlation of the 298 — 966 kev cascade in measuring the angular correlation of the 298 — 880 kev cascade.

We have measured the angular correlation of the 298 — 966 kev and 298 — 880 kev γ cascades with the apparatus previously described.[7]† To prevent false coincidences due to Compton scattering from one crystal to another, the crystal used to count the 880 and 966 kev photons was screened with a lead filter 5 mm thick on the front and 4 mm on the side surface. For measurements at 90 and 135°, a lead screen 5 mm thick was interposed between the crystals. After introducing corrections for the variations of the single loadings in the counters and for the finite angular resolution of the detectors, the angular correlation function of the 298 — 966 kev cascade was found to be

$$W(\theta) = 1 + (0.23 \pm 0.03) P_2(\cos\theta),$$

corresponding to the sequence of transitions 2 (D+Q) 2 (Q) 0 if the mixture ratio $\delta^2 = I(Q)/I(D)$ in the 298-kev transition is less than 1/1000. The obtained result entirely agrees with the measurement of the angular correlation of this cascade by Ofer.[5] By a suitable adjustment of the window of the pulse-height analyzer, the 966-kev γ line was practically completely separated from the 880-kev γ line.

In measuring the angular correlation of the 298 — 966 kev cascade corrections were made for the contribution of the angular correlation of the 298 — 966 kev cascade, for the variation of the single loadings in the counters, and for the finite angular resolution of the detectors. As a result, the following angular correlation function was obtained for the 298 — 880 kev cascade:

$$W(\theta) = 1 - (0.116 \pm 0.037) P_2(\cos\theta).$$

If account is taken of the results obtained for the 298 — 966 kev cascade, this correlation function agrees best with the transition sequence 2 (D) 2 (D+Q) 2, where the mixture ratio δ^2 in the 880-kev γ transition should be ≈ 56 $(\delta < 0)$, i.e., the intensity of the dipole radiation (M1) in the the 880-kev γ transition should constitute $(1.8 \pm 1.5)\%$ and the intensity of the quadrupole radiation (E2) should be $(98.2 \pm 1.5)\%$. This result differs from the result of Ofer,[5] who found the 880-kev transition to be practically pure Q.

From our work it follows that the spin of the 1264-kev energy level is 2.

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†We take this opportunity to correct an error made in reference 7. On page 1364, line 9 from the bottom should read "spin $^9\!/_2$" (instead of $^3\!/_2$), line 7 from the bottom should read "spin $^3\!/_2$" (instead of $^9\!/_2$).

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CRITICAL CURRENTS IN SUPERCONDUCTING TIN FILMS

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THE most interesting measurements of critical currents in superconducting films are those on films of such geometry that the magnetic field