Title
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Publication Date
1955-04-04
Radiation Laboratory

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BERKELEY, CALIFORNIA
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ANOMALOUS MESON DECAY

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Printed for the U.S. Atomic Energy Commission
ANOMALOUS MESON DECAY*

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It has been pointed out by Primakoff\textsuperscript{1} and others\textsuperscript{2} that the sudden creation of rapidly moving particles in meson decay is necessarily accompanied by radiation with the spectrum (classical) \( P(\omega) d\omega \sim d\omega/\omega \). Primakoff applied this idea to the \( \pi^- - \mu \) decay, which should be observably anomalous once in 5000 times. Since this rate of radiation increases rapidly with the velocity of the charged decay products, one must expect a much larger fraction of anomalous decays of heavier mesons. The probability for the photon to carry away 1/4 to 3/4 of the average energy of the charged particles is tabulated for those heavy meson decays in which anomalies are most easily noticeable: two-particle decays and decays into charged particles only.

<table>
<thead>
<tr>
<th>PARTICLE AND DECAY SCHEME</th>
<th>PROBABILITY FOR OBSERVABLY ANOMALOUS DECAY BY ELECTRIC DIPOLE PHOTONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \theta \rightarrow \pi^+ + \pi^- )</td>
<td>( \frac{1}{200} ) (constructive interference from two decay products.)</td>
</tr>
<tr>
<td>( \gamma^\pm \rightarrow \pi^+ + \pi^- + \pi^\mp )</td>
<td>( \frac{1}{400} ) (constructive interference from three decay products.)</td>
</tr>
<tr>
<td>( \Lambda^0 \rightarrow p + \pi^- )</td>
<td>( \frac{1}{1500} )</td>
</tr>
<tr>
<td>( \pi^\pm \rightarrow \mu^\pm + \gamma )</td>
<td>( \frac{1}{8000} )</td>
</tr>
</tbody>
</table>

TABLE I

* Assisted in part by the Office of Ordnance Research.
Among the approximately one hundred $\Upsilon$-mesons that have been observed there has been reported one anomalous event that can be interpreted as a radiative decay.
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3. We are indebted to Dr. Yash Pal for informing us of this observation prior to its publication in the Proc. Ind. Acad. Sci.