NUCLEAR INTERACTIONS OF K-MESONS

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ABSTRACT

Fast K-mesons (τ- as well as Kₑ⁻-mesons) with energies between 150 and 250 MeV can cause nuclear disintegrations and lose a substantial fraction of their kinetic energy without losing their identity. The character of the interaction in three of the four cases discussed here exhibit a remarkable degree of similarity.

The nuclear capture of a K-meson at rest is discussed. The nature and distribution of prongs in the capture star suggest that a Λ°-hyperon may have been formed during the capture process.

I. INTRODUCTION

DURING recent investigations with large emulsion block detectors¹ exposed to cosmic radiation at high altitude, we have observed examples of the interaction of fast K-mesons with nuclei and have also obtained some additional information on the interaction of negative K-mesons at rest. In this paper we describe five events:

(a) three have been interpreted as nuclear interactions of fast K-mesons,
(b) one event can be attributed either to Coulomb or to nuclear interaction of a K-meson, and
(c) one represents an example of a negative K-meson which gives rise to an unusual capture star when at rest.

For the sake of convenience and completeness in describing the available information on these events, we have adopted the following conventions. The tracks are classified as white, grey or black as given in Table I. This is,

<table>
<thead>
<tr>
<th>Type of track</th>
<th>Symbol</th>
<th>Grain density interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>w</td>
<td>g &lt; 1.5 gₚt*</td>
</tr>
<tr>
<td>Grey</td>
<td>g</td>
<td>1.5 gₚt &lt; g &lt; 4 gₚt</td>
</tr>
<tr>
<td>Black</td>
<td>b</td>
<td>g &gt; 4 gₚt</td>
</tr>
</tbody>
</table>

* gₚt is the grain density at the plateau of the ionization curve as measured by grain counting tracks of fast electron-positron pairs.
therefore, a classification of particles according to specific ionisation irrespective of mass and charge.

If the mass of the particle is known, the symbols L, K and Y, with their conventional meanings, are used. If in addition the exact decay scheme is known, the particle is designated by its Greek letter (µ, π, τ, Λ, etc.). If the decay process cannot be completely described, we add the available