HYPERON PRODUCTION BY 3, 3.5 AND 5 GeV/c $K^+$ MESONS


CERN, Geneva

(Presented by F. Muller)

We report here preliminary results on hyperon production by positive kaons, through reactions of the following type:

$$K^+ p \rightarrow KK\Lambda (\pi).$$

The experiment was performed at CERN, in the Saclay bubble chamber exposed to beams of 3, 3.5 and 5 GeV/c $K^+$-mesons, with low $\pi$-contamination (less than 5%).

The cross sections for the various reactions are as follows (Table). It is seen that the cross sections, approximately equal at 3 and 3.5 GeV/c, seem to increase when the momentum goes up to 5 GeV/c, but not spectacularly.

The $KK$ ($S = 2, B = 0, Q = 2$ or $1$) mass for the three body reactions at the two neighbouring momenta 3 and 3.5 GeV/c, is presented in Fig. 1.

An important bump is seen in the mass-range 1200–1350 MeV/c², its statistical significance is about three standard deviations. Unfortunately I do not have a slide for plot, but the $KY$ mass-spectra do not show any significant structure.

The similar $KK$ mass-spectrum for the 4-body reactions is presented in Fig. 2.

Here the interpretation of the enhancement at low mass values is more delicate, since...
there is also abundant production of $Y^*(1385)$, $K^*(891)$ and $N^*(1688)$ — see for instance Fig. 3 which exhibits the $\Lambda \pi$ mass-spectrum.

<table>
<thead>
<tr>
<th>Lab. momentum, GeV/c</th>
<th>3</th>
<th>3.5</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. M. energy, GeV/c</td>
<td>2.61</td>
<td>2.76</td>
<td>3.25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mass (MeV)</th>
<th>Width (MeV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$KK\Lambda^0$</td>
<td>$25 \pm 5$</td>
</tr>
<tr>
<td>$KK\Sigma^0$</td>
<td>$5 \pm 2$</td>
</tr>
<tr>
<td>$K^0\Sigma^+ (\pi^0)$</td>
<td>$7 \pm 2$</td>
</tr>
<tr>
<td>$K^+ \Lambda \pi^+$</td>
<td>$15 \pm 3$</td>
</tr>
</tbody>
</table>

DISCUSSION

Trebykhovskii

My question concerns the mass and width for the $K^*K^*$ system at 1.3 GeV. Do authors think they have discovered a resonance in this system, and if so, what is its mass and width?

Müller.

The «bump» lies between 1200 and 1350 MeV; it includes 61 events against 42 expected from phase space.

Sakurai.

If there is an $I = 3/2$ $K\pi$ resonance, as seems to be the case experimentally, we expect from unitary symmetry an $S = 2$ $KK\pi$ resonance. For this reason I would like to ask Dr. Müller whether he has examined the $KK\pi$ mass spectrum?

Müller.

We have not yet examined the $KK\pi$ mass spectrum.