Pion induced reaction with carbon and polyethylene targets obtained by HADES in 2014

Pablo Rodríguez Ramos, Nuclear Physics Institute, Czech Technical University in Prague, Czeckia, for the HADES collaboration

**Results for \( \pi^+N \rightarrow e^+e^-N \)**

In the summer of 2014, HADES conducted measurements with secondary pion-beam using different targets (PE) and carbon. The program is devoted to measure di-lepton radiation from baryonic resonances. In particular, we investigated a sub-threshold coupling of p to baryonic resonances in the second resonance region (e.g. N(1520)).

**Cocktail Source for reaction \( \pi^- + PE \) target**

<table>
<thead>
<tr>
<th>Channel</th>
<th>( n_{[nb]} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>(( \Delta ) Dalitz): from ( a^0 - p \rightarrow n\Delta ))</td>
<td>9.2</td>
</tr>
<tr>
<td>Single (( \pi^0 ) Dalitz): from ( \gamma \rightarrow \pi^0 )</td>
<td>2.18±3.6</td>
</tr>
<tr>
<td>( \gamma \rightarrow \pi^0 \pi^0 ) (( \gamma = \pi^0 ))</td>
<td>3.6±7</td>
</tr>
<tr>
<td>( \Delta ) Dalitz: from ( a^0 \rightarrow n\Delta )</td>
<td>10.6</td>
</tr>
</tbody>
</table>

**Inclusive Invariant and Missing Mass \( e^+e^- \) for \( \pi^- + PE \)**

Using missing mass cuts between \([900-1010]\) MeV/c \( e^+e^- \) events from the reaction:

\[ \pi^+N \rightarrow e^+e^-N \]

Using missing mass cuts between \([900-1010]\) MeV/c events from the reaction are identified:

**Conclusion & Outlook**

Using missing mass cuts we identified the events from the reaction \( \pi^+N \rightarrow e^+e^-N \). It is shown that \( e^+e^- \) yield of invariant mass above 350 MeV/c^2 region corresponding to the mass missing between \([900-1010]\) MeV/c. The HADES data measured in the same experiment and using the Strict Vector Dominance Model (VDM). The cut at 600 MeV/c is due to our model converting measured \( e^+e^- \) yield, for the decay via intermediate \( \rho^- \) so such cut-off is expected.

**References**


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