



Title	Search for X-particle as a bound state of Kaon and pion
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学 位 論 文 名	Search for X-particle as a bound state of Kaon and pion (K中間子とpi中間子の束縛状態におけるX粒子の探索)
論 文 審 査 委 員	(主査) 教 授 岸本 忠史 (副査) 教 授 能町 正治 教 授 野海 博之 准教授 阪口 篤志 准教授 與曾井 優

論 文 内 容 の 要 旨

The experiment at KEK-PS E548 was performed to search a new “Scalar particle, X” which was predicted as a bound system of “ $K\pi$ ”, that could explain the properties, mainly the narrow width of penta-quark Θ^+ , by predicting it as a $K\pi N$ bound system. We used 1.2 GeV/c K^+ beam on the proton target, to study $p(K^+, X^+)p$ reaction, where X-particle decay to $X^+ \rightarrow K^+\gamma\gamma$, in the experiment we took data with outgoing K^+ and one γ . We studied possible background and signal region, which was calculated from simulation. One of the main background was from the production of π^0 and its decay $\pi^0 \rightarrow \gamma\gamma$, which gave similar products at the final stage. As K^+ momentum from π^0 background can have maximum of 1.0 GeV/c, so we mainly studied the higher K^+ region (above 1.0 GeV/c) to find the signal corresponding to X-particle.

論文審査の結果の要旨

The experiment at KEK-PS E548 was performed to search a new “Scalar particle, X” which was predicted as a bound system of “ $K\pi$ ”, that could

explain the properties, mainly the narrow width of penta-quark Θ^+ , by predicting it as a $K\pi N$ bound system. We used 1.2 GeV/c K^+ beam on the CH_2 target, to study mainly the $p(K^+, X^+)p$ reaction, where X-particle decay to $X^+ \rightarrow K^+\gamma\gamma$. In the experiment we measured outgoing K^+ and γ rays in coincidence with the K^+ . One of the main background was from the production of π^0 and its decay $\pi^0 \rightarrow \gamma\gamma$, which gave similar products in the final stage. As K^+ momentum from π^0 background can have maximum of 1.0 GeV/c, so we mainly studied the K^+ momentum region above 1.0 GeV/c to find the signal corresponding to X-particle. We observed events in the signal region. We studied possible origin of the backgrounds and found no known physical processes that can give the events in the signal region. This study indicates observation of the X particle. The result is so important that it will open further study on this direction.

よって、本論文は博士（理学）の学位論文として十分価値あるものと認める。