The experimental search for strange multi-baryonic systems in ^{4}He(stopped K^-, YN) reaction

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Motivated by the prediction of strongly bound $\bar{K}$-nuclear states in several light nuclei, an experimental search had been performed for K^-ppn/K^-pnn states via ^{4}He(stopped K^-, N) (KEK-PS E471), and formation of tribaryonic states $S^0(3115)/S^+(3140)$ had been reported on the year 2004. Meanwhile, the FINUDA collaboration reported on possible evidence of a strongly-bound K^-pp state from a Λp invariant mass spectrum using stopped K^- reactions on light nuclear targets, and these strange di/tri-baryonic states triggered controversial discussions on their existence and nature.

To confirm the E471 results, ^{4}He(stopped K^-, N) spectra were successfully upgraded in the KEK-PS E549 experiment, and the presence of narrow ($\Gamma < 40$ MeV) tribaryonic states have not been confirmed in both proton and neutron emission channels, and severe upper limits for the formation probabilities were obtained, conversely. However, those (semi-)inclusive spectra commonly show anomalous strength at 3140 MeV/c^2, and further investigation on the correlation between formation nucleon and final state hyperon is indispensable to reveal the possible existence of broader ($\Gamma > 40$ MeV) tribaryonic states. In this contribution, we study the hyperon-nucleon pairs from the ^{4}He(stopped K^-, YN) reaction, and discuss the possible existence of di-/tribaryonic states by invariant mass and missing mass spectroscopy for non-mesonic $YNNN$ final states of the stopped K^- reaction on ^{4}He.

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