



Contribution ID: 220

Type: **Contributed talk**

Light Kaonic Nuclei at J-PARC

Wednesday, 10 July 2024 15:40 (20 minutes)

The possible existence of deeply-bound \bar{K} -nuclear bound states (kaonic nuclei) has been widely discussed as a consequence of the strongly attractive $\bar{K}N$ interaction in $I = 0$ channels. The investigation of kaonic nuclei can provide unique information about the $\bar{K}N$ interaction below the threshold, which is still not fully understood.

For the simplest kaonic nucleus, $\bar{K}NN$, we performed an experimental search using the in-flight ${}^3\text{He}(K^-, n)$ reactions at 1 GeV/c (J-PARC E15). With the Λpn final state reconstructed, we observed a significant peak below the K^-pp mass-threshold in the Λp invariant-mass spectrum, which can be interpreted as the " K^-pp " bound state.

To further understand the kaonic nuclei, we have proposed and prepared the E80 experiment to precisely measure the $\bar{K}NNN$ system as a first step toward the comprehensive study of the light kaonic nuclei from the " $\bar{K}N$ "($=\Lambda(1405)$) to " $\bar{K}NNNN$." Through the experiments and detailed theoretical calculations, we will unravel the nature of the kaonic nuclei from the property changes depending on the mass number A .

We will discuss the $\bar{K}NN$ bound state observed at J-PARC E15 and the future prospects of light kaonic nucleus studies at J-PARC starting with the E80 experiment.

session

J. Strange Nuclear Systems

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Session Classification: J. Strange Nuclear Systems