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Results of the J-PARC E27 experiment

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Recently, a study of kaonic nuclei have been actively conducted because they have a rich information, such as the sub-threshold Kbar-N interaction and the behavior of $\Lambda(1405)$ in many body systems. While the existence of kaonic nuclei has been intensively studied both theoretically and experimentally, there is no conclusive result establishing its existence. Here, we have carried out a experiment as a first phase to search for a K^-pp bound state, which is considered the simplest kaonic nucleus, by using the $d(\pi^+, K^+)X$ reaction at 1.69 GeV/c (J-PARC E27 experiment). Since the production cross section of the K^-pp would not be so large in this reaction, coincidence of high-momentum (> 250MeV/c) proton(s) in large emission angle (39°-122°) was required to enhance the signal to background ratio. We have obtained an inclusive $d(\pi^+, K^+)X$ spectrum in a wide missing-mass range from Λ , Σ to $\Lambda(1405)/\Sigma(1385)$, in high statics and high energy resolution for the first time. A broad enhancement in the proton coincidence spectra are observed around the missing-mass of 2.27 GeV/c², which might be attributed to the K^-pp production. We will report the results both on inclusive and coincidence analyses.

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