

K^-pp search experiments at J-PARC

Saturday, 31 May 2014 12:00 (0:30)

Collaboration

E27 and E15

Abstract content

Whether a Kaonic bound system, K^-pp , exists or not is one of important issues in Strangeness nuclear physics at J-PARC. Based on low-energy KN scattering data and kaonic-atom X-ray data, it is well known that the KN interaction near threshold has a strong attraction in the isospin 0 channel. It can be a driving force to form the Kaonic bound state, K^-pp . The FINUDA and DISTO collaborations reported possible signatures of the K^-pp decaying into a Λp pair. In order to establish the existence, it would be crucial to confirm it in different reactions. At J-PARC, there are two experiments searching for the K^-pp : E27 and E15. In E27, the $d(\pi^+, K^+)X$ reaction at 1.7 GeV/c is used to produce the K^-pp . The inclusive (π^+, K^+) spectrum is measured with the SKS spectrometer in a good energy resolution. To suppress large backgrounds coming from quasi-free hyperon (Y s and Y^* s) productions, coincidence of high-momentum protons emitted in the target area (39 – 122 degrees) is further required. A pilot data taking was already performed in 2012, and the analysis results on the inclusive and coincidence spectra will be presented in the conference. In E15, the ${}^3\text{He}(K^-, n)X$ reaction at 1.0 GeV/c is used to produce the K^-pp . The forward neutron is detected by a neutron hodoscope with ~ 15 -m time-of-flight. The (K^-, p) spectrum can be also obtained. At the same time, the decay products from the K^-pp are detected with a cylindrical detector system with an acceptance coverage of 66% of 4π surrounding the ${}^3\text{He}$ target. A commissioning physics data taking was carried out in a short period in May, 2013. Some preliminary results will be reported.

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Session Classification : Plenary Session