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Trace of $\Lambda(1405)$ in neutron momentum and energy spectra in $K^-_{Stopped} + d \to \pi\Sigma n$ reaction

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Abstract

In the present work, the effect of $\Lambda(1405)$ resonant state on the neutrons momentum and energy spectra due to a stopped kaon on deuteron is studied within the coupled-channel approach, employing Argonne V18SC potential to describe nucleon-nucleon interaction. For this purpose, both chiral and phenomenological potentials with different one-pole and two-pole structures have been used to investigate the dependence of the neutrons spectrum resulting from the interaction on the different models. In the following, using the Akaishi-Yamazaki model, we have shown that the $\Lambda(1405)$ resonance trace is clearly visible in such spectra. Our results indicate that a detailed study of the kaon–deuteron interaction can significantly contribute to improving our understanding of the $\bar{K}N - \pi\Sigma$ interaction and the nature of the $\Lambda(1405)$ resonance.

Keywords: Stopped negative kaon, Kaonic nuclei, $\Lambda(1405)$, Neutron momentum and energy spectrum

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