Coupled-channels Faddeev calculation of K^-d scattering length

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Knowledge of $\bar{K}N$ interaction is necessary for investigation of antikaonic nuclear clusters, attracted large interest recently. However, the interaction is not known very well. In particular, there are debates about nature of $\Lambda(1405)$ resonance, which couples $\bar{K}N$ and $\pi\Sigma$ channels. Different theoretical groups (see e.g. [1]) argue for one- or two-pole structure of the resonance. We investigated dependence of the K^-d scattering length on the different models of $\bar{K}N$ interaction, providing one or two poles for $\Lambda(1405)$ resonance. The obtained a_{K^-d} can be connected with characteristics of kaonic deuterium atom, being measured by SIDDHARTA experiment [2]. The $\bar{K}NN - \pi\Sigma N$ system is described by coupled-channel Faddeev equations in AGS form. The two-body $\bar{K}N - \pi\Sigma$ interaction models [3] reproduce all existing experimental data on K^-p scattering and K^-p atom level shift. The comparison with several approximations, commonly used for such calculations, is done.

[1] Mini-Proceedings ECT* Workshop "Hadronic Atoms and Kaonic Nuclei", Eds. C. Curceanu and J. Marton, arXiv:1003.2328 [nucl-ex].

[2] C. Curceanu et al., Eur. Phys. J. **A 31** (2007) 537.

[3] Révai and N.V. Shevchenko, Phys. Rev. **C 79** (2009) 035202.

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