

On the scattering length of the K^-d system

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A new version of multiple-scattering approximation to the Faddeev calculation of the K^-d scattering length is discussed and tested against the few existing fully reactive Faddeev calculations, beginning in 1981 [1]. The present approximation goes beyond the ‘fixed-center’ assumption for the nucleons, while including charge-exchange contributions which have been ignored in all previously published ‘fixed-center’ approximations, except for Ref. [2]. It is concluded that the K^-d scattering length is fairly large, 1 fm - 2 fm for each of its real and imaginary parts, which bears immediate consequences for the K^-d 1s atomic level shift and width measurement planned by the DEAR/SIDDHARTA experimental collaboration (see e.g. Ref. [3]). A precise value of the K^-d scattering length from the measured X-ray spectrum of the K^-d atom, plus precise results for the K^-p scattering length by improving the K^-p atom measurements [4,5], are essential for extracting the K^-n scattering length, as discussed recently by Meißner *et al.* [6], for resolving persistent puzzles in low-energy $\bar{K}N$ phenomenology [7,8] and for extrapolating into \bar{K} -nuclear systems [9].

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