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Are the chiral based $\bar{K}N$ potentials really energy-dependent?

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Collaboration

Abstract content

It is shown, that the energy dependence of the chiral based $\bar{K}N$ potentials, responsible for the occurrence of two poles in the $I = 0$ sector, is the consequence of applying the on-shell factorization introduced in [1]. When the dynamical equation is solved without this approximation, the second, unphysical, pole disappears. Accordingly, an energy- independent $\bar{K}N$ potential was derived, which supports only one pole in the region of the $\Lambda(1405)$ resonance. The potential, being energy-independent, is suitable for standard quantum mechanical calculations in $n > 2$ systems, including coordinate space variational approaches, where the energy-dependence leads to serious difficulties.
[1] E. Oset and A. Ramos Nucl.Phys. A 635, 99 (1998).

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