

Ab-initio calculations of eta-nuclear quasi-bound states

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Collaboration

Abstract content

We report on ongoing studies of in-medium η N interactions and η -nuclear quasi-bound states in few-nucleon systems, accounting self-consistently for the ηN and η -nucleus subthreshold dynamics and extending the few-body calculations of η quasi-bound states in ${}^3\text{He}$ and ${}^4\text{He}$ [1,2,3]. Our new ab-initio self-consistent calculations of the lightest η -nuclear systems, including for the first time ${}^6_\eta\text{Li}$ and ${}^7_\eta\text{Li}$, were performed within the Stochastic Variational Method. Input ηN scattering amplitudes for these calculations were constructed within coupled-channel meson-baryon interaction models that incorporate the $N^*(1535)$ resonance. It was found that the ηd system is not bound in any of the models considered, and ${}^3_\eta\text{He}$ and ${}^4_\eta\text{He}$ are likely to be nearly or just bound [1,2,3], while ${}^6_\eta\text{Li}$ and ${}^7_\eta\text{Li}$ are bound. The connection between our few-body calculations and optical-model calculations in heavier systems [4,5] will be discussed as well.

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[5] A. Cieply, E. Friedman, A. Gal, J. Mares, NPA 925 (2014) 126.

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