

Eta-mesic nuclei

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Recent theoretical studies of eta nuclear quasi-bound states in few- and many-body systems are reviewed [1,2,3,4].

Underlying energy-dependent eta-N interactions are derived from coupled-channel models that incorporate the $N^*(1535)$ resonance. The role of self-consistent treatment of the strong energy dependence of the subthreshold eta-N amplitudes is discussed.

Binding energies and widths of eta-nuclear states were calculated within several eta-N interaction models. No etaNN bound state was found. The onset of etaNNN binding occurs for the etaN scattering length $\text{Re}a_{\{\eta N\}}$ close to 1 fm, binding eta-4He requires $\text{Re}a_{\{\eta N\}}$ larger than 0.7 fm. Bound states of eta in ^{12}C are unlikely in models with $\text{Re}a_{\{\eta N\}}$ less than 0.5 fm, while $\text{Re}a_{\{\eta N\}}$ about 0.9 fm is required to reproduce the etaN bound-state candidate in ^{25}Mg from the COSY-GEM experiment [5].

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