Applications of in-medium chiral dynamics to nuclear structure

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ABSTRACT

A relativistic nuclear energy density functional is developed, guided by two important features that establish connections with chiral dynamics and the symmetry breaking pattern of low-energy QCD: a) strong scalar and vector fields related to in-medium changes of QCD vacuum condensates; b) the long-and intermediate-range interactions generated by one-and two-pion exchange, derived from in-medium chiral perturbation theory, with explicit inclusion of $\Delta(1232)$ excitations. Applications are presented for the description of ground-state properties and collective excitations of medium and heavy nuclei. The extension to hypernuclei will also be presented, showing a new interpretation of the $\Lambda$-nucleus potential.

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REFERENCES