Exploring new chiral interactions for neutron-rich nuclei

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Great progress has been made in *ab initio* nuclear structure calculations made over the past decade, enabling accurate and systematic studies up to the medium-mass region of the nuclear chart [1,2]. A crucial input for such calculations are nuclear forces derived from chiral effective field theory (EFT) [3,4]. While EFT-based interactions have been successfully applied to describe various properties of nuclei across the nuclear chart, challenges remain in accurately reproducing, for example, charge radii and spectra, as well as the evolution towards neutron-rich extremes. As a result, considerable effort has been put into understanding and improving chiral interactions.
Recent work [5] has shown that quark-mass-dependent long-range three-nucleon interactions may be more important than initially assumed. We investigate whether these terms contribute significantly at N^2LO or N^3LO in the chiral expansion and assess their potential to improve the description of medium-mass nuclei.

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