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Exploring the Relationship Between Nuclear Matter and Finite Nuclei with Chiral Two- and Three-Nucleon Forces.[1] FRANCESCA SAMMARRUCA, RANDY MILLERSON, Univ of Idaho — We address the connection between the saturating behavior of infinite nuclear matter and the description of finite nuclei based on state-of-the-art chiral two- and three-nucleon forces. We observe that chiral two- and three-nucleon interactions (at N2LO and at N3LO) which have been found to predict realistic binding energies and radii for a wide range of finite nuclei (from p-shell nuclei up to nickel isotopes) are unable to saturate infinite nuclear matter. On the other hand, it has been shown that, when the fits of the cD and cE couplings of the chiral three-nucleon interactions include the constraint of nuclear matter saturation in addition to, as is typically the case, the triton binding energy, medium-mass nuclei are underbound and their radii are systematically too large. We discuss this apparent inconsistency and perform test calculations for various scenarios to shed light on the issue.

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