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Advances in the Ab Initio Description of Neutron-Rich Nuclei[1]

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Today, computationally efficient many-body methods can be used to perform first-principles calculations for nuclei as heavy as the tin isotopes. This progress has made it possible to confront modern two- and three-nucleon interactions from Chiral Effective Field Theory (EFT) with a wealth of experimental data, in particular for neutron-rich nuclei, and provide important guidance in their ongoing refinement. Significant challenges remain when it comes to the treatment of collective correlations in doubly open-shell nuclei (e.g., due to intrinsic deformation) or the coupling to the continuum[2]. These issues have sparked new lines of research about combining complementary techniques, e.g., particle-hole expansions with symmetry breaking and restoration. The In-Medium Similarity Renormalization Group (IMSRG) offers a particular useful framework for such efforts[2,3,4]. I will give a brief overview of the state of the art of *Ab initio* nuclear many-body theory, and discuss applications of hybrid IMSRG approaches[2,5,6] to the first-principles description of selected medium-mass open-shell nuclei, including candidates for fundamental symmetry tests[6].

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