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Nuclear structure at the limits of stability

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The aim of this talk is to shed light on our understanding of many-body correlations in nuclei. Since all theoretical calculations involve effective Hamiltonians and effective Hilbert spaces, it is crucial to have a handle on the role many-body correlations play in complex many-particle systems like nuclei. This means that a sound theory should provide error estimates on the importance of neglected many-body effects. To understand these and develop mathematically rigorous error estimates is mandatory if one wants to have a predictive theory. In order to achieve the above, I will present several challenges to nuclear many-body theory and our understanding of the stability of nuclear matter. In particular, I will focus on our current understanding of many-body correlations, and how they evolve as function of the number of particles. This is of fundamental importance if we wish to use theoretical results in analysing properties of nuclei close to the drip lines. In particular, I will report on studies of weakly bound nuclei, focusing on properties like binding energies and spectroscopic factors as functions of proton-neutron asymmetry.