

Abstract Submitted
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Mean-field properties of short-ranged correlations abundance OR HEN, Massachusetts Institute of Technology MIT — While mean-field approximations, such as the nuclear shell model, provide a good description of many bulk nuclear properties, they fail to capture the short-distance and high-momentum components of the nuclear many-body wave function. In this talk I will discuss recent analysis of ab-initio Quantum Monte Carlo (QMC) calculations of nuclei from deuteron to Ca using the Generalized Contact Formalism. Our analysis shows a universal factorization of the many-body nuclear wave function at short-distance into a strongly-interacting pair and a weakly-interacting residual system. The residual system distribution is consistent with that of an un-correlated system, showing that short-distance correlation effects are predominantly embedded in two-body correlations. The nuclear scaling of our extracted spin- and isospin-dependent nuclear contact terms is shown to be scale and scheme independent and the same for short-distance and high-momentum pairs. These findings therefore allow extending the application of mean-field approximations to SRC pair formation by showing that the relative abundance of short-range pairs in the nucleus is a long-range (i.e., mean-field) quantity that is insensitive to the short-distance nature of the nuclear force.

Or Hen
Massachusetts Institute of Technology MIT

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