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Extended Random Phase Approximation (ERPA) with modern NN+NNN interactions

Content

We will discuss systematic calculations of ground-state properties, low-lying spectra, and electromagnetic response functions of closed (sub)-shell nuclei ranging from ^{4}He to ^{208}Pb. Utilizing the Extended Random Phase Approximation (ERPA) formalism [1-3], we demonstrate that ERPA provides more consistent results in scenarios where standard Random Phase Approximation (RPA) fails due to strong correlations induced by residual interactions. This is particularly relevant for modern Hamiltonians incorporating NN+NNN interactions. Presented ERPA calculations employ chiral Hamiltonians NNLOsat, ΔN2LOGO(394), and ΔN2LOGO(450), generated byt the state-of-the-art numerical code NuHamil [4]. We will highlight the advantages of ERPA over TDA/RPA and many-body perturbation theory, showcasing its potential for description of collective excitations with modern realistic potentials.

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