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Constraining Nuclear Structure Physics of Coherent Elastic Neutrino-Nucleus Scattering

Recent measurement of coherent elastic neutrino-nucleus scattering (CEvNS) process by COHERENT collaboration has opened a new portal of exploring various BSM processes. The major uncertainty in CEvNS stems from nuclear constraints on form-factors, and hence any experimentally measured deviation from the SM number of events can either be attributed to a lack of knowledge of the nucleon distributions in target nuclei or to new physics. Here, we present charge and weak nuclear form-factors and CEvNS cross section calculations on various nuclei using a microscopic many-body nuclear theory model based on Hartree-Fock approach with a Skyrme nuclear potential. We validate argon charge form factor predictions against the data from elastic electron scattering and compare argon weak form factor calculations with other theoretical approaches in order to estimate a theoretical uncertainty that could help extracting new physics signals in liquid-argon based CEvNS experiments.

Mini-abstract

Constraining Nuclear Structure Physics of Coherent Elastic Neutrino-Nucleus Scattering

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