

# Ab Initio Neutrinoless Double-Beta Decay Matrix Elements

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As experiments searching for neutrinoless double beta decay ( $0\nu\beta\beta$ ) are about to reach a ton-scale era, an effective way of calculating the nuclear matrix elements (NMEs), which govern the rate of the decay, is imperative. Observation of this decay would show the Majorana nature of neutrinos as well as potentially giving the absolute mass of the neutrino, as long as the NMEs are known accurately. The “In-Medium Similarity Renormalization Group” (IMSRG) method allows for an *Ab initio*, or first principles, prediction of the NMEs by approximately solving the nuclear many-body Schrodinger equation. This work uses the valence space formulation of the IM-SRG (VS-IMSRG) to compute the NMEs of candidate isotopes from  $A=48$  to  $A=136$ . These results provide the first *Ab initio* NMEs for all isotopes of high interest for next generation experiments, including ongoing and future Canadian experiments.

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## Please select: Experiment or Theory

Theory

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