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# Recent advances in the nuclear matrix elements of neutrinoless double-beta decay

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Neutrinoless double-beta decay, a sought-after process in which two nucleons in a nucleus beta-decay simultaneously without emitting neutrinos, is a promising probe for physics beyond the Standard Model. It would not only demonstrate lepton-number violation but also shed light on the unknown nature of neutrinos. However, extracting the interesting physics from experiments requires knowledge on nuclear matrix elements(NMEs), which currently form a major obstacle. In my talk, I will cover recents improvements on the NMEs in two widely used frameworks: the proton-neutron quasiparticle random-phase approximation (pnQRPA) and nuclear shell model (NSM). I will discuss how correlations with other observables—that can be or have been measured—can help constrain the values of the NMEs. I will also show first results for the NMEs with complete next-to-next-to-leading-order terms in medium-mass to heavy nuclei.

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