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Properties of neutrinoless double beta decay nuclear matrix elements studied along isotopic chains

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Neutrinoless double beta decay ($0\nu\beta\beta$) is the most promising process to disentangle the Majorana nature of the neutrino, its effective mass and the mass hierarchy. In this process, an even-even nucleus can not energetically decay into the odd-odd neighbor but it is allowed into the even-even nucleus with two protons more and two neutron less.

In this contribution we analyze nuclear matrix elements (NME) of neutrinoless double beta decay calculated for several isotopic chains (*pf*-shell nuclei and Cadmium isotopes). Energy density functional methods including beyond mean field effects such as symmetry restoration and shape mixing are used. Strong shell effects are found associated to the underlying nuclear structure of the initial and final nuclei. Furthermore, we show that NME for two-neutrino double beta decay evaluated in the closure approximation display a constant proportionality with respect to the Gamow-Teller part of the neutrinoless NME. This opens the possibility of determining the $0\nu\beta\beta$ matrix elements from $\beta\pm$ Gamow-Teller strength functions. Finally, the interconnected GT role of deformation, pairing, configuration mixing and shell effects in the NMEs will be discussed.