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Derivation of Neutrino Mass Parameters from the Study of Neutrinoless Double Beta Decay

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Abstract : In this paper the theoretical challenges in the study of neutrinoless double beta decay are reviewed. Then, new upper limits of the neutrino mass parameters in the case of three isotopes are derived; 48Ca, 76Ge, and 82Se, assuming two possible mechanisms of occurrence of this nuclear process, namely the exchange of i) light left-handed neutrinos and ii) heavy right-handed neutrinos, between two nucleons inside the nucleus. The derivation is based on accurate calculations of the phase space factors and nuclear matrix elements performed with new high-performance computer codes, which are described in more detail in recent publications. These results are useful both for a better understanding of the scale of neutrino absolute mass and for the planning of future double beta decay experiments.

Keywords : double beta decay, neutrino properties, nuclear matrix elements, phase space factors
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