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Present and future of double beta decay experiments

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The investigation of neutrinoless double beta decay (0νββ), violating lepton number, is the only practically viable experimental approach to discriminate between Majorana and Dirac character of neutrinos. The observation of neutrinoless double beta decay would also provide a value of its effective mass [m ββ], and possibly in the future, open the window to study CP violation in the lepton sector induced by Majorana phases. The exchange of a light Majorana neutrino is the most standard interpretation of (0νββ). In spite of that, other more exotic mechanisms are possible beyond the Standard Model, such as heavy neutrinos, non-standard Higgs, SUSY mechanisms and many others for which investigation of (0νββ) can provide very competitive limits. Several tens of experiments using different isotopes and variety of techniques are searching for this very rare process. Five experiments (GERDA, EXO, KamLAND-Zen, CUORE, NEMO) already reached [m ββ] < 1 eV sensitivity with four different isotopes. Upgraded and new experiments coming to investigate the inverted neutrino mass hierarchy region of [m ββ] < 10 -50 meV. The achieved results, present status of the ongoing experiments as well as expected sensitivities and discovery potentials of the different proposals are reviewed.

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