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Non-Standard Mechanisms for Neutrinoless Double Beta Decay, Their Probes and Implications

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In my talk I will describe the effective approach to lepton number violation and implications of potential future observation of lepton number violating (LNV) processes, primarily of neutrinoless double beta decay. The interplay between lepton number violation at high and low energies is of particular interest, as the constraints on theories of baryogenesis can be obtained. One can state that if neutrinoless double beta decay is triggered by other than the standard mass mechanism, then the usual high-scale baryogenesis models will be excluded. As can be shown, each LNV effective operator contributes to neutrinoless double beta decay in a number of ways and the understanding of the mutual relations among all the operators is crucial when determining the dominant contribution. Moreover, the nuclear side of the problem plays an important role, as a thorough calculation of corresponding nuclear matrix elements is needed for the estimation of the effective couplings and it can also help to pinpoint the dominant mechanism triggering neutrinoless double beta decay. Apart from the effective field approach, I will also outline the possible extension of our arguments to a general UV-completed model.

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