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Sensitivity Projection for Future Double Beta Decay Experiments

Neutrinoless double- β decay ($0\nu\beta\beta$) is an experimentally sensitive avenue to probe the nature (Majorana versus Dirac) and exact mass of neutrinos. There are already intense activities worldwide committed to the experimental searches of $0\nu\beta\beta$. This work [1] quantitatively explore the interplay between exposure and background levels in $0\nu\beta\beta$ experiments at their design stage. In particular, background reduction will be playing increasingly important and investment-effective roles in future $0\nu\beta\beta$ experiments. Although the primary goal of current running and projected experiments is to probe the inverted mass hierarchy, current neutrino oscillation experiments reveal a preference for non-degenerate (ND) normal mass hierarchy (NH). Therefore the strategy of scaling the summit of $0\nu\beta\beta$ should also take this genuine possibility into account. Present work would explore the role of background suppression in alleviating the necessity of large exposure for future $0\nu\beta\beta$ experiments with sensitivity goals of approaching and covering ND-NH. In particular, the roles of energy resolution in suppressing the irreducible background of $2\nu\beta\beta$ will be discussed.

[1] M.K.Singh et al., Phys. Rev. D 101, 013006 (2020).

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