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Required Exposure and Background Levels in the Searches of Neutrinoless Double$-\beta$ Decay

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Neutrinoless double beta decay ($0\nu\beta\beta$) is the most sensitive experimental probe to address the quest that whether neutrinos are Majorana or Dirac particles [1]. The observation of $0\nu\beta\beta$ would not only establish the Majorana nature of neutrinos but also provide direct information on neutrino masses and probe the neutrino mass hierarchy. The present work [2] would explore the required sensitivity for the upcoming projected $0\nu\beta\beta$ experiments to probe the inverted mass hierarchy (IH) as well as non-degenerate (ND) normal mass hierarchy (NH). We studied the required exposures of $0\nu\beta\beta$-projects as a function of the expected background (following "Discovery Potential at 3σ with 50% probability"statistical scheme) before the experiments are performed. This work would address the crucial role of background suppression in the future $0\nu\beta\beta$ experiments with sensitivity goals of approaching and covering ND-NH.

[1] M. Agostini, G. Benato, J. A. Detwiler, J. Menéndez, F. Vissani, "Toward the discovery of matter creation with neutrinoless double-beta decay", arXiv:2202.01787 (2022).
[2] M. K. Singh, H. T. Wong, L. Singh, V. Sharma, V. Singh, and Q. Yue, "Exposure-background duality in the searches of neutrinoless double beta decay", Phys. Rev. D 101, 013006 (2020).

In-person participation

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