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CDEX-300ν background simulation

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Neutrinoless double beta decay ($0\nu\beta\beta$) represents a crucial probe of new physics beyond the Standard Mode. The technology utilizing enriched germanium detectors demonstrates unique advantages in this field due to its high isotopic enrichment, ultra-low background characteristics, superior energy resolution, and scalable configuration. The CDEX Collaboration is preparing to construct the next-generation CDEX-300ν experiment with a 300 kg-scale germanium detector array. This project will implement a liquid argon veto detector system to further suppress background, anticipating a background level reduction to 10^{-4} counts/(keV·kg·year). The experiment is projected to reach the 10^{27} year sensitivity level for $0\nu\beta\beta$ half-life within three years of operation.

To ensure the achievement of experimental goals, comprehensive background simulation studies are essential. This project aims to leverage CDEX Collaboration's expertise in low-background experiments by conducting Monte Carlo simulations of all potential background sources in the CDEX-300ν setup. Simultaneously, the veto efficiency of the liquid argon detector system will be simulated. The objectives include generating the anticipated energy spectrum of CDEX-300ν, evaluating the final projected sensitivity, and providing strategic recommendations for future experimental configuration optimization.

Collaboration you are representing

CDEX

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