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Estimation of Backgrounds in LEGEND

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The LEGEND Collaboration aims to combine the successes of the GERDA Experiment and the $\{^{\text{sc}}\text{Majorana Demonstrator}\}$ with newly-developed technologies in a ton-scale, germanium-based experiment with discovery potential spanning the inverted neutrino mass-hierarchy regime. The LEGEND Collaboration has established a phased deployment scheme: an initial 200-kg array (LEGEND-200), deployed in the existing GERDA cryostat and shielding infrastructure at LNGS, followed by a 1000-kg array (LEGEND-1000) in a newly-constructed liquid cryogen shield and veto. This phased approach allows for the rapid construction of a world-leading experiment with half-life sensitivities in excess of 10^{27} yrs, followed by a nearly-background-free experiment with 10 ton-yrs exposure, yielding detection sensitivity for half-lives in excess of 10^{28} yrs. To achieve these sensitivities, we aim for background indices below 2×10^{-4} counts / (keV-kg-yr) in LEGEND-200, and 1×10^{-5} counts / (keV-kg-yr) in LEGEND-1000. This talk will summarize the designs, background sources, and background estimation for both phases of LEGEND.

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