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External Neutron and Gamma Background Shielding for LEGEND BLAINE HEFFRON, University of Tennessee, Knoxville, COREY GILBERT, Oak Ridge National Laboratory, LEGEND COLLABORATION — The search for neutrinoless double beta ($0\nu\beta\beta$) decay is the most sensitive technique to establish the Majorana nature of neutrinos. An extremely low background radiation environment in the $0\nu\beta\beta$ decay energy range is required in order to detect this hypothetical decay mode. The Large Enriched Germanium Experiment for Neutrinoless $\beta\beta$ Decay (LEGEND) collaboration is considering various shielding and active veto designs to sufficiently reduce external gamma and neutron backgrounds in order to achieve a discovery potential for a 10^{28} year $0\nu\beta\beta$ half life. This work presents these options with accompanying simulations using both MCNP6 and GEANT4 packages. Comparisons with literature values are also presented to validate the simulations. Impact on the $0\nu\beta\beta$ discovery potential is extrapolated.

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