

Abstract Submitted
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Neutron-induced Background for Double-Beta Decay Experiments via Inelastic Scattering Processes¹ DONGMING MEI, STEVE ELLIOTTS, VICTOR GEHMAN, Los Alamos National Laboratory, ANDREW HIME, Los Alamos National Laboratory, KAREEM KAZKAZ, University of Washington, MAJORANA COLLABORATION — We investigate several $Pb(n, n'\gamma)$ and $Ge(n, n'\gamma)$ reactions using a segmented clover detector. With and without an AmBe neutron source, we can separate the 2615-keV γ -ray produced from the $^{208}Pb(n, n'\gamma)$ reaction from the more familiar ^{208}Tl decay. The detection rate of the 2615-keV γ -ray produced via the $^{208}Pb(n, n'\gamma)$ reaction is determined. We emphasize that the 2615-keV γ -ray and the other high energy γ -rays from $Pb(n, n'\gamma)$ reactions can be a significant background for double beta decay experiments which use lead as a massive inner shielding and the background level depends on the depth of a specific underground laboratory. The excitation γ -ray lines through $Ge(n, n'\gamma)$ reactions are also observed. We consider the contribution of such backgrounds and the limitation in sensitivity of next generation searches for neutrinoless double beta decay using enriched germanium detectors and develop the the depth requirements of such detectors under different shielding configurations.

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