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Geant Simulation of Cosmic Ray Veto System MATTHEW RUSSELL, University of Notre Dame — The double-beta decay processes can provide essential details on the interactions of neutrinos, and many experiments are underway that may be able to detect the highly sought neutrinoless double-beta decay channel. This decay can provide a measurement of the absolute mass scale of neutrinos, but only if the Nuclear Matrix Elements (NME) of the candidate nuclei are known to high precision. Predictions for the NMEs of one of the most heavily studied candidates,^{76}Ge, vary by at least 50% and need to be further investigated. The University of Notre Dame Nuclear Structure Lab is in a unique position to probe the pairing structure of nucleons in ^{76}Ge via a two-proton transfer reaction. A time of flight measurement identifies neutrons from the ^{76}Ge(^{3}He,n) reaction using a large acceptance neutron detector. The cosmic ray background in our detector is large compared to the neutron signal, making it necessary to construct a plastic scintillator veto counter. At least an 80% rejection of background is necessary to cut the fractional error in half. A Geant simulation of the veto plastic is necessary in understanding the expected vetoed background signal in our detector and optimizing the rejection system. This project will report on the energy spectrum our Geant simulation predicts from the scintillator, as well as the accuracy of our model compared to the actual energy spectrum taken from our scintillator. The data's relevance to the veto system and error analysis will be discussed.

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