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Muon-Induced Background Study for Double Beta Decay and Dark Matter Experiments DONGMING MEI, University of South Dakota, ANDREW HIME, Los Alamos National Laboratory, CHRISTINA KELLER, University of South Dakota, DEAP/CLEAN COLLABORATION, MAJORANA COLLABORATION — Fast neutrons produced by muons traversing a detector are an important background for low energy neutrino experiments and dark matter searches. Muon-induced neutron production rates with heavy elements, such as lead and copper, are not well understood as evidenced by discrepancies between measurements and FLUKA simulations as large as about a factor of 3. Such a large discrepancy must be understood in order to optimize the detector design against muon-induced backgrounds. Muon-induced neutron production can be measured at the 300-foot level at Homestake using a detector system which consists of eight inner NaI detectors and forty outer liquid scintillators, together with the muon tracking detectors above and below the target. The inner and outer detectors in coincidence will be used to measure the neutron energy spectrum. The hit pattern of the outer detector indicates the multiplicity and angular distribution of the neutrons generated by muons. The construction of the entire detector system requires an R&D program to optimize the design in the detection efficiency. This paper will present the simulation results for detector design.

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