

Abstract Submitted
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Measuring External Sources of Background (R&D) at Homestake DONGMING MEI, University of South Dakota, YUEN-DAT CHAN, Lawrence Berkeley National Laboratory, STEVE ELLIOTT, Los Alamos National Laboratory, FREDERICK GRAY, Regis University, CHRISTINA KELLER, YONGCHEN SUN, University of South Dakota — Measuring external sources of radioactivity at the DUSEL site is the key to success in low-energy neutrino and dark matter (WIMP searches) experiments. Natural radioactivity can be measured using germanium and NaI detectors. Muon-induced neutrons and (a,n) neutrons will be measured utilizing liquid scintillators and germanium detectors through the $^{72}\text{Ge}(n,nx)$ reaction. External sources of background, particularly fast neutrons and cosmogenic radioactivity from muon-induced processes, are background matter that must be eliminated for underground experiments in pursuit of double beta decay, WIMPs, and oscillations of low-energy neutrinos. However, muon-induced neutron production rates with heavy elements, such as lead and copper, are not well understood. The discrepancy between the measurements and FLUKA simulations is as large as about a factor of 3. This discrepancy needs to be understood for the muon-induced fast neutron production rate in lead and copper, which are the most popular materials for shielding underground experiments. We propose an experiment at 300-ft level to measure the muon-induced fast neutron production rate in different targets.

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