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Radon Plate-out Measurements for Polyethylene and Copper at SNOLAB

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Neutrons are a challenging background for dark matter direct detection experiments such as the Super Cryogenic Dark Matter Search (SuperCDMS), and can come from contamination within common shielding materials such as polyethylene and copper. We present measurements of the alpha-activity accumulation on surfaces due to exposure to the elevated level of radon present deep underground at SNOLAB. Surface contamination from plate-out and implantation of radon daughters can give rise to neutron and gamma-ray backgrounds from (α,n) and Bremsstrahlung interactions. To help characterize these backgrounds, large-area samples were exposed underground for approximately three months in the planned SuperCDMS SNOLAB experiment location while simultaneously monitoring several environmental factors. Predictions of the radon-daughter plate-out rate are compared to the resulting surface activities, obtained from high-sensitivity measurements of alpha emissivity using the XIA UltraLo-1800 spectrometer at SMU. A predictive model is discussed for these materials placed in similar environmental conditions.

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