

Cosmogenic Radiation Characterization for the Colorado Underground Research Institute

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Underground facilities are often sought after due to their rock overburden, which provides natural protection from ionizing cosmogenic radiation, such as the near-elimination of cosmogenic muons. However, for many efforts such as dark matter searches or neutrinoless double beta decay experiments, the surviving cosmogenic muon and muon-induced events still present a significant background. One way to characterize and address these backgrounds, especially for R&D and equipment benchmarking, is to move to shallow underground facilities such as the new Colorado Underground Research Institute (CURIE). In this talk, we present the characterization of cosmogenic muon and secondary backgrounds for CURIE located in the Edgar Experimental Mine in Idaho Springs, CO. The underground muon flux was simulated using the MUTE software package and subsequently validated with direct measurements, yielding agreement within 10%. The overburden at CURIE provides a factor of 700 reduction relative to the sea level surface muon flux. Additionally, a new depth-intensity relationship was developed to interpret the overburden, resulting in an equivalent shielding of 415 meter-water-equivalent (m.w.e.) relative to a flat overburden. Lastly, we discuss the muon-induced secondaries which were simulated by coupling the underground muon angular and energy spectrum from MUTE with Geant4.

Collaboration you are representing

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