

Abstract Submitted
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Stopping Muons Study for Ultra-Low Background Experiments¹

DANIEL DUNCAN, Univ of South Dakota — Stopping negative muons can be captured by nucleus in various materials in which neutrons and gamma rays can be produced. These energetic secondary particles can be background events for ultra-low background experiments in searching for dark matter and neutrinoless double-beta decay. The stopping negative muons captures rates in different materials have been mostly evaluated theoretically. The secondary particles in particular the energy of neutrons is not well understood for heavy elements. Experimental study of the capture rates and secondary particles is of interest of nuclear physics and rare event physics. Two plastic scintillation panels were used to create a muon detection system allowing study of stopping muons. These panels are each made of EJ200 scintillator measuring approximately 100x50x2.54cm and attached on one side to EJ280 plastic strip measuring 2.54x2.54x50cm. A 1" Hamamatsu R1924A PMT is affixed to the end of each strip to collect light. The setup measures the lifetime of muons at earth's surface by detecting the time difference between stopped muons and muon decay. Data is collected for 21 hours and a mean muon lifetime of $2.02 \pm .06$ microseconds is obtained. The setup will be used at Homestake to measure captures rates and secondary neutron energy spectrum.

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