

Abstract Submitted  
for the APR12 Meeting of  
The American Physical Society

**Measuring fast neutrons with large liquid scintillator for ultra-low background experiments**<sup>1</sup> CHAO ZHANG, DONGMING MEI, KEENAN THOMAS, PATRICK DAVIS, BRAIN WOLTMAN, University of South Dakota, FREDERICK GRAY, Regis University, CUBED COLLABORATION — Characterizing neutron background is extremely important to the success of rare event physics research such as neutrinoless double-beta decay and dark matter searches. Measuring the energy spectrum of fast neutrons for an underground laboratory is difficult and it requires intensive R&D for a given technology. We developed a neutron detector that is constructed using an aluminum tube with one meter in length and 5 inch in diameter filled with 12 liter liquid scintillators. The inner surface of the tube is painted with specular reflector and there are two 5" PMTs(Hamamatsu H4144) attached to both ends. The detector is calibrated with cosmic muons and radioactive sources. Both position independent and position dependent methods are employed to analyze the experimental data. Good neutron/gamma discrimination is found from few MeV to 50MeV above. We report the result for the measurements of fast neutrons on the surface and at underground in Soudan Mine.

<sup>1</sup>This work is supported by NSF PHYS-019261, NSF PHYS-0919278, and NSF PHYS-0758120.

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Date submitted: 09 Jan 2012

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