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Active Neutron Shielding for Dark Matter Searches JOCELYN MONROE, RICHARD YAMAMOTO, PETER FISHER, MIT, BRETT CORNELL, Harvard, MAREENA ROBINSON, FAMU, DIANNA COWERN, RICHARD EYERS, SHAWN HENDERSON, MIT — Neutrons are a dangerous background to direct dark matter detection searches because they can mimic exactly the signal signature. Recent studies find that the few existing underground measurements of the fast, muon-induced neutron flux disagree at the 30%-50% level with predictions. Given this level of uncertainty, it is desirable to measure the neutron flux in-situ, as well as to reduce the number of neutrons incident on a dark matter detector. Towards these ends, we are developing a neutron veto system for both active and passive shielding. The goals of this R&D are (i) a measurement of the neutron energy spectrum underground above 10 MeV neutron kinetic energies, and (ii) measurements of the attenuation vs. energy of these neutrons in 1 meter of water, concrete, and liquid scintillator. These measurements will provide valuable input for simulation and design of shields for low-background experiments underground.

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