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Design of a keV-scale Neutron source for calibration of low threshold Dark Matter detectors. PRATYUSH PATEL, LUKE CHAPLINSKY, SCOTT HERTEL, DOUG PINCKEY, ALESSANDRO SERAFIN, University of Massachusetts, Amherst, ETHAN BERNARD, ANDREAS BIEKERT , JUNSONG LIN, DANIEL MCKINSEY, ROGER ROMANI, RYAN SMITH, BURKHANT SUERFU, VETRI VELAN, University of California, Berkeley, MAURICE GARCIA-SCIVERES, Lawrence Berkeley National Laboratory, Berkeley , WESLEY FREY, University of California, Davis — Direct detection dark matter searches are extending their reach to lower (sub-GeV) dark matter masses, requiring new detector technologies with low thresholds and new low-energy calibration methods. For many detectors (when the signal is a recoiling nucleus or atom), the ideal calibration source is a neutron beam of order-keV energy. We will discuss recent progress in making such neutron-based calibrations practical in a university lab environment. First, we will describe a SbBe (gamma,n) neutron source in which a novel shielding method suppresses the outgoing gamma flux while allowing the unmoderated escape of the neutron flux. Second, we will describe a method to moderate and then filter a pulsed Deuterium-Tritium (DT) generator, turning it into a pulsed keV-scale neutron source. And lastly, we will describe work towards large area neutron capture based backing detectors required for a neutron scattering calibration of dark matter experiment targets.

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