Abstract Submitted
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A Novel Nuclear Recoil Calibration in the LUX Detector Using a D-D Neutron Generator JAMES VERBUS, Brown University, LUX COLLABORATION — The LUX dark matter search experiment is a 350 kg two-phase liquid/gas xenon time projection chamber located at the 4850 ft level of the Sanford Underground Research Facility in Lead, SD. I will describe a novel calibration of nuclear recoils (NR) in liquid xenon (LXe) performed in-situ in the LUX detector using mono-energetic 2.45 MeV neutrons produced by a D-D neutron generator. This technique was used to measure the NR charge yield in LXe (Q_y) to <1 keV recoil energy with an absolute determination of the deposited energy. The LUX Q_y result is a factor of $\times 5$ lower in energy compared to any other previous measurement in the field, and provides a significant improvement in calibration uncertainties. We also present a measurement of the NR light yield in LXe ($\mathcal{L}_{\rceil\{\{}$) to recoil energies as low as $\sim$2 keV using the LUX D-D data. The $\mathcal{L}_{\rceil\{\{}$ result is also lower in energy with smaller uncertainties than has been previously achieved. These absolute, ultra-low energy calibrations of the NR signal yields in LXe are a clear confirmation of the detector response used for the first LUX WIMP search analysis. Strategies for extending this calibration technique to even lower energies and smaller uncertainties will be discussed.

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