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Ultra-low Energy Calibration of the LUX detector with pulsed D-D neutrons and 127Xe Electron Capture Events

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The LUX dark matter experiment has measured the nuclear recoil charge and light yields in LXe down to 0.7 keVnr and 1.1 keVnr, respectively, in situ using a D-D neutron calibration source. Improvements in the D-D calibration have been possible by incorporating pulsing technique with narrow pulses (20 us / 250 Hz). This technique allows the suppression of accidental backgrounds in D-D neutron data and also provides increased sensitivity for the lower energy NR calibrations. I will report the improved NR absolute Qy and Ly measurements using the pulsed D-D calibration technique performed in situ in the LUX detector. I also present an absolute calibration of electron recoil (ER) charge yield using ^{127}Xe electron capture events at energies down to the N-shell 186 eVee. These in situ energy calibrations, using D-D neutron and ^{127}Xe sources, represent the lowest energy NR and ER that have been explored in liquid Xe and are accompanied by a significant improvement in calibration uncertainty.

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