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 ($L_{\ell}$) to recoil energies as low as $\sim 2$ keV using the LUX D-D data. The $L_{\ell}$ 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.