Abstract Submitted
for the DNP15 Meeting of
The American Physical Society

A study of intrinsic statistical variation for low-energy nuclear recoils in liquid xenon detector for dark matter searches[1] LU WANG, WENZHAO WEI, DONGMING MEI, The University of South Dakota, CUBED COLLABORATION — Noble liquid xenon experiments, such as XENON100, LUX, XENON 1-Ton, and LZ are large dark matter experiments directly searches for weakly interacting massive particles (WIMPs). One of the most important features is to discriminate nuclear recoils from electronic recoils. Detector response is generally calibrated with different radioactive sources including ^{83m}Kr, tritiated methane, ^{241}AmBe, ^{252}Cf, and DD-neutrons. The electronic recoil and nuclear recoil bands have been determined by these calibrations. However, the width of nuclear recoil band needs to be fully understood. We derive a theoretical model to understand the correlation of the width of nuclear recoil band and intrinsic statistical variation. In addition, we conduct experiments to validate the theoretical model. In this paper, we present the study of intrinsic statistical variation contributing to the width of nuclear recoil band.

[1]DE-FG02-10ER46709 and the state of South Dakota

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Date submitted: 29 Jun 2015 Electronic form version 1.4