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Calibrating the Xenon10 Detector with Activated Xenon KAIXUAN NI, Yale University, XENON COLLABORATION — Xenon10 is a 15-kg liquid xenon (LXe) detector for the search of dark matter in the form of weakly interacting massive particles (WIMPs). The high scintillation yield of LXe and high light collection efficiency in Xenon10 allow the detection of low-energy nuclear recoils, e.g. from WIMPs elastic scattering, down to 10 keV. The energy calibration is usually performed by using external gamma ray sources, such as Co-57 and Cs-137. However, external low-energy gamma rays are not very useful to calibrate the central part of the detector due to their small interaction length ($\sim$mm) in LXe. Calibrations from external high-energy gamma rays are also not accurate due to gamma-ray's non-uniform distributions in the target and non-linearity of LXe scintillation yield for different energies. Here we introduce a new calibration method by using neutron-activated xenon, which emits 164 keV and 236 keV gamma rays uniformly in the target and provides precise energy calibration in every part of the detector. The method also allows the study of position-dependence of the signals, further improving the detector's energy resolution and background rejection capability.

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