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Title: Region of Interest Image Reconstruction for Gamma Ray Source Localization Using Position Sensing CdZnTe

Abstract

High-resolution image reconstructions and position resolution results are shown using the Region of Interest Maximum Likelihood Expectation Maximization (ROI-MLEM) algorithm. A PuBe source and a Cs-137 check source were measured using two digital CdZnTe detector systems built by H3D Inc. These detectors are comprised of a 2 x 2 CZT array, where each crystal is 2 cm x 2 cm x 1 cm in dimension. The digital systems were placed 30 cm away from the PuBe source, which was placed inside of a PVC block for one measurement, and then left bare and shifted to the right by 1 cm for the second measurement. The Cs-137 source is measured at a 30cm distance and shifted to the right in varying increments up to 1 cm. This work intends to show the capability of both the digital CZT and the recently updated ROI-MLEM algorithm to resolve a shift in the sources by reconstructing images of the detected 662 keV (from Cs-137) and the 4.44 MeV (PuBe source) photopeaks.