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Title: Super-MeV Gamma-Ray Time-Encoded Imaging

Abstract

This work aims to demonstrate the capabilities of our current time-encoded imaging (TEI) system, Mira, using the OrionUM CdZnTe detector for high energy gamma-ray imaging. Mira uses a rank 79 MURA made of tungsten which is controlled by two stepper motors to control horizontal and vertical movement. Previously, the highest energy gamma rays imaged using Mira was 662 keV from Cs-137. This work demonstrates the system's capabilities of imaging energies up to 1.274 MeV from Na-22 with the same mask thickness. In addition to imaging the high energy sources, the mask-to-source distance was also estimated and compared to the actual distance. This estimated distance is important for source quantification purposes. The Na-22 was measured at several different mask-to-source distances ranging from 30 cm to 40 cm to view the effect on the mask-to-source distance estimation. The estimation was within 5% of the actual distance and improved with lower energy gamma rays and shorter mask-to-source distances.