Results from the 2019 Idaho National Laboratory Measurement Campaign

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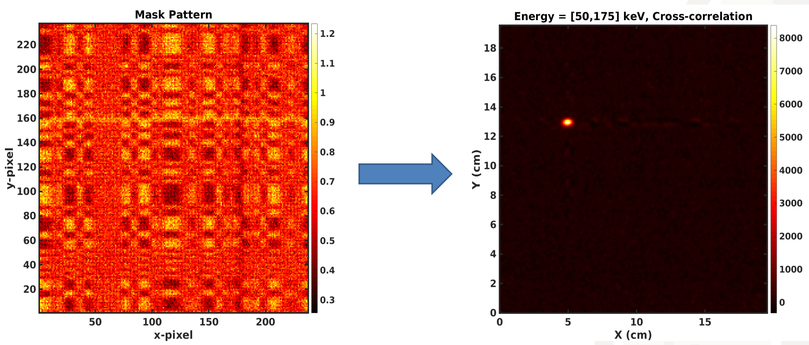
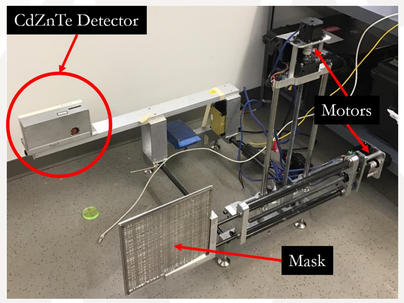
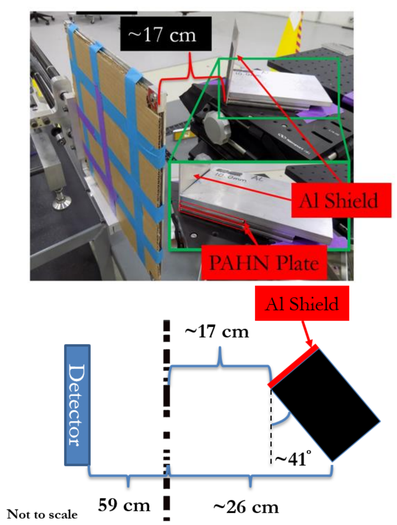
3D Source Distribution Estimation of Special Nuclear Material

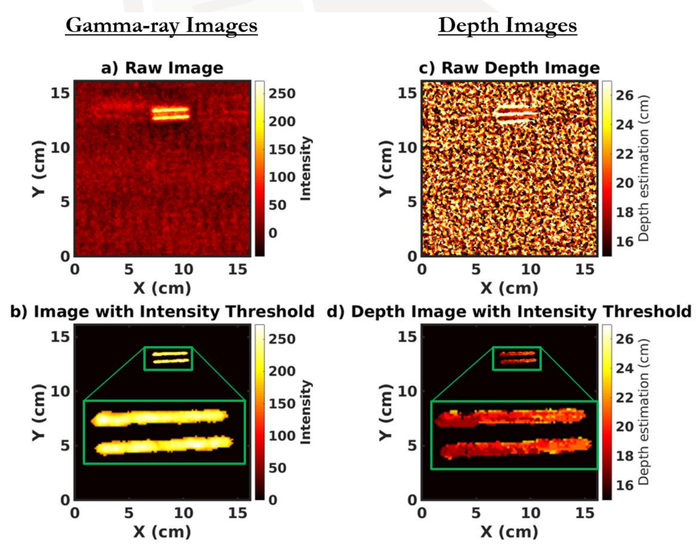
Time encoded imaging is a technique to image `low' energy gamma rays by spatially and temporally encoding the measured source. The system is composed of a pixelated CdZnTe detector, a MURA coded mask, and a mask translational system. The following system has an imaging resolution of better than 0.5 cm for a source that is 1 meter away from the mask.





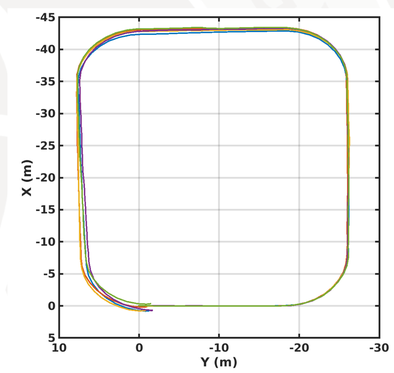
At Idaho National Laboratory, we were able to image plutonium fuel plates in different configurations. This configuration angles the plates 41° away from the image plane.



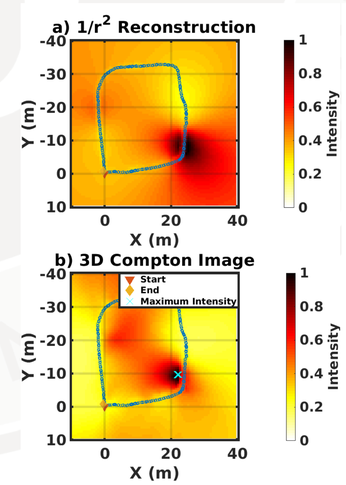


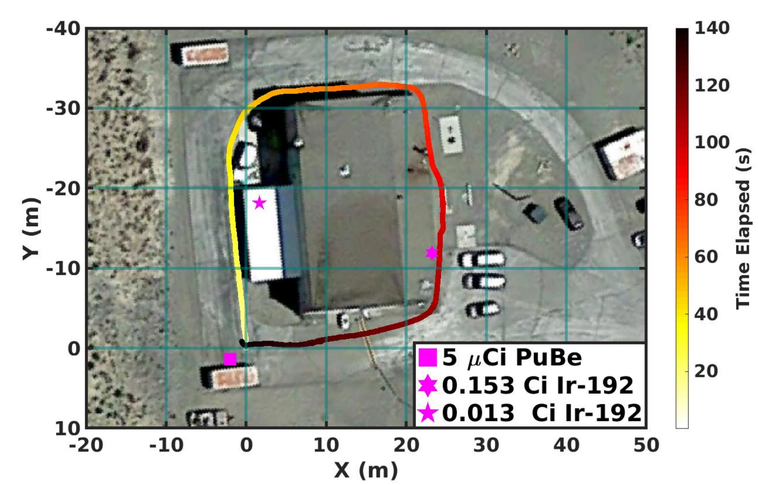
3D Compton Imaging in an Outdoor Environment

The ability to image in three dimensions allows for localisation and characterization of radioactive material in a 3D space. To demonstrate this capability, sensor data fusion between a pixelated CdZnTe gamma-ray detector and an inertial measurements unit (IMU) based personal odometry system (attached to the footwear of the operator) is used to reconstruct 3D gamma-ray images. A demonstration of the system using 3D Compton imaging and the inverse-square image-reconstruction algorithms is presented.



At the Idaho National Laboratory, we were able to place a couple of Ir-192 sources at the perimeter of a facility to demonstrate the localization capabilities of the imager.





The University of Michigan 3D CdZnTe detector development was funded under the Department of Defense DTRA award number HDTRA1-15-C-0049. This work was funded in-part by Consortium for Monitoring, Technology, and Verification under Department of Energy National Nuclear Security Administration award number DE-NA0003920

Any opinion, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the Department of Energy, Idaho National Laboratory nor the Defense Threat Reduction Agency.

National Nuclear Security Administration