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Multimodal Imaging Using a ^{11}B(d,nγ)^{12}C Source JASON NATTRESS, The University of Michigan, PAUL ROSE, The Georgia Institute of Technology, MICHAL MAYER, MARC WONDERS, KYLE WILHELM, The Pennsylvania State University, ANNA ERICKSON, The Georgia Institute of Technology, IGOR JOVANOVIC, The University of Michigan, MULTIMODAL IMAGING AND NUCLEAR DETECTION (MIND) IN ACTIVE INTERROGATION COLLABORATION — Detection of shielded special nuclear material (SNM) still remains one of the greatest challenges facing nuclear security, where small signal-to-background ratios result from complex, challenging configurations of practical objects. Passive detection relies on the spontaneous radioactive decay, whereas active interrogation (AI) uses external probing radiation to identify and characterize the material. AI provides higher signal intensity, providing a more viable method for SNM detection. New and innovative approaches are needed to overcome specific application constraints, such as limited scanning time. We report on a new AI approach that integrates both neutron and gamma transmission signatures to deduce specific material properties that can be utilized to aid SNM identification. The approach uses a single AI source, single detector type imaging system based on the ^{11}B(d,nγ)^{12}C reaction and an array of eight EJ-309 liquid scintillators, respectively. An integral transmission imaging approach has been employed initially for both neutrons and photons, exploiting the detectors' particle discrimination properties. Representative object images using neutrons and photons will be presented.

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