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Multimodal Imaging using Neutrons and Gammas at the NECTAR Instrument

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NECTAR is a unique beam-line with access to fission neutrons for non-destructive inspection of large and dense objects, where thermal neutrons or X-rays face limitations due to their comparatively low penetration. With the production of fission neutrons at the instrument, as well as neutrons interacting with beamline geometry, such as the collimator, gamma rays are inevitably produced in the same process. Furthermore, these gamma rays are highly directional due to their constraint to the same beam-line geometry and come with similar divergence as the neutrons. While difficult to shield, it is possible to utilize them by using gamma sensitive scintillator screens in place of the neutron scintillators, viewed by the same camera and swapped-out in-situ.

Here we present the advantages of combining the information gained from neutron imaging in conjunction with gamma imaging at the NECTAR beam-line, providing a unique probe with unparalleled isotope identification capabilities.

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