

LA-UR-20-24918

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Title: Neutron Imaging at LANSCE: Characterizing Nuclear Materials for Next Generation Reactor Designs.

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Intended for: TMS 2021 Annual Meeting & Exhibition, 2021-03-14/2021-03-18 (Orlando, Florida, United States)

Issued: 2020-07-06

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Neutron Imaging at LANSCE: Characterizing Nuclear Materials for Next Generation Reactor Designs.

Neutrons are an ideal probe for characterizing potential nuclear fuel and moderator materials for next generation nuclear reactors as the nature through which they interact with matter create complex attenuation functions that result in unique contrast mechanisms and material penetrabilities. Furthermore, given the variation of nuclear structure across all isotopes, fluctuations in neutron transmission spectra based on neutron-resonance absorptions can create isotope specific contrast mechanisms through which individual isotopes can be observed and identified. This technique, known as Energy Resolved Neutron Imaging (ERNI), is a powerful tool through which specific isotopes can be non-destructively mapped out in both 2D radiographs and 3D CT reconstructions. In this talk, I will discuss recent work at the Los Alamos Neutron Science Center (LANSCE) to develop advanced neutron radiography and ERNI capabilities on Flight Path 5 (FP5) specifically for characterizing nuclear fuels and moderator materials.