PURDUE UNIVERSITY

Nuclear Engineering
COLLEGE OF ENGINEERING

Nuclear Engineering Seminar

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Finding highly enriched uranium with low energy nuclear reactions

Abstract

Detection of shielded special nuclear material (SNM) still remains one of the greatest challenges facing nuclear nonproliferation and nuclear safeguards, 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 a 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 and radiation dose limits. This presentation will discuss the use of low energy nuclear reactions as a potential AI source for use in low-dose detection systems. The integration of multiple material signals that result from such a system such as particle transmission and delayed radiation will be discussed as a method to detect SNM.

Jason Nattress is a senior graduate researcher in the Nuclear Engineering and Radiological Sciences Department at the University of Michigan. His interest in nuclear science and engineering started during his time in the U.S. Navy, where he served as a nuclear operator on the USS Alaska, a ballistic missile submarine. After his time in the service, he obtained his bachelor of science in nuclear engineering from Rensselaer Polytechnic Institute. He then worked at Hope Creek Generating Station as a nuclear operations instructor and also as a systems manager in the plant's engineering department. He started his graduate studies at the Pennsylvania State University, where he obtained his masters of science in nuclear engineering. At Penn State, his research focused on developing composite neutron detectors. He is currently a Nuclear Nonproliferation International Safeguards Graduate Fellow, and his current research aims to address some of the major challenges affecting nuclear security and nonproliferation. Specifically, he concentrates on developing novel approaches to detecting shielded special nuclear material in transit and related nuclear treaty veri1cation measurement techniques.