

Abstract Submitted
for the DNP07 Meeting of
The American Physical Society

The Development of Algorithms For Neutron-Based Threat Determinations¹ M.E. NICHOLS, ALEXANDER BARZILOV, P.C. WOMBLE, I. NOVIKOV, Western Kentucky University Applied Physics Institute — As pulsed fast neutrons bombard a target object, the resultant nuclear reactions allow for elemental analysis by measuring gamma ray energies and intensities specific to each isotope. Our group primarily utilizes this technique to examine the elemental densities of carbon, nitrogen, oxygen and hydrogen to discern threats between inert materials and high explosives. Using Poisson probability distributions to simulate data from the neutron interrogation method, we have developed threat algorithms which couple the nuclear cross-sections of these elements with elemental densities to segregate materials. We will discuss these algorithms and present Receiver Operating Characteristic (ROC) curves for each determination process to express the likelihood of each material being correctly identified.

¹Acknowledgements: This work is supported in part by the Applied Research and Technology Program of Western Kentucky University.

Matthew Nichols
Western Kentucky University Applied Physics Institute

Date submitted: 15 Aug 2007

Electronic form version 1.4