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A Time of Flight Fast Neutron Imaging System Design Study BONNIE CANION, ANDREW GLENN, STEVEN SHEETS, RON WURTZ, LES NAKAE, Lawrence Livermore National Lab, PAUL HAUSLADEN, SETH MC-CONCHIE, MATTHEW BLACKSTON, LORENZO FABRIS, JASON NEWBY, Oak Ridge National Lab — LLNL and ORNL are designing an active/passive fast neutron imaging system that is flexible to non-ideal detector positioning. It is often not possible to move an inspection object in fieldable imager applications such as safeguards, arms control treaty verification, and emergency response. Particularly, we are interested in scenarios which inspectors do not have access to all sides of an inspection object, due to interfering objects or walls. This paper will present the results of a simulation-based design parameter study, that will determine the optimum system design parameters for a fieldable system to perform time-of-flight based imaging analysis. The imaging analysis is based on the use of an associated particle imaging deuterium-tritium (API DT) neutron generator to get the timeof-flight of radiation induced within an inspection object. This design study will investigate the optimum design parameters for such a system (e.g. detector size, ideal placement, etc.), as well as the upper and lower feasible design parameters that the system can expect to provide results within a reasonable amount of time (e.g. minimum/maximum detector efficiency, detector standoff, etc.). Ideally the final prototype from this project will be capable of using full-access techniques, such as transmission imaging, when the measurement circumstances allow, but with the additional capability of producing results at reduced accessibility.

> Bonnie Canion Lawrence Livermore National Lab

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