

Alex Glaser, Princeton University

Title: Confirming the absence of nuclear weapons via passive gamma-ray measurements

#### Abstract

Arms-control agreements between the United States and Russia negotiated after the end of the Cold War have imposed limits on the number of deployed strategic nuclear weapons. Verification of these agreements has relied on onsite inspections, sometimes supported by radiation detection techniques to confirm the absence of a nuclear warhead when ambiguities arise. So far, these measurements have sought to detect neutron emissions associated with the presence of plutonium, but they would be inadequate for uranium devices. In an effort to offer instruments that could be used to confirm the absence of both plutonium and uranium weapons, here we propose an inspection system that uses only passive gamma radiation detection techniques. Such a system would be particularly valuable for next-generation arms-control agreements that limit total numbers of weapons and would involve containerized items in storage. We conducted extensive Monte Carlo simulations to support the development of a verification protocol and detection algorithm. We demonstrate the viability of the technique using standard laboratory check sources and MCNP simulations for simplified configurations of special nuclear material.