Evaluation of a Photon Interrogation System for the Detection of Shielded Highly Enriched Uranium

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We describe an application of the MCNP-PoliMi code to identify concealed highly enriched uranium (HEU) by photon interrogation. This system is based on the use of photons with energies up to 20 MeV and scintillation detectors. The interrogating photon source is a LINAC with an adjustable beam on/beam off time structure. The detectors are sensitive to fast neutrons and gamma rays, which are emitted in photonuclear interactions in the fissile material and in the packaging. The measured correlation functions between detectors are described both for LINAC beam on and LINAC beam off operation.

The uranium metal sphere was placed inside varying amounts of shielding material. The contributions of neutrons and gamma rays to the correlation function are discussed. In the case of beam off simulations, the contribution of delayed neutrons is analyzed. The resulting data is analyzed to determine the presence of shielded HEU.

*** My Biblio ***

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