AGA 6: Verification II – Detection and Nuclear Disaramament Verification

Time: Thursday 17:15–18:45 Location: HS HISKP

Invited Talk AGA 6.1 Thu 17:15 HS HISKP

Neutron multiplicity measurement for nuclear disarmament verification — •Olaf Schumann[1], Martin Baron[2], Risse Monika[1], and Theo Köble[1] — [1]Fraunhofer INT, Euskirchen — [2]Bundesamt für Strahlenschutz, Berlin

International Partnership for Nuclear Disarmament Verification (IPNDV) aims to explore technologies and procedures to verify the reduction of nuclear weapon arsenals in the future. Within the IPNDV framework, an international measurement campaign was conducted in 2023 at the SCK CEN research center in Mol, Belgium. The goal was to validate or refute if an unknown assembly matches a previously measured template. During the three-week campaign, different techniques were employed by multiple teams. We present our neutron multiplicity measurements, that were taken with two different devices, an Ortec Fission Meter and a Canberra JCC 71 Slab Counter with a list mode electronic. We conclude that neutron measurements are a valuable tool for template validation, but have to be complemented with additional techniques, for example with gamma spectrometry.

AGA 6.2 Thu 18:15 HS HISKP

Neutron detection with a NaIL-detector — •Monika Risse, Theo Köble, and Thorsten Teuteberg — Fraunhofer INT, Euskirchen, Germany

Neutron detection is of crucial importance in the fields of verification and disarmament due to the difficulty of shielding neutrons compared to gamma radiation. Due to the global shortage of ^{3}He the exploration of alternatives are necessary. One promising approach is the use of ^{6}Li, which captures neutrons through the reaction ^{6}Li(n,t)α. This study introduces the NaIL detector, which incorporates ^{6}Li into sodium iodide (NaI), a proven material for gamma detection. Gamma and neutron radiation can be differentiated using pulse shape analysis. Measurements were conducted with various neutron sources to evaluate the performance of the detector, including its ability to detect sources producing radiation fields just above background levels. Further investigations examined the impact of moderator materials (e.g. HDPE), the gamma spectrum resolution, and the overall detection efficiency. NaIL results were compared to those from ^{3}He-based detectors.