AGA 5: Denuclearization and Verification Technologies

Time: Thursday 16:30–18:05 Location: H-HS XVII

Invited Talk AGA 5.1 Thu 16:30 H-HS XVII

One Size does not Fit All: Greatly Different Mandates for Denuclearizing Nuclear States — •Robert Kelley — SIPRI Stockholm

The International Atomic Energy Agency (IAEA) has dealt with nuclear materials verification inspections in many states. In only a few cases has the IAEA actually had to deal with extensive programs, nuclear weapons components, and very sensitive nuclear weapon design information. In three significant cases, Iraq (1991-2003), Libya (2004) and South Africa (1993) there were very sensitive nuclear investigations required. All three had widely varying mandates, discoveries and constraints. Future investigations of actual weaponization activities can learn many lessons from these cases. A third, denuclearization active, Project Sapphire in Kazakhstan provided yet another model for extracting dangerous weaponization materials. Hopefully these cases will be studied in preparations for another denuclearization campaign, possibly in the DPRK.

AGA 5.2 Thu 17:15 H-HS XVII

Investigating fissile material in the context of nuclear disarmament verification — Alessandro Borella[1], Gerald Kirchner[2], •Manuel Kreutle[2], Riccardo Rossa[1], and Klaas van der Meer[1] — [1]SCK*CEN, Mol, Belgium — [2]Universität Hamburg, Carl-Friedrich-von-Weizsäcker Center for Science and Peace Research, Hamburg, Germany

A key challenge of nuclear disarmament is equipping inspectors with detectors which enable them to determine the presence or absence of fissile material used within nuclear weapons. Promising for this is the analysis of unique gamma and neutron signatures governed by mass and composition of this material.

As part of the work of the International Partnership for Nuclear Disarmament Verification (IPNDV), we test and compare measurement techniques to be potentially used for the verification of fissile material. At the SCK*CEN in Mol, Belgium, ten measurement teams assessed the performance of various non-destructive passive methods and investigated the influence of the amount and type of fissile material, and the type of shielding material. The process was accompanied by several Monte Carlo based simulations.

In our talk we will present findings from the measurements and the simulations and we will discuss the suitability of these measurement techniques for nuclear disarmament verification.

AGA 5.3 Thu 17:40 H-HS XVII

Untersuchung der Auswirkungen verschiedener Abschirmungen auf die Aussagekraft neutronen- und gammabasierter Verifikationstechniken — •Yannick Fischer, Patrick Schuck, Simon Hebel und Gerald Kirchner — Universität Hamburg, Carl Friedrich von Weizsäcker-Zenrum für Naturwissenschaft und Friedensforschung

Eine der größten physikalischen Herausforderungen der nuklearen Abrüstungsverifikation, stellt die Detektion auch kleinster Mengen spaltbaren Materials dar. Im ZNF werden deshalb Simulationen durchgeführt, um die Auswirkungen bewusst gewählter Abschirmungen auf den Neutronenfluss und die Gammaintensität zu untersuchen. Zur Simulation wird das C++-basierte Programm Geant4 verwendet, welches Mont-Carlo-Techniken benutzt, um Photonen- und Partikeltransport zu simulieren. Der Vortrag stellt den Einfluss verschiedener Abschirmungsmaterialien und -geometrien auf die Neutronenflussdichte und deren Energieverteilung dar. Es wird insbesondere untersucht, welche Konfigurationen zu einer effektiven Abschirmung nötig sind, und diskutiert, welche Auswirkungen diese Erkenntnisse auf die Aussagekraft neutronenbasierter Verifikationstechniken haben.