AGA 8: Nuclear Prolfieration

Time: Friday 11:00–12:00 Location: HS HISKP

AGA 8.1 Fri 11:00 HS HISKP

Weapon Usability of High-Assay Low-Enriched Uranium (HALEU) — •Christopher Fichtlscherer — IFSH Hamburg, Germany — RWTH Aachen, Germany

Advanced nuclear reactor designs frequently explore using High-Assay Low-Enriched Uranium (HALEU) fuels. While current civilian power reactors use uranium fuels enriched up to 5% U-235, HALEU can contain up to 20%. Still falling into the category of low-enriched uranium (LEU), HALEU requires safeguards activities similar to typical reactor fuel, assuming that the material is not at all usable in nuclear weapons. In parallel to the increased interest in HALEU fuel deployment, a debate has recently started questioning that assumption. Kemp et al. claim in a 2024 published Science article *"that quantities ranging from several hundred kilograms to about 1000 kg of 19.75% HALEU could produce explosive yields similar to or greater than that of the 15 kilotons of TNT equivalent bomb that the United States dropped on Hiroshima, Japan, at the end of World War II."* The authors assert that their yield assumptions are based on the Serber-Bethe-Feynman formula; however, they do not provide any details about assumptions or calculations to support this claim. This presentation contributes to that debate by examining the weapon-usability of HALEU at different enrichment levels in detailed calculations relying only on publicly available information.

AGA 8.2 Fri 11:30 HS HISKP

Nonproliferation and Fusion Power — •Matthias Englert — Öko-INstitut e.V., Rheinstr. 95, 64295 Darmstadt

Fusion energy systems, while avoiding the use of fissile materials such as highly enriched uranium and plutonium, still pose certain proliferation risks. Key concerns include the diversion of tritium for military purposes, the production of weapon-grade plutonium using fusion neutrons, and the dual-use potential of laser/inertial confinement fusion facilities for nuclear weapons development. This talk examines these risks with a focus on material monitoring challenges, the technical feasibility of plutonium breeding in fusion reactors, and the role of advanced experimental and computational methods in circumventing nuclear test bans. Strategies for mitigating proliferation risks include the integration of safeguards-by-design in early-stage reactor concepts, international standardization of monitoring frameworks, and fostering dialogue between fusion research and nonproliferation communities. Given the increasing global interest in fusion energy, these measures are critical to ensuring that its development remains secure and aligned with peaceful objectives.