AGA 3: Nuclear Deterrence and Nuclear Disarmament

Time: Thursday 9:30–11:30 Location: PTB HS HvHB

Invited Talk AGA 3.1 Thu 9:30 PTB HS HvHB

The Three-Body Problem in Nuclear Deterrence — •Steve Fetter — Professor, School of Public Policy, University of Maryland

U.S. intelligence agencies are projecting that China*s nuclear arsenal will expand to 1500 warheads by 2035. For the first time, the United States will confront two nuclear peers. These potential adversaries have entered into a *no limits* partnership that may include coordination of military forces and opportunistic aggression. In response, a recent U.S. commission declared that "modifications to both strategic nuclear forces and theater nuclear forces are urgently necessary*; others have called for a doubling of U.S. nuclear forces. But expansion of U.S. nuclear forces is neither necessary nor wise. Current and planned U.S. forces are more than adequate to deter both Russia and China if it abandons counterforce targeting, which generates increased force requirements and increases the risk of nuclear escalation. Although it is often claimed that alternatives to counterforce violate the laws of war, there is little difference in terms of civilian deaths.

AGA 3.2 Thu 10:30 PTB HS HvHB

Next-Generation Warhead Authentication — •Christopher Fichtlscherer[1,2] and Moritz Kütt[2,3] — [1]RWTH Aachen, Germany — [2]Institute for Peace Research and Security Policy, Hamburg, Germany — [3]Program on Science and Global Security, Princeton University, USA

The verification of international treaties represents a critical task, particularly in the realm of nuclear disarmament. Gamma spectroscopy is acclaimed for its effectiveness, cost-efficiency, and non-destructive approach in the authentication of nuclear warheads and their components. A pivotal challenge in this process is the delicate balance between acquiring sufficient data for reliable authentication and preserving the confidentiality of sensitive information. Traditional methods have attempted to address this by employing a limited number of broad energy bins. However, these systems are prone to deception and often falter in distinguishing between similar objects. Here, a new, innovative methodology for ascertaining an object's gamma signature that is both tamper-proof and non-disclosing in terms of weapon specifics is proposed.

AGA 3.3 Thu 11:00 PTB HS HvHB

How to Verify the Comprehensive Test Ban Treaty at Very Low Yields? — •Christopher Fichtlscherer[1,2], Moritz Kütt[2,3], and Julien de Troullioud de Lanversin[4] — [1]RWTH Aachen, Germany — [2]Institute for Peace Research and Security Policy, Hamburg, Germany — [3]Program on Science and Global Security, Princeton University, USA — [4]Hong Kong University of Science and Technology, Hong Kong

The Comprehensive Test Ban Treaty (CTBT), though not in force, effectively acts as a moratorium on nuclear testing. The US conducted its last test in 1992, Russia in 1990, and China in 1996. Despite the end of tests, these states continue experiments (that include fission reactions in weapon-grade material) to maintain and develop their nuclear arsenals. The United States has accused Russia and China of conducting very low yield nuclear tests, potentially violating the CTBT. Satellite imagery showing increased activity at nuclear test sites might be part of these concerns. These alleged tests, suspected to be in the kilogram-range, could involve supercritical chain reactions, challenging to distinguish from permitted subcritical tests without direct evidence. At the 2023 CTBT Conference, Jill Hruby, Administrator of the U.S. National Nuclear Security Administration, called for a joint verification regime to enhance transparency. We propose a gamma-spectroscopy-based method for this verification.