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***Wednesday 19th until***

***Saturday 22nd October 2022***

programMe

**Inauguration and the first annual conference of the Alva Myrdal Centre for Nuclear Disarmament**

**#AlvaMyrdalCentre2022**

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| **Wednesday the 19th of October** | | | | |
| 13:00-14:30 | Interactive panel "Making of experts in the nuclear field: scholars as science diplomats"  **Venue:** *Sydney Alrutz hall*, Blåsenhus,  von Kraemers Allé 1A, 752 37 Uppsala  **NB:** Not livestreamed | | | |
| 15:00-16:30 | Inauguration of the Alva Myrdal Centre (AMC) and opening of the conference  **Venue:** *Grand Auditorium*, Main University Building,  Biskopsgatan 3, 753 10 Uppsala | | | |
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| **Thursday the 20th of October**  **Venue:** Uppsala Konsert & Kongress, Vaksala Torg 1, 753 31 Uppsala | | | | |
| 08:30-08:55 | Registration | | | |
| 08:55-09:00 | Welcome  **Venue:** *Hall C* | | | |
| 09:00-10:00 | Presentation of the state of the art by AMC WG1 and WG4  **Venue:** *Hall C* | | | |
| 10:00-10:10 | Short break | | | |
| 10:10-11:10 | Presentation of the state of the art by AMC WG2 and WG3  **Venue:** *Hall C* | | | |
| 11:10-11:20 | Short break | | | |
| 11:20-12:20 | Presentation of the state of the art by AMC WG5  **Venue:** *Hall C* | | | |
| 12:20-13:20 | Lunch | | | |
| 13:20-14:20 | Presentation of the state of the art by AMC WG6  **Venue:** *Hall C* | | | |
| 14:20-14:50 | Long coffee break | | | |
| 14:50-15:15 | Keynote address by Robert Kelley  **Venue:** *Hall C* | | | |
| 15:15-15:40 | Keynote address by Prof Thomas Biersteker  **Venue:** *Hall C* | | | |
| 15:40-16:05 | Poster session  **Venue:** *Foyer* outside Hall C  **NB:** Not livestreamed | | | |
| 16:05-17:35 | 1A:  Nuclear disarmament: Data, concepts and knowledge production  **Venue:** *K3* | 1B:  Nonproliferation and disarmament: state of the field and emerging challenges  **Venue:** *K1* | 1C:  Nuclear safeguards verification: new challenges and methods  **Venue:** *K4* | Posters are still up |
|  | | | | |
| **Friday the 21st of October**  **Venue:** Uppsala Konsert & Kongress, Vaksala Torg 1, 753 31 Uppsala | | | | |
| 08:45-09:00 | Registration | | | Posters are still up |
| 09:00-10:30 | 2A:  Treaties and beyond: The future of policy construction and nuclear arms control  **Venue:** *K3* | 2B:  Nonproliferation and disarmament: new perspectives and research gaps  **Venue:** *K1* | 2C (technical research):  Nothing here? Next steps for the verified absence of nuclear weapons  **Venue:** *K4* |
| 10:30-11:00 | Long coffee break | | | |
| 11:00-12:30 | 3A:  Nuclear disarmament issues in South Asia and the Middle East  **Venue:** *K3* | 3B:  The future of arms control and disarmament  **Venue:** *K1* | 3C (technical research):  Developing a virtual reality application for nuclear disarmament verifications: an interactive workshop  **Venue:** *K2*  **NB:** Not livestreamed | Posters are still up |
| 12:30-13:30 | Lunch | | | |
| 13:30-15:00 | 4A:  Perspectives on nuclear disarmament negotiations  **Venue:** *K3* | 4B:  Lessons from past experiences in nuclear arms control  **Venue:** *K1* | 4C (technical research):  Nuclear disarmament: Verification methods  **Venue:** *K4* | 4D Bonus session!  Try the VR technology from workshop 3C  **Venue:** *K2*  **NB:** Not livestreamed |
| 15:00-15:30 | Long coffee break | | | |
| 15:30-17:00 | 5A:  New weapons and doctrines  **Venue:** *K3* | 5B:  A gender perspective on nuclear disarmament  **Venue:** *K1* | 5C (technical research):  How to discourage cheating in disarmament verification? (workshop)  **Venue:** *K4* | Posters are still up |
| 17:05-17:20 | Closing remarks  **Venue:** *Hall C* | | | |
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| **Saturday the 22nd of October**  **NB: None of the sessions are livestreamed** | | | | |
| 11:30-13:00 | Book presentation of *Alva Myrdal: A Pioneer in Nuclear Disarmament*  (The event will be held in Swedish)  **Venue:** *Mallas sal*, Stadsbiblioteket,  [Svartbäcksgatan 17, 753 20 Uppsala](https://www.bing.com/local?lid=YN7995x502206766&id=YN7995x502206766&q=Uppsala+Stadsbibliotek&name=Uppsala+Stadsbibliotek&cp=59.86079025268555%7e17.635009765625&ppois=59.86079025268555_17.635009765625_Uppsala+Stadsbibliotek) | | | |
| 13:00-13:30 | Break | | | |
| 13:30-15:00 | Panel on the consequences of nuclear war  (The event will be held in Swedish)  **Venue:** *Brusewitz hall*, 2nd floor, Gamla Torget 6,  [753 20 Uppsala](https://www.bing.com/local?lid=YN7995x502206766&id=YN7995x502206766&q=Uppsala+Stadsbibliotek&name=Uppsala+Stadsbibliotek&cp=59.86079025268555%7e17.635009765625&ppois=59.86079025268555_17.635009765625_Uppsala+Stadsbibliotek) | | | |
| 15:00-15:15 | Break | | | |
| 15:15-18:00 | Film screening of *Where the Wind Blew* and discussion  (The event will be held in English)  **Venue:** *Brusewitz hall*, 2nd floor, Gamla Torget 6,  [753 20 Uppsala](https://www.bing.com/local?lid=YN7995x502206766&id=YN7995x502206766&q=Uppsala+Stadsbibliotek&name=Uppsala+Stadsbibliotek&cp=59.86079025268555%7e17.635009765625&ppois=59.86079025268555_17.635009765625_Uppsala+Stadsbibliotek) | | | |

**Wednesday the 19th of October**

**Inauguration of the Alva Myrdal Centre for Nuclear Disarmament and opening of the Conference**

13:00 – 14:30 | Sydney Alrutz lecture hall, Blåsenhus

**Interactive panel**

***Making of experts in the nuclear field: scholars as science diplomats***

(NB: Session not livestreamed)

Interactive panel event on informing about career opportunities from the personal perspectives in the nuclear (policy) field, aimed for newcomers and young/junior professionals.

Chair: Marzhan Nurzhan, PhD Candidate, Graduate School of Social Sciences, University of Basel

Marzhan Nurzhan is PhD Candidate at the Graduate School of Social Sciences at the University of Basel.  Marzhan holds an MA in European Studies and an MSc in Social Sciences from Europa-Universität Flensburg and the University of Southern Denmark, along with a postgraduate certificate in Peace Research from the University of Oslo. Marzhan gained professional experience at several United Nations office (in the European and Central Asian region) agencies and worked for European-based NGOs in the field of international peace and security.

Panel:

Jannis Kappelmann, Researcher, Lecturer and PhD Student in Political Science, Faculty of Economics and Social Sciences, University of Hamburg:

Jannis Kappelmann is a PhD Student, Researcher and Lecturer at University of Hamburg and a Young Fellow at the German Council on Foreign Relations (DGAP). He holds an MA in International Conflict Studies from King’s College London and a Bachelor’s degree in Sociology, Politics and Economics from Zeppelin University. Previously, he worked at the German Federal Foreign Office, the Centre for Science and Security Studies at King’s College London, the United Nations World Food Programme and the Permanent Mission of Liechtenstein to the UN. At SCRAP Weapons of SOAS University of London, he co-lead the Gender and Disarmament project. His research focuses on the role of norms in nuclear disarmament, gender, post/decolonial and humanitarian perspectives on disarmament and international security.

Tina Kurath, Climate Security Consultant at CGIAR, and UNODA-OSCE scholarship alumni

Tina Kurath is a climate security consultant at CGIAR FOCUS climate security. Holding a MA in Peace and Conflict Studies from Uppsala University and a BA in International Relations from the University of Geneva, she has previously worked at the Nordic Africa Institute, the Embassy of Switzerland to Kazakhstan and Tajikistan, and Eduki Foundation. Tina is a member of the CTBTO Youth Group and a 2021 alumni of the Scholarship for Peace and Security: Training in Arms Control and Non-proliferation, a joint initiative by the UN Office for Disarmament Affairs (UNODA) and the Organization for Security and Co-operation in Europe (OSCE).

Dr. Olamide Samuel, Research Associate in Nuclear Politics, The Third Nuclear Age project, School of History, Politics, and International Relations, University of Leicester

15:00 – 16:30 | University Aula, University Main Building

***Inauguration of the Alva Myrdal Centre for Nuclear Disarmament***

*Master of Ceremonies:* Prof. Ashok Swain, Head of theDepartment of Peace and Conflict Research, Uppsala University

*Speakers:*

Prof. Tora Holmberg, vice-rector Humanities and Social Sciences, Uppsala University

Cecilia Wikström, Chair of the Board for the Alva Myrdal Centre

Ann-Sofie Nilsson, Deputy Director-General and Head of Department for Disarmament and Non-Proliferation at the Ministry for Foreign Affairs

Izumi Nakamitsu, United Nations Under-Secretary-General of Disarmament Affairs (video message)

Musical performance by Allmänna Sången choir

*Disarmament Research: The Challenge of Nuclear Weapons*

Prof. Peter Wallensteen, Department of Peace and Conflict Research, Uppsala University and deputy chair of the Board for Alva Myrdal Centre

*Exploring the Next Frontier: Future Avenues for Research in Nuclear Disarmament*

Dr. Rupal N. Mehta, Associate Professor, Department of Political Science, University of Nebraska-Lincoln

*How Research and Science Can Change the World*

Beatrice Fihn, Executive Director of the International Campaign to Abolish Nuclear Weapons (ICAN)

Musical performance by Allmänna Sången choir

**Thursday the 20th of October**

**Day 1 of the Annual Conference**

08:55 – 09:00 | Hall C, Uppsala Kongress & Konsert

**Welcome by Prof. Erik Melander, Director of the Alva Myrdal Centre for Nuclear Disarmament**

09:00 – 10:00 | Hall C, Uppsala Kongress & Konsert

**Panel *Presentation of the state of the art by AMC’s Working Groups 1 and 4***

Members of AMC’s Working Groups 1 and 4 will present the state of the art in the topics pertaining to their Working Groups.

Working Group 1 “Negotiating Nuclear Disarmament” focuses on the processes of multilateral negotiations aimed at disarmament, non-proliferation, and management of nuclear weapons. We will seek to stimulate research, bringing together some of the leading international scholars in the study of negotiation research as well as scholars focusing specifically on the NPT and other forms of nuclear negotiations.

Working Group 4 “Technical Nuclear Non-Proliferation and Safeguards” consists of multiple members from the Division for Applied Nuclear Physics at UU, with competences and experiences relevant for technical non-proliferation, safeguards and nuclear disarmament. The focus of the working group is on the development of technical measures that support the non-proliferation and disarmament community, through development of approaches, methodologies and measurement techniques targeting existing needs and challenges. We are also interested in jointly with the other AMC working groups and experts in the field tackling issues of an interdisciplinary nature.

10:10 – 11: 10 | Hall C, Uppsala Kongress & Konsert

**Panel *Presentation of the state of the art by AMC’s Working Groups 2 and 3***

Members of AMC’s Working Groups 2 and 3 will present the state of the art in the topics pertaining to their Working Groups.

Working Group 2 “International Measures for Compliance to Nuclear Disarmament Regimes aims to investigate the role of sanctions in making countries join and adhere to the Non-Proliferation Treaty (NPT) or other non-proliferation arrangements. At the same time, for a complete understanding, there is a need to also investigate cases where sanctions have not led to parties joining or adhering to the NPT. Through the study of historical cases and current situations, we hope to establish an empirical basis for how sanctions can contribute to non-proliferation or other disarmament initiatives.

Working Group 3 “Data on Nuclear Rivalries, Negotiations, and Agreements” aims to identify needs for new data and gaps in existing data on issues related to nuclear weapons, and then to develop new data to meet those needs and fill those gaps. Through a systematic mapping of the data available in a number of areas of interest, we have identified a set of key areas where we think we can make important contributions to data that will facilitate research on nuclear rivalry, proliferation, crises and escalation processes, and treaty negotiation processes.

11:20 – 12:20 | Hall C, Uppsala Kongress & Konsert

**Panel *Presentation of the state of the art by AMC’s Working Group 5***

Working Group 5 “Nuclear Disarmament in Policy and International Law” considers the range of issues related to nuclear disarmament in the context of policy and international law. The group, consisting of international experts in the field, will exchange on the impact of ongoing developments in the strategic context, and explore pathways forward to help reinvigorate multilateral arms control and disarmament efforts. Research, anchored in the work of SIPRI staff and associates, will look to fill substantive gaps in the field identified by group members, diving into topics such as the future of arms control, outer space developments, and regional security dilemmas.

13:20 – 14:20 | Hall C, Uppsala Kongress & Konsert

**Panel *Presentation of the state of the art by AMC’s Working Group 6***

Working Group 6 “Nuclear Disarmament and Non-Proliferation” aims to lay the foundation for a more cumulative and systematic approach to the academic study of nuclear weapons focusing on questions relating to security and strategy. It will proceed with this effort through three sequential clusters: 1) empirical foundations, 2) past experiences and new tools, and 3) emerging challenges. It will pursue a comparative approach of studying past lessons, new tools and future prospects for nuclear disarmament and nuclear non-proliferation to facilitate a rigorous discussion and relevant outputs.

Chair: Prof. Målfrid Braut-Hegghammer, Professor, Department of Political Science, University of Oslo

Panelists: Dr. Mark S. Bell, Associate Professor, Department of Political Science, University of Minnesota

Dr. Jennifer L. Erickson, Associate Professor, Political Science Department, Boston College

Prof. Thomas Jonter, Professor, Department of Economic History and International Relations, Stockholm University

Discussant: Prof. Alexander H. Montgomery, Professor, Department of Political Science, Reed College

14:50 – 15:15 | Hall C, Uppsala Kongress & Konsert

**Keynote address by Robert E. Kelley: *Remembering Alva Myrdal:  Honoring her dreams with progress***

*The opening of the Alva Myrdal Centre is a significant moment in recognizing her vision and dedication. The goal of nuclear disarmament is now decades old. Progress until today does not do justice to her determination. A new Center, and a new dedication give us a chance to renew denuclearization efforts with new initiatives. This is a time for reflection and a time for bold ideas.*

Robert Kelley is a licensed nuclear engineer in the State of California. He worked in several roles within the US Department of Energy laboratories as a research reactor supervisor, a metallurgist and program manager for nuclear intelligence at Los Alamos National Laboratory. As Laboratory Director of the USDOE Remote Sensing Lab he managed nuclear emergency response programs and remote sensing applications for spectral imagery and radiation detection. In the early 1990s and again in the 2000s he was a Director of the International Atomic Energy Agency managing nuclear weapons inspections in Iraq, South Africa, Libya and many other countries. He is currently a Distinguished Associate Fellow at the Stockholm International Peace Research Institute and domiciled in Vienna, Austria.

15:15 – 15:40 | Hall C, Uppsala Kongress & Konsert

**Keynote address by Prof. Thomas Biersteker: *Sanctions and Non-proliferation: Overused or Underutilized?***

Thomas Biersteker is the Gasteyger Professor Honoraire at the Graduate Institute, Geneva and a Global Fellow at the Woodrow Wilson International Center for Scholars in Washington, DC. He previously taught at Yale University, the University of Southern California, and Brown University, where he directed the Watson Institute for International Studies from 1994 until 2006. His research focuses primarily on international relations, global governance, and international sanctions. In addition to providing annual sanctions training for incoming members of the UN Security Council, he is the principal developer of UN[SanctionsApp](https://unsanctionsapp.com/), an interactive tool for the design and analysis of UN targeted sanctions. Ongoing research includes work on the evolution of UN sanctions, how sanctions relief can be utilized to facilitate negotiations, and ways to make the UNSanctionsApp more useful for humanitarian actors facing the challenges of overcompliance with sanctions implementation.

15:40 – 16:05 | Foyer outside Hall C, Uppsala Kongress & Konsert

**Poster session** (NB: Session not livestreamed)

*What makes the bomb go off? On the definitions of fertile, fissile, fissible and fissionable nuclei*

Dr. Markus Preston, Researcher, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

For the success of treaties on nuclear non-proliferation and disarmament, an understanding of the materials needed to manufacture a nuclear weapon is required. The fission process, in which atomic nuclei are split by neutrons, is central to the detonation of a nuclear weapon. In the fission process, neutrons are released, potentially resulting in a chain reaction in the material. However, not all atomic nuclei can undergo fission, and not all nuclei that can undergo fission can support a self-sustained nuclear chain reaction. This means that some types of nuclides can be used to sustain the chain reaction in a nuclear weapon, whereas others are less useful for this purpose. To facilitate successful non-proliferation and disarmament agreements, a clear definition of which materials to control is needed. One fundamental input to this definition is knowledge of whether a material can at all undergo fission and if it can sustain a nuclear chain reaction.

The need to classify the properties of different atomic nuclei in connection with fission and neutron chain reactions has led to definitions of several “nuclear f-words”: one can speak of fertile, fissile, fissible and fissionable nuclei. However, not all of these terms are universally used and may have unclear, or even conflicting, definitions. Well-defined and agreed upon terminology may be beneficial to the negotiation and verification of future treaties. In this poster, the physical motivation for the definitions of these important concepts will be described.

*Peace Education activity on raising awareness of the nuclear weapons threat in secondary schools*

Prof. Tom Sauer, Professor in Political Science and member of the Research team in International Politics, University of Antwerp

The goal of this presentation is to describe this peace education initiative (by Rotary and myself) on raising awareness of the nuclear weapons threat: its goals, its origins, how it was established, sponsored (50,000 euro), and implemented. It was initiated in 2019-2020, long before the start of the war in Ukraine; it was prepared by Rotary, myself, and two peace organizations in Belgium (Pax Christi Flanders and Vrede vzw) with the help of pedagogical experts in the period 2020-2021; Rotary International approved the project in the Autumn of 2021; half-day workshops have been given in ten schools in Flanders in the period October 2021-May 2022 reaching a 1,000 pupils; the first year was concluded with a closing event attended by 100 people (mostly members of Rotary) at the University of Antwerp on the 7th of May 2022 with a key-note speakers (myself), a lecture on the humanitarian consequences of the use of nuclear weapons by the Red Cross Flanders, and a panel that included a former NATO Secretary-General, a former F-16 pilot of the Belgian Air Force, a Dutch IPPNW member and somebody from Pax Christi Flanders. The project will be continued in a second and last year, starting in September 2022. By being able to explain this project, others may get inspired and may repeat it in their respective countries.

*Pressurized heavy water reactors and associated proliferation concerns*

Vaibhav Mishra, PhD student, Department of Physics and Astronomy, Uppsala University

Pressurized heavy water reactors (PHWRs) are characterized by the use of heavy water as neutron moderator and the ability to use natural non-enriched uranium as fuel. Due to the ease of fuel fabrication, this reactor type was among the earliest to be developed and today many countries still use PHWRs for electricity production, even if the most common reactor type worldwide is the light water reactor; LWR.

Heavy water has excellent neutron economy features which is the reason it can be fuelled with natural uranium and still obtain criticality. Natural uranium contains only 0.7% of the fissile U-235 isotope that sustains the reactor power and it is rapidly consumed. Thus, PHWR reactor require frequent refuellings, and many PHWRs are designed to allow refuelling while the reactor is running, so-called online refuelling. This increases the availability time of the reactor, and enables extraction of fuel from the reactor at the time when it is most suitable for weapons production. For these reasons, reactors with online refuelling are considered a proliferation concern.

In this poster we will discuss some historic and contemporary nuclear weapons programmes that have relied on PHWR technology. We present a simulation framework created for future use for studying the plutonium production rate and isotopic quality in PHWRs. This simulation framework is aimed at enabling the estimation of fissile material inventories in heavy water reactors. In turn, this is of importance for verification of proposed treaties such as the NPT, TPNW and FMCT.

*Development of a PhD course in verification of nuclear test explosions under AMC*

Dr. Sophie Grape, Senior Lecturer and Associate Professor in applied nuclear physics, Department of Physics and Astronomy, Uppsala University and leader of AMC’s Working Group 4

Under the AMC, a range of activities covering education, research and outreach are foreseen. One of them concerns education and the build-up of competence related to disarmament, and for that reason collaborative efforts have been ongoing during 2021 and 2022 to develop a PhD-level course in verification of nuclear test explosions, and to offer it during September-October 2022.

The course is developed by Uppsala University and the Swedish Defence Reserach Agency (FOI) and corresponds to 7.5 credits. It is a cross-disciplinary course that spans over several disciplines. It introduces the participants to treaties and verification regimes governing nuclear weapons and it explains identification, calculation and analysis of signatures from nuclear weapon explosions. Furthermore, effort has been made to let the participants actively work with data collection, aggregation, analysis and with the interpretation and evaluation of data. The course includes also both a laboratory exercise on detection of radionuclides, and a project work in which the participants analyze a test explosion scenario and summarize their findings and conclusions in a manner very similar to how this is done in reality.

This poster will describe the details of the course and its content. Since the course is planned to be offered just before this conference, we also hope to provide some information on its execution, as well as feedback from the participants.

**Parallel sessions Day 1**

16:05 – 17:35 | Room K3, Uppsala Kongress & Konsert

**Session 1A: Nuclear disarmament: Data, concepts and knowledge production (panel)**

Chair: Dr. Magnus Öberg, Senior Lecturer/Associate Professor, Department of Peace and Conflict Research, Uppsala University and deputy leader of AMC’s Working Group 3

*Public opinion and the use of force. How the Italians consider the atomic weapons*

Dr. Francesca Farruggia, Assistant Professor, Department of Social Science and Economics (DiSSE) Sapienza, University of Rome

For an unpopular purpose such as the use of force, governments must guarantee legitimacy for their decisions. That is a resource that requires the consent of public opinion. The overall wisdom of public opinion is also capable, if oﬀered the opportunity, of ﬁnding its way on the diﬃcult roads of non-proliferation and disarmament. In January 2022 the Science and Security Board of the Bulletin of the Atomic Scientists set the Doomsday Clock at 100 seconds to midnight. At that time, we called out Ukraine as a potential ﬂashpoint in an increasingly tense international security landscape. For many years, many analysts have warned that the most likely way nuclear weapons might be used is through an unwanted or unintended escalation from a conventional conﬂict. Russia’s invasion of Ukraine has brought this nightmare scenario to life. Do the Italians consider the use of nuclear weapons a realistic threat in a conﬂict of such proportions? What do they think about the nuclear disarmament? We will try to give some answers to these questions by analyzing the results of the main opinion polls carried out on these issues.

Discussant: Jannis Kappelmann, Researcher, Lecturer and PhD student in Political Science, Faculty of Economics and Social Sciences, University of Hamburg

*The role of expertise in shaping politics of nuclear knowledge. A case study of think tanks.*

Marzhan Nurzhan, PhD Candidate, Graduate School of Social Sciences, University of Basel

Weapons of mass destruction, in particular nuclear arms, pose a signiﬁcant threat to global and human security. A human-centered approach toward outlawing these weapons was advocated by the International Campaign to Abolish Nuclear Weapons (ICAN) in cooperation with like-minded states and international organizations. This resulted in the adoption of the Treaty on the Prohibition of the Nuclear Weapons (TPNW) and its entry into force in 2021 constituting an important milestone in nuclear disarmament. The existing research on nuclear disarmament extensively covers the TPNW and its transformative role in changing norms, narratives, and discourses, the role of the ICAN, and grassroots activism. However, less is known about the role of expertise by experts, scholars and think tanks. In particular, we know little about the relationship between these actors and states with respect to the production of such norms and nuclear policy knowledge in general. Case studies on European think tanks allow us to address the research gap on the role of expertise and the impact of external along with internal factors on nuclear knowledge production. A qualitative inquiry employs semi-structured expert interviews with the leadership of think tanks. Guided by the building blocks paradigm, this comparative study regards nuclear disarmament from the perspective of positive peace. The transformative research approach allows the construction of new thought patterns related to knowledge production from the intergenerational and Global South-North aspects, in this case in the ﬁeld of nuclear disarmament. The ﬁndings of this empirical research contribute to scholarship on nuclear weapons, European studies, the politics of knowledge, and peace research.

Discussant: Jannis Kappelmann, Researcher, Lecturer and PhD student in Political Science, Faculty of Economics and Social Sciences, University of Hamburg

*Ideology and Risk: The Neuroscience of Nuclear Reversal*

Dr. Rupal N. Mehta, Associate Professor, Department of Political Science, University of Nebraska-Lincoln and member of AMC’s Working Group 3

Dr. Ingrid Haas, Associate Professor, Department of Political Science, University of Nebraska-Lincoln (co-author)

Noelle Troutman, PhD Candidate, Department of Political Science, University of Nebraska-Lincoln (co-author)

How does neural activity in high-risk decision contexts vary between ideological liberals and conservatives? Relatedly, how do these neural differences (or lack thereof) manifest in behavior, namely, the decision to provide opportunities to an opponent for nuclear reversal? We integrate three bodies of literature to develop an innovative framework of nuclear decision-making, including: 1) international and nuclear security, pertaining to the behavioral outcome of interest (i.e., nuclear reversal); 2) political psychology, indicating the mechanism through which reversal outcomes can vary (i.e., political ideology); and 3) cognitive neuroscience and neuroeconomics, namely, the neural factors likely to be driving varying ideological dispositions and preferences (i.e., variance in neural activity in strategic decision-making between liberals and conservatives broadly). We isolate the prefrontal cortex (PFC) and argue that when bargaining risk is high, ideological liberals, relative to conservatives, are more likely to experience higher brain activation in regions of the brain associated with positively-valenced information and reward. Conservatives, relative to liberals, are more likely to experience high brain activation in regions of the PFC associated with punishment and negatively-valenced information. We test this argument with evidence from experiments that employ functional Magnetic Resonance Imaging (fMRI) and find support for our theory. We conclude with a discussion of the policy implications for this research for nuclear security and foreign policy writ large.

Discussant: Prof. Kyle Beardsley, Professor of Political Science, Duke University and member of AMC’s Working Group 3

*(Title TBC)*

Scott Gates, Research Professor, Peace Research Institute Oslo (PRIO) and member of AMC’s Working Group 3

Discussant: Prof. Kyle Beardsley, Professor of Political Science, Duke University and member of AMC’s Working Group 3

*The Causes of U.S. Foreign Deployed Nuclear Weapons*

Alexander Sorg, PhD Candidate, Hertie School, Berlin

The paper examines the reasons for U.S. nuclear weapon deployments in a quantitative study based on an original dataset. I argue that there exist three causes for these deployments: Assurance, extended deterrence, and power projection. Thus far, the existing literature has largely neglected assurance, especially as a strategy distinct from non-proliferation. I reason that the United States will assure allies that possess credible options outside its alliance system, determined by: First, maintaining good relationships with other great powers. Second, military power. Third, nuclear latency. Allies with credible outside options will receive more assurance in the form of nuclear weapon deployments because the United States fears losing them from its sphere of influence. In addition, nuclear weapons are likely deployed to states that are highly threatened (extended deterrence), located at a great distance to the United States, at strategic military locations, or in regions void of other U.S. allies (power projection). I test my hypotheses using an original dataset that substantially improves existing collection efforts. I include information on each individual nuclear-armed delivery vehicle deployed in each year in a host state. In a preliminary data analysis, I find considerable support for my assurance hypothesis.

Discussant: Prof. Kyle Beardsley, Professor of Political Science, Duke University and member of AMC’s Working Group 3

16:05 – 17:35 | Room K1, Uppsala Kongress & Konsert

**Session 1B: Nonproliferation and disarmament: state of the field and emerging challenges (panel)**

Chair: Prof. Målfrid Braut-Hegghammer, Professor, Department of Political Science, University of Oslo and leader of AMC’s Working Group 6

*Prepared to deliver: Ballistic missiles, nuclear hedging, and proliferation*

Dr. Henrik S. Hiim, Associate Professor, Institute for Defence Studies, Norwegian Defence University College and member of AMC’s Working Group 6

*Arming to Disarm? The role of Conventional Precision-Strike Capabilities in Nuclear Disarmament*

Fabian Hoffmann, Doctoral Research Fellow, Department of Political Science, University of Oslo and member of AMC’s Working Group 6

*Nonproliferation Implications of the Diffusion of Emerging Technologies*

Prof. Alexander Montgomery, Professor, Department of Political Science, University of Oslo and member of AMC’s Working Group 6

*A Layered Approach: Considering Modern Verification Mechanisms*

Jamie Withorne, Graduate Research Affiliate, Department of Political Science, University of Oslo and an affiliate of the Oslo Nuclear Project and member of AMC’s Working Group 6

Discussants: Prof. Thomas Jonter, Professor, Department of Economic History and International Relations, Stockholm University

Ms. Amy Woolf, Independent Consultant specializing in nuclear weapons and arms control policy; Scowcroft National Security Senior Fellow, U.S. Air Force Academy; Senior Associate Fellow, RUSI.

16:05 – 17:35 | Room K4, Uppsala Kongress & Konsert

**Session 1C: Nuclear nonproliferation and safeguards verification: new challenges and methods (panel)**

Chair: Dr. Cecilia Gustavsson, Senior Lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

*Studies of naval reactor core properties in light of recent AUKUS developments*

Dr. Sophie Grape, Senior Lecturer and Associate Professor in applied nuclear physics, Department of Physics and Astronomy, Uppsala University and leader of AMC’s Working Group 4

As a result of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), nuclear safeguards veriﬁcation are conducted by the International Atomic Energy Agency (IAEA) to ensure accurate accounting for and control of nuclear materials in states. Experts have highlighted a loophole in the NPT, whereby safeguarded nuclear material could be removed and used for military applications such as naval propulsion. The loophole is exempliﬁed by the announcement by the AUKUS security pact that the United Kingdom and United States will help Australia acquire nuclear-powered submarines. Naval reactors have so-far only been operated by nuclear-weapon states and non-signatories to the NPT. The main non-proliferation concern is that Australia, a non-nuclear weapon state, may set a precedent to remove nuclear material from its civil nuclear fuel cycle. Alternatively, they could use unsafeguarded naval reactor material to produce nuclear weapon materials. This act could inspire other non-nuclear weapon states to use naval propulsion programs as a cover to divert nuclear material for nuclear weapons production.

As a ﬁrst step in addressing these concerns, we have been studying naval reactor cores and their properties. Openly available information has been used to create a model of a naval reactor core and its fuel, and the reactor operation. The model has been implemented in the Monte Carlo code Serpent2. The objective is to study the evolution of the fuel material composition over time and to make an assessment of how useful the material is for nuclear weapon production.

Discussant: Dr. Stephen Herzog, Senior Researcher in Nuclear Arms Control at the Center for Security Studies (CSS), ETH Zurich and associate of Harvard University's Project on Managing the Atom; and member of AMC’s Working Group 1

*The challenge of the naval nuclear fuel cycle to IAEA safeguards*

Tariq Rauf, Board Member Atomic Reporters; former Head of Verification & Security Policy and Alternate Head of NPT Delegation of the IAEA

A looming challenge for IAEA safeguards is that of safeguarding the naval nuclear cycle in States with comprehensive safeguards agreements (CSAs) in force. Presently, nuclear reactors for naval propulsion are either under development or envisaged for nuclear-powered submarines in at least three CSA States (Australia, Brazil and South Korea) and also could be considered in the future by additional States such as Argentina, Canada, Iran and Japan among others. Paragraph 14 of INFCIRC/153/Rev2 type safeguards agreements allows for the “Non-Application of Safeguards to Nuclear Material to be used in Non-Peaceful Activities”, generally interpreted to refer to nuclear-powered ships and submarines, military space vehicles, and nuclear reactors and radio-thermal generators (RTGs) for military bases or isolated radar stations, etc. However, there is no deﬁnition or concept of “non-peaceful or non-proscribed nuclear military activities” as this has never been tested at the IAEA Board of Governors or at NPT Review Conferences. This paper will describe the origins of the paragraph 14 provisions, earlier attempts at exercising such an exemption from safeguards, and the contemporary challenges for the Agency’s safeguards system as more CSA States develop and/or acquire nuclear powdered submarines and ships and seek to the exercise paragraph 14 exemption from safeguards on naval nuclear reactors and nuclear fuel. The paper will advance some recommendations on how to deal with this challenge and minimize or ameliorate deleterious eﬀects on the Agency’s safeguards system, for consideration by Member States and the expert community.

Discussant: Dr. Stephen Herzog, Senior Researcher in Nuclear Arms Control at the Center for Security Studies (CSS), ETH Zurich and associate of Harvard University's Project on Managing the Atom; and member of AMC’s Working Group 1

*Neptunium: time for nuclear safeguards?*

Dr. Markus Preston, Researcher, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

Plutonium and uranium are well known weapon-usable nuclear materials which are currently placed under international safeguards. Examples of nuclear-safeguards methods are surveillance of nuclear facilities, inspections of spent nuclear fuel and process monitoring at fuel reprocessing facilities. Once material comes under safeguards, records of the amount of material are kept throughout its life cycle, and material accountancy veriﬁcation is regularly performed. Deviations from the expected material balances could indicate diversion of nuclear material.

It has been known for many years that there exist materials which are currently not under full international safeguards, but which could at least theoretically be used to manufacture a nuclear explosive device. One material that has attracted particular attention in this context is neptunium, which can be found in spent nuclear fuel. Although it is unclear if neptunium has ever been used in a nuclear explosive device, measures for preventing un-declared separation of neptunium have been implemented since 20 years by the International Atomic Energy Agency (IAEA). However, it has never been placed under safeguards to the same extent as uranium and plutonium. In part, this decision was motivated by the relatively limited amount of neptunium available 20 years ago. However, many things have happened in the nuclear industry since then, and there might be a need for re-visiting the issue. In this presentation, the possible need for placing neptunium under full international safeguards will be discussed in the context of recent trends in the nuclear energy sector and eﬀorts to close the nuclear fuel cycle.

Discussant: Dr. Grant Christopher, Co-Programme Director (Acting) for Verification and Monitoring, VERTIC

*Nuclear Archaeology with Reprocessing Waste for Verifying Fissile Material Declarations*

Benjamin Jung, Research Associate & PhD student, Nuclear Verification and Disarmament, Physics Institute, RWTH Aachen University

To achieve irreversible nuclear disarmament, it is not sufficient to just dismantle the warheads. To ensure a complete denuclearization and prevent clandestine rearmament with hidden stockpiles of fissile materials, it is necessary to account for each state's entire fissile material inventory. From this point of view, it is prudent to include baseline declarations of fissile material and their verification in a nuclear disarmament regime. Nuclear archaeology comprises scientific methods to reconstruct the operating history of nuclear facilities and infer the amount of fissile material produced within. Here, we use North Korea's 5 MWe reactor as an example to demonstrate a technique that uses Bayesian inference to reconstruct the operating parameters of the reactor from measurements of isotopic ratios in high-level waste. This inference framework describes prior beliefs about the operating history as probability distributions and draws samples from them. Together with a computational model of the reactor, these samples are used to converge on a posterior distribution of parameters that best predicts the isotopic ratio values measured in the waste. These reconstructed operating parameters are used to calculate the amount of plutonium produced in the reactor.

Discussant: Dr. Grant Christopher, Co-Programme Director (Acting) for Verification and Monitoring, VERTIC

*Coincidence spectroscopy for increased sensitivity in radionuclide monitoring*

Dr. Peter Andersson, Senior lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

The majority of the energy in a nuclear explosion is released in the immediate blast, and initial radiation accounts for another small fraction. The remaining fraction is released through radioactive decay of the explosion’s ﬁssion products over a longer time span. This allows for the detection of a nuclear explosion by detecting the presence of residual decay. Radionuclide monitoring stations for detection of radioactive emissions to the atmosphere is thereby an important tool in the monitoring of nuclear test explosions. In particular, the globally spanning radionuclide station network of the International Monitoring System (IMS) has been implemented for veriﬁcation of the Comprehensive Nuclear-Test-Ban Treaty. Radionuclide monitoring may also be usable for multiple purposes, including radiological safety and veriﬁcation of existing or proposed treaties, e.g. TPNW, FMCT and NPT. Germanium detectors are the workhorse spectroscopy detector in radionuclide monitoring. By identiﬁcation of the characteristic gamma rays emitted by radioactive particles trapped in air ﬁlters, these detectors are used to disclose if a nuclear explosion caused the release of radioactivity. A particular development that has potential to improve the sensitivity of radionuclide monitoring is the coincidence technique where decaying nuclides, which emit several coincident gamma rays, can be detected at much smaller activity concentrations than with conventional spectroscopy. In this project, dedicated gamma-gamma coincidence detectors are being developed, utilizing electronically segmented germanium detectors. These detectors are expected to be more sensitive to small activity samples, of any nuclides that present coincident emissions of gamma rays. In this presentation, we explore through simulation studies the performance of such detectors to a subset of radionuclides of particular CTBT relevance. In addition, we discuss the path forward in developing a next generation gamma-gamma coincidence spectrometry system of segmented germanium.

Discussant: Dr. Grant Christopher, Co-Programme Director (Acting) for Verification and Monitoring, VERTIC

**Friday the 21st of October**

**Day 2 of the Annual Conference**

**Parallel sessions Day 2**

09:00 – 10:30 | Room K3, Uppsala Kongress & Konsert

**Session 2A: Treaties and beyond: The future of policy construction and nuclear arms control**

Chair: Jannis Kappelmann, Researcher, Lecturer and PhD student in Political Science, Faculty of Economics and Social Sciences, University of Hamburg

*Nuclear Arms Control in Light of the TPNW-1MSP and 10th NPT Review Conference*

Tariq Rauf, Board Member Atomic Reporters; former Head of Verification & Security Policy and Alternate Head of NPT Delegation of the IAEA

This presentation will assess the outcomes of the First Meeting of States Parties (1MSP) to the Treaty on the Prohibition of Nuclear Weapons (TPNW) in Vienna 21-23 June 2022, and the Tenth NPT Review Conference at the UN from 1-26 August 2022. Both international conferences focus on the role of nuclear weapons in the current security environment, development of new types of nuclear weapons and new missions, nuclear doctrines, future of bilateral and multilateral nuclear arms control, nuclear veriﬁcation (peaceful uses, monitoring of ex-weapons ﬁssile material), nuclear safety and nuclear security, and peaceful uses of nuclear technologies. Furthermore, the presentation will assess the future nuclear arms control architecture in the short- to medium-terms.

Discussant: Dr. Wilfred Wan, Director of the Weapons of Mass Destruction Programme, Stockholm International Peace Research Institute (Sipri) and member of AMC’s Working Group 5

*Bottom-Up Nuclear Disarmament: Local Activism and the Treaty on the Prohibition of Nuclear Weapons*

Dr. Stephen Herzog, Senior Researcher in Nuclear Arms Control at the Center for Security Studies (CSS), ETH Zurich and associate of Harvard University's Project on Managing the Atom; and member of AMC’s Working Group 1

Dr. Rebecca Davis Gibbons, Assistant Professor, University of Southern Maine and member of AMC’s Working Group 1 (co-author)

In 2017, 122 states adopted the Treaty on the Prohibition of Nuclear Weapons (TPNW), establishing a multilateral agreement banning nuclear arms. Proponents of the Treaty aim to discredit nuclear weapons among the public as a viable and ethical means of providing security. Today, one of the most common means of grassroots nuclear activism in the United States involves passing state- and city-level resolutions supporting disarmament and the TPNW. What is the eﬀect of adopting such resolutions on disarmament attitudes within local communities? Do these resolutions have the potential to lead to broader policy changes? To investigate these questions, this paper uses a nationally representative U.S. survey experiment and in-depth interviews to assess the eﬀects of current nuclear disarmament activism within the United States.

Discussant: Dr. Wilfred Wan, Director of the Weapons of Mass Destruction Programme, Stockholm International Peace Research Institute (Sipri) and member of AMC’s Working Group 5

*A New Model of ‘Taboo’: Disgust, Stigmatization, and Fetishization*

Dr. Michelle Bentley, Reader in International Relations and Director of the Centre for International Security Royal Holloway, University of London

The conceptualization of taboo within International Relations (IR) – that is, what we understand to be taboo – is inadequate. Specifically, current analysis fails to sufficiently distinguish between taboo and non-taboo forms of prohibitory norm, where this failure often facilitates a tendency (explicit or implicit) to comprehend the concept primarily in terms of actor compliance with a taboo in question. This understanding is shown here to be analytically unrepresentative and that it sets unrealistic expectations for actor behaviour, especially where those expectations are then employed as the foundation of quantifiable conceptual comprehension and study within IR. In response to this critical need for a new understanding of taboo relevant to IR, the article constructs an original analytic model based on: disgust, stigmatization, and fetishization. The article additionally outlines the conceptual and methodological implications of adopting this new model, including where it subsequently demonstrates that taboos are more prevalent and more influential than certain sectors of the IR discipline have previously given them credit for.

Discussant: Prof. Tom Sauer, Professor in Political Science and member of the Research team in International Politics, University of Antwerp

*Abolishing the Bomb: Analyzing the Implications of Past and Current Nuclear Disarmament Pathways*

Dr. Rebecca Davis Gibbons, Assistant Professor, University of Southern Maine and member of AMC’s Working Group 1

Discussant: Prof. Tom Sauer, Professor in Political Science and member of the Research team in International Politics, University of Antwerp

09:00 – 10:30 | Room K1, Uppsala Kongress & Konsert

**Session 2B: Nonproliferation and disarmament: new perspectives and research gaps (panel)**

Chair: Prof. Målfrid Braut-Hegghammer, Professor, Department of Political Science, University of Oslo and leader of AMC’s Working Group 6

*(Title TBC)*

Dr. Hassan Elbahtimy, Director of Centre for Science and Security Studies (CSSS) and Senior Lecturer, Department of War Studies, King's College London and member of AMC's Working Groups 1 & 6

*Building the Nonproliferation Regime from the Global South*

Dr. J. Luis Rodriguez, Postdoctoral Fellow, Center for International Security and Cooperation, Stanford University and member of AMC’s Working Group 6

*Gendering nuclear disarmament*

Dr. Emma Rosengren, Researcher, Department of Economic History and International Relations, Stockholm University and member of AMC’s Working Group 6

Discussants: Dr. Jennifer L. Erickson, Associate Professor, Political Science Department, Boston College

Ms. Amy Woolf, Independent Consultant specializing in nuclear weapons and arms control policy; Scowcroft National Security Senior Fellow, U.S. Air Force Academy; Senior Associate Fellow, RUSI.

09:00 – 10:30 | Room K4, Uppsala Kongress & Konsert

**Session 2C: Nothing here? Next steps for the verified absence of nuclear weapons (panel)**

Chair: Dr. Moritz Kütt, Senior researcher, Institute for Peace Research and Security Policy, University of Hamburg

Panel description

Typically, arms control, non-proliferation, and disarmament veriﬁcation approaches focus on the objects of concern, nuclear weapons, and ﬁssile material. However, such approaches rely on high levels of cooperation, which are diﬃcult in a hostile international environment. More feasible might be the inverse: Demonstrating the absence of such objects and materials. This is not without precedence. START, New START and INF treaty allowed inspectors to use radiation detectors to determine the non-nuclear nature of an object. In 2020, the International Partnership for Nuclear Disarmament Veriﬁcation identiﬁed the capability to detect nuclear weapons, and the capability to determine the absence of highly-enriched uranium as two current technology gaps. And reliably demonstrating the absence of nuclear weapons could, for example, play a role in a future European peace order, for example in a nuclear weapon-free zone in Central Europe. Absence veriﬁcation is a technical and political challenge: How can we detect nuclear weapons and ﬁssile material from a distance when they only emit relatively weak signals compared to stronger background levels? And how do we ensure conﬁdence after inspections that have - as intended - found “nothing”? This panel brings together researchers that work on proposals for the veriﬁed absence of nuclear weapons. It will include both conceptual presentations as well as contributions highlighting new measurement approaches in-depth.

*Finding Fissile Material using Cosmic-Ray Induced Muons*

Alexandra Datz, Fellow, Institute for Peace Research and Security Policy, University of Hamburg

Dr. Moritz Kütt, Senior researcher, Institute for Peace Research and Security Policy, University of Hamburg (co-author)

Measurement approaches to verify the absence (or presence) of fissile materials are currently under intensive investigation. Through such measurements, one can demonstrate the absence of nuclear weapons. Previous measurements relied on particles emitted by the nuclear weapons themselves, photons and neutrons. We propose a new approach, using cosmic-ray induced muons (muography), and a single detector to find hidden fissile material in potential nuclear weapon deployment sites (e.g. bunkers). This innovative approach is distinct from existing nuclear security muography applications, which require two detector systems, one on each side of an inspected object, hence limiting its size. Our contribution will present simulation results to estimate measurement times of finding significant quantities of plutonium or highly-enriched uranium hidden within bunker structures.

Discussant: Dr. Jens Wirstam, Researcher, Swedish Defense Research Institute (FOI)

*Verifying the Absence of Nuclear Weapons in a Field Exercise*

Dr. Pavel Podvig, Senior Researcher, Weapons of Mass Destruction and Other Strategic Weapons, UNIDIR

Robust verification is an essential element of the nuclear disarmament process. Each stage of this process presents its own verification challenges and requires the development of technical tools and organizational arrangements adapted to its specific circumstances. One of the disarmament steps includes a verifiable removal of nuclear weapons from operational bases, so they are no longer mated to delivery vehicles, such as missiles, and are not stored at the base-level storage facilities. Since it is the absence of weapons that is verified, the verification procedure in this case does not require access to information about weapons or their classified characteristics. Nevertheless, the verification arrangements still have to take into account practical aspects of an inspection that would be conducted at a military base. These include the procedures for obtaining access to an inspected facility, the inspection protocol, the tools available to inspectors and the types of measurements they would be allowed to perform. This paper presents a scenario of a field exercise that could be used to test these procedures in practice. The scenario considers a simulated inspection at a military facility that would confirm the absence of nuclear weapons. It discusses all elements of the inspection procedure that is built to take into account the experience of the past arms control and disarmament treaties, such as START, New START, the INF Treaty, and the CFE Treaty. The scenario is designed to be implemented during an actual field exercise at an active military base.

Discussant: Dr. Jens Wirstam, Researcher, Swedish Defense Research Institute (FOI)

*Inspection System to Confirm the Absence of Nuclear Warheads Using Passive Gamma-Ray Measurements*

Eric Lepowsky, PhD student, Department of Mechanical and Aerospace Engineering, Princeton University

Arms-control agreements between the United States and Russia negotiated after the end of the Cold War have imposed limits on the number of deployed strategic nuclear weapons. Verification of these agreements has relied on onsite inspections, sometimes supported by radiation detection techniques to confirm that an object is non-nuclear. Such absence-confirmation measurements, so far, rely on the detection of neutron emissions associated with the presence of plutonium, but they would be inadequate for uranium devices. Alternative instruments relying on the detection of gamma emissions could simultaneously confirm the presence or absence of both plutonium-based and uranium-based weapons, complementing existing systems that detect neutrons, which can only confirm the absence of plutonium devices. We propose a protocol for confirming the absence of nuclear warheads using only passive gamma-ray measurements. In support of developing and implementing the protocol, we have conducted extensive MCNP simulations, performed small-scale experiments using standard laboratory check sources, and developed a prototype device for use in verification exercises. Such a system would be particularly valuable for next-generation arms-control agreements that limit total numbers of weapons, including those deployed, in storage, and slated for dismantlement.

Discussant: Dr. Gerald Kirchner, Research Head, Carl Friedrich von Weizsäcker Centre for Science and Peace Research, University of Hamburg

11:00 – 12:30 | Room K3, Uppsala Kongress & Konsert

**Session 3A: Nuclear disarmament issues in South Asia and the Middle East (panel)**

Chair: Prof. Peter Wallensteen, Department of Peace and Conflict Research, Uppsala University and leader of AMC’s Working Group 2

*Plutonium production under uranium constraint*

Dr. Erik Branger, Researcher, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

Nuclear material such as high-enriched uranium or plutonium are key components of nuclear weapons. Plutonium does not occur naturally, and must be produced in a nuclear reactor, using uranium as fuel. Should treaties such as Fissile Material Cutoﬀ Treaty (FMCT) or the Treaty on the Prohibition on Nuclear Weapons (TPNW) come into force, it may be important to provide independent assessments of the amounts of nuclear material a country has, to ensure that no material is kept hidden. Some states with an active nuclear weapons program, most notably Pakistan, has been assessed as not having suﬃcient indigenous uranium reserves to operate their plutonium-producing reactors at full capacity. This constraints the amount of plutonium that can be produced, which is important to know when assessing the amount of nuclear weapons material that the state possesses. Since Pakistan has both nuclear reprocessing and enrichment, they may also employ more advanced fuel cycles, where recycled uranium is used in the reactors. This work investigates the feasibility of fuel cycles with a large share of recycled material in heavy water reactors, to assess the uranium resource eﬃciency for weapons-grade plutonium production. Signiﬁcant improvements in uranium resource eﬃciency can be obtained using advanced fuel cycle schemes, allowing a larger production of plutonium using the same amount of uranium. Thus, the perceived uranium shortage may be less severe than estimated, which must be taken into account when assessing Pakistan’s plutonium production capabilities.

Discussant: Dr. Moritz Kütt, Senior researcher, Institute for Peace Research and Security Policy, University of Hamburg

*A technical view on Pakistan’s nuclear weapons programme*

Dr. Cecilia Gustavsson, Senior Lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

Pakistan performed at least two nuclear weapons tests in 1998 as a direct response to the Indian nuclear tests earlier the same year. With this act, Pakistan became the seventh country to successfully complete a nuclear weapons programme. The Pakistani nuclear weapons arsenal consists of both uranium and plutonium weapons and the country has an extensive nuclear industry with all facilities necessary for enrichment of uranium, production of plutonium and reprocessing of spent reactor fuel. Pakistan acquired a Canadian civil heavy water nuclear reactor in 1971; KANUPP-1. In 1976 however, the cooperation with Canada ended as Canada stopped supplying fuel for the reactor. At this point, Pakistan had acquired know-how and experience to manufacture its own fuel and also started building an independent nuclear industry with several un-safeguarded reactors at the Khushab site. With French assistance, a reprocessing plant was constructed and consequently, Pakistan is today in possession of all components necessary for developing and employing both uranium and plutonium nuclear devices. In this presentation, we will explore technical challenges associated with bringing a country such as Pakistan under the existing or proposed veriﬁcation and treaties regimes, such as NPT, TPNW or FMC. Using a simulation framework and estimates based on known physical quantities and derived abilities, we will discuss what conclusions can be drawn with regards to uranium and plutonium stockpiles.

Discussant: Dr. Moritz Kütt, Senior researcher, Institute for Peace Research and Security Policy, University of Hamburg

*The Iranian Nuclear Deal and the path towards a regional agreement on nuclear activities in the Middle East*

Dr. Manuel Herrera, Researcher, Multilateralism and Global Governance Programme, Istituto Affari Internazionali

Compared with other agreements the Iranian nuclear deal includes a number of verification and monitoring activities that go beyond the requirements and scope of the Comprehensive Safeguards Agreement and the Additional Protocol. As a consequence, if the deal resumes and is implemented optimally, it can be an effective instrument to stabilize the Middle East and build trust. In this sense, there are a number of confidence-building measures (CBMs) derived from various elements of the Joint Comprehensive Plan of Action (JCPOA), particularly related to peaceful uses of nuclear energy, that can be fostered regionally and which certainly could make the Middle East a more secure place. Using this as a guide, we first identify the main challenges to this proposal. Then, we explain how peaceful uses of nuclear energy in the Middle East can be instrumentalized as CBMs between regional States, in order to then analyse the JCPOA and discuss how some of its provisions could be regionalized. In essence, we argue that the regionalization of certain provisions of the JCPOA could open the door to a future potential regional agreement on nuclear activities in the Middle East.

Discussant: Dr. Salma Shaheen

*The Impact of Economic Sanctions on Nuclear Non-Proliferation: A Strategically Interactive and Causally Mechanistic Framework*

Dr. Ferdinand Arslanian, Research Fellow, Centre for Syrian Studies, School of International Relations, University of St Andrews

This paper’s contribution to the study of the impact of economic sanctions on nuclear non-proliferation will be twofold: First, it will view the sanctions episode as a dynamic process where the sanctions regime in terms of its levels of restrictiveness and international cooperation is continuously reshaped in response to the proliferation activity of the target country. Second, it will elaborate on the causal mechanisms through which economic sanctions aﬀect the target country’s decision to proliferate or not through interrelating proliferation’s supply side factors related to its economic and nuclear capacities (Singh and Way 2004; Jo and Gartzke 2007) with its demand side factor related to its domestic politics dynamics (Solingen, 2012). The developed framework will examine the case of Iran from the nuclear crisis of 2002 towards the signing of JCPOA in 2015. It will demonstrate the broadening restrictiveness and multilateralism of the sanctions regime as a response to Iran’s proliferation activity and contrast that with the ﬁnal sub-episode of 2011 -2013 which adversely aﬀected both its nuclear program and general economy and in turn created favourable conditions for a shift in Iranian domestic politics through weakening the hardliners and strengthening the reformers paving the way forward towards signing the JCPOA.

Discussant: Prof. Peter Wallensteen, Department of Peace and Conflict Research, Uppsala University and leader of AMC’s Working Group 2

*Does Nuclear Weapons-steered Security Make South Asia More Secure? A Probe into the Contemporary Nuclear Posturing of India and Pakistan*

Dr. Surinder Mohan, Assistant Professor, Department of Strategic and Regional Studies, University of Jammu

From the South Asian nuclear discourse, it is clear that the Indian and Pakistani policymakers largely visualize and propagate the nuclear weapons as an absolute guarantor of their security. In the last couple of decades, the nuclear factor has transformed the India-Pakistan rivalry over Kashmir as well as made South Asia a nuclear ﬂashpoint, a recent case in point is the post-Pulwama military tension that almost edged the two adversaries closer to dangerous nuclear engagement. From the standpoint of the region’s complex state of security, it is important to underline that the general optimism toward nuclear deterrence stands on shaky ground as it might not prove as robust in a real crisis/war situation as propagated by its advocates. The February 2019 cross-border retaliatory air strikes indicate that nuclear threat still hangs over South Asia and nuclear deterrence has limitations of its own in this part of the world. Against this background, the policymakers on both sides must take growing threats to deterrence seriously, particularly from tactical nuclear weapons, as the region’s precarious nuclear equations have high likelihood of a large-scale nuclear mishap/clash.

Discussant: Dr. Salma Shaheen

*Pakistan and Fissile Material Cut-oﬀ Treaty*

Dr. Rizwan Zeb

Successful completion of a Fissile Material Cut-oﬀ Treaty (FMCT) would be a major step towards reaching the ultimate goal of nuclear disarmament. Although disarmament eﬀorts are as old as nuclear weapons yet one witnessed concentrated eﬀorts by global nuclear players to work out a ﬁssile material cut-oﬀ treaty in the post-cold war era. The proposed treaty continues to be one of the main objectives and agenda points for the Geneva based Conference on Disarmament (CD). As per details, the proposed FMCT would ban the production of ﬁssile materials (highly enriched uranium (HEU) and plutonium) for weapons purposes. Apparently, since 2009, Pakistan is acting as the impediment for any meaningful progress on FMCT at Conference on Disarmament (CD). Pakistan’s position is that the FMCT (in its present form) does not address the issue of existing stockpiles and the issue of asymmetry in these stockpiles. It holds the position that these issues must be addressed if the actual objective of this treaty and nuclear disarmament are to be achieved. The proposed paper aims to overview Pakistan’s policy position and narrative on FMCT within its larger nuclear disarmament policy and eﬀorts. It would aim to seek answers to questions: what is Islamabad’s position on the FMCT? Why Islamabad believes that it is important that the issue of existing stockpiles should be addressed and included in the draft of the FMCT before negotiations could begin in the Conference of Disarmament (CD)? Under what conditions would Islamabad enter into negotiations on a FMCT?

Discussant: Dr. Salma Shaheen

11:00 – 12:30 | Room K1, Uppsala Kongress & Konsert

**Session** **3B: The future of arms control and disarmament (moderated panel discussion)**

Chair: Dr. Wilfred Wan, Weapons of Mass Destruction (WMD) Programme Director, SIPRI

In the face of deteriorating relations among some of the nuclear-armed States, much of the legacy Cold War-era arms control architecture has collapsed, and progress towards nuclear disarmament stagnated. Meanwhile, this is accompanied by extensive nuclear modernization programmes that seem to make those armaments more central to security strategies and more useable on the battlefield. This panel takes stock of the current moment and explores the future of arms control and disarmament. How can States begin to rebuild trust and confidence, and develop the kind of common understanding necessary to address each side’s strategic concerns?

Panel: Dr. Tytti Erästö, Senior Researcher, WMD Programme, SIPRI

Dr. Oliver Meier, Senior Researcher, Institute for Peace Research and Security Policy (IFSH), University of Hamburg

Gaukhar Mukhatzhanova, Director, International Organizations and Non-Proliferation Program (IONP), Vienna Center for Disarmament and Non-Proliferation (VCDNP)

Ambassador Karim Haggag, Professor of Practice and Director of Middle East Studies, The American University in Cairo

Dr. Tanya Ogilvie-White, Senior Researcher Adviser, Asia-Pacific Leadership Network (APLN)

11:00 – 12:30 | Room K2, Uppsala Kongress & Konsert

**Session 3C: Developing a virtual reality application for nuclear disarmament verifications: an interactive workshop (VR simulation)**

(NB: Session not livestreamed)

Presenters: Dr. Simon Hebel, Research Associate, Carl Friedrich von Weizsäcker Center for Science and Peace Research, University of Hamburg

Dr. Alessandro Borella, Senior Researcher – Nuclear Safeguards, Belgian Nuclear Research Centre

Dr. Riccardo Rossa, Scientific collaborator at SCK-CEN, Belgian Nuclear Research Centre

The International Partnership for Nuclear Disarmament Veriﬁcation (IPNDV) is an initiative of more than 25 countries, both nuclear and non-nuclear weapon states, to address challenges in disarmament veriﬁcation, including the development of veriﬁcation technologies. Signiﬁcant recent achievements of the IPNDV underlined the importance of deﬁning realistic disarmament scenarios, inspection procedures, and the deployment of appropriate measurement equipment, as indicated by the technology demonstrations held in 2019 at SCK CEN and the German-French exercises NuDiVe in 2019 and in 2022. Continuing the eﬀorts on the development of hands-on nuclear disarmament exercises, SCK CEN and Hamburg University recently started to create a virtual reality (VR) application dedicated to nuclear disarmament veriﬁcation. The VR application is based on a realistic nuclear disarmament facility but does not contain any conﬁdential information. The user can move through several rooms and perform some veriﬁcation activities such as the use of hand-held equipment for radiation monitoring. The VR application can be used for table-top exercises and for optimization of the veriﬁcation approach. Due to its modular design, the available VR model can be further reﬁned and additional features can be added in the future. In this workshop, participants will get the opportunity to test some of the features and discuss their feedback with the developers.

13:30 – 15:00 | Room K3, Uppsala Kongress & Konsert

**Session 4A: Perspectives on nuclear disarmament negotiations (panel)**

Chair: Prof. Isak Svensson, Department of Peace and Conflict Research, Uppsala University and leader of AMC’s Working Group 1

*Chairs in multilateral negotiations: Roles, Strategies and Impact*

Dr. Magnus Lundgren, Senior Lecturer and Associate Professor, Department of Political Science, University of Gothenburg and member of AMC’s Working Group 1

*Secrecy and Issue Linkages in Libya's Negotiations with US and UK Intelligence (TBD)*

Dr. Alexander Bollfrass, Senior Researcher at the Center for Security Studies (CSS), ETH Zurich and member of AMC’s Working Group 1

*Understanding minilateral group dynamics in multilateral nuclear disarmament negotiations*

Dr. Megan Dee, Lecturer in International Politics, University of Sterling and member of AMC’s Working Group 1

*First Banning Tests, then Banning Weapons: Lessons from the study of negotiating CTBT and TPNW*

Ulrika Möller, Senior Lecturer and Associate Professor, Department of Political Science, University of Gothenburg and member of AMC's Working Group 1

Discussant: Dr. Hassan Elbahtimy, Director of Centre for Science and Security Studies (CSSS) and Senior Lecturer, Department of War Studies, King's College London and member of AMC's Working Groups 1 & 6

13:30 – 15:00 | Room K1, Uppsala Kongress & Konsert

**Session 4B: Lessons from past experiences in nuclear arms control (panel)**

*Nuclear Arms Control and Disarmament: Insights from the Past and Prospects for the Future*

Amy Woolf, Independent Consultant specializing in nuclear weapons and arms control policy; Scowcroft National Security Senior Fellow, U.S. Air Force Academy; Senior Associate Fellow, RUSI.

Discussant: (TBC)

13:30 – 15:00 | Room K4, Uppsala Kongress & Konsert

**Session 4C: Nuclear disarmament verification methods (panel)**

Chair: Dr. Sophie Grape, Senior Lecturer and Associate Professor in applied nuclear physics, Department of Physics and Astronomy, Uppsala University and leader of AMC’s Working Group 4

*Technology assessment by the International Partnership on Nuclear Disar-mament Veriﬁcation*

Dr. Jens Wirstam, Researcher, Swedish Defense Research Institute (FOI)

Dr. Gerald Kirchner, Research Head, Carl-Friedrich von Weizsäcker Center for Science and Peace, University of Hamburg (co-author)

Since 2015 the International Partnership on Nuclear Disarmament Veriﬁcation (IPNDV) is engaged in developing veriﬁcation concepts, processes and on-site inspection approaches, supplemented by measurement campaigns and exercises. This work included assessing applicability as well as limitations of technologies which potentially could be applied for veriﬁcation. This included both physical (radiation) measurement and chain of custody technologies. In this talk, the approach of IPNDV will be outlined, the assessment criteria will be presented as well as the technologies taken into consideration. Examples will illustrate the procedure and the technology-speciﬁc data sheets produced.

Discussant: Dr. Peter Andersson, Senior lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

*Neutron Signature of a Two-stage Nuclear Warhead before Dismantlement*

Svenja Sonder, PhD student, Carl-Friedrich von Weizsäcker Center for Science and Peace, University of Hamburg

Carina Prünte, Master student, Carl Friedrich von Weizsäcker-Centre for Science and Peace Research (ZNF), University of Hamburg (co-author)

Prof. Gerald Kirchner, Carl Friedrich von Weizsäcker-Centre for Science and Peace Research (ZNF), University of Hamburg (co-author)

Even though no nuclear disarmament treaty exists at present, possible procedures and accompanying veriﬁcation approaches are being developed. Finding a compromise between conﬁdence in the veriﬁcation and assurance that external inspectors do not gain classiﬁed weapon information has proved to be challenging. Therefore, proposed veriﬁcation approaches usually include passive neutron measurements (neutron counting and multiplicity measurements) which provide less information than active methods. They can be applied before the dismantlement of the warhead or afterwards at the separated nuclear components. To our best knowledge, these techniques have not been validated with an intact warhead before dismantlement. It includes more materials than just the special nuclear material and might therefore self-absorb the emitted neutrons. Hence, the potentials of these measurement techniques have been investigated by computer simulations. The simulations are performed with the toolkit Geant4 which uses Monte-Carlo techniques to simulate the passage of particles through matter. Our notional model of a two-stage nuclear warhead is based on the Fetter-Model of a one-stage warhead and publicly available information about US two-stage warheads. In this talk, we will present our results about neutron signals emitted from the notional warheads and their implications for neutron multiplicity measurements.

Discussant: Dr. Cecilia Gustavsson, Senior Lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

*Hoax or Real? On the Uniqueness of Nuclear Radiation Signatures*

Dr. Moritz Kütt, Senior researcher, Institute for Peace Research and Security Policy, University of Hamburg

Christopher Fichtlscherer, PhD student & researcher, Institute for Peace Research and Security Policy, University of Hamburg (co-author)

Nuclear veriﬁcation often relies on measuring the radiation signatures of warheads and ﬁssile material. Such radiation signatures include gamma and neutron emissions from decay (passive) and particles resulting from induced reactions (active measurements). While research often focuses on measurement technologies, the radiation signatures themselves are rarely studied. Could actors who imitate these signatures compromise nuclear disarmament or non-proliferation processes? This contribution presents initial technical research results on the possibility to cheat existing gamma-based veriﬁcation systems.

Discussant: Dr. Peter Andersson, Senior lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

*Forensic Measurements for Nuclear Archaeology – A New Approach*

Lukas Rademacher, PhD student, Nuclear verification and disarmament group, RWTH Aachen University

Nuclear archaeology is a field of study aiming to reconstruct the production and removal history of weapons-usable fissile materials and thus create estimates of existing stockpiles. A central method of nuclear archaeology is the deduction of a shut-down reactor’s lifetime plutonium production using samples taken from within its core. Specific isotopic ratios are measured to assess neutron fluence and thus estimate plutonium production. We will present a new approach aiming to strengthen the potential of the method by analyzing a larger set of measured isotopic ratios. This allows for the reconstruction of operational histories of the considered reactor in more detail, therefore also improving production estimates. The analysis required for this is however much more complex, so we developed a suitable procedure using mathematical and computational methods that we will present in the form of a first feasibility study. This new analysis methodology can be used for various applications. The reconstructed history can be used to crosscheck fissile material baseline declarations for international confidence building. In conjunction with the development and installation of reactor monitor tags made to facilitate this kind of analysis, the method could become a vital part of a verification scheme surrounding the proposed Fissile Material Cutoff Treaty. And even on a purely national basis, the method could be used to reassess past fissile material production and improve estimates of a country’s available stockpiles, as documentation of early nuclear programs is often laden with significant uncertainties.

Discussant: Dr. Peter Andersson, Senior lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

*Modelling North Korea’s ﬁssile material production to support negotiations and veriﬁcation*

Dr. Grant Christopher, Co-Programme Director (Acting) for Verification and Monitoring, VERTIC

A major challenge for the international community is negotiating a nuclear agreement with North Korea that results in its veriﬁable disarmament. An eventual disarmament process will require knowledge of North Korean ﬁssile material inventories and associated facilities to compare with those oﬀered in negotiations and any initial declarations in a resulting agreement. Open-source analyses since the inception of the North Korean nuclear programme have provided signiﬁcant insight into DPRK ﬁssile material production capabilities. Yet, outside intelligence communities, the full extent of DRPK ﬁssile material production is relatively unknown, particularly for highly enriched uranium production. Using a new open-source analysis methodology, spanning the full fuel cycle, we develop a model that provides new boundaries on estimated ﬁssile material inventories based on known and inferred facilities. The model uses probability distributions developed using open-source analysis that are input into a fuel cycle simulation built in the UK National Nuclear Laboratory’s Orion software. Such an analysis can provide stakeholders without access to advanced national technical means with the best information possible to support negotiations and veriﬁcation of the North Korean nuclear programme.

Discussant: Dr. Cecilia Gustavsson, Senior Lecturer, Department of Physics and Astronomy, Uppsala University and member of AMC’s Working Group 4

13:30 – 15:00 | Room K2, Uppsala Kongress & Konsert

**Session 4D: Bonus session! Try the virtual reality (VR) technology from session 3C (VR simulation)**

(NB: Session not livestreamed)

Facilitators: Dr. Simon Hebel, Research Associate, Carl Friedrich von Weizsäcker Center for Science and Peace Research, University of Hamburg

Dr. Alessandro Borella, Senior Researcher – Nuclear Safeguards, Belgian Nuclear Research Centre

Dr. Riccardo Rossa, Scientific collaborator at SCK-CEN, Belgian Nuclear Research Centre

The VR application dedicated to nuclear disarmament veriﬁcation is based on a realistic nuclear disarmament facility but does not contain any conﬁdential information. The user can move through several rooms and perform some veriﬁcation activities such as the use of hand-held equipment for radiation monitoring. The VR application can be used for table-top exercises and for optimization of the veriﬁcation approach.

Please use the sign-up sheet on the door to room K2 to secure your slot during the session.

15:30 – 17:00 | Room K3, Uppsala Kongress & Konsert

**Session 5A: New weapons and doctrines (panel)**

Chair: (TBC)

*New weapons systems as an alternative to nuclear weapons*

Prof. Tom Sauer, Professor in Political Science and member of the Research team in International Politics, University of Antwerp

Nuclear weapons have never been used again since Nagasaki. Many observers believe that the reason for their non-use is deterrence. Throughout the nuclear era, this body of thought has been criticized by others, but without much impact. In practice, nuclear weapons still exist in large numbers and are spread over more and more countries, despite the Nuclear Non-Proliferation Treaty (NPT). While the pressure by many non-allied non-nuclear weapon states and civil society with respect to nuclear disarmament has substantially increased over the last decade, resulting in the negotiation and entering into force of the Treaty on the Prohibition of Nuclear Weapons (TPNW), its impact on the nuclear armed states remains limited. The nuclear armed states and their allies seem determined to keep relying on nuclear weapons for a very long time. All nuclear armed states are modernizing their arsenals. This article posits that the arrival of modern conventional weapons, the so-called new weapons systems (cyber, hypersonic weapons, autonomous weapon systems, artificial intelligence?), may have a substantial impact on the debate about the future of nuclear weapons. It may strengthen the arguments of the critics of nuclear deterrence in two ways: first, new weapons systems are generally regarded as destabilizing for the global nuclear order, which will make it more likely that nuclear deterrence fails and nuclear weapons will be used; second, some of the new weapons systems have similar or even better deterrence characteristics than nuclear weapons and may replace them as weapons of deterrence.

Discussant: Tariq Rauf, Board Member Atomic Reporters; former Head of Verification & Security Policy and Alternate Head of NPT Delegation of the IAEA

*(Title TBC)*

Dr. Salma Shaheen

The evolving conceptual underpinnings of deterrence is hindering nuclear disarmament to ever become a reality. Due to its fusion with foreign policy baseline, industrial and societal resilience, and military modernization, the deterrence dynamics, in order to respond to transforming strategic environment, have left their conventional practices and political ground and entered into high extraordinary politics. Thus, extending securitization to other sectors of national power making societies obsessed with meeting enhanced demands of security. On one hand, engaging diﬀerent national power sectors or applying whole-of-government approach in establishing and maintaining rigorous deterrence would help those sectors to socialize and build a consensual view about threat perception and response, which in turn would legitimize securitization of national power. On the other hand, military modernization (including emerging disruptive technologies) has enhanced the sensitivity of deterrent posture to technology to a level where nuclear-armed states are eager to invest in whatever technology brings up. Thus, increasing investment in digital warfare and military modernization: 1) widens and deepens securitization further by integrated military and civilian (public and private) sectors; 2) could aﬀect core defense capabilities raising eﬀective conduct of military operations and commitments (in case of NATO) to alliances and partners; and 3) will provoke unrelenting arms race and competitive acquisitions risking strategic stability. Nonetheless, the real test for the eﬀectiveness of extraordinary deterrent posture of nuclear-armed states, as argued, does not lie in their integration, investments and modernization plans rather in their consistency of maintaining such a posture, which could potentially provide a thinking space for risk reduction and arms control. To explore that thinking space, this research assesses consistency of evolving deterrent posture in a comparative study of nuclear-armed states that highlights disturbing trends calling for a revision of deterrence.

Discussant: Dr. Surinder Mohan, Assistant Professor, Department of Strategic and Regional Studies, University of Jammu

*Rethinking Unthinkable: Lowering Nuclear Threshold*

Sergei Nerubenko, Independent Media Research Analyst

This paper probes the evolution of the Russian leadership’s strategic thinking in relation to the possible use of tactical nuclear weapons amid the recent turn of events. Specifically, I argue that the major political influence on the Russian strategic military decisions remains the United States as Russia intentionally sidetracks the EU and lowers the nuclear threshold to achieve its strategic goals. Russia aims to coerce the US dominated West into accepting it as a peer in the emerging multipolar world. I also argue that the gradual and consistent lowering of the nuclear threshold under Putin is a way of dealing with both external and internal threats, also outlined in the Russian military doctrines from 2000 on.

In relation to previous work, my contribution is a critical examination and comparative analysis of the available primary sources versus current interpretations to explain Russia’s evolving strategic behaviour under Putin. I examine the growing politicization of the Russian military doctrine that permits the use of tactical nuclear weapons not only to manipulate the adversary’s perception, but to achieve Russia’s strategic goals stopping short of a direct confrontation with the United States.

I analyse statements by representatives of the Russian regime and the West and put them in context of the invasion of Ukraine as well as the Russian military doctrine, other published official documents, and relevant analytical reports, both Russian and international.

I will show that the evolution of the Russian military doctrine reflects on the complex domestic situation, the new Russian ideology rooted in Russia’s imperial and Soviet superpower past, and the current Russian geopolitical ambitions aimed to ensure the survival of the regime.

My conclusion that Russian military strategic thinking primarily is influenced by and directed against the United States is in turn in line with the interpretation that Russia, though wary of a direct confrontation, is currently preparing for a major war with NATO, and therefore with the United States.

Discussant: Dr. Surinder Mohan, Assistant Professor, Department of Strategic and Regional Studies, University of Jammu

*The Cyber question in our nuclear world*

Angkuran Dey, MSc student in Gender and International Relations, School of Sociology, Politics and International Studies, University of Bristol

Cyber threats have emerged as a significant challenge with the advent of the 21st century, which poses a danger to the existing critical infrastructure of countries. With nine countries in the world possessing nuclear weapons and rogue states like North Korea in the picture, there is an increasing fear of a cyberattack that might paralyse the existing nuclear infrastructure, posing a significant risk. The framework of nuclear responsibilities, non-proliferation and nuclear disarmament stems from the cold war history of nuclear weapons. However, with the Russian invasion of Ukraine, the nuclear disarmament discussions have come back to haunt us as existing nuclear weapons stockpiles have created a legitimate fear surrounding a possible nuclear escalation. The paper will seek to understand how the cyber threat is something we are not ready for, illustrated through a detailed case study from Iran as it looks at the advent of the digital age and the need to question the existing frameworks. It would also establish the urgent need to develop a robust strategic bulwark toward mitigating devastating consequences while delving into the debate surrounding nuclear non-proliferation in a post-colonial world.

Discussant: Dr. Surinder Mohan, Assistant Professor, Department of Strategic and Regional Studies, University of Jammu

*Research on the Impact of Hypersonic Weapons on China-Us Strategic Stability*

MD Arifur Rahman, PhD student, School of Politics and International Relation, East China Normal University

The Sino-US strategic relation is being aﬀected and critically threatened with the aid of emerging technologies such as hypersonic weapons. Studies have found that hypersonic weapons increase crisis instability because of the ambiguity of their warheads, kinetic energy, maneuverability, and the short amount of time they give decision-makers to make decisions. The United States and China are emerging into a hypersonic arms race. According to the research, other Asian countries developing hypersonic weapons could have a signiﬁcant impact on the Sino-US strategic relation. Additionally, the analysis indicates how this speciﬁc weapon will impact the East Asian regional security environment, particularly the Taiwan strait, the Senkaku/Diaoyu Islands, and Korean Peninsula. These are some of the most dangerous ﬂashpoints of military conﬂicts that might lead to nuclear war escalation. Maintaining strategic stability and balancing power between the United States and China should be the key objectives of the relevant states and other regional countries. Qualitative methodologies and secondary data from state-owned newspapers, think tanks, research reports, academic journals, and Sino-US expert opinions are used to examine crisis and arms race stability. As mentioned earlier, this study develops a model that outlines a hypothetical situation with potential consequences and how it might destabilize the cases. According to the ﬁndings, hypersonic weapons can undermine strategic stability in the East Asian region under the following circumstances mentioned in the case study chapter. It has already triggered an arms race and driven the world’s foremost superpowers (the United States and China) into instability with this new weapon. Bilateral export control accords prohibiting the manufacture of speciﬁc components and testing of hypersonic weapons by additional players are intended to help decrease the likelihood that this technology may proliferate to other regional powers in the region. To maintain strategic stability between the US and China, both need to agree on not developing or deploying nuclear-armed hypersonic weapons and focus on the trust-building process. This research has certain limitations. The study is based on publicly available data, so there might be some other factors that are not accessible to the general audience that might aﬀect the analysis.

Discussant: Tariq Rauf, Board Member Atomic Reporters; former Head of Verification & Security Policy and Alternate Head of NPT Delegation of the IAEA

*Kinetic Counter Proliferation and Nuclear Risk*

Ludovica Castelli, Doctoral researcher, The Third Nuclear Age project, School of History, Politics, and International Relations, University of Leicester

Dr. Olamide Samuel, Research Associate in Nuclear Politics, The Third Nuclear Age project, School of History, Politics, and International Relations, University of Leicester

The recent Russian military attacks on the nuclear facilities in Ukraine raise questions about the legality of state-sponsored kinetic military operations on civilian nuclear facilities. Arguably, kinetic military operations targeting civilian nuclear facilities are illegal under international humanitarian law, with the only provision governing attacks on nuclear facilities found in article 56 of the ﬁrst 1977 amendment protocol to the 1949 Geneva conventions. We identify the weaknesses of Art 56 in the context of warfare and query the absence of stricter, more speciﬁc international legal provisions to regulate state behaviour in this regard. In the 1981 Committee on Disarmament meeting on radiological weapons, the Swedish representative observed the risks of mass destruction that would accompany attacks on nuclear power installations. Given these risks, the requirement for stricter regulations to protect civilian nuclear facilities from military attacks appears obvious. However, such proposed protections have been rejected by both NWS and NNWS alike, for various reasons. A weaker nonproliferation regime has (at times) necessitated the practice of kinetic attacks on nuclear facilities under the rubric of “counterproliferation”. Due to this development, the introduction of stricter legal protections for nuclear facilities appears to be a much less feasible proposition in contrast to the prospects that existed in the nuclear environment of the 1970s and 80s. As a result, only the inadequate Art 56 remains a global prohibition, notwithstanding the spread of these facilities globally. We contend that this ongoing situation not only impedes the inalienable rights of states to pursue nuclear energy for peaceful purposes but also increases the probability of new kinds of future nuclearized conﬂicts.

Discussant: Tariq Rauf, Board Member Atomic Reporters; former Head of Verification & Security Policy and Alternate Head of NPT Delegation of the IAEA

15:30 – 17:00 | Room K1, Uppsala Kongress & Konsert

**Session 5B:** **A gender perspective on nuclear disarmament (panel)**

Chair: Prof. Erik Melander, Department of Peace and Conflict Research, Uppsala University; and Director of the Alva Myrdal Centre for Nuclear Disarmament

*Not So Ladylike: Examining Gender Essentialism in Contemporary Nuclear Literature*

Dr. Laura O’Connor, Senior Programme Oﬃcer and Research Coordinator, Ottawa Dialogue and Junior Fellow, Council for Strategic and Defense Research

Gender essentialism is the (ﬂawed) notion that certain characteristics are inherent to a given gender. For example, softness, gentility, and a service orientation are all characteristics often seen as “feminine”, and as incorrectly inherent to womanhood. Gender essentialism is a framework that has largely been acknowledged as a hindrance to gender equality in gender studies literature. In the nuclear ﬁeld, gender essentialism commonly translates to women being siloed into disarmament, humanitarian work, and non-proliferation (the so-called “gentler” elements of the nuclear world). This article begins with an in-depth content analysis of contemporary literature on women, peace, and security (WPS) and nuclear decision-making, with ﬁndings that signal a pattern of gender essentialism even in feminist nuclear literature. This article then goes on to argue **not** that women must have the right to a pro-nuclear stance (though this may be true), but rather that in the pursuit of dis-armament and non-proliferation, gender essentialism undermines women’s arguments for a non-nuclear (or reduced-nuclear) world by chalking up their work to a viscerally gendered perspective, regardless of whether or not gender is inﬂuential to this perspective. This paper thus makes the argument that gender essentialism is a persisting problem in the ﬁeld that is not only disconnected from feminist nuclear analyses, but that also hinders feminist nuclear analyses from taking place.

Discussant: Prof. Maria Eriksson Baaz, Department of Government, Uppsala University and member of the AMC board

*Ban the Patriarchy? Gender Considerations and Feminist Activism at the First Conference of States Parties to the Treaty on the Prohibition of Nuclear Weapons*

Jannis Kappelmann, Researcher, Lecturer and PhD student in Political Science, Faculty of Economics and Social Sciences, University of Hamburg

Anna Hauschild, MSc student Gender, Peace and Security at the Department of Gender Studies, London School of Economics

Today’s global nuclear order consists of a complex structure of norms and institutions. They are not only a means of structuring the discourse about nuclear weapons, but also a system of governance. The governance hierarchy enshrined in the global nuclear order is not only visible at the state level, such as in the discrimination between nuclear haves and have-nots, but also manifests itself, for example, in the gender-disparity in arms control and disarmament negotiations, or practical policy outcomes such as the disproportionate eﬀects of nuclear weapon testing on women. Yet for early feminists or organisations like the Women’s International League for Peace and Freedom (WILPF) the struggle for (nuclear) disarmament has played a central role in their activism. Most recently, feminist concerns have had a decisive role in the Humanitarian Initiative and the campaign to ban nuclear weapons. We argue that feminist activism for nuclear disarmament has succeeded in transforming the experience of being governed into norm contestation, thus claiming agency. By drawing on the concept of the “agency of the governed” developed in the context of critical norms research, we contribute to an understanding of the ways in which norm contestation unfolds and the practices through which feminist activists gain access to norm contestation and are thus able to shape the discourse on nuclear norms. Analyzing these patterns of norm contestation contributes to the understanding of reasons for and results of normative change within the global nuclear order.

Discussant: Prof. Maria Eriksson Baaz, Department of Government, Uppsala University and member of the AMC board

*Examining ‘gender-sensitive’ approaches to nuclear weapons policy: a study of the Non-Proliferation Treaty*

Dr. Laura Considine, Associate Professor of International Politics, University of Leeds

Laura Rose Brown, PhD student on Gender and Nuclear Weapons, University of Leeds

The past decade has seen a push for “gender sensitive” approaches within nuclear policymaking. Yet the signiﬁcance of this approach, and how it relates to the outcomes of nuclear policymaking are unclear. This paper asks the question: how does work done on “gendering” nuclear policy to date understand what a gender sensitive approach to nuclear weapons means and requires, and what impact might this have for nuclear disarmament? Focusing on the NPT as the central institution of global nuclear politics, we examine how the recent push by several actors to bring a gender approach to the NPT to date ﬁts with its stated eventual goal of nuclear disarmament. We suggest that the next steps in “gendering” nuclear policy engage more with feminist policy analysis and the experiences of those already working within the policy space and consider further how and if one can meaningfully link gender sensitive approaches to the process of nuclear disarmament.

Discussant: Prof. Maria Eriksson Baaz, Department of Government, Uppsala University and member of the AMC board

*Gendering the Swedish NATO debate*

Dr. Emma Rosengren, Researcher in international relations, Department of Economic History and International Relations, Stockholm university

This paper analyses the Swedish NATO debate in 2022, and the position of nuclear disarmament therein, from a feminist perspective. Sweden is an especially interesting case for exploring the fundamentals of gender, nuclear disarmament, and NATO membership. Ever since the Swedish government abandoned its nuclear weapon programme and signed the Non-Proliferation Treaty (NPT) as a nuclear weapon-free state in 1968, nuclear disarmament has been a key feature of Swedish non-aligned foreign policy and national identity. Furthermore, gender equality evolved as a central pillar of Swedish foreign policy in the early 1990s, culminating in the declaration of a feminist foreign policy in 2014, and remains a core component of Swedish national identity in the present. Meanwhile, the recent decision to apply for membership of the NATO nuclear alliance has led some to question Sweden’s ability to perform an independent feminist foreign policy in the future, especially in relation to nuclear disarmament. This paper investigates the gender dimensions of the Swedish NATO debate, and the position of nuclear disarmament in this debate, from a feminist perspective. The analysis draws on insights about how articulated imagined futures limit prospects for policy initiatives, and about family analogies in international security. Investigating representations of the role of nuclear weapons in the future, and how references from the family sphere contributed to make meaning about Swedish NATO membership in 2022, the paper contributes with insights about the gendering of NATO membership and its relation with nuclear disarmament ambitions.

Discussant: Prof. Maria Eriksson Baaz, Department of Government, Uppsala University and member of the AMC board

15:30 – 17:00 | Room K4, Uppsala Kongress & Konsert

**Session 5C: How to discourage cheating in disarmament verification? (workshop)**

Facilitators: Dr. Moritz Kütt, Senior researcher, Institute for Peace Research and Security Policy, University of Hamburg

Christopher Fichtlscherer, PhD student & researcher, Institute for Peace Research and Security Policy, University of Hamburg

A critical stage for the veriﬁcation of nuclear disarmament is the authentication of nuclear weapons and ﬁssile material. Technical approaches for the authentication process commonly rely on radiation signatures of the diﬀerent objects, for example, their gamma spectra. The question of whether these signatures are unique has been raised multiple times but never discussed in the publicly available literature. If signatures are not unique, states could cheat the authentication process by inserting hoax objects, and replicating weapon-like detector signals. Progress on disarmament would be jeopardized by the lack of trust created by this obvious cheating possibility. In practical applications, uniqueness depends on the information passed to inspectors: Often, weapon-speciﬁc information is considered sensitive, hence inspectors only gain limited insights, e.g. low-resolution spectra or binary results. Veriﬁcation approaches need to balance the need to protect information with the obvious interest to prevent cheating. In this workshop, we want to address three questions: 1) To what extent is cheating part of scientiﬁc discussion in research and veriﬁcation exercises at your home institutions? 2) Who do we expect to be the most likely cheater? Host Country? Inspecting Party? 3) What is an ideal balance between conﬁdentiality of sensitive information and cheating prevention? Does that balance need to change while nuclear weapon stockpiles decrease?

17:05 – 17:20 | Hall C, Uppsala Kongress & Konsert

**Closing remarks by Prof. Erik Melander, Director of the Alva Myrdal Centre for Nuclear Disarmament**

**Saturday the 22nd of October**

**Day 3 of the Annual Conference**

(NB: None of the sessions are livestreamed)

11:30 – 13:00 | Mallas sal, Uppsala Stadsbibliotek, Svartbäcksgatan 17

**Presentation of the book *Alva Myrdal: A Pioneer in Nuclear Disarmament* (in Swedish)**

The book (in English) is the latest volume in the book series *Pioneers in Arts, Humanities, Science Engineering, Practice*. The first part of the book includes chapters by prominent academics and politicians regarding Alva Myrdal’s work and its importance for the world today. The second part of the book includes texts by Alva Myrdal herself on nuclear disarmament issues, as well as important speeches and a bibliography of her texts on the subject.

**Presenters:** Prof. Peter Wallensteen, Department of Peace and Conflict Research, Uppsala University and deputy chair of the Board for Alva Myrdal Centre

Dr. Emma Rosengren, Researcher in international relations, Department of Economic History and International Relations, Stockholm university

Prof. Hedvig Ekerwald, Department of Sociology, Uppsala University

Prof. Thomas Jonter, Head of Department, Department of Economic History and International Relations, Stockholm university

13:30 – 15:00 | Brusewitzsalen, Gamla Torget 6

**Panel on the consequences of nuclear war (in Swedish)**

What would happen in the event of a nuclear attack? How would society’s health system and emergency infrastructure cope with the effects? And what would the consequences be for our climate and food production? Hear the panel discuss the different consequences of a nuclear war and what we can do to prevent nuclear weapons being used.

Panel: Dr. Jan Larsson, member and advisor of Svenska Läkare mot Kärnvapen (SLMK, Swedish Physicians against Nuclear Weapons)

Prof. Gunilla Svensson, Department of Meteorology and the Bolin Centre for Climate Research, Stockholm university and member of the Scientific Council of SLMK

Stefan Björnson, civil engineer in engineering physics, KTH Royal Institute of Technology in Stockholm and member of the Scientific Council of SLMK

Prof. Lars Rydén, [Department of Earth Sciences, Natural Resources and Sustainable Development; Baltic University Programme](https://katalog.uu.se/organisation/?orgId=X35:39), Uppsala University and member of the Scientific Council of SLMK

15:15 – 18:00 | Brusewitzsalen, Gamla Torget 6

**Film screening and discussion of *Where the wind blew***

*Where the wind blew* tells the story of how the Cold War super powers, in their race to develop more and more deadly bombs, spent forty years developing weapons capable of wiping out entire nations, while sacrificing their own vulnerable populations in the name of national security.

Using archive and testimony from both those affected and those participating in these escalating events, Where the Wind Blew shows not only how ordinary people were allowed to suffer in ignorance, but also how, with personal fortitude and courage they defied their governments. They helped change the course of history by joining forces, first nationally, then across the world to finally triumph against the testing of nuclear weapons. Kazakhstan became, in 1989, the first nation to close its test site, leading the way to an international test ban treaty.

The story does not, of course, end with this victory. Despite treaties and promises, today sees the super powers (and some not-so-super powers) once again build up their nuclear arsenals. With global tensions on the increase, and the real fear that nuclear arms are increasingly available to unstable regimes and groups, we more than ever need reminding about the lessons of history. We may have become complacent about nuclear testing – but the Doomsday Clock which warns us about the threat of how nuclear global destruction takes us closer to Armageddon, is ticking steadily towards midnight.

The film viewing will be followed by a Q&A session about the events portrayed in the film.

Chair: Marzhan Nurzhan, PhD Candidate, Graduate School of Social Sciences, University of Basel

Panel: Prof. Ashok Swain, Head of theDepartment of Peace and Conflict Research, Uppsala University

*(Additional panelists TBC)*