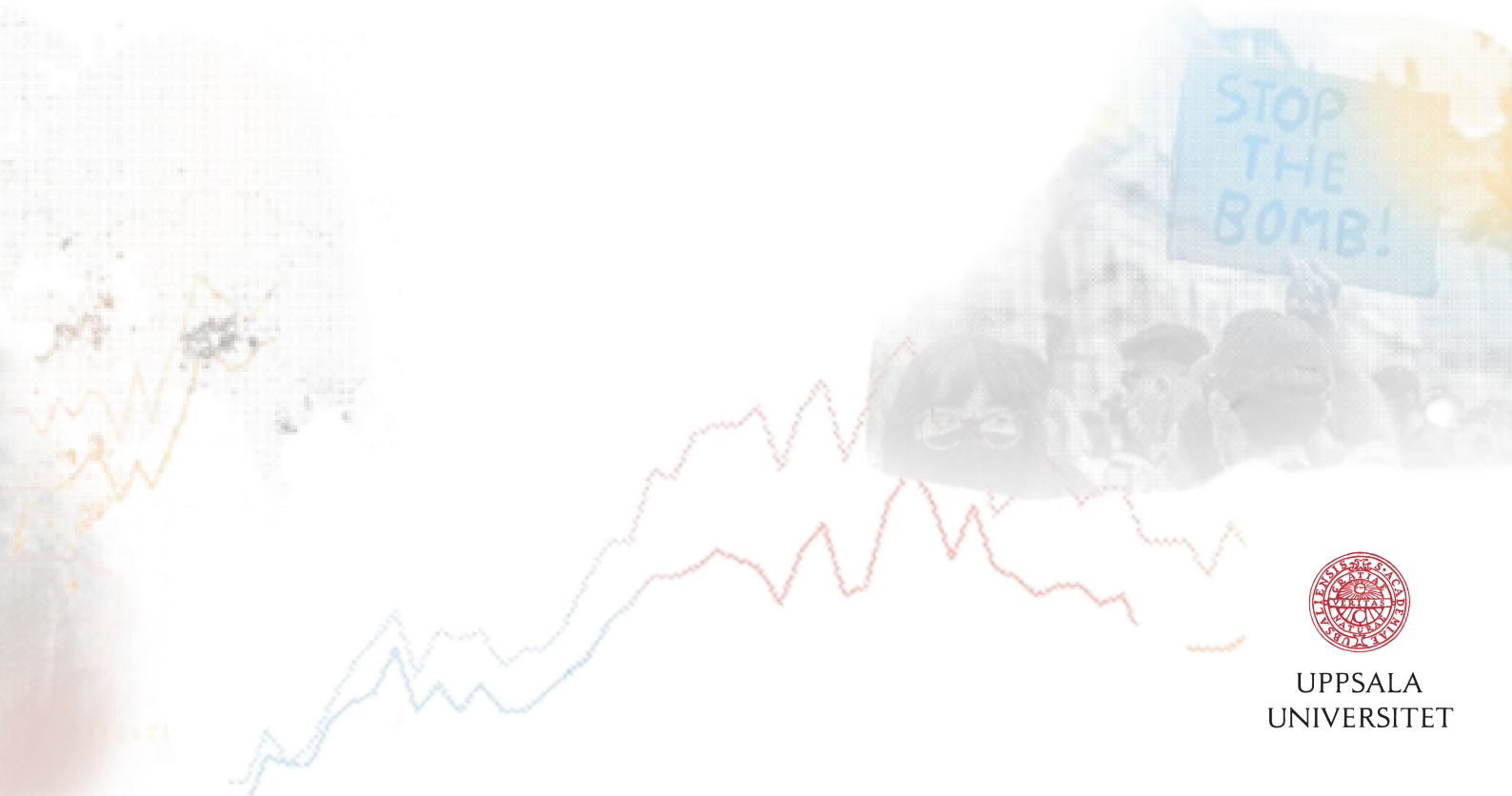
June 18 - 19 2024

Annual Conference

Reinvigorating Nuclear Disarmament

#AlvaMyrdalCentre2024



UPPSALA
UNIVERSITET

June 18 - 19 2024

AMC Annual Conference

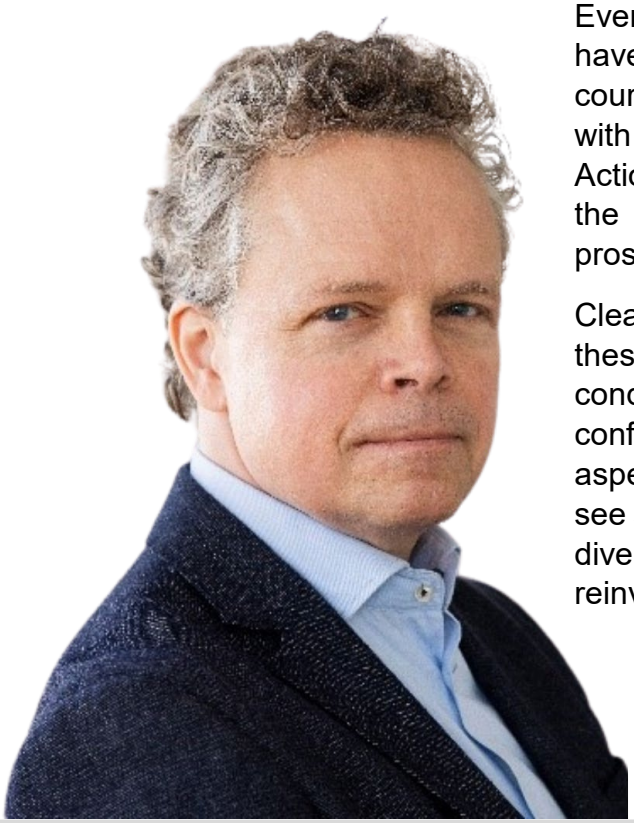
Reinvigorating Nuclear Disarmament

Programme

As the director of the Alva Myrdal Centre for Nuclear Disarmament at Uppsala University, I am delighted to warmly welcome you to our third annual cross-disciplinary conference, “Reinvigorating Nuclear Disarmament”. As we gather here in Uppsala, it is evident that the global conditions for nuclear disarmament, including arms control and non-proliferation, have further deteriorated since our conference last year.

We thus find ourselves in a more perilous world where increased understanding of nuclear weapons is crucial. This knowledge is essential for Sweden to effectively fulfil its new role as a NATO member while continuing being a constructive force in arms control, non-proliferation, and nuclear disarmament. In today's challenging global environment, the goal of a world without nuclear weapons may seem utopian or at least very distant to many. However, the steps that can reduce risks and gradually pave the way for more ambitious nuclear disarmament approaches are more crucial than ever. Sweden is pursuing this path, including through the Stockholm Initiative, which aims to promote the implementation of the Non-Proliferation Treaty.

The global number of nuclear weapons is likely to increase, partly due to China's ambition to reach parity with the USA. Arms control could then involve states abstaining from particularly destabilizing systems and taking measures to reduce the risks of accidental use. For example, there is a recent consensus between China and the United States on the need to discuss the risks of artificial intelligence. Despite many provocative actions and statements, Russia continues to adhere to its 1988 agreement with the USA on pre-notification of ballistic missile launches.



Even small confidence-building steps like these can have a significant impact when trust is at its lowest. Of course, larger agreements, such as a new nuclear deal with Iran similar to the Joint Comprehensive Plan of Action (JCPOA) or an extension of New START between the USA and Russia, would be very positive, but the prospects for these are currently not favourable.

Clearly, more research-based knowledge is needed on these types of arms control measures, as well as on the conditions for genuine détente and disarmament. Our conference adopts a broad approach, covering all these aspects of nuclear disarmament. I am thus pleased to see so many knowledgeable and engaged scholars from diverse backgrounds ready to contribute to reinvigorating research on nuclear disarmament.

Once again, welcome to Uppsala. I hope your conference will be productive!

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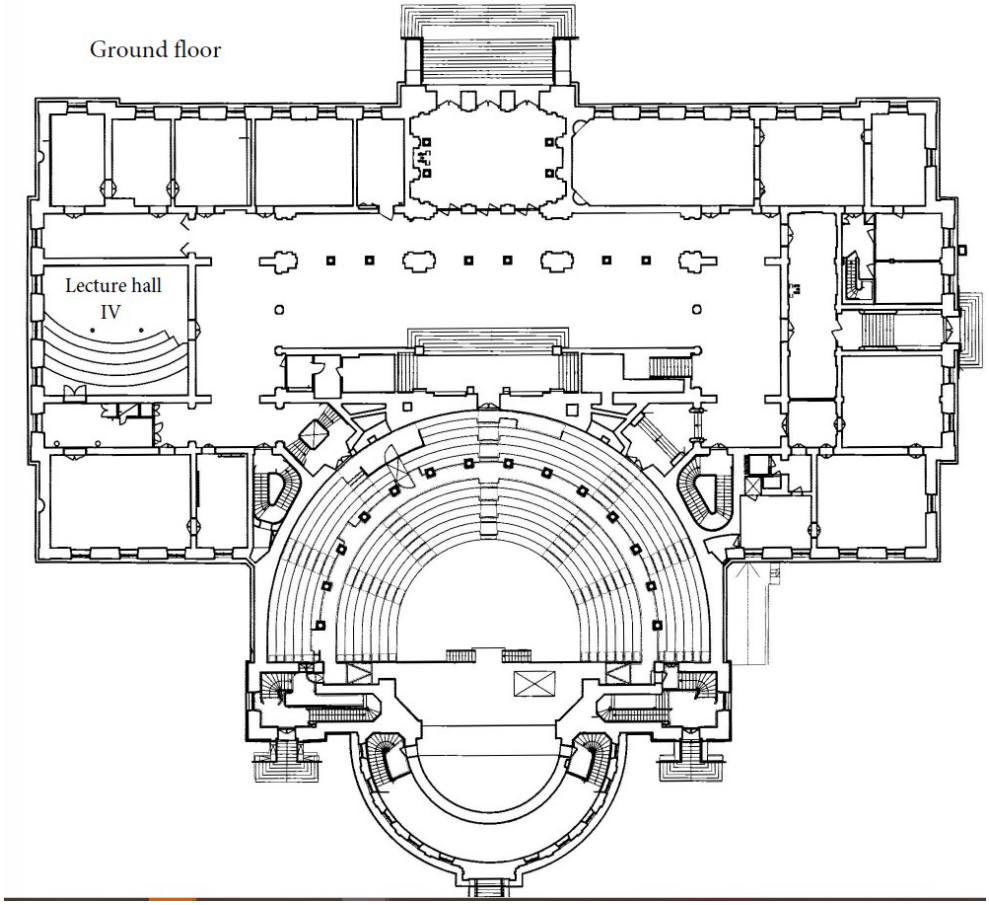
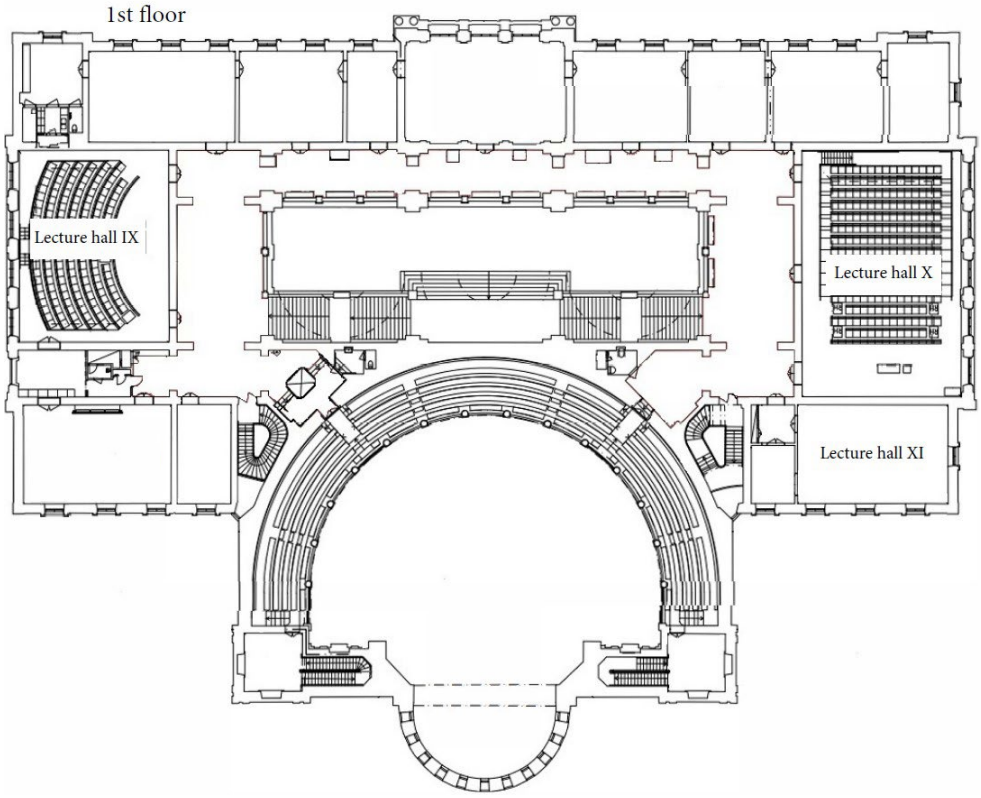
Ava Myrdal Centre for Nuclear Disarmament

Floor plan Uppsala University Main Building – *Biskopsgatan 3, 75310 Uppsala*





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Day 1: Tuesday 18 June

08:15-08:45 Registration & coffee

Venue: Main hallway

08:45-09:05 Welcome and opening of the conference

Cecilia Wikström – Chair of the board, Alva Myrdal Centre for Nuclear Disarmament

Ann-Sofie Nilsson – Head of Department for Disarmament, Non-Proliferation and Export Control, Swedish Ministry for Foreign Affairs
Venue: Lecture hall X

09:05-09:55 Keynote conversation: Prospects for Arms Control in Difficult Times – Perspectives from Different Parts of the World

Participants:
Matthew Bunn – Professor, Harvard Kennedy School
María Antonieta (Tonie) Jáquez – Coordinator for Disarmament, Non-Proliferation and Arms Control, Secretariat for Foreign Affairs of Mexico
Dr. Polina Sinovets – Head of the Odesa Center for Nonproliferation

Chair: **Thomas Jonter** – Professor, Stockholm University and Uppsala University; and leader of AMC's Working Group 6

Venue: Lecture hall X

The security architecture and the nuclear order that were built shortly after the cold war seem to be in a hopeless state of disintegration. The legal obligations based on international treaties play a decreasing role, while confrontation and uncertainty dominate. United States, Russia and China are modernizing their nuclear forces, and some experts believe we are in the beginning of a new nuclear arms race. On top of that gloomy picture, Russia is threating to use nuclear weapons in the war in Ukraine which have made cooperative efforts to reduce nuclear risks far more

complicated. How can we find ways out of this dangerous situation? In this Keynote panel, three leading experts on nuclear arms control, disarmament, and non-proliferation will discuss the prospects for making progress in the present dismal situation.

10:00-11:15 Sessions block 1

1A: Negotiating disarmament and arms control: Challenges and opportunities

Participants:
Valeriia Gergiieva – Visiting Research Fellow at the Institute for Peace research and Security Policy (IFSH), University of Hamburg; and Non-Resident Research Fellow at the Odesa Center for Nonproliferation (OdCNP)
Dr. Leila Hennaoui – Associate professor, Hassiba Ben Bouali University of Chlef
Ariel Phuphaphantakarn – Master's student, Middlebury Institute of International Studies

Chair: **Dr. Stephen Herzog** – Senior Researcher in Nuclear Arms Control, ETH Zurich; and member of AMC's Working Group 1
Discussant: **Dr. Alexander Bollfrass** – Senior Researcher, ETH Zurich; and member of AMC's Working Group 1

Venue: Lecture hall X

Russia's Shadow over Global Nuclear Stability: The Impact of Iran and North Korea Cases on Non-Proliferation and Disarmament Regime
by Valeriia Gergiieva

The Russian Federation has violated the norms and principles that contributed to a stable and generally perceived predictable global nuclear order. The paper examines the nuclear order before Russia's invasion of Ukraine and compares it with nowadays challenges in two years period, it evaluates how Russia's War on Ukraine and Moscow's new policy approach has influenced the Non-Proliferation and Disarmament regime. To illustrate its influence the author mostly uses the examples of Russia-Iran and Russia-DPRK cooperation and proves deepening crisis. Russia-Iran cooperation gives Iran more confidence to be a threshold nuclear-weapon state which exacerbates tensions around future JCPOA negotiations, and the situation in the Middle East region. DPRK – as the only country which withdrew from the NPT, became a nuclear weapon state and continue

to develop its missile technology – is an illustrative case study for the Non-Proliferation regime, and the fact that Russia continues to cooperate with it demonstrates the weakness of the Security Council and among P5 countries. In conclusion this paper will point on the main non-proliferation, disarmament and arms control challenges with possible scenarios of solving them.

Navigating Nuclear Disarmament: Global South's Diplomatic Imperative

by Leila Hennaoui

In the intricate landscape of nuclear justice, the Global South emerges as a unifying force, proposing a focused and holistic approach to nuclear disarmament. This proposal aims to unravel the complexities of global disarmament efforts with a specific lens on the active participation of the Global South. By prioritizing the concerns and aspirations of those who have historically endured nuclear injustices, it offers a unique perspective on the challenges of greater inclusion in multilateral nuclear discussions. This paper explores the Global South's active role in shaping policies and negotiations related to nuclear disarmament, emphasizing their commitment to addressing disparities in the global security landscape and their pursuit of more inclusive disarmament policies. Case studies from various regions provide nuanced perspectives on disarmament challenges and opportunities, showcasing the diverse experiences of nations in their pursuit of nuclear justice. Aligned with the conference's themes on negotiating nuclear disarmament, this paper contributes to the discourse on disarmament. It emphasizes the need for inclusive disarmament policies that consider the unique challenges faced by the Global South. In conclusion, this paper navigates the landscape of nuclear disarmament, drawing on the Global South's diplomatic imperatives, offering insights for achieving a just and balanced global nuclear order.

Negotiating Arms Control with China in the Third Nuclear Age: Strategic Empathy Strategy for Emerging Technology Challenges

by Ariel Phuphaphantakarn

Negotiating arms control with China has been a daydream for the global A.D.N. (Arm Control, Disarmament, and Non-proliferation) community as the country carries the ability to influence global arms control regimes. Beijing's interest in arms control has declined throughout the years up until the recent U.S.-China long-awaited talks on nuclear arms control last November, exhibiting positive signals from Beijing. However, as we enter the new nuclear era, the arrival of new threats such as emerging technologies requires new understanding on the negotiation strategy: how should the global A.D.N. negotiators approach such a conversation with China when it comes to both the weapons and its new technology such as

hypersonic, AI, and quantum technologies. This paper discusses the pathway towards addressing these concerns through the “Strategic Empathy” approach: to understand China’s perception on arms control-related efforts such as strategic stability, grand strategy, armament parity, etc. It provides two important policy and strategy recommendations for the multi-track diplomacy negotiation including: Track 1 – understanding China’s definition of strategic stability and emerging threats, Track 1.5 – emphasising the potential contribution of arms control efforts on grand strategy, and Track 2 – enhancing the global norms regarding nuclear disarmament.

1B: Nuclear Security in the Era of Unconventional War

Participants:
Ali Alkış – PhD Candidate, Hacettepe University
Dr. Matteo Gerlini – Assistant Professor, University of Siena
Dr. Masako Ikegami – Professor, Tokyo Institute of Technology; and leader of AMC’s Working Group 7

Chair: **Dr. Masako Ikegami** – Professor, Tokyo Institute of Technology; and leader of AMC’s Working Group 7
Discussants: **Dr. Serge Franchoo** – Researcher, Irene Joliot-Curie (ICJ) laboratory & University Paris-Saclay; **Dr. Venance Journé**, Laboratoire de météorologie dynamique, Paris

Venue: Lecture hall IX

The Russian attack and occupation of Ukraine’s Zaporizhia Nuclear Power Plant, the largest nuclear power plant in Europe, reminded us of the fact that nuclear power plants are often a prime or most preferred target of attack at the time of high military tension. Indeed, nuclear facilities are vulnerable to any determined military attacks, terrorist attacks, cyber-attacks, theft of nuclear materials for nuclear terrorism, or insider’s sabotage. This session analyses this phenomenon of nuclear insecurity in the era of unconventional war, and tries to explore possible measures to mitigate this problem.

Nuclear Security under Crisis: Nuclear Piracy
by Ali Alkış

In the aftermath of Russia’s occupation of the Zaporizhzhia nuclear power plant in Ukraine, a critical gap in nuclear security is exposed, demanding a re-evaluation of priorities. Traditional security measures, coined as “guns, guards, and gates,” are

inadequate in the face of deliberate hostile actions by state actors against nuclear facilities. The occupation poses unprecedented risks, blurring the lines between conventional warfare and nuclear security threats. The term “nuclear piracy” is proposed to distinguish state-sponsored actions from traditional nuclear terrorism, emphasizing the unique challenges posed by a state leveraging nuclear facilities for strategic goals. Proposed solutions include demilitarizing nuclear reactors through multilateral agreements or establishing nuclear safety and security protection zones. Despite challenges, granting the International Atomic Energy Agency (IAEA) full access to contested nuclear facilities is advocated. Urgent international measures are essential to counteract these evolving risks, emphasizing the need to rethink and reinforce nuclear security mechanisms to prevent potentially catastrophic consequences.

A Historical Assessment of Nuclear Security: We're Not in Kansas Anymore
by Matteo Gerlini

Compared to its emergence as an autonomous area, distinct from safety and safeguards, security is assuming a greater and different prominence than in the past. The paper proposes a reconstruction of the history of nuclear security, and why it was the last to arrive in the nuclear domain. This survey will address both the past criminal trafficking of nuclear technology and the risks of nuclear terrorism. This reconstruction will be compared with the literature on the crisis of states and especially of the norms of the international system. The weakness of states vis-à-vis non-state actors is an element that has long been discussed in international studies. The consequence is the weakness of the international system with respect to non-state actors, who can potentially be actors in the field of nuclear crime. This framework already poses problems with respect to the effectiveness of nuclear security plans, which are by definition nationally and not internationally based. Since the beginning of the Russian-Ukrainian war in 2014, the meaning of nuclear security has changed: the little green men or the Wagner Group place nuclear security on a higher plane, foreshadowing future challenges. Non-state actors acting on behalf of governments, while remaining independent or without direct declared ties, represent the new frontier of nuclear security threats on an international scale. The safeguards system has no tools to act against these actors. The conclusion is the need for a synthesis of safeguards and security, instead of the rigid separation envisaged by the IAEA and international agreements.

Study of crisis response using scenario planning regarding military attacks less than war on nuclear power plants
by Masako Ikegami & Daisuke Hara

This paper explores the uncertainties and potential impacts of sub-warfare military attacks on nuclear power plants (NPPs) in Japan, and elucidates necessary measures and challenges in implementing them from the perspectives of Japan and nuclear plant operators. Additionally, it evaluates the merits and demerits of replacing conventional NPPs with floating NPPs at the design stage.

Critical measures for NPPs include making the defense of these facilities feasible not only in terms of legal frameworks but also in practical operational terms in gray zone situations. Operators must prioritize countermeasures against threats such as bomb-carrying drones equipped with high-power microwave devices and reinforce the exterior walls of spent fuel pool buildings while physically isolating them. Implementing these measures is not anticipated to pose significant challenges. Therefore, this paper outlines common countermeasures applicable to existing domestic NPPs against sub-warfare military attacks expected until 2035.

Replacing conventional NPPs with floating ones offers advantages such as enabling vigilance and surveillance activities in the vicinity of floating NPPs offshore, even in situations where actions based on laws like "security deployment" have not been ordered. It facilitates swift implementation of "maritime security actions" without the need for parliamentary approval, streamlining the evidence-gathering process and allowing for tactical responses both before and after an incident, even in scenarios where Self-Defense Forces resource allocation is challenging. No significant drawbacks are identified. Thus, this paper highlights the potential of floating NPPs to provide unique offshore deterrence capabilities against sub-warfare military attacks anticipated until 2035.

1C: Instrumentation for treaty verification

Participants:
Dr. Peter Andersson – Senior Lecturer, Uppsala University; and leader of AMC's Working Group 4
Anders Ringbom – Research Director, Swedish Defence Research Agency (FOI)
Julian Schäfer – Research Associate, RWTH Aachen University

Chair: **Dr. Cecilia Gustavsson** – Associate professor, Uppsala University; and member of AMC's Working Group 4

Venue: Lecture hall IV

Evaluation of coincidence detector systems for radionuclide monitoring

by Peter Andersson, Erik Andersson Sundén, Peter Jansson, Alf Göök, Johan Kastlander, Cecilia Gustavsson, Catharina Söderström

Radionuclide monitoring is a proven means of non-intrusive verification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). In addition to that, the potential use of radionuclide monitoring spans beyond the detection of nuclear test explosions, since radionuclides can also be released and detected from operations of a nuclear fuel cycle, such as the reactor operation and nuclear reprocessing of plutonium production. In this work, we consider the use of coincidence and anticoincidence techniques as a means to increase the sensitivity in radionuclide monitoring, in terms of improved minimum detectable amount for radionuclides of interest to filter stations used in radionuclide monitoring. In particular, a multi-detector setup is currently being prepared for the evaluation of the technique, and to provide validation data for simulation codes. In this presentation, we will describe the multi-detector setup assembled for enabling the evaluation of various types of spectrometry, including 1) gamma-gamma coincidence (from dual detectors and up to five High Purity Germanium (HPGe) detectors), 2) anticoincidence using BGO active shield with single HPGe detector, as well as use of multiple detectors in addback mode, i.e. simply using the combined detector volume for increased efficiency of single gamma rays. We will present results of measurements of air filters (blank, used, as well as calibration objects), and provide discussion on advantages and disadvantages of the tested techniques in the context of radionuclide monitoring.

Radioxenon detection for national and international security

by Anders Ringbom & Sofie Liljegren

During the last two decades, Sweden has substantially contributed to the development and implementation of techniques to detect and analyse atmospheric radioactive xenon for the purpose to detect nuclear tests and other activities involving nuclear fission. The detection system SAUNA II, developed at FOI, is installed at 17 locations in the International Monitoring System for CTBT verification (IMS), and other versions of the system has been developed and tested for the purpose of On-Site Inspection within the same treaty. The systems have played a crucial role in the case of verification of North Korea's nuclear tests, in particular in 2006 and 2013. The last few years, a new radioxenon detection concept has been developed, based on an array design, where multiple, smaller and less costly, radioxenon measurement units are operated as a single system. The world's first radioxenon array was installed in Sweden in 2022. Data from the Swedish array show that the concept in many cases will offer higher capability to detect, locate

and characterize sources of radioxenon compared to the technology presently used in the IMS. In addition, the Swedish xenon array has resulted in an increased capability to monitor nuclear activities in Sweden and Europe. Examples of data from the new system in Sweden will be presented and discussed, together with a brief review of results from earlier activities.

Technology, Knowledge and Verification: How the IAEA develops and implements new technologies for nuclear verification
by Julian Schäfer

The verification of nuclear activities is a key task of the International Atomic Energy Agency (IAEA) in ensuring global security and the non-proliferation of nuclear weapons. Through safeguards, a set of technical measures, the IAEA seeks to independently verify a state's legal obligation to use nuclear material only for peaceful purposes. New technologies are constantly needed to carry out this task effectively and efficiently. But how do these technologies move from the research niche to the IAEA verification regime? What factors influence the diffusion of technologies into the verification regime? The article examines these questions using the theoretical framework of the multi-level perspective and shows how the IAEA scans the technology landscape and communicates innovation needs to the research community. The paper is part of a PhD thesis within the interdisciplinary research project VeSPoTec and argues that technology diffusion in this context faces regime-specific resistance. It is based on a literature review and a planned interview study with experts from the IAEA environment. In doing so, this work aims to add a reflexive level from a social science perspective to a field that is primarily illuminated by scientific-technical peace and conflict research.

1D: Nuclear deterrence and status for disarmament possibilities

Participants:
Tytti Erästö – Senior Researcher, Stockholm International Peace Research Institute (SIPRI); and member of AMC's Working Group 5
Hans M. Kristensen – Director of the Nuclear Information Project, Federation of American Scientists

Chair: **Josefin Lind** – Secretary General, Swedish Physicians against Nuclear Weapons
Discussant: **Anastasia Malygina** – Independent Expert

Venue: Lecture hall XI

Please note this session is not live streamed.

This discussion will examine the nuclear forces of today, modernization underway, ease of tensions as a regional but also global issue, and their implications for arms control. Leading experts on nuclear weapons data, European/NATO and Russian politics will be presenting and discussing these topics.

11:15-11:45 Coffee break

Venue: Main hallway

11:45-13:00 Sessions block 2

2A: An interactive session on "Decolonising Nuclear Studies"

Participants:
Shampa Biswas – Professor, Whitman College
Dr. Anne Harrington – Senior Lecturer, Cardiff University

Venue: Lecture hall X

In this session we introduce participants to the resources available to them through 'Decolonizing Nuclear Studies,' a new online resource for teaching nuclear issues. These materials include three distinct modules, which together consist of more than 40 assets that can be incorporated into existing or new syllabi. These assets include interactive exercises and assignments, interviews with experts and activists, and lecture slides. They will be available for free on the online platform *Highly NRiched*. We will begin by providing an overview of the project and then ask participants to engage in one of the classroom activities. You can watch a video preview of the modules here:

Video 1: https://www.youtube.com/watch?v=L-RGqvUoKDo
Video 2: https://www.youtube.com/watch?v=YeDQIyrhqRU
Video 3: https://www.youtube.com/watch?v=oTeNQSCEHJM

2B: The Creation of the NPT Regime Revisited: The Role of Non-Aligned States

Participants:
Dr. Hassan Elbahtimy – Senior Lecturer, King's College London; and member of AMC's Working Group 6
Thomas Jonter – Professor, Stockholm University and Uppsala University; and

leader of AMC's Working Group 6
J. Luis Rodriguez – Assistant Professor, George Mason University; and member of AMC's Working Group 6
Dr. Emma Rosengren – Research fellow, Swedish Institute of International Affairs; and member of AMC's Working Group 6

Chair: **Tapio Juntunen** – University Instructor, Tampere University
Discussant: **Hebatalla Taha** – Associate senior lecturer, Lund University

Venue: Lecture hall IX

This panel re-examines the foundation of the NPT from the perspective of non-nuclear weapon states involved in its negotiation. Papers introduce new empirics and angles on the various processes that led to the conclusion of the treaty in the 1960s. A special focus is on the negotiations that resulted in Article VI which stipulates that the nuclear weapon states should 'pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race – nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.' While the non-proliferation feature of the NPT has been successful, the disarmament commitment remains to be fulfilled. As a result, the nuclear weapon states have been accused of creating a monopoly situation which allows them to keep their nuclear weapons while at the same time banning other countries from acquiring them. How did non-aligned states such as Sweden, Mexico, and Egypt, who were involved in the negotiations of the NPT, act? What were their perspectives on the prospects for the realization of Article VI? How can an analysis cantered around these questions contribute to our understanding of contemporary challenges related to nuclear disarmament and arms control?

Challenging the hegemonic nuclear order *avant la lettre*: Alva Myrdal and the negotiation of the NPT
by Thomas Jonter & Emma Rosengren

This paper demonstrates how Swedish diplomat Alva Myrdal acted as an early sceptic of the contemporary 'hegemonic nuclear order' created by the nuclear weapon states. By focusing on the interrelation between the national and international levels, the analysis shows how Myrdal's emerging critique of the NPT in the 1960s was inextricably entwined with the story of how Sweden abandoned its nuclear-weapon ambitions and instead pursued a fair and just global nuclear order. Drawing on a broad range of primary sources, including government statements, parliamentary records, diplomatic correspondence and personal notes,

the study also sheds light on how the hegemonic nuclear order was challenged avant la lettre.

Bounding Commitments: Mexico and the Balancing of Nuclear Perils and Promises in the 1960s
by J. Luis Rodriguez

The Cuban Missile Crisis in 1962 sobered international optimism about the potential of nuclear technology. In response, Latin America built the first nuclear-weapon-free zone in a densely populated area with the Treaty of Tlatelolco. This essay traces how Mexican authorities purposedly linked the negotiations of the Treaty of Tlatelolco and the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The regional nuclear standard prohibited the threat and use of nuclear weapons and promoted nuclear exchanges for peaceful purposes. Mexican representatives intentionally used the regional nuclear standard and mobilized Latin American countries to increase their leverage during the NPT negotiations.

Egypt and the Negotiations of the NPT
by Hassan Elbahtimy

The Treaty on the Non-proliferation of Nuclear Weapons (NPT) is widely celebrated as a global regime embodying near universal norms. Yet, the history of the origins and the evolution of the regime are frequently framed as a function of superpower relations. The voices of neutral as well as non-nuclear states are consequently edited out despite their central role in giving the regime its global character and outlook. This paper traces the role of Egypt in the early evolution of the treaty as an idea, draft then as a final adopted text. The paper also examines the key drivers behind Egypt's attitude towards the evolving treaty. In doing that the paper argues that regional nuclear challenges from a nuclearizing Israel as well as Egypt's early embrace of anti-nuclear non-aligned stance in favour of disarmament played key roles in shaping and framing its options and policies. In examining Egypt's approach to the treaty, the paper relies on its negotiating records as well as Egyptian sources and interviews with key diplomats.

2C: Missile Proliferation in Asia: Envisioning a New INF Treaty

Participants:
Prof. Hideshi Takesada – Professor (Ret.) Takushoku University
Dr. Tong Zhao – Senior Fellow, Carnegie Endowment for International Peace

Chair: **Dr. Masako Ikegami** – Professor, Tokyo Institute of Technology; and leader of AMC's Working Group 7
Discussant: **Subrata Ghoshroy** – Research associate, Massachusetts Institute of Technology (MIT); and member of AMC's Working Group 7

Venue: Lecture hall IV

Starting from the US withdrawal from the Anti-Ballistic Missile Treaty (1972-2002) and Intermediate-Range Nuclear Forces Treaty (1987-2019) as well as Russian suspension of the New Strategic Arms Reduction Treaty (New START) (2010-2023) and de-ratification of the Comprehensive Nuclear Test Ban Treaty (CTBT), all the Cold War assets of arms control and disarmament is now lost, and there is an emerging risk of anarchy involving weapons of mass destruction in tandem with missile arms race. Missile proliferation is the hidden, driving force behind nuclear proliferation. If the world is ever to be free of nuclear threats, it is time to start addressing missile nonproliferation and nuclear disarmament as two inseparable elements of the same agenda This session makes cross-disciplinary scrutiny of the vicious escalation of missile arms race in the new Cold War era and aims to propose a new Intermediate Nuclear Force Treaty (INF). It may well be recalled that in the past, the 1987 INF Treaty had prompted the ending of the Cold War. It is time to envision a new multinational INF treaty joined by the United States, Russia, China, India, and other states with potential technological capability.

Missile proliferation in East Asia with a focus on North Korea
by Hideshi Takesada

North Korea is developing its missile technology capability and actively demonstrating its expanding missile forces. This study will first detail North Korea's efforts to develop missile technology capability and analyze the agenda of its rapidly expanding missile forces. To understand the cause of North Korea's missile force expansion would give a hint to solve the missile anarchy in the region.

Missile Competition in Asia: China's Vision and Strategy
by Tong Zhao

This presentation will start with a discussion of China's development of missile capabilities in recent years, followed by analysis of what security goals its missile programs seek to achieve and how much capabilities might affect arms race and crisis stability in the region. It will also examine Beijing's perceptions about and its potential reaction to the missile programs of other countries in the region. The

presentation will address how recent military conflicts, such as those in Ukraine and the Middle East, might influence China's thinking about the role of missiles, as well as how new military technologies, such as hypersonic missiles, space-based sensors, and missile defenses, might add to the complexity of missile warfare in the future. It will end with a discussion of potential measures to mitigate regional missile competition and its security consequences.

2D: Perspectives on Nuclear Deterrence

Participants:
Dr. Arvid Bell – Lecturer, Harvard University; and member of AMC's Working Group 1
Ambassador Michael Sahlin – Member, The Royal Swedish Academy of War Sciences
Robert Dalsjö – Research Director, Swedish Defence Research Agency (FOI)

Chair: **Dr. Kjell Engelbrekt** – Professor and Dean, Swedish Defence University

Venue: Lecture hall XI

Please note this session is not live streamed.

The Psychology of Nuclear Politics: Redefining Western Negotiation Tactics in Addressing Russia's Invasion of Ukraine
by Arvid Bell & Marat Atnashev

In the face of Russia's invasion of Ukraine and its persistent nuclear saber-rattling, the West finds itself at a critical juncture where conventional coercive measures have proven ineffective to end the war. This paper analyzes the complexities of the current geopolitical landscape, highlighting the pitfalls of past escalation patterns between Russia and the West and the necessity for a nuanced approach rooted in realistic assessments of Russian political-military decision-making. By leveraging open strategic debate in Western societies, acknowledging past military missteps (Afghanistan, Libya, Iraq), and combining pressure on Moscow with diplomatic signaling, the West can navigate away from the current escalation plateau. In this context, the paper explores the potential for a strategic "anti-nuclear war" coalition involving China, Brazil, and South Africa to counterbalance Russian nuclear escalation and advocates for a shift towards international law as the primary justification for Western actions. Ultimately, it proposes a framework for negotiating de-escalation around Ukraine while mitigating the risk of succumbing to nuclear blackmail.

The Dilemma of Deterrence – the Cases of Ukraine and Middle East
by Michael Sahlin

Deterrence in the context of contemporary geo-political turbulence, i.e., “successful deterrence”, is an indispensable key to peace and security (in the absence of common values and norms and interests), but as demonstrated by experiences and lessons learned from the lethal wars in Ukraine and the Middle East, the practice of deterrence, regardless of level and scope, entails an overly demanding exercise of calibration, a dilemma of choice, to avoid unwanted consequences (“unsuccessful deterrence”), notably escalation rather than stabilization. Lessons from “red line” dilemmas in the field can be learned at the highest levels of doctrine and grand strategy. Credibility is the key challenge, especially for a large alliance.

How Sweden’s Political and Military leadership Perceived Nuclear Weapons During the Cold War
by Robert Dalsjö

This paper presents an overview of previous findings on how Sweden’s political and military leadership perceived nuclear weapons and nuclear deterrence during the Cold War, and what stances they took, including on the issue of Swedish acquisition of nuclear weapons. Structured chronologically, the paper outlines the initial interest in atomic power and atom bombs, the campaign in the 1950s for and against the acquisition of nuclear weapons, the Swedish armed forces adaptation to a nuclear battlefield, the demise of the bomb programme and the issue of informal US guarantees, followed by the anti-nuclear stance taken by the government during the 1970s and 1980s, which left official Sweden ill-prepared for understanding what was at stake in the fight over Euromissiles in the 1980s.

13:00-14:00 Lunch break

Venue: Main hallway

14:00-15:15 Sessions block 3

3A: Presenting the Alva Myrdal Centre Data Project (AMC Data)

Participants:
Giacomo Cassano – PhD Candidate, Uppsala University; and member of AMC’s Working Group 1

Siri Jansson – Research Assistant, Uppsala University
Dr. Isak Svensson – Professor, Uppsala University; and leader of AMC's Working Group 1
Dr. Magnus Öberg – Associate Professor, Uppsala University; and leader of AMC's Working Group 3

Venue: Lecture hall X

This session presents the results and ongoing efforts of the Alva Myrdal Centre Data Project (AMC Data) in the areas of 1) arms control agreements and 2) arms control negotiations. It is also the official release of the live online AMC Data webpage and the AMC Data Encyclopedia of Arms Control Agreements.

First, we introduce AMC Data webpage and the Encyclopedia of Arms Control Agreements and demonstrate some of its contents, functionalities and visualization tools. We then outline further developments that are in the pipeline for AMC Data.

Second, we introduce the AMC Nuc Neg dataset, which explores international negotiations on disarmament, arms control and non-proliferation. In this presentation, we focus on describing the trajectories over time that can now be visualized through the data.

amcdata.uu.se is our new platform for making AMC arms control data and related materials available to researchers and the public. The webpage offers a data portal, visualisation tools to explore and to compare our data, agreement profiles, and a search function in our database. The webpage goes live on the 13th of June 2024.

3B: Assessing the effectiveness of sanctions and taboos for non-proliferation and non-use

Participants:
Dr. Michelle Bentley – Reader in International Relations, Royal Holloway, University of London
Dr. Rizwan Zeb – Independent Analyst
Ian Fleming Zhou – Research Fellow, Arms Control Negotiation Academy

Chair & discussant: **George A. Lopez** – Professor Emeritus, Peace Studies, Kroc Institute; and member of AMC's Working Group 2

Venue: Lecture hall IX

The Nuclear Weapons Taboo: Is the Taboo Enough?

by Michelle Bentley

This paper will consider the concept of the nuclear weapons taboo in relation to nuclear disarmament in order to ask and explore the (hypothetical) question: is the taboo alone enough? Debates on nuclear disarmament have considered a wide range of 'practical' measures to prevent the possession and use of nuclear armaments – often centring around the desire to promote transparency, improve attribution, restrict capacity, and construct more effective processes of accountability. Such measures are often discussed in relation to normative restraint, frequently understood as the taboo on nuclear warfare – but where more concrete measures are assumed to be necessary in addition to, and in support of, norms. But is the taboo alone enough i.e. that if the taboo is sufficiently robust then other measures would not be requisite? The paper takes a devil's advocate approach to explore the idea that, if the taboo is effective, to what extent (if any) are other measures necessary? The paper presents what is effectively a thought exercise to suggest that building normative restraint may remove the need for other measures in the aim of preventing nuclear warfare.

Sanctions as an effective tool of nuclear non-proliferation: An assessment

by Rizwan Zeb

Although the Treaty on the Non-Proliferation of Nuclear Weapons does not explicitly mention it, the idea that sanctions can be used as a tool to prevent the spread of nuclear weapons is not new. The earliest mention of it could be found in the 1946 Baruch Plan that hinted on imposing a penalty on the potential violators. Since 1970s, sanctions have been used to discourage states from building nuclear weapons. Such sanctions were imposed at the bilateral as well as multilateral levels. Pakistan that started its nuclear journey as part of the America's Atom for peace program, embarked on a nuclear weapons program in 1972 in the wake of the 1971 war and test its nuclear device in 1998. Throughout this period, it remained under several sanctions yet at no point it even considered halting its nuclear weapons program. Using Pakistan as a case study, this paper would explore whether sanctions are an effective tool to address the challenge of nuclear proliferation? What lessons could be drawn from the ineffectiveness of sanctions in cases such as Pakistan and India, and how these can be used to draw realistic options for future role of sanctions as a tool of non-proliferation.

The Efficacy of Economic Sanctions in Promoting Nuclear Nonproliferation: A Case Study of North Korea
by Ian Fleming Zhou

This research aims to comprehensively examine the effectiveness of economic sanctions as a tool for promoting nuclear nonproliferation, with a specific focus on the case of North Korea. Economic sanctions have been a prominent feature of international efforts to prevent nuclear proliferation, but their impact remains a subject of debate. This study will assess the design, implementation, and consequences of sanctions imposed on North Korea in relation to its nuclear program. It will explore the extent to which sanctions have influenced North Korea's nuclear behavior, and it will analyze the various factors that contribute to the success or failure of such measures. The findings will contribute to a better understanding of the role of economic sanctions in promoting compliance with nuclear disarmament regimes and offer policy recommendations for enhancing the effectiveness of such measures in the future.

3C: Nuclear arms control and verification

Participants:
Matthew Bunn – Professor, Harvard Kennedy School
Dr. Lars-Erik Lundin – Distinguished Associate Fellow, SIPRI; and Swedish Royal Academy of War Sciences
Henrik Stålhane Hiim – Associate Professor, The Norwegian Institute for Defence Studies; and member of AMC's Working Group 6

Chair: **Jakob Hallgren** – Director, Swedish Institute of International Affairs (UI); and member of AMC's Working Group 6
Discussant: **Jamie Rae Withorne** – Doctoral Research Fellow, Oslo Nuclear Project; and member of AMC's Working Group 6

Venue: Lecture hall IV

Non-Treaty Options for Future Arms Control
by Matthew Bunn

Future nuclear arms control agreements may not be treaties. At present, it is difficult to imagine a treaty that Russian President Vladimir Putin or Chinese leader Xi Xinping and two-thirds of the U.S. Senate would both accept. (Two-thirds of the Senate is the approval threshold for treaties required by the U.S. constitution.). Many other forms of agreements are possible, however, and many of these have been used in the history of nuclear arms control. These include executive

agreements (in some cases legally binding and approved by majorities in Congress, in other cases politically binding), political commitments, unilateral and reciprocal initiatives, and more. Future accords are likely to make use of a wide range of forms, to cover different topics. There may also be different countries participating in different accords, as different countries have strategically-relevant capabilities in strategic nuclear weapons, space systems, intermediate-range missiles, or artificial intelligence, to take a few examples. Hence, negotiators of future accords will face greater complexity and will have to be creative to find the best combination of form, parties, and substantive provisions for accords to address future arms control challenges. Two particular issues for non-treaty approaches will be how to provide for effective verification without the detailed provisions for inspection that treaties often provide and how to address the U.S. Senate's concerns that non-treaty approaches infringe on its constitutional power over treaty-making.

Double trouble: The intense U.S.–China stability-instability paradox and limited war in East Asia

by Henrik Stålhane Hiim and Øystein Tunsjø

Are China and the United States heading for war? In this paper, we compare the current China-U.S. rivalry in East Asia to that of Cold War Europe, and argue that the current risk for both conventional, limited war and limited nuclear employment is higher. This "double trouble" is largely the result of geopolitical differences, with the United States and China facing off in a maritime theater rather than on land. Because both states may believe that a Taiwan conflict or other disputes can be kept conventional and limited, the so-called stability-instability paradox – where stability at the strategic nuclear level makes limited wars appear safer to fight – is more intense now than during the Cold War. In the event of conventional war, we further argue that China's limited nuclear arsenal makes the risk of inadvertent escalation higher than it was in Cold War Europe. Although deliberate, limited nuclear escalation is still unlikely, technological shifts and the nature of the theater also increases the prospects for keeping nuclear war limited. Even if geopolitics is not destiny, and many other variables may influence the likelihood of conflict, it is crucial to recognize why the current superpower rivalry may be more war-prone than the previous one.

NATO, NPT and the Budapest Memorandum from a nonproliferation perspective

by Lars-Erik Lundin

As the United States is moving closer to another crucial election it may be useful to remind about the importance of maintaining respect for fundamental commitments

undertaken by nuclear weapons powers – very much including the United States – in their own interest over a long period from the end of WWII. Transactionalism is not a good method of bargaining in an international system becoming not only more and more multilateral but also to a certain extent anarchic.

3D: Diversity and gender perspectives on nuclear disarmament

Participants:
Akanshya Gurung – Former Consultant, Stockholm International Peace Research Institute (SIPRI)
Louis Reitmann – Research Associate, Vienna Center for Disarmament and Non-Proliferation (VCDNP)

Chair: **Erik Melander** – Professor & Director of AMC, Uppsala University
Discussant: **Dr. Anne Harrington** – Senior Lecturer, Cardiff University

Venue: Lecture hall XI

Please note this session is not live streamed.

Applying Diversity, Equity and Inclusion to University Education: The case of teaching nuclear studies
by Akanshya Gurung

Diversity, equity and inclusion are increasingly being discussed in the workplace as well as creating significant changes within policy contexts. Simultaneously, feminist approaches to foreign policy are gaining global momentum, as illustrated by the Political Declaration on Feminist Approaches to Foreign Policy adopted by 19 governments during the 2023 UN General Assembly in New York. However, gender perspectives are (still) not mainstreamed into international relations and political science degrees, and efforts to decolonise international studies remain a fringe issue in university curricula and academic conferences.

The scientific case for diversity in nuclear weapons policymaking
by Louis Reitmann

This paper is part of a UNIDIR volume on new intersectional approaches to nuclear weapons, to be published in early 2024. The lack of diversity in the nuclear weapons space, especially among officials controlling arsenal development, nuclear posture, and deterrence strategy, hinders critical examination and policy change, instead perpetuating traditional thinking about nuclear weapons and deterrence that has

led to increased nuclear risk. This paper explains why the commonly made 'business case' for diversity in nuclear weapons policy-making is inaccurate and ineffective. More persuasive advocacy for diversity, based on empirical evidence, is needed. There is a wealth of findings about the benefits of demographic diversity for human interaction and work outcomes that the nuclear weapons field has left untapped. This paper summarises findings from studies in psychology and behavioural science about the ways in which diversity changes how people think and collaborate and illustrates their relevance for nuclear weapons policy along concrete examples from decisionmaking in nuclear-weapon States. It also explains the negative behavioural effects diversity can have and presents strategies for successfully reducing them. Finally, the paper provides hands-on recommendations on how governments and organisations can activate diversity's potential to help create more innovative nuclear weapons policy.

15:15-15:45 Coffee break

Venue: Main hallway

15:45-17:00 Sessions block 4

4A: Humanitarian effects of nuclear weapons – Climate, food systems and health systems

Participants:
Dr. Alan Robock – Distinguished Professor, Rutgers University
Kim Scherrer – Postdoctoral Fellow, University of Bergen
Dr. Carlos Umaña – Co-president, International Physicians for the Prevention of Nuclear War (IPPNW)

Chair: **Josefin Lind** – Secretary General, Swedish Physicians against Nuclear Weapons

Venue: Lecture hall X

This discussion will present data from the leading international experts on global climate changes after a nuclear war. A nuclear war would generate smoke form the fires, which would block out the Sun making it cold and dark at Earth's surface for several years. As a result of this nuclear winter, crops would not grow and billions of people around the world could starve to death. Even a regional war between

India and Pakistan using less than 1% of the world's nuclear weapons arsenal could cause an unprecedented decline in global food production. Reducing the number of weapons and preventing their use is the only way to avoid such a global food crisis. The discussion will also include the impacts of a nuclear detonation on the health system, what preparedness is there in such a scenario and what can the medical system handle?

4B: Sanctions for Nuclear Disarmament and Non-Proliferation: Moving Forward

Participants:
George A. Lopez – Professor Emeritus, Peace Studies, Kroc Institute; and member of AMC's Working Group 2
Thomas Biersteker – Professor Honoraire, Geneva Graduate Institute; and member of AMC's Working Group 2
Gilberto Marcos Antonio Rodrigues – Associate Professor, Federal University of ABC; and member of AMC's Working Group 2
Dr. Peter Wallensteen – Professor Emeritus, Uppsala University; and leader of AMC's Working Group 2

Chair: **Dr. Armend Bekaj** – Researcher, Uppsala University; and member of AMC's Working Group 2

Venue: Lecture hall IX

Sanctions as Tools to Achieve Nuclear Reduction Policy: Is there a Better Way Forward?
by George A. Lopez

This chapter contends that the dynamic interaction of changes in the economic and political environments for the past decade pose substantial impediments to the long-trusted policy that successful coercive sanctions, followed by diplomacy and sanctions relief, will lead to nuclear agreements.

The changes examined include contentious features of the trading system, challenges to the dominance of the US dollar in global trade and finance, and the emergence of cryptocurrency as a mechanism that undercuts financial sanctions. The end of the UN Security Council as primary legitimator of multilateral sanctions, owing to the demise of cooperation among the Permanent Five (P5), the growing membership and significance of the BRICS coalition, and the recent emergence of the 'alliance among the sanctioned' comprise the new political landscape. The chapter refers to the proliferation crisis with North Korea throughout.

The chapter argues that the most significant tasks for decision-makers going forward does not involve attempting to forestall more global change, nor sharpening sanction techniques and tools. Rather, as illustrated by two examples, the chapter proposes more innovative, agile diplomatic tactics to bolster the chances that sanctions relief and negotiation arrive at sustainable reductions in nuclear proliferation.

Incentivizing Nonproliferation: Theory, Policy, and Experience
by Thomas Biersteker & David Cortright

This chapter argues for a strategy that supplements the application of international sanctions by employing the full range of positive inducements and incentives associated with economic statecraft to persuade states to desist from or reverse policies of developing nuclear weapons.

A comparative analysis of sanctions and incentives indicates the value of integrating negative and positive measures to achieve desired policy objectives. Studies of the reasons why states comply with non-proliferation norms identify the following factors: security guarantees, assurances of mutual constraint that result from broad international compliance with the global non-proliferation regime, and the presence within states of domestic constituencies that seek to benefit from more open societies and global economic engagement.

One of the most significant inducements for non-proliferation compliance is the offer of sanctions relief. The chapter presents a typology of the multiple options available for easing or lifting sanctions pressure, giving policy makers a variety of means for encouraging non-proliferation compliance. These dynamics are illustrated in brief case analyses of the 2015 Joint Comprehensive Plan of Action with Iran, attempts to constrain the nuclear program of North Korea, and Libya's decision to dismantle its weapons of mass destruction.

Latin America and the Caribbean: a Tradition of Nuclear Disarmament and Non-proliferation
by Gilberto Marcos Antonio Rodrigues

This chapter aims to analyse the trajectory through which Latin American and the Caribbean countries in general, and Brazil in particular, have established a tradition of nuclear disarmament and non-proliferation to date. Further, the chapter aims to examine how this context has arguably influenced Brazil's stance as a critic on sanctions in international politics. It does so by juxtaposing the analysis against the background of Brazil's historical resistance to sanctions. The chapter's main point

is to identify the relation between this tradition and the regional regime on nuclear disarmament and non-proliferation. Argentina and Mexico are also analyzed in parallel with Brazil's position on sanctions. The main argument, underlined herein, reflects the widespread perception in Brazil and most Latin American and the Caribbean countries that coercive instruments such as sanctions are not effective and do not contribute to cooperation and engagement with countries that are not willing to comply with the international regime of nuclear disarmament and non-proliferation. The methodology of the article is based on analysis of primary sources of official documents, speeches and related bibliography.

Sanctions and Non-Proliferation: Where We Are and Where We Should Go
by Peter Wallensteen & Armend Bekaj

The increased urgency of nuclear tensions requires a closer look at what can be done, for instance, with the help of sanctions. This chapter offers an overview on the sanctions' role in international law and international relations to date. It assesses their impact and effectiveness, adherence to human rights, international legitimacy and legality. The chapter then zooms into the interplay between sanctions and nuclear non-proliferation and, in so doing, reflects on the main findings and conclusions of each chapter of the volume. It draws on, and stresses, one of the main threads of this volume: the fine balancing act between coercive measures and positive inducements.

4C: Fissile Material Issues in the Era of Nuclear Renaissance

Participants:
Fredrik Dehlin – PhD Student, KTH Royal Institute of Technology
Prof. Tadashi Narabayashi (PhD) – Specially Appointed Professor, Tokyo Institute of Technology
Prof. Kenji Takeshita – Senior Professor, Tokyo Institute of Technology

Chairs: **Dr. Masako Ikegami** – Professor, Tokyo Institute of Technology; and leader of AMC's Working Group 7; **Dr. Peter Andersson** – Senior Lecturer, Uppsala University; and leader of AMC's Working Group 4
Discussant: **Dr. Serge Franchoo** – Researcher, Irene Joliot-Curie (ICJ) laboratory & University Paris-Saclay

Venue: Lecture hall IV

Plutonium disposal in the Lead-cooled Fast Reactor SUNRISELFR

by Fredrik Dehlin, Alejandría Pérez, Pär Olsson, Peter Andersson, Cecilia Gustavsson, Markus Preston

The use of nuclear reactors with a fast neutron spectrum has emerged as a promising path towards achieving nuclear disarmament, due to their capability to burn plutonium and other minor actinides. For this reason, in the present work, the feasibility and efficiency of plutonium disposal by using a lead-cooled fast reactor (LFR) is explored. The plutonium disposal efficiency, of the 80 MWth conceptual LFR design developed by the SUNRISE centre is evaluated with both mixed oxide and mixed nitride fuel. This work starts by defining the plutonium-containing fuel and its introduction in the LFR core design. In this step, Serpent 2, a Monte Carlo neutron transport code, is used to derive a new core configuration and to obtain the static neutronic properties at different burn-up levels. Once the new, plutonium-containing core design is established, the key parameters related to plutonium disposal, i.e., the net plutonium consumption and the discharge plutonium isotopic vector are evaluated. Finally, to analyze the dynamic behavior of the reactor and to make sure it respects the required safety margins, simulations of the plutonium-burning LFR in steady state and unprotected transient events are performed, using a KTH-developed reactor simulation code.

BWR-type SMR with Load-Following Function, FCVS, and Seismic Isolation Device that Eliminates Location Requirements

by Tadashi Narabayashi, Hiroshige Kikura & Kazuhiko Kasai

The authors introduced a new SMR, which is a simplified BWR with a small modular reactor (SMR) and a load following function that can be easily adopted in any country and modularized and manufactured in factories with short construction periods. The concept of the reactor was introduced as a simplified BWR (LSBWR) configuration with a low output, long operating cycle, and comprehensive safety features, and was presented in 1999 at the annual meeting of the JSME and ICONE11 by Narabayashi et al. To be economically competitive, the LSBWR design should include system and structural simplifications, modularity for short construction times, and increased availability. Comprehensive safety features are not intended to be evacuated by reliable equipment or systems, such as a lower-core layout, IVR features, and hybrid ECCS, including passive features and a Filtered Containment Venting System (FCVS). The concept proposed here provides flexibility for different site conditions and power demands, reduces investment risk, and promotes public acceptance. Finally, the author introduces a new SMR named LLBWR, which uses a reactor internal recirculation pump (RIP) for the purpose of load flow with fluctuating renewable energy and enhances stable grid control.

Mass Balance Analysis of Pu and MA within Nuclear Fuel Cycle during the Implementation Period of Metal-Fuel Fast Reactors
by Kenji Takeshita & Tomohiro Okamura

The effect of the implementation of metal-fuel fast reactor (FR) cycle on the composition of Pu recovered from spent fuel was evaluated by the dynamic nuclear fuel cycle simulator NMB4.0. We assume the nuclear power generation capacity by 2105 is 33 GWe. The first metal-fuel FR (0.6 GWe) is introduced in 2045, and the same ones are introduced sequentially at the timing of the replacement of LWRs after 2065. As for reprocessing, an 800 t/y PUREX reprocessing plant for spent UO2 fuel is in operation for 40 years from 2025, and the second reprocessing from 2065 consists of a 600-t/y PUREX reprocessing and a 200-t/y dry reprocessing for spent metallic fuel.

Pu is mixed in MOX and consumed in LWRs, except for the amount required to produce FR fuel. Up to 50 t of Pu is stored as mixed oxide with U by 2065. When the FR cycle is initiated in 2065, the spent LWR-MOX and Pu/U mixed oxides are converted into metallic fuels and transferred to the FR cycle. Pu in the spent metallic fuel cannot be isolated in principle by the dry reprocessing. The recovered Pu as of 2105 contains 3% Pu-238, 45% Pu-239, 38% degraded Pu (Pu-240, 241, 242), and about 7% each of MA (Am-214) and FP (mainly light rare earth elements of La~Nd). The recovered Pu is low attractiveness for making nuclear weapon. Therefore, it is supposed that the metal-fuel FR cycle has high nuclear proliferation resistance.

4D: The NATO enlargement and the Nordic states' perspective on nuclear weapons

Participants:
Thomas Jonter – Professor, Stockholm University and Uppsala University; and leader of AMC's Working Group 6
Tapio Juntunen – University Instructor, Tampere University
Dr. Emma Rosengren – Research Fellow, Swedish Institute of International Affairs; and member of AMC's Working Group 6
Jamie Rae Withorne – Doctoral Research Fellow, Oslo Nuclear Project; and member of AMC's Working Group 6

Chair: **Henrik Stålhane Hiim** – Associate Professor, The Norwegian Institute for Defence Studies; and member of AMC's Working Group 6
Discussant: **Tytti Erästö** – Senior Researcher, Stockholm International Peace Research Institute (SIPRI); and member of AMC's Working Group 5

Venue: Lecture hall XI

Please note this session is not live streamed.

Nuclear disarmament engagement in transformation. Continuities and changes in Swedish nuclear disarmament policy during the post-Cold War period
by Thomas Jonter & Emma Rosengren

This paper investigates the role of nuclear disarmament in Swedish foreign policy in the post-Cold War period. While previous research has analyzed how nuclear disarmament engagement was a central feature of Swedish Cold War foreign- and security policy, little attention has been paid to the post-Cold War era. In this paper we fill this gap by mapping and classifying Swedish policy on nuclear disarmament 1991-2022. The classification elaborates on policy advocacy ranging from a low ambition which serves to preserve status quo, a middle level ambition which strives for de-escalation, to a high-level ambition which challenges the founding principles of the contemporary nuclear order. Our analysis suggests that while nuclear disarmament was represented as a historical continuity in debates about Sweden joining the NATO nuclear alliance, a closer look at Swedish policy advocacy suggests that on the contrary, nuclear disarmament diminished as a policy priority during the post-Cold War period, especially from 2009 and onwards. This is an important dimension of why Sweden could apply for membership in NATO, an alliance reliant on extended nuclear deterrence. These findings are important both for those interested in nuclear disarmament in the post-Cold War period, and for understanding how Swedish disarmament policy is likely to evolve considering NATO membership.

Ability to adapt? Understanding strategic stability and NATO's evolving nuclear weapons' strategy
by Jamie Rae Withorne

What effect has strategic stability had on NATO nuclear weapons strategy? If any? In this piece I will trace the evolution of NATO nuclear weapons strategy alongside developments in strategic stability to identify a relationship. First, I will conceptualize strategic stability and situate it in a broader NATO context. Then, I will discuss the evolution of NATO strategy, identifying important milestones. Finally, I will evaluate instances in which strategic stability influenced NATO nuclear weapons strategy and how changing perceptions and policies affected alliance dynamics. I will conclude by discussing implications of recent geopolitical developments and alliance expansion.

Nuclear disarmament and Finnish foreign policy: historical legacy and future trajectories
by Tapio Juntunen

This paper delves into the intricate role of nuclear disarmament within Finnish foreign policy. By tracing the historical trajectory of Finnish nuclear disarmament policy from the late 1950s to the 2000s, the paper sheds light on how Finland's stance toward nuclear weapons and disarmament is likely to evolve as a NATO member. Despite Finnish foreign policy doctrine undergoing at least two phases of (incrementally adopted) changes since the end of the Cold War, certain continuities persist in relation to nuclear disarmament. Furthermore, the paper revisits the Finnish Cold War-era proposal to establish a nuclear weapon-free zone (NNFZ) in the Nordics. It will assess the relevance of the NNFZ proposal, considering its past both as an evolving foreign policy instrument and an arms control arrangement. This assessment will be viewed counterfactually against the backdrop of recent changes in the geopolitical landscape in the Nordics.

18:00-21:00 Conference dinner

Pre-registration required.

Venue: Hantverksföreningens hus (Nedre Slottsgatan 6, 753 09 Uppsala)

Day 2: Wednesday 19 June

09:00-10:30 Sessions block 5

5A: Ukraine and the nuclear threat

Participants:
Orla Haughey – Master's Student, Uppsala University
Tom Sauer – Professor, Universiteit Antwerpen
Dr. Polina Sinovets – Head of the Odesa Center for Nonproliferation

Chair & Discussant: **Dr. Magnus Öberg** – Associate Professor, Uppsala University; and leader of AMC's Working Group 3

Venue: Lecture hall X

Building the Bomb(shell), Feminization of States in Relation to Utilization of Nuclear Threats
by Orla Haughey

This paper will regard the relationship of Russia's feminization of Ukraine with the corresponding nuclear rhetoric threatening the deployment of weapons within the conflict. This paper highlights how Russia's militarized masculinity and domestic gender inequality has been magnified to the inter-state dynamic, magnified by the colonial history of Russia-Ukraine relationships. Gender conflict theory will be utilized to assess the retaliatory nature of Russia's nuclear rhetoric as a means to punish Ukraine for perceived infringement of the gendered power dynamic between the two states.

How Useful Are Nuclear Weapons in Practice? Case-study: The War in Ukraine
by Tom Sauer

The debate about nuclear weapons has been based on abstract notions. The war in Ukraine is a fascinating case-study for testing these decades-old abstract theories. The puzzle can be formulated as follows: what has been the impact of nuclear weapons in the war in Ukraine and what does that tell us about the usefulness of nuclear weapons in general? That question is further split up in three questions: what does this war tell us respectively about nuclear deterrence theory, nuclear responsibility theory, and the theory of nuclear coercion? Each time, the theory will be explained, and matched with the facts on the ground. The answers to

these questions will in all likelihood be important for the future of nuclear weapons. All in all, the analysis points out a bleak picture with respect to the usefulness of nuclear weapons. Apart from deterring an attack against the vital interests of a state, nuclear weapons do not seem to provide many benefits apart from many (potential) costs. And even with respect to deterring an attack against the vital interests of a state, it is unclear to what extent nuclear deterrence works.

Nuclear Deterrence and opportunities for disarmament: the case of Russia's War on Ukraine
by Polina Sinovets

The paper is dedicated to the analysis of the nuclear deterrence phenomenon in Russia's war on Ukraine. I evaluate Russia's nuclear deterrence in the framework of its coercive function as well as its basic military efficiency. Special attention is paid to the deterrence evolution in the Russia-US dialogue and also to the limitations nuclear threat has demonstrated in the framework of Russian-Ukrainian interaction. The main conclusion is that besides its well-known strengths the war has shown main limitations of nuclear deterrence. It can work well as a basic military strategy (in its defensive vs. offensive categories) while the ambition of some states to present it as a universal tool of even the regional conventional war turns to be not very promising. This understanding of nuclear deterrence as a limited strategy can be a first step towards nuclear disarmament.

5B: Is the global nuclear order perpetuating inequality?

Participants:
Dr. João Paulo Nicolini Gabriel – Postdoctoral Researcher, Federal University of Minas Gerais (UFMG)
Carolina Panico – Teaching Fellow, University of Auckland
Lena Wittenfeld – Research Associate, University Bielefeld
Felicia Yuwono – Doctoral Researcher, King's College London

Chair: **J. Luis Rodriguez** – Assistant professor, George Mason University; and member of AMC's Working Group 6
Discussants: **Prof. Emiliano Buis** – Project Director, NPSGLOBAL Foundation; **Becky Alexis-Martin** – Lecturer, University of Bradford

Venue: Lecture hall IX

Great Power Dynamics and the Role of Global South Emerging Powers in Nuclear Non-Proliferation Efforts

by João Paulo Nicolini Gabriel

This study delves into the challenges that emerging powers encounter while advancing their nuclear non-proliferation agendas. It scrutinizes whether the P5, encompassing the nuclear nations under the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), engage in delegitimizing their proposed initiatives. The central hypothesis posits that these great powers obstruct these endeavors to maintain their global strategic dominance and safeguard their interests. Relying on a qualitative case study anchored in constructivist International Relations theory, we scrutinize the case of the 2010 Brazilian-Turkish effort to broker a nuclear deal with Iran, which was swiftly rebuffed by the P5 powers. It explores the persistent adherence of great powers to the NPT framework, despite mounting criticism from emerging powers. Hence, the research question investigates whether great powers actively delegitimize the nuclear non-proliferation initiatives of emerging states as a means to preserve their privileged position in the global non-proliferation landscape. This research contributes substantially to the field of international relations by shedding light on the dynamics between great powers and emerging powers within the domain of nuclear nonproliferation. It deepens existing understanding of the role of emerging states in shaping the global non-proliferation landscape and offers insights into their potential contributions to non-proliferation efforts.

Playing Doomsday: Video Games and the Politics of Nuclear Weapons

by Carolina Panico

This article examines how nuclear weapons are depicted in video games. While the literature has explored the social and symbolic meanings of nuclear weapons and how they have been represented in popular culture, existing accounts have not thoroughly engaged with video games. Examining the bestselling game Call of Duty, I show how gameplay narratives contribute to normalising dominant knowledge about nuclear weapons. Rather than simply fictional or trivial, I argue that representations of nuclear weapons in video games contribute to legitimising the ongoing possession and modernisation of nuclear weapons. Drawing on feminist poststructuralist theory, I show how game dynamics produce nuclear weapons as a win-condition, thus a symbol of power, supremacy, and success that reinforces dominant understandings of their military value while masking the horror of killing. Moreover, I show how nuclear weapons are programmed to be an exclusive item that only the most skilled players can obtain, reinforcing the exclusionary power dynamics sustaining the nuclear status quo. Deconstructing the

playing dimension of video games, I situate the ludic aspect as a meaning-making system, working synergically with gameplay stories to reinforce dominant knowledge about nuclear weapons. The article draws attention to everyday discursive mechanisms that render a nuclear world possible.

Making Silence(s) Visible – A Feminist Perspective on Europe's (Un)Challenged Nuclear Narratives

by Lena Wittenfeld & Sandra Bandemer

Russia's invasion of Ukraine raises a plethora of questions regarding the European (nuclear) security architecture. Considering Russia's threat to use nuclear weapons and Russia's attempt to undermine the current nuclear order, the importance of the nuclear aspect to the war is evident. We therefore ask what impact does Russia's war against Ukraine have on EU discursive perceptions of nuclear security and which narratives on nuclear weapons are (re)produced? Accordingly, we seek to establish the extent to which Russia's challenge to the nuclear taboo is met with the presence or absence of 'traditional' narratives on nuclear weapons in the EU's discourse. Here, 'traditional nuclear narratives' refer to the necessity, legitimacy, and inevitability surrounding nuclear deterrence, which run counter to increasingly present contra-narratives, and which are inherently biased and gendered. Adopting a poststructuralist and critical feminist lens, we conduct a critical discourse analysis of EU-level official discourse. Doing so, this paper's aim is threefold: we trace traditional nuclear narratives, reflect on the absence of alternative nuclear narratives, and seek to scrutinize the silencing of the latter. The EU represents a particularly interesting discursive arena when analyzing nuclear narratives as it combines multiple nuclear perspectives (nuclear, non-nuclear and nuclear host states) and has presented itself as pursuing to actively shape international nuclear order (e.g. in the Iran nuclear deal). Our analysis sets in shortly before Russia invaded Ukraine, signaling its aggressive intentions through troop movements, and extends until the end of 2023. As the war is ongoing, we acknowledge our limitation of only being able to analyze how the EU's discourse has evolved so far. First findings indicate that Russia's war against Ukraine strengthens the narrative of security through deterrence as provided by NATO's nuclear umbrella, keeping unchallenged the dominance of gendered, traditional nuclear narratives.

The making of (im)possibility: The constitutive effect of NPT diplomacy for nuclear disarmament
by Felicia Yuwono

Can the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) ever achieve nuclear disarmament? The NPT is believed to be the foundation for nuclear disarmament, as it represents the only legally binding commitment by the five Nuclear Weapon States (NWS) to this goal. NPT diplomacy has mainly been studied through a functional lens, which is detached from theory and largely ignores the constitutive effect of diplomacy in nuclear politics. This paper draws on Bourdieu in critically examining how multilateral diplomacy shapes and conditions what can be achieved for nuclear disarmament. It employs analysis of discursive practice in the NPT review process, examining the treaty text, final outcomes since 1995 and multilateral discussions at the 2020 NPT Review Conference (RevCon). It argues that the logics of discursive practice of NPT diplomacy have reinforced the Treaty as an undisputed "truth", a doxa, which main resolve is to reproduce itself along with the inequality it established. They structure knowledge of nuclear disarmament around utopia, and all negotiations around symbolic violence and diplomatic permissibility. The paper concludes that NPT practice confines nuclear disarmament into an indefinite future, and realising this goal will require multilateral diplomacy to embrace the arbitrariness of the NPT.

5C: Approaches and methods in non-proliferation and disarmament

Participants:
Dr. Sophie Grape – Associate Professor, Uppsala University; and member of AMC's Working Group 4
Dr. Cecilia Gustavsson – Associate Professor, Uppsala University; and member of AMC's Working Group 4
Hannah Harris – Marie Skłodowska-Curie Fellow, IAEA
Dr. Jingjie He – Postdoctoral Fellow, The Hebrew University of Jerusalem

Chair: **Pavel Podvig** – Senior Researcher, UN Institute for Disarmament Research

Venue: Lecture hall IV

Exploring reasons behind the development of uranium and plutonium based nuclear weapons in states

by Sophie Grape, Erik Branger, Vitaly Fedchenko, Robert E. Kelley

A number of states have historically decided to develop nuclear weapons, and recent developments in the world have led to fears that new states are motivated to consider the option of developing nuclear weapons. However, establishing a nuclear weapons programme to design, develop and manufacture such weapons is not a simple thing to do. States already in possession of nuclear weapons have shown that the acquisition of nuclear weapons is a major endeavor that requires dedication, time, funding and competence. It also requires the state in question to make priorities with respect to the direction and scope of activities. One important priority concerns the production path required for the development of the nuclear weapons - does the state aim to develop weapons based on uranium or plutonium, or to do both? The first two nuclear weapon states, the United States and Soviet, chose to develop both types of weapons in parallel. Although there are more examples of other states that also chose to develop both types of nuclear weapons, there are also examples of states that decided to pursue only one of the routes, as well as states that switched paths once new opportunities opened up or when forced to switch due to external pressures. This paper studies a number of selected states that have had plans to, or actually did, develop nuclear weapons. The objective of this work is to describe and analyse historic developments and events that resulted in either a uranium path, the plutonium path, or both being pursued by the state. There are two goals with this work. The first goal is to develop a better understanding of the reasons why the states pursued the selected path(s). The second goal is to identify common factors or indicators among the studied states that explain why a certain route was chosen. With this information at hand, future non-proliferation experts can be better prepared and focus their attention to specific areas that may provide an early indication of which path a certain state may want to explore.

Modelling fissile production in the Experimental Light Water Reactor (ELWR) of DPRK

by Cecilia Gustavsson, Peter Andersson, Grant Christopher, David Schmerler

Since DPRK left the Non-proliferation Treaty (NPT) in 2003, the DPRK nuclear fuel cycle has continued operation as well as further development, without transparency to international inspectors. A recent addition to the DPRK fuel cycle is the Experimental Light Water Reactor (ELWR), a 100 MWth light water reactor in Yongbyon, which, as of December 2023, appeared to be preparing for operations. Considering the non-NPT-signatory status of DPRK, it is of concern that the ELWR

may be used to produce plutonium for nuclear warheads, in addition to or instead of its use for electricity production. In this work we explore the possibility to model the fissile material production in the ELWR, by modelling the core with Serpent2, and integrating information from available remote monitoring, such as satellite imagery of cooling water outlet from the facility. Little openly available and verified information exist on the details of the ELWR, such as nuclear fuel design and core geometry. Therefore, a base case based on available statements are used to create a core model similar to conventional international LWRs. Multiple scenarios for core load options are based on either assumptions on 1) uniform enrichment for high burnup and electricity production, 2) uniform enrichment optimized for low burnup and production of weapons grade plutonium (WG Pu), or 3) heterogeneous core with driver of enrichment fuel and target for Pu production of natural uranium. Plutonium production made possible using the ELWR is estimated per MWd, as well as per day of operation. Special consideration is given to cycle length constraints from requirement of weapons grade quality of the produced plutonium, and implications on availability and stoppage frequency, which might be monitored remotely, unless online refueling is a possibility. Possible implications on the DPRK Pu stockpile are discussed, as well as attempts to identify unkown parameters of importance (i.e. attempting to make unknown unkowns to known uknowns).

The Dual-Use Dilemma and Scientific Cooperation Between Adversaries: A Scientist's Perspective

by Hannah Harris

Disarmament and nonproliferation are both bolstered and stymied by the enduring matter of the 'dual-use dilemma'. Across the multi-dimensional fabric of nuclear issues, wherever the dual-use dilemma emerges, a critical aspect of the nuclear regime is exposed. One example is the strategy of scientific decoupling and isolation between nucleararmed or -backed adversaries, often driven by uncertainty related to dual-use applications and the fear of diversion or proliferation. This presentation offers a scientist's perspective on the dual-use dilemma as it pertains to nuclear issues by combining observations from astrophysics and nuclear physics with perspectives from mathematics and philosophy. It proposes an expanded definition of 'dual-use' and illustrates how a different take on the concept might aid in nuclear risk reduction and disarmament. By drawing on successful cooperation from the past, a new way forward for nuclear conflict transformation and disarmament through adversary scientific collaboration is proposed.

An Expanding Counter-AI Matrix: Whither the Remote Sensing Revolution?
by Jingjie He

Remote sensing is a commonly utilized tool for international peace, arms control, and nonproliferation missions. Lately, there has been growing interest in integrating AI into remote sensing to improve analytical efficiency. However, this enhancement could compromise accuracy and system security due to the susceptibility of AI models to counter-AI techniques. The present research delves into the emerging threats posed by counter-AI to AI-driven remote sensing analysis. It will assess four threat scenarios – data poisoning, model evasion, data inference, and model extraction. Potential counter-AI attacks encompass a range of adversarial AI techniques, spanning from digital to physical-world, giving rise to security concerns in international and nuclear security. To address this, the article proposes a comprehensive defense framework comprising six essentials: access and quality control of data and models, robustness enhancement of the frameworks, monitoring capability improvement of the remote sensing systems, knowledge and awareness enhancement of humans, adaptability improvement of the risk management, and resilience planning for contingencies.

5D: Multidisciplinary approaches to disarmament and non-proliferation

Participants:
Dr. Lodovica Clavarino – Post-doctoral fellow, Roma Tre University; Teaching Assistant, Luiss University
Natasha Karner – PhD Candidate, RMIT University
Amanda Pereira – Master's Student, Central European University
Lukas Rademacher – Doctoral Student, RWTH Aachen University

Chair: **Giacomo Cassano** – PhD Candidate, Uppsala University; and member of AMC's Working Group 1

Venue: Lecture hall XI

Please note this session is not live streamed.

From three minutes to Midnight to the age of hopes through the analysis of the Bulletin of the Atomic Scientists
by Lodovica Clavarino

The aim of this paper is to analyze the debate on nuclear arms control and disarmament through the lens of the scientists interested in 'science and security' issues. In particular, the contribution will investigate how the question of nuclear

weapons (their horizontal/vertical proliferation, testing, arms control & disarmament talks) was framed in the articles published in the 1980s by the Bulletin of the Atomic Scientists, probably the most widely circulated publication on these topics. The essay is aimed at mapping the most fervent voices advocating nuclear arms control among the transnational community of scientists and clarify the main arguments and keywords used in the articles of the BAS. Going beyond the usual historiography on the nuclear history of the 1980s, usually focused on the official politic-diplomatic dimension, this paper would explore more in depth the main issues concerning nuclear weapons, delving in the articles and dossiers circulating in the framework of scientists who were claiming a voice in the security issues, exactly due to their specific knowledge and expertise. Therefore, this contribution sets itself close to the research on science diplomacy, since it will also focus on the role of experts in framing the discourse on (in this case against) nuclear weapons.

Nuclear Stewardship and AUKUS
by Natasha Karner

This paper will outline the importance of responsible nuclear stewardship where the transfer of nuclear materials is concerned. As a case study, it examines Australia's responsibilities as a 'new' nuclear steward under AUKUS – the recent trilateral security pact between the United States, Australia, and United Kingdom. These include the logistics of stewarding nuclear-powered submarines (such as industrial capacity and nuclear waste management), the need for qualified personnel and training, and possible points of contestation with nuclear non-proliferation. To date, Australia has publicly provided assurances that it will adhere to the Non-Proliferation Treaty (NPT), the 1986 Rarotonga Treaty, and Article 14 of its Comprehensive Safety Agreement (CSA) with the International Atomic Energy Agency (IAEA). However, there is debate regarding 'loopholes', precedent setting, and regional insecurity where the proliferation of nuclear materials is concerned. Therefore, this paper analyses Australia's role and responsibilities as a nuclear steward under AUKUS, and puts forth policy recommendations to conclude.

Converging Crises: Exploring the Interconnections of Climate Change and Nuclear Weapons
by Amanda Pereira

Climate change and nuclear weapons pose significant threats to humanity, and their intertwining complexities demand closer examination. The Limited Test Ban Treaty of 1963 not only marked the inception of nuclear treaties but also represented the first time that states, in a global modality, agreed on an action that was harming the

planet (Masco, 2015), being the world's first global environmental agreement. Günther Anders, a visionary German philosopher, highlighted the potential for humanity's self-extermination, emphasizing our struggle to comprehend the consequences of our creations amidst rapid technological advancement (Anders, 1962). While his concerns were initially focused on nuclear weapons, Anders' insights are equally applicable to climate change, a side effect of industrial activity expansion. This paper highlighting the mutual exacerbation of these global threats. Presenting five key intersections between climate change and nuclear weapons, it emphasizes the need for disarmament and global cooperation to mitigate the risks associated with both.

Exploring Nuclear Verification through Expert Discussion – A Field Report
by Lukas Rademacher

The regional research consortium VeSPoTec – Verification in a complex and unpredictable world: social, political and technical processes – takes an integrated interdisciplinary approach, bringing together scientists from the natural and social sciences to advance nuclear verification research. An essential part of the project are verification exercises to develop and test approaches. In September 2023, we conducted a workshop at the interdisciplinary conference ’Science Peace Security ’23’ on the topic of nuclear safeguards in crisis situations. Using a world café format, participants discussed how to restore confidence in safeguards for three hypothetical crisis scenarios – terrorist occupation, natural disaster, and regime change presenting an unclear picture. In December 2023, we hosted a two-day tabletop exercise, where safeguards experts came together to analyse safeguards-relevant information in the context of state evaluation by the IAEA. Through role-play in groups, they discussed the availability and reliability of different types of information, depending on different safeguards agreements and situations. This presentation will introduce the workshop and the exercise, explaining their frames, formats, topics and objectives. It will then summarize their course and present the achieved results.

10:30-11:00 Coffee break with AMC Working Groups poster viewing

Please take the time to view the AMC Working Groups’ posters and discuss their work and research focuses with representatives of the different groups.

Venue: Main hallway

11:00-12:30 Sessions block 6

6A: Intersectionality and nuclear weapons

Participants:
Becky Alexis-Martin – Lecturer, University of Bradford
Dr. Flora Roberts – Assistant Professor, Utrecht University
Elisabeth Saar – Research Fellow, Alva Myrdal Centre for Nuclear Disarmament, Uppsala University
Hebatalla Taha – Associate Senior Lecturer, Lund University

Chair: **Alicia Sanders-Zakre** – Policy and Research Coordinator, International Campaign to Abolish Nuclear Weapons (ICAN)
Discussants: **Alain Ponce Blancas** – Research and Communication Officer, Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL); **Dr. Leila Hennaoui** – Associate Professor, Hassiba Ben Bouali University of Chlef

Venue: Lecture hall X

This interdisciplinary panel will include a diversity of research examining how nuclear weapons intersect with other social injustices such as environmental harm, gender, colonialism and racism. Presenters, with backgrounds in environmental studies, sociology and political science, have engaged in recent field work to unearth previously under-explored links between nuclear weapons production, maintenance and testing and other social issues from the United Kingdom to Kiribati to Germany to Israel and Palestine.

Atomic Epistemic Justice in Kiritimati: New Approaches to Community Nuclear Policy Education
by Becky Alexis-Martin

From 1957 to 1962, Kiritimati was colonised, militarised, and used as a base for UK and US nuclear weapons testing. The environmental and humanitarian consequences of nuclear weapon testing have been substantial, and policy interventions have not yet adequately addressed the needs and rights of nuclear test survivors (Alexis-Martin, et. al. 2021; Alexis-Martin 2019).

The Kiritimati community is still not facilitated to engage with TPNW policy implementation. Representative members of this community remain conspicuous by their absence at UN TPNW events and debates. This presents a deep epistemic

injustice, an injustice of knowledge, whereby the Kiritimati people are not being heard (Fricker 2007). This also means that their specific needs are being assumed, and therefore not directly addressed, despite policy progress in the context of Article 6 and 7.

We know that victims of nuclear testing seek not only medical assistance, but also support for practices of recognition, acknowledgement, and memorialization to address psycho-social and cultural consequences of the test programs. However, there are few contemporary insights into what the community wants post-TPNW ratification. This paper, based on recent field research in Kiribati, will aim to shed a light on with an eye towards addressing atomic epistemic injustice in Kiritimati.

Welsh Women against the Bomb: secrecy, intersectionality and resistance in nuclear Cardiff

by Flora Roberts

The Royal Ordnance Factory (ROF) in Llanishen, UK had manufactured conventional weapons throughout the Second World War, with a workforce of 20,000. By 1960, however, with no signs of any public consultation or debate, the site joined the British Trident program network, and began manufacturing nuclear weapons. Significant amounts of beryllium and depleted uranium were processed at what was officially known as Atomic Weapons Establishment (AWE) Llanishen, but locally still referred to as the ROF. Little to nothing has been published about the nuclear weapons factory in Cardiff.

Combining perspectives from environmental and social history, this paper will explore the hidden history of the Atomic Weapons Establishment in Cardiff. It seeks to address the following questions: What was the environmental impact of this atypical nuclear weapons factory, located within a major metropolitan area, just a few miles from the sea? How widely were the activities of the AWE site understood by the local community in Cardiff? What can Cardiff's history with nuclear weapons contribute to the global campaign to eradicate nuclear weapons forever?

Uranium Mining and Nuclear Justice

by Elisabeth Saar

Uranium is extracted disproportionally in areas formerly occupied or colonised, or on lands belonging to Indigenous peoples. The oppression of nuclear weapons extends beyond their use or the looming threat; they resonate in the very process of their production, commencing with the extraction of uranium ore. The mining of uranium is determined by the entrenched patriarchal, racist, and capitalist

structures that form the bedrock of the nuclear order. In International Law, the devastating humanitarian impacts of nuclear weapons have so far been scarcely acknowledged. Although the Treaty on the Prohibition of Nuclear Weapons (TPNW) is the only treaty within the nuclear complex that addresses the humanitarian impacts of nuclear weapons, questions regarding responsibility and affectedness, particularly in the context of uranium mining, remain unresolved.

Nuclear Lives in Israel/Palestine
by Hebatalla Taha

The construction for the Israeli nuclear weapons reactor at Dimona started in 1957 with French cooperation. Dimona itself had been conceived four years earlier in the Negev desert as a developmental town, where many racialized communities were settled, including Mizrahim and Ethiopian Jews. Meanwhile, the Negev is an area where many Palestinian-Bedouins continue to live. Today, Dimona is an industrial city that is home to the reactor, which produces thermo-nuclear weapons, as well as chemical and high-tech industries. Yet, nuclear weapons at Dimona have been studied exclusively as a strategic national project. For example, Avner Cohen, considered the leading scholar on the topic, begins his book Israel and the Bomb, by stating: “In the early days it took more than a little chuzpa to believe that tiny Israel could launch a nuclear program, but for a state born out of the Holocaust and surrounded by the hostile Arab world, not to do so would have been irresponsible” (9).

There has been no work dedicated to understanding lived experiences around the nuclear reactor, particularly how these can be brought into conversation with other cases of nuclear colonialism. Aiming to fill this gap, this research situates Dimona within other colonial histories and realities. It considers Dimona US nuclear weapons technologies and industries that have been concentrated on indigenous territories and enmeshed with regimes of violence and dispossession. Centering the everyday experiences of life and labor in Dimona, this research will analyze the reactor as part of broader technologies and economies of racialization and securitization in Israel and Palestine.

6B: Tech, Science & Policy

Participants:
Dr. Curtis Asplund – Assistant Professor, San José State University
Veerle Moyson – Consultant, United Nations Office for Disarmament Affairs Vienna

Philipp Sauter – Research Fellow, Max-Planck-Institute for International Law
Noel Stott – Senior Researcher, Scientific Advisory Group TPNW

Chair & discussant: **Vladislav Chernavskikh** – Research Assistant, Stockholm International Peace Research Institute (SIPRI)

Venue: Lecture hall IX

How much does physics affect US nuclear weapons policy?
by Curtis Asplund & Emily Foreman

Several areas of physics have significant bearing on nuclear weapons policy. Historically, research on fissile materials, ballistic trajectories, and climactic effects of nuclear wars have appeared to have major impacts on nuclear policy in the US and elsewhere. With these examples in mind, we assess the impact of more recent scientific research on plutonium on US plutonium pit production policy, which has been on a trajectory towards major increased production for use in nuclear weapons for years. We study mentions of the scientific literature in legislation, Congressional committee hearings, and relevant policy literature over several years. We identify how scientific results are used for arguments either for or against further nuclear weapons projects and analyze the strength of such arguments on both logical and scientific grounds. We discuss what we might learn about the role of science in the policy making process, specifically regarding policies that could move the US and the world farther from or closer to nuclear disarmament.

Does artificial intelligence nudge the world from nuclear deterrence towards nuclear disarmament?
by Veerle Moyson

The appropriateness of automation within nuclear weapon-related tasks has long been debated and decision-makers seemed to have reached a common understanding that nuclear weapons are too hazardous and complex to forego human oversight in processes related to their security. Now, artificial intelligence as a promising enabling tool is permeating almost all aspects of the military. Its applications seem endless and much has been written about the opportunities and challenges they pose. The introduction of AI in the military, throughout decision-making, surveillance, data analysis, and weaponry, again begs the question of the implications for nuclear weapons security. In particular, research has been done regarding the risks of AI for nuclear deterrence, with researchers foreboding destructive scenarios. Building on this existing research regarding the impact of artificial intelligence on nuclear deterrence strategy, this paper will evaluate the

various effects of the relevant military applications of AI that could undermine nuclear deterrence. Putting forward the idea that nuclear deterrence will further diminish in dependability and effectiveness, this paper will argue that nuclear deterrence is being pushed aside in favor of nuclear disarmament, as the only safe scenario for a future with AI.

Nuclear Fusion in Nuclear Weapons Law - Challenges and Opportunities Offered by a New Nuclear Technology

by Philipp Sauter

While today's regime of nuclear weapons law is based on nuclear fission, a new nuclear technology is about to become a commercially viable source of energy: nuclear fusion. Although fusion offers the opportunity to provide humanity with an inexhaustible, clean, and sustainable source of energy, the legal framework of nuclear weapons law is not adapted for the new kid on the block. While fusion technology can support nuclear weapons programmes by producing fissile material, by making tritium available in larger quantities and by giving insights in the physics and functioning of thermonuclear weapons, fusion is outside the scope of non-proliferation and disarmament instruments such as the NPT, Comprehensive Safeguards Agreements, the TPNW or Nuclear-Weapon-Free-Zone-Treaties. The paper explores the potential of fusion with regard to the development of nuclear weapons and points out the lacks of the current regime of nuclear weapons law. It then proceeds to make recommendations on how to adapt the legal system and how fusion can catalyze new momentum to reinvigorate nuclear disarmament.

The role of scientists in the effective implementation of the TPNW: The Scientific Advisory Group (SAG)

by Noel Stott & Andre Buys

At the First Meeting of States Parties (1MSP) to the Treaty on the Prohibition of Nuclear Weapons (TPNW) prohibits comprehensively the development, testing, production, manufacturing, a decision was taken to establish a Scientific Advisory Group (SAG) composed of up to 15 members with relevant scientific and technological expertise. This presentation will summarize the work of the SAG since February 2023. It will include a summary of its substantive report to the 2MSP in November 2023 on the status of nuclear forces and the role of nuclear weapons in the world, the changing risks of nuclear weapons and the humanitarian consequences of nuclear weapons testing as well as on nuclear disarmament and related issues. In addition, the SAG has been mandated to establish a broader geographically diverse and gender balanced network of experts to support the goals

and TPNW and to enhance capacity-building in States Parties, on the technical issues related to Treaty implementation, the humanitarian consequences and risks associated with nuclear weapons, and the related humanitarian response challenges. This task follows the recognition by States Parties that the humanitarian impacts of nuclear weapons and a shared understanding of their risks are underpinned and supported by a body of science and technical knowledge developed over decades and reflecting the current understanding and the gaps and uncertainties that require attention. The presentation will also reflect on the process so far undertaken by the SAG to fulfill this mandate including the consideration of the Network's potential terms of reference, mission, composition, principles of management and indicative activities. Finally, the paper will also outline the SAG activities in 2024.

6C: Results of the BeCamp2 measurement campaign for nuclear disarmament verification

Participants:
Dr. Alessandro Borella – Researcher, Belgian Nuclear Research Centre SCK CEN
Rolf Althaus – Senior Expert, CBRN Arms Control
Dr. Liqian Li – R&D Scientist, Canadian Nuclear Laboratories
Dr. Débora Montano Trombetta – Researcher, Uppsala University
Dr. Jenny Schofield – Senior Verification Scientist, AWE (Atomic Weapons Establishment)
Antonin Vacheret – Directeur de Recherche CNRS, LPC Caen

Chairs: **Dr. Alessandro Borella** – Researcher, Belgian Nuclear Research Centre SCK CEN; **Dr. Gerald Kirchner** – Professor, Universität Hamburg

Venue: Lecture hall IV

The BeCamp2 measurement campaign for disarmament verification
by Alessandro Borella

Within the IPNDV (International partnership for disarmament verification) SCK CEN organized a measurement campaign called BeCamp2. The measurement campaign was held between 11 and 29 September 2023. Ten measurement teams participated from all over the world. Each team deployed one or more measurement technology to verify their capability in view of their use in nuclear disarmament verification. The goal was to carry out measurements on unknown items containing different radioactive sources (including 235U and Pu). The results of the

measurements were used to answer typical questions that come up in disarmament such as: verifying the absence of special nuclear material and to confirm whether an item is of the same class as a reference item.

In this session, we report about the content of the measurement campaign, describing first the items and type of measurements that were carried out. We then focus on the disarmament questions that each team had to try to answer. Several teams will report about the results that they have obtained in a presentation in the session. We will conclude with a wrap-up and discussion of the results and lessons learned.

Challenges and limitations of isotope determination of uranium using high-resolution gamma spectrometry in the BeCamp2 measurement campaign from the perspective of the Swiss team

by Rolf Althaus & Christoph Wirz

Spiez Laboratory joined the BeCamp2 measurement campaign during the second week, in mid-September 2023. The measurement equipment consisted of two electrically cooled HPGe detectors (Falcon 5000, Mirion, each with a relative efficiency of around 23%) mounted on a lifting lab trolley. Two gamma spectra from each sample were simultaneously collected, one in the energy range from 4 to 1028 keV and the other in a lower range up to 614.4 keV or higher energy range up to 3000 keV depending on the type of sample.

During BeCamp2 29 configurations including different templates containing Uranium and MOX fuel, sometimes with additional sources or lead shields and background setups were measured. Spectral analysis was done with Multi Group Analysis (MGA) and Fixed energy Response function Analysis with multiple efficiencies (FRAM) as well with a code developed by Kalthoff et al. [1] in order to obtain isotope ratios of U and Pu. Standard spectral analysis was done with Genie 2000 in order to identify gamma emitters present in the samples or prompt gamma lines produced by neutron interactions. First results reveal that the three tools are not consistent for U-235. Nevertheless, the spectral analysis helps to answer most of the questions from the BeCamp2 Questionnaire. Results of the BeCamp2 measurement campaign for nuclear disarmament verification

[1] Oliver Kalthoff, Christoph Wirz, Friedrich Groß-Alltag, Frank Stetter, Thomas Bücherl, Determination of uranium-enrichment from gamma-spectra by linear least-squares, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, Volume 1057, 2023.

Combining Neutron and Gamma Detection Techniques for Mitigating Key Challenges in Nuclear Disarmament Verification

by Liqian Li, M. Seydaliev, G. Li, S. Bandiera & G. Bentoumi

Nuclear disarmament verification (NDV) activities need reliable technologies and procedures to verify nuclear weapons reductions without transferring sensitive information. A team from Canadian Nuclear Laboratories (CNL) participated in the BeCamp2 measurement campaign organized by the Belgian Nuclear Research Center (SCK-CEN) in collaboration with the International Partnership for Nuclear Disarmament Verification (IPNDV). Several neutron and gamma-ray detectors were deployed by the CNL team to evaluate and quantify their effectiveness in resolving some NDV scenarios proposed for the exercise by SCK-CEN. Specifically, CNL team deployed three systems: a set of eight He-3 detectors with variable high-density polyethylene moderators, a dual-panel polyvinyl toluene detector, and two mid-resolution gamma-ray detectors based on NaI and Cesium Lanthanum Lithium Bromo-Chloride scintillators. The first two systems tally and distinguish neutrons in various energy ranges from thermal to about 20 MeV, whereas the third one is mainly for gamma spectroscopy analysis. Combining neutron and gamma-ray results appear to be the best way to address some of the key challenges in NDV, namely authenticating the presence or absence of the shielded fissionable material and preventing spoofing by the disarming state. Each of the three systems addresses some of the NDV concerns. Although the methods are not suitable for giving an accurate amount or enrichment of the special nuclear materials, they are efficient in identifying differences in the neutron or gamma energy distribution. This aligns with the goal of the IPNDV of providing confidence in the verification without disclosing sensitive information. It would be nearly impossible to make any cheating modifications without being found out by the combined methods. These methods work well for verification against radiation templates.

Assessment of a liquid organic scintillation detector for fast neutron measurements in the context of verification of nuclear weapon dismantlement

by Débora Montano Trombetta

A key to the verification of nuclear weapon dismantling is the identification of presence respectively absence of fissile materials in items, specifically weapons grade plutonium and/or high enriched uranium. In the case of plutonium, spontaneous fission of minority isotopes enables its detection through emitted neutrons, making passive use of neutron detectors an attractive path. In the case of high enriched uranium, the emission of spontaneous fission neutrons is negligible, making its detection difficult. However, using active interrogation where an external neutron source irradiates the item under investigation, induced fission

neutrons are emitted from high enriched uranium as well as from weapons grade plutonium. Liquid organic scintillation detectors are a promising route to detect fission neutrons for verification of nuclear disarmament. These detectors are sensitive to fast neutrons, which are characterized by low self-attenuation in most materials. In addition, while the detector is sensitive to gamma radiation, it can be effectively discriminated by pulse shape analysis. This work details the assessment of a liquid organic scintillator for fast neutron detection for use in verification of nuclear weapon dismantling. The assessment was performed as a part of the BeCamp2 measurement campaign organized by SCK-CEN, where a delegation from the Alva Myrdal Centre on Nuclear Disarmament of Uppsala University participated. As a part of the campaign, 19 items with unknown content were assessed, with three different aims: template matching, determining the absence of nuclear material, and a technology challenge using active interrogation. In this first stage, where the content of the items is still not disclosed, it was concluded that the equipment was able to identify the presence of spontaneous fission content in items, using passive interrogation mode, within the measurement time constraints. Gamma and neutron spectrum comparison was a valuable tool for template matching, and active interrogation measurements enabled the detection of fissile content in interrogated items. Our preliminary assessment is that liquid organic scintillator detectors have the potential to be part of the toolbox that will support the technical verification of nuclear weapons dismantlement. Lessons learned from the campaign are discussed with focus on advantages and disadvantages of the technique, and possibilities for further development of the analysis.

Analysis of the IPNDV BeCamp2 Measurement Campaign

by Jenny Schofield

During BeCamp2, the UK fielded the same equipment as that used in the first Belgium measurement campaign. These were three helium-3 based neutron detectors (called the Nuclear Diagnostics Neutron Detector, or “(ND)2”), a mechanically-cooled high purity germanium (HPGe) detector (Transpec 100T) and a sodium iodide (NaI) Identifinder detector. The (ND)2 is a He3-based, rugged, portable and established detector, developed at AWE. Each detector consists of four tubes of He3 surrounded by high density polyethylene – we fielded three panels stacked vertically. The detector measures thermal neutrons, both gross counts and list mode data. The gamma detector choices were also made due to their well-established nature. Measurements were taken at 1 m from the source, at a height of 60 cm from the ground (for the gamma detection equipment). Durations of measurements depended on the time available in the schedule.

Testing the nFacet 3D Directional Spectrometer at the BeCamp2 Nuclear Disarmament Campaign.
by Antonin Vacheret

The nFacet 3D detector is a dual-mode (gamma-neutron) directional spectrometer. The system is based on a matrix of PVT and LiF:ZnS(Ag) scintillator voxels to record both neutron and gamma-ray signals. The segmentation of the detector in 64 smaller units and a FPGA-based multi-channel front-end electronics enable the reconstruction of the direction of the gamma-ray and neutron fields as well as count rates and energy deposition that depends on the energy of the incoming radiation. Both type of radiations can be recorded at the same time providing independent information using PSD techniques but also correlation between gamma and neutron signal. The BeCamp2 exercise provided an opportunity to test the nFacet 3D system in a realistic setting with a wide range of counting rates, type of sources and number of measurements to demonstrate the capability and robustness of the approach applied to Verification Treaty.

6D: Approaches to verification and irreversible disarmament

Participants:
Dr. Leonardo Bandarra – Postdoctoral Researcher, University of Duisburg-Essen
Prof. Emiliano Buis – Project Director, NPSGLOBAL Foundation
Pavel Podvig – Senior Researcher, UN Institute for Disarmament Research

Chair: **Dr. Luiza Elena Januário** – Professor, Universidade Paulista (UNIP)

Venue: Lecture hall XI

Please note this session is not live streamed.

The IAEA and Irreversible Nuclear Disarmament: Challenges and Opportunities**.**
by Leonardo Bandarra, Noah Mayhew & Malte Göttsche

This article explores the intricate relationship between trust and verification in international nuclear commitments, with a focus on the often-overlooked actors: nuclear inspectors. For that, we address two key questions: (1) how do nuclear inspectors perceive trust, and (2) how do they establish trust through verification activities? Contrary to the common perception of inspectors as neutral implementers, this research highlights their significant agency in sustaining commitments. Building on existing literature, the study examines trust in inspectorate activities and self-image through a three-phase qualitative approach, including content analysis of reports and testimonies, an online survey of current

inspectors, and a focus group with retired inspectors, revealing nuanced insights into the dynamics of trust and verification in nuclear governance. We argue that trust and verification are processes of co-construction that also reinforce and signify each other at the operative (or implementation) level.

What would constitute 'credible or sufficient assurance' that a nuclear weapons programme has been irreversibly dismantled: Insights from Africa and Latin America

by Emiliano Buis, Johann Kellerman, Irma Arguello & Noel Stott

Since 2018, VERTIC has been implementing a project in support of the development and strengthening of practical and effective nuclear disarmament verification measures. The project aims to: enhance the involvement of countries in Africa, Central Asia and Latin America (with Argentina, Kazakhstan and South Africa as the key focal points) in nuclear disarmament verification activities; establish national or regional hubs for nuclear disarmament verification research and innovation; and, to facilitate collaboration between relevant state institutions and initiatives, civil society and academic research sectors' at the national, regional and international levels in a sustainable manner. Working with three regional partners in Africa, the University of the Witwatersrand, in Central Asia, the International Science and Technology Center (ISTC) and in Latin America, the NPSGlobal Foundation – a series of meeting and workshops took place that ultimately concluded that establishing regional hubs would be a useful vehicle to facilitate capacity-building and knowledge transfer as a means to create a new generation of nuclear disarmament and non-proliferation experts. Such research and innovations hubs would also, inter alia, set out key technical and conceptual challenges, which from their perspective, need to be resolved and develop unique measures to address these technical and conceptual challenges. This paper will present an overview of the project's methodologies, results and impact, including research undertaken and regional perspectives gleaned, as well as the challenges encountered. A particular focus of this paper will be a presentation of regional perspectives on the complexities of irreversibility in nuclear disarmament as a key principle of multilateral nuclear disarmament. The question arises as to what would constitute 'credible or sufficient assurance' that nuclear weapons have been irreversibly dismantled and that ultimately the world would remain free of nuclear weapons. The paper argues that the question of what would constitute sufficient assurance is, from an African and Latin American perspective, not as straightforward as it may appear at first glance. Assurance is closely linked to the issue of verification, but is not identical. Whilst verification is technical in nature, the issue of assurance is inherently a subjective opinion relating to the efficacy of the

verification system and, ultimately, the confidence that States Parties will have in a treaty banning nuclear weapons.

Demonstrative verification in arms control and disarmament
by Pavel Podvig

In the established practice of nuclear arms control and disarmament agreements, verification provisions are negotiated as part of a treaty to provide states with a mechanism to assess compliance and to deter violations of its terms. However, it is becoming increasingly difficult to negotiate new legally binding agreements, whether bilateral or multilateral. In some areas, in the absence of a functioning treaty states assume certain obligations that constrain their behavior, such as moratoria on fissile material production or explosive nuclear tests, or a commitment to constrain deployment of some weapon systems. However, in the absence of an agreed verification mechanism it is extremely difficult to confirm compliance with any of these obligations. This presentation suggests an approach to verifying obligations assumed by states through a mechanism of demonstrative verification, in which a state that wants to demonstrate compliance with its obligations unilaterally implements measures to positively demonstrate its compliance to the international audience. To be effective, these measures must include detailed verification protocol, rely on open data rather than intelligence estimates, and potentially involve independent parties. The presentation will discuss potential application of this approach to CTBT verification and to post-New START arms control.

12:30-13:30 Lunch break

Venue: Main hallway

13:30-15:00 Sessions block 7

7A: Technological development and nuclear negotiations

Participants:
Dr. Alexander Bollfrass – Senior Researcher, ETH Zurich; and member of AMC's Working Group 1
Giacomo Cassano – PhD Candidate Uppsala University; and member of AMC's Working Group 1

Dr. Stephen Herzog – Senior Researcher in Nuclear Arms Control, ETH Zurich; and member of AMC's Working Group 1
Darine Razmadze – Mentee, The Vienna Center for Disarmament and Non-Proliferation (VCDNP)

Chair: **Dr. Isak Svensson** – Professor, Uppsala University; and leader of AMC's Working Group 1
Discussant: **Dr. Wilfred Wan** – WMD Programme Director, Stockholm International Peace Research Institute (SIPRI); and leader of AMC's Working Group 5

Venue: Lecture hall X

Satellites to SALT II
by Alexander Bollfrass

The paper introduces a new dataset of Corona reconnaissance satellite coverage of nuclear facilities in the 1960s, offering a detailed view of the qualitative and quantitative growth in U.S. capabilities to track the spread of nuclear capabilities. Original archival documents will be used to explore the contemporaneous implications of this growing intelligence collection capability for U.S. arms control and nonproliferation policies during this key period in the emergence of the global nuclear order.

Verification Centrality in Nuclear Arms Control Negotiations – and its effect on negotiation success
by Giacomo Cassano

Verification represents the main element of nuclear Arms Control agreements and situates itself at the core of Arms Control negotiations. Although this has been recognised extensively in previous research, no systematic empirical analysis has been offered on what role verification has within the negotiation process. I argue that agreement on verification provisions within a nuclear Arms Control negotiation represents a central moment in the bargaining process that has the capacity to speed up the negotiation to a successful conclusion. All concluded nuclear Arms Control negotiations processes between 1945 and the present day will be studied, with the introduction of a novel data set called NUKENEG. Representative case studies and a logistic model will then be used to answer the research question. The findings will contribute to the discussion on the role of verification systems within nuclear Arms Control agreements. Going beyond the agreement-outcome level, it will provide evidence on how bringing the negotiating parties to agreement on

verification methodologies represents a central step towards the success of the negotiation at the agreement-process level.

Negotiating and Verifying Irreversible Nuclear Disarmament
by Stephen Herzog

In recent years, the concept of “irreversibility” in nuclear disarmament has gained attention in multilateral negotiation settings. Such a notion is difficult enough to grasp regarding nuclear-armed states, but what does it mean for highly latent states? After all, disarmament requires a continuous commitment to monitoring and verification. It is not an end state of affairs. Having many states that can develop a nuclear device in short order is hardly conducive to maintaining a disarmed world. Constraining this “hedge” is complicated, however, as several major nuclear treaties permit and even encourage high levels of nuclear latency. The result is that states both seeking the bomb and states seeking to master the civilian nuclear fuel cycle will attain some degree of latency. This paper therefore investigates how the international community might negotiate and manage pathways to the bomb in a disarmed world. It introduces the strategy of “layered verification,” designed to monitor and verify uranium enrichment, spent fuel reprocessing, and weaponization knowledge. The strategy involves multiple, interlocking international and country-specific layers that are designed to be robust to expected noncompliance. But due to the contentious nature of this approach, the paper also lays out potential political obstacles to irreversibility that will need to be overcome in negotiations.

Iran nuclear deal (JCPOA): How Technical Solutions Affect the Multilateral Negotiations
by Darine Razmadze

This paper explores the negotiation dynamics of the Joint Comprehensive Plan of Action (JCPOA). Attempting to comprehend the strategies forming the multilateral cooperation framework during the decade-long negotiations, this research addresses why the agreement regarding the plutonium issue was so easily reached. Despite multiple views explaining Iran’s nuclear program development, extant literature lacks explanations regarding the compromise on blocking the plutonium pathway. Based on in-depth analysis, this study posits that the Chinese proposal on the plutonium issue altered the JCPOA negotiation framework from a zero-sum game into a non-zero-sum cooperation behavior. Using a case study approach, a plethora of academic literature was examined during the research. Finally, a novel theoretical framework demonstrated how the cooperation style determined the outcome of the negotiations. The conclusions are as follows: (1)

The empirical connection between investigated case studies shows that nuclear opacity poses a monumental challenge to the MENA region. (2) The role behavior of China and its multilateralist approach using mediation diplomacy proved relevant. (3) The Chinese counterpart dominated the discourse on plutonium reprocessing compared to the uranium issue. In sum, this paper adds a novel perspective to understanding pillar strategies shaping the multilateral framework of the JCPOA diplomatic talks.

7B: Impacts of recent events and initiatives on the disarmament regime

Participants:
Dr. Jenny Nielsen – Independent Analyst
Mahmoud Javadi – Researcher, Erasmus University Rotterdam
Adérito Vicente – Non-Resident Fellow, Odesa Center for Nonproliferation (OdCNP)

Chair: **Valeriia Gergiieva** – Visiting Research Fellow at the Institute for Peace research and Security Policy (IFSH), University of Hamburg; and Non-Resident Research Fellow at the Odesa Center for Nonproliferation (OdCNP)
Discussant: **Dr. Lars-Erik Lundin** – Distinguished Associate Fellow, SIPRI; and Swedish Royal Academy of War Sciences; **Carolina Panico** – Teaching Fellow, University of Auckland

Venue: Lecture hall IX

Analysis of recent events and initiatives on the disarmament and non-proliferation regime; A case study: Russia's 'de-ratification' of The Comprehensive Nuclear-Test-Ban Treaty (CTBT)

by Jenny Nielsen

The paper will aim to examine potential future implications of a significant recent event in the multilateral fora for the global nuclear non-proliferation and disarmament regime--Russia's 'deratification' of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Given geo-political developments, and overview of various potential challenges to the Treaty and its verification regime are provided, including regime including the recent withdrawal of its ratification by Russia. Suggestions for the possible future applications of the CTBT´s verification regime are additionally offered. The paper will also offer proposals and identify opportunities for strengthening the regime and the non-testing norm in face of this recent challenge and precedent set by Russia. This working paper serves to provide food-for-thought for policy-makers and analysts who are addressing the challenge of rebuilding trust

and confidence and implementing credible steps towards nuclear disarmament in an increasingly fractured geo-political system of states.

Strategic Approaches to Universalization: Analyzing Canonization, Securitization, and Weaponization in the Context of the TPNW

by Mahmoud Javadi

The universalization of the Treaty on the Prohibition of Nuclear Weapons (TPNW) constitutes a pivotal aspect of the Treaty, underscored by the existence of an informal working group dedicated to this cause. Additionally, diverse stakeholders actively contribute to the reporting of their respective TPNW universalization initiatives. Recognizing the paramount significance of universalization in fortifying the norms, values, and authorities of the Treaty, it is evident that the realization of this endeavor will not occur in isolation. Therefore, a set of strategic approaches is imperative. The present paper aims to articulate and delineate three strategic approaches – 'canonization', 'securitization', and 'weaponization' – in relation to the TPNW that need to be collectively pursued. Beyond mere description and delineation, the theoretical segment of the paper delves into the intrinsic prominence of these three concepts within the universalization discourse. Subsequently, the empirical aspect focuses on scrutinizing statements and documents (text analysis) presented before and during the second Meeting of the State Parties to the TPNW. Through this analysis, the paper aims to shed light on the extent to which efforts by participants to the Meeting, whether directly or indirectly highlighting universalization efforts, align with the canonization, securitization, and weaponization strategies.

Russia's war on Ukraine and Its Implications for the Nuclear Nonproliferation and Disarmament Regime: Sweden's NATO Accession as a Case Study

by Adérito Vicente

Russia's war on Ukraine has shaken the foundations of the global nuclear order, deteriorating the long-held principles enshrined in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The war has heightened threat perceptions among European nations and influenced public opinion, reinforcing the notion that nuclear weapons are indispensable for national security. Sweden's historic decision to join NATO represents a pivotal shift in the Nordic nation's policy of nonalignment, reflecting a heightened sense of security vulnerability in response to Russia's aggressive actions. Sweden's case serves as a compelling illustration of the challenges and opportunities that arise when nuclear disarmament imperatives intersect with security concerns. This paper delves into the far-reaching

implications of Russia's actions on the nuclear nonproliferation and disarmament regime, examining Sweden's historic decision to join NATO as a paradigmatic case study. First, I analyse how the war has weakened the NPT regime, assessing the prevailing challenges and delineating the characteristics of the regime we confront today. Second, I examine the conditioning factors that led to Sweden's historic decision to join NATO. Third, the paper concludes by evaluating the potential ripple effects and unintended consequences of Sweden's NATO membership for the future of global nuclear disarmament efforts.

7C: Nuclear Archeology

Participants:
Dr. Cecilia Gustavsson – Associate Professor, Uppsala University; and member of AMC's Working Group 4
Benjamin Jung – Doctoral Student, RWTH Aachen University
Dr. Sophie Kretzschmar – Postdoctoral Researcher, RWTH Aachen University

Chair: **Dr. Peter Andersson** – Senior Lecturer, Uppsala University; and leader of AMC's Working Group 4

Venue: Lecture hall IV

Exploring methods to reconstruct historic reactor operation
by Cecilia Gustavsson, Peter Andersson, Erik Branger & Sophie Grape

In the event of a far-reaching nuclear disarmament, nuclear weapon states would cease with production of fissile materials for nuclear weapons, and also place their pre-existing plutonium and HEU under international inspection. In this case, it can be anticipated that the sizes of stockpiles are declared, with detailed records on how they were produced. For example, if the core geometry and operational history of a military reactor would be declared by the owner state, the plutonium production of the core can be reconstructed using reactor physics codes, which can provide confidence in the declared plutonium stockpiles. Challenges include that any data on fuel cycle operations provided by the state cannot be assumed to be truthful. This leads to the additional need to verify the declared operational history by consistency checks within records and when possible with inspections. A further complication is that a long time might have passed since the fissile material production took place, and records can therefore be expected to be incomplete or inaccurate, and the responsible personnel may be retired or even deceased. In this case, there may be a need to be able to reconstruct lost information on fuel cycle operations. We consider a test and training case of the Swedish Pressurized Heavy

Water Reactor (PHWR) in Ågesta, which was in operation between 1963 and 1974. In this case study, we explore the available archive material in order to obtain information such as the core loads of the reactor, its operational history and the fuel designs used, with the aim of enabling the reconstruction of the plutonium production in the core. In addition to this, we consider the possibility to model the isotopic depletion and activation in various reactor materials, with the aim to enable the verification of 1) the plutonium production being in agreement with the fuel cycle and operation records, and 2) that the operation records are in agreement with isotopic composition of core materials. In this work we explore the use of records from the tritium monitoring for consistency checks with other operational data records. Tritium production occurs via neutron capture in deuterium; a main component of heavy water, and since heavy water is an expensive asset, the consumption of it is closely monitored, for example by measuring tritium release. In addition, we explore present day opportunities for retrieving material samples from the reactor structures, for isotopic analysis that can be used to verify the records on reactor operation. The Ågesta reactor is currently being decommissioned, meaning that a window of opportunity of independent inspection may be closing, and interaction with decommissioning contractor and owner is therefore timely.

Potential Nuclear Archaeology Applications in the DPRK

by Benjamin Jung, Johannes Bosse & Malte Göttsche

At some point, efforts to denuclearize the Democratic People's Republic of Korea (DPRK) will need to address the fissile material stockpiles. Publicly available information about the past and present operation of the North Korean fuel cycle is incomplete, prompting simulations, estimates, and speculation about the country's current fissile material stockpiles. As extensive open-source intelligence (OSINT) investigations have shown, there are too many unknowns to make a reliable, quantitative assessment without additional information, which may burden verification efforts during future disarmament endeavors. To mitigate this issue, inspectors could draw on techniques from nuclear archaeology to provide relevant insights into past fissile material production from measurements of samples of nuclear material. In this work, we show how the Bayesian approach to nuclear archaeology can extract useful information from measurements of isotopic ratios given prior information derived from OSINT analysis. We simulate potential measurements and use them as evidence in a Bayesian nuclear archaeology model to demonstrate how this approach could support disarmament verification efforts in the DPRK and potentially elsewhere.

Reconstructing nuclear histories with reactor-archive documents

by Sophie Kretzschmar & Lukas Rademacher

Future arms control and disarmament agreements are likely to require verification of fissile material declarations from nuclear weapon possessing States. Such verification measures would assess whether the declarations are correct and complete, for which confidence could be built with an understanding on how the fissile material was produced in the past. Methods for reconstructing this past production are being developed in the field of nuclear archaeology. Corresponding methods traditionally focus on forensic measurements taken at past fissile material production site, but documents created during the operation of such facilities could provide a complementary source of information. To develop systematic approaches on how such documents could be used, we visited an archive preserving design documentation and operation records from the former nuclear research and demonstration reactors FR-2 and MZFR in Karlsruhe, Germany. The reactors were used for civilian purposes only, but the fact that the reactors were moderated by heavy water makes them suitable candidates for this study, as this type of reactor was used elsewhere to produce plutonium. In this study we discuss two approaches to using such documents for verification: (1) analyzing documented isotopic composition and activity measurements and (2) assessing whether documents are internally consistent.

Nuclear archaeology for disarmament verification – an integrated interdisciplinary approach

by Sophie Kretzschmar & Linda Ostermann

An essential element for arms control agreements is effective verification ‘measures to assess the participating parties’ compliance with their obligations. For verifying future disarmament, not only political but also technical challenges remain. One of these is related to the fissile material: How can one verify that a disarming State does not retain any undeclared ”secret stockpiles” that would enable rapid re-armament? Approaches to this challenge are being developed with nuclear archaeology: by analyzing samples from former fissile-material production facilities, one can deduce information on the facilities’ operation and amount of produced fissile material – which can then be compared to the State’s declarations. This approach is, however, practically limited: uncertainties, stemming from information gaps and potential complex and decade-long operations, will likely remain significant. If, however, verification is understood not only as technical but also as a social and political process, a more holistic understanding can be achieved. From a sociological perspective, the production of knowledge that informs political decision-making processes depends on a much more complex interplay of not only

technologies, but also actors, institutions, and practices. This study combines a physicist's and a social scientist's perspective to re-evaluate the potential role of nuclear archaeology for nuclear disarmament verification.

7D: Nuclear norms

Participants:
Dr. Luiza Elena Januário – Professor, Universidade Paulista (UNIP)
Alain Ponce Blancas – Research and Communication Officer; Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL)
Prof. Gerard Powers – Professor of the Practice, University of Notre Dame
Maren Vieluf – PhD Researcher, University of Innsbruck

Chair & discussant: **Shampa Biswas** – Professor, Whitman College

Venue: Lecture hall XI

Please note this session is not live streamed.

Imagining a (Non-)Nuclear Future: Social Imaginaries about Nuclear Weapons and Political Choice
by Luiza Elena Januário

Human action is oriented toward the future, and the social understanding of what lies ahead shapes and constrains the decision-making process in the present. The analysis of future imaginaries is a fertile tool for exploring the meanings and value attributed to nuclear weapons and assessing the identified possibilities of action in a political sphere. This paper aims to analyze future images prevalent in the international nuclear forums from 2010 to 2022, especially regarding the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) review cycle and the negotiations for the Treaty on the Prohibition of Nuclear Weapons (TPNW). The study draws on the contributions of Future Studies to assess the issue of nuclear weapons, and it is based on primary sources such as pronouncements, working papers, and other official documents. It suggests that the discourse about a world free of nuclear weapons may constitute an alternative image of the future, but it is a weak and, most of the time, empty one. As a result, it strengthens the status quo as the dominant perspective shows the future as a continuation of the present, which stifles political choices and establishes a nuclear permanence.

Revitalizing the Norm of Nuclear-Weapon-Free Zones: A Call to Action *by Alain Ponce Blancas*

Extensive scholarship explores the transformative influence of NWFZs in shaping the global nuclear non-proliferation regime. While initiatives like the NWFZs Conferences of States Parties have demonstrated relative success, progress has been impeded by various factors, resulting in challenges in their implementation. Certainly, the contributions and influence of NWFZs are exemplified by a recent testament: the TPNW, as it marks an expansion of the regional prohibition norm observed in NWFZs to a global scale. However, it has been several years since a comprehensive, multidisciplinary, and collaborative effort was dedicated to analyze the norm established by NWFZs. The need for a renewed and in-depth examination is apparent, as the international landscape has evolved, presenting new challenges and opportunities that require different perspectives on the effectiveness and adaptability of these zones. I argue that a new comprehensive study on the question of NWFZs carried out by the UN could contribute to advance the full realization of principles and objectives embedded in the existing treaties and the establishment of other zones. By using archival research, primary sources, including UN studies, I will explore different mechanisms; identify and analyze potential outcomes of such initiative; and provide policy recommendations for states parties to NWFZs treaties.

Putin vs the Pope: An Ethic of Use and Deterrence or an Ethic of Disarmament? *by Gerard Powers*

The world is schizophrenic about nuclear weapons. The Treaty on the Prohibition of Nuclear Weapons has entered into force, but the nuclear arms control regime is in tatters, the risk of nuclear war is greater than at any time since the Cuban Missile Crisis, and the nuclear powers are engaged in a new nuclear arms race. In the 1980s, religious institutions brought morality into the policy debates on nuclear use and deterrence to a degree not seen before. Since the end of the Cold War, the religious and moral debate has shifted to focus on the moral imperative of nuclear disarmament. Pope Francis' 2017 statement condemning not only the use but even the possession of nuclear weapons as part of an effort to build upon the momentum of the TPNW epitomized that approach. In order to address the current nuclear schizophrenia, it is necessary to revive the ethical debates of the 1980s, while further developing an ethic of nuclear disarmament that is as sophisticated as the Cold War debates on the ethics of use and deterrence.

Evaluating the robustness of nuclear weapons prohibition norms through practice theory
by Maren Vieluf

Despite widespread adherence and the severe consequences associated with violations, a paradoxical discourse has emerged, advocating for the reinforcement and defense of ostensibly eroding nuclear prohibition norms. The paper (as a chapter of my dissertation) delves into practice theory to bridge the theoretical gap between normative assertions and practical behaviors and investigate the non-use norm, the non-proliferation norm, and the norm against explosive nuclear testing. The analysis delves into the challenges posed by nuclear deterrence practices, proliferation efforts, and the ambiguous policies of nuclear armed states. By scrutinizing micro-level practices related to nuclear weapons, this research is set to provide a nuanced understanding of norm dynamics, offering insights that contribute to the broader discourse on international norms and their robustness in the complex landscape of global security.

15:00-15: 30 Coffee break

Venue: Main hallway

15:30-16:20 Keynote conversation: Opportunities and challenges for technical verification in future arms control and disarmament processes

Participants:
Dr. Martin B. Kalinowski – Nuclear Science Freelancer
Dr. Katarina Wilhelmsen – Director of R&D, Swedish Defence Research Agency (FOI)

Chair: **Dr. Peter Andersson** – Senior Lecturer, Uppsala University; and leader of AMC's Working Group 4

Venue: Lecture hall X

The short-term prospects for nuclear disarmament are pessimistic, yet it is highly advisable to continue with crucial preparatory work so as to have the scientific and technological ground well prepared once the diplomatic opportunity arises. This includes conducting research and development, learning from past experiences to shape the building blocks of a future verification regime, and demonstrating

solutions to critical verification challenges. By laying the groundwork today, we prepare for more favorable conditions in the future. In this keynote conversation, Dr. Martin B. Kalinowski and Dr. Katarina Wilhelmsen will discuss the opportunities and challenges, exploring fruitful paths for progress in disarmament verification.

16:20-16:30 Closing remarks

Speaker: **Dr. Peter Wallensteen** – Professor Emeritus, Uppsala University; and leader of AMC's Working Group 2

Venue: Lecture hall X

What are you presenting in 2025?

The next Alva Myrdal Centre Annual Conference will take place in June 2025. The dates will be announced in the coming couple of months.

The call for proposals will be open October to November 2024.

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