Working Group on Physics and Disarmament
Arbeitsgruppe Physik und Abrüstung (AGA)

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Zur Abrüstung, der Verhinderung der Verbreitung von Massenvernichtungsmitteln und der Beurteilung neuer Waffentechnologien sind naturwissenschaftliche Untersuchungen unverzichtbar. Auch bei der Verifikation von Rüstungskontrollabkommen werden neue Techniken und Verfahren benötigt und eingesetzt. Schwerpunkte in diesem Jahr bilden Themen wie die nukleare Abrüstung, Verifikation bzw. die Detektion von Nuklearanlagen und Materialien, Raketenabwehr und Zerstörung von Nuklearsprengköpfen, neue militärrelevante Technologien wie Drohnen. Die Fachsitzung wird von der DPG gemeinsam mit dem Forschungsverbund Naturwissenschaft, Abrüstung und internationale Sicherheit FONAS durchgeführt. Die 1998 gegründete Arbeitsgruppe Physik und Abrüstung ist für die Organisation verantwortlich. Die Sitzung soll international vorrangige Themen behandeln, Hintergrundwissen vermitteln und Ergebnisse neuerer Forschung darstellen.

Overview of Invited Talks and Sessions

(Lecture room U HS 3 Parkstr. 6)

Max-von-Laue Lecture

PV XV	Thu	18:30–19:30	U Audimax	**Max-von-Laue Lecture: 2100: A Climate-Space Odyssey** — •Hans Joachim Schellnhuber

Invited Talks

AGA 2.1	Thu	10:30–11:30	U HS 3 Parkstr. 6	**Technological Demands and Institutional Arrangements for Verifying Nuclear Disarmament** — •Thomas E. Shea
AGA 2.2	Thu	11:30–12:30	U HS 3 Parkstr. 6	**New approaches to verification in nuclear disarmament** — •Pavel Podvig
AGA 3.1	Thu	14:00–15:00	U HS 3 Parkstr. 6	**North Korean Long-Range Ballistic Missiles and US Missile Defenses** — •Ted Postol
AGA 4.1	Thu	16:15–17:15	U HS 3 Parkstr. 6	**Technical Challenges to the Verification of Nuclear Weapon Reductions and Controls** — •Keir Allen

Sessions

AGA 1.1–1.4	Wed	14:00–16:00	U HS 3 Parkstr. 6	**Verification I: Simulation and Technologies**
AGA 2.1–2.2	Thu	10:30–12:30	U HS 3 Parkstr. 6	**Verifying Nuclear Disarmament**
AGA 3.1–3.3	Thu	14:00–16:00	U HS 3 Parkstr. 6	**North Korea, Missile Defense and new Challenges for Arms Control**
AGA 4.1–4.3	Thu	16:15–18:15	U HS 3 Parkstr. 6	**Verification II: Nuclear Reductions, Nuclear Disarmament and Cyberspace**
AGA 5.1–5.2	Fri	10:30–11:30	U HS 3 Parkstr. 6	**Nuclear Archeology and Fissile Materials**
AGA 6.1–6.2	Fri	11:30–12:30	U HS 3 Parkstr. 6	**Seismic Verification**
AGA 7.1–7.1	Fri	12:30–13:00	U HS 3 Parkstr. 6	**Physics and Peace**
AGA 8	Fri	13:00–13:45	U HS 3 Parkstr. 6	**Annual General Meeting of the Working Group on Physics and Disarmament**

Annual General Meeting of the Working Group on Physics and Disarmament

Freitag 13:00–13:45 U HS 3 Parkstr. 6

- Bericht
- Wahl
- Verschiedenes

AGA 1: Verification I: Simulation and Technologies

Time: Wednesday 14:00–16:00 Location: U HS 3 Parkstr. 6

AGA 1.1 Wed 14:00 U HS 3 Parkstr. 6

Simulation of a Neutron Multiplicity Counter and Comparison to Validation Experiments — •Olaf Schumann, Theo Köble, Wolfram Berky, and Monika Risse — Fraunhofer Institute for Technological Trend Analysis INT, Euskirchen, Germany

Neutron coincident counting is a useful tool, both to determine the nature of a neutron source and to extract parameters like the multiplicity, α-ratio and ultimately the mass of uranium or plutonium . For the latter, well-characterized detectors enable the determination in the order of several grams.

The multiplicity analysis also allows determining if an unknown neutron source emits fission neutrons and thus possibly contains special nuclear material. The Ortec Fission Meter is an instrument designed for this purpose, equipped with a highly efficient moderated ^{3}He neutron detector. In order to gain deeper understanding of the measured data and to predict the dependence of the analysis on different parameters like additional shielding, Fraunhofer INT performed a Monte-Carlo simulation of the instrument. A MCNP simulation of the source assembly and the instrument results in the arrival times of the neutrons for one single source event. Further software modules allow generating a pulse train and performing data analysis. While the count rate of the simulation and a validation experiment were in agreement, the calculated Feynman-Variance showed a significant deviation. The main cause is presumably a small fraction of double pulsing from the discriminator. The inclusion of this effect in the post-processing results in a substantial improved agreement of measured and simulated data.

AGA 1.2 Wed 14:30 U HS 3 Parkstr. 6

Kann der anthropogene Hintergrund eine Nutzung des radioaktiven Edelgasisotops Argon-37 für die Überwachung des Umfassenden Nuklearen Teststoppabkommens beeinträchtigen? — Gerald Kirchner[1], Franziska Gerfen[1], •Anna Heise[1], Roland Purtschert[2] und Timo Schlüschen[1] — [1]Universität Hamburg, ZNF, Beim Schlump 83, 20144 Hamburg — [2]Universität Bern, Klima- und Umweltphysik, 3012 Bern, Schweiz

Die hohen Emissionen radioaktiver Edelgasisotope aus zivilen Nuklearanlagen können die Nutzung dieser Isotope zur Überwachung des Umfassenden Nuklearen Teststoppabkommens beeinträchtigen. Daher ist in den letzten Jahren das Interesse an dem Argonisotop Ar-37 als Indikator einer unterirdischen Nuklearexplosion international gewachsen. Voraussetzung hierfür ist, dass für dieses Isotop kein signifikanter anthropogener Hintergrund zu erwarten ist. Da Emissionen und Immissionen von Ar-37 nicht routinemäßig überwacht werden, wurden die erforderlichen Kenntnisse im Rahmen eines Forschungsprojekts gewonnen.

Der Vortrag stellt für einen Leistungs- sowie einen Forschungsreaktor die verschiedenen Produktionspfade innerhalb und außerhalb des Reaktorkerns für Argon-37 vor, präsentiert die jeweils durchgeführten Simulationen und deren Ergebnisse sowie vergleicht diese mit eigenen Messungen der Aktivitätskonzentrationen dieses Nuklids in Raum- und Fortluft der betrachteten Reaktoren. Die Konsequenzen für die Nutzung von Argon-37 zur Überwachung des Umfassenden Nuklearen Teststoppabkommens werden diskutiert.

AGA 1.3 Wed 15:00 U HS 3 Parkstr. 6

Detection of nuclear reprocessing activities using Kr-85 — •Ergin Simsek, Carsten Sieveke, Pablo Woelk, Svenja Sonder, Malte Peters, and Markus Kohler — Carl Friedrich von Weizsäcker-Centre for Science and Peace Research (ZNF), Hamburg, Germany

An increased concentration of the isotope Kr-85 in atmospheric air samples combined with atmospheric calculations is an excellent indicator for detecting nuclear reprocessing activities.

For an effective detection, small sample sizes and a high sample throughput rate are necessary. These factors place high demand on the measuring technology. Therefore, the Atom Trap Trace Analysis (ATTA) group at Hamburg University focuses on middle to long range measurement techniques combined with the magneto-optical trapping (MOT) method to analyze samples down to the parts-per-trillion level.

Established implementations using the ATTA method allow for high sensitivity but have a limited sample throughput rate, since the vacuum chambers are subject to cross contamination due to the RF-driven excitation into the metastable state. The all-optical approach of the Hamburg ATTA avoids cross contamination.

Our experiment includes the entire chain of analysis. Besides the actual concentration measurement this includes an in-house developed and built autonomous air sampling device as well as automated sample preparation.

AGA 1.4 Wed 15:30 U HS 3 Parkstr. 6

Untersuchung der Auswirkungen verschiedener Abschirmungen auf die Aussagekraft neutronenbasierter Verifikationstechniken mittels Monte-Carlo-Simulation — •Yannick Fischer, Tobias Schoon, Simon Hebel und Gerald Kirchner — Universität Hamburg, ZNF, Beim Schlump 83, 20144 Hamburg

Eine der größten physikalischen Herausforderungen der nuklearen Abrüstungsverifikation stellt die Detektion auch kleinster Mengen spaltbaren Materials dar. Im ZNF werden deshalb Simulationen durchgeführt, um die Auswirkungen bewusst gewählter Abschirmungen auf den Neutronenfluss zu untersuchen.

Zur Simulation wird das C++-basierte Programm Geant4 verwendet, welches Monte-Carlo-Techniken benutzt, um Photonen- und Partikeltransport zu simulieren. Aufgrund seiner Vielseitigkeit findet dieses Programm Anwendung von der Detektorenplanung bis hin zu bildgebenden Verfahren in der medizinischen Physik.

Der Vortrag stellt den Einfluss verschiedener Abschirmungsmaterialien und -geometrien auf die Neutronenflussdichte und deren Energieverteilung dar. Es wird insbesondere untersucht, welche Konfigurationen zu einer effektiven Abschirmung nötig sind, und diskutiert, welche Auswirkungen diese Erkenntnisse auf die Aussagekraft neutronenbasierter Verifikationstechniken haben.

AGA 2: Verifying Nuclear Disarmament

Time: Thursday 10:30–12:30 Location: U HS 3 Parkstr. 6

Invited Talk AGA 2.1 Thu 10:30 U HS 3 Parkstr. 6

Technological Demands and Institutional Arrangements for Verifying Nuclear Disarmament — •Thomas E. Shea — Federation of American Scientists

As proposed in my book, Verifying Nuclear Disarmament, the future nuclear disarmament regime should address the seven risks arising from the standing arsenals through eleven verification missions, addressing a) the phased elimination of existing weapons, b) the elimination or irreversible conversion of mission critical nuclear weapon production, testing and support facilities, and c) providing assurances against possible future rearmament. Each nuclear-armed State must protect its nuclear weapon design and manufacturing secrets, while the verification authorities must be able to apply sound scientific methods so as to obtain independent and authentic verification results, especially while considering cyber threats that might enable espionage or invalidate verification findings. Finding pragmatic solutions will determine the future of nuclear disarmament, and future success at preventing proliferation and nuclear terrorism.

Invited Talk AGA 2.2 Thu 11:30 U HS 3 Parkstr. 6

New approaches to verification in nuclear disarmament — •Pavel Podvig — UN Institute for Disarmament Research

Robust verification is an essential element of nuclear disarmament and nuclear nonproliferation. Elimination of nuclear weapons will require a sustained effort aimed at creating political conditions for disarmament and reducing the role of war in international security. As states will assume obligations to reduce their nuclear arsenals and stocks of weapon-usable fissile materials, it will be extremely important to

ensure that these steps are done in a verifiable and irreversible manner. Every step of the way, effective verification arrangements will help build trust and confidence that are essential for making further progress toward nuclear disarmament possible. Also, innovative approaches to verification could open way for bold political disarmament initiatives. This presentation describes approaches to nuclear disarmament verification that are designed to avoid having to deal with sensitive information about nuclear weapons or weapon-related fissile materials. Protection of sensitive information emerged as one of the most difficult issues in verification and is currently seen as a serious obstacle on the way toward practical nuclear disarmament steps. To address this problem, UNIDIR developed an approach to verification of nuclear disarmament that relies on verifying the absence of nuclear weapons attached to delivery vehicles or stored at operational bases. This approach could be used in a variety of situations, from removal of non-strategic nuclear weapons from Europe to denuclearization of the Korean Peninsula. Another concept deals with weapon-usable fissile materials. The deferred verification arrangement developed at UNIDIR proposes a mechanism that would allow nuclear-armed states to declare the amount of fissile material that they possess and, most importantly, do it in a verifiable way. This arrangement could be an important element of comprehensive nuclear disarmament, which would require placing all weapon-usable fissile materials under international control.

AGA 3: North Korea, Missile Defense and new Challenges for Arms Control

Time: Thursday 14:00–16:00 Location: U HS 3 Parkstr. 6

Invited Talk AGA 3.1 Thu 14:00 U HS 3 Parkstr. 6
North Korean Long-Range Ballistic Missiles and US Missile Defenses — •Ted Postol — MIT, Boston

This talk explains how the North Korean liquid propellant ballistic missile program has been able to advance from its earliest days at an unprecedented rate. It will be shown that the program has received - almost certainly without the knowledge of the Russian government - large amounts of Russian rocket components and expertise, starting from the time of the catastrophic simultaneous collapse of the Soviet Union and its economy. Another feature of the North Korean program is the startling level of indigenous innovation demonstrated in North Korean ballistic missile designs, which very cleverly use rocket components that were intended for other purposes. This talk will also briefly introduce a missile defense concept that could potentially allow the US to destroy North Korean ICBM-range ballistic missiles while they are in powered flight. Unlike the current Ground-Based Missile Defense (GMD), this distinctly new defense concept can be built with existing demonstrated technologies and does not require violations of fundamental physical principles to work reliably.

AGA 3.2 Thu 15:00 U HS 3 Parkstr. 6
Now what? - Looking Back at the North Korean Missile Developments — •Markus Schiller — ST Analytics GmbH, München, Germany

Since Kim Jong Un came into power, the North Korean missile program made a great leap forward. The program culminated with the launch of the Hwasong-15 road-mobile ICBM in November 2017. More than one year later, not a single North Korean missile has been launched since then.

This presentation will look back at the events leading to the Hwasong-15 launch, and reveal some interesting parallels to the early days of the North Korean missile program.

AGA 3.3 Thu 15:30 U HS 3 Parkstr. 6
hypervelocity vehicles, missile defense and cyber warfare. new challenges for arms control — •Götz Neuneck — IFSH University of Hamburg

Nuclear arms control (N-START, INF) which was established during and implemented at the end of the Cold War is not only endangered by political mistrust but also by new military-technical developments such as Hypervelocity Vehicles, Space Capabilities, Missile Defense and Cyber Warfare. Classical nuclear arms control is based on parity of key weapon systems, offensive ballistic missiles and the verification of delivery systems. Maneuverable supersonic cruise missiles, hypervelocity gliders, anti-missile interceptors and cyberweapons can threaten the offensive oriented nuclear balance of the two superpowers or the asymmetric nuclear relationship of the dominating superpowers and the smaller nuclear weapon possessor states significantly. In the coming years, the challenge will be to define what strategic stability means between the dyadic and triadic nuclear armed forces. The presentation intend to categorize the stability challenges and develops some proposals for further arms control and disarmament frameworks based on the efficiency and impact of these new military-technical developments.

AGA 4: Verification II: Nuclear Reductions, Nuclear Disarmament and Cyberspace

Time: Thursday 16:15–18:15 Location: U HS 3 Parkstr. 6

Invited Talk AGA 4.1 Thu 16:15 U HS 3 Parkstr. 6
Technical Challenges to the Verification of Nuclear Weapon Reductions and Controls — •Keir Allen — Aldermaston

The development of effective verification measures necessary for making progress in the control and reduction of nuclear weapons is made challenging because nuclear weapons are integrated into the strategic security architecture of possessor states in a way that other controlled weapons are not. This situation creates an opaque environment when transparency would be preferable. The characteristics of weapons - that they are relatively small, mobile and concealable, further complicate the development of effective verification measures. This presentation will introduce a systems perspective of the problem, which highlights technical challenges that need to be addressed if progress is to be made. It demonstrates that many of the issues and questions that need to be answered are accessible by any interested party, and that the information communicated to enable verification need not contain detail that might be considered proliferative.

AGA 4.2 Thu 17:15 U HS 3 Parkstr. 6
Using a Systems Approach in Arms Control and Disarmament Verification — •Irmgard Niemeyer[1], Mona Dreicer[2], and Gotthard Stein[3] — [1]Forschungszentrum Jülich GmbH, Germany — [2]Lawrence Livermore National Laboratory, USA — [3]Bonn, Germany

Systems approaches are not new to verification but have generally been used to develop treaty-specific regimes and not considered the state or region as a whole. Inspired by the recent development and implementation of state-level approaches by the IAEA, ways to advance this concept for effective nuclear arms control and disarmament verification were explored. This study aimed at applying a systems approach to formulate an objective, standardized, transparent, and reproducible framework, that can be well-documented, so that stakeholders can confidently use it to identify and address gaps in arms control verification capabilities and approaches. Development of a systems approach that can drive the understanding of the interactions will be crucial to achieving confidence in arms control and disarmament verification. Such a systems approach could also the drive the development and implementation of new verification mechanisms for future agreements.

AGA 4.3 Thu 17:45 U HS 3 Parkstr. 6
Verifikation im Cyberspace - Ansätze und technische Grundlagen für die Kontrolle von Cyberwaffen — •Thomas Reinhold — Institut für Friedensforschung und Sicherheitspolitik an der Universität Hamburg, Beim Schlump 83, 20144 Hamburg

Der Cyberspace wird zunehmend als weitere Domäne in militärischen Planungen von Staaten und Verteidigungsbündnissen integriert - neben Aufbau und Stärkung defensiver Fähigkeiten zum Teil auch mit offensiven militärischen Absichten. Obgleich derartige Waffen selten öf-

fentlich bekannt werden, deuten viele Vorfälle darauf hin, dass bereits Verfahren eingesetzt werden, die fremde IT-Systeme stören. Während Initiativen der UN und der OSZE versuchen diese neuen technologischen Möglichkeiten zum militärischen Wirken durch politische Maßnahmen zu regulieren, fehlen bislang Ansätze wie etablierte Konzepte der Rüstungskontrolle, Abrüstung und Verifikation im Cyberspace funktionieren können. Viele Eigenschaften des Cyberspace unterscheiden sich sehr von physikalischen Domänen, andererseits wird dieser Raum vollständig vom Menschen kontrolliert und es bestehen in vielen Bereich der IT Verfahren, die sich auf den Problembereich der Verifikation übertragen lassen. Der Vortrag soll ausgehend vom aktuellen Debattenstand zur Cyber-Rüstungskontrolle derartige Ansätze für Verifikationsmaßnahmen vorstellen. Dabei sollen auch gezielt "Lessons Learned" anderer Technologien thematisiert und im interdisziplinären Dialog debattiert werden.

AGA 5: Nuclear Archeology and Fissile Materials

Time: Friday 10:30–11:30 Location: U HS 3 Parkstr. 6

AGA 5.1 Fri 10:30 U HS 3 Parkstr. 6

Nuclear Archaeology: Reconstructing Reactor Histories From Reprocessing Waste — •Antonio Figueroa and Malte Göttsche — Nuclear Disarmament and Verification Group, RWTH Aachen - Aachen Institute for Advanced Study in Computational Engineering Science (AICES) , Aachen, Germany

Nuclear Archaeology is a field dedicated to the reconstruction and quantification of the past production of weapons-usable fissile materials. As part of related research efforts, we examine the possibilities and limitations of exploiting measurements of high level waste to deduce parameters related to the operational history of reactors such as burnup. For the first stage of this project, we use high fidelity forward calculations to estimate spent fuel compositions, and develop a surrogate model which can be used as a computationally less expensive way to map combinations of input parameters to fuel compositions. This model will help better understand the challenges when solving the inverse problem of deducing the reactor history from waste. A promising method to solve the inverse problem may be Bayesian Inference, where prior existing information (e.g. a declaration by a state) can be taken into account, and waste measurements would be used to update this knowledge. This way, measurements may confirm the existing information, make it more accurate, or identifiy inconsistencies which may indicate cheating.

AGA 5.2 Fri 11:00 U HS 3 Parkstr. 6

Highly Enriched Uranium Status Update - All quiet since the Iran negotiatons? — •Matthias Englert — Öko-Institut e.V. Rheinstr. 95, 64283 Darmstadt

Highly Enriched Uranium - HEU is a nuclear material that can be used to fuel nuclear weapons. This talk presents an overview on the current status of HEU stockpiles and usage as well as HEU production technologies and newer developments over the last years. HEU is used in nuclear weapons worldwide, but also for other purposes such as to fuel research and power reactors, naval propulsion and to produce isotopes for medical purposes. Today HEU is produced with gas centrifuge technology, a technology which is in the reach of the technical capabilities of most countries worldwide. Problematic developments in nuclear proliferation in the last two decades involved the spread and covert acquisition of centrifuge enrichment capabilities by countries such as Iran and North Korea. Not know much is known about the North Korean enrichment program. In Iran the program is mostly frozen since the Iran Nuclear Deal (JCPOA), but more informatian about the program became available especially since the presentation of secret documents from Iran by Israeli Prime Minister Netanyahu. Not often talked about: other countries also enhance and expand their centrifuge capabilities such as Pakistan or Brazil. Also new technologies such as laser enrichment are on the verge of becoming industrialized. HEU minimization programs to minimize the civil use of HEU are also not progressing quickly especially in the area of research reactor conversion to the use of low enriched uranium. This is mostly due to the complexity to qualify suitable high density Uranium-Molybdenum (UMo) fuels to convert the reactors from HEU to LEU. But for HEU minimization there were also significant accomplishments in recent years e.g. in repatriating spent fuel from research reactors in other countries to the US and Russia. In nuclear weapons states such as Russia, HEU still plays a major role either as a commodity or for the domestic energy programs, e.g. the recent use of HEU to fuel the Russian fast reactor program and the reopening of a HEU production line in Russia.

AGA 6: Seismic Verification

Time: Friday 11:30–12:30 Location: U HS 3 Parkstr. 6

AGA 6.1 Fri 11:30 U HS 3 Parkstr. 6

Vergleich seismischer Signale von Kettenfahrzeugen auf Asphalt- und Sandstraße — •Hubertus Sonntag und Jürgen Altmann — Experimentelle Physik III, Technische Universität Dortmund

Im Rahmen der Forschung über kooperative Verifikation von Begrenzungen konventioneller Waffen hatte das Bochumer Verifikationsprojekt zur Sammlung von Daten 1992 bei Amersfoort (Niederlande) seismische, akustische und magnetische Signale bei Vorbeifahrten militärischer Fahrzeuge gemessen. Die meisten Fahrten geschahen auf einer Asphaltstraße, aber einige auch auf einer parallelen Sandstraße (etwa 45 m Abstand). Die seismischen Signale der Kettenfahrzeuge - Kampfpanzer Leopard 1 und gepanzertes Transportfahrzeug YPR-765 - werden bei verschiedenen Geschwindigkeiten untersucht in Bezug auf die Amplitude in Abhängigkeit vom Abstand sowie die Eigenschaften der Spektren, v.a. in Bezug auf harmonische Serien von der Kette sowie (v.a. akustisch in den Boden eingekoppelt) vom Motor. Gemeinsamkeiten und Unterschiede bei den beiden Untergründen werden erläutert.

AGA 6.2 Fri 12:00 U HS 3 Parkstr. 6

Vergleich seismischer Bergwerksignale mit hohen und mittleren Abtastraten — •Alexander Wilczek und Jürgen Altmann — Experimentelle Physik III, Technische Universität Dortmund

Im Rahmen der Forschung für IAEO-Sicherungsmaßnahmen für unterirdische Endlager abgebrannter nuklearer Brennstoffe hatte die Arbeitsgruppe Physik und Abrüstung (TU Dortmund) 2011 mehrere Messkampagnen im Erkundungsbergwerk Gorleben durchgeführt, gemeinsam mit einer Gruppe des damaligen Fraunhofer-Instituts für Zerstörungsfreie Prüfverfahren, Dresden, beauftragt durch das deutsche Unterstützungsprogramm für die IAEO. Die Signale der Dortmunder Geofone und Mikrofone unter wie über Tage wurden mit 10 kHz Abtastrate aufgezeichnet, die der Dresdener Beschleunigungsaufnehmer nur unter Tage mit meist 500 kHz. Gemessen wurde ein Vielzahl von Bergwerksquellen, von Transportfahrzeugen über Bohrmaschinen bis zu Sprengungen. Da die Dresdener Signale vor der Aufzeichnung gleichgerichtet worden waren (um 1 Bit Auflösung zu gewinnen), wurde zunächst zur Rekonstruktion der ursprünglichen Signale ein Verfahren entwickelt, Minima nahe Null zu erkennen und jeden zweiten "Berg" zu invertieren. Beim Vergleich der Ankunftszeiten bei Pulsquellen und der P-Wellen-Geschwindigkeiten zeigt sich zunächst eine leichte Abweichung der Dresdener Abtastrate von der nominellen (-7%). Die Signalformen variieren von Sensorort zu Sensorort. Entsprechend ändern sich die jeweiligen Spektren. Systematische Unterschiede zwischen mittleren und hohen Abtastraten werden erläutert.

AGA 7: Physics and Peace

Time: Friday 12:30–13:00 Location: U HS 3 Parkstr. 6

AGA 7.1 Fri 12:30 U HS 3 Parkstr. 6

Grundlagen des Friedens aus der Sicht eines Physikers — •Alexander Unzicker — Pestalozzi-Gymnasium München

Die Suche nach fundamentalen Naturgesetzen ist eine unpolitische Tätigkeit. Die im 20. Jahrhundert entwickelten Waffen bürden der Physik jedoch eine Verantwortung auf, diese Technologien nicht zum Einsatz kommen zu lassen. Dazu gehört auch eine Sensibilität für die gesellschaftliche Akzeptanz von Krieg. Physiker müssen sich dann dazu äußern, wenn Irrationalität und Verharmlosung von Krieg vermehrt zu beobachten sind.

AGA 8: Annual General Meeting of the Working Group on Physics and Disarmament

Time: Friday 13:00–13:45 Location: U HS 3 Parkstr. 6

Annual General Meeting of the Working Group on Physics and Disarmament