Symposium Nuclear Threats and Challenges – Japanese and German Views (SYNT)

jointly organised by
the Working Group on Physics and Disarmament (AGA) and
the country Japan

Götz Neuneck
IFSH, Universität Hamburg
Beim Schlump 83
20144 Hamburg
neuneck@ifsh.de

Both countries, Japan and Germany feel a special responsibility for the outbreak of WW II which ended 80 years ago with two nuclear explosions in Hiroshima and Nagasaki. Physicists of both countries played a special role here. Today, the nuclear threat is significantly increasing in Europe and the Indo-Pacific, but also nuclear arsenals are modernized, nuclear escalation is possible and the accidental use of nuclear weapons with catastrophic consequences is no longer ruled-out. The symposium aims at describing the challenges around both countries, their historical roots and potential ways out of the stalemate by physicists.

Overview of Invited Talks and Sessions

(Lecture hall HS 1+2)

Invited Talks

SYNT 1.1	Mon	16:30–17:00	HS 1+2	**Contributions of Japanese Physicists and the Future** — •Tomohiro Inagaki
SYNT 1.2	Mon	17:00–17:30	HS 1+2	**Nishina Yoshio and Japanese Physicists Early Reactions to the Nuclear Weapons** — •Kenji Ito
SYNT 1.3	Mon	17:30–18:00	HS 1+2	**The work and achievements of scientists in context of International Organisations** — •Martin B. Kalinowski
SYNT 1.4	Mon	18:00–18:30	HS 1+2	**Physicist Contributions to Reducing Current Nuclear Threats and Challenges** — •Moritz Kütt

Sessions

SYNT 1.1–1.4	Mon	16:30–18:30	HS 1+2	**Nuclear Weapons Risk Assessment**

SYNT 1: Nuclear Weapons Risk Assessment

Time: Monday 16:30–18:30 Location: HS 1+2

Invited Talk SYNT 1.1 Mon 16:30 HS 1+2

Contributions of Japanese Physicists and the Future — •Tomohiro Inagaki — Hiroshima University, Higashhiroshima, Japan

The threat of nuclear weapons remains one of the most critical global security challenges in the 21st century. I will highlight the some contributions of Japanese physicists and scientists toward the reduction of nuclear threats, both historically and in the current context.

In 1954, following the radioactive fallout from the Bikini Atoll nuclear test, research efforts by Japanese Universities led to important discoveries, including the detection of uranium-237. Yasushi Nishiwaki presented the results in Europe, which inspired Joseph Rotblat to identify the use of a "dirty hydrogen bomb." These efforts culminated in the "Russell-Einstein Manifesto." Three Japanese physicists participated in the first Pugwash Conference in 1957, and since then, the movement to abolish nuclear weapons has made progress through the Kyoto Conference of Scientists and other events.

Now, The world situation is becoming more chaotic and the future more difficult to predict. Despite the Treaty on the Prohibition of Nuclear Weapons, which entered into force in 2021, countries, including Japan, continue to rely on nuclear deterrence. The nuclear threat has become extremely serious, with a nuclear power advocating the possibility of using nuclear weapons. Here I will discuss the responsibilities of physicists and hope that these considerations will provide some basis for reducing the nuclear threat in the world today.

Invited Talk SYNT 1.2 Mon 17:00 HS 1+2

Nishina Yoshio and Japanese Physicists Early Reactions to the Nuclear Weapons — •Kenji Ito — Kyoto University, Kyoto, Japan

This talk examines the early responses of Japanese physicists to the atomic bomb, focusing on Nishina Yoshio's transformation from leading Japan's nuclear research to advocating for peace after the war. Renowned for the Klein-Nishina formula, Nishina was pivotal in establishing Japan's quantum and nuclear physics research and led the Japanese army's wartime nuclear project. After witnessing the human and material devastation of Hiroshima and Nagasaki, where he assessed the bombs' effects soon after the explosion, Nishina became a vocal proponent of peace and an advocate for international control of atomic energy. He participated in the the UNESCO movement in Japan and served as vice president of the Science Council of Japan, setting a precedent for later physicists like Yukawa Hideki and Tomonaga Sin-itiro. In this talk, I discuss the achievements and shortcomings of Nishina's actions and visions in this context.

Invited Talk SYNT 1.3 Mon 17:30 HS 1+2

The work and achievements of scientists in context of International Organisations — •Martin B. Kalinowski — Peace Science, Vienna, Austria

The nuclear non-proliferation and disarmament regime has been built with vital involvement of scientists and engineers. It requires constant adaptation to new scientific and technological developments and to the political constraints and challenges to support international peace. This presentation reflects on the role and contribution of scientists in international organizations like the UN, IAEA and CTBTO, in professional societies, in non-governmental organizations, academic institutions, laboratories, industry and civil society. The key questions to be addressed are how science and diplomacy are connected, how scientists can promote arms control treaties and what mechanisms international organizations utilize to tap into the knowledge and wisdom of the experts' community. A prominent example is the Group of Scientific Experts that was established by the Geneva Conference of the Committee on Disarmament in 1976. Its work led to the successful negotiation of the Comprehensive Nuclear-Test-Ban Treaty. Lessons learned from experience are applied to current challenges. How can scientists and professional societies get involved and have an impact? How can advances in science and technology drive progress in advising on policies and building confidence? How can the next generation of experts grow to become the future leaders?

Invited Talk SYNT 1.4 Mon 18:00 HS 1+2

Physicist Contributions to Reducing Current Nuclear Threats and Challenges — •Moritz Kütt — Institute for Peace Research and Security Policy (IFSH)

Even before the first nuclear weapon exploded, physicists warned in the "Franck Report" of the danger of a global arms race. Throughout the 20th century, physicists continued to help reduce nuclear dangers, highlighting risks and analyzing nuclear weapon effects like radioactive emissions from weapon tests. They also contributed to weapon reductions, developing innovative approaches to verification challenges.

In the third decade of the 21st century, the world finds itself in a new nuclear arms race. All nuclear-armed states modernize their arsenals, and many grow the absolute stockpile of weapons, both is a threat to global security. Additional challenges arise from increased use of conventional missiles, artificial intelligence, and emerging technologies in interacting with nuclear weapons.

To reduce threats and challenges, physicists have several opportunities to (re-)engage with the issue. Physicists can use their expertise to study and warn of escalation risks, highlight the catastrophic consequences caused by the effects of nuclear war, help estimate the scale of the arms race, and continue to provide innovative verification ideas. This presentation illustrates these opportunities and highlights potential benefits that could be achieved when physics research resources are not "wasted" anymore for developing nuclear weapons.