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# Science for Peace and the need for a Civil Clause in civilian research institutions and public universities

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The Science4Peace Forum

**Abstract**

The discussion about military research in civilian research institution has gained momentum recently. In Europe, the research center CERN in Geneva has in its constitution written, that "the Organization shall have no concern with work for military requirements", in Germany so-called Civil-Clauses have been issued as a self-declaration and self-commitment of many institutions and universities to work only for civilian and peaceful goals. While there was common agreement on research for peaceful and civil purpose after World War II, recently the discussion of the usefulness of Civil Clauses has been put on the table by the EU commission as well as national governments.

A dangerous development is taking place in science policy. Immediately followed by the invasion of Ukraine, Russian and Belorussian scientists were sanctioned, cooperations were stopped and scientists were excluded from participating in civilian research projects. Attempts to open research institutions, which were in the past a symbol for civilian research, for military purposes, is another step in separating the science communities and creating enemies-images, while giving up the universal feature of science.

Triggered by a white paper of the EU commission as well as a position paper by the German ministry for education and research in 2024, the Science4Peace Forum started a qualified discussion with a panel discussion in September 2024 on different aspects of Civil Clauses. In this paper we collect arguments for keeping the purely civilian and peaceful focus of public (non-military) research and argue that scientific progress for the benefit of humanity can only be achieved by collective efforts of all countries and nations. A restriction of research to those countries which share the same political values will create only anger, mis-trust and further conflicts will result in another arms-race and is clearly counterproductive to solving the most important problems humanity is facing now: climate change, poverty and, most of all, the too many wars.

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# 1 Introduction

In January 2024, the EU Commission issued a *White Paper* [1] calling for a special effort to promote research with both civil and military objectives (dual-use research). Similarly, the German Ministry of Education and Research (BMBF) released a *Position Paper* [2] in March 2024 calling for the deepening of cooperation between civilian and military research institutions and for establishing *funding incentives for increased cooperation between civilian and military research*. In its annual report for 2024, the German *Research and Innovation* Expert Commission proposed dissolving the previous separation between civil and military research [3] .

This reorientation is in fundamental contradiction to the spirit of civilian research following the experiences of World War II: at the opening of the Technical University of Berlin in 1949 Major-General E.P. Nares said in his opening speech [4]: *The British authorities are well aware that the Technical High School of Berlin made a valuable contribution to your country's war potential and was one of the props of the technical development of the vast war machine which Hitler built up to oppress other peoples ... The four great Allies - Russia, France, the United States and Great Britain - have vowed that such a war machine shall never be allowed to rise again....* and he continued in saying *Science and technology can be and must be devoted to advancing the peace and civilisation of man and this can only be so if they are used with responsibility.* The Science Council of Japan vowed in 1950 *to never become engaged in scientific research for war purposes* [5]. At the international research center CERN, where the Higgs Boson was found in 2012, the convention of 1954 [6] demands explicitly that it *shall have no concern with work for military requirements*, and at the Helmholtz Research Center DESY in Germany the guiding principles [7] stipulate that *research pursues goals that are peaceful and serve civil society*. Moreover, many universities and institutions have adopted so-called civil clauses [8] to focus voluntarily their research and teaching to purely civilian and peaceful purposes.

The discussion of opening of civilian research to military research, international cooperation is called into question, research funds are withdrawn from civilian research and made available for military research as formulated in a statement [9] of the German University Rectors' Conference (HRK).

At DESY the directorate has initiated a discussion in June 2024 [10] whether the restriction of research to civilian and peaceful purposes is still adequate, or whether military research should be allowed at the laboratory. This initiative triggered a lot of discussion and protest at DESY, where shortly after this announcement a petition [11] was launched to protest against this move. The topic has also found attention in the national [12] and international press [13].

We are facing significant changes in science policy:

- **Sanctions in Science**

  Immediately after the start of the invasion of Ukraine, several science institutions in Europe initiated sanctions against Russian and Belorussian scientists. At DESY, sanctions [14] imposed include a ban of common scientific publications as well as participation at scientific conferences, where Russian scientists participate under their institutional affiliation. The Science4Peace Forum has collected many arguments against ex-

cluding scientists from international cooperations [15]. At CERN, collaborations were put on hold. At the end of 2023 the CERN council decided to not to prolong cooperation agreements with Russian and Belorussian institutes after their expiry dates in 2024. The Science4Peace Forum has warned about the long term consequences of such a decision [16]. At least the cooperation of CERN with JINR was not cancelled, and is continuing but still under sanctions and restrictions.

These steps marked a clear change in science policy, scientists from certain countries are risking to be excluded from scientific cooperation, a step which did not happen at international organizations like CERN before, only in 1993 Serbia and Montenegro were excluded from CERN based on a decision of the UN security council [17, 18])

- **Role of science in geopolitical strategies**

  In a report *Security, Resilience and Sustainability* [19] from 2022 the increased role of science in security policy and military research is requested, but with caution *... if Germany positions itself too assertively [in increased spending for military], its current reputation as a peaceful nation could suffer.* In a report of Leopoldina and Deutsche Forschungs Gemeinschaft (DFG from 2024 [20] it is argued, that *... in doing so, the claim is made that academic research can no longer be carried out solely for its own sake, but also bears responsibility for safeguarding our basic democratic order and other national values*. Further it is argued that *... as a result, science and innovative power are also increasingly identified in Europe and North America as a levers of geopolitical power in order to strengthen resilience and competitiveness in the sense of national security interests*. Even fellowships and student exchange are seen critically *... young Chinese scientists with a scholarship from the Chinese Scholarship Council (CSC) will no longer be admitted in the future ...* , as written in Ref. [20].

- **Opening civilian research facilities for military research - the civil clause**

  The discussion about civil clauses and the focus of civilian research institution on purely civilian research has gained momentum recently with a White Paper [1] of the EU commission, where it is argued that resources spend for purely civilian research are missing in funding for military (or dual-use) research. With the further discussion on increased spending for military (at the moment several EU countries increased their spending to 2% of GDP) and the request to increase the spending from 2% to perhaps 3.5 or event 5 %, the resources for pure civilian research will decrease, and institutions maybe forced to look for additional funding, for example by removing civil clauses and opening their research facilities for military dual-use research. While such an attempt might solve the short term funding, it will lead to dramatic and significant changes in science and research.

In this paper we will discuss these three topics in more detail, with the emphasis that science and especially fundamental science is universal and independent of any political and geo-political strategies. We will emphasize, that sanctions and restrictions in science are

counter-productive, and lead only to further separation and confrontation, rather than helping solving international conflict. We argue, that science should play a role in international affairs such that the language of science is used to build bridges and dialogue, instead of banning communication. We also argue that successful science which can serve society and can help solving the most important problems of people must be international, including all countries, as well as that all results must be made available to the public, and by this is required to work only on civilian projects.

## 2 Sanctions in Science and the role of geopolitics

It is the first time in recent history, that sanctions are put against scientists at national and international institutions without any endorsement of the UN and UN security council, only in 1993 Serbia and Montenegro were excluded from CERN based on a decision of the UN security council [17,18]. The ban on Russian scientists from CERN by the end of 2024 caused many distortions, starting from knowledge and know-how which is now missing, but more importantly to a deep frustration of the scientists, who were treated in very discriminatory way. It will take a very long time until this damage in scientific cooperation can be healed, many scientists who were expelled say that even after lifting the sanctions at CERN they would refuse to return.

While sanctions in science damage scientific cooperation and question the universality of science as well as hinder necessary development, for example in climate research where cooperations are essential for accessing necessary data, the acceptance of sanctions by many in the scientific community mark also a major step in handing over independency to political leaders. This step cannot be overemphasised, as especially the German history shows clearly the dangers when scientists work in the name of politics, without feeling the responsibly for their research, but leaving it to politics.

Science always depends on the political framework and public funding and how much is put into which program. While it depends still on the institutions and individual scientists whether to apply for funding the decisions can have potentially significant consequences. If, however, the political situation changes during a funding period, and politics is imposing new constraints on already funded scientific projects, then this is a direct intervention of politics in science, which is a new quality, which has to be taken seriously. It also shows, that even during a funding period, the leaders of institutes might experience political pressure, which they might not be able to resist, and it puts the question of responsibility to every scientist.

In the report of Leopoldina and DFG [20], it is explicitly argued on international cooperations that *there is growing political pressure to stop cooperating with these countries, oronly cooperate to a limited extent, in order to secure strategic competitive advantages and one's own research integrity, avoid dependencies and not indirectly support developments abroad that are questionable from a Western perspective.* According to these statements, science is aimed to be clearly dominated by political reasoning. Under these considerations, the sanctions against scientists

are part of a general strategy, and not so much motivated by actual political reasons, and not directly coming from Russia's invasion to Ukraine, since these strategies were discussed already before.

The clear mention of the *Western perspective* bears the risk of decoupling research and development of western countries from the rest of the world, a development which is also counter-productive given the increasing influence and potential non-western countries have in new research and developments, and example is the development of DeepSeek [21].

In Ref. [20] it is further argued, that *academic research also bears responsibility for safeguarding our basic democratic order and other national values and that it can no longer be pursued solely for its own sake.* If such statements are giving the direction for future scientific research and development, the universal and humanistic value of science is questioned, and science would lose all it's credibility, while being degraded to a tool to enforce political strategies.

# 3 The Civil Clause: history and present

The Civil Clause in Germany was created from the experience of the connection of science and scientists with military and it's consequences in World War II, as a commitment to perform research only for civil, non-military and peaceful purposes. In Germany the Civil Clause goes back to the founding of the Technical University of Berlin [4] in 1946. An overview of existing Civil Clauses in Germany is given in Ref. [22], a writeup of a lecture series on civil clause is given in Ref. [23]. The Science Council of Japan declared in 1950, *its commitment to never become engaged in scientific research for military purposes* [5].

## 3.1 Some historical remarks on science in Germany. Author: M. Walker, John Bigelow Professor of History, Union College, Schenectady, NY USA, M. Renneberg

German scientists had a strong and consequential relationship with militarism in the first half of the twentieth century. During the First World War, most German scientists served as regular soldiers, but a significant minority put their professional expertise to work on early radar systems, aerodynamics for aircraft development, and of course chemical weapons. The overwhelming majority of these scientists supported the German war effort uncritically. Here Albert Einstein was the exception who proved the rule. When Germany was defeated, most scientists, like most Germans, focussed more on the harsh terms of the Treaty of Versailles than what responsibility Germany shared for the war.

When the Nazis came to power in 1933, they began massive investments in rearmament. It is important to note, however, that during this period Hitler publicly insisted that he wanted peace, not war, and the rearmament was only so that Germany could protect itself. When the Second World War began with the invasion of Poland, most scientists, including those opposed to Nazism, were either drafted into the armed forces or found research and development projects that allowed them to serve the war effort as scientists. These projects

were similar to those in other countries, like mines, submarines, radar, rockets, aeronautics, and even nuclear weapons. When the war turned against Germany after the defeat at Stalingrad and more and more German men were drafted, scientists came under even more pressure to find positions considered "indispensable for the war effort." When the war was over, the four victorious powers invited or sometimes kidnapped those German scientists whose research was of military interest. Here the most prominent example was Wernher von Braun and long-range ballistic missiles (for References and further reading see [24–26]).

### 3.2 Commitment not to engage in research for military purposes - Case for Japan.
### Author: Tatsujiro Suzuki Visiting Professor, Nagasaki University, and President, Peace Depot, Japan

After the end of World War II, scientific community of Japan established Science Council of Japan(SCJ) in 1949, set up as an *independent and special* organization under the jurisdiction of the Prime Minister of Japan. In 1950, SCJ adopted a statement on its commitment to never become engaged in scientific research for war purposes. In 1967, SCJ issued again a similar statement not to engage in research for military purposes.

The spirit of those pledges has been maintained until now, but the worsening security environment has pushed the government to encourage scientists to work for so-called *dual-purpose* research, whose purposes could include military use.

In 2015, the government established a new research funding, called *National Security Technology Research Promotion* sponsored by the Acquisition, Technology and Logistics Agency (ATLA) of Ministry of Defense (MOD) [27]. In this funding scheme, research proposals are invited and reviewed with a clear objective awarding projects which are likely to be applied for development of defense (military) equipment or systems. This is the first time that the Ministry of Defense directly funds university research projects.

This funding scheme caused major academic debate in Japan. Responding to such debate, SCJ issued report [28] and statement on research for military/security research in 2017 [5]. In that statement, SCJ affirmed the previous two statements on commitment not to engage in research for military purposes. The statement says the following: *It should be pointed out that this funding program(of MOD) has many problems due to these governmental interventions into research. From the standpoint of a sound development of the sciences, funding should be increased further for research in civilian areas where autonomous research by scientists and unrestricted publication of research results are assured.*

### 3.3 The Civil Clause in Germany.
### Author: J. Beullens

Two and a half months after the liberation of Germany from fascism on 8. May 1945 through Allied forces (its 80th anniversary taking place this year), a framework for the future of the German people was agreed upon at the Potsdam Conference. This included the famous

four Ds: Denazification, Democratization, Decentralization and Demilitarization. As German schools and universities had played an essential part in the ideological indoctrination of children, the development of weapons-systems as well as pseudoscientific theories in favor of conquering *Lebensraum* [29], the Potsdam Agreement contained the following passage in its *Political principles*: *German education shall be so controlled as completely to eliminate Nazi and militarist doctrines and to make possible the successful development of democratic ideas.* [30]

When the Technical University of Berlin (TUB) was to start up its activities again in 1946, the conscious decision was made not to label it a *reopening*, to decisively make a cut with Nazi past [31]. A humanities faculty was founded to promote societal responsibility in science and the reflection of (natural and technical) scientists on the consequences of their work. To manifest this change in the way science should be performed, the institution was renamed: the *Technical High School of Charlottenburg* should henceforth be called the Technical University of Berlin. In a speech by British Major-General E.P. Nares at the opening ceremony [4], he makes clear the expectations that would now govern the university: *The implications of this change of name are simple but of vital importance. It should teach you that all education, technical, humanistic, or what you will, is universal: that is to say it must embrace the whole of man, the whole personality, and its first aim is to produce a whole human being, capable of taking his place responsibly beside his fellows in a community. Its second aim may be to produce a good philologist, a good architect, a good musician or a good engineer.*

*But if education does not assist the development of the whole personality it fails in its aim, and this Technical University must not fail in its aim. You cannot bring into this building only the technical part of your minds and leave the other parts of your personalities outside or hang them up with your hat and coat on a peg in the hall. You must bring to your work all that you have - your love of art, your religion, your philosophy of life as well as your technical capacities - and allow them to develop together with your work through your experience here and your contact with your teachers and fellow-students. [...]*

*This universality is necessary in education because only by cultivating the whole of himself can man acquire a sense of responsibility, and only by responsibility can freedom, peace and justice - that is the happiness of all men - be assured.*

One of the first measures taken by the occupying forces in higher education to fulfil the principles of societal responsibility and peace was the implementation of a ban against military research at TUB, which had participated in the research program for the development of the V2 rockets used to bombard London and Antwerp [32]. So the first civil clause in Germany was born as a direct consequence from fascist and militarist rule. This civil clause was reaffirmed in 1991 by the senate of TUB, *out of responsibility and because of the university's role before and during the Second World War, especially in armaments research* [33].

Ten years later in 1956, the second civil clause was implemented at the newly built nuclear research centre in Karlsruhe. With the luckily failed Nazi *Uranprojekt* to build nuclear weapons still fresh in the minds of the Allies, pressure was applied on the Adenauer administration so that the research center should only follow peaceful objectives.

Broader efforts for demilitarization shaped the development of the new German constituion, which was passed in 1949. In its preamble it is stated that Germany should become "an

equal partner in a united Europe" to "promote world peace" and its very first article declares the "inviolable and inalienable human rights" to be the basis for international coexistence. This includes article 26 of the Universal Declaration of Human Rights [34] concerning education, which asserts that *education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or religious groups, and shall further the activities of the United Nations for the maintenance of peace.*

The preamble of the constitution of the United Nations Educational, Scientific and Cultural Organization (UNESCO) [35] affirms this goal, declaring *that since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed; That ignorance of each other?s ways and lives has been a common cause, throughout the history of mankind, of that suspicion and mistrust between the peoples of the world through which their differences have all too often broken into war; That the wide diffusion of culture, and the education of humanity for justice and liberty and peace are indispensable to the dignity of man and constitute a sacred duty which all the nations must fulfil in a spirit of mutual assistance and concern; [...]*

*In consequence whereof [the parties to this constitution] do hereby create [UNESCO] for the purpose of advancing, through the educational and scientific and cultural relations of the peoples of the world, the objectives of international peace and of the common welfare of mankind for which the United Nations Organization was established and which its Charter proclaims.*

Thus, civil clauses are to be seen as the fulfillment of the fundamental principles underlying worldwide social, economic, ecological and cultural development. Their implementation in scientific institutions contributes to the building of mutual trust between nations. The possibilities of open dialog created by focusing on civil research are essential to promoting peace and amity between peoples: Those who talk with each other are less likely to shoot at each other. In times of increasing hostility and wariness between nation states, especially concerning scientific cooperation, civil clauses provide generalizable criteria for international collaboration not only with China but also with Turkey, Iran, Israel and the United States.

They are also a direct expression of the will for peace by the university members themselves: in Germany, the majority of civil clauses have been instituted after lengthy discussions between researchers, students and administrative staff in committees and senates, in part even by popular vote among the student bodies, as was the case e.g. at the University of Frankfurt. At the beginning of the previous decade student protests against the introduction of extra tuition fees as well as for the improvement of working and learning conditions led to a discussion regarding the goal of research. The consensus emerged that universities and science cannot be truly free if financial constraints are in place which could force their opening up for military funded research. Freedom of science should be determined not only through negation of state interference but through the positive conception of enabling emancipatory and peace-minded work. Only in conjunction with the fulfillment of human dignity (Art. 1 German basic law) and the principle of a social state order (Art. 20) can freedom of science (Art. 5) truly flourish and be of use to all humankind.

This stands in stark contrast to current attempts by state and federal governments to undermine civil clauses. These top-down approaches are, in light of the historical develop-

ments outlined above, in open disregard for lessons learned from two world wars as well as the social and ecological challenges of our time. Geraldine Rauch, mathematician and rector of the Technical University of Berlin, summarized succinctly what is necessary instead:

*The role of universities is not to settle military and political conflicts, but to carry out research and teaching in the interests of a more stable, social and sustainable world - this brings us all real security* [36].

### 3.4 German Science Institutions and Civil Clauses. Author: S. Brentjes

All major German science institutions are financed by the federal government and various of its ministries. The ministry responsible for education and research (changing its precise designation depending on decisions of the respective government), for instance, declared in 2020 that it supports exclusively civil research. The defense ministry, in contrast, also finances military research since the mid-1950s at civil research institutions such as the Fraunhofer Society. The vulnerability of the research institutions towards shifts in political orientation of a government has become very clear during the last years, when debates about civil clauses and military research have intensified. In 2014, the main German research institutions, the German Science Foundation (DFG), and the Leopoldina, the National Academy of Sciences, decided to create a "Joint Committee on the Handling of Security-Relevant Research" [37]. The foundational document reveals that the inspiration to this step came from the federal government in 2012. The government's main concern was of a geopolitical nature and mainly directed against China, first and foremost in areas of technology and trade. Only since 2022, the activity report's primary justification for the need to react to geopolitical changes became the threat of war coming allegedly from Russia [38]. The shift in political rhetoric and orientation of the federal government is followed explicitly in the preface written by the presidents of the two institutions to the activity report of November 2022 [39]. Even more clearly is this new orientation expressed in the title of the report of 2024. While all previous reports were simply labeled Progress Report, the 2024 report published in March 2025, carries now the title "Scientific Freedom and Security Interests in Times of Geopolitical Polarisation" [40]. This development raises serious questions about the stability of the peaceful orientation of research at universities and research institutes represented through these two institutions and its partners - the Max Planck Society, the Helmholtz Society, the Fraunhofer Society, the Leibniz Society and therewith the role of civil clauses at those institutions that adopted them in various forms.

The last four activity reports of the Joint Committee have primarily focused on issues arising from dual-use problems in the sciences, technology, in particular IT, AI, and biotechnology, plus medicine and psychology. Civil clauses were discussed as tools against military research. This focus of civil clauses was defined as insufficient for the broader dual-use issues that the Joint Committee means to address. A second problem seen with civil clauses by the Joint Committee on the basis of a paper by a junior legal scholar concerns their relationship to the German constitution. Depending on their specific formulations and their

legal status as either a part of a law regulating the universities and comparable teaching and research institutions or as a voluntary declaration of a university, they may contradict Art. 5.3 of the constitution regarding the freedom of research.

The interesting aspect of the declarations and reports of the Joint Committee concerns the insistence on academic freedom in agreement with self-regulatory activities regarding dual-use issues. On the institutional level, such activities should be implemented by creating ethics commissions at each institution, whose members should counsel researchers and research institutions about how to deal with dual use issues. Since all reports of the Joint Committee continue to emphasize freedom of research and teaching and the obligation to undertake such activities for the sake of improving human conditions, fostering peace, defending human rights, and protecting the environment, multiple spaces remain for integrating the existent civil clauses and their practical implementations into the sponsored development of responsible research and teaching with regard to dual use issues. It seems to be even possible to formulate new civil clauses in this broader framework. Such opportunities are rhetorically strengthened by the explicit condemnation of research for developing sanctioned weapons such as biological weapons or of research projects in explicit collaboration with armament industries with the caveat that military research is acceptable if the weapons are specialized to clean up the debris of wars such as land mines.

However, the increasingly confrontational language in the reports of the Joint Committee sends warning signals calling for a public debate of all aspects of dual-use issues beyond the limited circles of the meetings organized by the Joint Committee.

### 3.5 Civilian and military research in different countries

In the following we provide an overview on relation of military research at civil and public universities in different countries.

- **Belgium**

- **France**

- **Germany**

- **Greece**
  In Greece, researchers also have the freedom to choose their field, but there is no clear separation between civilian and military research, and researchers can receive funding for both [41] .

- **Sweden**
  In Swedish universities there is nothing nothing corresponding to the Civil Clause [42].

- **Israel**

- **Italy**
  In Italy, there is a distinction between basic research and military research, which are carried out by different institutions. There is no Civil Clause in Italy [43].

- **Palestine**

- **Japan**

# 4 Science and Military: National and international Research Institutions

## 4.1 From Open Science to Military Secrecy: The Risks for DESY. Author: A. Glazov, DESY

DESY plays a crucial role in international cooperation. Historically, projects such as the HERA e-p collider benefited from extensive collaboration with numerous European countries, including France and Italy, as well as Russia (initially the USSR), the United States, and Japan. Over the years, DESY scientists have actively participated in major international collaborations at CERN and KEK, engaging with researchers from across the globe. With the commissioning of PETRA III, one of the largest synchrotron light facilities in the world, DESY became a major international hub to study fundamental phenomena in condensed matter, plasmas and molecules, and on the structure and function of complex materials to biomolecules and cells (Photon Science). While DESY is a national laboratory, it is widely recognized as a key international player, regularly reviewed by international committees that consistently encourage collaboration.

Peaceful scientific research conducted by scientists is fundamental to the development of humanity as a whole. Common fundamental goals foster a collaborative environment among researchers from diverse cultural and political backgrounds. The exchange of ideas between different scientific schools is crucial for innovation, promoting both the generation of new concepts and mutual respect for collective achievements. Open scientific hubs such as CERN, KEK, and DESY play an essential role in nurturing these interactions, strengthening the global research community.

International research is also vital for fostering trust among scientists from different nations. Historically, physicists' opinions have played a significant role in shaping governmental perspectives and promoting trust between nations. The end of the Cold War would not have been possible without Soviet leaders trusting that there was no need for ideological conflict with the West and recognizing that both sides shared fundamentally common values. The phone call between M. Gorbachov and A. Sakharov while A. Sakharov was still

in exile was one of the main turning points of perestroika. This phone call would not have been possible without the influence of Gorbachov's scientific advisors, who advocated for peaceful cooperation with the West based on Sakharov's concept of convergence.

Fundamental scientific research is inherently dependent on large-scale projects requiring substantial investment. Most cutting-edge facilities built in recent years have relied on contributions from participating nations. A prime example is the European XFEL, operated by DESY, where Russia contributed approximately 27% of the construction costs (up to 300 million euros by 2017 (XFEL). The war in Ukraine has called into question the interconnectedness of financial interests. However, investments in fundamental research have little connection to military activities. The involvement of DESY in military research would jeopardize such investments, making future contributions from international partners highly unlikely. Thus, while short-term financial gains from military research might seem attractive, they could ultimately become a limiting factor for the lab's long-term sustainability and international credibility.

Fundamental physics research, and DESY in particular, have been leading forces in open-access research. Open access is a foundational principle of fundamental science and remains the prevailing model for publicly funded research in Europe. Open-source and open-access frameworks have significant industrial implications, as exemplified by the recent Chinese DeepSeek deep learning model, which could lead to considerable reductions in electricity costs and a smaller environmental footprint. Military research, however, fundamentally contradicts the principles of open access. European science, and DESY in particular, should maintain leadership in open science, serving as a global example of transparency and collaboration.

The introduction of military research into existing civilian-only facilities raises multiple security concerns. Open access to research infrastructure would necessarily be restricted, reducing opportunities for international collaboration. Additionally, laboratories involved in military research become attractive targets for cyber threats from adversarial entities and, in extreme cases, could be considered legitimate military targets during conflicts. The potential for such attacks is particularly alarming given DESY's location in the heart of Hamburg. Any form of military-related targeting of DESY would have catastrophic implications for the city's civilian population. Moreover, DESY employees themselves would face greater security risks. While recent security measures, such as the introduction of two-factor authentication for DESY computing centers, make direct cyber intrusions more difficult, they also increase the likelihood of personal attacks aimed at obtaining authentication devices, placing additional risks on employees. The risks would multiply significantly if military research were introduced.

Furthermore, many physicists have chosen fundamental research precisely because of its strictly non-military nature. These researchers joined civilian institutions like DESY under the assumption that their work would remain uninvolved in military applications. If military research were introduced, they would face an ethical dilemma: continue working in an environment contrary to their beliefs or leave, despite having dedicated much of their careers to their research at DESY.

If military research must be expanded, it should be conducted in dedicated facilities located in less populated areas, designed with comprehensive security measures and clear contractual agreements that align with the nature of military-focused work. This approach would be far more appropriate than compromising the integrity and mission of existing civilian research institutions.

### 4.2 Research at CERN: "no concern with work for military requirements". Author: J. Ellis, Kings College London

CERN was founded shortly the end of the Second World War with the explicit intention of bringing together the scientific communities of European countries that had previously been fighting each other, to collaborate, in the words of its Convention [6], on “research of a pure scientific and fundamental character, and in research essentially related thereto". It is widely known that the CERN Convention goes on to state that the Organization "shall have no concern with work for military requirements". The French version of the CERN Convention states that the Organization “s’abstient de toute activité à fins militaires", which corresponds more clearly, perhaps, to “refrains from any activity for military purposes". To my knowledge, this rule has always been strictly applied, to the extent that CERN has refused to collaborate with institutions that are involved in military research. “Science for Peace" is in CERN’s genes.

I once accompanied a CERN Director-General who shall remain nameless to on a visit to a research group that shall remain nameless in a country that shall also remain nameless, with the aim of expanding scientific collaboration. The discussion started swimmingly. Unfortunately, I had to rush out for a moment to attend to an urgent call of Nature. When I returned a few minutes later, the atmosphere had turned distinctly chilly, and the meeting broke up prematurely. I discovered later that our prospective partners had revealed they worked on military laser systems, and that put a stop to any discussion of collaboration.

On another occasion, another nameless institute in a different nameless country approached CERN about collaboration. However, due diligence revealed that the institute worked on ballistic missiles, so that was the end of that discussion.

In some cases, however, CERN does collaborate with research establishments that do some military research. However, these are institutes - both in CERN Member States and elsewhere - that have fences across their campuses separating groups working on military research from their civilian colleagues. Only the latter may collaborate with CERN.

DESY is one of CERN’s most valued research partners, and it is reasonable to ask what would happen to this partnership if DESY were to accommodate dual-use research. If the research with military applications were separated from the civilian researchers by a fence, the collaboration could perhaps continue unimpeded. But does DESY really want its campus to be divided by a fence? I fear that the character of the institute would change irreversibly for the worse.

After the statement against military research, the CERN Convention goes on to state that “the results of its experimental and theoretical work shall be published or otherwise made

generally available." CERN takes this provision very seriously, insisting (like many funding agencies) that all its research be published under "Open Access" rules. To my mind, this provision places another significant obstacle in the way of collaboration with institutes that perform dual-use or military research. CERN has recently extended the principle of openness to include Open Infrastructure, Open Source Software and Open Hardware.

The insistence on avoiding any association with military research has played a key role in enabling CERN to become a global research centre. As such, it has hosted research teams from many countries that are political or military adversaries, such as India and Pakistan, Israel and Palestine, Iran and the US, even until recently Russia and Ukraine. As the founders of CERN recognised, research into the fundamental laws of physics is a topic of universal interest and value, that advances best if it is open to all scientists whatever their origin and its results are published in the open scientific literature. Until now, DESY has adopted a similar policy of openness, and has also developed into a global research centre. It is to be hoped that DESY will be able to resist any political pressures to change this policy, and avoid harming its enviable reputation.

### 4.3 FONAS statement against undermining the separation of civilian and military research.
### Authors: Thea Riebe, Technical University of Darmstadt, Germany, Jürgen Altmann, TU Dortmund University, Germany

FONAS (Forschungsverbund Naturwissenschaft, Abrüstung und internationale Sicherheit, Research Association for Science, Disarmament and International Security) is the professional organisation of researchers in German-language countries working on questions of disarmament and international security with natural-science, engineering, computer-science or mathematics methods. Reacting to calls for strengthening dual-use and military research at universities, FONAS has issued a statement in February 2025 [44]. In this, FONAS strongly warns against the increasing overlap between civilian and military research. Current political initiatives at both the national and European levels threaten to blur this fundamental boundary, thereby fundamentally altering the nature of science.

FONAS sees this as a significant danger to the independence and transparency of science. *The targeted promotion of dual-use technologies creates incentives for the militarization of civilian research institutions and universities*, warns the research network. *This not only leads to the deliberate creation of gray areas but also makes it more difficult for researchers to actively choose an exclusively civilian use of their work*. Particularly problematic is the looming weakening or even abolition of civilian clauses. Without these regulations, the responsibility for ethical research decisions would be unilaterally shifted onto individual scientists, while at the same time, third-party funding and career incentives are increasingly directed toward militarily relevant research fields.

FONAS emphasizes that science thrives on transparency, cooperation, and international exchange. A stronger integration of military interests not only endangers these fundamental principles but also the international attractiveness of Germany as a research location. Stricter

security regulations and confidentiality obligations in dual-use projects could exclude foreign researchers and hinder free collaboration in key scientific fields.

FONAS therefore calls for:

- The consistent maintenance and strengthening of the separation between civilian and military research.
- A clear stance from universities and research institutions against the militarization of science.
- Strengthening civilian clauses to ensure transparency and ethical responsibility in research.

# 5 Dual-Use Issues

## 5.1 Dual-use and militarization of science and technology
**Author: J. Scheffran, Hamburg University**

Civil-military interactions have shaped the history of science, technology and war [45]. Scientific knowledge and technical know-how became essential preconditions for weapons development and sources of proliferation [46]. The military was often suggested as a pacemaker of technology development, although the spin-offs were exaggerated. Civilian products are not optimized for military tasks and vice versa. An advantage over opponents is not guaranteed if the technology is available on the international market. The dichotomy between civilian and military technology was pronounced during the East-West conflict when large-scale science and technology became part of the military-industrial complex.

The boundaries eroded after the end of the Cold War. Facing disarmament, lack of public acceptance and budgetary resources, combined with converging demand profiles, supported the dual-use of technologies that have military and civilian applications. Dual-use strategies strengthened civil-military linkages in scientific and technological development and systematically exploited the ambivalence of science and the dual-use of technology [47,48]. A memorandum pointed to the dangers and made proposals for controlling military technology innovation and for redirecting research and technology policy [49].

In the new world disorder new crises and conflicts emerged, leading to new civil-military structures and incentives for rearmament, deliberately exploiting civil research for military purposes. The military benefits from research and technologies in the civilian-commercial sector and saving on development costs, shifting research from government to private sectors producing for the mass market. The armament industry pushes for the promotion of dual-use research and the integration of civilian research.

Taking advantage of its military-technological superiority, the United States and the NATO alliance continued their projections of power and force against competitors in Europe, Russia, China and the Global South and focused on controlling scientific and technological capabilities that may enhance or degrade military capabilities. In the context of the Gulf and Iraq

Wars and the terror attacks of September 11, 2001, the quest to control proliferation has increased, as well as the list of potential dual-use technologies, while arms control agreements such as the INF Treaty were terminated.

This included controlling exports of *sensitive* technologies to *critical* countries, in particular, the proliferation of weapons of mass destruction (nuclear, chemical, or biological) and delivery systems, including related dual-use items which are subject to strict export controls. Since the 1980s the export control focus shifted from an East-West to a North-South context, including technologies on the Trigger List of the London Nuclear Suppliers Club, the Australia Group for chemical weapons, and the Missile Technology Control Regime (MTCR).

In recent years, new crises, conflicts and enemy images have promoted growing armaments and expanded security conceptions, creating new justifications for military interventions. The global competition in science and technology has intensified, and is drawn into the arms race, exploiting its dual-use potentials [46]. The *Revolution in Military Affairs* encompasses almost the entire high-tech sector and draws it into warfare [50]. Materials and semiconductors, micro-, nano-, and biotechnologies, nuclear, laser and space, computer and communication technologies, drones and sensors, digitalization and AI are employed not only in civilian products but also in weapons [51]. New wars involve extensive networking, robotization and automation of the battlefields in air, water and ground, in space and cyberspace, with hybrid and information wars on the home front, in social networks and the media [52]. Societies are drawn into these wars, connecting civilian and military infrastructures across local and global levels, diffusing clear dividing lines.

In the turning point (Zeitenwende) proclaimed in response to Russia's attack on Ukraine in February 2022, Europe is becoming increasingly militarized [53]. In order to make society *war-ready* by 2029 (as stated by the German defense minister in 2024 [54]), Germany is striving to play a *leading role*, including key warfare technologies, which is driving the militarization of science and pushing back civilian-oriented science, including repressive measures against critical positions, impairing academic freedom. A report by the Expertenkommission Forschung & Innovation [3] recommended that the *strict separation* of civilian and military research and development should be fundamentally reconsidered and dissolved where appropriate, in order to consciously promote spillovers and dual use between military and civilian sectors. Aims for civil-military synergies can also be found in a position paper on research security in changing times of the Ministry for Education and Research [2].

The Coalition Agreement [55] of the new German government declares to be *committed to removing obstacles that make dual-use research or civil-military research cooperation more difficult*. Promoting future technologies for the armed forces applies to the following areas: *satellite systems, artificial intelligence, unmanned (including combat-capable) systems, electronic warfare, cyber, software-defined defense and cloud applications as well as hypersonic systems* which requires *simplified access and in-depth exchange with research institutions, the academic environment, start-ups and industry*.

Against these tendencies, resistance in the research community is emerging, calling for scientific principles such as truth, risk avoidance, peace promotion, social and ecological compatibility. Due to the historical experience with fascism and world wars, there is a

widespread rejection of military research and the associated logic of war, secrecy and enemy perception. Freedom of science according to the German Constitution is compatible with human dignity, social responsibility and strengthening democracy. Good research cannot thrive if it is subject to economic, political or military constraints; it needs openness, transparency and critical self-reflection, which requires a civilian orientation.

This is where the civil clauses at many universities come in: commitments to teach, learn and conduct research solely for civilian and not military purposes [56]. Even if civilian clauses cannot generally exclude the military relevance of civilian research, they can increase the barriers to military research and strengthen peaceful alternatives. As the civil clauses at universities stand in the way of militarization they are increasingly under political pressure.

In order to escape the logic of war, an ambivalence analysis contributes to transparency at the interface of civil-military research and development and identifies nodes where development paths can be separated on the basis of concrete parameters, as is usual in export control. In doing so, differences between civil and military need to be made clearer rather than blurred, and the social and international framework conditions of decision-making processes are to be revealed [48].

Challenges of new technologies in complex conflict landscapes require novel approaches of preventive arms control combined with political and legal frameworks that tackle the dual-use problem in the early phases of research and development [57]. Preventive arms control, technology assessment and design and civil clauses limit dangerous technological developments, influence technological conflicts and create transparency in science. Civil science and education promote international cooperation and solutions to global challenges (against climate crisis, war, displacement, social inequality, for just, sustainable and peaceful transformation).

## 5.2 Responsibility of Science Institutions and Scientists

Science and scientists were always trapped between the application for public resources to fund scientific research, the requests from society providing the financial resources, the own job position, and the ideas for new scientific research Science can therefor never be independent of political and economic situation, where it is embedded in. However, scientists and science institutions cannot deny responsibilities of the application of scientific results, a prominent example is the responsibility of scientists during Gemanys Nazi period in their work for developing a nuclear bomb, as well as the scientists in the Manhattan project. As a consequences of this responsibility the Einstein-Russel manifesto [58] was launched in 1955, 70 years ago, where it is said *we urge [the governments], consequently, to find peaceful means for the settlement of all matters of dispute between them.*

In a very similar spirit, the Göttingen Eighteen [59] (among the authors were M Born, O. Hahn, M. v. Laue, and C.F v. Weizsäcker) wrote *Our profession is pure science and its application. Conveying our knowledge to young people make us responsible for the consequences of our profession. This is why we cannot remain silent on all political questions.* And they continue *None of the signees would be willing to work on the production, testing of use of nuclear weapons.*

But not only the development of nuclear weapons is under the responsibility of scientists, any participation directly or also indirectly in military projects falls also under their responsibility. Not every cooperation with military is against humanistic and peaceful goals, for example participation in arms control as well as in verification of disarmament is at a different level than participation in testing and development material for weapon production.

A civil clause of research institutions helps to guide scientists and science institutions towards peaceful research, towards a commitment for a world without war, and especially without nuclear weapons. The discussion on scientific projects must be performed openly, identifying advantages as well as risks, such that everybody is aware of potential consequences and applications. Ethics principles must be part of the education process and be considered as an important part of a universal scientist, in accordance with the words of the Major-General E.-P. Nares [4] at the opening of the TU Berlin, where he argued, that every scientist must ask: *"Can I do a good job?" but: "Will it be put to good use?"* and he continued saying: *And remember that Society is not one nation nor one class of men, but is the whole world and all men and nations in it.*

Civilian scientific projects should have clear international, peacekeeping, bridge-building aspects and all results must be made available to the public in and open-access way. In applications for new projects, such criteria should be spelled out clearly as advantages, and risks of application for *the bad* should be considered and evaluated. Openness, transparency and internationality are essential, in contrast to secrecy and restriction of access. It must be obligatory that projects are followed from an outside, historical and societal perspective under the premise of peaceful research, and necessary resources and scientific positions for doing so must be created.

# 6 Conclusions

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