

1                   A Science4Peace initiative:  
2           Against sanctions and exclusions in international  
3                   scientific cooperation

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5                                   February 19, 2024

## Abstract

The armed invasion of Ukraine by the Russian Federation has adversely affected the relations between Russia and the western countries. Among other aspects, it has put scientific cooperation and collaboration into question and has changed the scientific landscape significantly. Cooperation between some western institutes with their Russian and Belarusian partners were put on hold immediately after Feb 24, 2022. Lately, the CERN council has decided in its meeting in Dec 2023 to stop cooperation agreements with Russian and Belarusian Institutes, dating back to the 1950s. The Science4Peace idea, propagated by CERN until the beginning of 2022, has still a high value, but the science institutions seem to be unable to formulate an independent stand in the current crisis. We argue that the scientific cooperation among scientists must continue since fundamental science is by its nature an international discipline. A ban on scientists from participating in the international cooperation and collaboration is counterproductive and would put us back to a situation before World War II. We propose measures to reactivate the peaceful cooperation of individual scientists on fundamental research, in order to stimulate international cooperation for a more peaceful world in the future. Specifically, we plead for finding ways to continue this cooperation through international organizations, such as CERN, in Geneva, and JINR, in Dubna, Russia.

## 1 Introduction

In the aftermath of World War II, nations came together and formed the United Nations (UN) with the purpose, as stated in the first article of the UN charter [1], "... to take effective collective measures for the prevention and removal of threats to the peace". With more than 100 wars and military conflicts since then [2], we are further away than ever from this ideal. This marks a significant failure of diplomacy to prevent those wars.

In a similar spirit as the UN, CERN was founded in 1954 to bring nations together through peaceful scientific collaboration. Remarkably, just one year after its foundation, cooperation between CERN and Soviet scientists began via the Joint Institute for Nuclear Research (JINR) in Dubna [3] and the Institute for High Energy Physics in Protvino close to Serpukhov in 1967. In 2014, on the occasion of CERN's 60th anniversary, the then Director-General Rolf Heuer wrote that "CERN has more than fulfilled the hopes and dreams of advancing science for peace".

The armed invasion of Ukraine by the Russian Federation at the end of February 2022 and the suffering inflicted on countless innocent civilians, including scientists, is against international law and must be condemned in the strongest terms. Despite pro-war statements from some Russian institutes, many Russian physicists opposed the war and immediately signed petitions against it [4].

In March 2022, as a reaction to the war in Ukraine, many national Western science institutions put bans on their historical scientific cooperation with Russian institutions. In a recent publication [5], the dramatic consequences of sanctions in science were discussed, and it was argued, how bad they are for the scientific progress and the scientific culture. This ban on historical scientific cooperation unexpectedly also concerned international organizations

48 such as CERN, whose Council – where the member states of CERN are represented – recently  
49 deliberated on the renewal of existing cooperation agreements with Russian and Belarusian  
50 Institutes – and decided to stop these agreements [6,7].

51 The building of LHC at CERN as well as the experimental detectors of the big LHC ex-  
52 periments was possible also because of a significant contribution from the Russian and Be-  
53 larusian institutes. In particular, a part of the calorimeter [8] of the CMS experiment was built  
54 from the melted brass military navy shells (Fig.1), a wonderful extension of the *Swords to*  
55 *ploughshares* sculpture at the UN headquarter.

56 The decision of the CERN  
57 council in Dec 2023 to stop  
58 further cooperation marks a  
59 significant change in science  
60 diplomacy: this decision breaks  
61 with CERN's mission of *Sci-*  
62 *ence for Peace* [9]. In an article  
63 in the CERN courier the former  
64 CERN director Herwig Schop-  
65 per has argued "Science for  
66 Peace? More than ever" [10].

67 While we have continued  
68 to work together until now  
69 with our Russian and Belaru-  
70 sian colleagues at CERN, and  
71 had many discussions among  
72 us within experimental and  
73 theoretical collaborations and  
74 other joint ventures in science,  
75 people with whom we worked together for decades are now excluded from their experi-  
76 ments at CERN and from other institutes. Even more, our Russian and Belarusian colleagues  
77 suddenly became *personae non gratae* at CERN. Some of the consequences of this exclusion are  
78 already summarized in FAQ's from the CERN user office [11], immediately after the decision  
79 of the CERN council in Dec 2023.

80 Limiting international scientific collaboration is against the advancement of knowledge,  
81 which is not just a global public good but also a powerful instrument for intercultural dia-  
82 logue and peace – especially during times of crisis. If we take the UN charter seriously, we  
83 must ask which measures are appropriate for the prevention and removal of threats to the  
84 peace.

85 Excluding a significant part of the scientific community from international projects, like  
86 the Large Hadron Collider (LHC) [12] at CERN, due to the ongoing Russian-Ukrainian con-  
87 flict, puts politics before science, which is against the very founding principles on which  
88 CERN was premised. It is not acceptable as it is contrary to the universal principles of sci-  
89 ence as being independent of political interests as well as of nationality, color, and gender.



Figure 1: In Russian military storage there were thousands of shells made of brass, the shells could be melted for use in the CMS detector (from [8])

90 Once adopted, this can be used as a template in future conflicts. As in the United Nations,  
91 we must instead insist that especially in difficult times, cooperation must continue in inter-  
92 national organization, rather than expelling countries from committees and organizations.

## 93 **2 The damage to international relations**

94 CERN is the international center for particle physics, with the world largest particle collider  
95 LHC, hosting the largest international collaborations ATLAS, CMS, ALICE and LHCb of up  
96 to 4000 scientists each. CERN is the only place at present, where fundamental physics at  
97 the forefront of highest energies can be performed, and where a new project like the Future  
98 Circular Collider (FCC) [13] is discussed, which is planned for the end of 2040 and expected  
99 to deliver data until the end of this century.

100 The decision of the LHC experiments at CERN\* [14] to remove all affiliations from the  
101 Russian and Belarusian authors in publications (examples in Refs. [15–18]) was an act of  
102 non-equal treatment depending on nationality, while other non-CERN international collab-  
103 orations continued with an equal treatment of all the authors (see e.g. Refs. [19–21]).

104 The consequences of the decision of the CERN council to stop further cooperation are  
105 epochal – CERN is not a national institute like DESY [22], which bans cooperation (although  
106 still participating in XFEL with Russian institutes [23]). A crucial point to note is that inter-  
107 national scientific cooperation with Russia still continues elsewhere, such as at XFEL [23],  
108 ESA [24], ITER [25], and ISS [26]. We think that CERN could have adopted other models of  
109 qualified cooperation, such as are *en vogue* at the Japanese research centre KEK and the Belle  
110 II experiment that it hosts, according to which scientific collaboration is not to be interpreted  
111 as an endorsement of the policies of the individual institutes or of their governments. Where  
112 there is a will, there is a way!

113 CERN is an international organization, endorsed by UNESCO, and has therefore respon-  
114 sibilities, which go much deeper than those of national institutes being affected by the na-  
115 tional policies, especially since CERN has been granted UN - observer status [27].

116 Excluding a whole community from international projects like the LHC means, that those  
117 scientists are excluded from participating and shaping fundamental science at the forefront  
118 of energies, that they are excluded from detector development, from analysis of the recorded  
119 data, and from any forthcoming discoveries, which are possible at highest energies. Further-  
120 more, scientists are excluded from social interactions and international chats during lunch  
121 or coffee break, which are essential ingredients for a peaceful cooperation between people,  
122 nations and states in the present and the future.

123 All this is even more regrettable, as CERN was in its 70-year history a role model for col-  
124 laborative scientific work and international collaboration. If CERN is to keep this role, also  
125 for the future projects and collaborative efforts, it is well advised to run it as a model for a  
126 World laboratory, where all those interested in common scientific goals and shared respon-  
127 sibilities are welcome. Shutting the doors for some countries, with whom CERN member

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\*The original documents of the decisions of the experiments are not available publicly, only internally.

128 countries have political differences, would seriously compromise this character.

129 The decision of the CERN council may also affect any future international projects: will  
130 countries still invest a significant amount of financial and personal resources in projects,  
131 where they risk to be excluded at some stage ? Will countries like China, or from the Middle-  
132 and Far East, from Africa and elsewhere still have trust in organizations like CERN ? Will  
133 they still risk any big financial investment or will they invest in projects in other regions,  
134 and even more dangerously, will there be more investment in military research instead of  
135 fundamental research ?

136 The decision of the CERN council to terminate the cooperation agreements between  
137 CERN and Russia and Belarus finally can lead to a break in the cooperation between Eu-  
138 ropean and Russian science and can lead to irreversible consequences on an international  
139 scale. Several countries may begin to question their cooperation with CERN. CERN might  
140 be caught in international courts in which Russian and Belarusian funding agencies will de-  
141 mand the return of their equipment and materials supplied to CERN over decades.

142 Cooperations and collaborations are to a large extent based on trust, trust that the in-  
143 vestment will pay off and trust that a cooperation will be at respect and frank goals. All  
144 this is now under question. The damage done by the CERN council decision goes much  
145 further than just banning common scientific publications. It created mis-trust and a shock  
146 and frustration that the scientific community as a whole did not oppose such discriminating  
147 decisions clearly.

### 148 **3 The Science4Peace Initiative**

149 With the CERN council decision, scientists from Russia and Belarus will have no longer  
150 access to the infrastructure at CERN, although many of the experimental colleagues have  
151 contributed very significantly to the construction, operation and maintenance of the exper-  
152 iments. In order to keep a certain level of trust and responsibility in an international or-  
153 ganization, everything must be done to ensure that scientists from Russia and Belarus who  
154 have contributed with know-how, with research, with building parts of the detector, with  
155 responsibilities in experimental analyses and in physics research will be granted to use any  
156 data and knowledge resulting from the experiments for scientific non-military purpose until  
157 completion of the experiments.

158 It is time to return to an equal-right, non-discriminatory treatment of all authors who  
159 have contributed to scientific results. A straight-forward solution has been adopted by the  
160 Belle II collaboration, who waived all affiliations in scientific publications [28].

161 In general, the organizational structure of international organizations like CERN must  
162 be reconsidered: the topics of research are still under the control of each individual scientist  
163 and one can decide which topic to work on and who to collaborate with. This decision is  
164 covered by the generally accepted principle of *Freedom of Science*, which has constitutional  
165 or legal status in most EU Member States [29] and many other countries and is covered by  
166 the *International Covenant on Economic, Social and Cultural Rights* by the United Nations [30].

167 Therefore it may only be appropriate that the scientists themselves play a larger role in the  
168 scientific planning and organization of their research, while the influence of politics must be  
169 reduced, such to avoid in future political decisions as the one of the CERN council.

170 In addition to a change in science policy, to return to the ideas of *Science for Peace*, each  
171 individual scientist believing in the universal and international ideas of scientific research,  
172 can contribute to a change by starting new and dedicated collaborations with scientists who  
173 are otherwise excluded. New projects and cooperations are rather easy in theory and phe-  
174 nomenology, and are being continued until today. In experimental particle physics, the situ-  
175 ation is more difficult, as access to detectors and accelerators as well as to the data which are  
176 recorded, is needed. However, since a few years an Open Data Portal [31] exists, where the  
177 LHC experiments provide a subset of their recorded data together with the relevant software  
178 and tools for further analysis. Some publications based on these Open Data have already  
179 been performed (e.g. in Refs [32,33]).

180 We therefore propose, as a Science4Peace initiative:

- 181 • grant every scientist who has contributed in the past to the experiments to use any data  
182 and knowledge resulting from the experiments for scientific non-military purpose until  
183 completion of the experiments,
- 184 • sign scientific publications only with names (not with institutes and laboratories as  
185 affiliations) to show that we are scientists committed to invest our knowledge and en-  
186 thusiasm into the scientific exchange, without being bound to the policies of nations  
187 and countries,
- 188 • allow and encourage international scientific cooperation between all countries orga-  
189 nized and committed to the United Nations
- 190 • continue with scientific communication between individuals and continue producing  
191 common scientific publications on fundamental physics,
- 192 • start dedicated new projects in theory and phenomenology, as well as in experimental  
193 physics based on openly accessible resources, between any interested scientists on the  
194 basis of universal scientific goals, independent on the nationality, gender or color of the  
195 scientists
- 196 • organize scientific conferences fully online to allow participation from everywhere  
197 without restrictions on nationality and funding opportunities for travel (as an addi-  
198 tional effect, this will reduce significantly travels and the ecological footprint) [34]
- 199 • organize international summer-schools (perhaps also fully online) for students.

200 The enormous consequences resulting from the decision of the CERN Council does not  
201 only affect the present ongoing research, but even more importantly affects directly the fu-  
202 ture of basic scientific research, and the by-now young scientists. Therefore this decision  
203 demands a common and cooperative action and reply, as a Science4Peace Initiative.

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