

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

4 All

5 March 7, 2024

7 **Abstract**

8 The armed invasion of Ukraine by the Russian Federation has adversely affected the
9 relations between Russia and the western countries. Among other aspects, it has put sci-
10 entific cooperation and collaboration into question and has changed the scientific land-
11 scape significantly. Cooperation between some western institutes with their Russian and
12 Belarusian partners were put on hold immediately after Feb 24, 2022. Lately, the CERN
13 council has decided in its meeting in Dec 2023 to stop cooperation agreements with Rus-
14 sian and Belarusian Institutes, dating back to the 1950s.

15 The Science4Peace idea, propagated by CERN until the beginning of 2022, has still
16 a high value, but the science institutions seem to be unable to formulate an independ-
17 ent stand in the current crisis. We argue that the scientific cooperation among scientists
18 must continue since fundamental science is by its nature an international discipline. A
19 ban on scientists from participating in the international cooperation and collaboration is
20 counterproductive and would put us back to a situation before World War II.

21 We propose measures to reactivate the peaceful cooperation of individual scientists on
22 fundamental research, in order to stimulate international cooperation for a more peaceful
23 world in the future. Specifically, we plead for finding ways to continue this cooperation
24 through international organizations, such as CERN, in Geneva, and JINR, in Dubna, Rus-
25 sia.

1 The historical international cooperation at CERN and the Science for Peace mission

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 [4] and then, in 1967, via the Institute for High Energy Physics in Protvino close to Serpukhov. 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 building of LHC [5] at CERN as well as the experimental detectors of the big LHC experiments was possible also because of a significant contribution from the Russian and Belarusian institutes. In particular, a part of the calorimeter [3] of the CMS experiment was built from the melted brass military navy shells (Fig.1), a wonderful extension of the *Swords to ploughshares* sculpture at the UN headquarter.

CERN is the international center for particle physics, with the world largest particle collider LHC, hosting the largest international collaborations ATLAS, CMS, ALICE and LHCb of up to 4000 scientists each. CERN is the only place at present, where fundamental physics at the forefront of highest energies can be performed, and where a new project like the Future Circular Collider (FCC) [6] is being discussed, which, if approved, is planned for the end of 2040 and expected to deliver data until the end of this century.

CERN is an international organization, established first at an intergovernmental meeting of UNESCO in Paris in December 1951 [7], and has therefore responsibilities, which go much deeper than those of national institutes being affected by the national policies, especially since CERN has been granted UN - observer status [8].

CERN has served as a model for the SESAME project [9,10] in the Middle East, as well as for the proposal to building a similar scientific infrastructure in the Western Balkans called SEEIST [11], bringing together scientists from Albania, Kosovo, Bosnia and Herzegovina, Montenegro and Serbia.



Figure 1: Thousands of Russian military shells made of brass were melted for the use in the CMS detector (from [3])

67 Fundamental research, since funded by public resources, and the advancement of knowl-
68 edge, are not just a global public goods but a powerful instrument for intercultural dialogue
69 and peace – especially during times of crisis. It is one of the greatest achievements that
70 results in fundamental research *shall have no concern with work for military requirements and*
71 *the results of its experimental and theoretical work shall be published or otherwise made generally*
72 *available*, as written in CERN’s convention [12]. Several other institutes and universities de-
73 clared, that their research is only for non-military purposes, as written in the so-called *Civil*
74 *Clause* [13,14].

75 The armed invasion of Ukraine by the Russian Federation at the end of February 2022
76 and the suffering inflicted on countless innocent civilians, including scientists, is against in-
77 ternational law and must be condemned in the strongest terms. Despite pro-war statements
78 from some Russian institutes, many Russian physicists opposed the war and immediately
79 signed petitions against it [15]. In March 2022, as a reaction to the war in Ukraine, many
80 national Western science institutions put bans on their historical scientific cooperation with
81 Russian institutions. In an article in the CERN courier in Sept 2022 the former CERN director
82 Herwig Schopper has argued "Science for Peace? More than ever" [16].

83 The International Union of Pure and Applied Physics (IUPAP) [17]) has taken a clear
84 position against exclusion of scientists from participating in conferences or events on the
85 basis of their nationality or their affiliation [18,19].

86 While the LHC experiments at CERN* [20] decided in Feb 2023 to remove all affiliations
87 from the Russian and Belarusian authors in publications (examples in Refs. [21–24]), other
88 non-CERN international collaborations continued with their original author-list, listing all
89 affiliations on equal footing (see e.g. Refs. [25–27]).

90 The ban on historical scientific cooperation unexpectedly also concerned CERN, whose
91 Council – where the member states of CERN are represented – recently deliberated on the
92 renewal of existing cooperation agreements with Russian and Belarusian Institutes – and
93 decided to stop these agreements [28,29].

94 In an opinion-view *Science needs cooperation, not exclusion* in the CERN courier of March
95 2024 [30] arguments for a continuing dialogue across all borders are given.

96 It is important to note is that international scientific cooperation with Russia still contin-
97 ues elsewhere, such as at XFEL [31], ESA [32], ITER [33], and ISS [34].

98 **2 The damage to international relations**

99 The decision of the CERN council in Dec 2023 to stop further cooperation with Russian and
100 Belarusian institutes marks a significant change in science diplomacy: this decision breaks
101 with CERN’s mission of *Science for Peace* [35]. The consequences of the decision of the CERN
102 council can hardly be estimated. The decision of the CERN council may affect any future
103 international projects: will countries still invest a significant amount of financial and per-
104 sonal resources in projects, where they risk to be excluded at some stage ? Will countries

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

105 like China, or from the Middle- and Far East, from Africa and elsewhere still have trust in
106 organizations like CERN ? Will they still risk any big financial investment or will they invest
107 in projects in other regions, and even more dangerously, will there be more investment in
108 military research instead of fundamental research ?

109 The decision of the CERN council to terminate the cooperation agreements might lead to
110 a break in the cooperation between European and Russian science and can lead to irreversible
111 consequences on an international scale. Several countries may begin to question their coop-
112 eration with CERN. CERN might be caught in international courts in which Russian and
113 Belarusian funding agencies will demand the return of their equipment and materials sup-
114 plied to CERN over decades.

115 Cooperations and collaborations are to a large extent based on trust, trust that the invest-
116 ment will pay off and trust that a cooperation will be at respect and frank goals. All this is
117 now under question. Already now we observe mis-trust, a shock and frustration that the
118 scientific community as a whole did not oppose such discriminating decisions clearly. Even
119 more, our Russian and Belarusian colleagues suddenly became *personae non gratae* at CERN.
120 Some of the consequences of this exclusion are already summarized in FAQ's from the CERN
121 user office [36], immediately after the decision of the CERN council in Dec 2023.

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

127 Excluding a significant part of the scientific community from international projects, like
128 the Large Hadron Collider (LHC) [5] at CERN, due to the ongoing Russian-Ukrainian con-
129 flict, puts politics before science, which is against the very founding principles on which
130 CERN was premised. It is against the universal principles of science as being independent
131 of political interests as well as of nationality, color, and gender. Once adopted, this can be
132 used as a template in future conflicts. On the contrary, as in the United Nations, we must
133 instead insist that especially in difficult times, cooperation must continue in international
134 organization, rather than expelling countries from committees and organizations.

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

142 CERN was in its 70-year history a role model for collaborative scientific work and in-
143 ternational collaboration, and projects like SESAME [10] and SEEIST [11] where constructed
144 having the success of CERN in mind. If CERN is to keep this role, also for the future projects
145 and collaborative efforts, it is well advised to run it as a model for a World laboratory, where
146 all those interested in common scientific goals and shared responsibilities are welcome. Shut-

147 ting the doors for some countries, with whom CERN member countries have political differ-
148 ences, would seriously compromise this character.

149 In a recent publication [37], the enormous consequences of sanctions in science were dis-
150 cussed, and it was argued, how bad they are for the scientific progress and the scientific
151 culture.

152 **3 The Science4Peace Initiative**

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

162 It is time to return to an equal-right, non-discriminatory treatment of all authors who
163 have contributed to scientific results. A straight-forward solution has been adopted by the
164 Belle II collaboration, who waived all affiliations in scientific publications [38].

165 Given the successful 70 year history of CERN as a place where international cooperations
166 were possible, independent of political conflicts, we must insist that political matters are put
167 into the background.

168 We therefore propose, as an immediate step, to limit negative consequences in the present
169 situation:

- 170 • grant continued access to data, and any knowledge resulting from the experiments, to
171 the collaborating scientists, without any discrimination. In the present crisis, CERN
172 should work out a *modus operandi* by fostering collaborations through international in-
173 stitutes, such as JINR, Dubna, Russia, enabling scientists of a large number of affiliated
174 countries access to CERN,
- 175 • sign scientific publications either only with names (leaving out affiliated institutes and
176 laboratories), or else state their affiliations, on an equal basis for all, acknowledging
177 also the support received from the organizations and funding agencies in carrying out
178 the experiments.

179 The topics of scientific research are still under the control of each individual scientist
180 and one can decide which topic to work on and who to collaborate with. This decision is
181 covered by the generally accepted principle of *Freedom of Science*, which has constitutional
182 or legal status in most EU Member States [39] and many other countries and is covered by
183 the *International Covenant on Economic, Social and Cultural Rights* by the United Nations [40].
184 Therefore it may only be appropriate that the scientists themselves play a larger role in the

185 scientific planning and organization of their research, while the influence of politics must be
186 reduced, such to avoid in future political decisions as the one of the CERN council.

187 Each individual scientist believing in the universal and international ideas of scientific
188 research and in the basic ideas of *Science for Peace*, can contribute to a change by starting new
189 and dedicated collaborations with scientists who are otherwise excluded. New projects and
190 cooperations are rather easy in theory and phenomenology, and are being continued until
191 today. In experimental particle physics, the situation is more difficult, as access to detectors
192 and accelerators as well as to the data which are recorded, is needed. However, since a
193 few years an Open Data Portal [41] exists, where the LHC experiments provide a subset of
194 their recorded data together with the relevant software and tools for further analysis. Some
195 publications based on these Open Data have already been performed (e.g. in Refs [42,43]).

196 We therefore propose, as a Science4Peace initiative:

- 197 • allow and encourage international scientific cooperation among all countries commit-
198 ted to the United Nations.
- 199 • continue with scientific communication between individuals and continue producing
200 common scientific publications on fundamental physics,
- 201 • start dedicated new projects in theory and phenomenology, as well as in experimental
202 physics based on openly accessible resources, for interested scientists on the basis of
203 universal scientific goals, independent on the nationality, gender or color of the scien-
204 tists
- 205 • organize scientific conferences fully online to allow participation from everywhere
206 without restrictions on nationality and funding opportunities for travel (as an addi-
207 tional effect, this will reduce significantly travels and the ecological footprint) [44]
- 208 • organize international summer-schools (perhaps also fully online) for students.

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

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