

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

4                                   All

5                                   February 22, 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 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 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, endorsed by UNESCO, 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 [7].

CERN has served as a model for the SESAME project [8,9] in the Middle East, as well as building a similar scientific infrastructure in the Western Balkans called SEEIST [10], bringing together scientists from Albania, Kosovo, Bosnia and Herzegovina, Montenegro and Serbia.

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



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

67 from some Russian institutes, many Russian physicists opposed the war and immediately  
68 signed petitions against it [11]. In March 2022, as a reaction to the war in Ukraine, many  
69 national Western science institutions put bans on their historical scientific cooperation with  
70 Russian institutions. In an article in the CERN courier in Sept 2022 the former CERN director  
71 Herwig Schopper has argued "Science for Peace? More than ever" [12].

72 The International Union of Pure and Applied Physics (IUPAP) [13]) has taken a clear  
73 position against exclusion of scientists from participating in conferences or events on the  
74 basis of their nationality or their affiliation [14, 15].

75 While the LHC experiments at CERN\* [16] decided in Feb 2023 to remove all affiliations  
76 from the Russian and Belarusian authors in publications (examples in Refs. [17–20]), other  
77 non-CERN international collaborations continued with their original author-list, listing all  
78 affiliations on equal footing (see e.g. Refs. [21–23]).

79 The ban on historical scientific cooperation unexpectedly also concerned CERN, whose  
80 Council – where the member states of CERN are represented – recently deliberated on the  
81 renewal of existing cooperation agreements with Russian and Belarusian Institutes – and  
82 decided to stop these agreements [24, 25].

83 It is important to note is that international scientific cooperation with Russia still contin-  
84 ues elsewhere, such as at XFEL [26], ESA [27], ITER [28], and ISS [29].

## 85 **2 The damage to international relations**

86 The decision of the CERN council in Dec 2023 to stop further cooperation with Russian and  
87 Belarusian institutes marks a significant change in science diplomacy: this decision breaks  
88 with CERN's mission of *Science for Peace* [30]. The consequences of the decision of the CERN  
89 council can hardly be estimated. The decision of the CERN council may affect any future  
90 international projects: will countries still invest a significant amount of financial and per-  
91 sonal resources in projects, where they risk to be excluded at some stage ? Will countries  
92 like China, or from the Middle- and Far East, from Africa and elsewhere still have trust in  
93 organizations like CERN ? Will they still risk any big financial investment or will they invest  
94 in projects in other regions, and even more dangerously, will there be more investment in  
95 military research instead of fundamental research ?

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

102 Cooperations and collaborations are to a large extent based on trust, trust that the invest-  
103 ment will pay off and trust that a cooperation will be at respect and frank goals. All this is  
104 now under question. Already now we observe mis-trust, a shock and frustration that the

---

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

105 scientific community as a whole did not oppose such discriminating decisions clearly. Even  
106 more, our Russian and Belarusian colleagues suddenly became *personae non gratae* at CERN.  
107 Some of the consequences of this exclusion are already summarized in FAQ's from the CERN  
108 user office [31], immediately after the decision of the CERN council in Dec 2023.

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

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

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

129 CERN was in its 70-year history a role model for collaborative scientific work and interna-  
130 tional collaboration, and projects like SESAME [9] and SEEIST [10] where constructed having  
131 the success of CERN in mind. If CERN is to keep this role, also for the future projects and col-  
132 laborative efforts, it is well advised to run it as a model for a World laboratory, where all those  
133 interested in common scientific goals and shared responsibilities are welcome. Shutting the  
134 doors for some countries, with whom CERN member countries have political differences,  
135 would seriously compromise this character.

136 In a recent publication [32], the enormous consequences of sanctions in science were dis-  
137 cussed, and it was argued, how bad they are for the scientific progress and the scientific  
138 culture.

### 139 **3 The Science4Peace Initiative**

140 With the CERN council decision, scientists from Russia and Belarus will have no longer  
141 access to the infrastructure at CERN, although many of the experimental colleagues have  
142 contributed very significantly to the construction, operation and maintenance of the exper-  
143 iments. In order to keep a certain level of trust and responsibility in an international or-

144 ganization, everything must be done to ensure that scientists from Russia and Belarus who  
145 have contributed with know-how, with research, with building parts of the detector, with  
146 responsibilities in experimental analyses and in physics research will be granted to use any  
147 data and knowledge resulting from the experiments for scientific non-military purpose until  
148 completion of the experiments.

149 It is time to return to an equal-right, non-discriminatory treatment of all authors who  
150 have contributed to scientific results. A straight-forward solution has been adopted by the  
151 Belle II collaboration, who waived all affiliations in scientific publications [33].

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

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

- 157 • grant continued access to data, and any knowledge resulting from the experiments, to  
158 the collaborating scientists, without any discrimination. In the present crisis, CERN  
159 should work out a *modus operandi* by fostering collaborations through international in-  
160 stitutes, such as JINR, Dubna, Russia, enabling scientists of a large number of affiliated  
161 countries access to CERN,
- 162 • sign scientific publications either only with names (leaving out affiliated institutes and  
163 laboratories), acknowledging also the support received from the organizations and  
164 funding agencies in carrying out the experiments.

165 The topics of scientific research are still under the control of each individual scientist  
166 and one can decide which topic to work on and who to collaborate with. This decision is  
167 covered by the generally accepted principle of *Freedom of Science*, which has constitutional  
168 or legal status in most EU Member States [34] and many other countries and is covered by  
169 the *International Covenant on Economic, Social and Cultural Rights* by the United Nations [35].  
170 Therefore it may only be appropriate that the scientists themselves play a larger role in the  
171 scientific planning and organization of their research, while the influence of politics must be  
172 reduced, such to avoid in future political decisions as the one of the CERN council.

173 Each individual scientist believing in the universal and international ideas of scientific  
174 research and in the basic ideas of *Science for Peace*, can contribute to a change by starting new  
175 and dedicated collaborations with scientists who are otherwise excluded. New projects and  
176 cooperations are rather easy in theory and phenomenology, and are being continued until  
177 today. In experimental particle physics, the situation is more difficult, as access to detectors  
178 and accelerators as well as to the data which are recorded, is needed. However, since a  
179 few years an Open Data Portal [36] exists, where the LHC experiments provide a subset of  
180 their recorded data together with the relevant software and tools for further analysis. Some  
181 publications based on these Open Data have already been performed (e.g. in Refs [37,38]).

182 We therefore propose, as a Science4Peace initiative:

- 183 • allow and encourage international scientific cooperation among all countries commit-  
184 ted to the United Nations.
- 185 • continue with scientific communication between individuals and continue producing  
186 common scientific publications on fundamental physics,
- 187 • start dedicated new projects in theory and phenomenology, as well as in experimental  
188 physics based on openly accessible resources, for interested scientists on the basis of  
189 universal scientific goals, independent on the nationality, gender or color of the scien-  
190 tists
- 191 • organize scientific conferences fully online to allow participation from everywhere  
192 without restrictions on nationality and funding opportunities for travel (as an addi-  
193 tional effect, this will reduce significantly travels and the ecological footprint) [39]
- 194 • organize international summer-schools (perhaps also fully online) for students.

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

## 199 **References**

- 200 [1] “United Nations Charter”, 26 June, 1945.
- 201 [2] Geneva Academy (Academy of International Humanitarian Law and Human Rights),  
202 “Today’s Armed Conflicts”, 2023.
- 203 [3] CMS Collaboration, “The CMS HCAL and Russian Navy Shells”, Nov, 2011.
- 204 [4] W. O. Lock, “A History of the Collaboration Between the European Organization for  
205 Nuclear Research (CERN) and the Joint Institute for Nuclear Research (JINR), and with  
206 Soviet Research Institutes in the USSR, 1955-1970”. CERN Yellow Report 75-7, 1975.
- 207 [5] “The Large Hadron Collider (LHC)”.
- 208 [6] “The Future Circular Collider”.
- 209 [7] CERN, “CERN is granted the status of observer to the United Nations General  
210 Assembly”, Dec, 2012.
- 211 [8] “SESAME: scientific excellence in the Middle East”.

- 212 [9] “Synchrotron-light for Experimental Science and Applications in the Middle East  
213 (SESAME)”.
- 214 [10] “The South East European International Institute for Sustainable Technologies  
215 (SEEIIST)”.
- 216 [11] “Open letter of Russian scientists and science journalists against the war with  
217 Ukraine”, Feb, 2022.
- 218 [12] H. Schopper, “Science For Peace? More than ever!”. CERN Courier, Sept, 2022.
- 219 [13] IUPAP, “Articles of Association”.
- 220 [14] IUPAP, “Use of IUPAP Affiliation at Conferences”.
- 221 [15] “IUPAP statement on the events occurring in ukraine”.
- 222 [16] R. V. Noorden, “LHC physicists resolve stalemate over Russian authors”. Nature, 17  
223 Feb., 2023.
- 224 [17] ALICE Collaboration, “Measurements of long-range two-particle correlation over a  
225 wide pseudorapidity range in p–Pb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV”, *JHEP* **01** (2024)  
226 199, arXiv:2310.07490.
- 227 [18] ATLAS Collaboration, “Studies of new Higgs boson interactions through nonresonant  
228 HH production in the  $b\bar{b}\gamma\gamma$  final state in pp collisions at  $\sqrt{s} = 13$  TeV with the ATLAS  
229 detector”, *JHEP* **01** (2024) 066, arXiv:2310.12301.
- 230 [19] CMS Collaboration, “Search for new Higgs bosons via same-sign top quark pair  
231 production in association with a jet in proton-proton collisions at  $s=13$ TeV”, *Phys. Lett.*  
232 *B* **850** (2024) 138478.
- 233 [20] LHCb Collaboration, “Measurement of the Branching Fraction of  $B^0 \rightarrow J/\psi\pi^0$   
234 Decays”, arXiv:2402.05528.
- 235 [21] Muon g-2 Collaboration, “Measurement of the Positive Muon Anomalous Magnetic  
236 Moment to 0.20 ppm”, *Phys. Rev. Lett.* **131** (2023), no. 16, 161802,  
237 arXiv:2308.06230.
- 238 [22] Belle-II Collaboration, “Measurement of  $CP$  asymmetries in  $B^0 \rightarrow \eta' K_s^0$  decays at Belle  
239 II”, arXiv:2402.03713.
- 240 [23] Daya Bay Collaboration, “First measurement of the yield of  $^8\text{He}$  isotopes produced in  
241 liquid scintillator by cosmic-ray muons at Daya Bay”, arXiv:2402.05383.
- 242 [24] CERN council, “Termination of the International Cooperation Agreement between  
243 CERN and the Republic of Belarus”, Dec, 2023.

- 244 [25] CERN council, "Termination of the International Cooperation Agreement between  
245 CERN and the Russian Federation", Dec, 2023.
- 246 [26] XFEL, "Partner countries of XFEL", 2024.
- 247 [27] ESA, "International Cooperation - European Space Agency (ESA)".
- 248 [28] ITER, "ITER Members", 2024.
- 249 [29] ISS, "International Space Station (ISS) – International Cooperation".
- 250 [30] CERN, "Science for Peace".
- 251 [31] CERN user office, "FAQ for those affiliated to RU-BY institutes", Dec, 2023.
- 252 [32] M. Albrecht et al., "Beyond a Year of Sanctions in Science", 11, 2023.  
253 arXiv:2311.02141.
- 254 [33] Belle II Collaboration, "Belle II Response to the Ongoing Russian Invasion of Ukraine".
- 255 [34] Ministerial Conference on the European Research Area, "Bonn Declaration on  
256 Freedom of Scientific Research", October, 2020.
- 257 [35] United Nations, "International Covenant on Economic, Social and Cultural Rights",  
258 1967.
- 259 [36] "CERN Open Data Portal".
- 260 [37] A. Larkoski et al., "Exposing the QCD Splitting Function with CMS Open Data",  
261 arXiv:1704.05066.
- 262 [38] A. Tripathee et al., "Jet Substructure Studies with CMS Open Data",  
263 arXiv:1704.05842.
- 264 [39] S. Görlinger, C. Merrem, M. Jungmann, and N. Aeschbach, "An evidence-based  
265 approach to accelerate flight reduction in academia", *npj Climate Action* **2** (2023), no. 1,  
266 41.