

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, marking 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 former Director-General Rolf Heuer wrote that "CERN has more than fulfilled the hopes and dreams of advancing science for peace" [5].

The building of LHC [6] 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) [7] 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 [8], 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 [9].

CERN has served as a model for the SESAME project [10,11] in the Middle East, as well as for the proposal to building a similar scientific infrastructure in the Western Balkans called SEEIST [12], bringing together scientists from Albania, Kosovo, Bosnia and Herzegovina, Montenegro and Serbia.



Figure 1: Over a million pounds of high-quality brass were melted from disarmed Russian military shells for use in a sophisticated CMS detector apparatus (from [3])

68 Fundamental research, since funded by public resources, and the advancement of knowl-
69 edge, are not just a global public goods but is also a powerful instrument for intercultural
70 dialogue and peace – especially during times of crisis. It is one of the greatest achievements
71 that results in fundamental research *shall have no concern with work for military requirements*
72 *and the results of its experimental and theoretical work shall be published or otherwise made generally*
73 *available*, as written in CERN’s convention [13]. Several other institutes and universities de-
74 clared, that their research is only for non-military purposes, as written in the so-called *Civil*
75 *Clause* [14,15].

76 **2 The change in science policy and the damage to international** 77 **relations**

78 The armed invasion of Ukraine by the Russian Federation at the end of February 2022 and the
79 suffering inflicted on countless innocent civilians, including scientists, has received strong in-
80 ternational condemnation. Despite pro-war statements from some Russian institutes, many
81 Russian physicists opposed the war and immediately signed petitions against it [16]. In
82 March 2022, as a reaction to the war in Ukraine, many national Western science institutions
83 put bans on their historical scientific cooperation with Russian institutions. In an article in
84 the CERN courier in Sept 2022 the former CERN director Herwig Schopper has argued "Sci-
85 ence for Peace? More than ever" [17].

86 The International Union of Pure and Applied Physics (IUPAP) [18]) has taken a clear
87 position against exclusion of scientists from participating in conferences or events on the
88 basis of their nationality or their affiliation [19,20].

89 In Feb 2023 the LHC experiments at CERN* [21] removed all affiliations from the authors
90 from the Russian and Belarusian institutions in publications(examples in Refs. [22–25]) lead-
91 ing to a discrimination. Other non-CERN international collaborations continued with their
92 original author-list, listing all affiliations on equal footing (see e.g. Refs. [26–28]). It is impor-
93 tant to note is that international scientific cooperation with Russia still continues elsewhere,
94 such as at XFEL [29], ESA [30], ITER [31], and ISS [32].

95 The ban on historical scientific cooperation unexpectedly also concerned CERN, whose
96 Council – where the member states of CERN are represented – recently deliberated on the
97 renewal of existing cooperation agreements with Russian and Belarusian Institutes – and
98 decided to stop these agreements [33,34]. However, this decision went much further than
99 removing the framework for establishing scientific collaboration, it also called for termina-
100 tion of exiting agreements, therefore denying access of Russian and Belarusian scientists to
101 scientific data and equipment that they jointly own (with just one of many examples shown
102 in Fig. 1).

103 In an opinion-view *Science needs cooperation, not exclusion* in the CERN courier of March
104 2024 [35] arguments for a continuing dialogue across all borders are given. *The Geneva Ob-*
105 *server* reported on the consequences of the CERN council decision [36].

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

106 The decision of the CERN council in Dec 2023 to stop further cooperation with Rus-
107 sian and Belarusian institutes marks a significant change in science diplomacy: this decision
108 breaks with CERN's mission of *Science for Peace* [37]. The consequences of the decision of the
109 CERN council can hardly be estimated. The decision of the CERN council may affect any
110 future international projects: will countries still invest a significant amount of financial and
111 personal resources in projects, where they risk to be excluded at some stage ? Will countries
112 like China, or from the Middle- and Far East, from Africa and elsewhere still have trust in
113 organizations like CERN ? Will they still risk any big financial investment or will they invest
114 in projects in other regions, and even more dangerously, will there be more investment in
115 military- instead of fundamental research ?

116 The decision of the CERN council to terminate the cooperation agreements might lead
117 to a break in the cooperation between European and Russian science and can lead to irre-
118 versible consequences on an international scale. Several countries may begin to question
119 their cooperation with CERN.

120 Cooperations and collaborations are to a large extent based on trust, trust that the invest-
121 ment will pay off and trust that a cooperation will be at respect and frank goals. All this is
122 now under question. Already now we observe mis-trust, a shock and frustration that the
123 scientific community as a whole did not oppose such discriminating decisions clearly. Even
124 more, our Russian and Belarusian colleagues suddenly became *personae non gratae* at CERN.
125 Some of the consequences of this exclusion are already summarized in FAQ's from the CERN
126 user office [38], immediately after the decision of the CERN council in Dec 2023.

127 Limiting international scientific collaboration is against the advancement of knowledge,
128 which is not just a global public good but also a powerful instrument for intercultural dia-
129 logue and peace – especially during times of crisis. If we take the UN charter seriously, we
130 must ask which measures are appropriate for the prevention and removal of threats to the
131 peace. It is important to note, that the UN (with CERN holding UN observer status [9]) did
132 not endorse any scientific exclusion of researchers from any international cooperation.

133 Excluding a significant part of the scientific community from international projects, like
134 the Large Hadron Collider (LHC) [6] at CERN puts politics before science, which is against
135 the very founding principles on which CERN was premised. It is against the universal prin-
136 ciples of science as being independent of political interests as well as of nationality, color, and
137 gender. Once adopted, this can be used as a template in future conflicts. On the contrary, as
138 in the United Nations, we must instead insist that especially in difficult times, cooperation
139 must continue in international organization, rather than expelling countries from committees
140 and organizations.

141 Excluding a whole community from international projects like the LHC means, that those
142 scientists are excluded from participating and shaping fundamental science at the forefront
143 of energies, that they are excluded from detector development, from analysis of the recorded
144 data, and from any forthcoming discoveries, which are possible at highest energies. Fur-
145 thermore, scientists are excluded from social interactions and international chats which are
146 essential ingredients for a peaceful cooperation between people, nations and states in the
147 present and the future.

148 CERN was in its 70-year history a role-model for collaborative scientific work and in-
149 ternational collaboration, and projects like SESAME [11] and SEEIST [12] where constructed
150 having the success of CERN in mind. If CERN is to keep this role, also for future projects and
151 collaborative efforts, it is well advised to run it as a model for a World laboratory, where all
152 those interested in common scientific goals and shared responsibilities are welcome. Shut-
153 ting the doors for some countries, with whom CERN member countries have political differ-
154 ences, would seriously compromise this character.

155 In a recent publication [39], the enormous consequences of sanctions in science were dis-
156 cussed, and it was argued, how bad they are for the scientific progress and the scientific
157 culture.

158 **3 The Science4Peace Initiative**

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

168 It is time to return to an equal-right, non-discriminatory treatment of all authors who
169 have contributed to scientific results. A straight-forward solution has been adopted by the
170 Belle II collaboration, who waived all affiliations in scientific publications [40].

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

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

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

185 The topics of scientific research are still under the control of each individual scientist
186 and one can decide which topic to work on and who to collaborate with. This decision is
187 covered by the generally accepted principle of *Freedom of Science*, which has constitutional
188 or legal status in most EU Member States [41] and many other countries and is covered by
189 the *International Covenant on Economic, Social and Cultural Rights* by the United Nations [42].
190 Therefore it may only be appropriate that the scientists themselves play a larger role in the
191 scientific planning and organization of their research, while the influence of politics must be
192 reduced, such to avoid in future political decisions as the one of the CERN council.

193 Each individual scientist believing in the universal and international ideas of scientific
194 research and in the basic ideas of *Science for Peace*, can contribute to a change by starting new
195 and dedicated collaborations with scientists who are otherwise excluded. New projects and
196 cooperations are rather easy in theory and phenomenology, and are being continued until
197 today. In experimental particle physics, the situation is more difficult, as access to detectors
198 and accelerators as well as to the data which are recorded, is needed. However, since a
199 few years an Open Data Portal [43] exists, where the LHC experiments provide a subset of
200 their recorded data together with the relevant software and tools for further analysis. Some
201 publications based on these Open Data have already been performed (e.g. in Refs [44, 45]).

202 We propose, as a Science4Peace initiative:

- 203 • allow and encourage international scientific cooperation among all countries commit-
204 ted to the United Nations.
- 205 • continue with scientific communication between individuals and continue producing
206 common scientific publications on fundamental physics,
- 207 • start dedicated new projects in theory and phenomenology, as well as in experimental
208 physics based on openly accessible resources, for interested scientists on the basis of
209 universal scientific goals, independent on the nationality, gender or color of the scien-
210 tists
- 211 • organize scientific conferences fully online to allow participation from everywhere
212 without restrictions on nationality and funding opportunities for travel (as an addi-
213 tional effect, this will reduce significantly travels and the ecological footprint) [46]
- 214 • organize international summer-schools (perhaps also fully online) for students.

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

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