Request for support for CERN's next flagship project in the next European Union Multiannual Financial Framework (2028-2034)

CERN, the European Organization for Nuclear Research, is the world's leading laboratory for high-energy particle physics. It designs, builds and operates a unique complex of facilities: particle accelerators, particle detectors and computing infrastructure. The Organization's 70-year history is adorned with great discoveries - not least that of the Higgs boson in 2012 - which have crucially contributed to humankind's understanding of the fundamental constituents and laws of nature, as well as the structure and evolution of the Universe.

CERN's ambitious scientific goals and advanced facilities require the development of cutting-edge, multidisciplinary technologies in many fields, including superconducting magnets and materials, robotics, electronics, vacuum and cryogenics, artificial intelligence, quantum technologies, distributed computing and big data. These technologies have given Europe and the world high-impact applications and benefits, ranging from the World Wide Web to accelerators used in cancer treatment facilities. Furthermore, CERN has developed wide-ranging collaborations with European industry in order to build its complex, sophisticated instruments, as well as numerous R&D partnerships with major enterprises, small and medium-sized companies and start-ups in numerous areas of technology. In this way, CERN contributes to the competitiveness of Europe's industrial landscape and to boosting European innovation, autonomy, security and sovereignty.

At any given time, the Laboratory is training some 5500 people (physicists, engineers, IT professionals, and technicians). Most of these young people subsequently find jobs outside particle physics, mostly in industry, other areas of research, or in the public sector. CERN thus provides European society with a continuous stream of highly skilled young people trained in science, technology, engineering and mathematics (STEM). It also attracts talented people to Europe and supports the mobility of researchers and other personnel across the continent.

CERN is the shared laboratory of all its Member and Associate Member States and, as such, it offers a platform of integration and federation of national research institutes, laboratories, universities and industries across Europe. It thus helps to increase the coordination between different ecosystems and to reinforce the European Research Area and its cohesion.

CERN is also a brilliant example of international collaboration and European impact beyond its borders, with its community of some 17 500 people across 110 nationalities, and since its inception it has exemplified the successful implementation of open science in all its facets.

CERN has 24 Member States[1] and 10 Associate Member States[2]. All European Union (EU) member countries are either Member or Associate Member States of CERN, except for Ireland, Luxembourg and Malta[3]. CERN has also profound links with non-Membre States such as the United States, Japan and Canada. The EU has the status of Observer in the CERN Council, and CERN and the European Commission have a longstanding partnership, particularly in the context of successive Framework Programmes.

Beyond its current programme of research and its main accelerator facility, the Large Hadron Collider (LHC), CERN is currently performing a feasibility study for its potential next flagship project, the Future Circular Collider (FCC). The FCC would be the most extraordinary instrument ever built by humanity to study the laws of the Universe at the most fundamental level; its physics objectives include unveiling the composition of dark matter, which makes up about 25% of the Universe, developing a detailed understanding of the Higgs boson, a very special particle associated with the origin and possibly also the ultimate fate of the Universe, and searching for new particles and forces that could help answer other outstanding questions.

Construction and operation of the FCC would secure continued world leadership for Europe in high-energy particle physics and related advanced technologies until the end of the 21st century. China is considering building a similar machine. As emphasised in the report by Mario Draghi on the future of European competitiveness, "*If China were to win this race and its circular collider were to start working before CERN's, Europe would risk losing its leadership in particle physics, potentially jeopardising CERN's future*."

The FCC project will be considered for approval by the CERN Council around 2028, if the necessary funding streams have been identified by that time. The total investment cost of the FCC, including the 91-km tunnel ring, the accelerator and the experiments, is estimated to be around 15 billion Swiss francs in capital expenditure. The major part of the funding would come from CERN's regular annual budget.

Additional contributions from outside the CERN budget will be needed and could be provided by countries outside Europe, in particular the United States, which has already indicated interest in the project, as well as, potentially, private donors. A significant contribution in the next EU Multiannual Financial Framework (2028-2034) would also be crucial to a) making the FCC a reality and thereby maintaining European leadership in a critical area of groundbreaking science and technology; and b) ensuring the project remains predominantly European in nature.

As Mario Draghi's report underlines, "*Refinancing CERN and ensuring its continued global leadership in frontier research should be regarded as a top EU priority, given the objective of maintaining European prominence in this critical area of fundamental research, which is expected to generate significant business spillovers in the coming years.*"

[1] CERN's Member States are Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Israel, Italy, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Spain, Sweden, Switzerland and the United Kingdom.

[2] CERN's Associate Member States are Brazil, Croatia, Cyprus, India, Latvia, Lithuania, Pakistan, Slovenia, Türkiye and Ukraine.

[3] Ireland will become an Associate Member State in the first half of 2025. Malta has signed a cooperation agreement with CERN in 2008. Discussions on a possible cooperation agreement are ongoing with Luxembourg, following the partnership agreed upon between the Luxembourg Institute of Science and Technology, the UN World Food Programme and CERN in October 2024 on AI to fight hunger.