Memorandum of Understanding for the Future Circular Collider (FCC) Feasibility Study hosted by CERN

THE INSTITUTES, LABORATORIES, UNIVERSITIES AND THEIR FUNDING AGENCIES AND OTHER SIGNATORIES OF THIS MEMORANDUM OF UNDERSTANDING AND CERN AS THE HOST LABORATORY **("**the Participants**")**

Whereas

At a dedicated session of the CERN Council held on 19 June 2020, the Council updated the European Strategy for Particle Physics, according to which, following on from the FCC conceptual design study performed in the implementation of the 2013 Strategy Update, an FCC feasibility study (the "Feasibility Study") should be undertaken, based on the following principles:

"…the particle physics community is ready to take the next step towards even higher energies and smaller scales. The vision is to prepare a Higgs factory, followed by a future hadron collider with sensitivity to energy scales an order of magnitude higher than those of the LHC, while addressing the associated technical and environmental challenges."

"Europe, together with its international partners, should investigate the technical and financial feasibility of a future hadron collider at CERN with a centre-of-mass energy of at least 100 TeV and with an electron-positron Higgs and electroweak factory as a possible first stage. Such a feasibility study of the colliders and related infrastructure should be established as a global endeavour and be completed on the timescale of the next Strategy update."

"An ambitious next-generation collider project will require global collaboration and a long-term commitment to construction and operations by all parties. CERN should initiate discussions with potential major partners as part of the feasibility study for such a project being hosted at CERN."

"The relationship between the particle physics community and the European Commission should be further strengthened, exploring funding mechanism opportunities for the realisation of infrastructure projects and R&D programmes in cooperation with other fields of science and industry."

On 17 June 2021, the CERN Council approved the organisational structure for the Feasibility Study.[1]

[1] http://cds.cern.ch/record/2774006/files/English.pdf

It is hereby understood as follows:

1. Purpose of this Memorandum

1.1. This Memorandum establishes a common understanding among the Participants of the collaborative effort required for the execution of the Feasibility Study. The Feasibility Study and its results will be used for peaceful purposes only.

1.2. It is expressly acknowledged that, except for Articles 1.1, 4.4, 4.5, 5, 7 and this Article, this Memorandum is not legally binding and each Participant's involvement in the Feasibility Study is on a "best-effort" basis. This Memorandum does not imply any commitment of resources. Each Participant's involvement in the Feasibility Study is governed, as the case may be, by its internal policies and regulations and the laws to which it is subject.

2. Scope

2.1 Pursuant to the European Strategy for Particle Physics Update 2020, the Feasibility Study should address, *inter alia*, *"…the possibility of constructing such a large infrastructure in the vicinity of CERN, the financial plan to complete and operate a project of this scale with international partners, its governance and the handling of the energy consumption"*.

2.2 Specifically, at the date of conclusion of this Memorandum it is understood that the main emphasis of the Feasibility Study will be on the feasibility of a new particle collider research infrastructure in an 80 to 100 km long circular tunnel.

The Feasibility Study will investigate the technical and financial feasibility of a future hadron collider (FCC-hh) with a centre-of-mass energy of at least 100 TeV and with an electron-positron Higgs and electroweak factory (FCC-ee) as a possible first stage. The Feasibility Study aims at demonstrating the geological, technical and environmental, and administrative feasibility of the tunnel and the surface areas. It will optimise the placement and layout of the ring, the related infrastructure, the two collider designs and their respective injector chains, and support targeted R&D programmes to develop key technologies. Physics cases and detector concepts for both colliders will be consolidated. The infrastructure optimisation will take into account the requirements for both the FCC-ee lepton collider and the FCC-hh hadron collider, including their respective detectors.

The Feasibility Study will also include the development of an implementation scenario in France and Switzerland, CERN's Host States, including all necessary steps to enable timely commencement of construction should the CERN Council approve the launch of the project, as well as the analysis of the environmental and the socio-economic impact of the infrastructure.

3. Organization

3.1 CERN will host the Feasibility Study, under the overall authority of the CERN Council. The Feasibility Study will be executed through the following entities [2]:

(i) A Steering Committee ("the Steering Committee"), the mandate of which is to provide organisational and technical supervision for the execution of the Feasibility Study, under the strategic guidance of the CERN Council;

(ii) A Collaboration Board, the mandate of which is to review the work needs and resource requirements and their sharing among the Participants;

(iii) A Scientific Advisory Committee, the mandate of which is to follow and review the implementation of the Feasibility Study, giving scientific and technical advice to the Steering Committee and the Coordination Group;

(iv) A Coordination Group, chaired by a Study Leader appointed by the CERN Director-General ("the Study Leader"), the mandate of which is to ensure the implementation of the work packages.

3.2 The Study Leader will be supported by CERN for matters concerning project and process definition and monitoring, core processes and transversal functions such as finance and cost management, schedule management, quality management, risk management, contract management and legal support, procurement, accounting, information technologies support and information management.

4. Contributions by the Participants

4.1 Each Participant's contribution to the Feasibility Study will be laid down in Addenda to this Memorandum, which will be signed by the Study Leader (or his designated representative) and an authorised representative of the Participant.

4.2 The Participants may, between themselves, or with any other entity, enter into arrangements or agreements as may be necessary for the delivery of their contributions, provided always that the terms of such arrangements or agreements will be consistent with the provisions of this Memorandum.

4.3 Except as agreed otherwise, each Participant will bear the cost of its contribution to the Feasibility Study. A Participant can contribute in terms of funds, expertise, equipment, materials, knowledge and/or other resources.

4.4 It is understood that the activities of the Coordination Group, including the Study Leader, do not diminish the Participants' responsibility for the delivery of their contributions, nor the responsibility for their personnel, including but not limited to matters concerning social insurance.

[2] Further information on each of these bodies, including their composition, is available in the CERN Council document: http://cds.cern.ch/record/2774006/files/English.pdf

4.5 Insofar as required, where a Participant's personnel performs activities at CERN, they may be granted the status of associate member of CERN's personnel. The Participant will ensure that health insurance cover is in place for such personnel at levels that are adequate in CERN's host states, Switzerland and France.

4.6 Participants and personnel affiliated with a Participant will be registered in the "Greybook" at CERN.

5. Intellectual Property

5.1. Title in intellectual property that is developed by a Participant in the execution of this Memorandum will be vested in that Participant (or if developed collectively by two or more Participants, vested in those Participants), who will grant the other Participants a free, non-exclusive licence for the use of such intellectual property in the execution of their scientific programmes, including their participation in the Feasibility Study and the possible construction and operation of a future circular collider infrastructure at CERN.

5.2. Each Participant that provides intellectual property under this Memorandum is understood to be giving no warranty in respect of such intellectual property and any Participant using such intellectual property will be exclusively liable for any cost and expense resulting from such use.

6. Publications

6.1. The Participants will jointly disseminate the results of their collaboration as Open Access publications and as Open Data on dedicated platforms.

6.2. Publications will acknowledge the collaboration between the Participants, including, wherever appropriate, the experts having taken part in the development of the results covered by the publication.

7. Liability

Except as expressly provided in this Memorandum, the Participants will have no liability in connection with their participation in the Feasibility Study.

8. Duration

8.1. This Memorandum will remain in force for as long as required to give effect to its provisions.

8.2. In recognition of the fact that this Memorandum does not imply any commitment of resources, a Participant may withdraw from this Memorandum by giving reasonable written notice to CERN as the host organization.

8.3. Signature of this Memorandum by a Participant is without prejudice to the completion of any deliverables committed to be provided by it under the Memorandum of Understanding for the Future Circular Collider (FCC) Study hosted by CERN and its related Addenda, which covered the previous phase of the FCC.

8.4. This Memorandum will also apply to any activities performed by a Participant in the execution of the Feasibility Study prior to such Participant's signature of this Memorandum.

Signed by the authorised representatives of:

For the European Organization for Nuclear Research (CERN) as the Host Organization	**For the**
Michael Benedikt Study Leader	
Date:	Date: