

SCIENTIFIC AND TECHNICAL COOPERATION

Accelerator

Addendum III to Protocol III

Between the

UNITED STATES OF AMERICA

and the EUROPEAN ORGANIZATION

FOR NUCLEAR RESEARCH

To the Agreement of May 7, 2015

Signed at Geneva and Washington

December 11 and 30, 2020

Entered into Force December 30, 2020



NOTE BY THE DEPARTMENT OF STATE

Pursuant to Public Law 89—497, approved July 8, 1966
(80 Stat. 271; 1 U.S.C. 113)—

“ . . . the Treaties and Other International Acts Series issued under the authority of the Secretary of State shall be competent evidence . . . of the treaties, international agreements other than treaties, and proclamations by the President of such treaties and international agreements other than treaties, as the case may be, therein contained, in all the courts of law and equity and of maritime jurisdiction, and in all the tribunals and public offices of the United States, and of the several States, without any further proof or authentication thereof.”

ADDENDUM III

to

ACCELERATOR PROTOCOL III

between

**THE DEPARTMENT OF ENERGY
OF THE UNITED STATES OF AMERICA (DOE)**

and

**THE EUROPEAN ORGANIZATION
FOR NUCLEAR RESEARCH (CERN)**

to

THE CO-OPERATION AGREEMENT

concerning

**SCIENTIFIC AND TECHNICAL CO-OPERATION
IN NUCLEAR AND PARTICLE PHYSICS**

2020

Addendum III to Accelerator Protocol III for Participation by the U.S. Department of Energy in the Future Circular Collider Feasibility Study

The Department of Energy of the United States of America (“DOE”),

and

The European Organization for Nuclear Research (“CERN”),
an Intergovernmental Organization having its seat at Geneva, Switzerland,

(hereafter collectively referred to as “the Parties”):

CONSIDERING:

That the Parties collaborated to their mutual benefit under the International Co-Operation Agreement Concerning Scientific and Technical Co-Operation on Large Hadron Collider (LHC) Activities signed December 8, 1997;

That the Parties successfully participated in the original construction activities of the LHC accelerator and in the exploitation of the LHC under an Accelerator Protocol I signed December 19, 1997, and continued their collaboration on LHC commissioning and consolidation activities under an Accelerator Protocol II signed July 11, 2014;

That the Parties renewed their collaboration under the Co-Operation Agreement Concerning Scientific and Technical Co-Operation in Nuclear and Particle Physics signed May 7, 2015 (hereinafter the “2015 Co-Operation Agreement”), and under Accelerator Protocol III, signed December 18, 2015 (hereinafter “Accelerator Protocol III”) on the LHC accelerator consolidation plan and the LHC accelerator upgrade program;

That the Parties established a common understanding of their collaboration in the design study for a Future Circular Collider (“FCC”) under Addendum I to Accelerator Protocol III signed December 18, 2015;

That at a dedicated session of the CERN Council held on June 19, 2020, the CERN Council updated the European Strategy for Particle Physics that states in its Preamble (CERN-ESU-015 document; dated July 10, 2020):

“...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...”

and recommends in Section 3 (titled “High-priority future initiatives”):

“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;”

That cooperation by the Parties on the FCC offers unique opportunities to advance next-generation accelerator technologies and extend the scientific discovery potential for the field of particle physics;

That the results of the feasibility study of the FCC (the “FCC Feasibility Study”) must be available by the next update of the European Strategy for Particle Physics, foreseen to take place circa 2026, in time for a decision on the project approval and commencement of construction of the FCC infrastructure before the end of the decade; and

That it is in the mutual interest of the Parties to establish a framework in accordance with Accelerator Protocol III on the participation by DOE in the FCC Feasibility Study, under this Addendum III (hereinafter “Addendum”) to Accelerator Protocol III,

HAVE AGREED AS FOLLOWS:

Article 1

Purpose

The purpose of this Addendum is to define the framework under which DOE, the U.S. funding agency, and U.S. universities, national laboratories, and other organizations (hereinafter collectively referred to as the "U.S. Participating Organizations") shall participate in the FCC Feasibility Study being carried out as a global cooperative effort hosted by CERN.

Article 2

Scope

2.1 The U.S. Participating Organizations plan to contribute to the following FCC Feasibility Study activities that are of mutual interest to the Parties:

- (1) Near- to medium-term (3 – 10 years) activities:
 - (a) Overall FCC concept optimization:
 - (i) Integrated optimization of machine optics and layout, civil engineering and technical infrastructure design in view of optimum implementation;
 - (ii) Civil engineering design optimization;
 - (iii) Optimization of beam optics and beam dynamics; and
 - (iv) Technical infrastructure design and safety design.
 - (b) Beam physics studies covering:
 - (i) Relevant areas of collider design and corresponding simulation code developments; and
 - (ii) High beam current and high power operation, collimation, and machine protection.
 - (c) Key technology developments in the areas of:
 - (i) Superconducting radiofrequency ("RF") cavity research and development ("R&D"), including copper cavity production, coating technologies and bulk niobium cavities;
 - (ii) Cryo-module development in view of optimized energy efficiency;
 - (iii) High-efficiency RF power source development; and
 - (iv) In view of a future electron-positron collider, R&D activities covering:
 - Beam instrumentation, including beam-position-monitors, beam-loss monitors, and lepton polarimeter;

- Beam dynamics and stability;
 - RF system concept and design (including beam feedback and correction systems);
 - Vacuum system and impedance/surface aspects;
 - Polarization and energy calibration; and
 - Machine detector interface, radiation shielding, synchrotron radiation masking, and superconducting final quadrupole.
- (2) Longer-term (5 – 20 years) activities:
- (a) High-field magnet R&D, for both Nb₃Sn and high-temperature superconductor-based technologies, in view of a future hadron collider, including:
- (i) Development of higher performance wires;
 - (ii) Magnet design optimization and prototyping; and
 - (iii) Auxiliary systems optimization.
- (3) In view of preparation for project construction:
- (a) Development of concepts of time- and cost-effective tunnelling techniques in view of potential contributions by DOE via U.S. Participating Organizations; and
- (b) Identification of potential areas for other in-kind contributions, which for example may include, but are not limited to, superconducting RF systems and advanced technical infrastructure systems.
- 2.2 Final responsibilities and detailed delivery schedules for activities identified in Article 2.1 of this Addendum shall be specified in Memoranda of Understanding (hereinafter “MOUs”) that shall be consistent with the FCC Feasibility Study framework, in accordance with Article 3 of Accelerator Protocol III.

Article 3

Membership of Committees

In addition to Article 4 of Accelerator Protocol III, it is agreed that representatives from DOE or CERN shall be able to serve as members of any committee, council, board, task force, or other similar group (hereinafter “committee”) that may be convened by the other Party, respectively, on any matters related to Accelerator Protocol III and this Addendum. Membership in a committee shall take effect upon written confirmation from the receiving

Party in response to a written request by the other Party, where the designated representative has agreed to serve on the committee.

Article 4

Entry and Exit Arrangements

- 4.1 The Parties' duty to facilitate the entry and exit of personnel and deliverables, as set out in Article 7 of the 2015 Co-Operation Agreement, shall extend to the U.S. Participating Organization(s).
- 4.2 Except as agreed otherwise by the Parties, ownership of and all risks related to deliverables owned by the shipping Party shall transfer to the receiving Party upon delivery and successful completion of a visual inspection, as attested by a written report by the receiving Party.
- 4.3 Disposal of deliverables upon completion of their use shall be the responsibility of the Party owning such deliverables at the time of their disposal.

Article 5

Liability

- 5.1 Each Party's participation in the work covered by this Addendum is on a best-effort basis and without any warranty.
- 5.2 In the event that damages are incurred in the course of, or arising out of, the execution of this Addendum, the Parties shall consult on appropriate methods of settlement.

Article 6

Entry into Force, Duration, and Termination

This Addendum shall enter into force upon signature of the last of the Parties to sign. This Addendum shall remain in force until the completion of all activities under this Addendum is confirmed by mutual written decision of the Parties, unless a written notice of termination is given by one Party to the other Party at least six (6) months prior to the date of termination, so long as the 2015 Co-Operation Agreement and Accelerator Protocol III remain in force.

Article 7

Amendment

The Parties may amend this Addendum at any time by mutual written consent, so long as the 2015 Co-Operation Agreement, Accelerator Protocol III, and this Addendum remain in force.

Article 8

Final Provisions

- 8.1 Each Party's participation in the activities contemplated by this Addendum is subject to the availability of appropriated funds, personnel, and other resources. The U.S. Participating Organizations and CERN shall each be responsible for their own personnel and contractors, in particular as far as salaries, allowances, social and health insurance coverage and travel costs are concerned.
- 8.2 This Addendum is done pursuant to Article 7 of Accelerator Protocol III and is subject to and governed by the terms of the 2015 Co-Operation Agreement and Accelerator Protocol III.
- 8.3 The provisions of the 2015 Co-Operation Agreement, Accelerator Protocol III, this Addendum and any associated MOUs, including in terms of intellectual property, ownership and shipment of deliverables, export control, liability and dispute settlement, set out the entire and exclusive understanding in the subject matter. The foregoing is without prejudice to each Party's entitlement to conclude such subsidiary agreements between the Parties or with U.S. Participating Organizations as they may mutually decide to conclude, it being understood that should any conflict arise, the provisions of the 2015 Co-Operation Agreement, Accelerator Protocol III, this Addendum and any associated MOUs shall prevail over the provisions of such subsidiary agreements.
- 8.4 Notwithstanding and without prejudice to Article 8.3 of this Addendum, it is agreed in respect of deliverables provided and work executed by a U.S. Participating Organization or CERN, directly or by its contractors, that the granting of access to its facility by CERN or the receiving U.S. Participating Organization shall be subject to the receiving entity's administrative and technical supervision and control, as well as to compliance with the receiving entity's applicable rules with regard to

admission to and use of the premises, including safety, operating and health-physics procedures, environmental protection, access to information, cyber-security, hours of work, and conduct. Employees, contractors and representatives of the U.S. Participating Organization concerned or CERN shall execute all documents required by CERN or the receiving U.S. Participating Organization acknowledging and agreeing to comply with such applicable rules, failing which CERN or the receiving U.S. Participating Organization may, without prejudice to any other legal or contractual rights, issue an order stopping all or any part of the U.S. Participating Organization's or CERN's activities, or those of its contractors, at its premises.


DONE, in duplicate, in the English language.

**FOR THE DEPARTMENT
OF ENERGY OF THE UNITED
STATES OF AMERICA:**



Chris Fall
Director
Office of Science

**FOR THE EUROPEAN
ORGANIZATION FOR NUCLEAR
RESEARCH:**



Fabiola Gianotti
Director-General
European Organization for
Nuclear Research

Signed on: 30 December 2020

Place: Washington DC

Signed on: 11 December 2020

Place: Geneva

