

ADDENDUM NO. 2
KR5427/TE
TO
FRAMEWORK COLLABORATION AGREEMENT
KN 4657/DG

BETWEEN: THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (“CERN”), an Intergovernmental Organization having its seat at Geneva, Switzerland,

AND: THE ITALIAN NATIONAL INSTITUTE FOR NUCLEAR PHYSICS (“INFN”), established in Rome, Italy,

AND THE DUTCH NATIONAL INSTITUTE FOR SUBATOMIC PHYSICS (“Nikhef”), established in Amsterdam, The Netherlands,

AND THE INSTITUT DE FISICA D’ALTES ENERGIES (“IFAE”), established in Barcelona, Spain,

Hereinafter each individually referred to as a “Party” and collectively as the “Parties”,

CONSIDERING THAT:

Framework Collaboration Agreement KN4657/DG (the “Agreement”) concluded between the Parties defines the framework applicable to collaboration between them in domains of mutual interest.

Article 2.1 of the Agreement provides that the scope, each Party’s contributions, and all other details of each specific project shall be set out in Addendums to the Agreement.

The Parties have identified the collaborative project set out below, which shall be covered by the provisions of this Addendum No. 1 (the “Addendum”),

AGREE AS FOLLOWS:

Article 1
Purpose

- 1.1 Under the terms of this Addendum, the Parties shall collaborate on the development of the Civil Engineering Study for the Einstein Telescope (“ET”) (the “Project”). The Project is outlined in Annex 1.
- 1.2 The Parties shall use the results and resources of their collaboration for non-military purposes only. INFN, Nikhef and IFAE shall ensure compliance with this obligation by the ET members.
- 1.3 This Addendum shall be subject to the provisions of the Agreement, it being understood that in case of divergence the provisions of this Addendum shall prevail.

Article 2
Duration of the Project

Subject to the continued validity of the Agreement, the Project shall begin upon signature by the last Party to sign and shall be completed after 36 months.

Article 3
INFN's contribution

As part of its contribution to the Project, INFN shall provide financial contributions in the amount(s) stated in Annex 2 of this Addendum, which also sets out the necessary payment details.

Article 4
Nikhef's contribution

As part of its contribution to the Project, Nikhef shall provide financial contributions in the amount(s) stated in Annex 2 of this Addendum, which also sets out the necessary payment details.

Article 5
IFAE's contribution

As part of its contribution to the Project, IFAE shall provide financial contributions in the amount(s) stated in Annex 2 of this Addendum, which also sets out the necessary payment details.

Article 6
CERN's contribution

6.1 CERN's SCE-SAM-FS section shall provide support in the civil engineering activities.

6.2 CERN shall execute the following **tasks**:

1. Support composing and review the overall plan for the ET team to deliver the studies and documents related to civil engineering that must be submitted to the ET Board of Governmental Representatives ("BGR") to approve the construction of ET.
2. Support in reviewing of the existing information relevant for civil engineering.
3. Support drafting the requirements and specific deliverables for the provision of civil engineering consultant(s) responsible for design and costing.
4. Advice on the configuration of the shared design platform for multicriteria analysis (Geoprofiler, GIS data, BIM model etc.)
5. Perform technical reviews of civil engineering reports (e.g., structure of TDR, cost and risk documents).
6. Provide technical input for civil engineering aspects to be adopted in the documents submitted for approving the construction of ET process.

6.3 CERN shall make available personnel for participation in the definition, follow-up, and evaluation of the scientific objectives of the Project.

6.4 In respect of any staff CERN appointments to be made in the context of the execution of this Project, CERN shall manage the recruitment process in accordance with CERN's standard recruitment practice and such staff shall be subject to CERN's Staff Rules & Regulations.

Article 7
Technical co-ordination and contact persons

The Parties shall each nominate a technical coordinator, who together shall coordinate the technical execution of the Project, as well as contact persons. Their names and contact details are set out in Annex 6.

Article 8
Deliverables and Milestones

The list of the deliverables is set out in Annex 3.

Article 9
Acceptance Procedure

INFN, Nikhef and IFAE Technical Coordinators shall grant acceptance of the deliverables set out in Annex 3 within two (2) months from submission by CERN of the relevant report demonstrating successful completion.

Article 10
Amendments

Any amendment to this Addendum shall be made in writing and signed by the authorized representatives of the Parties.

Done in the English language and signed by the authorized representatives of the Parties.

The European Organization
for Nuclear Research (CERN)

The European Organization
for Nuclear Research (CERN)

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Raphael Bello

.....
Mar Capeans

Signed on2023

Signed on.....2023

The European Organization
for Nuclear Research (CERN)

The European Organization
for Nuclear Research (CERN)

.....
Christopher Hartley

.....
Cristina Lara

Signed on2023

Signed on 2023

The Dutch National Institute for Subatomic
Physics (“Nikhef”)

The Italian National Institute for Nuclear
Physics (“INFN”)

.....
Stan Bentvelsen

.....
Pierluigi Campana

Signed on2023

Signed on 2023

The Institute de Fisica d’Altes Energies
(“IFAE”)

.....
Mario Martínez

Signed on2023

ANNEX 1

Contribution of CERN to the Civil Engineering Study of Einstein Telescope

Introduction

The future Einstein Telescope is a third-generation gravitational-wave observatory that will be built in a dedicated underground triangular infrastructure with 10km long arms at a depth between 200 and 300 m to mitigate disturbances caused by environmental seismic noise. At each corner of the triangle a large cavern structure is hosted. The access to the underground structure is provided by either a vertical shaft or an inclined tunnel.

Currently there are two candidate sites for the Einstein Telescope: Meuse-Rhine Euroregion (EMR) and Sardinia with their own specific geology and environment.

The ET Civil Engineering Department is responsible for the development, design, engineering and construction of the underground and surface civil infrastructure up to the delivery of the ET project.

In a first phase the ET Civil Engineering Department will be devoted to the assembling of a Preliminary TDR on the design of the civil works for the ET infrastructure, including a cost and time and risk assessment.

Over the years, the Future Studies section (SCE-SAM-FS) of the Site and Civil Engineering Department (SCE) has developed expertise in the co-ordination of the civil engineering and infrastructure studies for large scale physics projects such as HL-LHC, Future Circular Colliders (FCC), Linear Colliders (ILC and CLIC), Muon Colliders and Physics Beyond Colliders.

The SCE-SAM-FS Mandate includes:

- Lead of civil engineering studies of scientific facilities, in conjunction with other SCE groups, from conception, feasibility and technical design towards construction preparation.
- Inspections and monitoring of all existing underground assets within the ‘Tunnel Asset Management’ unit, including research and development for monitoring technologies like photogrammetry and fibre optic monitoring.

Aims of CERN’s contribution

CERN will collaborate on the Project activities for civil engineering studies of the ET in collaboration with other involved ET partners.

Work Plan

CERN will provide support in the development and final review of the civil engineering work plan detailing the roadmap to prepare a final technical design document for the site approval process.

Review and Assessment Document

At the beginning of the civil engineering study an assessment will be carried out for identifying the current state of the project and identifying opportunities for further refinements.

CERN will assist the ET team in reviewing all the existing documentation and information relevant for civil engineering. At the end of the review phase, a Review and Assessment document will be prepared by the ET team and CERN civil engineering team.

External Civil Engineering Consultant(s)

Civil Engineering costs for projects such as the Einstein Telescope typically represent a significant proportion of the overall implementation budget. For this reason, particular emphasis needs to be placed on CE studies to ensure a cost-efficient design and construction methodology.

CERN will provide guidance and recommendations on formulating the requirements and deliverables for the provision of civil engineering consultant(s) responsible for developing a civil engineering design together with a construction cost and schedule.

Design Tool

CERN will provide technical guidance in the development and configuration of a design tool similar to the ones used for the CLIC, ILC, FCC and Muon Collider studies (e.g., Geoprofiler, TOT). This tool should optimise the location of the tunnels to ensure they are situated in the best geological conditions and at the same time taking into account surface constraints.

Civil Engineering Documents

At the end of preparatory phase of the required documentation for site approval, CERN will comment and provide recommendations during the technical review of the prepared civil engineering documents.

These will include:

- Technical specifications for the provision of civil engineering consultancy services.
- Cost and risk documents.
- Structure of TDR.

CERN will provide technical input for civil engineering aspects to be adopted in the documents submitted for the ET process leading to approving the construction of ET.

Some of the key aspects to be considered are the following:

- Geology and geological long profiles.
- Proposed construction methodology.
- Management of the excavated material.
- Carbon footprint.
- Environmental impact.
- Cost and schedule.

ANNEX 2

Collaboration Contributions

The person power contribution will be based on a “QUEST” type graduate, in the form of one person per year for three years, so three person-years in total. The costs incurred will be funded by INFN, Nikhef and IFAE. It is being understood that there will be no payments by CERN to INFN, Nikhef and IFAE.

The cost of CERN graduate member involved in the Project represents an amount of 318 kCHF, which is equivalent to CERN’s costs for 3 person-years (CERN salary grid 2023). The CERN graduate will be integrated in and supervised by SCE-SAM-FS.

Additionally, there is a financial contribution for travel of CERN members (Annex 4).

ANNEX 3
Milestones, Deliverables

Table 2: Project deliverables

Deliverable	Description civil engineering documents to be produced by ETO and reviewed and supported by CERN	Date
D1	Work Plan explaining the roadmap to produce the TDR	Q4 2023
D2	Review and Assessment document of existing information relevant for civil engineering	Q4 2023
D3	Requirements and specific objectives for the civil engineering tender documents for consultant(s) to develop civil engineering layouts/specifications and to produce cost/schedule report and risk analysis	TBC
D4	Configuration of a design tools (Geoprofiler, GIS data, BIM model etc.)	TBC
D5	Structure of the TDR	TBC
D6	TDR	Q4 2026

ANNEX 4
Payment schedule

Based on the financial contributions outlined in Annex 2, INFN's, Nikhef's and IFAE's payment schedule is summarised in Table 3.

Table 3: Payment schedule

Description	INFN Payment [kCHF]	IFAE Payment [kCHF]	Nikhef Payment [kCHF]	Total [kCHF]	Date
QUEST (3 years)	106	106	106	318	2024-2026
Travel expenses (site visits, committee meetings) 1 meeting / year 2 attendees from CERN	4	4	4	12	2024-2026
TOTAL				330	2024-2026

CERN will send the invoices to INFN, Nikhef and IFAE technical contacts. The invoices shall be paid within 30 days upon its receipt.

ANNEX 5
Commercial or contractual documents

All commercial or contractual documents shall be sent to:

CERN — IPT Department
Procurement Service
1211 Geneva 23
Switzerland

ANNEX 6
Technical Coordinators and Contact Persons

CERN's Technical Coordinator will be:

John Osborne

- Email: John.Andrew.Osborne@cern.ch
- Tel: +41-75-411-3752
- CERN Address:
M28110
CERN
1211 Genève 23
Suisse

INFN Technical Coordinator will be:

Maria Marsella

- Email: maria.marsella@uniroma1.it
- Tel: +39-345-2508861
- Address:
Università di Roma La Sapienza
Via Via Eudossiana, 18
00184 Rome
Italy

Nikhef Technical Coordinator will be:

Patrick Werneke

- Email: p.werneke@nikhef.nl
- Tel: +31 205925057
- Mobile: +31 651275253
- Address:
Nikhef - National Institute for Subatomic Physics
Science Park 105
098 XG Amsterdam
Netherlands

IFAE Technical Coordinator will be:

Mario Martinez

- Email: mmp@ifae.es
- Tel: +34 93 175 1519
- Address:
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