

ADDENDUM NO. 1
KNXXXX/SY
TO
FRAMEWORK COLLABORATION AGREEMENT
KN5902/TE

BETWEEN: THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (“CERN”), an Intergovernmental Organization having its seat at Geneva, Switzerland, duly represented by Brennan Goddard, Head of the Accelerator Systems Department,

AND: THE UNIVERSITY OF GRANADA (UGR), established in Granada, Spain, duly represented by D.Pedro Mercado Pacheco, in the name and on behalf of the University of Granada, of which he is Rector Magnificent, by virtue of decree 131/2023 of 12 June (BOJA nº 113 of 15 June 2023, acting with the powers conferred on him by Article 50.1. of Organic Law 2/2023 of 22 March, on the University System. and article 45, k) of the Statutes of the University of Granada,

AND: IFMIF-DONES ESPAÑA CONSORTIUM, duly represented by Ángel Ibarra Sánchez, Director of the IFMIF-DONES España Consortium, as representative of the same with registered office at Calle Gran Vía de Colón no 48 18010 Granada and with Tax Identification Code: no Q1800796C, in use of the faculties attributed by his appointment as director of the Consortium by agreement adopted in the ordinary session of the Governing Council held on 5 July 2021 and included in the statutes of the Consortium (BOE no 148, of 22 June 2021),

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

CONSIDERING THAT:

Framework Collaboration Agreement KN 5902/TE (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 Addenda 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 KN XXXX/SY** (the “Addendum”),

AGREE AS FOLLOWS:

Article 1
Scope

1.1 Under the terms of this Addendum, the Parties shall collaborate in the characterization, validation and development of instruments and diagnostics in fast neutron, fusion like spectra at the NEAR irradiation station of the neutron Time-Of-Flight (n_TOF) facility at CERN (the “Project”). The neutron beam is produced by 20 GeV/c proton beams impinging on a nitrogen cooled pure Pb spallation target.

The scope of the Project consists in the characterization of responses of different on-line neutron instruments and diagnostics in the field of fusion reactor material qualification as well as for monitoring of neutron producing devices. This can be achieved by employing an operational facility, like NEAR, offering different mixed neutron, charged particle and gamma field spectra as well as long-term irradiation capabilities. It will allow as well to assess the technical and radiation robustness of each solution, identify limitation and improve performances, with the objective of potentially employing for operational monitoring.

Both, passive or on-line irradiation may form part of the Project. The focus is to employ the part of the facility located within the target systems first shielding.

For on-line irradiation, on a best effort basis only as the NEAR infrastructure may not be adaptable, the following activities may be undertaken:

- Characterization of instruments and diagnostics (such as SPNDs) in fast neutron, fusion-like spectra, as well as other types of instruments and diagnostics beyond the SPND-array experiment (for example, microfission chambers, ionization chambers, semiconductors detectors), focusing on other eventual irradiation of diagnostics and instruments of interest for both parties at NEAR.

For passive irradiation, the following activities may be undertaken:

- Study of radiation effects of instruments, diagnostics (for example, activation foils) or material (R2M) as a function of the absorbed dose. Comparison with similar results already collected in gamma radiation.

The long-term objective is to identify whether this type of monitoring systems could be employed at the future IFMIF-DONES infrastructures to monitor large neutron flux spectrum for operational purpose or the evaluation of a lifetime of commercial materials and components and eventually in the CERN's accelerator systems, specifically monitoring of beam intercepting devices.

- 1.2 Except as agreed in this Addendum, each Party shall bear the cost of its participation in the Project.
- 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

The Project shall commence on 1st February 2024 and shall be completed no later than 30th December 2026. This timeline should be compatible with the beginning of Long Shutdown 3, foreseen to start end of 2025, when the accelerator complex will be stopped for major upgrades.

Article 3 The University of Granada and IFMIF-DONES's contribution

- 3.1 UGR and IFMIF-DONES shall contribute to the Project by performing the work packages set out in this Article 3 and by providing the Project deliverables in accordance with Article 6.

3.2 UGR and IFMIF-DONES shall make its contribution through qualified experts who will work in collaboration with CERN insert full department name Department to execute the different work packages (WP). This will include experts on characterization of instruments and diagnostics (located at IFMIF-DONES / UGR), and PhD students dedicated to irradiation campaigns activities such as preparation, data processing and interpretation. (Who could share their time between the IFMIF-DONES/UGR and CERN)

Thanks to these resources the following WP are foreseen:

WP1: Performing experimental measurements with SPND detectors as well as other types of instruments and diagnostics, in the surroundings of the n_TOF spallation Target#3. Cross check simulations of signal response of the detectors versus the irradiation field data during the irradiation period applicable.

WP2: Provide instrumentation and diagnostics material to be tested for the duration of the agreed irradiation experiment. In case of on-line irradiation, the material should have been tested *a priori* in a non-radioactive environment to demonstrate feasibility and data quality, assuming the same constraints (e.g. cables length). This step is required to provide CERN with the detailed physical, mechanical and electronics layout of the experiment to be installed in radioactive environment of the target area.

UGR and IFMIF-DONES shall take care of proposing an irradiation plan and of drafting the technical documentation necessary to perform irradiation activities at NEAR. UGR/ IFMIF-DONES personnel of the required expertise shall participate in the NEAR coordination meeting as well as in the installation in the target area.

WP3: Accessing and processing the whole data set corresponding to the irradiation period set out in this agreement (2021-2026). UGR and IFMIF-DONES shall be responsible of the data acquisition system required for the instruments readout.

WP4: Cross-check simulations of signal response of the detectors versus the irradiation field data during the irradiation period applicable coming at the specific corresponding locations in NEAR.

WP5: UGR and IFMIF-DONES shall contribute with the reporting and diffusion of results of the irradiation experiments, by means of the preparation of open access scientific publications in collaboration with CERN and the respective co-authorships of personnel involved in the campaigns organisation and execution.

WP6: UGR and IFMIF-DONES shall contribute with the scientific and technical support regarding state-of-the art of fusion-related (and IFMIF-DONES) diagnostics techniques which can be applicable to developments of Beam Instrumentation and Diagnostics (BIDs) monitoring at CERN, strengthening the links between Fusion and Accelerator Communities in terms of irradiation performance of instruments and diagnostics.

Article 4 CERN's contribution

4.1 CERN shall contribute to the Project by allocating passive irradiation slots at the NEAR irradiation station for the mentioned irradiation activities. On a best-effort basis, CERN will consider the possibility to use also the ISOLDE target stations.

- 4.2 CERN shall contribute to the Project by allocating on-line irradiation position at NEAR. Prior to discussion, UGR and IFMIF-DONES shall have demonstrated the feasibility of the proposed test (as set out in Article 3). If any modification of the NEAR infrastructure (e.g. cables installation) is needed, it shall remain CERN's responsibility, property and decision to implement these changes after specific discussion and mutual agreement, and on a best effort principle (as set out in Article 1).
- 4.3 For passive or on-line irradiation, the number and position of the slots shall be decided upon specific discussion and mutual agreement. Installations in the target area and in the NEAR stations shall not interfere with the physics performances of the n_TOF facility and the other activities conducted within NEAR. It shall be performed in compliance with CERN Radiation Protection recommendations.
- 4.4 CERN shall keep custody of IFMIF-DONES irradiated instruments or diagnostics until IFMIF-DONES will be allowed to receive radioactive material at their site.
- 4.5 CERN shall provide the technical support as follows:
- NEAR coordination meeting in collaboration with WP1.
 - Organising access of the agreed experiments at NEAR to selected and agreed UGR/IFMIF-DONES personnel, in time slots compatible with the schedule of the irradiation station.
 - Installation and removal of samples with the robotic team.
 - High-level dosimeters provided by CERN to be placed close to the samples as defined by WP1.
 - Installation and removal of instruments and diagnostics equipment at NEAR following the instruction provided or in collaboration with the UGR and IFMIF-DONES
 - Expedition of irradiated samples to IFMIF-DONES in accordance with 4.4
- 4.6 CERN should put at disposal of UGR and IFMIF-DONES experts the existing or future simulation around the NEAR target area (mainly FLUKA simulation). Extra simulation could be performed by CERN upon UGR and IFMIF-DONES request but on a best effort basis only.
- 4.7 CERN shall contribute to scientific publications in collaboration with UGR and IFMIF-DONES in open access journals.
- 4.8 CERN shall contribute to the Project by making available office facilities, equipment, materials and services (the "Facilities") on the CERN site as required for the execution of the Project. The Facilities shall remain the property of CERN and are made available without any warranty or liability relating to their use. UGR and IFMIF-DONES shall take proper care of them until the completion of the Project. In a similar way, all equipment brought by IFMIF-DONES and UGR to CERN remain their property, including respective radioactive equipment.

Article 5
Technical co-ordination and contact persons

- 5.1 The overall responsibility for the Project lies with CERN. It is understood however that UGR and IFMIF-DONES shall remain exclusively responsible for the proper execution of its contribution.
- 5.2 The Parties shall each nominate a technical co-ordinator, who together shall coordinate the technical execution of the Project, as well as contact persons, including a designated safety correspondent. Their names and contact details are set out in Annex 1.

Article 6

Knowledge transfer

- 6.1 The Parties aim at enhancing the impact of this Project by furthering disseminating its results to other disciplines for the benefit of society and industry.
- 6.2. For this purpose, in the event the Parties wish to engage in knowledge transfer activities, concerning the intellectual property developed in the execution of the Project, such as commercial exploitation, or research and development in domains other than particle physics, they will involve their respective knowledge and technology transfer offices.
- 6.3. In the event the Parties wish to commercially exploit intellectual property jointly developed in the execution of the Project, the Parties shall establish in a separate agreement the allocation and terms of exercising (i) the joint ownership, and (ii) the commercial exploitation.
- 6.4. Each Party hereby grants the other Party a non-exclusive, royalty free and perpetual licence to use its intellectual property developed in the Project for non-commercial research and development with third parties in domains other than particle physics.
- 6.5. In accordance with Article 7 (Confidentiality) of the Agreement, the Parties agree to execute the Project in a spirit of openness. Notwithstanding the foregoing, and in view of the potential intellectual property that could result from the Project, each Party shall take measures to adequately protect their results, including confidentiality measures in the event a patent right is sought, it being understood that should such protection engender costs, these shall be covered by the owning Party(ies) unless agreed otherwise.

Article 7

Status of personnel

During their stay at CERN, the UGR and IFMIF-DONES Experts shall be appointed as Cooperation Associate (COAS) in accordance with Article 3 of the Agreement and CERN's Staff Rules and Regulations.

In addition to the requirements mentioned in Article 3 of the Agreement, UGR and IFMIF-DONES experts shall also ensure that the medical insurance of the University of Granada and IFMIF-DONES Experts covers for any duty travel required as part of the Project.

Article 8

Amendments

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

Thus drawn up in two copies in the English language and signed by the authorised representatives of the Parties.

The European Organization for Nuclear Research (CERN)	The University of Granada (UGR)	IFMIF-DONES España Consortium
.....
Brennan Goddard Head of the Accelerator Systems Department	Pedro Mercado Pacheco Rector of the University of Granada	Ángel Ibarra Sánchez Director of the IFMIF-DONES España Consortium
On:.....2023	On:.....2023	On:.....2023

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ANNEX 1
Technical coordinators and contact persons

CERN's technical coordinator will be:

Ana-Paula Bernardes

Email: ana-paula.bernardes@cern.ch

Tel: +41227666194 or +41754114255

Address: Esplanade de Particules 1, 1211 Meyrin, Switzerland

University of Granada (UGR) technical coordinator will be:

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IFMIF-DONES technical coordinator will be:

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