KN4233/EP

Addendum No. 4

to

Collaboration Agreement KN3774/EP for the SHiP Program at CERN

SHiP Spectrometer Tracker

CONSIDERING THAT:

The SHiP Program is governed by Collaboration Agreement KN3774/EP ("the Agreement"), including its Annexes, Addenda and Amendments, which provides the organisational, managerial and financial framework for the execution of the SHiP Program;

Articles 3.1 and 3.3 stipulate that the SHiP Program shall be organised as projects ("the SHiP Projects") and that each SHiP Project shall be defined in a dedicated Addendum to the Agreement, to be signed by CERN as the Host Laboratory and the SHiP Institutions (as defined in the Agreement) participating in the Project;

The SHiP Project entitled "SHiP Spectrometer Tracker" ("the Project") is described in https://edms.cern.ch/document/1816155/1;

The Project addresses the challenges related to the mechanical properties of the straws and wires under operational conditions (gravity, vacuum and gas pressure, electric fields, magnetic field, tension, etc.). Prototypes will be constructed to address these challenges and to develop an adequate readout electronics chain.

IT IS AGREED AS FOLLOWS:

Article 1
Purpose

1.1 The purpose of this Addendum is to lay down the terms of participation of SHiP Institutions in the Project, which is described in Annex 1. This Addendum is subject to the provisions of the Agreement and signature of this Addendum therefore constitutes approval of the Agreement.

1.2 The Annexes form an integral part of this Addendum.

Article 2
Parties

The Parties to this Addendum shall be the SHiP Institutions contributing to the Project and CERN as the Host Laboratory. The current list of participating SHiP Institutions is included in Annex 2.

Article 3
Duration

This Addendum shall take effect on the date of its signature. It shall remain effective until the termination of the SHiP Program, subject to continued recommendation and approval of the SPSC and the CERN Research Board.

Article 4
The Project

4.1 The work plan consists of a number of sub-units, work packages and/or deliverables as listed in Annex 1.

4.2 The management structure of the Project is described in Annex 3.

4.3 Annex 4 sets out the deliverables, including their value, grouped by Funding Agency.

4.4 A set of Project milestones is included in Annex 5.

Article 5
Financial procedures

5.1 Pursuant to Article 9 of the Agreement, a dedicated budget code for the purposes of the SHiP Project is held and administered by CERN. Participating SHiP Institutions may financially contribute to this budget code on a voluntary basis in accordance with the estimated value of deliverables stated in Annex 4.

5.2 The aforementioned budget code is available to cover material, equipment and manpower costs connected to the SHiP Project, on condition that sufficient funds are available on the said budget code. This budget code may also be used by CERN for the execution of payments of subsistence allowance to experts of participating SHiP Institutions on behalf of such Institutions. It is understood that such payments shall be made in accordance with CERN's Rules and Regulations, including but not limited to Administrative Circular 11.

ANNEXES

Annex 1: Description of the Project

Annex 2: Participating SHiP Institutions

Annex 3: Management structure of the SHiP Program and of the Project

Annex 4: Value of deliverables grouped by Funding Agency

Annex 5: Project milestones

The European Organization for Nuclear Research (CERN)

and

The University of Hamburg

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The University of Hamburg**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

The European Organization for Nuclear Research (CERN)

and

The Humboldt University of Berlin

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The Humboldt University of Berlin**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

The European Organization for Nuclear Research (CERN)

and

The Forschungszentrum Jülich

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The Forschungszentrum Jülich**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

The European Organization for Nuclear Research (CERN)

and

Joint Institute of Nuclear Research (JINR)

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The Joint Institute of Nuclear Research (JINR)**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

The European Organization for Nuclear Research (CERN)

and

The Petersburg Nuclear Physics Institute

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The Petersburg Nuclear Physics Institute**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

The European Organization for Nuclear Research (CERN)

and

The Moscow Engineering Physics Institute

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The Moscow Engineering Physics Institute**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

The European Organization for Nuclear Research (CERN)

and

The Yandex School of Data Analysis

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The Yandex School of Data Analysis**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

The European Organization for Nuclear Research (CERN)

and

The Taras Shevchenko University of Kyiv

declare that they agree on Addendum No 4 to Collaboration Agreement KN3774 for the SHiP Program at CERN concerning the SHiP Spectrometer Tracker.

Signed in Geneva, Switzerland	Signed in ……
On ……..	on ……
For the European Organization For Nuclear Research (CERN) As the Host Laboratory of the SHiP Program	**For the participating SHiP Institution** **The Taras Shevchenko University of Kyiv**
……	…….
E. Elsen	Institute/Funding Agency
Director for Research and Computing	Signatory: ……..

ANNEX 1: Description of the Project

The objective of the SHiP Spectrometer Tracker project is to study the properties of the straws and wires under operational conditions (gravity, vacuum and gas pressure, electric fields, magnetic field, tension, etc.). Prototypes must be constructed for this study. They will also be used to develop an adequate electronics chain.

The SHiP Spectrometer Tracker project is organized in three work packages described in summary below.

Work package 1: Construction and testing of 5 m long prototype straws. The outcome will be the definition of a set of specifications for the engineering design. A first design of a straw tracker station will be developed.

Work package 2: Development of the electronics chain.

Work package 3: Construction of a large size module-0 prototype to demonstrate the soundness of the station design. It should be possible to test this module-0 in vacuum.

ANNEX 2: Participating SHiP Institutions

1. CERN, represented by H. Dijkstra
2. University of Hamburg, Germany, represented by D. Bick
3. Humboldt University of Berlin, represented by H. Lacker
4. Forschungszentrum Jülich, Jülich, Germany, represented by S. van Waasen
5. Joint Institute of Nuclear Research (JINR), represented by R. Tsenov
6. Petersburg Nuclear Physics Institute (PNPI), St. Petersburg, Russia, represented by V. Kim
7. Moscow Engineering Physics Institute, Moscow, Russia, represented by S. Smirnov
8. Yandex School of Data Analysis, Moscow, Russia, represented by A. Ustyuzhanin
9. Ukraine (UA): National Taras Shevchenko University of Kyiv, Ukraine, represented by S. Vilchinskii

ANNEX 3: Management structure of the SHiP Program and of the Project

Spokesperson: **A. Golutvin**

Technical Coordinator: **R. Jacobsson**

Chairperson of the SHiP Board: **E. van Herwijnen**

Project leader for the SHiP Spectrometer Tracker: **M. Ferro-Luzzi**

ANNEX 4: Value of deliverables grouped by Funding Agency

The following table summarizes the deliverables for the construction of the SHiP Spectrometer Tracker prototypes for testing.

DE = Germany, RU = Russia, UA = Ukraine

Table 1: Work package 1, construction of SHiP Spectrometer Tracker prototypes for testing

	COST [kCHF]	JINR	CERN	DE	RU	UA
Prototype straws		10			10	
Copper-Gold coating			20			
Test stands			20	50	10	10
Total [kCHF]		**10**	**40**	**50**	**20**	**10**

The following table summarizes the deliverables for the development of the electronics chain for the Spectrometer Tracker.

Table 2: Work package 2, development of the electronics chain for the SHiP Spectrometer Tracker

	COST [kCHF]	JINR	CERN	DE	RU	UA
Prototype digital electronics					10	
Prototype analog electronics				50		
Test stands			20		20	
Total [kCHF]			**20**	**50**	**30**	

The following table summarizes the deliverables for the construction of module-0 of the SHiP Spectrometer Tracker.

Table 3: Work package 3, construction of a module-0 of the SHiP Spectrometer Tracker

	COST [kCHF]	JINR	CERN	DE	RU	UA
Prototype tooling				100		
Module-0				50		
Test stands			20	50		
Total [kCHF]			**20**	**200**		

ANNEX 5: Project milestones

1. Prototype straw array constructed and tested: second half of 2019
2. First station design: second half of 2019
3. Electronics chain prototypes: first half of 2020
4. Module-0 tested: first half of 2020