

## **IMPLEMENTATION AGREEMENT N.5**

to the Framework Agreement  
between  
The JOINT INSTITUTE FOR NUCLEAR RESEARCH  
(Dubna, Russia)  
and  
The ISTITUTO NAZIONALE DI FISICA NUCLEARE  
(Italy)

### **Preamble**

The present Implementation Agreement involves the Joint Institute for Nuclear Research (JINR/Dubna) and the Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Frascati (INFN/LNF) and regulates the scientific collaboration between the above mentioned research centers hereinafter referred to as JINR/Dubna and INFN/LNF.

- Considering the Framework Agreement between JINR and INFN signed in 2017;
- Considering the long tradition of fruitful collaboration between JINR and INFN/LNF;
- Considering the common interests of JINR and INFN in the development of high energy physics;
- Considering the common interest of JINR/Dubna and INFN/LNF in the study of rare muon processes, in development of a new generation of heavy crystal electromagnetic calorimetry, and considering the work going on in these fields at INFN/LNF and JINR/Dubna;
- Wishing to further promote the collaboration between the Parties;

**JINR/Dubna and INFN/LNF, hereinafter referred to as the Parties,**

### **HAVE AGREED AS FOLLOWS**

#### **1. Areas of collaboration between JINR/Dubna and INFN/LNF**

JINR/Dubna and INFN/LNF are foreseeing to collaborate in the following research program:

- Development of a new generation high resolution calorimetry based on the new generation heavy scintillating crystals.
- Preparation and participation in experimental searching and study for rare muon processes at FNAL (USA).

#### **2. Research and development program**

- Study of new photodetectors for the next generation of electromagnetic calorimeters.

LABORATORI NAZIONALI DI FRASCATI DELL'INFN  
IL DIRETTORE  
Dott. Pierluigi Carniti



- Study of crystals properties for the new generation of electromagnetic calorimeters for  $\sim 100$  MeV electron detection.
- Manufacture of the heavy crystals pilot set and performance of its quality control.
- Simulation of a calorimeter response and rare decay spectrometer as a whole.
- Design, construction and tests of detector and their components for rare decays spectrometers to perform and extend the physics program.
- Preparation and participation in Mu2e and Mu2e-II project at FNAL, USA.

### 3. Obligations

The obligations of the Parties shall be as follows:

#### *Scientific and technical research*

The Parties will participate in the scientific and technical program of the common researches, cooperate in the design, development, manufacturing, testing and calibration of the developed devices and will be involved in the simulation studies at all stages.

#### *Exchange of personnel*

JINR/Dubna may invite INFN/LNF colleagues and technical personnel to visit Dubna for discussions and collaborative work. As a rule for these activities JINR will cover full expenses for stay and travel within the Russian territory, as allowed by available funds.

INFN/LNF may invite JINR/Dubna colleagues and technical personnel to visit Frascati for discussions and collaborative work. As a rule, on the INFN side, the expenses will be charged to the funds yearly assigned to INFN/LNF, taking into account the availability of budgetary funds and the respective internal procedures.

#### *Exchange of equipment*

JINR/Dubna may send to INFN/LNF and/or other sites as indicated by INFN/LNF, equipment and materials for scientific use like electronics, detectors, computers and computer components.

INFN/LNF may send to JINR/Dubna and/or other sites as indicated by INFN/LNF, equipment and materials for scientific use like electronics, detectors, computers and computer components.

### 4. Publications

Before publication, the information produced by the common research program will be treated as confidential and will not be transferred to third Parties without mutual agreement. The publication of the results or/and conference presentations will be done according to mutual consent.

### 5. Property

Experimental devices and technological methods produced during the course of common work belong to the Institutions where they were produced. Special cases of common fabrication will be considered by special agreements. Achieved results may be used by JINR/Dubna and INFN/LNF for high energy physics experiments.



## **6. Commercial use of results**

In the case of possible use for commercial purposes of results produced by common efforts, the two Parties will define the conditions of such use in additional agreements.

## **7. Legal obligations**

JINR/Dubna and INFN/LNF staff sent to other Institutions to work in the frame of the present Implementation Agreement, shall be required to follow all rules and safety obligations of the hosting Organization.

## **8. Validity**

This implementation Agreement shall become active after formal approval is granted by the JINR Director and the INFN LNF Director. The present Implementation Agreement will be valid until the end of the Framework Agreement (December 09, 2023).

## **9. Local contact persons**

The contact persons in charge for the coordination of the activities covered by this Implementation Agreement will be appointed by the local Directories of the Parties through exchange of letters.

## **10. Extension and cancellation rules**

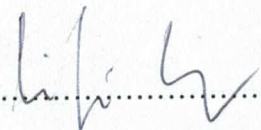
This Implementation Agreement can be extended or changed by mutual agreements between the two Parties or cancelled by one Party. To cancel the Implementation Agreement either Party should submit a written notice to the other at least two months before the cancellation date. Extension and changes will be made by means of a new Implementation Agreement.

### **For Agreement:**

For JINR/Dubna  
Prof. Victor Matveev  
Director of the Joint Institute for Nuclear  
Research, Dubna

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For INFN/LNF  
Dr. Pierluigi Campana  
Director of Laboratori Nazionali di Frascati  
Istituto Nazionale di Fisica Nucleare

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LABORATORI NAZIONALI DI FRASCATI DELL'INFN  
IL DIRETTORE  
Dott. Pierluigi Campana