

PROJECT ANNEX
TO THE IMPLEMENTING ARRANGEMENT
BETWEEN
THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF
AMERICA
AND
THE MINISTRY OF EDUCATION, UNIVERSITIES AND
RESEARCH OF THE ITALIAN REPUBLIC
FOR COOPERATION
IN THE AREAS OF HIGH ENERGY, ASTROPARTICLE AND
NUCLEAR PHYSICS

CONCERNING NEUTRINO PHYSICS RESEARCH

The Department of Energy of the United States of America and the Ministry of Education, Universities and Research of the Italian Republic, hereinafter referred to as the “Parties”:

ACTING pursuant to Section 4 of the Implementing Arrangement between the Department of Energy of the United States of America and the Ministry for Education, Universities and Research of the Italian Republic for Cooperation in the Areas of High Energy, Astroparticle and Nuclear Physics of July 17, 2015, hereinafter referred to as the “Implementing Arrangement”; and

DESIRING to establish a framework for cooperation and collaboration in neutrino physics research between U.S. Department of Energy (DOE) national laboratories and the Istituto Nazionale di Fisica Nucleare (INFN) under the Ministry of Education, Universities and Research of the Italian Republic (MEUR), for the advancement of science and technology in the Parties’ countries,

Have agreed as follows:

Section 1 – Objective

- A. The objective of this Project Annex is to establish the framework for collaboration, including research, design and development; infrastructure development, and construction of neutrino physics projects in both Parties' countries. The collaboration will be undertaken with the participation of the Parties, their respective national laboratories, universities, and other United States and Italian government and private industry organizations.
- B. This Project Annex is subject to the terms and conditions of the Implementing Arrangement, which is itself subject to the Agreement between the Government of the United States of America and the Government of the Italian Republic for Scientific and Technological Cooperation of April 1, 1988 (the "S&T Agreement"). In the event of any conflict between the provisions of the S&T Agreement or the Implementing Arrangement on the one hand and this Project Annex on the other hand, the provisions of the S&T Agreement and the Implementing Arrangement shall govern.

Section 2 – Areas for Cooperation

- A. Cooperative activities under this Project Annex may include, but are not limited to, the following areas of neutrino physics:
 - 1. Research, development and fabrication of detectors and infrastructure for short-baseline and long-baseline neutrino physics research;
 - a. Installation of INFN's ICARUS at FNAL
 - b. Fabrication and operation of other short-baseline detectors
 - 2. Astrophysical neutrino experiments:
 - a. Cosmic neutrino detection in dark matter experiments
 - b. Supernovae, solar and geologic neutrino detection
 - c. Neutrino double beta decay experiments: fabrication, installation and operation of the CUORE experiment;
 - 3. High intensity particle beam facility research, development and fabrication;
 - 4. International advanced training activities for post-doctoral researchers and young scientists in neutrino physics, related high energy physics and detector technologies, and theory.
- B. The technologies for which research and development are required include, but are not limited to:

1. Neutrino detectors and related technologies:
 - a. Liquid argon purification systems
 - b. Liquid argon cryostats and other cryogenic systems
 - c. Nobel liquid time projection chambers, double and single phase detectors
 - d. High purity crystal calorimeters
 - e. Cryomodules
 - f. Modular cryogenic systems
 - g. Large area photon detectors
 - h. TeO₂ crystal detectors
2. High intensity particle beam facilities:
 - a. High intensity proton source
 - b. Superconducting radio frequency cavities, linacs
 - c. Neutrino beamlines
 - d. High-power targets
 - e. Magnet systems (solenoid, dipole, quadrupole).
- C. The development of technical information will be done within the framework of the Collaboration Governance Plan to be jointly developed and agreed by the Parties' Project Coordinators.

Section 3 – Participating Organizations

Each Party may invite other government agencies and organizations and private organizations in its country to participate in cooperative activities under this Project Annex, at the participating organizations' own expense and subject to such terms and conditions as the Parties may specify.

Section 4 – Forms of Cooperation

Cooperative activities undertaken pursuant to this Project Annex may include, but are not limited to, the following:

A. Assignment and Exchange of Personnel

Extended stays by one Party's scientific and technical personnel at the other Party's facilities will be funded by the Party that is providing the personnel, in accordance with Section 7 of the Implementing Arrangement.

B. Exchange of Equipment

Exchange of personnel will be required to conform to the terms of Section 8 of the Implementing Arrangement.

C. Exchange of Information

The Parties may exchange, as agreed on a mutually beneficial basis, scientific and technical information, and results of research and development or work, in accordance with Section 10 of the Implementing Arrangement.

Section 5 – Management

- A. The Technical Coordinators designated pursuant to Article 4 of the Implementing Agreement shall jointly plan the technical approach for accomplishing the objective of this Project Annex, and shall be responsible for the collaborative program, schedule, and coordination. The Technical Coordinators will also make progress reports at Project Coordination Meetings to be held at mutually agreed sites, preferably annually.
- B. Each Party shall exercise due care of budget, schedule, safety and other applicable requirements in carrying out all the work under this Project Annex.

Section 6 – Entry into Force, Amendment, and Termination

- A. This Project Annex shall enter into force upon signature by the Parties and remain in force so long as the Implementing Arrangement remains in force.
- B. This Project Annex may be amended or extended in writing by agreement of the Parties, so long as the Implementing Arrangement remains in force.
- C. The Parties may terminate this Project Annex at any time in writing by mutual agreement. Alternatively, a Party may terminate this Project Annex upon six (6) months advance notice in writing to the other Party.

DONE at Washington, in duplicate, this 17th day of July 2015.

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

Franklin M. Ouf

FOR THE MINISTRY OF EDUCATION,
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Giuseppe Bignardi