

# **Memorandum of Understanding**

## **for Collaboration in the Exploitation and Upgrade of the ISOLDE Facility at the PS-Booster**

**between**

The EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, an intergovernmental Organization having its seat at Geneva,

hereinafter referred to as “CERN”, as the Host Laboratory

on the one hand,

**and**

The Institutes / Funding Agencies of the ISOLDE Collaboration

on the other hand.

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**Preamble**

- (a) In 1993 the ISOLDE Collaboration, a group of Institutes from CERN Member States and CERN that had been working together since 1964, was formalised in a Memorandum of Understanding for the Execution of the ISOLDE Experiments at the PS-Booster (“the 1993 MoU”), triggered by the need to make arrangements for the move of the ISOLDE on-line mass separators to a new experimental area connected to the beams from the PS-Booster and thereafter for exploiting the facility for physics experiments.
- (b) The 1993 MoU was subsequently updated by two successive Addenda in 2000 (“the 2000 Addendum”) and in 2004 (“the 2004 Addendum”) to reflect changes in the membership of the ISOLDE Collaboration, the organizational structure of CERN and the evolution of the programme of the ISOLDE facility. The membership of the ISOLDE Collaboration is shown in Annex 1.
- (c) Whereas the 2004 Addendum foresaw in its article 7.2 the need for yet another Addendum for the REX-ISOLDE operating costs, the accumulation of Addenda detracted considerably from the clarity of the 1993 MoU and it was decided in 2006 to proceed with an entirely new Memorandum of Understanding.
- (d) Agreement to the continuation of the ISOLDE Collaboration is thus now effected through this Memorandum of Understanding (“the MoU”) between each collaborating Institute, as the case may be represented for purposes of signature by its Funding Agency, and CERN as the Host Laboratory. This MoU defines the ISOLDE Collaboration and its objectives, and the rights and obligations of the collaborating Institutes. It replaces the 1993 MoU, the 2000 Addendum and the 2004 Addendum and the 2006 MOU, all of which documents shall henceforth be null and void.
- (e) Experiments at the ISOLDE facility may involve teams from any CERN Member or non-Member State and are approved by the CERN Research Board on recommendation by the Experiment Committee responsible for this part of the CERN programme, presently the ISOLDE and Neutron Time-of-Flight Committee (INTC). In making its recommendation, the INTC shall take into account the availability of any resources that the experiment may be requesting from the ISOLDE Collaboration.
- (f) Each experiment makes its own funding arrangements, governed if necessary by a Memorandum of Understanding. CERN shall operate the facility, including the experimental area (Building 170), and provide the isotope beam to each experiment. It may also upgrade the facility. The ISOLDE Collaboration shall provide and maintain equipment of common use to the experiments and in some cases give individual support to them, as well as fostering coherence amongst the often small teams involved. It will also participate in the upgrade of the facility and will promote the opportunities it offers.
- (g) An ISOLDE Collaboration Committee (ISCC) has been constituted (Annex 5.1.1), which comprises one representative of each signatory to this MoU. Relevant coordinators and the Chairperson of the INTC are invited to attend. The ISCC shall meet at least twice per year.

One of the roles of the ISCC is to govern the ISOLDE Collaboration in financial and legal matters. In this respect its tasks include:

- reaching agreement on this MoU;
- approving any substantial modification or addition to the ISOLDE facility that affects the terms of this MoU;
- reaching agreement on a maintenance and operation (M&O) procedure and monitoring its functioning;
- endorsing the ISOLDE Collaboration's annual construction and M&O budgets;
- monitoring the Common Projects and the use of the Common Funds;
- monitoring the general financial and manpower support.

The ISOLDE Collaboration management (Annex 5.2) reports regularly to the ISCC on technical, managerial, financial and administrative matters, and on the composition of the ISOLDE Collaboration.

- (h) The general obligations of CERN in its role as Host Laboratory and of the Institutes (including CERN in this role) are contained in the General Conditions Applicable Experiments Performed at CERN "the General Conditions". This document applies fully to the execution of this MoU and is attached as Annex 14.

**Article 1 Parties to this MoU**

- 1.1 The Parties are all the Institutes of the ISOLDE Collaboration as listed in Annex 1 and their Funding Agencies, and CERN as the Host Laboratory. Annex 2 lists the Funding Agencies and their duly authorized representatives. An Institute may itself have the role of Funding Agency.
- 1.2 The collaborating Institute(s) and the ISOLDE Collaboration will hereinafter be referred to as “Institute(s)” and “Collaboration”, respectively.

**Article 2 Purpose of this MoU**

- 2.1 This MoU addresses the distribution of charges and responsibilities amongst the Parties for the exploitation and upgrade of the ISOLDE facility. It defines the programme of work to be carried out for this phase and the procedure for determining the M&O costs along with the mechanisms by which they are reviewed. It sets out the distribution of charges and responsibilities amongst the Parties for the execution of the work. It further sets out organizational, managerial and financial guidelines to be followed by the Collaboration, and describes the obligations of CERN as Host Laboratory towards the Collaboration and the ISOLDE experiments.
- 2.2 M&O comprises the actions needed to fulfil the Collaboration co-ordination function and to operate and keep in good working order the individual components of the ISOLDE common equipment for experiments, along with their respective infrastructure and facilities, and to dismantle them when the experiments are completed.
- 2.3 The work linked to upgrade comprises the engineering design, final prototyping, construction, calibration, transportation, assembly, installation and commissioning of the elements which will be part of the ISOLDE facility and the common equipment for the experiments.
- 2.4 The ISOLDE facility is operated in the normal framework of the CERN scientific programme, approved by the CERN Council, and subject to the bilateral Agreements and Protocols between CERN and non-Member States.

**Article 3 Duration of this MoU and its Extension**

- 3.1 This MoU shall be valid for three years, from 1 January 2017 to 31 December 2019, and shall thereafter be renewed automatically, each time for a new period of three years.
- 3.2 Notwithstanding the foregoing, this MoU shall automatically cease to be valid when the ISOLDE programme is declared closed by the CERN Council.
- 3.3 Any Funding Agency may withdraw its support from the Collaboration by giving not less than twelve months notice in writing to the Collaboration and the CERN Director-

General. In such an event, reasonable compensation to the Collaboration shall be negotiated through CERN and confirmed by the ISCC.

- 3.4 Any Institute may withdraw from the Collaboration according to the procedures agreed by the Collaboration, the conditions as set out in the General Conditions and by giving notice in writing to its Funding Agency.
- 3.5 Any Institute that joins the Collaboration in accordance with the Collaboration rules during the lifetime of this MoU shall accept the agreements in force and will be expected to make an appropriate contribution to the M&O and to the funding of any equipment being constructed, including the Common Projects. This shall be negotiated by the Collaboration and endorsed by the ISCC.

#### **Article 4      The ISOLDE Facility and its Resources**

- 4.1 The ISOLDE facility is described in detail in A. Herlert; Nucl. Phys. News 20 (2010) pages 5-13. Its main features are listed in Annex 3 and Annex 7 summarises the contributions made to date by the Institutes. Matters relating to the upgrade project HIE-ISOLDE are set out in Annex 13.
- 4.2 The names of the scientists participating in the Collaboration are listed in Annex 4 by Country and by Institute.
- 4.3 The Collaboration management structure is described in Annex 5.1. Persons holding management positions are given in Annex 5.2.
- 4.4 The technical participation of the Institutes in the upgrade work and in common equipment for the ISOLDE experiments is set out in Annex 6.
- 4.5 The manpower and financial resources needed for the common equipment for the ISOLDE experiments and for the upgrade work are grouped into three headings:
  - 4.5.1 R&D work on the various components;
  - 4.5.2 Costs for infrastructure in the Institutes, and costs for personnel, travel, etc. of the Institutes as arising from their participation in the Collaboration;
  - 4.5.3 Engineering design, final prototyping, construction, calibration, transportation, assembly, installation and commissioning costs for the complete equipment.

The resources needed for work under the headings 4.5.1 and 4.5.2 are the responsibility of the Institutes supported by their respective Funding Agencies. These resources are neither accounted for in equipment construction costs, nor monitored centrally by the Collaboration.

The resources needed for work under the heading 4.5.3 cover the costs of the equipment construction. These costs have been evaluated by the Collaboration. Only these costs are monitored centrally by the Collaboration.

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- 4.6 As part of its activities, the Collaboration shall actively continue to seek support for the ISOLDE programme from external sources such as the European Union Framework programmes.
- 4.7 Unless explicitly mentioned, all cost figures in this MoU are expressed in Swiss Francs.

**Article 5 Responsibilities of the Institutes for Construction, Maintenance and Operation of Common Equipment for the ISOLDE Experiments and for the Upgrade of the ISOLDE Facility, and Responsibilities of CERN as Host Laboratory**

- 5.1 The total work for upgrade of the facility and for the common equipment is divided into:
- 5.1.1 Equipment construction, which will be the responsibility of individual Institutes, or groups of Institutes, and
- 5.1.2 Common Projects comprising those elements of the equipment construction which the Collaboration has agreed are to be provided at its common expense.
- 5.2 Annex 7.1 shows the total overall summary of the estimated values of the deliverables, by Funding Agency and equipment element, to which the Funding Agencies are committed and for which they have foreseen the appropriate funding. Annex 7.2 gives the projected spending profile over the three years 2017-2019, by Funding Agency, for Collaboration Membership Fees and those deliverables for which future funding is already secured. The Collaboration shall update this Annex annually to reflect the projection for the following three years.
- 5.3 The Institutes, supported by their Funding Agencies, will make their best efforts to design, produce final prototypes, construct, calibrate, transport, assemble, install and commission all the deliverables listed in Annex 7.1 within the limits of their funding.
- Any cost overruns for which solutions have not been found will be brought, by the Institute(s) concerned, to the attention of the ISCC. The ISCC shall decide ways of accommodating such overruns including descoping or staging if other ways cannot be found.
- Annex 7.3 shows for completeness the experimental equipment placed at ISOLDE by the Institutes but not forming part of the common equipment. The equipment listed in Annex 7.3 does not form part of the responsibilities of the Institutes under this MoU.
- 5.4 Annex 8 lists the Common Projects.
- 5.5 Contributions to the Common Projects shall be made in two ways:
- 5.5.1 By taking responsibility for a Common Project item or parts of it, in agreement with the ISCC. This option is referred to as “in-kind contribution”.

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- 5.5.2 By cash payments to a dedicated Common Fund, established through a dedicated account at CERN. The Common Fund will be managed and operated by the Resource Coordinator (Annex 5.1.6), taking advice from the Collaboration Management together with the CERN Finance Department. All Common Fund operations shall be monitored by the ISCC. The Common Fund shall be maintained and managed in the currency of the CERN Budget.
- 5.6 All equipment brought to the CERN site shall comply with CERN's safety regulations. The design, test criteria and testing of equipment should be discussed well in advance with CERN's safety officials. All equipment brought to CERN shall be accessible for inspection by the ISOLDE Group Leader in Matters of Safety (Annex 5.1.9).
- 5.7 The details of beam-time scheduling and floor space allocation for the experiments shall be co-ordinated by the ISOLDE Physics Coordinator (Annex 5.1.8).
- 5.8 Responsibility for the M&O of the common equipment for the ISOLDE experiments rests jointly with the Collaboration as a whole and with CERN as Host Laboratory, in accordance with the General Conditions. It is a fundamental principle that each Institute within the Collaboration shall participate in both maintenance and operation and contribute a fair and equitable share of common costs.
- 5.9 It is also a fundamental principle that an Institute having contributed a component of equipment, shall also contribute to the necessary scientific and technical manpower support to operate that component, maintain it in good working order and dismantle it when individual experiments are completed.
- 5.10 Within the fundamental principles set out in Articles 5.8 and 5.9 above, the Collaboration shall, for each M&O cost item, decide whether the cost is to be borne at the common expense of the Collaboration or not. The M&O expenses are thereby divided into three categories:
- 5.10.1 **Category A.** M&O expenses that are agreed to be shared by the entire Collaboration. Annex 9 lists the headings under which Category A costs are categorised.
- 5.10.2 **Category B.** M&O expenses borne by part of the Collaboration, i.e. by single Institutes or groups of Institutes, and their Funding Agencies. The headings in this category are defined with reference to the distribution of responsibilities amongst the various Institutes for the provision of the common equipment for the ISOLDE experiments as given in Annex 6. Annex 10 lists for this category, by sub-item/system, the deliverables provided by the Institutes.

It is agreed that an Institute having responsibility under a Category B heading shall contribute to providing the necessary financial, scientific and technical support, as well as replacement or spare parts, for normal operation of that equipment and for the routine maintenance needed to keep it in good working order. If problems arise that require major modifications, responsibility shall lie with the Collaboration as a whole. The Collaboration shall propose on a case-by-

case basis the events to which this provision will apply. The proposal shall be submitted for approval to the next ISCC meeting, which shall also be asked to approve the provision of the necessary resources.

5.10.3 **Category C.** General maintenance and operation expenses that are provided to the Collaboration by CERN, acting in its role as Host Laboratory. Subject to the General Conditions, these are more precisely described in the list given in Annex 11.

5.11 The responsibility for M&O of the equipment that is specific to an individual experiment remains with the experimental team concerned.

5.12 CERN is the Host Laboratory of the Collaboration. Its responsibilities as Host are set out in the General Conditions and more specifically in Annex 12.

## **Article 6      Administrative and Financial Provisions**

6.1 The budgets for the Common Projects listed in Annex 8 and for M&O Category A shall be approved annually in advance by the ISCC. The costs shall be shared equally amongst the Parties or as the ISCC may from time to time decide.

6.2 Contracts for Common Projects shall be placed by CERN in accordance with its financial rules.

6.3 Under the provisions of the CERN basic Convention dated 1<sup>st</sup> of July 1953, revised on 17 January 1971, any Institute's staff and property located at CERN shall be subject to the authority of the CERN Director-General and shall comply with the CERN regulations.

6.4 An annual membership fee per country is decided by the collaboration committee. In specific cases, for example small countries or new applicants, this fee can be reduced on decision of the collaboration committee.

## **Article 7      Publications**

7.1 One copy of any Ph.D. thesis or research report including results from Collaboration activity shall be sent to the CERN library. As a condition for the approval of each ISOLDE experiment, the CERN Research Board shall require the same with respect to results of that experiment.

## **Article 8      Amendments**

8.1 The Collaboration shall make every effort to ensure that the information contained in the Annexes to this MoU is kept up-to-date. To this end it shall review the information at least annually for the ISCC.

8.2 This MoU may be amended at any time with the agreement of the Parties or of their appointed successors. Any such amendments shall be subject to the prior agreement of the ISCC.

## **Article 9      Disputes**

9.1 The primary mechanism for resolution of any disputes shall be negotiation within the Collaboration in the first instance and then if necessary in the ISCC. Should these fail to conclude, the following three mechanisms shall apply, as appropriate. Any dispute between Funding Agencies shall be resolved by negotiation or, failing that, by arbitration through the President of the CERN Council, who will use defined arbitration procedures where they exist and will otherwise adopt one at his or her discretion. Any dispute between a Funding Agency and CERN shall be resolved using standard CERN procedures for the resolution of such disputes. Any dispute between Institutes shall be resolved according to Collaboration procedures.

## **Article 10     Annexes**

10.1 All the Annexes are an integral part of this MoU. They are understood to be the planning basis for the exploitation of the ISOLDE facility. They shall be updated from time to time as necessary to reflect the current reality.

## **Article 11     Final Provisions**

11.1 This MoU is not legally binding, but the collaborating Institutes and Funding Agencies recognize that the success of the Collaboration depends on all its members adhering to its provisions. Any default will be dealt with by the ISCC. Notwithstanding the foregoing, the provisions of the General Conditions are binding.

**ANNEXES**

- Annex 1: Institutes representing their country in the ISOLDE Collaboration and the names of their Contact Persons
- Annex 2: List of Funding Agencies and their Representatives
- Annex 3: Main Features of the ISOLDE Facility
- Annex 4: Participants in the ISOLDE Collaboration by Country and Institute
- Annex 5: The Organizational Structure of the ISOLDE Collaboration
- 5.1: The Management Structure of the ISOLDE Collaboration
- 5.2: Persons holding Management and other senior positions within the ISOLDE Collaboration
- Annex 6: Overview of Technical Participation of Institutes in ISOLDE Upgrades and in Common Equipment for the Experiments
- Annex 7: Summary Table of the Contributions by Funding Agency and equipment item, including Common Projects
- 7.1: Overall Summary of the estimated value of deliverables to which the Funding Bodies have contributed or are committed and for which they have foreseen appropriate funding
- 7.2: Projected 2017-2019 Spending Profile for Collaboration Membership Fees and those deliverables for which future funding is already secured
- 7.3: Physics equipment permanently at ISOLDE but not forming part of the common equipment (shown for information only and not part of the responsibilities of the Institutes under this MoU)
- Annex 8: Common Projects
- Annex 9: Category A Headings for ISOLDE M&O Costs Categorisation to be shared by the entire Collaboration
- Annex 10: Category B Headings for ISOLDE M&O Costs Categorisation to be borne by part of the Collaboration
- Annex 11: Category C Headings for ISOLDE M&O Costs Categorisation to be provided by CERN
- Annex 12: CERN's Responsibilities as Host Laboratory
- Annex 13: HIE-ISOLDE Project
- Annex 14: General Conditions Applicable to Experiments Performed at CERN

**The European Organization for Nuclear Research (CERN)**

And

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declare that they agree on the present Memorandum of Understanding for the ISOLDE Facility.

Signed in Geneva, Switzerland

on .....

for CERN

Signed in

on .....

for

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Prof. Eckhard Elsen  
Director for Research and Computing

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### Annex 1 Institutes representing their country in the ISOLDE Collaboration and the names of their Contact Persons

Country	Town	Institute	Representative
	Geneva	CERN, European Organization for Nuclear Research	G. Neyens
Belgium	Leuven	Katholieke Universiteit Leuven (KU Leuven)	N. Severijns
Denmark	Aarhus	Department of Physics and Astronomy, University of Aarhus	H.O.U Fynbo
Finland	Helsinki	Helsinki Institute of Physics	J. Pakarinen
France	Orsay	CSNSM	G. Georgiev
Germany	Greifswald	Universität Greifswald	L. Schweikhard
Greece	Athens	INP, NCSR Demokritos	A. Lagogiannis
Italy	Firenze	INFN	A. Nannini
Norway	Oslo	Fysisk institutt, Universitetet i Oslo	S. Siem
Poland	Warsaw	University of Warsaw	M. Pfützner
Romania	Bucharest	National Institute of Physics and Nuclear Engineering	N. Marginean
Slovakia	Bratislava	Institute of Physics, Slovak Academy of Sciences	M. Venhart
South Africa	Witwatersrand	University of the Witwatersrand	D. Naidoo
Spain	Madrid	Complutense University of Madrid	L. Fraile
Sweden	Lund	Lund University	J. Cederkall
United Kingdom	Guilford	University of Surrey	D. Doherty

**Annex 2 List of Funding Agencies and their Representatives**

<b>Country</b>	<b>Agency</b>	<b>Place</b>	<b>Represented by</b>
	CERN	Geneva	E. Elsen
Belgium	Fonds voor Wetenschappelijk Onderzoek – Vlaanderen (FWO)	Brussels	H. Willems
Denmark	University of Aarhus	Aarhus	K. Riisager
Finland	Helsinki Institute of Physics	Helsinki	K. Huitu
France	IN2P3	Paris	R. Pain
Germany	Universität Greifswald	Greifswald	L. Schweikhard
Greece	General Secretariat For Research and Technology	Athens	P. Kyprianidou
Italy	INFN	Rome	Prof. Antonio Zoccoli
Norway	University of Oslo	Oslo	Morten Dæhlen
Poland	University of Warsaw	Warsaw	M. Duszczuk
Romania	National Authority for Scientific Research and Innovation - Institute of Atomic Physics	Bucharest	F. D. Buzatu
Slovakia	Ministry of Education, Science, Research and Sport of the Slovak Republic	Bratislava	Z. Hlavacikova
South Africa	National Research Foundation	Pretoria	M. Qhobela
Spain	Ministerio de Ciencia, Innovación y Universidades	Madrid	R. Rodrigo Montero
Sweden	Swedish Research Council	Stockholm	Niklas Ottosson
United Kingdom	UKRI-STFC	Swindon	Mark Thompson

### Annex 3 Main Features of the ISOLDE Facility

The ISOLDE facility is dedicated to the production, separation and acceleration of a large variety of radioactive ion beams. The facility receives proton beam from the Proton-Synchrotron Booster (PSB) of CERN and provides low energy beams up to 60 kV as well as post-accelerated beams. In 2016 the post-accelerated beams obtained an energy up to 5.5 MeV/u for charge state  $A/q = 4.5$  and from 2018 onwards, post accelerated radioactive beams up to 9.2 MeV/u (for  $A/Q=4.5$ ) should be accessible after the installation of the 4th cryomodule.

The main components of the facility are:

- The target workshop with target material research laboratory, the off-line separators and target conditioning systems, located in building 3
- The class A radioactive laboratory with target conditioning units and hot cell in building 179
- The ISOLDE proton beam line, intermediate irradiated target storage and remote handling area, and the target areas (GPS and HRS) in building 838.
- The two on-line ISOLDE front-ends (GPS and HRS). These front-ends accelerate  $1+$  ions to 60 keV. There is also one spare front-end
- The two ISOLDE magnetic separators GPS and HRS
- The beam distribution system including instrumentation
- The RFQ cooler for the HRS beams in building 170
- The experimental area (except for the experiments themselves) in building 170
- The post-acceleration of radioactive beams, including the bunching, charge breeding and the linear post accelerator system, made up of normal conducting elements (REX-ISOLDE) and new superconducting elements (HIE-ISOLDE), and its three experimental beamlines.
- The ISOLDE targets and ion sources including the Resonant Ionization Laser Ion Source (RILIS) system located in building 170 and the off-line RILIS lab.
- Test and prototyping space for the physics experiments and short term storage for experimental equipment (building 275)
- The ISOLDE control room in building 508
- The solid state laboratory, the laser laboratories, the workshop and DAQ room in building 508

**Annex 4 Participants in the ISOLDE Collaboration by Country and Institute**

<b>Country</b>	<b>Institute</b>	<b>Person</b>
Belgium	Department of Subatomic and Radiation Physics, Ghent University	Heyde K. Philippe Brunier
	Instituut voor Kern- en Stralingsfysica, KU Leuven	Andel Boris Arajo Escalona V. Cocolios T. De Lemos Lima T. De Witte H. Dirkx D. Dockx K. Farooq-Smith G. Ferrer R. Hayen L. Huyse M. Kanellakopoulos A. Koszorus A. Kraemer S. Kudryavtsev Yu. Langouche G. Lin Pin-Cheng Lippertz G. Manea V. Martinez Palenzuela Y. Neyens G. Parnefjord Gustafsson F. Pereira L. Perkowski M. Poleshchuk O. Ramos Joao Pedro Raabe R Refsaard J. Renaud M.. Romans J. Severijns N. Stegemann S. Stryczyk M. Van Duppen P. Van den Bergh P. Vanlangendonck S. Vantomme A. Verlinde M. Verstraelen E.
	Laboratorium voor Vaste-Stoffysica en Magnetisme, K.U.Leuven	Lievens P.
	SCK.CEN Mol	Boeckx S. Ghys L. Houngbo D. Popescu L. Schuermans S.

	Service de Physique Nucléaire Théorique, Université Libre de Bruxelles	Godefroid M. Filippin L.
Denmark	Department of Chemistry, University of Copenhagen	Hemmingsen L. Jensen M.L. Thulstrup P.
	Dept. of Physics & Astronomy, Uni. Of Aarhus	Fynbo H.O.U. Gad A. Jensen J.H. Munch M. Riisager K. Rosana Martinez Turtos
Finland	University of Helsinki	K. Helariutta
	University of Jyväskylä	De Groote R. Gins W. Grahn T. Greenlees P.T. Jokinen A. Kankainen A. Koivisto H. Moore I.D. Ojala J. Pakarinen J. Rahkila P. Reponen M. Ruotsalainen P.
France	CEA Saclay	Korten W. Pollacco E.C. Zielinska M.
	Centre d'Etudes Nucleaires de Bordeaux Gradignan	Ascher P. Blank B. Gerbaux M. Giovinazzo J. Grevy S. Kurtukian-Nieto T. Versteegen M.
	GANIL	Bastin B. Caceres L. Delahaye P.- Jardin P. Thomas J.C. Mansour F. Wittwer G.
	IJC Lab, University Paris-Saclay	Gaulard C. Georgiev G. Ljungvall J. Lunney D. Petrache C.

	IJC Lab, University Paris-Saclay	Assié M. Blumenfeld Y. Cheikh Mhamed M. Franchoo S. Le Blanc F. Matea I. Manea V. Verney D. Yordanov D.
	Institut Laue-Langevin Grenoble	Köster U.
	LPC Caen	Flavigny F. Ban G. Flécharde X. Liénard E. Parlog M. Quéméner G.
	IPHC & University of Strasbourg	Nowacki F. Sieja K. Dudek J.
Germany	Eberhard-Karls-Universität Tübingen	Rolle A-M. Wiehr S. Zimmermann C.
	Experimentalphysik, Universität des Saarlandes	Deicher M. Schell J. Wolf H.
	GSI	Beck D. Block M. Geithner W. Gorska M. Gumenyuk, O Heinz S. Herfurth F. Kindler B. Litvinov, Yu Lommel B. Martinez-Pinedo G. Neidherr D. Petridis N. Sanchez R. Sanjari S. Scheidenberger Ch. Simon H.
	FAIR Darmstadt	Herlert A.
	Helmholtz Institut für Strahlen- und Kernphysik, University of Bonn	Herzog P. Keßler P. Niederhausen J. Simon R.
	Institut für Kernchemie, Universität Mainz	Ballof. J. Dorrer H. Duellmann Ch. Geppert C.

		Keller O. Neugart R.
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	Institut für Kernphysik, Universität Münster	Beck M. Friedag P. Mueller J. Weinheimer Ch. Zboril M.
	Institut für Materialphysik, Universität Münster	Divinski S. Gartner D. Hergemöller F. Stolwijk N.A. Wegner M.
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	University of Dresden	Zuber K.
	University of Göttingen	Hofsäss H. Nagl M.
	University of Essen Duisberg	Lupascu D. Schell J.
	TU Ilmenau	Schaeff P. Zyabkin D.
Greece	TANDEM Accelerator, INPP, NCSR Demokritis	Harissopoulos S. Lagoyannis A. Axiotis M.
	University of Ioannina, Department of Physics, Nuclear Physics Laboratory	Aslanoglou X. Nicolis N. Patronis N. Eleme Z. Georgali E. Stamati E.M.

	University of Athens	Mertzimekis T. Assimakopoulou A. Chalil A.
Italy	INFN Laboratori Nazionali del Sud	Cherubini S. Di Pietro A. Figuera P. Gulino M. La Cognata M. Pizzone G. Santonocito D. Spartà R.
	INFN Laboratori Nazionali di Legnaro	Andrighetto A. Corradetti S. De Angelis G. Gottardo A. Manzolaro M. Marchi T. Napoli D. Prete G. Scarpa D. Valiente-Dobon J.
	INFN Sezione di Firenze	Marchini N. Nannini A. Rocchini M.
	INFN Sezione di Milano e Università di Milano	Benzoni G. Bottoni S. Bracco A. Camera F. Crespi F. Iskra L. Leoni S. Million B. Wieland O. Ziliani S.
	INFN Sezione di Napoli	De Nitto A. La Commara M. La Rana G. Parascandolo C. Pierrotsakou J. Vardaci E.

	INFN Sezione di Padova and Università di Padova	Bazzacco D. Brugnara D. Fabris D. Goasduff A. Lenzi S. Mazzocco M. Menegazzo R. Mengoni D. Montaner Pizà A. Napoli D. Pasqualato G. Recchia F. Testov D.
	Università di Camerino	Saltarelli A.
Norway	University of Oslo	Bello Garrote F.L. Crespo Campo L. Görgen, A. Guttormsen M. Hagen T.W. Hjorth-Jensen M. Ingeberg V.W. Khesura V. Klintefjord M. Larsen A.-C. Midtbø J.E. Modamio V. Renstrøm T. Rose S.J. E. Sahin Siem S. Tveten G. M. Zeiser F.
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	Heavy Ion Laboratory, University of Warsaw	Iwanicki J. Komorowska M. Matejska-Minda M. Napiorkowski P. Rusek K. Wrzosek-Lipska K.
	National Centre for Nuclear Research	Cap T. Charviakova V. Patyk Z.

	The Henryk Niewodniczański Institute of Nuclear Physics, Polish Academy of Science	Bednarczyk P. Cieplicka N. Fornal B. Iskra Ł. Królas W. Maj A.
	Faculty of Physics and Applied Informatics, University of Łódź	Andrzejewski J. Perkowski J. Wróblewski W.
Romania	Horia Hulubei National Institute of Physics and Nuclear Engineering	Borcea R. Filipescu D. Lica R. Marginean R. Marginean N. Mihai C. Negoita F. Negret A. Nita C.R. Pascu S. Rotaru I. Sotty C. Stanoiu M. Zamfir N.
Slovakia	Institute of Physics, Slovak Academy of Sciences, Bratislava	Venhardt M. Kliman J Hlavac S. Matousek V Urban R. Klimo J. Sedlak M. Repko A. Kantay, G. Balogh M. Herzán, A. Konopka A. Vielhauer S. Krajňák J.
	Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava	Antalic S. Simkovic F. Stefanik D. Mosat P. Broniš A
South Africa	Durban University of Technology	Bharuth-Ram K.
	iThemba LABS	Wiedeking M. Bark R.A. Kheswa B.V. <del>Negi D.</del> Malatji K. Jongile S. Netshiya A. Molahlehi P. Jones, P.M.

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	University of the Western Cape	Abrahams K. Mehl C.V. Ngwetsheni C. Kapoor K. Masango S. Akakpo E. Garrett P. Orce J.N. Triambak S. .
	University of Witwatersrand	Naidoo D. Masenda H. Peters G.
	University of Johannesburg	Masiteng P.L.
	Stellenbosch University	Steenkamp C.M.
	University of Zululand	Ntshangase S.S. Akakpo E.H.
Spain	University of Huelva	Sánchez-Bénitez A. Pérez-Bernal F. Martel I. Labrador Bernal J.A. García-Ramos J.E. Orduz A.K. Marquínez-Durán G.
	Grupo de Física Nuclear & IPARCOS, Universidad Complutense de Madrid	Fraile L.M. Benito J. España S. García M. Ibáñez García P. López Herraiz J. Moreno O. de la Riva J. Rodríguez Murias J. Sánchez-Tembleque V. Valladolid V. Udías J.M.
	Instituto de Física Corpuscular, CSIC, University of Valencia	Algora A. Agramunt J. Domingo Pardo C. Nácher E. Orrigo S.E.A. Rubio B. Taín J.L. Tolosa A.

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	ESS, Lund	Lindroos M.
	Fundamental Physics, Chalmers Univ. of Technology	Diaz Fernandez P Heinz A. Johansson H. Jonson B. Lindberg S. Nilsson T. Thies R.
	University of Lund	Cederkäll J. Di Julio D. Fahlander C. Forsberg U. Golubev P. Lalovic N. Lorenz C. Knyazev A. Rudolph D. Sarmiento L. Snall J.
	University of Stockholm	Källberg A. Liljeby L.

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	Department of Physics and Astronomy, University of Edinburgh	Davinson T. Woods P.J. Aliotta, M Murphy, A.St.J Lederer, C Kahl, D Lonsdale, S
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	School of Engineering and Computing, Univ. of the West of Scotland, Paisley	Chapman R. Keatings J. A. Kelly N. A. McKee P. Nara Singh B.S. O'Donnell D. Scheck M. Smith J. F. Spagnoletti P.

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	School of Physics and Astronomy, The University of Birmingham	Forest D.H. Freer M. Tungate G.
	Department of Physics, University of Surrey	Al-Khalili J.S. Catford W.N. D. T. Doherty Gelletly W. Lotay G. Podolyák Zs. Regan P.H. Walker P.M. Rudigier M Berry T Morrison L Brunet M

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## Annex 5 The Organizational Structure of the ISOLDE Collaboration

### 5.1 The Management Structure of the ISOLDE Collaboration

1. Concerning all scientific and technical matters (in particular related to the upgrade of ISOLDE and the definition, construction and operation of the common items for the experiments) and all resource and legal matters, the Collaboration is governed by the **ISOLDE Collaboration Committee (ISCC)**. This committee comprises one representative of each signatory to this MoU, with voting rights. The ISCC elects the **Chairperson of the ISCC** from among the members of the Collaboration for a period of office of 3 years. The ISOLDE physics group leader, the Resource Coordinator (7 below), the ISOLDE Technical and OP Coordinators (8 below), the ISOLDE Physics Coordinator (9 below), the HIE-ISOLDE Project Leader (10 below) and the Chairperson of the INTC are invited to attend (without voting rights). On request of the Chairperson of the ISCC, other coordinators can be invited to attend (without voting rights).
2. The **INTC** advises CERN Management on the physics program of ISOLDE and the required upgrades of the ISOLDE facility needed to realize that program.
3. Concerning the priorities for the upgrade of ISOLDE and HIE-ISOLDE, CERN Management is advised by the **Standing Group for the Upgrade of ISOLDE (SGUI)**. The members of the SGUI comprise the Chairperson of the INTC, the Chairperson of the ISCC, the immediate past Chairperson of the ISCC, the ISOLDE Technical Coordinators and the ISOLDE OP Section Leader, the ISOLDE Physics Coordinator, the ISOLDE Physics Group Leader, and representatives from the users community for the low and high-energy sections of ISOLDE. It is chaired by the ISOLDE Physics Group Leader.
4. The list of persons presently holding management and other senior positions in the Collaboration is shown in Annex 5.2.
5. The **Spokesperson** represents the Collaboration to the outside, including to CERN as Host Laboratory, and coordinates its work. The ISCC elects the Spokesperson for a period of office of 3 years.
6. The **Project Leaders of the main facility components** listed in Annex 3. The Coordinators listed in Annex 5.2 are ratified by the ISCC on proposal by the Spokesperson.
7. The **Resource Coordinator** oversees the resource planning and will typically deal with budget and manpower planning, MoU's and the Common Fund. He/she is appointed by the ISCC in consultation with the CERN Management.
8. The **ISOLDE Technical Coordinator (ITC)** and **Deputy ISOLDE Technical Coordinator (DITC)** appointed by the CERN Departments responsible for ISOLDE and HIE-ISOLDE (EN and BE Departments), coordinate the ISOLDE/HIE-ISOLDE facility maintenance and technical R&D, while the **ISOLDE OP Section Leader** coordinates the operation of the facility. They are the liaison persons (a) between the CERN staff in EN and BE Departments and those in EP Department, and (b) between EN and BE Departments and the rest of the ISOLDE Collaboration. They are also the contact persons for technical collaborations concerning the ISOLDE facility, as may from time to time arise outside the context of the ISOLDE Collaboration.

9. The ISOLDE **Physics Coordinator** deals with the details of beam-time scheduling and floor space allocation for the experiments. He/she acts as liaison between EP Department, the ISOLDE Technical teams and the ISOLDE users.
10. The Group Leader in Matters of Safety (**GLIMOS**) is responsible to the CERN Management for all matters of safety concerning ISOLDE Collaboration personnel as well as for work and equipment on the CERN premises. He/she is appointed by the Leader of EP Department, on the proposal of the Spokesperson.
11. In 2018, the HIE-ISOLDE accelerator was completed with 4 operational cryomodules. The **ISOLDE OP Section Leader** is in charge of its operation and consolidation.

## 5.2 Persons holding Management and other senior positions within the ISOLDE Collaboration

ISOLDE Collaboration Committee Chairperson	Kieran Flanagan
Spokesperson	Gerda Neyens
Resource Coordinator	Gerda Neyens
ISOLDE Technical Coordinator (ITC)	Richard Catherall and Joachim Vollaire
Deputy ISOLDE Technical Coordinator (DITC)	Erwin Siesling
ISOLDE Operations Section Leader	Jose Alberto Rodriguez Rodriguez
Physics Coordinator	Karl Johnston
GLIMOS	Karl Johnston

## Annex 6 Overview of Technical Participation of Institutes in ISOLDE Upgrades and in Common Equipment for the Experiments

### ACTIVITY

	CERN	Belgium	Denmark	Finland	France	Germany	Spain	Sweden	UK
<b>REX energy upgrade</b>	x	x	x			x	x		x
<b>Spectrometer for REX</b>	x	x		x		x	x	x	x
<b>Renewal of Target Robots</b>	x								
<b>Target disposal study &amp; Infrastructure</b>	x								
<b>RFQ Cooler</b>	x			x	x	x	x		x
<b>Tape Station</b>	x						x		
<b>LIST</b>						x			
<b>MR-TOF</b>	x					x			

**Annex 7 Summary Table of the Contributions by Funding Agency and equipment item, including Common Projects****7.1 Overall Summary of the estimated value of deliverables to which the Funding Bodies have contributed or are committed and for which they have foreseen appropriate funding (kCHF)**

	CERN	Belgium	Denmark	France	Germany	Spain	Sweden	UK	ISOLDE Collaboration	EU
<b>REX-ISOLDE</b>	325									
<b>Low energy stage</b>		30	26		1000	10	1200			
<b>Linac</b>			33		5450					
<b>HIE-ISOLDE</b>	26434	5058	77		115	341(in kind)			7301	5250
<b>RILIS</b>							2655			
<b>RFQ Cooler + prototype</b>	2			20	70			260	44	
<b>EBIS</b>										
<b>ECR</b>	63				33					
<b>LIST</b>					200					
<b>Tape Station</b>	250									
<b>Renewal of Target Robots</b>	1500									
<b>Target disposal study &amp; Infrastructure</b>	2700									
<b>Total</b>	32097	5088	136	20	6868	351	3855	260	7345	5250

The contributions listed in this table must be added to the investments made jointly through the Collaboration budget (2-300 kCHF/year).

The Collaboration has during the years contributed significantly to the infrastructure in the ISOLDE experimental hall, including to its extension (Collaboration 575 kCHF, EU funds 230 kCHF) and the HIE-ISOLDE project (2009-2011 300kCHF per year, 2012-2015 500kCHF per year). The total contribution up to the end of 2018, which concludes Phase 2 of the project, amounts to 12.551 CHF (as detailed in Table 1 of Annex 13). Details how to pay back to CERN the money that was advanced, in order to close Phase 2 in 2018, is given in Table 2 of Annex 13.

**7.2 Projected 2020-2022 Collaboration Membership Fees****CONTRIBUTION (kCHF)**

	Total	2020	2021	2022
CERN	285	95	95	95
Belgium	180	60	60	60
Denmark	180	60	60	60
Finland	180	60	60	60
France	180	60	60	60
Germany	180	60	60	60
Greece	90	30	30	30
Italy	180	60	60	60
Norway	180	60	60	60
Poland	180	60	60	60
Romania	180	60	60	60
Spain	180	60	60	60
Slovakia	150	30	60	60
South Africa	90	30	30	30
Sweden	180	60	60	60
UK	180	60	60	60

As of 2019, a yearly contribution of 10 kCHF is paid by the Czech Technical University of Prague, who signed and “Institute membership Agreement”, in preparation of the Czech Republic becoming a full member of the ISOLDE Collaboration. In 2019, Portuguese institutions have committed to contribute 10 kEuro. Funding is searched for a similar contribution in the next years, without signed agreement.

**7.3 Physics equipment permanently at ISOLDE but not forming part of the common equipment (shown for information only and not part of the responsibilities of the Institutes under this MoU) (kCHF)**

	CERN	Belgium	Denmark	Finland	France	Germany	Spain	Sweden	UK	Romania
<b>ISOLTRAP</b>					75	3600				
<b>COLLAPS</b>		400				1800				
<b>WISArD</b>		1500			200					
<b>Miniball</b>		1300		50	8	5200		10		
<b>Spectroscopy</b>	360		150				200	400		
<b>Lucrecia-Tags</b>					200		130		200	
<b>CRIS</b>		800							900	
<b>Tilted Foil NMR</b>	30				4					
<b>IDS</b>		390.5		10			209.3		171.6	423.5
<b>Reaction Chamber</b>								56		
<b>VITO-NMR</b>	147	52								
<b>ISS spectrometer</b>	50	91							1400	

Supplementary information:

- i. The Collaboration has contributed jointly to several experiments, e.g. the HV platform and the former WITCH (80 kCHF) (now WISArD).
- ii. Solid state experiments have invested more than 2500 kCHF.
- iii. The NICOLE on-line orientation set-up (France, United Kingdom) is estimated to have cost 780 kCHF.
- iv. An electron gun is planned for the new EBIS. The preliminary budget estimate is 150 kCHF.

## Annex 8 Common Projects

The ISOLDE Collaboration has decided to consider a number of items as Common Projects to be financed either by cash contributions to the Common Fund or by in-kind contributions:

- On-line data acquisition system
- Off-line software
- HIE-ISOLDE
- Tape station
- High-voltage MR-TOF for fast beam purification

**Annex 9 Category A Headings for ISOLDE M&O Costs Categorisation to be shared by the entire Collaboration****Detector related costs**

- On-line data acquisition system
- Off-line software

**Administration**

- Administrative assistance
- Economat
- Fax, printers
- Printing and publication

**Communications**

- GSM phones/on-call service (EP Department)

**On-line computing (no recording media)**

- Data storage, (temporary on disk)
- Computers/processors/LANs
- Software licenses
- Desktop infrastructure for experiments
- ...

**Vacuum**

- Spare vacuum pumps and other vacuum devices

**LN2****Detector laboratory in building 508****Chemical laboratory in building 508****DAQ room in building 508****Test bench laboratory in building 275**

**Annex 10 Category B Headings for ISOLDE M&O Costs Categorisation to be borne by part of the Collaboration****Mechanics****Gas-system****Cryo-system****Cooling system****Front-end computer electronics spares****Standard electronics**

Power supplies (low voltage, high voltage)

Crates

Read-out Modules

**Controls**

Detector Control System

Detector Safety System

**Annex 11 Category C Headings for ISOLDE M&O Costs Categorisation to be provided by CERN**

## General services

Safety &amp; radioprotection including territorial safety officer

Compliance with CERN regulations

Radioactive waste disposal

Access system

Elevators

Insurance (CERN standard)

Cleaning

Office space

Computing (CERN standard)

Detector support (i.e. bond lab ...)

Machine equipment including devices, systems, power supplies and controls

Alignment

Cooling and ventilation

Electricity

...

**Annex 12 CERN's Responsibilities as Host Laboratory**

1. CERN shall provide proton beam from the PS Booster to the ISOLDE target stations according to the schedule approved by the CERN Research Board. The intensity of the proton beam will be typically  $3 \times 10^{13}$  protons per pulse and on average an intensity of  $1.5 \mu\text{A}$  will be delivered to the ISOLDE target.
2. CERN shall produce each year up to 30 target units for the ISOLDE Collaboration.
3. CERN, together with the Collaboration, shall develop target-ion source systems as approved by the INTC and the standing group for the upgrade of the ISOLDE facility.
4. CERN shall operate and maintain the ISOLDE facility including HIE-ISOLDE as described in Article 5 and shall pay from its budget for the Category C M&O expenses detailed in Annex 11. During an experimental run, it shall be the responsibility of CERN to deliver the beam up to the merging switchyard for low energy experiments and up to each HIE-ISOLDE experiment.
5. CERN shall be responsible for the installation, upgrade and maintenance of the on-line computing environment.
6. The ISOLDE experiments shall have access to the CERN-EP Department Electronics Pool.
7. Experimental area support in line with general CERN standards.

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## Annex 13 HIE-ISOLDE Project

### A. SCOPE

The HIE-ISOLDE project has two objectives: the upgrade of the post-accelerated Radioactive Ion Beam (RIB) energies and the upgrade of the low-energy RIB beam intensities for the ISOLDE facility as a whole. Both upgrades will be realized in phases. Phases 1 and 2 of the project focus on a major upgrade of the energy of the RIB's produced by REX-ISOLDE, by adding to it a superconducting Linac (called the HIE-ISOLDE Linac) with 4 cryomodules. Phase 3 comprises two aspects: an intensity upgrade of all ISOLDE beams by making use of the LIU upgrades (realized during LS2) in the CERN Booster and Linac4, and an upgrade of the REX-part of the post-accelerator in order to reach 10 MeV/u for all radioactive species produced at ISOLDE.

1) For the energy upgrade, a superconducting linear accelerator has been constructed behind the REX-Linac, consisting of four cryomodules and 20 RF-cavities. The project included all the buildings and services, in particular also the cryogenic plant, necessary for the operation of the accelerator. The transfer lines to the experimental areas are also included. The first phase of the project was realized in 2016 and included the installation of 2 cryomodules bringing the energy to 5.5A MeV. During the second phase, 2 additional cryomodules have been installed, respectively in 2017 and 2018 to increase the beam energy up to a maximum of 9.2 A MeV for beams with  $A/Q=4.5$ . If all cryomodules operate at their nominal capacity, all isotopes produced at ISOLDE can be reaccelerated to at least this energy.

2) The further energy upgrade, planned as part of the 3<sup>rd</sup> phase of the project, has not yet been endorsed by CERN. It was planned to install 2 low-beta cry-modules to replace part of the current warm LINAC (REX-ISOLDE), thus boosting the maximum achievable energy to 10 MeV/u for  $A/Q=4.5$  (so for almost all isotopes at ISOLDE). This phase will be revised in the coming years.

3) The design study for an intensity upgrade, which aims at delivering a TDR for making best use of the upgraded proton beams from the LINAC 4 and the upgraded PSB is planned in the next years.

### B. FUNDING of Phase 1 and Phase 2.

Funding of the first two phases of the project has been shared between CERN and outside partners. The total Cost-to-Completion of the project up to the end of Phase 2, reached in December 2018, is 39.4 MCHF over the period 2007-2018. The current CtC of the project excludes Phase 3 for which the 5.6 MCHF are still not funded, and which is currently not yet in the CERN planning.

**Table 1** – Cost-to-Completion of the HIE-ISOLDE project

<i>In kCHF</i>	Infrastructure	Machine			Total
		Phase 1	Phase 2	3 <sup>rd</sup> beam line	
CERN funding	21067	4199	415	753	26434
Collaboration		8329	4222		12551
In kind		341	41		382
<b>Total</b>	<b>21067</b>	<b>12869</b>	<b>4678</b>	<b>753</b>	<b>39367</b>

The CERN contribution formalized in the current mid-term plan (MTP2017-2021) is 26.4 MCHF and covers civil engineering and general services (19.5 MCHF), the machine and the 3<sup>rd</sup> beam line (5.4 MCHF), the Design Study for the intensity upgrade (1.2 MCHF), Safety (0.6 MCHF) and project management (0.3 MCHF). The contribution from external partners, including the ISOLDE collaboration, is 12.9 MCHF and covers the Superconducting linear accelerator (Phases 1 and 2) and the high-energy beam transfer lines. Table 2 summarizes the contributions in kCHF pledged at the date of December 2018, including the payback scheme for the ISOLDE Collaboration to CERN, both for Phase 1 (till 2020) and for Phase 2 (till 2023). Former contributions to the RILIS source and the RFQ cooler ISCOOL, as part of the beam quality upgrade, are detailed in annex 7.1 and not reported here.

**Table 2** – Cash Funding Sources secured by the Collaboration

Funding Source	2007-2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
FWO Big Science I (BE)	4460										4460
ISOLDE Coll.	2477	500									2977
MPI (DE)	115										115
Uni. Aarhus (DK)	77										77
CERN loan (KM2180)			140	140	140	140	140				700
<b>Phase 1</b>	<b>7129</b>	<b>500</b>	<b>140</b>	<b>140</b>	<b>140</b>	<b>140</b>	<b>140</b>				<b>8329</b>
FWO Big Science II (BE)	494	104									598
ISOLDE Coll.			433								433
CERN pre-payment			400	400	400	400	400	400	400	391	3191
<b>Phase 2</b>	<b>494</b>	<b>104</b>	<b>833</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>391</b>	<b>4222</b>
<b>Total Machine</b>	<b>7623</b>	<b>604</b>	<b>973</b>	<b>540</b>	<b>540</b>	<b>540</b>	<b>540</b>	<b>400</b>	<b>400</b>	<b>391</b>	<b>12551</b>

In order to match the funding secured by the collaboration with the cash flow of expenses of the HIE-ISOLDE project an advanced payment by CERN was obtained in order to complete Phase 2 by the end of 2018. The amount will be paid back at the rate of 400 kCHF per year, starting from 2016 until 2023. An additional payment of 433 kCHF has been made in 2016 to cover all HIE-ISOLDE expenditures made until 2015. A CERN loan of 700 kCHF has been given in 2016 to complete phase 1, which is paid back at a rate of 140 kCHF/year from 2016 until 2020. The Collaboration authorized the Chair of the ISOLDE Collaboration Committee and the ISOLDE Physics Section Leader to sign this loan on behalf of the Collaboration

**Table 3 – In-kind Contributions**

<b>Funding source</b>	<b>Contribution (in kCHF)</b>	<b>Deliverables</b>
<i>“Industry for Science Programme”</i> (CDTI, Spain)	241	Engineering study and construction of the prototype beam diagnostic box
EU-INTERREG-IV (CATE Consortium, Scandinavia)	140	Mechanical adjustment of cryomodules and collar for tuning systems, as well as the motorisation for tuning system.
Instituto de Estructura de la Materia – CSIC, Spain	100	R&D on diamond detector and prototyping of the RF slow controls
<b>Total</b>	<b>481</b>	

In addition, the FP7-PEOPLE-2010-ITN project CATHI (Marie Curie Actions – ITN – Grant agreement N° PITN-GA-2010-264330) funded fellows for a total budget of **4.6 MEUR** (2010-2014).

The associated expenditures were relatively well balanced:

- 425 k€ for Training
- 355 k€ for Networking
- 480 k€ for R&D and Prototyping (namely for the high-intensity upgrade)

**Annex 14 General Conditions Applicable to Experiments Performed at CERN**

**ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE**

**EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH**

Laboratoire Européen pour la Physique des Particules  
European Laboratory for Particle Physics

**GENERAL CONDITIONS**

**APPLICABLE TO**

**EXPERIMENTS AT CERN**

20 February 2008

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# ***GENERAL CONDITIONS***

*applicable to*

## ***Experiments at CERN***

*(Terms with a particular meaning in the context of this document are defined at the end – their first occurrence in the document is indicated with a reference number thus: term<sup>a</sup>).*

The mission of the European Organization for Nuclear Research (“*CERN*”) is to sponsor international scientific research in high-energy physics.

This document (the “*General Conditions*”) sets out the rules and procedures in organisational, managerial and financial matters, which apply to the participation by Universities and Research Institutions (the “*Collaborating Institution(s)*”) in experiments at CERN. The Collaborating Institutions jointly constitute the “*Collaboration*”. They provide, and are responsible for, the Visiting Research Teams<sup>i</sup> (the “*Team(s)*”) carrying out the experiment.

The General Conditions also define CERN's role as Host Laboratory of the experiment, which must be distinguished from its role as a Collaborating Institution, as the case may be.

Any reference made in the General Conditions to a specific document shall be to its most recent version.

## **1. SCOPE OF APPLICATION**

The General Conditions apply to Approved Experiments<sup>ii</sup> (the “*Experiment(s)*”) carried out on the CERN site<sup>iii</sup>. They do not apply to Recognised Experiments<sup>iv</sup>.

## **2. PARTIES AND THEIR REPRESENTATION**

2.1. The parties involved in the Experiment (the “*Party*” or the “*Parties*”) are:

- CERN as Host Laboratory;
- The Collaborating Institutions (including, as the case may be, CERN).

2.2. Each Party shall have a representative:

- CERN as Host Laboratory shall be represented by its Director of Research, acting on behalf of the Director-General;
- The Collaboration shall appoint a Spokesperson, who shall represent the Collaboration to the outside, including to CERN as Host Laboratory, and co-ordinate its work. Where the Spokesperson is not stationed full-time at CERN, the Collaboration shall also appoint a Contactperson at CERN;

- Each Collaborating Institution shall appoint a Team Leader who shall represent it in its relations with CERN as Host Laboratory. The Team Leader's responsibilities are detailed in the "Appointment of Team Leader" form (available on the Users' Office Web site – see Article 5.7).
- 2.3. Each Collaborating Institution shall ensure that the members of its Team (the "*Team Member(s)*") comply with the General Conditions.

### 3. BASIC DOCUMENTS GOVERNING THE EXECUTION OF THE EXPERIMENT

- 3.1. The following documents shall constitute the formal basis for the Experiment:
- 3.1.1. the **EXPERIMENTAL PROPOSAL**, after its approval by the CERN Research Board on the recommendation of the Experiment Committee dealing with the appropriate part of the physics programme (the "*Experiment Committee*");
  - 3.1.2. the **TECHNICAL DESIGN REPORTS**, where appropriate;
  - 3.1.3. the **MEMORANDUM OF UNDERSTANDING** (the "*MoU*"), which sets out the detailed arrangements specific to the Experiment and which shall be agreed and signed by CERN as Host Laboratory and the Collaborating Institutions, for the purpose of signature represented, as the case may be, by their Funding Agencies<sup>v</sup>. Through the signature of the MoU, the Collaborating Institutions accept its terms;
  - 3.1.4. the **GENERAL CONDITIONS**.

#### Contents of the MoU

- 3.2. The MoU may be a single document setting out the arrangements for construction, installation, maintenance and operation, or it may comprise two documents, one for construction and installation and the other for maintenance and operation. As a guide, the essential parts of the MoU are the following:
- a) a list of the Collaborating Institutions responsible for the Teams carrying out the Experiment;
  - b) a list of the Funding Agencies of the Collaboration;
  - c) details of the persons with specific responsibilities in the Experiment;
  - d) the obligations of the Parties for:
    - i) construction and installation
      - the obligations for construction and installation of the detector components and the auxiliary equipment (jointly the "*Equipment*");
      - a breakdown of the funding requirements for the Equipment, together with the contributions of the Parties;
      - a timetable for the construction and installation of the Equipment;
    - ii) maintenance and operation
      - the obligations for maintenance and operation of the Equipment;
  - e) an explicit statement that the General Conditions apply;

- f) references to any specific agreements and Protocols relevant to the Experiment, copies of which shall be included as Appendices to the MoU.

#### **4. ORGANISATION OF THE COLLABORATION**

##### **Internal autonomy and co-ordination with CERN as Host Laboratory**

- 4.1. In its internal relations, the Collaboration shall be free to take such organisational decisions as deemed necessary, always subject to the terms of the MoU and the General Conditions. Any financial arrangements between CERN as Host Laboratory and the Collaboration shall be subject to the Financial and Administrative Provisions for Visiting Research Teams.

##### **Co-ordination in matters of safety**

- 4.2. The Leader of the CERN Department responsible for the physics programme of which the Experiment is part shall appoint a Group Leader in Matters of Safety (GLIMOS), on the proposal of the Spokesperson. The rights and responsibilities of the GLIMOS are defined in the document "Safety Policy at CERN - SAPOCO/42".

##### **Finance Review Committee/Resources Review Board**

###### **Initial Decision**

- 4.3. For Experiments involving large capital investments, a Finance Review Committee (FRC) or a Resources Review Board (RRB) may be set up by agreement of CERN as Host Laboratory and the Collaboration.

###### **Membership**

- 4.4. The FRC/RRB shall consist of one representative of each Funding Agency, along with the Managements of CERN and the Collaboration. It shall be chaired by the CERN Director of Research.

###### **Terms of reference**

- 4.5. The role of the FRC/RRB includes:
- reaching agreement on the MoU;
  - approving any modification of, or addition to, the Experiment that would require amending the MoU;
  - monitoring the supply of Equipment according to the agreed schedule;
  - monitoring the Common Projects<sup>vi</sup> and the use of the Common Funds<sup>vii</sup>;
  - monitoring the general financial and manpower support;
  - approving a maintenance and operation procedure and monitoring its functioning;
  - approving the annual construction and installation budgets as well as those for maintenance and operation.
- 4.6. The Collaboration Management reports to the FRC/RRB on technical, managerial, financial and administrative matters, and on the composition of the Collaboration.

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## 5. CERN'S OBLIGATIONS AS HOST LABORATORY

### PRINCIPLES

#### Installation

- 5.1. The Collaboration shall ensure that the Equipment and counting rooms meet the CERN Safety Rules. Provided that this is the case, CERN shall agree in writing to their installation in the appropriate experimental area.

#### Duration

- 5.2. CERN shall agree to keep the Equipment on-site during the data-taking for the experimental programme approved by the CERN Research Board.

#### Network connections

- 5.3. CERN shall agree that computers and peripherals belonging to the Collaboration, which are needed for the operation of the Equipment, may be connected to the CERN computer network, provided they meet its compatibility and security standards, including as set out in the document "Operational Circular No 5 – Use of CERN Computing Facilities" and subsidiary rules.

#### Insurance

##### - *Property*

- 5.4. CERN shall at its expense insure against the risks of fire, explosion, natural disaster and water damage all items belonging to the Collaboration or a Collaborating Institution, once they have been delivered to the CERN site, added to the Ownership Inventory (Article 6.10) and accepted in writing by CERN. CERN shall not insure such items against the risks of transport, crane or rigging accidents. It may however offer the possibility that such insurance is taken out at the expense of the Collaborating Institution(s) concerned.

##### - *Third party liability*

- 5.5. CERN shall at its expense insure the members of the Collaborating Institutions against third party liability incurred by them at CERN in the execution of the Experiment.

##### - *Limitation of coverage*

- 5.6. The insurance covers defined in Articles 5.4 and 5.5 are subject to the provisions, including the specified deductibles, exclusions and limits, of CERN's insurance policies. Any risk or amount not covered by such policies shall be for the exclusive account of the Collaboration. CERN does not warrant or accept liability as to the sufficiency of its insurance policies in relation to the risks incurred by the Collaboration.

### SERVICES

#### User support, Users' Office and ACCU

- 5.7. CERN operates a Users' Office as a point of contact with the user community. Documentation for users is maintained on the Users' Office Web site, which can be accessed through the CERN home page (<http://www.cern.ch>). CERN shall provide access to its services, as described in the

“CERN Guide for Newcomers” (available from the Users’ Office Web site). The Users’ Office provides assistance on questions concerning access to the services provided by CERN.

The Advisory Committee of CERN Users (ACCU) promotes links between CERN Management and the User Community and advises CERN Users on the working conditions and the arrangements for technical support.

### **Standard services and facilities**

- 5.8. CERN normally provides, free of charge and within the limits and constraints imposed by the available resources and schedules of accelerators, the following standard services and facilities for the duration of the Experiment:

#### ***Particle beams and equipment***

- a) particle beams and related shielding, monitoring equipment and standard communication with the accelerator control rooms;
- b) beam time allocation and scheduling, in accordance with the recommendations of the Experiment Committee;
- c) test-beam time for testing prototypes and calibrating final detector components, subject to the applicable scheduling and allocation procedures;

#### ***Space***

- d) floor space in the experimental area(s) for the Equipment;
- e) laboratory and hall space for construction, testing and assembly of the Equipment;
- f) temporary short-term storage space for spare parts, handling and assembly tools and Equipment that is awaiting installation or removal. CERN reserves the right to charge the cost of longer-term storage of the above items to the Collaborating Institution(s) concerned;
- g) office space, equipped with standard furniture and infrastructure facilities including network connections, telephones and electricity;

#### ***Supplies and installations at the Experiment***

- h) assistance with the installation and removal of the Equipment, such as the provision of crane and rigging services, geometrical survey and alignment, as well as transport of the Equipment on and between the parts of the CERN site and inside the experimental areas;
- i) mechanical infrastructure, local infrastructure for the supply of mains electricity, raw cooling water, compressed air and standard connections to the CERN communication network;

#### ***Computing***

- j) central computing resources for the Collaboration, in amounts to be decided in accordance with the applicable CERN allocation procedures;

***Transport of persons***

- k) basic transportation for personnel between the main parts of the CERN site, including the experimental areas;

***Safety services***

- l) access to its safety services for advice, inspection and verification, and first aid or other emergency help;

***Administrative services***

- m) access to its administrative services to assist the Collaboration in financial matters, in accordance with the Financial Rules and the Financial and Administrative Provisions for Visiting Research Teams;

***Purchasing services***

- n) access to its purchasing services to assist the Collaboration in placing purchase orders and contracts for its account, in accordance with the CERN Financial Rules and the CERN Purchasing Procedures. In such cases there is immediate automatic transfer of ownership to the Collaborating Institution(s) for which the purchase is made. This(These) Institution(s) shall hold CERN free and harmless from liability arising from such assistance;

***Maintenance and operation***

- o) the resources needed to operate and maintain the standard infrastructure and other equipment supplied by CERN as Host Laboratory.

**Special services**

- 5.9. A variety of services other than those specified above may be provided to the Collaboration on request, subject to the availability of resources. Such services shall be charged according to the applicable conditions.

**Special equipment**

- 5.10. Any additional infrastructure equipment to be provided by CERN, as well as the obligations of CERN and the Collaborating Institutions with regard to the construction, installation, maintenance and operation of such equipment, shall be explicitly mentioned in the MoU.

**6. OBLIGATIONS OF THE COLLABORATING INSTITUTIONS****Basic obligations**

- 6.1. In their capacity as members of the personnel of CERN<sup>viii</sup>, the Team Members shall be subject to the authority of the Director-General of CERN and shall comply with the rules and regulations in force at CERN. Items brought onto the site by the Collaboration are subject to the rules and regulations in force at CERN.

**Status of personnel**

- 6.2. Each Collaborating Institution shall ensure that its Team Members shall for the duration of their Contract of Association<sup>ix</sup> with CERN (the “*Contract of Association*”) remain employed by, and receive a salary from, their Collaborating Institution. It is understood that where they are students, the Team Members shall remain enrolled at their Collaborating Institution, and where they have a sponsor, they shall remain under contract with, and continue to be financed by, their sponsor.
- 6.3. Each Collaborating Institution shall ensure the provision of adequate social and third party liability insurance cover to its Team Members and the members of their family accompanying them. The social insurance must include cover against the financial consequences of illness and accidents that is adequate in the Host States of CERN for the duration of the Contract of Association.
- 6.4. Each Collaborating Institution shall be liable to CERN for any cost or expense resulting from the situation where its Team Members have insufficient insurance cover.

**Medical surveillance and certificates**

- 6.5. Each Collaborating Institution shall remain responsible for the medical surveillance of its Team Members and, in the case of Team Members who are to work in conditions which are deemed to pose special risks (e.g. radiation controlled areas), shall supply to the CERN Medical Service a certificate of medical fitness, for the first time on registration of the Team Member at CERN and then every two years thereafter (a form for such certificates is available on the Users’ Office Web site – Article 5.7).

**Safety briefings and inspections**

- 6.6. The Collaborating Institutions, in conjunction with the CERN Department responsible for the physics programme of which the Experiment is part, shall ensure the safety of the Team Members and the Equipment. The Collaborating Institutions shall participate in safety meetings and studies of the Experiment. They shall ensure compliance by the Team Members with the CERN Safety Rules.

Each Team Member has specific safety responsibilities and obligations, as defined in the document “Safety Policy at CERN - SAPOCO/42”. The Team Members shall attend the CERN safety course(s) for newcomers, any compulsory CERN safety course, and all specific safety courses deemed necessary by the Collaboration.

The CERN safety personnel shall be entitled to carry out safety visits, checks and inspections as well as other safety measures set out in the document “Safety Policy at CERN - SAPOCO/42”.

**Supply of Equipment**

- 6.7. The Collaborating Institutions shall make available on the CERN site, according to an agreed timetable and in working order, the Equipment that they have undertaken to supply and commission. The Spokesperson shall promptly inform the CERN Director of Research of any material failure to meet the agreed schedule. For experiments with an FRC/RRB, this body shall monitor such matters.

**Transport, installation and dismantling of Equipment**

- 6.8. Each Collaborating Institution supplying Equipment shall be responsible for its delivery to and removal from the CERN site, always in compliance with applicable export laws and restrictions. All such Equipment shall be properly documented to indicate its ownership status (Article 6.10) handling requirements and any potential hazards that it may pose. The Collaborating Institutions shall be collectively responsible for the installation and dismantling of the Equipment.

**Ownership of Equipment**

- 6.9. Except as may be agreed in writing by the owner and CERN as Host Laboratory, the delivery of Equipment to the CERN site or its handling on the CERN site shall not affect its ownership. The owner and CERN as Host Laboratory may agree in writing to transfer to CERN the ownership of Equipment which is no longer required by the Collaboration.

**Ownership inventory**

- 6.10. As a condition of coverage by CERN's insurance policy, the Collaboration shall provide CERN with a list of the Equipment which it brings on the CERN site, specifying for each item the owning Collaborating Institution(s) or joint ownership by the Collaboration. It shall keep the list up-to-date and inform CERN promptly of any modifications.

**Maintenance and operation of Equipment**

- 6.11. The Collaborating Institutions shall be collectively responsible for the maintenance and operation of the Equipment, and for providing the resources necessary to carry out the experimental programme.

**Assignment of Equipment**

- 6.12. Any Collaborating Institution providing Equipment shall continue to make it available to the Collaboration until the Experiment has been declared completed (Article 8.2).

**Early removal of Equipment**

- 6.13. The Collaboration may request the removal from the CERN site under the responsibility of the owning Collaborating Institution(s) of any Equipment which in the opinion of the Collaboration is no longer required for the Experiment.

**Release of space**

- 6.14. Space allocated for construction and assembly shall be released when these activities have terminated. As Host Laboratory, CERN reserves the right to change the space allocation during the lifetime of the Experiment. As soon as the Experiment has been declared completed (Article 8.2), all space used by the Collaboration, including office and laboratory space, and the space used for testing and running the Experiment, shall be made available to CERN for reallocation.

**Removal of Equipment**

- 6.15. Equipment shall be removed from the CERN site under the responsibility of the owning Collaborating Institution(s) within six months following a request from the Leader of the CERN Department responsible for the physics programme of which the Experiment is part.

- 6.16. The dismantling and removal of the Equipment must respect the CERN Safety Rules and the laws of the countries through which the dismantled Equipment will transit during the removal, including the country of its final destination (e.g. transport, disposal, elimination of special or radioactive waste). Except as may be agreed in writing by the Collaboration and CERN, the associated costs shall be borne by the Collaboration.

## **7. INTELLECTUAL PROPERTY**

### **Publication and use of data and knowledge**

- 7.1. CERN is bound by its Convention to publish or otherwise make generally available the results of its experimental and theoretical work.
- 7.2. The Collaborating Institutions shall strive to publish any data and knowledge resulting from the experiment through Open Access<sup>x</sup> journals. Where the copyright in an article shall be transferred to the publisher, each Collaborating Institution shall ensure that it has the necessary internal authorisations to approve such a transfer.
- 7.3. Subject to Articles 7.4 and 7.5, each Collaborating Institution and CERN as Host Laboratory shall be entitled to use any data and knowledge resulting from the Experiment for its own scientific non-military purposes.

### **Contribution of proprietary information**

- 7.4. A Collaborating Institution contributing proprietary information to the Collaboration shall ensure that it has or has procured the rights to use, and to contribute to the Collaboration for use by the other Collaborating Institutions, such proprietary information for the execution of the Experiment. The term “use” shall include any integration, modification, enhancement and redistribution. Where the use of proprietary information is subject to restrictions, the contributing Collaborating Institution shall disclose them in writing when making its contribution available to the Collaboration. The obligations defined in this article shall apply whether or not the proprietary information is pre-existing or developed in the execution of the Experiment, and whether or not it was developed individually or jointly with one or more other institution(s).

### **Use of proprietary information**

- 7.5. The contribution by a Collaborating Institution of any proprietary information, including information protected by trademark, patent or copyright, shall not create any right in respect of such information for the other Collaborating Institutions, other than a free, irrevocable and non-exclusive licence to use such information in the execution of the Experiment.

### **Publication and disclosure of proprietary information**

- 7.6. Subject to the intellectual property rights of the Collaborating Institutions having contributed the proprietary information and taking into account any potential for commercial exploitation, the Collaborating Institutions shall strive to publish and make publicly available all proprietary information contributed to the Collaboration. In particular, they shall consider making any software available under Open Source licence conditions.

**Limitation of liability**

- 7.7. The Collaborating Institutions provide no warranties or representations of any kind to each other.

Each Collaborating Institution shall use the data and knowledge resulting from the Experiment and the proprietary information contributed to the Collaboration at its own risk.

The Collaborating Institutions shall have no liability to each other with respect to the subject matter of this Article 7.

**8. FINAL PROVISIONS****Modification of the Experiment and amendment to the MoU**

- 8.1. The Collaboration shall agree on any modification of or addition to the Experiment that would require amending the MoU and shall inform CERN as Host Laboratory of such changes. For experiments with an FRC/RRB, such changes shall also be approved by this body. Where the changes constitute a substantial change to the Experiment, they shall be submitted to the Experiment Committee for approval by the CERN Research Board and the Director-General. Any amendment to the MoU shall be signed by the representatives of the parties to the MoU.

**Duration of applicability of the MoU**

- 8.2. Unless another duration is specified in the MoU, the MoU shall remain in force until the CERN Director of Research, in agreement with the Spokesperson, has declared the Experiment completed, the Equipment has been dismantled and the arrangements for its disposal agreed in writing.
- 8.3. Notwithstanding the foregoing, the General Conditions shall remain in force.

**Observance of the MoU and the General Conditions**

- 8.4. The MoU is not legally binding but the parties to the MoU recognise that the success of the Collaboration depends upon their adherence to its provisions. Any default under its provisions shall be dealt with, in the first instance, by the Collaboration in consultation with the CERN Management and if necessary then by the FRC/RRB (where such a body exists).
- 8.5. Notwithstanding the foregoing, the provisions of the General Conditions are binding.

**Liability**

- 8.6. Except as specifically stipulated in the General Conditions, the Parties shall not be liable to each other for any loss or damage arising in connection with the Experiment.

**Arbitration**

- 8.7. If a dispute within the Collaboration or between the Collaboration and CERN as Host Laboratory cannot be resolved amicably, it shall be referred by any party to the dispute for arbitration to the President of the CERN Council, whose decision shall be binding and final, without right of revision or appeal.

**Relevant documents**

8.8. The following documents apply to the execution of the MoU:

- the CERN Guide for Newcomers;
- Financial and Administrative Provisions for Visiting Research Teams;
- Use of CERN Computing Facilities - Operational Circular No 5 (<http://cern.ch/ComputingRules/>);
- the Safety Guide for experiments at CERN (<http://cern.ch/SafetyGuide/>);
- the Safety Policy at CERN - SAPOCO/42;
- Purchasing Rules and Procedures for Experiments at CERN

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## Definitions

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- i        **Visiting Research Team:** A Collaborating Institution's personnel involved in the Experiment.
- ii       **Approved Experiment:** An Experiment approved by the CERN Research Board and the Director-General after consideration of a written proposal submitted to the appropriate Experiment Committee, taking into account scientific interest, technical feasibility and the constraints imposed by available resources.
- iii      **CERN site:** All parts of CERN's fenced-in domain and all of its underground works.
- iv      **Recognised Experiment:** An experiment in fields allied to particle physics, such as astroparticle physics, the full definition of which was decided by the CERN Research Board (CERN/DG/RB 99-285). The conditions applicable to such experiments are decided by the CERN Research Board on a case-by-case basis.
- v        **Funding Agency:** A body providing resources to one or more of the Collaborating Institutions for the purpose of participation in the Experiment. A Collaborating Institution may itself be a Funding Agency.
- vi      **Common Project:** A project that the Collaboration has decided to manage jointly under the authority of the Collaboration Management.
- vii     **Common Funds:** Funds contributed by the Funding Agencies to joint accounts administered by the Collaboration Management.
- viii    **Member of the personnel of CERN:** All Team Members who are not employed by CERN are required to sign a Registration Form, in which they apply to become an associated member of the personnel of CERN.
- ix      **Contract of Association:** The contract defined in Article RI 2.04 of the Staff Rules and Regulations of CERN.
- x        **Open Access:** The free, irrevocable, worldwide right of access to, and use of, a work in any digital medium for lawful purposes, subject to proper attribution of authorship.