

Memorandum of Understanding

for the Construction and Operation of the COMPASS Experiment (NA58)

between

The EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, “CERN”,
an Intergovernmental Organization having its seat at Geneva, Switzerland,
as Host Laboratory

on the one hand,

and

the Collaborating Institutions/Funding Agencies of the COMPASS Collaboration

on the other hand.

WHEREAS

- (a) The COMPASS Collaboration (“the Collaboration”), which consists of a group of institutes from CERN Member and non-Member States and CERN, (“the Collaborating Institutions”), listed in **Annex 1**, have proposed to CERN to carry out an experiment (“the Experiment”) to study **the structure of hadrons in DVCS and HEMP, Drell-Yan and Primakoff reactions**. Further investigations in the field of hadron spectroscopy are envisaged as well. The experimental apparatus (“the Detector”) comprises a number of particle detection systems and their auxiliary equipment (severally “the Sub-Detectors”, jointly “the Equipment”). A large fraction of the Detectors exist and is installed in the present COMPASS experiment;
- (b) On the basis of an Experimental Proposal (“the Experimental Proposal”) submitted on **May 17, 2010** (CERN/SPSC-2010-014), and a detailed review of the scientific merits of the Experiment, the technological feasibility and estimates of the resources needed, the **SPS Committee** has recommended approval of the Experimental Proposal to the CERN Research Board (CERN-SPSC-2010-030/SPSC-098 *ref. Minutes, point 7.2*);
- (c) Based on that recommendation, the CERN Research Board has granted scientific approval to the Experiment (CERN/DG/Research Board 2011-417 *ref. Minutes-194, point 4.7*).
- (d) The execution of the Experiment is subject to the General Conditions applicable to Experiments at CERN (“the General Conditions”). The General Conditions define the representation of the parties involved in the Experiment and the basic documents that govern its execution, and set out in general terms the organisation of the Collaboration, CERN’s obligations as Host Laboratory and the obligations of the Collaborating Institutions. They also set out the rules governing liability and arbitration, as well as matters related to Intellectual Property. The General Conditions are regarded as an integral part of the Construction and Operation MoU and the current version is attached as **Annex 11**;
- (e) As provided for in the General Conditions, agreement on the construction, installation and operation of previously existing and new Equipments shall be effected through this Memorandum of Understanding (“the Construction and Operation MoU”) between CERN as Host Laboratory and the Collaborating Institutions, represented for the purpose of signature, as the case may be, by their Funding Agencies;
- (f) The Experiment is executed in the framework of the scientific programme approved by the CERN Council, and subject to the bilateral Agreements and Protocols listed in **Annex 11**, the provisions of which shall prevail over those of the Construction and Operation MoU;
- (g) A **Finance Review Committee (FRC)** has been constituted, the membership and general terms of reference of which are defined in the General Conditions. Its specific role with respect to construction and operation is set out in the present document. The representatives of the Funding Agencies of the Collaboration are listed in **Annex 2**.
- (h) The present Construction and Operation MoU supersedes the previous MoU signed in 1998 (reference to the old MoU to be added).

IT IS HEREWITH UNDERSTOOD AS FOLLOWS**Article 1. Parties to the Construction and Operation MoU**

- 1.1 The Parties to the Construction and Operation MoU are CERN as Host and the Collaborating Institutions listed in Annex 1. Annex 2 lists the Funding Agencies of the Collaboration. A Funding Agency may be a Collaborating Institution or a body acting on behalf of one or more Collaborating Institutions in the conclusion of the Construction and Operation MoU.

Article 2. Purpose of the Construction and Operation MoU

- 2.1 The Construction and Operation MoU defines the structure of the Equipment and the organizational structure of the Collaboration. It also sets out organizational, managerial and financial guidelines to be followed by the Collaboration.
- 2.2 It sets out the technical participation of the Collaborating Institutions in the construction and installation of the Equipment, as well as the associated timetable. It provides a breakdown of the financial contributions to the Equipment by Funding Agency and the expected spending profile.
- 2.3 It sets out the participation of the Collaborating Institutions in the operation of the Equipment and in the running of the Experiment.

Article 3. CERN's Obligations as Host Laboratory

- 3.1 CERN's general Host Laboratory obligations are set out in the General Conditions. Beyond these the following specific Host Laboratory obligations apply:
- 3.1.1 Hall EHN2: Maintenance/ improvement of cooling
 - 3.1.2 Consolidation of the M2 beam line
 - 3.1.3 Cryogenic Installation for the Polarized Target
 - 3.1.4 Central Data Recording

Article 4. CERN's Obligations as Collaborating Institute

- 4.1 The following obligations as Collaborating Institute apply:
- 4.1.1 Construction of LH₂ target for DVCS.
 - 4.1.2 Movement of the polarized target.
 - 4.1.3 Supporting Structures for new equipments
 - 4.1.4 Construction of the radiation shieldings around the Hadron Absorber for Drell-Yan program

- 4.1.5 Design and Construction of the Magnet Safety System for the superconducting solenoid magnet of the COMPASS PT (to be discussed; similar point added also for Saclay)

Article 5. Obligations of the Collaborating Institutions

- 5.1 The distribution of responsibilities amongst the Collaborating Institutions with respect to the construction and operation of the various detectors is given in **Annex 6** for the construction of new equipments and in **Annex 10** for the operation of new and existing equipments. An Addendum to this Memorandum of Understanding will be edited in the case of an Institution accepting additional responsibilities or of a new Institution joining the Collaboration.

Article 6. The Equipment and Collaboration

- 6.1 The Equipment is described in detail in the Experimental Proposal. It consists of a number of Sub-Detectors as listed in **Annex 3**.
- 6.2 The names of the scientists currently participating in the Collaboration (“the Members”) are listed in **Annex 4** by Country and by Collaborating Institution.
- 6.3 The management structure of the Collaboration is defined in **Annex 5.1**. Persons currently holding management positions are listed in **Annex 5.2**.
- 6.4 The technical participation of each Collaborating Institution in the construction of the Equipment is set out in **Annex 6**.
- 6.5 In accordance with the recommendations of the *SPS Committee*, the Collaboration shall group the manpower and financial resources (including in-kind contributions) required for construction of the Experiment into four categories:
 - 6.5.1 R&D work on the various Sub-Detectors;
 - 6.5.2 Infrastructure in the Collaborating Institutions, and personnel, travel, etc. of the Collaborating Institutions in connection with their membership of the Collaboration;
 - 6.5.3 Engineering design, final prototyping, construction, calibration, transportation, assembly, installation and commissioning of the Equipment, and its integration into the Detector (jointly “the Construction and Installation”, severally “the Deliverables”).
 - 6.5.4 For the operation, an annual Budget, the M&O Budget, is setup, shared by members of the Collaboration and approved by the FRC.

The manpower and financial resources covering 6.5.1 and 6.5.2 above are the responsibility the Collaborating Institutions, supported as the case may be by their Funding Agencies. These resources shall neither be accounted as construction costs nor monitored centrally by the Collaboration.

The manpower *outside of the Infrastructure of the Collaborating Institutions* and financial resources for the Construction and Installation (6.5.3) shall be accounted as construction costs. These costs shall be evaluated by the Collaboration and verified by the *FRC* (via a dedicated Cost Review Committee, as the case may be). Only these costs are monitored centrally by the Collaboration.

- 6.6 Any institute that wishes to join the Collaboration prior to the completion of the Construction and Installation shall make an appropriate contribution thereto (including to the Common Projects – see **Article 8** below). In the event that the Construction and Installation are already fully funded, the institute shall make a special contribution. Such contributions shall be negotiated by the Collaboration and endorsed by the *FRC*.
- 6.7 Except as indicated otherwise, all cost figures in the Construction MoU are expressed in year **2012** Swiss francs and based on estimates valid on **01.01.2012**. The calculated CERN index for materials cost variations shall be used for construction cost monitoring purposes throughout the lifetime of the Experiment.

Article 7. Programme of Work for the Construction and Installation, and Sharing of Responsibilities for its Execution

- 7.1 The Construction and Installation work is divided into:
- 7.1.1 Sub-Detector work under the responsibility of individual Collaborating Institutions, or groups of Collaborating Institutions, and
- 7.1.2 Common Projects, comprising those elements of the Construction and Installation (including, as the case may be, Sub-Detectors or parts of Sub-Detectors) that the Collaboration has agreed are to be provided at the common expense of the Collaboration, in accordance with Article 8 below.

Annex 7 gives an overview of the financial participation of the Funding Agencies in the Equipments. **7.1** gives the cost matrix by Sub-Detector and Funding Agency of the Deliverables committed to by each Funding Agency. **7.3** provides the projected spending profile.

- 7.2 The Collaborating Institutions, supported by their Funding Agencies, shall make their best efforts to design, produce final prototypes, construct, calibrate, transport, assemble, install and commission the Deliverables listed in **Annex 7** within the limits of their funding.

Any cost overruns that cannot be accommodated internally shall be reported by the Collaborating Institution(s) concerned to the Collaboration. The Collaboration shall propose ways of addressing such overruns (e.g. by cost-savings, asking for additional funds or, if other ways cannot be found, by de-scoping or staging) and seek the endorsement of the *FRC*.

- 7.3 **Annex 8** gives an overview of the timetable for construction and installation of the Equipment.

Article 8. Common Projects

- 8.1 **Annex 9** lists the Common Projects, together with their estimated costs and the current level of contributions from each Funding Agency.
- 8.2 Contributions to the Common Projects may be made in two ways:
- 8.2.1 By taking responsibility for a Common Project item or parts of it, in agreement with the Collaboration Board and endorsed by the **FRC**. This option is referred to as “in-kind contribution”;
- 8.2.2 By cash payments to a dedicated Common Fund, established for the Common Projects through one or more dedicated accounts at CERN in the currency of the CERN Budget. The Common Fund shall be managed and operated by the Resource Coordinator (Annex 5), taking advice from the Collaboration Management together with the CERN Finance Department. All Common Fund operations shall be monitored by the **FRC** and reported to the Collaboration Board.
- 8.3 The contributions to the Common Projects listed in Annex 9 are due in proportion to the number of authors per Collaborating Institution. Collaborating Institutions may contribute more to Common Projects than the amount calculated by this method.

On the recommendation of the Collaboration Management, the **FRC** may decide on changes to the level of contribution, for example due to a major change in the level of participation of a Collaborating Institution or a change in the composition of the Collaboration.

- 8.4 Contracts for Common Projects shall be placed by CERN for the account of the Collaboration, in accordance with the General Conditions, the CERN Financial Rules and the CERN Purchasing Procedures.

Article 9. Maintenance and Operation (“M&O”)

- 9.1 The responsibilities for the M&O of the Experiment both for the new equipments detailed in this MoU and for the existing equipments constructed within previous MoU are laid down in the **Annex 10**.
- 9.2 A dedicated M&O Fund is established for the M&O through one or more dedicated accounts at CERN in the currency of the CERN Budget. The M&O Fund shall be managed and operated by the Resource Coordinator, taking advice from the Collaboration Management together with the CERN Finance Department. All M&O Fund operations shall be monitored by the **FRC** and reported to the Collaboration Board.
- 9.3 The contributions to the M&O Fund are due in proportion to the number of authors per Collaborating Institution.

On the recommendation of the Collaboration Management, the **FRC** may decide on changes to the level of contribution, for example due to a major change in the level of

participation of a Collaborating Institution or a change in the composition of the Collaboration.

Article 10. Specific Rights and Obligations of the Collaborating Institutions

- 10.1 The Collaborating Institutions are entitled to join the pre-exploitation and exploitation phases of the Experiment and to participate in the scientific exploitation of the data acquired.

Article 11. Theses

- 11.1 One copy of any Ph.D. thesis or similar academic document relating to the Experiment must be sent by the Collaborating Institution(s) concerned to the CERN Library for inclusion in its collection.

Article 12. Observance of the MoU and the General Conditions

- 12.1 The MoU is not legally binding, but the Parties 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*.
- 12.2 Notwithstanding the foregoing, the provisions of the General Conditions are binding.

Article 13. Duration of the MoU and its Extension

- 13.1 The MoU is valid from after its approval by all participating Institutes and CERN Director of Research to a date not earlier than *1.1.2016*. The actual termination date will be set by the *FRC*.
- 13.2 The MoU may be extended at any time by mutual agreement of the Parties.

Article 14. Withdrawal of Funding Agencies or Collaborating Institutions

- 14.1 Any Funding Agency may withdraw its support from the Collaboration by giving not less than *eighteen* months' notice in writing to the Collaboration and the Director-General of CERN. In such an event, reasonable compensation to the Collaboration shall be negotiated through CERN and confirmed by the *FRC*.
- 14.2 Any Collaborating Institution may withdraw from the Collaboration in accordance with the General Conditions, the procedures agreed by the Collaboration and by giving notice in writing to its Funding Agency.

Article 15. Participation of additional institutes

- 15.1 Subject to the agreement of the Parties, additional institutes may join the Collaboration at any time during the lifetime of the MoU. Each such event shall give

rise to an **Addendum** to the MoU setting out the specific terms of collaboration for the institute(s) concerned and with explicit mention that the terms of the MoU (including all existing Addenda and Amendments) apply. The terms of collaboration shall be negotiated by the Collaboration (which reserves the right to request additional contributions from such institutes) and endorsed by the **FRC**. The Addendum shall be signed by CERN as Host Laboratory, by the Spokesperson as representative of the Collaboration, and by the institute(s), for the purposes of signature represented, as the case may be, by their Funding Agency/Agencies.

Article 16. Amendments

- 16.1 The MoU may be amended at any time in accordance with the General Conditions.

Article 17. Annexes

- 17.1 All the Annexes are an integral part of this Construction and Operation MoU. They are understood to be the planning basis for the construction of the Equipment and the sharing of responsibilities in the operation phase. The Collaboration Management shall keep up-to-date the information contained therein and shall report any changes to the Parties and to the **FRC**.

ANNEXES

- Annex 1: Collaborating Institutions in the Collaboration and the names of their Contact Persons
- Annex 2: Funding Agencies of the Collaboration and their Representatives
- Annex 3: Sub-Detector Structure of the Experiment
- Annex 4: Current Members of the Collaboration by Country and Collaborating Institution
- Annex 5: The Organizational Structure of the Collaboration
- 5.1: The Management Structure of the Collaboration
- 5.2: Persons currently holding Management and other senior positions within the Collaboration
- Annex 6: Overview of the Technical Participation of the Collaborating Institutions in Equipment Construction
- Annex 7: Overview of the Financial Participation of the Funding Agencies in Equipment Construction
- 7.1: Summary of the Investments for the Detectors (kCHF)
- 7.2: Details of Deliverables by Sub-Detector (year 2012 kCHF)
- 7.3: Projected Spending Profile (kCHF)
- Annex 8: Timetable for the Construction and Installation of the Equipment
- Annex 9: Common Projects, their estimated Costs (kCHF)
- Annex 10: Overview of the participations of the operation on new and existing equipments.
- Annex 11: General Conditions applicable to Experiments at CERN

This MoU is produced in **27** original documents, each pair signed by a Collaborating Institution and by CERN as Host Laboratory and as a Collaborating Institution.

Done in Geneva

Done in _____

on _____

on _____

For CERN

For

S. Bertolucci

Director of Research and Computing

Annex 1 Collaborating Institutions in the Collaboration and the names of their Contact Persons

Country	Town	Collaborating Institution	Representative
<i>China Taipei</i>	<i>Taipei</i>	<i>Academia Sinica</i>	<i>W.-C. Chang</i>
<i>Czech Republic</i>	<i>Joint Czech Groups of:</i>		<i>M. Finger</i>
	<i>Liberec</i>	<i>Technical University of Liberec</i>	
	<i>Prague</i>	<i>Charles University in Prague</i>	
	<i>Prague</i>	<i>Czech Technical University in Prague</i>	
	<i>Brno</i>	<i>Institute of Scientific Instruments in Brno</i>	
<i>France</i>	<i>Gif/Yvette</i>	<i>IRFU, CEA-Saclay</i>	<i>N. d'Hose</i>
<i>Germany</i>	<i>Bochum</i>	<i>Ruhr-Universität Bochum</i>	<i>W. Meyer</i>
	<i>Bonn</i>	<i>Universität Bonn, Helmholtz-Institut für Strahlen- und Kernphysik</i>	<i>R. Beck</i>
	<i>Bonn</i>	<i>Universität Bonn, Physikalisches Institut</i>	<i>F. Klein</i>
	<i>Erlangen</i>	<i>Universität Erlangen-Nürnberg</i>	<i>W. Eyrich</i>
	<i>Freiburg</i>	<i>Universität Freiburg</i>	<i>K. Königsmann</i>
	<i>Mainz</i>	<i>Universität Mainz</i>	<i>J. Pochodzalla</i>
	<i>Munich</i>	<i>Technische Universität München</i>	<i>S. Paul</i>
<i>India</i>	<i>Calcutta</i>	<i>Matrivani Institute of Experimental Research & Education</i>	<i>S. Dasgupta</i>
<i>Israel</i>	<i>Tel Aviv</i>	<i>Tel Aviv University</i>	<i>J. Lichtenstadt</i>
<i>Italy</i>	<i>Trieste</i>	<i>INFN, Sezione di Trieste, e Università di Trieste</i>	<i>A. Martin</i>
	<i>Torino</i>	<i>INFN, Sezione di Torino, e Università di Torino</i>	<i>D. Panzieri</i>
<i>Japan</i>	<i>Yamagata</i>	<i>Yamagata University</i>	<i>T. Iwata</i>
<i>Poland</i>	<i>Warsaw</i>	<i>National Centre for Nuclear Research</i>	<i>A. Sandacz</i>
	<i>Warsaw</i>	<i>Warsaw University of Technology</i>	<i>K. Zaremba</i>
<i>Portugal</i>	<i>Aveiro</i>	<i>University of Aveiro</i>	<i>J. Veloso</i>
	<i>Lisbon</i>	<i>Laboratory of Instrumentation and Experimental Particles Physics</i>	<i>P. Bordalo</i>
<i>Russia</i>	<i>Dubna</i>	<i>JINR, Joint Institute for Nuclear Research</i>	<i>A. Nagaytsev</i>
	<i>Moscow</i>	<i>P.N.Lebedev Physical Institute of the Russian Academy of Sciences</i>	<i>M. Zavertyaev</i>
	<i>Protvino</i>	<i>IHEP</i>	<i>S. Donskov</i>
<i>Switzerland</i>	<i>Geneva</i>	<i>CERN, the European Organisation for Nuclear Research</i>	<i>G. Mallot</i>
<i>USA</i>	<i>Urbana</i>	<i>University of Illinois at Urbana-Champaign</i>	<i>J.C. Peng</i>

Annex 2 Funding Agencies of the Collaboration and their Representatives

Country	Agency	Place	Represented by
	CERN	Geneva	<i>Director of Research</i>
Czech Republic	MEYS		
France	CEA		
Germany	BMBF		
Italy	INFN		
Poland			
Portugal	FCT		
Russia	Ministry of Education and Science		
	JINR	Dubna	<i>Vice Director</i>
USA			

Annex 3 Sub-Detector Structure of the Experiment

The list comprises both existing equipments from COMPASS and new equipments needed for the program of COMPASS-II. New equipments, or equipments where an upgrade is foreseen are highlighted in gray; the list follows the incident beam direction, with the exception of the last two items.

Beam momentum station

Cedars

Sci-Fi Hodoscopes

Veto System

Silicon stations

Polarized Target

Target Solenoid

Drell Yan Absorber

LH₂ Target for DVCS

LH₂ Target for spectroscopy

RPD

Camera

Sandwich Veto

ECal0

Trigger Hodoscopes

MicroMegas

Pixel Micromegas

DC

SM1

Straws

Gems

PixelGems

Rich

RichWall

MWPC

ECal1

HCal1

MuonWall I

SM2

ECAL2

HCAL2

Muon Wall II

DAQ

DCS

Annex 4 Current Members of the Collaboration by Country and Collaborating Institution**CERN**

CERN, the European Organisation for Nuclear Research:

Vladimir FROLOV, Gerhard K. MALLOT, Elena ROCCO, Karin SCHÖNNING.

Czech Republic

Charles University in Prague:

Miroslav FINGER, Michael FINGER.

Technical University of Liberec:

Jaroslav POLAK, Miroslav SULC.

Institute of Scientific Instruments in Brno:

Ales SRNKA.

Czech Technical University in Prague:

Vladimir JARY, Miroslav VIRIUS.

France

SACLAY, CEA/IRFU:

Vincent ANDRIEUX, Yann BEDFER, Marie BOER, Etienne BURTIN, Luigi CAPOZZA, Quiela CURIEL, Andrea FERRERO, Nicole d'HOSE, Fabienne KUNNE, Alain MAGNON, Claude MARCHAND, Damien NEYRET, Stephane PLATCHKOV, Laurent SCHOEFFEL, Florian THIBAUD, Heiner WOLLNY.

Germany

BOCHUM, Ruhr-Universität:

Alexander BERLIN, Fabrice GAUTHERON, Jonas HERICK, Jaakko H. KOIVUNIEMI, Werner MEYER, Gerhard REICHERZ, Li WANG.

BONN, Universität, Helmholtz-Institut für Strahlen- und Kernphysik:

Reinhard BECK, Jens BISPLINGHOFF, Dieter EVERSHEIM, Rainer JAHN, Frank HINTERBERGER, Rainer JOOSTEN.

BONN, Universität, Physikalisches Institut:

Jens BARTH, John BIELING, Stefan GOERTZ, Daniel HAHNE, Friedrich KLEIN, Regine PANKNIN, Jörg PRETZ, Hartmut SCHMIEDEN, Roland WINDMOLDERS.

ERLANGEN, Friedrich Alexander Universität:

Christoph ADOLPH, Christopher BRAUN, Wolfgang EYRICH, Albert LEHMANN, Adrian SCHMIDT.

FREIBURG, Universität:

Tillmann GUTHÖRL, Horst FISCHER, Fritz-Herbert HEINSIUS, Florian HERRMANN, Kay KÖNIGSMANN, Frank NERLING, Wolf-Dieter NOWAK, Christian SCHILL, Katharina SCHMIDT, Sebastian SCHOPFERER, Stefan SIRTIL, Johannes TER WOLBEEK.

MAINZ, Universität:

Johannes BERNHARD, Nicolas du FRESNE von HOHENESCHE, Dietrich von HARRACH, Prometheus K.JASINSKI, Eva-Maria KABUSS, Michael OSTRICK, Josef POCHODZALLA, Tobias WEISROCK, Malte WILFERT.

MUNICH, Technische Universität:

Alexander AUSTREGESILO, Karl BICKER, Suh-Urk CHUNG, Jan M.FRIEDRICH, Sergei GERASSIMOV, Reiner GEYER, Stefanie GRABMÜLLER, Boris GRUBE, Florian HAAS, Christian

HÖPPNER, Stefan HUBER, Bernhard KETZER, Igor KONOROV, Markus KRÄMER, Thiemo NAGEL, Sebastian NEUBERT, Stephan PAUL, Sebastian UHL.

India

CALCUTTA, Matrivani Institute of Experimental Research & Education:
Sudebsankar DASGUPTA, Lily SINHA

Israel

TEL-AVIV, University:
Jechiel LICHTENSTADT

Italy

TRIESTE, INFN/University and ABDUS SALAM ICTP:

Renato BIRSA, Franco BRADAMANTE, Andrea BRESSAN, Silvia DALLA TORRE, Vinicio DUIC, Carmine ELIA, Marcello GIORGI, Benigno GOBBO, Stefano LEVORATO, Anna MARTIN, Nour MAKKE, Katerina NOVAKOVA, Giulio SBRIZZAI, Paolo SCHIAVON, Federica SOZZI, Lukas STEIGER, Susanna TESSARO, Fulvio TESSAROTTO, Andres CICUTTIN, Maria LizCRESPO.

TORINO, University/INFN

Maxim G.ALEXEEV, Antonio AMOROSO, Ferruccio BALESTRA, Raimondo BERTINI, Michela CHIOSSO, Oleg Yu.DENISOV, Raffaello GARFAGNINI, Ivan GNESI, Antonio GRASSO, Aram M.KOTZINIAN, Angelo MAGGIORA, Daniele PANZIERI, Bakur PARSAMYAN, Guido PIRAGINO, Stefano SOSIO, Stefano TAKEKAWA.

Japan

Yamagata University:

Norihiro DOSHITA, Naoaki HORIKAWA, Shigeru ISHIMOTO, Takahiro IWATA, Kaori HORIKAWA, Hiroki MATSUDA, Tatsuro MATSUDA, Takuma MICHIGAMI, Yoshiyuki MIYACHI, Hajime SUZUKI.

Poland

WARSAW, National Centre for Nuclear Research (NCBJ)/University:

Barbara BADELEK, Konrad KLIMASZEWSKI, Krzysztof KUREK, Andrzej SANDACZ, Robert SULEJ, Pawel SZNAJDER.

WARSAW, Technical University:

Michal DZIEWIECKI, Robert KURJATA, Janusz MARZEC, Krzysztof ZAREMBA, Marcin ZIEMBIKI.

Portugal

AVEIRO University:

Carlos AZEVEDO, Fabio PEREIRA, Carlos SANTOS, João VELOSO.

LISBON, LIP:

Paula BORDALO, Celso FRANCO, Ana Sofia NUNES, Catarina QUINTANS, Sergio RAMOS, Luís SILVA, Marcin STOLARSKI.

Russia

DUBNA, JINR Joint Institute for Nuclear Research:

Vadim Yu.ALEXAKHIN, Guennadi D.ALEXEEV, Vladimir A.ANOSOV, Artem A.ANTONOV, Anatoli V. EFREMOV, Alexey V.GUSKOV, Nikolai I.JOURAVLEV, Yuri I.IVANSKIN, Yuri F.KISSELEV, Oleg M. KOUZNETSOV, Zinovi V.KRUMSHTEYN, Nikolai A.KUCHINSKI, Gleb V.MESHCHERYAKOV, Alexander P.NAGAYTSEV, Alexandre G.OLCHEVSKI, Dmitri V.PESHEKHONOV, Natalia S.ROSSIYSKAYA, Mikhail G.SAPOZHNIKOV, Igor A.SAVIN, Oleg Yu.SHEVCHENKO, Miloslav SLUNECKA, Leonid G.TKATCHEV, Nikolai V.VLASSOV, Elena V ZEMLYANICHKINA.

MOSCOW, Lebedev Physics Institute:

Mikhail ZAVERTYAEV.

PROTVINO, IHEP:

Sergey V.DONSKOV, Alexey FILIN, Guennadi V.KHAUSTOV, Yuri A.KHOKHLOV, Vladimir N.KOLOSOV, Victor F.KONSTANTINOV, Anatoli A.LEDNEV, Yuri V.MIKHAILOV, Vladimir I.NIKOLAENKO, Vladimir A.POLYAKOV, Dimitri RYABCHIKOV, Vladimir D.SAMOYLENKO.

USA

University of Illinois at Urbana-Champaign:

Jen-Chieh PENG, Mattias GROSSE PERDEKAMP, Naomi MAKINS

China Taipei

Academia Sinica:

Wen-Chen CHANG, Yen-Chu CHEN

Annex 5 The Organizational Structure of the Collaboration

5.1 The Management Structure of the Collaboration

1. Concerning all scientific and technical matters, in particular the definition, construction and operation of the Equipment, the Collaboration is governed by the **Collaboration Board (CB)** which is the supreme decision body of the Collaboration. The CB comprises representatives from each countries and International Research Institutions (CERN, JINR), with voting rights plus the Spokesperson(s), the Technical Coordinator and the Analysis Coordinator as ex-officio members, without voting rights. On request of the Chairperson, other coordinators can be invited to attend (without voting rights).
2. The **CB** appoints the **Chair** of the Board between his members.
3. All scientific and technical issues are discussed in the **Collaboration Meeting** before any major decisions are taken by the CB.
4. The **Spokesperson(s)** represents the Collaboration to the outside and leads the Collaboration in all day-to-day matters. He/she is (they are) appointed following the rules outlined hereafter. The Spokesperson(s) represent the Collaboration and bear the managerial responsibility of the experiment. The Spokesperson(s) call the meetings of and report to the CB. The Spokesperson(s) is (are) assisted in the design, realization, implementation, installation and operation of the apparatus by a Technical Coordinator and a Technical Board. Candidates for spokesperson-ship are nominated by the CB on the occasion of the Collaboration meeting preceding the end of term of the acting Spokesperson(s). From this list the spokesperson(s) is (are) elected by the full Collaboration in secret vote. Every scientific Collaboration member listed on the official COMPASS web pages is entitled to vote, excluding members below Ph.D. student level. The spokesperson(s) is (are) elected for a term of 2 years with the possibility of re-election. Any spokesperson may, however, serve for more than two consecutive terms only on explicit approval by the CB, upon nomination, and as expressed by an absolute 2/3 majority of all voting members of the CB. No less than 6 months before the end of a spokesperson term of office, the CB shall appoint a Search Committee, charged with proactively contacting suitable candidates for spokesperson-ship. The search Committee is to report (within 3 months from taking office) to the CB.
5. **Contact Person:** The CB may nominate a Contact Person which will reside permanently at CERN. In this case the Contact Person will stay in charge for the duration of one year with a possible extension of one year. The Contact Person is collaborating closely with the Spokesperson(s) and the Technical Coordinator to the implementation, installation and operation of the apparatus, and to the coordination of the various efforts.
6. The number of representatives in the **Collaboration Board** is evaluated on the basis of countries and International Research Institutions (CERN, JINR) in the following called 'entities'. The CB has 31 voting members. This number can be adjusted by the CB only when an entity joins or leaves COMPASS. The number of representatives of an entity depends on the number of members carrying a financial contribution to the M&O, and is computed as follows:

- Each entity is initially given one seat;
- Then the seats are distributed according to Sainte Laguë's method;
- If at the end of the procedure several entities are eligible for the last seat, all of them will be attributed an additional representative, thus enlarging temporarily the CB.

The composition of the CB will be revised annually on the basis of the membership list defining the financial contributions to the M&O Fund for the upcoming year.

Absent CB members may appoint a representative. However, absentees and their representatives do not vote. The CB may decide to vote by internet (rather than in session), following a discussion at the CB meeting. In case of an even vote, the final decision is up to the Spokesperson(s).

The CB meets regularly (usually on the occasion of a main Collaboration meeting), but can also be called if urgent decisions have to be taken. The CB:

- Proposes candidates for the spokespersons-ship to the Collaboration;
- Proposes the Technical Coordinator;
- Nominates the Analysis Coordinator;
- Nominates the coordinators of major equipments;
- Nominates the members of the Publication Committee;
- Decides on major scientific, financial, and personnel issues;
- Decides on new collaborators;
- Sets guidelines for the distribution of presentations on conferences and workshops;
- Determines the financial budget to be approved by the Finance Review Committee (FRC).

7. Concerning all resource and legal matters, the Collaboration is monitored by the *Finance Review Committee (FRC)*. The **FRC** comprises representatives of each Funding Agency, with voting rights, and ex-officio members of the Collaboration Management and CERN Management, without voting rights. The **FRC** is chaired by CERN's Director of Research.

8. The **Resource Coordinator** oversees the resource planning of the Collaboration and will typically deal with budget planning, manpower planning, Memoranda of Understanding and the M&O Fund. He/she is appointed by the CB in consultation with the CERN Management.

9. M&O Funds

A Collaboration fund, with contributions "Per Capita" from all the collaborating Institutes, is setup to cover running costs (gas, maintenance, Electronics Pool, stores, technical and secretarial help) and contingencies. The size of the M&O Fund is decided upon yearly by the CB according to the estimated needs in the following year and has to be approved by the FRC. As a special agreement for 2013, in view of going to the "Per Capita" contribution from 2014 onwards, JINR will contribute to the 2013 M&O Fund with the same total amount of 2012, reducing the number of full members to 20.

10. Special Funds

Special funds can be set up by the CB to cover unforeseen expenditures on particular detector items. The CB will then elaborate a funding scenario among the participating

Institutes, to be approved by the FRC. This can also hold in case of unexpected problems or updates of the setup requiring new detectors.

11. The **Technical Coordinator** monitors and coordinates the activities of the various projects, and is responsible for the technical planning, scheduling, installation, and overall technical performance of the COMPASS spectrometer. The Technical Coordinator is appointed by the CERN PH Department Leader in consultation with the Collaboration. The Technical Coordinator chairs the Technical Board and reports to the Spokesperson(s) and the CB. Unexpected problems in the commissioning and running of parts of the apparatus will be managed by the Spokesperson(s) together with the Technical Coordinator and the appropriate responsible. If the relevance of the problem implies major interventions, or redefinitions of the responsibilities of the collaborating Institutes, it will be dealt with by the CB.

12. Technical Board

a. Mandate

The Technical Board (TB) assists the Technical Coordinator. It reviews periodically the performances of the various subsystems of the COMPASS spectrometer and proposes specific interventions in case problems were identified; it follows up closely the planning, manpower and cost of ongoing projects; it discusses new ideas and projects for upgrades and optimization of the spectrometer and evaluates them technically.

b. Operation

The Technical Coordinator may invite to the TB meetings experts for advice on specific technical issues and ask dedicated referees for reports on particular projects. The TB takes decisions on all technical issues and projects of the COMPASS spectrometer. Major projects or decisions with important impact on the COMPASS spectrometer have to be endorsed by the CB.

c. Composition

- Technical Coordinator (chair),
- Spokesperson(s),
- Eight appointed members.

The Technical Coordinator and the Spokesperson(s) are ex-officio members of the TB. The other TB members are appointed for a period of two years by the CB on proposal by the Technical Coordinator and the Spokesperson(s). A re-appointment is possible, subject to the same rules that apply to the re-election of spokespersons.

13. Coordination in matters of safety is provided by the Collaboration Board in Matters of Safety (**GLIMOS**), the rights, responsibilities and appointment procedure of who are defined in the General Conditions.

14. The other Coordinators and the Project Leaders of the Sub-Detectors are ratified by the Collaboration Board on proposal by the Spokesperson(s).

15. Publication Matters and Publication Committee:

a. Publication Committee:

The COMPASS Publication Committee consists of seven members of the COMPASS collaboration, nominated by the Collaboration Board.

Appointments are normally for 2 years and half of the Committee is renewed every year. Re-appointment is possible, subject to the same rules that apply to the re-election of spokespersons. The members should preferably belong to different institutes and are expected to represent a broad spectrum of the physics topics studied by the collaboration. The chairperson is elected for a period of 2 years by the members of the Publication Committee.

The role of the Publication Committee is:

- Give the final judgement on the material proposed for release and book- keep all COMPASS results that have been officially released;
- Maintain an updated database of conferences of interest to COMPASS and to insure a good and fair COMPASS representation at international conferences;
- Organize rehearsals for COMPASS speakers at international conferences;
- Proofread conference abstracts and contributions before they are sent out;
- Book-keep all drafts of journal papers released by the “Drafting Committee” and make them available to the collaboration.

The Publication Committee meets at CERN whenever appropriate and at least once before each COMPASS collaboration meeting.

b. Rules for publication.

All members of the collaboration (as defined by the Collaboration Board) have the right to sign general papers about COMPASS results on the following conditions:

- They were members of COMPASS for at least one year;
- They have taken shifts during the year in which the data used in the publication were taken or have been members of the Collaboration for the last two years;
- They have not left the Collaboration since more than two years.
- Exceptions will be agreed upon by the CB.

The names of the authors will appear in alphabetic order (ordering by institute is ruled out for practical reasons because it would require excessive space).

COMPASS publications should be referred to in the form:

“COMPASS collaboration, first name et al., ...” instead of using the first author’s name only.

Names of authors for publications based on results obtained by COMPASS in 2002 – 2012 are defined following the rules of previous MoU (ref.)”

16. Modification of this document

A modification of this **Annex 5** to the Memorandum of Understanding requires an absolute two-thirds majority of the voting members of the CB.

5.2 Persons currently holding Management and other senior positions within the Collaboration

Spokespersons	Fabienne Kunne Andrea Bressan
Resource Coordinator	Gerhard Mallot
Chair of the Collaboration Board	Fabienne Kunne Andrea Bressan
Technical Coordinator	Reiner Geyer
GLIMOS	Gerhard Mallot
Analysis Coordinator	Claude Marchand
Front End Coordinator	Damien Neyret
DAQ Coordinator	Vladimir Frolov

Annex 6 Overview of the Technical Participation of the Collaborating Institutions in Equipment Construction

Sub-det A: Tracking

Sub-det B: ECal

Sub-det C: LH₂ Target

Sub-det D: Recoil Proton Detection

Sub-det E: DAQ/Trigger/DCS

Sub-det F: Particle Identification

Sub-det G: Absorber

Sub-det H: Polarized Target

Funding Agency	Collaborating Institution	Sub-det	Sub-det	Sub-det	Sub-det	Sub-det	Sub-det	Sub-det	Sub-det
		A	B	C	D	E	F	G	H
CERN	CERN	•	•	•				•	•
Czech Republic	Prague					•	•		•
	TU		•						
France	Saclay	•	•		•				
Germany	Bochum								•
	Bonn HSKP	•							
	Bonn PI					•			
	Erlangen	•							
	Freiburg				•				
	TUM	•	•			•			
	Mainz				•	•			
India	Calcutta				•				
Israel	Tel-Aviv					•			
Italy	Turin						•	•	
	Trieste					•	•		
Japan	Yamagata			•					•
Poland	Warsaw WUT		•		•				
	Warsaw-NCNR		•		•				
Portugal	Lisbon		•			•		•	
JINR	JINR		•						
Russia	Protvino		•						
USA	UIUC	•							
China Taipei	Sinica	•							
Comment: CERN participation to these projects is in the infrastructure									

Annex 7 Overview of the Financial Participation of the Funding Agencies in Equipment Construction

7.1 Summary of the Investments for the Detectors (kCHF)

Funding Agency	Sub-det A	Sub-det B	Sub-det C	Sub-det D	Sub-det E	Sub-det F	Sub-det G	Sub-det H	Total
CERN	100	110	150				80	150	590
Czech Rep.					49	18		24	91
France	342	43		410					795
Germany	616	285		210	229	159		248	1747
India				30					30
Israel					25				25
Italy						1198	293		1491
Japan			25					250	275
JINR		509							509
Poland		93		77					170
Portugal		41			37	31	31		140
Russia		69							69
USA	478								478
China Taipei	135								135
Common Projects								300	300
Total	1671	1150	175	727	340	1406	404	972	6845

7.2 Details of Deliverables by Sub-Detector (year 2012 kCHF)

Sub-Detector A Tracking

Funding Agency	Value (kCHF)	Type of Deliverable							Infrastructure
		SciFi Stations	Silicon Detectors	Pixel Micromegas	Pixel GEMs	W45 refurbishment	MWPC	DC5	
<i>France</i>	342			342					
<i>Germany</i>	616	452	82		82				
<i>USA</i>	478						27	451	
<i>China Taipei</i>	135							135	
<i>CERN</i>	100					40			60
total	1671								

Sub-Detector B *ECal0 (+ECal1, ECal2 updates)*

Funding Agency	Value (kCHF)	Type of Deliverable										
		ECAL0					ECAL1					ECAL2
		<i>ECal0 modules</i>	<i>ECal0 Readout</i>	<i>ECal0 Monitoring</i>	<i>ECal0 Temperatur Stabilisation</i>	<i>ECal0 Support</i>	<i>ECal1 Modules</i>	<i>ECal1 HV Basis</i>	<i>ECal1 Radout</i>	<i>ECal1 Monitoring</i>	<i>ECal1 Mechanics</i>	<i>ECal2 Monitoring</i>
<i>France</i>	46		15						31			
<i>Germany</i>	285		204			45	12	24				
<i>Portugal</i>	41										41	
<i>JINR</i>	510	370		40	40	60						
<i>Poland</i>	93		93									
<i>Russia</i>	70										70	
<i>CERN</i>	110					60				50		
total	1155	882				162					111	

Sub-Detector C **LH₂ Target**

		Type of Deliverable		
		Value (kCHF)		
Funding Agency			Cryostat	Target and Services
<i>Japan</i>		25	25	
<i>CERN</i>		150		150
total		175		

Sub-Detector D Recoil Proton CAMERA Detector

Funding Agency	Value (kCHF)	Type of Deliverable				
		PMS	Structure	Scintillators and Lightguides	Read-out	HV, Crates, Electronics
<i>France</i>	409	49	122	171		67
<i>Germany</i>	210			55	155	
<i>Poland</i>	77	23				54
<i>India</i>	30	30				
total	726					

Sub-Detector E DAQ/Trigger/DCS

Funding Agency	Value (kCHF)	Type of Deliverable				
		Veto & Matrices	DAQ	DCS	Hall Installations	ECAL2 Digital trigger
<i>Germany</i>	228	82	122			24
<i>Israel</i>	25		25			
<i>Portugal</i>	37			37		
<i>Czech Rep.</i>	49		49			
total	339					

Sub-Detector F Particle Identification

Funding Agency	Value (kCHF)	Type of Deliverable						
		Peripheral Chambers	RICH Read Out	CEDARS Fast readout				
<i>Germany</i>	159		147	12				
<i>Italy</i>	1198	758	440					
<i>Portugal</i>	31	31						
<i>Czech Rep.</i>	18	18						
total	1406							

Sub-Detector G Absorber

	Value (kCHF)	Type of Deliverable							
		Inner Absorber	External Shielding						
Funding Agency									
<i>Italy</i>	293	293							
<i>Portugal</i>	31		31						
<i>CERN</i>	80		80						
total	404								

Sub-Detector H POLARIZED TARGET

Funding Agency	Value (kCHF)	Type of Deliverable						
		Pumps refurbishment	EIO Microwave Tube	Target material (NH ₃)	Target holder	Cavity	Magnet	Infrastructure
Czech Rep.	24					24		
Germany	248	165		42	12	29		
Japan	250	70	180					
CERN	150							150
Common Project	300						300	
total	972							

7.3 Projected Spending Profile (kCHF)

The figures for the year 2011 are as spent.

Project	Spending per year (kCHF)			
	2011	2012	2013	2014
Sub-Detector A: Tracking				
Scifi Station				
Silicon Beam Telescop				
Pixel Micr omegas				
W45 refurbishment				
Sub-Detector B: Ecal				
Ecal0 Modules				
Ecal0 Readout				
Ecal 0 Monitoring				
Ecal0 Temp. Stabilisation				
Ecal0 Support				
Ecal1 Modules				
Ecal1 Readout				
Ecal1 Mechanics				
Ecal2 Monitoring				
Sub-Detector C: LH2 Target				
Target				
Target Cryostat				
Sub-Detector D: Camera				
Mechanical Structure				
Scintillators				
Readout				
Monitoring System				
Sub-Detector E				
Trigger-System				
DAQ-Upgrade				
DCS Upgrade				
Sub-Detector F				
Thick Gems				
Readout				
CEDAR				
Sub-Detector G				
Hadron Absorber				
Target Shielding				
Sub-Detector H				
Pumps Refurbishment				
EIO Microwave tubes				
Cavity Modification				
Target Holder				
Target Material				

Annex 8 Timetable for the Construction and Installation of the Equipment

Sub-Detector A: Tracking <i>SciFi Stations</i>	R&D	Prototyping	Final Installation
Germany CERN			
Scifi Station	Jan. 2012	feasibility to be proven	Ready for 2014?
Silicon Beam Telescop			
Pixel Micr omegas W45 refurbishment		2 detectors 2012	not specified
Sub-Detector B: Ecal			
ECal0 Modules		3x3 test end 2011. 56 modules for 2012.	2013
ECal0 Readout			to be confirmed
Ecal 0 Monitoring		3x3 test end 2011. 56 modules for 2012.	2013
ECal0 Temp. Stabilisation		3x3 test end 2011. 56 modules for 2012.	2013
ECal0 Support			2013
Ecal1 Modules			early 2012
ECal1 Readout			early 2012
ECal1 Mechanics			early 2012
ECal2 Monitoring		Prototyping	2012
Sub-Detector C: LH2 Target			
Target			Mid 2012
Target Cryostat		End 2011	Mid 2012
Sub-Detector D: Camera			
Mechanical Structure			Mid 2012
Scintillators			Mid 2012
Readout			Mid 2012
Monitoring System			Mid 2012
Sub-Detector E			
Trigger-System			2013
DAQ-Upgr ade			2014
DCS Upgr ade			2014
Sub-Detector F			
Thick Gems	R&D onging		
Readout	R&D onging		
CEDAR			early 2012
Sub-Detector G			
Hadr on Absor ber			2013
Target Shielding			2013
Sub-Detecor H			
Pumps Refur bishment		To be confirmed	2013
EIO Micr owave tubes		To be confirmed	2013
Cavity Modification		To be confirmed	2013
Target Holder		To be confirmed	2013
Target Material			2011

Annex 9 Common Projects, their estimated Costs (kCHF)

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

<i>Item</i>	<i>Costs (kCHF)</i>
Target Magnet	300.0
	300.0

Annex 10 Overview of the participations of the operation on new and existing equipments.

<i>Equipment</i>	<i>Responsibility</i>	
	<i>Main</i>	<i>Subresponsibilities</i>
<i>Beam momentum station</i>	<i>Bonn HISKP/Erlangen</i>	
<i>CEDARS</i>	<i>Mainz</i>	
<i>Sci-Fi Hodoscopes</i>	<i>Bonn HISKP/Erlangen</i>	
<i>Veto System</i>	<i>Bonn</i>	<i>Mainz</i>
<i>Silicon Stations</i>	<i>Munich</i>	
<i>Absorber</i>	<i>Turin</i>	
<i>Polarized Target</i>	<i>Bochum</i>	
<i>Superconduction Solenoid</i>	<i>CERN/SACLAY</i>	
<i>Drell-Yan Absorber</i>	<i>Turin</i>	
<i>LH₂ target for Spectroscopy</i>	<i>Yamagata/CERN</i>	
<i>LH₂ target for DVCS</i>	<i>Yamagata/CERN</i>	
<i>RPD</i>	<i>Saclay</i>	
<i>CAMERA</i>	<i>Saclay</i>	<i>Freiburg/Mainz/Warsaw</i>
<i>Sandwich Veto</i>	<i>Munich</i>	
<i>Micromegas</i>	<i>Saclay</i>	
<i>Pixelized Micromegas</i>	<i>Saclay</i>	
<i>Drift Chambers</i>	<i>Saclay</i>	
<i>ECal0</i>	<i>JINR</i>	<i>Munich/Warsaw/CERN</i>
<i>SM1</i>	<i>CERN</i>	
<i>DC5 and Straws</i>	<i>UIUC</i>	<i>Saclay</i>
<i>GEMs</i>	<i>Munich</i>	
<i>Pixelized GEMs</i>	<i>Munich</i>	
<i>Trigger Hodoscopes</i>	<i>Mainz</i>	<i>Bonn</i>
<i>RICH1</i>	<i>Trieste</i>	<i>Saclay/Turin</i>
<i>Rich Wall</i>	<i>Turin</i>	
<i>MWPC</i>	<i>Turin</i>	
<i>ECal 1</i>	<i>IHEP</i>	
<i>W45</i>	<i>CERN</i>	
<i>HCal 1</i>	<i>JINR</i>	
<i>Muon Wall 1</i>	<i>JINR</i>	
<i>SM2</i>	<i>CERN</i>	
<i>ECal2</i>	<i>IHEP</i>	
<i>HCal2</i>	<i>IHEP</i>	
<i>Muon Wall 2</i>	<i>IHEP</i>	
<i>Front End</i>	<i>Freiburg/Munich</i>	
<i>DAQ</i>	<i>Munich</i>	
<i>DCS</i>	<i>Lisbon</i>	
<i>ECAL Triggers</i>	<i>Munich</i>	
<i>Monte Carlo</i>		
<i>CORAL/Data Decoding</i>		
<i>Software validation</i>		

Annex 11 General Conditions applicable to Experiments at CERN