Memorandum of Understanding

for Maintenance and Operation of the LHCb Detector

between

The EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH,

hereinafter referred to as CERN, Geneva, as the Host Laboratory

on the one hand

and

a Funding Agency / Institution of the LHCb Collaboration

on the other hand.

Preamble

(a) A group of Institutes from CERN Member and non-Member States, and CERN, has agreed to collaborate to form the LHCb Collaboration. This Collaboration has proposed to CERN an experiment to study particle interactions at the highest possible energies and luminosities to be reached with the Large Hadron Collider (LHC). These Institutes have secured the support of their Funding Agencies to enable them to participate in the LHCb Collaboration.

(b) Agreement to this Collaboration has been effected through the signature of Memoranda of Understanding (LHCb RRB-D 2000-24 Rev.) between each Funding Agency or Institute, as appropriate, in the Collaboration and CERN as the Host Laboratory. These Memoranda of Understanding for construction (Construction MoUs) collectively define the Collaboration and its objectives, and the rights and obligations of the collaborating Institutes in construction matters during the construction period.

(c) In their Article 6.6, the Construction MoUs specify that the responsibilities for the maintenance and operation (M&O) of the LHCb detector are to be laid down in a separate Memorandum of Understanding on maintenance and operation procedures (M&O MoU), to be signed by all the Parties. Agreement is effected as for construction, i.e. through Memoranda of Understanding between each Funding Agency or Institute, as appropriate, in the Collaboration and CERN as the Host Laboratory. While the Construction MoUs remain valid, their provisions take precedence over those of the M&O MoUs.

(d) The Resources Review Board (RRB) referred to in Preamble (g) of the Construction MoU is defined therein to have the following roles with respect to M&O :

- reaching agreement on a maintenance and operation procedure and monitoring its functioning
- endorsing the annual maintenance and operation budgets of the detector

The management of the Collaboration reports regularly to the RRB on technical, managerial, financial and administrative matters, and on the composition of the Collaboration.

(e) The present M&O MoUs are not legally binding, but the Funding Agencies and Institutes recognise that the success of the experiment depends on all members of the Collaboration adhering to their provisions. Any default will be dealt with in the first instance by the Collaboration and if necessary then by the RRB.

Article 1 : Annexes

1.1 All the Annexes are an integral part of this MoU.

1.2 Annexes 1, 2, 4, 5 and 6 shall be identical to Annexes 1, 2, 3, 5 and 6 (including any amendments thereto) of the Construction MoU. When the latter ceases to be valid, amendments to these Annexes shall be made in accordance with the provisions of this M&O MoU.

Article 2 : Parties to this MoU

2.1 The Parties shall be all the Institutes of the 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 authorised representatives. The Funding Agency may be an Institute or an established institution acting on behalf of one or more Institutes.

2.2 The collaborating Institute(s) and the LHCb Collaboration will hereinafter be referred to as “Institute(s)” and “Collaboration”, respectively.

Article 3 : Purpose of this MoU

3.1 This MoU addresses the pre-exploitation and exploitation phases of the LHCb detector. Its purpose is to define the procedure for determining the maintenance and operation (M&O) costs in these phases along with the mechanisms by which they are reviewed and by which the charges and responsibilities for the execution of this work are distributed amongst the Parties. It sets out organisational, managerial and financial guidelines to be followed by the

Collaboration. It does not address the offline computing needs of the Collaboration. These will the subject of a separate Memorandum of Understanding for LHC Computing as described in the document "Proposal for Building the LHC Computing Environment" (CERN/3279 Rev.).

3.2 Exploitation refers to the time after data-taking for physics has commenced at the LHC. Pre-exploitation refers to the time before this and in particular, for individual sub-detector/system components of the LHCb detector, to the time after they have been commissioned.

3.3 M&O comprises all of the actions needed to fulfil the LHCb Collaboration co-ordination function and to operate and keep in good working order the individual components of the LHCb detector, along with their respective infrastructure and facilities.

3.4 The LHCb project is executed 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.

3.5 In case of conflict between relevant Co-operation Agreements or Protocols entered into by CERN and the present MoU, the former prevail.

Article 4: Duration of this MoU and its Extension

4.1 The initial period of validity of this MoU covers the pre-exploitation phase of the LHCb detector and the expected first five years of physics running, i.e. from 1 May 2002 to 31 December 2011.

4.2 The validity of this MoU will be extended automatically at its expiry for successive periods of five years beyond the initial period unless the RRB determines otherwise. This provision notwithstanding, the MoU will automatically cease to be valid when the LHC programme is declared closed by the CERN Council.

4.3 The provisions of this MoU will apply to elements of the LHCb detector as they begin to incur M&O costs, as distinct from the costs that belong to the construction phase and are defined in Article 2.2 of the Construction MoU.

4.4 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 will be negotiated through CERN and confirmed by the RRB.

4.5 Any Institute may withdraw from the Collaboration according to the procedures agreed by the Collaboration, subject to the General Conditions for Experiments Performed at CERN (**Annex 3**), and by giving notice in writing to its Funding Agency.

4.6 Any Institute that joins the Collaboration in accordance with the Collaboration rules during the period of validity of this MoU shall accept the agreements in force and will be expected to make an appropriate contribution to the M&O. This will be negotiated by the Collaboration (which reserves the right to request additional contributions from such Institutes) and endorsed by the RRB.

Article 5 : The LHCb Detector and Collaboration

5.1 The detector for the LHCb experiment has been described in detail in the Technical Proposal submitted to the LHCC in February 1998 and in the subsequent sub-detector / system Technical Design Reports. It consists of a number of sub-detector / system units as listed in **Annex 4**.

5.2 The current management structure of the Collaboration is described in **Annex 5**.

5.3 The technical participation of the Institutes in detector construction, grouped by Funding Agency, is set out in **Annex 6**.

5.4 The Collaboration shall update Annexes 5 and 6 annually to reflect the situation on 1 January of the current year.

Article 6 : Responsibilities of the Institutes for the Maintenance and Operation of the LHCb Detector, and of CERN as Host Laboratory

6.1 Responsibility for the M&O of the LHCb detector rests jointly with the Collaboration as a whole and with CERN as Host Laboratory, within the General Conditions for Experiments Performed at CERN. 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.

6.2 It is also a fundamental principle that an Institute, which has contributed a component of equipment, will also contribute to the necessary scientific and technical manpower support to operate that component and maintain it in good working order.

6.3 Within the fundamental principles set out in Articles 6.1 and 6.2 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 cost items are thereby divided into two categories :

6.3.1 Common Items, comprising those costs that the Collaboration has agreed to bear at its common expense, and

6.3.2 Sub-detectors / systems that are the responsibility of individual Institutes or groups of Institutes.

6.4 **Annex 7** lists the M&O cost items agreed by the Collaboration to be Common Items.

6.5 **Annex 8** lists for the second category, by sub-detector/system, the deliverables provided by the Institutes, the CORE value of these deliverables and the sharing among Institutes. Also summarised are the CORE values of the deliverables for particular sub-detectors/systems by Funding Agency.

6.6 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 for Experiments Performed at CERN (Annex 3), which in case of contradiction or ambiguity shall prevail over the main body of this MoU.

Article 7 : Maintenance and Operation Categories

7.1 The M&O expenses can be divided into the following three categories :

7.1.1 **Category A**. M&O expenses that are shared by the entire Collaboration (cf. Article 6.3.1 above). **Annex 9** lists the headings under which Category A costs are categorised.

7.1.2 **Category B**. M&O expenses that are borne by part of the Collaboration, i.e. by single Institutes or groups of Institutes, and their Funding Agencies (cf. Article 6.3.2 above). The headings in this category are defined with reference to the distribution of responsibilities amongst the various Institutes for the construction of the LHCb Detector as given in Annex 8. **Annex 10** lists the headings under which Category B costs are categorised and the Institutes concerned.

It is agreed that an Institute having responsibility under a Category B heading will 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 will lie with the Collaboration as a whole. The Collaboration will propose on a case-by-case basis the events to which this provision will apply. The proposal will be submitted for approval to the next RRB meeting, which will also be asked to approve the provision of the necessary resources.

7.1.3 **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 for Experiments Performed at CERN (Annex 3), these are more precisely described in the list given in **Annex 11**.

Article 8 : Approval and Oversight

8.1 Oversight of the M&O costs for the LHCb detector shall lie with the RRB, which will meet normally twice per year, in spring and autumn. The RRB shall have the responsibility for approving the levels and sharing of the Category A costs. It

shall also approve the overall level of Category B costs and the sharing of these costs as proposed by the Collaboration.

8.2 The RRB shall be assisted in this aspect of its work by a Scrutiny Group that it shall appoint. The role of the Scrutiny Group is to analyse critically the Collaboration's M&O reports and estimates, refine the Category A estimates in consultation with the Collaboration and advise the RRB on the course of action to take.

8.3 The Scrutiny group shall operate according to the procedures set out in **Annex 12**.

Article 9 : Cost Sharing

9.1 Subject to exceptions that may be agreed on a case-to-case basis by the RRB, the following guidelines are agreed for the sharing of M&O costs :

9.2 For Category A, the costs are to be shared amongst the Funding Agencies or Institutes in proportion to the number of their scientific staff holding PhD or equivalent qualifications who are entitled to be named as authors of scientific publications of the Collaboration. To this end, the Collaboration shall maintain a list, by Funding Agency and Institute, of these persons (**Annex 13**). The Collaboration shall update this list annually to reflect the situation on 30 September. The updated list is to be ready in time for the autumn meeting of the RRB (see Article 10.1 below).

9.3 Funding Agencies or their Institutes must normally pay their share of Category A costs in cash. In exceptional circumstances some of the Category A costs could eventually be paid in kind with the agreement of the RRB, subject always to a minimum fixed cash amount per Institute. In such cases the cash value attributed to the in-kind contribution shall also be agreed by the RRB. The Collaboration shall propose annually to the RRB the minimum fixed cash amount to be applied in the following year.

9.4 CERN will pay from its operating budget the energy costs falling on Member States. In recognition of the contributions made to the construction of the LHC machine by some non-Member States, CERN will treat these countries in a manner analogous to Member States and will partially pay the energy costs that fall on their Funding Agencies and Institutes.

The non-Member States for which CERN will partially pay the energy costs are listed in **Annex 14**.

CERN Management shall propose annually in its Medium Term Plan (The Scientific Activities of CERN and Budget Estimates for the Years n - n+3) the overall size of these energy payments for the following year, so that they may be incorporated in the M&O budget presented to the RRB for approval in October. The payments are shared amongst the countries concerned according to a formula, the current version of which is explained in **Annex 15**. Any

modifications to the arrangements for these payments will also be proposed in the context of the Medium Term Plan.

9.5 For Category B, the costs are to be shared by the Funding Agencies and Institutes concerned in a manner that the Collaboration shall propose to the RRB.

9.6 For Category C, the costs are paid by CERN from its operating budget.

9.7 The boundary between Category A and Category B costs is determined by the Collaboration as explained in Article 6.3 above. Category C costs are determined by the CERN Director General, having regard to the General Conditions for Experiments Performed at CERN and, in particular, the need to provide a safe and secure environment for the operation of the LHCb detector.

Article 10 : Procedure

10.1 Proposals for providing and sharing Category A M&O costs according to the criteria set out in Article 9 above, including the proposal for the minimum fixed cash amount per Institute, will be drawn up annually by the Collaboration and submitted to the RRB at its spring meeting. At the same meeting, the Collaboration will report on Category B costs and on the proposed responsibilities and commitments for these, while CERN will report on Category C costs. The information for all Categories will comprise the M&O expenses for the previous year and the proposals for the following year, along with estimates for the three subsequent years. The Scrutiny Group will then operate during the summer, with the aim of agreeing the estimates for Category A for the following year, so that they can be endorsed at the autumn meeting of the RRB. It will also make critical comment on the arrangements for Category B costs.

10.2 The RRB will approve the M&O budget for the following year at its autumn meeting.

10.3 Unless explicitly mentioned, all proposals and estimates are to be expressed in Swiss Francs, using the calculated CERN index for materials cost variations.

10.4 For Category A expenses, a common Maintenance and Operation account (M&O Account) will be opened in the name of the Collaboration. All payments made by CERN on behalf of the Collaboration and the related receipts will be shown in that account.

10.5 CERN will issue invoices in Swiss Francs to the Funding Agencies of the Collaboration for their M&O contributions. The detailed procedure for the payment of Category A contributions is set out in **Annex 16**.

10.6 For Category A, the Resources Co-ordinator (see Annex 5) and other named individuals as necessary will be authorised by the Collaboration to sign commitments and payments relating to the above-mentioned account within the limits of the agreed annual budget for Category A. The authorised signature

levels for these persons will be subject to the standard CERN rules for Team Accounts.

10.7 The Resources Co-ordinator shall report annually to the autumn meeting of the RRB on the functioning of the M&O arrangements for Categories A and B, and shall point out any cases of default (see Article 12.3 below). At the same meeting CERN Finance Division shall report on the status of the Collaboration accounts for Category A and those parts of Category B for which accounts exist at CERN.

10.8 If, for any reason, the RRB should fail to reach agreement on the M&O costs or on their sharing, the arrangements that it last agreed will continue to apply until agreement is reached.

Article 11 : Rights and Benefits of Institutes

11.1 The Institutes participating in the Collaboration are entitled to join the pre-exploitation and exploitation phases of the project and to participate in the scientific exploitation of the data acquired. Further details are set out in the document “General Conditions for Experiments Performed at CERN” (Annex 3).

Article 12 : Administrative and Financial Provisions

12.1 General financial matters and purchasing rules and procedures for the LHC experiments, including the rules that apply for Common Fund operations, are dealt with in accordance with the "Financial Guidelines for the LHC Collaborations" (CERN / FC / 3796).

12.2 Under the provisions of the CERN basic Convention dated 1st of July 1953 and 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.

12.3 Default on provision of the agreed contributions for M&O shall engage the procedure for resolution of disputes described in Article 14.1 below and may result in specific action against the defaulter. Should the outcome of the dispute resolution procedure imply a loss of M&O contributions to the Collaboration, the question of recovery from the loss is for the RRB to address.

Article 13 : Amendments

13.1 The Collaboration will 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 in time for the autumn meeting of the RRB.

13.2 This MoU may be amended at any time with the agreement of its signatories or of their appointed successors. Any such amendments will be subject to the prior agreement of the RRB.

Article 14 : Disputes

14.1 As indicated in the Preamble (e), the primary mechanism for resolution of any disputes shall be negotiation within the Collaboration in the first instance and then if necessary in the RRB. 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 will be resolved using standard CERN procedures for the resolution of such disputes. Any dispute between Institutes will be resolved according to Collaboration procedures.

14.2 It is understood that any issues that have arisen during the lifetime of the Construction MoU shall be without prejudice to the rights and obligations laid down in this M&O MoU. No party shall be entitled under this M&O MoU to reduce, retain or set-off any obligation due under the Construction MoU.

Annex 1 : Institutes in the LHCb Collaboration and Names of their Representatives to the Funding Agencies.

Institute	Represented by
CBPF, Brazil	I. Bediega
UFRJ, Brazil	B. Marechal
LHCb-China [1]	J.P.Cheng
LAPP, IN2P3, Annecy-le-Vieux, France	B. Pietrzyk
University of Clermont-Ferrand, France	P. Perret
CPPM Marseille, France	E. Aslanides
University of Paris-Sud LAL, France	O. Callot
Technical University Dresden, Germany	B. Spaan
Kirchhoff Institute for Physics, Heidelberg, Germany	V. Lindenstruth
Max-Planck Institute for Nucl. Phys. Heidelberg, Germany	M. Schmelling
Physics Institute, University Heidelberg, Germany	F. Eisele
Frascati National Laboratory, Italy	P. Campana
University and INFN of Bologna, Italy	N. Semprini-Cesari
University and INFN of Cagliari, Italy	B. Saitta
University and INFN of Ferrara, Italy	M. Savrie
University and INFN of Firenze, Italy	G. Passaleva
University and INFN of Genoa, Italy	M. Sannino
University and INFN of Milan, Italy	C. Matteuzzi
University (La Sapienza) and INFN Rome, Italy	R.Santacesaria
University (Tor Vergata) and INFN Rome, Italy	G. Carboni
NIKHEF, The Netherlands [2]	J. van den Brand
Institute for Nuclear Physics and University of Mining and Metallurgy, Krakow, Poland	G. Polok
Soltan Institute for Nuclear Physics, Warsaw, Poland	M. Szczekowski
IFIN-HH, Bucharest, Romania	C. Coca
Budker Institute of Nuclear Physics, Russia	A. Bondar
Institute for Nuclear Research, Russia	L. Kravchuk
Institute of Theoretical and Experimental Physics, Russia	A. Goloutvin
Institute of High Energy Physics, Russia	V. Obraztsov
Petersburg Nuclear Physics Institute, Russia	A. Vorobyov
University of Barcelona	L. Garrido
University of Santiago de Compostela, Spain	B. Adeva
University of Lausanne, Switzerland	A. Bay
University of Zürich, Switzerland	U. Straumann
Kharkov Institute of Physics and Technology, Ukraine	Yu. Ranyuk
Institute of Nuclear Research, Kiev, Ukraine	V. Pugatch
Imperial College London, U.K.	D. Websdale
Rutherford Appleton Laboratory, UK	J. V. Morris
University of Bristol, UK	N. Brook
University of Cambridge, U.K.	V. Gibson
University of Edinburgh, U.K.	F. Muheim
University of Glasgow, U.K.	F. J. P. Soler

[1] Institute of High Energy Physics Beijing, Tsinghua University Beijing
[2] Free University Amsterdam, FOM Institute SAF/NIKHEF, University of Amsterdam

University of Liverpool, U.K.	T. Bowcock
University of Oxford, U.K.	N. Harnew
CERN, Switzerland	J. Harvey

Humboldt University Berlin and University Freiburg, Germany, have expressed interest in joining LHCb at a later stage.

Technical Associates:

EVITEK, Finland,	CERN acting as host;
Geneva Engineering School, Switzerland,	University of Lausanne acting as host.
CEFET-RJ, Brazil	UFRJ acting as host

Annex 2 : LHCb Funding Agencies and their Representatives.

Country	Funding Agency	Represented by
Brazil	CNPq	E. Mirra de Paula e Silva
France	IN2P3	G. Wormser
Germany	BMBF	H.-F.Wagner
	Max-Planck-Institute, Heidelberg	W. Hofmann
Italy	INFN	E. Iarocci
The Netherlands	NIKHEF	J. Engelen
Poland	State Committee for Scientific Research	A. Wiszniewski
China	NSFC	N.Wang
Romania	MEC, IFIN - HH	G.Mateescu
Russia	Ministry of Industry, Science and Technology of the Russian Federation	M.P. Kirpichnikov
Spain	MCYT	R. Marimón
Switzerland	Swiss National Science Foundation	P. Burkhard
	Lausanne University	G. Chapuis
	Zürich University	U. Straumann
United Kingdom	PPARC	R. Wade
Ukraine		To be confirmed

Annex 3 : General Conditions for Experiments Performed at CERN.

ORGANISATION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE

CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

GENERAL CONDITIONS

APPLICABLE TO

EXPERIMENTS PERFORMED AT CERN

14 April 2000

GENERAL CONDITIONS

applicable to

Experiments Performed at CERN

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

This document sets out the rules and procedures concerning organisational, managerial and financial matters, which apply to all Universities and Research Institutions in connection with their participation in an experiment at CERN.

This document also addresses CERN's role as that of a Host Laboratory, to be distinguished from CERN's scientific responsibility as a member of an experiment Collaboration.

1. SCOPE OF APPLICATION

1.1. The General Conditions apply to experiments carried out at CERN by the combined efforts of several Universities and Research Institutions.

1.2. These experiments require approval by the CERN Research Board and the Director-General after consideration of written proposals submitted to the appropriate experiments committees, taking into account scientific interest, technical feasibility and the constraints imposed by available resources.

1.3. The General Conditions do not apply to "Recognised Experiments", the 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 Research Board on a case-by-case basis and any individual members of these experiments who become registered as CERN users are subject to the rules in operation on the CERN site governing this category of personnel.

2. PARTIES AND THEIR REPRESENTATION

2.1. The Parties concerned include:

- CERN as Host Laboratory, hereinafter referred to as "***CERN as Host***" (or simply "CERN") - in this connection, the "***CERN site***" refers to all parts of CERN's fenced-in territory and all of its underground works,

- the Institutions responsible for the research teams taking part in the experiments and forming ***the Collaborating Institutions,*** hereinafter collectively referred to as the ***Collaboration***. CERN may be a Collaborating Institution as well as Host Laboratory.

2.2. Each Party shall have a Representative:

- CERN as Host shall be represented by a ***Director of Research,*** acting on behalf of the Director-General.

- The Collaboration shall be represented by a duly appointed ***Spokesperson***, who represents the Collaboration to the outside and who co-ordinates its work. Where the Spokesperson is not stationed permanently at CERN, the Collaboration shall appoint in addition a ***Contactperson*** at CERN.

- In its relations with CERN, each Collaborating Institution taking part in the experiment shall be represented by a **team member** appointed by the relevant Institution and/or a **member** of the relevant **Funding Agency**.

2.3. All Parties shall assume responsibility for ensuring that all members of their teams comply with these General Conditions.

3. BASIC DOCUMENTS GOVERNING THE COLLABORATION

3.1. The following documents shall constitute the formal basis for experiments performed at CERN:

3.1.1. the ***EXPERIMENTAL PROPOSAL***, after its approval by the CERN Research Board;

3.1.2. ***TECHNICAL DESIGN REPORTS***, where appropriate;

3.1.3. a ***MEMORANDUM OF UNDERSTANDING,*** which sets out the detailed arrangements and provisions specific to the experiment and which must be agreed and signed by CERN as Host and by the Collaborating Institutions and/or Funding Agencies; special agreements or protocols of relevance may be appended to the Memorandum of Understanding;

3.1.4. the present ***GENERAL CONDITIONS,*** which the Parties accept by signing the Memorandum of Understanding, except as otherwise specified therein.

Contents of the Memorandum of Understanding

3.2. As a guide, the essential parts of the Memorandum of Understanding are the following:

~~b)~~a) a list of the Collaborating Institutions and/or the Funding Agencies, responsible for the teams in the Collaboration;

b) details of the persons with specific responsibilities in the experiment;

~~b)~~c) - the definition of the obligations of the Parties with respect to the construction of the detector and the auxiliary equipment;

- a breakdown of the funding requirements for the main items of the detector and of the auxiliary equipment, together with the contributions of the Parties;

- a timetable for the construction and installation of the equipment to be provided for the experiment;

~~b)~~d) the obligations of the Parties concerning the installation, operation and maintenance of the detector and auxiliary equipment, unless they are specified in a separate Maintenance and Operation agreement;

~~b)~~e) a mechanism for the resolution of disputes amongst the Parties;

~~b)~~f) an explicit reference to the General Conditions (in particular 6.7, 6.8 and 6.13), which the Parties accept unless otherwise specified in the Memorandum of Understanding; moreover, references should be made to the specific agreements and protocols relevant to the experiment.

4. ORGANISATION OF THE COLLABORATION

Internal autonomy and co-ordination with CERN

4.1. In its internal relations, the Collaboration is free to take such organisational decisions as deemed necessary. However, in preparing and performing the experiment, the Collaboration shall take into account the rules in force on the CERN site. In particular, financial arrangements between CERN and the Collaboration shall be subject to the Financial and Administrative Provisions for Visiting Teams currently in force.

Co-ordination in matters of safety

4.2. The Leader of the CERN Division with responsibility for the physics programme to which the experiment belongs shall appoint a Group Leader in Matters of Safety (GLIMOS) on the proposal of the Spokesperson of the Collaboration. The rights and obligations 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 in agreement with all the Parties concerned.

Membership

4.4. The FRC/RRB will consist of one representative of each Funding Agency or Collaborating Institution, and the Managements of CERN and the Collaboration. It will be chaired by the appropriate Director of Research.

Terms of reference

4.5. The role of the FRC/RRB includes:

- reaching agreement on the Memorandum of Understanding;
- monitoring the Common Projects and the use of the Common Funds;
- monitoring the general financial and manpower support;
- approving a maintenance and operation procedure and monitoring its functioning;
- approving the annual construction and maintenance & operation budgets.

4.6. The Collaboration Management reports to the FRC/RRB on technical, managerial, financial and administrative matters, and on the composition of the Collaboration.

5. CERN'S OBLIGATIONS AS HOST LABORATORY

5.1. CERN is the Host Laboratory for the Collaboration. The provisions of this Section concern its obligations as Host.

PRINCIPLES

Installation

5.2. CERN will agree to the installation of the detector, its auxiliary equipment and counting rooms in the appropriate experimental area, provided that they satisfy CERN safety standards.

Duration

5.3. CERN will agree to keep the detector on-site during the data taking for the experimental programme approved by its Research Board.

Network Connections

5.4. CERN agrees that computers and peripherals belonging to the Collaboration, which are needed for the operation of the detector and its auxiliary equipment, may be connected to the CERN Computer network, provided they conform to its compatibility standards.

Insurance[3]

- ***Property***

5.5. The items belonging to the Collaboration and the Collaborating Institutions, once they have been officially accepted on the CERN site, shall be insured at CERN's expense and under the conditions and within the limits set out in the relevant insurance policy against the risks of fire, explosion, natural disaster and water damage.

- ***Third Party Liability***

5.6. Any third party liability of the Collaboration, the Collaborating Institutions and their personnel arising from the experiment shall be insured at CERN's expense under the conditions and within the limits set out in the relevant insurance policy.

- ***Limitation of coverage***

5.7. However, CERN's insurance coverage is effective only above specified amounts of excess. Any amount not covered by CERN's insurance policies shall be for the account of the Collaboration. CERN shall not be liable for any loss or damage arising from or in connection with the experiment.

Social insurance

5.8. Independently of the foregoing provisions, social insurance cover for the experimental teams shall remain the responsibility of the employer institutions concerned.

[3] CERN's insurance policies are currently under review and it is intended that new insurance policies will come into effect on 1 January 2003. CERN does not warrant that the new insurance policies will continue to cover the risks set out in clauses 5.5 and 5.6 and accepts no liability in this connection.

SERVICES

User Support and Users Office

5.9. CERN will provide access to its services, as described in the document "CERN User's Guide". The Users Office will provide assistance, if required, on questions concerning access to the services provided by CERN.

Standard Services

5.10. CERN will generally provide, for the duration of the experiment, free of charge and within the limits and general constraints imposed by the available resources and schedules of accelerators, the standard services and facilities listed below:

Particle beams and equipment

~~b)~~a) particle beams and related shielding, monitoring equipment and standard communication with the accelerator control rooms;

b) beam time allocation and scheduling, following the recommendations of the relevant Experiment Committee;

~~b)~~c) test beam time for testing prototypes and calibrating final detector elements, subject to the normal scheduling and allocation procedures;

Space

~~b)~~d) floor space in the experimental area(s) for the experimental detector and its auxiliary equipment;

~~b)~~e) laboratory and hall space for construction, testing and assembly of equipment;

~~b)~~f) temporary, short-term storage place for spare parts, handling and assembly tools, detector and auxiliary equipment that is awaiting installation or removal. CERN reserves the right to charge longer term storage of the above items to the Collaborating Institutions;

~~b)~~g) office space, equipped with standard furniture and infrastructure facilities including network connections, telephones and electricity;

Supplies and installations at the experiment

~~b)~~h) assistance with the installation and removal of the detector and its auxiliary equipment, such as the provision of crane and rigging services, geometrical survey and alignment, transport of equipment on and between the parts of the CERN site, as well as inside the experimental areas;

~~b)~~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

~~b)~~j) central computing resources for the Collaboration for the duration of the experiment in amounts to be decided by the normal CERN allocation procedures;

Transport of persons

~~b)~~k) basic transportation for personnel between the main parts of the CERN site;

Safety services

~~b)~~l) access to its safety services for advice, inspection and control, and first aid or other emergency help;

Administrative services

~~b)~~m) access to its administrative services to help the Collaboration in financial matters, in accordance with the CERN Financial Rules and in particular with those applying to Visiting Teams.

Special Services

5.11. A variety of services other than those specified above may be provided to the Collaborating Institutions on request, subject to the availability of resources. Such services will be charged to the Collaborating Institutions according to the rules currently in force at CERN.

Special Equipment

5.12. Any additional infrastructure equipment to be provided by CERN shall be explicitly mentioned in the Memorandum of Understanding. The respective obligations of CERN and of the Collaborating Institutions with regard to the construction, operation and maintenance of this equipment shall also be specified therein or in the Maintenance and Operation agreement, where this is a separate document.

6. OBLIGATIONS OF THE COLLABORATING INSTITUTIONS

Basic Obligations

6.1. The team members and property of Collaborating Institutions shall, while located on the CERN site, be subject to the authority of the Director-General of CERN and shall comply with the regulations in force on the Organization's site. Each Collaborating Institution shall nominate a Team Leader who is responsible, among other things, for ensuring that all members of the team (paid academic, research, technical and administrative staff and registered students) are aware of the regulations and obligations, and of the need to comply with them at all times while on the CERN site.

Medical surveillance and certificates

6.2. Each Collaborating Institution sending team members to CERN shall remain responsible as employer for the medical surveillance of its team members and, in the case of team members who are to work in conditions deemed to constitute special risks (e.g. radiation controlled areas), shall supply a certificate of medical fitness on first arrival at CERN.

Safety briefings and inspections

6.3. Collaborating Institutions shall participate in safety meetings and studies of their experiment, and shall accept the right of the CERN safety personnel to carry out safety inspections as well as other safety measures set out in the document "Safety Policy at CERN - SAPOCO/42".

Supply of equipment

6.4. 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 to commission. The Spokesperson shall inform the appropriate Director of Research of any significant failure to meet the agreed schedule. For experiments with FRCs or RRBs, these bodies will monitor such matters.

Ownership status

6.5. The delivery of items to the CERN site, or the handling of such items there, will not affect the property rights relevant to those items, unless otherwise formally agreed with the owner. On the other hand, the ownership of equipment no longer required by the Collaboration can, subject to formal mutual agreement, be transferred to CERN, where this is in the mutual interest of CERN and the Collaboration concerned.

Ownership inventory

6.6. As a condition of coverage by CERN's Insurance, each Collaborating Institution must provide CERN with a list of the property it installs on the CERN site. All equipment delivered to the CERN sites must be properly documented to indicate its ownership status, handling requirements and any potential hazards that it may pose. It shall keep the list up to date and, where necessary, inform CERN of any modifications to it.

Transport of equipment

6.7. Each Collaborating Institution supplying equipment shall be responsible for its delivery to and removal from the CERN site.

Installation and dismantling of equipment

6.8. The Collaboration is collectively responsible for the installation and dismantling of the equipment supplied by the Collaborating Institutions, in common or individually.

Operation and maintenance costs of equipment

6.9. The Collaborating Institutions shall be collectively responsible for the operation and maintenance of the equipment supplied by them, and for providing the resources necessary to carry out the experimental programme. The resources needed to operate and maintain the infrastructure and other equipment supplied by CERN as Host shall be provided by CERN.

Assignment of equipment

6.10. Any Party providing equipment undertakes to continue to make it available to the Collaboration at CERN until the experiment is officially declared to have been completed (see 8.2 below).

Early removal of equipment

6.11. If equipment provided by a Collaborating Institution is, in the opinion of the Collaboration, no longer required, the Parties may agree to and request its removal from the CERN site under the responsibility of the Institution concerned.

Release of space

6.12. Space allocated for construction and assembly should be released when these activities have been terminated. CERN reserves the right to change the space allocation during the lifetime of the experiment. As soon as the experiment is declared to have been completed (see 8.2 below), all space used by the Collaboration, including office and laboratory space, and the space used for testing and running the experiment, will be made available to CERN for reallocation.

Removal of equipment

6.13. Equipment associated with an experiment shall be removed from the CERN site within six months following a request from the CERN Division Leader concerned.

7. INTELLECTUAL PROPERTY

Free use of knowledge and data

7.1. CERN is bound by its Convention to publish or otherwise make generally available the results of its experimental and theoretical work. In addition, subject to clause 7.2 hereunder, each Collaborating Institution and CERN as the Host Laboratory is entitled to use for its own purposes any data and knowledge arising from the preparation or execution of the experiment.

Matters for prior agreement

7.2. Title to any patentable invention or any know-how arising from the preparation or execution of the experiment is vested in the Collaborating Institution(s) which is/are its author(s), who shall decide on the taking of measures, at its/their own expense, to protect such invention or know-how and who shall grant each Collaborating Institution and CERN a free, perpetual and irrevocable license to use such invention or know-how for its own purposes. Such license does not include the right to sub-license.

8. FINAL PROVISIONS

Modifications and formal amendments

8.1. The Collaboration shall reach agreement on any modification or addition to the experiment that affects the terms of the Memorandum of Understanding and shall inform CERN of such changes. Where the changes constitute a substantial change to the experiment, they will be submitted to the appropriate committee for approval and acceptance by CERN. In cases where the Collaboration has an FRC/RRB, the latter bodies must also approve any such changes. Major modifications shall be approved as formal amendments to the Memorandum of Understanding and signed by the representatives of all the Parties.

Duration of applicability of the Memorandum of Understanding

8.2. Unless the duration of applicability is specified in the Memorandum of Understanding, the terms and conditions of the Memorandum of Understanding will apply until the appropriate CERN Research Director, in agreement with the Spokesperson, declares the experiment to have been completed, dismantled and the arrangements for its disposal agreed.

Observance of the Memorandum of Understanding

8.3. The Memorandum of Understanding formalises the agreement reached between all the Parties on the experiment, who will do their best to adhere to its provisions. Any default under its provisions will be dealt with by the Collaboration, in consultation with the CERN Management.

Relevant documents

8.4. The following documents are fully applicable in the execution of the Memorandum of Understanding:

- the CERN Users' Guide,
- the Safety Guide for CERN experiments,
- the Safety Policy at CERN - SAPOCO/42,
- Financial Guidelines for the LHC Collaborations (CERN/FC/3796) - for the LHC experiments only,
- Financial and Administrative Provisions for Visiting Teams.

ACCU

8.5. 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.

Annex 4 : Sub-detector Structure of the LHCb detector.

1. Dipole Magnet	
2. Tracking:	Vertex Locator Inner Tracker Outer Tracker
3. RICH	
4. Calorimeter	Preshower ECAL HCAL
5. Muon System	
6. Trigger	Level 0 Level 1
7. Datahandling	
8. Infrastructure	

Annex 5 : Management Structure of the LHCb Collaboration.

5.1 The Organizational Structure of the LHCb Collaboration

1. Concerning all scientific matters, in particular the definition, construction and operation of the detector, the Collaboration is governed by the LHCb **Collaboration Board**. This board is composed of one representative from each collaborating institution, with voting right; and the Spokesperson, the Deputy-Spokesperson, the Technical Coordinator and the Resource Coordinator as ex-officio members, without voting rights. The CB elects the **Chairperson of the CB** from among the Members of the Collaboration.
2. All scientific and technical issues are discussed in the **Plenary Meeting** before any major decisions are taken.
3. Concerning all resource and legal matters, the Collaboration is monitored by the LHCb **Resource Review Board** (RRB). This board is composed of representatives of each Funding Agency, with voting rights, and ex-officio members of the LHCb Management and CERN Management, without voting rights. The RRB is chaired by CERN's Director of Research.
4. The Coordinators of the sub-systems listed in Annex 5.2 below are ratified by the Collaboration Board on proposal by the Spokesperson.
5. The **Spokesperson** represents the Collaboration to the outside and leads the Collaboration in all day-to-day matters. He/she is appointed by the CB in consultation with the CERN Management.
6. The **Technical Coordinator** has the responsibility to oversee all technical aspects of the detector construction. In particular, he/she ensures the integration of all sub-systems into the complete detector and directly monitors the Common Projects. He/she is appointed by the CB in accordance with the CERN Management.
7. The **Resource Coordinator** is responsible for coordinating the financial planning and other resource issues of the Collaboration and, in particular, for managing the Common Fund.
8. The Group Leader in Matters of Safety (**GLIMOS**) is responsible to the CERN Management for all matters of safety concerning LHCb personnel, work and equipment on the CERN premises. He/she is appointed by the CERN Management in consultation with the LHCb Management.

5.2 Management and other senior positions within the LHCb Collaboration and the names of the people currently holding them

Spokesperson :	T. Nakada
Deputy- Spokesperson:	B. D'Almagne
Technical Coordinator / GLIMOS :	H. J. Hilke (until 30 June 2002) W. Witzeling (from 1 July 2002)
Reseource Coordinator	A. Smith
Chairperson of the Collaboration Board :	C. Matteuzzi

Coordinators :

Magnet :	W. Flegel
Vertex Locator:	T. Ruf
Inner Tracker :	U. Straumann (Deputy: O. Steinkamp)
Outer Tracker :	C. Padilla
RICH :	D. Websdale
Calorimeter :	J. Lefrançois (Deputy: A. Schopper)
Muon System:	G. Carboni (Deputy: B. Schmidt)
Trigger :	H. Dijkstra
Data Handling :	J. Harvey
Experimental areas :	D. Lacarrère
Test beams:	R. Lindner
Front-end Electronics:	J. Christiansen
Tracking optimization :	M. Merk
Particle Identification :	R. Forty
Physics :	O. Schneider

Annex 6 : Overview of the Technical Participation of Institutes in LHCb Detector Construction

	VELO	ITR	OT	RICH	PRESH	ECAL	HCAL	MUON S.	DAH	TRIGGER
Rio de Janeiro								x	x	
Clermont-Ferrand					x					x
Marseille									x	x
Orsay						x	x		x	x
Dresden			x							
Heidelberg MPI	x	x								
Heidelberg PI			x							x
Heidelberg KIP										x
Bologna									x	x
Cagliari								x		
Ferrara								x		
Firenze								x		
Frascati								x		
Genova				x						
Milano				x					x	
Rome I								x	x	
Rome II								x		
Beijing			x							
Tsinghua			x							
Krakow			x							
Warsaw			x						x	
Bucuresti-Magurele							x			
BINP Novosibirsk		x					x			
Moscow INR					x					
Moscow ITEP						x				
Moscow LPI										
Protvino							x			
St. Petersburg								x		
Barcelona					x					
Santiago de Compostela		x								
Lausanne	x	x							x	x
Zürich		x								
Amsterdam NIKHEF	x		x							x
Kiev*		x								
Kharkiv										
Bristol				x						
Cambridge				x					x	
RAL				x					x	
Edinburgh				x						
Glasgow				x						
Liverpool	x									
ICSTM, London				x						
Oxford				x					x	
CERN	x		x	x		x	x	x	x	x

* Negotiations on funding have started

Annex 7 : LHCb Common Items for M&O Costs

For M&O costs, the following subsystems shall be treated as Common items:-

The Magnet

Infrastructure

Data Handling (DAQ & DCS)

plus other items as listed in Annex 9 below.

If radiation damage necessitates the replacement of certain detectors, these detectors may become a Common Item regarding M&O.

Annex 8 : LHCb Sub-detector Systems: Deliverables being provided by the Institutes, their estimated total value and the sharing among Institutes.

8.1 VERTEX LOCATOR (VELO)

A) Deliverables	**Value (kCHF)**	**Sharing**
Vertex Tank	1290	NIKHEF(1160), Liverpool (130)
Silicon Detectors	460	Liverpool(460)
Hybrids	250	Liverpool(250)
Veto Trigger	340	NIKHEF(340)
Electronics	2760	Lausanne(2170), MPIHeidelberg(370), Liverpool(220)
TOTAL	5100	

B) Funding Summary (kCHF)	
MPI Heidelberg (BMBF)	370
NIKHEF	1500
Lausanne	2170
Liverpool	1060
TOTAL	5100

8.2 INNER TRACKER

A) Deliverables	**Value (kCHF)**	**Sharing**
Detectors	2660	MPI Heidelberg(1000), Santiago de Compostela(800), Zuerich / Lausanne(790), Ukraine (70)
Electronics	2490	MPI Heidelberg(690), Lausanne / Zuerich(1690)
TOTAL	5040	

B) Funding Summary (kCHF)	
MPI Heidelberg, MPG	1290
BMBF	400
Lausanne / Zuerich	2480
Santiago de Compostela	800
Ukraine	70
TOTAL	5040

8.3 Outer Tracker

A) Deliverables	**Value (kCHF)**	**Sharing**
Detector stations+ Frames (Incl. Transport/Install.)	2815	China(180), Heidelberg(1220), Krakow(50), NIKHEF(1365), Warsaw
Front-end boards (HV+ Preamp Boards)	1475	NIKHEF(1475)
TDC and Level-1 boards	3220	CERN(2520), Heidelberg(700)
Interfacing to DAS/TTC	1005	Krakow(225), NIKHEF(140), CF(640)
Cables and Connectors; Power Supplies(HV/LV); Slow Controls	1320	CERN(715), Krakow, NIKHEF(20), CF(260)
Gas system	200	CERN(165), Krakow(35)
Alignment	50	Warsaw(50)
TOTAL	10085	

B) Funding Summary (kCHF)	
CERN	3400
China	180
Heidelberg	1920
NIKHEF	3000
Poland	360
CF	900
TOTAL	9760

8.4 RICH

A) Deliverables	**Value (kCHF)**	**Sharing**
Mechanics + Optics		
RICH 1	510	UK(510; Bristol, ICSTM London)
RICH 2	1200	CERN(380), Italy(120; Genova, Milano), RAL(700)
Aerogel	150	Milano(150)
Electronics	1350	UK(1350; Cambridge, Oxford)
Photon Detectors	3760	CERN(400), Italy(500; Genova, Milano); UK(2860; Edinburgh, Glasgow, Oxford)
Services / Alignment	730	CERN(220), Milano(230), UK(280; Edinburgh, RAL)
TOTAL	7700	

B) Funding Summary (kCHF)	
CERN	1000
Italy	1000
UK	5700
TOTAL	7700

The detailed sharing of responsibilities is given in Table 20 of the RICH TDR **(CERN/LHCC/2000-0037).**

8.5 CALORIMETERS

A) Deliverables	**Value (kCHF)**	**Sharing**
SPD / PS Detector	1140	INR (250), CF (790);
SPD / PS PMT+HV	550	Barcelona(320), Clermont(230)
SPD Electronics	110	Barcelona(110)
PS Electronics	990	Clermont(990)
ECAL Detector	4450	ITEP(680),CERN(1800), CF(1970)
HCAL Detector	3350	IHEP(670), Bucharest(150), Ukraine(70), CERN(1350), CF(1110)
ECAL / HCAL PMT+HV	2410	LAL(590), Bucharest(60), CF(1440)
ECAL / HCAL Electronics	2010	LAL (2010)
Support Structure	350	CERN(350)
TOTAL	15360	

B) Funding Summary (kCHF)	
France	3820
Romania	210
Russia	1600
Spain	430
Ukraine	70
CERN	3500
CF	5310
TOTAL	14940

8.6 Muon System

A) Deliverables	Value (kCHF)	Sharing
Detectors	2450	CERN(50), INFN(1650; Cagliari, Ferrara, Firenze, LN Frascati, Roma I, Roma II), PNPI(500), UFRJ7(250)
Electronics	4650	CERN(60), INFN(3000; Cagliari, LN Frascati, Rome I, Rome II), UFRJ(970)
Support Structures	350	CERN(90), LN Frascati(200), PNPI(60)
Iron absorber	4000	CERN, special in-kind contribution
TOTAL	11450	

B) Funding Summary (kCHF)	
Brazil	1220
INFN	4850
Russia	560
CERN	200
CERN, Iron in kind	4000
TOTAL	10830

8.7 Trigger

A) Deliverables	**Value (kCHF)**	**Sharing**
Level 0 Muon	1000	Marseille(1000)
Level 0 Calorimeters	1350	Bologna(800), Clermont/Orsay(550)
Level 0 Decision Unit	30	Clermont(30)
Level 1	1020	KIP Heidelberg(520), Lausanne(500)
TOTAL	3400	

B) Funding Summary (kCHF)	
France	1580
Germany BMBF	520
Italy	800
Switzerland	500
TOTAL	3400

Annex 9 : Headings that give rise to Category A M&O costs

Detector related costs

- Magnet
- Magnet controls
- Magnet power supply
- Gas systems
- Gas consumption
- Cooling systems
- Cooling fluids (above -50°C)
- External cryogenics
- Cryogenic fluids (below -50°C)
- Moving / hydraulic systems
- Detector safety systems
- Shutdown activities
- General Technical support
- UPS maintenance
- Electronics pool rentals
- Beam pipe & vacuum
- Counting & control rooms

Secretariat

- Secretarial assistance
- Economat
- Fax, photocopiers, printers
- Printing and publication

Communications

- GSM phones / on-call service
- Automatic call-back

On-line computing (no recording media)

- System management
- Data storage, (temporary on disk)
- Detector controls
- Computers / processors / LANs
- Software licenses
- Common desktop infrastructure

Test beams, calibration facilities

- General operation
- Common electronics
- Electronics pool rentals
- Gas systems
- Gas consumption
- External cryogenics

Laboratory operations

- Assembly areas, clean rooms
- Workshops
- Laboratory instruments

General services

- Cooling & ventilation
- Power
- Power distribution system
- Heavy transport
- Cranes
- Cars
- Cleaning
- Survey
- Storage space
- Common desktop infrastructure
- Academic subsistence
- Outreach

Annex 10 : Category B Cost Headings and Responsibilities.

Category B Costs will be estimated under the headings given below for which the list is not exhaustive :

Mechanics, Gas-systems, Cooling systems, Front end (FE) electronics, Standard electronics, Power Supplies (LV, HV), Crates, Read Out Modules, Controls, (DCS, DSS), Sub-Detector Spares, Communications, Store Items, Hired Manpower at CERN, Technical Manpower at CERN.

Each sub-system will have M&O costs under most of the above headings.

The sub-systems are listed below along with the countries or institutes who will be responsible for their maintenance and operation :

VELO : Lausanne, Liverpool, MPI Heidelberg, NIKHEF

Inner Tracker : MPI Heidelberg, Lausanne, Santiago de Compastela, Ukraine, Zurich

Outer Tracker : China, CERN, Heidelberg, Krakow, NIKHEF, Warsaw.

RICH1 : CERN, Italy, UK

RICH2 : CERN, Italy, UK.

ECAL : ITEP, LAL.

HCAL : Bucharest, IHEP, LAL, Ukraine.

SPD : Barcelona, Clermont Ferrand, INR.

PS : Barcelona, Clermont Ferrand, INR.

MUON : Brazil, CERN, INFN, PNPI.

Trigger : Bologna, KIP Heidelberg, LAL Orsay, Lausanne, Marseilles.

Annex 11 : Headings that give rise to Category C M&O costs.

General services
- Safety & radioprotection
- INB compliance
- Radioactive waste disposal
- Access system
- Elevators
- Gerant de site
- Flood control
- Insurance (CERN standard)
- Cleaning
- Office space

Annex 12 : Rules of Procedure for the M&O Scrutiny Group

12.1 The RRBs of the LHC experiments, acting together, shall appoint a Scrutiny Group to assist them in exercising their duties with respect to the oversight of M&O costs and the approval of M&O spending for the coming year. The Scrutiny Group has a technical role and shall be composed of six persons chosen appropriately by the RRBs acting jointly and four persons chosen by CERN. The Scrutiny Group shall perform its duties for all of the LHC Collaborations. The members chosen by the RRBs shall normally include at least one person from each of a large Member State, a small Member State, a large non-Member State and a small non-Member State.

12.2 In order to promote continuity in its deliberations, appointments to the Scrutiny Group shall normally be for two years, with the possibility of re-appointment. Half of the members chosen by the RRBs and half of those chosen by CERN will be replaced each year. In order to establish this rolling replacement, half of the initial members of the Scrutiny Group will serve for three years.

12.3 The names of new Scrutiny Group members for the current and following year will normally be settled at the spring meeting of the RRBs. For the members to be chosen by the RRBs, the RRB Chairperson will receive nominations. CERN will inform the RRBs of its choice of members. The RRBs will then appoint the Scrutiny Group members by consensus in plenary session.

12.4 The Scrutiny Group shall select its Chairperson from amongst the members chosen by the RRBs.

12.5 At his or her discretion, the Chairperson of the Scrutiny Group will accept that, in exceptional circumstances, a member is replaced at an individual meeting by a named proxy.

12.6 The Scrutiny Group will receive for scrutiny, normally at the spring meetings of the RRBs, the Collaborations' proposals concerning the level, provision and sharing of Category A M&O costs for the following year, along with their reported Category B costs and the proposed responsibilities and commitments for these. It will then carry out its scrutiny activities and will submit its reports for each experiment to the autumn meetings of the RRBs.

Annex 13 : LHCb Collaboration participants holding PhD or equivalent qualification by Country and Institute for 2002

Brazilian Centre for Particle Physics, CBPF, Rio de Janeiro, Brazil
I. Bediaga, G. Cernicchiaro, C. de Oliveira, A. Franca Barbosa, J. Magnin, J. Marques de Miranda, A. Reis.

University of Rio de Janeiro, UFRJ, Rio de Janeiro, Brazil
S.Amato, P.Colrain, J.R.T. de Mello Neto, L. de Paula, M.Gandelman, J.H. Lopes, B.Marechal.

Laboratoire d'Annecy-le-Vieux de Physique des Particules (LAPP), IN2P3-CNRS, Annecy, France
D. Boget, I. De Bonis, D. Decamp, J-P. Leef, M-N. Minard, B. Pietrzyk.

Laboratoire de Physique Corpusculaire (LPC Clermont), IN2P3-CNRS Université Blaise Pascal de Clermont-Ferrand II, France
Z.Ajaltouni, G. Bohner, V.Breton, N. Brun, R.Cornat, O.Deschamps, P. Henrard, J.Lecoq, S. Monteil, P.Perret.

Centre de Physique des Particules de Marseille (CCPM), IN2P3-CNRS Université d'Aix - Marseille II, France
E.Aslanides, J.P.Cachemiche, F. Derue, P. Y. Duval, R. Le Gac, O.Leroy, P. L. Liotard, M.Menouni, A.Tsaregorodtsev

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G. Barrand, C.Beigbeder-Beau, D.Breton, O.Callot, D. Charlet, Ph.Cros, B.D'Almagne, B.Delcourt, F.Fulda, B.Jean-Marie, J.Lefrancois, F. Machefert, M. H. Schnune, V.Tocut, K.Truong, I.Videau

Technical University of Dresden, Dresden, Germany
R.Schwierz, B.Spaan

Max-Planck-Institute for Nuclear Physics, Heidelberg, Germany
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Kirchhoff Institute for Physics, University of Heidelberg, Heidelberg, Germany
R. Achenbach, M. Dorn, P. Hanke, I. Kisel, V.Lindenstruth.

Frascati Laboratori Nazionali, Frascati, Italy
G.Bencivenni, C.Bloise, F.Bossi, P.Campana, G.Capon, P.DeSimone, C.Forti, A. Franceschi, M.Murtas, L.Passalacqua, V.Patera(1), A. Sciubba(1)

(1)also at Dipartimento di Energetica, University of Rome, ``La Sapienza''

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University of Rome, "Tor Vergata" and INFN, Rome, Italy
G.Carboni, G. Ganis, R.Messi, E.Santovetti

NIKHEF, The Netherlands
G. van Apeldoorn(3), H. J. Bulten(1,2), J.F.J. van den Brand(1,2), M.Doets(1,2), J.J. van Hunen(1), E.Jans(1), T.Ketel(1,2), M. Kraan(1), M.Merk(1), F. Mul(1,2), A. Pellegrino(1), G. Raven (1,2), H.Schuijlenburg(1), T.Sluijk(1), H. de Vries(1), L.Wiggers(1), A. Zwart(1).

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Soltan Institute for Nuclear Physics, Warsaw, Poland
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The name lists above for Beijing have not been updated.

More names are given for the 5 Russian institutes than the agreed total number used for the sharing of Category A M&O contributions but the names on each individual publication will be chosen to form an appropriate subset of these names.

Annex 14 : Non-Member States for which CERN will partially pay the energy costs

14.1 CERN will partially pay the energy costs for the following CERN Non-Member States by virtue of their contributions to the construction of the LHC machine.

1. Canada
2. India
3. Japan
4. Russian Federation
5. United States of America

14.2 Under a co-operation agreement Israel contributes to CERN 20% of the amount that would normally be expected of it as a Member State. The further provisions of this co-operation agreement on the use of these funds lead to the conclusion that CERN should pay 16% of the energy costs for this country.

Annex 15 : Formula used for determining the sharing of the CERN payment of energy costs amongst the eligible non-Member States.

M_i = contribution to the LHC machine of country *i*

M_{MS} = contribution to the LHC machine of CERN Member States taken together

M_{NMS} = contribution to the LHC machine of the non-Member States listed in Annex 14.1 taken together

G_i = GDP of country *i* (see explanatory note below)

A_i = category A costs for country *i*

E_{MS} = energy costs of the Member States together

E_{NMS} = energy costs of the non-Member States listed in Annex 14.1 taken together

E_i = Energy costs attributable to country *i*

The CERN share $E_{NMS(CERN)}$ of E_{NMS} is determined by the LHC machine contribution of these countries relative to the contribution of the CERN Member States, i.e.

$$E_{NMS(CERN)} = E_{NMS} \cdot M_{NMS} / M_{MS}$$

Beyond this, the algorithm used for sharing amongst the eligible non-Member States is:

$$\mathbf{E_i = k \cdot (M_i / G_i) \cdot A_i} \qquad \text{where} \quad k = E_{NMS(CERN)} / \sum_{NMS}((M_i / G_i).A_i)$$

Explanatory note on the calculation of GDPs

The Gross Domestic Products to be taken into account in preparation for the decision in the autumn of year *n* on the payment of energy costs by CERN in year *n+1* to contributing non-Member States are those for the years of LHC construction (1996-2006). Thus initially the averaged Gross Domestic Product in Swiss francs for each contributing non-Member State is calculated as described in the following two paragraphs.

1. The Gross Domestic Product (GDP) in US Dollars of each contributing non-Member State for the years 1996 to *m*, the last year available ($m \leq n-1$), is obtained from the document "International Financial Statistics" published by the International Monetary Fund (IMF), Washington DC.
2. An average of the resulting data for each contributing non-Member State is calculated by the application of the following formula :

$$(GDP_{1996} + GDP_{1997} + ... + GDP_m) / (m\text{-}1996+1)$$

When *m* reaches 2006, the averaged GDP for the country in question will cover the whole period of LHC construction and will then be used unchanged in subsequent years.

Annex 16 : Procedure for the payment of Category A contributions

For Category A expenses, CERN will issue, each calendar year, on the basis of the agreed costs and sharing, invoices in Swiss francs to the Funding Agencies of the various Institutes for payment during that year; any necessary adjustments will be made and taken into account in the following year. Payment of 50% of the amount invoiced will be due not later than 10 February and the remaining 50% not later then 10 June. Advance payments are encouraged. The RRB will be informed at its autumn meeting each year of the interest gained or lost by the Collaboration.

The European Organization for Nuclear Research (CERN)

and

_____

declare that they agree on the present Memorandum of Understanding for the LHCb Experiment.

Done in Geneva

on _____

For CERN

_____

Roger Cashmore
Director of Research

Done in _____

on _____

For

_____

LHCb