Memorandum of Understanding

for Maintenance and Operation of the CMS 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 CMS 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 CMS 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 CMS Collaboration.

(b) Agreement to this Collaboration has been effected through the signature of Memoranda of Understanding (RRB CMS-D 98-31) 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 6.5, the Construction MoUs specify that the responsibilities for the maintenance and operation (M&O) of the CMS 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 CMS 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 CMS 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 CMS detector, to the time after they have been commissioned.

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

3.4 The CMS 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 CMS 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 CMS 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 CMS Detector and Collaboration

5.1 The detector for the CMS experiment has been described in detail in the Technical Proposal submitted to the LHCC in December 1994 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 CMS Detector, and of CERN as Host Laboratory

6.1 Responsibility for the M&O of the CMS 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 CMS 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 CMS 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 CMS 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 Resource Manager (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 Resource Manager 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 Collaboration and Names of their Contact Persons.

Code	Institute	Contact Person
AR1	Yerevan Physics Institute, Yerevan, Armenia	Albert M. Sirunyan
AT1	Institut für Hochenergiephysik der ÖAW, Wien, Austria	Claudia-Elisabeth Wulz
BY1	Byelorussian State University, Minsk, Belarus	Nikolaï Shumeiko
BY2	Research Institute for Nuclear Problems, Minsk, Belarus	Nikolaï Shumeiko
BY3	National Centre for Particle and High Energy Physics, Minsk, Belarus	Nikolaï Shumeiko
BY4	Research Institute of Applied Physical Problems, Minsk, Belarus	Nikolaï Shumeiko
BE1	Université Catholique de Louvain, Louvain-la-Neuve, Belgium	Ghislain Gregoire
BE2	Université de Mons-Hainaut, Mons, Belgium	Philippe Herquet
BE3	Université Libre de Bruxelles, Brussels, Belgium	Catherine Vander Velde
BE4	Universiteit Antwerpen (UIA), Antwerpen, Belgium	Frans Verbeure
BE5	Vrije Universiteit Brussel, Brussels, Belgium	Stefaan Tavernier
BG1	Institute for Nuclear Research and Nuclear Energy, BAS, Sofia, Bulgaria	Vladimir Genchev
BG2	University of Sofia, Sofia, Bulgaria	Leander Litov
CERN	CERN, European Organization for Nuclear Physics, Geneva, Switzerland	Henrik Foeth
CN1	Institute of High Energy Physics, Beijing, China	Hesheng Chen
CN2	University for Science and Technology of China, Hefei, Anhui, China	Hongfang Chen
CN3	Peking University, Beijing, China	Yanlin Ye
CR1	Technical University of Split, Split, Croatia	Ivica Puljak
CR2	University of Split, Split, Croatia	Mile Dzelalija
CY1	University of Cyprus, Nicosia, Cyprus	Panos A. Razis
EE1	Institute of Chemical Physics and Biophysics, Tallinn, Estonia	Endel Lippmaa
FI1	Department of Physics, University of Helsinki, Helsinki, Finland	Jorma Tuominiemi
FI2	Helsinki Institute of Physics, Helsinki, Finland	Jorma Tuominiemi
FI4	Digital and Computer Systems Lab., Tampere Univ. of Technology, Tampere, Finland	Jarkko Niittylahti
FI5	Dept. of Physics & Microelectronics Instrumentation Lab., Univ. of Oulu, Oulu, Finland	Tuure Tuuva
FR1	LLR, Ecole Polytechnique, IN2P3-CNRS, Palaiseau, France	Ludwik Dobrzynski
FR2	Lab. d'Annecy-le-Vieux de Phys. des Particules, IN2P3-CNRS, Annecy-le-Vieux, France	Jean-Pierre Peigneux
FR3	DSM/DAPNIA, CEA/Saclay, Gif-sur-Yvette, France	John Rander
FR4	IReS Strasbourg, IN2P3-CNRS-ULP, LEPSI Strasbourg, UHA Mulhouse, France	Jean-Marie Brom
FR5	Institut de Physique Nucléaire de Lyon, IN2P3-CNRS, Univ. Lyon I, Villeurbanne, France	Didier Contardo
GE1	High Energy Physics Institute, Tbilisi State University, Tbilisi, Georgia	Ramazi Kvatadze
GE2	Institute of Physics Academy of Science, Tbilisi, Georgia	Vladimir Roinishvili
DE2	Institut für Experimentelle Kernphysik, Karlsruhe, Germany	Thomas Müller
DE3	RWTH, I. Physikalisches Institut, Aachen, Germany	Stefan Schael
DE4	RWTH, III. Physikalisches Institut A, Aachen , Germany	Thomas Hebbeker
DE5	RWTH, III. Physikalisches Institut B, Aachen, Germany	Günter Flügge
GR1	Institute of Nuclear Physics "Demokritos", Attiki, Greece	Athanasios Markou
GR2	University of Athens, Athens, Greece	Leonidas Resvanis
GR3	University of Ioánnina, Ioánnina, Greece	Frixos Triantis
HU1	KFKI Research Institute for Particle and Nuclear Physics, Budapest, Hungary	Gyorgy Vesztergombi
HU2	Kossuth Lajos University, Debrecen, Hungary	Laszlo Baksay
HU3	Institute of Nuclear Research ATOMKI, Debrecen, Hungary	Jozsef Molnar
IN1	Bhabha Atomic Research Centre, Mumbai, India	Sushil Kumar Kataria
IN2	Panjab University, Chandigarh, India	J.M. Kohli
IN3	Tata Institute of Fundamental Research - EHEP, Mumbai, India	Som N. Ganguli
IN4	Tata Institute of Fundamental Research - HECR, Mumbai, India	V.S. Narasimham
IN5	University of Delhi South Campus, New Delhi, India	R. K. Shivpuri
IR1	Institute for Studies in Theoretical Physics and Mathematics, Tehran, Iran	M.M. Baarmand
IT01	Università di Bari, Politecnico di Bari e Sezione dell' INFN, Bari, Italy	Giuseppe Iaselli
IT02	Università di Bologna e Sezione dell' INFN, Bologna, Italy	Gaetano-Marco Dallavalle
IT03	Università di Catania e Sezione dell' INFN, Catania, Italy	Renato Potenza
IT04	Università di Firenze e Sezione dell' INFN, Firenze, Italy	Carlo Civinini
IT05	Università di Genova e Sezione dell' INFN, Genova, Italy	Pasquale Fabbricatore
IT06	Università di Padova e Sezione dell' INFN, Padova, Italy	Dario Bisello
IT07	Università di Pavia e Sezione dell' INFN, Pavia, Italy	Sergio P. Ratti
IT08	Università di Perugia e Sezione dell' INFN, Perugia, Italy	Giancarlo Mantovani
IT09	Università di Pisa e Sezione dell' INFN, Pisa, Italy	Rino Castaldi
IT10	Università di Roma I e Sezione dell' INFN, Roma, Italy	Marcella Diemoz
IT11	Università di Torino e Sezione dell'INFN, Torino, Italy	Cristiana Peroni
KR01	Chonnam National University, Kwangju, Korea	Jae Yool Kim
KR02	Dongshin University, Naju, Korea	Jae Yool Kim
KR03	Seonam University, Namwon, Korea	Jae Yool Kim
KR04	Wonkwang University, Iksan, Korea	Jae Yool Kim
KR05	Konkuk University, Seoul, Korea	June-Tak Rhee
KR06	Korea University, Seoul, Korea	Sung Keun Park
KR07	Cheju University, Cheju, Korea	June-Tak Rhee
KR08	Chungbuk University, Chongju, Korea	June-Tak Rhee
KR09	Kangwon National University, Chunchon, Korea	June-Tak Rhee
KR10	Seoul National University of Education, Seoul, Korea	June-Tak Rhee
KR11	Kyungpook National University, Taegu, Korea	Dong-Chul Son

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KR12	Seoul National University, Seoul, Korea	Soo-Bong Kim
KR13	Sungkyunkwan University, Suwon, Korea	Soo-Bong Kim
PK1	National Centre of Physics, Islamabad, Pakistan	Hafeez R. Hoorani
PK2	Ghulam Ishaq Khan Institute of Engineering Sciences and Techn., Swabi, Pakistan	Jamil Ahmad
PL1	Institute of Experimental Physics, Warsaw, Poland	Jan Krolikowski
PL2	Soltan Institute for Nuclear Studies, Warsaw, Poland	Maciej Gorski
PT1	Laboratório de Instrumentação e Física Experimental de Partículas, Lisboa, Portugal	Joao Varela
RU1	Institute for High Energy Physics, Protvino, Russia	Nicolai E. Tyurin
RU2	Institute for Nuclear Research, RAS, Moscow, Russia	Viktor Matveev
RU3	Institute for Theoretical and Experimental Physics, Moscow, Russia	Vladimir Gavrilov
RU4	Moscow State University, Institute for Nuclear Physics, Moscow, Russia	Ludmila Sarycheva
RU5	P.N. Lebedev Physical Institute, RAS, Moscow, Russia	Sergei Rusakov
RU6	Petersburg Nuclear Physics Institute, RAS, St Petersburg, Russia	Alexei Vorobyov
JINR	Joint Institute for Nuclear Research, Dubna, Russia	Igor Golutvin
SK1	Slovak University of Technology, Bratislava, Slovak Republic	Jozef Lipka
SP1	Centro de Investigaciones Energéticas Medioambientales y Tecnólogicas, Madrid, Spain	Marcos Cerrada
SP2	Universidad Autónoma de Madrid, Madrid, Spain	Teresa Rodrigo
SP3	Universidad de Oviedo, Oviedo, Spain	Teresa Rodrigo
SP4	Instituto de Física de Cantabria (IFCA), CSIC-Univ. de Cantabria, Santander, Spain	Teresa Rodrigo
SW1	Institut für Teilchenphysik, Eidgenössische Technische Hochschule (ETH), Zürich, Switzerland	Felicitas Pauss
SW2	Paul Scherrer Institut, Villigen, Switzerland	Quentin Ingram
SW3	Universität Basel, Basel, Switzerland	Ludwig Tauscher
SW4	Universität Zürich, Zürich, Switzerland	Claude Amsler
TA1	National Central University, Chung-Li, 32054 Taipei	Willis T. Lin
TA2	National Taiwan University, Taipei, 10764 Taipei	George W. S. Hou
TR1	Cukurova University, Adana, Turkey	Gulsen Onengut
TR2	Middle East Technical University, Ankara, Turkey	Ramazan Sever
TR3	Bogazici University, Department of Physics, Istanbul (Bebek), Turkey	Erhan Gulmez
UR1	Institute of Single Crystals of National Academy of Science, Kharkov, Ukraine	Vadym Lyubynskiy
UR2	National Scientific Center, Kharkov Inst. of Physics and Technology, Kharkov, Ukraine	Vadym Lyubynskiy
UR3	Kharkov State University, Kharkov, Ukraine	Vadym Lyubynskiy
UK1	Brunel University, Uxbridge, United Kingdom	Stephen J. Watts
UK2	Imperial College, University of London, London, United Kingdom	Geoffrey Hall
UK3	Rutherford Appleton Laboratory, Didcot, United Kingdom	Robert M. Brown
UK4	University of Bristol, Bristol, United Kingdom	Greg P. Heath
US02	Boston University, Boston, Massachusetts, USA	Lawrence Sulak
US03	University of California at Davis, Davis, California, USA	Winston Ko
US04	University of California at Los Angeles, Los Angeles, California, USA	Katsushi Arisaka
US05	University of California, Riverside, California, USA	John G. Layter
US06	University of California San Diego, La Jolla, California, USA	James G. Branson
US07	California Institute of Technology, Pasadena, California, USA	Harvey Newman
US08	Carnegie Mellon University, Pittsburgh, Pennsylvania, USA	Thomas Ferguson
US09	Fairfield University, Fairfield, Connecticut, USA	David R. Winn
US10	Fermi National Accelerator Laboratory, Batavia, Illinois, USA	Dan Green
US11	University of Florida, Gainesville, Florida, USA	Guenakh Mitselmakher
US12	Florida State University-HEPG, Tallahassee, Florida, USA	Vasken Hagopian
US14	University of Illinois at Chicago, (UIC) Chicago, Illinois, USA	Mark Adams
US15	The University of Iowa, Iowa City, Iowa, USA	Yasar Onel
US16	Iowa State University, Ames, Iowa, USA	John Hauptman
US17	Johns Hopkins University, Baltimore, Maryland, USA	Chih-Yung Chien
US20	University of Maryland, College Park, Maryland, USA	Andris Skuja
US21	Massachusetts Institute of Technology, Cambridge, Massachusetts, USA	Paraskevas Sphicas
US22	University of Minnesota, Minneapolis, Minnesota, USA	Roger Rusack
US23	University of Mississippi, Oxford, Mississippi, USA	Jim Reidy
US24	University of Nebraska-Lincoln, Lincoln, Nebraska, USA	Gregory R. Snow
US25	Northeastern University, Boston, Massachusetts, USA	Steve Reucroft
US26	Northwestern University, Evanston, Illinois, USA	Bruno Gobbi
US27	University of Notre Dame, Notre Dame, Indiana, USA	Randal Ruchti
US28	The Ohio State University, Columbus, Ohio, USA	Ta-Yung Ling
US29	Princeton University, Princeton, New Jersey, USA	Pierre Piroué
US30	Purdue University, West Lafayette, Indiana, USA	Virgil E. Barnes
US31	Rice University, Houston, Texas, USA	Jabus Roberts
US32	University of Rochester, Rochester, New York, USA	Arie Bodek
US33	Rutgers, the State University of New Jersey, Piscataway, New Jersey, USA	Steve Schnetzer
US34	University of Texas at Dallas, Richardson, Texas, USA	Ervin J. Fenyves
US35	Texas Tech University, Lubbock, Texas, USA	Richard Wigmans
US36	Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA	Luke Mo
US37	University of Wisconsin, Madison, Wisconsin, USA	Don Reeder
US38	Kansas State University, Manhattan, Kansas, USA	Reguina Demina
US39	The University of Kansas, Lawrence, Kansas, USA	Alice Bean
US40	University of California, Santa Barbara, California, USA	Joseph Incandela
US41	Florida Institute of Technology, Melbourne, Florida, USA	M.M. Baarmand
UZ1	Institute for Nuclear Physics of the Uzbekistan Academy of Sciences, Ulugbek, Uzbekistan	Bekhzad S. Yuldashev

Annex 2 : CMS Funding Agencies and their Representatives.

Austria	Federal Ministry for Education, Science and Culture	Vienna	H. Schacher, H. Borns
Belgium	Fonds voor Wetenschappelijk Onderzoek (FWO)	Brussels	J. Traest, J. Lemonne
	Fonds National de la Recherche Scientifique (FNRS)	Brussels	M.J. Simoen, J. Sacton
Bulgaria	Ministry of Education and Science	Sofia	V. Atanasov
CERN	European Organization for Nuclear Research	Geneva	D. Schlatter
China	Chinese Academy of Sciences (CAS)	Beijing	X. Zhu
	National Natural Science Foundation (NSFC)	Beijing	N. Wang
Croatia	Ministry of Science and Technology	Zagreb	D. Butkovic
Cyprus	University of Cyprus	Nicosia	A. Christophides
Estonia	Estonian Academy of Sciences	Tallinn	E. Lippmaa
Finland	Helsinki Institute of Physics (HIP)	Helsinki	D.O. Riska
France-CEA	Commissariat à l'Energie Atomique (CEA) Saclay	Gif-sur Yvette	M. Spiro, P. Brossier
France-IN2P3	Institut National de Physique Nucléaire et de Physique des Particules (IN2P3-CNRS)	Paris	G. Wormser
Germany	Bundesministerium für Bildung, und Forschung (BMBF)	Bonn	R. Koepke
Greece	General Secretariat for Research and Technology	Athens	E. Floratos, K. Lagouvardos
Hungary	National Committee for Technological Development	Budapest	G. Szabó
India	Department of Atomic Energy	Mumbai	A. Kakodkar
	Department of Science & Technology	New Delhi	V. S. Ramamurthy
Iran	Institute for Studies in Theoretical Physics & Mathematics (IPM)	Tehran	R. Mansouri
Italy	Istituto Nazionale di Fisica Nucleare (INFN)	Rome	A. Scribano
Korea	Ministry of Science and Technology	Seoul	Y.U. Lim, J.B. Kim
Pakistan	Pakistan Atomic Energy Commission	Islamabad	M. Ahmad
Poland	State Commission for Scientific Research	Warsaw	J.K. Fraçkowiak
Portugal	Instituto Cooperação Científica e Técnica Internacional (ICCTI)	Lisbon	A. Trigo de Abreu
RDMS-Russia	Ministry of Science and Technologies of Russian Federation	Moscow	M.P. Kirpichnikov
RDMS-DMS [1]	Joint Institute for Nuclear Research (JINR)	Dubna	A.N. Sissakian
Spain	Oficina de Ciencia y Tecnologia	Madrid	A. Ferrer
Switzerland	Rat der Eidgenössischen Technischen Hochschulen ETH Zürich Universities Basel and Zürich	Zürich Zürich	S. Bieri O. Kübler
	Paul Scherrer Institut (PSI)	Villigen	M.K. Eberle
Taipei	National Science Council, 10636 Taipei	Taipei	C.J. Chen
Turkey	Scientific and Technical Research Council (TÜBITAK)	Ankara	N.K. Pak
United Kingdom	Particle Physics and Astronomy Research Council (PPARC)	Swindon	J. Seed, R. Wade
USA-DOE	US Department of Energy (DOE)	Washington	J.R. O'Fallon
USA-NSF	National Science Foundation (NSF)	Washington	M. Goldberg

[1] Dubna Member States (DMS): Armenia, Belarus, Georgia, Slovak Republik, Ukraine, Uzbekistan

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:

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;

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;

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;

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

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[1]

- ***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.

[1] 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

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;

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

Space

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

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

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;

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

Supplies and installations at the experiment

h) assistance with the installation and removal of the 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;

i) mechanical infrastructure, local infrastructure for the supply of mains electricity, raw cooling water, compressed air and standard connections to the CERN communication network;

Computing

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

Transport of persons

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

Safety services

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

Administrative services

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 CMS detector.

The CMS detector is structured into the following sub-detector units which are used throughout this document

Reference	Sub-detector	Sub-system
1.	**Magnet**	
1.1		***Barrel Yoke and Vacuum Tank***
1.2		***Endcap Yokes***
1.3		***Coil***
1.4		***Magnet Installation***
2.	**Tracker**	
2.1		***Pixel Detectors***
2.2		***Silicon Detectors***
2.3		***Electronics for Si Detectors***
2.4		***Power Supplies for Si Detectors***
2.5		***Mech. Struct. & Cooling for Si Detectors***
2.6		***Monitoring for Si Detectors***
2.7		***Data Acquisition for Si Detectors***
2.8		***Installation of Si Detectors***
3.	**ECAL**	
3.1		***Barrel***
3.2		***Endcaps***
4.	**HCAL**	
4.1		***Barrel***
4.2		***Outer Barrel***
4.3		***Endcap***
4.4		***Outer Endcap***
4.5		***Forward***
5.	**Muon Detector**	
5.1		***Barrel Drifttubes***
5.2		***Forward ME 1/1***
5.3		***Endcap CSC***
5.4		***Barrel RPC***
5.5		***Forward RPC***
5.6		***Alignment***
6.	**Trigger/DAQ**	
6.1		***Trigger***
6.2		***Data Acquisition***
6.3		***Detector Controls***
7.	**Offline Computing**	
7.1		***Offline Infrastructure***
8.	**Infrastructure**	
8.1		***Access and Survey***
8.2		***General Installation***
8.3		***Cooling and Ventilation***
8.4		***Safety***
8.5		***Fixed Cranes***
8.6		***Shielding Systems***

Annex 5 : Management Structure of the CMS Collaboration.

THE CMS CONSTITUTION

Ref 1: CMS/D-CB/1996-1

Ref 2: RRB CMS D99-59

13 September 1996

Amended on 11 December 1998

Annex 6 : Overview of Technical Participation of Institutes in Detector Construction.

		TRACKER								ECAL		HCAL				MUONS						TR/DQ			
Code	Institute	2.1 Pixel Detectors	2.2 Silicon Detectors	2.3 Electronics for Si	2.4 Power Supplies for Si	2.5 Mech. Structures & Cooling	2.6 Monitoring for Si	2.7 Data Acquisition for Si	2.8 Installation of Si Detectors	3.1 Barrel	3.2 Endcaps	4.1 Barrel	4.2 Outer Barrel	4.3 Endcap	4.4 Outer Endcap	4.5 Forward	5.1 Barrel Drifttubes	5.2 Forward ME 1/1	5.3 Endcap CSC	5.4 Barrel RPC	5.5 Forward RPC	5.6 Alignment	6.1 Trigger	6.2 Data Acquisition	6.3 Detector Controls	Common Projects Only
AR1	Yerevan Physics Institute, Yerevan, Armenia										•			•												
AT1	Institut für Hochenergiephysik der ÖAW, Wien, Austria	•	•	•				•									•					•	•	•		
BY1	Byelorussian State University, Minsk, Belarus										•			•												
BY2	Research Institute for Nuclear Problems, Minsk, Belarus									•	•															
BY3	National Centre for Particle and High Energy Physics, Minsk, Belarus										•			•				•								
BY4	Research Institute of Applied Physical Problems, Minsk, Belarus										•															
BE1	Université Catholique de Louvain, Louvain-la-Neuve, Belgium		•					•																		
BE2	Université de Mons-Hainaut, Mons, Belgium		•					•																		
BE3	Université Libre de Bruxelles, Brussels, Belgium		•					•																		
BE4	Universiteit Antwerpen (UIA), Antwerpen, Belgium		•					•																		
BE5	Vrije Universiteit Brussel, Brussels, Belgium		•					•																		
BG1	Institute for Nuclear Research and Nuclear Energy, BAS, Sofia, Bulgaria													•				•		•						
BG2	University of Sofia, Sofia, Bulgaria													•				•		•						
CERN	CERN, European Organization for Nuclear Physics, Geneva, Switzerland		•	•	•	•	•	•	•	•	•						•					•	•	•	•	
CN1	Institute of High Energy Physics, Beijing, China									•	•						•		•							
CN2	University for Science and Technology of China, Hefei, Anhui, China									•	•															
CN3	Peking University, Beijing, China																			•	•					
CR1	Technical University of Split, Split, Croatia									•																
CR2	University of Split, Split, Croatia									•																
CY1	University of Cyprus, Nicosia, Cyprus									•																
EE1	Institute of Chemical Physics and Biophysics, Tallinn, Estonia																									•
FI1	Department of Physics, University of Helsinki, Helsinki, Finland		•			•																	•			
FI2	Helsinki Institute of Physics, Helsinki, Finland		•			•																	•			
FI4	Digital and Computer Systems Lab., Tampere Univ. of Technology, Tampere, Finland																						•			
FI5	Dept. of Physics & Microelectronics Instrumentation Lab., Univ. of Oulu, Oulu, Finland		•																							
FR1	LLR, Ecole Polytechnique, IN2P3-CNRS, Palaiseau, France									•																
FR2	Lab. d'Annecy-le-Vieux de Phys. des Particules, IN2P3-CNRS, Annecy-le-Vieux, France									•																
FR3	DSM/DAPNIA, CEA/Saclay, Gif-sur-Yvette, France									•	•												•			
FR4	IReS Strasbourg, IN2P3-CNRS-ULP, LEPSI Strasbourg, UHA Mulhouse, France		•	•																						
FR5	Institut de Physique Nucléaire de Lyon, IN2P3-CNRS, Univ. Lyon I, Villeurbanne, France		•	•				•		•																
GE1	High Energy Physics Institute, Tbilisi State University, Tbilisi, Georgia										•			•												
GE2	Institute of Physics Academy of Science, Tbilisi, Georgia													•												
DE2	Institut für Experimentelle Kernphysik, Karlsruhe, Germany		•	•		•		•	•																	
DE3	RWTH, I. Physikalisches Institut, Aachen, Germany		•	•		•	•	•	•																	
DE4	RWTH, III. Physikalisches Institut A, Aachen , Germany																•									
DE5	RWTH, III. Physikalisches Institut B, Aachen, Germany		•	•				•																		
GR1	Institute of Nuclear Physics "Demokritos", Attiki, Greece										•												•	•		
GR2	University of Athens, Athens, Greece																						•	•		
GR3	University of Ioánnina, Ioánnina, Greece										•												•	•		
HU1	KFKI Research Institute for Particle and Nuclear Physics, Budapest, Hungary														•									•		
HU2	Kossuth Lajos University, Debrecen, Hungary																					•				
HU3	Institute of Nuclear Research ATOMKI, Debrecen, Hungary														•											
IN1	Bhabha Atomic Research Centre, Mumbai, India										•															
IN2	Panjab University, Chandigarh, India												•													
IN3	Tata Institute of Fundamental Research - EHEP, Mumbai, India												•													
IN4	Tata Institute of Fundamental Research - HECR, Mumbai, India												•													
IN5	University of Delhi South Campus, New Delhi, India										•															
IR1	Institute for Studies in Theoretical Physics and Mathematics, Tehran, Iran														•											
IT01	Università di Bari, Politecnico di Bari e Sezione dell' INFN, Bari, Italy		•	•	•		•	•	•											•			•			
IT02	Università di Bologna e Sezione dell' INFN, Bologna, Italy																•									
IT03	Università di Catania e Sezione dell' INFN, Catania, Italy		•	•	•		•	•	•																	
IT04	Università di Firenze e Sezione dell' INFN, Firenze, Italy		•	•	•			•	•																	
IT05	Università di Genova e Sezione dell' INFN, Genova, Italy																									•
IT06	Università di Padova e Sezione dell' INFN, Padova, Italy		•	•	•			•	•								•							•		
IT07	Università di Pavia e Sezione dell' INFN, Pavia, Italy																			•						
IT08	Università di Perugia e Sezione dell' INFN, Perugia, Italy		•	•	•			•	•																	
IT09	Università di Pisa e Sezione dell' INFN, Pisa, Italy		•	•	•	•	•	•	•																	
IT10	Università di Roma I e Sezione dell' INFN, Roma, Italy									•																
IT11	Università di Torino e Sezione dell'INFN, Torino, Italy		•	•	•			•	•								•							•		
KR01	Chonnam National University, Kwangju, Korea																				•	•	•			
KR02	Dongshin University, Naju, Korea																				•		•			
KR03	Seonam University, Namwon, Korea																				•		•			
KR04	Wonkwang University, Iksan, Korea																				•		•			
KR05	Konkuk University, Seoul, Korea																				•		•			
KR06	Korea University, Seoul, Korea																				•		•			
KR07	Cheju University, Cheju, Korea																				•		•			
KR08	Chungbuk University, Chongju, Korea																				•		•			
KR09	Kangwon National University, Chunchon, Korea																				•		•			
KR10	Seoul National University of Education, Seoul, Korea																				•		•			
KR11	Kyungpook National University, Taegu, Korea																				•		•			
KR12	Seoul National University, Seoul, Korea																				•		•			
KR13	Sungkyunkwan University, Suwon, Korea																				•		•			
PK1	National Centre of Physics, Islamabad, Pakistan																				•					
PK2	Ghulam Ishaq Khan Institute of Engineering Sciences and Techn., Swabi, Pakistan																				•					
PL1	Institute of Experimental Physics, Warsaw, Poland																						•			
PL2	Soltan Institute for Nuclear Studies, Warsaw, Poland																						•			
PT1	Laboratório de Instrumentação e Física Experimental de Partículas, Lisboa, Portugal									•	•												•			
RU1	Institute for High Energy Physics, Protvino, Russia										•			•												
RU2	Institute for Nuclear Research, RAS, Moscow, Russia										•			•												
RU3	Institute for Theoretical and Experimental Physics, Moscow, Russia														•											
RU4	Moscow State University, Institute for Nuclear Physics, Moscow, Russia										•				•											
RU5	P.N. Lebedev Physical Institute, RAS, Moscow, Russia										•															

		TRACKER								ECAL		HCAL					MUONS						TR/DQ				
Code	Institute	2.1 Pixel Detectors	2.2 Silicon Detectors	2.3 Electronics for Si	2.4 Power Supplies for Si	2.5 Mech. Structures & Cooling	2.6 Monitoring for Si	2.7 Data Acquisition for Si	2.8 Installation of Si Detectors	3.1 Barrel	3.2 Endcaps	4.1 Barrel	4.2 Outer Barrel	4.3 Endcap	4.4 Outer Endcap	4.5 Forward	5.1 Barrel Drifttubes	5.2 Forward ME 1/1	5.3 Endcap CSC	5.4 Barrel RPC	5.5 Forward RPC	5.6 Alignment	6.1 Trigger	6.2 Data Acquisition	6.3 Detector Controls	Common Projects Only
RU6	Petersburg Nuclear Physics Institute, RAS, St Petersburg, Russia										•								•							
JINR	Joint Institute for Nuclear Research, Dubna, Russia										•			•				•								
SK1	Slovak University of Technology, Bratislava, Slovak Republic																	•								
SP1	Centro de Investigaciones Energéticas Medioambientales y Tecnólogicas, Madrid, Spain															•	•					•				
SP2	Universidad Autónoma de Madrid, Madrid, Spain																•					•				
SP3	Universidad de Oviedo, Oviedo, Spain																					•				
SP4	Instituto de Física de Cantabria (IFCA), CSIC-Univ. de Cantabria, Santander, Spain																					•				
SW1	Institut für Teilchenphysik, Eidgenössische Technische Hochschule (ETH), Zürich, Switzerland	•	•							•	•													•		
SW2	Paul Scherrer Institut, Villigen, Switzerland	•								•														•		
SW3	Universität Basel, Basel, Switzerland	•																								
SW4	Universität Zürich, Zürich, Switzerland	•																								
TA1	National Central University, Chung-Li, 32054 Taipei										•															
TA2	National Taiwan University, Taipei, 10764 Taipei										•															
TR1	Cukurova University, Adana, Turkey															•										
TR2	Middle East Technical University, Ankara, Turkey															•										
TR3	Bogazici University, Department of Physics, Istanbul (Bebek), Turkey															•										
UR1	Institute of Single Crystals of National Academy of Science, Kharkov, Ukraine													•												
UR2	National Scientific Center, Kharkov Inst. of Physics and Technology, Kharkov, Ukraine													•												
UR3	Kharkov State University, Kharkov, Ukraine													•												
UK1	Brunel University, Uxbridge, United Kingdom			•							•															
UK2	Imperial College, University of London, London, United Kingdom			•							•															
UK3	Rutherford Appleton Laboratory, Didcot, United Kingdom			•							•													•		
UK4	University of Bristol, Bristol, United Kingdom										•												•			
US02	Boston University, Boston, Massachusetts, USA											•	•	•	•	•										
US03	University of California at Davis, Davis, California, USA	•																	•				•			
US04	University of California at Los Angeles, Los Angeles, California, USA																		•				•	•		
US05	University of California, Riverside, California, USA																		•							
US06	University of California San Diego, La Jolla, California, USA																							•		
US07	California Institute of Technology, Pasadena, California, USA									•																
US08	Carnegie Mellon University, Pittsburgh, Pennsylvania, USA																		•				•			
US09	Fairfield University, Fairfield, Connecticut, USA															•										
US10	Fermi National Accelerator Laboratory, Batavia, Illinois, USA	•		•	•	•						•	•	•	•	•			•			•		•		
US11	University of Florida, Gainesville, Florida, USA																		•				•			
US12	Florida State University-HEPG, Tallahassee, Florida, USA											•	•	•	•	•										
US14	University of Illinois at Chicago, (UIC) Chicago, Illinois, USA											•	•	•	•											
US15	The University of Iowa, Iowa City, Iowa, USA											•	•	•	•	•										
US16	Iowa State University, Ames, Iowa, USA															•								•		
US17	Johns Hopkins University, Baltimore, Maryland, USA	•																								
US20	University of Maryland, College Park, Maryland, USA											•	•	•	•											
US21	Massachusetts Institute of Technology, Cambridge, Massachusetts, USA																						•	•		
US22	University of Minnesota, Minneapolis, Minnesota, USA									•		•	•	•	•											
US23	University of Mississippi, Oxford, Mississippi, USA	•										•	•	•	•											
US24	University of Nebraska-Lincoln, Lincoln, Nebraska, USA															•										
US25	Northeastern University, Boston, Massachusetts, USA									•												•				
US26	Northwestern University, Evanston, Illinois, USA	•																								
US27	University of Notre Dame, Notre Dame, Indiana, USA											•	•	•	•											
US28	The Ohio State University, Columbus, Ohio, USA																	•	•				•			
US29	Princeton University, Princeton, New Jersey, USA									•																
US30	Purdue University, West Lafayette, Indiana, USA	•										•	•	•	•	•		•	•							
US31	Rice University, Houston, Texas, USA																		•				•			
US32	University of Rochester, Rochester, New York, USA											•	•	•	•											
US33	Rutgers, the State University of New Jersey, Piscataway, New Jersey, USA	•																								
US34	University of Texas at Dallas, Richardson, Texas, USA																	•								
US35	Texas Tech University, Lubbock, Texas, USA	•														•										
US36	Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA											•	•	•	•											
US37	University of Wisconsin, Madison, Wisconsin, USA																		•				•			
US38	Kansas State University, Manhattan, Kansas, USA		•																							
US39	The University of Kansas, Lawrence, Kansas, USA		•																							
US40	University of California, Santa Barbara, California, USA		•																							
US41	Florida Institute of Technology, Melbourne, Florida, USA															•										
UZ1	Institute for Nuclear Physics of the Uzbekistan Academy of Sciences, Ulugbek, Uzbekistan													•												

Annex 7 : Common Items - Costs that the Collaboration has agreed are to bear at its common expense.

Ref	Sub-detector	Sub-system	Item
1.	**Magnet**		
1.1		***Barrel Yoke and Vacuum Tank***	
1.1.01			*Barrel Rings and Vacuum Tank*
1.1.02			*High Tension Bolts*
1.1.03			*Hydraulic Tensioners*
1.1.04			*Support Feet - Outer - Material*
1.1.05			*Support Feet - Outer - Transport to Karachi*
1.1.06			*Support Feet - Outer - Manufacture*
1.1.07			*Support Feet - Outer - Transport to CERN*
1.1.08			*Manufacture Follow-up*
1.1.09			*Moving Beams*
1.1.10			*Jacks and Air Pad System*
1.1.11			*Grease Pad Systems*
1.1.12			*Hydraulic Rotator*
1.1.13			*Drilling Machine*
1.1.14			*Rails*
1.1.15			*Assembly on Surface*
1.1.16			*Rigs and Scaffolds*
1.1.17			*Ancillaries and Coupling Devices*
1.1.18			*Design and Follow-up*
1.2		***Endcap Yokes***	
1.2.01			*Endcap Disks*
1.2.02			*Superbolts*
1.2.03			*HE Supports*
1.2.04			*Design and Follow-up*
1.2.05			*Carts Weldments*
1.2.06			*Transport of Carts to CERN*
1.2.07			*Ancillaries and Coupling Devices*
1.2.08			*Support System*
1.3		***Coil***	
1.3.01			*Conductor - Insert*
1.3.02			*Conductor - Reinforcement*
1.3.03			*Conductor - Quality Assurance*
1.3.04			*Module Assembly, Swiveling Tooling*
1.3.05			*Process Qualification and QA Winding*
1.3.06			*Thermal Shields*
1.3.07			*Cold Supports*
1.3.08			*He Circuits*
1.3.09			*Cold Mass Instrumentation*
1.3.10			*Vacuum System*
1.3.11			*Power Supply and Bus Bar*
1.3.12			*Dump Resistor*
1.3.13			*Magnet Safety System*
1.3.14			*Magnet Control System*
1.3.15			*He Refrigeration External Plant*
1.3.16			*Components Testing*
1.3.17			*Coil Assembly*
1.3.18			*Coil Surface Tests*
1.3.19			*Studies and Supervision*
1.3.20			*Consumables*
1.3.21			*Coil Transfer into Underground Cavern*
1.3.22			*Implantation and Integration*
1.4		***Magnet Installation***	
1.4.01			*2'200 t Crane Rental*
1.4.02			*Rigging Equipment*
1.4.03			*SX Infrastructure*
1.4.04			*Winch System*
1.4.05			*Field Mapping*

7.	**Offline Computing**		
7.1		***Offline Infrastructure***	
7.1.1			*File Servers*
7.1.2			*Information Servers*
7.1.3			*Computing Power*
7.1.4			*Spares*
7.1.5			*System Assembly*
7.1.6			*Software Licenses*
7.1.7			*System Management*
8.	**Infrastructure**		
8.1		***Access and Survey***	
8.1.1			*Gangways, Stairs*
8.1.2			*Structures on Yoke*
8.1.3			*Personnel Access Equipment*
8.1.4			*General Survey*
8.2		***General Installation***	
8.2.1			*Counting Room Structures*
8.2.2			*Racks with Cooling*
8.2.3			*Electrical Distribution from Outlets*
8.2.4			*Gas Systems and Primary Distribution Racks*
8.2.5			*Beam Pipe*
8.2.6			*Cable Trays to Counting Rooms*
8.2.7			*Control Room and Cabling to Surface*
8.2.8			*General Piping*
8.3		***Cooling and Ventilation***	
8.3.1			*Detector Cooling Plant*
8.3.2			*Detector Specific Ventilation*
8.3.3			*Detector Primary Cooling System*
8.4		***Safety***	
8.4.1			*Safety Installations*
8.4.2			*Safety Equipment Control*
8.4.3			*Hard-wired Safety System*
8.4.4			*Inertion System*
8.5		***Fixed Cranes***	
8.5.1			*80 ton /100 m*
8.5.2			*80 ton /100 m Double Beam System*
8.5.3			*20 ton Crane*
8.5.4			*3 ton Lift*
8.6		***Shielding Systems***	
8.6.1			*Rotating Shielding*
8.6.2			*Vertical 400 ton Lifting System*
8.6.3			*Mechanics and Shielding for Forward HCAL*

Annex 8 : Deliverables (by Sub-detector/System) that are to be maintained and operated by individual Institutes or groups of Institutes.

8.1 The Magnet Sub-system is part of the common costs and listed in Annex 7

8.2 Tracker

8.2A Deliverables to be provided by the Institutes for the individual Sub-detectors (including Assigned Funds)

Best Estimate of Assigned Funds as per Signed MoU and its Amendments

Ref	Deliverables	Assigned Funds	Institutes
2.1.01	Detectors (incl. Pre-series)	965	SW1 SW2 SW3 SW4 US17
2.1.02	Electronics (include. Engineering)	5,020	AT1 SW1 SW2 SW3 SW4 US03 US10 US17 US23 US26 US33 US35
2.1.03	Module Mechanics	1,010	SW1 SW2 SW3 SW4 US10 US26 US35
2.1.04	Support Structures & Assembly	480	SW1 SW2 SW3 SW4 US03 US10 US26 US30
2.1.05	Monitoring	110	SW2 US03 US23
2.1.06	Service Systems	655	SW1 SW2 SW3 SW4 US23
2.1	**Pixel Detectors**	**8,240**	**AT1 SW1 SW2 SW3 SW4 US03 US10 US17 US23 US26 US30 US33 US35**
2.2.01	Procurement of Sensors	21,270	AT1 BE1 BE2 BE3 BE4 BE5 CERN DE2 DE3 DE5 FI1 FI2 FI5 FR4 FR5 IT08 IT09 SW1 US38 US39 US40
2.2.02	Capton	385	CERN US38 US39 US40
2.2.03	Frames	1,990	BE1 BE2 BE3 BE4 BE5 US38 US39 US40
2.2.04	Pitch Adapters	480	BE1 BE2 BE3 BE4 BE5 US38 US39 US40
2.2.05	FE Hybrid	1,845	FR4 US38 US39 US40
2.2.06	Hybrid Support Plate	475	FR4 US38 US39 US40
2.2.07	Tooling and Box	180	BE1 BE2 BE3 BE4 BE5 FR5 IT01 IT03 IT08 US38 US39 US40
2.2.08	Interconnect Board	540	CERN DE3 IT01 US38 US39 US40
2.2.09	Module Preseries	1,200	AT1 BE1 BE2 BE3 BE4 BE5 CERN DE2 DE5 FR4 IT01 IT03 IT04 IT06 IT08 IT09 IT11 US38 US39 US40
2.2	**Silicon Detectors**	**28,365**	**AT1 BE1 BE2 BE3 BE4 BE5 CERN DE2 DE3 DE5 FI1 FI2 FI5 FR4 FR5 IT01 IT03 IT04 IT06 IT08 IT09 IT11 SW1 US38 US39 US40**
2.3.01	Module Electronics	3,430	AT1 CERN IT06 UK1 UK2 UK3
2.3.02	Analogue Link	8,250	CERN DE2 DE3 DE5 FR4 FR5 IT01 IT03 IT04 IT06 IT08 IT09 IT11 US10
2.3.03	Digital Link	365	CERN US10
2.3.04	Analogue Optohybrid	1,025	DE3 DE5 IT08
2.3.05	Digital Optohybrid	170	CERN
2.3.06	FED	2,000	CERN DE2 DE5 FR4 FR5 UK2 UK3
2.3.07	CCU Module	255	CERN
2.3.08	FEC	400	AT1 CERN DE2 DE5
2.3	**Electronics for Si Detectors**	**15,895**	**AT1 CERN DE2 DE3 DE5 FR4 FR5 IT01 IT03 IT04 IT06 IT08 IT09 IT11 UK1 UK2 UK3 US10**
2.4.01	Power Supplies	1,890	CERN IT04 IT11
2.4.02	Cables (installed)	4,230	CERN IT01 IT03 IT04 IT06 IT08 IT09 IT11 US10
2.4.03	Slow Control	660	CERN IT09
2.4	**Power Supplies for Si Detectors**	**6,780**	**CERN IT01 IT03 IT04 IT06 IT08 IT09 IT11 US10**
2.5.01	Inner Barrel	1,100	IT09
2.5.02	Inner Endcap	440	IT09
2.5.03	Outer Barrel	650	FI1 FI2
2.5.04	Outer Barrel Rods	1,250	FI1 FI2
2.5.05	Endcaps	440	DE2 DE3
2.5.06	Endcaps Petals	440	DE3
2.5.07	General Cooling	1,100	CERN US10
2.5.08	Integration (st, ts,...)	2,640	CERN
2.5	**Mech. Struct. & Cooling for Si Detectors**	**8,060**	**CERN DE2 DE3 FI1 FI2 IT09 US10**
2.6.01	Position Monitoring Systems	650	CERN DE3 IT01 IT03
2.6.02	Temperature Control	550	CERN IT09
2.6	**Monitoring for Si Detectors**	**1,200**	**CERN DE3 IT01 IT03 IT09**
2.7.01	Test Stands	1,200	AT1 BE1 BE2 BE3 BE4 BE5 CERN DE2 DE3 DE5 FR5 IT01 IT03 IT04 IT06 IT08 IT09 IT11
2.7	**Data Acquisition for Si Detectors**	**1,200**	**AT1 BE1 BE2 BE3 BE4 BE5 CERN DE2 DE3 DE5 FR5 IT01 IT03 IT04 IT06 IT08 IT09 IT11**
2.8.01	Installation Manpower	1,000	CERN DE2 DE3 IT01 IT03 IT04 IT06 IT08 IT09 IT11
2.8	**Installation of Si Detectors**	**1,000**	**CERN DE2 DE3 IT01 IT03 IT04 IT06 IT08 IT09 IT11**
2.	**Tracker**	**70,740**	**AT1 BE1 BE2 BE3 BE4 BE5 CERN DE2 DE3 DE5 FI1 FI2 FI5 FR4 FR5 IT01 IT03 IT04 IT06 IT08 IT09 IT11 SW1 SW2 SW3 SW4 UK1 UK2 UK3 US03 US10 US17 US23 US26 US30 US33 US35 US38 US39 US40**

See Annex 1 for the abbreviations of the names of Institutes

8.2B Deliverables & Assigned Funding for the individual Sub-detectors by Funding Agency

(including Assigned Funds as per previous table)

Cost Estimate Reference	Deliverables	Austria	Belgium	CERN	Finland	France-IN2P3	Germany	Italy	Switzerland - ETHZ	Switzerland - PSI	Switzerland - Universities	United Kingdom	USA - DOE	USA - NSF	Assigned Funds
2.1.01	Detectors (incl. Pre-series)									42.49%	24.87%			32.64%	965
2.1.02	Electronics (include. Engineering)	3.39%								44.82%	24.50%		13.84%	13.45%	5,020
2.1.03	Module Mechanics									45.54%	25.74%		28.71%		1,010
2.1.04	Support Structures & Assembly									29.17%	22.92%		47.92%		480
2.1.05	Monitoring									54.55%			45.45%		110
2.1.06	Service Systems									42.75%	24.43%		32.82%		655
2.1	**Pixel Detectors**	**2.06%**								**43.69%**	**24.27%**		**17.96%**	**12.01%**	**8,240**
2.2.01	Procurement of Sensors	2.40%	2.37%	22.00%	2.35%	15.51%	15.28%	28.80%	8.93%		2.35%				21,270
2.2.02	Capton			100.00%											385
2.2.03	Frames		100.00%												1,990
2.2.04	Pitch Adapters		100.00%												480
2.2.05	FE Hybrid					100.00%									1,845
2.2.06	Hybrid Support Plate					100.00%									475
2.2.07	Tooling and Box		25.00%			25.00%		50.00%							180
2.2.08	Interconnect Board			37.04%			37.04%	25.93%							540
2.2.09	Module Preseries	4.17%	25.00%	6.25%		6.25%	25.00%	33.33%							1,200
2.2	**Silicon Detectors**	**1.97%**	**11.70%**	**18.83%**	**1.76%**	**20.24%**	**13.22%**	**23.81%**	**6.70%**		**1.76%**				**28,365**
2.3.01	Module Electronics	10.79%		5.25%				27.11%				56.85%			3,430
2.3.02	Analogue Link			27.64%		4.97%	12.24%	55.15%							8,250
2.3.03	Digital Link			100.00%											365
2.3.04	Analogue Optohybrid						40.00%	60.00%							1,025
2.3.05	Digital Optohybrid			100.00%											170
2.3.06	FED			5.00%		20.00%	37.50%					37.50%			2,000
2.3.07	CCU Module			100.00%											255
2.3.08	FEC	50.00%		50.00%											400
2.3	**Electronics for Si Detectors**	**3.59%**		**22.33%**		**5.10%**	**13.65%**	**38.35%**				**16.99%**			**15,895**
2.4.01	Power Supplies			12.17%				87.83%							1,890
2.4.02	Cables (installed)			55.08%				44.92%							4,230
2.4.03	Slow Control			69.70%				30.30%							660
2.4	**Power Supplies for Si Detectors**			**44.54%**				**55.46%**							**6,780**
2.5.01	Inner Barrel							100.00%							1,100
2.5.02	Inner Endcap							100.00%							440
2.5.03	Outer Barrel				100.00%										650
2.5.04	Outer Barrel Rods				100.00%										1,250
2.5.05	Endcaps						100.00%								440
2.5.06	Endcaps Petals						100.00%								440
2.5.07	General Cooling			100.00%											1,100
2.5.08	Integration (st, ts,...)			100.00%											2,640
2.5	**Mech. Struct. & Cooling for Si Detectors**			**46.40%**	**23.57%**		**10.92%**	**19.11%**							**8,060**
2.6.01	Position Monitoring Systems			30.77%			38.46%	30.77%							650
2.6.02	Temperature Control			63.64%				36.36%							550
2.6	**Monitoring for Si Detectors**			**45.83%**			**20.83%**	**33.33%**							**1,200**
2.7.01	Test Stands	4.17%	8.33%	8.33%		16.67%	16.67%	45.83%							1,200
2.7	**Data Acquisition for Si Detectors**	**4.17%**	**8.33%**	**8.33%**		**16.67%**	**16.67%**	**45.83%**							**1,200**
2.8.01	Installation Manpower			60.00%				40.00%							1,000
2.8	**Installation of Si Detectors**			**60.00%**				**40.00%**							**1,000**
2.	**Tracker**	**1.91%**	**4.83%**	**23.89%**	**3.39%**	**9.54%**	**10.25%**	**27.57%**	**2.69%**	**5.09%**	**3.53%**	**3.82%**	**2.09%**	**1.40%**	**70,740**

8.3 Electromagnetic Calorimeter

8.3A Deliverables to be provided by the Institutes for the individual Sub-detectors (including Assigned Funds)

Best Estimate of Assigned Funds as per Signed MoU and its Amendments

Ref	Deliverables	Assigned Funds	Institutes
3.1.1	Crystals	22,350	BY2 CERN CN1 CN2 CY1 FR2 IT10 SW1
3.1.2	Electronics	23,910	CERN CR1 CR2 CY1 FR1 FR2 FR3 FR5 IT10 PT1 SW1 SW2 US22 US25 US29
3.1.3	Mechanics	8,340	CERN FR1 FR5 IT10 SW1
3.1.4	Assembly and Installation	5,850	CERN FR3 SW1
3.1.5	Monitoring	1,810	FR3 US07
3.1	**Barrel**	**62,260**	**BY2 CERN CN1 CN2 CR1 CR2 CY1 FR1 FR2 FR3 FR5 IT10 PT1 SW1 SW2 US07 US22 US25 US29**
3.2.1	Crystals	7,650	BY1 BY3 CERN CN1 CN2 RU1 RU2 RU4 SW1 UK1 UK2 UK3 UK4
3.2.2	Electronics	6,705	PT1 RU1 RU2 RU5 RU6 SW1 UK1 UK2 UK3 UK4
3.2.3	Mechanics	1,950	RU1 RU2 UK1 UK2 UK3 UK4
3.2.4	Assembly and Installation	750	RU1 RU2 UK1 UK2 UK3 UK4
3.2.5	Monitoring	500	FR3 RU1
3.2.6	Preshower	7,810	AR1 BY1 BY2 BY3 BY4 CERN GE1 GR1 GR3 IN1 IN5 JINR TA1 TA2
3.2	**Endcaps**	**25,365**	**AR1 BY1 BY2 BY3 BY4 CERN CN1 CN2 FR3 GE1 GR1 GR3 IN1 IN5 JINR PT1 RU1 RU2 RU4 RU5 RU6 SW1 TA1 TA2 UK1 UK2 UK3 UK4**
3.	**ECAL**	**87,625**	**AR1 BY1 BY2 BY3 BY4 CERN CN1 CN2 CR1 CR2 CY1 FR1 FR2 FR3 FR5 GE1 GR1 GR3 IN1 IN5 IT10 JINR PT1 RU1 RU2 RU4 RU5 RU6 SW1 SW2 TA1 TA2 UK1 UK2 UK3 UK4 US07 US22 US25 US29**

See Annex 1 for the abbreviations of the names of Institutes

8.3B Deliverables & Assigned Funding for the individual Sub-detectors by Funding Agency

(including Assigned Funds as per previous table)

Cost Estimate Reference	Deliverables	CERN	China	Croatia	Cyprus	France - CEA	France - IN2P3	Greece	India	Italy	Portugal	RDMS - Russia	RDMS - Dubna Member States	Switzerland - ETHZ	Switzerland - PSI	Taipei	United Kingdom	USA - DOE	USA - NSF	Assigned Funds
3.1.1	Crystals	24.16%			0.22%		1.12%			2.91%				71.59%						22,350
3.1.2	Electronics	6.27%		0.84%	1.46%	2.93%	16.77%			5.23%	2.97%			33.46%	7.19%			14.45%	8.43%	23,910
3.1.3	Mechanics	13.19%					29.86%			20.38%				36.57%						8,340
3.1.4	Assembly & Installation	25.64%				8.55%								65.81%						5,850
3.1.5	Monitoring					71.82%												28.18%		1,810
3.1	Barrel	15.26%		0.32%	0.64%	4.02%	10.84%			5.78%	1.14%			49.63%	2.76%			6.37%	3.24%	62,260
3.2.1	Crystals	13.07%												81.70%			5.23%			7,650
3.2.2	Electronics										6.04%			79.79%			14.17%			6,705
3.2.3	Mechanics											58.97%					41.03%			1,950
3.2.4	Assembly & Installation											26.67%					73.33%			750
3.2.5	Monitoring					100.00%														500
3.2.6	Preshower	34.57%						17.41%	12.80%			9.60%	5.12%			20.49%				7,810
3.2	Endcaps	14.59%				1.97%		5.36%	3.94%		1.60%	8.28%	1.58%	45.73%		6.31%	10.64%			25,365
3.	ECAL	15.06%		0.23%	0.46%	3.42%	7.70%	1.55%	1.14%	4.11%	1.27%	2.40%	0.46%	48.50%	1.96%	1.83%	3.08%	4.52%	2.30%	87,625

8.4 Hadron Calorimeter

8.4A Deliverables to be provided by the Institutes for the individual Sub-detectors (including Assigned Funds)

Best Estimate of Assigned Funds as per Signed MoU and its Amendments

Ref	Deliverables	Assigned Funds	Institutes
4.1.01	Mechanics	12,208	US10 US20 US23 US32
4.1.02	Optics	2,116	US10 US12 US14 US23 US27 US30 US32
4.1.03	Read-out Boxes	356	US10 US12 US14 US22 US23 US27
4.1.04	Photodetectors	2,293	US10 US22 US27 US30 US36
4.1.05	Front-end Electronics	1,506	US02 US10 US14 US22 US30
4.1.06	Calibration Systems	268	US10 US12 US15 US30 US32
4.1.07	Trigger/DAQ Electronics	1,226	US02 US10 US14 US20
4.1.08	Voltage Supply Systems	307	US10 US20
4.1.09	Detector Control Systems	228	US02 US10 US20 US27 US30
4.1.10	Pre-production Prototypes	1,666	US10 US12 US14 US15 US20 US22 US23 US27 US30 US32
4.1	**Barrel**	**22,174**	**US02 US10 US12 US14 US15 US20 US22 US23 US27 US30 US32 US36**
4.2.01	Mechanics	98	IN2 IN3 IN4 US10
4.2.02	Optics	2,289	IN2 IN3 IN4 US10 US14 US23 US27 US32
4.2.03	Read-out Boxes	224	US10 US14 US22 US23 US27
4.2.04	Photodetectors	53	US10 US22 US27 US36
4.2.05	Front-end Electronics	475	US02 US10 US22
4.2.06	Calibration Systems	40	US10 US12 US15 US30
4.2.07	Trigger/DAQ Electronics	409	US02 US10 US20
4.2.08	Voltage Supply Systems	95	US10 US20
4.2.09	Detector Control Systems	111	US02 US10 US20 US27
4.2.10	Pre-production Prototypes	171	IN2 IN3 IN4 US10 US12 US14 US15 US22 US23 US27 US32
4.2	**Outer Barrel**	**3,965**	**IN2 IN3 IN4 US02 US10 US12 US14 US15 US20 US22 US23 US27 US30 US32 US36**
4.3.01	Mechanics	9,261	BG1 BG2 BY1 BY3 JINR UZ1
4.3.02	Optics	1,114	AR1 GE1 GE2 JINR RU1 RU2 UR1 UR2 UR3 US14 US23 US27 US30 US32
4.3.03	Read-out Boxes	290	US10 US14 US22 US23 US27
4.3.04	Photodetectors	54	US10 US22 US27 US30 US36
4.3.05	Front-end Electronics	386	US02 US10 US22 US30
4.3.06	Calibration Systems	204	RU1 US10 US12 US15 US30
4.3.07	Trigger/DAQ Electronics	497	US02 US10 US20
4.3.08	Voltage Supply Systems	173	US10 US20
4.3.09	Detector Control Systems	92	US02 US10 US20 US27 US30
4.3.10	Pre-production Prototypes	563	AR1 BG1 BG2 BY3 JINR RU1 RU2 UR2 UR3 US10 US12 US14 US15 US22 US23 US27 US30 US32
4.3	**Endcap**	**12,634**	**AR1 BG1 BG2 BY1 BY3 GE1 GE2 JINR RU1 RU2 UR1 UR2 UR3 US02 US10 US12 US14 US15 US20 US22 US23 US27 US30 US32 US36 UZ1**
4.4	**Outer Endcap [1]**		
4.5.01	Mechanics	3,060	HU1 HU3 IR1RU3 RU4 US15
4.5.02	Optics	2,338	HU1 HU3 RU3 RU4 TR1 TR2 TR3 US15
4.5.03	Read-out Boxes	297	US09 US15
4.5.04	Photodetectors	998	US09 US15
4.5.05	Front-end Electronics	358	US02 US10
4.5.06	Calibration Systems	324	RU3 RU4 US09 US10 US12 US15 US16 US30 US41
4.5.07	Trigger/DAQ Electronics	396	US02 US10 US15 US16
4.5.08	Voltage Supply Systems	207	US09 US10
4.5.09	Detector Control Systems	106	HU1 HU3 SP1 TR1 TR2 TR3 US02 US10 US16
4.5.10	Pre-production Prototypes	442	HU1 RU3 RU4 SP1 TR1 TR2 TR3 US02 US09 US10 US12 US15 US16 US30 US35
4.5.11	Luminosity Monitor	99	US24
4.5	**Forward**	**8,625**	**HU1 HU3 IR1 RU3 RU4 SP1 TR1 TR2 TR3 US02 US09 US10 US12 US15 US16 US24 US30 US35 US41**
4.	**HCAL**	**47,398**	**AR1 BG1 BG2 BY1 BY3 GE1 GE2 HU1 HU3 IN2 IN3 IN4 IR1 JINR RU1 RU2 SP1 TR1 TR2 TR3 UR1 UR2 UR3 US02 US09 US10 US12 US14 US15 US16 US20 US22 US23 US24 US27 US30 US32 US35 US36 US41 UZ1**

[1] Outer Endcap has been dropped

See Annex 1 for the abbreviations of the names of Institutes

8.4B Deliverables & Assigned Funding for the individual Sub-detectors by Funding Agency

(including Assigned Funds as per previous table)

Cost Estimate Reference	Deliverables	Hungary	India	Iran	RDMS - Russia	RDMS - Dubna Member States	Turkey	USA - DOE	USA - NSF	Assigned Funds
4.1.01	Mechanics							100.00%		12,208
4.1.02	Optics							93.76%	6.24%	2,116
4.1.03	Read-out Boxes							67.98%	32.02%	356
4.1.04	Photodetectors							19.36%	80.64%	2,293
4.1.05	Front-end Electronics							85.13%	14.87%	1,506
4.1.06	Calibration Systems							96.27%	3.73%	268
4.1.07	Trigger/DAQ Electronics							88.09%	11.91%	1,226
4.1.08	Voltage Supply Systems							100.00%		307
4.1.09	Detector Control Systems							100.00%		228
4.1.10	Pre-production Prototypes							97.36%	2.64%	1,666
4.1	Barrel							88.64%	11.36%	22,174
4.2.01	Mechanics		100.00%							98
4.2.02	Optics		97.95%					1.44%	0.61%	2,289
4.2.03	Read-out Boxes							81.25%	18.75%	224
4.2.04	Photodetectors							100.00%		53
4.2.05	Front-end Electronics							64.00%	36.00%	475
4.2.06	Calibration Systems							100.00%		40
4.2.07	Trigger/DAQ Electronics							93.64%	6.36%	409
4.2.08	Voltage Supply Systems							100.00%		95
4.2.09	Detector Control Systems							100.00%		111
4.2.10	Pre-production Prototypes		93.57%					4.68%	1.75%	171
4.2	Outer Barrel		63.05%					30.49%	6.46%	3,965
4.3.01	Mechanics				29.50%	56.58%			13.92%	9,261
4.3.02	Optics				32.32%	13.46%		44.08%	10.14%	1,114
4.3.03	Read-out Boxes							74.83%	25.17%	290
4.3.04	Photodetectors							100.00%		54
4.3.05	Front-end Electronics							55.44%	44.56%	386
4.3.06	Calibration Systems							100.00%		204
4.3.07	Trigger/DAQ Electronics							94.77%	5.23%	497
4.3.08	Voltage Supply Systems							100.00%		173
4.3.09	Detector Control Systems							100.00%		92
4.3.10	Pre-production Prototypes				35.52%	57.73%		6.39%	0.36%	563
4.3	Endcap				26.06%	45.24%		15.45%	13.26%	12,634
4.4	Outer Endcap [1]									
4.5.01	Mechanics	0.56%		16.67%	60.65%		22.12%			3,060
4.5.02	Optics	20.02%						79.98%		2,338
4.5.03	Read-out Boxes							100.00%		297
4.5.04	Photodetectors							100.00%		998
4.5.05	Front-end Electronics							64.25%	35.75%	358
4.5.06	Calibration Systems				18.21%			81.79%		324
4.5.07	Trigger/DAQ Electronics							93.43%	6.57%	396
4.5.08	Voltage Supply Systems							100.00%		207
4.5.09	Detector Control Systems							100.00%		106
4.5.10	Pre-production Prototypes				52.04%		2.94%	45.02%		442
4.5.11	Luminosity Monitor								100.00%	99
4.5	Forward	5.62%		5.91%	24.87%		8.00%	52.66%	2.93%	8,625
4.	HCAL	1.02%	5.27%	1.08%	11.47%	12.06%	1.46%	57.72%	9.92%	47,398

[1] Outer Endcap has been dropped

8.5 Muon Detector

8.5A Deliverables to be provided by the Institutes for the individual Sub-detectors (including Assigned Funds)

Best Estimate of Assigned Funds as per Signed MoU and its Amendments

Ref	Deliverables	Assigned Funds	Institutes
5.1.1	Detectors and Components	7,945	AT1 CN1 DE4 IT02 IT06 IT11 SP1 SP2
5.1.2	Electronics	10,610	CERN CN1 DE4 IT02 IT06 IT11 SP1 SP2
5.1.3	Mechanical Structure and Supports	310	DE4 IT02 IT06 IT11 SP1 SP2
5.1.4	Assembly and Installation	720	DE4 IT02 IT06 IT11 SP1 SP2
5.1.5	Monitoring	460	DE4 IT02 IT06 IT11
5.1.6	Service Systems	700	CERN DE4 IT02 IT06 IT11
5.1	**Barrel Drifttubes**	**20,745**	**AT1 CERN CN1 DE4 IT02 IT06 IT11 SP1 SP2**
5.2.1	Detectors and Components	1,765	JINR
5.2.2	Electronics	860	BG1 BG2 BY3 JINR SK1 US28 US30 US34
5.2.3	Mechanical Structure, Supports	210	BY3 JINR SK1
5.2.4	Assembly and Installation	325	BY3 JINR SK1
5.2.5	Monitoring	50	BG1 BG2 JINR
5.2.6	Service Systems	100	BY3 JINR SK1
5.2	**Forward ME 1/1**	**3,310**	**BG1 BG2 BY3 JINR SK1 US28 US30 US34**
5.3.1	Detectors and Components	13,805	CN1 RU6 US03 US04 US05 US08 US10 US11 US37
5.3.2	Electronics	8,425	RU6 US03 US04 US08 US28 US30 US31
5.3.3	Mechanical Structure and Supports	490	US37
5.3.4	Assembly and Installation	230	RU6 US04 US10 US11 US37
5.3.5	Monitoring	35	US04 US10 US37
5.3.6	Service Systems	650	US10 US37
5.3	**Endcap CSC**	**23,635**	**CN1 RU6 US03 US04 US05 US08 US10 US11 US28 US30 US31 US37**
5.4.1	Detectors and Components	2,245	BG1 BG2 CN3 IT01 IT07
5.4.2	Electronics	1,375	CN3 IT01 IT07
5.4.3	Mechanical Structure and Supports	350	CN3
5.4.4	Assembly and Installation	255	BG1 BG2 CN3 IT01 IT07
5.4.5	Monitoring	60	CN3 IT01 IT07
5.4.6	Service Systems	65	CN3 IT01 IT07
5.4	**Barrel RPC**	**4,350**	**BG1 BG2 CN3 IT01 IT07**
5.5.1	Detectors and Components	720	CN3 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13
5.5.2	Electronics	810	CN3 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PK1 PK2
5.5.3	Mechanical Structure and Supports	695	CN3 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PK1 PK2
5.5.4	Assembly and Installation	350	CN3 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PK1 PK2
5.5.5	Monitoring	60	CN3 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PK1 PK2
5.5.6	Service Systems	720	CN3 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PK1 PK2
5.5	**Forward RPC**	**3,355**	**CN3 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PK1 PK2**
5.6.1	Barrel	1,300	AT1 CERN HU2
5.6.2	Forward	335	US10 US25
5.6.3	Link	1,065	SP1 SP2 SP3 SP4
5.6	**Alignment**	**2,700**	**AT1 CERN HU2 SP1 SP2 SP3 SP4 US10 US25**
5.	**Muon Detector**	**58,095**	**AT1 BG1 BG2 BY3 CERN CN1 CN3 DE4 HU2 IT01 IT02 IT06 IT07 IT11 JINR KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PK1 PK2 RU6 SK1 SP1 SP2 SP3 SP4 US03 US04 US05 US08 US10 US11 US25 US28 US30 US31 US34 US37**

See Annex 1 for the abbreviations of the names of Institutes

8.5B Deliverables & Assigned Funding for the individual Sub-detectors by Funding Agency

(including Assigned Funds as per previous table)

Cost Estimate Reference	Deliverables	Austria	Bulgaria	CERN	China	Germany	Hungary	Italy	Korea	Pakistan	RDMS - Russia	RDMS - Dubna Member States	Spain	USA-DOE	USA-NSF	Assigned Funds
5.1.1	Detectors and Components	0.63%			8.81%	25.80%		41.91%					22.84%			7,945
5.1.2	Electronics			8.01%	2.83%	16.97%		62.30%					9.90%			10,610
5.1.3	Mechanical Structure and Supports					25.81%		48.39%					25.81%			310
5.1.4	Assembly and Installation					31.94%		54.17%					13.89%			720
5.1.5	Monitoring					41.30%		58.70%								460
5.1.6	Service Systems			42.86%		7.14%		50.00%								700
5.1	Barrel Drifttubes	0.24%		5.54%	4.82%	21.21%		53.51%					14.68%			20,745
5.2.1	Detectors and Components										100.00%					1,765
5.2.2	Electronics										12.79%	87.21%				860
5.2.3	Mechanical Structure, Supports										52.38%	47.62%				210
5.2.4	Assembly and Installation										84.62%	15.38%				325
5.2.5	Monitoring											100.00%				50
5.2.6	Service Systems										50.00%	50.00%				100
5.2	Forward ME 1/1										69.79%	30.21%				3,310
5.3.1	Detectors and Components				10.87%						7.24%			81.89%		13,805
5.3.2	Electronics													100.00%		8,425
5.3.3	Mechanical Structure and Supports													100.00%		490
5.3.4	Assembly and Installation													100.00%		230
5.3.5	Monitoring													100.00%		35
5.3.6	Service Systems													100.00%		650
5.3	Endcap CSC				6.35%						4.23%			89.42%		23,635
5.4.1	Detectors and Components		21.60%					78.40%								2,245
5.4.2	Electronics							100.00%								1,375
5.4.3	Mechanical Structure and Supports				100.00%											350
5.4.4	Assembly and Installation		45.10%					54.90%								255
5.4.5	Monitoring							100.00%								60
5.4.6	Service Systems							100.00%								65
5.4	Barrel RPC		13.79%		8.05%			78.16%								4,350
5.5.1	Detectors and Components								100.00%							720
5.5.2	Electronics									100.00%						810
5.5.3	Mechanical Structure and Supports				21.58%				9.35%	69.06%						695
5.5.4	Assembly and Installation									100.00%						350
5.5.5	Monitoring									100.00%						60
5.5.6	Service Systems								83.33%	16.67%						720
5.5	Forward RPC				4.47%				41.28%	54.25%						3,355
5.6.1	Barrel	3.85%		88.46%			7.69%									1,300
5.6.2	Forward														100.00%	335
5.6.3	Link												100.00%			1,065
5.6	Alignment	1.85%		42.59%			3.70%						39.44%		12.41%	2,700
5.	Muon Detector	0.17%	1.03%	3.96%	5.16%	7.57%	0.17%	24.96%	2.38%	3.13%	5.70%	1.72%	7.07%	36.38%	0.58%	58,095

8.6 Trigger and Data Acquisition

8.6A Deliverables to be provided by the Institutes for the individual Sub-detectors (including Assigned Funds)

Best Estimate of Assigned Funds as per Signed MoU and its Amendments

Ref	Deliverables	Assigned Funds	Institutes
6.1.1	Calorimeter Trigger	5,225	FI1 FI2 FI4 PT1 UK4 US37
6.1.2	CSC Trigger	1,100	US03 US04 US08 US11 US21 US28 US31
6.1.3	DT Trigger	780	AT1
6.1.4	RPC Trigger	3,060	FI1 FI2 FI4 IT01 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PL1 PL2
6.1.5	Global Trigger	1,340	AT1 CERN GR1 GR2 GR3
6.1	**Trigger**	**11,505**	**AT1 CERN FI1 FI2 FI4 GR1 GR2 GR3 IT01 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PL1 PL2 PT1 UK4 US03 US04 US08 US11 US21 US28 US31 US37**
6.2.1	Read-out Unit	5,670	CERN GR1 GR2 GR3 IT06 IT11 SW1 SW2 UK3
6.2.2	Filter Unit	10,940	AT1 CERN FR3 HU1 SW1 SW2 US04 US06 US10 US16 US21
6.2.3	Event Builder	5,420	CERN SW1 US10 US21
6.2.4	DAQ Integration	1,530	CERN IT06
6.2	**Data Acquisition**	**23,560**	**AT1 CERN FR3 GR1 GR2 GR3 HU1 IT06 IT11 SW1 SW2 UK3 US04 US06 US10 US16 US21**
6.3.1	Detector Controls	2,345	CERN
6.3	**Detector Controls**	**2,345**	**CERN**
6.	**Trigger/DAQ**	**37,410**	**AT1 CERN FI1 FI2 FI4 FR3 GR1 GR2 GR3 HU1 IT01 IT06 IT11 KR01 KR02 KR03 KR04 KR05 KR06 KR07 KR08 KR09 KR10 KR11 KR12 KR13 PL1 PL2 PT1 SW1 SW2 UK3 UK4 US03 US04 US06 US08 US10 US11 US16 US21 US28 US31 US37**

See Annex 1 for the abbreviations of the names of Institutes

8.6B Deliverables & Assigned Funding for the individual Sub-detectors by Funding Agency

(including Assigned Funds as per previous table)

Cost Estimate Reference	Deliverables	Austria	CERN	Finland	France-CEA	Greece	Hungary	Italy	Korea	Poland	Portugal	Switzerland - ETHZ	Switzerland - PSI	United Kingdom	USA - DOE	USA - NSF	Assigned Funds
6.1.1	Calorimeter Trigger			9.95%							4.88%			7.66%	77.51%		5,225
6.1.2	CSC Trigger														100.00%		1,100
6.1.3	DT Trigger	100.00%															780
6.1.4	RPC Trigger			16.34%				3.27%	13.07%	67.32%							3,060
6.1.5	Global Trigger	32.84%	14.93%			52.24%											1,340
6.1	Trigger	10.60%	1.74%	8.87%		6.08%		0.87%	3.48%	17.91%	2.22%			3.48%	44.76%		11,505
6.2.1	Read-out Unit		37.39%			23.99%						24.51%	6.17%	7.94%			5,670
6.2.2	Filter Unit	0.27%	25.37%		7.68%		0.82%					26.19%	1.37%		31.31%	6.99%	10,940
6.2.3	Event Builder		73.80%									22.97%			3.23%		5,420
6.2.4	DAQ Integration		100.00%														1,530
6.2	Data Acquisition	0.13%	44.25%		3.57%	5.77%	0.38%					23.34%	2.12%	1.91%	15.28%	3.25%	23,560
6.3.1	Detector Controls		100.00%														2,345
6.3	Detector Controls		100.00%														2,345
6.	Trigger/DAQ	3.34%	34.67%	2.73%	2.25%	5.51%	0.24%	0.27%	1.07%	5.51%	0.68%	14.70%	1.34%	2.27%	23.39%	2.04%	37,410

8.7 The OFFLINE COMPUTING Sub-system is part of the common costs and listed in Annex 7

8.8 The INFRASTRUCTURE Sub-system is part of the common costs and listed in Annex 7

Annex 9 : Category A Headings for CMS M&O Costs Categorisation

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 Headings for CMS M&O Costs Categorisation.

Mechanics
Gas-system
Cryo-system
Cooling system
Front-end electronics spares
Standard electronics
- Power supplies (low voltage, high voltage)
- Crates
- Read-out Modules

Controls
- Detector Control System
- Detector Safety System

Sub-Detector Spares
Areas
- Clean Rooms
- Storage Areas
- Workshops

Communications
Store Items
Manpower @ CERN
- Hired as Industrial Support (CHF)
- Technicians from Collaborating Institutes (FTE)

Annex 11 : Category C Headings for CMS M&O Costs Categorisation.

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 : Participants in the CMS Collaboration

(as registered by 14 December 2001)

13.1 Scientific staff in the CMS Collaboration holding PhD or equivalent qualifications.

Yerevan Physics Institute, Yerevan, ARMENIA (RDMS)
Genrikh L. Bayatian, Nersik Grigorian, Albert M. Sirunyan
-- for M&O at **YEREVAN**: 3 people

Institut für Hochenergiephysik der OeAW, Wien, AUSTRIA
Wolfgang Adam, Thomas Bauer, Thomas Bergauer, Massimiliano Fierro, Markus Friedl, Josef Hrubec, Anna Jeitler, Manfred Krammer, Norbert Neumeister, Paul Porth, Herbert Rohringer, Lali Rurua**1, Anton Taurok, Claudia-Elisabeth Wulz
--for M&O at **HEPHY**: 14 people
**1: Also at TBILISI-IPAS

Research Institute for Nuclear Problems, Minsk, BELARUS (RDMS)
Vladimir G. Baryshevsky, Andrey Fedorov, Mikhail Korzhik, Oleg Missevitch**2
-- for M&O at **MINSK-INP**: 4 people
**2: Also at CERN

National Centre for Particle and High Energy Physics, Minsk, BELARUS (RDMS)
Vladimir Chekhovsky, Oleg Dvornikov, Igor Emeliantchik, A. Ilyichev, Vyacheslav Kuvshinov, Alexandre Litomin, Vladimir Mossolov, Nikolai Shumeiko, Alexander Solin, Roman Stefanovitch, S. Timoshin, Fedor Zyazyulya
-- for M&O at **MINSK-NCPHEP**: 12 people

Research Institute of Applied Physical Problems, Minsk, BELARUS (RDMS)
Piotr Kuchinsky
-- for M&O at **MINSK-RIAPP**: 1 people

Byelorussian State University, Minsk, BELARUS (RDMS)
Vladimir Petrov, Vladislaw Prosolovich
-- for M&O at **MINSK-UNIV**: 2

Vrije Universiteit Brussel, Brussels, BELGIUM
Jacques Lemonne, Stefaan Tavernier, Fred Udo
-- for M&O at **BRUSSEL-VUB**: 3

Université Libre de Bruxelles, Brussels, BELGIUM
Daniel Bertrand, Othmane Bouhali, Catherine Vander Velde, Pascal Vanlaer
-- for M&O at **BRUXELLES-ULB**: 4 people

Université Catholique de Louvain, Louvain-la-Neuve, BELGIUM
Thierry Delbar, Denis Favart, Jan Govaerts, Jean-Sebastien Graulich, Ghislain Grégoire, Vincent Lemaitre, Krzysztof Piotrzkowski
-- for M&O at **LOUVAIN**: 7 people

Université de Mons-Hainaut, Mons, BELGIUM
Evelyne Daubie, Philippe Herquet
-- for M&O at **MONS**: 2 people

Universitaire Instelling Antwerpen, Wilrijk, BELGIUM
Eddi De Wolf, Frans Verbeure, Valery Zhukov**3
-- for M&O at **ANTWERPEN**: 3 people
**3: Also at MOSCOW-MSU

Institute for Nuclear Research and Nuclear Energy, Sofia, BULGARIA
Vladimir Genchev, Plamen Iaydjiev, Georgi Sultanov
-- for M&O at **SOFIA-INRNE**: 3 people

University of Sofia, Sofia, BULGARIA
Leander Litov, Matey Mateev, Mihail Tchijov
-- for M&O at **SOFIA-UNIV**: 3 people

Institute of High Energy Physics, Beijing, CHINA, PR
Guo-Ming Chen, He-Sheng Chen, Ya-Nan Guo, Chu-Hwa Jiang, Wei-Guo Li, Huaimin Liu, Kanglin He, Zian Zhu, Weiren Zhao, Li Zhou
-- for M&O at **BEIJING-IHEP**: 10 people

Peking University, Beijing, CHINA, PR
Yong Ban, Hong-Tao Liu, Yan-Lin Ye, Jun Ying
-- for M&O at **PEKING-UNIV**: 4 people

University for Science and Technology of China, Hefei, Anhui, CHINA, PR
Zi-Ping Zhang**2, Jiawei Zhao
-- for M&O at **HEFEI**: 2 people
**2: Also at CERN

Technical University of Split, Split, CROATIA
Ivica Puljak
-- for M&O at **SPLIT-FESB**: 1 people

University of Split, Split, CROATIA
Zeljko Antunovic, Mile Dzelalija
-- for M&O at **SPLIT-UNIV**: 2 people

University of Cyprus, Nicosia, CYPRUS
Paraskevas Demetriou, Panos A. Razis
-- for M&O at **NICOSIA-UNIV**: 2 people

National Institute of Chemical Physics and Biophysics, Tallinn, ESTONIA
Endel Lippmaa, Martti Raidal, Juhan Subbi
-- for M&O at **TALLINN**: 3 people

Helsinki Institute of Physics, Helsinki, FINLAND
Sandor Czellar, Jaakko Härkönen, Veikko Karimäki, Ritva Kinnunen, Kati Lassila-Perini, Véronique Lefébure**2, Sami Lehti, Tomas Lindén, Saara Nummela, Eija Tuominen, Jorma Tuominiemi
-- for M&O at **HELSINKI-HIP**: 11 people
**2: Also at CERN

Department of Physics, University of Helsinki, Helsinki, FINLAND
-- for M&O at **HELSINKI-UNIV**: 0 people

Laboratoire d'Annecy-le-Vieux de Physique des Particules, IN2P3-CNRS, Annecy-le-Vieux, FRANCE (IN2P3)
Jean-Paul Guillaud, Jean-Pierre Mendiburu, Patrick Nedelec, Jean-Pierre Peigneux, Marc Schneegans, Daniel Sillou
-- for M&O at **LAPP**: 6 people

DSM/DAPNIA, CEA/Saclay, Gif-sur-Yvette, FRANCE
Pierre Bonamy, Marc Dejardin, Daniel Denegri, Bernard Fabbro, Jean-Louis Faure, François-Xavier Gentit, Alain Givernaud, Patrick Jarry, Marie-Claude Lemaire, Yves Lemoigne, Elizabeth Locci, Jean-Pierre Pansart, John Rander, André Rosowsky, Ann Van Lysebetten, Patrice Verrecchia
-- for M&O at **SACLAY**: 16 people

Laboratoire Leprince-Ringuet, Ecole Polytechnique, IN2P3-CNRS , Palaiseau, FRANCE (IN2P3)
Jean Bourotte**2, Philippe Busson, Claude Charlot, Ludwik Dobrzynski, Maurice Haguenauer, Philippe Miné, Pascal Paganini
-- for M&O at **POLYTECHNIQUE**: 7 people
**2: Also at CERN

Institut de Recherches Subatomiques, IN2P3-CNRS-ULP, LEPSI Strasbourg, UHA Mulhouse, Strasbourg, FRANCE (IN2P3)
Reiner Blaes**4, Daniel Bloch, Jean-Marie Brom, François Charles**4, Frédéric Drouhin**4, Jean-Pierre Ernenwein**4, Jean-Charles Fontaine**4, Walter Geist, Ulrich Goerlach, Daniel Huss, Pierre Juillot, Abdenour Lounis, Isabelle Ripp-Baudot, Roger Strub, Teddy Todorov, P. Van Hove
-- for M&O at **STRASBOURG**: 16 people
**4: Also at UHA

Institut de Physique Nucléaire de Lyon, IN2P3-CNRS, Univ. Lyon I, Villeurbanne, FRANCE (IN2P3)
Marc Bedjidian, Eric Chabanat, Didier Contardo, Pierre Depasse, Houmani El Mamouni, Jean Fay, Susan Gascon, Roger Haroutounian, Bernard Ille, Morgan Lethuillier, Stephane Perries, Benjamin Trocme
-- for M&O at **LYON**: 12 people

High Energy Physics Institute, Tbilisi State University, Tbilisi, GEORGIA (RDMS)
Nodar Amaglobeli, Ramazi Kvatadze, Dato Mzavia
-- for M&O at **TBILISI-HEP**: 3 people

Institute of Physics Academy of Science, Tbilisi, GEORGIA (RDMS)
Ia Iashvili, Avto Kharchilava, Vladimir Roinishvili
-- for M&O at **TBILISI-IPAS**: 3 people

RWTH, I. Physikalisches Institut, Aachen, GERMANY
Wolfgang Braunschweig, Andrei Ostaptchouk, Demetrios Pandoulas, Frank Raupach, Stefan Schael, Arndt Schultz von Dratzig, Britta Schwering
-- for M&O at **AACHEN-1**: 7 people

RWTH, III. Physikalisches Institut A, Aachen, GERMANY
Albrecht Böhm, Harm Fesefeldt, Martin Grunewald, Thomas Hebbeker, Kerstin Hoepfner, Dankfried Lanske, Dieter Rein, Hans Reithler, Manfred Tonutti, Martin Wegner
-- for M&O at **AACHEN-3A**: 10 people

RWTH, III. Physikalisches Institut B, Aachen, GERMANY
Volker Commichau, Günter Flügge, Klaus Hangarter, Joachim Mnich, Peter Schmitz, Reiner Schulte, Lars Sonnenschein
-- for M&O at **AACHEN-3B**: 7 people

Institut für Experimentelle Kernphysik, Karlsruhe, GERMANY
Peter Blüm, Wim De Boer, Martin Erdmann, Michael Feindt, Eugene Grigoriev, Frank Hartmann, Thomas Müller, Gunter Quast, Wolfgang Schwerdtfeger, Hans-Jürgen Simonis, Christian Weiser
--for M&O at **KARLSRUHE-IEKP**: 11 people

University of Athens, Athens, GREECE
Leonidas Resvanis
-- for M&O at **ATHENS**: 1 people

Institute of Nuclear Physics "Demokritos", Attiki, GREECE
Petar Adzic, Michele Barone, George Fanourakis, Theodoros Geralis, Panayotis Kokkinias, Aristotelis Kyriakis, Demetrios Loukas, Athanasios Markou, Christos Markou, Spyros Tzamarias, Katerina Zachariadou
-- for M&O at **DEMOKRITOS**: 11 people

University of Ioánnina, Ioánnina, GREECE
Ioannis Evangelou, Panagiotis Kokkas, Nikolaos Manthos, Frixos A. Triantis
-- for M&O at **IOANNINA**: 4 people

KFKI Research Institute for Particle and Nuclear Physics, Budapest, HUNGARY
Gyorgy Bencze**2, Gyorgy Vesztergombi
-- for M&O at **BUDAPEST**: 2 people
**2: Also at CERN

Institute of Nuclear Research ATOMKI, Debrecen, HUNGARY
Jozsef Molnar
-- for M&O at **ATOMKI**: 1 people

Kossuth Lajos University, Debrecen, HUNGARY
Peter Raics, Zoltan Szillasi
-- for M&O at **DEBRECEN-IEP**: 2 people

Panjab University, Chandigarh, INDIA
Suman Bala Beri, Vipin Bhatnagar, Manjit Kaur, Jatinder Mohan Kohli, Jasbir Singh
-- for M&O at **CHANDIGARH**: 5 people

University of Delhi, Delhi, INDIA
Sudeep Chatterji, Ram Krishen Shivpuri
-- for M&O at **NEW_DELHI**: 2 people

Bhabha Atomic Research Centre, Mumbai, INDIA
Sushil Kumar Kataria, Ajit Kumar Mohanty
-- for M&O at **MUMBAI-BARC**: 2 people

Tata Institute of Fundamental Research - EHEP, Mumbai, INDIA
Tariq Aziz, Sunanda Banerjee, Som N. Ganguli, Atul Gurtu, Sudhakar Katta, Manas Maity, Gobinda Majumder, Kajari Mazumdar, Suresh C. Tonwar
-- for M&O at **TIFR-EHEP**: 9 people

Tata Institute of Fundamental Research - HECR, Mumbai, INDIA
Bannaje Sripathi Acharya, Sudeshna Banerjee, Shashikant Dugad, Marthi Ramaswamy Krishnaswamy, Naba Kumar Mondal, Narasimham Vemuri
-- for M&O at **TIFR-HECR**: 6 people

Institute for Studies in Theoretical Physics & Mathematics (IPM), Tehran, IRAN
Farhad Ardalan, Hessamedin Arfaei, Reza Mansouri, Nasser Mirfakhrai, Mohammad E. Zomorrodian
-- for M&O at **IPM**: 5 people

Università di Bari, Politecnico di Bari e Sezione dell' INFN, Bari, ITALY
Marcello Abbrescia, Anna Colaleo, Donato Creanza, Mauro De Palma, Luigi Fiore, Giuseppe Iaselli, Giorgio Maggi, Marcello Maggi, Bartolomeo Marangelli, Salvatore My, Sergio Natali, Salvatore Nuzzo, Gabriella Pugliese, Antonio Ranieri, Francesco Romano, Federico Ruggieri, Giovanna Selvaggi, Lucia Silvestris, Giuseppe Zito
-- for M&O at **BARI**: 19 people

Università di Bologna e Sezione dell' INFN, Bologna, ITALY
Silvia Arcelli, Alberto Benvenuti, Paolo Capiluppi, Andrea Castro, Francesca Cavallo, Marco Cuffiani, Gaetano-Marco Dallavalle, Fabrizio Fabbri, Alessandra Fanfani, Paolo Giacomelli**5, Claudio Grandi, Stefano Marcellini, Paolo Mazzanti, Alessandro Montanari, Francesco Navarria, Fabrizio Odorici, Andrea Perrotta, Antonio Rossi, Tiziano Rovelli, Gianni Siroli
-- for M&O at **BOLOGNA**: 20 people
**5: Also at UCRIVERSIDE

Università di Catania e Sezione dell' INFN, Catania, ITALY
Sebastiano Albergo, Vincenzo Bellini, Paolo Castorina, Salvatore Costa, Luigi Lo Monaco, Renato Potenza, Concetta Sutera, Alessia Tricomi, Cristina Tuve, Gianluca Verona Rinati
-- for M&O at **CATANIA**: 10 people

Università di Firenze e Sezione dell' INFN, Firenze, ITALY
Emilio Borchi, Mara Bruzzi, Alessandro Buffini, Guido Castellini, Vitaliano Ciulli, Carlo Civinini, Raffaello D'Alessandro, Ettore Focardi, Gregorio Landi, Anna Macchiolo, Marco Meschini, Simone Paoletti, Giuliano Parrini, Silvio Sciortino
-- for M&O at **FIRENZE**: 14 people

Università di Genova e Sezione dell' INFN, Genova, ITALY
Pasquale Fabbricatore, Stefania Farinon, Riccardo Musenich
-- for M&O at **GENOVA**: 3 people

Università di Padova e Sezione dell' INFN, Padova, ITALY
Nicola Bacchetta, Dario Bisello, Andrea Candelori, Roberto Carlin, Sandro Centro, Enrico Conti, Flavio Dal Corso, Marco De Giorgi, Alberto De Min, Umberto Dosselli, Fabrizio Gasparini, Ugo Gasparini, Franco Gonella, Alexandre Kaminski, Ivano Lippi, Alexei Litovchenko, Maurizio Loreti, Mirco Mazzucato, Anna Teresa Meneguzzo, Massimo Nigro, Alessandro Paccagnella, Marina Passaseo, Matteo Pegoraro, Riccardo Rando, Paolo Ronchese, Ezio Torassa, Sara Vanini, Luigi Ventura, Pierluigi Zotto**6, Gianni Zumerle
-- for M&O at **PADOVA**: 30 people
**6: Also at MILANO

Università di Pavia e Sezione dell' INFN, Pavia, ITALY
Saverio Altieri, Sergio P. Ratti, Cristina Riccardi, Paola Torre, Paolo Vitulo
-- for M&O at **PAVIA**: 5 people

Università di Perugia e Sezione dell' INFN, Perugia, ITALY
Matteo Maria Angarano, Maurizio Biasini, Gian Mario Bilei, Maria Teresa Brunetti, Nicoleta Dinu, Marco Giorgi, Paolo Lariccia, Gabriela Manolescu, Giancarlo Mantovani, Attilio Santocchia, Leonello Servoli
-- for M&O at **PERUGIA**: 11 people

Università di Pisa e Sezione dell' INFN, Pisa, ITALY
Giuseppe Bagliesi, Tommaso Boccali, Laura Borrello, Pier Luigi Braccini, Rino Castaldi, Roberto Dell'Orso, Suchandra Dutta, Lorenzo Foà, Alessandro Giassi, Franco Ligabue, Alberto Messineo, Otilia Militaru, Fabrizio Palla, Francesco Palmonari, Giulio Sanguinetti, Andrea Sciaba, Andrei Starodumov, Liliana Teodorescu**7, Guido Tonelli, Cristina Vannini, Piero Giorgio Verdini, Jinchuan Wang
-- for M&O at **PISA**: 22 people
**7: Also at BUCHAREST-UNIV

Università di Roma I e Sezione dell' INFN, Roma, ITALY
Stefania Baccaro**8, Luciano Barone, Francesca Cavallari, Silvia Costantini, Ioan Dafinei, Francesco De Notaristefani, Marcella Diemoz, Egidio Longo, Marco Montecchi**8, Giovanni Organtini, Enzo Valente
-- for M&O at **ROMA-1**: 11 people
**8: Also at ENEA

Università di Torino e Sezione dell' INFN, Torino, ITALY
Cristina Biino-Palestini, Roberto Cirio, Marco Costa, Lino Demaria, Silvia Maselli, Ernesto Migliore, Vincenzo Monaco, Cristiana Peroni, Alessandra Romero, Marta Ruspa, Roberto Sacchi, Ada Solano, Amedeo Staiano
-- for M&O at **TORINO**: 13 people

Chungbuk National University, Chongju, KOREA
Yong Uhn Kim
-- for M&O at **CHUNGBUK**: 1 people

Kangwon National University, Chunchon, KOREA
Soon-Kwon Nam
-- for M&O at **KANGWON**: 1 people

Wonkwang University, Iksan, KOREA
Sang Yull Bahk
-- for M&O at **WONKWANG**: 1 people

Cheju National University, Jeju, KOREA
Yong Joo Kim
-- for M&O at **CHEJU**: 1 people

Chonnam National University, Kwangju, KOREA
Han-Il Jang, Jae-Yool Kim, Tae Ick Kim, In-Taek Lim
-- for M&O at **CHONNAM**: 4 people

Dongshin University, Naju, KOREA
Myoung-Youl Pac
-- for M&O at **DONGSHIN**: 1 people

Seonam University, Namwon, KOREA
Seok Jae Lee
-- for M&O at **SEONAM**: 1 people

Konkuk University, Seoul, KOREA
June-Tak Rhee
-- for M&O at **KONKUK-UNIV**: 1 people

Korea University, Seoul, KOREA
Byung-Sik Hong, Seong-Jong Hong, Kyong-Sei Lee, Sung-Keun Park, Kwang-Souk Sim
-- for M&O at **KOREA-UNIV**: 5 people

Seoul National University of Education, Seoul, KOREA
Duk-Gil Koo
-- for M&O at **SEOUL-EDU**: 1 people

Seoul National University, Seoul, KOREA
Bock-Joo Kim, Soo-Bong Kim, Il-Hung Park
-- for M&O at **SEOUL-SNU**: 3 people

Sungkyunkwan University, Suwon, KOREA
Byung-Gu Cheon, Young-Il Choi
-- for M&O at **SKK-UNIV**: 2 people

Kyungpook National University, Taegu, KOREA
Woo Hyun Chung, Seung Woo Ham, Hun Moo Jeon, Dong-Hee Kim, Guinyun Kim, Woo-Young Kim, Sun Kun Oh, Sang Ryul Ro, Dong-Chul Son
-- for M&O at **KYUNGPOOK**: 9 people

National Centre for Physics, Quaid-I-Azam University, Islamabad, PAKISTAN
Zia Aftab, Masud Ahmad Ahmad, Naseem Bhatti, Khurshid Hasanain, Hafeez R. Hoorani, Mohammad Khalid Khan, Arif Niaz, Riaz Riazuddin, Tariq Solaija
-- for M&O at **ISLAMABAD-NCP**: 9 people

Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Swabi, PAKISTAN
Irfan Ullah Awan, Misbah Uddin Mirza, Ali Muhammad
-- for M&O at **GIK**: 3 people

Institute of Experimental Physics, Warsaw, POLAND
Bunkowski Karol, Mikolaj Cwiok, Wojciech Dominik, Jan Krolikowski
-- for M&O at **WARSAW-IEP**: 4 people

Soltan Institute for Nuclear Studies, Warsaw, POLAND
Ryszard Gokieli, Maciej Górski, Lukasz Goscilo, Krzysztof Nawrocki, Grzegorz Wrochna, Piotr Zalewski
-- for M&O at **WARSAW-INS**: 6 people

Laboratório de Instrumentação e Física Experimental de Partículas, Lisboa, PORTUGAL
Paula Bordalo, Sergio Ramos, Joao Varela**2
-- for M&O at **LIP**: 3 people
**2: Also at CERN

Joint Institute for Nuclear Research, Dubna, RUSSIA (RDMS)
Alexandre Belkov, Alexander Cheremukhin, Igor Golutvin, Nikolai Gorbunov, Igor Gramenitsky, Vladimir Karjavin, Sergei Khabarov, Yuri Kiryushin, Viktor Konoplyanikov, Vladimir Korenkov, Ivan Kossarev, Vladimir Ladyguine, Alexandre Malakhov, Gleb Mechtcheriakov, Petr Moissenz, Serguei Movchan, Vladimir Palichik, Victor Perelygin, Mariya Savina, Serguei Sergeev, Serguei Shmatov, Siarhei Shulha, Ilia Slepnev, Vitali Smirnov, Elena Tikhonenko, Anton Volodko, Nikolai Zamiatin, Anatoli Zarubin, Pavel Zarubin
-- for M&O at **DUBNA**: 29 people

Petersburg Nuclear Physics Institute, Gatchina (St Petersburg), RUSSIA (RDMS)
Nikolai Bondar, Victor Golovtsov, Yuri Ivanov, Victor Kim, Vladimir Kozlov, Peter Lectchenko, Igor Smirnov, Igor Tkach, Gueorgui Velitchko, Alexey Vorobyev
-- for M&O at **ST-PETERSBURG**: 10 people

Institute for Nuclear Research, Moscow, RUSSIA (RDMS)
Sergei Gninenko, Nikolai Goloubev, Mikhail Kirsanov, Nikolai Krasnikov, Viktor Matveev, Anatoly Pashenkov, Alexandre Poliarouch, Vladimir E. Postoev, Aino Skassyrskaia**9, Alexander Toropin**9
-- for M&O at **MOSCOW-INR**: 10 people
**9: Also at PISA

Institute for Theoretical and Experimental Physics, Moscow, RUSSIA (RDMS)
Vladimir Gavrilov, Vitali Kaftanov, Ivan Kisselevitch, Victor Kolosov, Mikhail Kossov, Sergey Kuleshov, Nikita Stepanov, Viatcheslav Stoline
-- for M&O at **MOSCOW-ITEP**: 8 people

P.N. Lebedev Physical Institute, Moscow, RUSSIA (RDMS)
Nina Konovalova, Valentin Kozlov, Andrei I. Lebedev, Serguei Potashov, Sergey V. Rusakov
-- for M&O at **MOSCOW-LEBEDEV**: 5 people

Moscow State University, Moscow, RUSSIA (RDMS)

Edouard Boos, Alexandre Erchov, Andrei Gribushin, Viacheslav Ilin, Olga L. Kodolova, Igor P. Lokhtin, Vitali Mikhailin, Ludmila Sarycheva, Viktor Savrin, Alexander Snigirev, Irina Vardanyan

-- for M&O at **MOSCOW-MSU**: 11 people

Institute for High Energy Physics, Protvino, RUSSIA (RDMS)
Victor Abramov, Igor Azhgirey, Sergei Bitioukov, Petr Goncharov, Alexandre Inyakin, Vassili Katchanov, Victor Kryshkin, Vladimir Petrov, Serguei Slabospitski, Alexander Sytin, Sergey Troshin, Leonid Turchanovich, Nicolai E. Tyurin, Andrei Uzunian, Alexei Volkov
-- for M&O at **PROTVINO**: 15 people

Slovak University of Technology, Bratislava, SLOVAK REPUBLIC (RDMS)
Peter Ballo, Jozef Lipka, Vladimir Necas, Milan Seberini
-- for M&O at **BRATISLAVA**: 4 people

Centro de Investigaciones Energeticas Medioambientales y Tecnologicas, Madrid, SPAIN
Manuel Aguilar-Benitez, Marcos Cerrada, Nicanor Colino, Begona De La Cruz, Antonio Ferrando, Maria Cruz Fouz, Maria Isabel Josa, Pedro Ladrón de Guevara, Luciano Romero, Jesus Salicio, Eusebio Sanchez-Alvaro, Carlos Willmott
-- for M&O at **MADRID-CIEMAT**: 12 people

Universidad Autónoma de Madrid, Madrid, SPAIN
Carmen Albajar, Jorge Fernandez De Troconiz
-- for M&O at **MADRID-UNIV**: 2 people

Universidad de Oviedo, Oviedo, SPAIN
Javier Cuevas
-- for M&O at **OVIEDO**: 1 people

Instituto de Física de Cantabria (IFCA), CSIC-Universidad de Cantabria, Santander, SPAIN
Pedro Arce, Carlos Figueroa, Guillelmo Gomez Ceballos, Isidro Gonzalez, José Maria Lopez, Maria Amparo Lopez Virto, Jesus Marco, Celso Martinez Rivero, Francisco Matorras, Teresa Rodrigo, David Rodriguez Gonzalez, Alberto Ruiz Jimeno, Ivan Vila
-- for M&O at **SANTANDER**: 13 people

Universität Basel, Basel, SWITZERLAND
Ludwig Tauscher, Sotirios Vlachos
-- for M&O at **BASEL**: 2 people

CERN, European Organization for Nuclear Research, Geneva, SWITZERLAND
Duccio Abbaneo**9, Shaun Ashby, Etiennette Auffray, Austin Ball, David Barney, Marco Battaglia, Diether Blechschmidt, Philippe Bloch, Horst Breuker, Ariella Cattai, Roberto Chierici, Sergio Cittolin, Julien Cogan, Akos Csilling, Michel Della Negra, Anna Elliott-Peisert, Henrik Foeth, Wolfgang Funk, Stefano Fratianni, Andreas Furtjes, David Futyan, Karl Gill, Frank Glege, Johannes Gutleber, Alan Honma, Mika Huhtinen, Vincenzo Innocente, Werner Jank, Kostas Kloukinas, Marcin Konecki, Zsolt Kovacs, Vicente Lara, Helena Larsen, Paul Lecoq, Michela Lenzi, Marcello Mannelli, Frans Meijers, Emilio Meschi**9, Jordi Mocholi Moncholi, Alexander Oh, Carmen Palomares Espiga, Gabriella Pa'sztor, Martti Pimiä, Vincent Poireau, Jean-Pierre Porte, Attila Racz, Pierpaolo Rebecchi, Rui Ribeiro, Gigi Rolandi, Christoph Schaefer, Christoph Schwick, Giacomo Sguazzoni, Patrice Siegrist, Nick Sinanis, Paraskevas Sphicas, Heinz Stockinger, Are Strandlie, Jan Troska, Andromachi Tsirou, Tejinder Virdee**10, Helge Voss, Johannes-Peter Wellisch, Ian Malcolm Willers, Zhen Xie
-- for M&O at CERN: 64 people
**9: Also at PISA
**10: Also at LONDON-IC

Paul Scherrer Institut, Villigen, SWITZERLAND
Willi Bertl, Konrad Deiters, Kurt Gabathuler, Roland Horisberger, Quentin Ingram, Danek Kotlinski, Dieter Renker, Tilman Rohe, Tariel Sakhelashvili
-- for M&O at **PSI**: 9 people

Institut für Teilchenphysik, Eidgenössische Technische Hochschule (ETH), Zürich, SWITZERLAND
Botjo Betev, Paolo Cannarsa, Günther Dissertori, Michael Dittmar, Ralph Eichler, Wolfram Erdmann, Marta Felcini, Klaus Freudenreich, Christoph Grab, Bing-Nian Jin, Pierre Lecomte, Werner Lustermann, Francesca Nessi-Tedaldi, Anne-Sylvie Nicollerat, Felicitas Pauss, Ghita Rahal, Hans Rykaczewski, Henry Suter, Zhao-Min Wang
-- for M&O at **ZURICH-ETH**: 19 people

Universität Zürich, Zürich, SWITZERLAND
Claude Amsler, Hendrik Pruys, Christian Regenfus, Peter Robmann, Thomas Speer
-- for M&O at **ZURICH-UNIV**: 5 people

National Central University (NCU), Chung-Li, 32054 TAIPEI
Yuan-Hann Chang, E. Augustine Chen, Apollo Go, Willis Lin
-- for M&O at **CHUNG-LI**: 4 people

National Taiwan University (NTU), Taipei, 10764 TAIPEI
Paoti Chang, George Wei-Shu Hou, Suen Hou, Koji Ueno
-- for M&O at **TAIPEI**: 4 people

Cukurova University, Adana, TURKEY
Isa Dumanoglu, Eda Eskut, Aysel Kayis, Ayse Kuzucu-Polatöz, Gülsen Önengüt, Nazife Ozdes Koca
-- for M&O at **ADANA-CUKUROVA**: 6 people

Middle East Technical University, Physics Department, Ankara, TURKEY
Akif Esendemir, Meltem Serin-Zeyrek, Ramazan Sever, Mehmet Zeyrek
-- for M&O at **ANKARA-METU**: 4 people

Bogaziçi University, Department of Physics, Istanbul, TURKEY
Erhan Gulmez, Engin Isiksal**11, Mithat Kaya**12, Suat Ozkorucuklu**13
-- for M&O at **BOGAZICI**: 4 people
**11: Also at Marmara University, Istanbul, Turkey
**12: Also at Kafkas University, Kars, Turkey
**13: Also at Suleyman Demirel University, Isparta, Turkey

Institute of Single Crystals of National Academy of Science, Kharkov, UKRAINE (RDMS)
Boris Grinev, Vadym Lyubynskiy, Vitaliy Senchyshyn
-- for M&O at **KHARKOV-ISC**: 3 people

National Scientific Center, Kharkov Institute of Physics and Technology, Kharkov, UKRAINE (RDMS)
Leonid Levchuk, Anatoly Nemashkalo, Pavel Sorokin
-- for M&O at **KHARKOV-KIPT**: 3 people

Kharkov State University, Kharkov, UKRAINE (RDMS)
Volodymyr Kovtun, Illya Zalyubovskiy
-- for M&O at **KHARKOV-KSU**: 2 people

University of Bristol, Bristol, UNITED KINGDOM
Dave S. Bailey, David Cussans, Greg P. Heath, Helen F. Heath, Catherine Kirsty Mackay, Dave M. Newbold, Vincent J. Smith, Robert J. Tapper
-- for M&O at **BRISTOL**: 8 people

Rutherford Appleton Laboratory, Didcot, UNITED KINGDOM
Ken W. Bell, Robert M. Brown, David J.A. Cockerill, John A. Coughlan, Paul S. Flower, William J. Haynes, Bruce W. Kennedy, Ian R. Tomalin
-- for M&O at **RAL**: 8 people

Imperial College, University of London, London, UNITED KINGDOM
David Britton, William Cameron, Costas Foudas, Geoffrey Hall, Gregory Iles, Nancy Marinelli, Alexander Nikitenko**14, Xiangdong Qu, David Mark Raymond, Christopher Seez
-- for M&O at **LONDON-IC**: 10 people
**14: Also at MOSCOW-ITEP

Brunel University, Uxbridge, UNITED KINGDOM
Barbara Camanzi, Cinzia Da Via, Peter R. Hobson, Derek C. Imrie, Steve J. Watts
-- for M&O at **BRUNEL**: 5 people

University of California at Davis, Davis, California, USA (DOE)
Richard Breedon, Maxwell Chertok, Peter Timothy Cox, Winston Ko, Richard Lander, Dave Pellett, John Smith, Mani Tripathi
-- for M&O at **UCDAVIS**: 8 people

University of California San Diego, La Jolla, California, USA (DOE)
Satyaki Bhattacharya, James G. Branson, Ian Fisk, David MacFarlane, Hans P. Paar, Gerhard Raven, Vivek Sharma
-- for M&O at **UCSD**: 7 people

University of California at Los Angeles, Los Angeles, California, USA (DOE)
Katsushi Arisaka, Alon Attal, David Cline, Robert Cousins, Samim Erhan, Jay Hauser, Mike Lindgren, Christina Matthey, Stanislaw Otwinowski, Yuriy Pischalnikov, Peter Schlein, Benn Tannenbaum, Viatcheslav Valouev, Martin Von Der Mey, Han-Guo Wang
-- for M&O at **UCLA**: 15 people

California Institute of Technology, Pasadena, California, USA (DOE)
Julian Bunn, Harvey B. Newman, Sergey Shevchenko, Richard Wilkinson, Ren-Yuan Zhu
-- for M&O at **CALTECH**: 5 people

University of California, Riverside, California, USA (DOE)
Robert Clare, J. William Gary, Gail Hanson, Thomas Kress, John George Layter, Hartmut Rick, Benjamin C. Shen, Valeri Sytnik, Stefano Villa, Daniel Zer-Zion
-- for M&O at **UCRIVERSIDE**: 10 people

University of California, Santa Barbara, Santa Barbara, California, USA (DOE)
Claudio Campagnari, Joe Incandela
-- for M&O at **SANTA-BARBARA**: 2 people

Fairfield University, Fairfield, Connecticut, USA (DOE)
C.P. Beetz, C. Sanzeni, Dave Winn
-- for M&O at **FAIRFIELD**: 3 people

University of Florida, Gainesville, Florida, USA (DOE)
Darin Acosta, Paul Avery, Dimitri Bourilkov**15, Richard Cavanaugh, Sergei Dolinsky, Richard D. Field, Sergey Klimenko, Jacobo Konigsberg, Andrey Korytov, Peter Levtchenko, Guenakh Mitselmakher**16, Pierre Ramond, John Stasko, Holger Stoeck, Song Ming Wang, John Yelton
-- for M&O at **FLORIDA-UNIV**: 16 people
**15: Also at SOFIA-INRNE,
**16: Also at FERMILAB

Florida Institute of Technology, Melbourne, Florida, USA (DOE)
Laszlo Baksay**17, Marcus Hohlmann, Rong S. Jin, Marc Mohammadi Baarmand**18
-- for M&O at **FLORIDA-TECH**: 4 people
**17: Also at DEBRECEN-IEP
**18: Also at IPM

Florida State University, Tallahassee, Florida, USA (DOE)
Howard Baer, Harvey Goldman, Sharon Hagopian, Vasken Hagopian, Kurtis F. Johnson, Harrison Prosper, Horst Wahl
-- for M&O at **FLORIDA-STATE**: 7 people

Fermi National Accelerator Laboratory, Batavia, Illinois, USA (DOE)
Giorgio Apollinari, Muzaffer Atac, Lothar A.T. Bauerdick, Ulrich Baur, Andrew Beretvas, Morris Binkley, Selcuk Cihangir, Mike Crisler, Dmitri Denisov, David P. Eartly, John E. Elias, Sandor Feher, Brenna Flaugher, Jim Freeman, Irwin Gaines, Douglas A. Glenzinski, Joel Goldstein, Dan Green, Charles Grimm, Jim Hanlon, Robert M. Harris, Umesh Joshi, Yuri Kozhevnikov, Simon Kwan, Mike Lamm, Dragoslav Lazic, Ron Lipton, Maarten Litmaath, Patrick Lukens, Kaori Maeshima, John Michael Marraffino, Shekhar Mishra, Nikolai Mokhov, Shahzad Muzaffar, Vivian O'Dell, Jim Patrick, Ruth Pordes, Oleg Prokofiev, Petros Rapidis, Anatoly Ronzhin, Richard Smith, Leonard Spiegel, David Stuart, Ichiro Suzuki, Slawek Tkaczyk, Robert Tschirhart, Richard Vidal, Hans Wenzel, Juliana Whitmore, William John Womersley, Wei-Min Wu, Victor Yarba
-- for M&O at **FERMILAB**: 52 people

University of Illinois at Chicago (UIC), Chicago, Illinois, USA (NSF)
Mark Raymond Adams, Elizaveta Chabalina, Cecilia Elena Gerber
-- for M&O at **CHICAGO**: 3 people

Northwestern University, Evanston, Illinois, USA (DOE)
Bruno Gobbi, Mikhail Kubantsev, Sudhir Malik
-- for M&O at **NORTHWESTERN**: 3 people

University of Notre Dame, Notre Dame, Indiana, USA (NSF)
James M. Bishop, Neal M. Cason, Michael Hildreth, Daniel John Karmgard, Randy Ruchti, Jadwiga Warchol, Mitchell Wayne
-- for M&O at **NOTRE_DAME**: 7 people

Purdue University, West Lafayette, Indiana, USA (DOE)
Virgil E. Barnes, Gino Bolla, Daniela Bortoletto, Adam Bujak, Arthur F. Garfinkel, Laszlo Gutay, Alvin T. Laasanen, Jik Lee, David Miller, Jun Miyamoto, Carsten Rott, Ian Shipsey
-- for M&O at **PURDUE**: 12 people

Iowa State University, Ames, Iowa, USA (DOE)
E. Walter Anderson, John M. Hauptman, John Krane
-- for M&O at **AMES**: 3 people

The University of Iowa, Iowa City, Iowa, USA (DOE)
Edward McCliment, Jean-Pierre Merlo, Alexi Mestvirishvili, Edwin Norbeck, Yasar Onel
-- for M&O at **IOWA**: 5 people

The University of Kansas, Lawrence, Kansas, USA (NSF)
Philip Baringer, Alice Bean, Leonard Christofek, Xin Zhao
-- for M&O at **KANSAS-UNIV**: 4 people

Kansas State University, Manhattan, Kansas, USA (DOE)
Tim Bolton, Regina Demina, William E. Kahl**16, Neville Reay, Flera Rizatdinova, Ronald Sidwell, Noel Stanton
-- for M&O at **KANSAS-STATE**: 7 people
**16: Also at FERMILAB

Johns Hopkins University, Baltimore, Maryland, USA (NSF)
Bruce Arnold Barnett, Chih-Yung Chien, Morris Swartz
-- for M&O at **JOHNS-HOPKINS**: 3 people

University of Maryland, College Park, Maryland, USA (DOE)
Salavat Abdullin**14, Drew Baden, Sarah Catherine Eno, Doug Fong, Nick J. Hadley, Richard G. Kellogg, Shuichi Kunori, Andris Skuja
-- for M&O at **MARYLAND**: 8 people
**14: Also at MOSCOW-ITEP

Boston University, Boston, Massachusetts, USA (DOE)
Robert Carey, Eric Hazen, Edward Kearns, James Miller, B. Lee Roberts, James Rohlf, Lawrence Sulak
-- for M&O at **BOSTON-UNIV**: 7 people

Northeastern University, Boston, Massachusetts, USA (NSF)
George Alverson, Andrei Kuznetsov, Jorge Moromisato, Yuri V. Musienko**19, Thomas Paul, Steve Reucroft, John Swain, Lucas Taylor, Eberhard Von Goeler
-- for M&O at **NORTHEASTERN**: 9 people
**19: Also at MOSCOW-INR

Massachusetts Institute of Technology, Cambridge, Massachusetts, USA (DOE)
Gerry Bauer, Jerome Friedman, Petr Koulinitch, Christoph Paus, Lawrence Rosenson, K. Sham Sumorok, Steve Tether, Bolek Wyslouch
-- for M&O at **MIT**: 8 people

University of Minnesota, Minneapolis, Minnesota, USA (DOE)
Priscilla Cushman, James Grahl, Ivan Kronkvist, Roger Rusack, Alexander Singovsky
-- for M&O at **MINNESOTA**: 5 people

University of Mississippi, University, Mississippi, USA (DOE)
Lucien Cremaldi, Jim Reidy, David Sanders, Don Summers
-- for M&O at **MISSISSIPPI**: 4 people

University of Nebraska-Lincoln, Lincoln, Nebraska, USA (NSF)
William B. Campbell, Daniel R. Claes, Gregory R. Snow
-- for M&O at **NEBRASKA**: 3 people

Rutgers, the State University of New Jersey, Piscataway, New Jersey, USA (NSF)
John Conway, Thomas Devlin, Pieter F. Jacques, Mohan S. Kalelkar, Amitabh lath, Lalith Perera, Richard Plano, Steve Schnetzer, Sunil Somalwar, Robert Stone, Gordon Thomson, Terry L. Watts, Steven Worm
-- for M&O at **RUTGERS**: 13 people

Princeton University, Princeton, New Jersey, USA (DOE)
Daniel Marlow, Pierre Piroué, David Stickland, Christopher Tully, Stephan Wynhoff
-- for M&O at **PRINCETON**: 7 people

University of Rochester, Rochester, New York, USA (DOE)
Steven R. Blusk, Arie Bodek, Howard Budd, Pawel de Barbaro, Alexandre Dyshkant, George Ginther, Mark Charles Kruse, Willis Sakumoto, Paul Slattery, Paul Tipton
-- for M&O at **ROCHESTER**: 10 people

The Ohio State University, Columbus, Ohio, USA (DOE)
L. Stan Durkin, Jianghui Gu, Chang Kim, Ta-Yung Ling
-- for M&O at **OHIO-STATE**: 4 people

Carnegie Mellon University, Pittsburgh, Pennsylvania, USA (DOE)
Thomas Ferguson, James Russ, Nikolay Terentyev, Helmut Vogel, Igor Vorobiev
-- for M&O at **CARNEGIE-MELLON**: 5 people

Rice University, Houston, Texas, USA (DOE)
Marjorie Corcoran, Geary Eppley, Hannu E. Miettinen, Brian Paul Padley, Jay Roberts, Pablo Yepes
-- for M&O at **RICE**: 6 people

Texas Tech University, Lubbock, Texas, USA (DOE)
Nural Akchurin, Jack Cranshaw, Vladimir Nagaslaev, Vaia Papadimitriou, Alan Sill, Richard Wigmans
-- for M&O at **TEXAS-TECH**: 6 people

University of Texas at Dallas, Richardson, Texas, USA (DOE)
Roy C. Chaney, Ervin J. Fenyves, Daniel Suson
-- for M&O at **TEXAS-DALLAS**: 3 people

Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA (NSF)
Luke Mo
-- for M&O at **VIRGINIA**: 1 people

University of Wisconsin, Madison, Wisconsin, USA (DOE)
Duncan Carlsmith, Pamela Chumney, Sridhara Dasu, Francesca Romana Di Lodovico, Richard Loveless, Sergei Lusin, Don Reeder, Wesley H. Smith
-- for M&O at **WISCONSIN**: 8 people

Institute of Nuclear Physics of the Uzbekistan Academy of Sciences, Ulugbek, Tashkent, UZBEKISTAN (RDMS)
Anvar Avezov, Naubet Bisenov, Anatoly Gafarov, Eldar Gasanov, Elvira Ibragimova, Genchan Kim, Nemat Rakhmatov, Igor Rustamov, Ismailov Shukrullo, Anarbay Urkinbaev, Bekhzad S. Yuldashev
-- for M&O at **TASHKENT**: 11 people

**1: Also at Inst. of Physics Academy of Science, Tbilisi, Georgia
**2: Also at CERN, Geneva, Switzerland
**3: Also at Moscow State Univ. (MSU), Moscow, Russia
**4: Also at Université de Haute-Alsace, Mulhouse, France
**5: Also at Univ. of California, Riverside, California, USA
**6: Also at Univ. di Milano e Sez. dell'INFN, Milano, Italy
**7: Also at Univ. of Bucharest, Bucuresti-Magurele, Romania
**8: Also at ENEA - Casaccia Research Center, S. Maria di Galeria, Italy
**9: Also at Univ. di Pisa e Sez. dell' INFN, Pisa, Italy
**10: Also at Imperial College, Univ. of London, London, United Kingdom
**11: Also at Marmara University, Istanbul, Turkey
**12: Also at Kafkas University, Kars, Turkey
**13: Also at Suleyman Demirel University, Isparta, Turkey
**14: Also at Inst. for Theoretical and Exp. Phys. (ITEP), Moscow, Russia
**15: Also at Inst. for Nucl. Research and Nucl. Energy (INRNE), Sofia, Bulgaria
**16: Also at Fermi National Accelerator Lab., Batavia, Illinois, USA
**17: Also at Kossuth Lajos Univ., Debrecen, Hungary
**18: Also at Inst. for Studies in Theoretical Physics & Math. (IPM), Tehran, Iran

13.2 2002 Maintenance & Operations Cat.A Sharing

(based on Annex 13.1)

Funding Agencies	Scientists	PhD%
Austria	14	1.36%
Belgium-FWO	6	0.58%
Belgium-FNRS	13	1.27%
Bulgaria	6	0.58%
CERN	64	6.23%
China	16	1.56%
Croatia	3	0.29%
Cyprus	2	0.19%
Estonia	3	0.29%
Finland	11	1.07%
France-CEA	16	1.56%
France-IN2P3	41	3.99%
Germany BMBF	35	3.41%
Greece	16	1.56%
Hungary	5	0.49%
India	24	2.34%
Italy	158	15.38%
Korea	31	3.02%
Pakistan	12	1.17%
Poland	10	0.97%
Portugal	3	0.29%
RDMS-JINR	80	4.97%
RDMS-Russia	59	8.57%
Spain-CIEMAT	12	1.17%
Spain-Univ.	16	1.56%
Switzerland-PSI	9	0.88%
Switzerland-ETHZ	19	1.85%
Switzerland-Univ.	7	0.68%
Taipei	8	0.78%
Turkey	14	1.36%
UK	31	3.02%
USA	283	27.56%
TOTAL:	1027	100.00%

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:

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

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 CMS Experiment.

Done in Geneva

on _____

For CERN

_____

Roger Cashmore
Director of Research

Done in _____

on _____

For

_____

CMS