

Preliminary Draft Budget for CMS Construction in the Year 2008

INTRODUCTION

This document summarizes the preliminary funding requirements for the payments that the CMS Collaboration plans to make in the year 2008 in order to follow the detector construction schedule.

The year 2008 will be the eleventh year of construction; most of the sub-detectors will be finished.

This preliminary draft budget for the year 2008 is based on the overall planning as presented at this RRB.

The figures shown as "Estimate of Income and Payments expected in 2008" in the Summary Table (Annex 10) are still very tentative at the present stage, and many of them are not yet agreed by the appropriate CMS Funding Agencies. According to the established procedure, this document is meant to give timely information to the CMS Resources Review Board (RRB) and to provide input for further discussions with the CMS Funding Agencies to prepare the Draft 2008 Budget, which will be submitted for approval to the RRB in October 2007.

The financial commitments arising from contracts that are expected to be placed in the years 2007 and 2008 will depend, case by case, on contractual policy and the associated negotiations with the potential contractors. It is, therefore, too early to present reliable and precise estimates for all the commitments to be made by the end of the year 2008.

The financial commitments on the Common Funds will be normally limited to the cash balance of these Funds (unless Funding Agencies underwrite formal guarantees for future payments).

1. MAGNET

An overview of the preliminary 2007 budget requirements is shown in **Annex 1**.

No funds are requested for 2008.

The Common Fund is expected to go into deficit during 2008 until the last expected contributions have been received.

Following the agreed policy of the CMS Collaboration concerning the ways of making contributions to the CMS Common Projects, the Preliminary Draft Budget for 2008 for the CMS Magnet is broken down by the three following categories:

- (a) procurements from the CMS Magnet Common Fund,
- (b) payments to contracts and
- (c) in-kind contributions.

1.1 Procurements from the CMS Magnet Common Fund

Items that are neither procured directly through CMS institutes, nor provided as in-kind contributions are procured through CERN and paid from the CMS Magnet Common Fund.

No new commitments are foreseen for the year 2008.

1.2 Payments to Contracts

There is no expenditure foreseen in 2008. The project will have been concluded.

1.3 In-kind Contributions

All approved in-kind contributions have been delivered to CERN and have been reported to the RRB in previous years.

2. TRACKER

There is no expenditure foreseen in 2008. The project will have been concluded.

3. ELECTROMAGNETIC CALORIMETER

An overview of the preliminary 2008 budget requirements is shown in **Annex 3**.

The Endcap crystals production should end in February 2008 for Russia Elektronika and for SIC (China). Expenditures for crystals, their characterization and activities in the CERN Regional Center are about 85% of the total expenditures, which will occur in the year 2008.

About 7 % of the total ECAL payments expected to be due in 2008 will be for the Preshower, mostly for Off-detector Readout modules and Power Supplies.

The main other expenditures correspond to the Electronics (2.6%), Assembly and Installation for the Endcaps (2.6%) and Endcaps mechanics (1.6%).

4. HADRON CALORIMETER

There is no expenditure foreseen in 2008. The project is concluded.

In 2008, HCAL will be in the operations phase.

5. MUON DETECTOR

There is no expenditure foreseen in 2008. The project will have been concluded.

6. TRIGGER AND DATA ACQUISITION

An overview of the preliminary 2008 budget requirements is shown in **Annex 6**.

6.1 Trigger

There is no expenditure foreseen in 2008. The project will have been concluded.

6.2 Data Acquisition

In 2008 the Data Acquisition system will be completed with a 4 event filter farm slices allowing the experiment to run up to 50 kHz level 1 trigger rate.

7. OFFLINE COMPUTING

There is no expenditure foreseen in 2008. The project is concluded.

8. INFRASTRUCTURE

There is no expenditure foreseen in 2008. The project will have been concluded.

9. COMMISSIONING & INTEGRATION

There is no expenditure foreseen in 2008. The project will have been concluded.

10. SUMMARY

The numbers given in this document are summarized in **Annex 10**.

Annex 10 shows all funds needed by CMS during the year 2008 to follow the detector construction schedule.

It should be noted that the budget shows an overall deficit of some 10.3 MCHF.

The Magnet and C&I deficit, totaling 3.6 MCHF, was reported to the October 2006 RRB and is covered by the Step 1 contributions (cf. CMS Financial Plan, CERN-RRB-2007-023).

The remainder of the deficit, 6.7 MCHF, is concentrated in ECAL and is linked to the final deliveries of endcap crystals. This was reported to the October 2006 RRB and is covered by the Step 1 contributions (cf. CMS Financial Plan, CERN-RRB-2007-023).

It should also be noted that:

- (1) Many numbers shown as "Estimate of Income and Payments expected" have not yet been agreed with the respective Funding Agencies. At this stage they are just indicative and for discussions in view of the preparation of the "CMS Draft Budget for 2008" which will be presented at the October 2007 RRB.
- (2) The use of uncommitted funds, which may have been allocated by the Funding Agencies to their respective institutes in previous years for payments expected in 2007, is a matter of policy for the respective Funding Agencies and their associated institutes. Therefore they are not included in this document (except for the CMS Common Funds).

11. ANNEXES

Preliminary Budget Requirements for 2008

- | | |
|------------------|--|
| Annex 1: | Superconducting Magnet |
| Annex 2: | Tracker |
| Annex 3: | Electromagnetic Calorimeter |
| Annex 4: | Hadron Calorimeter |
| Annex 5: | Muon Detector |
| Annex 6: | Trigger and Data Acquisition |
| Annex 7: | Offline Computing |
| Annex 8: | Infrastructure |
| Annex 9: | Commissioning & Integration |
| Annex 10: | Summary of Income and Payments expected in the year 2008 |

ANNEX 1

SUPERCONDUCTING MAGNET

Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
<u>Procurements from Common Fund</u>		<input type="text"/>
<u>Subtotal Procurements from Common Fund</u>		<input type="text"/>
<u>Payments to Contracts</u>		
<u>Package A (Barrel Yoke and Vacuum Tank)</u>	<u>Subtotal</u>	<input type="text"/>
<u>Package B (Endcap Disks)</u>	<u>Subtotal</u>	<input type="text"/>
<u>Package C (Superconducting Cable)</u>	<u>Subtotal</u>	<input type="text"/>
<u>Package D (Coil Winding)</u>	<u>Subtotal</u>	<input type="text"/>
<u>Package F (Assembly of Barrel & Vacuum Tank on the Surface)</u>	<u>Subtotal</u>	<input type="text"/>
<u>Package H (Swiveling Platform)</u>	<u>Subtotal</u>	<input type="text"/>
<u>Subtotal Payments to Contracts</u>		<input type="text"/>
<u>In-kind Contributions</u>		
<u>Subtotal In-kind Contributions</u>		<input type="text"/>
<u>OVERALL TOTAL</u>		<input type="text"/>

ANNEX 2

TRACKER

Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
<u>Pixel Detectors</u>	<u>2.1</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Silicon Detectors</u>	<u>2.2</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Electronics for Si Detectors</u>	<u>2.3</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Power Supplies for Si Detectors</u>	<u>2.4</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Mech. Struct. & Cooling for Si Detectors</u>	<u>2.5</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Monitoring for Si Detectors</u>	<u>2.6</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Data Acquisition for Si Detectors</u>	<u>2.7</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Installation of Si Detectors</u>	<u>2.8</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>OVERALL TOTAL</u>		<input type="text"/>

ANNEX 3

ELECTROMAGNETIC CALORIMETER Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	<u>Payments expected in 2008</u>
<u>Barrel</u>		
Electronics	3.1	30
	3.1.2	30
	<u>Subtotal</u>	30
<u>Endcaps</u>	<u>3.2</u>	
Crystals	3.2.1	6,585
Electronics	3.2.2	174
Mechanics	3.2.3	120
Assembly and Installation	3.2.4	200
Monitoring	3.2.5	72
Preshower	3.2.6	531
	<u>Subtotal</u>	7,682
<u>OVERALL TOTAL</u>		7,712

ANNEX 4

HADRON CALORIMETER Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
<u>Barrel</u>	<u>4.1</u>	
	Subtotal	<input type="text"/>
<u>Outer Barrel</u>	<u>4.2</u>	
	Subtotal	<input type="text"/>
<u>Endcap</u>	<u>4.3</u>	
	Subtotal	<input type="text"/>
<u>Outer Endcap</u>	<u>4.4</u>	
	Subtotal	<input type="text"/>
<u>Forward</u>	<u>4.5</u>	
	Subtotal	<input type="text"/>
<u>OVERALL TOTAL</u>		<input type="text"/>

ANNEX 5

MUON DETECTOR

Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
<u>Barrel Drifttubes</u>	5.1	
	<u>Subtotal</u>	<input type="text"/>
<u>Forward ME 1/1</u>	5.2	
	<u>Subtotal</u>	<input type="text"/>
<u>Endcap CSC</u>	5.3	
	<u>Subtotal</u>	<input type="text"/>
<u>Barrel RPC</u>	5.4	
	<u>Subtotal</u>	<input type="text"/>
<u>Forward RPC</u>	5.5	
	<u>Subtotal</u>	<input type="text"/>
<u>Alignment</u>	5.6	
	<u>Subtotal</u>	<input type="text"/>
<u>OVERALL TOTAL</u>		<input type="text"/>

ANNEX 6

TRIGGER/DATA ACQUISITION Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
<u>Trigger</u>	<u>6.1</u>	<input type="text"/>
	Subtotal	<input type="text"/>
<u>Data Acquisition</u>	<u>6.2</u>	
Event Filter	6.2.1	1,000
Readout Builder	6.2.2	1,300
DAQ Integration	6.2.6	500
	Subtotal	2,800
<u>OVERALL TOTAL</u>		<input type="text" value="2,800"/>

ANNEX 7

OFFLINE COMPUTING Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
<u>Offline Computing</u>	<u>7.1</u>	<input type="text"/>
<u>OVERALL TOTAL</u>		<input type="text"/>

ANNEX 8

INFRASTRUCTURE

Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
<u>Access and Survey</u>	<u>8.1</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>General Installation</u>	<u>8.2</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Cooling & Ventilation</u>	<u>8.3</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Safety</u>	<u>8.4</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Fixed Cranes</u>	<u>8.5</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>Shielding Systems</u>	<u>8.6</u>	<input type="text"/>
	<u>Subtotal</u>	<input type="text"/>
<u>OVERALL TOTAL</u>		<input type="text"/>

ANNEX 9

Commissioning and Integration Payments expected in the Year 2008 (kCHF)

	<u>CE-Ref</u>	Payments expected in 2008
Additional facilities for commissioning on	9.1	
	<u>Subtotal</u>	<input type="text"/>
Detector installation, opening and access	9.2	
	<u>Subtotal</u>	<input type="text"/>
<u>General Services</u>	9.3	
	<u>Subtotal</u>	<input type="text"/>
 <u>OVERALL TOTAL</u>		<input type="text"/>

ANNEX 10

Income and Payments expected in the Year 2008

	COMMON PROJECTS					SUB-DETECTORS					Infrastructure	Commissioning & Integration	TOTALS		
	Common Fund	Payments to Contracts	In-kind Contributions	Subtotals for Magnet	Offline Computing	Totals Common Projects	Tracker	Electromagnetic Calorimeter	Hadron Calorimeter	Muon Detector				Trigger and Data Acquisition	Totals Sub-detectors
Funding Agencies	MAGNET				OFFL	Σ						Σ	Σ		
Austria															
Belgium															
Bulgaria															
CERN										2,800		2,800		2,800	
China															
Croatia															
Cyprus							55					55		55	
Estonia															
Finland															
France - CEA							120					120		120	
France - IN2P3															
Germany															
Greece							300					300		300	
Hungary															
India							306					306		306	
Iran															
Ireland															
Italy															
Korea															
Mexico															
New Zealand															
Pakistan [A]															
Poland															
Portugal							50					50		50	
RDMS - Russia [A]															
RDMS - DMS															
Serbia															
Spain															
Switzerland - ETHZ															
Switzerland - PSI															
Switzerland - Universities															
Taipei							50					50		50	
Turkey															
United Kingdom							171					171		171	
USA - DOE															
USA - NSF															
Funds expected to be carried forward from 2007	-2,071			-2,071		-2,071								-1,529	-3,600
Income expected in 2008 plus funds from 2007	-2,071			-2,071		-2,071	1,052			2,800	3,852			-1,529	252
Planned payments							7,712			2,800	10,512				10,512
Funds expected to be carried forward to 2009	-2,071			-2,071		-2,071	-6,660				-6,660			-1,529	-10,260

[A] = Estimated 'Net Western Value.'

Shaded fields indicate that no contribution is expected in 2008 for this sub-detector from that Funding Agency