

# **Draft Budget for CMS Construction in the Year 2008**

## **INTRODUCTION**

This document summarizes the 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 completed.

This draft budget for the year 2008 is based on the overall planning as presented at this RRB. The budget shows a deficit due to missing pledges for covering the cost increase (steps) presented to the RRB meeting of April 2007.

The figures shown as "Income and Payments expected in 2008" in the Summary Table (Annex 10) are to be considered as best estimates at the present stage.

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 2008 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.

## **2. TRACKER**

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

## **3. ELECTROMAGNETIC CALORIMETER**

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

The Endcap crystals production should end in March 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.

## **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 requires funds for the purchase of filter farm units.

## **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 2.6 MCHF.

This is the amount not yet pledged by the Step 1 contributions (cf. CMS Global Financial Plan, CERN-RRB-2007-085).

It should also be noted that:

- (1) Many numbers shown as "Income and Payments expected" are current best estimates.
- (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 2008, 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**

### **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 &amp; 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>	
	<u>Subtotal</u>	
<u>Silicon Detectors</u>	<u>2.2</u>	
	<u>Subtotal</u>	
<u>Electronics for Si Detectors</u>	<u>2.3</u>	
	<u>Subtotal</u>	
<u>Power Supplies for Si Detectors</u>	<u>2.4</u>	
	<u>Subtotal</u>	
<u>Mech. Struct. &amp; Cooling for Si Detectors</u>	<u>2.5</u>	
	<u>Subtotal</u>	
<u>Monitoring for Si Detectors</u>	<u>2.6</u>	
	<u>Subtotal</u>	
<u>Data Acquisition for Si Detectors</u>	<u>2.7</u>	
	<u>Subtotal</u>	
<u>Installation of Si Detectors</u>	<u>2.8</u>	
	<u>Subtotal</u>	
<u>OVERALL TOTAL</u>		

# ANNEX 3

## ELECTROMAGNETIC CALORIMETER

Payments expected in the Year 2008 (kCHF)

### Barrel

Electronics

### CE-Ref

3.1

3.1.2

### Subtotal

### Endcaps

Crystals

Electronics

Mechanics

Assembly and Installation

Monitoring

Preshower

3.2

3.2.1

3.2.2

3.2.3

3.2.4

3.2.5

3.2.6

### Subtotal

## OVERALL TOTAL

### Payments expected in 2008

30

30

6,585

174

120

200

72

531

7,682

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>	
	<u>Subtotal</u>	
<u>Outer Barrel</u>	<u>4.2</u>	
	<u>Subtotal</u>	
<u>Endcap</u>	<u>4.3</u>	
	<u>Subtotal</u>	
<u>Outer Endcap</u>	<u>4.4</u>	
	<u>Subtotal</u>	
<u>Forward</u>	<u>4.5</u>	
	<u>Subtotal</u>	
<u>OVERALL TOTAL</u>		



# ANNEX 5

## MUON DETECTOR

Payments expected in the Year 2008 (kCHF)

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

# ANNEX 6

## TRIGGER/DATA ACQUISITION

Payments expected in the Year 2008 (kCHF)

### Trigger

CE-Ref

Payments  
expected in 2008

6.1

Subtotal

### Data Acquisition

6.2

Event Filter

6.2.1

1,000

Readout Builder

6.2.2

1,300

DAQ Integration

6.2.6

500

Subtotal

2,800

OVERALL TOTAL

2,800

# ANNEX 7

## OFFLINE COMPUTING

Payments expected in the Year 2008 (kCHF)

Offline Computing

CE-Ref

7.1

Payments  
expected in 2008

OVERALL TOTAL

# 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>	
	<u>Subtotal</u>	
<u>General Installation</u>	<u>8.2</u>	
	<u>Subtotal</u>	
<u>Cooling &amp; Ventilation</u>	<u>8.3</u>	
	<u>Subtotal</u>	
<u>Safety</u>	<u>8.4</u>	
	<u>Subtotal</u>	
<u>Fixed Cranes</u>	<u>8.5</u>	
	<u>Subtotal</u>	
<u>Shielding Systems</u>	<u>8.6</u>	
	<u>Subtotal</u>	
<u>OVERALL TOTAL</u>		

## 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>	
Detector installation, opening and access	9.2	
	<u>Subtotal</u>	
<u>General Services</u>	9.3	
	<u>Subtotal</u>	
<u>OVERALL TOTAL</u>		

# ANNEX 10

## Income and Payments expected in the Year 2008 (in kCHF)

	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								4,102				4,102	4,102 [A]
Income expected in 2008 plus funds from 2007								5,154			2,800	7,954	7,954 [A]
Planned payments								7,712			2,800	10,512	10,512
Funds expected to be carried forward to 2009								-2,558				-2,558	-2,558

[A]

Includes advanced funds as per the CMS Global Financial Plan, October 2007, CERN-RRB-2007-085

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