

# CMS

## CERN-Korea Meeting

23rd April 2007

Compact Muon Solenoid

**Introduction**

**Status of MoU Contribution**

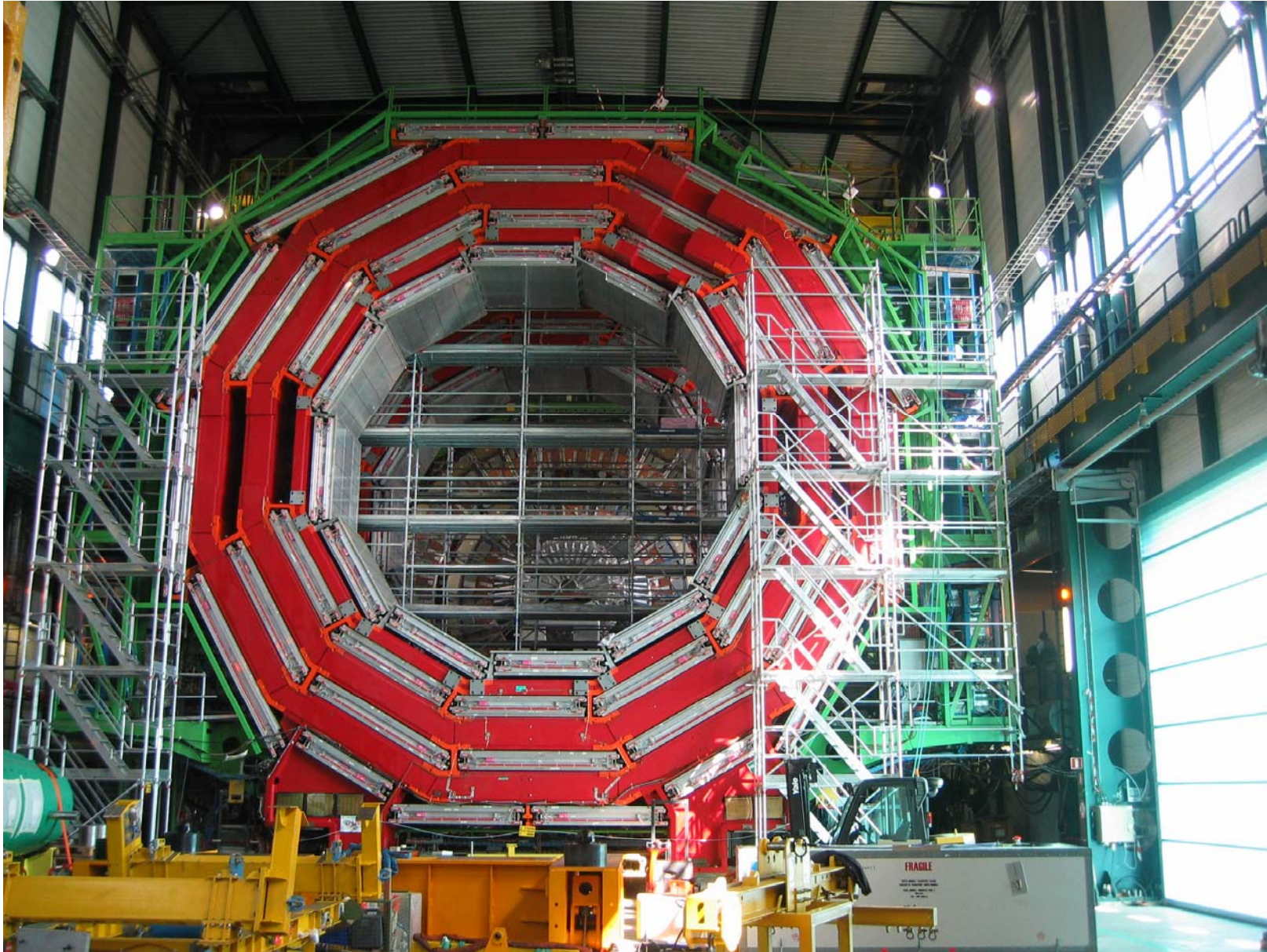
**Commissioning and Exploitation Phase**

**Completion of Design Luminosity Detector**

T. Virdee

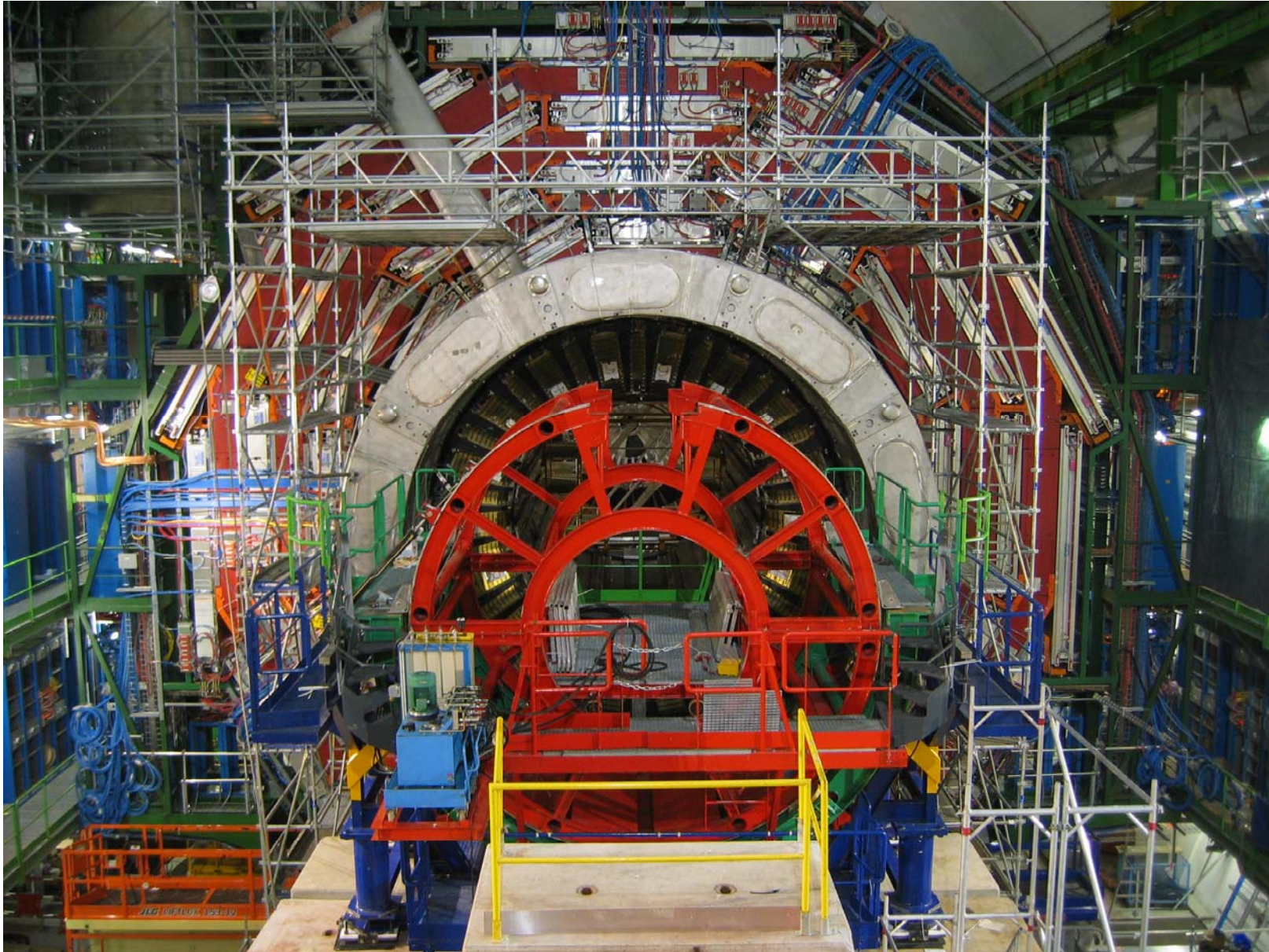


# Situation in the Surface Hall





# Situation in the Underground Cavern





# Installation of Off-detector Electronics: USC55



USC\_S1  
Tracker  
FEDs



USC\_S2  
ECAL  
RCT



USC\_S1  
Trigger  
Systems  
TTC  
DT HV



USC\_S2  
HCAL -  
HTR  
ECAL HV

**TKR:** FED > 50% installed  
**ECAL:** DCC 95% installed, HV installation started  
**HCAL:** HTRs installed, HV Installation proceeding  
HF+ being readout  
**RPC:** HV installation started  
**CSC & Trigger:** Installation well along  
**USC\_DAQ:** Installation finished  
**Connectivity tests almost completed for all sub-detectors.**



# Commissioning

**Two areas : hardware/online and offline**

**Plan to commission hardware at pit:**

Off-detector electronics and connection to central trigger and DAQ done

Full chain Front-end to data logging: tested for HCAL, planned in the next month for detectors connected to USC :CSC and DT

LV1 trigger: all hardware components available at Pt. 5. Check of trigger functionality and connectivity ongoing and so far successful.

**Schedule of Detector commissioning:** start commissioning of slices of systems and debug functionality of all 'components' (front end firmware, datalinks, trigger links, online software database, DQM etc)

**Plan of regular monthly global runs: First one end of May.**

Each "run" period will test increasing functionality and complexity of the system



# Preparation for Physics

## **“Papers CMS will write in 2008” using $\int L \cdot dt = 1 \text{ fb}^{-1}$**

This is a comprehensive list of all the actual papers that we will actually publish with the 2008 data

Think what are the elements necessary for each one of them

## **“Analysis topics to be worked upon in 2007”**

This is a subset of the topics in the “2008 papers”

Work on the preparation of all the tools, methods and organization (triggers, samples, people!) needed to carry out the 2008 program

## **“Write Papers in 2007”**

This is a subset of the “2007 analyses”

For a FEW analyses, walk all the way to a “publication”



# Overall CMS Schedule

## 1) Detector Installation, Commissioning & Operation

## 2) Preparation of Software, Computing and Physics Analysis

	March	
	April	
	May	
First Global Readout Test	June	HLT exercise complete
Barrel ECAL Inserted	July	
	Aug.	Pre-CSA07 Computing Software Analysis Challenge
Tracker Inserted	Sep.	CSA07
Trigger/DAQ Ready for Commissioning	Oct.	2007 Physics Analyses completed
CMS Ready to Close	Nov.	for Global Data Taking
All CMS Systems Ready		



# Korea in CMS

## Korean Contribution to CMS:

- Common Project (815 kCHF, manufacture of swiveling platform, etc.)
- Forward RPCs (500 kCHF, RPC gap manufacture)
- Online Data Acquisition hardware (500 kCHF, PCs and monitors, still to be realised)

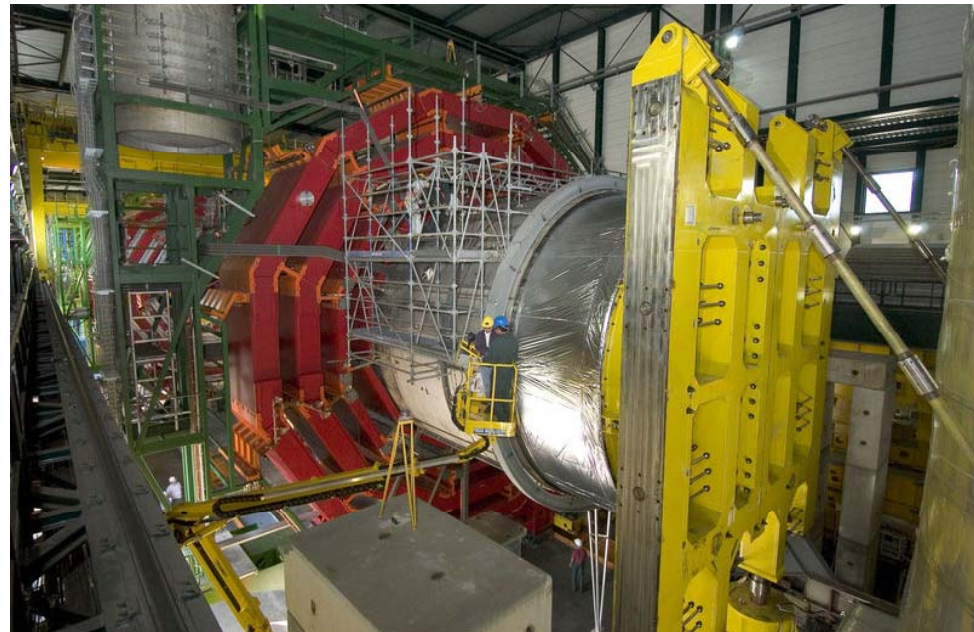
## Historical Perspective

- CERN-Korea Cooperation Agreement was signed in Nov. 2006
- Original MoU (1998) foresaw Korea making the full Korea Forward RPC (RE) system
- Due to lack of Funding the RE system was descope
- China and Pakistan joined in the construction of de-scoped RE system
- Korea has successfully manufactured all the gaps for the RE system.  
**This contribution has been vital.**
- Korea is just starting to contribute to the DAQ system.
- The full RE system has to be restored for design luminosity running in 2010-2011.**



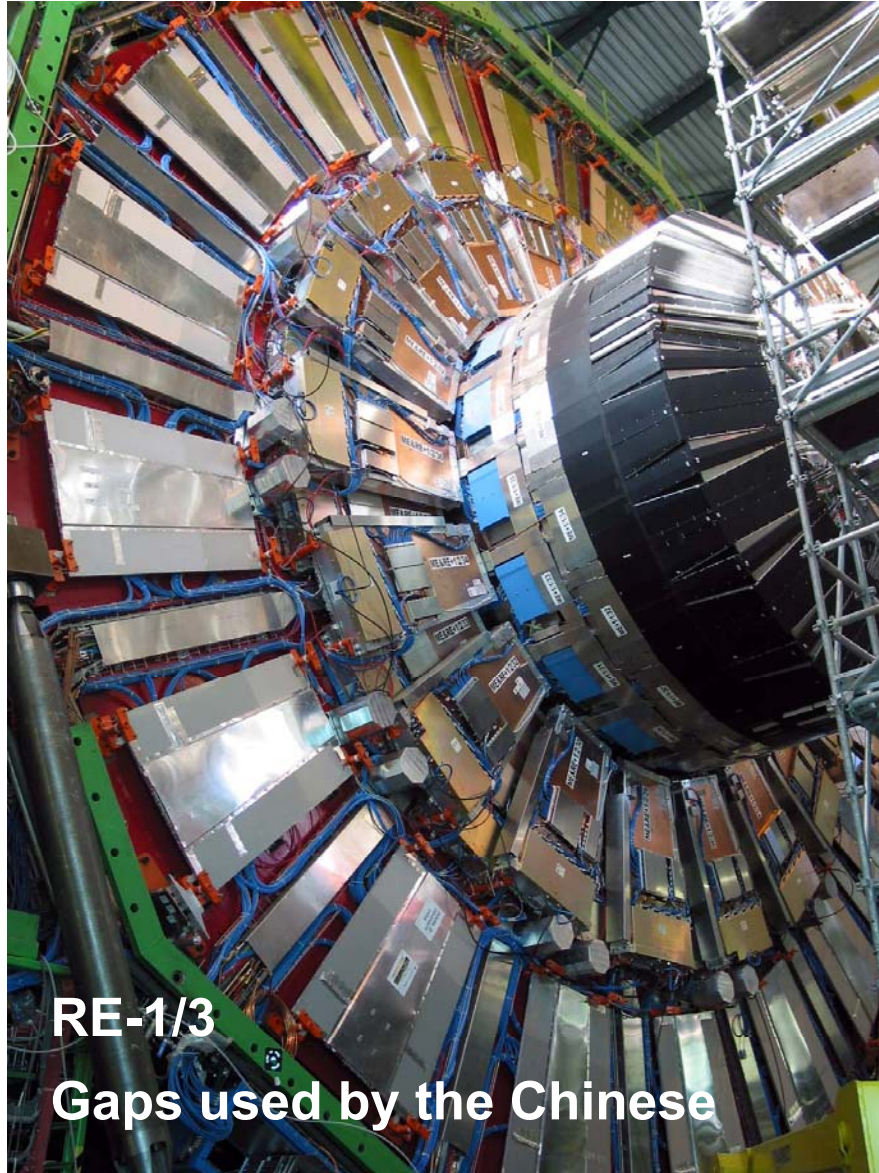


# Swivelling Platform - Insertion of Coil





# RPCs in the Endcap System



RE-1/3

Gaps used by the Chinese



Gaps used by the Pakistanis  
RE-2/2,3



# Exploitation of Physics

## CERN-Korea Fund

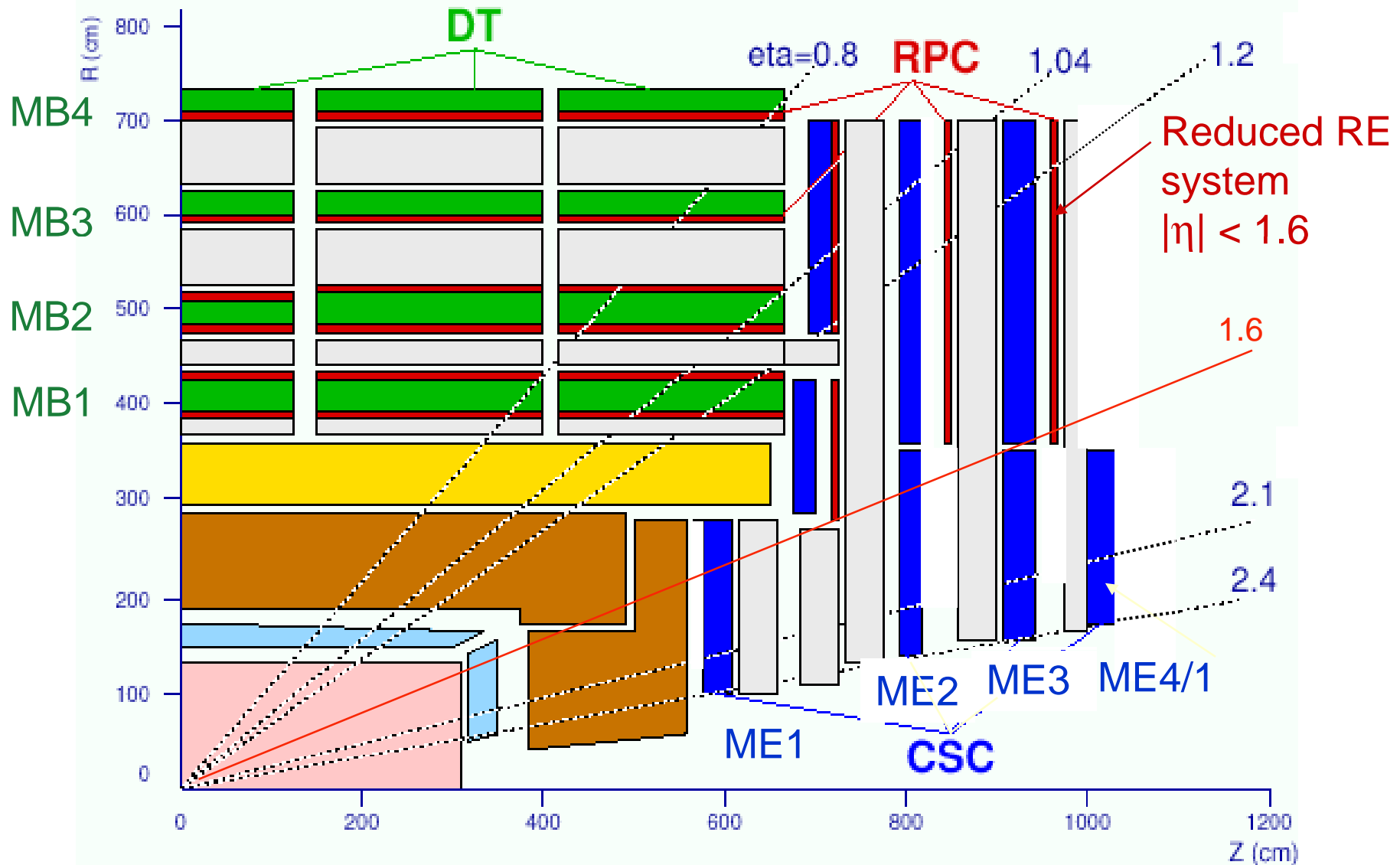
- CMS welcomes the creation of the CERN-Korea Fund (0.8 MCHF for CMS\_Korea) to be used for:
  1. Travel expenses and subsistence payments for visits at CERN
  2. Expenditures associated with the “Construction” and “M&O” MoUs
  3. Expenditures at CERN for material and equipment at CERN
  4. Expenditures at CERN for material and equipment to be used in Korea

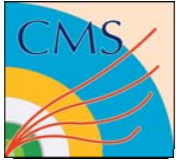
## Remarks

- In CMS, and HEP, Institutes and Countries take the attitude : “You commission, maintain and operate what you have built”.
- Furthermore physics exploitation is usually closely connected with the use of the hardware built.
- Natural for Korean groups to do the above for the RE and DAQ systems and follow through with work in HLT and physics using muons.
- CMS will do its best to help the Korean groups to integrate into, and contribute to, physics analyses.**



# Muon System





# Restoration of the RE System

CMS presented a Financial Plan to complete the construction of the Design Luminosity Detector. **All Funding Agencies are requested to provide their share of the remaining funds for completion.** Some countries were requested to provide in-kind contribution to restore the staged RE system.

**CMS requests Korea to manufacture the needed gaps, and RE1,2,3/1 Chambers, and associated trigger electronics.**

Money Matrix under discussion (kCHF)

<b>Table 3 CERN-RRB-2006-105</b>	<b>PhDs</b>	<b>Additional RE gaps</b>	<b>RE4/2, RE4/3</b>	<b>RE2a</b>	<b>RE1/1, RE2/1, RE3/1</b>	<b>Trigger</b>	<b>Sum</b>
<b>Cost</b>		<b>1,000</b>	<b>1,300</b>	<b>1,300</b>	<b>1,300</b>	<b>1,000</b>	<b>5,900</b>
<b>China</b>	13				to be decided	to be decided	to be decided
<b>India</b>	26			700		200	900
<b>Iran</b>	3			600		200	800
<b>Korea</b>	12	1,000			800	200	2,000
<b>Pakistan</b>	3		1,300			200	1,500
<b>Funding</b>	<b>57</b>	<b>1,000</b>	<b>1,300</b>	<b>1,300</b>	<b>1,300</b>	<b>800</b>	<b>5,200</b>



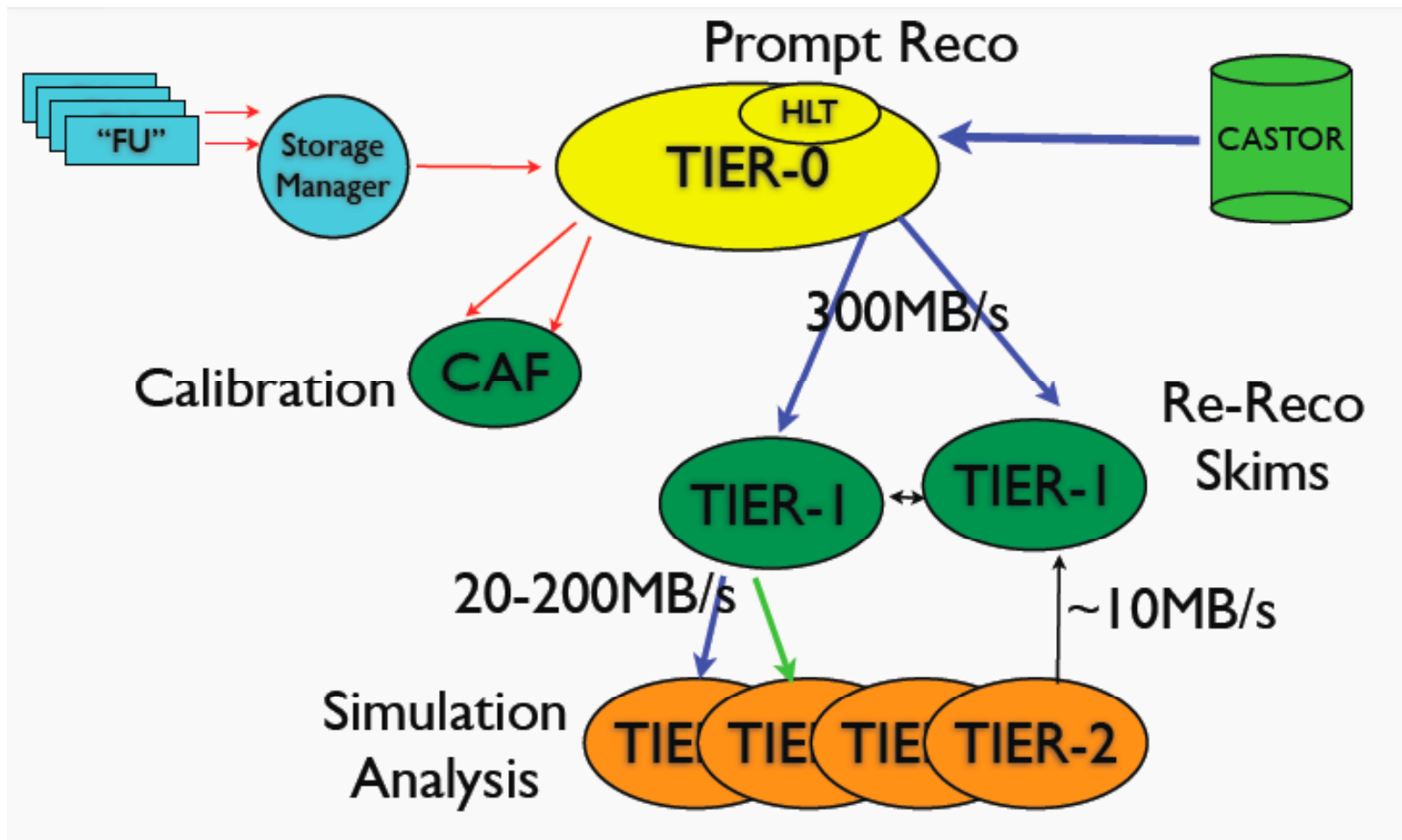
# CMS Computing Software and Analysis Challenge: CSA07

**A “50% of 2008” data challenge of the CMS data handling model.**

**1) Scaling:**

Need to reach 100% of system scale and functionality by Spring 08

**2) Transition to sustainable operations.**



**Table 2**  
**CERN-RRB-2006-105**

	PhDs	MoU Funding 2002	CTC1 RRB15 Oct02	CTC2 RRB20 Apr05	Constr. Funding 2006	STEP 1 Low Lumi (Constr.)	STEP 2 DAQ (PhD)	STEP 3 Rest (PhD)	Total Design Lumi
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Austria	11	3,900	600	275	4,775	211	45	171	427
Belgium	27	5,000	870	300	6,170	272	111	420	803
Brazil	9				0	0	37	140	177
Bulgaria	5	600	0	0	600	26	21	78	125
CERN	72	85,200	13,500	4,800	103,500	4,569	297	1,119	5,984
<i>China</i>	13	4,315	500	300	5,115				<i>in kind RPC</i>
Croatia	7	280	49	20	349	15	29	109	153
Cyprus	3	600	106	0	706	31	12	47	90
Estonia	2	90	16	6	112	5	8	31	44
Finland	12	5,000	870	300	6,170	272	49	187	508
France CEA	14	5,600	1,687	445	7,732	341	58	218	617
France IN2P3	38	19,700	2,000	2,000	23,700		2,000	0	2,000 <i>Pledg</i>
Germany BMBF	41	17,000	2,709	1,100	20,809	919	169	637	1,725
Germany DESY	5				0	0	2,000	0	2,000 <i>New</i>
Greece	17	5,000		0	5,000	221	70	264	555
Hungary	6	1,000	58	0	1,058	47	25	93	165
<i>India</i>	26	4,400	300	500	5,200				<i>in kind RPC</i>
<i>Iran</i>	3	510	700	0	1,210				<i>in kind RPC</i>
Ireland	1				0	0	4	16	20
Italy	181	55,000	8,927	4,000	67,927	2,998	746	2,813	6,557
<i>Korea</i>	12	1,315	500	147	1,962				<i>in kind RPC</i>
Mexico	5				0	0	21	78	98
New Zealand	3				0	0	12	47	59
<i>Pakistan</i>	3	2,445	230	149	2,824				<i>in kind RPC</i>
Poland	12	3,000		0	3,000	132	49	187	368
Portugal	5	2,000	300	140	2,440	108	21	78	206
RDMS	72	18,862	2,211	1,657	22,730	1,003	297	1,119	2,419
Serbia	3		450	0	450	20	12	47	79
Spain	34	6,000	1,350	450	7,800	344	140	528	1,013
Switzerland	30	86,500		200	86,700	0	124	466	590
Taipei	11	2,330	410	0	2,740	121	45	171	337
Turkey	18	1,000	58	0	1,058	47	74	280	401
UK	49	9,100	918	3,000	13,018	575	202	762	1,538
USA	418	104,320	12,800	1,868	118,988	5,252	1,722	6,497	13,471
<b>Sum</b>	<b>1,168</b>	<b>450,067</b>	<b>52,119</b>	<b>21,657</b>	<b>523,843</b>	<b>17,530</b>	<b>8,400</b>	<b>16,600</b>	<b>42,530</b>
<b>Requested</b>			<b>63,000</b>	<b>32,000</b>					



# Conclusions

- CMS is making very good progress towards completion of the Low Luminosity Detector.**
- We are entering a pivotal period in HEP, and Science in general.**
- Some of the most fundamental questions about Nature are most likely to be answered by CMS and LHC.**
- Korea is a full partner in CMS**
  
- CMS welcomes the setting of the CERN-Korea Fund and CERN-Korea Meetings.**
- CMS recommends that, as with other countries, the Korean contribution be formalised in an Annex to the Protocol. This would include the use of the CERN-Korea Fund and upon agreement the Korean contribution to the completion of the Design Luminosity Detector.**