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PRINCIPAL LHCC DELIBERATIONS

21ST MEETING OF THE CMS RESOURCES REVIEW BOARD

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This document summarises the principal LHCC deliberations concerning CMS at the Committee's sessions in May and June 2005.

The LHCC is currently reviewing the CMS Computing Technical Design Report.

CONCERNS FROM THE PREVIOUS CMS RESOURCES REVIEW BOARD

SUB-SYSTEM	CONCERN	STATUS
Silicon Strip Tracker (SST)	The SST continues to be on the critical path for completion of CMS.	Excellent progress was reported on the SST but the overall schedule remains tight.
ECAL	Crystal production for the ECAL Barrel and ECAL End-cap is on the critical path.	Production of crystals has improved but is still late with respect to the ECAL schedule. The production of crystals continues to dominate the ECAL schedule, resulting in a very tight time-line for the installation of the detector in CMS.
Muon Spectrometer	Problems with the availability of high voltage boards and MINICRATE electronics modules for the Drift Tube (DT).	Technical problems with the high fraction of defective boards have been understood and fixed by proper clock timing tuning. Production of the MINICRATE electronics is still driving the DT installation schedule. The LHCC endorses the CMS plan for an accelerated production of MINICRATES, which will gain two months' contingency in the schedule.

LHCC COMPREHENSIVE REVIEW

Since the fifth of the CMS Comprehensive Reviews in October 2004, the CMS Collaboration has made very significant progress towards the realisation of an experimental set-up ready for LHC operation in the Summer 2007.

It is realistic to expect CMS to install an initial working detector suitable for LHC operation starting in Summer 2007, although the completion of the detector installation can be foreseen beyond this date. The LHCC considers that the CMS schedule to achieve this is challenging. Excellent progress was reported on the construction of Electromagnetic Calorimeter (ECAL) and Tracker but their respective schedules remain tight. Good progress was also reported on the start of construction of the Resistive Plate Chambers (RPCs) RE2 and RE3 but their installation in CMS on the surface is tight. Installation of the ECAL End-cap (EE) and Preshower (ES) detectors is now scheduled for the 2007/2008 winter shutdown period. The Pixel Detector, although expected to be ready for the LHC pilot run, will also be installed during the 2007/2008 winter shutdown period to minimize risk of damage during the initial stages of LHC operation. The LHCC noted that additional resources, both in terms of money and manpower, would aid in accelerating the current CMS schedule, and thereby would ensure a timely completion of the initial detector in 2007.

The sixth annual LHCC Comprehensive Review of CMS took place on 27-28 June 2005. The LHCC referees addressed the following areas: Tracker, Electromagnetic and Hadronic Calorimetry, Muon Spectrometer, Trigger/DAQ, Computing/Software, and the topics of Management, Technical Coordination, Integration, Schedules and Costs.

The conclusions and concerns of the LHCC are given below. They will help the Committee to follow up outstanding issues and to monitor future progress of this project in forthcoming sessions of the LHCC prior to the next CMS Comprehensive Review one year hence.

- Excellent progress was reported on the Tracker Project but the schedule remains very tight. Technical problems with the sensors and Hybrid electronics have been solved and their delivery is advancing well. Production of modules and the assembly of the Tracker Inner Barrel (TIB), Tracker Outer Barrel (TOB) and Tracker End Cap (TEC) are progressing smoothly. The Tracker Project is overseen by a greatly improved organization and communication structure.
- Very good progress was reported on the ECAL electronics, sub-systems and testing activities. The production of crystals continues to dominate the ECAL schedule, resulting in a very tight schedule for the installation of the detector in CMS.
- Excellent progress was reported on the Hadron Calorimeter (HCAL) with no major concerns having been identified. The LHCC considers that the organization of work concerning the integration, commissioning and testing to be reasonable.
- Good progress was reported on all sub-detectors of the Muon Spectrometer – Drift Tubes (DTs), Cathode Strip Chambers (CSCs) and Resistive Plate Chambers (RPCs). However, delivery of the RPC Endcap RE2 and RE3 sub-detectors is delayed and the time for installation of the Muon Spectrometer is tight.

- Good progress was reported on the Trigger and DAQ Projects. Both projects are advancing according to schedule and no major concerns were identified.
- The software and computing structures have been re-organised to address the concerns expressed at the previous Comprehensive Review and the problems identified during the Data Challenge 2004. The LHCC endorses the proposed plan, whose ambitious milestones will need to be closely monitored. Successful testing of the computing and software infrastructure during the Cosmic Challenge is crucial and it is recommended that the Collaboration provides the appropriate support. Following the timely completion of the Computing Technical Design Report, work for the Physics Technical Design Report is underway.
- Good progress was reported on the magnet and the remaining surface and underground areas have been handed over to CERN. Preparations are well-underway for the magnet test and Cosmic Challenge on the surface. Some delays have been accumulated with respect to the baseline CMS Master Schedule v34.2 and additional resources have been requested to the CMS Research Review Board to consolidate the CMS schedule. It is realistic to expect CMS to have installed an initial working detector, without the ECAL End-cap (EE) and Pixel Detector, suitable for the first operation of the LHC starting in the Summer 2007.