

PRINCIPAL LHCC DELIBERATIONS

25TH MEETING OF THE CMS RESOURCES REVIEW BOARD

23 OCTOBER 2007

EMMANUEL TSESMELIS

SCIENTIFIC SECRETARY, LHCC

GENERAL

This document summarises the principal LHCC deliberations concerning CMS at the Committee's sessions in May, July and September 2007.

CONCERNS FROM THE PREVIOUS CMS RESOURCES REVIEW BOARD

SUB-SYSTEM	CONCERN	STATUS
Electromagnetic Calorimeter (ECAL)	Timely assembly of the ECAL End-cap (EE) and Preshower (ES) detector.	Over 50% of the EE crystals have been delivered and the last EE crystals are due to be delivered at the end of March 2008. Installation of the ES detector is expected to match the EE installation dates, but the completion of the ES is on a tight schedule.
YB0 Services	The CMS critical path goes through the installation of cables and pipes of the chambers on the central barrel yoke YB0.	Excellent progress has been made on the installation of the YB0 services. Following a slow start up, installation of services is now advancing well. Substantial additional manpower has been recruited from the Collaboration, providing invaluable assistance. Due to the earlier delays, the completion of the work for the YB0 services remains on the CMS critical path.

LHCC COMPREHENSIVE REVIEW

The eighth annual LHCC Comprehensive Review of CMS took place on 2-3 July, 2007. The LHCC referees addressed the following areas: the Overall Status and Issues; Tracker and Pixel Detector; Electromagnetic and Hadronic Calorimeters; Muon Spectrometer; YB0 Progress, Schedule, and Issues; Commissioning; Trigger, DAQ and Physics; and Computing and Offline.

Since the previous LHCC Comprehensive Review a year ago, the CMS Collaboration has made significant progress towards producing a detector ready for LHC operation in 2008. The past year saw all sub-detector groups successfully produce high-quality components and modules, and integrate them into the final objects to be installed into the CMS magnet. Installation and commissioning of final components in the CMS UXC55 cavern are well-underway. In particular, the heavy lowering of detector elements into the CMS experiment cavern is a major success.

The new CMS master schedule V36 incorporates the revised LHC machine schedule and includes an optimized detector sequencing. In spite of various delays, it remains probable that CMS will have an initial detector ready to exploit the initial LHC run in 2008. Installation of the Electromagnetic Calorimeter End-Cap (EE) and Preshower (ES) detectors is scheduled to be completed no sooner than July 2008 and CMS now plans to install the complete Pixel Detector for the 2008 LHC run.

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.

- The LHCC noted that there are no serious technical impediments to CMS completing the initial detector in time for the first LHC run in 2008. In view of the revised LHC machine schedule, CMS has produced a new version (V36) of the experiment's master schedule that includes known delays in the previous CMS schedule and optimized detector installation sequencing, resulting in much less risk in incurring large delays. To minimize the probability of delays during the endgame, the LHCC urges CMS to conduct a comprehensive risk analysis, prevention, and mitigation study, and not wait till a problem arises.
- Excellent progress was reported on the Tracker and the performance of the detector is of superior quality. Production of the Pixel Detector is advancing well and it is reasonable to expect the detector to be available at CERN by early 2008. Prior to its installation in CMS, the LHCC urges CMS to carry out a risk evaluation regarding the Pixel Detector with respect to beam failures.
- Good progress was reported on the Electromagnetic Calorimeter (ECAL) and Hadronic Calorimeter (HCAL). The first ECAL End-cap (EE) is scheduled to be installed in March 2008 and the second in July 2008. Installation of the Preshower (ES) detectors is expected to match these EE installation dates, but the completion of the ES is on a tight schedule. The HCAL has participated in a successful combined ECAL/HCAL beam test and Magnet Test and Cosmic Challenge (MTCC) at which a higher than expected noise level in the Hybrid Photo Detectors (HPDs) has been observed and is currently under investigation.
- Good progress was reported on the installation and commissioning of the Muon Spectrometer. The issue of demonstrating that the regeneration of gas by filters is made without dark current in the Resistive Plate Chambers (RPCs) remains outstanding and must be resolved.
- Excellent progress has been made on the installation of YB0 services. Following a slow start-up to the work, resulting in a one-month delay, installation of services on the YB0 is now advancing well and at present, the cable tray, pipe support infrastructure and balcony racks are ready. Substantial additional manpower has been recruited from the Tracker project and elsewhere, providing invaluable assistance to the effort.
- Good progress was reported on the commissioning of the CMS global read-out. The LHCC requests further details providing quantitative information on the status, progress and outlook in the commissioning area.

- Very good progress was reported in the area of Trigger and DAQ. Improvements to the High-Level Trigger (HLT) show that the CPU time per event on the HLT could reach the final aim of 40 ms. Preparations for the first LHC physics analyses are reasonable and are advancing well.
- A new organizational structure for the offline and computing projects has been put in place since January 2007 and includes the re-definition of goals and the involvement of new people. Good progress has been made in many areas of the offline software such as on the simulation, reconstruction, calibration and alignment, and more recently with the analysis toolkit. The commissioning of the global computing infrastructure for CMS is continuing with more emphasis currently in the preparation and validation of Tier-1/Tier-2 sites and services. The preparations for the Computing, Software and Analysis 2007 (CSA07) are on track and the CSA07 tasks have clear goals.

EXPERIMENT SUB-SYSTEMS

SILICON STRIP TRACKER (SST)

Since the Comprehensive Review, the commissioning of the Silicon Strip Detector (SST) on the surface has been completed and the detector is now ready for installation in CMS. Several million cosmic-ray tracks have been recorded over a period of five months, including periods at nominal operating temperatures. The installation has been pushed back to the end of October 2007 in order to allow the YB0 central magnet barrel yoke services to advance further.

ELECTROMAGNETIC CALORIMETER (ECAL)

Since the Comprehensive Review, installation and testing of the full Electromagnetic Barrel (EB) Calorimeter in CMS is complete. Production of crystals for the Electromagnetic End-cap (EE) Calorimeter is also progressing well and the integration of the first EE Dee is advancing smoothly.

BEAM RADIATION MONITORING

Good progress was reported on the Beam Radiation Monitoring (BRM) project. The LHCC considers it reasonable to expect that CMS will have installed a fully-operational set of BRM detector for the start of LHC operations in 2008, but much work remains to be done in the meantime.