OPEN SESSION:

1. ALICE Status Report: Juergen Schukraft
2. ALICE Physics Performance Report: Karel Safarik, Christian Kuhn, Ginés Martinez-Garcia, Mercedes López Noriega
3. CMS Physics Technical Design Report: Darin Acosta
4. MOEDAL Status Report: James Pinfold
5. RD42 Status Report: Peter Weilhammer

CLOSED SESSION:

Present: S. Bertolucci (Chairman), J.-J. Blaising, S. Dalla Torre, S. de Jong, J. Engelen, M. Gonin, J. Haba, F. Hemmer (representing J. Knobloch), V. Kekelidze, R. Landua, M. Mangano, R. Mankel, M. Martinez-Perez, C. Niebuhr, B. Peyaud, K. Potter, C. Rembser, S. Smith*, E. Tsesmelis (Secretary), R. Yoshida

* part-time

Apologies: P. Dauncey

1. PROCEDURE

The Chairman welcomed M. Robillard, the new Secretary at the LHCC Secretariat, to the Committee.

The minutes of the seventy-ninth LHCC meeting (LHCC 2005-040 / LHCC 79) and the report from the LCG Comprehensive Review (LHCC 2005-041 / LHCC-G-102) were approved.

2. REPORT FROM THE CHIEF SCIENTIFIC OFFICER

The Chief Scientific Officer (CSO) reported on the LHC Project. The installation of magnets in the LHC tunnel is advancing well and the corresponding installation rate is increasing. M. Ferro-Luzzi has been appointed LHC Programme Coordinator and the newly-created Commissioning and Running Advisory Group (CRAG) will provide priorities for the LHC physics running.

He also reported on the CERN Council Strategy Group. This Group has been set up on the initiative of the CERN Council to prepare a Draft Strategy Document aiming for unanimous approval by the CERN Council. This strategy should address the main lines of Particle Physics in Europe, accelerator-based and non-accelerator based, including R&D for novel accelerator and detector technologies. The strategy should also address the visibility of the field, the collaboration between the European laboratories, the coordinated European participation in world projects and knowledge transfer beyond high energy physics.
Finally, following approval of the Memorandum of Understanding for the LHC Computing Grid (LCG) in 2005, signatures from the various funding agencies are being solicited, committing the services of the various Tier sites.

3. REPORT FROM THE ALICE REFEREES

The LHCC heard a report from the ALICE referees, concentrating on the sub-detector progress and the schedule milestones.

The Committee heard a report on the ALICE milestones. Progress was reported on meeting the scheduled milestones but several critical milestones were missed in 2005. Of the missed milestones, four are considered to be very critical and concern the Inner Tracker System (ITS), the High Momentum Particle Identification Detector (HMPID) and the Muon System. Installation of the HMPID will start in July 2006 rather than in December 2005 as originally planned and a 2-month delay in the termination of cathode production was reported. The primary concern of the Muon System is with delays related to the delivery of the MANAS and MANU front-end electronics boards. Installation of the Silicon Strip Detector (SSD) and the Silicon Drift Detector (SDD) will start in ALICE in September 2006, while the Silicon Pixel Detector (SPD) will be installed in ALICE as of November 2006. The schedule to meet the ITS installation milestone is tight and all three ITS sub-systems are on the critical path. The primary concerns are with the on-time delivery of the SDD and the 'just-in-time' delivery of the cables for both the SSD and SSD. Start of installation of Transition Radiation Detector (TRD) modules has been delayed by 6 months to June 2006. TRD supermodule production has now started and all components are available. Installation and testing of the front-end electronics for the Time Projection Chamber (TPC) has started and is scheduled to be completed in March 2006. The ALICE Collaboration is putting every effort to recover delays in the sub-detectors and the LHCC will continue monitoring progress.

4. REPORT FROM THE ATLAS REFEREES

The LHCC heard a report from the ATLAS referees, concentrating on the general progress of the experiment and progress with sub-systems.

The referees reported on the status of the ATLAS sub-systems. Good progress was reported on the integration of the End-cap Toroid (ECT) magnet. The cold mass of the ECT-A is complete and integration with the vacuum vessel has started, while alignment of the cold mass of ECT-C is complete and shimming is in progress. However, the repair of faulty welds and the inclusion of additional thermal shields have caused a 3-month delay. ATLAS is preparing a plan to recover this delay. Production and testing of the Barrel Muon Detector is close to completion. Integration and installation of the Barrel Muon Detector is well underway and commissioning has started in the UX15 cavern. The corresponding work for the End-cap Muon Detector has started late and the schedule for completing Side-A has now become critical. ATLAS is preparing a plan to recover this delay. Repair of the Pixel Detector cooling pipes and staves is continuing, but concerns remain on the long-term effectiveness of the repair. The schedule to complete the repair is tight as the milestone to have repairs completed is the start of Layer-1 half-shell loading in March 2006. Good progress was reported on the Barrel Transition Radiation Tracker (TRT) and the detector is on schedule for installation in ATLAS. Progress was also reported on the low voltage and high voltage power supplies for the LAr and Tile Calorimeters but serious concerns remain. The continuing difficulties may result in not being able to power up the entire LAr Calorimeter during the cool-down tests, and commissioning of the Tile Calorimeter has paused until the outstanding issues with the associated power supplies are resolved.
The Committee also heard a report on the ATLAS software and computing. Many tasks for Service Challenge 3 were completed successfully in 2005 and preparation for Service Challenge 4 is in progress. The Event Management Board has been set-up and its charge and time scale of operation has been defined.

5. REPORT FROM THE CMS REFEREES

The LHCC heard a report from the CMS referees, concentrating on the status of work at Point 5, the reviews of the Tracker, Electromagnetic Calorimeter (ECAL) and Muon System and the preliminary report on the Physics Technical Design Report.

The referees reported on the status of work at Point 5. Steady progress was reported at Point 5, with work in the surface building SX5 and in the underground areas USC55 and UXC55 advancing well. After some delays due to final work and test on the vacuum tank, the cool-down of the CMS magnet is now progressing well and the completion of the magnet coil is now off the critical path. Preparations for the Magnet Test and Cosmic Challenge are advancing well. Lowering of the Barrel Yoke 0 (YB0) is a critical milestone following the magnet test and as such the installation of Drift Tube chambers and Barrel Resistive Plate Chambers (RB) is now on the critical path. The Committee also heard a report on the recent reviews on the Tracker, ECAL and Muon System. The Tracker still remains on schedule to meet the ready-for-lowering date of 1 December 2006. The Tracker Integration Facility is up and running and integration of the various sub-systems of the Tracker is advancing well. The Tracker resource-loaded schedule has been updated and the draft set of milestones will be agreed this week. The Committee considers that the next twelve months will prove to be very challenging. Good progress was reported on the ECAL. Delivery of good-quality crystals from BCTP is proceeding regularly. Crystals from SIC was stalled for two months due to quality problems concerning mostly insufficient radiation hardness and light transmission. Improved protocols have been put in place and preliminary studies on a new batch of crystals are promising. The required ECAL supermodule integration rate has been demonstrated, but throughput is still limited by the availability of components and the extra time needed to tune procedures to solve problems as they appear, as for example the observation of metallic dust. Installation of the End-cap Muon Detector is proceeding well. Cabling and commissioning of the Barrel Muon Detector has started slowly but the upcoming milestones for completion are reachable. Completion of the YB-1 and YB-2 might be hastened by investing in additional tooling and installation teams. The unavailability of RPC Link Boards presently limits testing to high voltage.

The LHCC took note of the submission of the CMS Physics Technical Design Report. Following further discussions with the CMS Collaboration, the referees will make a detailed presentation on the Technical Design Report at the next session of the LHCC.

The Committee took note of the updated CMS Master Schedule Version 34.3 and the accompanying milestones. The schedule remains very tight and challenging, as delays since the end of 2005 have further reduced the contingency in the schedule. To consolidate the schedule, settle the crystal procurement problem, and implement the new Tracker integration plan, CMS will soon need the 4 MCHF requested from the CMS Resources Review Board.

6. REPORT FROM THE TOTEM REFEREE

The LHCC heard a report from the TOTEM referee, concentrating on the status of the detector, the integration with CMS, the running strategy and the status of the TOTEM Memorandum of Understanding (MoU).

The referee reported on the status of the TOTEM detectors. The Engineering Design Review (EDR) of the Roman Pots, held in conjunction with the LHC Machine groups, concluded that the design is sound and the Review Committee approved production of the Roman Pot prototype. Moreover, the preliminary conclusions from the recent EDR of the GEM T2 telescope indicate that the design is sound, production of 40 GEM detectors should proceed, irradiation tests of detector materials should be performed
and tests with the GEM read-out with the existing version of the VFAT front-end electronics should be carried-out. An EDR will also be held for the Cathode Strip Chamber (CSC) T1 telescope, with a view of launching production of these detectors after the review. The production schedule for the CSCs is tight. Production of sensors for the Roman Pot stations is advancing with evaluation of two technologies - `guard ring’ sensors and `planar 3D’ sensors. Submission of the engineering run for the complete production of the VFAT front-end electronics is scheduled to start in March 2006. The production of the VFAT front-end electronics has a very tight schedule.

Progress was reported on integration issues with CMS. Solutions have been found for the mechanical and electronics integration of the TOTEM set-up with CMS and no significant technical problem has been identified. A common TOTEM and CMS Technical Design Report is being prepared for submission in June 2006, representing a 6-month delay from the original submission date.

TOTEM is preparing an updated running strategy for the experiment, based on new machine optics. A more detailed report will be given in a future session of the LHCC.

Preparations for finalizing the TOTEM MoU are advancing well. The aim is to sign the MoU at the April session of the Resource Review Boards.

7. REPORT FROM THE LHCf REFEREES

The LHCC took note of the submission of the LHCf Technical Design Report for the measurement of photons and neutral pions in the very forward region of the LHC. Following further discussions with the LHCf Collaboration, the referees will make a detailed presentation on the Technical Design Report at the next session of the LHCC.

8. REPORT FROM THE LCG REFEREES

The LHCC heard a report from the LHC Computing Grid (LCG) referees, concentrating on the status of the project since the previous Comprehensive Review.

Significant progress was reported since the previous LCG Comprehensive Review held in November 2005. The primary thrust has shifted to the transition from the development phase to the service phase. The CASTOR2 mass storage system has been deployed successfully and its architecture has been validated. Migration to CASTOR2 has commenced for the experiments and the procedure shall be completed by the end of February 2006. The Storage Data Manager SRM2.1 has been implemented and deployed, but certain issues need to be resolved before it attains its full functionality. A set of Grid service metrics, to be used to measure the services against the Memorandum of Understanding and which represent an important tool for monitoring, debugging and accounting, is being prepared but certain issue need to be resolved before the metrics can be used. The Service Challenges (SCs) are viewed as being invaluable processes to bring the developers and users together in an effort to arrive at a coherent system. The SC3 re-run proved to be successful in achieving the planned throughput. Certain issues were identified, including the need to ensure that people from the experiments are present at the sites, and that standardization, stability and reliability are important matters. Detailed planning for SC4 is being prepared and the LHCC will review the plan when it is complete.

9. COMPUTING TECHNICAL DESIGN REPORTS

The LHCC has completed its scientific and technical evaluation of the Computing Technical Design Reports submitted by the ALICE, ATLAS, CMS and LHCb Collaborations and by the LCG Project. The Technical Design Reports present the respective computing models and architectures and the current estimates of resources required to implement the models together with the associated schedules and milestones. The LHCC finds the system architectures proposed for the computing
adequate to achieve the physics goals stated in the Technical Proposals and 
congratulates the Collaborations and the LCG Project for the work presented in the 
Computing Technical Design Reports.

The Committee has no major concerns. Ancillary documents (LHCC 2006-005/G-105, 
provide more detailed comments and specific recommendations. The LHCC review 
was not an engineering review, although some engineering aspects were presented and 
discussed with the referees. The LHCC recommends that the Collaborations and LCG 
Project follow the established practice of conducting independent reviews of the 
engineering designs. Written reports should be made available to the LHCC through its 
referees.

Recommendation

The LHCC recommends general approval of the ALICE, ATLAS, CMS, LHCb and 
LCG Project Technical Design Reports. The LHCC considers the schedule and 
milestones given in the Technical Design Reports to be reasonable. They will be used 
by the Committee to measure and regulate the future progress of the projects.

10. REPORT FROM THE MOEDAL REFEREE

The Committee heard a report from the MOEDAL referee, concentrating on 
developments towards the final design of the MOEDAL experiment and towards the 
MOEDAL Technical Proposal.

The design of the MOEDAL experimental set-up is progressing. Contacts have 
established with the LHCb Vertex Locator (VELO) group concerning integration of 
the MOEDAL detector around the VELO. In order to proceed with the MOEDAL 
detector design, the detailed design of the VELO region crane system is awaited. Fast 
access to the VELO detector is ensured by the prompt removal of the MOEDAL 
detector panels and the entire MOEDAL set-up can be removed from the VELO 
region within a few hours. An air permeable frame for the MOEDAL detector will 
allow convective cooling needs to be assessed. The VELO group is working closely 
with MOEDAL to ensure proper passage of VELO services through the MOEDAL 
detector. MOEDAL and the LHCb VELO group agreed that that the MOEDAL 
detector will not be deployed before stable operation of the VELO detector is 
achieved. The LHCC encourages the MOEDAL collaboration to continue the design 
of their experimental set-up with a view of submitting their Technical Proposal by the 
end of 2006.

11. TEST BEAMS

The SPS and PS Coordinator reported on the test beams. He showed the slightly 
revised CERN Accelerator Schedule, where some activities have been shifted to adapt 
to the present LHC installation schedule. The CERN Accelerator Schedule will be 
presented to the next Research Board. Draft user schedules for beam time in 2006 at 
the PS Complex and at the SPS have been prepared and will be sent to the users 
shortly. No major conflicts have been identified. CNGS running will result in a reduced 
duty cycle for test beam users, but the impact on the test beam programme is expected 
to be minor.

12. LHCb COMPREHENSIVE REVIEW

The fourth of the LHCC Comprehensive Reviews of LHCb took place on 13-14 
February 2006. The LHCC referees addressed the following areas: Inner Tracker, 
Trigger Tracker, Outer Tracker, Vertex Locator, RICH Detectors, Calorimeter System, 
Muon System, Trigger & DAQ, Computing, Physics and the issues of Management, 
Technical Coordination and Schedules.
Since the previous Comprehensive Review in February 2005, the LHCb Collaboration has made very significant progress towards the realisation of an experimental set-up ready to record proton-proton collisions at the LHC. The LHCC expects LHCb to have a working detector installed in time for the beginning of LHC operation in 2007 provided the timely delivery of the sub-detectors and the smooth advancement of the production schedules is ensured.

Construction of final components is well underway. The spectrometer dipole magnet has been successfully commissioned and its magnetic field mapped. The Electromagnetic Calorimeter (ECAL), Hadronic Calorimeter (HCAL) and RICH-2 Ring Image Cerenkov Detector have been installed in the UX85 cavern. Installation of the infrastructure and technical services in the experimental area are well advanced. Issues concerning interference due to the installation of LHC Machine components around the LHCb experimental hall have been successfully handled. The LHCC noted as a concern the delays and resulting tight schedules in the production of the Vertex Locator (VELO), Inner Tracker, Trigger Tracker, RICH-1 Detector, Muon System, and in the Outer Tracker and Calorimeter front-end electronics.

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

- Good progress was reported on the Inner Tracker, Trigger Tracker and Outer Tracker. The tight schedules for Inner Tracker and Trigger Tracker and for the Outer Tracker front-end electronics remain as the major outstanding issues.
- Good progress was reported on the VELO, RICH Detectors and Calorimeters. Production of all detectors is either underway or complete and installation in the UX85 cavern has started. The major outstanding issues regard the tight schedules for the completion of the VELO module production, the RICH-1 spherical mirrors and the Calorimeter front-end electronics.
- Good progress was reported on the Level-0, High-Level Triggers, Data Acquisition and Experiment Control System.
- Impressive progress was made in the Muon System and the Computing project since the previous LHCb Comprehensive Review. However, the schedule for the production of modules and electronics for the Muon System remains tight, increasing the risk that the ready-for-installation milestone will not be met.
- The LHCC took note of the new organization structure for the physics activities and plans until the start of LHC data-taking and requests further details on the physics commissioning strategy for the initial LHC operation phase.
- Much progress was reported on the work in the UX85 experimental cavern. The LHCC considers that although the schedule is tight, it is realistic to expect LHCb to have a working detector installed in time for the beginning of LHC operation in 2007.

13. REFEREES
The LHCC referee teams are as follows:
ALICE: P. Dauncey, M. Gonin, J. Haba (Co-ordinator)
ATLAS: F. Forti, V. Kekelidze (Co-ordinator), R. Landua, M. Martinez-Perez
CMS: S. de Jong, R. Mankel, S. Smith (Co-ordinator), R. Yoshida
LHCb: S. Dalla Torre, C. Niebuhr, B. Peyaud (Co-ordinator)
TOTEM: S. Dalla Torre
MOEDAL: B. Peyaud
LHCf: M. Mangano, C. Niebuhr
14. DATES FOR LHCC MEETINGS

Provisional Dates for 2006:
22-23 March
10-11 May
28-29 June
27-28 September
15-16 November

The LHCC received the following documents:
- Minutes of the 79th Meeting held 16-17 November 2005
- LCG Comprehensive Review (LHCC-2005-041 / G-102)*
- Review of the CMS Tracker Project (LHCC-2006-003/G-104)*
- LHCf Technical Design Report ((LHCC-2006-004/TDR-001)
- Review of the Computing Technical Design Report for ALICE
  (LHCC-2006-005/G-105)*
  (LHCC-2006-006/G-106)*
  (LHCC-2006-007/G-107)*
- Review of the Computing Technical Design Report for LHCb
  (LHCC-2006-008/G-108)*
- Review of the Computing Technical Design Report for LCG
  (LHCC-2006-009/G-109)*

* restricted circulation