OPEN SESSION

1. LHC Status Report: Lyn Evans
2. WLCG Status Report: Ian Bird
3. RD39 Status Report: Zheng Li
4. RD42 Status Report: Harris Kagan
5. RD50 Status Report: Mara Bruzzi

CLOSED SESSION:


*part-time

Apologies: M. Mangano

1. PROCEDURE

The Chairman thanked the Chief Scientific Officer, Jos Engelen, for the magnificent job that he had done in wisely steering the LHC experiments through the construction, installation and commissioning period, leading up to LHC first beams.

The Chairman welcomed Horst Breuker who has been appointed as SPS and PS Physics Co-ordinator as of 1 January 2009 and thanked the outgoing Co-ordinator, Emmanuelle Perez, for her contributions to the Committee.

The minutes of the ninety-fifth LHCC meeting (LHCC 2008-016 / LHCC 95) were approved.

2. REPORT FROM THE CHIEF SCIENTIFIC OFFICER

The Chief Scientific Officer (CSO) reported on issues related to the LHC. Repair of LHC Sector 3-4 is well underway. The work required to be carried out is now known and detailed diagnostics are being developed as part of the inspection plan of the full machine. Details of the work will be presented to Council in December 2008 together with an update on the expected duration of the shut-down and the financial consequences that need to be taken into account. Access conditions to the underground areas need to be reviewed in order to mitigate the risk of an accident while allowing the experiments to carry out their work. The CSO also mentioned that the civil engineering work for LINAC4 has started.
3. REPORT FROM THE LHCb REFEREES

The LHCC heard a report from the LHCb referees, concentrating on the status of the experiment and the work scheduled for the LHC shut-down period.

The referees reported on the status of the experiment. All detector components took data during LHC first beam in September 2008. New issues which were identified and are being dealt with in order to achieve full functionality and reliability of the LHCb experiment are a) the replacement of Silicon Tracker modules that have broken bonds; and b) the modification of noisy Cockcroft-Walton bases of the Electromagnetic Calorimeter photomultiplier tubes. Moreover, work is on-going in the following areas: a) new beryllium beam pipe to replace the UX85/3 experimental beam pipe, which has small leaks; b) production of two replacement and two spare RF boxes for the Vertex Locator as the current RF box exhibits small leaks; c) fabrication of new TELL-1 read-out boards at new manufacturer to resolve bad via problem; d) continue studies on the origin of high ion feedback currents in the Hybrid Photo Diodes (HPDs) of the Ring Imaging Cherenkov (RICH) detector; e) further understanding of the Outer Tracker gain loss with heating and flushing of all chambers to be complete by the end of the shut-down; and f) complete the installation and commissioning of the M1 Muon Station. Moreover, improvements in the experiment control system, DAQ and monitoring system software are in progress. The CPU capacity of the DAQ system will be upgraded to the full nominal requirements. LHCb expects to complete the detector work by May 2009 and could take TED data resulting from interactions of injected beams on the beam stop in front of the LHCb detector whenever possible until LHC circulating beams are available.

4. REPORT FROM THE CMS MINI-REVIEW

The LHCC conducted the second Mini-review of CMS on 17 November 2008, consisting of a day of presentations and discussions with CMS management, and a visit to the Preshower construction site in Bldg. 186. The three foci of the review were: completion of the first-phase detector, progress of the Electromagnetic Calorimeter (ECAL) Preshower system, and detector commissioning with the first beam and with cosmic rays.

Detector and Magnet Construction and Performance

In the past few months all phases of the experiment have come together in the CMS cavern. The low-luminosity detector (minus the Preshower) was completed and tested successfully with cosmic rays and first beam. The magnet system performed flawlessly, but stray fields and magnetic forces were much larger than experienced two years ago on the surface, and up to 5 times those predicted by modeling. Stresses on parts of the detector and magnetic effects on LHC equipment limited initially the magnet operation to below 3 T. Extensive efforts are underway to reduce the fields to acceptable values, and also to reconcile measurements with calculations. By removing the CASTOR calorimeter, the part most affected, CMS brought the magnet to full field, and carried out a 4-week cosmic-ray run at 3.8 T (CRAFT) as well as various tests of the magnet. The only interruptions were caused by occasional failures of the cooling system. These interruptions caused around 10% inefficiency during the cosmic-ray data-taking and are being fixed over the shut-down. The LHCC congratulates CMS on its heroic efforts in conclusively winning a difficult and complex “end-game” to be ready to take high-quality data.

On the downside, the CASTOR calorimeter requires a major re-design to withstand the unexpectedly large magnetic forces. A solution is not yet in hand, so it is unlikely it will be reinstalled under the current LHC schedule. Fortunately, this system is not required for physics in the 2009 run. Similar concerns about TOTEM T1 Telescope are being addressed by CMS and TOTEM.

The LHCC took note of additional TOTEM issues troubling CMS, including activation of the TOTEM T2 Telescope cooling fluid. A joint CMS-TOTEM session will be
convened at the February LHCC meeting to make sure that TOTEM’s systems and plans, including the above, are compatible with CMS.

Finally, the Committee took note of the continuing dependence of CMS on expert teams to carry out maintenance and repairs, especially during shut-downs, and their concern that these needed resources may become unavailable in the future.

**Shut-down Plans**

CMS presented a detailed, well-thought-out plan for the shut-down, which the Committee strongly endorses. The main interventions include repairing the cooling systems of the Tracker and Forward Pixel Detector, replacing the few Hybrid Pixel Detectors (HPDs), that are especially sensitive to magnetic fields, repairing Barrel muon chambers and endcap Cathode Strip Chambers (CSCs), and solving the problem of increased leakage current in some of the End-cap Resistive Plate Chambers (RPCs), and installing the ECAL Preshower detectors. CMS also described a comprehensive program to improve procedures for opening and closing the detector, and to access components near the beam line. Safety of the detector and ALARA are prime considerations. The referees look forward to receiving a progress report at its February meeting.

**Preshower Construction and Schedule**

The Preshower group has been strengthened considerably as the ECAL and Tracker manpower has become available over the last year. Currently about 40 people are involved at CERN on ECAL assembly, representing about 25 full-time equivalent (FTE) personnel, including skilled and experienced technical manpower.

The assembly is taking place in the former TIF facility of the Tracker. All components are on hand, and one complete Dee has been assembled and tested. Another is almost ready. The schedule to finish all assembly and testing in January looks realistic if the goal of reducing the testing time from 2 weeks to a few days, by using the latest improvements in readout and hardware, works as expected. The schedule has 1 month contingency with 5-day work weeks and appears to be relatively safe. Quality assurance practices taken from the Tracker experience appears to be paying off with very few problems found at the testing stage.

The installation into CMS has been tested using the Preshower windows previously in July. However, since the Preshower installation now has to take place with the beam pipe in place, new tooling has been designed and some changes in procedure are envisioned for the actual installation. The off-detector electronics are mostly on hand and the software integration are well advanced.

**Commissioning with Beam and Cosmic Run at Full Field (CRAFT)**

Very good progress has been reported on the commissioning of the CMS detector using cosmic-ray runs with the solenoid operational at 3.8 T (CRAFT). The experiment ran continuously during four weeks and collected 370M events. In about 200M of these events, all sub-detectors were functional and read out.

The DAQ system showed a good performance with a reasonable efficiency (~70%) and a modest time required to start new runs. The prompt reconstruction of the data at the Tier-0 centre at CERN and the transfers to Tier-1 centres were carried out as expected.

The Collaboration has used the data to perform a first alignment of the Tracker, Pixel Detector, and Muon Chambers and a detailed study of the efficiency and timing of the RPCs. The result of alignment of the Muon Chambers from cosmic-rays agrees with the results of the photogrammetry. The occupancy plots indicate a good performance and understanding of both the ECAL and Hadronic Calorimeter (HCAL).

Modulo some noise observed in the RPCs and in the HCAL HPDs, currently under investigation, the CMS detector has been demonstrated to be ready to take high-quality physics data.
Overall Conclusion
The LHCC considers that CMS has made excellent progress in the detector and DAQ commissioning achieved during three periods of cosmic-ray runs and with LHC first beams. The CMS plan for the shut-down period is reasonable and includes the installation of the end-cap Preshower detector. The Committee considers it realistic for CMS to be completely ready for the first colliding beams in 2009.

5. REPORT FROM THE ATLAS REFEREES
The LHCC heard a report from the ATLAS referees, concentrating on the status of the experiment, the plans for the shut-down and the status of the upgrade planning.

The Committee heard a report on the status of the ATLAS experiment. A number of repairs and improvements are planned for the shut-down period and the ATLAS Collaboration is making excellent use of the shut-down. The failure of the front-end transmitters for the LAr Calorimeter appears to be the most serious recent development with the greatest schedule risk. The new transmitters for the Semiconductor Tracker (SCT) and the Pixel Detector front-ends are arriving and will be installed upon reception as access to the ATLAS detector is made possible. ATLAS would be in a position to install the remaining Muon Chambers if time becomes available in May/June 2009. The LHCC requests further details on the plans for replacing the low voltage power supplies of the LAr Calorimeter and the repair plans for the SCT and Pixel Detector cooling system. Given the number of complicated tasks, the LHCC urges the ATLAS Collaboration to proceed with caution and the Committee will monitor progress of the repairs during the shut-down period.

The referees also reported on the cosmic-ray data taking, the status of the data preparation and on the status of the software and computing. The ATLAS cosmic-ray data collection ran extremely efficiently. The referees noted that the software strategy and approach has become more effective. The software release schedule and strategy is reasonable. Good progress was reported on the alignment and calibration. The referees would like to see more work on the inter-detector calibration and on the resolution of the muon barrel alignment variation.

The LHCC also heard a report on the ATLAS upgrade planning. The plan to submit in 2009 both the Technical Design Report for the ATLAS Inner Barrel Layer and a Letter of Intent for the ATLAS experiment upgrade is reasonable. The LHCC urges ATLAS to consult available external expertise, e.g. from DØ, with respect to the Inner Barrel Layer.

6. REPORT FROM THE TOTEM REFEREES
The LHCC heard a report from the TOTEM referees, concentrating on the status of the detector and of the software and computing.

The referees reported on the status of the detector. Production of the Cathode Strip Chambers (CSCs) of the T1 Telescope is complete and assembly of one-quarter of the telescope is finished. Installation of the full T1 Telescope in CMS is scheduled for when CMS is closed in April 2009. Production of the Gas Electron Multiplier (GEM) modules is complete and production of the read-out and trigger components is approaching completion. Assembly of the full T2 Telescope is in progress and is expected to be installed in CMS between January and March 2009. All Roman Pots have been installed at the LHC with two fully-equipped Roman Pots installed on either side at 220 m. from the interaction point. TOTEM plans to equip all Roman Pot stations at this location by mid-March 2009. The availability of the read-out electronics remains a concern as the schedule is very tight. The Committee noted the aggressive planning needed to complete the assembly and installation of the T1 Telescope, the T2 Telescope and the Roman Pot Stations at 220 m. from the interaction point. Integration of the T1 and T2 Telescopes in CMS needs to be revisited in some detail. The LHCC requests that TOTEM submits a resource-loaded schedule for the completion of the TOTEM experiment together with a plan for the
requested physics run. A joint meeting between TOTEM and CMS has been proposed in order to better understand the schedule of the installation. Work on the offline software is advancing well. The simulation program is being prepared and Monte Carlo productions are being scheduled.

7. REPORT FROM THE LHCf REFEREES

The LHCC heard a report on the LHCf experiment, concentrating on the status of the experiment and its running scenario. Installation of the LHCf Arm-1 and Arm-2 calorimeters was completed in January 2008 and since then no major issues have been identified. Both the Arm-1 and Arm-2 calorimeters are functioning well. Moreover, fixed Front Counters were installed in front of Arm-1 and Arm-2 and have proven to be very useful to check the beam quality. The referees also reported that the LHCf computing and DAQ are well developed and work well and that the communication with ATLAS and the LHC machine is fully operational. The LHCf shut-down activities are well organized and include the installation of the remote-handling system, improvements to the offline software and DAQ and a cross-check of the Monte Carlo simulations with various codes. The LHCC took note of the memorandum submitted by LHCf concerning running at 14 TeV centre-of-mass energy. The LHCf physics measurement, as approved by the LHCC, is fulfilled at 14 TeV centre-of-mass energy. Should the 2009 LHC run at 10 TeV centre-of-mass energy exceed an instantaneous luminosity of $10^{31}$ cm$^{-2}$ s$^{-1}$, LHCf would be obliged to remove their detectors due to the risk of radiation damage. In such a case, LHCf requests that their detectors are re-installed during the 2009/2010 shut-down period in order to complete their data-taking at the nominal 14 TeV centre-of-mass energy. The LHCC will discuss this issue again when further details on the LHC schedule for the coming years is available.

8. REPORT FROM THE WLCG REFEREES

The LHCC heard a report from the WLCG referees, concentrating on the general status and issues of the project and the experiments. The LHCC took note of the Tier-1 and Tier-2 resources for 2009. Given the present understanding of the LHC schedule for 2009, the experiments consider that their estimates for their 2009 computing needs remain valid. Neither the experiments nor the WLCG Management could support any delay in the delivery of the pledged resources for 2009. Moreover, the Computing Scrutiny Group of the Resources Review Board (RSG) has reviewed the Computing Technical Design Reports and modifications since then and agreed with the requests by the experiments for 2009. The ATLAS computing needs differ substantially from those originally envisaged in the Technical Design Report, particularly in the heavier demands on CERN resources, the large event sizes and the increased number of derived data sets. The RSG believes that the ATLAS request for CERN resources (which is roughly a factor of two larger than originally requested in terms of both CPU and storage capacity) are largely justified but is concerned about the move away from other Tier-1 centres and urges ATLAS to re-examine the parameters of their computing model. Moreover, any increase in the allocation of CERN-based computing resources to ATLAS would have to come at the expense of the other experiments, since the total available resources are fixed. In addition, the RSG recommends that ALICE undertake a full assessment of how their physics reach might be affected should the requested computing resources not materialize fully. Finally, the CMS effort to improve the performance and to reduce the event size should be followed by all the experiments as they have a direct impact on the overall computing requirements. The LHCC recommends that the experiments keep their computing models updated as certain of the underlying assumptions might vary. The LHCC also took note of the WLCG software upgrades brought forward due to the earlier-than-expected LHC shut-down period. A mini-review of the WLCG will be conducted during February 2009 session of the LHCC and will be an excellent opportunity to examine these issues in detail.
9. REPORT FROM THE EXPERIMENT UPGRADE REVIEW

The LHCC heard a report on the LHC experiment upgrades. This session focused on the machine-experiment interface, and in particular on the collimation system and on the experimental beam pipes. The session brought very useful interchanges between the machine and experiment groups.

The referees reported on the status of plans for the experiment upgrades. The ATLAS Collaboration has decided that the only feasible option to upgrade its Pixel Detector for LHC Phase I running from 2012-2013 is to install a new, smaller radius beam pipe with an additional pixel layer inside the current B-layer. The ALICE Collaboration has also expressed an interest in a smaller radius beam pipe and Pixel Detector. Over the coming months an assessment will be made by the machine group to determine the minimum beam pipe radius that is realistically achievable with the machine optics and collimation scheme to be envisaged in LHC Phase I running. This is an essential step in establishing the feasibility of the ATLAS and ALICE Phase I pixel upgrade plans.

The referees also reported on various machine issues having a direct bearing on the experiments. The Committee took note of the ATLAS request to realise a spare beam pipe for ATLAS to be used in case of an accident that would spoil the LHC vacuum. This beam pipe would be inserted without removing the Pixel Detector. The LHCb experiment is limited to a few interactions per bunch crossing by its Trigger and Tracker detectors and further machine studies to optimize the bunch structure and to evaluate the feasibility of luminosity leveling are requested. LHCb also presented their plans for the upgrade to the Trigger and Vertex Locator. Moreover, the LHCC took note that additional R&D effort on machine elements such as crab cavities and dipole magnets would be required before proceeding to the Phase-II upgrade of the machine.

The Committee noted a request from the machine group that the maximum $\beta^*$ required for LHC physics running after Phase I machine upgrades be specified as soon as possible. The LHCC considers that a forum to discuss regularly upgrade issues between the machine and experiment is now needed. A mini-review of the LHC experiment upgrades is schedule for the LHCC’s next session in February 2009.

10. REPORT FROM THE ALICE MINI-REVIEW

The Committee heard a report from the second ALICE Mini-review concerning the current and foreseen shut-down activities and the general detector performance. Three cosmic-ray runs have been held during the last twelve months and during that period the experiment continued to make very good progress in the detector and DAQ commissioning and in solving the long-standing noise problems.

Forward Detectors

The neutron-proton and electromagnetic Zero Degree Calorimeters (ZDCs) are commissioned and ready for data taking. The T0 detectors were operational for the injection tests and saw the first LHC beams. A time resolution for the T0 detectors of 35 ps was measured, which is within specifications.

Firmware adjustments were needed to synchronize the V0 detector with the LHC clock, and modifications to the electronics have been identified. Noise issues on the A-side will also be addressed during the shut-down. After-pulses in the V0 photomultiplier tubes inducing fake triggers implies lower operating voltages and possibly a multiplicity requirement of at least two hits, rather than one, on each V0 side. The trigger efficiency reduction would then be at the level of 5%. The V0 is an essential component of the ALICE trigger system, and it is therefore very important that it becomes fully operational for first beam in 2009.

Only 25% of the Photon Multiplicity Detector (PMD) was installed and operated satisfactorily. The main reason is that a spark protection system was found to be necessary for its safe operation. All of the PMD modules are expected to be ready for installation before end of March 2009.
The entire Forward Multiplicity Detector (FMD) has been operational with beam. Clean MIP signals were observed at low intensity, and hit densities were derived from the total charge collected up to \( \sim 150 \) charged particles/cm\(^2\). Zero suppression was implemented in the front-end electronics, allowing an accepted trigger rate of 2.7 kHz at 40 MHz.

**Inner Tracking System, Time Projection Chamber, and Muon System**

Good progress on the Inner Tracking System (ITS) was reported. On average, more than 90% of the ITS channels are working and exhibit a very good performance. The remaining bad connections or dead channels will be fixed during the shut-down. The cooling problems for the Silicon Drift Detector (SDD) and Silicon Strip Detector (SSD) have been solved with the modification and repair of their common cooling plant. New problems regarding the Silicon Pixel Detector (SPD) cooling system were discussed and a solution seems to have been found. Upgrades concerning modifications of the pressure for the SPD cooling system will be carried out during the shut-down.

Very stable operation was reported for the Time Projection Chamber (TPC) over a five-month running period and very good progress in the calibration was achieved. The high-voltage sparks that occurred in the chambers have been identified to be due to impurity in the resistor rods. Modifications to the low voltage power supplies are complete but a new source of noise has arisen and is still under investigation. Repair interventions on the A-side front-end electronics and for the cooling system are scheduled for the next two months.

The main issue regarding the Muon Spectrometer remains the noise measured in the tracking chambers of the Stations 3, 4 and 5. The low frequency noise, roughly 300 Hz, was significantly reduced with the modification of the low voltage power supplies. The origin of the high frequency noise, roughly one MHz, is still unclear. Some fraction of the noise seems to be due to interferences with the Geometry Monitoring System (GMS) located in the same support panel as the tracking chambers. This GMS system is planned to be isolated from the tracking chambers during the shut-down. A repair of the low voltage bus bars on the MANU readout board is underway and expected to be complete in two months. These upcoming failures seem to be due to soldering problems not detectable before the transportation and the installation of the tracking chambers in the ALICE cavern.

**Remaining Central Region Detectors**

One Photon Spectrometer (PHOS) module was installed and operated with reduced performance at 18°C due to a serious humidity problem. The solution is to equip each module with an air-tight enclosure flushed with dry nitrogen. The schedule for the timely repair and completion of the five modules is very aggressive. In addition, noise problems were observed during the operation of the first module, which also need to be addressed.

The Time of Flight (TOF) detector is mechanically complete, and 17 out of the 18 supermodules (SMs) are flushed with gas. First observations with cosmic data show a very good efficiency, and triggers were provided by the TOF for the TPC, as well as pre-triggers for the Transition Radiation Detector (TRD). The time resolution achieved up to now is 160 ps, but a number of analysis improvements should allow the 100 ps goal to be achieved. A fix to the problem of DC-DC converters damaged in the magnetic field is underway.

Four SMs of the TRD have been operational in ALICE with good performance. Two modules developed gas leaks at an unacceptable level and will be repaired during the shut-down. The production of all the chambers is close to completion, but there is a new bottleneck at the level of the Read-Out Boards (ROBs). Some stress between the Multi-Chip Modules (MCMs) and the ROBs on which they are mounted developed during the cool-down phase. This problem is apparently due to unwanted changes made by the subcontractor, as the initial MCM batches did not show any such defect. Negotiations are underway, and it is clear how to proceed. Given the potentially large
delays involved, a detailed progress report at the LHCC session in February 2009 is expected. With the available parts, it is foreseen that four SMs could be installed during the shut-down, leading to a total of eight once the first two are repaired.

**DAQ and Trigger Commissioning**

The ALICE data acquisition has been assembled to a level of 40% design capacity. Most detectors were successfully integrated and algorithms have been developed for most sub-systems and stable operation was achieved with most sub-systems. The system is able to perform at 400 MB/s sustained recording rate, which should be sufficient for the first proton-proton run. 3 PB of data was read out in total and 350 TB were transferred to mass storage. Open issues include problems with the recording speed, which should be improved with a new version of ROOT. As expected from the commissioning of such a complex system, there are still occasional crashes due to corrupted data or sub-systems running out of synchronization. Furthermore, the feedback on data quality monitoring in the control room needs improvement.

The Central Trigger Processor (CTP) worked well during the cosmic-ray runs. A new switch was introduced which increases the number of inputs to the CTP. A SPD Level-0 trigger was introduced. Run-by-run information is now available via a new MySQL relational database, which also includes scaler settings and further monitoring parameters.

**Shut-down Activities**

The ALICE schedule was presented for the coming shutdown activities. The main goals are the modification of the Miniframe services, general repairs for all sub-detectors, installation of four to six new TRD modules and 2 new PHOS modules. The first EMCAL module should be ready for installation beginning of 2009. The work on the Miniframe services will continue until February 2009 on the surface. The purpose of the work on the Miniframe is to provide an easy access of the TPC A-side without taking out the Miniframe. The modification does not concern the structure of the Miniframe but just the location of some of the ITS patch panels. The Miniframe reinstallation is scheduled for mid-February 2009 and the reconnection of all detectors should be finished by end of March 2009. The modified Miniframe will require new installation procedures for the installation, which will remain a complex operation.

Very recent progress on noise studies shows that the ALICE ventilation unit, used for the ITS and Muon Spectrometer, might have significant noise contributions at high frequencies. The measurement of this noise effect in each detector is underway.

**Overall Conclusion**

The LHCC considers that ALICE has made very good progress in the detector and DAQ commissioning achieved during three periods of cosmic-ray runs. The Committee notes some risk for the timely commissioning of the V0 detector and expresses its concern regarding the readiness of the TRD and PHOS detectors for the 2009 LHC run. It is nevertheless realistic to expect ALICE to be completely ready for the first colliding beams in 2009.

11. **REPORT FROM THE RD39 REFEREES**

The LHCC heard a report from the RD39 referee on the collaboration’s programme concerning the operation of solid-state detectors at low temperatures and in a high radiation environment. The referee summarised the experimental results that RD39 has achieved on the development of such detectors and also described the proposed programme for future work.

The Committee took note of the good progress during 2008 in the study of such cryogenic devices for applications in future high energy physics experiments. RD39 has made considerable progress in characterizing and modeling the new Charge Injection Device (CID) operation mode for heavily-irradiated silicon detectors. The first test beam results with strip detectors operated in CID mode are encouraging and
the operation temperatures for these devices is approaching feasible levels for applications in LHC detectors.

The LHCC considers the proposed research programme for 2009, concentrating on test beams on heavily-irradiated CID strip detectors, new micro-strip sensor processing following ATLAS and CMS specifications, and the study of CID suitability for higher temperature operation, to be reasonable.

In order to continue their research programme, the RD39 Collaboration requests support from CERN and from the external funding agencies together with the use of CERN facilities, such as space and access to test beam set-ups. The Committee considers that solid-state detectors developed by RD39 are one of the options for the LHC experiment upgrades and their further development should be taken up by the experiments interested in such a technology. In order to share experiences and infrastructure, the LHCC encourages the RD39 Collaboration to work closely with other R&D projects. In view of the above, the CERN Physics Department agrees to continue providing support in terms of access to common CERN facilities such as laboratories and test beams.

Under the above terms, the LHCC recommends that the RD39 project be continued in 2009. A status report is expected to be submitted to the LHCC in one year’s time.

12. REPORT FROM THE RD42 REFEREE

The LHCC heard a report from the RD42 referee on the Collaboration’s programme concerning the development of intrinsically radiation-hard Chemical Vapour Deposition (CVD) diamond devices.

Good progress was reported for the past year. Large dimensions and large quantities of diamond-based detectors are now available. The collection distance is no longer an issue for polycrystalline (pCVD) material and large-area single-crystal (scCVD) has become a reality. Moreover, the understanding of radiation damage is improving. Diamond pixel modules have been prepared and tested for ATLAS. Such modules exhibit low noise, good performance and operate at room temperature and are being considered for use in the ATLAS upgrade plans. Finally, diamond-based beam monitors recorded successfully first beams at the LHC in September 2008.

The LHCC considers the proposed research programme for 2009, concentrating on studies of radiation hardness of diamond trackers and pixel detectors, production of pixel detector modules, beam tests with diamond trackers and pixel detectors and the further characterization of diamond, to be reasonable.

In order to continue their research programme, the RD42 Collaboration requests financial support from CERN and from the external funding agencies together with the use of CERN facilities, such as space and access to test beam set-ups. The Committee considers that diamond-based detectors are one of the options for the LHC experiment upgrades and their further development should be taken up by the experiments interested in such a technology. In order to share experiences and infrastructure, the LHCC encourages the RD42 Collaboration to work closely with other R&D projects. In view of the above, the CERN Physics Department is not in a position to cover the request for funding for 2009, but it agrees to continue providing support in terms of access to common CERN facilities such as laboratories and test beams.

Under the above terms, the LHCC recommends that the RD42 project be continued in 2009. A status report is expected to be submitted to the LHCC in one year’s time.

13. REPORT FROM THE RD50 REFEREE

The LHCC heard a report from the RD50 referee on the collaboration’s programme concerning the development of radiation-hard semiconductor devices for very high luminosity colliders. The referee summarised the experimental results that RD50 has achieved on the development of such detectors and also described the proposed programme for future work.
Good progress was reported for the past year. The Collaboration carried out work which provides confirmation of a planar detector’s suitability for a pixel detector at a future LHC experiment upgrade. Microscopic studies are beginning to provide results, but there is some way to go in gaining a full understanding of defect engineering. The compensating effects of various defects point towards certain technologies to be used for pixel detectors.

The LHCC considers the proposed research programme for 2009, concentrating on characterization of irradiation silicon, studies on high-quality double-column 3D devices, further exploration of irradiation effects at higher fluences and the production of epitaxial silicon on FZ substrate, to be reasonable.

In order to continue their research programme, the RD50 Collaboration requests support from CERN and from the external funding agencies together with the use of CERN facilities, such as space and access to test beam set-ups. The Committee considers that solid-state detectors developed by RD50 are one of the options for the LHC experiment upgrades and their further development should be taken up by the experiments interested in such a technology. In order to share experiences and infrastructure, the LHCC encourages the RD50 Collaboration to work closely with other R&D projects. In view of the above, the CERN Physics Department agrees to continue providing support in terms of access to common CERN facilities such as laboratories and test beams.

Under the above terms, the LHCC recommends that the RD50 project be continued in 2009. A status report is expected to be submitted to the LHCC in one year’s time.

14. TEST BEAMS

The LHCC heard a report from the SPS and PS Physics Co-ordinator. Due to the incident at the LHC on 19 September, it was decided to stop the North Area physics programme on 6 October rather than on the scheduled date of 12 November in order to bring forward the start of the LHC in 2009. The long intervention planned for the 2008/2009 shut-down concerns the replacement of cables in LSS2 needed for the extraction from the SPS to the North Area. In general, the LHC test beams worked fine and most groups achieved their goals although they were affected by the shorter running period. The draft SPS and PS accelerator schedule for 2009 has the physics programme at the East Hall starting on 23 April and that at the North Hall on 4 May, with both programmes terminating on 16 November. This is about four more weeks than in 2008. The deadline for submission of beam time requests was end of October 2008 and the 2009 physics programme is being drawn up. The users acknowledge the dedication and assistance of the SPS and PS accelerator, beam and experimental area teams.

15. REPORT FROM THE LHC PROGRAMME CO-ORDINATOR

The LHCC heard a report from the LHC Programme Co-ordinator. He recapitulated the incident of 19 September in LHC Sector 3-4 and summarized the primary repair work, which includes particularly the replacement and repair of dipole and quadrupole magnets as well as interventions on the beam vacuum system (cleaning of the beam pipes, control and repair of the plug-in-modules) and a systematic inspection of interconnects elsewhere in the machine. Issues of safety and access to the LHC experiment caverns are being reviewed in depth as are the running scenarios for 2009 and 2010.
16. REFEREES

The LHCC referee teams are as follows:

ALICE: M. Gonin (Co-ordinator), W. Kuehn, J.-F. Grivaz
ATLAS: J. Blazey (Co-ordinator), C. Cecchi, P. Mato, D. Pitzl
CMS: M. Martinez-Perez, S. Smith (Co-ordinator), R. Yoshida
LHCb: F. Bedeschi (Co-ordinator), C. Hawkes, A. Nomerotski
TOTEM, LHCf, MoEDAL: C. Cecchi, M. Mangano, P. Mato
LCG: J.-F. Grivaz, C. Hawkes, M. Martinez-Perez (Co-ordinator)

Experiment Upgrades:

Co-ordinator: D. Pitzl
RD39: D. Pitzl
RD42: A. Nomerotski
RD50: A. Nomerotski, R. Yoshida
RD51: W. Kuehn

17. The LHCC received the following documents:

Minutes of the 95th Meeting of the LHCC, held on 24 and 25 September 2008
LHCC-2008-016; LHCC-095
RD39 Status Report 2008
LHCC-2008-019; LHCC-SR-001
Memorandum to LHC 27 October 2008 from LHCf Spokesperson
LHCC-2008-020 – G-143

18. DATES FOR LHCC MEETINGS

Dates for 2009:

18-19 February
6-7 May
8-9 July
23-24 September
11-12 November (Note change of date made January 2009)

Emmanuel Tsesmelis
E-mail: LHCC.Secretary@CERN.CH
Tel. 78949, 164057

LHCC Secretariat: Morna Robillard (Bldg. 3/R-012)
Tel. 73224 morna.robillard@cern.ch