OPEN SESSION – STATUS REPORTS

1. LHC Machine Status Report: Mike Lamont (on behalf of F. Bordry)
2. LHCb Status Report: Mirco Dorigo
3. ALICE Status Report: Martino Gagliardi
4. ATLAS Status Report: Olga Igonkina
5. CMS Status Report: Silvia Goy Lopez
6. TOTEM Status Report: Hubert Niewiadomski
7. LHCf Status Report: Oscar Adriani

CLOSED SESSION:


Apologies: H. Burkhardt, R.-D. Heuer, E. Meschi, A.-L. Perrot, C. Touramanis

* part-time

1. EXECUTIVE SUMMARY

General

The Long Shutdown 1 (LS1) is proceeding well.

The update of the physics case for the Phase-2 upgrades is being prepared by ATLAS and CMS. A Phase-2 document with the cost matrix and scoping scenarios is under preparation by the experiments.

The forward physics programme of TOTEM/CMS and ALFA should be coordinated further. This should include the request for a special run for the measurement of the proton-proton total cross-section and low-mass states. Such a special run of one week total duration (including setting up of the LHC) should be accommodated in 2015, if possible.
LHCb

LHCC discussed in detail the LHCb Scintillator Fibre (SciFi) tracker. Many challenges were identified and are being successfully dealt with by LHCb.

ALICE

The LHCC considered the ALICE request for running at the intermediate proton-proton energy of 5 TeV in the centre-of-mass. The 22-day run is requested for Run II, at a time to be agreed for after the 2015 LHC run. The LHCC recognizes the physics motivation for a request to run at this energy and encourages ALICE to elaborate further the required luminosity and to discuss with the other interested experiments.

The Addendum to the Time Projection Chamber (TPC) Technical Design Report is expected to be submitted to the LHCC by the end of January 2015.

The Online and Offline (O^2) Technical Design Report will be submitted to the LHCC in June 2015.

The LHCC received an early draft of the Muon Forward Tracker (MFT) Technical Design Report and the final version will be submitted to the LHCC in January 2015.

ATLAS

The LHCC carried-out a review of the ATLAS Phase-1 upgrade projects. The Committee noted the overall 6-month delay in the Fast Track Trigger (FTK) project, although good progress was reported on the key AM06 read-out chip.

The isolation (ground loop) issue in the end-cap LAr system persists. ATLAS is continuing their investigations to resolve the problem.

The LHCC deems that the ATLAS Forward Physics (AFP) should receive further serious consideration within the ATLAS Collaboration.

CMS

The 25% of the Barrel Pixel (BPIX) modules in one quadrant that were found to be unresponsive have been repaired. The cause of the problem has been traced to excessive humidity and the lack of comprehensive temperature control during handling of the detector.

CMS is preparing the Technical Proposal for the Phase-2 upgrades and an update of the physics case will be submitted to the LHCC at its next session. The technical choice for the end-cap calorimeter is expected in the spring of 2015, roughly concurrently with the submission of the Technical Proposal.

TOTEM

The LHCC encourages TOTEM to proceed with the tests of the horizontal Roman Pots and the proposed timing measurements in the vertical Roman Pots.


LHCf

The LHCC took note of the LHCf operation plan for Run II and the joint operation and analysis with ATLAS.
CMS-TOTEM Precision Proton Spectrometer (CT-PPS)

The LHCC recommended for approval to the Research Board the project’s technical objectives. These objectives will be submitted to the Research Board in a short document supplementing the Technical Design Report (CERN-LHCC-2014-021) submitted to the LHCC.

WLCG

Individual projects from the recently-submitted document Update of the Computing Models of the WLCG and the LHC Experiments (WLCG-ComputingModel-LS1-001) still have to be defined, including their clear targets.

Pledges for computing resources for 2015-2016 have been secured and funding for the subsequent years is under discussion.

2. PROCEDURE

The minutes of the one-hundredth-and-nineteenth LHCC meeting (LHCC-2014-023 / LHCC119) were approved.

3. REPORT FROM THE DIRECTOR FOR RESEARCH AND COMPUTING

The Director for Research and Computing reported on issues related to CERN and the LHC.

He provided an update to the LHC experiment Phase-2 upgrades. He stated that it is inconceivable under any reasonable scenario to stop the LHC programme before the execution of its high luminosity upgrade, HL-LHC. The HL-LHC is also indicated as the top priority of the European Strategy for Particle Physics. The ATLAS and CMS Phase-2 upgrades are therefore necessary, with the goals of the Phase-2 upgrades being to retain the same experiment performance as in Run I but in a much more challenging environment. Discussions have been carried out at the October 2014 Resource Review Boards (RRBs). ATLAS and CMS were requested to submit to the LHCC Technical Proposals highlighting the physics case, with CORE costs of 200 MCHF, 235 MCHF and 275 MCHF and with a first money matrix. This procedure is to be completed by the October 2015 RRBs, after which the experiments could proceed to Technical Design Reports on individual detector components.

He also reported on CERN’s involvement in a future neutrino programme. The organization for a long-baseline neutrino facility in the US is being put together and the collaborations are invited to submit Letters of Intent and Conceptual Design Reports by summer 2015. The first module of the ICARUS detector has arrived at CERN and the second module is scheduled to arrive by the end of 2014. Discussions also continue for a short-baseline neutrino programme.

Finally, he reported that Fabiola Gianotti has been elected the next Director-General of CERN and will take office on 1 January 2016.

4. REPORT FROM THE LHC PROGRAMME CO-ORDINATORS

The LHCC heard a report from the LHC Programme Co-ordinators. The LHCC reiterated that the first priority for 2015 is the high-luminosity running with the aim of reaching an integrated luminosity of 10-15 fb$^{-1}$. The report concentrated on the requests by LHC experiments for special runs. Given the already tight commissioning and
physics schedules for 2015, careful scheduling of these runs is needed. The LHCC supports the LHCf run at $\beta^*=90$ m, to be done early in Run II in 2015 together with the van der Meer scans. The forward physics programme of TOTEM/CMS and ALFA should be co-ordinated further. This should include the request for a special run for the measurement of the proton-proton total cross-section and low-mass states. Such a special run of one week total duration (including setting up of the LHC) should be accommodated in 2015, if possible. Finally, proton-proton running at an intermediate energy for ALICE needs to be co-ordinated with ATLAS and CMS.

5. TESTBEAMS

The PS and SPS Physics Co-ordinator reported on the LHC test beams. He reported on the PS and SPS running period in 2014, with the physics programmes running smoothly at both the East Hall and the North Area. At the PS, the new irradiation facilities – the IRRAD proton irradiation facility and the CHARM mixed-field facilities – have been under commissioning with beam since October 2014 and with the first user experiments starting in November 2014. Installation of the new Gamma Irradiation Facility (GIF++) in the SPS North Hall is approaching completion with the source being installed and tested last week and commissioning with beam to start next week. Finally, he showed the LHC machine injector schedule for 2015, which includes an Argon-ion run for NA61 at the start and followed by a proton run and an LHC Pb-ion run. The calls for the 2015 PS and SPS fixed-target programmes have been launched and requests are due on 15 November 2014. The draft schedule for 2015 will be available in January 2015.

6. REPORT & DISCUSSION WITH LHC EXPERIMENT UPGRADE REFEREES

The upgrade session was dedicated to a general discussion of forward proton physics in the upcoming LHC Run II and beyond. Two distinct running conditions were discussed: special runs with high $\beta^*$ at low to medium pile-up, and normal running conditions at low $\beta^*$ for collider operations. Following the presentation on forward proton physics during the Open Session at the previous LHCC meeting, a summary of the forward physics opportunities was presented as an introduction to the session. The spectrum of physics measurements is quite broad and an essential part of the LHC programme. Measurements of the total cross-section, single diffractive processes and exclusive diffractive processes, among others, can be carried out with the forward proton programme. In addition, the programme allows for searches for low-mass resonances and glueballs and for the search for anomalous couplings, for example.

The LHCC heard a report describing the physics of the joint TOTEM special high $\beta^*$ runs with CMS. A one-week high $\beta^*$ run at low luminosity would allow the experiment to collect about 5 pb$^{-1}$ of data and prove or disprove the glueball nature of the f$_0$(1710) state, measure exclusive $\chi_c$ and J/$\psi$ production, including proton azimuthal correlations, measure the rapidity gap survival probability in several single diffractive processes and search for exclusive mass states. A one-week, high $\beta^*$ run at medium luminosity in the following year was proposed, allowing for the collection of 100 pb$^{-1}$ of data. This data set would enable the search of missing mass signals of processes with a cross-section of the order of a picobarn, allowing for the study of exclusive jet production and the study the quark content of the Pomeron.

The CMS-TOTEM Precision Proton Spectrometer (CT-PPS) is a project that would take data under general high-luminosity collider running conditions. The detector
consists of two tracking stations with pixel detectors and one station with quartz-based timing detectors in new Roman Pots. The project described its plan, which comprises two phases: an exploratory phase in 2015-2016 followed by a production phase. The main objective of the exploratory phase is to demonstrate that CT-PPS does not prevent stable operation of the LHC beams. To achieve this, it is proposed to evaluate the Roman Pots in 2015. Roman Pot insertion tests would be carried out in end-of-fill studies with the goal of finding an optimal set of positions of Roman Pots and collimators. The Roman Pots would be equipped with the TOTEM silicon strip detectors and in October 2015 the baseline quartz-based timing detectors would be installed and their performance evaluated. The project hopes to upgrade the tracking detectors to 3D pixel detectors in March 2016 and then also to upgrade the timing detectors if required. The last step in the commissioning is the integration of the CT-PPS detectors into the CMS trigger/DAQ system. In parallel, the project proposes to pursue an R&D programme based on the experience gained through physics data-taking. In particular, the project proposes to study the moveable beampipe as an alternative to Roman Pots. The project hopes to collect 100 fb$^{-1}$ of data before LS2. This would allow, for example, observation of exclusive WW production in the e$^-\mu^+$ channel with a signal-to-background ratio ranging from 1:3 to 1:8 depending on the pile-up conditions.

The ATLAS experiment described the status of ALFA (Absolute Luminosity For ATLAS) and the ATLAS Forward Physics (AFP) programme. The ALFA set-up consists of four stations of Roman Pots with eight detectors, 237 m and 245 m from the interaction point. The tracking technology employed is scintillating fibres. Neither the detectors nor the electronics of ALFA are radiation-hard. The maintenance of ALFA during Long Shutdown 1 has enabled an improvement of the tracking precision. Also, the distance between the stations was increased from 4 m to 8 m, a new trigger module was installed which allows using ALFA trigger signals for ATLAS triggering and the heat load on the detector was significantly improved. The AFP project is geared towards running at low $\beta^*$, high luminosity collider running. It consists of four Roman Pots with stations at 206 m and 214 m from the interaction point on both outgoing beams. The tracking detectors are based on the Inner B-Layer (IBL) sensors with FEI4 read-out and provide position and direction of each outgoing beam. The timing detectors will be located in stations at 214 m. A Technical Design Report for AFP is being prepared, but the project is currently delayed due to lack of resources. The AFP project would significantly improve the acceptance for events at small $t$ (four-momentum transfer squared) and is complementary with the physics reach of ALFA. The priorities for the forward physics programme is to complete the ALFA programme, running with $\beta^*$=90 m and measuring the total cross-section, elastic cross-section, elastic slope and nuclear dominance region. The ultimate goal of ALFA is to carry out these measurements at $\beta^*$=2.5 km. To accomplish this, new current return cables are needed for several quadrupole magnets.

The LHCC affirms that the forward physics programme is an essential complement of the LHC programme, with potential contributions to many areas, from perturbative QCD and non-perturbative dynamics to exotic Beyond Standard Model (BSM) searches. A complete quantitative assessment of the scientific prospects, in the context of specific measurements, remains nevertheless to be completed. Given the value to the physics programme, the LHCC endorses the planning of CT-PPS, ALFA and AFP as presented, with the details of the exact running scenarios to be worked out with the machine group and the other experiments. The LHCC strongly encourages a
synchronous AFP and TOTEM/CMS programme to provide parity and independent measurements, and in particular in view of special run requests that affect the overall LHC schedule.

7. REPORT FROM THE UPGRADE COST GROUP (UCG)

The LHCC heard a report from the UCG. The Chairperson of the UCG reiterated the scenario and motivation for the Phase-2 upgrades of the LHC experiments and the procedure for their approval and funding. The Chairperson also stated that enhanced procedures are clearly needed to continually evaluate costs and schedules for these Phase-2 projects. The UCG has agreed with ATLAS and CMS on a phased-approval process that includes a) approval of the preliminary designs for the complete set of Phase-2 upgrades, b) approval of final design, cost and schedule, c) approval of construction and d) approval for operations.

8. DISCUSSION WITH ATLAS

Introduction

Since the previous LHCC session in September 2014, ATLAS has published 12 papers and is within a few days of closing the detector in preparation for first beam in 2015. ATLAS was able to accomplish its entire suite of tasks for this long shutdown. During the November 2014 LHCC session, the Committee started a new process of examining in detail the ATLAS four Phase-1 upgrade projects, a process that is to be repeated annually during each November LHCC session.

Physics

In terms of physics, the ATLAS Collaboration has published 370 papers in Run I thus far. The experiment expects to publish another 20 or so papers this year and 20-30 papers in early 2015 before first physics collisions in Run II. After that, Run I papers will reduce as a number of small groups complete their work. In all, ATLAS will get close to 500 papers from the Run I data set. The LHCC noted in the Open Session a number of new results, including the \( H \to WW \) observation, \( H \to \tau \tau \) with a 4.5\( \sigma \) signal, highly boosted top quarks out to 1 TeV and W+jets differential plots comparing a suite of physics observables with simulation.

Long Shutdown 1 (LS1)

LS1 is approaching completion. At the time of the November 2014 LHCC session, ATLAS was within a few days of closing. Since the previous LHCC session, the beam pipe was baked out, 26 of the 27 muon Thin Gap Chambers (TGCs) were repaired and the Resistive Plate Chamber (RPC) leak fixes are progressing. The solenoid was commissioned, as was its new magnet safety system. Finally, Milestone 6 Week was successfully executed where the DAQ was run over night. All 14 Inner B-Layer (IBL) staves were read out at once for the first time and the trigger was ramped up to 100 kHz with most systems responding well. Milestone 7 Week starts next week (24 November) that will include full system integration and 24×7 control room operations. The toroid magnets will be available for the first time during Milestone 7 Week. ATLAS expects to collect 10k cosmic-ray events in the IBL and more than 100k in the pixel tracker. This data would allow 30 \( \mu \)m alignment resolution for modules that are well illuminated.
Computing

In computing, ATLAS has developed a new data management strategy where each data set has a well-defined lifetime based on an agreed algorithm. This will enable the offline group to manage both disk and tape much more easily. Once the model is complete, it will be used to predict future storage requirements. The new analysis model is now in place and is more efficient and user friendly. The offline group used the new workflows and software to produce 500 million Run I Monte Carlo events, 800 million Run II Monte Carlo events and reconstructed a significant portion of the Run I events. This data is now available for analysis.

Forward Physics

In terms of the forward physics programme, the ALFA (Absolute Luminosity For ATLAS) Roman Pots have been improved. The outer stations were moved away from the interaction point by between 4 m and 8 m and added ring ferrites to reduce RF losses, improved heat distribution from the Roman Pots to flanges and did a substantial amount of consolidation work. The AFP (ATLAS Forward Physics) was approved by the ATLAS Executive Board, subject to available resources, and the Technical Design Report is being prepared. Installation is foreseen for 2016/2017. The LHCC encouraged ATLAS to continue developing its forward physics programme and finds both the 90 m diffractive data with ALFA and the low-β* diffractive data with AFP to be compelling physics programmes. Furthermore, the LHCC strongly encouraged ATLAS to, if possible, remain on the same timescale as the joint CMS and TOTEM project and thus would need to expedite their 2016/2017 plan.

Phase-1 Upgrades

The Phase-1 upgrades are progressing well. There are a few delays scattered around the four upgrade projects with no major concern reported. The Fast TracKer (FTK) trigger is the project that is most behind its Technical Design Report schedule: overall progress is 6 months behind that aggressive success-oriented schedule. The associative memory chip Version 6 will be submitted in the coming few weeks. This is the one that will be used in production and the design is now complete. The Committee requested a list of milestones that each project expects to accomplish in the coming year and that would be used as a reference in December 2015 to evaluate progress.

Phase-2 Upgrades

The Phase-2 upgrade projects are in progress. Since the September 2014 LHCC, ATLAS has held an Upgrade Week. The new ATLAS Inner Tracker (ITK) had its initial design review and institute kick-off meeting. With the successful passing of those two milestones, the group now proceeds to become an upgrade project with an Institute Board. Its next step is to prepare a Technical Design Report with 92 institutes having expressed interest in contributing to this project. The Technical Design Report for the strip part of the ITK is expected in mid-2016 with the others following in mid-2017. The high-η task force established nine months ago is expected to report in spring 2015.

The funding agencies have requested both ATLAS and CMS to prepare a “scoping document”. The goal is to understand the physics performance versus upgrade cost. ATLAS will provide a “short” document looking at the range between 200 MCHF and 275 MCHF with a point also at around 235 MCHF. The LHCC recognizes the workload from a new physics run at a never before explored energy. It encourages ATLAS to keep the Phase-2 performance studies focused and the report compact. In
terms of next steps, the LHCC expects Technical Design Reports as the next documents from ATLAS – the first one on the silicon tracker expected in mid-2016 and the remainder to follow in 2017.

9. DISCUSSION WITH CMS

Physics

CMS has solid plans for accomplishing the major physics objectives with a focus on finishing Run I publications, pursuing upgrades and preparing for Run II. CMS has appointed a ‘physics officer’ responsible for each of these areas to assist the physics co-ordinator. CMS has 348 publications with a 100 additional analyses in review process, and with about 100 more in progress from Run I.

Long Shutdown 1 (LS1)

The work scheduled for LS1 is considered an underpinning for the long-term operation of CMS. As outlined in previous LHCC sessions, the programme of work had the following major elements: (1) muon system upgrades, including the installation of the 4th layer end-cap Cathode Strip Chambers (CSCs) and Resistive Plate Chambers (RPCs) and the YE4 shielding wall, plus upgrade of the M1/1 CSC front-end electronics and placement off-detector of part of the barrel muon electronics; (2) the first stage of Hadron Calorimeter (HCAL) photo-detectors consolidation/upgrade (HCAL Outer HO, HCAL Forward HF); (3) tracking system upgrades and consolidations including the installation of the 45 mm outer diameter beam pipe, necessary for the installation of the pixel tracker upgrade. A key priority for the shutdown was to enable the tracker to operate 30 °C colder than its current operating temperature. Without this intervention its performance degradation due to radiation would become significant beyond 500 fb⁻¹; (4) installation of optical splitters in the Electromagnetic Calorimeter (ECAL) and CSC read-out to allow commissioning of the trigger upgrade in parallel to operation and (5) installation of a new central DAQ system (DAQ2) addressing the replacement of computing and network equipment for future connectivity and the support of sub-detectors with new µTCA back-end electronics.

The LS1 work continues to progress, with most projects now completed as CMS enters Phase 10 of the work plan, completing the major milestone of the beam pipe bake-out.

During final pre-installation check-out, 25% (47/192) of Barrel Pixel (BPIX) modules in one quadrant were found to be unresponsive. This half-shell was transported to PSI for evaluation and repairs. Technical Co-ordination developed a plan that will enable the installation of the pixel detector starting in December 2014 while continuing to pursue a magnet test in November 2014. The detector closure was completed as planned, taking a month. The magnet ramp occurred without incident, with stable operations at 3.8 T for 36 hours. Cosmic-ray data at 3.8 T was collected with the available sub-detectors. As expected, this test provided a needed shake-down that will prevent problems during the final closure prior to colliding beams.

The BPIX half-shell has been repaired, with 40 new modules and 19 repaired modules. An installation review is scheduled for barrel & forward pixels, the Beam Conditions Monitors (BCM) and the Pixel Luminosity Telescope (PLT). The barrel pixel installation is scheduled for 9 December 2014. Technical Coordination is assessing the trade-offs of installing the Forward Pixel detector before or after the end of the year as a local optimization concerning schedules. Both options are consistent with the long-
range schedule. The final closing for this shutdown period will occur after the trackers are fully commissioned. The final schedule for pump-down and cosmic running at 3.8 T before beam will be determined during the machine and experiments schedule review in January 2015.

Run I Preparations

For trigger coordination, the challenge is to keep the same acceptance for Standard Model (e.g. Higgs) physics, and full sensitivity to new physics as in Run I, while coping with increases in luminosity at the same time as an increase in cross-sections due to the increased beam energy. The luminosity and energy increases will lead to higher pile-up, increasing the CPU time/event, requiring optimization of CPU-intensive code. The Level-1 trigger menu will utilize improvements in the hardware. The first full menu aimed at pile-up of 40 PU and bunch crossing of 25 ns is now implemented in CMS simulation and is being tested and CMS is now testing trigger conditions for lower luminosity conditions. The High Level Trigger (HLT) algorithm development is in the final stages and the HLT farm upgrade tender is in progress.

The computing systems are seeing good utilization with the sample generation and reconstruction for Run II and the Phase-2 Upgrade Technical Design Report. Three key demonstrations were planned for the computing infrastructure. The first two are completed, and the lessons learned are being incorporated in the systems. The next major exercise is the physics-focused analysis exercise (PHY14) that will target high-priority analyses and will conclude with reports at CMS Week in Miami in mid-December 2014. Based on that exercise and with the planned release of the CMSSW_7_3 in January 2015, the final step is Run II sample validation for beam readiness.

Phase-1 Upgrades

The Phase-1 upgrades include the construction of a new pixel detector, installation of new photo-detectors and electronics for the hadronic calorimeter and a new Level-1 (L1) trigger system.

For the L1 trigger system, the plan is to have the parallel data path for the ECAL fully installed and commissioned by March 2015. The legacy calorimeter trigger has been re-commissioned and is participating in the CMS runs.

Phase-2 Upgrades

The outline of the proposed Phase-2 upgrades is to replace detectors and components that will suffer from radiation damage and to investigate increased forward coverage, increased granularity and enhanced trigger capability for high-luminosity operation. The tracking system and end-cap calorimeters will be replaced. For the muon system, the end-cap CSC stations will be completed with new detectors (Gas Electron Multiplier (GEM) detectors and RPCs) possibly also extending the coverage in the forward direction. The front-end electronics will be replaced on the barrel ECAL and on parts of the muon system. The L1 trigger will include tracks, requiring a latency of more than 12.5 µs; and the new detector read-outs will be designed to allow an input rate to the HLT up to 750 kHz. With a similar reduction factor as in the present system, the HLT output rate would reach up to 7.5 kHz.

Technical Design Reports for each upgrade project requiring major construction efforts are expected in 2016-2017. The upgrade organization has been refocused on Phase-2 upgrades and significant effort is invested to prepare supporting studies for the
Technical Proposal within a tight schedule that is concurrent to the Run II preparation. Technical Co-ordination is also devoting considerable attention to the planning of installation work during Long Shutdown 3 (LS3), anticipating some of the upgrades with preparatory work in Long Shutdown 2 (LS2) could provide the necessary contingencies to maintain the proposed 30-month LS3 duration.

CMS plans to replace the End-cap ECAL for Phase-2 due to radiation damage and is investigating two concepts. The first is an Electromagnetic End-cap (EE) calorimeter built in a Shashlik design and a Hadronic End-cap (HE) Calorimeter rebuild. The second is a High Granularity CALorimeter (HGCAL) integrating EE and HE functions based on the CALICE concept with a Back HE to capture energy tails. The technical decision for the end-cap calorimeter technology is expected in early spring 2015, concurrent with the formal submission of the Technical Proposal.

CMS has described the overall program for Phase-2 in a draft Technical Proposal that was circulated privately to the CMS referees in August 2014 to get some preliminary feedback. An update on the physics case and Technical Proposal was made at the November 2014 LHC meeting, with a formal submission of the Technical Proposal to the full LHCC for discussion at the March 2015 meeting. As agreed in the November 2014 session, CMS will also produce a scoping Phase-2 document in summer 2015 showing the physics and detector trade-offs within a funding envelop of 200 MCHF to 270 MCHF.

For the physics justification in the Technical Proposal, Monte Carlo samples in key physics channels at the High-Luminosity LHC (HL-LHC) are being generated. These processes, documented in an ECFA workshop report, include Higgs properties and rare processes, Standard Model measurements, and Beyond the Standard Model (BSM) topics. Full CMS simulations for performance are being generated at the sub-system level, the objects level (including trigger) and physics signatures. The samples generated include a ‘Phase-1’ configuration with no aging and 50 PU to serve as the reference for target performance. A ‘Phase-1’ configuration with 1000 fb$^{-1}$ and 140 PU is used to demonstrate the performance degradation that motivates the need for the upgrades. The Phase-2 performance is simulated with a mix of aged and new systems as would be the case after the Phase-2 upgrade. CMS has produced a matrix of detector upgrades against the benchmark channels that will be instrumental in showing the physics impact in the scoping document including possible staging. CMS has been developing the software tools necessary to prepare a complete and comprehensive physics case for the proposed upgraded detectors, including a Phase-2 simulation package. In particular, the new ECAL amplitude reconstruction is well-advanced. The algorithm reconstructs amplitudes of overlapping pulses from neighbouring bunch crossings to match the pulse shape. This algorithm reduces out-of-time pile-up to a negligible level and this method will be used for Run II. The details of a new HGCAL clustering scheme were also presented.

10. DISCUSSION WITH LHCb

Physics

The scientific production of the LHCb Collaboration proceeds well, as proven by the LHCb reaching 200 published papers. During 2014, 70 papers were submitted, accepted, published and another 19 are under final internal review. Many new results were presented at the Open and Closed Sessions of the LHCC such as: (i) the discovery of two new $\Xi_b^-$ baryon states, (ii) a 3 fb$^{-1}$ measurement of the CP violation in
B^0_s \to J/\psi K^+ K^- and combination with the one in B^0 \to J/\psi \pi\pi, thus improving the
result on the $\Delta \Gamma_s$ and $\phi_s$ plane, (iii) a search for signs of new physics in the CKM plane
by setting limits to the Penguin contribution to the $\beta$-angle in $B^0_s \to J/\psi \rho$, (iv) an
improvement of their limits on $\tau \to 3\mu$, (v) the production cross-section of the $B^+_c$ at
8 TeV, (vi) the measurement of $Z + b$ jet cross section and much more. Many other
benchmark modes will be soon updated to 3 fb^{-1} and preparation for the 2015 analysis
is under way. The LHCC took note of the details regarding the Precise Luminosity
method used by the experiment that is based both on the standard Van Der Meer
(VDM) scan and on their own Beam Gas Imaging (BGI) method. The latter technique
uses neon injected in the beam pipe to reconstruct the beam shape looking at the
reconstruction of Beam Gas interaction vertices as seen by the VELO. The best result
obtained for the 8 TeV running showed a combined precision on the luminosity of
1.12 % (1.43% BGI, 1.47% VDM); this translated in a very high precision on the
inelastic cross-section determination, as estimated by the events with a reconstructed
vertex, when compared with the measurements in the other LHC experiments.

Long Shutdown 1 (LS1)

The maintenance and consolidation of the LHCb detector, in preparation for Run II, is
being completed. The beam pipe installation is finished and the delicate operation of
connecting the beam pipe section in the Vertex Locator (VELO) sector has been carried
out without incident. The beam pipe and the VELO have been pumped down and all the
detectors have been closed. At the time of the November 2014 LHCC session, there
were only two LHCb systems that still remained to be completed: (i) the RICH2-C,
where the schedule of Hybrid Photon Detector (HPD) replacement has been moved
forward to January 2015, and (ii) the installation of the remaining 1.5/5 Herschel
Forward Shower Scintillating Counters. The LHCb work is now turning to operation.
In the next months, it will be of high priority to re-validate the safety systems in order
to guarantee the detector safety and functionality along the run due to the large number
of changes to the hardware and control systems along the LS1. In this respect, a new
control room will be ready for summer 2015. In the meantime, LHCb will start-up
using the old control room where all operational interfaces have been already re-
commissioned. In the transition phase, both control rooms will be working in parallel.
A preparation for the shifts is under way with the aim of keeping the old model of
running: two shift personnel in the control room per 8 hours, 13 piquets on call, one run
(chief) coordinator and two data quality personnel per day.

The first real test of the detector is planned from Friday afternoon to Monday morning
of Week 47 2014, by means of the so-called LHC TED shots. The beam will be sent
from the transfer line to a concrete block to obtain beam-splashes inside LHCb. The
detector will be configured with all sub-systems and data will be acquired with a
Scintillating Pad Detector (SPD) trigger. LHCb will run with and without a dummy
High Level Trigger (HLT) and will include also a first test of the new automatic
calibration procedures. From previous experience, the TED shots will correspond to a
particle flow/shot in the detector of about 10 particles/cm^2 and of about 5 particles in
the VELO region. As far as the new calibration system is concerned, the installation of
new disks for storage of the HLT-1 output is under way. The LS1 programme is being
concluded and activities are shifting to running the detector and getting ready for data
taking.

The commissioning with beam will start soon after the hardware will be tested and the
detector fully commissioned with long runs of cosmic-ray data taking. A set of detector
alignment measurements, with the LHCb dipole turned off, will be carried out with dedicated runs during the first fills of the machine. These first data will be used also to commission the detector, the read-out and the data quality monitoring. The trigger will be commissioned with 50 ns beam by simulating, with a filling scheme of reduced number of bunches, the pile-up to be reached in the 25 ns configuration. A special data-taking run at low luminosity, with a minimum bias trigger, will allow to make the first physics studies at the new energy of 13 TeV such as the low-\( P_T \) physics, the distribution of multiplicity and the evaluation of the total cross-section. The nominal data-taking will start with the aim of keeping a sustained levelled luminosity of \( 4 \times 10^{32} \) \( \text{cm}^{-1}\text{s}^{-1} \) at 13 TeV. Tests done at 8 TeV at higher luminosity to simulate the expected multiplicity increase makes this assumption reasonable. In any case, a lot of handles exist to tune the trigger at the desired and accessible rate by means of the GEC (Global Event Cuts) thresholds.

**LHCb Upgrades**

The preparation of the LHCb upgrade proceeds as planned. After the approval of all the Technical Design Reports, the money matrix has been frozen and has been presented to the Resource Review Boards meeting in October 2014. The Memorandum of Understanding for the sub-detectors has been prepared and is being released to the Funding Agencies for the final signature. The total covered cost for the sub-detectors is 40.4 MCHF and that is consistent with the Framework Technical Design estimated cost. Underfunding of 1.2 MCHF exists in the case of the Ring Image Cherenkov (RICH) detector. If this difference persists in the actual implementation part of the project, the procurement of spares will have to be staged. A final, revised version of the Upgrade Milestones’ list has been delivered and is used to monitor the upgrade progress. The first two milestones have been met and the experiment continues with its upgrade activities.

During the LHCC session, a report on the Scintillating Fibre (SCIFI) tracker was presented. A strong team has been put in place with 17 institutions participating in the construction of such a large detector. A detailed Quality Assurance (QA) programme will be undertaken, by both the supplier and the experiment, for the control of the fibre diameter uniformity, for the detection of fibre bumps and for a dedicated measurement of the attenuation length. Indeed, in the first fibre samples under test, a deterioration effect is visible on the attenuation length, being related to the decrease of the die quality. Interaction with the procuring firm has started to improve the fibre production. For completing the QA, an irradiation programme will be also carried out. LHCb will repeat both the study of the effects due to the high dose and will start a dedicated investigation of the effects related to a low-dose irradiation. In parallel, the development of a new scintillator (NOL, Nanostructure Organosilicon Luminophores) is under way at Kuraray, promising an increase of the light output by \( \sim 20\% \). If the development will reach a positive conclusion in a short timeline and if costs remain affordable, a fraction of the SCIFI (e.g. inner side) could be based on this technology.

The procedure and the technology for the construction of the fibre mat and of the modules are being defined. The fibre mat winding will be carried-out by industrial machines and special pins and grooves, inserted in the wheel, will be used for alignment during the winding. The mat final dimension will be 140 mm \( \times \) 2560 mm. The final module (500 \( \times \) 5000 mm\(^2\)) will be obtained by joining 8 mats and will correspond to a total material budget of 1% \( X_0 \) for a crossing minimum-ionizing particle. The module assembly will be done in four different steps: (i) a casted mat will
be glued to the end-piece interface for the Silicon Photomultiplier (SiPM); (ii) the end-piece interface will be machined with a diamond head tool, (iii) the long side will be also cut to correct the module width and finally (iv), 8 fibre mats will be joined together by using glue. On the first mat prototypes with 5 layers $140 \times 2500 \text{ mm}^2$, the overall thickness uniformity along the position is very stable indicating a good reproducibility of the assembly technique. The module production will be carried out in four winding and three module assembly centres.

For the photo-sensors, the final producer choice has not been taken although, for the last production of new SiPM array with 128 channels, the Hamamatsu photo-sensors show promising performance. The SiPM will be cooled to $-40^\circ\text{C}$ in a cooling box positioned at the end-piece of the fibre mat. Optical connection will be in air without usage of any optical grease. The front-end electronics boards will be connected to the SiPM via a FLEX cable. The Pacific chip is still under development. In the final implementation, there will be no ADC but a simple digitization by means of three thresholds’ scheme. The Pacific chip Version 1, with one channel only and an analogue version of the read-out, has been successfully tested showing a clear separation between photoelectron peaks and a shaper output of $\sim 20 \text{ ns}$. The Version 2 of the chip, 8-channel prototype with both analogue and digital readout, will be back from the foundry in November 2014. The final version of the chip, 64 channels only digital, is still under design and is expected to go to the foundry in the first quarter of 2015.

Modules of long dimension $(70 \times 3000 \text{ mm}^2, 130 \times 2500 \text{ mm}^2)$ and with different number of layers (5 and 6) have been exposed to the SPS beam and read out with the newest Hamamatsu SiPM. An analogue read-out based on SPIROC chip has been used in order to quantify the observed light yield in different conditions. The number of photo-electrons collected for a minimum-ionizing particle remains on the safe side: 20 photo-electrons when the beam hits the detector at 45 cm from the photo-sensors. The dependence of the light yield on the over-bias was tested for the 5 layers’ module without using the mirror at the opposite edge: a variation from $12 \text{ photo-electrons/MIP}$ to $25 \text{ photo-electron/MIP}$ was observed when increasing the bias from $+3 \text{ V}$ to $+5.5 \text{ V}$ above the operation voltage.

11. DISCUSSION WITH ALICE

Physics

Since the previous LHCC meeting in September 2014, ALICE published seven papers and three have been submitted (four manuscripts submitted before September 2014 have been accepted for publication) bringing the total number of ALICE papers to 100. The new results cover a wide range of physics topics in Pb-Pb, p-Pb and pp collisions, among them the observation of $\Upsilon(1S)$ suppression at forward rapidity in Pb-Pb collisions, the measurement of the inclusive $\Upsilon(1S)$ and $\Upsilon(2S)$ in p-Pb, as well as the first measurement of the visible cross sections in p-Pb collisions in van der Meer scans at the LHC.

Long Shutdown 1 (LS1)

ALICE achieved a major milestone by completing the installation of the Dijet Calorimeter (DCAL) in October 2014. In early November 2014 the full DCAL was powered on for the first time. Remaining tasks are the installation of the read-out boards and the cooling connections. The Photon Spectrometer (PHOS) modules embedded in the DCAL are now equipped with the same read-out electronics as the
Electromagnetic Calorimeter (ECAL), improving its performance and simplifying maintenance. Also, the last three missing super-modules (#4, #5, and #17) of the Transition Radiation Detector (TRD) arrived at Point 2 and installation is scheduled for completion before the end of November 2014. This implies that ALICE starts Run II with the DCAL and the full TRD.

The L3 magnet ventilation was modified because of space constraints with the new DCAL. Its purpose is to homogenize the L3 volume and remove the remaining heat dissipated on cables. The main support rails are used as diffusors with 10,000 m³/h of pulsion (bottom) and extraction (top).

New Beam Condition Monitors (BCMs) for ALICE and new Beam Loss Monitors (BLM) for the LHC were successfully installed. The Photon Multiplicity Detector (PMD) is still in parking position and will be moved in early January 2015.

The situation with the RCU2 read-out electronics for the Time Projection Chamber (TPC) remains critical. At the moment, ALICE is testing a new prototype that contains engineering samples of a new version of the SmartFusion (SF) FPGA. Radiation tests in Uppsala are underway and will show if the new SF chip is free of the single event latch-ups that affected the first prototype. The TTC interface of the RCU2 was also redesigned. It features a new optical receiver (PDLD) and TTCrx ASIC for the Clock and Data Recovery (CDR) unit. Radiation tests of the new TTC interface are also being conducted in Uppsala. The RCU2 pre-series production is ongoing and the test installation in one TPC sector (RCU2 and backplanes) is scheduled for 8-19 December 2014. The mass production of the RCU2 is scheduled to start in December 2014 with delivery in February 2015. Except for one TPC sector, ALICE will start Run II with the old RCUs and thus with a reduced data-taking rate. The experiment intends to install all new RCU2s (216 boards) during Technical Stop 1 (25-29 May 2015) and Technical Stop 2 (24-28 August 2015). This would allow heavy-ion running in November 2015 with all TPC sectors at the desired higher data-taking rate (twice higher than with the current RCU).

Integration & Recommissioning

The ALICE Consolidation Task Force has finished and Run Co-ordination has taken up re-commissioning of the detector. Regular activity has started at Point 2 on 10 November 2014 including continuous technical runs for stability tests and detector integration into central systems. ALICE intends to start its full shift schedule on 12 January 2015 with cosmic-ray data-taking and stability tests via a technical run and stress tests, as well as dedicated TRD and TPC Kr runs.

The LS1 consolidation efforts for the online systems included a full hardware upgrade of the DAQ cluster as well as the High Level Trigger (HLT) cluster in terms of CPU, network, and FPGA processing. The integration of these upgrades is still under way. For half of the 19 detectors the trigger and DAQ integration is complete. A similar fraction of systems is now fully integrated in the Detector Control System (DCS). This includes the introduction of new in-run recovery procedures for the read-out and DCS.

ALICE has developed new IT web-tools and databases for operation management. The shift management system has been integrated into the collaboration database and now allows real time reporting of institutional credit balance, the automatic role and rights assignment to coordinators from the central ALICE database, and also features a new training management interface.
Run II

The upcoming Pb-Pb runs in Run II will make use of the maximized centre-of-mass energy of √s = 5 TeV per nucleon. ALICE aims for 1 nb⁻¹ in Pb-Pb at 5 TeV in Run II. For the study of the properties of the Quark-Gluon Plasma, many measurements compare results in Pb-Pb collisions to the equivalent measurements in pp. The mismatch in default pp and Pb-Pb energies of Z/A requires the higher √s pp-reference to be extrapolated to √s = 5 TeV. Especially at low p_T, where perturbative QCD gives little guidance, this extrapolation carries large uncertainties. It is, however, a region of large interest for the ALICE physics programme. To minimize the systematic uncertainties on the pp-reference data sufficiently, the experiment estimates that they would need around 15 days of minimum bias and 7 days of triggered pp running at √s = 5 TeV. ALICE presented the first studies on this topic, showing the systematic uncertainties of various measurements (RAA of D mesons, J/ψ, and high-p_T hadrons) as a function of recorded statistics. The LHCC recommends expanding these studies and improving the physics case by including further low-p_T measurements that are key to the ALICE physics programme. It also encourages close collaboration between ATLAS, CMS, and ALICE on this issue.

ALICE Upgrades

Two of the five expected ALICE Technical Design Reports have been endorsed by the LHCC and UCG: the new Inner Tracking System (ITS) and the upgrade of the Readout and Trigger System. The TPC Technical Design Report submitted in April 2014 is still under review and ALICE continues to conduct a substantial R&D programme. Testing of prototypes of the Inner Readout Chamber (IROC) is underway at the PS and SPS. ALICE intends to submit an addendum to the Technical Design Report summarizing the results of their R&D efforts before the end of January 2015. This addendum will also include the decision on the read-out chamber technology.

The Online and Offline Upgrade (O²) Technical Design Report is currently expected to be submitted in June 2015. Due to the heavy load on the LHCC and UCG in autumn 2015 (Phase-2 upgrades) the LHCC strongly suggests submitting it a month or two earlier to give the referees sufficient time.

The Technical Design Report of the new Muon Forward Tracker (MFT) is in a mature state and is now under collaboration review. ALICE intends to submit the final version to the LHCC in January 2015. The MFT provides vertexing for the ALICE muon spectrometer and consists of 5 disks of silicon pixel sensors (MAPS) with 0.6% of X/X₀ per disk, covering a pseudorapidity of -3.6 < η < -2.45. The MFT’s read-out electronics are designed to achieve ~50 kHz in Pb-Pb and 200 kHz in pp. Many components, such as sensors, flex-printed circuits, and read-out architecture, are identical or similar to those of the ITS to minimize cost and manpower resources. The choice of sensor architecture will mirror that to be made by the ITS project in January 2015.

The MFT project reported progress on software and physics performance. The stand-alone tracker is now implemented in the reconstruction code and the muon system–MFT matching at low-p_T has been improved. New techniques helped to improve the B → J/ψ X measurement performance. Substantial progress was made on construction and design on many fronts including ladder design, Flex Printed Circuit (FPC), Hybrid Integrated Circuit (HIC), half-disk design, mechanical structure, and cooling. ALICE now expects water cooling for sensors and printed-circuit boards, although air cooling of the sensors is still an appealing option given that the ALPIDE sensor has a low
power consumption of 50 mW/cm$^2$. In the new design, power supply and cooling run through the A-side (along the ITS), while read-out and DCS cables go through the C-side (absorber/muon spectrometer side). Compared to the MFT Letter of Intent, the revised design also features a new read-out scheme with one single line/sensor. The GBT optical transceivers and fibres are not used in the new lay-out.

12. DISCUSSION WITH TOTEM

**Physics**

The LHCC looks forward to the publication of the two physics analyses nearing completion, namely the study of deviations from the exponential behaviour of the elastic differential cross-section at low momentum transfer, and the measurement of the elastic differential cross-section in the Coulomb-nuclear interference region.

**Long Shutdown 1 (LS1)**

The maintenance and commissioning (on the surface) of the T1 detector are complete, and the detector is ready for installation. The installation is integrated in the CMS schedule, and is foreseen for the end of January 2015 or early February 2015. The T2 detector has been assembled and commissioned, and also installed in CMS. The installation work for the Roman Pots is finished, and the commissioning work in the tunnel was due for completion the week following the LHCC meeting in November 2014. The first tests of Roman Pot movement controlled from the CERN Control Centre were due to start in December 2014.

**Upgrade Technical Design Reports**


Timing in the vertical Roman Pots, which is the key technical aspect of the upgrade project, is under control. The resolution target of 100 ps/plane was achieved during the autumn 2014 test beams at the SPS. More work is needed to complete a full-scale prototype of the detector and assess its overall performance, but the underlying strategy and approach of the Technical Design Report appear sound, and there is no evidence that showstoppers might appear to impede the successful completion of the project. More test beam studies were expected for the week of 8-14 December 2014, and a final hybrid design is expected by February 2015. The production of the hybrids would start in March 2015, and test beam studies of the final hybrids would be possible from May 2015 onward. Installation of a final prototype in the Roman Pots is expected by September 2015.

More work must be done to illustrate the real physics potential, to optimize both the data taking and the analysis strategies for individual studies, and to explore a broader variety of possible measurements. This is particularly true of the more exotic parts of the programme, such as the search for missing mass signatures. Nevertheless, the flagship part of the programme, from the study of possible glueball states to the exclusive production of charmonium and dijets, is clear, strong, and its feasibility looks well demonstrated. With the understanding that the additional work outlined above will be continued and monitored, the LHCC **endorses** the Technical Design Report and its addendum (addressing the questions raised after the September 2014 review).
13. DISCUSSION WITH LHCf

**Physics**

The review of the LHCf experiment during this LHCC session focused on the latest physics results, in particular from analysis on neutrons and $\pi^0$ with the data sample of proton-proton collisions at 7 TeV.

Current results of the LHCf experiment are based on the $\pi^0$ data sample, called Type-I events (two photons detected in two different towers, one in the large tower and one in the small one). Improved $\pi^0$ reconstruction allows for the use of the Type-II events (two photons reconstructed in the same tower) in the analysis. The $\pi^0$ spectra in different $p_T$ bins show that DPMJET and PHYTIA generators are harder than LHCf for $p_T < 1$ GeV but compatible at low $p_T$ and low energy. QGSJETII shows good agreement for $0 < p_T < 0.2$ GeV and $0.8 < p_T < 1.0$ GeV. EPOS 1.99 agrees with LHCf data for $0.4 < p_T < 0.8$.

Neutron energy spectra for proton-proton events at 7 TeV in different bins of pseudorapidity show that in the high-$\eta$ region, $\eta > 10.76$, the one with the highest statistics of neutrons, only QGSJET2 generator reproduces LHCf data. The analysis of neutrons at 7 TeV proton-proton collisions is ready to be submitted.

**Long Shutdown 1 (LS1)**

The LHCC also reviewed the preparation of the LHCf detector for Run II at 13 TeV. Radiation damage will be more severe at the higher energy and is expected to be about 2-3 Gy/nb$^1$ at 13 TeV. All plastic scintillators have been replaced with GSO scintillators in both Arm-1 and Arm-2. GSO scintillator can survive up to $10^6$ Gy. Scintillation fibres have been replaced with GSO bars on Arm-1. Since the original silicon detector (on Arm-2) would be saturated for >1.5 TeV photons, a new wire bonding scheme has been implemented to avoid saturation effects and the pulse height was reduced by ~60%. A new silicon layer location has been studied to maximize the energy resolution. A beam test at the SPS for new Si modules, for the fully-upgraded LHCf detectors, has been carried out in October 2014. The final precise calibration of the GSO absolute energy scale for both Arm-1 and Arm-2 has been measured as well as the final precise calibration of the silicon part for the energy scale. The Arm-2 energy reconstruction shows a resolution of about 2.5% for 100-150 GeV electron beams and about 43% for 300 GeV proton beams. The silicon energy measurement gives a resolution of 7.7% and 7.0% at 100 GeV and 150 GeV, respectively, showing an improvement between 10% and 15% with respect to the previous configuration of the detector before the upgrade. The installation of Arm-1 in the LHC has been completed and the Arm-2 is ongoing.

**Run II**

Dedicated LHC beam time for LHCf and for van der Meer scans is scheduled for 11-15 May 2015, which is a part of the LHC start-up schedule at $\beta^* = 20$ m (corresponding to the beam size at the TAN of 1 mm.) and crossing angle = 140 $\mu$rad at a maximum luminosity of about $1.5 \times 10^{30}$ cm$^{-2}$s$^{-1}$, subsequently the detector will be removed from the LHC and a post calibration at the SPS is expected.

Collaboration with ATLAS is in progress, some data with a common trigger have been collected and data analysis is in progress. Technical points regarding triggering ATLAS events by LHCf have been discussed and a dedicated meeting is scheduled for 11 December 2014.
14. REPORT AND DISCUSSION WITH THE LCG REFEREES

General

The experiments continue to use in an efficient way the allocated resources, with a consumption rate for CPU near 90% in Tier-1 centres and a coverage exceeding the pledges in the Tier-2 centres.

The allocated resources are considered as satisfactory for the needs of next year, with concerns constantly expressed for the subsequent years, since several parameters of the computing models cannot be fully predicted in the medium term due to the changes expected for Run II. In order to ensure the stability of several WLCG services and to ignite the exploration of the longer-term paradigms, several Horizon 2020 projects were submitted, including the continuation of the European Grid Initiative (EGI) and several exploratory projects on new technologies – the outcome of these applications is expected in the beginning of 2015. The organization of the HEP computing community through the HSF (HEP Software Foundation) is taking shape, with an interim leadership been appointed, a synthesis document been released and the web site being available.

ALICE

The resources adequate to cover the ALICE needs and the resources request for 2015-2017 were endorsed by Computing Resources Scrutiny Group (CRSG), and with a new Tier-2 (Mexico) joining the network. The reprocessing of Run I is planned for completion by April 2015. In preparation for Run II, the software tuning continues, with tests foreseen of the upgraded detector read-out, trigger, DAQ, as well as the usage of the new High Level Trigger (HLT) farm. The simulation framework, based on Geant4, is being adapted to the multi-threaded version. The preparations for the ALICE upgrade continue and work is ongoing on system design and software demonstrators. The existing testing structures of FairRoot are re-used, while the transport layer and the dynamic deployment service from Alfa are employed. The Technical Design Report for Online and Offline (O2) project is planned for spring 2015.

LHCb

The Collaboration is using efficiently the allocated resources. The usage of Tier-2 centres is ramping up. The stripping-21 is close to the start-up and is intended to issue the legacy Run I data set, while the reprocessing of the 2010 data has been postponed pending valid use case. The data popularity is under study and the first considerations, based on an innovative multi-variate approach, emerge towards a temporal data management strategy. A large-scale deployment of MDST (Micro Data Summary Tape) is ongoing with many minor issues still to be addressed. The software commissioning proceeds according to the schedule. Full-scale tests of automated calibration procedures are imminent. The tuning of the HLT bandwidth for Run II is under study. The transition to ROOT6 is underway - further studies are needed in the area of virtual memory usage. LHCb contributed with a reduced data set to the opendata portal and will continue to deliver example analyses to that framework according to their open data policy.

ATLAS

The new data-lifetime data management model is under construction and a cautious implementation is under way. The preparation of the software for the Run II registered very good progress. The simulation framework is under continuous improvement,
including FastSim, the integrated simulation framework and the multi-threaded version of Geant4, the latter not foreseen for the Run II start-up. A new production system and a new distributed data management system have been tested and released. ATLAS did not make a progress report on the long-term developments at this session of the LHCC.

CMS

Simulation and reconstruction has been steady for all of 2014. The processing activities were dominated by Run I samples, while the preparation of samples for Run II is ramping up. CMS is validating a new format called miniAOD to cover the bulk of analysis use cases. A number of planned improvements have been achieved: multi-core transition, speed improvements, and performance improvements for more complex events. The releases for simulation and physics validation are foreseen before end 2014. Scale tests for data federation approach were successful. The dynamic data management method is under study, as well as the disk usage monitoring. The disk separation at the Tier-1 centres is complete. The workflow validation release is planned for March 2015, while one billion events are needed for the beginning of the Run II. The software framework is being prepared for future technologies. Important open items include: Analysis Object Data (AOD) and miniAOD content finalization, reduction of input/output for pile-up simulation, Root6 integration and validation, data access and job management. CMS released a significant data set of 27 TB on the opendata portal together with a real-life analysis example.

Concluding Remarks

The WLCG computing is a solid pillar of the physics analysis activity and all computing teams of the experiments and the WLCG project should be congratulated for the high quality of the computing environment and for the proactive consideration of the future challenges at Run II and beyond. Given the necessary improvements already implemented or to still come during this year, the analysis communities will face important changes in the analysis software and workflows. The intense preparation for Run II is getting near the commissioning phase. For the longer-term developments, the need for a well-prepared approach and the case for common projects are recognized by the experiments. The Committee expects that proposals for computing with the upgraded experiments are formulated and presented in the next years. The HEP Software Foundation started and may offer a further motivation and the adequate framework to initialize and develop in a larger scope than before the common approaches in fields like: multithreaded simulation, data placement and lifetime strategies, data preservation, open access. The portal opendata, recently enhanced by a real data analysis from CMS, is a significant action towards a new paradigm based on an open access to LHC data.

15. CLOSE-OUT WITH THE DIRECTOR FOR RESEARCH AND COMPUTING

The LHCC informed and discussed with the Director for Research and Computing the status of the LHC experiments and their plans for the future. The discussion concentrated on the status of the LHC machine, experiments and computing; the status of the physics analyses; the activities during Long Shutdown 1 (LS1); and the upgrades of the LHC experiments.
16. REFEREES
The LHCC referee teams for this session are as follows:

ALICE: J.-C. Brient, T. Ullrich (Co-ordinator), P. Newman
CMS: A. Boehnlein (Co-ordinator), M. Demarteau, D. Denisov, H. Yamamoto
LHCb: C. Diaconu, G. Eigen, S. Miscetti (Co-ordinator)
LHCf, MoEDAL, TOTEM: U. Bassler, C. Cecchi, M. Mangano (Co-ordinator)
LCG: A. Boehnlein, J.-C. Brient, C. Diaconu (Co-ordinator)

Experiment Upgrades:
  General: J.-C. Brient, M. Demarteau (Co-ordinator)
  RD39: G. Eigen
  RD42: M. Demarteau
  RD50: G. Eigen
  RD51: D. Denisov
  RD52: P. Burrows
  RD53: M. Demarteau

17. The LHCC received the following documents:

<table>
<thead>
<tr>
<th>Document ID</th>
<th>Description</th>
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<tbody>
<tr>
<td>CERN-LHCC-2014-023</td>
<td>Minutes of the 119th meeting of LHCC</td>
</tr>
<tr>
<td>CERN-LHCC-2014-024</td>
<td>Addendum to the TOTEM TDR: Timing Measurements in the Vertical Roman Pots of the TOTEM Experiment</td>
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DATES FOR LHCC MEETINGS

Dates for 2015

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<td>4 - 5 March</td>
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<td>3 – 4 June</td>
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<td>23 – 24 September</td>
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