

LHC Performance Workshop (Chamonix 2016)

Report of Contributions

Contribution ID: 0

Type: **not specified**

Introductory Remarks: LIU Baseline and Proton/Ion Beam parameters through the Chain

Wednesday, January 27, 2016 4:45 PM (10 minutes)

<P> In 2015, extended beam studies, a general project Cost and Schedule Review and several dedicated LIU project reviews contributed to define a number of important aspects of the final LIU roadmap. This brief presentation will describe the current LIU baseline and the performance reach of the main upgrades. </P>

Presenters: RUMOLO, Giovanni; MEDDAHI, Malika

Session Classification: Session 6: LIU

Track Classification: Session 6: LIU

Contribution ID: 1

Type: **not specified**

LIU-IONS PS injectors: Baseline, Outcome from 2015 Operation and next steps

Wednesday, January 27, 2016 4:55 PM (30 minutes)

20' + 10'

Preliminary results of the 2015 latest studies to understand limitations in the PS injectors chain will be given, as well as the prospective for the upgrades being installed in YETS 2015-16, and the plans for studies to be performed in 2016.

Presenter: SCRIVENS, Richard (CERN)

Session Classification: Session 6: LIU

Track Classification: Session 6: LIU

Contribution ID: 2

Type: **not specified**

LINAC4: 2015 Progress, Lessons and Implications on the Performance Reach and Options

Wednesday, January 27, 2016 5:25 PM (20 minutes)

15' + 5'

In this paper we report the status of the LINAC4 beam commissioning and detail the strategy for the remaining commissioning steps. The H- source present performance, the intensity achieved and its impact on the LIU parameters will be discussed. The overall schedule with emphasis on the beam availability for the half-sector test will be presented.

Presenter: LOMBARDI, Alessandra

Session Classification: Session 6: LIU

Track Classification: Session 6: LIU

Contribution ID: 3

Type: **not specified**

LIU-PSB & PS: Main 2015 Findings and Achievements and Main Objectives for 2016

Wednesday, January 27, 2016 5:45 PM (30 minutes)

20' + 10'

<P> We will give an overview of the most important LIU upgrade items for both Booster and PS machines and report on their status and the plans until completion of the project. The main achievements in 2015 will be highlighted and the next steps in 2016 outlined. On the beam physics side, we will report on the progress with the production of the 25ns LHC beam in both machines and on the results from machine studies carried out during the 2015 run. </P>

Presenter: HANKE, Klaus

Session Classification: Session 6: LIU

Track Classification: Session 6: LIU

Contribution ID: 4

Type: **not specified**

Main Outcomes from 2015 for LIU-SPS

Wednesday, January 27, 2016 6:30 PM (30 minutes)

20' + 10'

<P> In 2015 several important decisions were taken to define the baseline upgrade path of the SPS for LIU, and solid technical progress was made in the different upgrade work-packages. In this presentation the progress of the upgrade activities is described, together with the accompanying theoretical and simulation advances where relevant. The reviews and decisions on the electron cloud mitigation, the additional impedance reduction and the beam protection devices (including the beam dump) are explained, and the implications for the project are described. The key machine studies and operational experience are reviewed and put into the context of the expected performance reach. The situation with the various beam instrumentation upgrades is discussed, and the status of the alternative scenarios like 8b+4e and BCMS is summarised. The remaining challenges and timeline for completion are outlined. </P>

Presenter: GODDARD, Brennan

Session Classification: Session 6: LIU

Track Classification: Session 6: LIU

Contribution ID: 5

Type: **not specified**

LIU-RF Systems along the Injector Chain and Outlook on Post-LS2 Performance

Wednesday, January 27, 2016 7:00 PM (30 minutes)

20' + 10'

Major upgrades of the RF systems in the injector chain are required to reach the high beam intensity and quality for the High-Luminosity LHC. Finemet technology has been retained as the baseline for the future RF systems of the PSB. Since LS1 the PSB is operated with a fully digital beam control system, which allowed gaining important operational experience especially in view of driving the Finemet cavities. The upgrades of the RF systems in the PS are targeted to reduce the longitudinal impedances of the RF cavities by additional and improved feedbacks. Coupled-bunch instabilities will be controlled by a dedicated feedback using a Finemet cavity as a wide-band longitudinal kicker. In the SPS the regrouping of the sections of the main 200 MHz travelling wave cavities with two additional RF power plants and slip stacking for ions require a new low-level RF system. A new cavity controller for the 800 MHz RF systems is being commissioned. It will improve the relative phase control, a major ingredient to longitudinal stability. Status and planning of the upgrades will be summarized and an outlook on the performance after their full implementation in the era after LS2 will be given.

Presenter: DAMERAU, Heiko

Session Classification: Session 6: LIU

Track Classification: Session 6: LIU

Contribution ID: 6

Type: **not specified**

LIU: Transverse Feedback Systems along the Injectors Chain and Outlook for Post-LS2 Performance

Wednesday, January 27, 2016 7:30 PM (30 minutes)

20' + 10'

<P> The status of the transverse feedback systems of the LHC injector chain - LEIR, PSB, PS and SPS - is reviewed. This includes the LIU upgrades already implemented and commissioned as well as the planned outstanding LIU work. The review includes capabilities of damping electron cloud instabilities as well as other limitations, and the role the high bandwidth feedback system project in the SPS. </P>

Presenter: HOFLE, Wolfgang

Session Classification: Session 6: LIU

Track Classification: Session 6: LIU

Contribution ID: 7

Type: **not specified**

Experiments: Expectations and Requirements

Wednesday, January 27, 2016 8:45 AM (25 minutes)

<P> The talk discusses the input from the experiments that is relevant to define next year's program. It covers the target for integrated luminosity for 2016, for both p-p and Heavy Ion physics, and the requests for special runs (high beta*, VdM scans, high or low pile-up runs...). The impact of LHC parameters and conditions on the experiments is also discussed, including the effect of pile-up, beam energy, bunch length, vacuum and background, etc.. </P>

Presenter: BOYD, Jamie (CERN)**Session Classification:** Session 5: 2016 and Run 2**Track Classification:** Session 5: 2016 and Run 2

Contribution ID: 8

Type: **not specified**

LHC Machine Configuration in the 2016 Proton Run

Wednesday, January 27, 2016 9:10 AM (25 minutes)

<P> The baseline machine parameters of the 2016 LHC proton run are presented, with focus on beta* and the collimation hierarchy. The proposed scenario is based on input from operational experience and MDs in 2015. The parameters and settings have been chosen in order to provide significantly higher luminosity than in 2015, while staying within the boundaries where the safety and smooth running of the LHC are not jeopardized. </P>

Presenter: BRUCE, Roderik

Session Classification: Session 5: 2016 and Run 2

Track Classification: Session 5: 2016 and Run 2

Contribution ID: 9

Type: **not specified**

Beams from Injectors in 2016

Wednesday, January 27, 2016 9:35 AM (25 minutes)

Over the years the LHC beams in the injectors have evolved and production schemes alternative to the baseline scheme have been developed and tested. The baseline is recalled and the beams from the alternative production schemes that are available to the LHC in 2016 are discussed together with their performance reach.

Presenter: STEERENBERG, Rende

Session Classification: Session 5: 2016 and Run 2

Track Classification: Session 5: 2016 and Run 2

Contribution ID: **10**Type: **not specified**

Plans for the Ion Run in 2016

Wednesday, January 27, 2016 10:30 AM (25 minutes)

The 2016 run will end with proton-lead collisions at either 4Z TeV, as in 2013, or 6.5Z TeV, still to be defined. This talk reviews the special features of operation with asymmetric collisions, and the lessons of the 2013 proton-nucleus run, as well as the 2015 lead-lead run. A new proton filling scheme to match the lead scheme will have to be prepared in 2016. This talk also reviews the optics, the LHC operation cycle and the special requirements on various systems like RF and beam instrumentation.

Presenter: ALEMANY FERNANDEZ, Reyes**Session Classification:** Session 5: 2016 and Run 2**Track Classification:** Session 5: 2016 and Run 2

Contribution ID: 11

Type: **not specified**

Key Machine Development for 2016 and Run 2

Wednesday, January 27, 2016 10:55 AM (25 minutes)

MD results from 2015 have been fundamental in deciding the 2016 LHC parameters and to shed light in unexplored regimes of operation both for LHC and HL-LHC. 2016 emerges with improved efficiency for machine studies. Possible MD requests for 2016 and Run II, along with priorities, are currently being discussed in the LSWG framework with a dedicated extended meeting in January. This talk highlights the most important MD proposals and reviews the current priorities for 2016 and beyond.

Presenter: TOMAS GARCIA, Rogelio

Session Classification: Session 5: 2016 and Run 2

Track Classification: Session 5: 2016 and Run 2

Contribution ID: 12

Type: **not specified**

Plans for 2016 and Run 2

Wednesday, January 27, 2016 11:20 AM (25 minutes)

Presenter: LAMONT, Mike

Session Classification: Session 5: 2016 and Run 2

Track Classification: Session 5: 2016 and Run 2

Contribution ID: 13

Type: **not specified**

Lessons from LHC operation in 2015

Monday, January 25, 2016 9:00 AM (30 minutes)

In 2015 the LHC entered the first year of its second long Run, and the first collisions at 13 TeV CoM were delivered to the experiments on 3 June, after two months of beam commissioning. The rest of the year was characterized by a stepwise increase in the number of bunches that allowed reaching 2244 bunches/ring and a peak luminosity of $5 \times 10^{33} \text{cm}^{-2}\text{s}^{-1}$, for a total of just above 4fb^{-1} delivered to the high luminosity experiments. While the machine efficiency was hampered by many different issues related to the high intensity and high energy, the luminosity performance was excellent, thanks to little losses and good emittance preservation through the cycle, in combination with excellent luminosity lifetimes in physics. This presentation reviews the 2015 proton-proton physics performance and the parameters that allowed reaching it. It also collects relevant input presented at the Evian workshop that is not collected elsewhere in this workshop.

Presenter: PAPOTTI, Giulia**Session Classification:** Session 1: Lessons from 2015**Track Classification:** Session 1: Lessons from 2015

Contribution ID: 14

Type: **not specified**

LHC Operation and Efficiency in 2015

Monday, January 25, 2016 9:30 AM (30 minutes)

<P>With the restart at a record energy level, 2015 has been a challenging year for the LHC. An analysis of the performance through the investigation of each phase of the nominal cycle will be presented. The possibility and different scenarios to potentially increase efficiency will also be discussed.</P>

Presenter: SOLFAROLI CAMILLOCCI, Matteo

Session Classification: Session 1: Lessons from 2015

Track Classification: Session 1: Lessons from 2015

Contribution ID: 15

Type: **not specified**

Machine Protection at 6.5 TeV

Monday, January 25, 2016 10:00 AM (30 minutes)

No major machine protection incidents occurred during the 2015 run, but a number of critical issues can be identified and will be presented. Details of the intensity ramp-up and the handling of the safety critical Machine Development requests are given. A look ahead to 2016 is given and the potential critical issues will be highlighted.

Presenter: UYTHOVEN, Jan**Session Classification:** Session 1: Lessons from 2015**Track Classification:** Session 1: Lessons from 2015

Contribution ID: 16

Type: **not specified**

Collimation System Performance

Monday, January 25, 2016 11:00 AM (30 minutes)

The beam cleaning performance of the collimation system at 6.5 TeV and its evolution over the year will be presented. Collimation setup and validation procedures will be presented, including the gain from the embedded beam position monitors.

Presenter: SALVACHUA FERRANDO, Belen Maria (CERN)

Session Classification: Session 1: Lessons from 2015

Track Classification: Session 1: Lessons from 2015

Contribution ID: 17

Type: **not specified**

RF and Transverse Damper Systems

Monday, January 25, 2016 11:30 AM (30 minutes)

The LHC operation in 2015 for the RF and transverse damper system is presented. After a brief summary of the changes made during LS1 and recommissioning in the beginning of 2015, operational RF and transverse damper parameters as well as new diagnostics are detailed. Finally, an outlook of plans for the next year is given.

Presenter: BAUDRENGHIEN, Philippe**Session Classification:** Session 1: Lessons from 2015

Contribution ID: 18

Type: **not specified**

Circuit Performance at 6.5 TeV and beyond

Monday, January 25, 2016 12:00 PM (30 minutes)

The quench performance of the magnet circuits during the HWC at the beginning of 2015 will be compared to previous HWC campaigns in 2008 and 2013. Training quenches and trips during operation will also be shortly summarised. Finally the feasibility to run the magnet circuits at 7 TeV equivalent will be presented, and an estimate will be given of the number of quenches and additional commissioning time required to reach this level.

Presenter: VERWEIJ, Arjan**Session Classification:** Session 1: Lessons from 2015

Contribution ID: 19

Type: **not specified**

Accelerator Fault Tracker & Availability Working Group –Where Do We Go From Here?

Tuesday, January 26, 2016 8:30 AM (25 minutes)

<P>Numerous fault tracking concepts and requirements were defined by the LHC Availability Working Group (AWG) during the study of LHC Run 1 availability (2010-2012). During Long-Shutdown 1 (LS1), these requirements were converted into an Accelerator Fault Tracker (AFT) tool, by a BE/CO, BE/OP and TE/MPE initiative. This paper presents an overview of the AWG concepts and requirements for fault tracking, explaining how these were evaluated in Run 1 versus how this been done using the AFT in Run 2. The resources used in the on-going work to complete fault tracking and development of the AFT are explained, and future plans are shown. The AFT has directly influenced the concepts of availability capture being used by the AWG, new and important influences on availability have been identified and can be quantified: allowing more complete and detailed models to be created. The future direction of the AWG and the future approaches to consider these are briefly shown.</P>

Presenter: TODD, Benjamin

Session Classification: Sessions 3 & 4: LHC Hardware Performance

Track Classification: Session 3: LHC Hardware Performance

Contribution ID: 20

Type: **not specified**

LHC Availability - Status and Prospects

Tuesday, January 26, 2016 8:55 AM (35 minutes)

Increasing LHC availability is one of the key challenges for improving luminosity production in the next years and particularly in view of HL-LHC. Both hardware performance and beam-related effects have an impact on the achieved availability and are directly influenced by the LHC operating conditions (e.g. in terms of radiation levels, number of beam-induced quenches, etc.). A review of the lessons learnt during LHC Run 1 and in 2015 and possible extrapolations to future operational scenarios will be given. For hardware systems, the so-called availability matrices, highlighting the main systems failure modes and foreseen mitigation strategies will be presented. A breakdown of the turnaround time will be derived based on the experience with the 25 ns Run in 2015. Predictions of luminosity production will be presented based on the identified scenarios for future LHC Runs.

Presenter: APOLLONIO, Andrea**Session Classification:** Sessions 3 & 4: LHC Hardware Performance**Track Classification:** Session 3: LHC Hardware Performance

Contribution ID: 21

Type: **not specified**

Cryogenics

Tuesday, January 26, 2016 9:30 AM (30 minutes)

The first part of the presentation summarizes the cryogenic performance and availability for 2015 and the expected performance for 2016 after completion of the YETS activities. The cryogenic configuration used in 2015, observed issues and proposed improvements will be detailed. The second part of the presentation will focus on cryogenic power studies (design, installed, available) in order to optimize the cryogenic refrigeration capacity needed to extract higher thermal load on beam screens than initially designed. Finally, we will briefly discuss a number of tests and monitoring proposal to investigate the origin of the unexplained movements of the triplet ITR8.

Presenter: FERLIN, Gerard (CERN)

Session Classification: Sessions 3 & 4: LHC Hardware Performance

Track Classification: Session 3: LHC Hardware Performance

Contribution ID: 22

Type: **not specified**

Quench Detection System

Tuesday, January 26, 2016 10:30 AM (30 minutes)

The contribution will review the upgrades to the LHC quench detection system (QDS) performed during LS1 and discuss the QDS dependability during LHC operation in 2015. The QDS performance with respect to reliability, availability and maintainability will be presented and analysed, including issues specific to the ion run. An account of the consolidation measures already successfully implemented during technical stops will be given; the remaining observed failure modes and possible measures for mitigation will be discussed. The presentation will conclude with a report on the on-going system preparation for 2016 operation and an estimate of the expected system performance.

Presenter: DENZ, Reiner**Session Classification:** Sessions 3 & 4: LHC Hardware Performance**Track Classification:** Session 3: LHC Hardware Performance

Contribution ID: 23

Type: **not specified**

LBDS and Injection Protection

Tuesday, January 26, 2016 4:45 PM (30 minutes)

20' + 10'

The most critical failure scenarios for LHC machine protection concern the injection and dump systems. In view of operation at higher energy and intensity and in light of the experience gained during Run 1, several upgrades were put in place to further enhance the reliability of these systems. Changes were applied both to the protection elements and the kickers (magnets, related electronics, powering systems and interlock logic). The effective performance of the injection and extraction systems and the impact on operation and machine availability are reviewed with respect to forecasts. Extrapolations to operation at 7 TeV and further increased intensity are drawn.

Presenter: BRACCO, Chiara

Session Classification: Sessions 3 & 4: LHC Hardware Performance

Track Classification: Session 4: LHC Hardware Performance

Contribution ID: 24

Type: **not specified**

Radiation to Electronics - R2E

Tuesday, January 26, 2016 7:00 PM (25 minutes)

The talk will first provide a summary of the 2015 radiation levels and failures on the electronics focusing on the performed R2E activities that led to the improvements on the overall system failures. We will then focus on the strategy and goals for the next years and run3 operation era, identifying the parameters that have to be monitored in order to keep and improve the availability for the next years. The future availability related to R2E is also strictly connected to the new developments. For this reason, a radiation hardness assurance protocol is proposed with the aim to reduce the risk of installing not qualified hardware in the tunnel. Finally the instruments and the actors of this process will be discussed.

Presenters: BRUGGER, Markus; DANZECA, Salvatore

Session Classification: Sessions 3 & 4: LHC Hardware Performance

Track Classification: Session 4: LHC Hardware Performance

Contribution ID: 25

Type: **not specified**

Availability in view of Increasing Beam Energy to 7 TeV

Tuesday, January 26, 2016 7:25 PM (35 minutes)

The integrated luminosity for LHC depends on the time operating with colliding beams as well as on the peak luminosity. Different factors enter into the time that the LHC operates with colliding beams, this is discussed for operation at 6.5 TeV, and extrapolated to operation at 7 TeV. Independent of the operational energy, ideas to increase the LHC availability are presented. High availability is required, in particular for HL-LHC, where the peak luminosity is limited due to pile-up. High availability is not only relevant for LHC, but also for other accelerators at CERN and future projects. The talks includes an overview of the various activities at CERN related to reliability and availability.

Presenter: SCHMIDT, Rudiger

Session Classification: Sessions 3 & 4: LHC Hardware Performance

Track Classification: Session 4: LHC Hardware Performance

Contribution ID: 26

Type: **not specified**

Performance Limitations in HL-LHC after LIU Upgrade

Thursday, January 28, 2016 8:30 AM (25 minutes)

$20' + 5'$

HL-LHC upgrades during LS2 (collimators, TDIS, cryogenics, coating of IP2 and IP8 triplet beam screens) Beta* reach and performance (optics, ATS, flat vs. round) Validation of the levelling scenarios driven by pile-up measurements (beta* levelling in IP1/5 and separation in IP2/8) with high brightness beams Expected limitations (aperture, heat loads in the IR1/5 triplets from electron cloud, debris, impedance,) Validation of heat load dependence due to electron cloud on bunch population Validation of the longitudinal stability limits (coupled bunch) confirming the longitudinal stability up to HL-LHC parameters with a single RF system Validation of the operation of the 400 MHz system in full detuning mode Performance with head-on and long range limits comparable to HL-LHC Stability limits and effect of the impedance reduction campaign Emittance control for very high brightness beams (BCMS) Halo measurement and control Losses and margin with respect to quench limits (need or not of IR7 dispersion suppressor collimators) Component heating and validation of the upgrade scenarios (e.g. confirm that the present MKI design is compatible with the HL-LHC beams for bunch lengths in the range of 8 to 10 cm)

Presenter: ARDUINI, Gianluigi

Session Classification: Session 7: HL-LHC

Track Classification: Session 7: HL-LHC

Contribution ID: 27

Type: **not specified**

RF Upgrade Paths

Thursday, January 28, 2016 8:55 AM (25 minutes)

20' + 5'

Time line and criteria for deciding between options (design; prototyping; construction; commissioning) so that they are ready by LS3? Is it already too late for some options? Implications / coordination with LIU upgrades What kind of feedback upgrade do we need (bandwidth) (provisionally)

Presenter: JENSEN, Erk

Session Classification: Session 7: HL-LHC

Track Classification: Session 7: HL-LHC

Contribution ID: 28

Type: **not specified**

Collimation Upgrade Path for the HL-LHC

Thursday, January 28, 2016 9:20 AM (25 minutes)

20' + 5'

 The upgrade strategy for the LHC collimation system relies on various inputs from the LHC operation: loss rates, quench limits of magnet against beam losses, beam stability limit from collimator impedance, etc. The performance assessment based on the LHC Run I entails intrinsic uncertainties because of the differences in beam energy, bunch spacing and intensity, and operating magnet current. The road map for the collimation upgrade is reviewed in light of the 2015 operational experience. While this first year at 6.5TeV cannot be considered fully conclusive for the future performance, as the operational parameters were still far from the design parameters, useful feedback could be accumulated. In this paper, the results of dedicated studies and of analyses of the high-intensity operation are presented and used to review the collimation upgrade baseline choices.

Presenter: REDAELLI, Stefano

Session Classification: Session 7: HL-LHC

Track Classification: Session 7: HL-LHC

Contribution ID: 29

Type: **not specified**

Crab Cavity Test Installation in the SPS

Thursday, January 28, 2016 9:45 AM (25 minutes)

20' + 5'

 Planning and interface with other integration activities -> time line Test program and goals (provisionally)

Presenter: VANDONI, Giovanna

Session Classification: Session 7: HL-LHC

Track Classification: Session 7: HL-LHC

Contribution ID: 30

Type: **not specified**

Coating Options for IR2 and IR8

Thursday, January 28, 2016 10:30 AM (25 minutes)

20' + 5'

- Issue and how to tackle
- Carbon coating
- Laser patterning
- RD and downselection process (Provisional)

Presenter: COSTA PINTO, Pedro

Session Classification: Session 7: HL-LHC

Track Classification: Session 7: HL-LHC

Contribution ID: 31

Type: **not specified**

Lessons Learned from the Civil Engineering Test Drilling and Earthquakes on LHC Vibration Tolerances

Thursday, January 28, 2016 10:55 AM (25 minutes)

20' + 5'

 During Run 1 and in 2015 LHC operation has not been perturbed by vibrations and higher frequency (>1 Hz) ground motion. The effects of some large earthquakes was observed on the beam orbits, but no beam was lost or spoiled by such events. In the coming years two new sources of perturbations could possibly impact LHC operation: civil engineering for HL-LHC in points 1 and 5 as well as enhanced seismic activity to due the development of a geothermal energy program Geothermie 2020 by the Canton of Geneva. The triplet area is particularly sensitivity to vibrations due to large beta-functions and strength and resonances in the frequency range of 10-30 Hz. Depending on amplitude, frequency and coherence length vibrations may lead to loss of performance or in the worst cases to beam dumps. The current observations and measurements on LHC beam will be reviewed. Triplet vibrations and in situ transfer functions of vibrations will be presented. Mitigation measures in the form of fast orbit feedbacks and girder designs will be discussed.

Presenter: WENNINGER, Jorg

Session Classification: Session 7: HL-LHC

Track Classification: Session 7: HL-LHC

Contribution ID: 32

Type: **not specified**

Heavy Ion Operation after LS2

Thursday, January 28, 2016 11:20 AM (25 minutes)

 20' + 5'

 LHC Pb-Pb performance prospects and LIU projections compared to experiments' requests, updated in the light of the 2015 Pb-Pb run. Sharing options among the experiments including LHCb. Experience and feedback from ion MDs 2015 Recommended running scenario and schedule.

Presenter: JOWETT, John

Session Classification: Session 7: HL-LHC

Track Classification: Session 7: HL-LHC

Contribution ID: 33

Type: **not specified**

LIU Activities during LS2, highlight of changes with respect to last year

Thursday, January 28, 2016 2:00 PM (25 minutes)

20' + 5'

<P>The baseline LIU installation activities corresponding to both ion and proton upgrades will be reviewed to show-up changes approved and/or proposed with respect the 2014 baseline. An advanced draft schedule of LIU activities will be presented, underlining the corresponding support needed from the various CERN groups together with the required technical expertise.

Presenter: COUPARD, Julie

Session Classification: Session 8: (E)YETS and Long Shutdown 2 Strategy and Preparation

Track Classification: Session 8: LS2

Contribution ID: 34

Type: **not specified**

HL-LHC Activities during LS2, highlight of changes with respect to last year

Thursday, January 28, 2016 2:25 PM (25 minutes)

20' + 5'

<P>The baseline HL-LHC installation activities will be reviewed to show-up changes approved and/or proposed with respect the 2014 baseline. A draft schedule of HL-LHC activities will be presented, underlining the impact of civil engineering and of other preparatory works. on the infrastructure accessibility and reviewing options of coactivity. </P>

Presenter: TAVIAN, Laurent Jean

Session Classification: Session 8: (E)YETS and Long Shutdown 2 Strategy and Preparation

Track Classification: Session 8: LS2

Contribution ID: 35

Type: **not specified**

LHC Experiments Activities during LS2

Thursday, January 28, 2016 2:50 PM (25 minutes)

20' + 5'

<P>The LHC experiments have planned significant maintenance and upgrade efforts for LS2. ALICE and LHCb will implement major upgrades with important changes to the entire apparatus, while ATLAS and CMS will perform their major detector upgrades only during LS3. The presentation will review the LS2 plans of the experiments and will focus on support needed during (E)YETS from the technical sector.</P>

Presenter: LINDNER, Rolf

Session Classification: Session 8: (E)YETS and Long Shutdown 2 Strategy and Preparation

Track Classification: Session 8: LS2

Contribution ID: 36

Type: **not specified**

Non-LHC Experiments Activities during LS2

Thursday, January 28, 2016 3:15 PM (25 minutes)

20' + 5'

The non-LHC experiments have planned significant maintenance and consolidation efforts. The presentation will review the most relevant activities and will focus on support needed during (E)YETS from the technical sector.

Presenters: BRUGGER, Markus; EVRARD, Sebastien

Session Classification: Session 8: (E)YETS and Long Shutdown 2 Strategy and Preparation

Track Classification: Session 8: LS2

Contribution ID: 37

Type: **not specified**

First Feedback from Plan Tool

Thursday, January 28, 2016 3:55 PM (25 minutes)

20' + 5'

<P>After a brief review of the Plan Tool implementation, the first feedback will be evaluated and the consistency with LIU will be reviewed as a pilot check. </P>

Presenter: FORAZ, Katy

Session Classification: Session 8: (E)YETS and Long Shutdown 2 Strategy and Preparation

Track Classification: Session 8: LS2

Contribution ID: 38

Type: **not specified**

Framework schedule from EYETS 2016 to LS2

Thursday, January 28, 2016 4:20 PM (25 minutes)

20' + 5'

<P>Following the first feedback from Plan Tool, a preliminary version of the master schedule will be presented, highlighting the process of validation of interfaces between activities and groups. The impact of all activities restricting accesses (civil engineering, cabling campaigns, access and alarms system renovations, etc.) will be reviewed.</P>

Presenter: BERNARDINI, Marzia

Session Classification: Session 8: (E)YETS and Long Shutdown 2 Strategy and Preparation

Track Classification: Session 8: LS2

Contribution ID: 39

Type: **not specified**

UFOs, ULO, BLMS

Monday, January 25, 2016 4:45 PM (25 minutes)

20' 5'

<P> As far as beam-losses are concerned, UFOs and the ULO have been the most prominent threats to machine availability in Run-2 proton operation. For the time being, the fast advance of the conditioning effect and the orbit bump around the ULO appear to have saved the day. In this presentation we will give an overview of beam losses in the LHC with protons and ions, the corresponding quench levels in cold magnets, as well as the adopted BLM-threshold strategies for different scenarios. </P>

Presenter: AUCHMANN, Bernhard

Session Classification: Session 2: Key Challenges for Operation

Track Classification: Session 2: Key Challenges for Operation

Contribution ID: 40

Type: **not specified**

Electron Cloud Effects

Monday, January 25, 2016 5:10 PM (25 minutes)

20' + 5'

<P> The brief experience with 25 ns beam in the LHC at the end of Run 1 suggested that the electron cloud effects were set to pose important challenges to the machine operation during Run 2. In spite of four weeks of dedicated scrubbing run, the 2015 proton run of the LHC fully confirmed this expectation, with the electron cloud severely degrading the beam quality at the beginning of the scrubbing run and then limiting the number of bunches at 6.5 TeV, due to strong heat load in the cold regions. This contribution will first describe the main e-cloud observations and limitations encountered during the 2015 run. The dedicated scrubbing periods at 450 GeV, the intensity ramp up with 25 ns beams at 6.5 TeV and tests with special beam variants (doublets, 8b+4e) will be covered. Finally, based on the acquired experience and the lesson learnt in 2015, a proposal for the scrubbing strategy and 25 ns intensity ramp up in 2016 will be presented. </P>

Presenter: IADAROLA, Giovanni

Session Classification: Session 2: Key Challenges for Operation

Track Classification: Session 2: Key Challenges for Operation

Contribution ID: 41

Type: **not specified**

Beam Induced Heating including TDI

Monday, January 25, 2016 5:35 PM (20 minutes)

15' + 5'

<P> Beam induced RF heating of several LHC devices represented a significant limitation before LS1. A lot of effort was invested by equipment groups to mitigate these issues and add monitoring to be able to react early. This effort clearly paid off in 2015 and most limitations could be waived. Bunch length could even be allowed to decrease below 1 ns during long fills without significant adverse effects. The only notable issue came from one of the two injection protection collimators (TDI8) that affected operation at injection throughout 2015. For 2016, both TDIs will be equipped with copper coated graphite jaws (instead of titanium coated hexahedral boron nitride jaws), which are expected to mitigate these issues. Monitoring and follow-up of beam induced heating will continue - in particular for injection kickers - but no showstoppers are so far expected with the beam parameters planned for Run 2. One should of course watch out for the non-conformities.

<P>

Presenter: SALVANT, Benoit**Session Classification:** Session 2: Key Challenges for Operation**Track Classification:** Session 2: Key Challenges for Operation

Contribution ID: 42

Type: **not specified**

Instabilities, Impedance, LR Beam-beam

Monday, January 25, 2016 5:55 PM (25 minutes)

20' + 5'

<P> With the LHC operation at 6.5 TeV and with 25 ns bunch spacing after LS1, the understanding and control of beam instabilities in 2015 has become at least as challenging as during Run 1 and a crucial point to be followed to guarantee a smooth intensity ramp up. As expected, electron cloud appeared to be the dominant instability driver during the early phases of Run 2 with multi-bunch operation. The instabilities caused by electron cloud at injection limited the speed of scrubbing and also prevented the efficient use of doublets. Later on, at a more advanced stage of machine scrubbing, beam coupling impedance and beam-beam effects also started to play a role, as well as their interplay with the residual electron cloud. In this talk the main observations of beam instabilities in the LHC during 2015 will be reviewed, highlighting the key tools used for their monitoring and control. Based on our present understanding, we will then propose settings and operational procedures for operation in 2016 as well as the required diagnostics for an improved detection of potential instabilities. Finally, an outlook on open studies and future potential mitigation measures will be provided. </P>

Presenter: LI, Kevin Shing Bruce**Session Classification:** Session 2: Key Challenges for Operation**Track Classification:** Session 2: Key Challenges for Operation

Contribution ID: 43

Type: **not specified**

Challenges for the SPS and SPS-to-LHC transfer for the 2016 Run 1

Monday, January 25, 2016 6:35 PM (25 minutes)

20' + 5'

<P> The LHC 2016 run will be a high intensity 25 ns physics production run. During the 2015 commissioning run several issues for the SPS and SPS-to-LHC transfer became apparent which will need to be addressed in 2016 and the years to come. Some of these will only be fully mitigated with the LIU upgrade of the SPS. This talk will summarize the experience with 25 ns beams in the SPS during 2015 run and present the achieved performance. Outstanding issues such as orbit control at flattop, satellite population, tail population etc. as well as mitigation possibilities for the next run will be discussed. </P>

Presenter: KAIN, Verena

Session Classification: Session 2: Key Challenges for Operation

Track Classification: Session 2: Key Challenges for Operation

Contribution ID: 44

Type: **not specified**

Diagnostics

Monday, January 25, 2016 7:00 PM (25 minutes)

20' 5'

After summarizing the post-LS1 beam instrumentation performance, the presentation will focus on the key challenges for beam diagnostic systems in 2016. This will first concentrate on instruments that are essential for beam commissioning and operation, such as the BPM and tune systems for high sensitivity orbit and tune measurements. An overview will then be given of the status and expectations for all the other beam diagnostics, with particular emphasis on instrumentation designed to monitor beam instabilities (Multi-band Instability Monitor), beam-beam effects (Beam Transfer Function measurements), fast losses (diamond detectors) and transverse emittance (Wire Scanners, Synchrotron Light Monitors, BGI, BGV). Where relevant, the discussion will address the bunch-per-bunch capability of these devices and their expected performance.

Presenter: RONCAROLO, Federico

Session Classification: Session 2: Key Challenges for Operation

Track Classification: Session 2: Key Challenges for Operation

Contribution ID: 45

Type: **not specified**

LHC YETS Recovery

10' 5'

16 days are allocated in March 2016 to prepare the machine for the beam. Around 7000 powering tests will have to be performed to re-commission the superconducting circuits. An extensive list of tests will have to be executed as well on the various systems affected by interventions during YETS. A preliminary planning for these tests will be shown.

Presenter: POJER, Mirko

Track Classification: Session 2: Key Challenges for Operation

Contribution ID: 46

Type: **not specified**

YETS: Update from CMS and ATLAS

Monday, January 25, 2016 7:25 PM (10 minutes)

5' + 5'

A short update will be given about the activities being performed in the 2016-16 YETS by ATLAS and CMS. Particular focus will be given to activities on the critical path, notably the repair of the ATLAS End Cap Toroid Bellows, the cleaning of the CMS magnet cryogenic system and the diagnosis and repair of the water leak in the CMS end-cap.

Presenters: BALL, Austin; PONTECORVO, Ludovico

Session Classification: Session 2: Key Challenges for Operation

Track Classification: Session 2: Key Challenges for Operation

Contribution ID: 47

Type: **not specified**

General Safety

Thursday, January 28, 2016 4:45 PM (25 minutes)

20' + 5'

Presenter: OTTO, Thomas

Session Classification: Session 8: (E)YETS and Long Shutdown 2 Strategy and Preparation

Contribution ID: 48

Type: **not specified**

Introduction

Monday, January 25, 2016 8:30 AM (15 minutes)

Presenter: BORDRY, Frederick

Contribution ID: 49

Type: **not specified**

Electrical Performance of Magnet Circuits

Tuesday, January 26, 2016 11:00 AM (30 minutes)

<P>From individual system tests and commissioning after LS1 up to operation with beam, the talk will start with a quick overview on the main phases that the LHC magnet circuits have experienced since the last Chamonix meeting. The main faults and events along the 2015 beam operation will be reported and classified according to system, frequency and impact to downtime. The systems and aspects covered are the following: electrical integrity on cold parts and warm cabling, energy extraction, quench heater power supplies and DFB instrumentation. Other systems also pertaining to the LHC magnet circuits will be covered elsewhere. A discussion will follow on the forecast of actions on the related hardware with an emphasis on machine availability. </P>

Presenter: RODRIGUEZ MATEOS, Felix**Session Classification:** Sessions 3 & 4: LHC Hardware Performance**Track Classification:** Session 3: LHC Hardware Performance

Contribution ID: 50

Type: **not specified**

Power Converters

Tuesday, January 26, 2016 11:30 AM (30 minutes)

The hardware performance of the LHC power converters during 2015 is presented. After a brief summary of the changes made during LS1, the performance of the power converters will be detailed by presenting the availability matrices of the different systems. The efficiency of the mitigations deployed during LS1 as well as the remaining observed failure modes are discussed. Finally, an outlook of foreseen measures for consolidation/mitigation for 2015-2016 YETS and the next years is given.

Presenter: MONTABONNET, Valerie**Session Classification:** Sessions 3 & 4: LHC Hardware Performance**Track Classification:** Session 3: LHC Hardware Performance

Contribution ID: 51

Type: **not specified**

RF/ADT

Tuesday, January 26, 2016 5:15 PM (30 minutes)

The RF and ADT underwent a number of consolidations and upgrades during LS1, including a major renovation of the ADT signal processing and the replacement of a degraded cavity module. The effect of these upgrades on 2015 performance will be reviewed. The system availability and operational issues encountered through the 2015 run will be detailed and the improvements being made during the YETS and through 2016 will be described.

Presenter: BUTTERWORTH, Andy

Session Classification: Sessions 3 & 4: LHC Hardware Performance

Track Classification: Session 4: LHC Hardware Performance

Contribution ID: 52

Type: **not specified**

Beam Instrumentation

Tuesday, January 26, 2016 5:45 PM (30 minutes)

20' + 10'

<P>The dependability of many beam instrumentation systems directly impact the operational efficiency of the CERN accelerator complex and the LHC in particular. While some are connected to the Beam Interlock System and have been designed with this in mind, others provide data essential for machine optimization, the absence of which can also potentially affect the availability of the beam. This presentation will take a look at these systems and will be composed of two main parts. The first part will be an analysis of the 2015 performance for all instruments impacting beam availability, with the second part showing the strategy being followed by the BE-BI Group to ensure dependability, showing what has already been implemented and highlighting what needs to be improved to guarantee the high quality performance of these systems in the future.</P>

Presenter: VIGANÒ, William

Session Classification: Sessions 3 & 4: LHC Hardware Performance

Contribution ID: 53

Type: **not specified**

Technical Infrastructure

Tuesday, January 26, 2016 6:30 PM (30 minutes)

In the Technical Infrastructure a major event is filed every time a technical incident causes a stop of one of CERNs accelerators. But how many did we record in 2015? And how did we do in 2015 compared to RUN 1 in 2012? We will also look closer into electrical perturbations and their causes, are they still as big an issue for the LHC as we think? Of course statistics are good and help us understand how we did and where we can improve, but what about the data behind it, is it accurate enough? and what can we do to make it better?

Presenter: NIELSEN, Jesper**Session Classification:** Sessions 3 & 4: LHC Hardware Performance

Contribution ID: 54

Type: **not specified**

LHC YETS Recovery

Wednesday, January 27, 2016 8:30 AM (15 minutes)

<P>16 days are allocated in March 2016 to prepare the machine for the beam. Around 7000 powering tests will have to be performed to re-commission the superconducting circuits. An extensive list of tests will have to be executed as well on the various systems affected by interventions during YETS. A preliminary planning for these tests will be shown. <P>

Presenter: POJER, Mirko (CERN)

Session Classification: Session 5: 2016 and Run 2

Contribution ID: 55

Type: **not specified**

LHC YETS Recovery

Presenter: POJER, Mirko (CERN)