SUMMARY OF SESSION 4: SYSTEMS 2 - HARDWARE STATUS AND COMMISSIONING PLANS

W. Höfle, R. Jones, CERN, Geneva, Switzerland

Abstract

This paper summarizes the discussions that followed the presentations of Session 4 "Systems 2 – Hardware Status and Commissioning" of the 2014 Evian workshop.

LIST OF PRSENTATIONS

The session included five presentations, two on beam instrumentation topics, one each on vacuum and cryogenics complemented by a talk on software packages:

- Software Packages (*D. Jacquet*)
- Cryogenics (*K. Brodzinski*)
- Vacuum (*G. Bregliozzi*)
- Transverse Beam Size Measurement (*G. Trad*)
- Status of Tune and Orbit Measurement and Correction, Testing and Strategy (*T. Lefevre*)

SOFTWARE PACKAGES (D. JACQUET)

Delphine summarized the major changes which include the CMW upgrade, the move to FESA 3, LSA "refactoring", timing system upgrade, repopulation of the LHC Alarm screen, an upgrade to Diamon as well as a number of other software packages. She added that the logging using SDDS would no longer be possible and that someone should be given the responsibility to complete the data implementation for the fault tracking project.

To a question by *Mike Lamont* on the aperture model and whether it would be available for the injection tests, *Piotr Skowronski* said that this would be revived in November 2014. *Jorg Wenninger* added that first turn data, such as that from injection tests, has never been used in the model.

Philippe Baudrenghien asked about how the alarms for LHC would be repopulated. *Delphine Jaquet* replied that the decision on which alarms should be reported will be taken by OP in consultation with the equipment groups.

In reply to a question by *Philippe Baudrenghien* concerning automation of the abort gap cleaning during RF blow-up in stable beams, *Jan Uythoven* replied that both an automatic and manual mode was foreseen.

Withold Kozanecki asked when the Van de Meer Scan application will be ready. *Fabio Follin* replied that it was on his to-do list, but would not be started before the SPS was once again fully operational with beam.

Enrico Bravin was worried about the consequences of abandoning SDDS data, in particular the ability of the logging database to cope with the demand for the large quantities of data often associated with these files. *Chris Roderick* stated that this had been fully tested.

CRYOGENICS (K. BRODZINSKI)

During LS1 a number of leaks are being repaired and mitigation work in the framework of the R2E project is also being carried out. The strategy to increase availability and reduce recovery time in case of failure scenarios was explained. Limitations were presented, in particular for the electron cloud expected with 25 ns and the associated scrubbing run.

Bernd Dehning asked about the likelihood of losing Helium following a quench and the expected recovery time. *Krzysztof Brodzinski* explained that no Helium is lost in the event of a quench and that the experience from the high current powering of Sector 5-6 showed that the recovery time was reduced from 15 hours down to 7 hours.

Ruediger Schmidt enquired about a prediction concerning the availability of the cryogenic system for Run II. *Krzysztof Brodzinski* replied that aim is to be at 90% with the hope to increase towards 95%.

VACUUM (G. BREGLIOZZI)

Giuseppe Bregliozzi recalled the design parameters for the LHC vacuum system and explained the ongoing upgrade and repair work during LS1. The expected performance for the scrubbing run was detailed.

Wolfgang Hofle asked whether the requirements have been tightened for Run II. *Miguel Jimenez* replied that the requirements themselves have not changed, but that non-conforming equipment installed before the original LHC start-up are now being addressed and corrected.

TRANSVERSE BEAM SIZE MEASUREMENT (G. TRAD)

Georges Trad summarized the plans for the wire scanners, the BSRT and BGI as well as the new BGV for which a prototype will be installed on beam 2.

To a question by *John Jowett* on the availability of bunch-by-bunch data from the BGI for ions, *Georges Trad* replied that from the camera point of view gating at 50 ns is possible but that the scintillator used may be too slow. *John Jowett* insisted that this would be very useful to have.

On the subject of calibration for all these instruments, *Withold Kozanecki* recommended to coordinate the calibration campaigns with VDM scans. While it may be difficult to correlate the actual beam size in Point 4 with that in the LHCb experiment due to uncertainty on the optics, it would still provide valuable input for relative measurements. *Bernd Dehning* added that collecting more data with the LHCb SMOG detector would also be useful.

Mike Lamont asked about the status of the application for bunch-by-bunch beam size scans. *Verena Kain* commented that this is planned by OP, but would not be available for the start-up. *Georges Trad* explained that the scans should in future run with a cycle time of 20 minutes. To a question by *Gianluigi* on the source of the limitation to 20 minutes *Enrico Bravin* replied that this is limited by software. Faster scans would be possible by using FPGA based acquisitions; however no one is currently assigned to work on this.

Paul Collier enquired about the precision of halo measurements for tuning Alice luminosity at 6σ. *Rhodri Jones* explained that while this is being looked into for HL-LHC no instrument capable of this dynamic range is currently installed. *Gianluigi Arduini* added that tuning Alice would be carried out using their measurement of luminosity.

Stephane Fartoukh asked whether the calibration factors depend on the beam size itself and whether studies should be foreseen with a squeezed optics in IR4. *Frederico Roncarolo* and *Georges Trad* reply that indeed this can be checked in studies, but it is judged to be easier to change the beam size by controlled blow-up using the ADT than by optics changes.

STATUS OF TUNE AND ORBIT MEASUREMENT AND CORRECTION, TESTING AND STRATEGY (T. LEFEVRE)

Thibaut Lefevre summarized the status and modifications foreseen for Run II concerning the Beam Position and the Tune Systems as well as their related feedbacks. The changes for the BPM system include the installation of 48 water cooled racks for improved stability, installation of a number of additional pick-ups and the deployment of a new electronics processing system based on diode detection for improved precision down to the 1 μm level (DOROS). This electronics will initially only be installed on a few pick-ups in the LSS regions in the 4 experimental points.

The tune system continues to rely on the BBQ system, with new pick-ups installed to separate out the continuous, on-demand and bunch-by-bunch measurements. The Schottky monitor is also undergoing a complete overhaul and is complementary to the BBQ system.

The feedback systems for tune and orbit undergo modifications mainly with respect to the computer control and software in order to improve their reliability.

Oliver Bruning asked about the availability of the PLL for beam transfer function measurement. *Thibaut Lefevre* explained that the PLL is not currently a baseline instrument. It was commented that it could be very useful for collimation studies as an exciter.

Concerning the suggested use of the Schottky *Elena Shaposhnikova* explained the complexity of understanding the longitudinal spectrum.

Following a question from *Mike Lamont* about the orbit feedback system, both *Joerg Wenninger* and *Mike Lamont* expressed their desire to start operation with a new version running on FESA 3. The old version can be kept as a back-up with a decision on which version to run taken in January 2015. *Thibaut Lefevre* explained that a new version is being prepared by *Stephen Jackson*, but as a new team is in place he insisted that starting with the old system looks like the better option. *Mike Lamont* emphasized that a change of version during the run would imply a large overhead. *Rhodri Jones* summarized that the baseline plan is to proceed with a new FESA 3 version incorporating the changes identified by the feedback review in 2013, while maintain the old system as a back-up.

Stephane Fartoukh enquired about the precision of the orbit system around the inner triplet and questioned whether accurate bunch-by-bunch data would be available. *Marek Gasior* explained that the new DOROS system is not bunch-by-bunch. He underlined that while the implementation of gating is possible it would significantly reduce the precision of the DOROS system. *Thibaut Lefevre* clarified that for the LSS pick-ups in question both the new DOROS and the classical system will be available in parallel.