

## LHC-Beam Commissioning Working Group

Notes from the meeting held on  
**2 June 2009**

Present: Ralph Assmann, Roger Bailey, Helmut Burkhardt, Alejandro Castaneda Serra, Pierre Charue, Stephane Fartoukh, Rossano Giachino, Massimo Giovannozzi, Delphine Jacquet, Lars Jensen, John Jowett, Verena Kain, Mike Lamont (chair), Alick Macpherson, Malika Meddahi, Gabriel Mueller, Laurette Ponce, Frank Schmidt, `Frank Schmidt, Marek Strzelczyk, Ezio Todesco, Jan Uythoven, Walter Venturini Delsolaro, Hemut Vincke, Simon White, Frank Zimmermann.

Excused: Reyes Alemany, Gianluigi Arduini, Brennan Goddard, Eugenia Hatziangeli, Bruno Puccio, Stefano Redaelli, Jörg Wenninger.

### 1. Follow-up from the last minutes

- Sign of the magnetisation component for the transfer functions of some magnets must be flipped in LSA. Work is on going, extensive testing will be required. Ezio Todesco asked if this was really recognized as an issue for the operation and, in this case, if a list of the magnets concerned could be made. It was agreed that this subject will be discussed at the next FiDel meeting and conclusions / work progress reported at the LHC Beam Commissioning meeting towards end of June. **Follow-up: Marek Strzelczyk, Ezio Todesco.**
- Additional disk space (Pierre Charrue, [slides](#)): 18 Tb of SDDS data storage are now offered. Both operational (NFS4) and read-only (NFS99) file servers are available. On the operational side, nothing changes, except that the CASTOR transfer is now done from the new file server NFS99. NFS99 has been loaded with all data from 2006 to 2009. 6 Tb (out of 18) are currently used. See [\cs-ccr-nfs99\data](#) or [/nfs/cs-ccr-nfs99/data](#) or [\cs-ccr-samba1\slops\data\LHC DATA\OP DATA](#) or [\cs-ccr-samba1\slops\data\SPS DATA\OP DATA](#). Details on the data flow and on the high data security offered can be found in Pierre's slides.

### 2. News from LMC (Mike Lamont)

The detailed minutes -written by Frank Zimmermann- of the LHC meeting held on 27 May will be available [here](#). Items covered:

- Beam presence and vacuum valve interlocks;
- Modifications of doors in LHC tunnel;
- Update on access matrix;
- nQPS status report;
- Phase 1 current limits.

Mike Lamont presented some of these subjects ([slides](#)). Concerning the beam permit signal, it was stressed that the beam signal information has not been designed to be used for highly critical actions. The BLMs are fast enough to detect losses when the valve touches the secondary halo. Sixtrack simulation will be performed, including interaction with the valve to obtain the impact location and to confirm wrt to BLM positions.

MPS commissioning with beam (156x156 bunch scenario) was estimated to 42 shifts (2 weeks). Most shifts will be performed at 450 GeV.

The access tunnel matrix during powering tests was presented. To release the constraints due to the LHC access system, 12 extra doors would be required in the tunnel. A working group is being formed.

Presentation on the nQPS conclusions demonstrated the huge amount of work done. Team would have needed at least 2 more weeks from the first installation in LHC to come to a successful completion with all required verification for QA.

A proposal for the magnet current limits was presented, which was since then approved.

Finally the latest LHC schedule was shown.

### 3. Dry Run week 21 and 22 (Verena Kain)

Done during week 21:

- RBAC: Operational mode and piquet roles tested. Details in Verena's slides.
- Collimator dry run

Lars Jensen expressed worries about the limitations of the roles as defined by RBAC. Should everything be done by OP or can equipment experts still performed tasks, e.g. change a delay value? It was reminded that all should be fully implemented by end of July.

#### **Follow-up: Reyes Alemany**

Done during week 22:

Testing of RF power from the control room went very well. The application and sequence tasks are ready to control the RF power.

There are still some issues with the DC BCTs and the connection to the SMP.

Extraction of LHC beam under mastership and coupled to the LHC worked very well.

Trim & Incorporation was tested and it works as foreseen for the time being.

Incorporation from the LHC Sequencer tested and working.

BLM online check is working very well now. The generic online checks are available now from the sequencer (check MCS online for MKD, MKB, MKI, BLM and BETS implemented and working).

Power converter logging in the transfer lines is working (the dependency on extraction time and user name has been removed entirely).

More details can be found under:

<https://espace.cern.ch/mddb/Activity%20Tracking%20Tool/Activity%20Tracking%20Welcome.aspx?View=%7b593B6E53%2dF6F9%2d4485%2d8646%2dE7E683D0F681%7d&FolderCTID=0x012001&SelectedID=34>

and

<https://espace.cern.ch/mddb/Activity%20Tracking%20Tool/Activity%20Tracking%20Welcome.aspx?View=%7b593B6E53%2dF6F9%2d4485%2d8646%2dE7E683D0F681%7d&FolderCTID=0x012001&SelectedID=32>

Next dry runs are planned for week 26 and week 27. See details of plans in Verena's talk. Tests of the damper used for abort gap cleaning will be delayed.

### 4. Putting the beams into collisions – Helmut Burkhardt

Helmut Burkhardt presented the foreseen strategy for putting the beams into collisions ([slides](#)). Helmut reminded that the 2008 commissioning procedures remain valid, with a stage A –pilot physics run, 43X43 and 156X156, no external crossing angle- and a stage B where the external crossing angle scheme will be used. Stage B used to be with 75ns bunch spacing with up to 936 bunches and is now with 50 ns bunch spacing with between 144 to 432 bunches in the 2009 / 2010 run. The use of the various correctors needed for the crossing and separation schemes was reminded together with the strategy. The hardware commissioning strategy of the three types of corrector magnets involved in bringing the beam into collisions had been explained (see slide #7 for details). In the process of putting the beams into collision, the beam positions will be measured with

special beam directional stripline couplers BPMSW positioned in front of Q1 L / R and providing high resolution (extra BPMWF button pick-up provides 10  $\mu\text{m}$  resolution). The strategy is to adjust the orbits such that the beam 1 and 2 difference left / right of the IP is the same; beams must then collide. This is independent of mechanical offsets and crossing angles. Values of some important beam parameters were reminded, together with the fact that parasitic beam-beam effects will become a concern beyond the 156X156 stage.

Initially -and probably also later for every step in commissioning towards higher intensity/luminosity, going into collision will be performed with one experiment at a time. It is interesting for the background to distinguish between main sources -collisions related, beam gas and halo.

General sequence:

- Injection, ramp, squeeze - adjust tune, orbit, chromaticity during this pre-collision phase. If lifetime is ok, experiments could consider to start taking data; **TBD**  
**Follow-up: Helmut Burkhardt**
- Collapse separation - measure and optimize if needed;  
Separation scans to centre collisions - when and how often - to be seen;  
On demand: larger separation scans to calibrate luminosity.

The first priority will be to understand the background without the crossing angle.

Values for the separation and crossing angle at top energy when going into collisions “pre-collision conditions” were shown. However, these numbers should be updated for 2009 / 2010 and it should be agreed on optics with default pre-collision separation ( $\pm 0.5\text{mm}$  would work) and crossing angles in collision at all planned  $\beta^*$  including 1 and 3 m at 5 TeV

**Update table for pre-collision separation and collision crossing angle values:**

**Follow-up: Massimo Giovannozzi**

Convention on the use of the parameters “on\_x” must be clarified, explained and kept for all IPs. **Follow-up: Massimo Giovannozzi.**

## 5. Preparation for the beam tests – Rossano Giachino

DSO and access tests went very well. Consignation and deconsignation gymnastics allowed also performing dry tests in TI 2.

Dry run for TI 8 is on-going with BI, BIC, logging, collimator test. Powering can be re-tested as of Friday afternoon. The downstream TI 8 TED will be blocked IN beam position on Friday with the key kept in the CCC.

A last preparation meeting of the TI 8 tests has been organised by Rossano and will take place on Thursday at 17:00, in the CCC glass box.

Helmut Vincke confirmed that all RP monitors are ready. On Monday 8 June access to the experiments can be given right at the end of the TI 8 beam tests. RP surveys will be done downstream of TI 8, but not at the experiments.

## 6. Programme for the TI 8 injection tests – Malika Meddahi

Malika Meddahi presented the TI 8 beam test [programme](#). The tests will start on Saturday 6 June at 8:00 and will end at the latest on Monday 8 June, 07:00. All details can be found in Malika’s slide.

### Next meeting

Tuesday 9 June 2009, **15:30**, 874-1-011. Agenda will be sent in due time.

Malika Meddahi