

LHC-Beam Commissioning Working Group

Notes from the meeting held on
28 April 2009

Present: Reyes Alemany, Gianluigi Arduini, Roger Bailey, Oliver Brüning, Rossano Giachino, Massimo Giovannozzi, Eugenia Hatziangeli, Delphine Jacquet, Lars Jensen, Verena Kain, Mike Lamont (chair), Alick MacPherson, Malika Meddahi, Gabriel Mueller, Bruno Puccio, Laurette Ponce, Stefano Redaelli, Marek Strzelczyk, Walter Venturini Delsolaro, Helmut Vincke.

Excused: Brennan Goddard, Jan Uythoven.

1. Follow-up from the last minutes

- Date for RBAC on strict mode for the LHC only: **Reyes Alemany and Verena Kain**.
- Applications and devices used for the beam tests: Verena Kain said this subject will be discussed on Thursday 30 April in a dedicated meeting.
- Name of BTVI.877(50 - 51?): Lars Jensen and Verena Kain confirmed that the name has now been updated to BTVI.87751, which was indeed the name indicated in last year sequence. Malika Meddahi mentioned that after the extraction from the data base of the new TI 8 sequence, this device appears now with the name BTVI.87752! Overall consistency of the sequence names is being checked by **Malika Meddahi**
- Total intensity and list of beam tests: Brennan Goddard sent all information to Helmut Vincke and Rossano Giachino.
- Updates on the organisation of the TL beam tests:
 - o Rossano Giachino said that the readiness of the vacuum system in the downstream part of TI 8 (work done on the collimators, leak tests to be done for the 4 new BPM bodies, removal of a close valve) has been discussed and a solution found to ensure the system availability for the scheduled TI 8 test of week 23 (6-7 June).
 - o TI 2: dates of 11-12 July confirmed. DSO tests will be performed the week before.
 - o Test of the upgraded LHC access system is scheduled for Saturday 30 May; machine closure will start on Friday 29 May.

2. News from LMC (Mike Lamont)

Main subjects of the meeting held on 22 April (minutes (under approval) written by Brennan Goddard available [here](#))

- Sector 3-4 repair;
- LHC collimators wrt required performance for phase 2;
- Report from the new magnet powering and performance panel;
- Investigation into LHC beam vacuum protection.

3. Dry Run week 17 (Reyes Alemany)

Much work has been done by the dry run team and a complete status of all the checks was given by Reyes Alemany ([slides](#))

Remaining issues:

- TL user dependence hard coded;
- Pre-pulse in asynchronous mode comes 8 ms in advance;
- Fast BCT;
- Alarms;
- Fixed displays;
- Logging reconnection after FE reboot;
- BI with post mortem events to be tested.

Concerning the alarms, Gianluigi Arduini added that an alarm list exists for a good fraction of the systems and the related documentation can be found in the LHC Machine Check-Out web page: <https://espace.cern.ch/LHCMachineCheckout/default.aspx>

M. Albert is the contact with the CO Alarm team for transmitting the requirements.

More dry run details also available at:

https://espace.cern.ch/mddb/Activity%20Tracking%20Tool/Activity%20Tracking%20Welcome.aspx?Paged=TRUE&p_Modified=20090325%2015%3a10%3a25&p_ID=27&View=%7b593B6E53%2dF6F9%2d4485%2d8646%2dE7E683D0F681%7d&FolderCTID=0x012001&PageFirstRow=6&SelectedID=20

Post generation sanity checks will be done before beam tests: they will aim to reconstruct from the currents –and Ks- (Fidel group) the beta functions and separation & crossing bumps (OM)... **Follow-up: Fidel group (Walter Venturini Delsolaro) and OM (Frank Schmidt and Stefano Redaelli).**

4. Status of ramp and squeeze (Marek Strzelczyk)

Marek Strzelczyk presented the status of the ramp and squeeze ([slides](#)). He reminded that inject and ramp are being done at constant beta* from injection to top energy in all IP, the squeeze aiming then at reducing the beta* at each IP, possibly in an independent way for each of them.

Chronological steps:

- Ramp to top energy with injection optics;
- Change the injection optics at top energy to pre-collision optics with
 - Tune change using IR1 and IR5 (from 0.28/0.31 to 0.31/0.32)
 - Pre-squeeze for IR2 and IR8, if needed (triplet strength reduced below 215 T/m at constant beta*)
- Change to collision optics, with proper settings of the separation and crossing schemes.

To note: the chromaticity is corrected to 2 in both planes.

Marek Strzelczyk said that optimisation has been done to achieve the minimum possible time for the transition between each pair of optics with respect to power convectors.

Additional ways to further optimise the squeeze time are being studied. At the moment, the minimum squeezing time is first established, and then all the settings are generated.

The squeeze times (pre-squeeze included for IR2 and IR8) are 1188s, 2533s, 1273s, 1295s at IR1, IR2, IR5 and IR8 respectively. The reason for the longer time needed to squeeze IR2 is due to mostly RQ4.R2B2 & RCBXH1.L2; this squeeze is only relevant for ions operation.

These numbers might slightly change, but the proportion is expected to be (roughly) kept.

Ready:

- Ramp on injection optics;
- Ramp with optics changes from injection to 11p. Such optics features a beta* of 11 m, but a crossing angle compatible with top energy values. Hence, the transition

from the injection to the top energy crossing scheme is assumed to be done during the ramp;

- Squeeze in IR5 (dry run done)

Missing:

- Squeeze in IR1, IR2, and IR 8
- Simultaneous squeeze for IR1&5 and IR2&8;
- Ramp with snapback corrections.

Issues: I_PNO limits exceeded in ramp (see list of concerned magnets in Marek's talk) (slightly better situation with optics 11p). Marek added that the issue of I_PNO limit has been fixed - for most of the devices this was due to a mistake in strength calculation. But it is still exceeded for two RCDs, two RCOs and two RQT13s. Concerning QT13.L5B1, Massimo Giovannozzi said that if the non-conformity on the maximum current is established, optics re-matching will have to be done. Massimo added that however that he did not know that QT13.R1B1 was also reaching strength limit.

During the squeeze, some magnets for IR 1, 2, 5 will change the sign of the current ramp, therefore the sign of the magnetization component for their transfer functions must be flipped in LSA. **Follow-up: Walter Venturini Delsolaro / Marek Strzelczyk**

5. A.O.B

- **NEW START TIME FOR THE LHC BEAM COMM. MEETINGS:15:30;**
- Massimo Giovannozzi said that spool pieces of MCO dipoles for B2 sector 8-1 will not be available for beam commissioning this year (open circuit);

Massimo Giovannozzi added that the 2008 beta-beat measurements (Rogelio Tomas Garcia et al.) pointed to a swap in aperture of MQTL7.R3, which has then been confirmed by an inversion of the voltage taps signals. The correction has not been done yet.

Next meeting

Tuesday 19 May 2009, **15:30**, 874-1-011. Agenda will be sent in due time.

Malika Meddahi