

LHC-Beam Commissioning Working Group

Notes from the meeting held on 20 October 2009

Present: Carmen Alabau, Reyes Alemany, Ralph Assmann, Roger Bailey, Tobias Baer, Andrea Boccardi, Stephane Bart Pedersen, Helmut Burkhardt, Enrico Bravin, Massimiliano Ferro-Luzzi, Kajetan Fuchsberger, Brennan Goddard, Jean-Jacques Gras, Rossano Giachino, Hitomi Ikeda, Verena Kain, Mike Lamont (chair), Yngve Levinsen, Malika Meddahi, Gabriel Mueller, Mario Pereira, Bruno Puccio, Stefan Roesler, Katarina Sigerud, Ralph Steinhagen, Rogelio Tomas, Jan Uythoven, Walter Venturini Delsolaro, Glenn Vanbavinckhove, Jörg Wenninger, Simon White, Frank Zimmermann.

Excused: Oliver Brüning, Massimo Giovannozzi, Eugenia Hatziangeli, Barbara Holzer, Lars Jensen, Alick Macpherson, Ezio Todesco.

1. Comments and actions from the last minutes

Alick Macpherson: vacuum valve tests (see [slide](#), post-meeting email).

2. News from LMC – Ralph Assmann (slides)

Summary notes from previous LMC meetings, written by Brennan Goddard or Frank Zimmermann, are available [here](#).

Ralph Assmann highlighted some of the LMC subjects (presentation he made at the LPC):

- High beta optics for TOTEM - H. Burkhardt and S. White. Adding cables is the preferred solution –vs inverting Q4 polarity.
- HWC (powering tests) - R. Schmidt. Ready for the upcoming injection tests of 23-26 October. Progressing on schedule.
- **Decision regarding the HW commissioning:** Mike Lamont reporting on a meeting called on Friday 16 October by S. Myers. Decision: Qualify the whole machine at 2 kA and take at least 2 sectors to 6 kA this year. Therefore end of HW commissioning should be around 16 November, for 2 kA.
- SymQ commissioning status – J. Steckert. Final solution for higher energies might require adjustments on heater cables.
- He leak in sector 3-4 (P.Cruikshank). Able to cool down and reduce/stabilise the vacuum pressure, and probably can operate like this.
- TI 2 and TI 8 beam tests (M.Meddahi): Excellent results, ready for LHC beam injection.
- Summary of SM18 data mining – G. Lehmann Miotto. Revisited surface data for magnets, confirmed known bad cases and no other bad splices found from SM18 data.
- LHC IR upgrade phase 1 –R.Ostojic. Request to update LHC operational performance estimates for project assumptions. Presentation to continue in an upcoming LMC meeting.

3. Dry Run news – Reyes Alemany (slides) W42:

- **A new LHC timing system version deployed.** Working fine and reliably.
- **Pre-pulse + BPM capture:** working fine; pending issue: BPMFipSigt for SR1 has the wrong FESA version in LSA. Needs to be updated for the hardware commands
- **MKI synchronization:** O.K.
- **LHCb dipole and compensators ramp:** while ramping the LHCb magnet together with the compensator, received an alarm that the IT fingers (signal we received from IT A 1) touched the beam pipe (for one second, at current of 3033A). While ramping another 700

A, the signal appeared again. Ramp stopped at 3733A. This had never been observed before and not when ramping to full field on the Friday before. On the 15th, the magnet was ramped up to nominal field together with the compensators. This time the fingers of the Inner Tracker have not sent any alarm. However it has to be pointed out that during the morning the IT (1+2 A) had been moved out by ~0.5 mm and a very small gap had been left between the finger and the beam pipe. The reason why the IT was closer to the beam pipe than last year and why this alarm did not trigger last Friday when we ramped up to nominal field is not understood. Massimiliano Ferro Luzzi said that, in the meantime, the beam pipe was pumped down and moved longitudinal.

- **LHCb dipole, BCM and VELO interlock test**: The BIC team retested all CIBU connections for the LHCb dipole, BCM and VELO. This requires independently toggling the 2 redundant signals that each client must provide.

- **Timing of the LHCb spectrometer magnet interlock signals** that are sent to the respective CIBUs has been tested and gave satisfactory results.

- **LHCb and compensators close bump monitoring by the SIS**: works.

- **Head-tail monitor**: Looks fine. Some issues in the tracking page.

- **Tune viewer application**: Tune knobs are ready and tested. Trims from Tuneviewer not tested yet.

- **Handshake with the experiments**:

Tested the sequence DIP ALL EXP with the new task to write the beam mode in SMP in. All experiments participated except TOTEM. Check detailed results concerning all scenarios in the usual tracking link.

- **SMP**: Tested the writing of the BEAM MODE with the sequencer into SMP, and works. Verified that the all logics work fine:

- **LBDS MCS**: Updated almost all the many, many critical settings of the beam dump system. Details can be found in the tracking page.

- **TCDQ + LBDS arming and tracking**: LBDS beam 1: one BetsBei table (MKBVD) has wrong values. Every ramp fails on BETS tracking. Switched back to local over the weekend to sort that out. Need to arm and test again next week.

- **RF frequency ramp to 7 TeV + mode change + handshake + RF synchronization for ions** with ATLAS, ALICE, CMS, LHCb: completed the cycle for ions. Tested the operational scenario with a RF frequency ramp to 7 TeV and then an RF resynchronization during the SETUP mode. After the RF resynchronization and after receiving the message IMMINENT via DIP at the injection phase for the handshake, the experiments switched to the LHC clock to follow the RF ramp. Test was successful but OP is waiting for the feedback of the experiments to check if they stayed locked during the ramp. To be repeated for protons.

- **Luminosity scans + Experiments fixed displays + DIP + Page 1**: Luminosity scans done for each experiment with the correctors in simulation mode. The luminosity scan application is now operational under CCM ==> Beam measurements. All the lumi scans went fine. The fixed displays were as well checked for all the experiments. The Injection permit and beam permit were checked for all the experiments.

More details can be found in our tracking pages:

<https://espace.cern.ch/mddb/Activity%20Tracking%20Tool/Activity%20Tracking%20Welcome.aspx?View={593B6E53-F6F9-4485-8646-E7E683D0F681}&SelectedID=52>

W43: Injection test preparation.

4. **LHC- BRAN Status**– Enrico Bravin ([slides](#))

BRAN detectors are designed to provide on-line feedback on the collision rate. For nominal conditions, they will provide the average luminosity at 1Hz and bunch by bunch luminosity at 0.1Hz. Information on the crossing angle can also be provided. The BRANs intercept the neutral particles emitted at very small angles. The layout and target luminosity of the experience are very different and led to install different types of BRANs.

In high radiation region, a fast ionisation chamber is used –BRAN-A. Otherwise, solid state detectors are used – BRAN-B. At low energy and low luminosity, the fast ionisation chambers are not sufficiently sensitive and for this reason scintillating pads have been installed near the BRAN-A.

Enrico gave further explanation on the three types of BRANs, together with control software- same FESA acquisition interface for the 3 types. The three types of BRANs, are all installed and electronics and controls are ready. Particularities:

BRAN-A: At IP1, the presence of LHC-f renders the BRAN-A unusable.

BRAN-B: Should work at any energy or luminosity (dominated by statistical and background limitations).

BRAN-Sci: Very sensitive to any form of energy deposition.

Complications:

LHC-f will move in and out and therefore the BRANs will give different values in the two configuration.

At ALICE and LHC-b the converter block in front of the BRAN is moveable and will be moved if and when needed.

Dangers: HV and gas pressure settings are particularly delicate and should only be changed by experts.

Counting rates: efficiency of 50% at 7 TeV and scales with γ^{-2}

Conclusions:

- Collision rate monitors will be available at all 4 IPs;
- Statistics and background are limiting at low intensity;
- 3 different types of detectors are used to cover the range of needs;
- These are unusual detectors/techniques and will need sometime to understand.

Discussion:

To questions from Verena Kain: Logging not requested yet. Monitors used as well in the application of Simon White.

Helmut Burkhardt reminded the importance of all additional luminosity monitors and applications which will be needed especially in the early days of beam setting-up.

Enrico Bravin: A lot of offline analysis will be needed in order to analyse the data and commission the systems. Luminosity information will be more widely published (on-line application) as soon as confirmed to be reliable.

To a question of Reyes Alemany: No alarm signal -e.g. gas pressure- implemented yet concerning the status of the monitors.

Massimiliano Ferro Luzzi: Any measurements done last year? Enrico Bravin: no real good conditions for taking data.

5. Status of tune, chromaticity and coupling measurements – Ralph Steinhagen ([slides](#))

Postpone to next week due to lack of time. Transparencies are attached, and comments are already welcome!

6- A.O.B. - Mike Lamont

Sector test preparatory meeting: DAILY, 17:00, in the CCC glass box.

TI 2 beam tests down to TI 2 TED: Wednesday 21 October, pm+night, tbc.

Next meeting

Tuesday 27th October 2009, 15:30, 874-1-011. Agenda will be sent in due time.

Malika Meddahi.