LHC-Beam Commissioning Working Group

Notes from the meeting held on
21 September 2010

Present: Carmen Alabau, Nicholas Aquilina, Roger Bailey, Wolfgang Bartmann, Roderik Bruce, Kajetan Fuchsberger, Brennan Goddard, Per Hagen, Lars Jensen, Verena Kain, Mike Lamont, Yngue Levinsen, Malika Meddahi, Annika Nordt, Lasse Normann, Giulia Papotti, Mario Pereira, Tatiana Pieloni, Laurette Ponce, Rüdiger Schmidt, Katarina Sigerud, Matteo Solfaroli, Ralph Steinhagen, Marek Strzelczyk, Benjamin Todd, Rogelio Tomas, Jan Uythoven, Gianluca Valentino, Simon White, Daniel Wollmann, Marco Zanetti, Frank Zimmermann.

Excused: Markus Albert, Reyes Alemany, Gianluigi Arduini, Ralph Assmann, Tobias Baer, Chandra Bhat, Philippe Baudrenghien, Chiara Bracco, Oliver Brüning, Xavier Buffat, Florian Burkart, Helmut Burkhardt, Andy Butterworth, Marija Cauchi, Pierre Charrue, Octavio Dominguez, Lene Drosdal, Stephane Fartoukh, Massimilano Ferro-Luzzi, Rama Calaga, Ed Ciapala, Guy Crockford, Riccardo De Maria, Laurent Deniau, Bernd Dehning, Marek Gasior, Rossano Giachino, Massimo Giovannozzi, Jean-Jacques Gras, Werner Herr, Wolfgang Höfle, Eva Barbara Holzer, Delphine Jacquet, John Jowett, Witold Kozanecki, Emanuele Laface, Thibaut Lefevre, Ewen Maclean, Alick Macpherson, Aurelien Marsili, Ryoichi Miyamoto, Valerie Montabonnet, Gabriel Mueller, Eduardo Nebot, Kazuhito Ohmo, Mirko Pojer, Bruno Puccio, Stefan Roesler, Stefano Redaelli, Adriana Rossi, Mariusz Sapinski, Elena Shaposhnikova, Andrzej Siemko, Frank Schmidt, Ezio Todesco, Daniel Valuch, Glenn Vanbavinckhove, Walter Venturini Delsolaro, Jörg Wenninger, Uli Wienands, Markus Zerlauth.

1- Comments and Follow-up from the last minutes

- Fixed display available providing the tune spectra online (20 min delay). Important to reduce the present 20 mn display delay by accessing the data of the BBQ FFT via the proxy. **In progress.**
- β^* knobs: ready, will be deployed when Gabriel Mueller is back.
- Parallel luminosity optimisation: ready, to be tried on one of the coming pilot collision run.
- Voltage drop at injection: to be tested.
- Test to squeeze in one go: to be tested.

2- LHC beam commissioning: progress and issues

Reminder: Monday morning summary of Week 37 - (slides) from M. Lamont & J. Wenninger.

Update on the LHC coordinator team: Jan Uythoven has joined the LHC coordinator team. Malika Meddahi has taken over new activities and will only continue as LHC coordinator when needed (e.g. no other coordinator available).

3- Collimation commissioning status – Stefano Redaelli – Daniel Wollmann

Daniel Wollmann gave the status of the collimation setting up progress: table of the status of collimator alignment campaigns and loss map requests.
Much work has been done on the setting up and validation of the collimation system. Only three cases are missing:

a) Negative off momentum before squeeze with 100/110 μrad configuration;
b) Horizontal betratron case for B2 in collision conditions;
c) Positive off momentum with squeezed and separated beams.

The first two cases are mandatory before the declaration of stable beams (note that case 2 will be done at the end of the TOTEM run). The off momentum case with squeezed and separated beams might be done after the first stable beams runs.

To note: Optics functions do not change much when RF frequency change is applied.

By tomorrow morning all the requested validation tests will be complete.

4- Injection and protection status– Brennan Goddard (slides)

Brennan Goddard summarised the work done for the injection and dump protection system.

The TCDI protection level was measured at 5 sigma jaw setting (4.5 sigma are used). All validations are fine.
Loss maps: TCDI: The losses for 7.5 sigma impact were compared with assumed damage limits (with Annika Nordt). Work is in progress and the preliminary results are looking very good (no losses outside collimators).
TDIs: offsets were found with respect to the centered beam for both beams. To note: done with the pilot beam (LHCFAST1), for which the trajectory is different to the nominal beam one, on LHC3 cycle.
TDI and TCDIs: The full gap is correct for both beams. The offset from centering or injection is in tolerance but increases the system opening. The centering on circulating beam (±0.2 mm) was cross-checked and will have to be repeated regularly. The protection which is achieved depends on the orbit and the injection oscillation being in tolerance. This confirms the requirements to keep the injection oscillations below 2 sigma/mm and needs to be enforced.
Injection of trains: successfully tested 3 trains of 8 bunches. And the learning curve is now to be done with this 8 bunch configuration.
Filling schemes:

- 24b in 3x8b
- 48b in 6x8b
- 96b in 12x8b
- Beyond this, propose staying with 8, 16, 24 and 32b for 2010 and in any case, always inject 8b when moving on to another bunch filling pattern.

Asynchronous beam dump: One asynchronous beam dump is still to be done. All other tests were fully in agreement with the simulation. To note: for the first asynchronous beam dump, losses in P4 on MBRB.5L4.B2 were observed, with loss levels still O.K. but the reasons for these losses is to be understood. The last asynchronous beam dump tests showed losses on P3 which were 50 times higher after tightening of P3 TCPs from 12 to 10 sigma.
TCDQ settings: TCDQ moved to injection position while beam was at 3.5 TeV. The reason is understood (missing reset of armed flag in low level control), fixed but should have been caught by the interlocking. Collimators should all be driven through sequencer.
Still do to:

- Final asynchronous beam dump at 3.5 TeV
- Check of P6 interlock in BPMs

5- A.O.B

Daily 8:30 HWC meeting in the CCC conference room (09:00 at weekends).
Next meeting: **28 September 2010,** 15:30, 874-1-01.

Malika Meddahi