LHC-Beam Commissioning Working Group

Notes from the meeting held on
28 September 2010

Present: Carmen Alabau, Nicholas Aquilina, Gianluigi Arduini, Alex Bagacz, Roger Bailey, Wolfgang Bartmann, Roderik Bruce, Xavier Buffet, Christian Carli, Marija Cauchi, Guy Crockford, Laurent Deniau, Massimilano Ferro-Luzzi, Kajetan Fuchsberger, Rama Calaga, Massimo Giovannozzi, Per Hagen, Eva Barbara Holzer, Lars Jensen, John Jowett, Verena Kain, Mike Lamont, Yngue Levinsen, Ewen Maclean, Annika Nordt, Lasse Normann, Giulia Papotti, Mario Pereira, Tatiana Pieloni, Laurette Ponce, Agnisska Pribe, , Frank Schmidt, Rüdiger Schmidt, Katarina Sigerud, Andrzej Siemko, Matteo Solfaroli, Ralph Steinhagen, Marek Strzelczyk, Benjamin Todd, Ezio Todesco, Rogelio Tomas, Jan Uythoven, Gianluca Valentino, Glenn Vanbavinckhove, Gianluca Valentino, Walter Venturini Delsolaro, Jörg Wenninger, Simon White, Daniel Wollmann, Marco Zanetti, Frank Zimmermann.

Excused: Markus Albert, Reyes Alemany, Ralph Assmann, Tobias Baer, Chandra Bhat, Philippe Baudrenghien, Chiara Bracco, Oliver Brüning, Florian Burkart, Helmut Burkhardt, Andy Butterworth, Pierre Charrue, Octavio Dominguez, Lene Drosdal, Stephane Fartoukh, Rama Calaga, Ed Ciapala, Riccardo De Maria, Bernd Dehning, Marek Gasior, Rossano Giachino, Brennan Goddard, Jean-Jacques Gras, Werner Herr, Wolfgang Höfle, Delphine Jacquet, Witold Kozanecki, Emanuele Laface, Thibaut Lefevre, Alick Macpherson, Aurelien Marsili, Malika Meddahi, Ryoichi Miyamoto, Valerie Montabonnet, Gabriel Mueller, Eduardo Nebot, Kazuhito Ohmo, Mirko Pojer, Bruno Puccio, Stefan Roesler, Stefano Redaelli, Adriana Rossi, Mariusz Sapinski, Elena Shaposhnikova, Daniel Valuch, Uli Wienands, Markus Zerlauth.

1- Comments and Follow-up from the last minutes

- 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.
- Update on status of tune feedback and behaviour of BBQ system in the presence of bunch trains, transverse feedback and longitudinal blow-up. Ralph Steinhagen (slides).

  The BBQ appears to be swamped by noise during the ramp – the tune feedback back consequently switches itself off. The BBQ uses a direct strip-line pickup; it appears that the carrier frequency is modulated by the bunch configuration. One specific but not necessary problem is the longitudinal blow-up in the ramp, this causes bunch shape changes on modulation of the signal – a possible contribution to the saturation of the BBQ.

  The low band filter, which cost 6dB of signal, has been re-installed in an attempt to circumvent the problem.

  The problem appears to be worse in the horizontal plane – perhaps because of energy modulation and the small horizontal dispersion at the pickups.

  The spurious stops in the squeeze are probably related to excessive coupling which should be fixed.

  Chirping should be attempted to lift the signal out of the noise. What level – with TFB on? To be determined.

  The transverse feedback gain increase is not optimal in the ramp and increases at

a faster rate than the energy – to be modified (since done). Whether the transverse feedback has to be on in the ramp was questioned (ML). Apparently needed to fight hump in vertical plane (GA). Maybe we could leave it off in H.
Should mimic effect of longitudinal blow-up at 450 GeV and check its effect on the signal. It was noted that we have to perform the blow-up at some point.

- Brennan Goddard reported that discussions on high-level SW were ongoing between himself and Etienne regarding the recent controls related problems with the TCDQ.
- Gianluigi Arduini made a play to have the TFB on during the squeeze. It was decided that given the present problems with the BBQ that this was not the moment.
- The B1/B2 differences in emittances were noted and the effectiveness of the TFB against the hump inquired about, especially in a multi-bunch environment. BSRT bunch-by-bunch data (incoming) would be useful.
- Vacuum at plus/minus 18 metres of IP5 noted.
- 152 bunches had been signed off by the rMPP and was incoming.

2- LHC beam commissioning: progress and issues

Monday morning summary of Week 38 - (slides) from G. Arduini and R. Bailey.
Version presented at the meeting (slides).

3- Possible LHC filling patterns for the next intensity increases – Massimiliano Ferro-Luzzi

Massimiliano Ferro-Luzzi presented possible bunch number evolution in terms of filling scheme (slide1, slide2)
Requests covered in Massi slides. Some question about about which way the beams move with respect to each other during longitudinal scans. Strategy for Totem's Roman Pots has been agreed with operations. Open question remains the request for an additional bunch of 1 e10 to given TOTEM low pile.

4- New filling schemes for heavy ions– Christian Carli (slides)

Christian Carli presented the filling schemes proposed for the 2010 Heavy Ion Run.

- Introduction
- A scheme with 140 bunches/ring (minimum spacing 500 ns)
  - Filling scheme and pattern
  - Collision pattern (scheduling)
- A scheme with 124 bunches/ring (minimum spacing 600 ns)
  - Filling scheme and pattern
  - Collision pattern (scheduling)
- Summary and Conclusions
  - Alternative filling schemes to increase Luminosity … adaptations of EARLY scheme
    - Increase of (minimum) filling time to ~7 mins/ring
  - Further steps (if decision to in increase the number of LHC ion bunches in 2010):
    - Which scheme to be used … may-be further variant to be studied?
    - Discuss with relevant SPS and LHC (RF, BI, machine protection …?) experts

5- A.O.B

Daily 8:30 HWC meeting in the CCC conference room (09:00 at weekends).

Next meeting: **5 October 2010,** 15:30, 874-1-01.

Mike Lamont