LHC-Beam Commissioning Working Group

Notes from the meeting held on
1 June 2010

Present: Carmen Alabau, Wolfgang Bartmann, Chiara Bracco, Rama Calaga, Pierre Charrue, Ed Ciapala, Bernd Dehning, Laurent Deniau, Lene Drosdal, Stephane Fartoukh, Rossano Giachino, Massimo Giovannozzi, Brennan Goddard, Per Hagen, Werner Herr, Wolfgang Höfle, Lars Jensen, John Jowett, Mike Lamont, Malika Meddahi, Gabriel Mueller, Giulia Papotti, Mario Pereira, Laurette Ponce, Mirko Pojer, Stefano Redaelli, Stefan Roesler, Elena Shaposhnikova, Katarina Sigerud, Matteo Solfaroli, Ralph Steinhagen, Marek Strzelczyk, Benjamin Todd, Rogelio Tomas, Jan Uythoven, Jörg Wenninger, Frank Zimmermann.

Excused: Reyes Alemany, Gianluigi Arduini, Tobias Baer, Roger Bailey, Helmut Burkhardt, Andy Butterworth, Oliver Bruening, Octavio Dominguez, Lyn Evans, Massimilano Ferro-Luzzi, Kajetan Fuchsberger, E. Barbara Holzer, Delphine Jacquet, Verena Kain, Thibaut Lefevre, Yngue Levinsen, Alick Macpherson, Ryoichi Miyamoto, Bruno Puccio, Adriana Rossi, Frank Schmidt, Rüdiger Schmidt, Ezio Todesco, Glenn Vanbavinckhove, Walter Venturini Delsolaro, Simon White, Uli Wienands, Daniel Wollmann, Marco Zanetti.

1- Comments and follow-ups from last meetings

No comments.

2- Highlights from the last week of operation – Mike Lamont (slides)

- 13 bunches of 2e10 per beam brought into physics for the first time. Rocky in lifetime.
- Energy matching of beam 1: done.
- Injection kicker studies - Etienne Carlier- detailed study is in progress.
- Injected higher longitudinal emittance from the SPS, and was matched properly.
- Use of controlled longitudinal beam blow up: to be tested – Elena Shaposhnikova will report on this next week at the LHC Beam Commissioning meeting. If we inject less than 0.6 eVs then loss of Landau damping is observed on the flat top together with a small continuous slow increase in emittance on the flat bottom. Otherwise, for larger emittances the beam is stable on flat top but small particle losses (abort gap filling) are observed along the flat bottom.
- BPM versus intensity: measurements done, should be continued.
- Impedance measurements performed.
- High intensity, un-squeezed, 1e11 per beam.
    - 1st trial: Collisions done with tunes left at injection, no Q split applied, lost on strong coherent instability.
    - 2nd trial: Collisions tunes, tune split applied, single beam was rocky before the collisions.
    - 3rd trial: looked good longitudinally, strong tune peaks observed in the tune spectra, single beam looked rocky, sensitive to tune and coupling. Strong activities in tunes, which conducted to strong beam losses.
    - Flat top chromaticity: high (too high, to be lowered).
    - Transverse damper B2V was on during the ramp. Did good on the transverse emittance during the ramp, small growth.

    - Colliding 13*2e10 – strong activities on the vertical tunes, linked to the strong beam losses. More coupling correction needed?
    - Orbit feedback: operational.
    - Transverse damper systems being commissioned.
    - BPM: Sensitivity switch: study to be continued.
- Bunch length calibration vs. SPS (slides from Giulia Papotti). Good agreement when compare with data from experiments. GUI application of the LHC BQM: Gain to be adjusted for the different intensities. RBAC to be included at a later stage.
- Jörg Wenninger: both octupoles and skew quads will trigger a beam dump when they trip. If one is off and non-functioning, should then be put out of the configuration. No more action needed.

3- Status and outcomes of the LHC operational review – Mike Lamont et al. (slides)

As we are moving from commissioning to more regular operations and already operating well above the safe beam limit at 3.5 TeV, the question was raised concerning the readiness to deal with the real destructive potential of 0.5 – 1 MJ?
As an illustration, different examples of unsafe operational cases which did happen were given.
Very nice and complete list of subjects were prepared by the EICs, with issues, actions and responsible groups. Subjects covered were: preparation, injection, ramp, squeeze, operation, sequencer, controls, LSA, orbit, collimators, MPS. The critical points are highlighted in red in the tables (see slides).
Orbit: highest critical subject. Strategy for switching between high and low gain to be decided on, strategy to deal with intensity dependence to be defined. Must look at all implications (such as interlocked BPMs). Going to 5 m beta* will provide more margin while the temperature dependence is not yet under control. Need to only have one reference orbit. All issues are being worked on.
RBAC: As we are moving to higher and higher beam power, the machine mode BEAM-SETUP and ACCESS should now be put as OPERATIONAL. Pierre Charrue will organise this change with the EICs.
Actions, names and deadlines will be added to the lists shown and progress followed-up – Mike Lamont.
To note: Only one BSRA is currently operational (for beam 2). Spare pieces (PM) ordered for the second one. Time estimate to be provided.

4- Strategy for the 10 A/s ramp rate

Hardware tests will continue tonight and tomorrow night. If all tests are successful, the green light will be given to use this 10 A/s ramp rate in operation. This will be made operational next week, in order to slightly ease the complicated beam restart after this technical stop.

5- Beam planning for week 22 – Gianluigi Arduini, Malika Meddahi (slides)

Goals of this (short) beam commissioning week are to continue the transverse damping commissioning and provide luminosity runs with 13 bunches of 2e10.

6- A.O.B

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

Daily 17:00 Beam commissioning meeting /OP, CCC glass box.

Next meeting: **8 June 2010,** 15:30, 874-1-01. Agenda will be sent in due time.

Malika Meddahi