LHC Beam Operation Committee

Notes from the meeting held on 24th April 2012

Participants

1. Activities During TS – J. Coupard (slides)

J. Coupard presented a summary of the activities foreseen for TS1 (see slides for details) and explained that they mainly consist in recurrent maintenance of the different systems.
Among the non-conventional activities: X-rays at the TDI in point 8 to check any eventual deformation, inspection of collimators with train in point 3, repair of the secondary collimator that was stuck at injection setting (TCSG in point 3) and installation of new biometry in 3 new points.
The replacement of the MKID in IP8 was postponed to a future TS (TS3 was foreseen in the original plans: MKI with 24 conducting strips).

Discussion:

G. Arduini asked about the replacement of the faulty RF power supply.
D. Valuch answered that the weak amplifier will be checked and eventually replaced.
J. Wenninger asked if any RF reconditioning has to be performed after the TS and, if yes, what the time estimate is.
P. Maesen answered that, due to the replacement of one compressor in point 4, RF reconditioning is needed and it is supposed to start on Friday at midday and continue until Saturday morning.
G. Arduini commented that a more precise time estimate should be provided in order to be able to present a planning for the recovery with beam at the 8:30 meeting on Friday morning.

P. Charrue asked about the status of the re-cabling in point 6 for the LBDS systems.
C. Bracco answered that work is ongoing as foreseen: fast fuses are being installed to all the WIENER power supplies and the reconfiguration of the electrical distribution will be completed on Thursday 26th. She added that E. Carlier asked to implement a software interlock to dump the beam in case of failure of one of the TSU power supplies (loss of redundancy).
P. Charrue answered that a dedicated FESA server would be needed in order to react fast enough and reduce the number of unnecessary internal triggers; this kind of work cannot be performed during TS1.

J. Wenninger asked about the mitigations foreseen for the BLM high voltage drop problem.
E. Del Busto explained that one possible strategy would consist in reducing the resistor in the IP7 distribution line from 1 MΩ to 100 kΩ; this would allow for 10 times higher losses to generate the same voltage drop that caused the beam dump.
M. Lamont asked if it was possible to live without this modification.

J. Wenninger answered that this could prevent from increasing the bunch intensity. He asked if a change of the thresholds on the card could be enough. BLM people should provide an answer as soon as possible in order to be able to perform the required interventions. *

*Final decision: no change will be applied in the high voltage box but thresholds will be lowered in 10 cards from ~1400V down to ~1000V (max. 8 BLMs / card).

2. BE-CO Work for the TS1 – P. Charrue (slides)

P. Charrue reported on the BE-CO interventions and upgrades planned for TS1 (DB, SAMBA server, CTR firmware, new COLSA machines, etc.).
The symbolic link "/user/pcrops/data" will be removed; all the applications should refer to the official link: "user/slops/data" and should then not be affected by this change.
A new version of Diamond with faster fault detection will be released. All the consoles will be rebooted to have the latest security patches.
A change of the Root password policy in the FrontEnd will be made: no direct root access will be possible anymore. Personal logins and "SUDO" will have to be used to perform changes; this will allow a better control of the applied changes (instructions will be sent around).
The intervention on Faraday cage will be skipped for lack of time.

3. First Observations on Transfer Line and Injection Stability – L. Drosdal (slides)

L. Drosdal presented on transfer line and injection stability. She reminded that shot-by-shot, bunch-by-bunch variations and long term drifts were observed last year. Ripples in the MSE power converter and on the MKE4 waveform were indicated as main sources of the transfer line instabilities. Interventions on the MSE power converter allowed to reduce the shot-by-shot variations by a factor of ~2 in the horizontal plane for TI2 (the most critical one). Work is still ongoing to try to further improve the situation. The change of the MKE delay permitted to reduce the injection oscillations and, in particular, to improve the steering with 12 bunches (more representative of the full 144 bunches injection batch).

Preliminary studies showed a long term drift in both planes for both lines and a model independent analysis indicates many candidate sources. Further investigation is needed.

Variation of the current of the injection septum MSI in IP2 has been identified as a potential issue for Beam 1 injection stability. The option of pre-cycling this magnet is considered and noise will be monitored.

Discussion:

J. Wenninger pointed out that, for the long term drifts, one should keep in mind that a dipole was changed in the SPS and this could cause a change of the orbit at flattop and, as a consequence, of the TL trajectory.

W. Höfle asked what the main concern related to the MKE problem is since injection oscillations could be easily corrected with the transverse damper.
J. Wenninger explained that the protection provided by the TCDI,TDI and TCLI depends on the oscillations at the first turn and this cannot be fixed by the damper.

J. Wenninger commented that the pre-cycle of the MSI will likely require a new re-steering of the lines.

G. Arduini asked if the timing problem that caused the dump of 144 bunches on the TDI in point 8 was understood.
C. Bracco answered that she will ask E. Carlier*.

* Still under investigation

4. Orbit Changes During Collision and Applied Solutions – J. Wenninger (slides)

J. Wenninger presented an update on orbit control during squeeze and collision.
He explained that, in 2012, the strategy for smoothing at the matching points was changed to reduce artificially induced orbit spikes. He also reminded that the orbit FB is on during the squeeze and off when going into collision.
Some lifetime issues, correlated with orbit spikes and consequent losses at the collimators in IR7, were encountered during the squeeze, mainly for Beam 2.
It was observed that losses at the horizontal TCP are dominant also when the orbit spikes are in the vertical plane (showers from upstream vertical TCP).
The orbit spikes in IR7 were not predicted by the model and could not be corrected by the orbit FB. A manual orbit feed-forward, mainly at the matching points, allowed to reduce the orbit spikes during squeeze (orbit errors are now a factor of 4-5 smaller than in 2011) and further improvements can be envisaged.
The main orbit problems during collision were related to non-closure bumps. Again manual trims at the matching points allowed to reduce the orbit leakage to IR7 from ~100 μm down to ~ 30 μm. The residual errors could be further reduced with the orbit FB.

5. Recovery From TS1 – J. Wenninger (slides)

J. Wenninger presented the plans for recovery activities after TS1. Standard checks will be performed at injection and collision (dump checks, cycle with beam, intensity ramp up, etc.). Injection setup will be needed due to the replacement of a SPS dipole and the implementation of the MSI pre-cycle. Few hours will be dedicated to TDI

check to define references with “cold” jaws. New measurements will have to be repeated, after the intensity ramp up, with “hot” jaws.
Tests of ADT gain gating for tune measurements during the energy ramp have to be performed.
Between other non-standard checks: waist scans, OFSU software update, LHCb polarity change and roman pot alignment.

Discussion:

G. Arduini asked if waist scan with RF is really needed.
E. Meschi answered that at the moment there is no data justifying a RF waist scan. He proposed to wait for the results of the WdM scans and then eventually re-discuss this option.

R. Jacobson asked if all the LHCb applications use the same knob (with linear combination of the H and V planes) which is used for inverting the polarity, since he observed strange behaviors during the VdM scan.
J. Wenninger answered that in principle the same knob should be used in all the applications.

E. Meschi commented that the roman pot alignment is still under discussion. The test should take 5 hours plus loss maps independent from collimators loss maps.

6. Next meeting

Tuesday, 08/01/2012: **LBOC meeting (15:30 in 874-1-011)**.