WP2: Optics, Orbit, instrumentation

R. De Maria

Optics and Layout

Points	11	12	1	2	3	4	5	6	7	8	9	10
1												
2												
3												
4												
5												
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7												
8												
9												
10												
11												
12												

Done; In progress; Waiting for info

Optics and layout

1. From 16/10/2015: BPM aperture could be a bottleneck close to the D1 according to its distance from D1. Verify.

11. Update aperture estimates with latest information on tolerances from TE/VSC. Needs also new alignment tolererances.

Actions:

1) Iteration with vacuum on-going (input received, feedback given, waiting for meeting to progress).
2) Possible conflict for D1 to be addressed by TCC.
3) Alignment tolerances with remote alignment being reviewed
4) Needs global update with final drawing expected in spring

Proposal:

Jan/19: WP2-WP15 joint meeting and TCC for D1

June/19: New optics version with consistent drawings/vacuum

Optics and layout

2. Possibility to suppress the installation of MS in Q10 in IR1 and IR5.

On going actions:

1) Fabien is studying various scenarios with driving term and DA
2) Need studies with DA-BB

Proposal:

Update Feb/19

Optics and layout

3. Need for the replacement of weak MQTLs in IR6 should be also addressed.

Actions:

1) Operational scenarios compatible with present limit.
2) WP3/Luca Bottura: do not anticipate further degradations

Proposal:

Ask WP3 to confirm statement in writing.

Optics and layout

4. Re-Check minimum TAXS aperture

7. Verify whether the TAXN aperture can be reduced as this could be beneficial for radiation. See e-mail to F. Cerutti on 24/9/2018 and see minutes of the TCC on 20/09/2018 (https://indico.cern.ch/event/758028/). F. Cerutti expected to provide an answer in spring 2019.

Actions:

1) Shape and alignment tolerances under review: TAXS present margin expected to disappear with new tolerances, some margin TAXN margin
2) Provide tentative minimum aperture with best guess tolerances
3) Reconfirm apertures after studies

Proposal:

Update Feb/19 with best guess tolerances

Optics and layout

5. Implications of the issue with imbalance of currents on Q8.L4.B1

6. Verify that the proposed operational scenario is robust both for the nominal and ultimate scenario:

- *Injection (Verify aperture for possible increase of crossing angle/separation at injection at the IPs)*
- *ramp and squeeze and pre-squeeze/squeeze*

Impact of separation and crossing angle in the various phases on aperture should be checked and used to guide the choice of these parameters in all the phases of the cycle. Check compatibility with power converter ramp/acceleration rates.

Actions:

1) Q8.L4.B1 slightly less extreme than RunII optics, within the known limitations. Checking with Matteo exact causes of past issues in case of non-conformities.
2) New proposed squeeze mechanism takes into account detailed features of the circuits (no surprises on optics transitions unless hardware failures).
3) Detailed ramp&squeeze sequence under development (with&without ATS factors) for updated values of BB separation during the squeeze
4) Hardware tests foreseen at the end of the year.

Proposal:

Update Jan/19 of hardware test results

Optics and layout

8. The optics constraints coming from beam instrumentation have been revised at the WP2 meeting on 6/3/2017 (https://indico.cern.ch/event/706991/):

1. TL should provide a list of the instruments that can be moved longitudinally and by how much to further optimize the optical parameters. **Action: Thibaut.**

2. Optics parameters should be estimated at the location of BGV and new BSRT using the light from D4. Action: Riccardo. For that, exact positions should be provided. **Action: Thibaut.**

3. The imbalance in beta functions at the Schottky monitors between B1 and B2 should be reduced, also considering the option of moving the monitors longitudinally, if needed. **Action: Riccardo.**

4. Increase the minimum beta at the BSRT above 200 m while keeping the beta at HEL bigger than 250 m. **Action: Riccardo.**

5. Blocking the phase advance at the BSRT with respect to the two IPs would limit significantly the optics flexibility and the solution of installing on pair of electro optical BPMs per beam is proposed. The positions close to Q5 and Q6 at IR1 or 5 are proposed. Thibaut will discuss this with the integration team. **Action: Thibaut.**

Actions:

1) All actions done and presented during WP13 meeting 3/9/2018
2) BI is reviewing the input to prepare a feedback

Proposal:

Wait for BI Feedback tentatively during winter 19 and give feedback spring 19

Optics and layout

9. From WP2 meeting on 21/08/2018 (https://indico.cern.ch/event/750135/: ACTION (Riccardo): Supply to BI a specification on orbit accuracy requirements of the new BPMs

Requirements on Beam Instrumentation Status 5/11/2018: Following the meeting on 13/10/2017 : review of the requirements on the beam position measurements and in particular of the EDMS note 327557 . Follow-up meetings on 27/4/2018 and 1/10/2018.

- The Requirements should be documented in a note. Starting point should be the LHC BPM functional specification above. Action: Riccardo

Actions:

1) First draft document discussed in the WP13 1/10/2018
2) WP13 proposed setting up working group with target in spring for final document

Proposal:

Setting up working group (Rhodri proposed Manfred, Jean-Jacques, Jorg, Riccardo, Rogelio) to follow-up document.

Optics and layout

10. Make sure that the nominal orientation of the crossing angle (H in IP1 and V in IP5) are included in the optics files for the round optics.

Needs to decide final crab cavity orientation

Actions:

1) Done
2) HV crossing attractive for wire+flat scenarios and slightly for pure round optics. VH crossing attractive for any flat (large ratio without crab cavities or small ratio with crab cavities).

Proposal:

Wait for wire studies

Optics and layout

12. Need to update the position of the 11T dipoles/TCLDs in point 7 taking into account the latest informations

Actions:

1) Present layout 11T in cell 8
2) Can be updated for 11T in cell 9 if decided.

Proposal:

Update HL1.4 with optional 11T in cell 9 if needed

Oribt corrections

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Orbit corrections

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Orbit Correction

1. Need to issue an updated note for the orbit correction for the Optics version 1.4 by the end of the year. Difference in the transfer function between the two D2 apertures and the alignment errors (including waviness) assumed for the triplet. Action: Davide

Flat optics (same as round) and large beta should be considered too.*

3. Do we have enough knobs to control the orbit at the crab cavities without affecting the orbit at the IP also assuming remote alignment capabilities?. Action: Davide, Riccardo

Realistic closed orbit residual estimates to be used in aperture calculations.

Actions:

1) HLLHCV1.4 being already studied (documented also in IPAC'18 paper) using the 1.3 with the remote-alignment assumption and checked a posteriori with the small modification introduced by 1.4.

Proposal:

a) Write a short note by the end of year without closed orbit residual estimates (using the IPAC'18 paper as base.

b) Complete the analysis with the closed orbit residuals, but deliver the note in spring 2019.

Orbit Correction

2. From the WP2 meeting on 22/5/2018 (https://indico.cern.ch/event/726043/):

Is it injection oscillation from crab cavities?

Actions:

1) Done at annual meeting talk

Proposal:

Done

Orbit Correction

4. The acceleration and ramp rates for the orbit correctors for the separation bumps should be reviewed to account for the fast crossing of critical stability areas assuming tolerance in the reproducibility of the separation of xx sigmas (value xx to be confirmed with LHC tolerances)

Actions:

1) Estimates in presented in the circuit note for 2 σ in 3 s for which we need 0.6 A/s^2 and we ask for 5 A/s^2 for orbit feedback reasons

Proposal:

We have sufficient margins, done.