

Minutes of the 58th WP2 Task Leader Meeting held on 16/10/2015

Participants: G. Arduini, F. Cerutti, R. De Maria, I. Efthymiopoulos, M. Giovannozzi, T. Lefevre, E. Métral, Y. Papaphilippou, R. Tomás, A. Tsinganis, A. Valishev

Minutes, Follow-up of Actions, General Information (Gianluigi)

Minute approval has been postponed as the minutes were not ready in time.

From LIU/HL-LHC day: clarify what is the threshold for the onset of TMCI for the scenario with a 200 MHz system. **Action: Elias.**

The bunch length, total and inelastic cross sections will be updated in the PLC pages and TDR.

Update of the beam parameters for the nominal (standard and BCMS) and 8b+4e scheme (R. Tomas)

Rogelio presented an updated table of the parameters for HLLHC based on a new value of γ_t . Gianluigi noted that value is not correct. Riccardo provided the following table for HL-LHC V1.2:

Optics	Energy [GeV]	Beta* IP1/5 [cm]	γ_t Beam 1	γ_t Beam 2
Inj.	450	600	53.787	53.860
Inj.	7000	600	53.787	53.860
Round	7000	15	53.735	53.769
Flat	7000	30/7.5	53.725	53.755

Gianluigi commented that the pileup should be taken as input for the calculating the levelled luminosity.

Update on energy deposition for the triplet (A. Tsinganis)

Andrea reported an update of the energy deposition studies using the layout HL-LHCV1.2.

The TAXS position has not changed with respect to previous studies for HL-LHCV1.1 but the radius increased from 54 mm to 60 mm. Ilias added that CMS needs 63 mm valves for standardization, which implies a TAS opening of about 57 mm \pm 0.5 mm in shape tolerances. Riccardo mentioned that he used in the aperture calculation the value of 60 mm with shape tolerances included. Gianluigi noted that non-standard vacuum valves should be also considered.

The round optics and crossing angle have been used with the field maps given by Ezio Todesco together with the D1 field map freshly generated by Japanese colleagues for the actual 150mm aperture (previously an older 160mm aperture map was adapted to 150mm; main quadrupole field maps for 150mm aperture have been used since the beginning). The triplet cross section has been updated to account for the new coil diameter and all the inner layers have been scaled accordingly. The pumping slots have been covered with W with a 50% filling factor. The interconnects use the circular BPM design without shielding. Thibaut commented that in principle, also W inserts could be included in circular BPMs. Riccardo asked by how

much the BPM aperture is larger than the beam screen. Thibaut replied that is larger by about 1 mm and Riccardo added that the BPM aperture could be a bottleneck close to the D1 according to its distance from D1. Thibaut concluded that the BPM in D1 has not been looked yet. **Action: Thibaut and Riccardo to follow-up on the D1 BPM aperture and position.**

A comparison with previous results showed that the power deposited increased in Q1 due to the increase of the TAXS aperture but within acceptable limits. The presence of long gaps in the interconnects result in a peak power density increase in the face of Q2B for horizontal crossing resulting in value of peak dose approaching 50 MGy for 4000 fb⁻¹. Francesco reminded that expected quench limit is 40mW/cm³ and 15mW/cm³ is assumed as target.

Crossing angle and planes have large impact on the results. In particular a different time sharing of crossing planes and angle between IR1/IR5 could results in an equalization of the doses. Flat optics and VV crossing show the best compromise, however it requires to keep full crossing plane flexibility between IR1 and IR5. Crossing angle at 45 degrees do not help much as the dynamics is dominated by the field symmetries in the quadrupoles. Additional shielding in the BPM may help, but not substantially, due to the intrinsic empty length of the transitions. Andrea will perform simulations with an Inermet BPM to evaluate the maximum expected gain. Gianluigi encouraged to study solutions to extend the shielding in the BPM transitions. **Action: Vincent Baglin.**

Report from Task Leaders:

Elias: The BPMs impedance should now be studied.

Massimo: tracking has started for new triplet field quality including the effect of the coil ends. Ezio should provide estimates for the contribution of the beam screen (including the shielding) on the field quality.

Rogelio: a report of on triplet coupling corrections with beam based method confirmed no issue with the present corrector strength, however it also confirmed problems for MADX to handle strongly coupled optics.

Yannis: nothing to report.

Reported by Gianluigi and Riccardo