Minutes of the WP2 Task Leader Meeting held on 24/10/2014

Participants: G. Arduini, O. Brüning, B. Dalena, R. De Maria, P. Fessia. Remote: A. Wolski, A. Valishev.

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

The minutes of the previous meeting have been approved without comments.

Follow-up:

A meeting on beam-beam is scheduled next week to compare simulation models: **Action: Tatiana, Sasha.**

Tools for HL-LHCv1.1 should be prepared after KEK meeting: **Action: Riccardo**

Comments were received from the Editorial Board regarding the draft of Chapter 2 for the PDR. Andy to discuss appropriate changes with the contributors of the different sections, and to prepare a new version with a response to the Editorial Board comments.

Next deliverable reports should be finished within next week, including deliverable 2.6 that includes the alternative scenarios. Gianluigi will use the material of the PDR for it.

Oliver reports from ECFA meeting that there were discussions on the luminosity goals: the experiments would like to keep 3000 fb^{-1} by 2035, which is rather challenging taking into account that the number of operation years is reduced now to 8 as compared to the initial assumption of 10. In terms of pile-up density it was noted that below 140 events per crossings, shaping of the pile-up density has a limited impact on the vertex reconstruction efficiency although it might have a larger impact for larger pile-up levels, i.e. for levelled luminosities larger than $5\times10^{34.}$ $cm^{-2}s^{-1}$.

After the PLC, Herve is working on a possible solution for the integration of the main sextupoles in Q10. From the TC, J. Osborne is updating the cost estimate for civil engineering.

The HiLumi book is in good progress; only one chapter is missing now.

Q7+ optics and layout (B. Dalena)

Barbara presented an alternative scenario with an additional Q7 (2xMQM called Q7+) that would aim at providing larger beta functions at the crab cavity locations and at extending the optics flexibility to reach beta*=15 cm for non-ATS optics. The new Q7 is installed at about 6 m from the existing one to allow for the space required for the DFB. Paolo noted that the from the integration point of view, a possible option is to put to the Q7+ closer to the existing Q7 and shifting the DFB. Riccardo added that powering Q7+ in series with Q7 could be also considered to save a power converter.
G. Arduini pointed out that the total phase advances of IR1 and IR5 could be further relaxed for VDM optics, in order to lift the minimum beta*.
Barbara showed the difference in chromatic performance between ATS and not-ATS optics (large high order chromaticity and beta-beating, difficulties in correcting dispersion with arc for the latter). Also for the crab cavities voltage, non-ATS optics is less optimal.

Gianluigi asked whether there is a gain in changing only Q5. Barbara replied that Q7+ is essential for pushing the beta functions and the MQYY is needed mostly for aperture. Riccardo added that with different optics schemes as the ones proposed by Stephane, the gain in aperture of the MQYY could be beneficial.
Barbara showed the evolution of the strength of the triplet magnets during the squeeze, a 5% relative variation of the triplet magnets' strengths is observed and compatible with the maximum variation of 11% allowed by the presently considered triplet powering scheme. Q4 will require the maximum strength at the beginning of the squeeze while Q7 will reach the maximum strength at the end of the squeeze.
Gianluigi asked whether the required crab voltage is constant during beta* levelling from 70 cm to 44 cm. Riccardo confirmed after the meeting that for HLLHCV1.0 there is an increase of the higher voltage of the order of 3%, however for the squeeze of HLLHCV1.1 one could attempt to optimize the squeeze in such a way that the voltage decreases with the increase of beta* thanks to optics flexibility that is gained when beta* increases. Also at the beginning of the levelling full crabbing is not strictly necessary and the luminosity loss can be restored by starting with a slightly smaller beta*.
Sasha noted that although larger beta at the crab cavities allows obtaining a given angle for a lower voltage, transverse impedance effects are enhanced. Gianluigi elaborated that at constant transverse impedance one could at some point reduce the number of cavities, but this would nevertheless require additional magnets: 2xMQYY and 2xMQM per IP.

Updates from Task Leaders (Task leaders)

- Task 2.2: Riccardo mentioned that new thin optics files are available for version HLLCHV1.0 for the nominal squeeze transitions. The task leaders have been informed after the meeting.
- Task 2.5: Sasha reported that he has established contacts with Mikhail Zobov in Frascati to profit of their experience with beam-beam long range compensation.
- Task 2.6: Nothing to report.

Next meeting will take place on **Friday 7th November 2014**.

Reported by Gianluigi and Riccardo.