

## Minutes of the 39<sup>th</sup> WP2 Task Leader Meeting held on 30/1/2015

Participants: G. Arduini, D. Banfi, R. De Maria, T. Pieloni, E. Todesco, A. Valishev.

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

The minutes of the previous meeting have been approved with comments and a tentative agenda for the following meeting has been setup on the WP2 website (<https://espace.cern.ch/HiLumi/WP2/Wiki/Meetings.aspx>).

A table of beam parameters and beam settings of the main operational scenarios (nominal pile-up level with 140ev/crossing and 210ev/crossing) has been circulated by Elias and Gianluigi has provided comments. There are still some open points that need to be clarified. Once complete it will be placed in the WP2 website.

From PLC:

- The MQXF review recommended reducing the gradient from 80% to 75% of the margin.
- An increase of the distance between triplet and TAS and the distance between quadrupoles has being envisaged from the integration studies (the first item is still being studied).

From the Steering Committee:

- the next Hi-Lumi US-LARP meeting (11<sup>th</sup> to 13<sup>th</sup> of May) is being organized.
- the construction of a gallery parallel to the tunnel close to IR1/5 is being considered to install cryogenics equipment and crab cavity ancillary equipment. The construction of these galleries and corresponding pits should take place during LHC operation. The impact of the vibrations resulting from the civil engineering work is being considered (M. Fitterer).

### Beam-Beam sensitivity on multipole with Beam Beam (T. Pieloni, D. Banfi)

Tatiana mentioned some delays in LHC@Home queues that delayed some results, Gianluigi mentioned that a Bologna cluster (contact Daniele Cesini) could be used also for SixTrack simulations if needed.

Tatiana reviewed the baseline scenario with leveling at a luminosity of  $5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$  (in that case the minimum  $\beta^*=15 \text{ cm}$  is reached with a bunch population of  $10^{11} \text{ p}$ ),  $7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$  ( $1.25 \times 10^{11} \text{ p/bunch}$  at  $\beta^*=15 \text{ cm}$ ), and no levelling ( $2.2 \times 10^{11} \text{ p}$  at  $\beta^*=15 \text{ cm}$ ). Tatiana noted that the uncertainty in the beam parameters (e.g.  $\pm 10\%$  variations in emittance or bunch population) gives an uncertainty in the DA estimates with beam-beam of the order of  $0.5\text{-}1 \sigma$ . Gianluigi commented that there is also a part coming from the simulation uncertainties. The impact of field quality of the magnets is  $0.7 \sigma$  (dominated by the triplet) for high intensity case, and  $0.9\sigma$  for the low intensity case.

The effect of b10 (systematic -0.39) and b14 (systematic -0.67) has little impact for the high intensity case. In selected seeds the multipole components can reduce the spread (leading to better dynamic aperture), in the other cases a shift the working point degrades the DA. In case of large crossing angle the multipole errors decrease further the DA, however b10 and b14 show the same trend. Gianluigi asked whether the values for the b10 and b14 multipolar errors are those provided by Ezio or are those proposed by Task 2.3. The following discussion seemed to indicate that these are the values provided by WP3. **Action: Tatiana to confirm with Massimo.**

Sasha asked if  $\beta^*=10\text{cm}$  has been tested since it enhances the effect of high order multipoles and if the impact of the triplet misalignment could be simulated. Riccardo replied that it is possible to introduce a misalignment model in the mask file, correct the orbit and translate it into SixTrack.

Ezio asked if random components of the low order multipoles ( $a_3$ ,  $b_3$ ,  $a_4$ ,  $b_4$ ) and  $b_3$  of D2 could be studied. Gianluigi proposed to complete the analysis on triplet error with  $\beta^*=10\text{ cm}$  and after look at D2.

**Action: Tatiana.**

*Reported by Riccardo and Gianluigi*