



WP2 Meeting #142

Tue 26 Feb 2019, 10:00 – 12:00

Chair: G. Arduini

Speakers: M. Giovannozzi

Participants: **J. Andersson, S. Kyriacos, E. Maclean, N. Mounet, A. Oeftiger, Y. Papaphilippou, K. Paraschou, F. Plassard, B. Salvant, G. Skripka, G. Sterbini, R. Tomás**

AGENDA

The meeting was devoted to the study of the impact on DA of the field quality of the D2 correctors referred to as the MCBRD magnets. This study follows the discussion and the action proposed at the 141th WP2 meeting during which **Frederik** presented his simulations on the large impact on DA of the MCBXF errors and its sensitivity to the signs of the reference fields including MCBRD errors. In this updated study, presented by **Massimo**, the impact on the DA focuses on the influence of the MCBRD (a3,b3) errors by not including the errors on MCBXF for two different set up of the reference strengths of the MCBRD.

General information (G. Arduini)¹

1 Update on field quality of MCBRD (D2 correctors) and impact on DA (M. Giovannozzi)Error!
Bookmark not defined.

MEETING ACTIONS

Frederik,
Massimo Investigate the impact of a change of crossing plane on the DA (Horizontal crossing in IP1 and vertical in IP5) and the impact of different signs of the reference field using a Monte Carlo approach. Investigate the possibility of correcting the field quality of the magnets generating the crossing angle scheme using the corrector's package.

GENERAL INFORMATION (G. ARDUINI)

The talk of **Galina Skripka** on "Scaling of ecloud effects with bunch population" is postponed to next week, due to the absence of both Giovanni Iadarola and Elias Métral.

Gianluigi reviewed the minutes of the 141th meeting, and reminded us on the very important results from **Frederik** on the impact of the MCBXF and D2 correctors field quality on DA. **Massimo** is waiting for the measured field quality from Lucio Fiscarelli; then, on his side the scans are essentially done.

Gianluigi commented on the AOB of the 141th meeting, where **Benoît** evoked the secondary collimator coating quality control. **Benoît** did not get any news from Stefano. **Gianluigi** said the subject has to be presented at WP5 at some point.

The minutes were accepted without further comments.

Gianluigi then reported on the [International Review of the HL-LHC Collimation System](#) (Feb. 11 /12). The conclusion of the panel was quite positive – the review supported the strategy for the collimation upgrade, in particular for the low impedance collimators & dispersion suppressor collimators. The reviewers noted the quench limits for the 11T magnets ($70\text{mW}/\text{cm}^3$), are higher than for 8T magnets, but marginally with respect to the expected deposited energy density.

For the low impedance collimators, it is now important to analyze samples irradiated at BNL and check if they respect the specifications. The review also highlighted the need for a clearer justification of the copper-diamond collimators, which is an upgrade foreseen for LS3.

The conclusion of the review was presented at the last technical committee (by Mike Lamont). **Benoît** asked if any action was foreseen on the impedance team following the review, and **Gianluigi** replied that a priori, none.

The Technical Design Report (TDR) is undergoing iterations. Next week will see the final polishing, then it will be sent. **Gianluigi** is now preparing a first draft of the Appendix for distribution among the task leaders.

Gianluigi evoked then the HiLumi book, which will come after the TDR. There will be parts on wire compensation, noise (in particular its impact on stability), as well as optics measurements and corrections (in particular for non-linearities) and more recent ATS developments.

Finally, **Benoît** asked about the beam screen pumping holes and the recent requirement from Nicolaas Kos to abandon the randomization of the holes (as was initially recommended for the LHC, to reduce their impedance). **Benoît** mentioned in particular a tool from Sergey Arseniev that could allow to check the impedance. **Gianluigi** said that the issue is the cost, and it would be interesting to know whether the randomization in the length of pumping slots is required or whether the randomization in the distance between slots is sufficient.

1 UPDATE OF THE STUDIES OF THE IMPACT OF FIELD QUALITY OF MCBRD (D2 CORRECTORS) ON DA (M. GIOVANNOZZI & F. VAN DER VEKEN)

This updated study follows the discussion on the 141th WP2 meeting about the impact of the MCBXF and MCBRD field quality on DA. The action proposed during the 141th WP2 meeting was to understand if 15 units of b_3/a_3 in MCBRD is acceptable or not. For this updated study the errors in MCBXF were not included and (a_3 , b_3) errors were applied and scanned from 0 to +20 units for various combination of a_3 and b_3 values.

The study was performed again with the HLLHCV.1.0 optics and β^* of 15 cm in order to be consistent with the previous results. The reference field signs for the MCBRD were set to their nominal values determined by the optics. Two set up are compared for this study, one with reference strengths always at maximum and one with reference strengths at 10% in the separation plane.

The results show a small impact of the MCBRD errors for both set up but a slight trend observed on the DA when scanning (a3,b3) with a notable increase of DA for values of (a3,b3) up to around 5 to 10 units depending on the (a3,b3) combination. This shows possible compensations with residual a3 and b3 along the beamline that need to be understood. Above these values, the DA tends to decrease for B1 while it improves the DA for B2 (or B4 for tracking) up to 20 units. This effect is stronger for the vertical correctors than for the horizontal ones. As the DA behavior is dominated by the crossing planes, using 10% in the separation plane for the reference strength has no visible impact.

Gianluigi proposed to check the impact on DA for this same study but with inverted crossing scheme (horizontal crossing in IP1 and vertical crossing in IP5). Further work will focus on understanding the source of the difference in DA behavior between B1 and B2 and investigating the impact of different signs of the reference fields using a Monte Carlo approach. From the above studies we can conclude that we could even tolerate 20 units (absolute value) of b3 and a3 with a minimum loss of DA (less than a sigma for Beam 1). In reality we know that the measured field quality (communicated by E. Todesco and L. Fiscarelli) is slightly asymmetric between H and V correctors, with typical values of 15 units of a3 and -6 units of b3. This has an even smaller impact on the DA. Hence, we can conclude that the field quality, as it is known today, of the MCBRDs is not an issue. On the other hand, the field quality of MCBXF needs to be addressed in detail.

AGENDA OF NEXT MEETING (G. ARDUINI)

The next meeting will take place on March 5th at 10 AM, and will be devoted to the following subjects:

- Galina Skripka: "Scaling of ecloud effects with bunch population"
- Lily Celine Blondel and Stéphane Fartoukh: "Transverse beam cooling in LHC"
- Nicolas Magnin: "AC dipole limitations and options for it upgrade"

The next one will be 14 days later.