230th HiLumi WP2 Meeting

Tuesday 3rd September 2024, 10:30 – 12:00

Chair: Rogelio Tomas

Speakers: Thomas Pugnat, Colas Droin

Participants: Yannis Angelis, Hannes Bartosik, Joschua Dilly, Colas Droin, Lorenzo Giacomelli, Massimo Giovannozzi, Lotta Mether, Nicolas Mounet, Kostantinos Parachou, Kyriacos Skoufari, Rogelio Tomas.

AGENDA

Meeting actions 1

1. DA updates from the D2 field quality (Thomas Pugnat) 1

2. DA results for flat optics with Q'=5,15 (Colas Droin) 2

3. AoB 2

MEETING ACTIONS

Massimo et al: Write the DMR concerning the D2 field quality and the preference for the first coil coupling strategy.

WP2: Bring up the strong motivation to use hybrid in 2025 to prepare for HL-LHC and to increase Run 3 performance.

Colas: Perform DA studies with negative MO and flat optics.

1. DA UPDATES FROM THE D2 FIELD QUALITY (THOMAS PUGNAT)

Thomas presented an update on D2 field quality. Various multipoles were higher than in the acceptance criteria, WP3 proposed two mitigation strategies. Studies have been performed, in particular scanning systematic b3 from -6 to 6 units and studying the two configurations proposed by WP3. Some bugs were solved and robustness improvements were implemented in Xdyna. Xdyna was benchmarked by reproducing a previous study made with SixDesk, showing almost identical results. The production of DA

simulations can now resume with Xdyna and at a faster pace. The DA is very good for both coil-coupling strategies. Even without correction of the average b3 within D2, the DA is expected to be higher than 9 σ for both beams. With correction, it is possible to reach 10 σ for both beams. The first coil coupling strategy is preferred based on the a2 components, as discussed in previous meetings.

Discussion:

- **Rogelio** asked which multipoles were considered and Thomas replied that he used multipoles up to a10/b10 for the data available; the remaining ones followed the specification.
- **Rogelio** and **Massimo** discussed how to update the acceptance criteria and write a decision management report (DMR) about the non-conformity.

2. DA RESULTS FOR FLAT OPTICS WITH Q'=5,15 (COLAS DROIN)

Colas presented DA results for flat optics (1.6 repository, low beta* =7.5cm) with positive octupoles (60 A). Bunch intensity is optimised to be maximal within nominal luminosity and pile-up constraints. Results show the worst bunch in terms of Head-On (HO) + Long-Range (LR). With low chromaticity (Q'=5) DA is very good and there are large margins; the situation is more constrained with high chromaticity (Q'=15) and with beta*=18/7.5 cm. With beta*=30/7.5 cm there are improvements at low chroma, but less substantial with high chromaticity. Round optics give similar results in terms of DA. An octupole/chroma scan was performed to show areas of good DA. Crossing-angle limit is about 220 murad at Q'=5. After various requests to OP to reduce Q' during levelling, LHC is currently running at Q'=7, which gives an optimistic forecast for running also HL-LHC at low Q' during levelling.

Discussion:

- **Kostas** asked about a counterintuitive good DA region at large Q'. **Colas** replied that this could be an artefact of the choice of the working point (initially optimised for I=60 A and Q'=5).
- **Rogelio** asked to redo the studies with negative polarity to confirm the target polarity in the new baseline. One could also repeat the octupoles/chroma scan with a working point optimised for -60 A or do a 3D scan to avoid a potential bias from the working point.
- **Riccardo** enquired whether the crossing angle had an impact also at large chromaticity. **Colas** will check, **Rogelio** observed that there could be some results already.

3. AOB

The next WP2 meeting will be announced in due time.

Reported by Riccardo De Maria