Contribution ID: **1407** Contribution code: **WEPM014** Type: **Poster Presentation**

Impact of linear imperfections in the high luminosity LHC separation dipole magnets

Wednesday 4 June 2025 16:00 (2 hours)

Magnetic field measurements have been performed after fabrication of new separation dipoles for the low beta-star insertion regions of the High Luminosity LHC project*. In this paper, the effect of the linear imperfections of these magnets on coupling, beam size and beta-beating are evaluated using MAD-X simulations. The results indicate that the impact of normal-oriented quadrupole errors are small and easily correctable, while for skew-oriented quadrupole imperfections corrections require a significant fraction of the arc skew quadrupoles strength. Subsequent simulation studies were therefore performed to devise potential mitigation strategies, the results of which are also reported here.

Footnotes

- Research supported by the HL-LHC project

Paper preparation format

LaTeX

Region represented

Europe

Funding Agency

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Session Classification: Wednesday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D01 Beam Optics Lattices, Correction Schemes, Transport