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Beam-based beam-beam benchmarking and correction

Wednesday 4 June 2025 16:00 (2 hours)

Optics studies in the LHC are generally performed on low-intensity, non-colliding beams. Understanding the optics perturbation from beam-beam effects however, is of significant interest. This was particularly true for the LHC in 2024, where the 3Qy resonance driven by the long-range beam-beam (LRBB) contributed to breaking of the collimator hierarchy, limiting beta* reach and luminosity. By performing optics measurements on a low-intensity bunch in collision with a nominal train, it has been possible for the first time to directly measure the optics perturbation from LRBB in the LHC. Benchmarking of the beta-beat and resonance driving terms against simulation shows good agreement. Based on these models, it was possible to find corrections for the LRBB driven 3Qy resonance using the skew-sextupole correctors present in the LHC.

Footnotes

Paper preparation format

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Region represented

Europe

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