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Energy sensitivity of the High Luminosity LHC optics at the end of the Beta* squeeze

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During 2022 and 2023 LHC optics commissioning, it was observed that at low-beta*small changes in the beam-energy could generate substantial perturbations of the linear beam optics, requiring re-commissioning of local corrections in the experimental insertions. This issue may become even more significant at the very low beta* anticipated for operation in the High Luminosity LHC (HL-LHC). Furthermore, energy drifts, for example due to the terrestrial tides, have generally been ignored during LHC optics commissioning, with no regular corrections applied during the duration of a specific measurement campaign. This paper examines the anticipated sensitivity of HL-LHC optics corrections to energy errors at end of the beta* squeeze.

Footnotes

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Author: HORNEY, Sasha (European Organization for Nuclear Research)

Co-authors: MACLEAN, Ewen (European Organization for Nuclear Research); DILLY, Joschua (European Organization for Nuclear Research); BURROWS, Philip (John Adams Institute); PERSSON, Tobias (European Organization for Nuclear Research)

Presenter: HORNEY, Sasha (European Organization for Nuclear Research)

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