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Optics function determination using luminosity data

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Determining the betatronic waist shift and the β^* at the interaction points through K-modulation in the Large Hadron Collider presents considerable challenges. This paper introduces a novel method for the measurement of these quantities, based on luminosity measurements and the van der Meer technique for reconstructing transverse bunch profiles.

The strategy involves colliding multiple bunches with distinct emittances, performing emittance scans, and subsequently shifting the collision point along the longitudinal plane via RF cogging. This shows promising potential to reduce uncertainties in the optics parameters at the interaction point and to obtain measurements of the absolute beam emittance. The first measurement using this technique was carried out at the Large Hadron Collider, with the analysis and findings discussed in detail.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

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