

Overview of optics tuning results and tolerances

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“The FCC-ee project foresees to build a 100 km e⁺/e⁻ circular collider for precision studies and rare decay observations in the range of 90 to 350 GeV center of mass energy with luminosities in the order of 10³⁵ cm⁻²s⁻¹. In

order to reach such performances, an extrem focusing of the beam is required in the interaction regions with a low vertical beta function of 2mm at the IP.

Moreover, the FCC-ee physics program requires also very low emittance never achieved in a collider with 1nm for eps_x and 2pm for eps_y, bringing down the coupling ratio to 2/1000. In order to reach such performances, coupling and vertical dispersion sources should be under control.

This paper describes the low tolerance of the machine to magnet alignment errors and the optics correction methods that were implemented in order to bring the vertical dispersion to reasonable values. The betatron coupling being also a very important source of emittance growth, its correction has been integrated to the challenging correction scheme to keep the vertical emittance as low as possible.”

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