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Updated monochromatization Interaction Region optics design for FCC-ee GHC lattice

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Determining Yukawa couplings of the Higgs boson is one of the most fundamental and outstanding measurements since its discovery. The FCC-ee, owing to its exceptionally high-integrated luminosity, offers the unique opportunity to measure the electron Yukawa coupling through s-channel Higgs production at 125 GeV centre-of-mass (CM) energy, provided that the CM energy spread can be reduced from 50 MeV to a level comparable to the Higgs bosons' natural width of 4.1 MeV. To improve the energy resolution and reach the desired collision energy spread, the concept of a monochromatization mode has been proposed as a new operation mode at the FCC-ee, relying on the Interaction Region (IR) optics design with a nonzero dispersion function of opposite signs at the interaction point (IP). A first optics design and preliminary beam dynamics simulations have been carried out for version 22 of the FCC-ee GHC lattice type. In response to the continuously evolving FCC-ee GHC optics, this paper presents an optimized updated monochromatization IR optics design based on the Version 2023 of the FCC-ee GHC optics.

Footnotes

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