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Optics design of the interaction region for the STCF

The Super Tau-Charm Facility (STCF), proposed in China, is a new-generation high luminosity e^+/e^- collider in the low-energy region of 1-3.5 GeV. To achieve the target luminosity of larger than $5 \times 10^{34} \text{ cm}^{-2} \text{s}^{-1}$, a large crossing angle and crab-waist correction scheme is applied. It is well-known that nonlinearity within the interaction region (IR), particularly due to crab sextupoles, significantly decreases both dynamic and momentum apertures. Consequently, the design of IR optics holds critical importance in enhancing the Touschek lifetime. In this paper, we will present the modular linear optics design for the STCF IR, to facilitate nonlinear optimization. Furthermore, we will elaborate on high-order chromaticity correction methods aimed at broadening the momentum bandwidth, thereby improving the Touschek lifetime.

Footnotes

Funding Agency

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Yes

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