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Optimized physics performance evaluation of monochromatization interaction region optics for direct s-channel Higgs production at FCC-ee

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The measurement of electron Yukawa coupling, y_{e} , via direct *s*-channel Higgs production at ~ 125 GeV centre-of-mass (CM) energy, is significantly facilitated at the FCC-ee if the CM energy spread can be reduced to a level comparable to the natural width of Higgs boson, $\Gamma_{H} = 4.1$ MeV. Achieving this reduction is possible through the “monochromatization” concept, which consists of generating opposite correlations between spatial position and energy deviation within the colliding beams. Three different interaction region optics designs have been proposed for this new collision mode, each with nonzero horizontal, vertical, or combined dispersion at the interaction point, based on an initial parametric study of the monochromatization implementation at the FCC-ee. In this work, we benchmark upper limits contours on y_{e} with simulated CM energy and luminosity using Guinea-Pig in order to assess, optimize and compare their physics performances.

Footnotes

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