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Optimized Monochromatization for Direct Higgs Production in Future Circular e+e- Colliders

Abstract

Direct s-channel Higgs production in e+e− collisions is of interest if the centre- of-mass energy spread can be reduced to be comparable to the width of the standard model Higgs boson. A monochromatization principle, previously proposed for several earlier lower-energy colliders, could be employed in order to achieve the desired reduction, by introducing a nonzero horizontal disper- sion of opposite sign for the two colliding beams at the interaction point. In high-energy high-luminosity circular colliders, beamstrahlung may increase the energy spread and bunch length. The horizontal emittance blow up due to beamstrahlung, a new effect which was not present in past monochromatization proposals, may degrade the performance, especially the luminosity. We study, for the FCC-ee at 62.5 GeV beam energy, how we can optimize the IP optics parameters (βx∗, Dx∗) along with the number of particles per bunch so as to obtain maximum luminosity at a desired target value of the collision energy spread.

Primary author(s) : Mr. VALDIVIA GARCÍA, Marco Alan (University of Guanajuato)

Presenter(s) : Mr. VALDIVIA GARCÍA, Marco Alan (University of Guanajuato)