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Monochromatization under Beamstrahlung for Direct Higgs Production at Future Circular Colliders

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Content

A monochromatization scheme has been proposed for the FCC-ee in previous works, for direct s-channel Higgs production in e+e− collisions, adapted for the higher energy beam-beam conditions in future circular colliders proposals. When beamstrahlung is present (with significant nonzero IP dispersion required for monocromatization) the horizontal emittance increases, degrading the collider performance, especially the luminosity. We have shown that classical relation between expectation values of u and u squared holds, an that have been used to produce an optimized scheme where the increase in bunch length due to beamstrahlung allow us a redistribution of particles among bunches, obtaining a maximum luminosity for a certain center-of-mass energy resolution. Nevertheless, first approximation fails to reproduce simulations, due to the model limitation of constant field. In this work, we model the beamstrahlung in collisions of Gaussian beams with a crossing angle, obtaining the relation between expectation values of u and u squared in a non-constant field scenario.

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