

Comparing Event Generators for Radiative Bhabha Interaction at CEPC

Wednesday, 23 October 2024 22:25 (1 minute)

Small-Angle Bhabha Scattering is a traditional process used for high-precision luminosity measurement at electron-positron colliders, known for its clean event signature and large cross section. The Circular Electron Positron Collider (CEPC) is a Higgs factory that will produce millions of HZ events at $\sqrt{s}=240\text{GeV}$, and 0.7 trillion Z bosons at the Z-pole energy. In order to improve precision on measurements of Standard Model processes, the luminosity systematic with an accuracy of 10^{-4} is required. This study focuses on the measurement of radiative Bhabha interaction using the event generators ReneSANCe and BHLUMI, aiming to achieve a systematic uncertainty of 0.01% for the Bhabha cross-sections. The radiative photons from NLO processes are compared in terms of momentum and opening angles relative to the electrons, considering the luminometer acceptance at CEPC. Our study suggests that the detection of radiative Bhabha events is a viable approach to achieving a precision of 10^{-4} for the luminosity measurement at CEPC.

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Session Classification: Poster

Track Classification: Detector and System: 11: MDI & Integration