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Measurement of the Higgs decaying into two photons with the CEPC reference detector

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This presentation details a study of the prospective measurement of the cross-section times branching ratio for Higgs decaying into two photons, $\sigma(e^+e^- \to ZH) \times \mathrm{Br}(H \to \gamma\gamma)$, at the Circular Electron Positron Collider (CEPC). The analysis is performed at a center-of-mass energy of $\sqrt{s} = 240$ GeV, considering the three dominant Z boson decay channels: $Z \to q\bar{q}$, $\mu^+\mu^-$, and $\nu\bar{\nu}$. Using simulated Monte Carlo events corresponding to an integrated luminosity of 21.6 ab^{-1}, a combined statistical precision of 3.1% is achieved. Furthermore, we investigate the impact of the electromagnetic calorimeter (ECAL) performance by studying the degradation of the photon energy resolution. Our results indicate that the stochastic term is the dominant factor, and a transition from a Silicon-Tungsten to a glass bar ECAL design significantly improves the energy resolution, thereby enhancing the precision of the $H \to \gamma\gamma$ measurement.

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