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Prospects for Off-Shell Slepton Searches at CEPC

The proposed CEPC serves as a Higgs factory and provides a unique opportunity to explore new physics related to dark matter. We present a set of Lorentz invariant kinematic variables that effectively reconstruct the mass of semi-invisible decaying particle pairs at lepton colliders, enhancing the signal's statistical significance. Applying these variables to smuon pair production at a 240 GeV lepton collider with 5 ab^{-1} of integrated luminosity, we establish exclusion and discovery limits beyond $\sqrt(s)/2$, extending into the off-shell region. Additionally, these variables improve the precision of W-boson mass measurements by approximately 2-3 MeV in the full leptonic decay channel.

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