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Jet origin identification for electron positron Higgs factory

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To enhance the scientific discovery power of high-energy collider experiments, we propose and realize the concept of jet origin identification that categorizes jets into 5 quark species (b, c, s, u, d), 5 anti-quarks (\bar{b} , \bar{c} , \bar{s} , \bar{u} , \bar{d}), and the gluon. Using state-of-the-art algorithms and simulated $v\bar{v}H, H \rightarrow jj$ events at 240 GeV center-of-mass energy at the electron-positron Higgs factory, the jet origin identification simultaneously reaches jet flavor tagging efficiencies ranging from 67% to 92% for bottom, charm, and strange quarks, and jet charge flip rates of 7% to 24% for all quark species.

We apply the jet origin identification to Higgs rare and exotic decay measurements at the nominal luminosity of the Circular Electron Positron Collider (CEPC), and conclude that the upper limits on the branching ratios of $H \rightarrow s\bar{s}, u\bar{u}, d\bar{d}$, and $H \rightarrow sb, db, uc, ds$ can be determined to 2×10^{-4} to 1×10^{-3} at 95% confidence level. We also discussed its application on EW and Flavor Physics measurements at future electron-positron Higgs factory.

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