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Deep-learning boosted hadronic Higgs precise measurements at future e+e− Higgs factories

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Precise measurements of Higgs decays into quarks and gluons are essential
for probing the Yukawa couplings of the Higgs boson and testing the flavor structure of the Standard Model. We investigate the process e+e− ⟶ ZH at √s = 240 GeV at a future e+e− Higgs factory, taking the CEPC design as a benchmark. Jet flavor is identified using state-of-the-art particle-level deep neural network taggers, whose per-jet outputs are combined with global event observables in a two-stage analysis to separate the Higgs hadronic decay modes from the backgrounds. Assuming an integrated luminosity of 20 ab−1, we present a quantitative sensitivity estimation corresponding to a statistical significance of about 1.3σ for H ⟶ s^{-}s. These results highlight the potential of deep-learning-based jet flavor tagging for precision studies of Higgs decays at future e+e− Higgs factories.

Primary author: ZHU, Yifan

Presenter: ZHU, Yifan

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