



Contribution ID: 1290

Type: Higgs

Higgs to Charm Quarks in Vector Boson Fusion plus a Photon

Tuesday 25 May 2021 17:15 (15 minutes)

Probing the charm Yukawa coupling is very important to confirm Higgs-fermion interactions and search for deviations from the Standard Model (SM), yet extremely challenging due to enormous QCD background. In this study, we examine the sensitivity of probing Higgs-charm coupling at Large Hadron Collider (LHC) via vector boson fusion with a photon radiation. This additional photon provides an extra handle in triggering and helps suppress gluon-rich background. With a proposed trigger strategy and utilizing multivariate analysis, we find a projected sensitivity of about 5 times the SM charm Yukawa coupling at 95% C.L. at High Luminosity LHC (HL-LHC). Our result is comparable and complementary to existing projections at HL-LHC.

Summary

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Session Classification: Higgs II