

# Phenomenology 2019 Symposium



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## Charm-quark Yukawa Coupling in $h \rightarrow c\bar{c}\gamma$ at LHC

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It is extremely challenging to probe the charm-quark Yukawa coupling at hadron colliders primarily due to the large Standard Model (SM) background (including  $h \rightarrow b\bar{b}$ ) and the lack of an effective trigger for the signal  $h \rightarrow c\bar{c}$ . We examine the feasibility of probing this coupling at the LHC via a Higgs radiative decay  $h \rightarrow c\bar{c}\gamma$ . The existence of an additional photon in the final state may help for the signal identification and background suppression. Adopting a refined triggering strategy and utilizing basic machine learning, we find that a coupling limit of about 8 times the SM value may be reached with  $2\sigma$  sensitivity after the High Luminosity LHC (HL-LHC). Our result is comparable and complementary to other projections for direct and indirect probes of  $h \rightarrow c\bar{c}$  at the HL-LHC. Without a significant change in detector capabilities, there would be no significant improvement for this search from higher energy hadron colliders.

### Summary

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