

# Probing light quark Yukawa couplings through angularity distributions in Higgs boson decay

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We propose to utilize angularity distributions in Higgs boson decay to probe light quark Yukawa couplings at  $e^+e^-$  colliders. Angularities  $\tau_a$  are a class of 2-jet event shapes with variable and tunable sensitivity to the distribution of radiation in hadronic jets in the final state. Using soft-collinear effective theory (SCET), we present a prediction of angularity distributions from Higgs decaying to quark and gluon states at  $e^+e^-$  colliders to NNLL +  $\mathcal{O}(\alpha_s)$  accuracy. Due to the different color structures in quark and gluon jets, the angularity distributions from  $H \rightarrow q\bar{q}$  and  $H \rightarrow gg$  show different behaviors and can be used to constrain the light quark Yukawa couplings.

We show that the upper limit of light quark Yukawa couplings could be probed up to 15 ~ 22% level of the bottom quark Yukawa coupling in the Standard Model.

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