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Top-quark rare decays $t \to cg(g)$ in the aligned two-Higgs-doublet Model

We update the Standard Model predictions for the branching ratios of the top-quark rare decays $t \to cg(g)$ in the Standard Model and focus on evaluating the maximum they can be in the aligned two-Higgs-doublet model (A2HDM), their properties are also discussed briefly in the 2HDM with $\mathcal{Z}_2$ symmetries. With the constraints on the alignment parameters from flavour observables, we find that the branching ratios of $t \to cg$ and $t \to cgg$ are in the same order and can reach about 3.79×10^{-9} and 6.80×10^{-9} in the A2HDM, respectively; while the branching ratio of $t \to cgg$ is nearly three orders of magnitude as large as the one of $t \to cg$ in the SM. Moreover, there are no significant enhancements in the 2HDM than that in the SM for these two decays. Compared with the measurements in the high-luminosity colliders in the near future, both the branching ratios of $t \to cg$ and $t \to cgg$ within the A2HDM are out of the sensitivity of the HL-LHC and FCC-hh.

Presentation type

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