

Distinguishing Axion-Like Particles from Extended Higgs Sector Models in $t\bar{t}$ production at the LHC

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Abstract

We present an analysis of the sensitivity of LHC searches for new spin-0 particles produced via gluon-fusion and decaying into top quark-antiquark ($t\bar{t}$) final states to generic axion-like particles (ALPs) coupled to top-quarks and gluons. We derive new limits on the effective ALP Lagrangian in the linear representation in terms of the Wilson coefficients c_t and c_G based on the existing CMS search using 35 fb^{-1} collected at $\sqrt{s} = 13\text{ TeV}$. We further investigate possible distinctions between ALPs and pseudoscalar Higgs bosons as predicted by the two-Higgs-doublet model (2HDM), and find that distinction is possible with data anticipated to be collected during the high-luminosity of the LHC for a significant range of the effective ALP-gluon coupling.