

Contribution submission to the conference Karlsruhe 2024

Search for heavy Higgs bosons and Axion-Like Particles in the $t\bar{t}$ final state at CMS — •JÖRN BACH^{1,2,3}, CHRISTIAN SCHWANENBERGER^{1,2}, ALEXANDER GROHSJEAN², LAURIDS JEPPE¹, AFIQ ANOUAR⁴, and SAMUEL BAXTER¹ — ¹Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany — ²Universität Hamburg, Hamburg, Germany — ³HAW Hamburg, Hamburg, Germany — ⁴CERN, Geneva, Switzerland

The Standard Model of particle physics is very successful in predicting the processes we observe at modern Colliders such as the Large Hadron Collider (LHC). It is however incomplete and remaining questions, such as the nature of dark matter, are motivating searches for new particles.

A CMS search for a heavy Higgs boson in the $t\bar{t}$ final state in 2016 data has observed a local excess of 3.5σ (1.9σ global) for a pseudoscalar with a mass of 400 GeV and a width of 4%. Motivated by this result, we present a search for a scalar and pseudoscalar heavy Higgs boson decaying to $t\bar{t}$ with the full Run 2 CMS dataset. We exploit spin correlation information and the invariant mass of the $t\bar{t}$ system. Additionally to the scalar and pseudoscalar heavy Higgs bosons, we interpret the search in terms of a more general pseudoscalar Axion-Like particle (ALP) by also allowing for direct couplings to the gluon.

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