Contribution ID: **810** Type: **Poster**

Search for single production of a vector-like T quark decaying into a Higgs boson and top quark with fully hadronic final states using the ATLAS detector

Friday, 8 July 2022 20:10 (20 minutes)

A search is made for a vector-like T quark decaying into a Higgs boson and a top quark in 13 TeV proton-proton collisions using the ATLAS detector at the Large Hadron Collider with a data sample corresponding to an integrated luminosity of 139 fb^{-1}.
The all-hadronic decay modes $H \rightarrow b\bar{b}$ and $t \rightarrow bW \rightarrow bq\bar{q}'$ are reconstructed as large-radius jets and identified using tagging algorithms.
Improvements in background estimation, signal discrimination, and a larger data sample, contribute to an improvement in sensitivity over previous all-hadronic searches.
No significant excess is observed above the background, so limits are set on the production cross-section of a singlet T quark at 95\% confidence level, depending on the mass, m_T, and coupling, κ_T, of the vector-like T quark to Standard Model particles.
This search targets a mass range between 1.0 to 2.3 TeV, and a coupling value between 0.1 to 1.6, expanding the phase space of previous searches.
In the considered mass range, the upper limit on the allowed coupling values increases with m_T from a minimum value of 0.35 for $1.07 < m_T < 1.4$ TeV up to 1.6 for $m_T = 2.3$ TeV.

In-person participation

Yes

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Session Classification: Poster Session

Track Classification: Beyond the Standard Model