A Search for Hadronic Decays of Vector-like Quarks in CMS

We present a search for hadronically-decaying pair-produced vector-like quarks (T/B) in data collected by the CMS detector during the Run 2 data taking period. The analysis is performed using a Boosted Event Shape Tagger (BEST): a multi-class jet tagger optimized for the boosted heavy particle final state jets. We train a neural-net-based tagger to identify high momentum, large-radius jets as originating from one of six particle classes: QCD (light jets), bottom, W, Z, Higgs, and top. Data are triggered on high calorimeter activity, requiring events with a scalar sum of jet transverse momenta of at least 1600 GeV. The dominant multi-jet background is estimated from a data-driven process in a QCD-rich three-jet region. The signal regions are categorized based on the classification of the four leading jets of the event. A statistical analysis is performed simultaneously across all regions and compared to the standard model only hypothesis.

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Session Classification: Poster Session

Track Classification: BSM-1 (TeV-Scale)