

International Conference on High Energy Particle & Astroparticle Physics (ICHEPAP2023)



Contribution ID: 73

Type: Poster

Precise probing and discrimination of third-generation scalar leptoquarks.

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: We explore the pair production of third-generation scalar leptoquark at the Large Hadron Collider to next-to-leading order accuracy in QCD, matched to parton shower for a precise probing of the stemming model. We propose to tag two boosted top-like fatjets produced from the decay of heavy leptoquarks in association with notably large missing transverse momentum and consider them as the potential signal. Such a signal demonstrates the capability of a robust discovery prospect in the multivariate analysis with different high-level observables, including jet substructure variables. Various scalar leptoquark models predict different chirality of the top quark appearing from the decay of the leptoquark carrying same electromagnetic charge. We make use of the polarization variables sensitive to the top quark polarization in order to identify the underlying theory.

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Session Classification: Poster Session 1