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Azimuthal Angular Correlation as a New Boosted Top Jet Substructure

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We propose a novel jet substructure observable of boosted tops that is related to the linear polarization of the W boson in boosted top quark decay, which results in a cos 2φ angular correlation between the t ⟶ bW and W ⟶ ff′ decay planes. The degree of this angular correlation can be used to measure the longitudinal polarization of a boosted top quark, which is an important probe of new physics that couples to top sector. We show that the unique cos 2φ angular correlation only exists in the boosted regime, but not in the top quark rest frame, and can discriminate a boosted top quark jet from its background events, such as QCD jets.

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