

12th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP (BOOST 2020 webinars)

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A Robust Measure of Event Isotropy at Colliders

Tuesday 21 July 2020 17:00 (9 minutes)

We introduce a new event shape observable – event isotropy – that quantifies how close the radiation pattern of a collider event is to a uniform distribution. This observable is based on a normalized version of the energy mover’s distance, which is the minimum “work” needed to rearrange one radiation pattern into another of equal energy. We investigate the utility of event isotropy both at electron-positron colliders, where events are compared to a perfectly spherical radiation pattern, as well as at proton-proton colliders, where the natural comparison is to either cylindrical or ring-like patterns. Compared to traditional event shape observables like sphericity and thrust, event isotropy exhibits a larger dynamic range for high-multiplicity events. This enables event isotropy to not only distinguish between dijet and multijet processes but also separate uniform N-body phase space configurations for different values of N. As a key application of this new observable, we study its performance to characterize strongly-coupled new physics scenarios with isotropic collider signatures.

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