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Boosted Top Jet Tagging at 100 TeV LAUREN ENNESSER, ROBERT TABB, RICHARD CAVANAUGH, University of Illinois at Chicago —
The identification of top quarks at particle colliders such as the Large Hadron Collider via the resolution of constituent subjets is accomplished by use of various algorithms that analyze the substructure of these jets. These algorithms work well at energies at and below 13 TeV, but in order to probe new physics, higher energies will have to be used. To study boosted top quark jets at these higher energies, the jet substructure algorithms must be tested to determine which ones work best for resolving the jet substructure at these higher energies. We used particle level data produced in Pythia 8.2 of W and top quark jets at 13 TeV and 100 TeV. We tested four jet grooming methods (pruning, trimming, soft drop, and modified mass drop), and two jet substructure algorithms (n-subjettiness and the energy correlation function parameter). We compared these results with the particle level QCD background. We found that grooming methods that are successful at lower energies are less effective at 100 TeV, and the more sensitive methods also have a higher mistag rate. We also found that while the substructure algorithms are not as sensitive at higher energies, they are still able to distinguish the jet substructure from the background.

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