

1 Probing the parton shower and hadronization with novel jet
2 substructure measurements in $\sqrt{s} = 200$ GeV pp collisions at
3 STAR

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6 Jets are collimated sprays of final-state particles produced from initial high-momentum-
7 transfer partonic scatterings in particle collisions. We present measurements of jet sub-
8 structure observables with data from $\sqrt{s} = 200$ GeV pp collisions at STAR. To explore the
9 interplay between different stages of the parton shower, we measure CollinearDrop jet mass
10 and its correlation with SoftDrop groomed jet observables, the former of which has an en-
11 hanced sensitivity to the soft radiation within jets. These measurements are fully corrected
12 for detector effects with a novel machine learning method, MultiFold, which preserves the
13 correlations in the multi-dimensional observable phase space. To further our understanding
14 of non-perturbative QCD and potentially provide tests for various phenomenological mod-
15 els for hadronization, we also measure the charge correlation ratio (r_c) with hadrons in jets.
16 This observable characterizes the fraction of string-like fragmentation by distinguishing the
17 charge signs of leading and subleading charged particles within jets.