

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 hadron collisions. We present measurements of jet sub-
8 structure observables in pp collisions at $\sqrt{s} = 200$ GeV at STAR. To explore the interplay
9 between different stages of the parton shower, we measure CollinearDrop jet mass and its
10 correlation with SoftDrop groomed jet observables, the former of which has an enhanced
11 sensitivity to the soft radiation within jets. These measurements are fully corrected for
12 detector effects with a novel machine learning method, MultiFold, which preserves the cor-
13 relations in the multi-dimensional observable phase space. To further our understanding of
14 non-perturbative QCD and potentially provide tests for various phenomenological models
15 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.