

1 **MULTI-DIMENSIONAL MEASUREMENTS OF PARTON**
2 **SHOWER IN PP COLLISIONS AT $\sqrt{s} = 200$ GEV**

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6 Jets are collimated sprays of hadrons and can serve as an experimental tool for
7 studying the dynamics of quarks and gluons. In particular, differential measure-
8 ments of jet substructure observables enable a systematic exploration of the parton
9 shower evolution. The SoftDrop grooming technique utilizes the angular ordered
10 Cambridge/Aachen reclustering tree and provides a correspondence between the
11 experimental observables, such as the shared momentum fraction (z_g), groomed
12 jet radius or split opening angle (R_g), and the QCD splitting functions in vacuum.
13 We present fully corrected correlations between z_g and R_g at the first split for
14 jets of varying momenta and radii in pp collisions at $\sqrt{s} = 200$ GeV. To study
15 the evolution along the jet shower, we also present the splitting observables at
16 the first, second and third splits along the jet shower for various jet and initiator
17 prong momenta. As these novel measurements are presented in three dimensions,
18 we outline the correction procedure so that it can be used as a template for future
19 multi-differential measurements across all experiments.