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Pure quark and gluon observables

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One application of jet substructure techniques is to disentangle quark- and gluon-initiated jets. Previous studies mainly relied on the difference in the quark and gluon quadratic Casimirs that appear in Sudakov factors. In this talk, I construct a set of pure quark and gluon observables with the collinear drop grooming techniques, utilizing factorization formulas constructed using Soft-Collinear Effective Theory (SCET) which crucially include both perturbative and non-perturbative effects. For example, a gluon observable is constructed so as to give a vanishing distribution for any sample that has only quark jets, and a non-vanishing result for any process which can produce gluon jets. I will also show Monte Carlo simulation results for these observables and discuss how to remove the soft contamination from the underlying events.

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