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Groomed jet mass as a direct probe of collinear parton dynamics

Jet grooming techniques have proved efficient in mitigating hadronization and pile-up effects in jet observable measurements at the LHC. We study the link between parton dynamics in the collinear limit and the logarith-mically enhanced terms of the groomed jet mass distribution, for jets groomed with the modified mass-drop tagger (mMDT). While the leading-logarithmic (LL) result is linked to collinear evolution with leading-order splitting kernels, here we derive the NLL structure directly from triple-collinear splitting kernels. The calculation we present is a fixed-order calculation in the triple-collinear limit, independent of resummation ingredients and methods. It therefore constitutes a powerful cross-check of the NLL results previously derived using the SCET formalism and provides much of the insight needed for resummation within the traditional QCD approach. This work also provides direct insight into the connection between higher-order splitting kernels and NNLL structure of rIRC safe observables, and is part of a larger program to develop new more accurate parton showers.

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