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Cutoff dependence of the top quark mass parameter in angular ordered parton showers

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We prove for the simple case of hemisphere masses in e+e- annihilation that using a transverse momentum cut Q_0 on the evolution of parton showers based on coherent branching implies that the heavy quark mass parameter of the algorithm is not the pole mass, but differs from the pole mass by an amount proportional to $\alpha_0_0 Q_0$. The basis of the proof is (a) an analytic solution of the PS evolution in the narrow width approximation, (b) that the infrared cut on the angular ordered shower can be implemented into corresponding analytic calculations in QCD factorization and (c) the dependence of the peak of the jet mass distribution on the shower cut. Numerical comparisons to the Herwig event generator confirm our analytic results. Observables based on reconstruction and the relevance and irrelevance of having NLO matched calculations to address the issue are also discussed.

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