

Factorisation and resummation for double differential cross-section in τ_{10} and τ_{01}

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We present a factorisation formula for the double differential cross-section in the N-jettiness variables τ_{10} and τ_{01} . The phase space spanned by these two variables are already known in different hierarchies between them. However the region $\tau_{10} \sim \tau_{01}$ is not well known due to absence of a proper factorisation formula in this scenario. This region corresponds to two unordered but resolved emissions. We present the factorisation formula first time for such unordered emissions. We use Soft collinear Effective theory (SCET) to separate the soft and collinear modes contribution at the measurement level. Using the power counting argument in SCET, we completely separate the collinear and soft contribution which are encoded inside Beam and Soft functions respectively. We also comment on the structure of these objects as well as on their consistencies. Finally we describe the resummation and matching with other regions of phase space in particular the SCET⁺ region with strongly ordered emissions. This has immediate application on the improvement of parton shower accuracy in Geneva framework at NNLL⁺ accuracy as well as on the jet substructure observables without hierarchies.

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