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Winner take all qT slicing with multiple jets and hadrons

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Modern collider phenomenology requires unprecedented precision for the theoretical predictions, for which slicing techniques provide an essential tool at next-to-next-to-leading order (NNLO) in the strong coupling. The most popular slicing variable is based on the transverse momentum qT of a color-singlet final state, but its generalization to final states with jets is known to be very difficult. Here we propose two generalizations of qT that can be used for jet processes, providing proof of concept with an NLO slicing for pp $\longrightarrow$ 2 jets. We present factorization formulae that enable our approach to NNLO, calculate the NNLO collinear-soft function and demonstrate slicing at this order for e+e− $\longrightarrow$ 2 jets. One of these generalizations of qT only applies to planar Born processes, such as pp $\longrightarrow$ 2 jets, but offers a dramatic simplification of the soft function. We also discuss how
our approach can directly be extended to obtain predictions for the fragmentation of hadrons. This presents a promising path for high-precision QCD calculations with multi-jet final states.

Primary author: SHAO, Dingyu

Presenter: SHAO, Dingyu

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