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A parton branching algorithm with transverse momentum dependent splitting functions

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Parton branching methods underlie the Monte Carlo (MC) generators, being therefore of key importance for obtaining high energy physics predictions.

We construct a new parton branching algorithm which for the first time incorporates the off-shell, transverse-momentum dependent (TMD) splitting functions, defined from the high-energy limit of partonic decay amplitudes.

Based on these TMD splitting functions we construct a new TMD Sudakov form factor.

We present the first MC implementation of the algorithm for the evolution of the TMD and integrated parton distribution functions (PDFs). We use this implementation to evaluate small-x corrections to the distributions and to verify the momentum sum rule.

Presented study is a first step towards a full TMD MC generator covering the small-x phase space.

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