Comments on Truncated showers and CKKW-L

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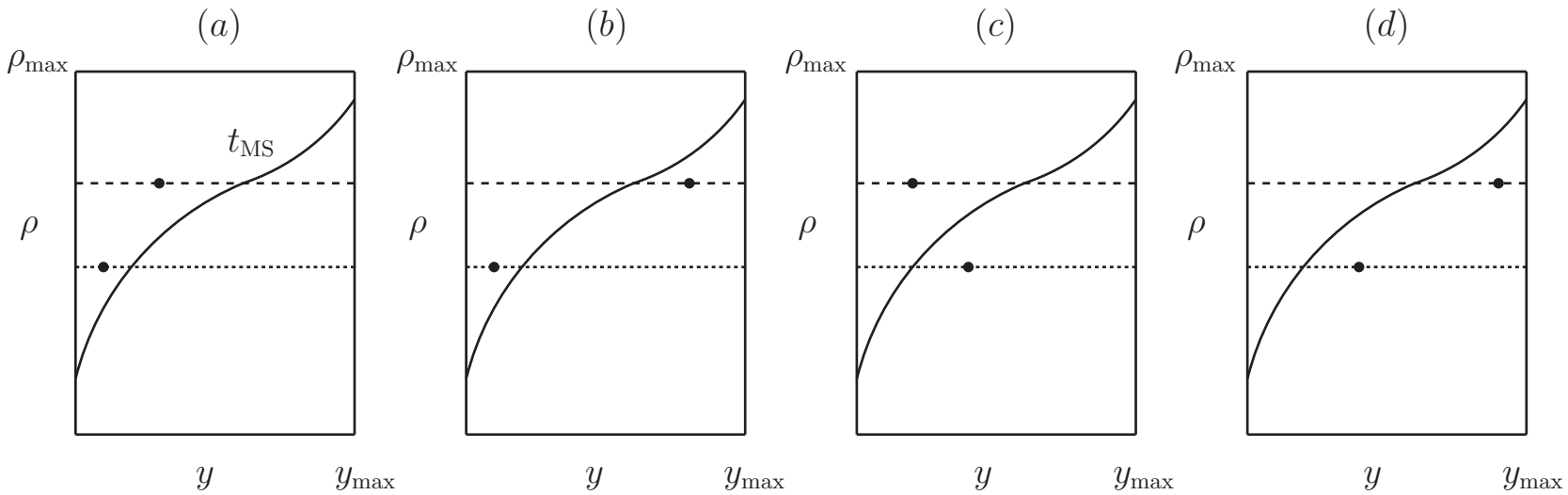
What we want in CKKW-L

Our aim is to describe the $n \leq N$ hardest jets in the evolution variable, by the tree-level matrix element, if all n jets are above some arbitrary cut-off (called merging scale).

CKKW-L ME PS merging

- Get the state S_{+n} from a matrix element generator
- Find all possible shower histories $(S_{+0}, \rho_0), \ldots, (S_{+n}, \rho_n)$ and pick one according to the probability with which the shower would have produced it.
- Generate the Sudakov factor by **trial** showering. Reweight with α_s factors and PDF factors.
- Combine histograms for all ME multiplicities to get distributions for ME+PS merging.

An example how CKKW-L fills the phase space



(a) Taken from the ME +2 jet sample, no information on merging scale needed

(b) Taken from the ME +0 jet sample, with a shower veto on the first emission. In truncated showers taken from ME +1 sample

(c) Taken from the ME +1 jet sample, with a shower veto on the first emission

(d) Taken from the ME +0 jet sample, with a shower veto on the first emission

$k_\perp$ as merging scale

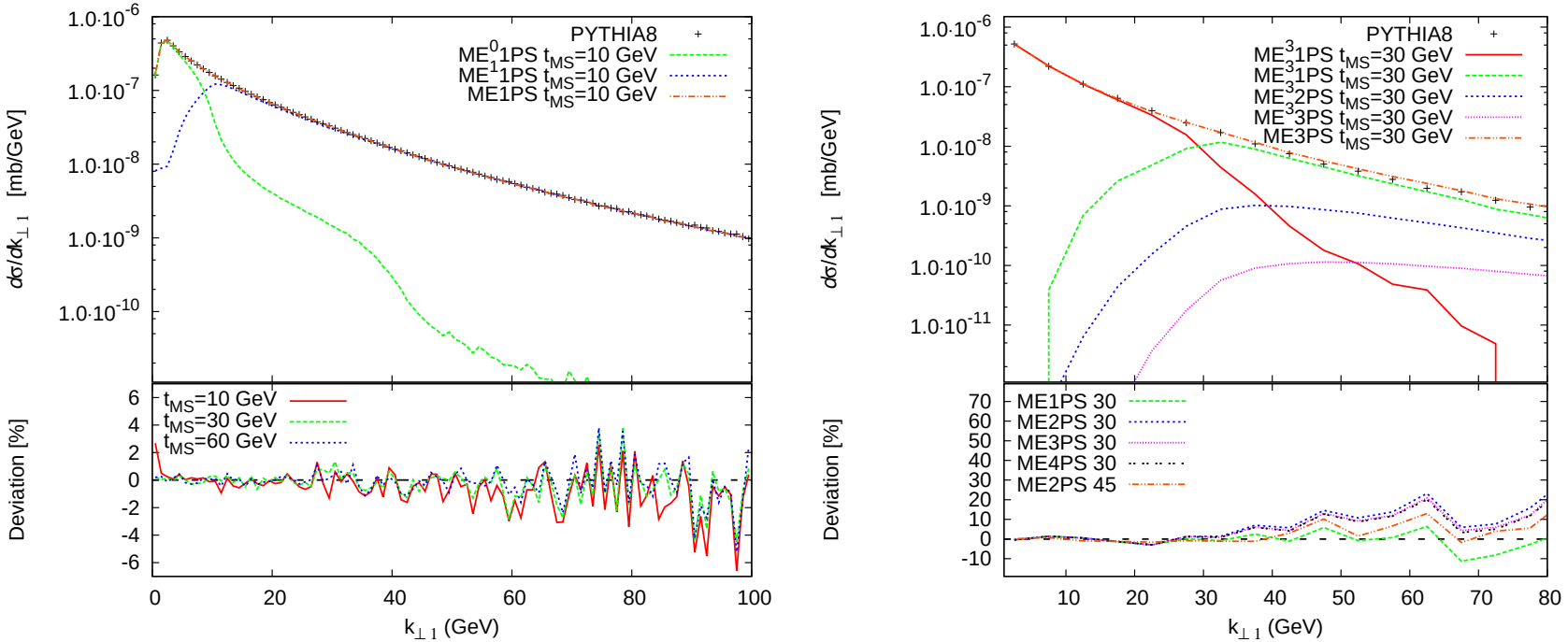


Figure: Left Panel: Transverse momentum of the first jet in W + jets in pp collisions at $E_{CM} = 7000$ GeV, for different merging scale values. Right Panel: Transverse momentum of the first jet in W + jets in $p\bar{p}$ collisions at $E_{CM} = 1960$ GeV, for different number of jets. Jet defined with $k_\perp$ algorithm as implemented in `fastjet` with $D = 0.4$. Plot produced with CKKW-L implementation in PYTHIA8.

Rapidity as merging scale

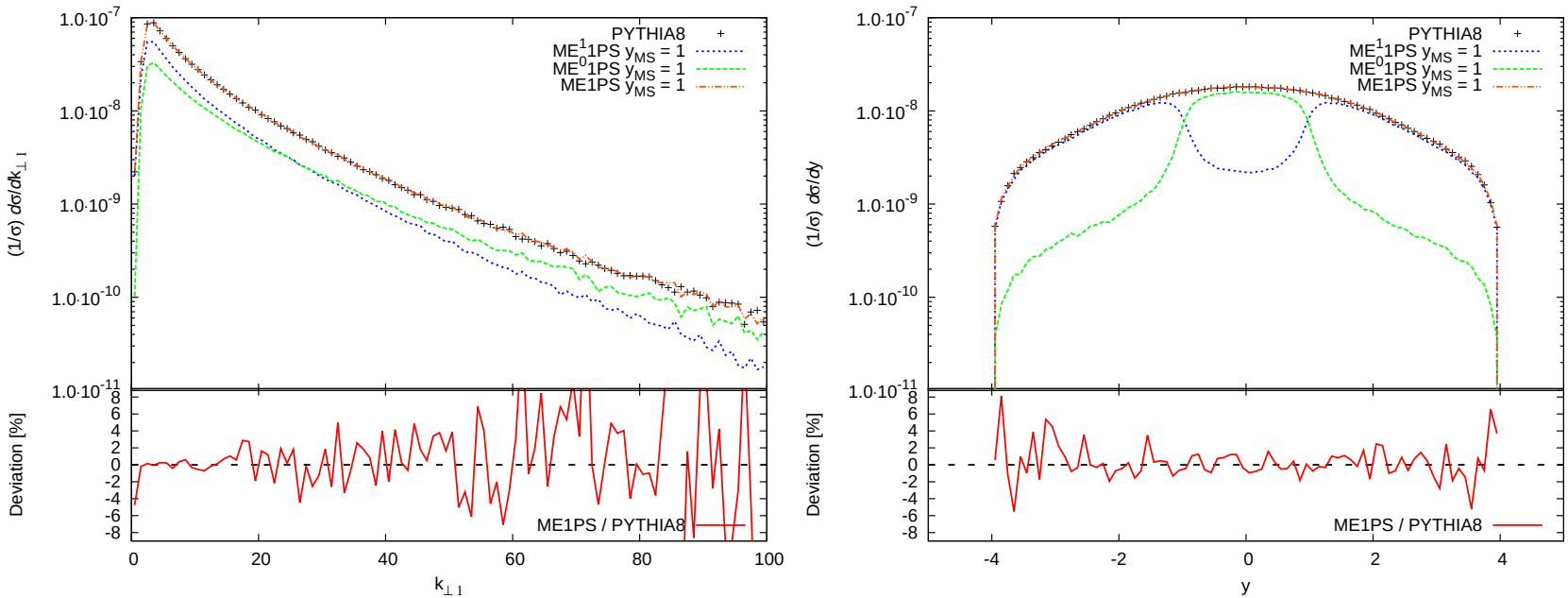


Figure: Transverse momentum and rapidity of the first jet in W + jets in $p\bar{p}$ collisions at $E_{CM} = 1960$ GeV. Rapidity used as merging scale with $y_{MS} = 1.0$. Minimal cut $p_{\perp 1,min} > 2$ GeV applied. Jet defined with $k_\perp$ algorithm as implemented in `fastjet` with $D = 0.4$. Plot produced with CKKW-L implementation in PYTHIA8.