

CKKW-L merging in Pythia8



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General procedure for CKKW-L merging

- From the ME input (Les Houches Event Files), find all possible shower histories
- Pick one history 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.

Multiple interactions

This is the first time CKKW-L is implemented outside ARIADNE. Also included is a treatment of interleaved multiple interactions. Example: $W + 3$ jets in the shower can come from

- (a) Three emissions at any scale
- (b) One emission at any scale, followed by one multiple interaction at a lower scale
- (c) One multiple interaction at any scale, followed by one emission at a lower scale

If we want to correct (b), we should include a no-emission probability for multiple interactions in the reweighting of the $W + 1$ jet sample.

Status of CKKW-L merging in Pythia8

$pp \rightarrow V + \text{jets}$ (LO) and $e^+e^- \rightarrow \text{jets}$ (LO) are implemented and working.

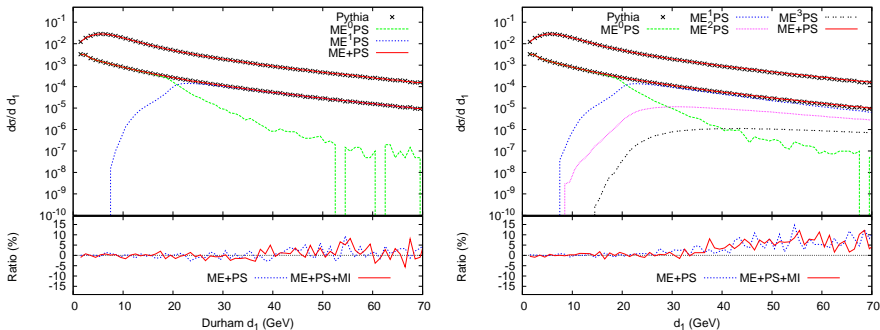


Figure: *Left panel:* d_1 separation in the k_t algorithm for 1 jet merging at Tevatron energies. *Right panel:* Same for 3 jet merging.

W + jets plots I

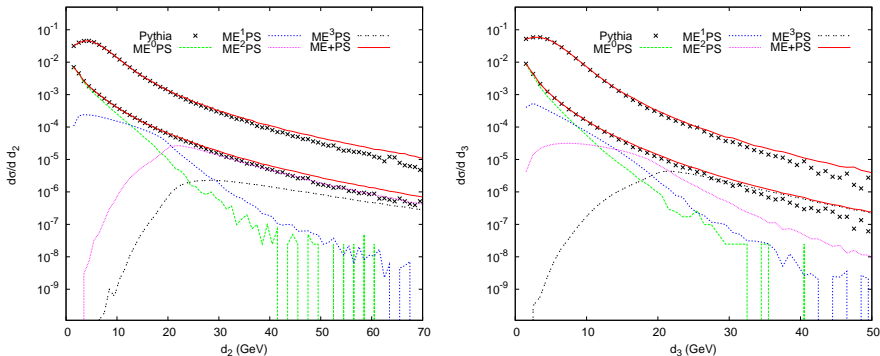


Figure: Left panel: d_2 separation in the k_t algorithm for 3 jet merging at Tevatron energies.

Right panel: d_3 separation in the k_t algorithm for 3 jet merging at Tevatron energies.

W + jets plots II

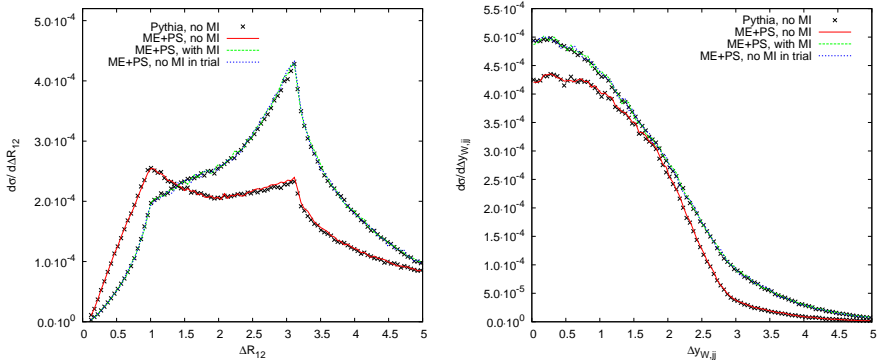


Figure: *Left panel:* R separation between the hardest ($p_{\perp} > 40$ GeV) and second hardest jet for 3 jet merging at Tevatron energies (all jets with $p_{\perp} > 12$ GeV).

Right panel: Rapidity between the system of the two hardest jets and the W for 3 jet merging at Tevatron energies.