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Parton Shower Unitarity and NLO Matching

During the last years, much effort has gone into increasing the precision of event generators by carefully matching or merging parton shower programs with exact fixed-order matrix elements. The merging of tree-level matrix elements has now become the standard for multi-jet events, but these leading order procedures lack in precision, and also suffer from a dependence on an unphysical merging scale. For many processes the matching of Next-to-Leading Order (NLO) matrix elements with parton showers has become state-of-the-art, but the standard programs can typically only handle the lowest possible jet-multiplicities.

In this talk I will present a new algorithm where multi-jet NLO matrix elements are correctly merged with parton showers. The new algorithm is based on an improvement of the so-called CKKW-L scheme for tree-level merging where the combination of different multiplicities is treated in a unitary way. The algorithm has been implemented in the Pythia8 event generator and will in principle be able to handle any process where multi-jet partonic states can be produced to NLO precision, however, in this talk I will only present results for W+jets and Higgs+jets observables.

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