

Pileup and Underlying Event Mitigation with Iterative Constituent Subtraction

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Hard-scatter processes in hadronic collisions are often significantly contaminated by background contributions from pileup in proton-proton collisions or underlying event in heavy-ion collisions. It is crucial to mitigate this background since it has a significant impact on hadronic jet reconstruction and on the ability to identify the substructures of hadronically decaying boosted objects.

We present a new background subtraction method for jet and event observables, called Iterative Constituent Subtraction [1]. This new method is based on the Constituent Subtraction algorithm [2], which is used extensively in the heavy-ion community. In the new method, an iterative approach is adopted to the event-wide implementation of Constituent Subtraction. Using particle-level simulation, we provide a comparison of Iterative Constituent Subtraction with several existing methods. The new method has the best performance for the pileup conditions at the upcoming LHC data taking and at the High Luminosity LHC. Possibilities to use information from charged particles to mitigate pileup effects from neutral particles are also discussed.

[1] JHEP08(2019)175, arXiv:1905.03470

[2] JHEP06(2014)092, arXiv:1403.3108

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