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Learning to Remove Pileup at the LHC with Jet Images

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Many simultaneous proton-proton collisions occur in each bunch crossing at the Large Hadron Collider (LHC). However, most of the time only one of these collisions is interesting and the rest are a source of noise (pileup). Several recent pileup mitigation techniques are able to significantly reduce the impact of pileup on a wide set of interesting observables. Using state-of-the-art machine learning techniques, we develop a new method for pileup mitigation based on the jet images framework. We demonstrate that our algorithm outperforms existing methods on a wide range of simple and complex jet observables up to pileup levels of 140 collisions per bunch crossing. We also investigate what aspects of the event our algorithms are utilizing and also test the robustness of the trained pileup mitigation algorithm.

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