Contribution ID: **31** Type: **not specified**

Convolutional neural networks with event images for pileup mitigation [cancelled due to illness]

Friday 17 January 2020 13:20 (10 minutes)

The addition of multiple, nearly simultaneous proton proton collisions to hard-scatter collisions (in-time pileup) is a significant challenge for most physics analyses at the LHC. Many techniques have been proposed to mitigate the impact of pileup on jets and other reconstructed objects. This study investigates the application of convolutional neural networks to pileup mitigation by treating events as images. By optimally combining low-level information about the event, the neural network can potentially provide a eventwise pileup energy correction. The impact of this correction is studied in the context of a global event observable: the missing transverse momentum, a variable particularly sensitive to pileup. The potential benefits of a neural network approach are analyzed alongside other constituent pileup mitigation techniques and the ATLAS default reconstruction algorithm.

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Session Classification: Experimental methods