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Data-driven estimation of neutral pileup particle multiplicity in high-luminosity hadron collider environments

The contamination from low-energy strong interactions is a major issue for data analysis at the Large Hadron Collider, particularly with reference to pileup, i.e. to proton-proton collisions from other bunch crossings. With a view to improving on the performance of pileup subtraction in higher-luminosity regimes, particle weighting methods have recently been proposed whereby the weights are used to rescale the particle four-momentum vectors. We describe an algorithm based on a different approach that instead employs the weights to reshape the particle-level kinematic distributions in the data. We have applied the algorithm to the task of estimating the number of neutral pileup particles in different kinematic regions inside individual simulated events. Because of the simplicity and parallelisation potential of this technique, we foresee the possibility of using it in conjunction with existing methods at the reconstruction level in future high-luminosity hadron collider environments.

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