

Simultaneous calibration of jet energy and mass using DNN in ATLAS

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The energy and mass measurements of jets are crucial tasks for the Large Hadron Collider experiments. This paper presents a new calibration method to simultaneously calibrate these quantities for large-radius jets measured with the ATLAS detector using a deep neural network (DNN). To address the specificities of the calibration problem, special loss functions and training procedures are employed, and a complex network architecture, which includes feature annotation and residual connection layers, is used. The DNN-based calibration is compared to the standard numerical approach in an extensive series of tests. The DNN approach is found to perform significantly better in almost all of the tests and over most of the relevant kinematic phase space. In particular, it consistently improves the energy and mass resolutions, with a 30% better energy resolution obtained for transverse momenta $p_T > 500$ GeV.

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Yes

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