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Exploring biases in neural network jet background estimation in heavy-ion collisions

Many studies in recent years have shown that neural networks (NNs) trained using jet sub-structure observables in ultra-relativistic heavy ion collision events are capable of significantly increasing the resolution of jet-\pT background corrections relative to the standard area-based technique. However, modifications to jet substructure due to quenching in quark-gluon plasma (QGP) in central collisions can bias NN background corrections, when the NNs have been trained on jets in a vacuum. We simulate realistic thermodynamically modelled QGP in central Au+Au events with associated jet quenching using the FASTJET model, and compare varying jet modifications to computationally simpler jet quenching in fixed-length bricks of QGP. We investigate possible biases in NN background correction by embedding a simulated inclusive spectrum of quenched jets into backgrounds from the thermodynamically modelled QGP. Potential errors from the NN correction are demonstrated through comparison of the nuclear modification factor (R_{AA}) measured using NNs for background correction to the generator-level R_{AA} of the JETSCAPE MC.

Focus areas

HEP

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