UNFOLDING JET SUBSTRUCTURE OBSERVABLES WITH A MACHINE LEARNING METHOD IN pp COLLISIONS AT $\sqrt{s}$ = 200 GeV IN STAR

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Jets are collimated sprays of final-state particles produced from initial hard partonic (quark/gluon) scatterings in particle collisions. Since jets are multi-scale objects that connect asymptotically free partons to confined hadrons, jet substructure measurements in vacuum can provide insight into the parton evolution and the ensuing non-perturbative processes, and also serve as a baseline for similar measurements in heavy-ion collisions. Jet substructure observables are usually unfolded to correct for detector effects with a binned, one- or two-dimensional Bayesian method. Potentially, it is more desirable to unfold in higher dimensions which can account for the possible correlation in the multi-dimensional observable phase space.

The STAR experiment recorded data of $\sqrt{s}$ = 200 GeV pp collisions during the 2012 RHIC run. From this dataset, we reconstruct jets with charged particle tracks measured in the Time Projection Chamber and neutral particles measured in the Barrel Electromagnetic Calorimeter. We will present preliminary studies of jet substructure observables unfolded with MultiFold, a machine learning method that simultaneously corrects for multiple observables in an un-binned fashion. This will be the first time MultiFold has been applied for hadronic collision data. We will also preview correlation measurements across different jet substructure observables that could enable separating quark vs gluon jets.

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