

# Modeling a top jet classifier with two-point energy correlation and geometry of soft emission

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We introduce a two-point energy correlation spectra analysis for the classification of top jets and QCD jets. The two-point energy correlation spectra based on the angle between constituents, which is the main parameter of the kinematics of parton shower and heavy particle decay, are useful for tagging Higgs jets with a multilayer perceptron (MLP) or logistic regression. On the other hand, the substructure of a top jet is more complicated than that of a Higgs jet, and additional variables are required. We use trimmed jets and subjets together with the spectra to encode the pattern of soft radiation and the three-point correlation into the two-point correlation spectra. For the classification model with these new inputs, we use a multilayer perceptron analyzing each category of two-point correlation spectra independently. We further compare the classification result with that of a convolutional neural network (CNN) with jet images. The performances of our method and that of the CNN are comparable within the uncertainty between Pythia8 and Herwig7 generated jets.

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