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Spectral Analysis of Color Charge in Two-Prong Jets with Neural Networks

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We discuss signatures in the two-point correlation spectrum S2(R) on the angular scale R for identifying color charge in two-prong jets. In a two-prong jet, the radiation pattern is correlated with the color charge of originating partons and the decay topology of the jet so that we need a strategy considering those effects simultaneously. The spectral analyses with S2(R) and neural network provide us with a visual framework for studying two-prong substructure as well as color superstructure in terms of the angular scale R. Furthermore, we can design neural networks with interpretable subparts in this framework. The interpretable subparts help us understand how the prediction from the neural network came out. We show our results in the context of classification among Higgs, Sgluon, and QCD jets.

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