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Uncovering latent jet substructure

We apply techniques from Bayesian generative statistical modeling to uncover hidden features in jet substructure observables that discriminate between different a priori unknown underlying short distance physical processes in multi-jet events. In particular, we use a mixed membership model known as Latent Dirichlet Allocation to build a data-driven unsupervised top-quark tagger and ttbar event classifier. We compare our proposal to existing traditional and machine learning approaches to top jet tagging. Finally, employing a toy vector-scalar boson model as a benchmark, we demonstrate the potential for discovering New Physics signatures in multi-jet events in a model independent and unsupervised way.

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