

# Machine learning, computer vision, and probabilistic models in jet physics

*Thursday, November 12, 2015 12:15 PM (45 minutes)*

In this talk we present recent developments in the application of machine learning, computer vision, and probabilistic models to the analysis and interpretation of LHC events. First, we will introduce the concept of jet-images and computer vision techniques for jet tagging. Jet images enabled the connection between jet substructure and tagging with the fields of computer vision and image processing for the first time, improving the performance to identify highly boosted  $W$  bosons with respect to state-of-the-art methods, and providing a new way to visualize the discriminant features of different classes of jets, adding a new capability to understand the physics within jets and to design more powerful jet tagging methods. Second, we will present Fuzzy jets: a new paradigm for jet clustering using machine learning methods. Fuzzy jets view jet clustering as an unsupervised learning task and incorporate a probabilistic assignment of particles to jets to learn new features of the jet structure. In particular, we will show how fuzzy jets can learn the shape of jets providing a new observable that improves the  $W$  boson and top tagging performance in highly boosted final states.

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