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Deep Learning Jet Substructure from Two-Particle Correlation

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Deciphering the complex information contained in jets produced in collider events requires a physical organization of the jet data. In this talk I will discuss the use of two-particle correlations (2PCs) by pairing individual particles as the initial jet representation from which a probabilistic model can be built. Particle momenta, as well as particle types and vertex information are included in the correlation. We construct a novel, two-particle correlation neural network (2PCNN) architecture by combining neural network based filters on 2PCs and a deep neural network for capturing jet kinematic information. We apply the 2PCNN to boosted boson and heavy flavor tagging and achieve excellent performance by comparing to models based on telescoping deconstruction. Major correlation pairs exploited in the trained models are also identified, which shed light on the physical significance of certain jet substructure.

Primary authors: Dr CHIEN, Yang-Ting (Stony Brook University); CHEN, Kai-Feng (National Taiwan University (TW))

Presenter: Dr CHIEN, Yang-Ting (Stony Brook University)

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