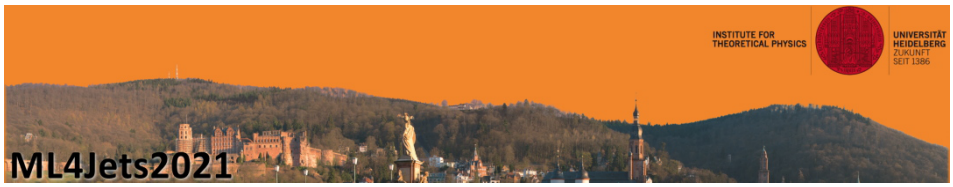

Contribution ID: **46** Type: **not specified**

Autoencoders for unsupervised anomaly detection in high energy physics

Tuesday, July 6, 2021 5:00 PM (20 minutes)

Autoencoders have been introduced in high energy physics as a promising tool for model-independent new physics searches. As a benchmark scenario, we study the tagging of top jet images in a background of QCD jet images. Although we reproduce the positive results from the literature, we show that the standard autoencoder setup cannot be considered as a model-independent anomaly tagger by inverting the task: the autoencoder fails to tag QCD jets if it is trained on top jets. We suggest improved performance measures for the task of model-independent anomaly detection. We also improve the capability of the autoencoder to learn non-trivial features of the jet images, such that it is able to achieve both top jet tagging and QCD jet tagging with the same setup. However, we want to stress that a truly model-independent and powerful autoencoder-based unsupervised jet tagger still needs to be developed.

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Session Classification: BSM