Contribution ID : **23** Type : **Physics Beyond the Standard Model**

Search for New Physics Inside Jets at the ATLAS Detector Using Machine Learning

Friday, 12 February 2021 12:45 (15)

Since the discovery of the Higgs Boson at the LHC in 2012, no sign of new physics beyond the Standard Model has been found. The SUSY and exotic particles searches have not uncovered signs of new physics, as the model-dependent searches. In recent years, multiple unsupervised machine learning methods have been proposed to search for new physics at the LHC. This talk will explore the use of a variational auto-encoder (VAE) to perform a general search in proton-proton collisions at the LHC using large radius jets in ATLAS simulation data. The algorithm was trained on TopoClusters to differentiate between the dominant QCD background and a chosen test signal corresponding to top quark jets. The most anomalous jets predicted by the VAE were selected to plot the invariant mass spectrum to find the top quark mass peak. Our study found an important correlation between the jet invariant mass and the loss function of the VAE, resulting in QCD background sculpting and preventing the apparition of the top peak. We successfully used a mass-decorrelation method based on Outlier Exposure to prevent this sculpting.

email address

jacinthe.pilette@umontreal.ca

Please select: Experiment or Theory

Experiment

Primary author(s) : Mrs PILETTE, Jacinthe (Université de Montréal)

Co-author(s) : Mr GODIN, Dominique (Université de Montréal); Mr ARGUIN, Jean-François (Université de Montréal); Mr LEISSNER-MARTIN, Julien (Université de Montréal); Mrs CHENG, Taoli (MILA)

Presenter(s) : Mrs PILETTE, Jacinthe (Université de Montréal)