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Identification of Quenched Jets with Machine Learning

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It is believed that the properties of quark-gluon plasma (QGP) can be studied through measurements of the jet quenching phenomenon. More specifically, detailed studies of the jet substructure may reveal the microscopic properties of the QGP.

Recently the modification of groomed jet observables was studied in heavy-ion collisions [1][2]. In addition, the Lund radiation plane was introduced to investigate parton shower modifications in the QGP [3].

In this talk, I am going to show how machine learning techniques can help evaluate how quenched a jet is on a jet-by-jet basis. A classifier based on the long short-term memory (LSTM) model is trained. The LSTM model is an artificial recursive neural network (RNN) and is capable of processing sequential data. This design makes it well-suited for making predictions on jets by taking advantage of the binary structure of parton branchings that form a jet.

Simulations are made with Monte-Carlo event generators including PYTHIA8, JEWEL and the hybrid strong/weak coupling model, the last two of which take the medium response into consideration.

Reference:
[1] Measurement of the splitting function in pp and PbPb collisions at √sNN =5.02TeV. arXiv:1708.09429.
[2] Exploration of jet substructure using iterative declustering in pp and Pb-Pb collisions at LHC energies. arXiv:1905.02512v1.
[3] Novel tools and observables for jet physics in heavy-ion collisions. arXiv: 1808.03689.

Collaboration (if applicable)

Track

Jets and High Momentum Hadrons

Contribution type

Contributed Talk

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