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Identifying quenched jets in heavy ion collisions with machine learning

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Measurements of jet substructure in ultra-relativistic heavy ion collisions suggest that the jet showering process is modified by the interaction with quark gluon plasma. Modifications of the hard substructure of jets can be explored with modern data-driven techniques. In this study, we use a machine learning approach to identify jet quenching amounts. Jet showering processes, with and without the quenching effect, are simulated with the JEWEL model, and are embedded with thermal backgrounds. Sequential substructure variables are extracted from the jet clustering history following an angular-ordered sequence, and are used in the training of a neural network built on top of a long short-term memory network. We measure the jet shape and jet fragmentation functions for jets classified with the neural network outputs, and quantify their in-medium modifications. The results support that the machine learning approach successfully identifies the quenching effect in the presence of the large uncorrelated background of soft particles created in heavy ion collisions.

Category

Experiment

Collaboration (if applicable)

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