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Disentangling and Quantifying the Quark Gluon Plasma with Generative Deep Learning

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In heavy-ion collisions in RHIC and at the LHC a nearly perfect fluid state of matter is generated, the QGP, expanding to the surrounding detector in a very short timescale. Jets, collimated sprays of hadrons reconstructed by some clustering algorithm, are very well understood in the absence of this dense medium and are, not only for this reason, amongst the prime tools to study this state of matter. A jet starts as a single parton, with very high virtuality, emerging from a hard scattering in the collision. This parton relaxes its virtuality by fragmenting into more and more partons until these reach the hadronization scale and arrive at the detector, as a spray of color singlets. When the QGP is present this fragmentation is modified, either by extra radiation induced by the extreme color field. either by elastic collisions with the constituents of this medium, which broaden the momenta distribution of the jet. The study of these modifications is the study of Jet Quenching, where we attempt to use the jet as hard probe that transverses the medium to study some of its properties.

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