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Decoding the quark-gluon plasma with jet quenching observables

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The modifications of jets created in heavy-ion collisions at LHC energies enables us to study microscopic features of the quark-gluon plasma. The inherent hierarchy of scales governing the jet evolution allows to distinguish a leading jet structure, which interacts coherently with the medium as a single color charge, from softer sub-structures, which will be sensitive to effects of color decoherence. We show that this picture is consistent with experimental data on reconstructed jets at the LHC. In particular, we demonstrate that effects due to color decoherence are manifest in the excess of soft particles measured in fragmentation functions in Pb-Pb compared to proton-proton collisions. Finally, we discuss the sensitivity of the different observables to the jet quenching parameter $\hat{q}$ of the plasma as well as to the finite mean-free-path of the medium.

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