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Initial stage jet momentum broadening and energy loss in tBLFQ formalism

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We study the energy loss and momentum broadening of a high energy quark jet in the high density gluon medium created right after the collision of two ultrarrelativistic heavy nuclei, the Glasma. Using the light-front QCD Hamiltonian formalism, we compute the real-time evolution of the quark jet. We thereby treat the jet as a fully quantum state, and describe the Glasma as an evolving classical color background field. Notably, in this formalism, the fields are quantized on the equal light-front time surface of the jet and in the associated light-cone gauge, whereas the existing studies of the Glasma field are usually formulated in a different gauge, the Glasma's temporal gauge. For the first time, we carried out the gauge transformation of the Glasma fields from its temporal gauge to the jet's light-cone gauge. In this work, we will focus on jets at approximately mid-rapidity. By evolving the jet state within the Glasma, we analyze various observables with the obtained jet wavefunction.

Category

Theory

Collaboration

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