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Transverse momentum broadening in the glasma: real-time lattice simulations and the weak-field limit

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Jets produced in heavy-ion collisions provide important information about the medium that they traverse. Their seeds, highly energetic partons that are created via hard scatterings during the collision, are affected by all different stages of the medium, including the pre-equilibrium precursor state of the quark-gluon plasma, which is known as the glasma. We will report on our numerical real-time lattice simulations of partons traversing the boost-invariant, nonperturbative glasma, which is generated at the early stages of heavy-ion collisions and calculate the effect for RHIC and LHC energies [1]. We observe that partons quickly accumulate transverse momentum up to the saturation momentum during the glasma stage. Moreover, we notice an anisotropy in transverse momentum broadening with larger broadening in the rapidity than the azimuthal direction. We compare our lattice simulations to a semi-analytic weak-field approximation [2], where we also find such an anisotropy and are able to link it to correlations among the color-electric and color-magnetic flux tubes in the initial state of the glasma.
[1] A. Ipp, D. I. Müller, D. Schuh, Phys. Lett. B 810 (2020), arXiv:2009.14206
[2] A. Ipp, D. I. Müller, D. Schuh, Phys. Rev. D 102 (2020), arXiv:2001.10001

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