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Influence of scattering versus coherent parton branching on the k_T broadening of QCD cascades in a medium

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Heavy ion collisions at high energies can be used as an interesting way to recreate and study the medium of the quark-gluon plasma (QGP).

We particularly investigate how jets produced in hard binary collisions evolve within a tentative medium and in particular how the jet-particle momentum components k_T orthogonal to the jet axis are affected.

We evolved the jets within a medium that contains both, transverse kicks as well as medium induced coherent radiation within the MINCAS-algorithm [1] following the works of [2,3]. In this framework parton branching occurs simultaneously to scatterings within the medium, leading to the interference effects that reproduce the well known BDMPS-Z emission rates and sizeable k_T broadening. It is, thus, interesting to study the relative importances of k_T broadening from the coherent splittings and different types of in-medium scatterings.

We find a clear hierarchy of the influences from different scattering effects and deflections during branchings: While scattering still yields the largest contributions to broadening, the branching effects are comparable in size.

We also observed that the k_T distributions in our results differ considerably from a Gaussian distribution in transverse momentum.

References:

- [1] K. Kutak, W. Płaczek, R. Straka, Eur.Phys.J. C79 (2019) no.4, 317
- [2] J.-P. Blaizot, F. Dominguez, E. Iancu, Y. Mehtar-Tani, JHEP 1301 (2013) 143
- [3] J.-P. Blaizot, F. Dominguez, E. Iancu, Y. Mehtar-Tani, JHEP 1406 (2014) 075

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Collaboration / Activity

jet phenomenology in QGP

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