



Contribution ID: 21

Type: **not specified**

Momentum broadening in strongly coupled $N=4$ Yang-Mills theory revisited

Saturday 28 September 2024 14:50 (20 minutes)

Due to the strongly coupled nature of quark-gluon plasma (QGP) formed in heavy-ion collisions, and the notorious difficulties in carrying out QCD calculations at realistic values of the coupling, supersymmetric $N=4$ Yang-Mills theory at large N_c has served as a highly helpful reference point to gain intuition on aspects of the strongly coupled physics of QGP.

In this work, we revisit the setup of the independent calculations by [1], and by [2] of the momentum broadening (MB) coefficient of a heavy quark propagating through a strongly coupled $N=4$ plasma, and the calculation by [3] of the MB coefficient of a highly energetic, light like particle through the same plasma. At the time, both MB coefficients were regarded as unconnected due to the different kinematic regimes in which each calculation was set up.

We show that these coefficients are, in fact, two different features of a common distribution: the probability distribution for a hard particle to change its momentum by given amounts. We calculate this distribution and show that the results of [1, 2] correspond to the MB of a particle that has lost a certain amount of energy and that the result of [3] corresponds to the transverse MB of a particle that does not lose any energy.

Our calculation allows us to obtain, for the first time, nontrivial correlations between MB and energy loss of a hard particle propagating through strongly coupled plasma.

[1] hep-th/0612143

[2] hep-th/0701123

[3] hep-ph/0605178

Category

Theory

Collaboration

Authors: SCHEIHING HITSCHFELD, Bruno Sebastian (Massachusetts Institute of Technology); RAJAGOPAL, Krishna (Massachusetts Inst. of Technology (US)); WIEDEMANN, Urs (CERN)

Presenter: SCHEIHING HITSCHFELD, Bruno Sebastian (Massachusetts Institute of Technology)

Session Classification: Session 3