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Open Heavy Flavor dynamics: impact of T-dependent medium interaction and initial magnetic field

Saturday 24 September 2016 15:00 (20 minutes)

1) S.˜K.˜Das, F.˜Scardina, S.˜Plumari and V.˜Greco,
"Toward a solution to the R_{AA} and v_2 puzzle for heavy quarks,"
Phys. Lett. B747 (2015) 260

2) S.˜K.˜Das, F.˜Scardina, S.˜Plumari and V.˜Greco,
"Heavy-flavor in-medium momentum evolution: Langevin versus Boltzmann approach,"
Phys. Rev. C90 (2014) 044901

3) S.˜K.˜Das, J.˜M.˜Torres-Rincon, L.˜Tolos, F.˜Scardina and V.˜Greco,
"Propagation of heavy baryons in heavy-ion collisions. II: observables and predictions," arXiv:1604.05666 [nucl-th].

Summary

We address the present theoretical challenge to have a self-consistent description
of both the R_AA(p_T) and the elliptic flow v_2(p_T) at both RHIC and LHC by existing models. We discuss how the temperature dependence of the heavy quark drag coefficient associated to a Boltzmann dynamics can account for a large part of such a puzzle.
In particular we point out that for the same R_AA(p_T) one can generate 2-3 times more v_2 depending on the temperature dependence of the heavy quark drag coefficient.
Similarly to what is seen for light quark jets a constant drag diffusion, or q/Tˆ3 = 1/Tˆ2, leads to a large v_2 in agreement with experimental observation.
We will also highlight the impact of radiative energy loss contribution.
Besides it turns out that charm quarks may be an ideal probe of the initial electromagnetic field. In fact thanks to their short formation time, subdominant thermal production and not very large mass can be a sensitive probe of the initial magnetic field and electric conductivity of the bulk matter. Conjointly thanks to their Higgs mass there should be no mixing with the chiral magnetic dynamics. Realistic simulation shows a charm/anti-charm opposite transverse flow v_1 of the order of a few percent depending on the value of the electric conductivity of the bulk QGP.

Presentation type

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