Contribution ID: **134** Type: **Contributed talk**

Transport properties of Heavy Quarks and their correlations to the bulk dynamics and the initial Electromagnetic field

Tuesday 11 June 2019 16:50 (20 minutes)

We study the propagation of heavy quarks (HQ), charm and bottom, in the QGP by means of a relativistic Boltzmann transport approach. The non-perturbative interaction between HQs and light quarks is described by means of a quasi-particle approach that permits to have an Equation of State close to lattice QCD and it is able to describe the main feature of the non-perturbative dynamics: the enhancement of the interaction strength near the critical temperature. The resulting charm in-medium evolution correctly describe both the experimental data for the D mesons R_{AA} and the elliptic flow $v_2(p_T)$ from RHIC to LHC energies. The extracted T-dependence of the space-diffusion coefficient D_s is in a agreement with lattice QCD results within the systematic uncertainties. In the same scheme we present novel predictions also for B mesons at LHC energies. It will be discussed the role of initial state fluctuations that allows to extend the analysis to high order D meson anisotropic flows $v_3(p_T)$ and $v_4(p_T)$. This allows to match the recent and upcoming experimental efforts of ALICE and permits to investigate the role of QCD interaction in developing correlations between light and heavy flavor anisotropic flows (v_n^{light},v_n^{heavy}) providing a proof that the heavy flavor anisotropies are induced by the bulk expansion and powerful constraints for the transport coefficients. Finally, as recently recognized, very strong initial electromagnetic (e.m.) fields are created in Heavy-Ion Collision that induce a vorticity in the reaction plane that is odd under charge exchange. We show that the strong initial e.m. field entails a transverse motion of HQ, resulting in a splitting of directed flow v_1 of D and anti-D mesons of few percent much larger compared to the observed light charged particles v_1. Moreover, we discuss for both RHIC and LHC, the role played by the initial large bulk vorticity.

[1] S. Plumari, Eur.Phys.J. C79 (2019) no.1, 2.
[2] S. Plumari et al., Eur. Phys. J. C78 (4) (2018) 348.
[3] F. Scardina et al., Phys.Rev. C96 (2017) no.4, 044905.
[4] S. K. Das et al., Phys.Lett. B768 (2017) 260.
[5] S. K. Das et al., Phys.Lett. B747 (2015) 260.

Collaboration name

Track

Heavy Flavour

Primary authors: COCI, Gabriele (INFN - National Institute for Nuclear Physics); MINISSALE, Vincenzo (INFN); DAS, Santosh Kumar (School of Physical Science, Indian Institute of Technology Goa, India); GRECO, Vincenzo (University of Catania); PLUMARI, Salvatore (University of Catania (Italy))

Presenter: PLUMARI, Salvatore (University of Catania (Italy))

Session Classification: Heavy Flavour