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## Open heavy flavor dynamics in heavy ion collisions: RAA, $v_1$ , $v_2$ , $v_3$

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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.

We describe the heavy quarks dynamics in the quark-gluon plasma (QGP) by means of a Boltzmann transport approach in which the non-perturbative interaction between heavy quarks and light quark is described by means of a quasi particle approach.

Such a model is able to catch the main features of non-perturbative interaction as the increasing of the interaction in the region of low temperature, which is a fundamental ingredient to reproduce the experimental data for the nuclear suppression factor and the elliptic flow.

We will also discuss the impact of radiative energy loss calculated in a multiple scattering and higher-twist scheme.

Moreover we point 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 they can be a sensitive probe of the initial electromagnetic field and electric conductivity of the bulk matter.

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.

[1]S. K. Das, F. Scardina, S. Plumari, V. Greco, Phys.Rev. C90 (2014) 044901.

[2]S. K. Das, F. Scardina, S. Plumari, V. Greco, Phys.Lett. B747 (2015) 260-264.

[3]S. K. Das, S. Plumari, S. Chatterjee, J. Alam, F. Scardina, V. Greco, Phys.Lett. B768 (2017) 260-264.

### Experimental Collaboration

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