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Energy loss of heavy flavor quarks in color string medium

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"In this talk, we present our preliminary results on the estimation of the energy loss of heavy flavor (HF) quarks in the quark-gluon string medium in minimum bias p+p collisions at LHC energies.

This study is inspired by the ongoing hot debates on whether tiny droplets of liquid Quark-Gluon Plasma (QGP) can be formed in small colliding systems [1,2]. A number of observations indeed supports this assumption in high-multiplicity p+p at LHC, e.g. measured charged hadron azimuthal anisotropies [3] and strangeness enhancement [4]. On the other hand, there exist some natural limitations of hydrodynamical interpretation [5,6].

In this work, we assume that system in a p+p collision can be represented by overlapping quark-gluon strings originated from multi-pomeron exchanges [7,8]. On the one hand, this picture can be considered as the pre-equilibrium stage of the system evolution in relativistic hadron or heavy ion collisions. It can be followed by expanding QGP in local thermal equilibrium to which color strings act as sources [9]. On the other hand, QGP may never be formed in an event and, then, the quark-gluon strings would directly fragment into observed hadrons [10,11].

In this report, we focus on the estimation of the magnitude of transverse momentum loss of charm and bottom quarks, produced in initial hard scattering and propagating through quark-gluon soft strings formed. String overlaps result in the fluctuations of the energy density of the color field [12] whose influence is manifested and studied via elastic collisions of HF quarks with gluons in color strings. The simulation is performed event-by-event with fluctuating number of strings as well as their longitudinal oscillations [13], which creates dynamically initialized medium each time step.

The result is compared with the corresponding HF quarks'energy losses in expanding hydro scenario in EPOS4HQ [14] and in static glasma fields of Color-Glass Condensate (CGC) approach [15].

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