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HEAVY QUARK DYNAMICS IN THE QGP WITHIN A BOLTZMANN TRANSPORT MODEL: Radiative vs Collisional Energy Loss

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Heavy quarks represent a fundamental probe for investiganting the properties of hot and dense QCD matter created at Ultra-Relativistic Heavy Ion Collisions.
They are created at early stages of collisions and due to their large masses they do no thermalize with the bulk medium. Thus they conserve memory of propagation throw the entire space-time evolution of the QGP.
The two key observables for heavy quarks are the nuclear suppression factor $R_{AA}(p_T)$ and the elliptic flow $v_2(p_T)$. The challenge of each theoretical framework is to give a consistent description of both quantities at RHIC and LHC energies, hence solving the so called $R_{AA} - v_2$ puzzle for D mesons.
We discuss the propagation of heavy quarks through the QGP by means of a relativistic Boltzmann transport approach including both collisional and radiative energy loss mechanisms.
In particular we investigate the impact of induced gluon radiation by dynamical QCD medium implementing in our transport model a formula for the emitted gluon spectrum calculated in a higher-twist scheme.
We notice that in the high p_T region ($p_T > 10$ GeV) radiative processes play an essential role giving a significant contribution to the generation of R_{AA} and v_2 at momentum values for which the energy loss by collisions is in the perturbative regime, hence less effective with respect to the low p_T region in reproducing the experimental data for these two observables.

Summary

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