



Contribution ID: 142

Type: Poster

Lienard–Wiechert potential of a heavy quark moving in the quark gluon plasma

Monday 12 December 2022 14:00 (1 hour)

We investigate the nature of the complex retarded potential of a heavy quark moving in a hot and dense static quark gluon plasma. The well-known concept of the retarded potential in electrodynamics is extended to the context of the heavy-quark by modifying the static vacuum Cornell potential through Lorentz transformation to the static frame of the medium. The resulting potential in the vacuum is further corrected to incorporate the screening effect offered by the thermal medium. To do so, the retarded Cornell potential is modified by the dielectric function of the static QGP medium. We present the numerical results for the real and imaginary parts of the potential along with the analytical expression of potential approximated by a small velocity limit. The relative motion of a heavy quark with respect to the static QGP medium breaks the spherical symmetry of the potential. We show the angular variation of both the real and imaginary parts of the potential at different velocities. Finally, we present the thermal width of quarkonia in the QGP medium derived using the imaginary part of the potential and study its dependence on velocity and temperature.

Session

Heavy Ions and QCD

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Session Classification: Poster - 1