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Heavy Quarkonium in a moving QGP medium

We study the behavior of the real and the imaginary parts of the static
potential between a heavy quark and its anti-quark,
which are in relative motion with respect to the QGP medium. The heavy
quark-antiquark complex potential is obtained by correcting both the
Coulombic and the linear terms in the Cornell potential
through the dielectric function in real-time formalism using the hard thermal loop (HTL) approximation.
We show the variation of both the real and the imaginary parts of the potential for different values of velocity when the bound state is aligned in the direction parallel and perpendicular to the velocity of the thermal medium.
We find that real part of potential increases with the increase in velocity at short distances and becomes less screened but it decreases with increase in velocity at large distances for the parallel case. On the other hand, the potential decreases with the increase in velocity for the perpendicular case which results in
the more screening of the potential. Since the $Q\bar{Q}$ potential is effectively more screened
in the moving plasma, it results in the earlier dissociation of quarkonium states in a moving medium.
The inclusion of string term makes the potential less screened as compared to the Coulombic term alone for both the cases.
Combining all these effects we expect a stronger binding of a $Q\bar{Q}$ pair in moving medium in the presence of string
term as compared to the Coulombic term alone. The imaginary part decreases (in magnitude) with increase in velocity and
increases (in magnitude) with inclusion of string term. We also calculate the decay width of the quarkonium state
and find that width decreases with increase in velocity and increases with the inclusion of the string term.
All of these effects leads to the modification of the quarkonium suppression.
We also extend our calculation at finite chemical potential and show its effect on the properties of quarkonium states in a moving medium.

Preferred Track

Quarkonia

Collaboration

Not applicable

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