

Quark Matter 2012



Contribution ID : 50

Soft gluon emission and energy loss of heavy flavors in relativistic heavy ion collisions

Thursday 16 Aug 2012 at 16:00 (02h00')

Content :

Most of the the calculations on gluon emission off a heavy quark, within perturbative QCD, have been performed in the literature using light cone gauge with eikonal approximations. Recently we revisited the issue in Feynman gauge that resulted in a very compact and elegant expression for the suppression factor for gluon emission off a heavy quark [1]. This generalization is valid for the full range of rapidity of the radiated gluons and also has no restriction on the scaled mass of the quark with its energy. In the appropriate limit it correctly reproduces the usual dead cone factor in the forward rapidity region [2]. On the other hand, this suppression factor becomes close to unity in the backward direction. We then obtain the radiative energy loss of a heavy quark in a deconfined medium due to radiation of gluons off them using this derived gluon emission spectrum. We find that the heavy flavor loses energy almost in a similar fashion like light quarks through this process. This indicates a small suppression of gluon emission in the backward region, which should have an impact on the phenomenology of heavy quark energy loss in the hot and dense matter produced in ultra-relativistic heavy-ion collisions. An analysis of the nuclear modification factor for D -meson at LHC is found to be in very good agreement with the most recent data from ALICE collaboration at 2.76 ATeV Pb-Pb collisions [3].

1. R. Abir, C. Greiner, M. Martinez, M. G. Mustafa and J. Uphoff,
"Soft gluon emission off a heavy quark revisited"
Phys. Rev. D 85, 054012 (2012)
arXiv:1109.5539 [hep-ph].
2. Y. L. Dokshitzer and D. E. Kharzeev
"Heavy quark colorimetry of QCD Matter"
Phys. Lett. B 519 (2001) 199-206
3. R. Abir, U. Jamil, M. G. Mustafa and D. K. Srivastava,
"Heavy Quark Energy Loss and D Mesons at LHC"
arXiv:1203.5221 [hep-ph].

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Session classification : Poster Session Reception

Track classification : Jets

Type : Poster