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# The problem of overlapping formation times: In-medium virtual corrections

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High energy particles traversing through medium primarily lose energy by showering through hard bremsstrahlung and pair production. These splitting processes are coherent over large distances in the very high energy limit, leading to suppression from the Landau-Pomeranchuk-Migdal (LPM) effect. Avoiding soft-emission approximations, we study the cases where the coherence lengths of two consecutive splittings overlap (which is important for calculating corrections to LPM effect in QCD). In this work, we will show how to compute in-medium virtual corrections to the leading order LPM emission rates for QCD. These loop corrections will be necessary for calculating properties of in-medium high energy parton showers. To simplify the calculations, we will focus on the all-gluon case and work in the large-Nc limit of QCD, where Nc is the number of colors.

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