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Exploring transverse momentum broadening in expanding medium-induced cascades

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We investigate the characteristics of gluonic cascades in static and expanding media by numerically solving the complete BDIM (Blaizot-Dominguez-Iancu-Mehtar-Tani) evolution equations in longitudinal and transverse momentum using the Monte Carlo event generator MINCAS. In this analysis, we compare angular distributions of in-cone radiation across various medium profiles with effective scaling laws. Our findings indicate that the out-of-cone loss of energy occurs through the radiative break-up of hard fragments, which is followed by an angular broadening of soft fragments. Although the broadening of the leading fragments is substantially impacted by the dilution of the medium caused by expansion, we find that in the low-x range, which is accountable for the majority of gluon multiplicity in the cascade, the angular distributions are almost identical when comparing different medium profiles. This similarity is primarily because multiple splittings play a dominant role in broadening within this range. Lastly, we examine how our findings influence the phenomenological explanation of jet quenching and out-of-cone radiation.

Category

Theory

Collaboration (if applicable)

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