Investigating jet modification in absence of QGP-medium

Friday 10 January 2025 13:30 (30 minutes)

We explore modification of jet properties in high-multiplicity proton-proton (pp) collisions at $\sqrt{s} = 13$ TeV, utilizing the PYTHIA 8 Monash 2013 Monte Carlo simulation. While the formation of a quark-gluon plasma (QGP) is typically associated with jet quenching, our investigation focuses on jet modifications arising purely from non-QGP mechanisms, including color reconnection (CR) and multiparton interactions (MPI).

We analyze intra-jet properties, specifically the jet shape observable $\rho(r)$ and fragmentation distribution z^{ch} . Our results demonstrate that the interplay between MPI, CR, and gluonic contributions to jets in highmultiplicity events leads to significant broadening and softening of jets compared to minimum bias events, particularly at low- p_{T} regime. A direct correlation is observed between the average number of multiparton interactions, the gluonic contribution, and the extent of modification in $\rho(r)$, indicating that higher number of MPIs and/or gluonic contributions correspond to greater modifications in jet properties. These findings underscore the rich interplay of dynamics in high-multiplicity environments, providing valuable insights into the mechanisms at play, independent of QGP formation.

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