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Thermodynamical string fragmentation and QGP-like effects in jets

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It has been proposed to search for thermal and collective properties arising from parton-fragmentation processes by examining high jet charged-constituent multiplicities (N_{j,ch}) in proton-proton (pp) collisions [1]. Initial studies that tested this proposal using the PYTHIA 8 event generator with the Monash tune, incorporating multiparton interactions (MPI) and the MPI-based colour reconnection (CR) model, did not reveal any strangeness enhancement, nor provide conclusive evidence for the presence of radial flow. In this contribution, we expand upon the proposed Monte Carlo study by eliminating selection biases associated with triggering on charged particle multiplicities. We disable MPI to focus exclusively on jet fragments. We analyse pp collisions at √s=13 TeV simulated with PYTHIA 8, exploring different implementations of the generator: thermodynamical string fragmentation and the standard Lund fragmentation model, considering various CR models. Surprisingly, the thermodynamical string fragmentation model predicts a hint of strangeness enhancement in jets. Additionally, the light-flavor baryon-to-meson ratios as a function of j_T exhibit similarities across all PYTHIA 8 implementations, and hint at radial flow-like effects. In contrast, the ratio of heavy-flavor hadrons (Lambda_c/D^0) at low j_T as a function of N_{j,ch} shows a similar trend to that observed as a function of charged-particle multiplicity in soft data, suggesting that colour string junctions may play an important role in jet development [2].

[1] A. Baty, P. Gardner, W. Li, PRC107 (2023) 064908,
[2] R. V., A. O., arXiv:2408.06340

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