

Multiplicity dependence of inclusive and heavy-flavor jet structures in pp collisions at LHC energies

High multiplicity events of small colliding systems at high c.m.s. energies show similar collective features to heavy ion collisions with comparable multiplicities, such as long-range near-side correlations and v_n coefficients [1,2]. Whether this behaviour may be attributed to the presence of a deconfined state in small systems is an open question.

Recent analyses of pp and p-Pb collisions also show an universal enhancement of heavy-flavour particles [3], that is usually attributed to multiple parton interactions (MPI) and higher gluon radiation associated with short distance production processes [4,5]. While we cannot expect jet quenching to be detectable in small systems, QCD phenomena at the soft-hard boundary may cause a modification of the jet observables such as jet shapes (momentum profiles). Existing and forthcoming data at the experiments of the LHC provides means to access such modifications.

We give predictions for multiplicity-dependent jet structures in p+p collisions at high jet-pT, based on extensive studies with event generators. We show that the presence of MPI modifies the jet shapes in high-multiplicity events beyond trivial selection bias, and that such high-pT multiplicity-differential probes provide a sensitive validation opportunity for models involving different MPI, color reconnection schemes or parton distribution functions. We also propose a definition of a characteristic jet size measure that is independent of multiplicity [6], and we provide a comparison of multiplicity-dependent jet structures from heavy-flavor and light-flavor jets.

References:

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Summary

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