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Recent multiplicity-based measurements in jet physics

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Observables based on multiplicity play a crucial role in jet measurements. An influential contribution to the analysis of event multiplicity distributions is the Koba-Nielsen-Olesen (KNO) scaling hypothesis, which states that the multiplicity distributions can all be collapsed onto a universal scaling curve. Phenomenological studies based on proton–proton collisions have found a similar scaling behavior within jets and concluded that the KNO scaling may be violated by processes outside the jet development, such as single and double-parton scatterings or softer multiple-parton interactions. In this contribution, recent results are presented that can help validate different fragmentation models.

Measurements from the LHC show an enhancement of both charm and beauty baryon-to-meson production ratios in the low-transverse-momentum region when compared to model predictions based on e+e- collisions. We explored this enhancement in terms of event activity using the color-reconnection model beyond leading color approximation to determine whether the enhancement is a result of processes connected to the jet development or the underlying event. We propose sensitive probes relying on event shape that can help differentiate between multiple proposed charm- and beauty-production scenarios using new LHC Run-3 data.

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