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MC study of high multiplicity jet- and UE-biased pp collisions at the LHC energies

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New measurements on particle production as a function of the charged-particle multiplicity in pp collisions have been reported by the ALICE Collaboration. The novelty of the results relies on the use of transverse sphericity for event classification in either pencil-like or isotropic events, which turn out to be sensitive to the main hard scattering or underlying event, respectively. Results indicate that the average transverse momentum as a function of multiplicity is higher in jetty-like (low sphericity) events than in isotropic (high sphericity) events. While QCD-inspired generators like EPOS LHC and PYTHIA 8 describe the data for minimum bias and isotropic events, the average p_T is overestimated by PYTHIA 8 in high multiplicity jetty-like events.

In this work the charged particle production in the toward and transverse regions, relative to the leading-charged particle ($p_T^{\text{leading}} > 4 \text{ GeV}/c$), are studied as a function of the event multiplicity and event transverse sphericity in pp collisions at $\sqrt{s} = 13 \text{ TeV}$. The study is conducted using EPOS LHC and PYTHIA 8. We will show that in the 0-10% most jetty-like events, the UE is not negligible. The contributions of the jet and underlying event to the average p_T of high multiplicity jetty-like and isotropic events will be shown. The auto-correlation effects in both two models will be discussed. In this context, the observed tension between data and PYTHIA 8 will be explained.

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