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Quantifying the softened hadron production at ALICE-LHC

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Abstract

We conduct a data-driven analysis of softened hadron production in pp and AA collisions at LHC energies, using the string fragmentation model as the baseline for charged-particle production. We observed that the pT spectrum data reported by the ALICE collaboration deviate from the produced particles modeled by the fragmentation of color strings, behaving as a pT-exponential in the range between 1 and 6 GeV (intermediate pT region). This insight shows that the pT spectrum contains information on charged-particle production from two sources: fragmentation of color strings and collective phenomena that redistribute transverse momentum and enhance particle production at intermediate pT. We found scaling laws for the contribution of the softened hadrons to the pT spectrum, multiplicity and average pT, showing that the physical mechanisms producing softened hadrons have similar origins for all colliding systems, revealing a stronger dependence on freeze-out parameters than on system size.

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