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Multihadron production: universality, correlations and search for new physics

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Hadroproduction process in different types of collisions are shown to be interrelated within the recently proposed participant dissipating effective-energy approach which combines the constituent quark picture with Landau relativistic hydrodynamics. Within this approach the heavy-ion measurements on multiplicities in the midrapidity as well as in the full rapidity range and the pseudorapidity distribution are shown to be well reproduced based on (anti)proton-proton collisions in the heavy-ion collision energy range from a few GeV to a few TeV. The correlations of produced particles are considered within the model of clusters correlated in the transverse plane. The model is shown to describe the near-side ridge effect of two-particle azimuthal and rapidity correlations independent of types of collisions, from hadron-hadron interactions to heavy-ion collisions. Being generalized to higher-order correlations the model shows that the ridge effect to hold for three-particle correlations. The model points to a potential signature of new physics beyond the Standard Model to be observed in three-particle azimuthal correlations which can be directly tested in experiments at the LHC.

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