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Fourth order corrections to the MV model, multiplicity distributions and KNO scaling

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A scaling law for the multiplicity distribution in high-energy hadronic collisions has been proposed by Koba, Nielsen, and Olesen (KNO). Experiments at the LHC observed that multiplicities in the central region of proton-proton collisions follow a negative binomial distribution and that they do exhibit KNO scaling. The negative binomial distribution has been theoretically reproduced in the Color Glass Condensate (CGC) formalism with a Gaussian (McLerran-Venugopalan) action. We derive corrections to the MV model up to fourth order in the density of color charges (ρ^4) and investigate their implication on the multiplicity distribution and on KNO scaling. We find that KNO scaling constrains the deviation of the small- x effective action from a Gaussian.

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