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Non-Gaussian initial conditions for evolution of observables in high-energy collisions

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The proper description of the initial states of heavy ion collisions requires complete understanding of the partonic structure of the participants in the process. The essential role in the high-energy nuclear wave-functions of the target and projectile is played by the small-x gluons whose behavior and interactions are studied by the Color Glass Condensate effective theory. We extend the effective McLerran-Venugopalan action for distribution of large-x sources by introducing an additional non-Gaussian term of fourth order in the density of color charges. The effects of the quartic term may explain the observed discrepancy between the MV model and the LHC data on charged hadron transverse momentum distribution and may give a theoretical explanation of the gamma modification contained in the AAMQS global fits. We also attempt to relate the observed KNO scaling law in particle multiplicity distributions to properties of soft gluons. Finally, we obtain an area law behavior for the magnetic Wilson loop in the first moment after the impact, using a Gaussian action, indicating that the structure of the chromo-magnetic fields might be represented as an uncorrelated magnetic vortex configuration.

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