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Fluctuations and particle multiplicities in pA collisions

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We argue that large fluctuations of the proton saturation scale are necessary to explain recent ATLAS and ALICE data on pA collisions at the LHC. We first show that, in contrast to the lower energy RHIC data, neither the wounded nucleon model nor the Color Glass Condensate are able to describe slopes of pseudorapidity distributions of charged particles. Next, we argue that non-linear evolution equations used within the CGC framework exhibit fluctuations whose width is growing with the scattering energy. Motivated by this observation we introduce fluctuations into the CGC formalism and find a remarkably good description of the data. We discuss consequences of such fluctuations for the proton cross-section and other observables.

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