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Forward particle production in the CGC formalism: average transverse momentum and τ scaling

In this work we have used the Color Glass Condensate (CGC) formalism of forward particle production to describe the transverse momentum spectra of charged particles in proton-lead collisions at the LHC. We have also investigated the rapidity dependence of the average transverse momentum, $\langle p_T \rangle$, and the so called scaling variable, $\langle \tau = p_T^2/Q_s^2 \rangle$, where Q_s represents the saturation scale of these processes. We compute the ratios of these quantities at a given rapidity y to the value at $y = 0$, going from $y = 0$ towards the proton fragmentation region. Our analysis, based on (gluon) saturation and geometrical scaling, shows that these ratios decrease strongly with y (above midrapidities) and decrease slightly with the energy. We briefly discuss the implications of our results and present predictions for the forthcoming LHC data.

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