

Gluon saturation in stopping and particle production

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In relativistic heavy-ion collisions, stopping in the initial collision stages is accompanied by a local thermalization of gluons towards the Bose-Einstein distribution, and of valence quarks towards the Fermi-Dirac limit. Whereas the thermalization can be accounted for by an analytically solvable nonlinear diffusion model [1], we describe the time-dependent slowing down (“stopping”) of the fragments [2] based on a QCD-inspired model for the interaction of valence quarks and soft gluons in the respective other nucleus. For data in the expected stopping-peak region at LHC that could determine the gluon saturation scale, a new forward-spectrometer would be needed to distinguish protons from pions and kaons. Charged-hadron production in symmetric (Pb-Pb) and asymmetric (p-Pb) collisions also depends on the gluon saturation scale Q_s , and we investigate its centrality dependence in p-Pb at $\sqrt{s_{NN}}=5.02$ and 8.16 TeV [3].

[1] G. Wolschin, EPL 140, 40002 (2022)

[2] J. Hoelck, G. Wolschin, Phys. Rev. Res. 2, 033409 (2020)

[3] P. Schulz, G. Wolschin, Phys. Rev. C110, 044910 (2024)

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