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Saturation effects in neutron-tagged DIS

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We present here for the first time the impact-parameter dependent saturated dipole model (bSat or IP-Sat) with a fit [1] to the leading neutron structure function HERA data in one pion exchange approximation. We estimate the magnitude of gluon saturation effects by performing a fit to the same data with the linearised version of the considered dipole amplitude and comparing both models. Our analysis helps to constrain the longitudinal gluon distribution of the pions at small x , which is difficult to be measured in a direct experiment. Both models provide good descriptions of the considered data, and no hints of saturation could be deduced from the currently available data. This could be understood as the Bjorken x value probed in neutron-tagged DIS measurements is considerably larger than the Bjorken x in inclusive DIS events on proton, where the latter has exhibited no clear signal for saturation. Further, we discuss the observables in leading neutron production in ep collisions that are sensitive to the non-linear effects [2].

[1] A. Kumar, arXiv:2208.14200 [hep-ph]

[2] A. Kumar and T. Toll, Phys. Rev. D 105 (2022) 114045, arXiv:2203.13314 [hep-ph]

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