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Isolated photon-hadron production in high energy pp and pA collisions at RHIC and LHC

We compute the isolated photon production in association with a charged hadron at mid rapidity in pp and pA based on the Color Glass Condensate (CGC) framework of high energy QCD where, for the first time, we incorporate the Sudakov effect of soft gluon emissions. Our results are based on the leading order $qg \to q\gamma$ channel in the CGC framework and confronted with the recent data from RHIC and LHC concerning the angular distributions and out-of-plane transverse momentum distributions. We find that, while the CGC computation alone results in too narrow distributions, with the help of the Sudakov effect, we can get a satisfactory description of the data. With this as a benchmark, we provide predictions for the magnitude of the nuclear effect brought by the phenomena of gluon saturation in the CGC.

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