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Gluon saturation in proton and its contribution to single inclusive soft gluon production in high energy pA collisions

The leading order result of single inclusive soft gluon production in high energy pA collisions has been calculated by various approaches for more than two decades . The first saturation correction to the leading order result, terms that are enhanced by $\alpha_s^2 A^{1/3}$ with α_s the strong coupling constant and A the atomic number of nucleus, was only analytically attempted recently through a diagrammatic approach despite many relevant numerical studies. In this talk, I will present our efforts in completing this calculation analytically. Our approach is to solve the classical Yang-Mills equations in the dilute-dense regime and use the LSZ reduction formula to calculate gluon production from classical gluon fields. Both analytic and numerical results on the first saturation corrections to the single inclusive soft gluon production will be presented.

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