

Diffraction on Nuclei: Effects of Nucleon-Nucleon Correlations and Inelastic Shadowing Within an Improved Glauber-Gribov Approach

The cross sections for a variety of diffractive processes in proton-nucleus scattering, associated with large gaps in rapidity, are calculated [1] within an improved Glauber-Gribov theory, where the inelastic shadowing corrections are summed to all orders by employing the dipole representation [2] and the effects of nucleon-nucleon correlations, leading to a modification of the nuclear thickness function [3], are also taken into account. Numerical calculations are performed for the energies of the HERA-B experiment, and the RHIC and LHC colliders, and for several nuclei. It is found that whereas the Gribov corrections generally make nuclear matter more transparent, nucleon correlations act in the opposite direction and have important effects in various diffractive processes. The number of inelastic hadron-nucleus and nucleus-nucleus collisions $n_{\text{coll}}(b)$ at impact parameter b [4], and its integral value N_{coll} , which are used to normalize the measured fractional cross section of a hard process, are also calculated within the same approach [5]. The results for gold-gold scattering at RHIC energies show that whereas Gribov inelastic corrections are negligible, nucleon-nucleon correlations appreciably affect the number of collisions.

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- [2] B. Z. Kopeliovich, I. K. Potashnikova and I. Schmidt Phys. Rev. C73 (2006) 034901
- [3] M. Alvioli, C. Ciofi degli Atti, H. Morita, V. Palli Phys. Rev. C78 (2008) 031601(R).
- [4] B. Z. Kopeliovich Phys. Rev. C68 (2003) 044906.
- [5] C. Ciofi degli Atti, C. B. Mezzetti, B. Z. Kopeliovich, I. K. Potashnikova and I. Schmidt to appear.

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