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A critical reassessment of cold nuclear matter effects in proton-nucleus collisions at RHIC and LHC

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Recent results from the p+Pb run at the LHC on light hadron, heavy flavor, and jet production reveal highly non-trivial nuclear cross section modifications, when compared to p+p collisions. These discoveries complement similar earlier findings from d+Au reactions at RHIC. In this talk we present recent calculations and theoretical interpretation for two such examples - the nuclear enhancement for heavy meson production in the backward rapidity region and single inclusive jet production in both d+Au and p+Pb collisions. We demonstrate that the incoherent multiple parton scattering can describe rather well the observed Cronin-like nuclear enhancement in the intermediate p_T region of heavy meson production at RHIC and the LHC [1,2]. On the other hand, we show that initial-state inelastic parton processes in p+A collisions lead to attenuation of the jet production cross section, which is amplified at very high p_T and forward rapidity. We demonstrate quantitatively to what extent parton energy loss effects in cold nuclear matter can explain the attenuation of the recently observed jet production yields in p(d)+A reactions at RHIC and the LHC [3]. We further show the consistency between the observed scaling behavior of the nuclear modification factor as a function of the jet energy and the initial-state parton energy loss picture.

- [1]. Z. Kang, I. Vitev and H. Xing, Phys. Rev. D88, 054010.
- [2]. Z. Kang, I. Vitev, E. Wang, H. Xing and C. Zhang, Phys. Lett. B740, 23.
- [3]. Z. Kang, I. Vitev and H. Xing, in preparation.

On behalf of collaboration:

NONE

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