

Forward Single Inclusive Jet Production in pA Collisions at Next-to-leading Order with Threshold Resummation

Tuesday, August 9, 2022 3:40 PM (15 minutes)

My talk is based on our work of presenting the first complete next-to-leading-order (NLO) prediction for the single inclusive jet production in pA collisions at forward rapidities within the color glass condensate (CGC) effective theory. Our prediction is fully differential over the final state physical kinematics, which allows the implementation of the full jet clustering algorithm in our calculation, as well as any other infrared safe observables. The NLO calculation is setup with the aid of the observable originated power counting framework we proposed which gives rise to the novel soft contributions in the CGC factorization. We achieve the fully-differential calculation by constructing suitable subtraction terms to handle the singularities in the real corrections. The subtraction contributions can be exactly integrated analytically. The NLO calculation demonstrates explicitly the validity of the CGC factorization theorem to the jet production. Furthermore, as a byproduct of the subtraction method, we also derive the fully analytic cross section for the forward jet production in the small-R limit. We show that in the small-R limit, the forward jet cross section can be factorized to a semi-hard cross section that produces a parton and the semi-inclusive jet function (siJF), just like the jet production in the central region where exactly the same siJF shows up. We argue this feature holds for generic jet productions in the CGC framework. Last, we show numerical predictions of the jet transverse momentum and energy distributions. Like the forward hadron production, the obtained NLO result also exhibits the negative cross section in the large jet transverse regime, this talk also contains our solution to this which is the threshold resummation.

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Session Classification: Parallel Session I (3): Heavy Ion Physics

Track Classification: 重离子物理