Contribution ID: **157** Type: **Oral**

Particle production in proton-nucleus collisions beyond leading order

Tuesday, 7 February 2017 11:40 (20 minutes)

The study of particle production in proton-nucleus (pA) collisions provides essential information about high-density effects (like gluon saturation) in the nuclear wavefunction and offers a benchmark for the corresponding studies in nucleus-nucleus collisions. The cross-sections for particle production in pA can in principle be computed within perturbative QCD, using the framework of the Color Glass Condensate (CGC). However, recent efforts trying to extend such calculations beyond the leading-order (LO) approximation met with an unexpected difficulty: the next-to-leading order (NLO) prediction for the hadron multiplicity suddenly turns negative at transverse momenta of the order of a few GeV, in a range where perturbation theory was expected to be reliable.
This problem triggered much interest and several studies over the last 5 years, but not satisfactory solution has emerged.

In a recent publication [1], we have revisited the previous proposals for the CGC factorization at NLO and identified the source of the negativity problem: this is related to the subtraction method used to separate LO from NLO contributions. To overcome this difficulty, we proposed a new factorization scheme which involves no such a subtraction: the relevant, LO or NLO, perturbative contributions are included once and only once. We have thus obtained a manifestly positive expression for the cross-section for hadron multiplicities in pA. On this occasion, we have also extended the resummation program that we recently proposed [2] for the BK and JIMWLK evolution equations to the calculation of cross-sections. Besides its phenomenological implications, this new factorization scheme should provide a better framework for computing particle production in QCD at high energy.

[1] "CGC factorization for forward particle production in proton-nucleus collisions at next-to-leading order," E. Iancu, A. Mueller, and D. Triantafyllopoulos, e-Print: arXiv:1608.05293 [hep-ph].

[2] E. Iancu et al, Phys.Lett. B744 (2015) 293; Phys.Lett. B750 (2015) 643; JHEP 1608 (2016) 083.

Preferred Track

Initial State Physics and Approach to Equilibrium

Collaboration

Not applicable

Primary author: Dr IANCU, Edmond (IPhT Saclay)

Presenter: Dr IANCU, Edmond (IPhT Saclay)

Session Classification: Parallel Session 2.1: Initial State Physics and Approach to Equilibrium (II)

Track Classification: Initial State Physics and Approach to Equilibrium