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Type: Oral presentation

Multiplicity distributions and entropy of the produced particles in one dimensional models and QCD

Thursday 12 October 2023 11:20 (25 minutes)

In this talk I wish to clarify two questions that have been left unanswered in the paper D.Kharzeev and E. Levin:

“Deep inelastic scattering as a probe of entanglement,”

Phys. Rev. D \textbf{95} (2017) no.11, 114008.

In this paper we compute the von Neumann entropy of the system of partons resolved by deep inelastic scattering at a given Bjorken x and momentum transfer $q^2 = -Q^2$. We interpret the result as the entropy of entanglement between the spatial region probed by deep inelastic scattering and the rest of the proton. Our calculation was done for the moment of time just after the wee parton from the parton cascade of a fast hadron interacts with the virtual photon ($t = 0^+$). This interaction destroys the coherence of partons in a hadron and creates a system of partons with calculated entropy. However, we can measure the entropy as well as multiplicity distribution only in the final state: at $t = \infty$. In the talk I will discuss the entropy of produced particle both in the simple zero dimension model and in QCD. Recall, that $S_E = \ln xG(x, Q^2)$ we have computed in the zero dimension model. It turns out that resulting entropy in both approaches is the same at $t = \infty$ as at $t = 0^+$, in spite of a huge number of interactions that the partons have undertaken during the propagation from $t = 0$ to $t = \infty$. The second observation is the non-perturbative correction can reduce the value of entropy.

Is this abstract from experiment?

No

Name of experiment and experimental site

no

Is the speaker for that presentation defined?

Yes

Details

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Internet talk

Yes

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Presenter: LEVIN, Eugene

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