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The 112nd HENPIC seminar by Dr. Tu Zhoudunming (涂周顿明), Brookhaven National Laboratory, US, July 9th, 2020, Thursday, 10:30 am (Beijing time)

Talk title: Probing quantum entanglement of partons in high energy collisions.

Speaker : Dr. Tu, Zhoudunming (涂周顿明), Brookhaven National Laboratory, US

Abstract:
The confinement of quarks and gluons, the building blocks of all visible matter, is perhaps the ultimate example of quantum entanglement. Inside nucleons they are not just correlated, they do not even exist as isolated states. However, in the parton model formulated by Bjorken, Feynman, and Gribov, the partons are viewed by an external hard probe as independent when the nucleon is boosted to an infinite-momentum frame. Therefore, the parton probed by a virtual photon is causally disconnected from the rest of proton. It has been recently proposed that this apparent paradox can be resolved by quantum entanglement of partons, possibly manifesting itself in observables related to hadron multiplicities. In this talk, I will briefly introduce the idea of measuring the entanglement entropy using final-state hadron multiplicities, and its test in proton-proton collisions based on the LHC data. In addition, I will focus on testing this idea in deep inelastic scattering of ep collisions using the H1 data. Finally, possible future measurements at the EIC will be discussed.

Profile:

Tu, Zhoudunming (涂周顿明), I received my Ph.D in 2018 from Rice University based on the CMS experiment with a focus of heavy ion physics. I had worked on physics topics that are mostly related to particle correlations. After my Ph.D, I joined Brookhaven National Lab as a Goldhaber fellow, working on the project of the Electron-Ion Collider. Currently, my physics interest involves both nuclear and particle physics, from nuclear short-distance dynamics to low-x/spin physics in ep, eD/He3, and eA collisions.