

Probing the onset of maximal entanglement inside the proton in diffractive DIS

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It has been proposed that at small Bjorken x , or equivalently at high energy, hadrons represent maximally entangled states of quarks and gluons. This conjecture is in accord with experimental data from the electron-proton collider HERA at the smallest accessible x . In this Letter, we propose to study the onset of the maximal entanglement inside the proton using Diffractive Deep Inelastic Scattering. It is shown that the data collected by the H1 Collaboration at HERA allows us to probe the transition to the maximal entanglement regime. By relating the entanglement entropy to the entropy of final state hadrons, we find a good agreement with the H1 data using both the exact entropy formula as well as its asymptotic expansion which indicates the presence of a nearly maximally-entangled state. Finally, future opportunities at the Electron Ion Collider are discussed. The talk is based on 10.1103/PhysRevLett.131.241901

Alternate track

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