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Quantum fluctuations of parton densities in diffractive ep scattering CHRISTIAN WEISS, Jefferson Lab — The nucleon in QCD is a relativistic many-body system, in which configurations with different number of particles (partons) and spatial size exist in a coherent quantum-mechanical superposition. Inclusive deep-inelastic scattering (DIS) measures the quantum average of the parton density at a given light-cone momentum fraction x. The quantum fluctuations of the parton densities can be revealed in diffractive DIS at small x [1]. The fluctuation width of the gluon density is extracted from the ratio of inelastic and elastic diffractive cross sections measured at HERA and related to models of nucleon structure. Detailed studies of quantum fluctuations of gluons in QCD could be performed in next-generation experiments with a future Electron-Ion Collider (EIC).Such fluctuations also affect rapidity gap survival and multiparton interactions in high-energy proton-proton scattering at LHC.

[1] L. Frankfurt, M. Strikman, D. Treleani, C. Weiss, PRL 101 (2008) 202003

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