

Measurement of charged particle multiplicity distributions in DIS at HERA and its implication to entanglement entropy of partons

Charged particle multiplicity distributions in positron-proton deep inelastic scattering at a centre-of-mass energy $\sqrt{s} = 319$ GeV are measured. The data are collected with the H1 detector at HERA corresponding to an integrated luminosity of 136 pb^{-1} . Charged particle multiplicities are measured as a function of photon virtuality Q^2 , inelasticity y and pseudorapidity η in the laboratory and the hadronic centre-of-mass frames. Predictions from different Monte Carlo models are compared to the data. The first and second moments of the multiplicity distributions are determined and the KNO scaling behaviour is investigated. The multiplicity distributions as a function of Q^2 and the Bjorken variable x_{Bj} are converted to the hadron entropy S_{hadron} , and predictions from a quantum entanglement model are tested.

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Authors: H1, Collaboration (DESY); SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE))

Presenter: H1, Collaboration (DESY)