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Bose-Einstein Correlations in Deep–Inelastic ep Scattering at HERA

H1 Collaboration

Two-particle correlations in invariant mass are studied separately for like-sign and unlike-sign charged particles produced in deep inelastic positron-proton scattering in a new kinematic domain. The data were taken with the H1 detector at the HERA storage ring in 1994, in which 27.5 GeV positrons collided with 820 GeV protons at a centre of mass energy $\sqrt{s} = 300$ GeV. The observed enhancement of the like-sign correlations at low invariant masses is related to the dimensions of the hadronic source. The data are compared to different QCD models where the hadronization is performed with the string-fragmentation model. Results are presented for the first time separately for diffractive and non-diffractive scattering, in domains of four-momentum transfer, Bjorken-x, and hadronic center of mass energy, and in intervals of charged particle multiplicity. The observed source radii do not differ strongly from those measured in lower energy lepton-nucleon inelastic scattering, and e^+e^-–annihilation.