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Determination of the Gluon Density in the Proton from Charm Electro- and Photo-Production at HERA Using NLO QCD

H1 Collaboration, DESY

With the H1 detector at the ep collider HERA, D^* meson production cross sections have been measured in deep inelastic scattering with 4-momentum transfers $Q^2 > 2$ GeV^2/c^2 and in photo-production at photon-proton centre-of-mass energies $W_{\gamma p} \approx 88$ and 194 GeV. Next-to-leading order QCD calculations are found to describe the differential cross sections well. Using these calculations, the gluon momentum distribution in the proton, $xg(x)$, has been extracted in the momentum fraction range $7.5 \cdot 10^{-4} < x < 4 \cdot 10^{-2}$, at average scales $\mu^2 = 25$ to 50 GeV^2/c^2. The gluon momentum fraction x has been approximately reconstructed from the measured kinematics of the scattered electron and the D^* meson in the final state.