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Measurement of D^* Meson Cross Sections at HERA and Determination of the Gluon Density in the Proton using NLO QCD

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With the H1 detector at the *ep* collider HERA, D^* meson production cross sections have been measured in deep inelastic scattering with four-momentum transfers $Q^2 > 2$ GeV^2 and in photoproduction at energies around $W_{\gamma p} \approx 88$ GeV and 194 GeV. Next-to-Leading Order QCD calculations are found to describe the differential cross sections within theoretical and experimental uncertainties. Using these calculations, the NLO gluon momentum distribution in the proton, $x_g g(x_g)$, has been extracted in the momentum fraction range $7.5 \cdot 10^{-4} < x_g < 4 \cdot 10^{-2}$ at average scales $\mu^2 = 25$ to 50 GeV^2. The gluon momentum fraction x_g has been obtained from the measured kinematics of the scattered electron and the D^* meson in the final state. The results compare well with the gluon distribution obtained from the analysis of scaling violations of the proton structure function F_2.

References

1. H1 Collaboration, C. Adloff *et al*, DESY-98-204 / submitted to Nucl. Phys. B