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Extraction of α_s at NNLO and measurement of jet cross sections in Deep-inelastic Scattering at HERA

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A precision measurement of jet cross sections in neutral current deep-inelastic scattering for photon virtualities $5.5 < Q^2 < 80 \text{ GeV}^2$ and inelasticities $0.2 < y < 0.6$ is presented, using data taken with the H1 detector at HERA, corresponding to an integrated luminosity of 290 pb^{-1} . Double-differential inclusive jet, dijet and trijet cross sections are measured simultaneously and are presented as a function of jet transverse momentum observables and as a function of Q^2 . Jet cross sections normalised to the inclusive neutral current DIS cross section in the respective Q^2 -interval are also determined. Previous results of inclusive jet cross sections in the range $150 < Q^2 < 15000 \text{ GeV}^2$ are extended to low transverse jet momenta $5 < P_T < 7 \text{ GeV}$. The data are compared to predictions from perturbative QCD in next-to-leading order in the strong coupling, in approximate next-to-next-to-leading order and in full next-to-next-to-leading order. Using also the recently published H1 jet data at high values of Q^2 , the strong coupling constant $\alpha_s(M_Z)$ is determined in next-to-leading order. [arxiv:1611.03421, accepted by EPJC]

A first determination of the strong coupling α_s in next-to-next-to leading order (NNLO) from inclusive jet and dijet production in deep-inelastic scattering at HERA is presented. The strong coupling is determined in a fit of jet data collected by the H1 experiment in the range of momentum transfer $5.5 < Q^2 < 15000 \text{ GeV}^2$ and jet transverse momenta $p_T > 5 \text{ GeV}$. The running of the strong coupling is probed in a single experiment over one order of magnitude in the renormalisation scale μ_r . NNLO predictions were obtained using the program NNLOJET, where the corresponding calculations are based on antenna subtraction techniques.

Experimental Collaboration

H1

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