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Measurement of Jet Production Cross Sections in Deep-inelastic ep 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.

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