

Charm and beauty jet production at HERA with ZEUS

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The production of charm and beauty quarks in deep inelastic scattering has been measured with the ZEUS detector using the full HERA II data set. The charm and beauty contents in events with a jet were determined using the decay length significance and invariant mass of inclusive secondary decay vertices. Differential cross sections as functions of Q^2 , Bjorken x , E_T^{jet} and η^{jet} were measured and compared to theoretical predictions. The open charm and beauty contributions to the proton structure function F_2 were extracted. Beauty production in deep inelastic scattering with events in which a muon and a jet are observed in the final state has been measured using an integrated luminosity of 114 pb⁻¹. The fraction of events with beauty quarks in the data was determined using the distribution of the transverse momentum of the muon relative to the jet. The cross section for beauty production was measured in the kinematic range of photon virtuality, $Q^2 > 2 \text{ GeV}^2$, and inelasticity, $0.05 < y < 0.7$, with the requirement of a muon and a jet. Total and differential cross sections are presented and compared to QCD predictions. The beauty contribution to the structure function F_2 was extracted and is compared to theoretical predictions. The production of charm and beauty quarks was measured in photoproduction at centre-of-mass energy of 320 GeV using the properties of their secondary vertices, specifically by exploiting the lifetimes and masses of the D^0 - and D^+ - hadrons. This procedure is considerably more precise than previously used exclusive methods, where the reconstruction of selected decay channels puts a limit on the statistics. Kinematics of the outgoing quarks and their correlations were investigated.

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