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## Charm and Beauty Production from Secondary Vertexing at HERA

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### Measurement of the Charm and Beauty Structure Functions using the H1 Vertex Detector at HERA

Inclusive charm and beauty cross sections are measured in  $e^+p$  and  $e^-p$  neutral current collisions at HERA in the kinematic region of photon virtuality  $5 < Q^2 < 2000 \text{ GeV}^2$  and Bjorken scaling variable  $0.0002 < x < 0.05$ . The data were collected with the H1 detector in the years 2006 and 2007 corresponding to an integrated luminosity of  $189 \text{ pb}^{-1}$ . The numbers of charm and beauty events are determined using variables reconstructed by the H1 vertex detector including the impact parameter of tracks to the primary vertex and the position of the secondary vertex. The measurements are combined with previous data and compared to QCD predictions.

### Measurement of Charm and Beauty Jets in Deep Inelastic Scattering at HERA

Measurements of the charm and beauty jet cross sections have been made in deep inelastic scattering at HERA for the kinematic region of photon virtuality  $Q^2 > 6 \text{ GeV}^2$  and elasticity variable  $0.07 < y < 0.625$  for jets in the laboratory frame with transverse energy  $E_{T\text{jet}} > 6 \text{ GeV}$  and pseudorapidity  $-1.0 < \eta_{\text{jet}} < 1.5$ . Measurements are also made requiring a jet in the Breit frame with  $E_{T\text{jet}} > 6 \text{ GeV}$ . The data were collected with the H1 detector in the years 2006 and 2007 corresponding to an integrated luminosity of  $189 \text{ pb}^{-1}$ . The number of charm and beauty jets are determined using variables reconstructed by the H1 vertex detector including the impact parameter of tracks to the primary vertex and the position of the secondary vertex. The measurements are compared with QCD predictions and with previous measurements obtained using muon tagging.

### Charm and beauty production in deep inelastic scattering from inclusive secondary vertexing at ZEUS

Charm and beauty production 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 have been extracted using the decay length significance and invariant mass of secondary decay vertices. Differential cross sections as a function of  $Q^2$ , Bjorken  $x$ ,  $p_T(\text{jet})$  and  $\eta(\text{jet})$  were measured and compared to theoretical predictions. The open charm and beauty contributions to the proton structure function  $F_2$  are extracted.

### Measurement of charm and beauty photoproduction from inclusive secondary vertexing at HERA-II

Photoproduction of beauty and charm quarks in events with two jets has been measured with the ZEUS detector at HERA using an integrated luminosity of  $130 \text{ pb}^{-1}$ . The beauty and charm content was extracted using the decay-length significance of the  $b$  and  $c$  hadrons and the invariant mass of the decay vertices. Differential cross sections as functions of  $p_T(\text{Jet})$  and  $\eta(\text{Jet})$  are compared with the Pythia leading order plus parton shower (LO+PS) Monte Carlo and QCD predictions calculated at next-to-leading order.

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