



Contribution ID: 54

Type: Oral presentation

Measurement of beauty and charm production in deep inelastic scattering at HERA and measurement of the beauty-quark mass

Wednesday 30 April 2014 14:00 (25 minutes)

The production of beauty and charm quarks in ep interactions has been studied with the ZEUS detector at HERA for exchanged four-momentum squared $5 < Q^2 < 1000 \text{ GeV}^2$ using an integrated luminosity of 354 pb^{-1} . The beauty and charm content in events with at least one jet have been extracted using the invariant mass of charged tracks associated with secondary vertices and the decay-length significance of these vertices. Differential cross sections as a function of Q^2 , Bjorken- x , jet transverse energy and pseudorapidity were measured and compared with next-to-leading-order QCD calculations. The beauty and charm contributions to the proton structure functions were extracted from the double differential cross section as a function of x and Q^2 . The running beauty-quark mass is determined from a QCD fit at next-to-leading order to HERA data for the first time.

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Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities