

Prompt Photon Production in Deep Inelastic Scattering and Photoproduction at HERA

Thursday, July 16, 2009 3:05 PM (20 minutes)

Prompt-photon cross sections in deep inelastic ep scattering were measured with the ZEUS detector at HERA using an integrated luminosity of 320 pb^{-1} . A clear signal for isolated photons in the photon transverse-energy and rapidity ranges $4 < E_T^\gamma < 15 \text{ GeV}$ and $-0.7 < \eta^\gamma < 0.9$ was observed for virtualities of the exchanged photon of $Q^2 > 10 \text{ GeV}^2$. Measurements of differential cross sections are presented for inclusive prompt-photon production as a function of Q^2 , x_{Bj} , E_T^γ and η^γ . Perturbative QCD predictions are compared to the measurements.

The production of isolated photons in deep-inelastic scattering $ep \rightarrow e\gamma X$ is measured with the H1 detector at HERA. The measurement is performed in the kinematic range of negative four-momentum transfer squared $4 < Q^2 < 150 \text{ GeV}^2$ and a mass of the hadronic system $W_X > 50 \text{ GeV}$. The analysis is based on a total integrated luminosity of 227 pb^{-1} . The production cross section of isolated photons with a transverse energy in the range $3 < E_T^\gamma < 10 \text{ GeV}$ and pseudorapidity range $-1.2 < \eta^\gamma < 1.8$ is measured as a function of E_T^γ , η^γ and Q^2 . Isolated photon cross sections are also measured for events with no jets or at least one hadronic jet. The measurements are compared with predictions from Monte Carlo generators modelling the photon radiation from the quark and the electron lines, as well as with calculations at leading and next to leading order in the strong coupling. The predictions significantly underestimate the measured cross sections.

A measurement of the production of prompt photons in photoproduction by the H1 experiment at HERA is presented. The analysis is based on the data taken in the years 2004-2007, with a total integrated luminosity of 340 pb^{-1} . Prompt photon cross sections are measured for photons with a transverse energy in the range $6 < E_T^\gamma < 15 \text{ GeV}$ and in the pseudorapidity range $-1 < \eta^\gamma < 2.4$. Cross sections for prompt photon events with an additional hadronic jet are measured as a function of the transverse energy and pseudorapidity of the jet and of the momentum fractions x_γ and x_{proton} of the incident photon and proton, respectively, carried by the constituents participating in the hard scattering process. Additionally, the transverse correlation between the photon and the jet is studied. The results are compared with predictions of a next-to-leading order calculation and a calculation based on the k_T factorisation approach.

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Session Classification: V. QCD at Colliders

Track Classification: QCD at Colliders