Measurement of Prompt Photon Production with associated Jets

Abstract

Results are presented on the photo-production of prompt photons and associated jets in the γp center of mass energy range $142 < W < 266$ GeV and $Q^2 < 1$ GeV^2. The data were taken at HERA in the years 1996-2000 corresponding to an integrated luminosity of 105 pb^{-1}. Cross sections are given for photons in the E_T and pseudo rapidity range $5 < E_T^\gamma < 10$ GeV, $-1 < \eta^\gamma < 0.9$ with associated jets in the range $E_T^{jet} > 4.5$ GeV, $-1 < \eta^{jet} < 2.3$ as a function of $E_T^\gamma, \eta^\gamma, E_T^{jet}, \eta^{jet}, x_\gamma$, and x_p, where $x_\gamma = (E_T^{jet} e^{-\eta^{jet}} + E_T^\gamma e^{-\eta^\gamma})/2yE_e$ and $x^p = (E_T^{jet} e^{\eta^{jet}} + E_T^\gamma e^{\eta^\gamma})/2E_p$ correspond to the energy fractions of the exchanged photon and proton, respectively, participating in the hard process. The photon is required to be isolated. The transverse energy in a cone in (η, ϕ) of radius 1 around the photon E_T^{cone} is required not to exceed $0.1 \cdot E_T^\gamma$. The results are reasonably well described by pQCD calculations in next to leading order. by M. Fontannaz, J.P. Guillet and G. Heinrich, Eur. Phys. J. C21 (2001) 303.

This analysis is an extension of an inclusive prompt photon analysis presented at ICHEP2002 (http://www-h1.desy.de/h1/www/publications/htmlsplit/H1prelim-02-152.long.html).

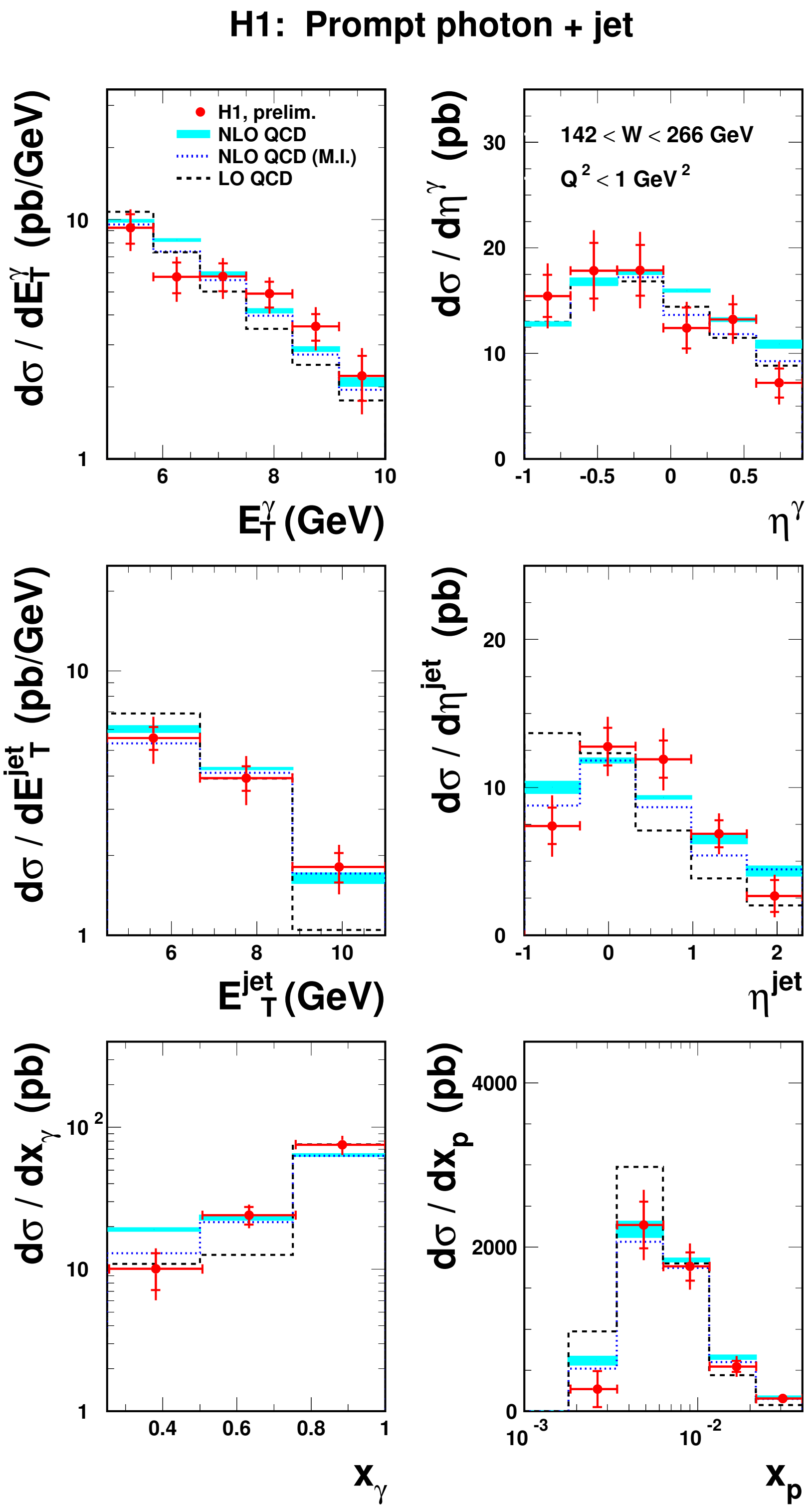

Figure 1: Prompt photon differential cross sections with jet requirement as function of E_T^γ, η^γ, E_T^{jet}, η^{jet}, x_γ, and x_p. The data are compared with pQCD in LO (dashed line) and NLO. The error bands show the effect of a variation of the renormalisation and factorisation scales in the NLO calculation from $0.5 \cdot E_T^\gamma$ to $2 \cdot E_T^\gamma$. Also shown is the NLO result corrected by PYTHIA for multiple interaction effects (dotted line).

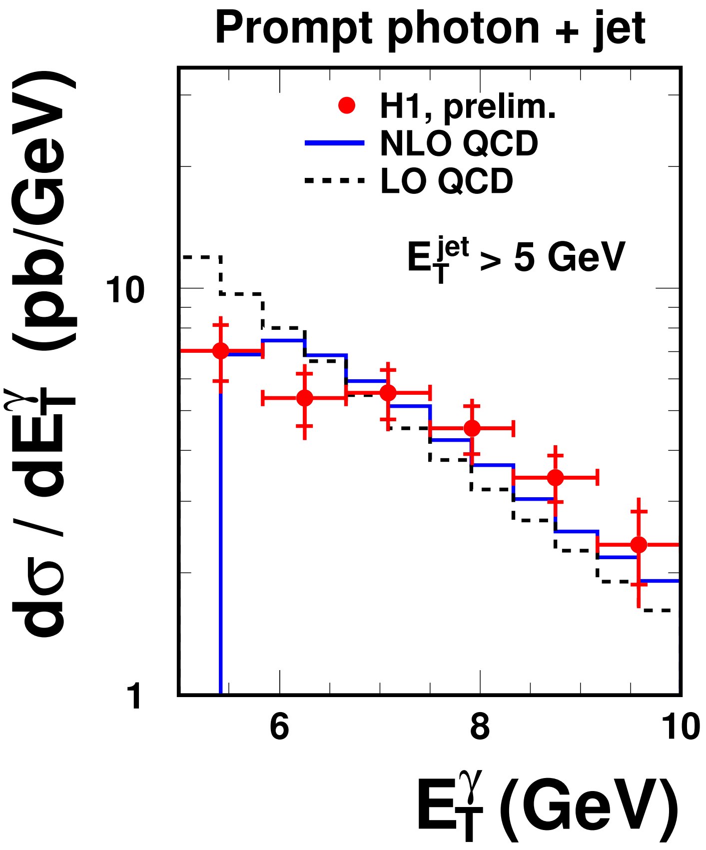

Figure 2: Prompt photon differential cross sections with jet requirement as function of E_T^{γ} for symmetric cuts $E_{T,min}^{jet} = E_{T,min}^{\gamma} = 5$ GeV. The data are compared with pQCD LO (dashed line) and NLO (solid line).