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# Measurement of $D^*$ Meson Cross Sections at HERA and Determination of the Gluon Density in the Proton using NLO QC

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Description: [?]

D\* meson production cross sections have been measured in deep inelastic scattering with four-momentum transfers  $Q^2 > 2 \text{ GeV}^2$  and in photoproduction at energies around  $W_{\gamma p} = 88 \text{ GeV}$  and  $W_{\gamma p} = 194 \text{ GeV}$ . Next-to-Leading Order QCD calculations are found to describe the differential cross sections within theoretical and experimental uncertainties; since the Rivet analysis takes account only of LO events there is a difference of approximately a factor of 2 between the data and the predictions.

Beams: 27.5 GeV electrons on 820 GeV protons.

The DIS events are selected within the following kinematic range:  $2 < Q^2 < 100$ ,  $0.05 < y < 0.7$ ,  $p_t(D^*) > 2.0 \text{ GeV}$ ,  $|\eta(D^*)| < 1.5$

The photoproduction events are separated into two types of events, the ETAG33 and ETAG44 with different kinematic range. The ETAG33 events are selected within the following cuts:  $Q^2 < 0.01$ ,  $0.29 < y < 0.62$ ,  $2.5 < p_t(D^*) < 10.5 \text{ GeV}$  and  $|\eta(D^*)| < 1.5$ , while for ETAG44 events:  $Q^2 < 0.009$ ,  $0.02 < y < 0.32$ ,  $2.5 < p_t(D^*) < 10.5 \text{ GeV}$  and  $|\eta(D^*)| < 1.5$

The MC simulation has been done using RAPGAP, both for DIS and photoproduction has been used as a leading order subprocess  $\gamma g \rightarrow c\bar{c}$ . The parton density function used are CTEQ 6L and HERAPDF15. In the photoproduction events there has been a problem with the normalization as one can see in the plot.

Validation plots are shown in Fig. 2.

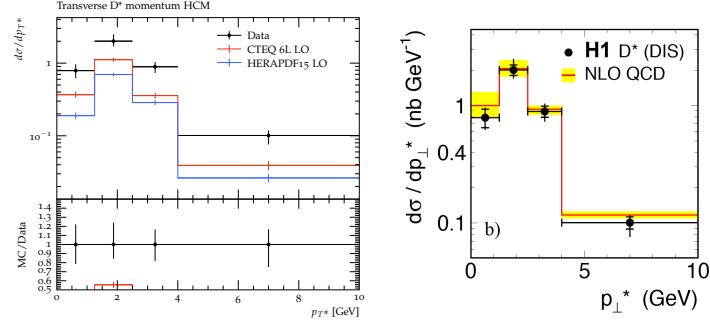


Figure 1: Comparison of results obtained from [?] and the corresponding one from [?]. Differential DIS cross sections in the kinematic range of experimental acceptance. Transverse D\* momentum in the hadronic centre-of-mass frame.

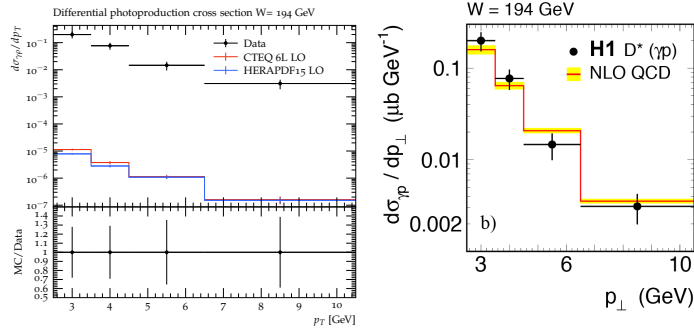


Figure 2: Comparison of results obtained from and the corresponding one from [?]. Differential photoproduction cross sections in the kinematic range of experimental acceptance(ETAG33). Transverse D\* momentum in the lab frame.