H1prelim-05-072

Acceptance corrected ratios of $D^*p(3100)$ and D^* yields and differential cross sections of $D^*p(3100)$ production

H1 Collaboration

presented at
XIIIth International Workshop on
Deep Inelastic Scattering, DIS 2005
April, 2005, Madison

Abstract

The measurement of acceptance corrected ratios $\sigma(D^*p(3100))/\sigma(D^*)$ for electroproduction of anti-charmed baryon state $D^*p(3100)$ decaying into D^* and p is presented. The analysis based on the 1996-2000 data is performed in the deep inelastic scattering region $1 < Q^2 < 100$ GeV^2, $0.05 < y_e < 0.7$.

Acceptances for D^* and $D^*p(3100)$ production are calculated using the RAPGAP 3.1 Monte-Carlo model, assuming the same production mechanism for D^* and $D^*p(3100)$. The $D^*p(3100)$ state is simulated by appropriate modification of mass and decay products of D_1, D_2 and D^{**} states with no spin assignment made.

The total acceptance corrected ratio $R_{cor}(D^*p(3100)/D^*)$ of $1.59\ \pm\ 0.33^{+\ 0.33}_{-\ 0.45}$ % is observed for the visible range defined by $P_t(D^*p(3100)) > 1.5$ GeV, $-1.5 < \eta(D^*p(3100)) < 1.0$, $P_t(D^*) > 1.5$ GeV, $-1.5 < \eta(D^*)$ <1.0, $z(D^*)$ >0.2. In this case the D^* visibility is required for the inclusive D^* sample as well as for D^* mesons originating from $D^*p(3100)$ decay. Systematic uncertainties due to variation of the selection criteria, fitting methods, fragmentation and pseudo-rapidity distributions of the $D^*p(3100)$ are taken into account together with uncertainties related to the dE/dx measurement.

When extrapolating to the full D^* phase space from $D^*p(3100)$ decay, i. e. the visible ranges of D^*p and D^* are defined by $P_t(D^*p)$ >1.5 GeV, -1.5< $\eta(D^*p)$ <1.0 and $P_t(D^*)$ >1.5 GeV, -1.5< $\eta(D^*)$ <1.0, respectively, a ratio of $\sigma(D^*p(3100))/\sigma(D^*)$ of $2.48 \pm 0.52^{+0.85}_{-0.64}$ % is obtained.

Differential distributions of the acceptance corrected ratios of $\sigma(D^*p(3100))/\sigma(D^*)$ as function of variables related to the kinematics of the electron, the D^* meson and the $D^*p(3100)$ state and differential cross sections for $D^*p(3100)$ production are shown. The extrapolation is done to the full D^* phase space in $D^*p(3100)$ decay.

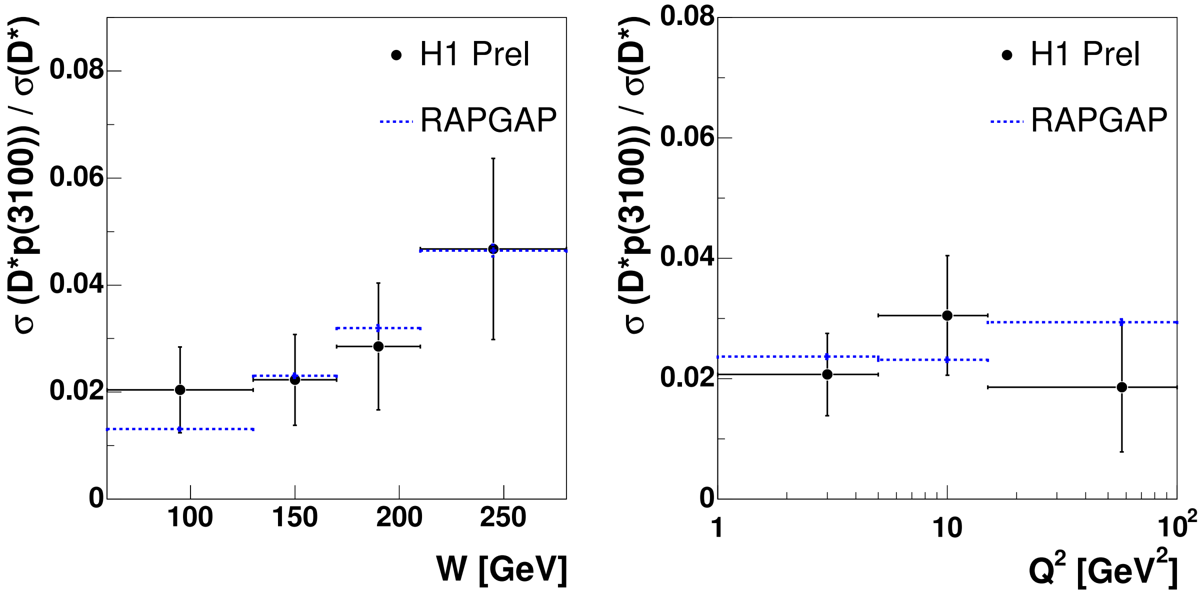

Figure 1: Acceptance corrected ratio of $D^*p(3100)$ and D^* yields in bins of W (left panel) and Q^2 (right panel). Data (closed symbols) are compared with the expectation (dashed line) of RAPGAP 3.1 which assumes the same mechanism for D^* and $D^*p(3100)$ production.

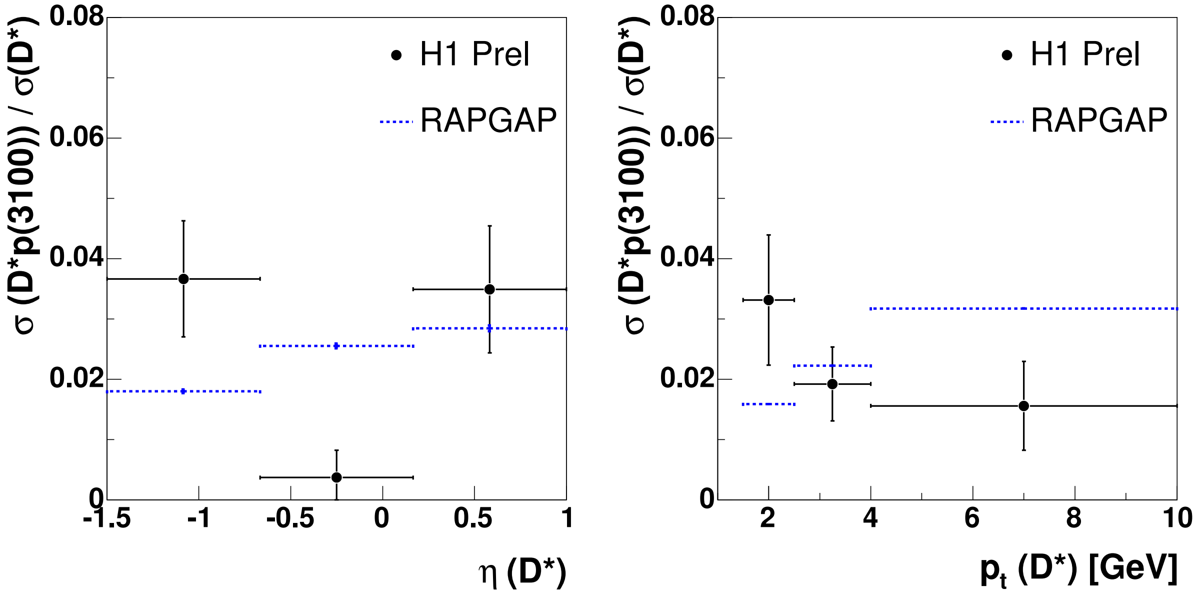

Figure 2: Acceptance corrected ratio of $D^*p(3100)$ and D^* yields in bins of pseudo-rapidity, $\eta(D^*)$, (left panel) and transverse momentum, $P_t(D^*)$, (right panel). Data (closed symbols) are compared with the expectation (dashed line) of RAPGAP 3.1 which assumes the same mechanism for D^* and $D^*p(3100)$ production.

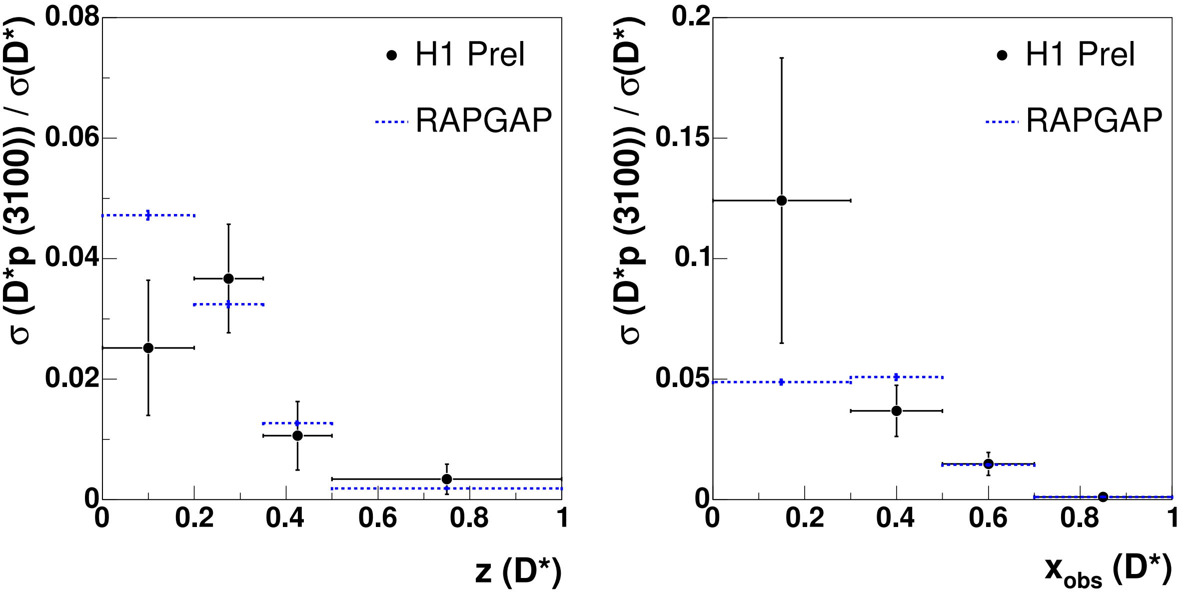

Figure 3: Acceptance corrected ratio of $D^*p(3100)$ and D^* yields in bins of inelasticity, $z(D^*)$, (left panel) and fragmentation variable, $x_{obs}(D^*)$, (right panel). Data (closed symbols) are compared with the expectation (dashed line) of RAPGAP 3.1 which assumes the same mechanism for D^* and $D^*p(3100)$ production.

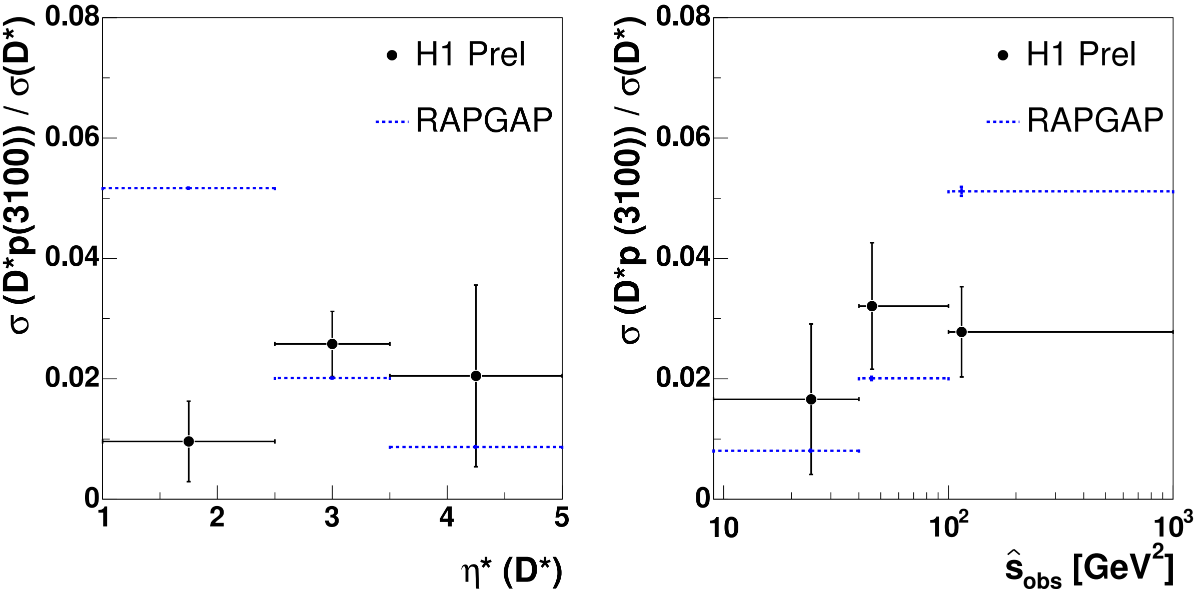

Figure 4: Acceptance corrected ratio of $D^*p(3100)$ and D^* yields in bins of pseudo-rapidity in the γp center of mass system, $\eta^*(D^*)$, (left panel) and reconstructed jet invariant mass, $\hat{s}_{obs}(D^*)$, (right panel). Data (closed symbols) are compared with the expectation (dashed line) of RAPGAP 3.1 which assumes the same mechanism for D^* and $D^*p(3100)$ production.

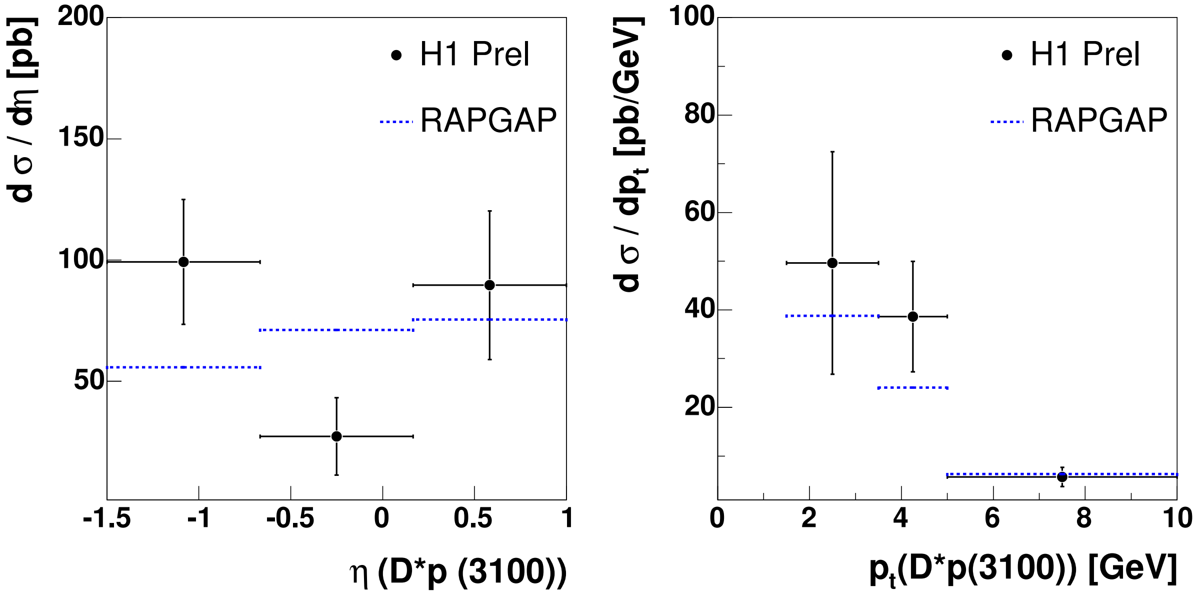

Figure 5: Differential cross section of $D^*p(3100)$ production in bins of pseudo-rapidity, $\eta(D^*p)$, (left panel) and transverse momentum, $P_t(D^*p)$, (right panel). Data (closed symbols) are compared with the expectation (dashed line) of RAPGAP 3.1.

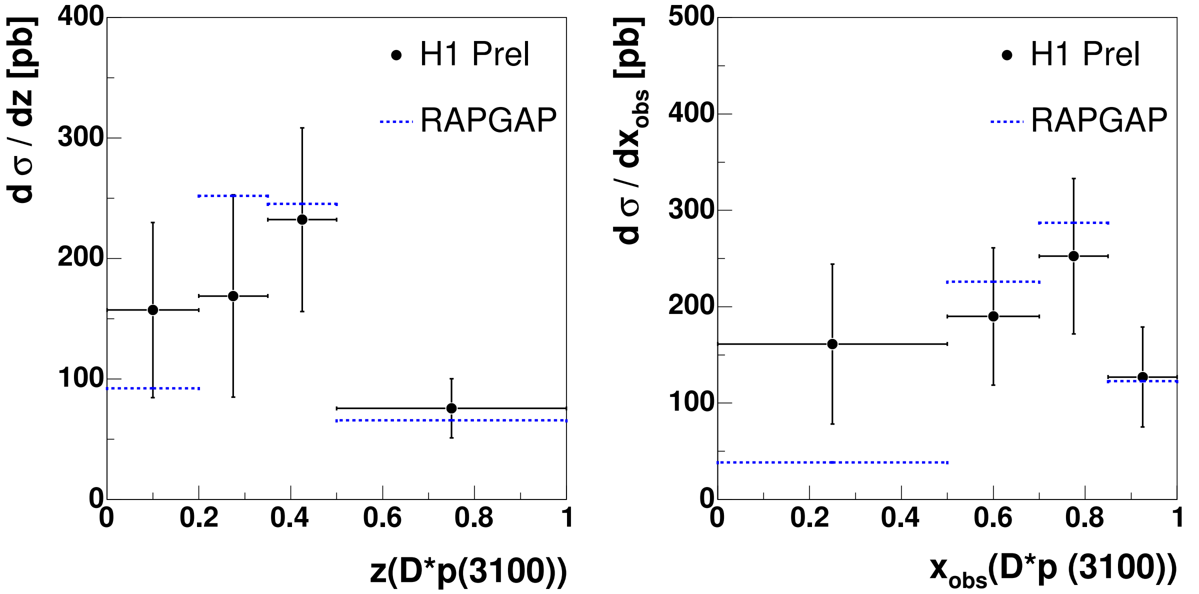

Figure 6: Differential cross section of $D^*p(3100)$ production in bins of inelasticity $z(D^*p)$ (left panel) and fragmentation variable $x_{obs}(D^*p)$ (right panel). Data (closed symbols) are compared with the expectation (dashed line) of RAPGAP 3.1.

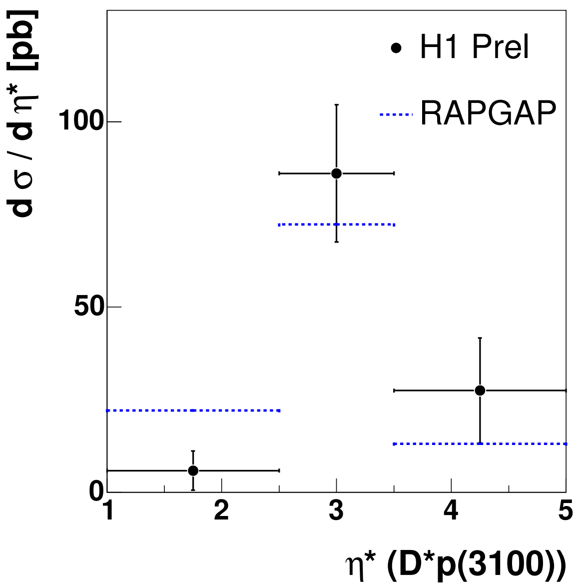

Figure 7: Differential cross section of $D^{*}p(3100)$ in bins of pseudo-rapidity in the γp center of mass system, $\eta^{*}(D^{*}p)$. Data (closed symbols) are compared with the expectation (dashed line) of RAPGAP 3.1.