

September, 2018 ZEUS Collaboration Meeting

MOTIVATION

- Update HERA 1 analysis for HERA 2

From Heavy Flavour Meeting, 29.01.2004

Found 7.19 ± 2.96 $D^{*\pm}$ Events

This Leads to Estimate of about 32 Events for Combined HERA 1 and 2

For charged currents we analyzed HERA 1 and HERA 2 runs

Somewhat relaxed Charged Current selection:

- No Trigger Selection
- Electron Energy $< 10 \text{ GeV}$
- Missing Transverse Momentum $> 12 \text{ GeV}$
- $Q^2 > 200 \text{ GeV}^2$
- $y_{jb} < 0.9$

D* in Charged Current Production

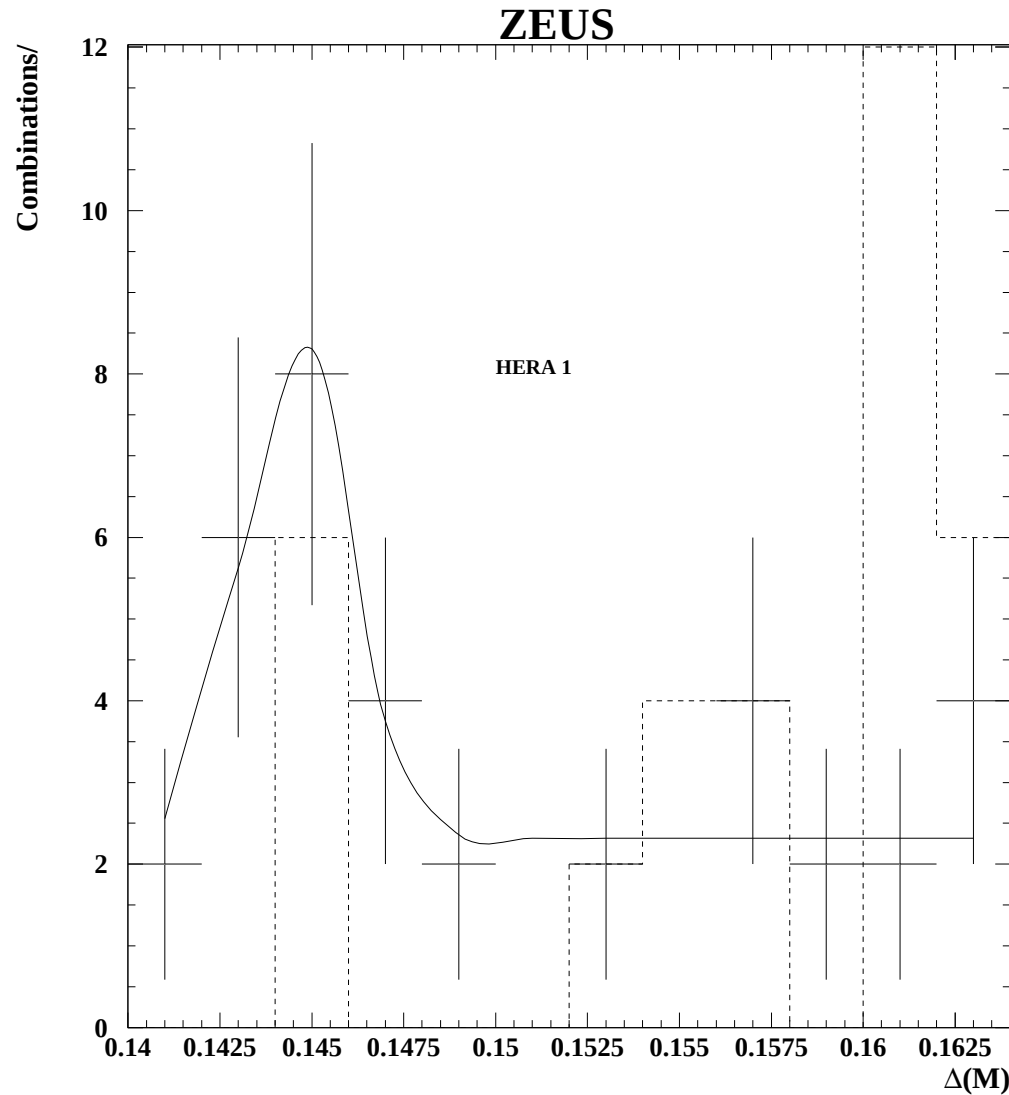
$D^{*\pm}$ Selection

- $1.80 < M(D^0) < 1.92 \text{ GeV}$
- $P_T(D^{*\pm}) > 3 \text{ GeV}$
- $-1.5 < \eta(D^{*\pm}) < 1.5$
- $P_T(K, \pi) > 0.4 \text{ GeV}$
- $P_T(\pi_{\text{slow}}) > 0.12 \text{ GeV}$
- $\mathbf{P}_T(D^{*\pm}/E_T \text{ Cone}) > 10 \text{ degrees}$

Simple Fits to Gaussian

D* in Charged Current Production

From HERA 1 Run



11.0 ± 5.0 Events

$M = 145 \pm 7 \text{ MeV}$

$\Gamma = 1.4 \pm 0.5 \text{ MeV}$

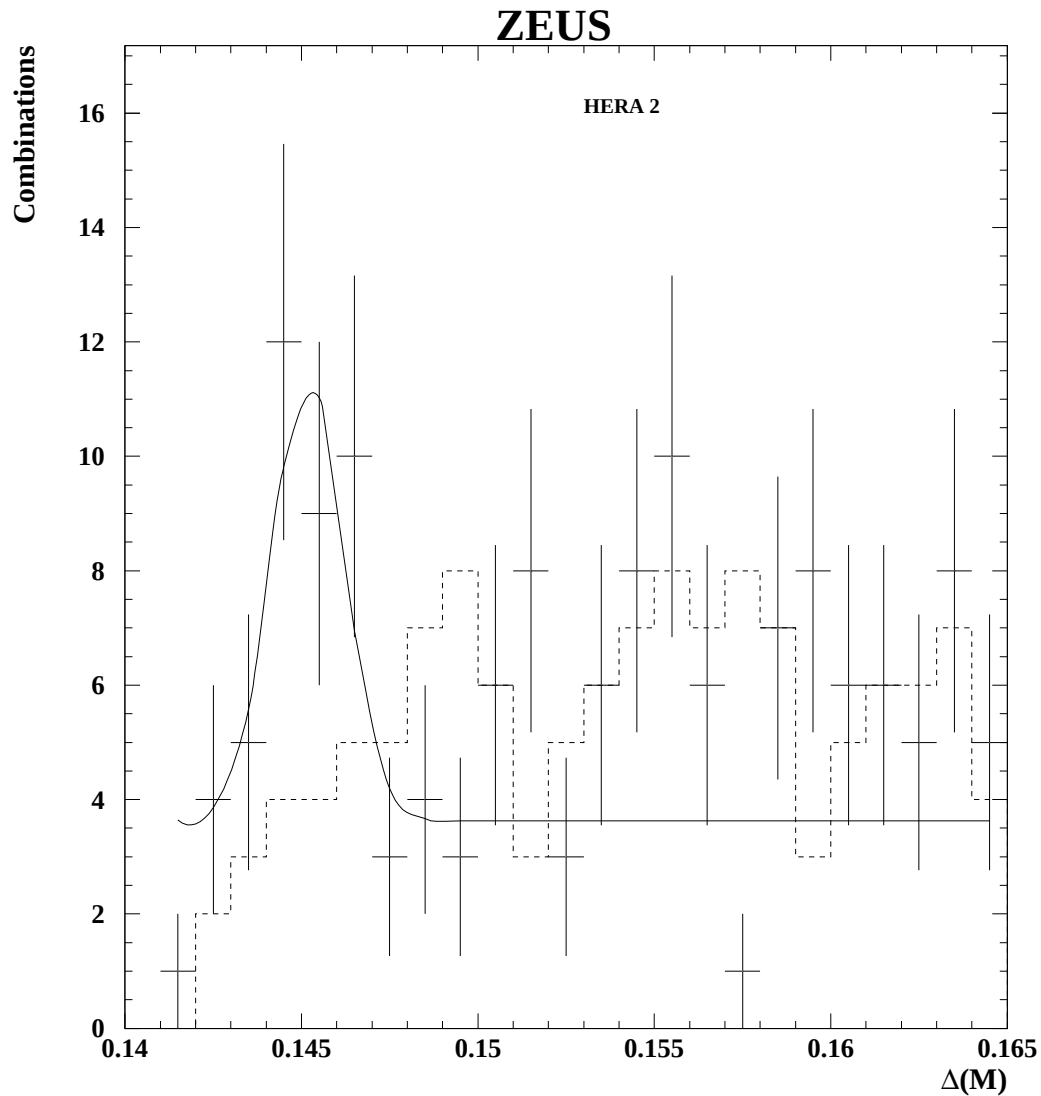
$1.80 < M(D^0) < 1.92 \text{ GeV}$

$P_T(D^{*\pm}) > 3 \text{ GeV}$

$P_T(K, \pi) > 0.4 \text{ GeV}$

D* in Charged Current Production

From HERA 2 Run



$$19.7 \pm 6.6 \text{ Events}$$

$$M = 145 \pm 4 \text{ MeV}$$

$$\Gamma = 1.0 \pm 0.2 \text{ MeV}$$

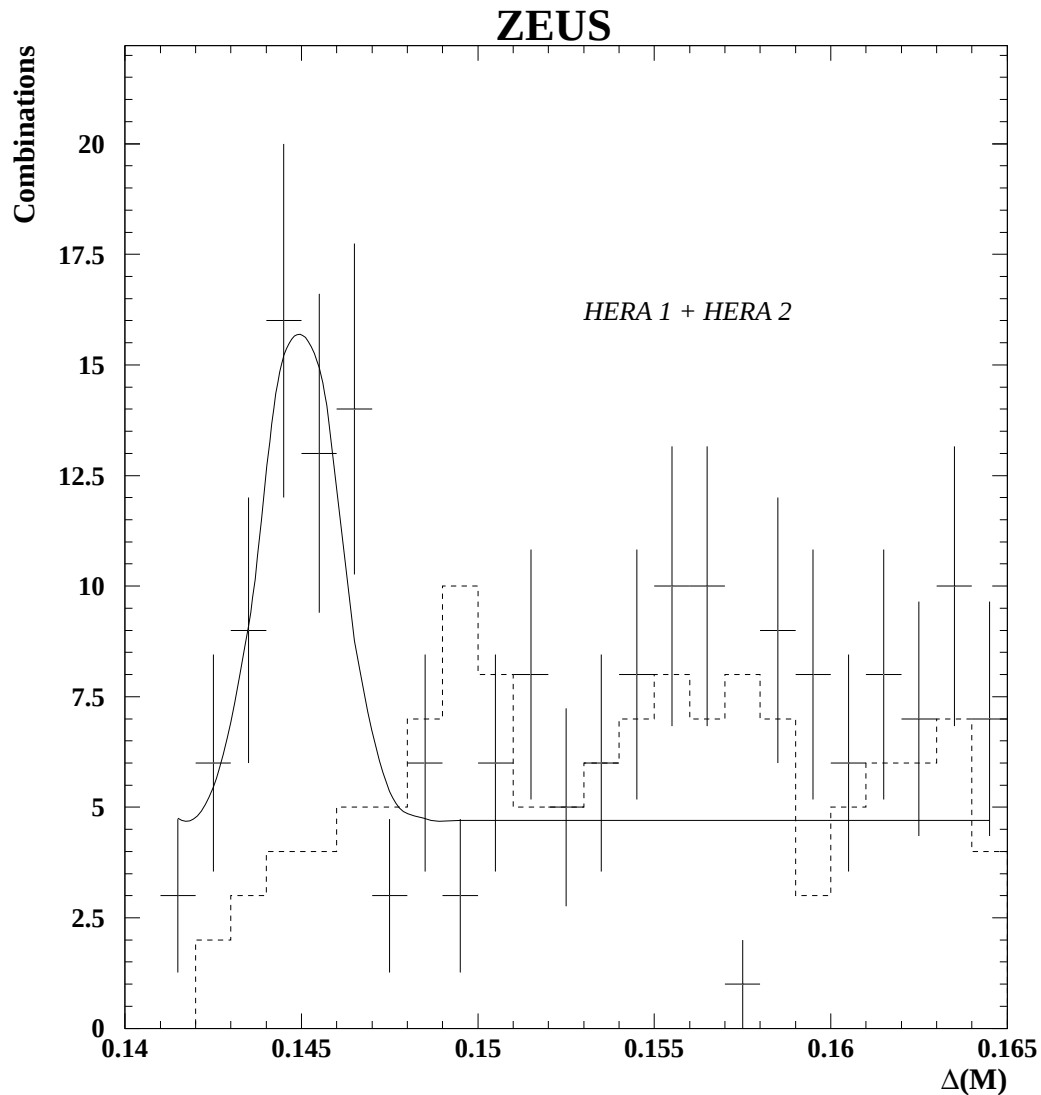
$$1.80 < M(D^0) < 1.92 \text{ GeV}$$

$$P_T(D^{*\pm}) > 3 \text{ GeV}$$

$$P_T(K, \pi) > 0.4 \text{ GeV}$$

D* in Charged Current Production

Combined HERA 1 and HERA 2



$$30.7 \pm 8.1 \text{ Events}$$

$$M = 145 \pm 3 \text{ MeV}$$

$$\Gamma = 4.7 \pm 0.5 \text{ MeV}$$

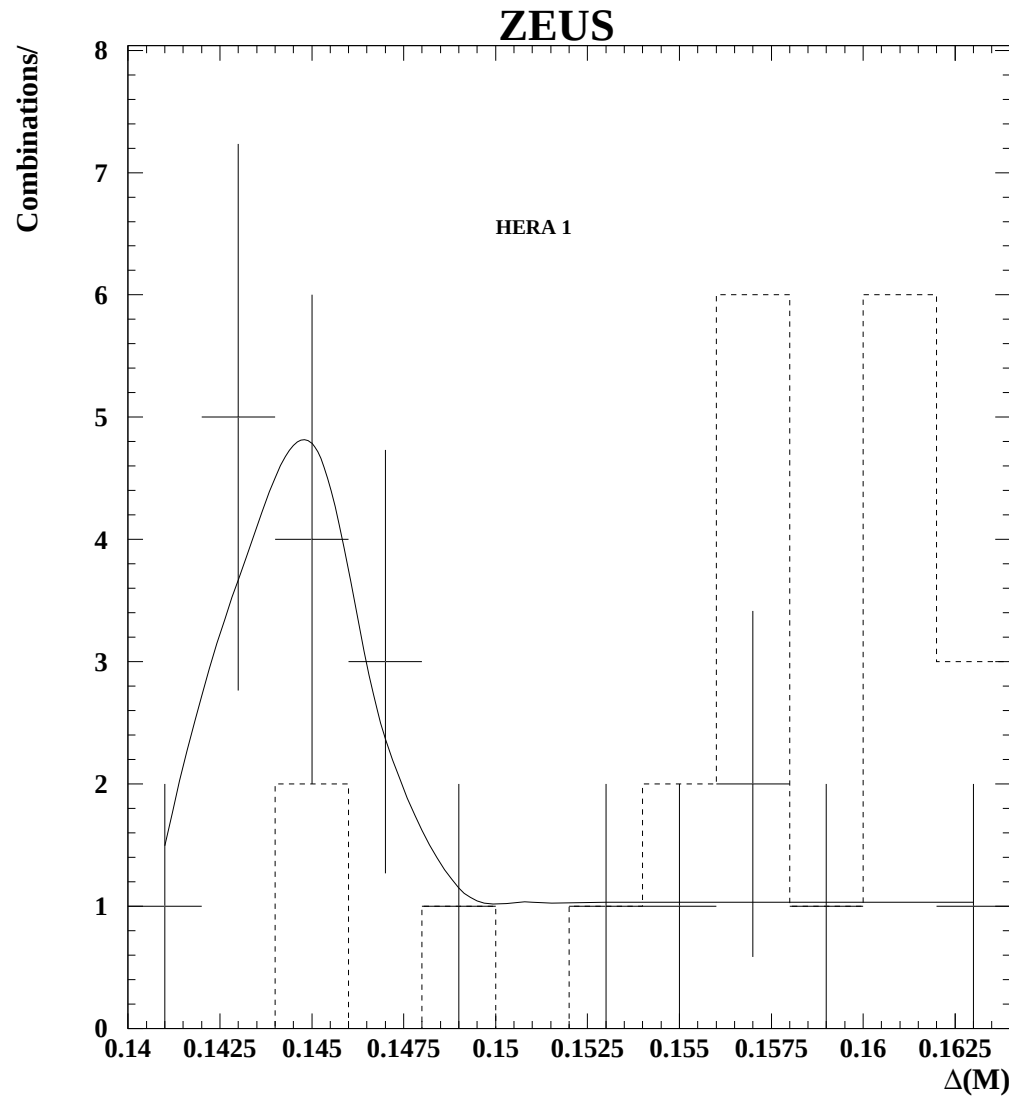
$$1.80 < M(D^0) < 1.92 \text{ GeV}$$

$$P_T(D^{*\pm}) > 3 \text{ GeV}$$

$$P_T(K, \pi) > 0.4 \text{ GeV}$$

D* in Charged Current Production

From HERA 1 Run



8.3 ± 4.1 Events

$M = 145 \pm 1 \text{ MeV}$

$\Gamma = 1.7 \pm 0.6 \text{ MeV}$

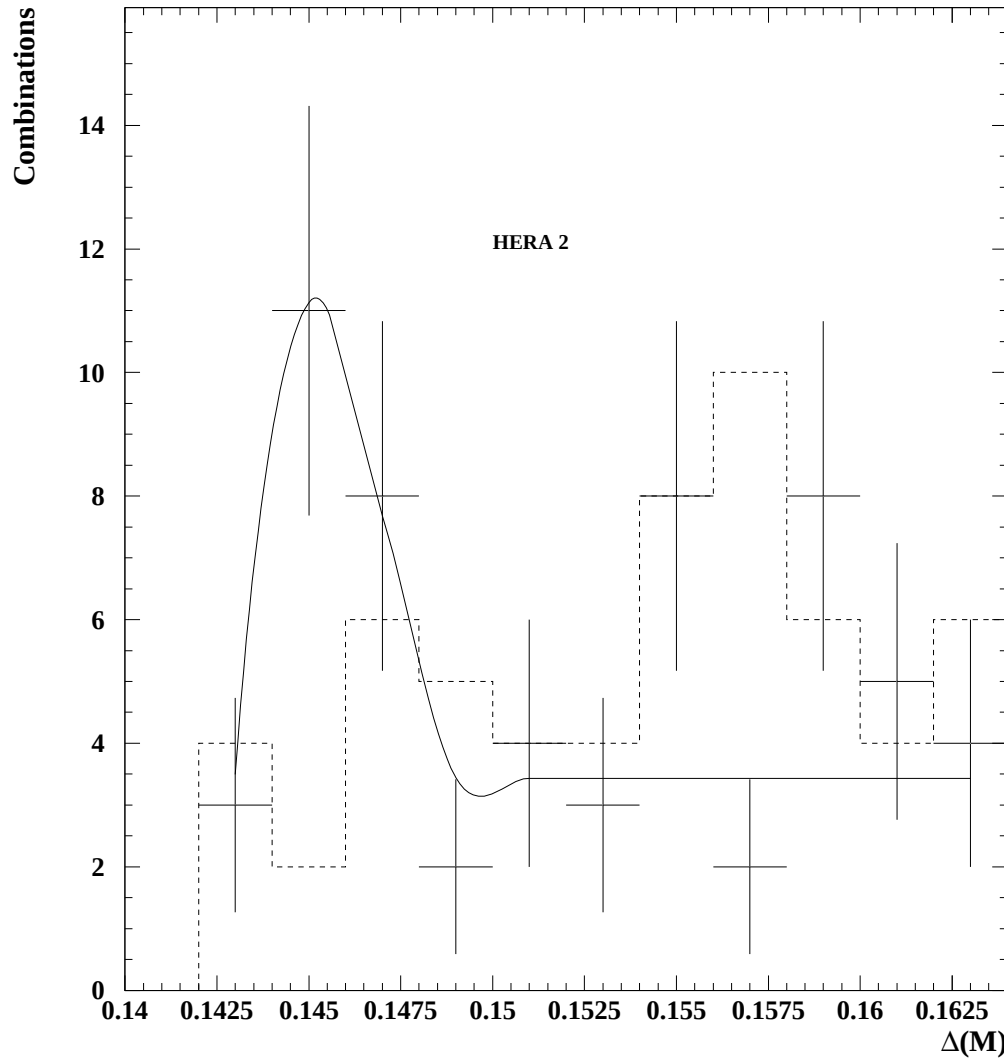
$1.80 < M(D^0) < 1.92 \text{ GeV}$

$P_T(D^{*\pm}) > 4 \text{ GeV}$

$P_T(K, \pi) > 0.4 \text{ GeV}$

D* in Charged Current Production

From HERA 2 Run



$$25.0 \pm 10.3 \text{ Events}$$

$$M = 146 \pm 3 \text{ MeV}$$

$$\Gamma = 0.86 \pm 0.43 \text{ MeV}$$

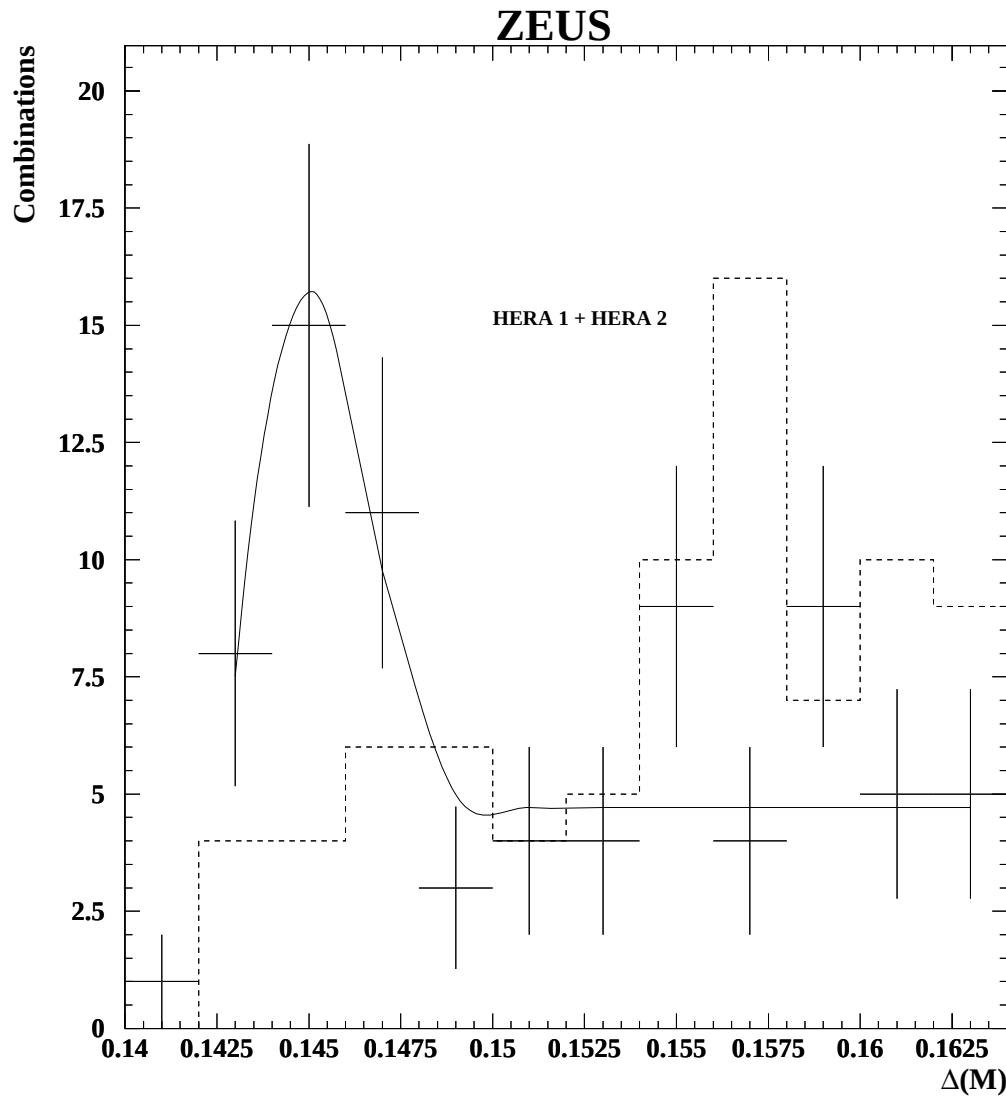
$$1.82 < M(D^0) < 1.90 \text{ GeV}$$

$$P_T(D^{*\pm}) > 4 \text{ GeV}$$

$$P_T(K, \pi) > 0.5 \text{ GeV}$$

D* in Charged Current Production

Combined HERA 1 and HERA 2



$$38.4 \pm 13.4 \text{ Events}$$

$$M = 145 \pm 6 \text{ MeV}$$

$$\Gamma = 4.7 \pm 0.8 \text{ MeV}$$

$$1.82 < M(D^0) < 1.90 \text{ GeV}$$

$$P_T(D^{*\pm}) > 4 \text{ GeV}$$

$$P_T(K, \pi) > 0.5 \text{ GeV}$$

D* in Charged Current Production

SUMMARY

Looked at $D^{*\pm}$ in CC Events in HERA 2

TO DO

- Compare to Monte Carlo
- Do Systematics