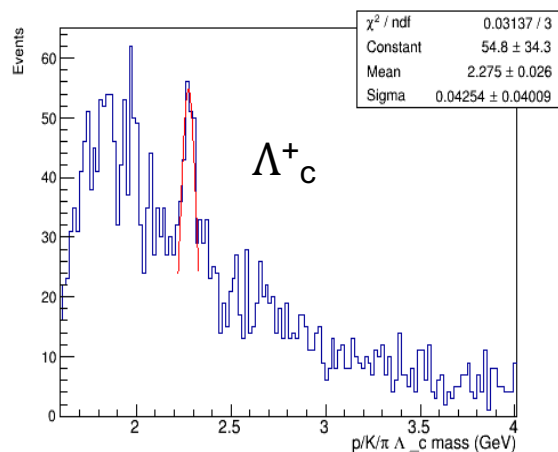
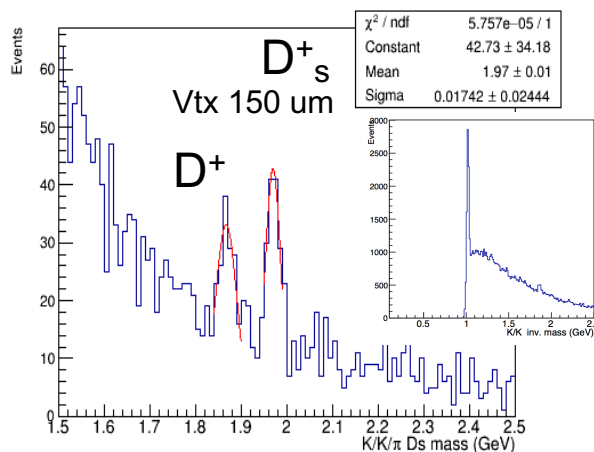
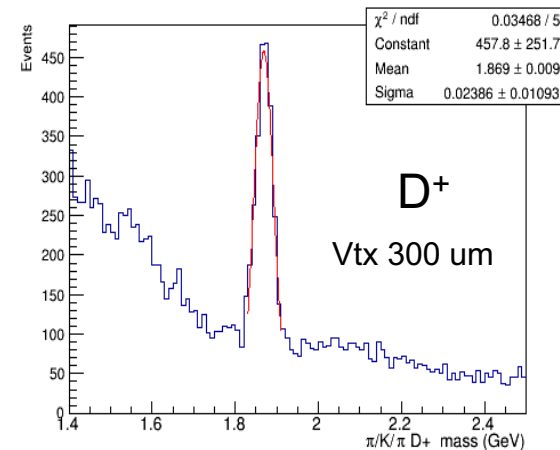
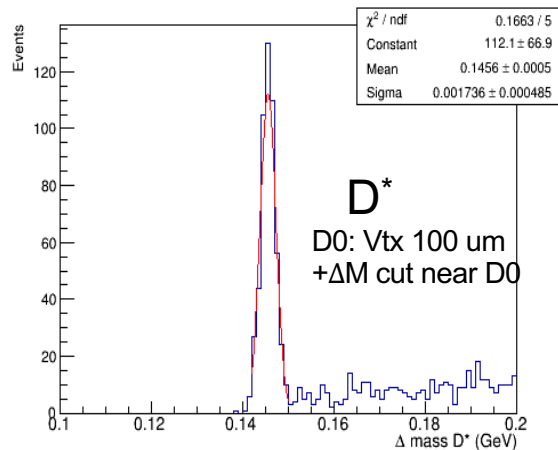
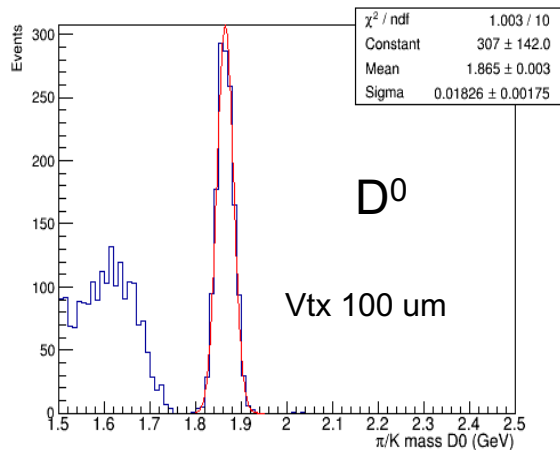


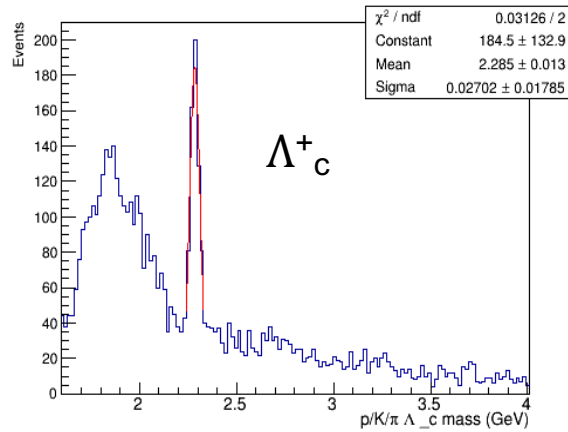
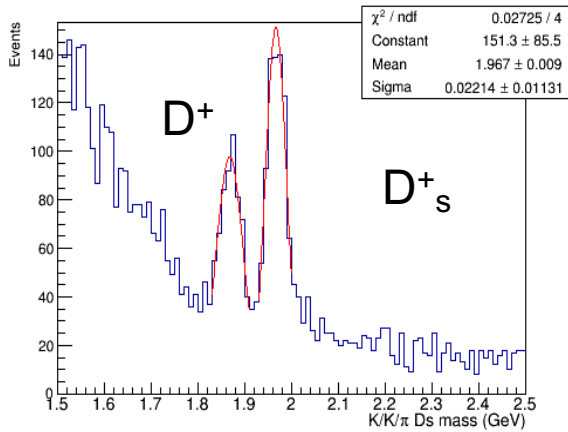
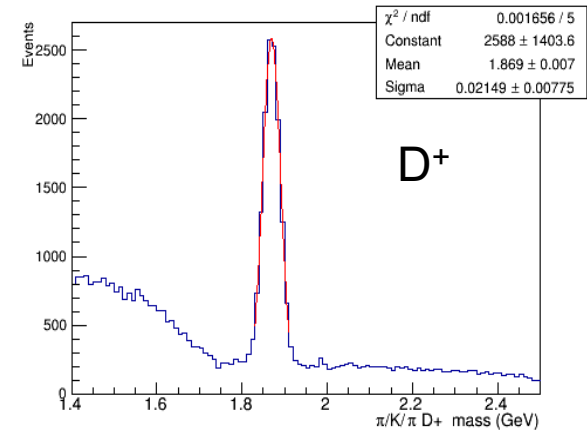
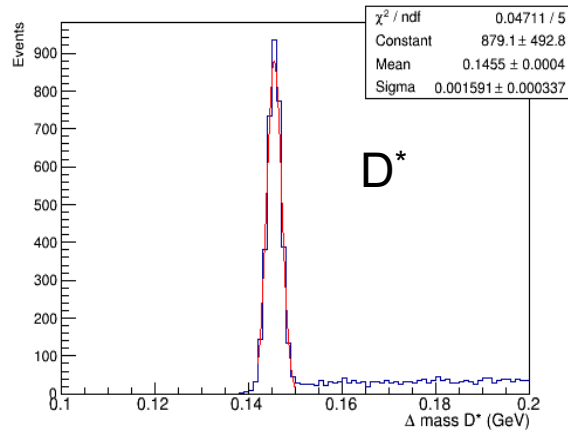
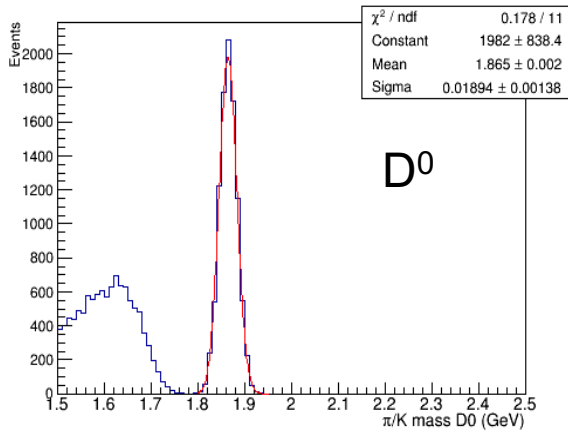
# DIS ( $Q^2 > 10 \text{ GeV}$ , $x > 0.05$ , $p_t > 0.1 \text{ GeV}$ ) $\sim 0.01 \text{ fb}^{-1}$ 100% PID + vertex cut



- $Q^2 > 10 \text{ GeV}$ ,  $\sigma \sim 9.25 \text{ nb}$
- 100k events
- $x > 0.05$
- $p_t > 0.1 \text{ GeV}$
- VTX+PID

$h_c$	$f$	Decay	BR
$D^0$	59%	$K^- \pi^+$	3.9%
		$K^- \pi^+ \pi^+ \pi^-$	8.1%
$D^+$	23%	$K^- \pi^+ \pi^+$	9.2%
$D^{*+}$	23%	$(K^- \pi^+)_{D0} \pi_{\text{slow}}^+$	2.6%
		$(K^- \pi^+ \pi^+ \pi^-)_{D0} \pi_{\text{slow}}^+$	5.5%
$D_s^+$	9%	$(K^+ K^-)_\phi \pi^+$	2.3%
$\Lambda_c^+$	8%	$p K^- \pi^+$	5.0%

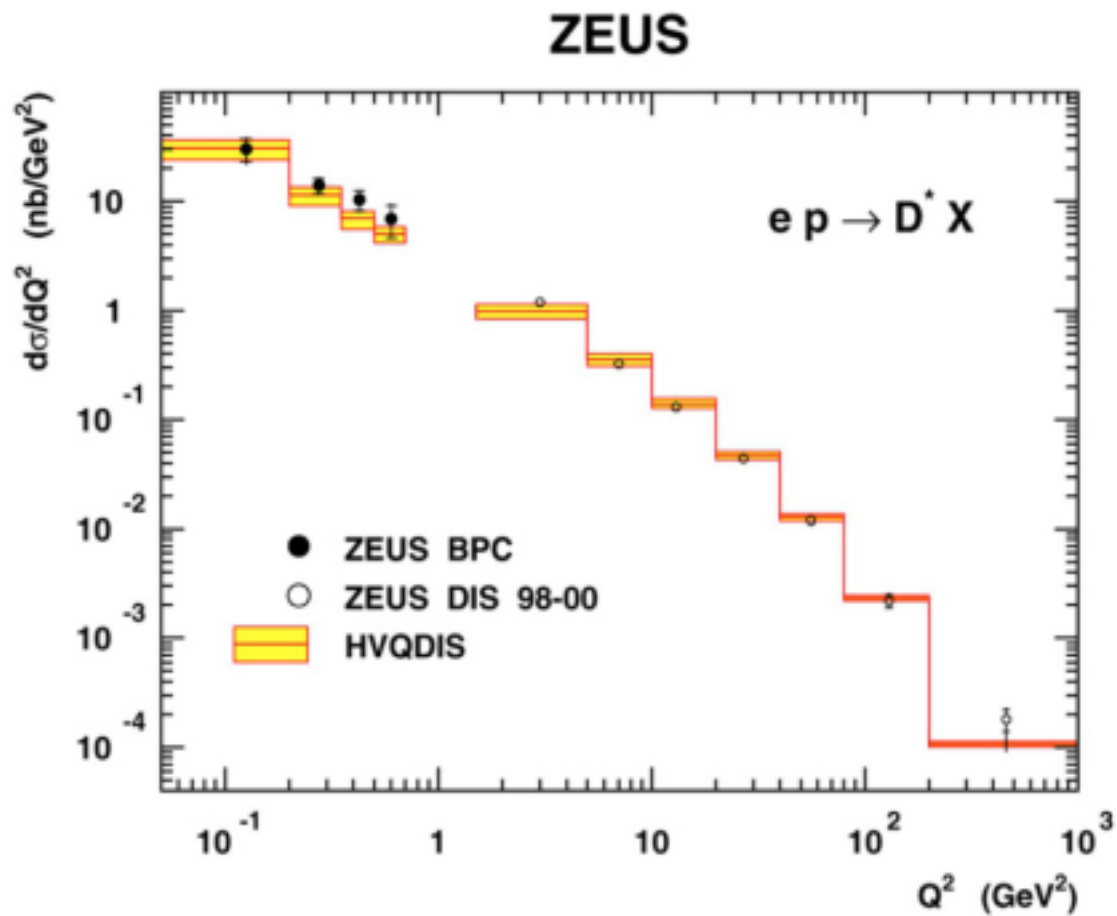
# PHP ( $Q^2 < 1 \text{ GeV}$ , $P_T > 1 \text{ GeV}$ ) $\sim 0.01 \text{ fb}^{-1}$



- $Q^2 < 1 \text{ GeV}$
- $\sigma \sim 54.02 \text{ nb}$
- Normalized to DIS  $Q^2 > 10$
- $P_T > 1 \text{ GeV}$
- $V_{tx} + \text{PID}$

$h_c$	$f$	Decay	BR
$D^0$	59%	$K^- \pi^+$	3.9%
		$K^- \pi^+ \pi^+ \pi^-$	8.1%
$D^+$	23%	$K^- \pi^+ \pi^+$	9.2%
$D^{*+}$	23%	$(K^- \pi^+)_{D0} \pi_{\text{slow}}^+$	2.6%
		$(K^- \pi^+ \pi^+ \pi^-)_{D0} \pi_{\text{slow}}^+$	5.5%
$D_s^+$	9%	$(K^+ K^-)_\phi \pi^+$	2.3%
$\Lambda_c^+$	8%	$p K^- \pi^+$	5.0%

# ZEUS: Electron in Beam Pipe Calorimeter (BPC)



# Positrons at JLAB and EIC

- Workshop (Summer 2017) at JLAB
  - PWG - mailing list
  - [https://wiki.jlab.org/pwgwiki/index.php/Main\\_Page](https://wiki.jlab.org/pwgwiki/index.php/Main_Page)
  - Charged Current subsection: charm
- 
- Interference physics
  - Charged current physics
  - Tests of the Standard Model
  - Low energy applications
  - Positron production and beam physics

# Charm production in Charged Current DIS

$$\sigma(e+p \rightarrow \bar{\nu}_e + X) \sim 50 \text{ pb (HERA } Q^2 > 200 \text{ GeV}^2)$$

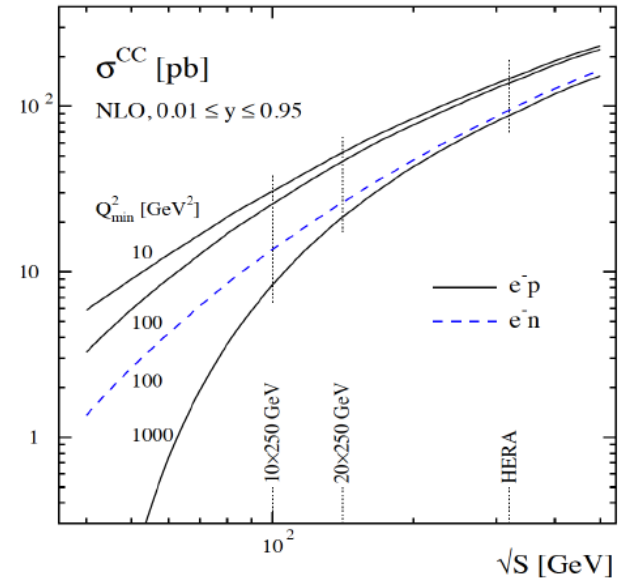
$$\sigma(e+p \rightarrow \bar{\nu}_e + c + X) \sim 5 \text{ pb (HERA } Q^2 > 200 \text{ GeV}^2)$$

At EIC :

$$\sigma(\text{CC DIS}) \sim 10 \text{ pb}$$

$$\sigma(\text{CC DIS} + \text{charm}) \sim 1 \text{ pb ( ? )}$$

$$\Rightarrow \sim 1 \text{ event/minute (with } L \sim 10^{34})$$



- Measurements of strange distribution (+polarization)

$$W^+ s \rightarrow c$$

$$|V_{sc}| = 0.97$$

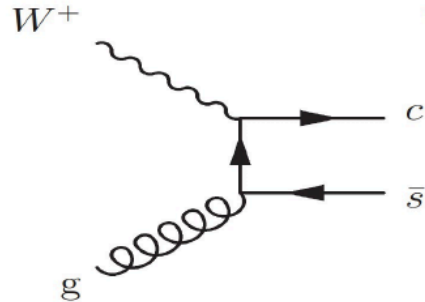
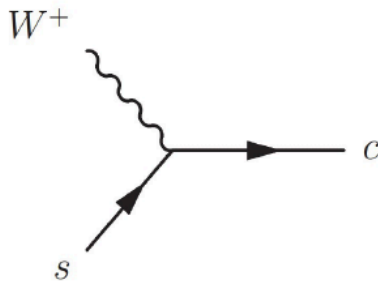
- Flavor mixing

$$W^+ d \rightarrow c$$

$$|V_{cd}| = 0.224$$

- BGF

$$W^+ g \rightarrow c \bar{s}$$



# Diffractive Ds production in charged current DIS

$$\nu_\mu + N \rightarrow \mu^- + N' + D_{s+}.$$

[hep-ph/0112192](http://hep-ph/0112192)

