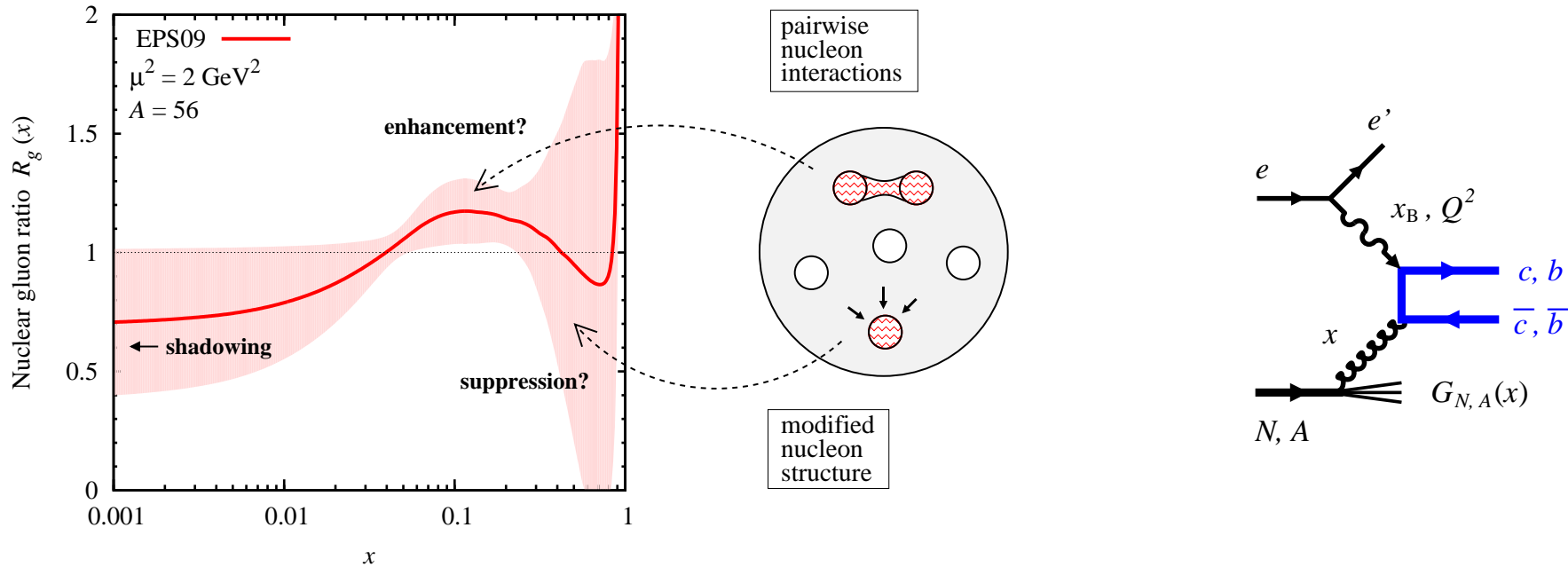


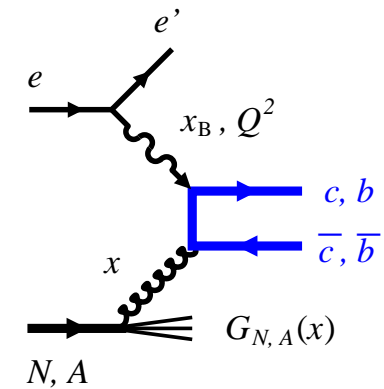
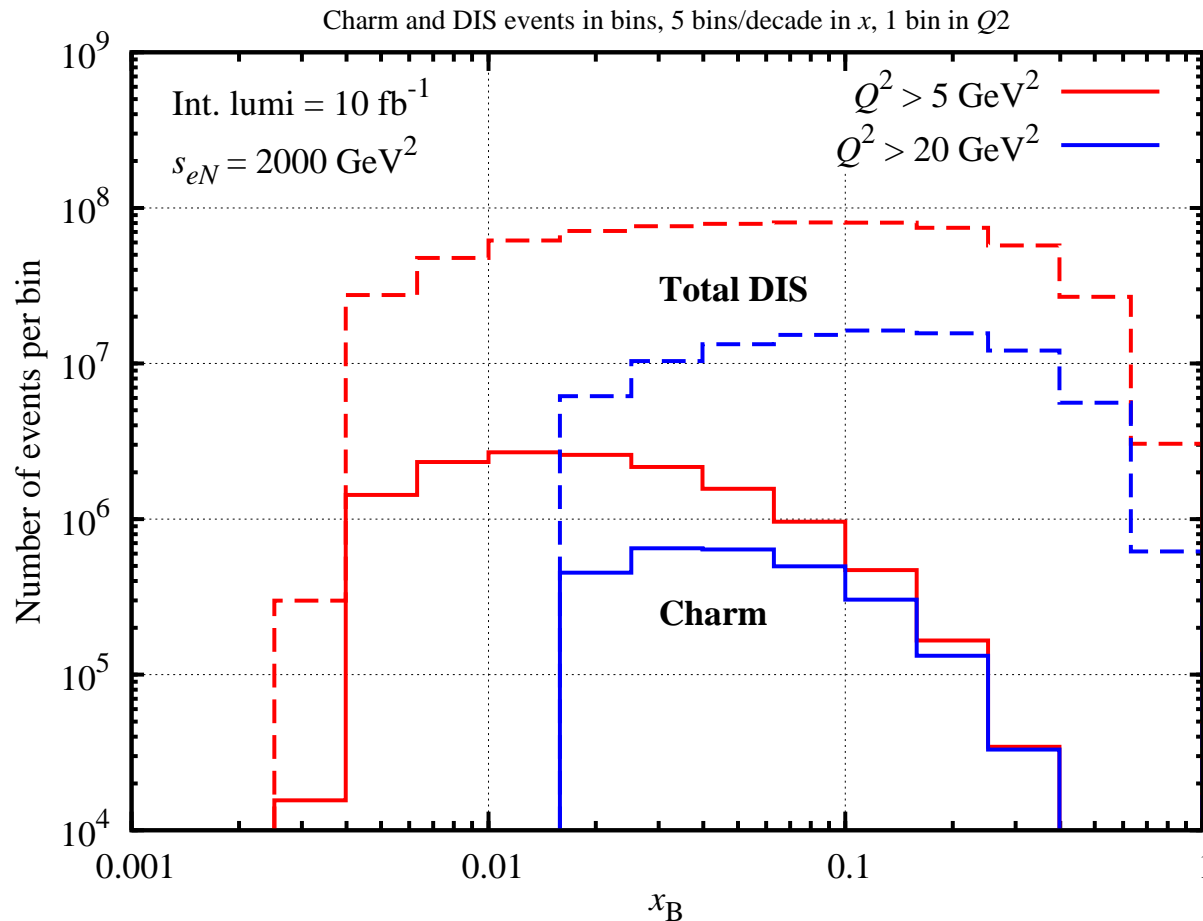
# Large- $x$ nuclear gluons with charm at EIC

S. Furletov, Yu. Furletova, Ch. Hyde, N. Sato, M. Strikman, C. Weiss, prepared for DIS2017



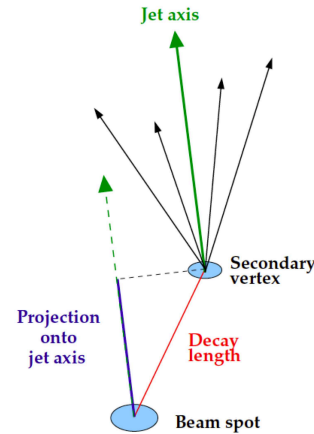
- Nuclear modification of gluons gives insight into  $NN$  interactions in QCD  
 $x > 0.3 \leftrightarrow$  modified single-nucleon structure,  $x \sim 0.1 \leftrightarrow$  pairwise  $NN$  interactions
- Nuclear modification at large  $x$  poorly constrained by present data
- EIC: Limited information from inclusive  $F_{2A}, F_{LA}$
- EIC: Heavy quark production as direct probe

# Charm production rates at large $x$



- Charm production rates drop rapidly at large  $x$
- Charm production rates  $\sim 10^5/\text{bin}$  at  $x \sim 0.1$  (int. lumi  $10 \text{ fb}^{-1}$ )
- Charm/DIS ratio  $\sim 2\text{--}3 \%$  at  $x \sim 0.1$ , increases with  $Q^2$

$h_c$	$f$	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%



- Charm reconstruction using exclusive D-meson decays

$D^{*+} \rightarrow \pi^+(\text{slow}) + (K^- \pi^+)_{D0}$  used at HERA w/o PID, efficiency  $< 1\%$ .

EIC PID + vertex detection allow use of other exclusive channels ( $D^0, D^+$ )

Total efficiency estimated  $\sim 6\%$

- Charm reconstruction using inclusive modes with displaced vertex

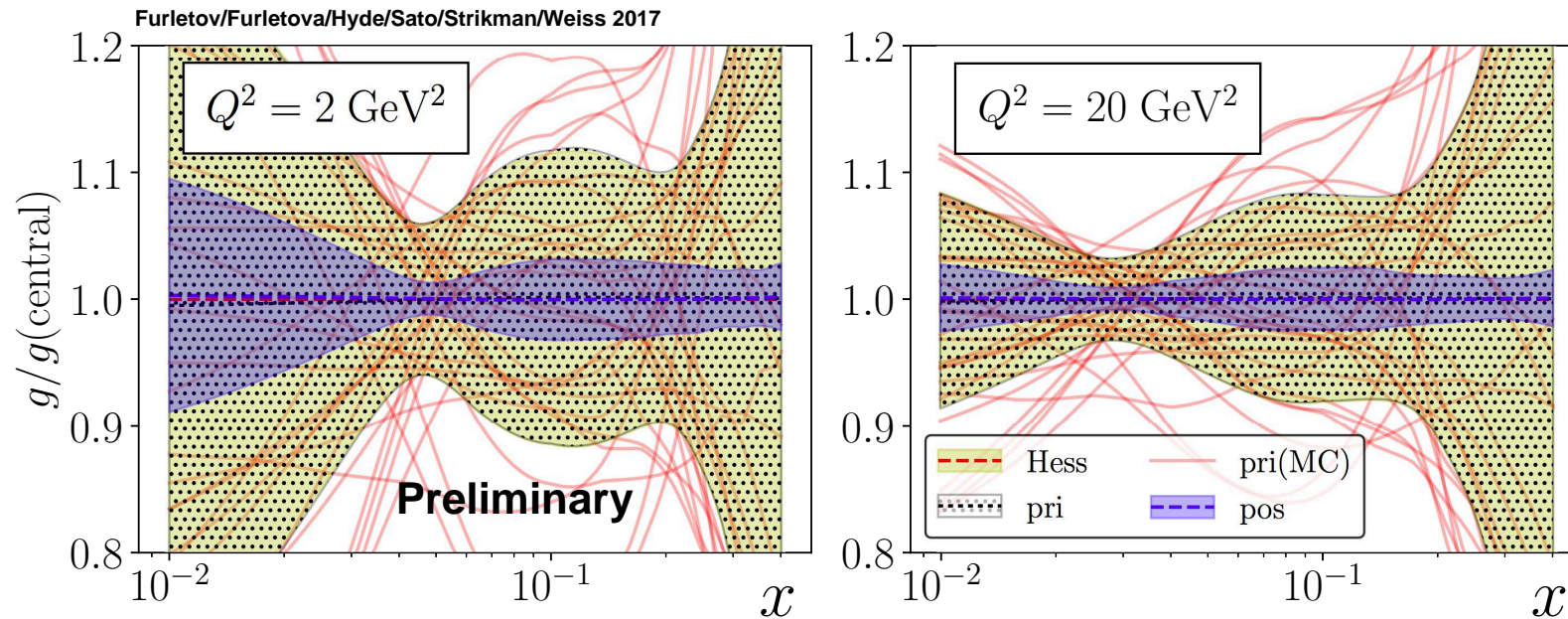
$D$ -meson decay length significance distribution used at HERA with vertex detector

Efficiency estimated at  $\sim 30\%$  (E. Aschenauer et al., 2016)

Sys error estimate with simulations of track fitting & vertex reconstruction, in progress

- Charm reconstruction using high- $p_T$   $c\bar{c}$  pairs

# Charm impact on large- $x$ nuclear gluon



- Impact of  $F_{2c}$  pseudodata on EPS09 studied quantified using MC reweighting Method of CJ15 analysis. Verified equivalence with Hessian reweighting.
- Here: Assumed 10% total error, dominated by systematics, point-to-point
- Substantial impact on large- $x$  nuclear gluons
- Possible to constrain large- $x$  nuclear gluons with charm at EIC!