Open charm production on nuclei: Sensitivity to nuclear gluon modification

C. Weiss, LDRD Project "Nuclear gluons with charm at EIC," Meeting 02-Mar-16

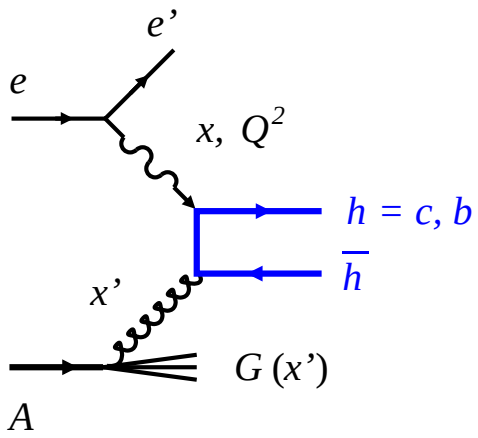
- Study sensitivity of open charm cross section (integrated over x, Q^2 bins) to variation of the nuclear gluon density

- Use LO differential cross section, numerical integration

  Should be confirmed by more detailed studies using HVQDIS

- Use EPS09 PDF parametrization

Open charm: LO cross section

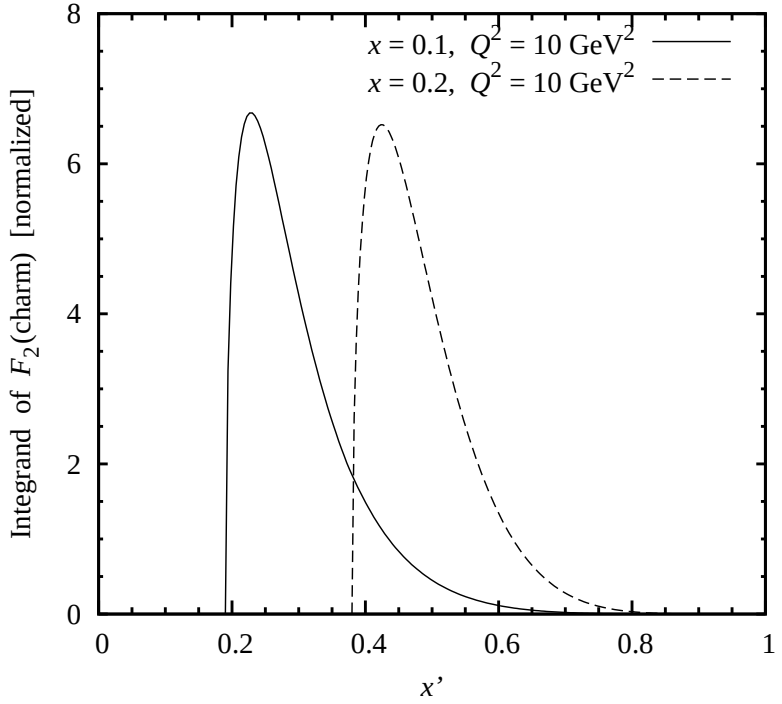


$$F_2^h(x,Q^2) \;=\; \int_{ax}^1 \frac{dx'}{x'}\, x'G(x')\; \hat{F}_g^h(x/x',\, Q^2,\, m_h^2,\, \mu^2)$$

coefficient function

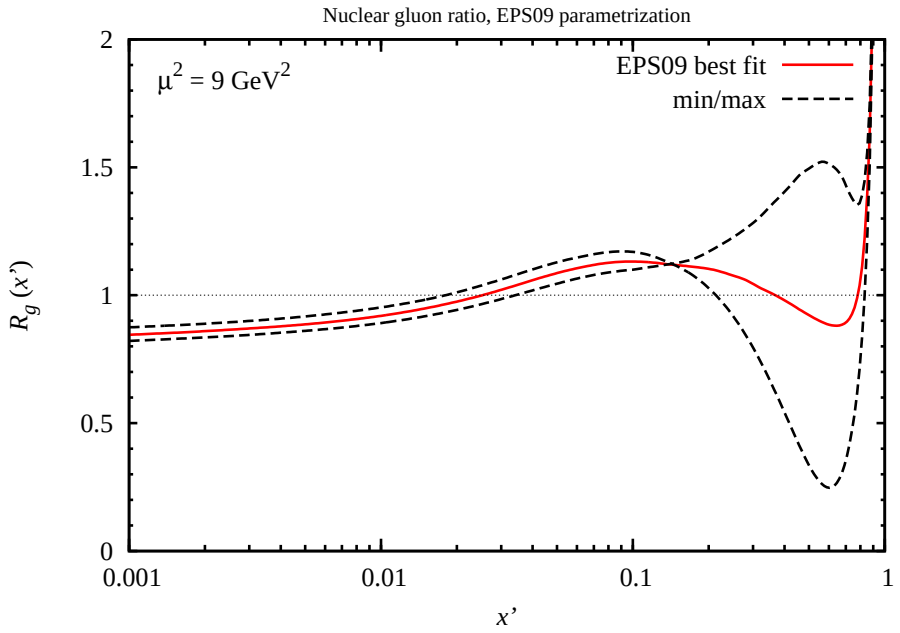
$$a \;=\; 1+\frac{4m_h^2}{Q^2}$$

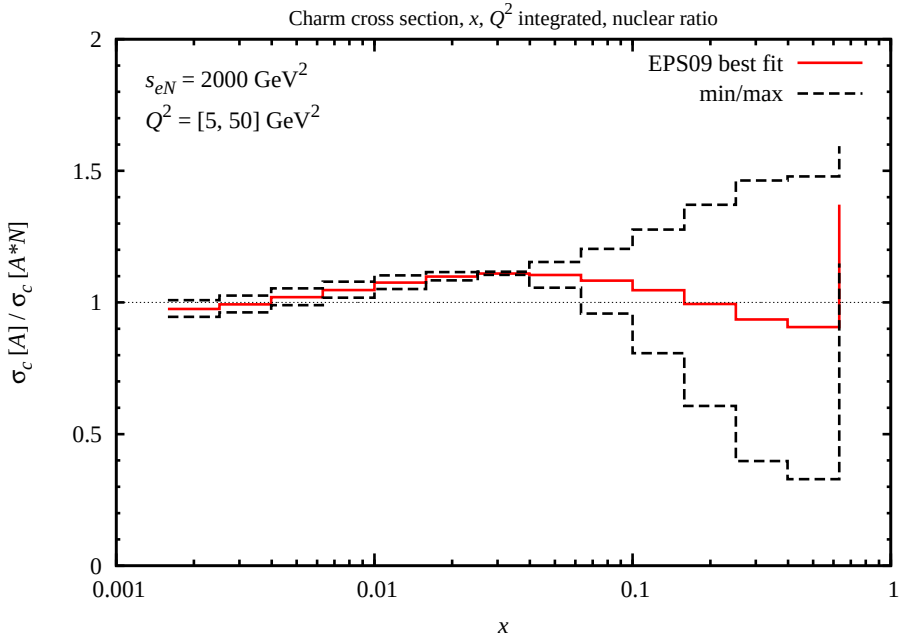
sets limit of x' integral



- Integrand localized in x' around lower limit ax
- Heavy quark production probes large–x' gluons "almost locally"

Open charm: Sensitivity to nuclear gluons





- Large uncertainty in $R_g(x' > 0.2)$
- Variation of cross section

  Variation shifted to $x < x'$

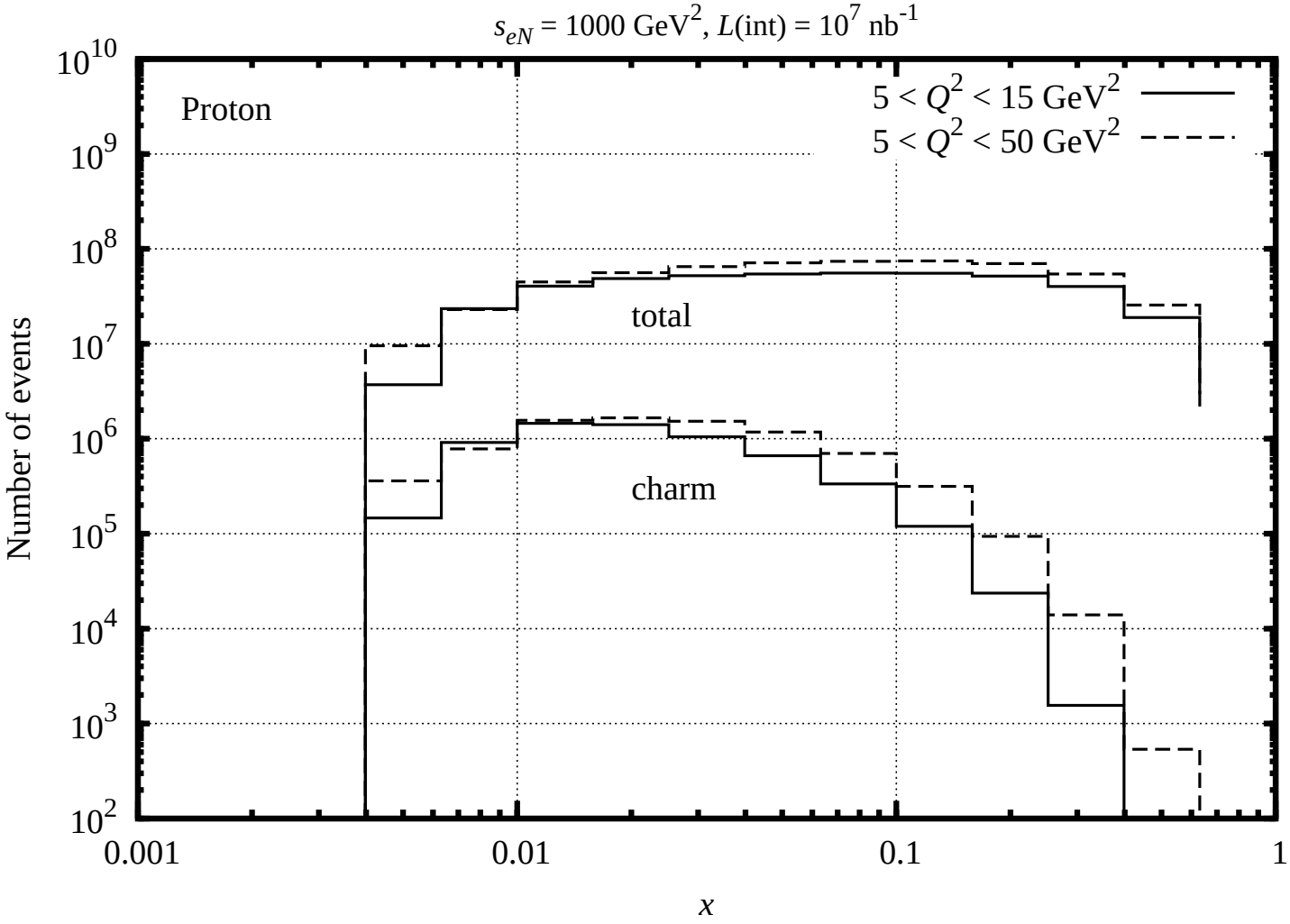
  Large variation at $x > 0.1$

  Very small variation at $x < 0.05$
- Reasonable chance for experiments

  Impact relative to present error bands

  Probably impossible to detect deviation from unity $R_g \neq 1$
- Detailed studies with HVQDIS

Open charm: Rates and background



- Cross sections and rates drop rapidly at large x
- Here proton; nuclear rates comparable $F_{2A}^c \sim AF_{2N}^c$, but luminosity $L_A \approx L_N/A$