Associated Production of W+charm in √s=13 TeV Proton-Proton Collisions at the LHC

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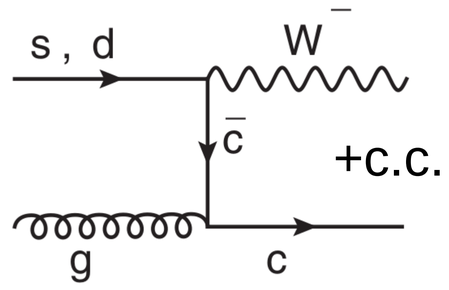
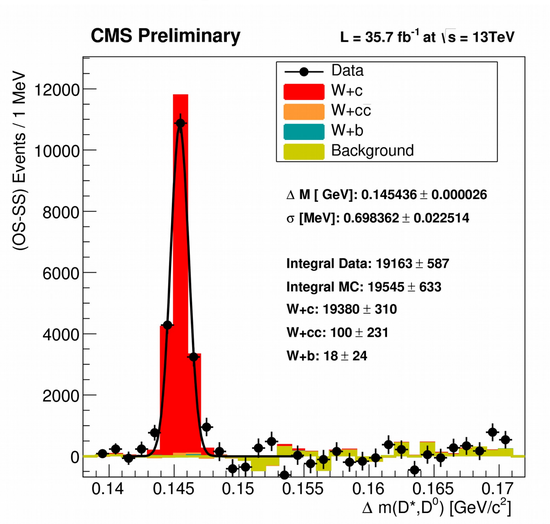
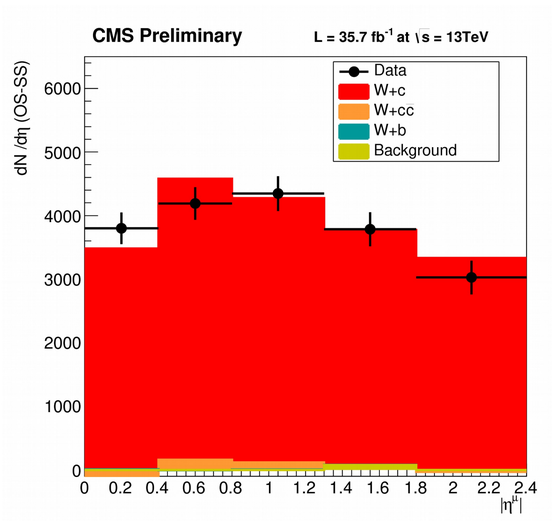
The cross section of W+charm is measured in 13 TeV pp-collisions in the CMS experiment.
In this analysis W bosons are reconstructed by their decays into a muon and a neutrino.
The c quarks are tagged by the full reconstruction of $D^*(2010)^{\pm}$.
This measurement is used to estimate an impact on the strange-quark distribution of the proton.

Measurement of W+charm Cross Section

- CMS 2016 data ($\mathcal{L}$ = 35.7 fb^{-1})
- $W \to \mu\nu$
  - $p_T^{\mu} > 26$ GeV, $|\eta^{\mu}| < 2.4$
  - $M_T > 50$ GeV
- $c \to D^{*\pm} \to D^0 + \pi^{\mp}_{slow}$
  - $p_{T,reco}^{D^*} > 5$ GeV
  - $p_{T,gen}^{c} > 5$ GeV

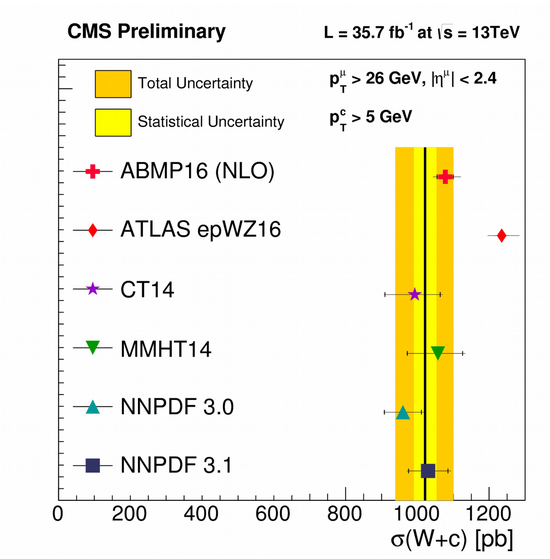


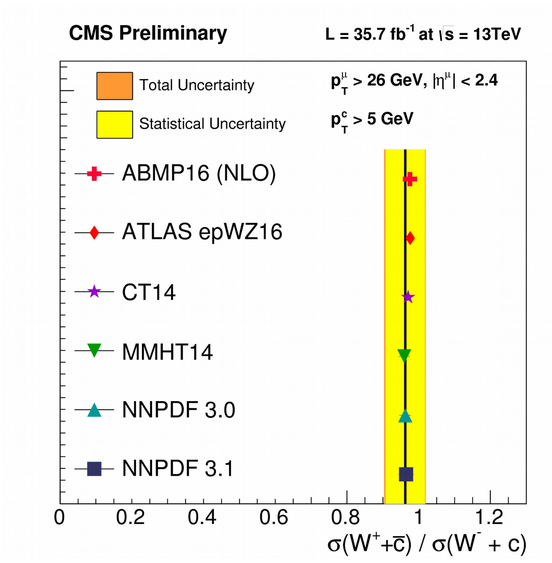


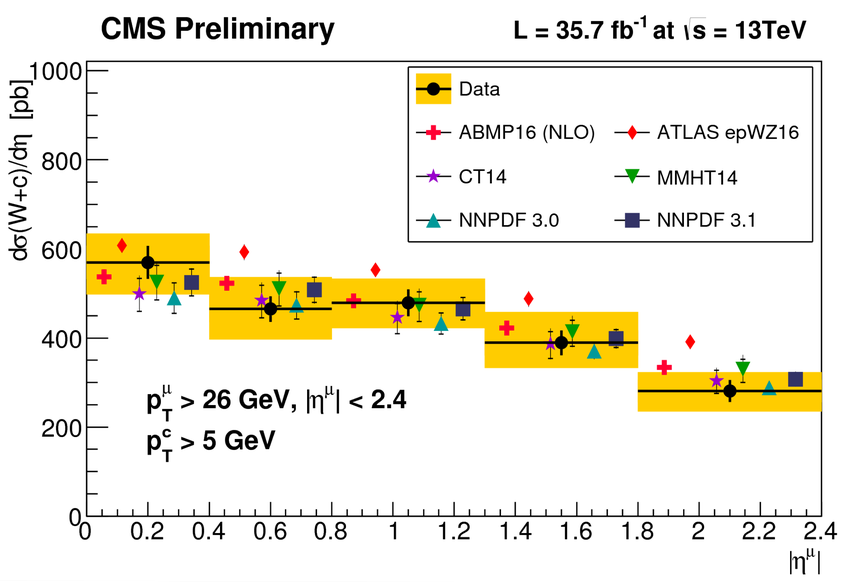


Comparison with Fixed Order QCD

- $W + c$ available at NLO in MCFM
- $\mu_r = \mu_f = M_W$
- $\frac{1}{2}\mu < \mu_r = \mu_f < 2\mu$







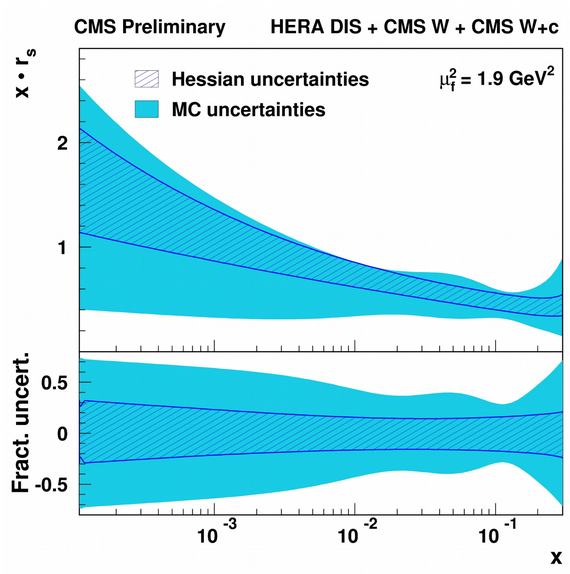
QCD Analysis (xFitter ver. 2.0.0)

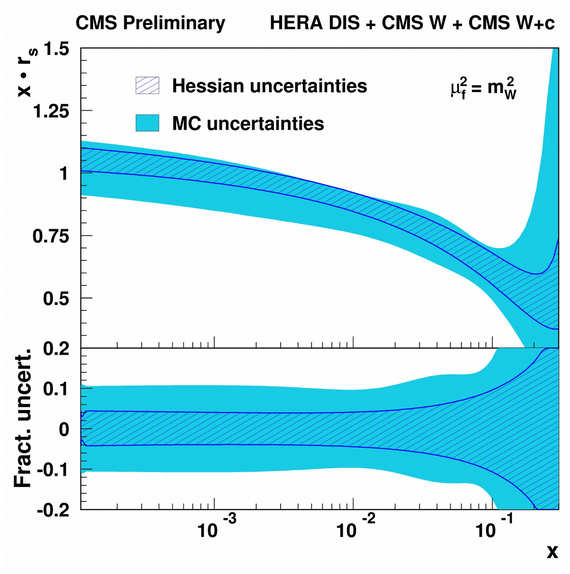
- **HERA I+II** [Eur.Phys.J. C75 (2015) no.12, 580]
- **W asymmetry**
  - 7 TeV [Phys. Rev. D 90, 032004]
  - 8 TeV [Eur.Phys.J. C76 (2016) 469]
- **W+charm**
  - 7 TeV [JHEP 02 (2014) 013]
  - 13 TeV [CMS-PAS-SMP-17-014]

PDF parametrization at the starting scale Q^2 = 1.9 GeV^2:

$$xu_v(x) = A_{u_v}\, x^{B_{u_v}}\, (1-x)^{C_{u_v}}\, (1+E_{u_v}x^2)$$
$$xd_v(x) = A_{d_v}\, x^{B_{d_v}}\, (1-x)^{C_{d_v}}$$
$$x\overline{U}(x) = A_{\overline{U}}\, x^{B_{\overline{U}}}\, (1-x)^{C_{\overline{U}}}\, (1+E_{\overline{U}}x^2)$$
$$x\bar{d}(x) = A_{\bar{d}}\, x^{B_{\bar{d}}}\, (1-x)^{C_{\bar{d}}}$$
$$x\bar{s}(x) = A_{\bar{s}}\, x^{B_{\bar{s}}}\, (1-x)^{C_{\bar{s}}}$$
$$xg(x) = A_g\, x^{B_g}\, (1-x)^{C_g}\, (1+D_g x)$$

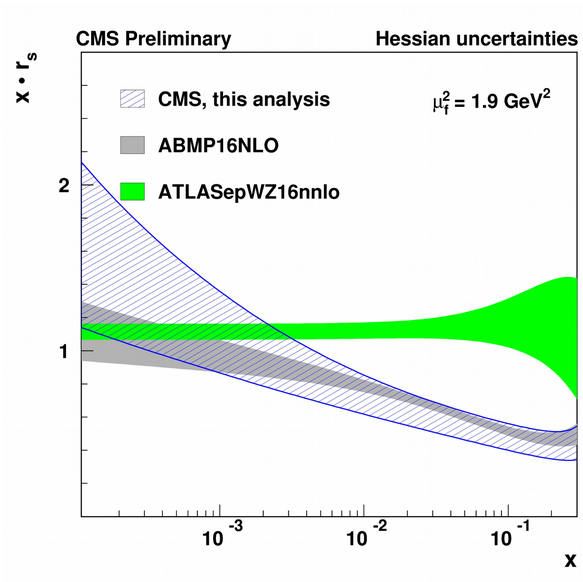
$f_s = \bar{s}/(\bar{d}+\bar{s})$ released; $\quad B_{\bar{u}} \neq B_{\bar{d}} \neq B_{\bar{s}}$

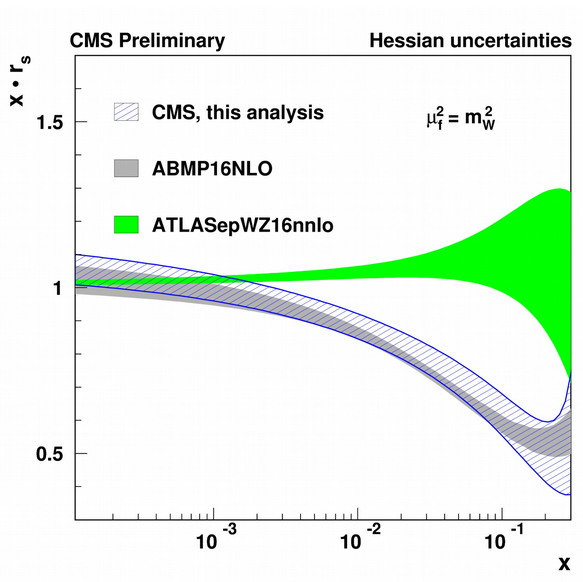




Comparisons with other PDFs

- Compatible with results from ν-scattering
- No observation of enhanced strangeness





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HELMHOLTZ
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