Very first look at QCD fits with 13 TeV W asymmetry data

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Data & fits

- Data from MIT W group → specifically from Stephanie Brandt
- I got yields (cross sections) for W+ and W- with uncertainties
  - Statistical uncertainty ~0.1%
  - Two systematic uncertainties: 1% and 0.5%
  - very preliminary data, couldn't learn more from the group → very busy …
  - together with Vlad we will make progress when looking into the code
- Made asymmetries: stat uncert. ~1%, total uncertainty ~5-8% (conservative)
- Theory predictions from Vlad – first try with 13 TeV
- Results shown are very crude
- QCD fits
  - HERAPDF2.0-like settings
  - HERA combined data + W asymmetry
  - Very simple fits to start with

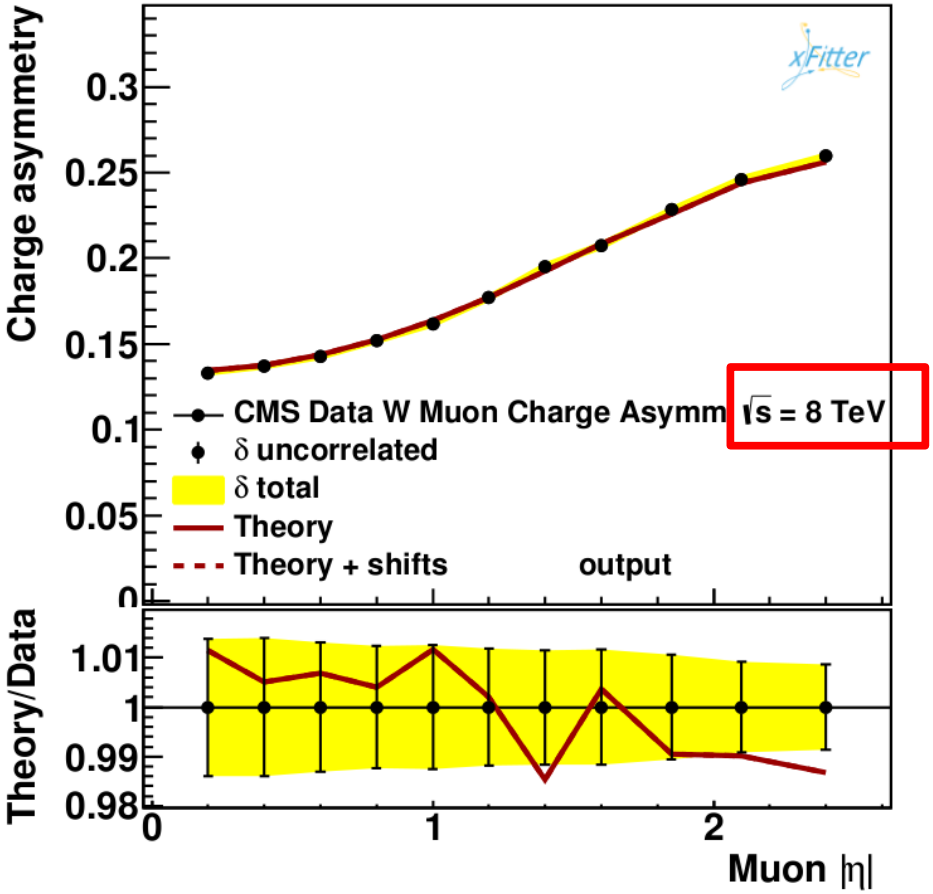
QCD fit

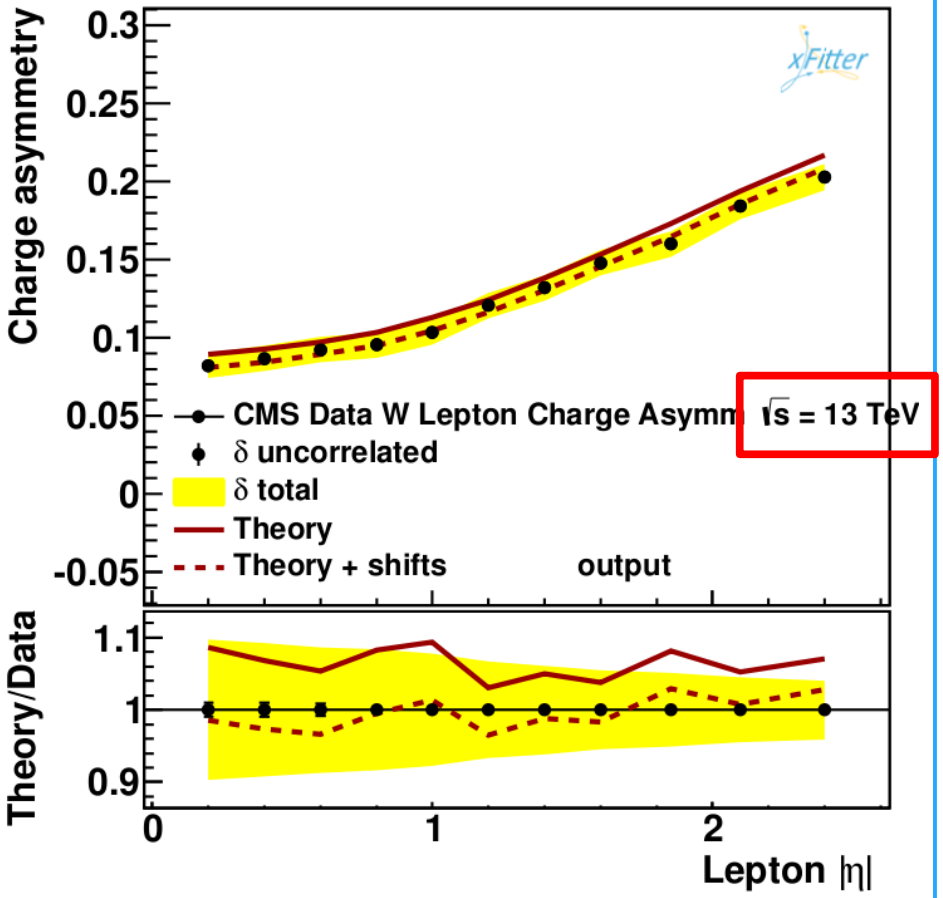
- HERA combined data + muon W asymmetry @ 8 TeV + lepton W asymmetry @ 13 TeV
- Quite bad chi2 for 13 TeV asymmetry → small uncertainties
- Rest fine
  - Let's look closer at 13 TeV data

Dataset	output
HERA1+2 CCep	42 / 39
HERA1+2 CCem	56 / 42
HERA1+2 NCem	219 / 159
HERA1+2 NCep 820	69 / 70
HERA1+2 NCep 920	443 / 377
HERA1+2 NCep 460	217 / 204
HERA1+2 NCep 575	219 / 254
CMS W muon asymmetry 8 TeV	9.4 / 11
CMS W lepton asymmetry 13 TeV	158 / 11
Correlated χ^2	87
Log penalty χ^2	+8.7
Total χ^2 / dof	1528 / 1153

W asymmetries

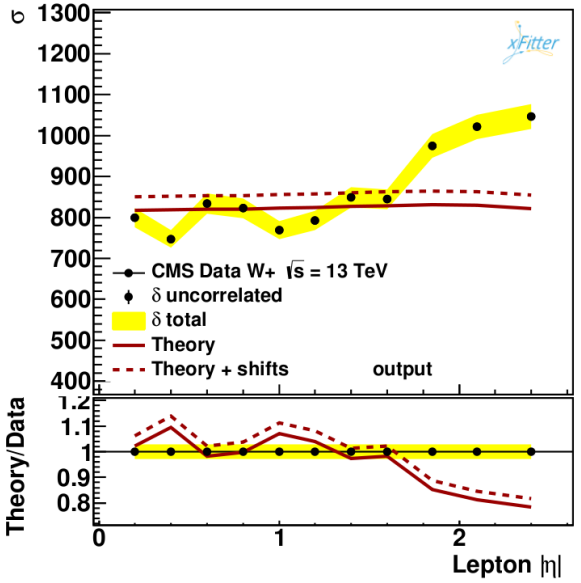
- Shapes similar for data and predictions
- Normalisation ~10% off for 13 TeV
- Fit after shifts close to data but due to small statistical uncertainties chi2 large

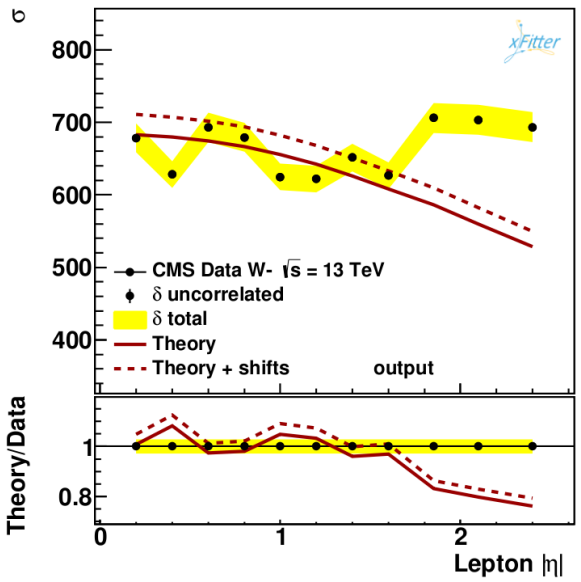




W+ and W- distributions

- 13 TeV data look really strange for W+/W- separate distributions
- Predictions for 8 and 13 TeV look very similar
  - Normalisation differs due to different CME





My suggestion for fits

- Make eta distributions ourselves → Vlad's code
- Carefully think about systematics
  - 8 TeV has full correlation matrix for systematics