

LHAPDF interface in H1Fitter



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Why LHAPDF interface?

What is the purpose of using fixed PDF in PDF fitting tool?

- H1Fitter can be used for α_s fit with fixed PDF*
- Fast comparison of several PDFs through plotting tools*
- Cross check for new developments (known cross sections using standalone dedicated program usually using LHAPDF)*

Technical solution

In the *steering.txt*:

- ! PDF parameterisation style. Possible styles are currently available:
- ! '10p HERAPDF' -- HERAPDF-like with extra assumption $B_{uv} = B_{dv}$
- ! '13p HERAPDF' -- HERAPDF-like with B_{uv} and B_{dv} floated independently
- ! '10p H12000' -- H12000-like (D,U,Dbar,Ubar+g)
- ! 'CTEQ' -- CTEQ-like parameterisation
- ! 'CHEB' -- CHEBYSHEV parameterisation based on glu,sea, uval,dval evolved pdfs
- ! 'LHAPDF' -- use lhapdf library to define pdfs

PDFStyle = 'LHAPDF'

(...)

*

* (Optional) LHAPDF steering card

*

&lhapdf

LHAPDFSET = 'cteq66.LHgrid' ! LHAPDF grid file

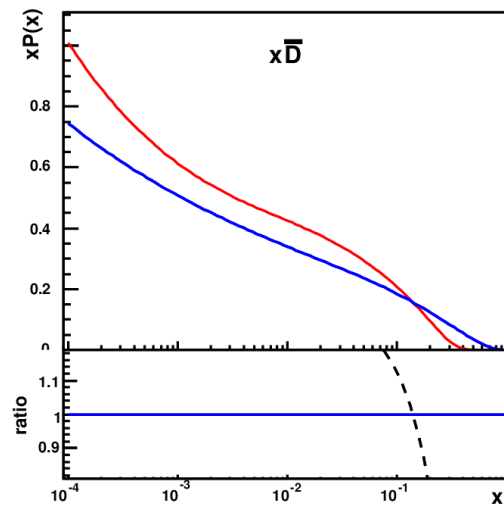
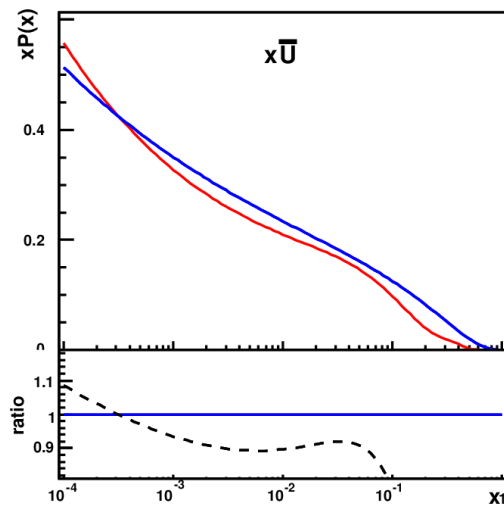
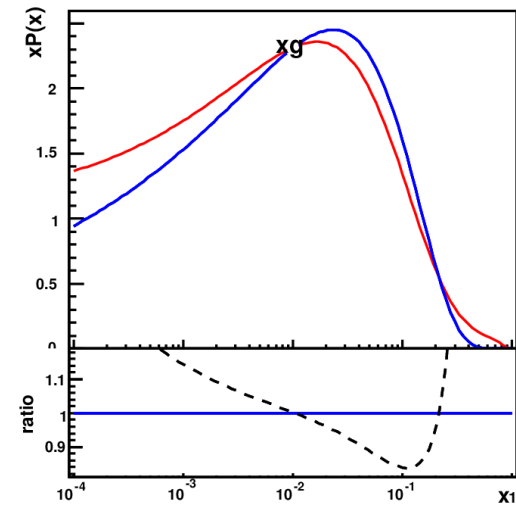
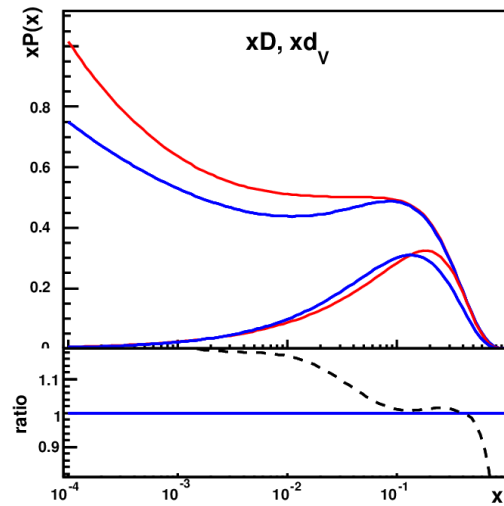
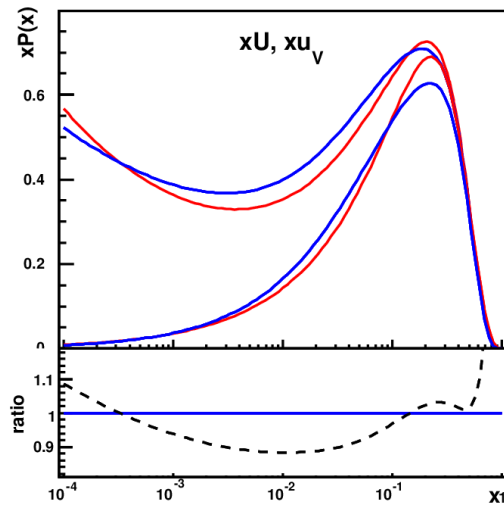
ILHAPDFSET = 0 ! Set number withing PdfSet

&End

Switch to LHAPDF mode

**An official LHAPDF file or
a path to private LHAPDF grid**

Comparison of PDFs

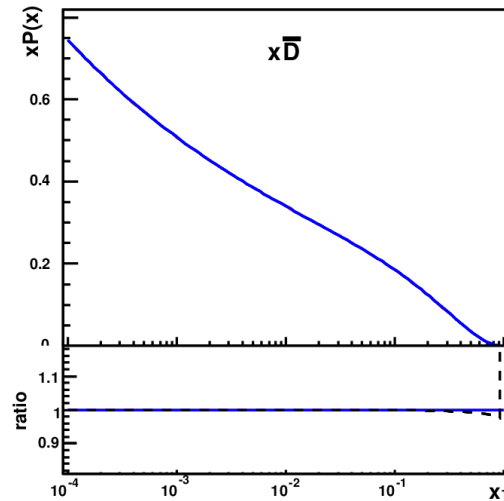
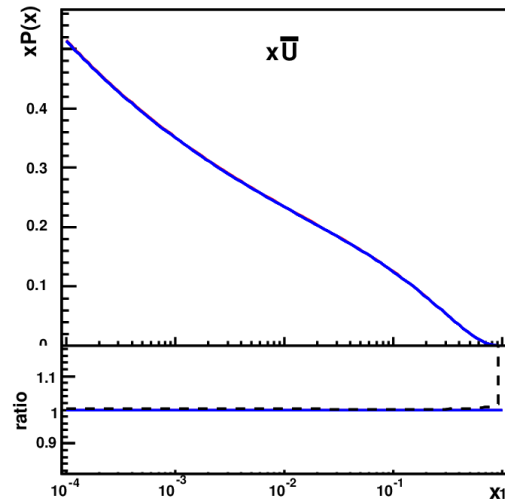
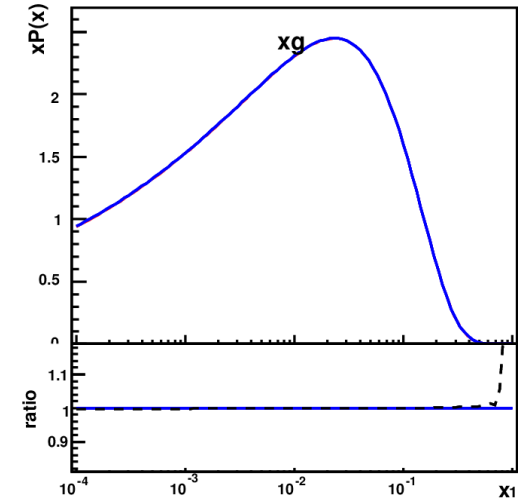
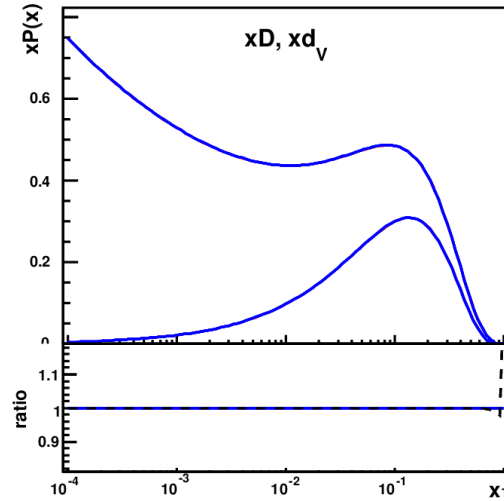
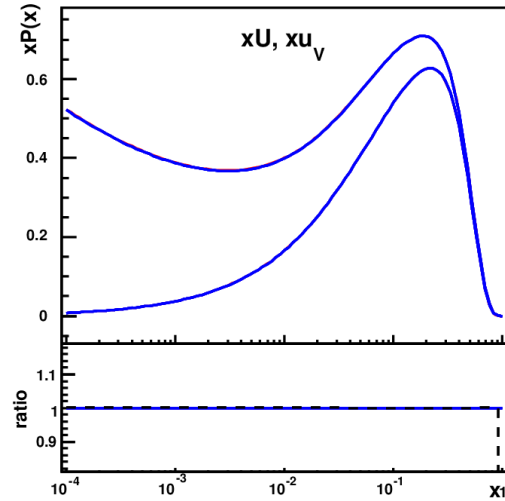


Fit output (HERAPDF1.0)
LHAPDF (CTEQ6.6)

$Q^2 = 1.90 \text{ GeV}^2$

One can see difference in shapes, steeper gluon etc.

Validation



Fit output (HERAPDF1.0)
LHAPDF (HERAPDF1.0)

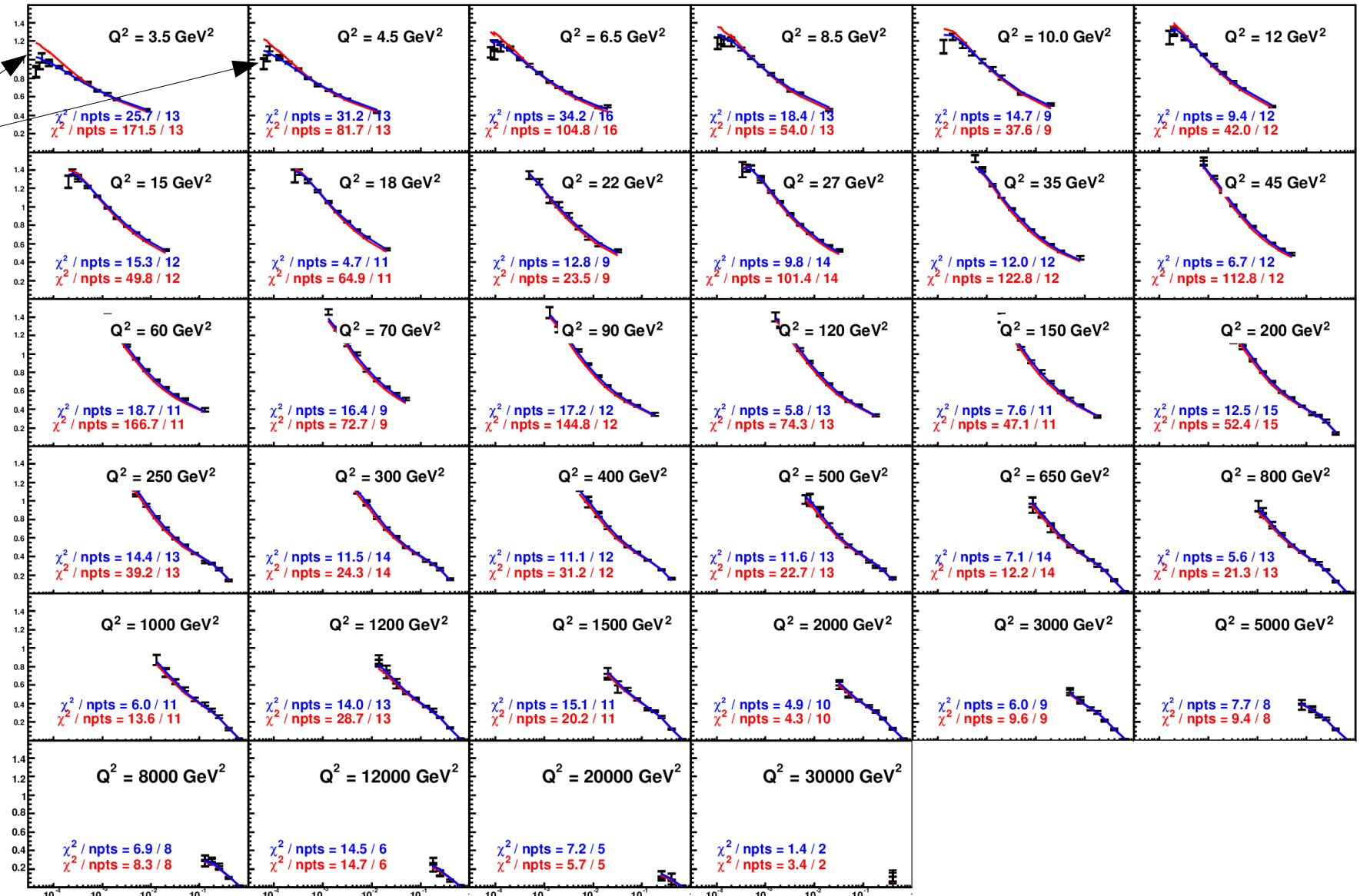
$Q^2 = 1.90 \text{ GeV}^2$

Exactly the same PDFs from fit and lhapdf

Data description comparison

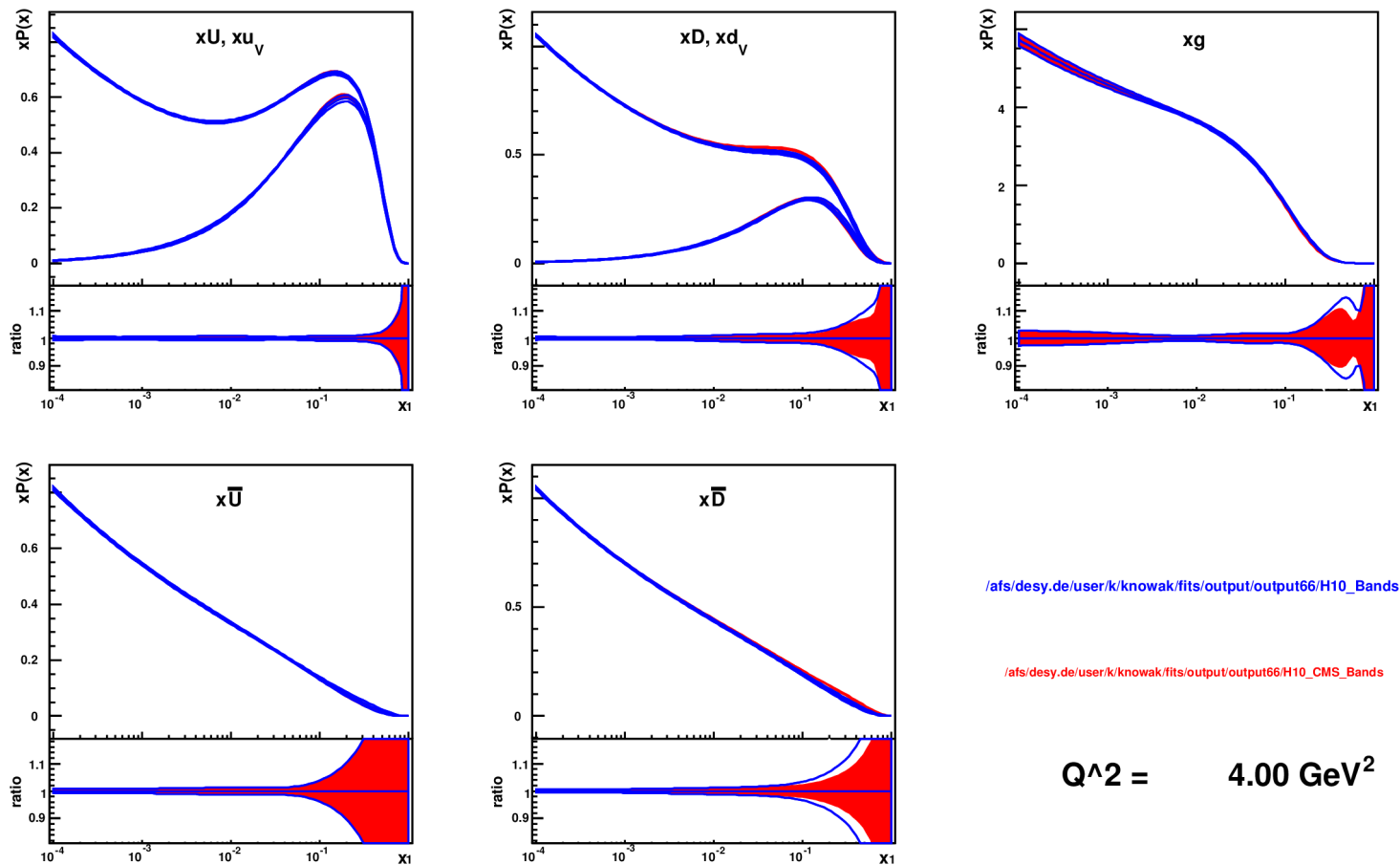
HERAPDF1.0 CTEQ6.6

NC cross section HERA-I H1-ZEUS combined e+p.



Easy detecting where differences manifest the most

Error plotting?



- Plotting of errors should be fairly easy providing even more interesting and comprehensive comparison
- Difficult to correctly use, only experimental errors can be plotted in H1-Fitter, could be very misleading if not used on equal footing

Summary

- *LHAPDF* can now be used withing *H1Fitter*
- The implementation has been validated and usage demonstrated
- Open for feedback