



HERAFitter User's Meeting status report



Announcements:

- Happy New Year ☺
- HERAFitter-1.0.0 released on 10.12.2013!

- Versioning convention: **i.j.k** with
 - **i** - stable release
 - **j** - beta release
 - **k** - bug fixes.
- The release notes can be found in this attachment: @HERAFitter_release_notes.pdf.

Date	Version	Files	Remarks
🌟 12/2013	1.0.0	@herafitter-1.0.0.tgz	stable released with decoupled @theoryfiles.tgz

Recent and Future Conferences and Workshops:

HERAFitter /
HERAFitterTalks

<https://www.herafitter.org/HERAFitter/HERAFitter/HERAFitterTalks>

List of Presentations

Date	Conference/Workshop	Presenter	Link	Remarks
22-29.03.2014	🌐 MoriondQCD	speaker	HERAFitter talk	stable release
16-22.02.2014	🌐 Lake Louise Winter Institute	S. Camarda	HERAFitter poster	HERAFitter project overview
16-20.12.2013	🌐 HEP in the LHC Era 2013	P. Laycock	HERAFitter talk	stable release
13.12. 2013	PDF4LHC	S. Camarda	HERAFitter 🌐 talk	stable release



New Results based on HERAFitter

- ◆ There are new results from LHC (CMS, ATLAS) and independent users:
<https://www.herafitter.org/HERAFitter/HERAFitter/results>

List of analyses using HERAFitter

Date	Group	Reference	Title
NEW 01.2014	R. Sadykov	arXiv:1401.1133	🌐 Impact of QED radiative corrections on Parton Distribution Functions
NEW 01.2014	F. Hautmann and H. Jung	arXiv:1312.7875	🌐 Transverse momentum dependent gluon density from DIS precision data
NEW 12.2013	A. Luszczak and H. Kowalski	arXiv:1312.4060	🌐 Dipole model analysis of high precision HERA data
12.2013	LHC/ATLAS	ATL-PHYS-PUB-2013-018	🌐 A study of the sensitivity to the proton parton distributions of the inclusive photon production cross section in pp collisions at 7 TeV measured by the ATLAS experiment at the LHC
12.2013	LHC/CMS	CMS-SMP-12-021 / arXiv:1312.6283	🌐 Measurement of the muon charge asymmetry in pp W production at 7 TeV
12.2013	LHC/CMS	CMS-SMP-12-028	PDF constraints and extraction of the strong coupling constant from the inclusive jet cross section at 7 TeV



Highlights of new results (I)

Study sensitivity to strange PDF:

- ▶ Using W+charm (5/fb) and W muon asymmetry (4.7/fb) – CMS [SMP-12-021]
- ▶ NLO QCD Analysis: $R_s(x)$ is determined

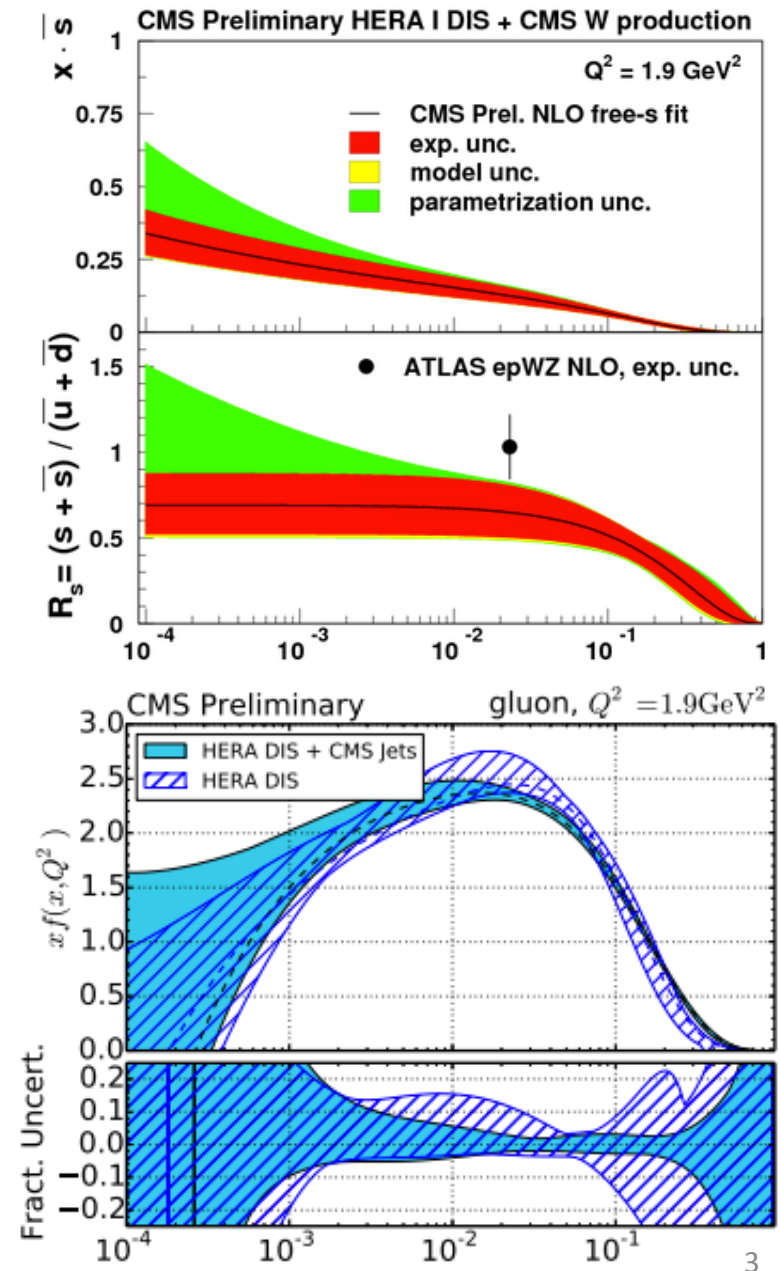
Study sensitivity to the gluon PDF:

- ▶ Using inclusive jet cross section at 7 TeV CMS data from 2011 (5/fb) [SMP-12-028]:
 - ✦ PDFs are extracted and compared to fits using just HERA I and fits using HERA I + CMS 7 TeV jet data

Extraction of the strong coupling:

From PDF and alphas simultaneous fit:

$$\alpha_s(M_Z) = 0.1192^{+0.0017}_{-0.0015}$$





Highlights of new results (II)

- ◆ And first time that drawing tools are being used officially:



ATLAS NOTE
ATL-PHYS-PUB-2013-018
December 14, 2013



A study of the sensitivity to the proton parton distributions of the inclus photon production cross section in pp collisions at 7 TeV measured by the ATLAS experiment at the LHC

The ATLAS Collaboration

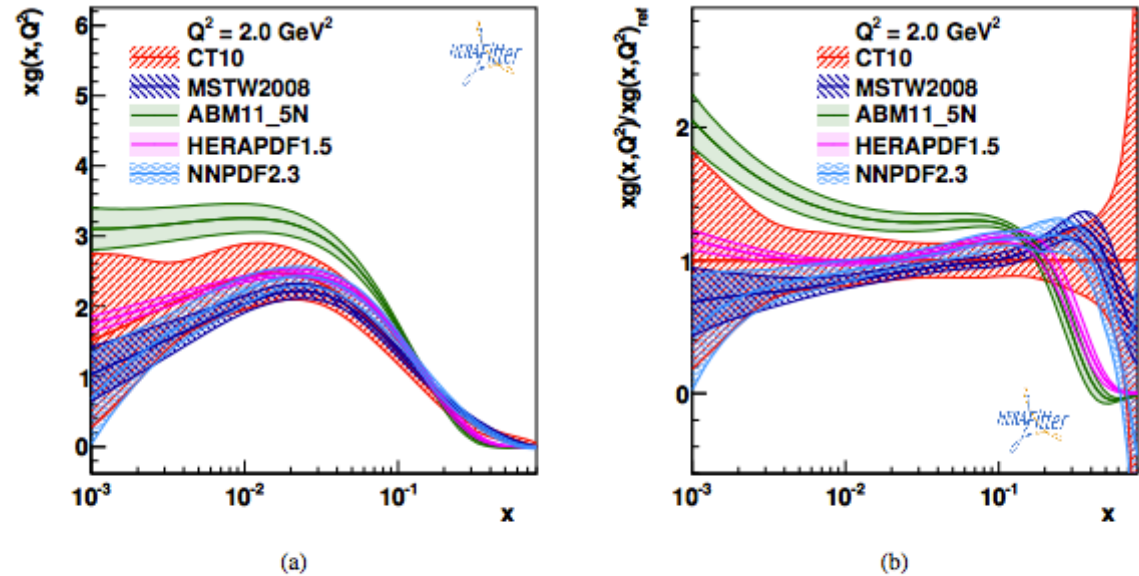


Figure 4: (a) Comparison of the gluon PDF $xg(x, Q^2)$ at the scale $Q^2 = 2 \text{ GeV}^2$ for different PDF sets, and (b) ratio $xg(x, Q^2)/xg(x, Q^2)_{\text{ref}}$ using CT10 as the reference gluon PDF.

- ◆ HERAFitter has been used in the studies of HERA low Q^2 data using non-DGLAP formalism, a unique framework to allow such studies.

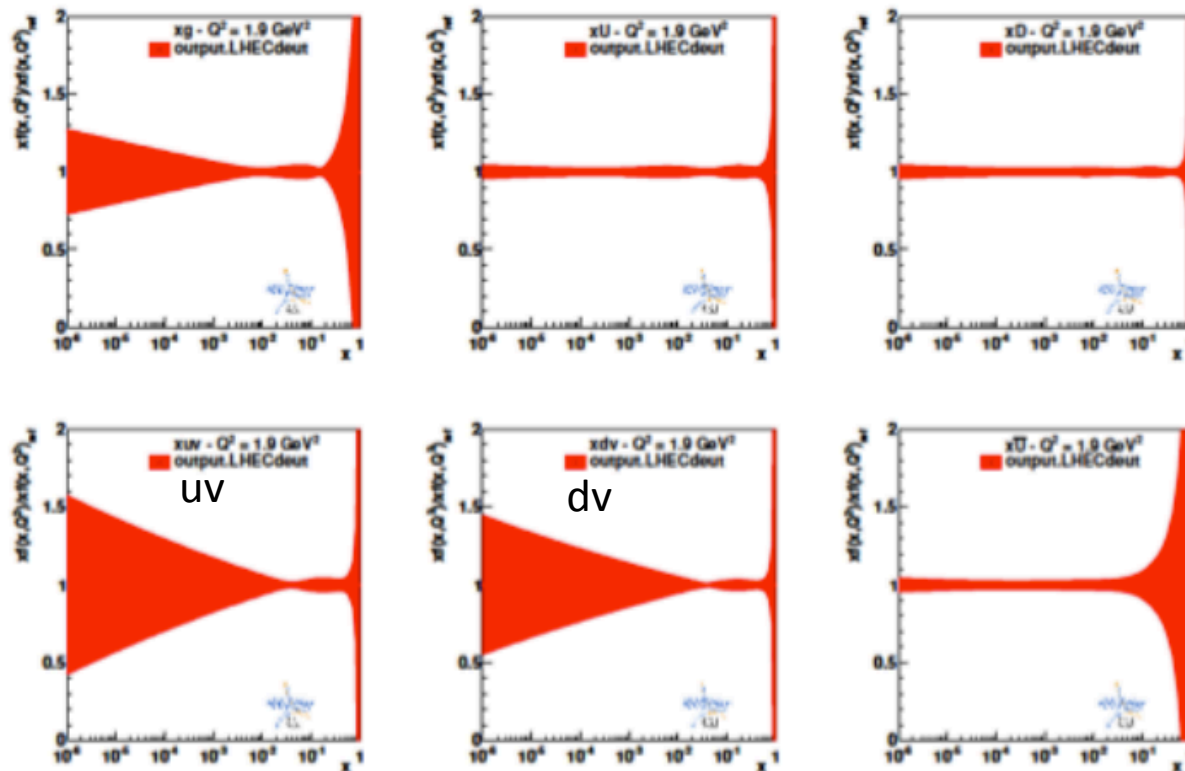


Developments since First Stable Release

- ◆ HERAFitter has been interfaced to LHAPDF6(C++) → See V. Kolesnikov's talk
- ◆ Added possibility to fit deuteron data (used for LHeC studies)
 - ▶ <https://indico.cern.ch/conferenceTimeTable.py?confId=278903>

First, standalone eD data fits

3.5 TeV x 60 GeV, e-, P=-0.8, 1fb⁻¹ Neutral and Charged Current, exp uncertainties





New Options in Drawing Tools Developments

◆ More Options for Drawing Tools added:

program usage:
bin/DrawPdfs [options] dir1[:label1] [dir2:[label2]] [...]

First directory is used as reference for PDF ratio plots and to display data in data plots.
Directory labels are used in the legends of the plots, to add spaces and special characters to the labels use quotation marks ' ' (ex. dir:'HERA I').
To specify greek letters and latex commands in the labels use the ROOT notation (#alpha #bar{u}).
It is possible to specify up to 6 directories, you need to specify at least one directory.

general options:

- help
Show this help
- pdf (requires ps2pdf)
Produce and additional plot file in pdf format (Portable Document Format)
- outdir <output directory>
Specify output directory
- splitplots
Produce also additional eps files for each plot
- --splitplots-png
Produce additional png files for each plot
- colorpattern <1-3>
Select among 3 additional color patterns
- lowres
Low resolution plots (smaller file)
- highres
High resolution plots (paper quality)
- --no-version
Do not show version on logo
- --no-data
Data plots are not produced
- --no-pdfs
PDF plots are not produced
- ..



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general options:

```
--help          Show this help message
--pdf (requires Produce)
--outdir <output> Specify output directory
--splitplots    Produce split plots
--splitplots-png Produce split plots in PNG format
--colorpattern <pattern> Select a color pattern
--lowres        Low resolution
--highres       High resolution
--no-version    Do not show version
--no-data       Do not plot data
--no-pdfs      Do not plot PDF plots
```

options for pdf plots:

```
--bands          Draw PDF uncertainty band
--asymbands      PDF bands are not symmetrised
--filledbands    Filled uncertainty bands, usefull for sensitivity studies
--ratorange min:max Specify y axis range in PDF ratio plots
--xrange min:max Specify x axis range in PDF plots, default minimum and maximum x are determined by settings in the first reference directory
--no-logx        Linear x scale in PDF plots
--absolute-errors Plot absolute pdf uncertainties centered around 0 in PDF ratio plots
--relative-errors Plot relative pdf uncertainties centered around 1 in PDF ratio plots
```



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general options:

```
--help          Show this help message
--pdf (requires ps2pdf) Produce and save PDF plots
--outdir <output dir> Specify output directory
--splitplots    Produce also split plots
--splitplots-png Produce additional PNG plots
--colorpattern <1-3> Select among color patterns
--lowres       Low resolution plots (screen quality)
--highres     High resolution plots (paper quality)
--no-version   Do not show version on logo
--no-data     Data plots are not produced
--no-pdfs    PDF plots are not produced
```

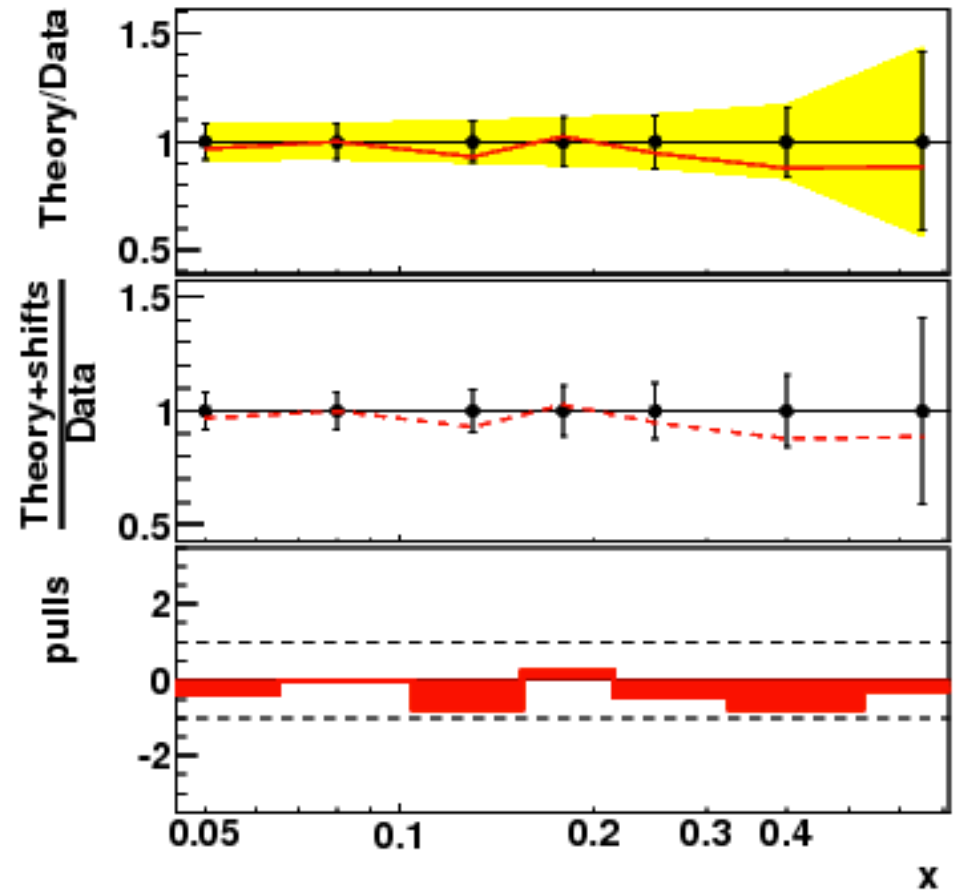
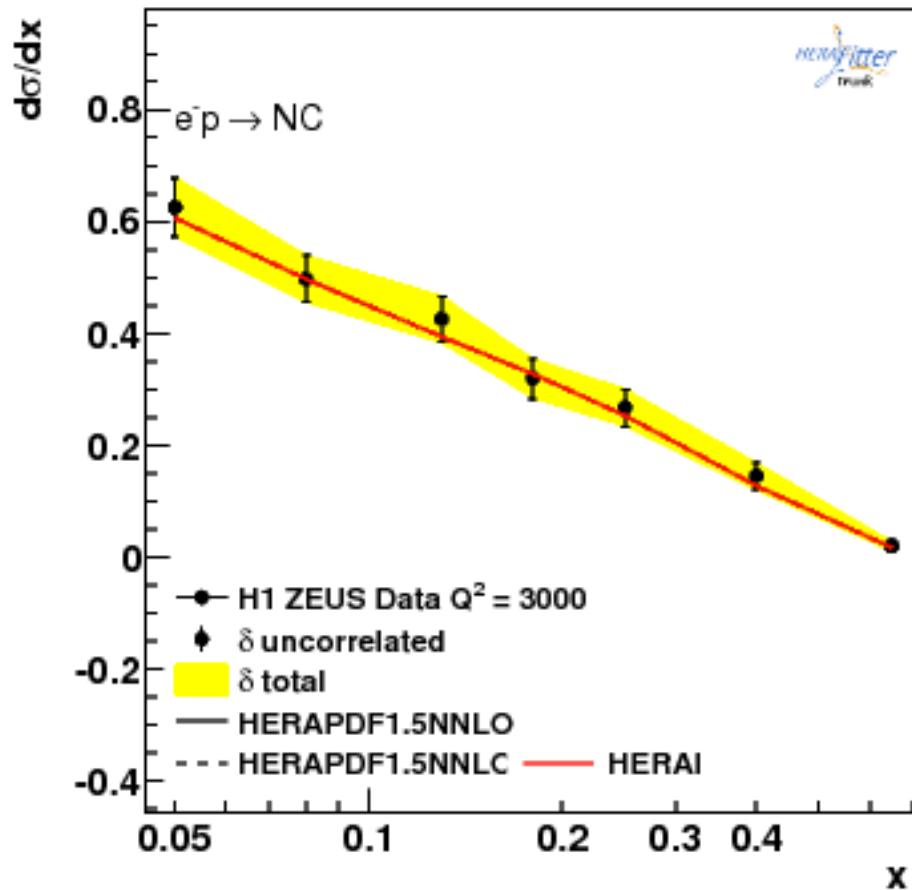
options for data plots:

```
--therr       Plot theory errors if available
--points      Plot theory as displaced marker points (with vertical error bars) instead of continuous lines (with dashed error area)
--theory <label> Change the "Theory" legend to the specified label
--2panels     Plot additional right bottom panels with pulls
--3panels     Plot additional right mid panels with theory+shifts
```




New Options in Drawing Tools Developments

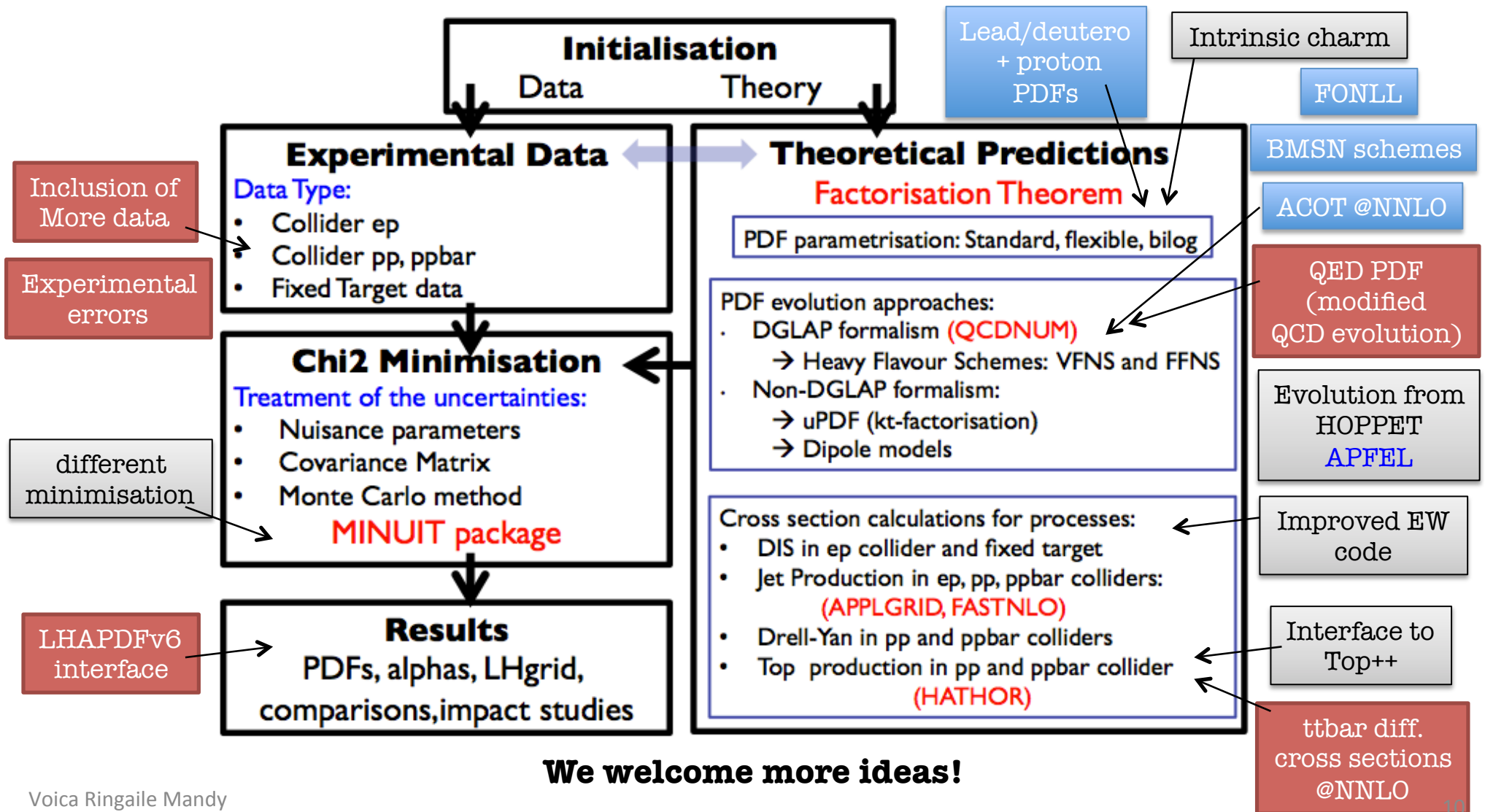
- ◆ More Options for Drawing Tools added:





HERAFitter Perspectives

- Many new developments are planned to be implemented in future releases:





Today's Agenda

HERAFitter User's meeting

Wednesday, 29 January 2014 from **15:00** to **18:00** (Europe/Zurich)
at **CERN (42-R-031)**
DESY: SR 03a

Manage ▾

Description ONLY If default VIDYO fails ——— a backup VIDYO LINK:

Extension 9265520
Meeting PIN 2323
Auto-join URL <http://vidyoportal.cern.ch/flex.html?roomdirect.html&key=QpFaaSZLsTe1>

Video Services Vidyo public room : HERAFitter_Users_meeting [More Info](#) | [Join Now!](#) | [Connect 42-R-031](#)

Wednesday, 29 January 2014

- | | |
|---------------|---|
| 15:00 - 15:20 | Status 20' ▾ |
| | Speakers: Voica Ana Maria Radescu (Deutsches Elektronen-Synchrotron (DE)), Ringaile Placakyte (Deutsches Elektronen-Synchrotron (DE)) |
| 15:20 - 15:40 | QED PDFs and implementation in the HERAFitter 20' ▾ |
| | Speakers: Renat Sadykov (Joint Inst. for Nuclear Research (RU)), Michiel Botje (NIKHEF (NL)) |
| 15:40 - 16:00 | LHAPDF6 interface to HERAFitter 20' ▾ |
| | Speaker: Vladimir Kolesnikov (Joint Institute for Nuclear Research (JINR)) |

Doodle for next User's Meeting (end of February) will be sent around after the meeting