

Welcome to REF 2016 - Antwerpen

History and goals of the REF workshop series

- 23-24 June 2014 Antwerp (Belgium)
- 8-11 December 2014 in Antwerp (Belgium)
- 1-3 June 2015 Amsterdam (The Netherlands)
- 2-5 November 2015 DESY Hamburg (Germany)

- Goal:
 - organize a discussion between the experts
 - the investigation of the nucleon structure based on the Transverse-Momentum Dependent factorization framework (TMD)
 - dealing with the unintegrated Parton Distribution Functions (uPDF) in the small- X_B regime.
 - develop common language for mutual understanding
 - promote joint research programs
 - unify treatments of some of the crucial problems in the theory of strong interaction.

What has happened - TMDlib and TMDplotter

- TMDlib proposed in 2014 as part of REF workshop and further developed
- combine and collect different ansaetze and approaches:
<http://tmd.hepforge.org/> and
<http://tmdplotter.desy.de>
- TMDlib: a library of parametrization of different TMDs and uPDFs (similar to LHApdf)

TMDlib and TMDplotter: library and plotting tools for transverse-momentum-dependent parton distributions, *F. Hautmann et al. arXiv 1408.3015, Eur. Phys. J., C 74(12):3220, 2014.*

Fixed-x TMD Plotter

Home TMD Plotter Publications HEP Links

Parameters

$p^2 = 100$ GeV²
 $x = 0.001$
 $y_{min} = 0.000001$ $y_{max} = 100$
 $k_{t,min}^2 = 0.01$ GeV $k_{t,max}^2 = 1000$ GeV

PDFs

1. gluon ccfm-JH-2013-set1 x 1
2. gluon ccfm-setA0 x 1
3. x 1
4. x 1

Output

Format: ps
 display ratio
 display command line

Plot Restore Add PDF field

Plot: $x A(x, k_t^2, p^2)$ vs k_t^2 [GeV²]. $p^2 = 100$ GeV², $x = 0.001$. Legend: gluon ccfm-JH-2013-set1 (blue), gluon ccfm-setA0 (red).

Contact Imprint

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LHAPDF 6.1.4 and TMDlib 1.0.6

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DESY

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- Also integrated pdfs (including photon pdf are available via LHAPDF)

The screenshot shows the 'Integrated PDF plotter' interface. At the top, there is a navigation bar with 'Home', 'TMD Plotter', 'Publications', and 'HEP Links'. The main content area is divided into three sections: 'Parameters', 'PDFs', and 'Output'.
- **Parameters:** $p^2 = 25$ GeV², $y_{min} = 1.0E-5$, $y_{max} = 100$, $x_{min} = 1.0E-5$, $x_{max} = 1$.
- **PDFs:** A list of four PDFs: 1. gluon (ccfm-JH-2013-set1) x 1, 2. gluon (NNPDF23_lo_as_0130_qed) x 1, 3. photon (NNPDF23_lo_as_0130_qed) x 1, 4. gluon (MRST2004qed_proton) x 1.
- **Output:** Format: ps, with checkboxes for 'display ratio' and 'display command line'.
- **Plot:** A log-log plot of $x(x,p^2)$ vs x for $p^2 = 25$ GeV². The x-axis ranges from 10^{-5} to 1 , and the y-axis ranges from 10^{-5} to 10^2 . The plot shows four curves corresponding to the selected PDFs, with the photon PDF (purple) showing a distinct peak at low x .

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- Also integrated pdfs (including photon pdf are available via LHAPDF)

- **Feedback and comments from community is needed – just use it !**

Integrated PDF plotter

Home TMD Plotter Publications HEP Links

Parameters

$p^2 = 25$ GeV²

$y_{\min} = 1.0E-5$ $y_{\max} = 100$

$x_{\min} = 1.0E-5$ $x_{\max} = 1$

PDFs

1. gluon ccfm-JH-2013-set1 x 1
2. gluon NNPDF23_lo_as_0130_qed x 1
3. photon NNPDF23_lo_as_0130_qed x 1
4. gluon MRST2004qed_proton x 1

Output

Format: ps

display ratio

display command line

Plot Restore Add PDF field

$p^2 = 25$ GeV²

$x(x,p^2)$

10²
10
1
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵

10⁻⁵ 10⁻⁴ 10⁻³ 10⁻² 10⁻¹ 1

x

gluon ccfm-JH-2013-set1
gluon NNPDF23_lo_as_0130_qed
photon NNPDF23_lo_as_0130_qed
gluon MRST2004qed_proton

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Summary and state of the art

Vol. 46 (2015)

ACTA PHYSICA POLONICA B

No 12

TRANSVERSE MOMENTUM DEPENDENT (TMD) PARTON DISTRIBUTION FUNCTIONS: STATUS AND PROSPECTS*

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(Received September 25, 2015)

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(2501)

- Transverse Momentum Dependent (TMD) parton distribution functions: status and prospects

R. Angeles-Martinez (Manchester U.) et al.. Acta Phys.Polon. B46 (2015) no.12, 2501-2534, 1507.05267

Cited by 30 records

- description of theory and tools

Program for REF 2016

- Monday:
 - Higgs/DY/QQbar production
- Tuesday:
 - TMD pdfs
- Wednesday
 - Tools, Monte Carlo generators
 - Jets, Final states
- Thursday
 - Small x
- New developments in all areas !
- Please note:
 - all talks include 5 min for discussion (i.e. $25+5 = 30$)
 - longer discussion sessions at the end of the sessions !
 - Please stay within the time limits !

Welcome to REF 2016 - Antwerp

Organizing committee:

- Igor Cherednikov
- Didar Dobur
- David Dudal
- Laurent Favart
- Francesco Hautmann
- Fabio Maltoni
- Pierre Van Mechelen

and behind the scene:

- Sara Van Mierlo

- and a special thank you to
 Pierre & Francesco for setting up
 such a nice program

Scientific committee:

- Elke Aschenauer
- Daniel Boer
- Igor Cherednikov
- Markus Diehl
- Didar Dobur
- David Dudal
- Miguel Echearría
- Laurent Favart
- Francesco Hautmann
- Hannes Jung
- Fabio Maltoni
- Piet Mulders
- Andrea Signori
- Pierre Van Mechelen

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Enjoy the workshop !