

TMDlib, a library for TMDs

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REF workshop

8-11 Dec. 2014

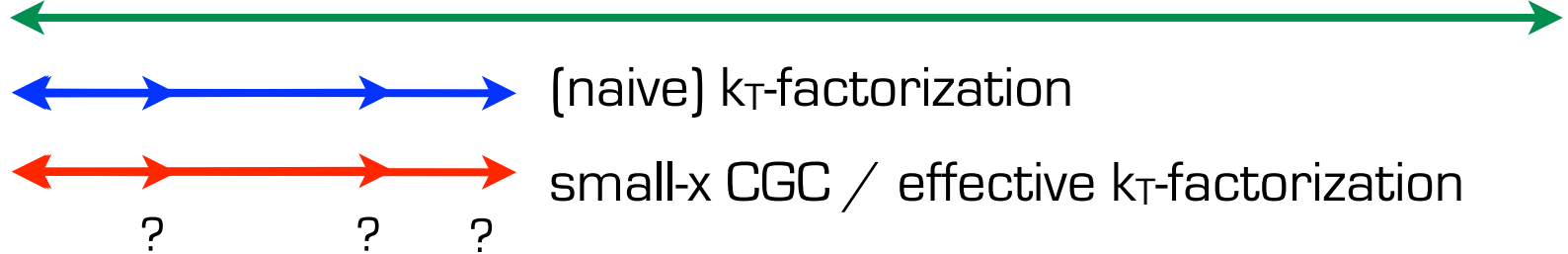
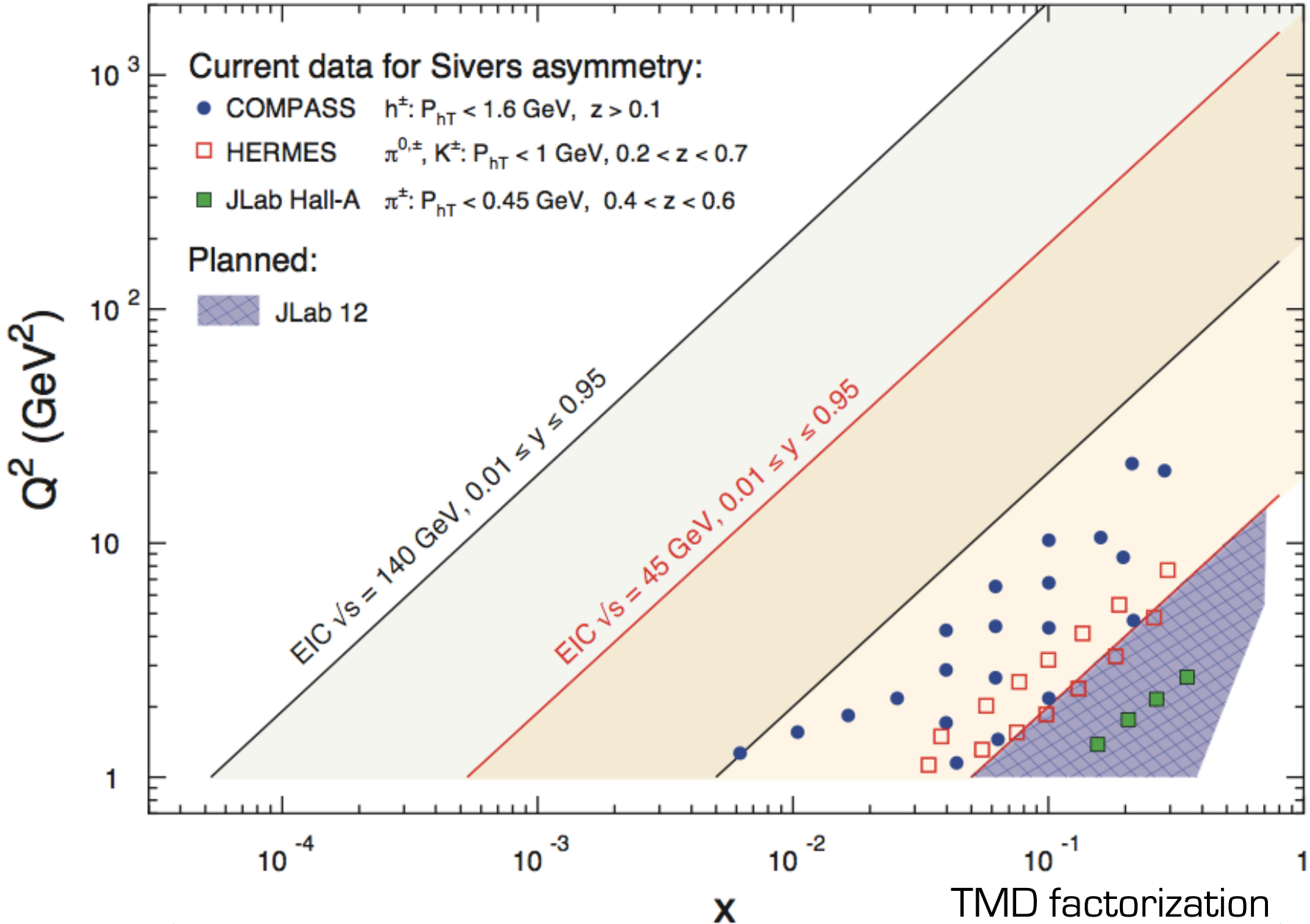
Antwerp

<http://tmdlib.hepforge.org>

arXiv:1408.3015

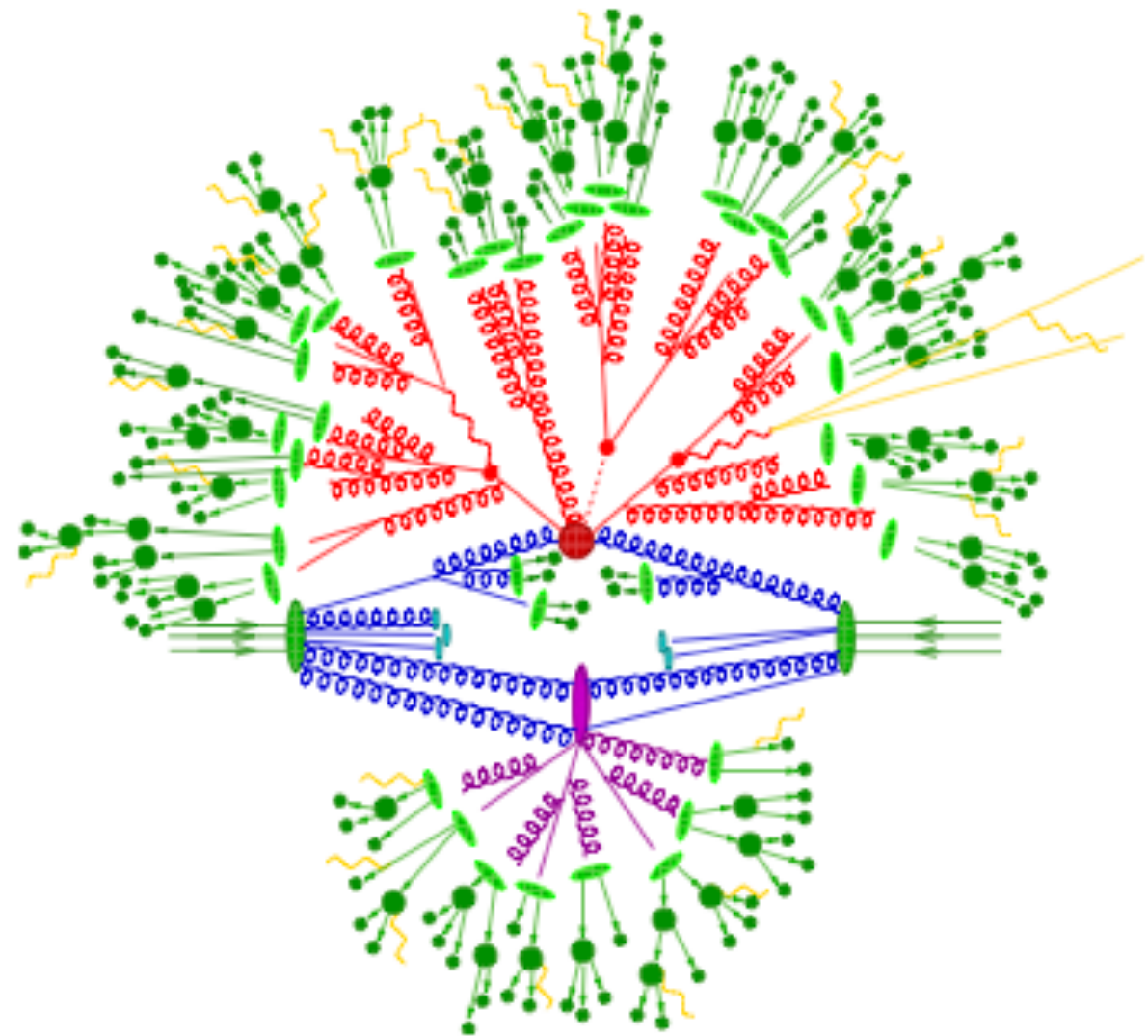


Why different “REF” frameworks?



Why a common tool?

TMD effects
in **different kinematic regimes**
need to be encoded in
MC generators
to build realistic **predictions**
and perform **data analysis**
at current and future experiments
(LHC, EIC, etc.)



a single tool dealing with different “REF choices” (kinematics)
could be helpful for phenomenology

TMDlib project

<http://tmdlib.hepforge.org>

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TMDlib 1.0.2

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TMDLIB manual

TMDlib and TMDplotter: library and plotting tools for Transverse Momentum Dependent parton distributions

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TMDlib project

parton	uPDF/TMD set	iset	$\Lambda_{qcd}^{(4)}$	k_t^{cut} [GeV]	Q_0 [GeV]	Ref.
gluon	ccfm-JS-2001	101000	0.25	0.25	1.4	[74]
	ccfm-setA0	101010	0.25	1.3	1.3	[74]
	ccfm-setA0+	101011	0.25	1.3	1.3	[74]
	ccfm-setA0-	101012	0.25	1.3	1.3	[74]
	ccfm-setA1	101013	0.25	1.3	1.3	[74]
	ccfm-setB0	101020	0.25	0.25	1.3	[74]
	ccfm-setB0+	101021	0.25	0.25	1.3	[74]
	ccfm-setB0-	101022	0.25	0.25	1.3	[74]
	ccfm-setB1	101023	0.25	0.25	1.3	[74]
	ccfm-JH-set 1	101001	0.25	1.33	1.33	[77]
	ccfm-JH-set 2	101002	0.25	1.18	1.18	[77]
	ccfm-JH-set 3	101003	0.25	1.35	1.35	[77]
	ccfm-JH-2013-set1	101201	0.2	2.2	2.2	[70]
	ccfm-JH-2013-set2	101301	0.2	2.2	2.2	[70]
	GBWlight	200005	-	-	-	[75]
GBWcharm	200006	-	-	-	[75]	
quark	ccfm-setA0	-	0.25	1.3	1.3	
	ccfm-JH-2013-set1	-	0.2	2.2	2.2	[70]
	ccfm-JH-2013-set2	-	0.2	2.2	2.2	[70]
	SBRS-2013-TMDPDFs	300005	-	-	1.55	[42]

only
distribution
functions
up to know

small-x
factorization

Table 1: Available uPDF/TMD parton sets in TMDlib.

new entry: gluon densities with BFKL and BK evolution [Kutak, Sapeta]

TMD factorization

TMDplotter

High Energy Physics | TMD Plotter

[Home](#)[TMD Plotter](#)[Publications](#)[HEP Links](#)

Using the form below you can calculate, in real time, values of $x_A(x, k_t, p)$ for any of the TMDs. You can also generate and compare plots of $x_A(x, k_t, p)$ vrs x and vrs k_t^2 at any p^2 for up to 4 different parton types or PDFs.

Please click one of the buttons to generate the according form for the TMD Plotter:

[Plot TMD \(\$x\$, fixed \$k_t\$ \)](#)[Plot TMD \(fixed \$x\$, \$k_t\$ \)](#)

Plot uPDF as a function of k_t^2 in range

$k_t^2_{\min} =$ GeV^2 , $k_t^2_{\max} =$ GeV^2

$y_{\min} =$, $y_{\max} =$

at $x =$

at $p^2 =$ GeV^2

using dPDF, give LHAPDF identifier here:

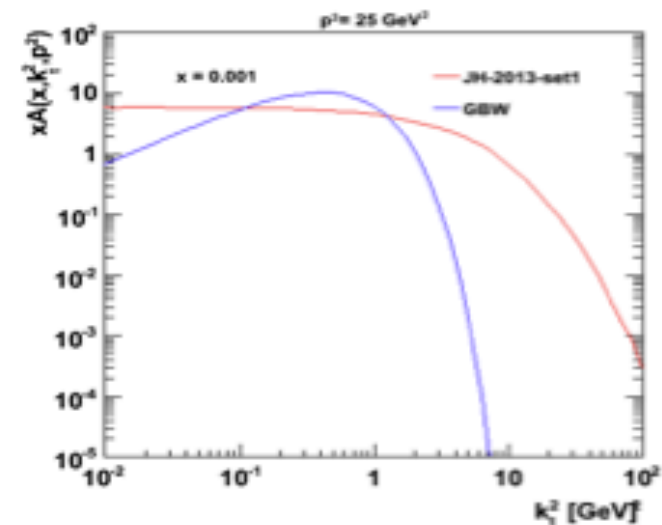
1

PDF:

scale-factor

2

PDF:



Monte Carlo and transverse momentum

MC generators sensitive
to transverse momentum,
intrinsic and/or radiative

MC @ NLO + PS

Powheg

Herwig Pythia

gluon TMD effects
in DIS and pp + PS
Cascade

Gmc_trans

TMDGen

ResBos

...



inputs from TMDlib

TMDlib project

- phenomenologically useful
- theoretically “stimulating”
(do matches between the REF approaches exist? see next talks!)

Looking further

- Language problems?
Fortran for some of us is the present, but C++ is the both the present and the future
(see e.g. data analysis at LHC)
- use it, we need feedback!
- Explore theoretical issues (REF frameworks) and strengthen phenomenology (predictions for LHC, LeHC, ILC, EIC ... and future data analysis)