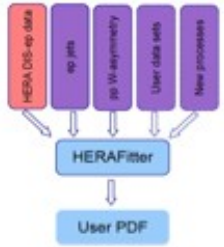
HERAFitter Meeting



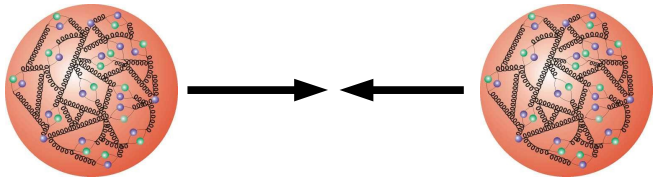
fastNLO v2

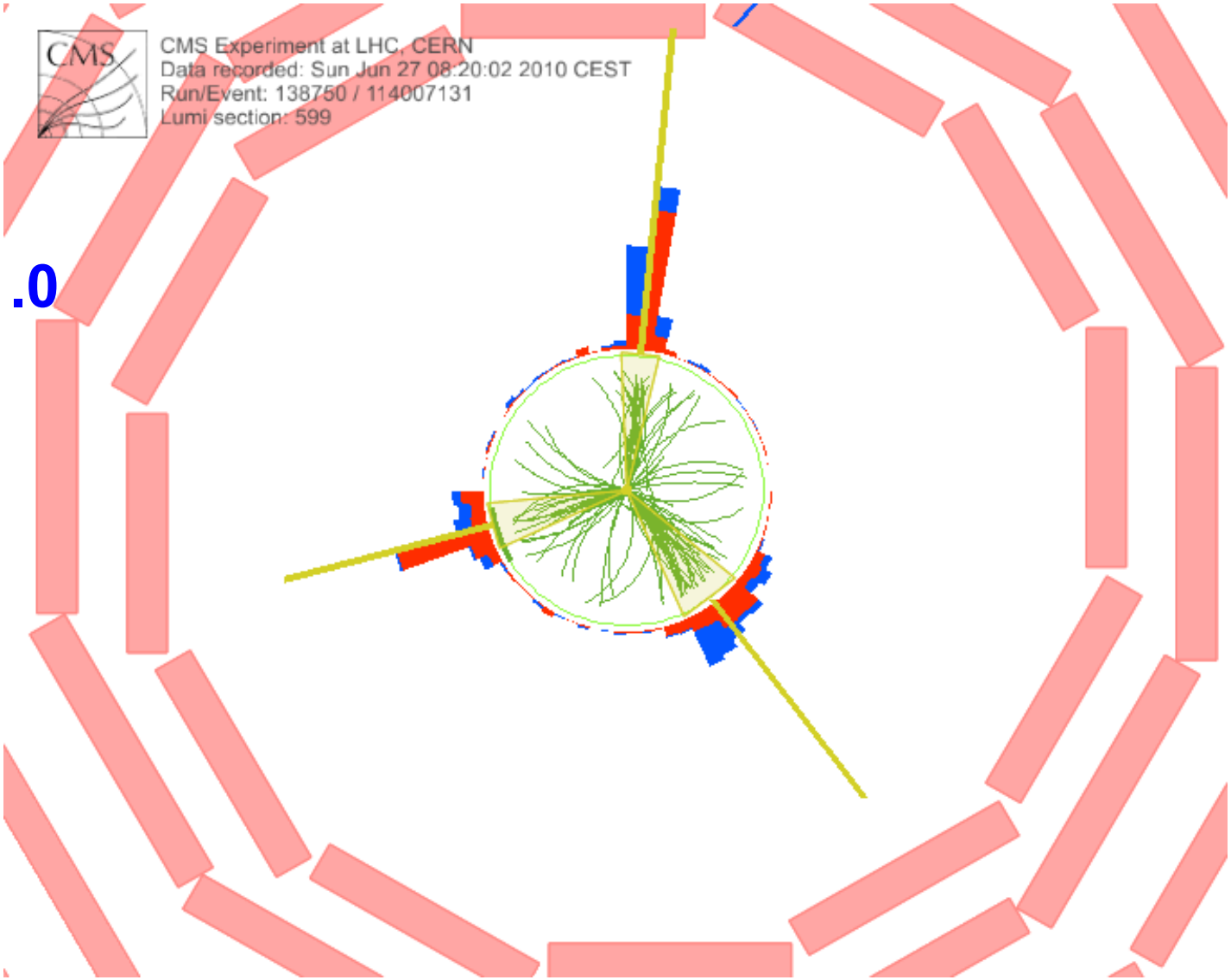
The fastNLO Collaboration:
Daniel Britzger, Thomas Kluge, **Klaus Rabbertz,** Fred Stober,Markus Wobisch
(DESY, Liverpool, KIT, KIT, Louisiana Tech University)

Karlsruhe Institute of Technology

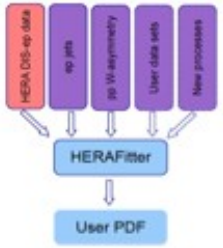
Outline

- Quick Reminder: Motivation
- Release of fastNLO_reader_2.1.0
- Some use of v2
- Outlook





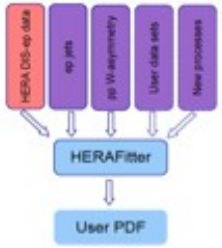
Motivation



- Interpretation of experiment data relies on:
  - Availability of reasonably fast theory calculations
  - Often needed: Repeated computation of (almost) same cross sections
- Examples for a specific analysis:
  - Use of various PDFs (CTEQ, MSTW, NNPDF, HERAPDF, ABKM ...)
  - Determine PDF uncertainties (PDF error sets)
  - Use data set in fit of PDFs and/or $\alpha_s(M_Z)$
- Sometimes NLO predictions can be computed fast
- But some are very slow, esp. for jets
- Need procedure for fast repeated computations of NLO cross sections
- Use fastNLO (in use by most PDF fitting groups)

(ATLAS mostly uses another project: APPLGrid)

fastNLO_reader_2.1.0



First public release TODAY, 14.02.2012
See: http://projects.hepforge.org/fastnlo/

fastNLO
fast pQCD calculations for hadron-induced processes

Home | Documentation | Interactive | Code | Links

fastNLO Homepage

The fastNLO project provides computer code and tables of pre-computed perturbative coefficients for various observables in hadron-induced processes.

This allows very fast computations of these observables for arbitrary PDFs and/or values of alpha_s(Mz) as e.g. needed in PDF fits or in systematic studies.

February 14, 2012:

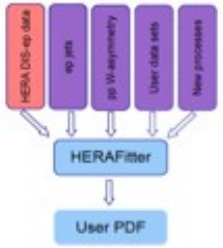
Generic table reader, in Fortran and C++, for new fastNLO version 2 available: fastNLO_reader_2.1.0_1062

New v2 tables, including threshold corrections at default scale, for ATLAS Inclusive Jets, arXiv:1112.6297, with anti-kT jet sizes R=0.4 and R=0.6 available.

New v2 table as well as converted v14 table for CMS Inclusive Jets, Phys. Rev. Lett. 107 (2011) 132001, available; v2 table also includes 2-loop threshold corrections st default scale and, as proof of concept, the CMS non-perturbative correction factors as well as data points.

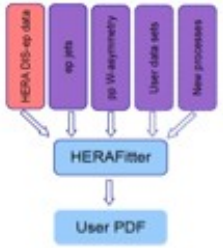
Logging output for comparison can be found here: ATLAS R=0.4, Fortran, ATLAS R=0.4, C++, ATLAS R=0.6, Fortran, ATLAS R=0.6, C++, CMS R=0.5, Fortran, CMS R=0.5, C++, CMS R=0.5, Fortran, converted from v14, CMS R=0.5, C++, converted from v14.

Scope of Release



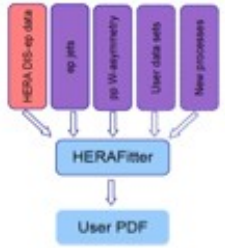
- Generic code to read fastNLO v2 tables: fastNLO_reader
  - Installable from autotools distribution tarball
  - Only dependency: LHAPDF
  - Comes in two flavors, Fortran and C++
  - Different code base, same results at O(10^{-10})
  - Fortran does not yet deal with flexible scale DIS tables
- New tables:
  - ATLAS Inclusive Jets, http://arxiv.org/abs/1112.6297, including 2-loop threshold corrections at default scale (pT_{jet}), R=0.4 and 0.6
  - CMS Inclusive Jets, Phys. Rev. Lett. 107 (2011) 132001, including 2-loop threshold corrections at default scale, R=0.5, and as proof of concept the CMS non-perturbative correction factors and data points
  - CMS: Table converted from v14 for comparison

Installation



- Install packages produced with standard autotools, just run
  - ./configure - -prefix=your/local/dir
  - make; make install
- In case of different location of LHAPDF use
  - ./configure –prefix=your/local/dir --with-lhapdf=path/to/lhapdf
  - Error message with hints if still not found
- For more options check
  - ./configure -help
- And also look into the README file
- Executables: fnlo-fread and fnlo-cppread, type
  - fnlo-fread -h (or fnlo-cppread -h)
- for command line arguments (table file, PDF file)

Initial Output




```
#########################################################################
#
# fastNLO_reader_2.1.0_1062
#
# Fortran program to read fastNLO v2 tables and
# derive QCD cross sections using PDFs from LHAPDF
#
#-------------------------------------------------------------------------
#
# Copyright (C) 2011 fastNLO Collaboration
# D. Britzger, T. Kluge, K. Rabbertz, F. Stober, M. Wobisch
#
# This program is free software: you can redistribute it and/or modify
# it under the terms of the GNU General Public License as published by
# the Free Software Foundation, either version 3 of the License, or
# (at your option) any later version.
#
# This program is distributed in the hope that it will be useful,
# but WITHOUT ANY WARRANTY; without even the implied warranty of
# MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
# GNU General Public License for more details.
#
# You should have received a copy of the GNU General Public License
# along with this program. If not, see <http://www.gnu.org/licenses/>.
#
#-------------------------------------------------------------------------
#
# The projects web page can be found at:
#   http://projects.hepforge.org/fastnlo
#
# If you use this code, please cite:
#   T. Kluge, K. Rabbertz, M. Wobisch, hep-ph/0609285
#   D. Britzger, T. Kluge, K. Rabbertz, F. Stober, M. Wobisch, arXiv:1109.1310
#
#########################################################################
```

Version and svn revision number

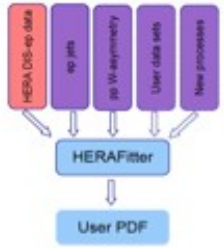
People

GPLv3 License

Web Page

References
(will be updated)

Program Start



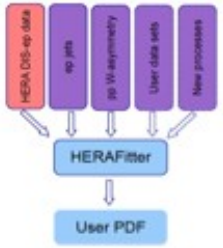

```
##################################################################################
# fnlo-read: Program Steering
#---------------------------------------------------------------------------------
# fnlo-read: Evaluating table: fnl1014_v2_all.tab
# fnlo-read: Using PDF set   : cteq66.LHgrid
##################################################################################

##################################################################################
# alphas-grv: First call:
##################################################################################
# ALPHAS-GRV: PI              =  3.141592653589793
# ALPHAS-GRV: M_Z/GeV         = 91.187600
# ALPHAS-GRV: a_s(M_Z)        =  0.118500
# APLHAS-GRV: a_s loop        =  2
# APLHAS-GRV: flavor-matching =    F
# APLHAS-GRV: nf (M_Z)        =  5
##################################################################################
```

Start parameters of default internal alpha_s code for comparison

Basic evaluation code ...
Other evolution code can be used/interfaced e.g. from LHAPDF
→ edit, recompile
Default output: List of LO and NLO x sections for selected PDF
Loop over scale variations, PDF members, alpha_s variations …
→ edit, recompile

Scenario Information 1




```
#################################################################################
# Information on fastNLO scenario: fnl1014
#--------------------------------------------------------------------------------
# Description:
#   d2sigma-jet_dpTd|y|_[pb_GeV]
#   CMS_Collaboration
#   Inclusive_Jet_pT
#   anti-kT_R=0.5
#   arXiv:1106.0208, Phys. Rev. Lett. 107, 132001 (2011).
#
# Centre-of-mass energy Ecms:  7000.     GeV
#
# Tot. no. of observable bins: 176 in 2 dimensions:
#
# No. of contributions 5
# Contribution 1:
#   LO
#   No. of events:      30000000000
#   provided by:
#   NLOJet++_4.1.3
#   Z. Nagy, Phys. Rev. Lett. 88, 122003 (2002),
#   Z. Nagy, Phys. Rev. D68, 094002 (2003).
#   Scale dimensions: 1
#     Scale description for dimension 1:          pT_jet_[GeV]
#     Number of scale variations for dimension 1: 1
#     Available scale settings for dimension 1:
#       Scale factor number 1:                       1.0000
#     Number of scale nodes for dimension 1:      6
```

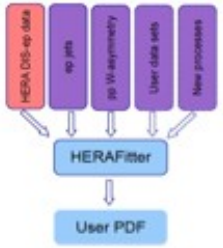
Exceptional!
Normally 2 or 3.

Measurement

Total no. of bins
No. of table contributions

Info for 1st contribution:
LO from NLOJet++
Referenz for used code is included in table where it belongs!

Scenario Information 2




```
# Contribution 3:
#   THC_2-loop
#   No. of events:        270336000
#   provided by:
#   Owens/Wobisch
#   2-loop threshold corrections for the inclusive jet
#   cross section in pp and ppbar according to:
#   N. Kidonakis, J.F. Owens, Phys. Rev. D63, 054019 (2001).
#   Scale dimensions: 1
#     Scale description for dimension 1:          pT_jet_[GeV]
#     Number of scale variations for dimension 1: 1
#     Available scale settings for dimension 1:
#       Scale factor number 1:                       1.0000
#     Number of scale nodes for dimension 1:      6
# Contribution 4:
#   NP Correction
#   No. of events:                0
#   provided by:
#   Pythia6 D6T & Herwig++ 2.3
#   T. Sjöstrand, S. Mrenna, P. Skands, JHEP 05, 026 (2006),
#   R. Field, Acta Phys. Polon. B39, 2611 (2008),
#   M. Bähr et al., Eur. Phys. J. C58, 639 (2008),
#   CMS Collaboration, arXiv:1106.0208, Phys. Rev. Lett. 107, 132001 (2011).
#   Scale dimensions: 0
```

Threshold Corrections

Non-perturbative Corrections

Technical Cross-check

tkdiff between Fortran and C++, ALL differences in color ...!

TkDiff 4.1.4

File Edit View Mark Merge

1 : 6c6 Merge: Diff: Mark:

fnl1014_v14_cv21_fread_1062.log

```
126 ##########################################################################################################################################################
127 ==========================================================================================================================================================
128  Cross Sections
129  The scale factor chosen here is:      1.000
130 ----------------------------------------------------------------------------------------------------------------------------------------------------------
131   IObs  Bin Size IODim1  [ pT_[GeV]     ]    IODim2  [   |y|          ]  LO cross section   NLO cross section   K NLO
132 ----------------------------------------------------------------------------------------------------------------------------------------------------------
133      1   3.000        1   18.00       21.00        1  0.00E+00  5.00E-01  1.57274581281E+07  1.63402311907E+07  1.03896
134      2   3.000        2   21.00       24.00        1  0.00E+00  5.00E-01  8.38588042457E+06  8.92499652457E+06  1.06429
135      3   4.000        3   24.00       28.00        1  0.00E+00  5.00E-01  4.44617619413E+06  4.68895651667E+06  1.05460
136      4   4.000        4   28.00       32.00        1  0.00E+00  5.00E-01  2.32175304480E+06  2.48739373594E+06  1.07134
137      5   5.000        5   32.00       37.00        1  0.00E+00  5.00E-01  1.22985606580E+06  1.31501340014E+06  1.06924
138      6   6.000        6   37.00       43.00        1  0.00E+00  5.00E-01  6.20058716819E+05  6.57353581654E+05  1.06015
139      7   6.000        7   43.00       49.00        1  0.00E+00  5.00E-01  3.19183821541E+05  3.42274328312E+05  1.07234
140      8   7.000        8   49.00       56.00        1  0.00E+00  5.00E-01  1.69704477492E+05  1.83046529104E+05  1.07862
141      9   8.000        9   56.00       64.00        1  0.00E+00  5.00E-01  8.87915718598E+04  9.55576371649E+04  1.07620
142     10   10.00       10   64.00       74.00        1  0.00E+00  5.00E-01  4.47860610011E+04  4.83398734386E+04  1.07935
143     11   10.00       11   74.00       84.00        1  0.00E+00  5.00E-01  2.26334926926E+04  2.44897733616E+04  1.08201
144     12   13.00       12   84.00       97.00        1  0.00E+00  5.00E-01  1.14157974746E+04  1.23657778458E+04  1.08322
145     13   17.00       13   97.00       114.0        1  0.00E+00  5.00E-01  5.20864150541E+03  5.66705156918E+03  1.08801
146     14   19.00       14   114.0       133.0        1  0.00E+00  5.00E-01  2.26986160457E+03  2.47492393341E+03  1.09034
147     15   20.00       15   133.0       153.0        1  0.00E+00  5.00E-01  1.03027761770E+03  1.12801906894E+03  1.09487
148     16   21.00       16   153.0       174.0        1  0.00E+00  5.00E-01  4.94585929406E+02  5.44349660966E+02  1.10062
149     17   22.00       17   174.0       196.0        1  0.00E+00  5.00E-01  2.48671425936E+02  2.74189028880E+02  1.10262
150     18   24.00       18   196.0       220.0        1  0.00E+00  5.00E-01  1.28423986831E+02  1.42067642887E+02  1.10624
151     19   25.00       19   220.0       245.0        1  0.00E+00  5.00E-01  6.77424165982E+01  7.54903551563E+01  1.11437
152     20   27.00       20   245.0       272.0        1  0.00E+00  5.00E-01  3.65423220021E+01  4.07221522939E+01  1.11438
153     21   28.00       21   272.0       300.0        1  0.00E+00  5.00E-01  2.00810227037E+01  2.24894597220E+01  1.11994
154     22   30.00       22   300.0       330.0        1  0.00E+00  5.00E-01  1.12407556895E+01  1.26477375709E+01  1.12517
155     23   32.00       23   330.0       362.0        1  0.00E+00  5.00E-01  6.33683801220E+00  7.14852031809E+00  1.12809
156     24   33.00       24   362.0       395.0        1  0.00E+00  5.00E-01  3.62773698109E+00  4.11706825391E+00  1.13489
157     25   35.00       25   395.0       430.0        1  0.00E+00  5.00E-01  2.10813697037E+00  2.40328694241E+00  1.14001
158     26   38.00       26   430.0       468.0        1  0.00E+00  5.00E-01  1.22390945155E+00  1.40066739688E+00  1.14492
159     27   39.00       27   468.0       507.0        1  0.00E+00  5.00E-01  7.14273567995E-01  8.21258466624E-01  1.14978
160     28   41.00       28   507.0       548.0        1  0.00E+00  5.00E-01  4.22300908307E-01  4.88483283158E-01  1.15672
161     29   44.00       29   548.0       592.0        1  0.00E+00  5.00E-01  2.49475414467E-01  2.89536598089E-01  1.16058
162     30   46.00       30   592.0       638.0        1  0.00E+00  5.00E-01  1.47171713316E-01  1.72087362982E-01  1.16930
163     31   48.00       31   638.0       686.0        1  0.00E+00  5.00E-01  8.71981367924E-02  1.02345684984E-01  1.17371
164     32   51.00       32   686.0       737.0        1  0.00E+00  5.00E-01  5.16004131315E-02  6.09739215817E-02  1.18166
165     33   109.0       33   737.0       846.0        1  0.00E+00  5.00E-01  2.39696393032E-02  2.86096708138E-02  1.19358
166     34   838.0       34   846.0       1684.        1  0.00E+00  5.00E-01  1.64803906607E-03  2.15929120721E-03  1.31022
```

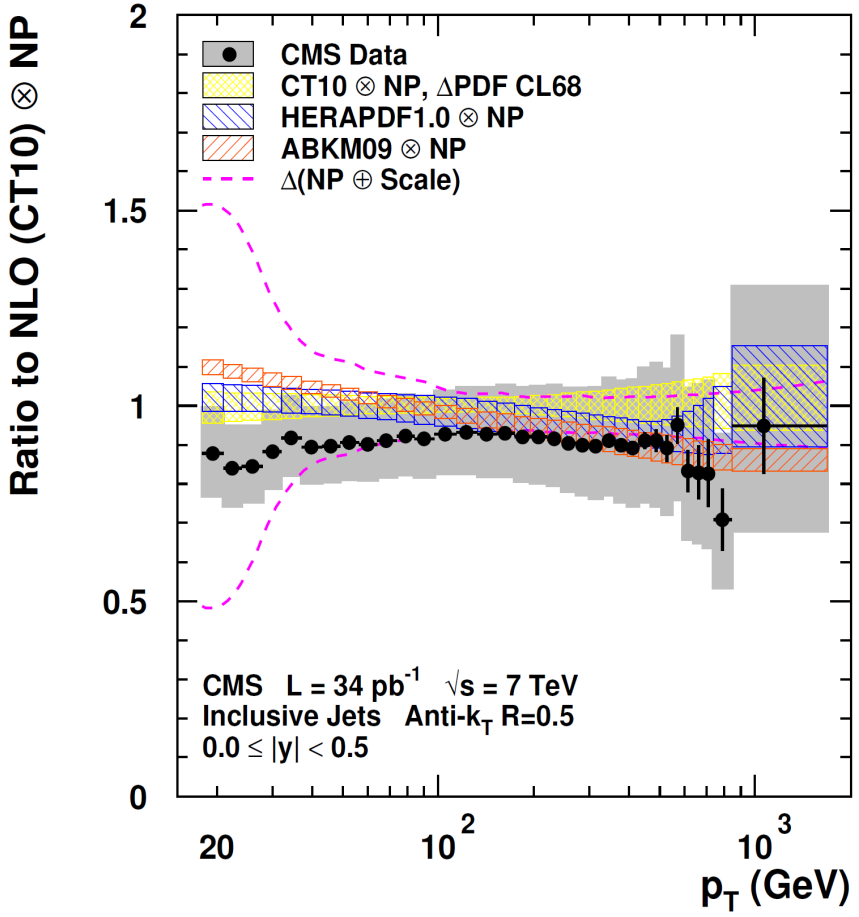
Identical at O(10^{-10})

CMS Inclusive Jets 2010

Theory derived with v1.4:

For given syst. experimental uncertainty stat. precision of NLO of 1% (low pT) or less sufficient

Highest pT bins are XXL in addition with large exp. stat. uncertainties



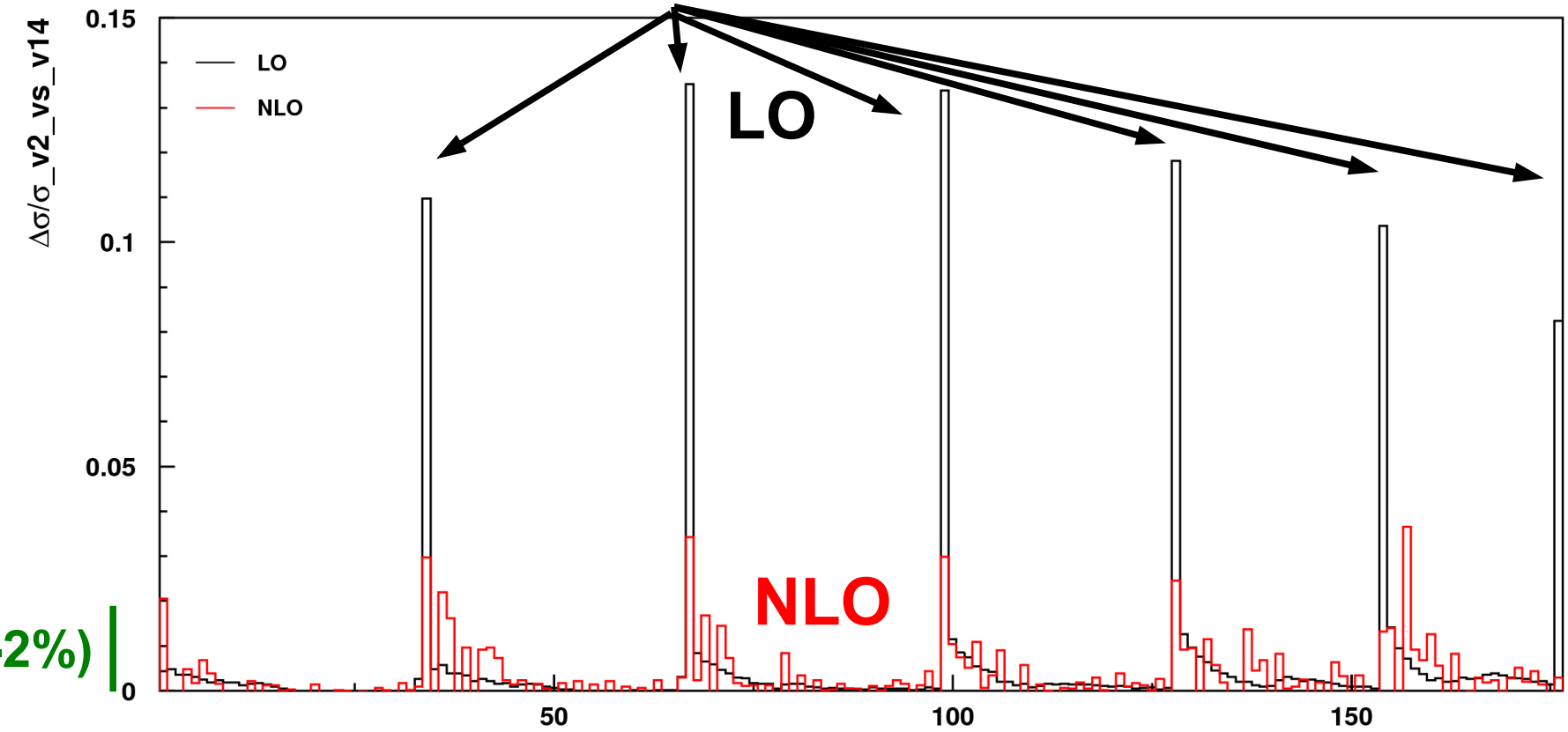
- **Investigate**
  - **Scale Dependence**
  - **PDF Uncertainties**
  - **Sensitivity to alpha_s**

CMS Note-2011-004

Cross-check v2 vs. v14

Feature known from discussion with CTEQ:

Small scale offset in highest pT XXL bin → resolved in v2!



O(1-2%)

Expected due to:

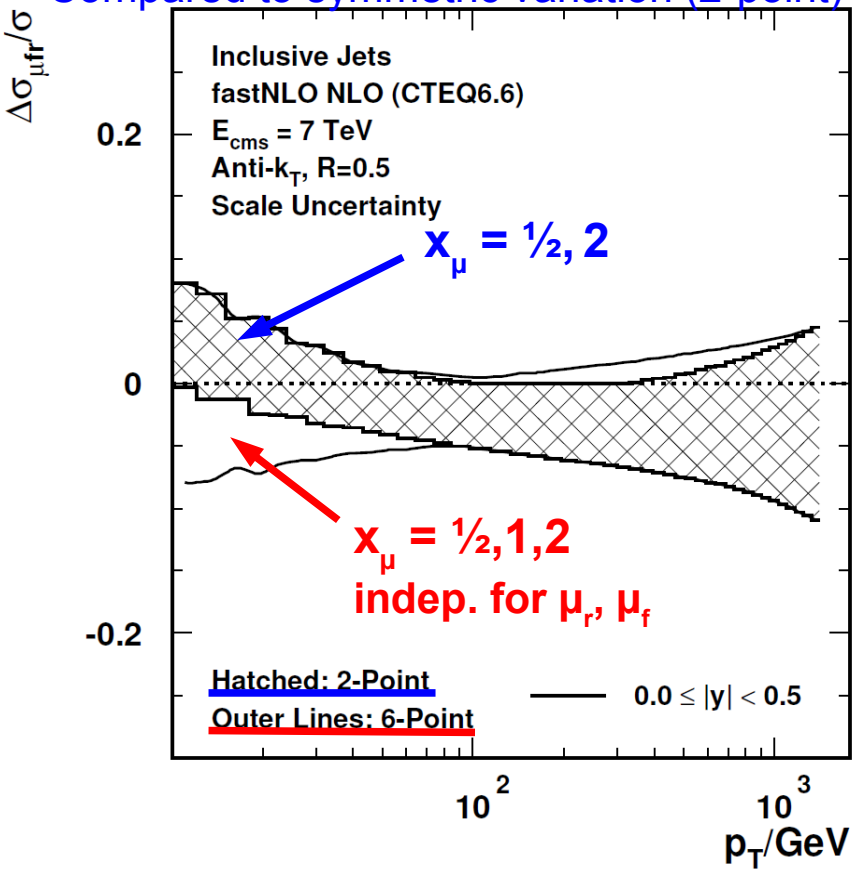
Stat. independent calculations, NLOJet++_2.0.1 → NLOJet++_4.1.3, improved x limits/binning, …

Scales in v2

In v14:

Asymmetric scale variations:

Independent variation of μ_r and μ_f
by factors of ½ and 2 avoiding rel. factors of 4
(6-point: (1/2,1/2), (1/2,1), (1,1/2), (1,2), (2,1), (2,2)
Compared to symmetric variation (2-point)

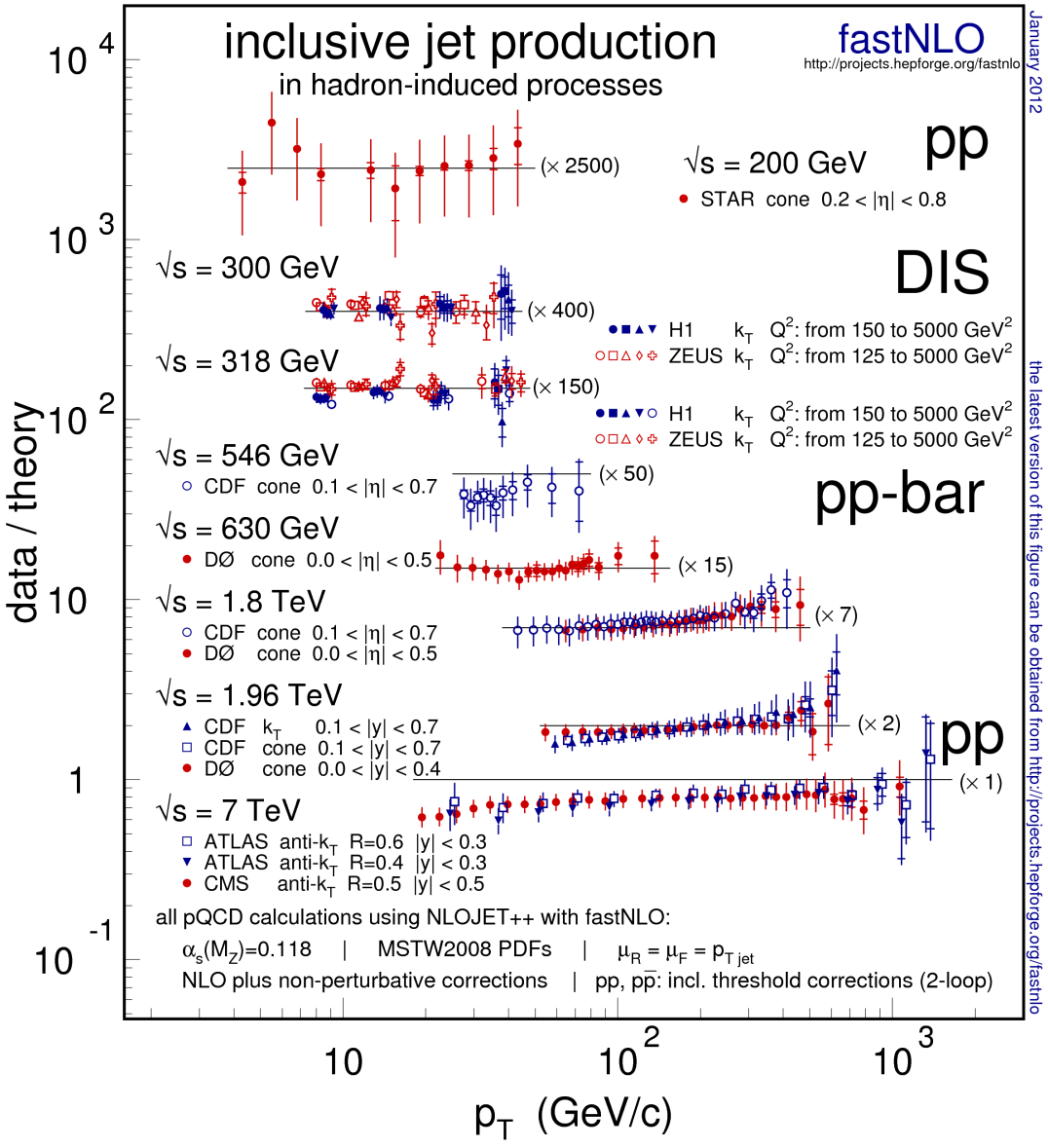


New in v2:

- **Two new possibilities:**
- **Improved interpolation for pre-defined scale**
  - **Examples exist for pp/ppbar scattering (CMS incl. Jets, D0 3-Jet Mass)**
  - **Table size moderately larger, sufficient for many purposes**
- **Even better: Save μ_r and μ_f dependent contributions separately**
  → full flexibility to compute results for arbitrary combinations of these two scales
  - **Can e.g. choose p_T^2 for μ_r and Q^2 for μ_f**
  - **Calculations for H1 and ZEUS**
  - **Works now also for ppbar, testing with ATLAS dijet mass**

Jets Data / Theory

- **Comparison of jet data from**
  - **STAR at RHIC**
  - **H1 and ZEUS at HERA**
  - **CDF and D0 at Tevatron**
- **Compatible with QCD**
- **Includes measurements from LHC**
- **New: Updated with ATLAS inclusive jets**

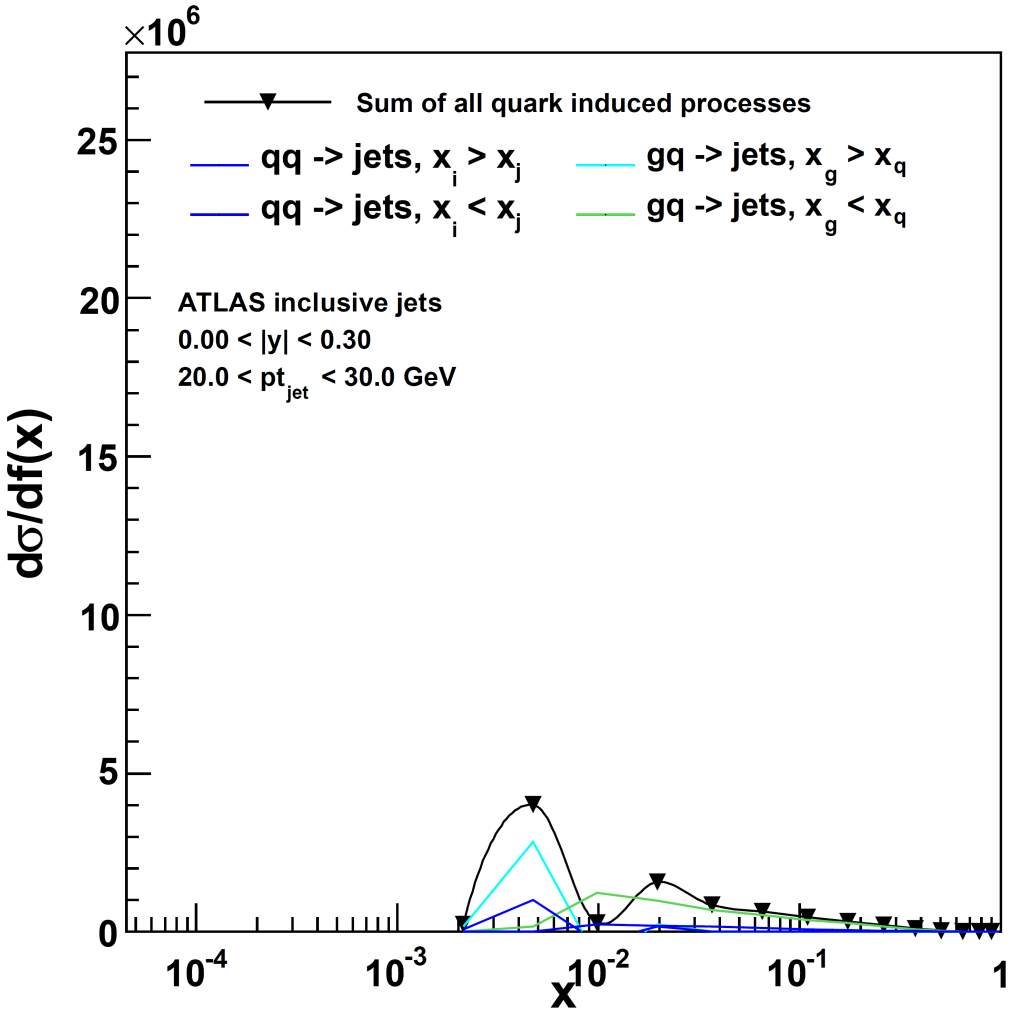


fastNLO, to be uploaded, arXiv:1109:1310v2, 2012

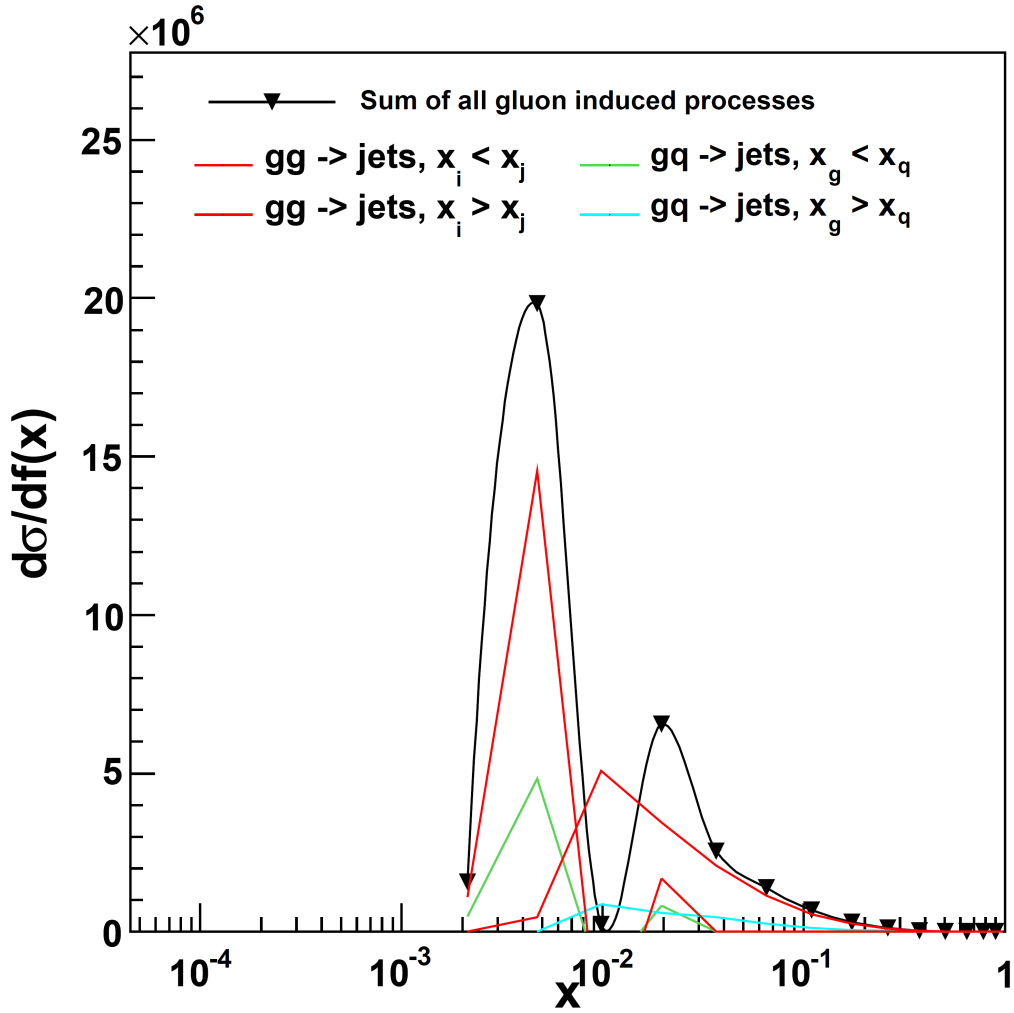
x Ranges

New plots from Daniel: x_1, x_2 ranges in inclusive jets

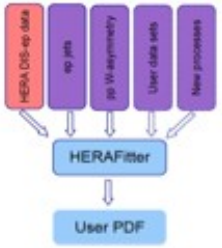
Quark contributions

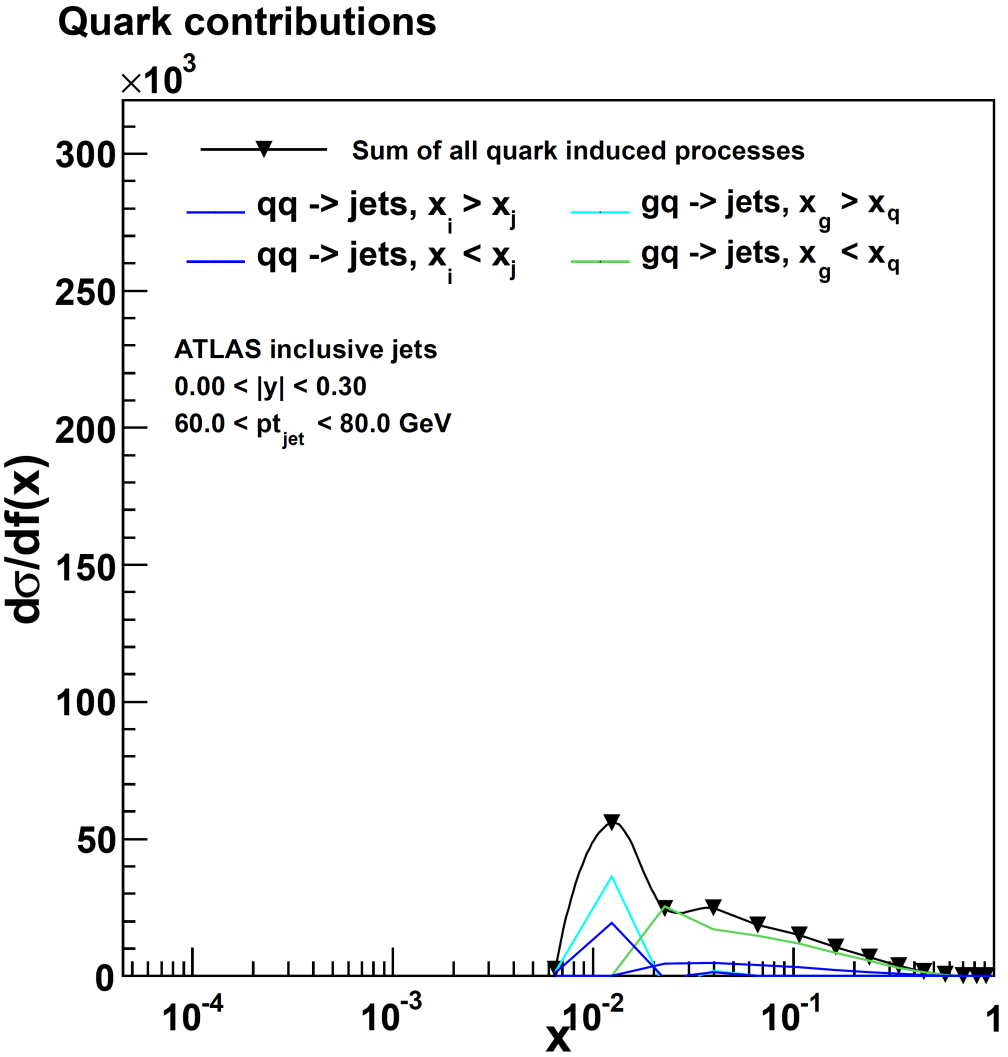


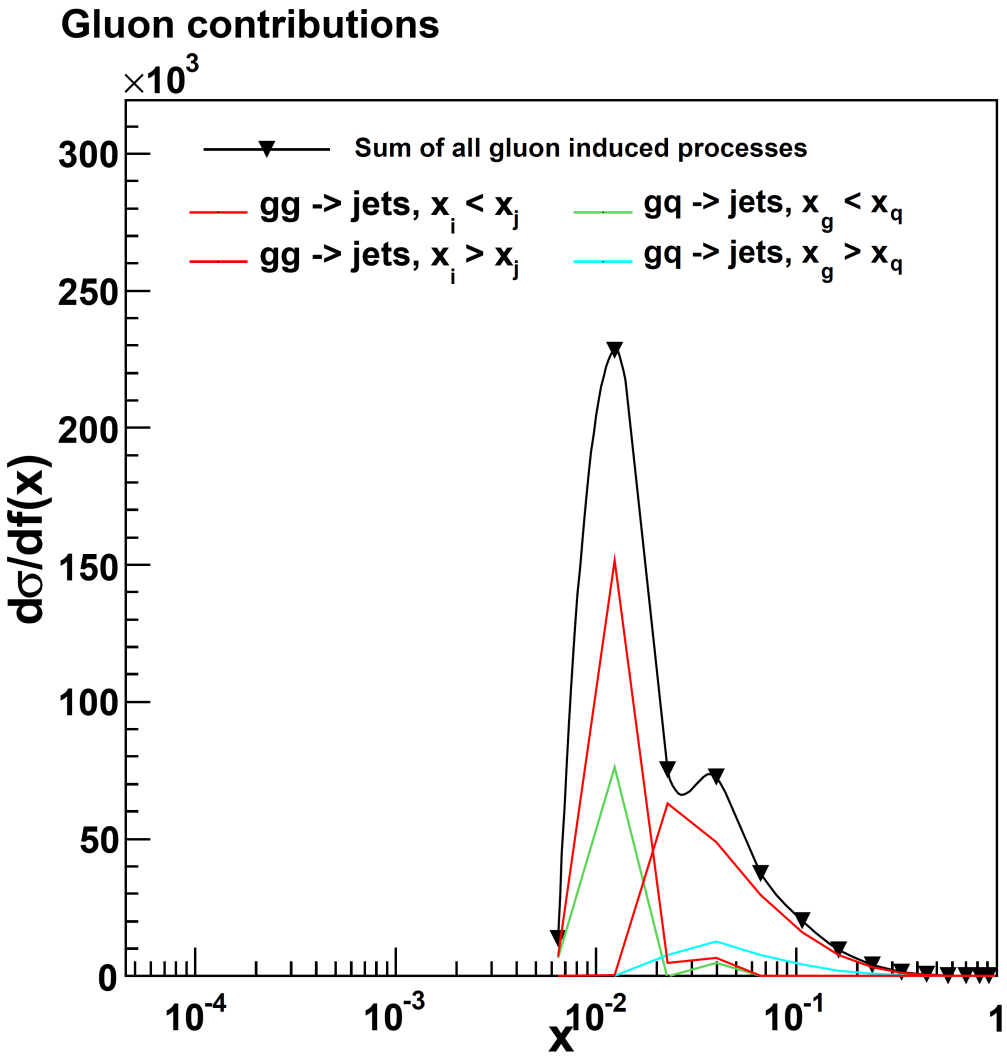
Gluon contributions



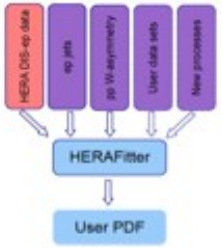
x Ranges


HERAFitter
User PDF

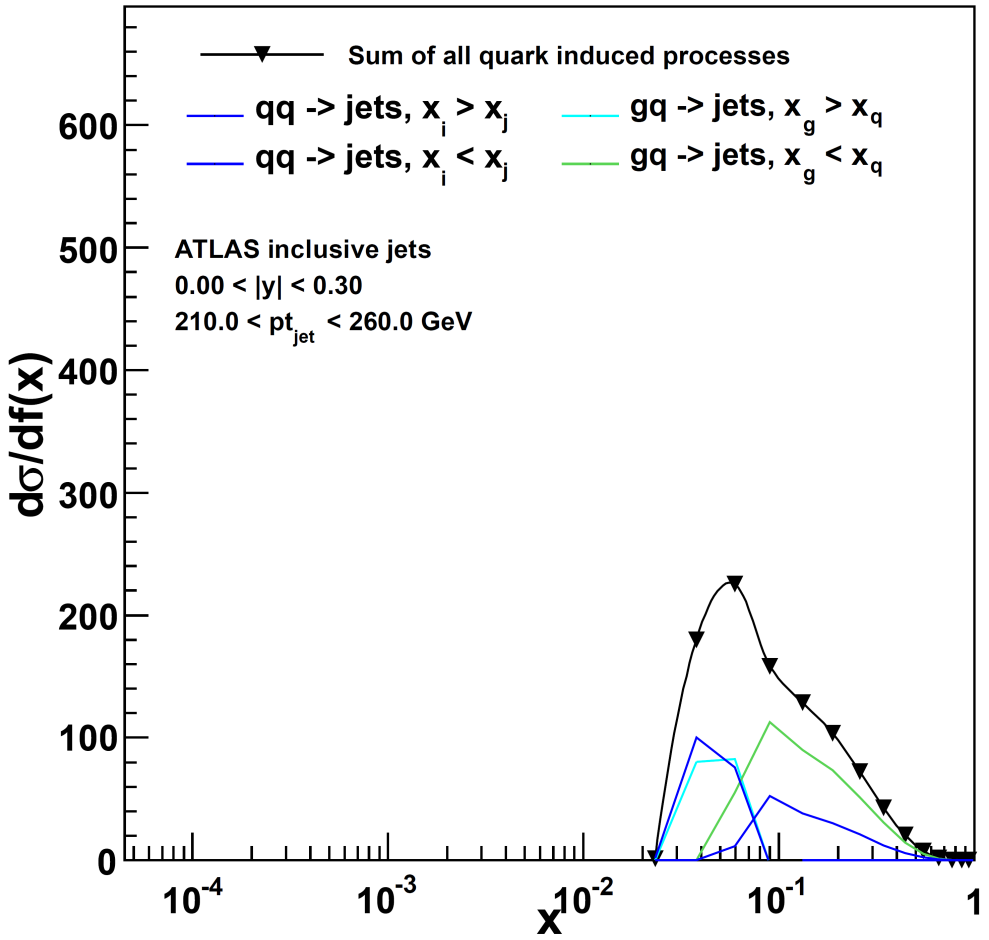

Quark contributions
×10^3
Sum of all quark induced processes
qq -> jets, x_i > x_j
qq -> jets, x_i < x_j
gq -> jets, x_g > x_q
gq -> jets, x_g < x_q
ATLAS inclusive jets
0.00 < |y| < 0.30
60.0 < pt_jet < 80.0 GeV
dσ/df(x)
x


Gluon contributions
×10^3
Sum of all gluon induced processes
gg -> jets, x_i < x_j
gg -> jets, x_i > x_j
gq -> jets, x_g < x_q
gq -> jets, x_g > x_q
dσ/df(x)
x

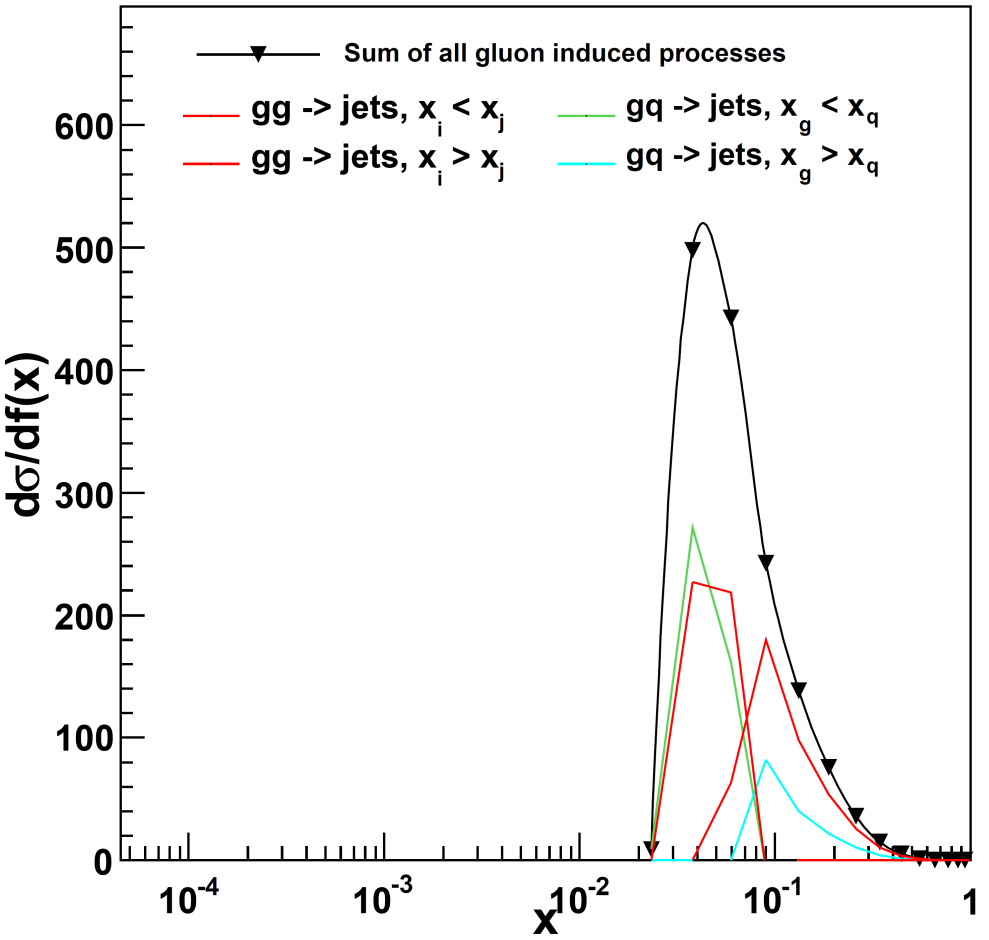
x Ranges



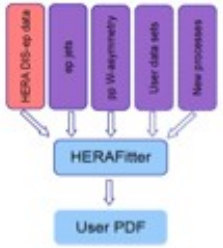
Quark contributions



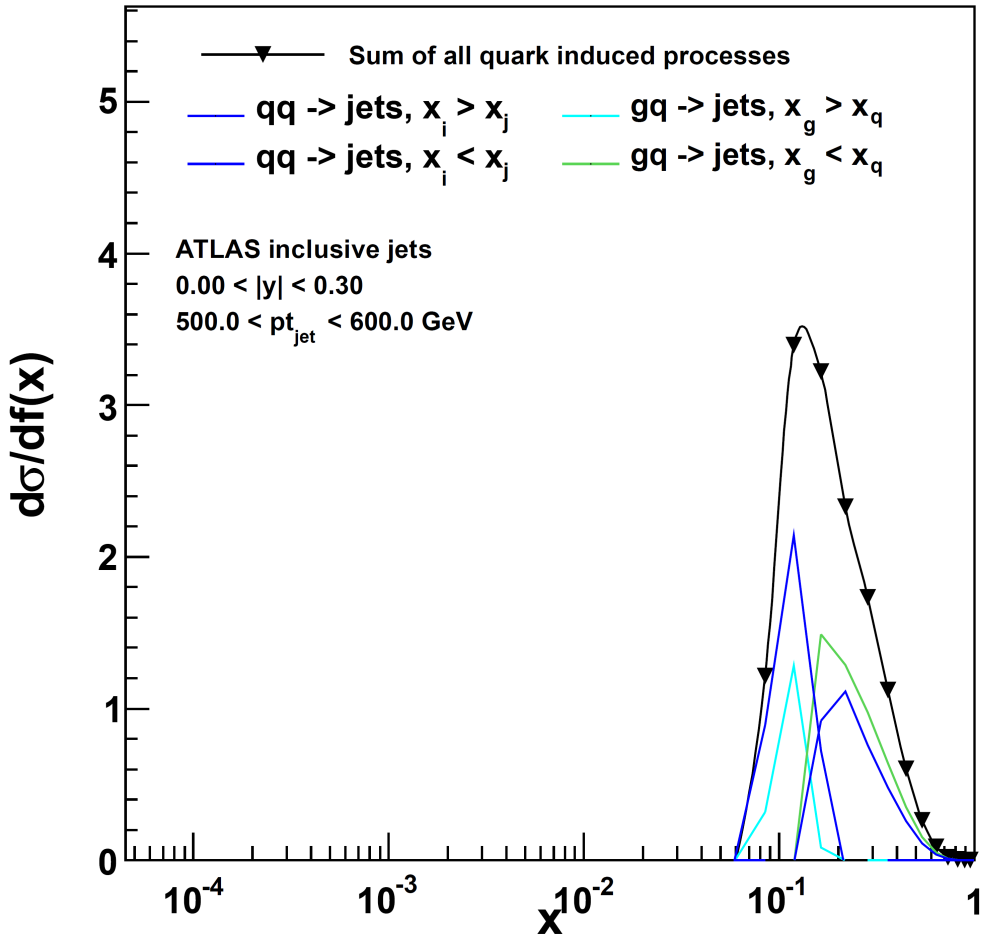
Gluon contributions



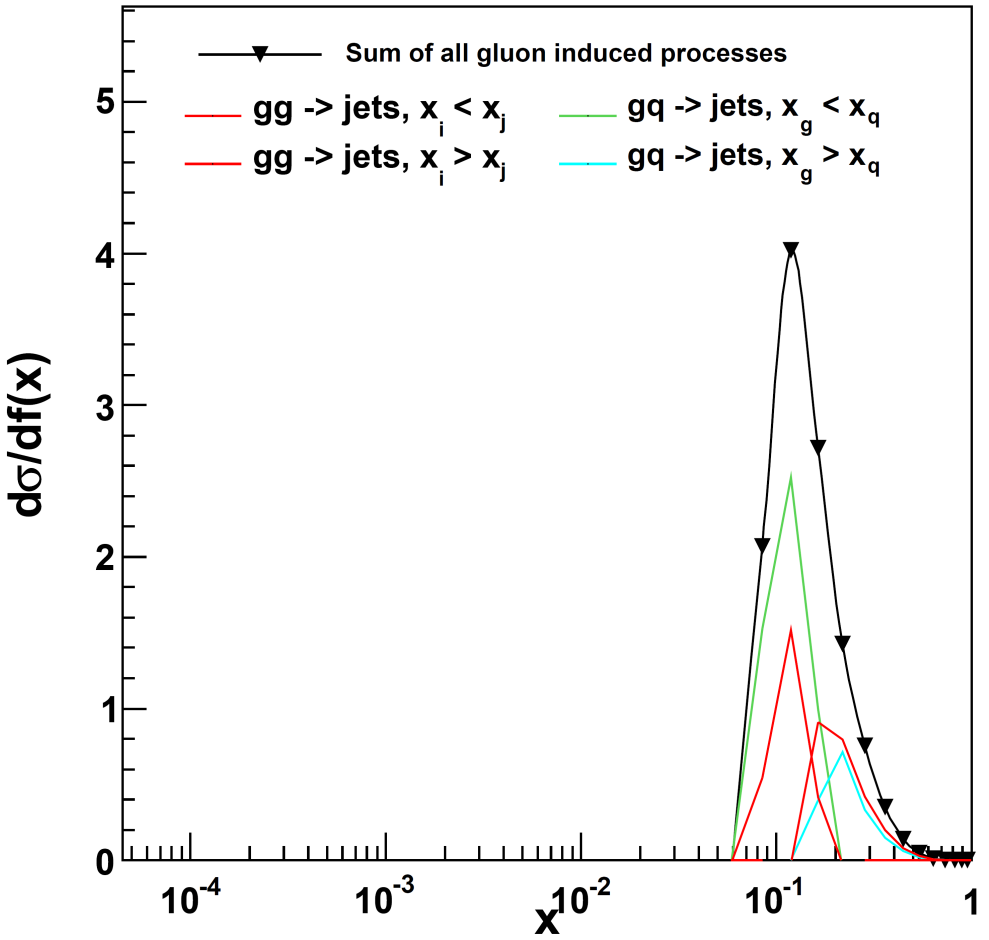
x Ranges



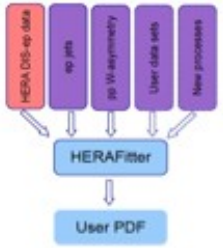
Quark contributions



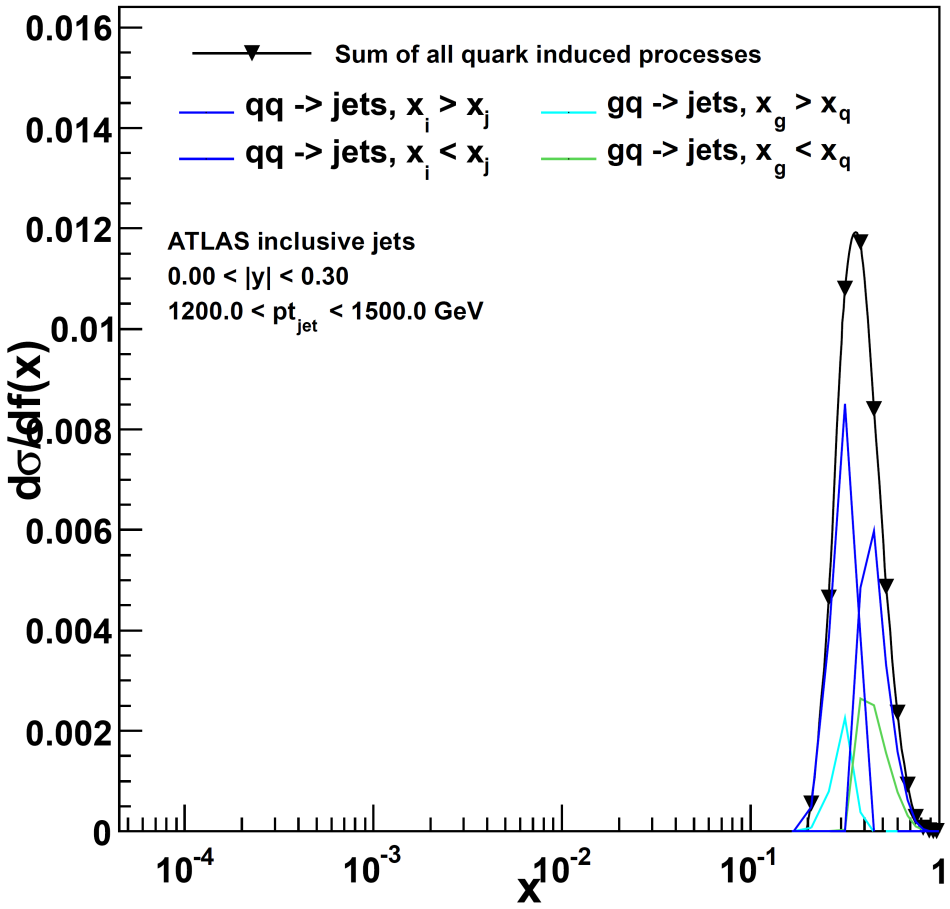
Gluon contributions



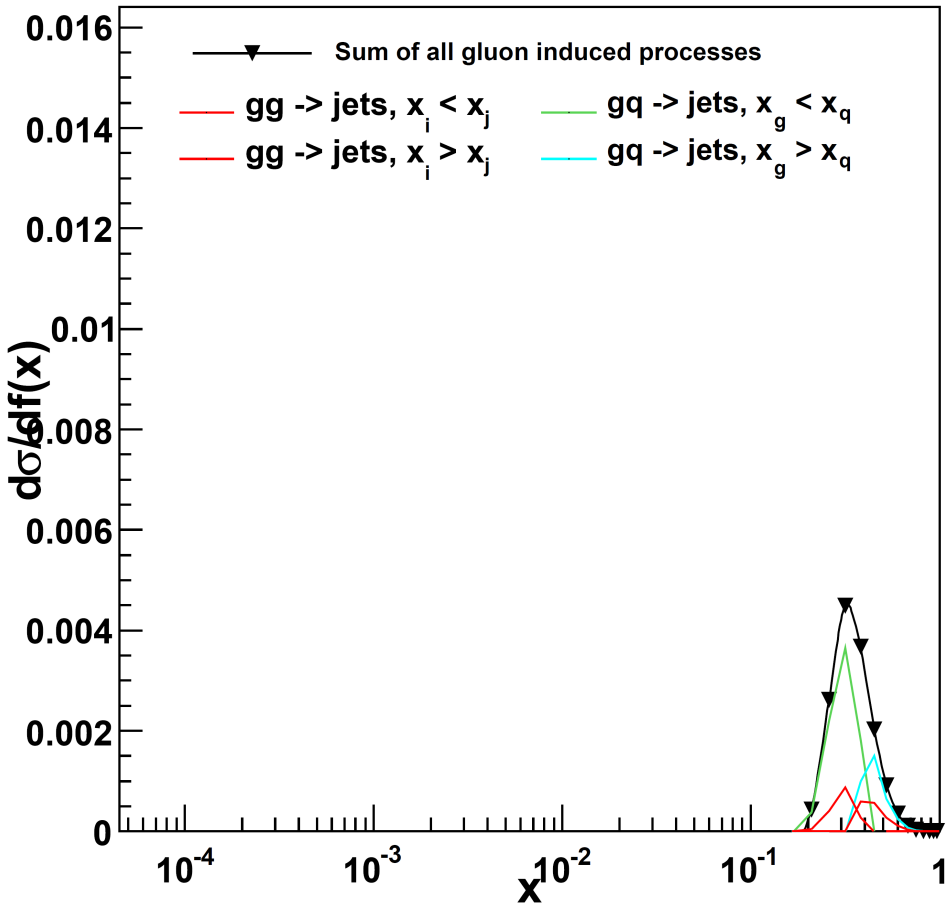
x Ranges



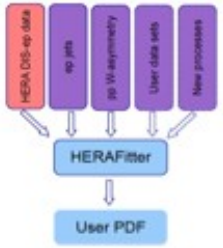
Quark contributions



Gluon contributions



ATLAS Dijet Mass



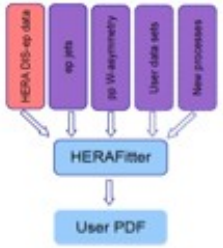
Here using scale pT_{12} average, not pT_{max}

No negative x sections

But small K factors at high y*

IObs	Bin Size	IODim1	[m12_[TeV]]		IODim2	[y*]		LO cross section	NLO cross section	K NLO
1	0.02000	1	0.07000	0.1100	1	0.00E+00	5.00E-01	4.04335857049E+08	3.77076355743E+08	0.93258
2	0.02500	2	0.1100	0.1600	1	0.00E+00	5.00E-01	5.36940002705E+07	5.15163176652E+07	0.95944
3	0.02500	3	0.1600	0.2100	1	0.00E+00	5.00E-01	1.01919265711E+07	1.00180081481E+07	0.98294
4	0.02500	4	0.2100	0.2600	1	0.00E+00	5.00E-01	2.83535594095E+06	2.82307316459E+06	0.99567
5	0.02500	5	0.2600	0.3100	1	0.00E+00	5.00E-01	9.92247092771E+05	1.00147064371E+06	1.00930
6	0.03000	6	0.3100	0.3700	1	0.00E+00	5.00E-01	3.78064012023E+05	3.84944182557E+05	1.01820
7	0.03500	7	0.3700	0.4400	1	0.00E+00	5.00E-01	1.41619587975E+05	1.45890009674E+05	1.03015
8	0.03500	8	0.4400	0.5100	1	0.00E+00	5.00E-01	5.59784220628E+04	5.82071322572E+04	1.03981
9	0.04000	9	0.5100	0.5900	1	0.00E+00	5.00E-01	2.36121051053E+04	2.47753042254E+04	1.04926
10	0.04000	10	0.5900	0.6700	1	0.00E+00	5.00E-01	1.03342555494E+04	1.09303160878E+04	1.05768
11	0.04500	11	0.6700	0.7600	1	0.00E+00	5.00E-01	4.73470538811E+03	5.04838992370E+03	1.06625
12	0.04500	12	0.7600	0.8500	1	0.00E+00	5.00E-01	2.22627281621E+03	2.38987023810E+03	1.07348
129	0.09000	1	1.760	1.940	8	3.50E+00	4.00E+00	2.47147477257E+04	1.11320512734E+04	0.45042
130	0.09000	2	1.940	2.120	8	3.50E+00	4.00E+00	1.23608241685E+04	4.36460280956E+03	0.35310
131	0.1050	3	2.120	2.330	8	3.50E+00	4.00E+00	5.93355777381E+03	2.62657064558E+03	0.44266
132	0.1100	4	2.330	2.550	8	3.50E+00	4.00E+00	2.72246193108E+03	1.20088197222E+03	0.44110
133	0.1150	5	2.550	2.780	8	3.50E+00	4.00E+00	1.19884116134E+03	4.94354574819E+02	0.41236
134	0.1300	6	2.780	3.040	8	3.50E+00	4.00E+00	5.04966931118E+02	1.65732994373E+02	0.32821
135	0.1350	7	3.040	3.310	8	3.50E+00	4.00E+00	1.90309622496E+02	5.62557839301E+01	0.29560
136	0.3100	8	3.310	3.930	8	3.50E+00	4.00E+00	4.39852246710E+01	1.42470181508E+01	0.32390
137	0.7700	9	3.930	5.470	8	3.50E+00	4.00E+00	1.64878716730E+00	1.66376848603E-01	0.10091
138	0.1960	1	2.550	3.040	9	4.00E+00	4.40E+00	1.08519370692E+03	2.42791287352E+02	0.22373
139	0.4920	2	3.040	4.270	9	4.00E+00	4.40E+00	1.01979645090E+02	2.40265257563E+01	0.23560

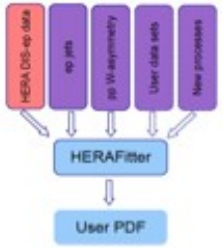
ATLAS Dijet Mass



Within same flexible-scale table using now additional exp. of y* factor
First application of flexible-scale table in pp x sections
K factors improved as suggested in ATLAS publication

120	0.08000	4	1.600	1.760	7	3.00E+00	3.50E+00	1.32646108148E+04	1.18262313480E+04	0.89156
121	0.09000	5	1.760	1.940	7	3.00E+00	3.50E+00	6.35427568486E+03	5.98677448962E+03	0.94216
122	0.09000	6	1.940	2.120	7	3.00E+00	3.50E+00	3.01826719152E+03	2.59343103139E+03	0.85925
123	0.1050	7	2.120	2.330	7	3.00E+00	3.50E+00	1.39004545812E+03	1.26626648970E+03	0.91095
124	0.1100	8	2.330	2.550	7	3.00E+00	3.50E+00	6.05397545736E+02	4.71383534578E+02	0.77863
125	0.1150	9	2.550	2.780	7	3.00E+00	3.50E+00	2.60448074223E+02	2.19328183457E+02	0.84212
126	0.1300	10	2.780	3.040	7	3.00E+00	3.50E+00	1.05168809161E+02	8.86573184111E+01	0.84300
127	0.2850	11	3.040	3.610	7	3.00E+00	3.50E+00	2.58231089299E+01	2.01999728660E+01	0.78224
128	0.7150	12	3.610	5.040	7	3.00E+00	3.50E+00	1.26139283969E+00	8.42048200351E-01	0.66755
129	0.09000	1	1.760	1.940	8	3.50E+00	4.00E+00	1.72927102352E+04	1.48219438223E+04	0.85712
130	0.09000	2	1.940	2.120	8	3.50E+00	4.00E+00	8.69399157133E+03	6.67217855935E+03	0.76745
131	0.1050	3	2.120	2.330	8	3.50E+00	4.00E+00	4.19230808938E+03	3.51738853546E+03	0.83901
132	0.1100	4	2.330	2.550	8	3.50E+00	4.00E+00	1.93254151699E+03	1.60395602406E+03	0.82997
133	0.1150	5	2.550	2.780	8	3.50E+00	4.00E+00	8.54637132530E+02	6.86500568967E+02	0.80327
134	0.1300	6	2.780	3.040	8	3.50E+00	4.00E+00	3.61445572890E+02	2.62022802533E+02	0.72493
135	0.1350	7	3.040	3.310	8	3.50E+00	4.00E+00	1.36818401919E+02	9.58563033375E+01	0.70061
136	0.3100	8	3.310	3.930	8	3.50E+00	4.00E+00	3.17683134169E+01	2.26530880711E+01	0.71307
137	0.7700	9	3.930	5.470	8	3.50E+00	4.00E+00	1.19973639554E+00	6.21475083804E-01	0.51801
138	0.1960	1	2.550	3.040	9	4.00E+00	4.40E+00	7.35596741054E+02	5.14249165497E+02	0.69909
139	0.4920	2	3.040	4.270	9	4.00E+00	4.40E+00	6.99309748151E+01	4.84475413111E+01	0.69279

Outlook



- Public release of generic code to read fastNLO v2 tables available: fastNLO_reader_2.1.0
- Released simultaneously: ATLAS and CMS inclusive jet tables
- More tables to come, in particular DIS
- Please try it out, we are happy to receive feedback and answer questions

Backup Slides