Validphys Report
NNPDF revision 528M

The NNPDF Collaboration

February 4, 2013

Contents

VALIDPHYS 528M	**Current Fit**	**Reference**	**CTEQ**	**MSTW**
PDF set name	NNPDF23 nlo FFN NF4 as 0119 mc	NNPDF23 nlo FFN NF4 as 0119	CT10nlo	MSTW2008nlo90c

Table 1: Configuration file

1 Fit summary

- This is the description block, please update these lines before run.

Parameter	**Current Fit**	**Reference Fit**
$\chi^2_{\rm tot}$ (exp)	1.16	1.10
$\langle E\rangle \pm \sigma_E$	2.21±0.06	2.21±0.06
$\langle E_{\rm tr}\rangle \pm \sigma_{E_{\rm tr}}$	2.17±0.09	2.17±0.09
$\langle E_{\rm val}\rangle \pm \sigma_{E_{\rm val}}$	2.25±0.08	2.25±0.08
$\langle {\rm TL}\rangle \pm \sigma_{\rm TL}$	18539±6918	18539±6918
$\langle \chi^{2(k)}\rangle \pm \sigma_{\chi^{2(k)}}$	1.18±0.06	1.16±0.04
$\langle \sigma^{(\rm exp)}\rangle_{\rm dat}$	15.66%	15.66%
$\langle \sigma^{(\rm net)}\rangle_{\rm dat}$	3.00%	3.17%
$\langle \rho^{(\rm exp)}\rangle_{\rm dat}$	3.78e-01	3.78e-01
$\langle \rho^{(\rm net)}\rangle_{\rm dat}$	5.99e-01	5.75e-01
$\langle {\rm cov}^{(\rm exp)}\rangle_{\rm dat}$	1.87e+08	1.87e+08
$\langle {\rm cov}^{(\rm net)}\rangle_{\rm dat}$	1.36e+06	1.03e+06
$x\Sigma + xg$	1.00657e+00±3.72023e-03	1.00004e+00±1.16460e-03
u_v	1.99988e+00±3.00107e-03	2.00020e+00±2.93500e-03
d_v	9.99269e-01±2.98912e-03	9.99990e-01±2.98826e-03
s_v	-1.78484e-03±4.13986e-03	5.97808e-06±3.48107e-05
xs_v	2.08956e-03±1.52120e-03	3.48336e-03±1.88172e-03
K_s	3.38972e-01±6.80957e-02	2.90192e-01±7.72663e-02
Δ_s	1.43902e-01±3.47919e-02	1.43429e-01±3.49106e-02

Table 2: Summary.

2 Comparing PDFs

2.1 Distances

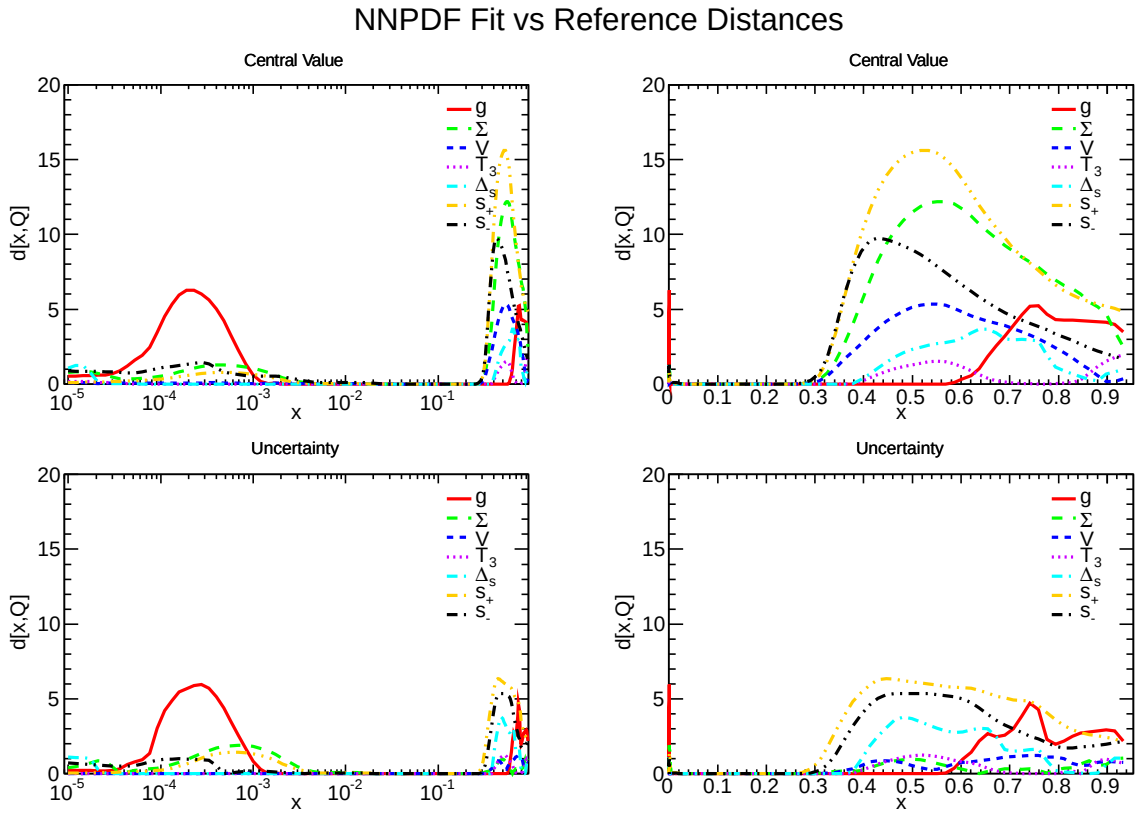

Figure 1: Distances in the fitting basis.

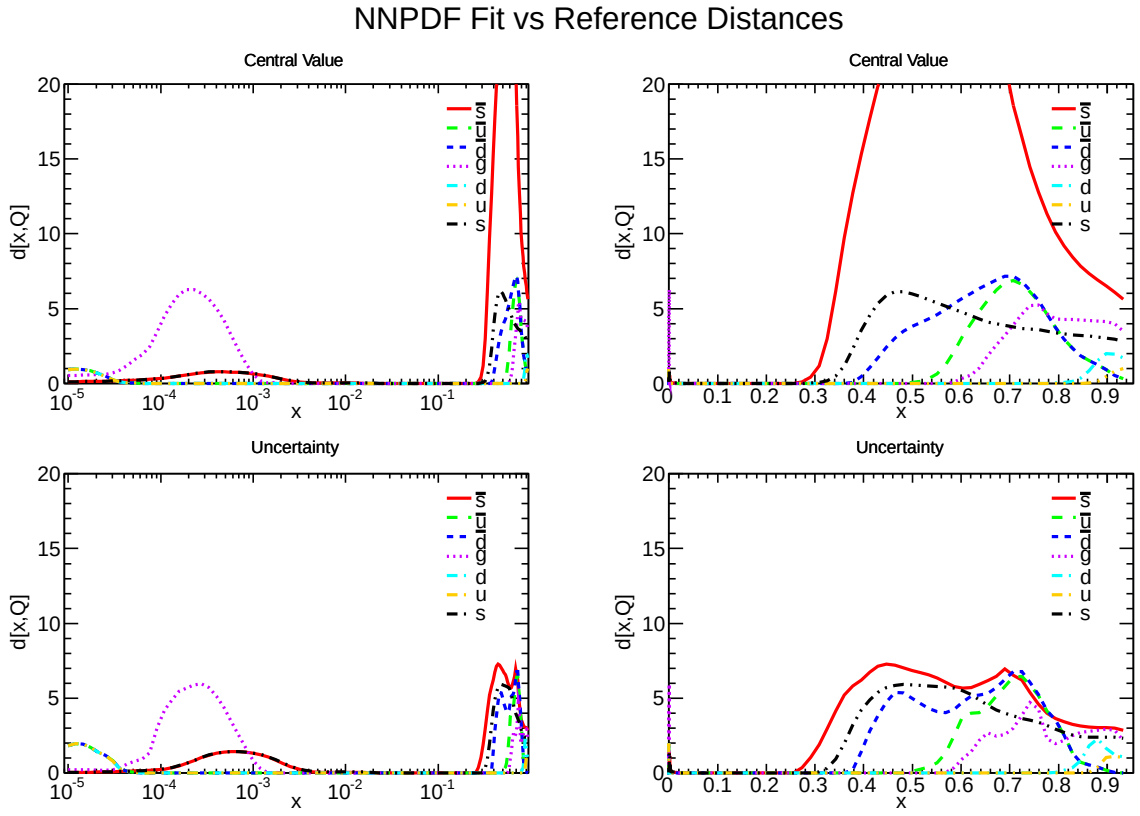

Figure 2: Distances in the flavour basis.

2.2 Comparing PDFs in evolution basis

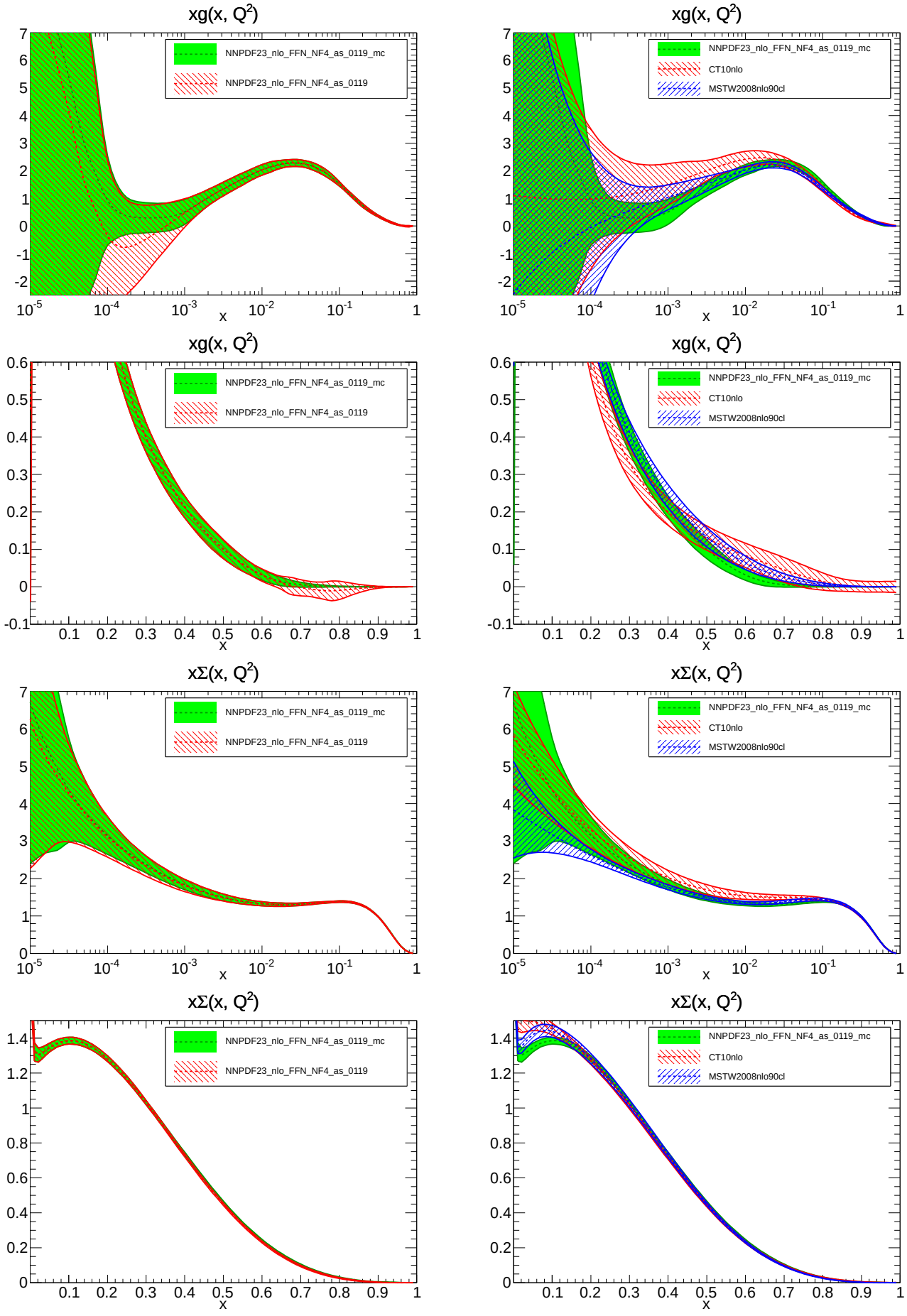

Figure 3: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

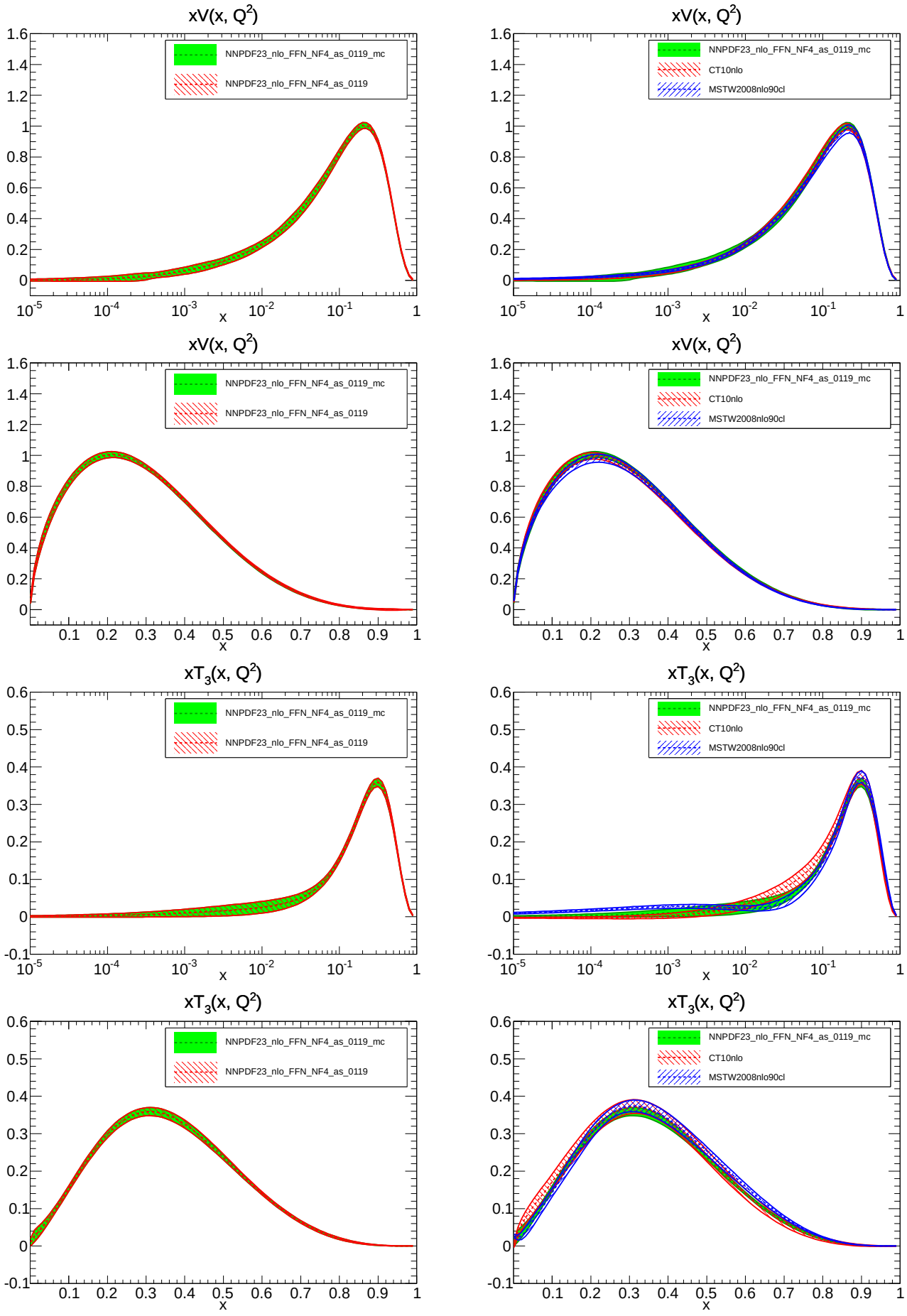

Figure 4: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

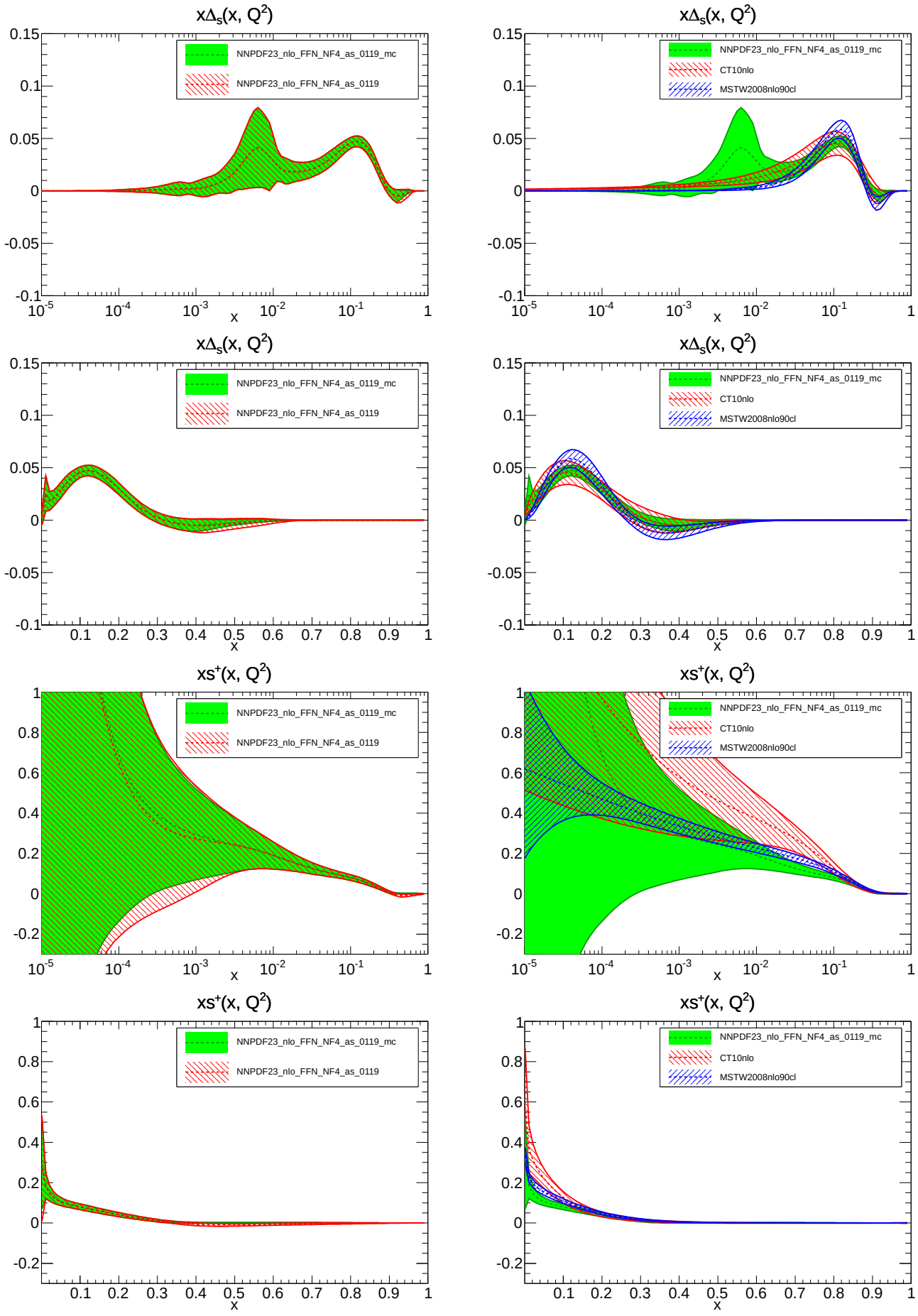

Figure 5: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

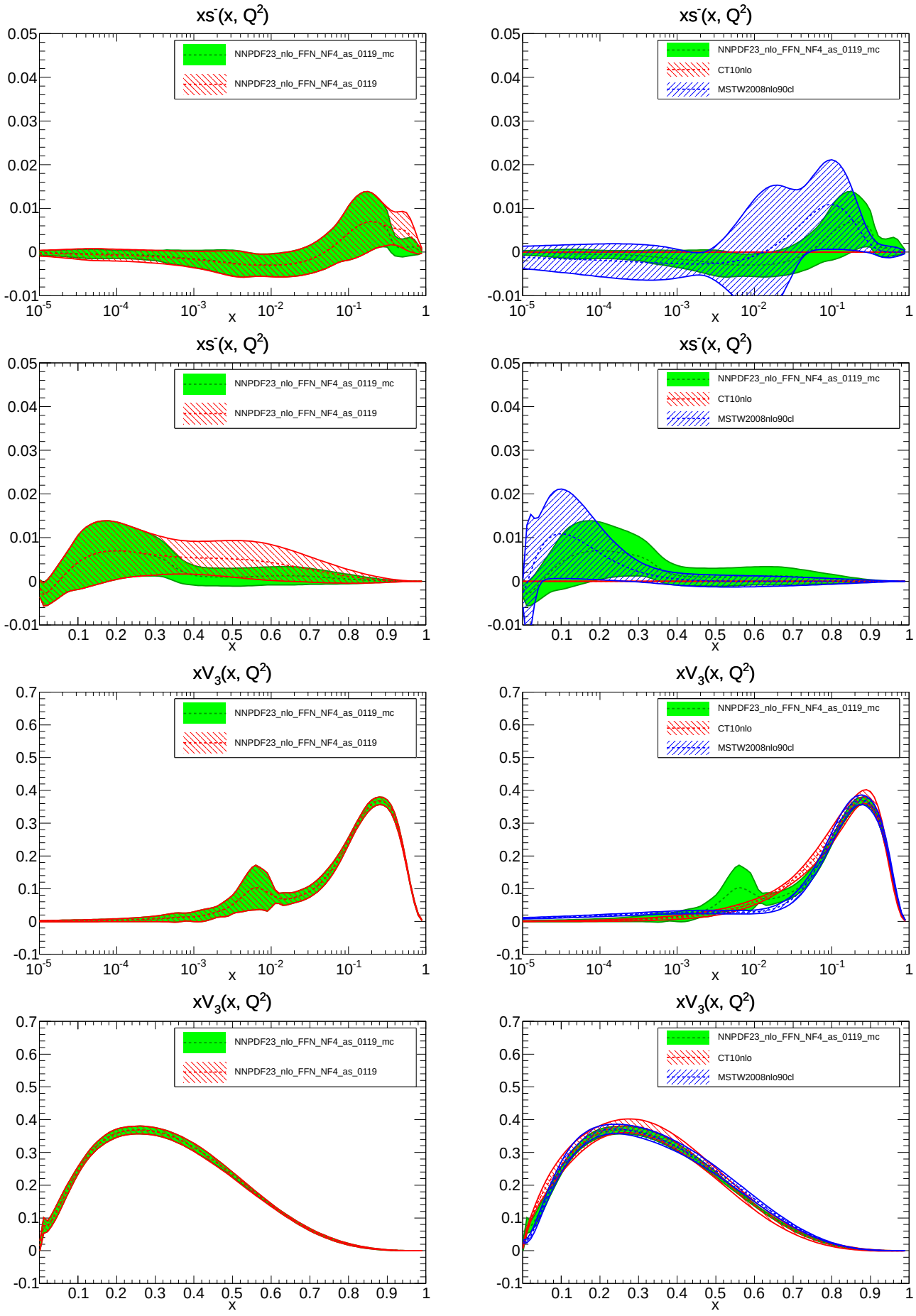

Figure 6: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

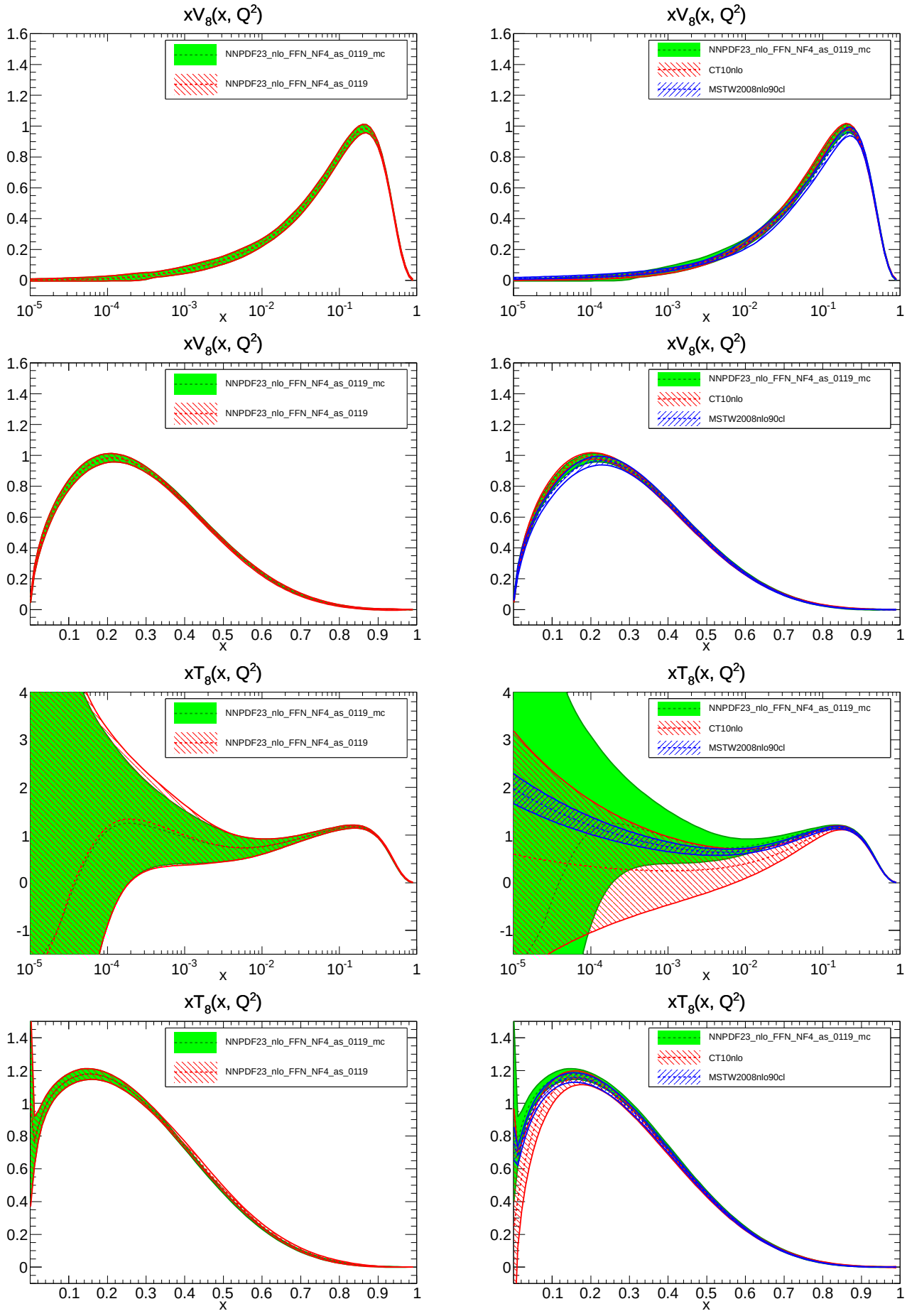

Figure 7: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

2.3 Comparing PDFs in LHA basis

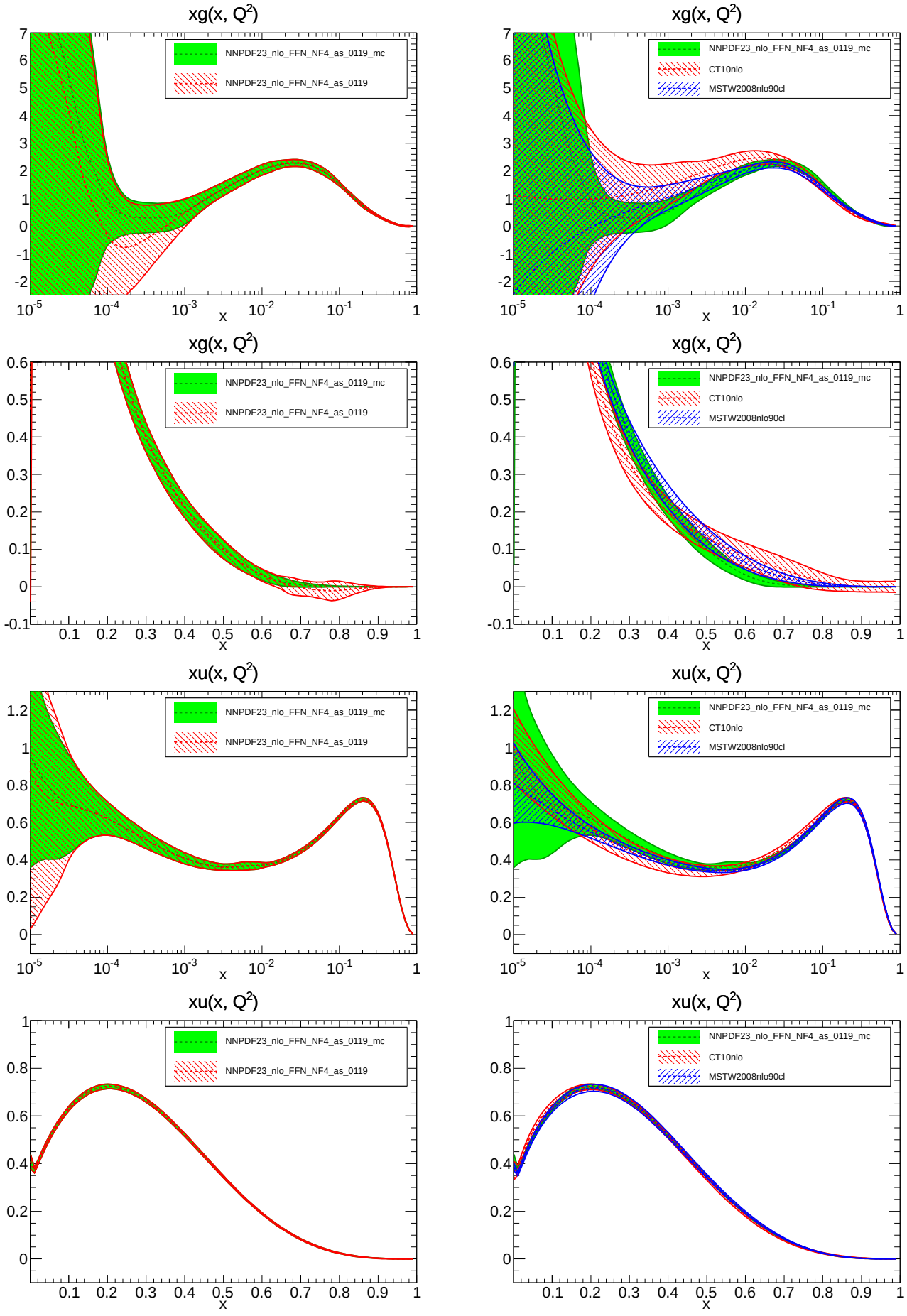

Figure 8: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

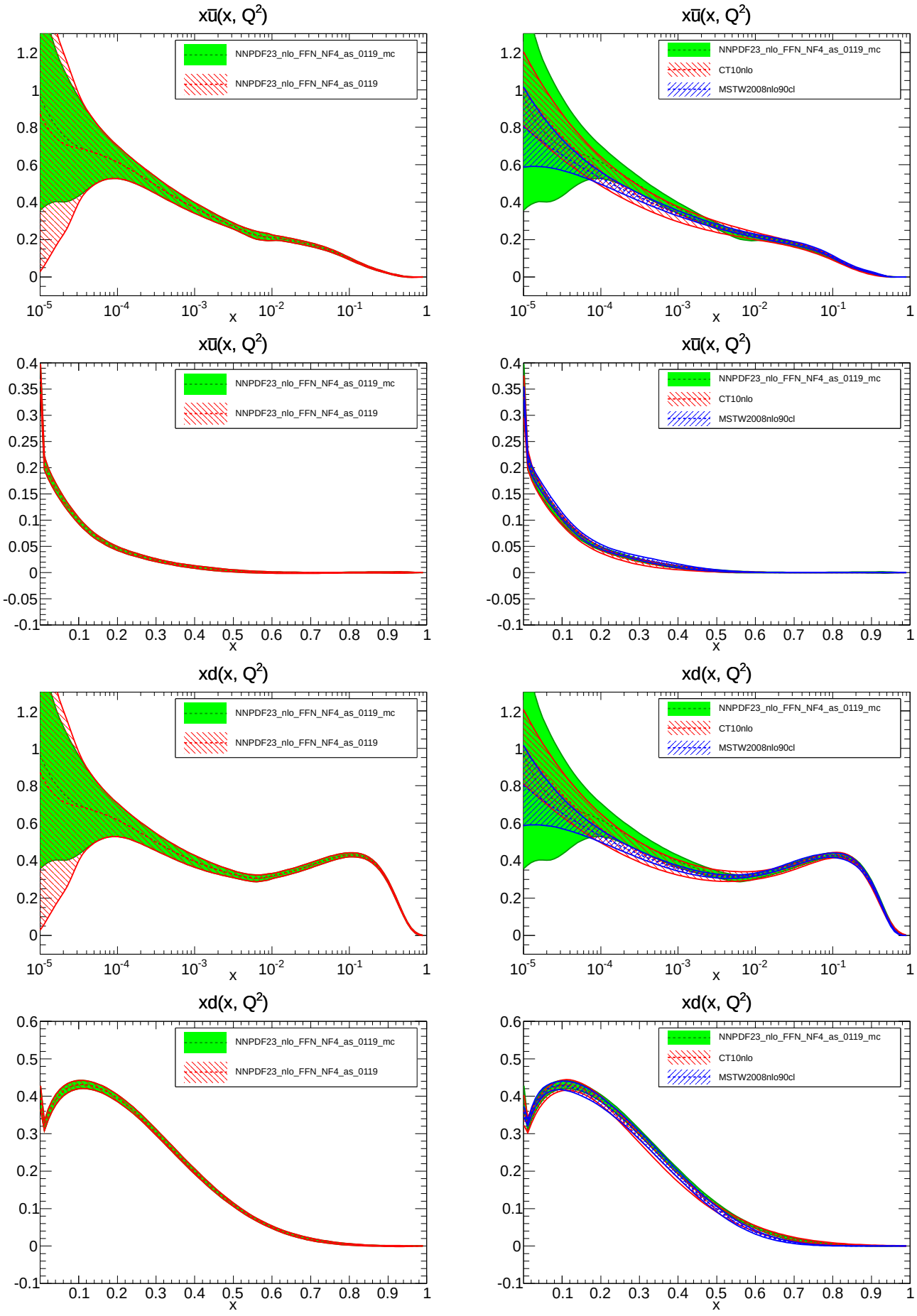

Figure 9: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

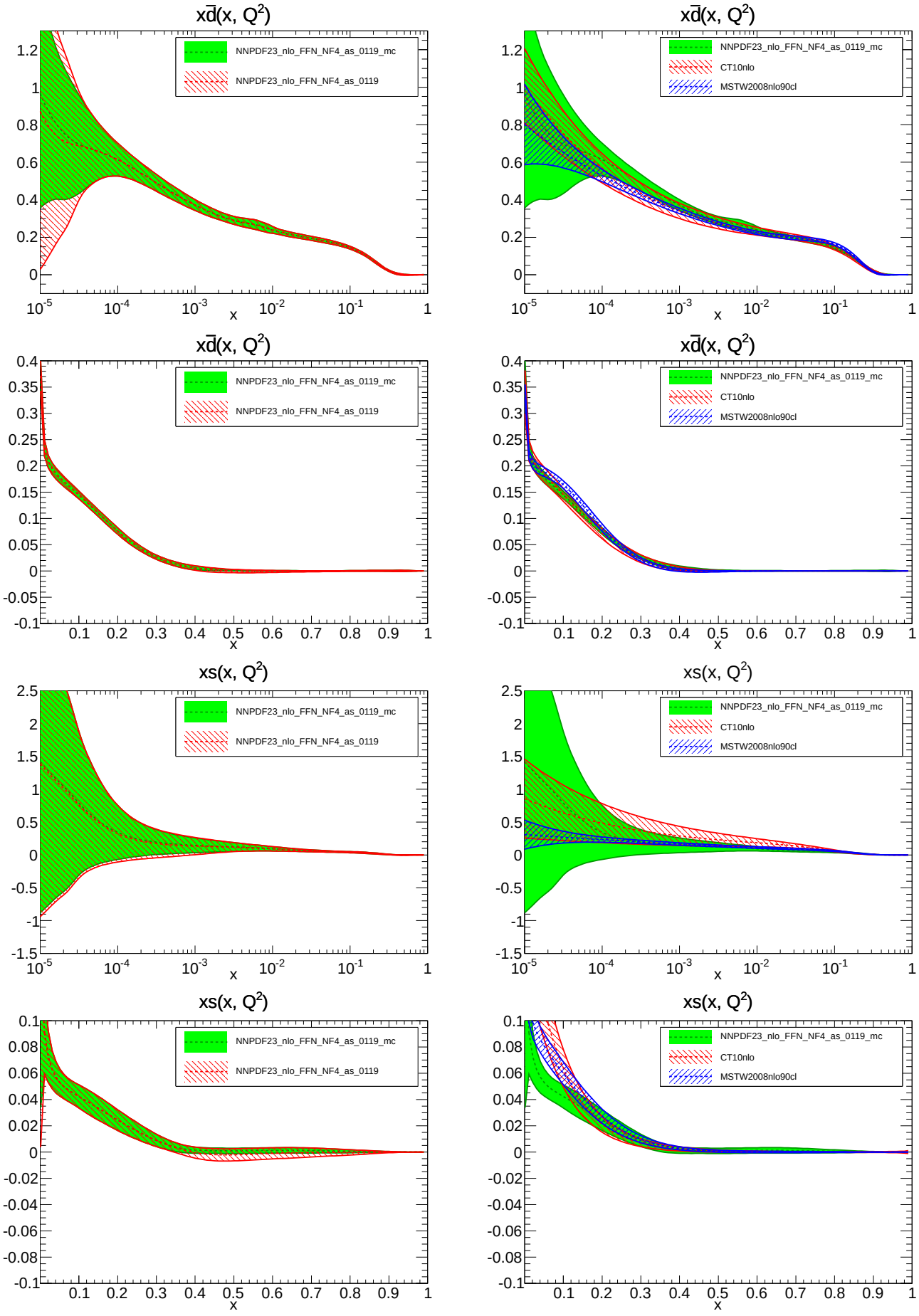

Figure 10: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

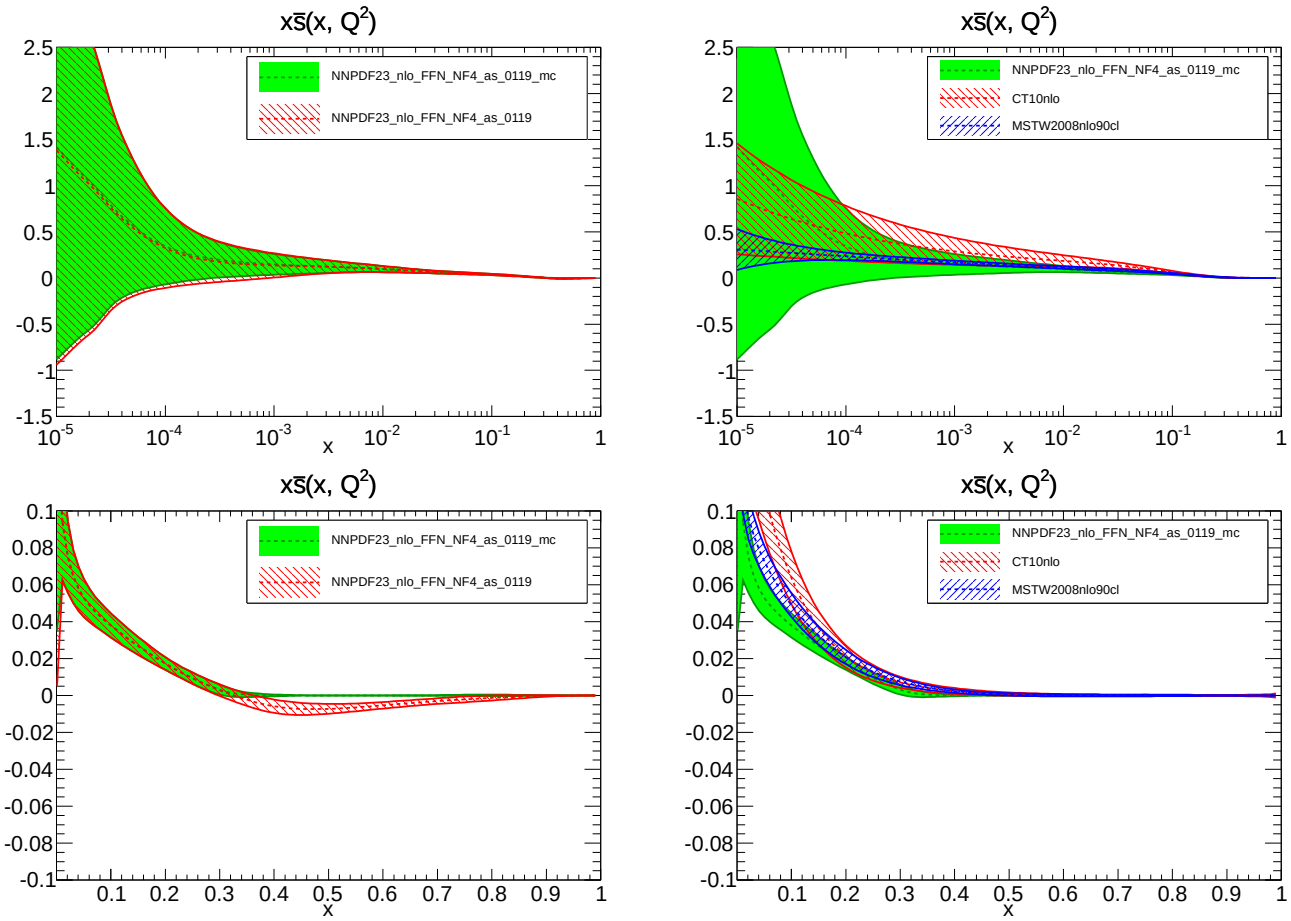

Figure 11: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

2.4 Replicas in the evolution basis

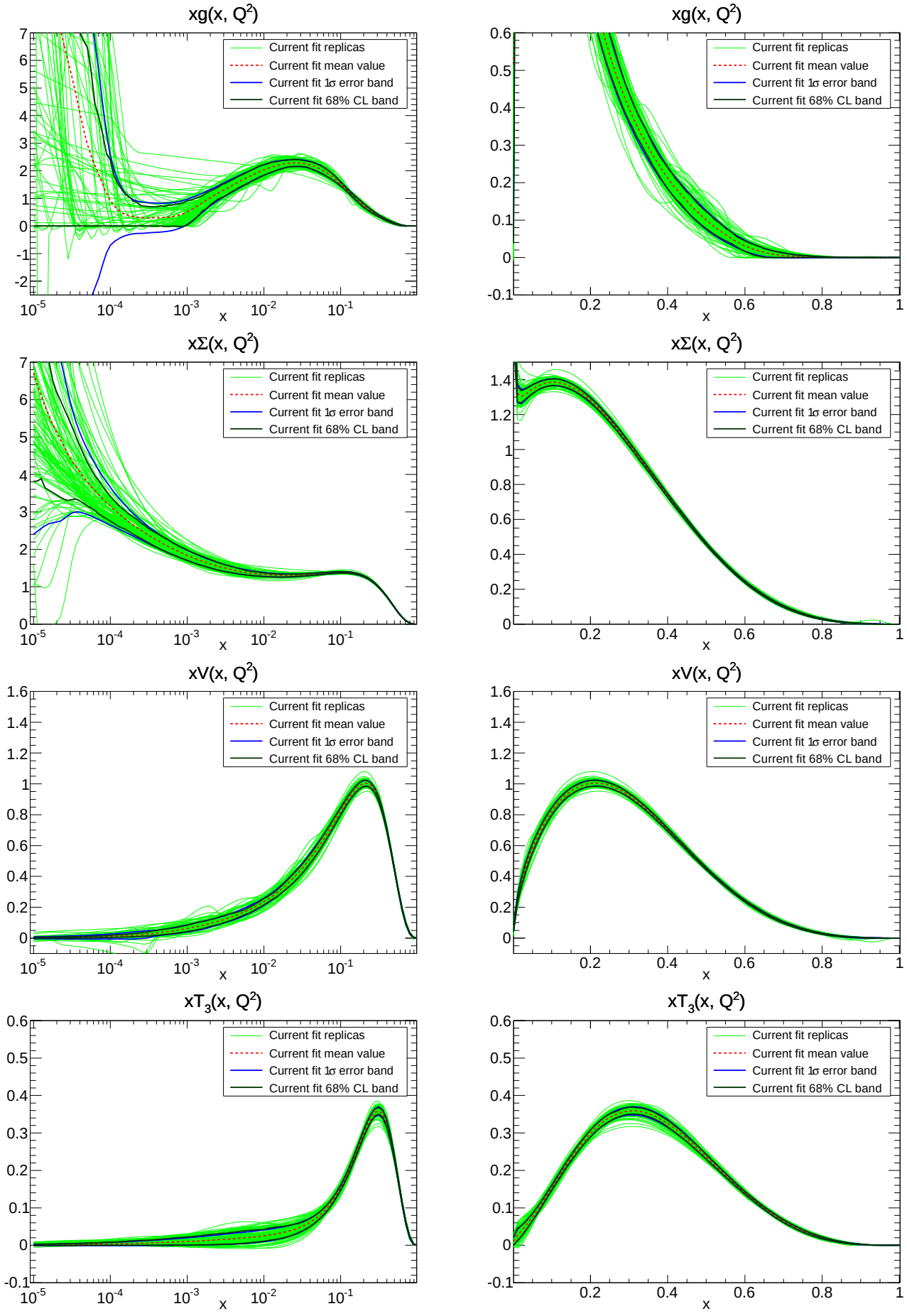

Figure 12: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

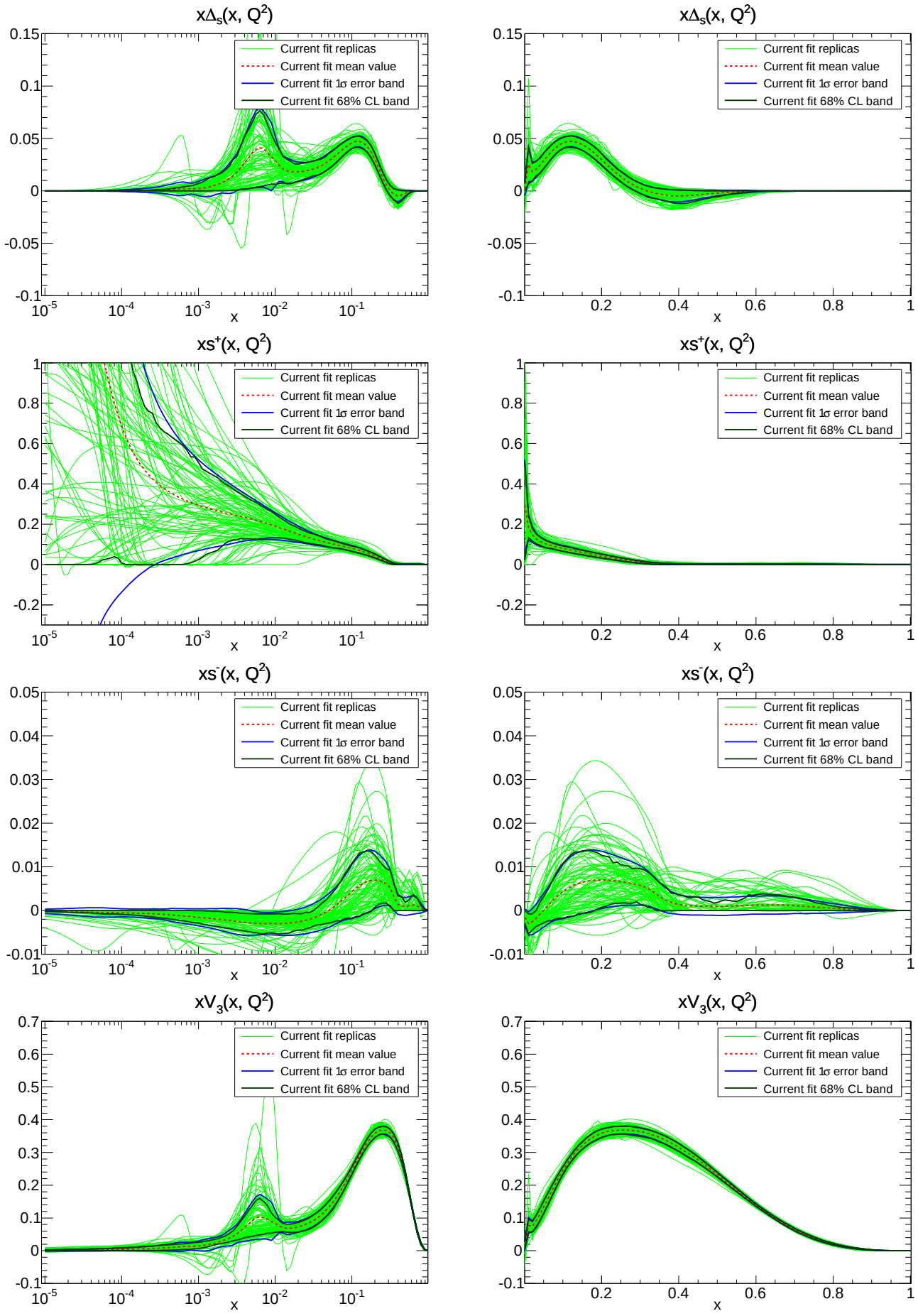

Figure 13: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

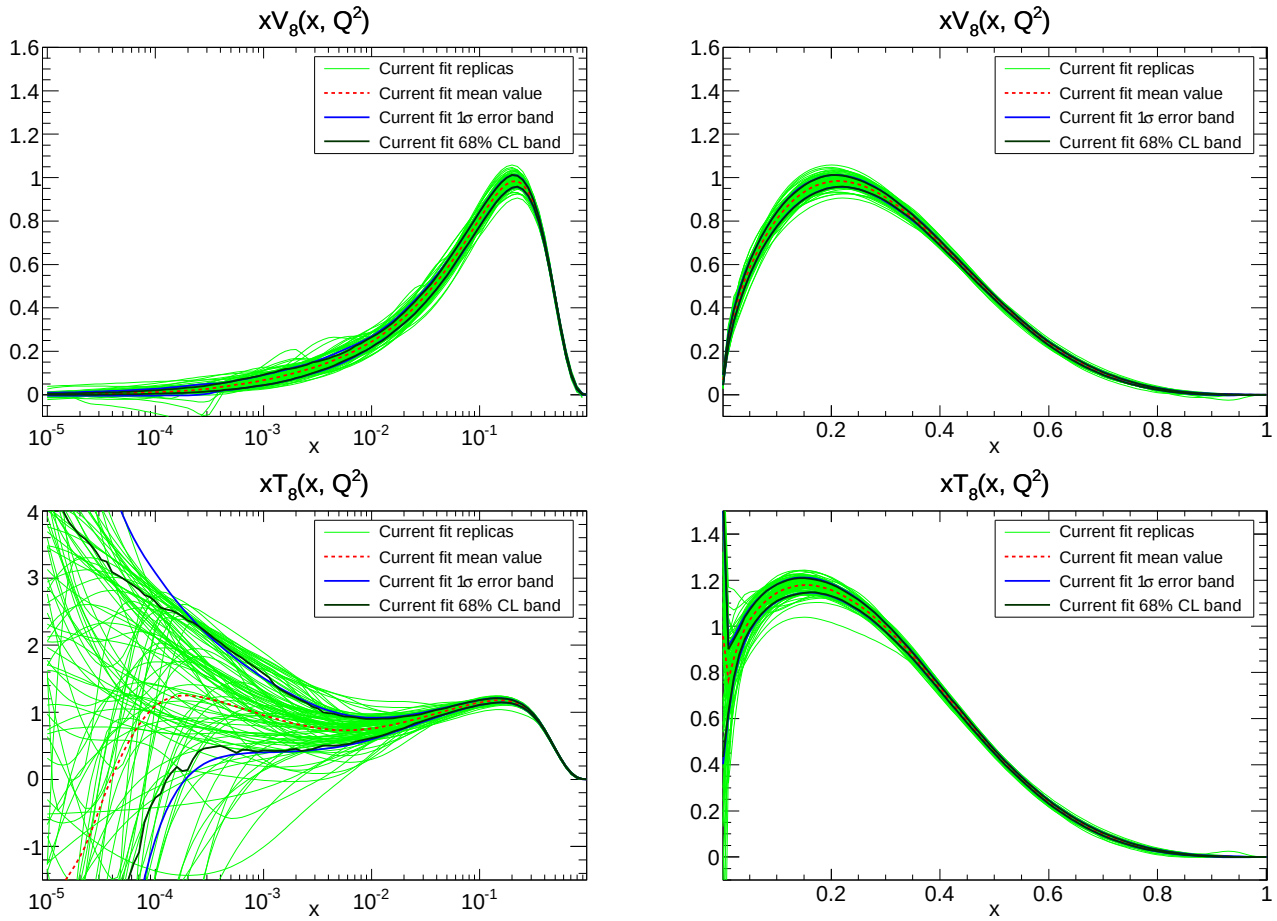

Figure 14: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

2.5 Replicas in the LH basis

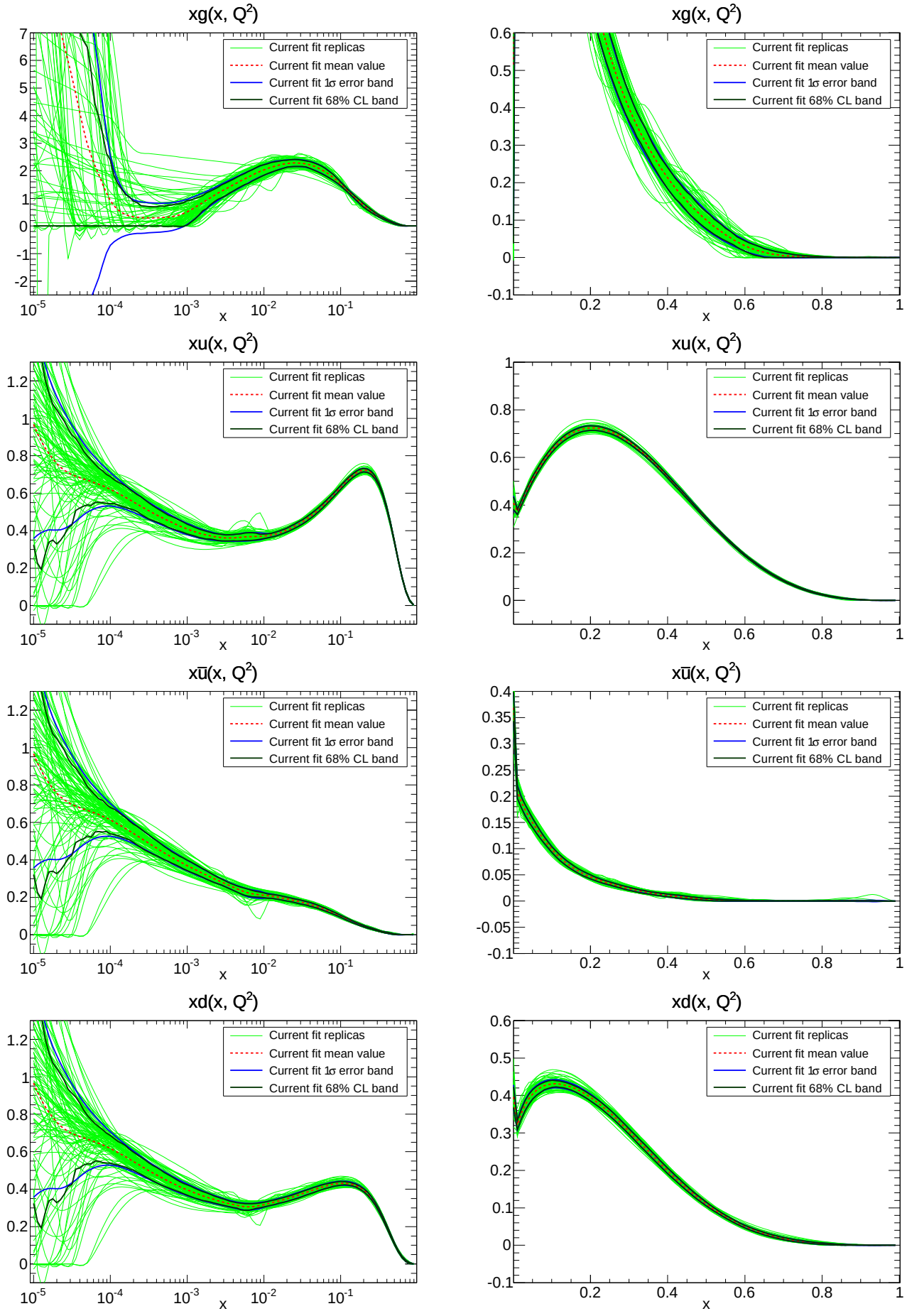

Figure 15: Current fit PDFs in the LH basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

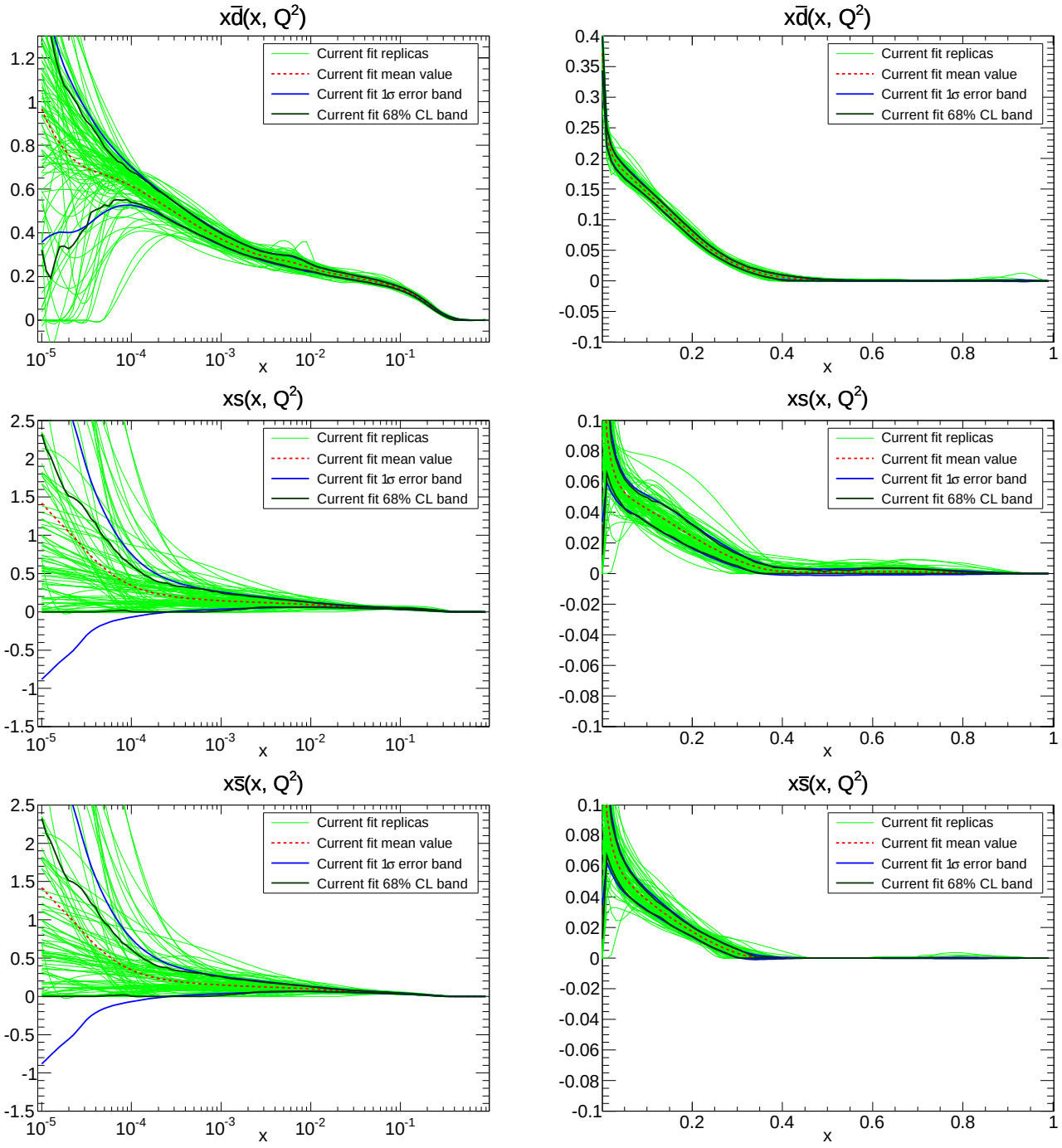

Figure 16: Current fit PDFs in the LH basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

3 Fit properties

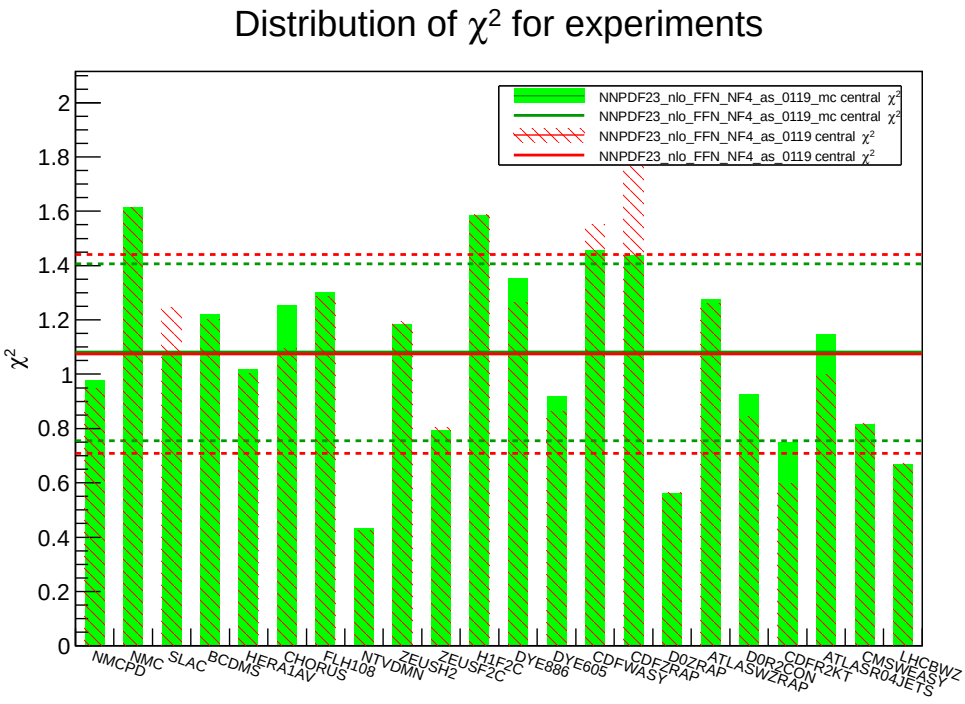

Figure 17: Total χ^2 for each experiment.

3.1 χ^2 details - experimental covariance matrix

Experiment	Dataset	DOF	Current χ^2	Reference χ^2	CTEQ χ^2	MSTW χ^2
NMCPD	NMCPD	132	0.97650	0.94678	0.97431	0.98168
NMC	NMC	224	1.61480	1.61490	1.67544	1.44034
SLAC		74	1.08418	1.24499	1.66775	1.35240
	SLACP	37	1.20647	1.33043	1.66336	1.29017
	SLACD	37	0.91720	1.10607	1.46126	1.27373
BCDMS		581	1.22200	1.20239	1.68122	1.47123
	BCDMSP	333	1.21498	1.21759	1.84817	1.45139
	BCDMSD	248	1.17968	1.14740	1.44109	1.37768
HERA1AV		592	1.01753	1.00232	1.25308	1.24324
	HERA1NCEP	379	1.17202	1.15072	1.49239	1.50295
	HERA1NCEM	145	0.78328	0.77618	0.80335	0.86471
	HERA1CCEP	34	0.87550	0.89207	1.06657	0.92536
	HERA1CCEM	34	0.56153	0.56747	0.57770	0.55438
CHORUS		862	1.25423	1.09544	1.37123	1.25963
	CHORUSNU	431	1.17459	1.13963	1.33284	1.18426
	CHORUSNB	431	1.20165	0.98374	1.30625	1.24490
FLH108	FLH108	8	1.30336	1.28842	1.43437	1.33943
NTVDMN		79	0.43416	0.42541	4.09079	1.01694
	NTVNUDMN	41	0.26900	0.25703	2.61103	0.63596
	NTVNBDMN	38	0.60044	0.59765	6.32563	1.66839
ZEUSH2		127	1.18507	1.19509	1.33659	1.20424
	Z06NC	90	1.13571	1.13908	1.29451	1.15496
	Z06CC	37	1.17612	1.20172	1.27789	1.15717
ZEUSF2C		50	0.79397	0.80499	0.67401	0.74206
	ZEUSF2C99	14	0.75117	0.76015	0.56630	0.69782
	ZEUSF2C03	21	1.31904	1.33983	1.09296	1.22976
	ZEUSF2C08	7	0.18724	0.18671	0.29508	0.18325
	ZEUSF2C09	8	0.11820	0.11768	0.18772	0.11315
H1F2C		38	1.58531	1.58669	1.39443	1.42119
	H1F2C01	6	0.99292	1.00343	0.66265	1.03789
	H1F2C09	6	2.86603	2.83539	2.54089	2.32380
	H1F2C10	26	1.34400	1.35145	1.23270	1.24197
DYE886		199	1.35308	1.26511	1.24895	1.46776
	DYE886R	15	0.49191	0.48450	0.49444	0.75281
	DYE886P	184	1.42329	1.32874	1.31045	1.52605
DYE605	DYE605	119	0.92083	0.86286	0.74536	0.96200
CDFWASY	CDFWASYM	13	1.45812	1.55102	3.41375	9.07544
CDFZRAP	CDFZRAP	29	1.43755	1.79541	1.85897	2.32934
D0ZRAP	D0ZRAP	28	0.56059	0.56467	0.55617	0.59228
ATLASWZRAP	ATLASWZRAP36PB	30	1.27688	1.26175	1.11096	1.98904
D0R2CON	D0R2CON	110	0.92438	0.84267	0.95983	0.93687
CDFR2KT	CDFR2KT	76	0.74837	0.59917	0.98503	0.70937
ATLASR04JETS	ATLASR04JETS36PB	90	1.14796	0.99848	1.22557	1.05639
CMSWEASY	CMSWEASY840PB	11	0.81543	0.82040	1.40669	4.42589
LHCBWZ	LHCBWZ36PB	10	0.66949	0.67022	1.08593	0.89579
Total (sets)		**3482**	**1.14**	**1.09**	**1.40**	**1.00**
Total (exps)		**3482**	**1.16**	**1.10**	**1.41**	**1.30**

Table 3: Fit quality for datasets.

4 Configuration file of the training

```
#
# Configuration file for NNPDF++,
# comments start with # or ; or [
#

[Description]
This is the description block, please update these lines before run.
[/Description]

############################################################
[Experiments & Datasets]
EXPERIMENT: NMCPD
        DATASET = NMCPD 0.5
EXPERIMENT: NMC
        DATASET = NMC 0.5
EXPERIMENT: SLAC
        DATASET = SLACP 0.5
        DATASET = SLACD 0.5
EXPERIMENT: BCDMS
        DATASET = BCDMSP 0.5
        DATASET = BCDMSD 0.5
EXPERIMENT: HERA1AV
        DATASET = HERA1NCEP 0.5
        DATASET = HERA1NCEM 0.5
        DATASET = HERA1CCEP 0.5
        DATASET = HERA1CCEM 0.5
EXPERIMENT: CHORUS
        DATASET = CHORUSNU 0.5
        DATASET = CHORUSNB 0.5
EXPERIMENT: FLH108
        DATASET = FLH108 1
EXPERIMENT: NTVDMN
        DATASET = NTVNUDMN 0.5
        DATASET = NTVNBDMN 0.5
EXPERIMENT: ZEUSH2
        DATASET = Z06NC 0.5
        DATASET = Z06CC 0.5
EXPERIMENT: ZEUSF2C
        DATASET = ZEUSF2C99 0.5
        DATASET = ZEUSF2C03 0.5
        DATASET = ZEUSF2C08 0.5
        DATASET = ZEUSF2C09 0.5
EXPERIMENT: H1F2C
        DATASET = H1F2C01 0.5
        DATASET = H1F2C09 0.5
        DATASET = H1F2C10 0.5
EXPERIMENT: DYE886
        DATASET = DYE886R 1
        DATASET = DYE886P 0.5
EXPERIMENT: DYE605
        DATASET = DYE605 0.5
EXPERIMENT: CDFWASY
        DATASET = CDFWASYM 1
EXPERIMENT: CDFZRAP
        DATASET = CDFZRAP 1
EXPERIMENT: D0ZRAP
        DATASET = D0ZRAP 1
EXPERIMENT: ATLASWZRAP
        DATASET = ATLASWZRAP36PB 1
EXPERIMENT: D0R2CON
        DATASET = D0R2CON 0.5
EXPERIMENT: CDFR2KT
        DATASET = CDFR2KT 0.5
EXPERIMENT: ATLASR04JETS
        DATASET = ATLASR04JETS36PB 0.5
EXPERIMENT: CMSWEASY
        DATASET = CMSWEASY840PB 1
EXPERIMENT: LHCBWZ
        DATASET = LHCBWZ36PB 1
[/Experiments & Datasets]

############################################################
[Theory]
NFL      = 7
PTORD    = 1
ALPHAS   = 119
Q20      = 2
VFNS     = GMVN
VFNSTYPE = 1
[/Theory]

############################################################
[Experimental Data]
TOPDFSET = NNPDF-t0-set-nlo
IQ2CUT   = 0
NPARSAT  = 2
PARSAT   = 1.5  0.333333
IREG     = 1
Q2MINCUT = 3
Q2MIN    = 3
W2MIN    = 12.5
[/Experimental Data]

############################################################
[Replica Properties]
SEED         = 0
GENREP       = 1
RNGALGORITHM = 0
[/Replica Properties]

############################################################
[Fit Properties]
NGEN       = 50000
DYNSTOP    = 0
POSITIVITY = 0
MINCHI2    = 6
NSMEAR     = 200
DELTASM    = 200
RV         = 1.0003
RT         = 0.9999
[/Fit Properties]

############################################################
[Positivity]
POSDATASET = FCPOS
POSDATASET = FLPOS
POSDATASET = DMPOS
[/Positivity]

############################################################
[NN Properties]
```

```
NMUTANTS = 80
NLAYERS  = 4
NNODES   = 2 5 3 1
SMALLXSNG = 1.05 1.35
LARGEXSNG = 2.55 3.45
SMALLXGLU = 1.05 1.35
LARGEXGLU = 3.55 4.45
SMALLXT3  = 0 0.5
LARGEXT3  = 2.55 3.45
SMALLXV   = 0 0.5
LARGEXV   = 2.55 3.45
SMALLXDS  = -0.95 -0.65
LARGEXDS  = 12 14
SMALLXSP  = 1.05 1.35
LARGEXSP  = 2.55 3.45
SMALLXSM  = 0 0.5
LARGEXSM  = 2.55 3.45
[/NN Properties]

#################################################################
[Output Folder]
RESULTSDIR = results
[/Output Folder]
```