

Validphys Report

NNPDF revision 528M

The NNPDF Collaboration

February 5, 2013

Contents

1	Fit summary	1	2.4 Replicas in the evolution basis	12
			2.5 Replicas in the LH basis	15
2	Comparing PDFs	2	3 Fit properties	17
2.1	Distances	2	3.1 χ^2 details - experimental covariance matrix	18
2.2	Comparing PDFs in evolution basis	3		
2.3	Comparing PDFs in LHA basis	8	4 Configuration file of the training	19

VALIDPHYS 528M	Current Fit	Reference	CTEQ	MSTW
PDF set name	NNPDF23 nlo FFN NF4 as 0116 mc	NNPDF23 nlo FFN NF4 as 0116	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
χ_{tot}^2 (exp)	1.13	1.08
$\langle E \rangle \pm \sigma_E$	2.21±0.06	2.21±0.06
$\langle E_{\text{tr}} \rangle \pm \sigma_{E_{\text{tr}}}$	2.17±0.09	2.17±0.09
$\langle E_{\text{val}} \rangle \pm \sigma_{E_{\text{val}}}$	2.25±0.08	2.25±0.08
$\langle \text{TL} \rangle \pm \sigma_{\text{TL}}$	18539±6918	18539±6918
$\langle \chi^{2(k)} \rangle \pm \sigma_{\chi^{2(k)}}$	1.16±0.09	1.15±0.08
$\langle \sigma^{(\text{exp})} \rangle_{\text{dat}}$	14.89%	14.89%
$\langle \sigma^{(\text{net})} \rangle_{\text{dat}}$	2.92%	3.22%
$\langle \rho^{(\text{exp})} \rangle_{\text{dat}}$	3.81e-01	3.81e-01
$\langle \rho^{(\text{net})} \rangle_{\text{dat}}$	5.89e-01	5.74e-01
$\langle \text{cov}^{(\text{exp})} \rangle_{\text{dat}}$	1.87e+08	1.87e+08
$\langle \text{cov}^{(\text{net})} \rangle_{\text{dat}}$	1.43e+06	9.48e+05
$x\Sigma + xg$	1.00740e+00±4.55120e-03	1.00012e+00±4.44741e-04
u_v	2.00030e+00±3.37671e-03	2.00042e+00±3.16556e-03
d_v	9.99407e-01±3.81287e-03	9.99910e-01±3.49611e-03
s_v	-1.35719e-03±5.90091e-03	2.19147e-06±4.04646e-06
xs_v	1.83621e-03±1.39275e-03	3.18039e-03±1.99721e-03
K_s	3.32136e-01±6.08632e-02	2.85446e-01±6.64088e-02
Δ_s	1.36570e-01±3.72263e-02	1.36049e-01±3.74755e-02

Table 2: Summary.

2 Comparing PDFs

2.1 Distances

NNPDF Fit vs Reference Distances

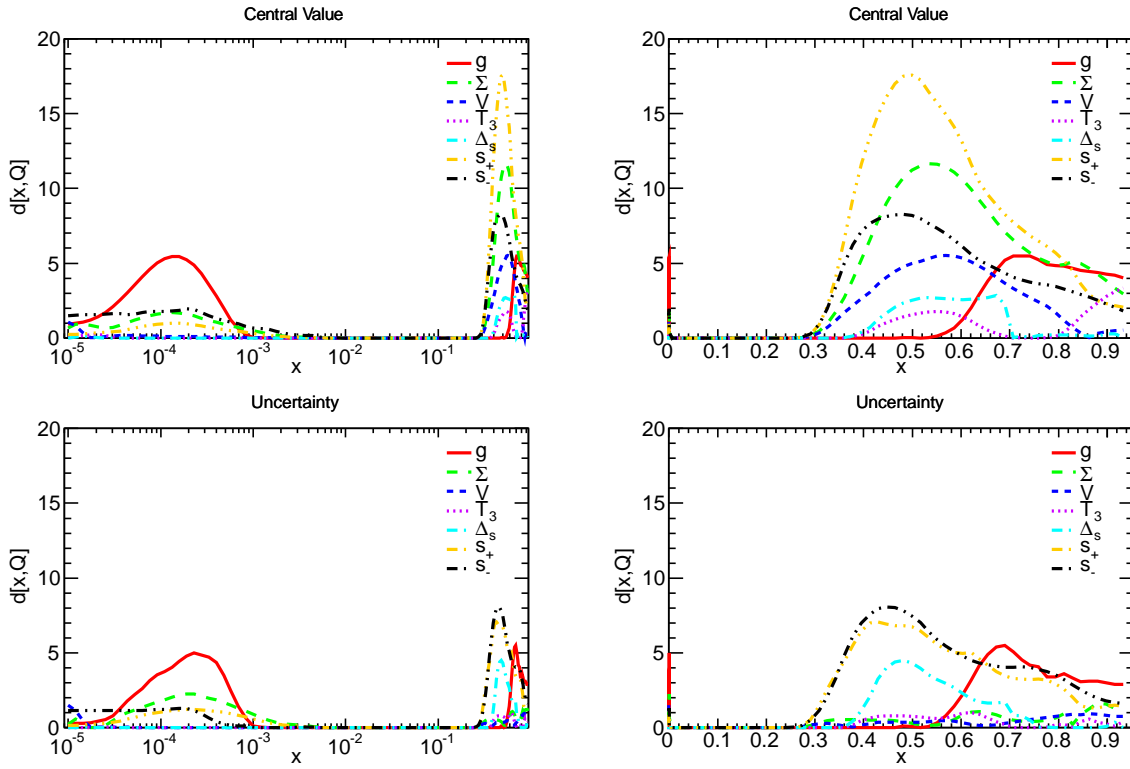


Figure 1: Distances in the fitting basis.

NNPDF Fit vs Reference Distances

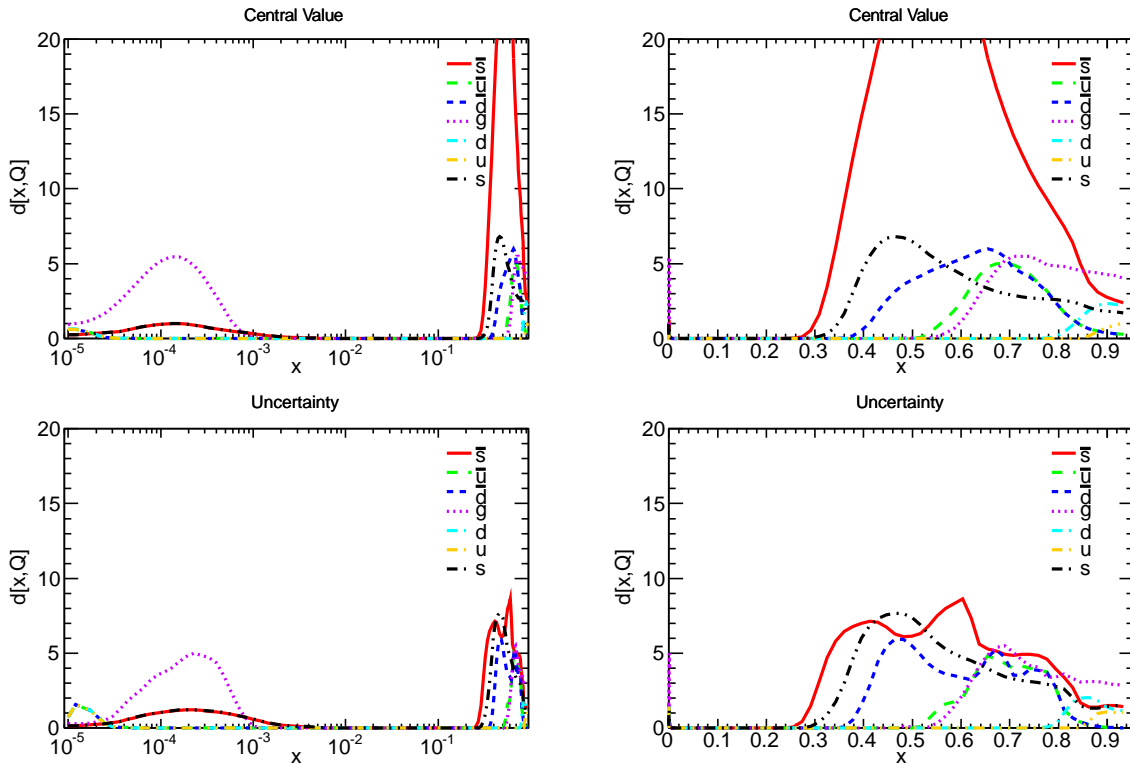


Figure 2: Distances in the flavour basis.

2.2 Comparing PDFs in evolution basis

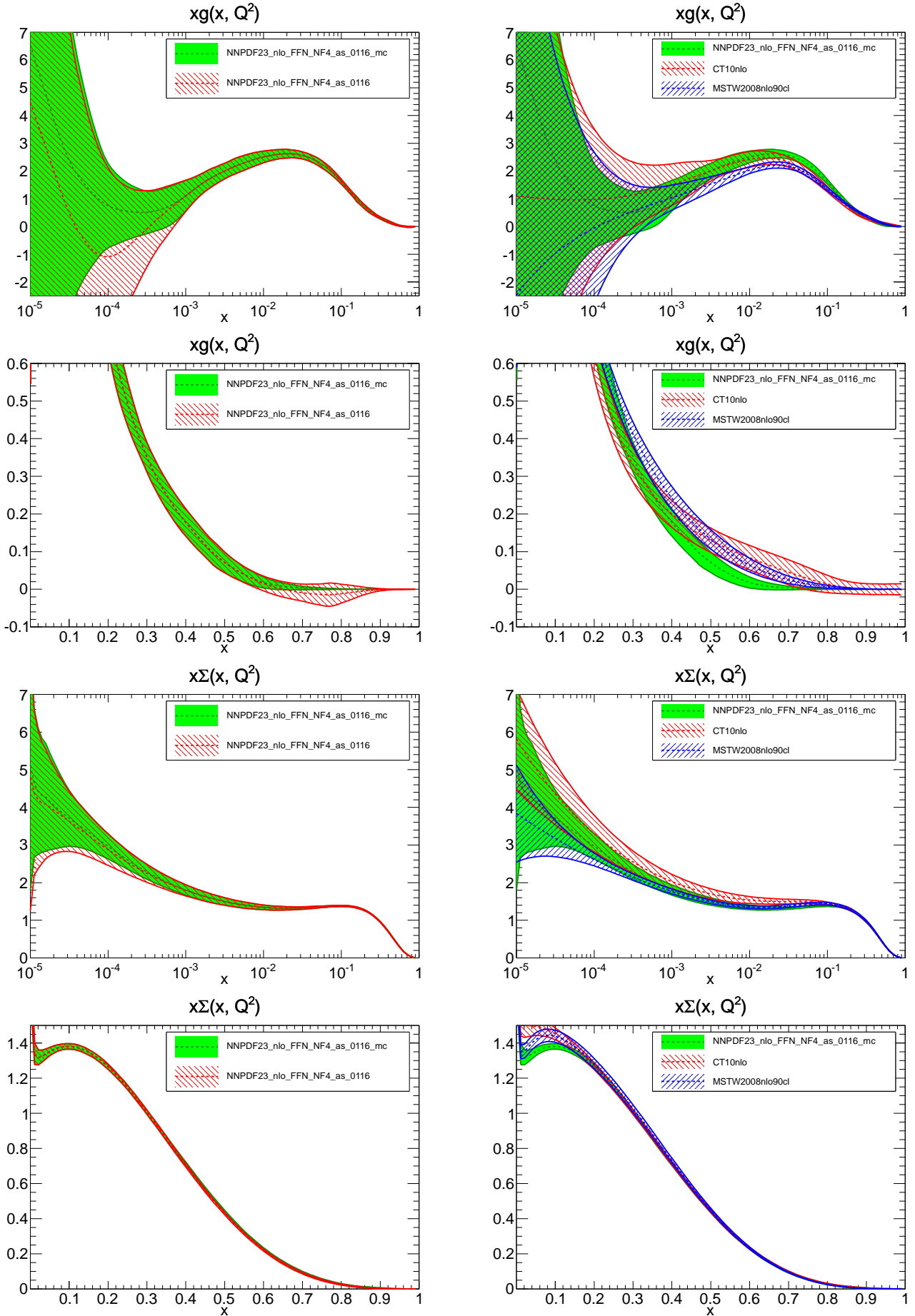


Figure 3: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

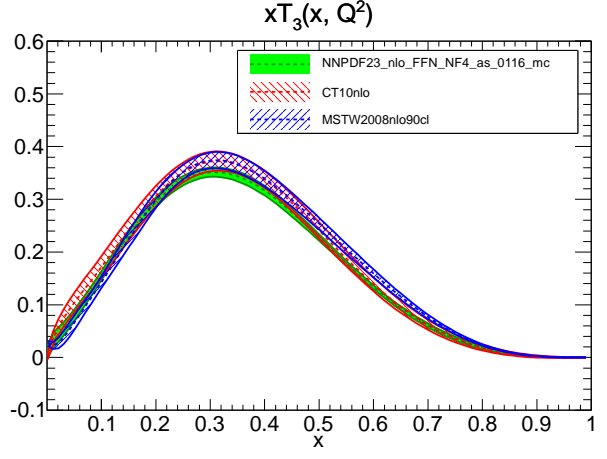
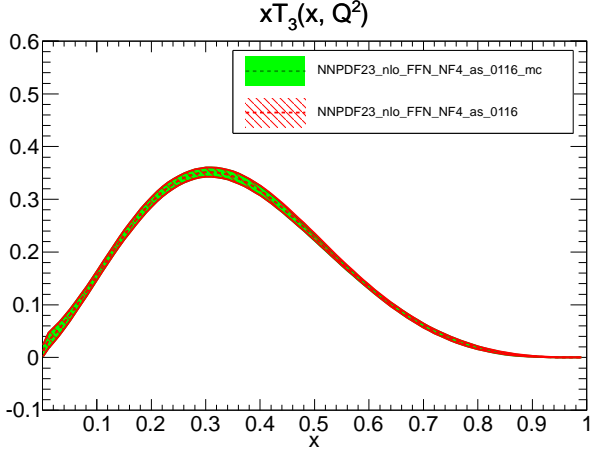
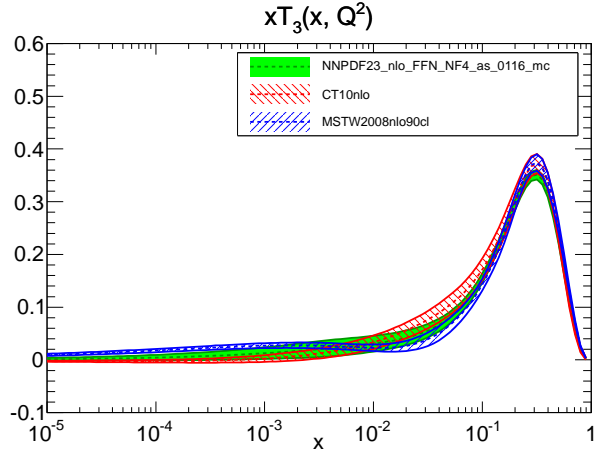
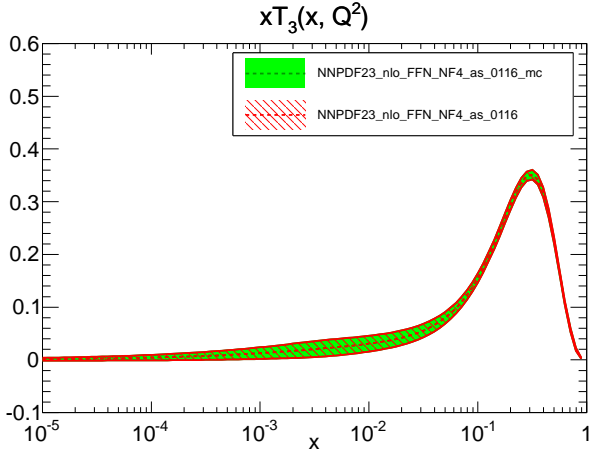
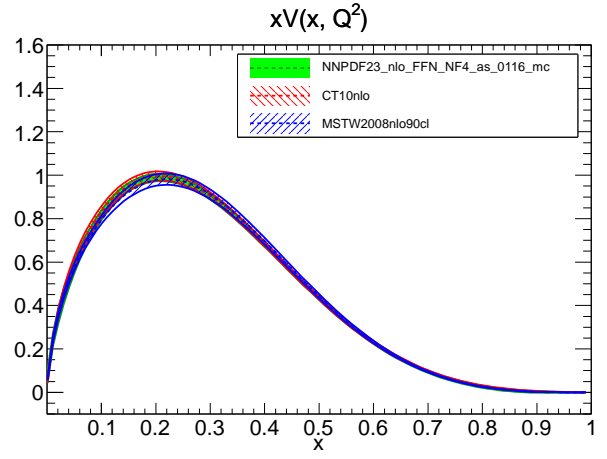
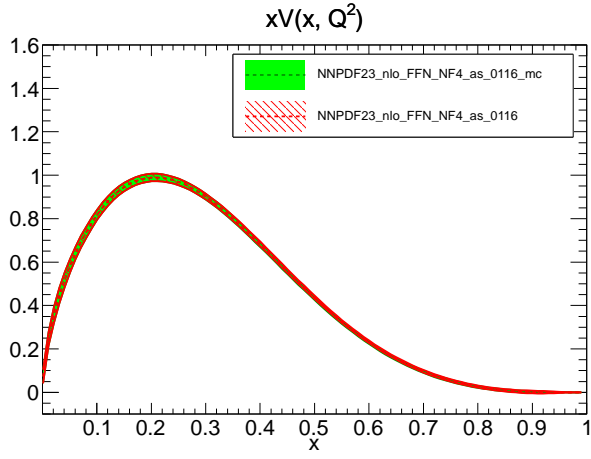
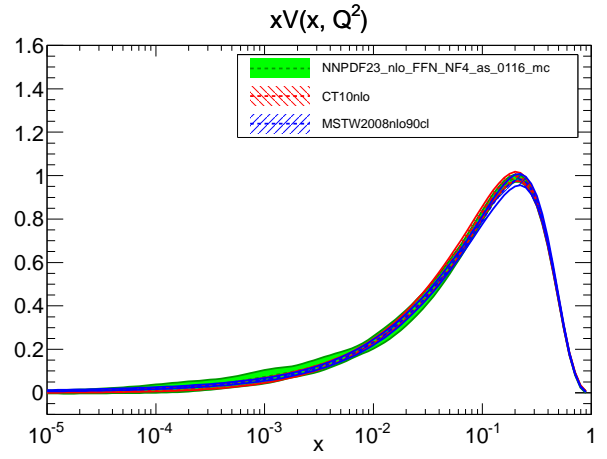
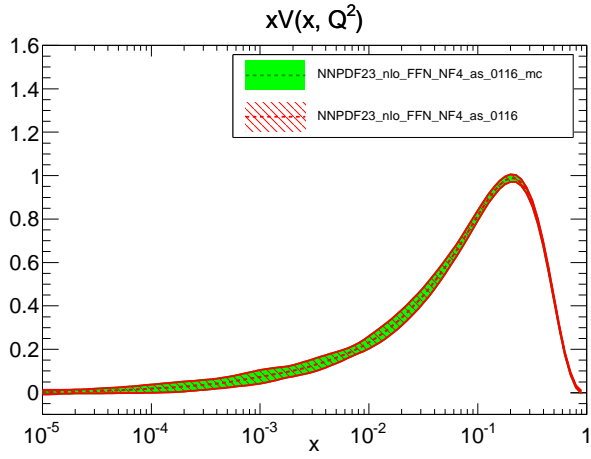


Figure 4: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

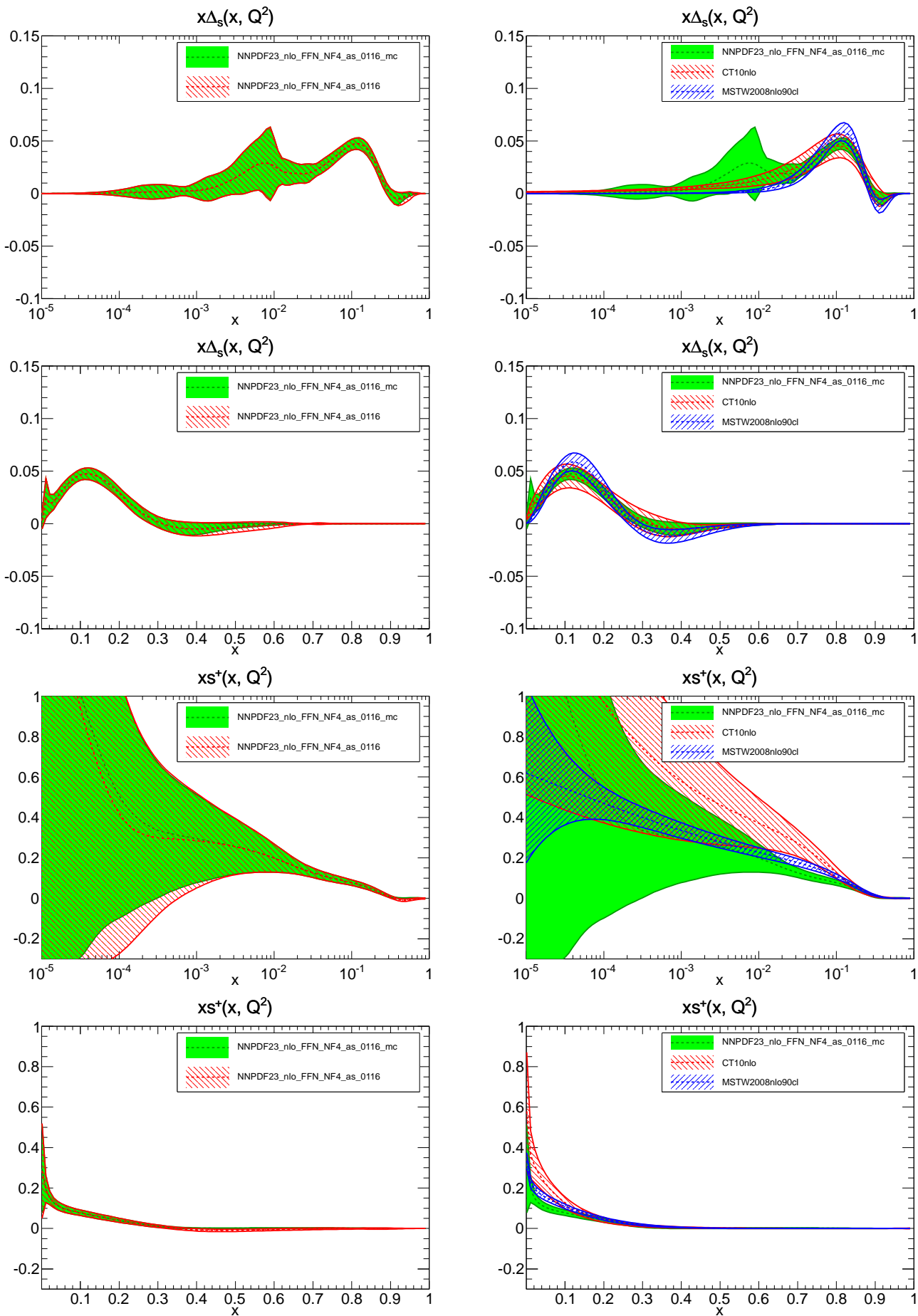


Figure 5: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

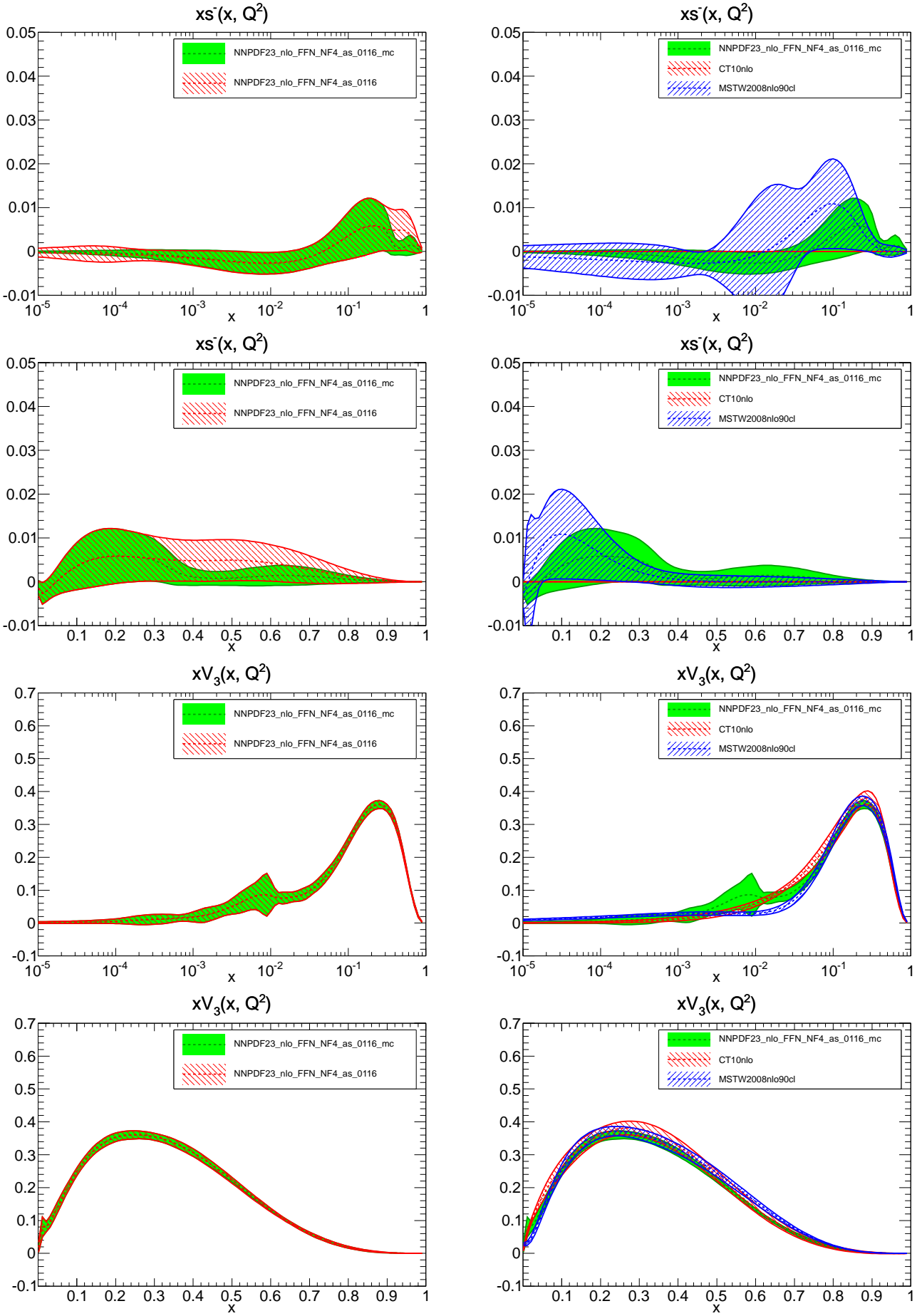


Figure 6: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

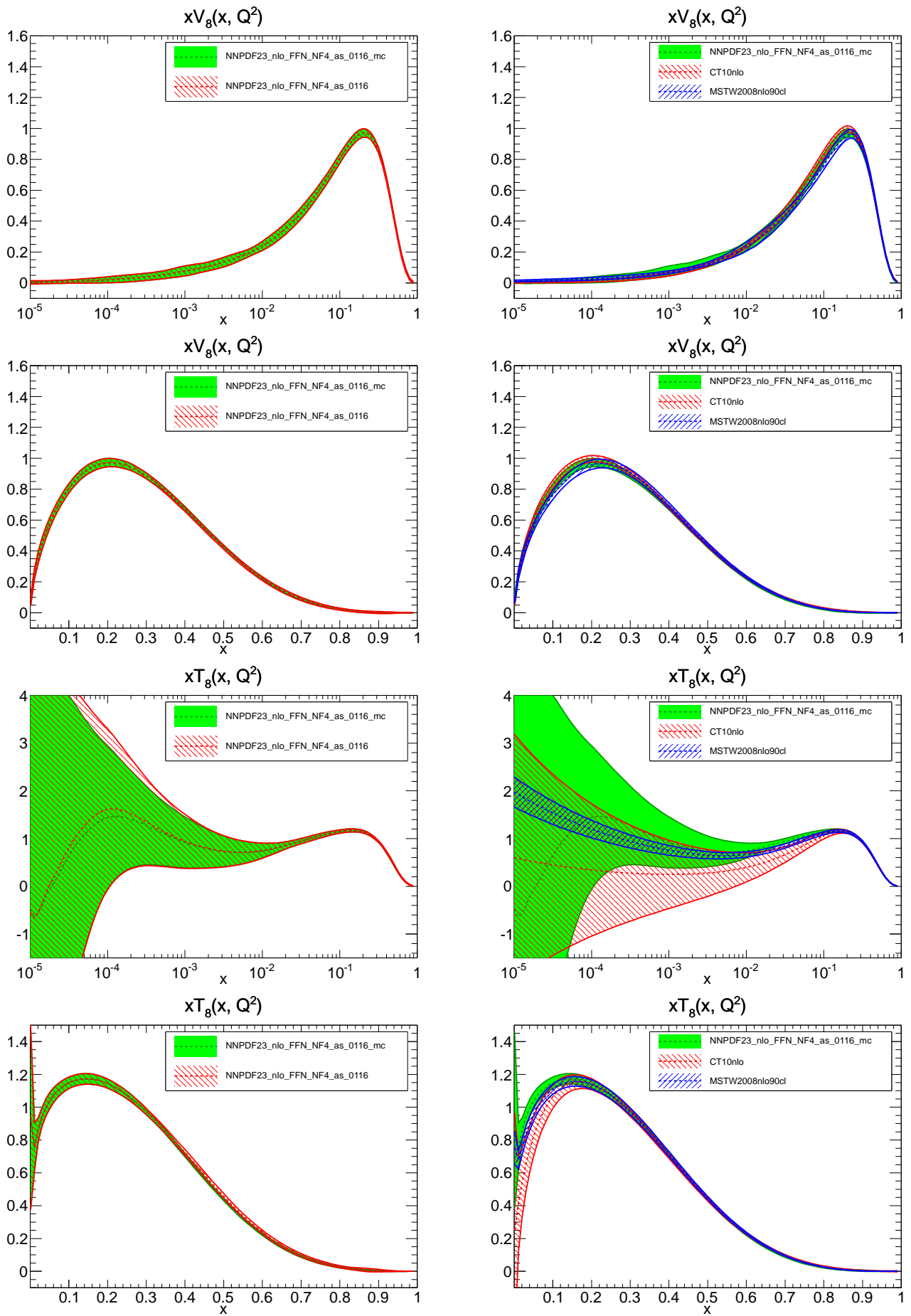


Figure 7: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

2.3 Comparing PDFs in LHA basis

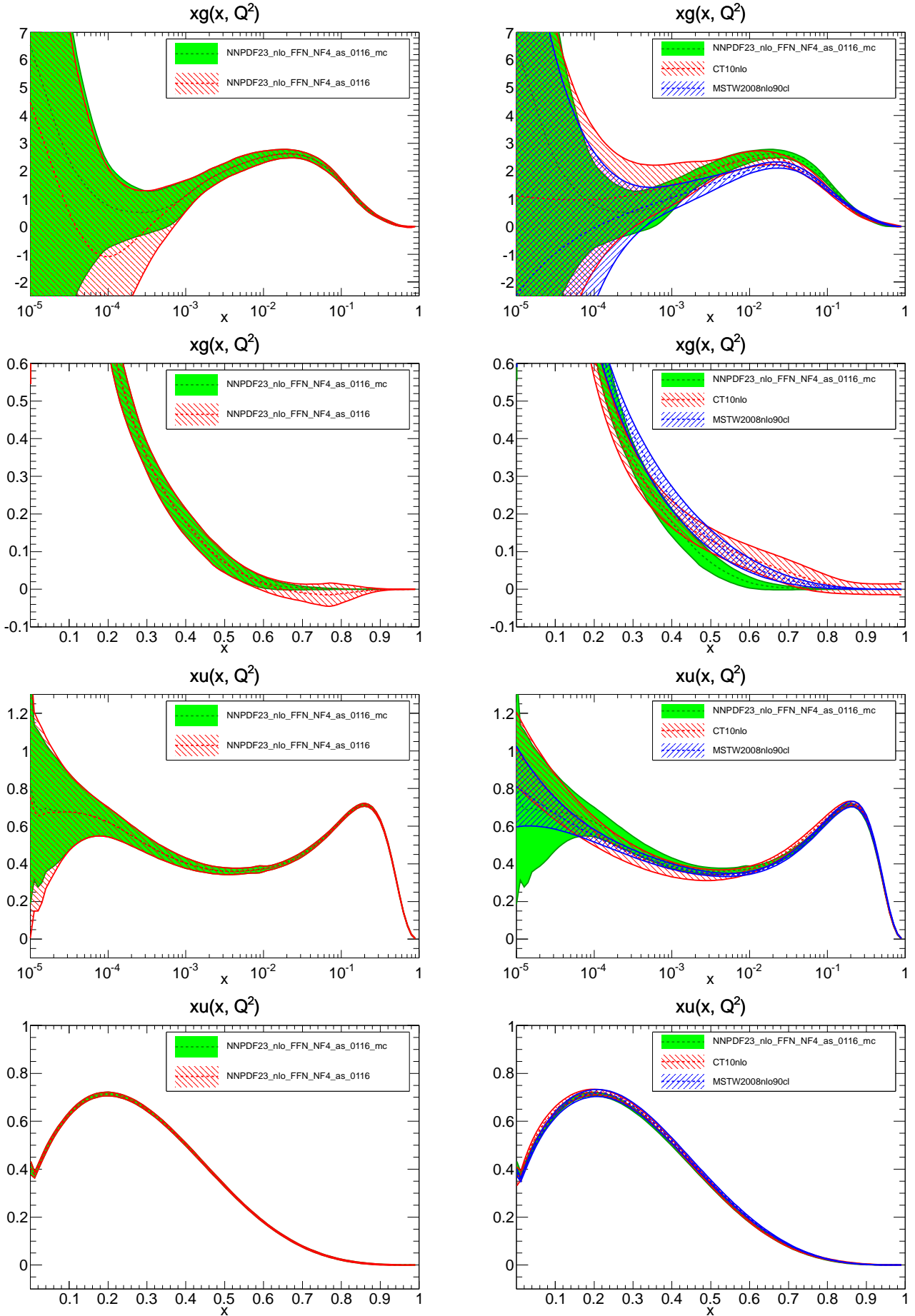


Figure 8: Comparison between PDFs at $Q^2 = 2.0e+00 \text{ GeV}^2$.

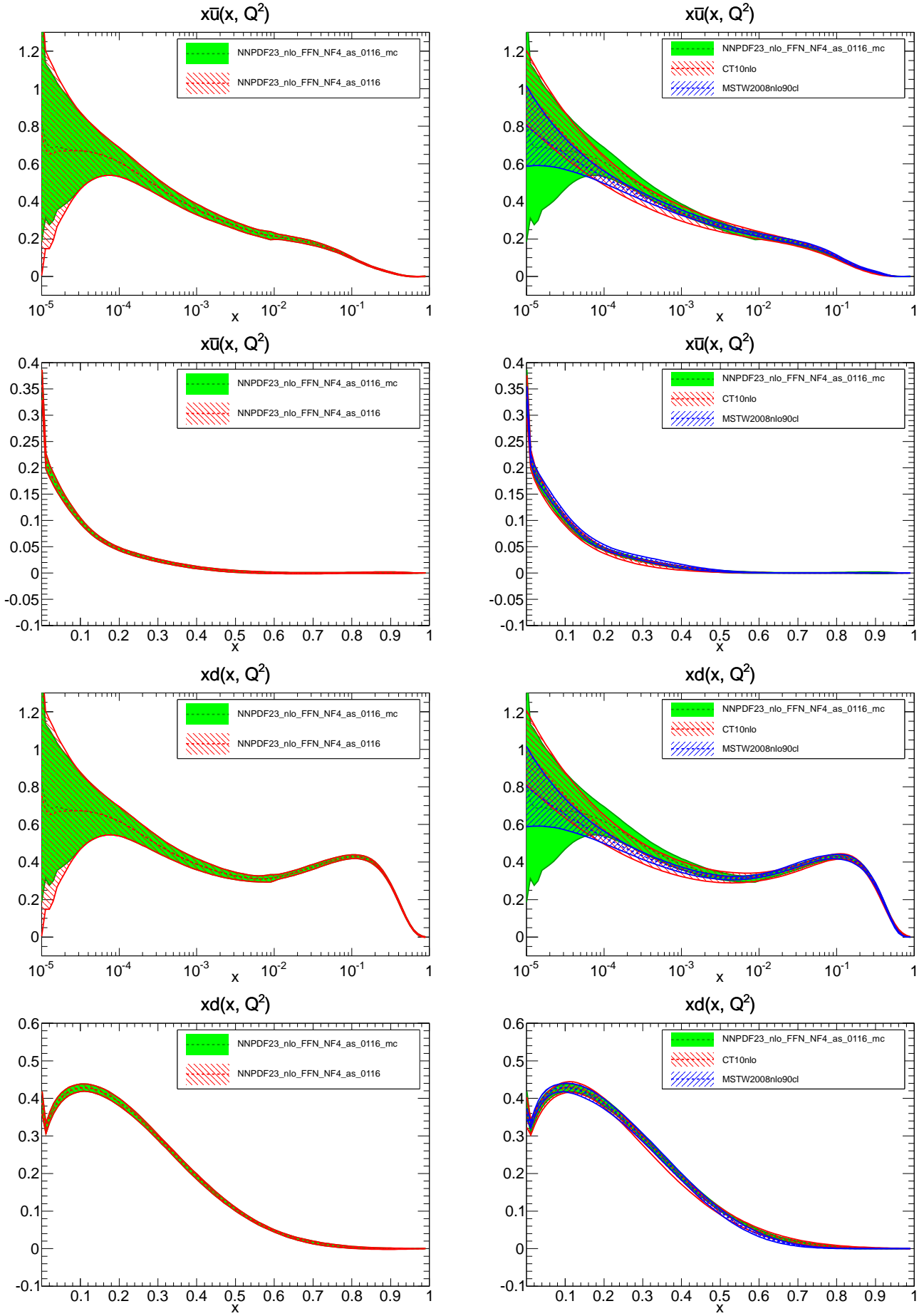


Figure 9: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

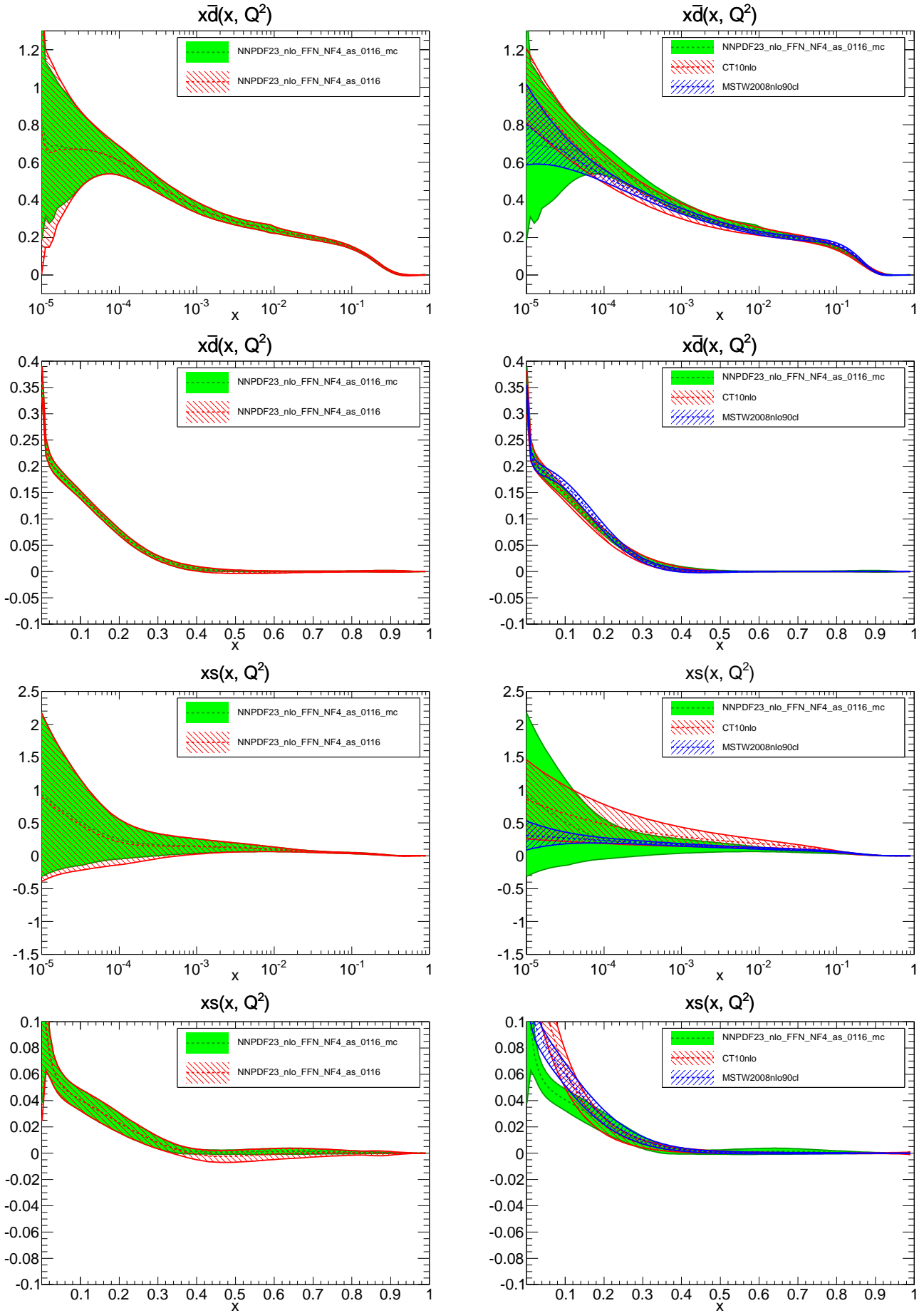


Figure 10: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

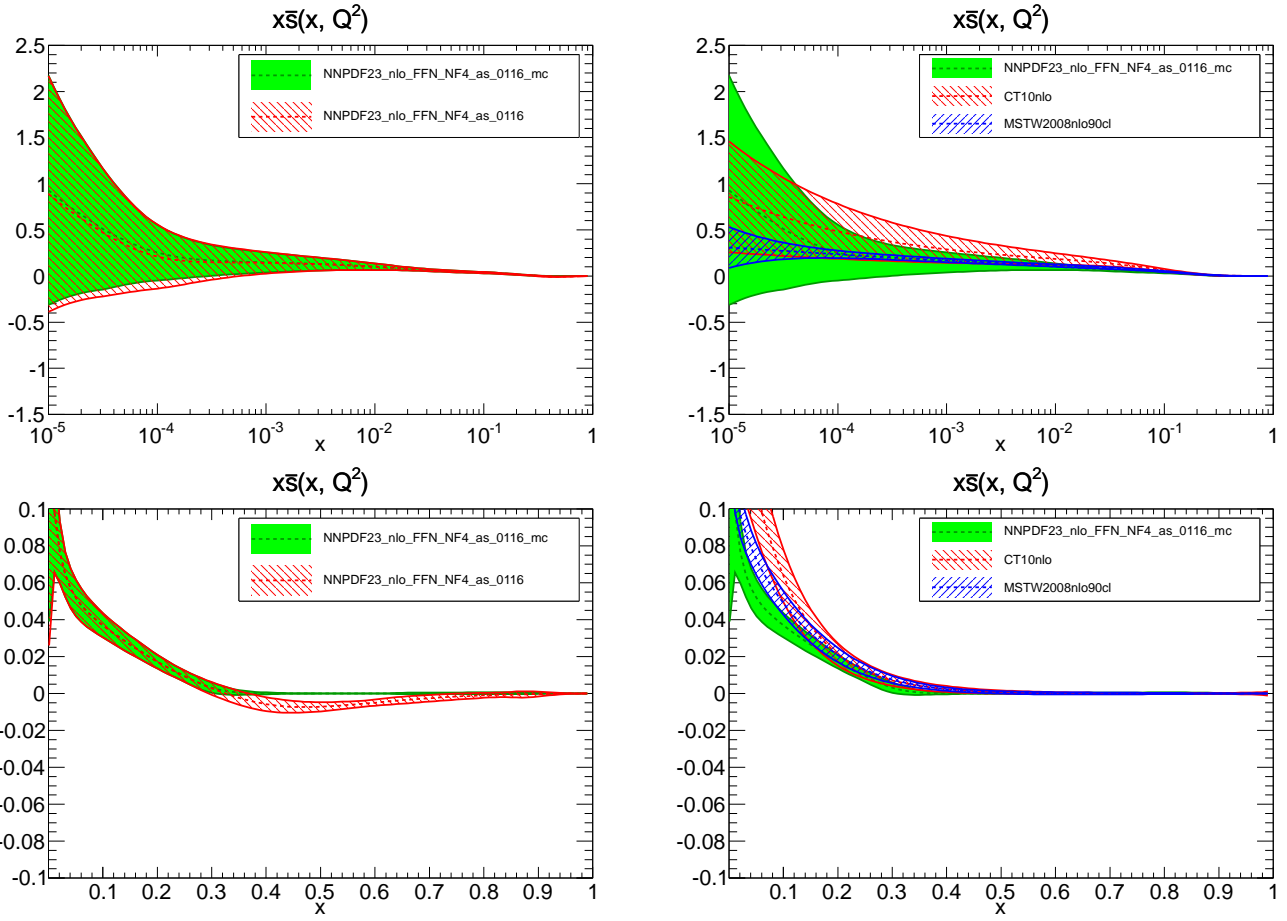


Figure 11: Comparison between PDFs at $Q^2 = 2.0e+00 \text{ GeV}^2$.

2.4 Replicas in the evolution basis

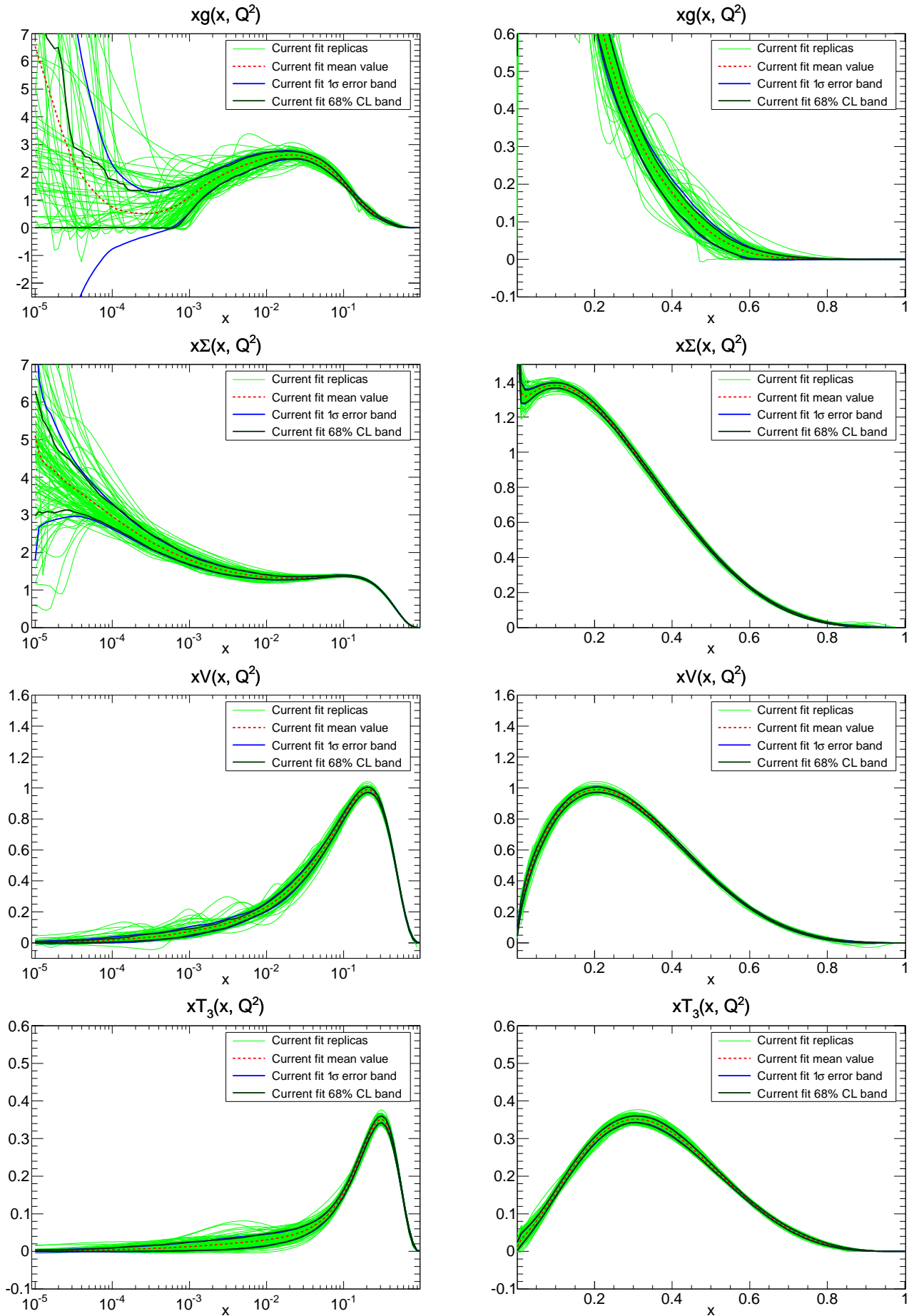


Figure 12: Current fit PDFs in the evolution basis at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

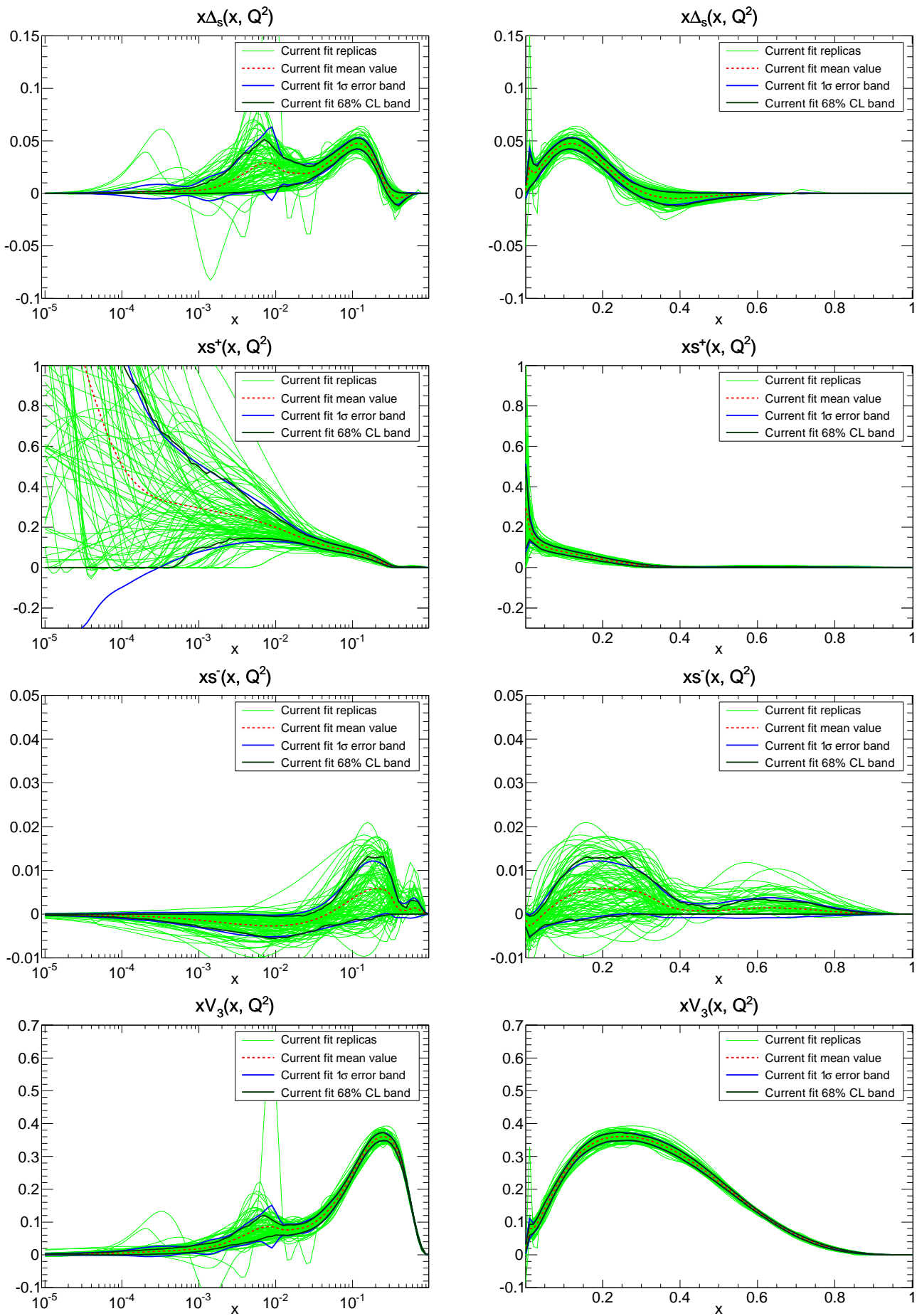


Figure 13: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00 \text{ GeV}^2$.

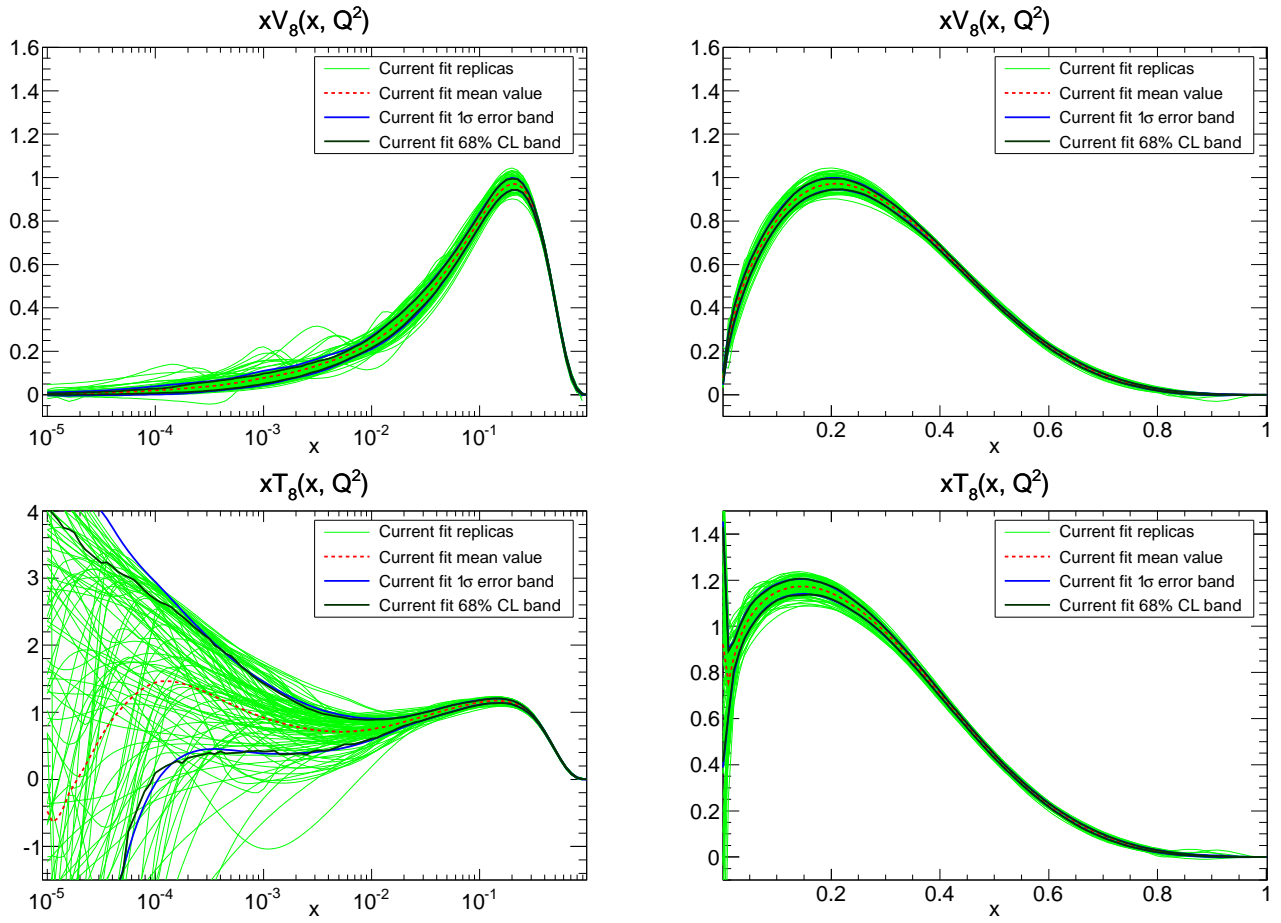


Figure 14: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00 \text{ GeV}^2$.

2.5 Replicas in the LH basis

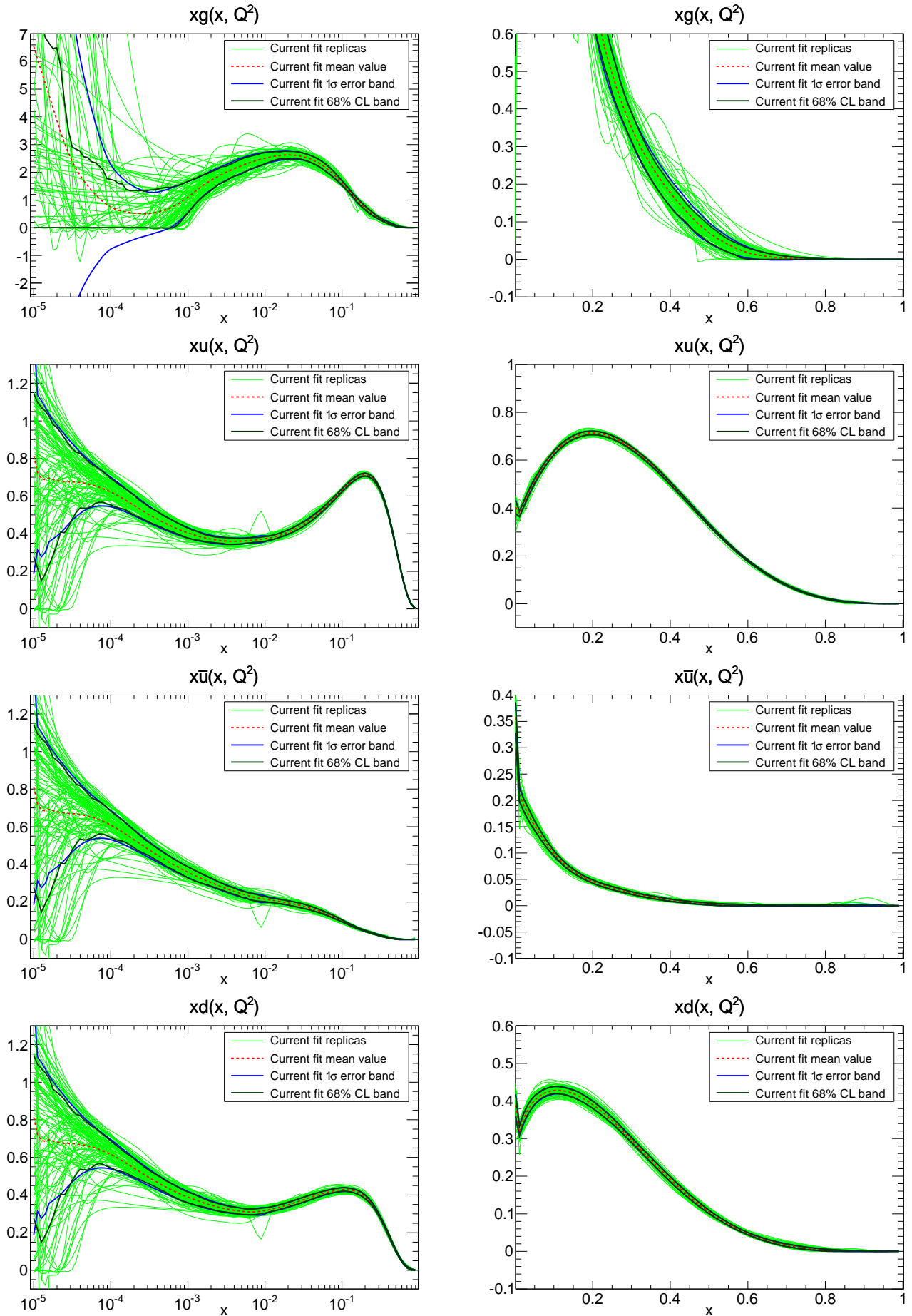


Figure 15: Current fit PDFs in the LH basis at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

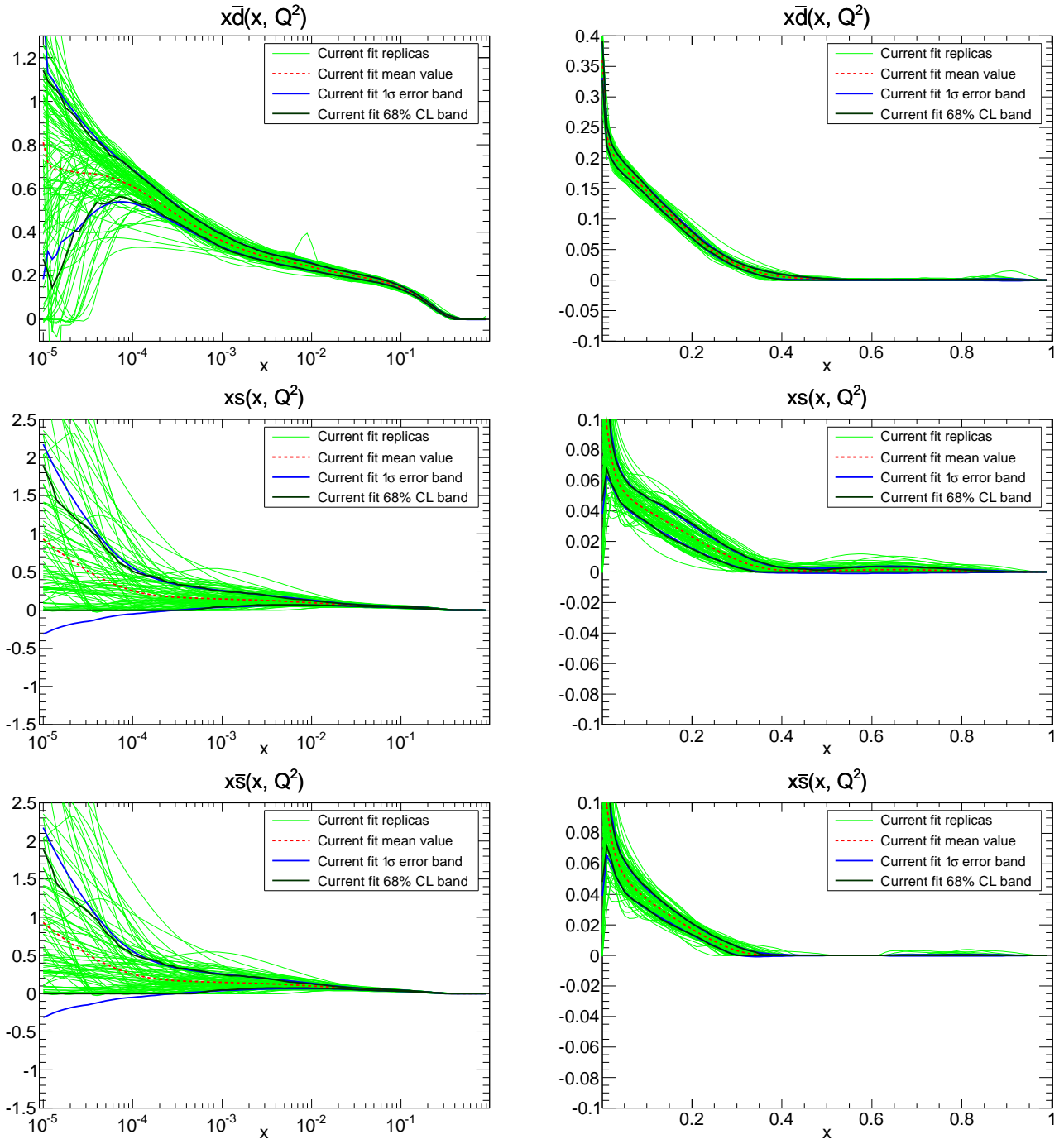


Figure 16: Current fit PDFs in the LH basis at $Q^2 = 2.0e+00 \text{ GeV}^2$.

3 Fit properties

Distribution of χ^2 for experiments

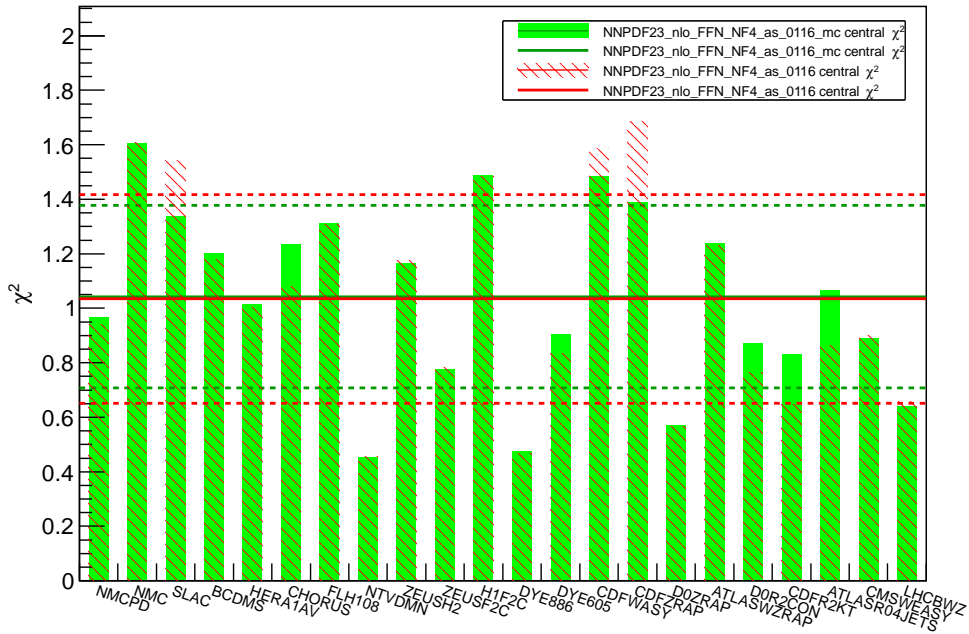


Figure 17: Total χ^2 for each experiment.

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	0.96857	0.93851	0.97134	0.99602
NMC	NMC	224	1.60758	1.60865	1.65192	1.48948
SLAC	SLACP	74	1.33665	1.54214	1.41837	1.15589
	SLACD	37	1.47034	1.62580	1.46374	1.15535
		37	1.14151	1.38743	1.19656	1.05797
BCDMS	BCDMS	581	1.20181	1.18111	1.50094	1.36641
	BCDMSP	333	1.20411	1.20598	1.60686	1.36062
	BCDMSD	248	1.14683	1.11447	1.32290	1.29031
HERA1AV	HERA1AV	592	1.01437	1.00435	1.13733	1.89444
	HERA1NCEP	379	1.16787	1.15477	1.33283	2.42509
	HERA1NCEM	145	0.80108	0.79406	0.91185	1.26049
	HERA1CCEP	34	0.90132	0.92225	0.97777	0.92083
	HERA1CCEM	34	0.55631	0.56223	0.55179	0.54159
CHORUS	CHORUS	862	1.23502	1.08147	1.46318	1.34690
	CHORUSNU	431	1.16560	1.13166	1.41225	1.26004
	CHORUSNB	431	1.18143	0.96739	1.38339	1.32014
FLH108	FLH108	8	1.31169	1.30533	1.35711	1.30481
NTVDMN	NTVDMN	79	0.45312	0.45429	4.02421	1.00181
	NTVNUDMN	41	0.32555	0.32837	2.53253	0.63980
	NTVNBDMN	38	0.58724	0.59515	6.30520	1.64476
ZEUSH2	ZEUSH2	127	1.16579	1.17371	1.25633	1.73681
	ZO6NC	90	1.12260	1.12382	1.19129	1.88069
	ZO6CC	37	1.13595	1.15974	1.18026	1.15100
ZEUSF2C	ZEUSF2C	50	0.77644	0.78239	0.78902	1.01011
	ZEUSF2C99	14	0.73260	0.73693	0.78968	1.13198
	ZEUSF2C03	21	1.28942	1.30097	1.28353	1.63594
	ZEUSF2C08	7	0.18205	0.18175	0.18492	0.18040
	ZEUSF2C09	8	0.11502	0.11488	0.12500	0.10382
H1F2C	H1F2C	38	1.48749	1.48400	1.30237	1.45264
	H1F2C01	6	1.03785	1.04528	1.27737	1.75566
	H1F2C09	6	2.53007	2.49959	1.63591	1.52846
	H1F2C10	26	1.28317	1.28450	1.19806	1.34146
DYE886	DYE886R	15	0.47496	0.46830	0.47659	0.73583
DYE605	DYE605	119	0.90344	0.83326	0.82139	1.06641
CDFWASY	CDFWASYM	13	1.48635	1.58516	3.45955	8.79989
CDFZRAP	CDFZRAP	29	1.38988	1.68486	1.50890	1.85528
DOZRAP	DOZRAP	28	0.57286	0.56502	0.54236	0.55714
ATLASWZRAP	ATLASWZRAP36PB	30	1.23999	1.23003	1.04416	2.19374
DOR2CON	DOR2CON	110	0.87264	0.76510	1.13466	1.08114
CDFR2KT	CDFR2KT	76	0.83315	0.64626	1.19001	0.89684
ATLASR04JETS	ATLASR04JETS36PB	90	1.06665	0.86447	1.42874	1.22453
CMSWEASY	CMSWEASY840PB	11	0.89137	0.90171	1.51670	4.12387
LHCBWZ	LHCBWZ36PB	10	0.64069	0.65727	1.02418	1.00910
Total (sets)		3298	1.11	1.07	1.38	1.00
Total (exps)		3298	1.13	1.08	1.39	1.45

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 = BCDMSF 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
EXPERIMENT: DYE605
    DATASET = DYE605 0.5
EXPERIMENT: CDFWASY
    DATASET = CDFWASYM 1
EXPERIMENT: CDFZRAP
    DATASET = CDFZRAP 1
EXPERIMENT: DOZRAP
    DATASET = DOZRAP 1
EXPERIMENT: ATLASWZRAP
    DATASET = ATLASWZRAP36PB 1
EXPERIMENT: DOR2CON
    DATASET = DOR2CON 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 = 116
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]
PGSDATASET = FCPGS
PGSDATASET = FLPGS
PGSDATASET = DMPGS
[/Positivity]

#####
[NN Properties]
NMUTANTS = 80
```

```
NLAYERS = 4
NNODES = 2 5 3 1
SMALLXSNG = 1.05 1.35
LARGXSNG = 2.55 3.45
SMALLXGLU = 1.05 1.35
LARGXGLU = 3.55 4.45
SMALLXT3 = 0 0.5
LARGXT3 = 2.55 3.45
SMALLXV = 0 0.5
LARGXV = 2.55 3.45
SMALLXDS = -0.95 -0.65
LARGXDS = 12 14
SMALLXSP = 1.05 1.35
LARGXSP = 2.55 3.45
SMALLXSM = 0 0.5
LARGXSM = 2.55 3.45
[/NN Properties]
```

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