

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	4	Configuration file of the training	19
2.3	Comparing PDFs in LHA basis	8			

VALIDPHYS 528M	Current Fit	Reference	CTEQ	MSTW
PDF set name	NNPDF23 nlo FFN NF5 as 0117 mc	NNPDF23 nlo FFN NF5 as 0117	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)	1.14	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
$\langle \chi^{2(k)} \rangle \pm \sigma_{\chi^{2(k)}}$	1.15±0.12	1.14±0.06
$\langle \sigma^{(\text{exp})} \rangle_{\text{dat}}$	14.89%	14.89%
$\langle \sigma^{(\text{net})} \rangle_{\text{dat}}$	3.10%	3.34%
$\langle \rho^{(\text{exp})} \rangle_{\text{dat}}$	3.81e-01	3.81e-01
$\langle \rho^{(\text{net})} \rangle_{\text{dat}}$	6.03e-01	5.86e-01
$\langle \text{cov}^{(\text{exp})} \rangle_{\text{dat}}$	1.87e+08	1.87e+08
$\langle \text{cov}^{(\text{net})} \rangle_{\text{dat}}$	1.48e+06	1.12e+06
$x\Sigma + xg$	1.00738e+00±3.99793e-03	1.00012e+00±6.74706e-04
u_v	1.99948e+00±6.79696e-03	1.99997e+00±5.74967e-03
d_v	9.99748e-01±7.51917e-03	1.00054e+00±5.61150e-03
s_v	-2.06089e-03±2.96586e-03	3.75194e-06±1.36847e-05
xs_v	1.84851e-03±1.55617e-03	3.17634e-03±1.99802e-03
K_s	3.54934e-01±8.06108e-02	3.05342e-01±8.98828e-02
Δ_s	1.25153e-01±3.90499e-02	1.24451e-01±3.93600e-02

Table 2: Summary.

2 Comparing PDFs

2.1 Distances

NNPDF Fit vs Reference Distances

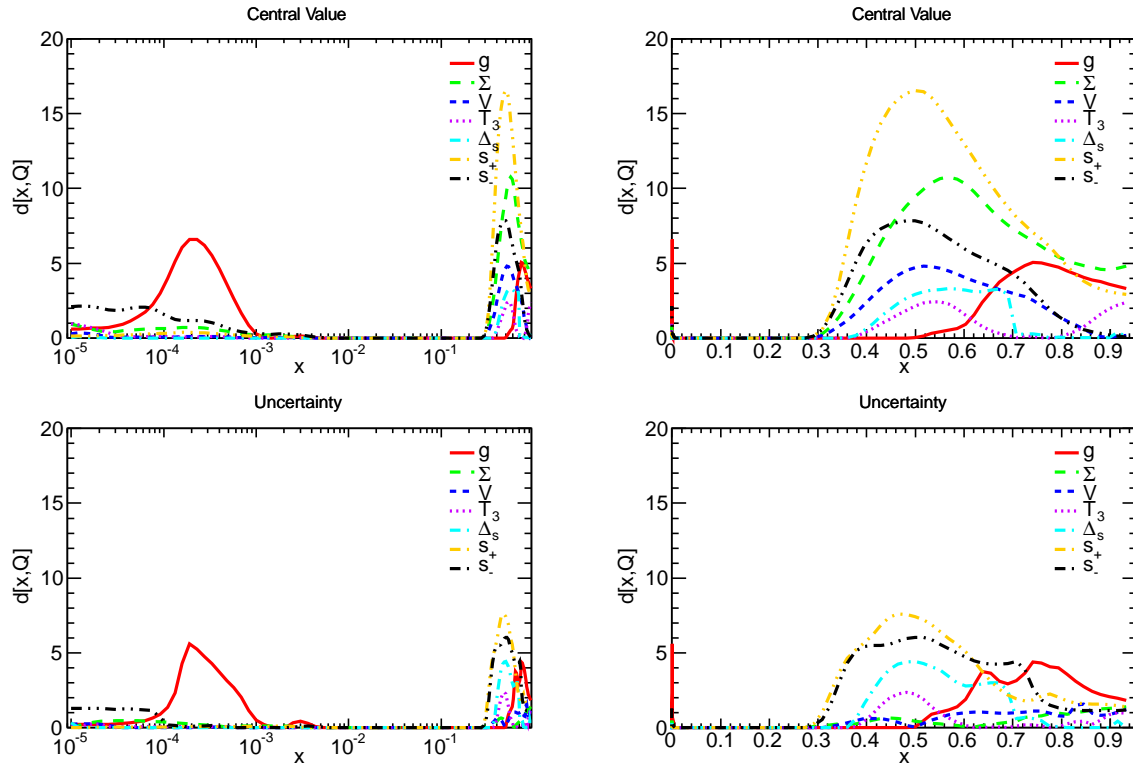


Figure 1: Distances in the fitting basis.

NNPDF Fit vs Reference Distances

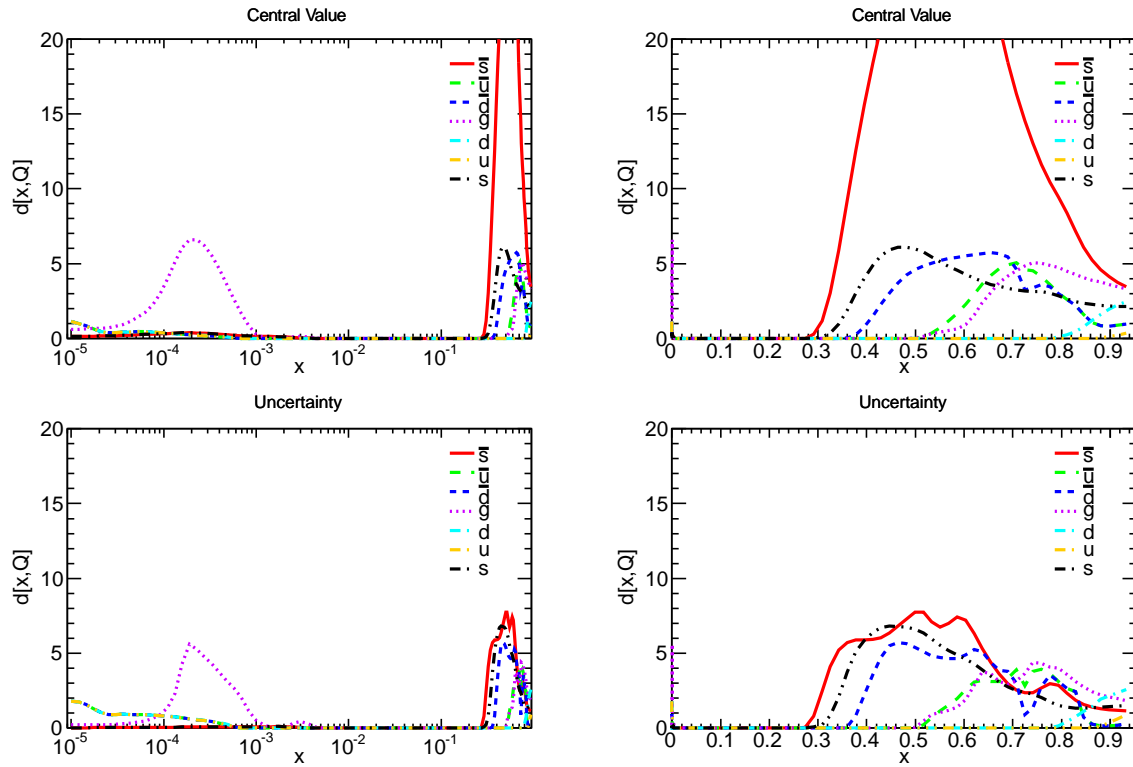


Figure 2: Distances in the flavour basis.

2.2 Comparing PDFs in evolution basis

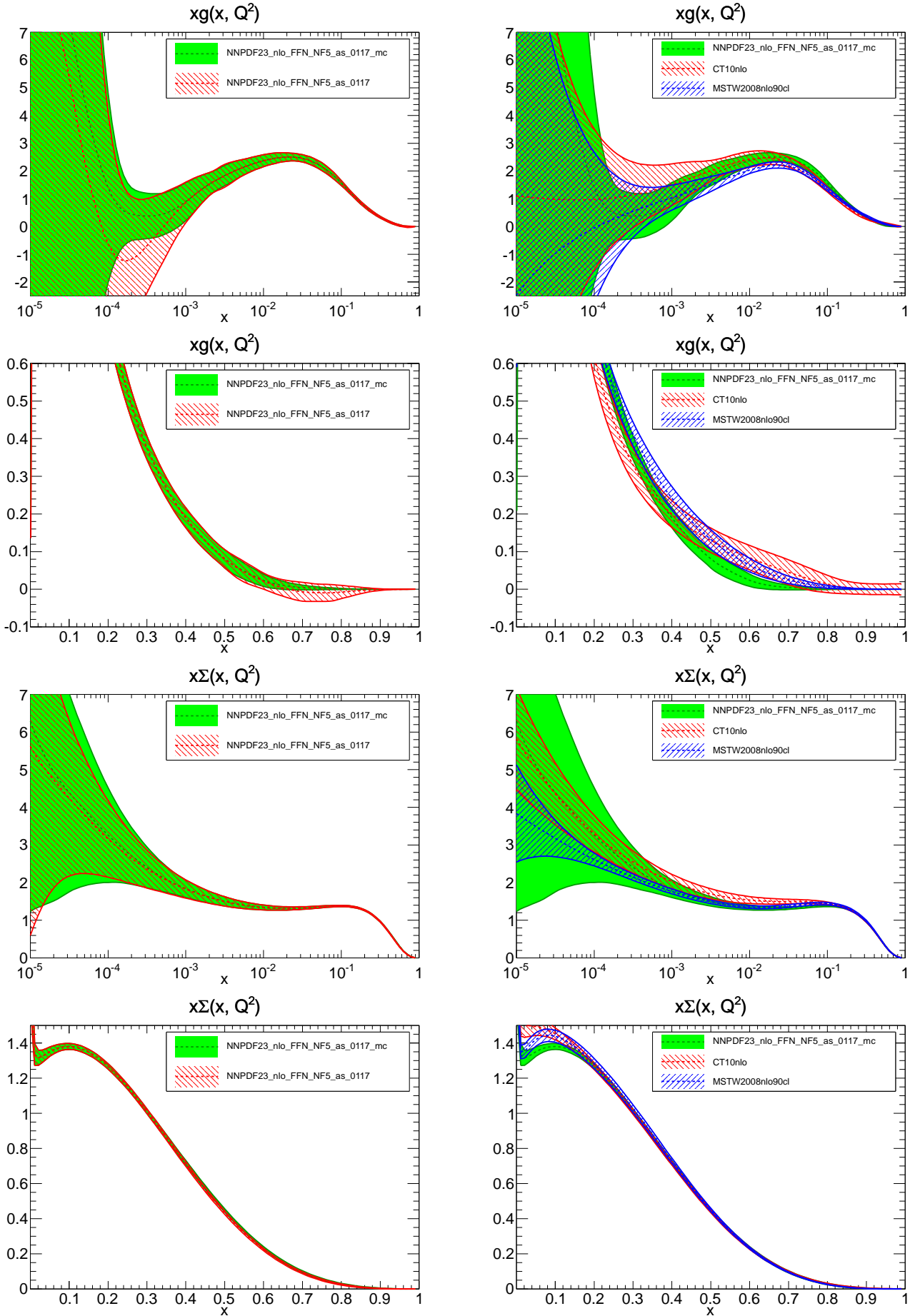


Figure 3: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

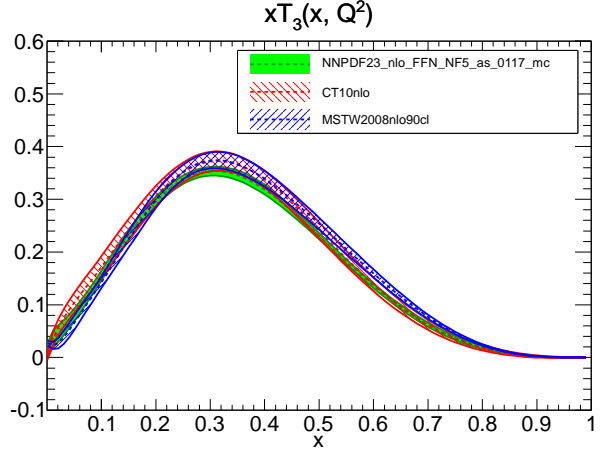
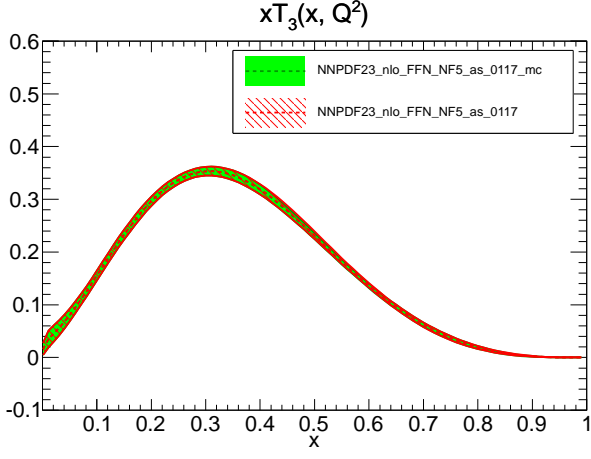
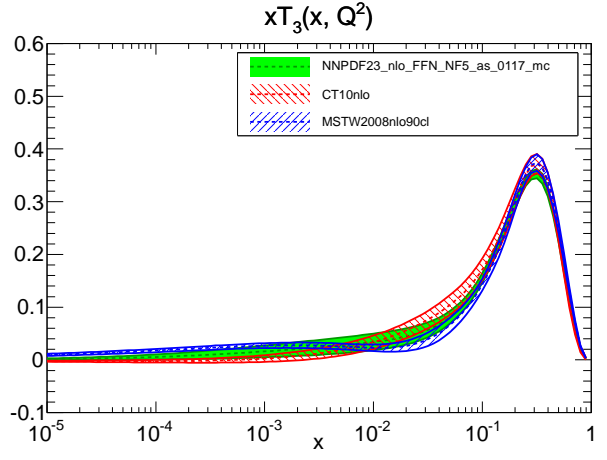
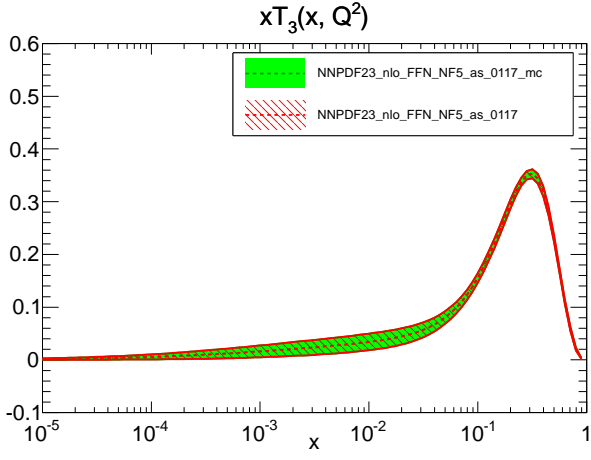
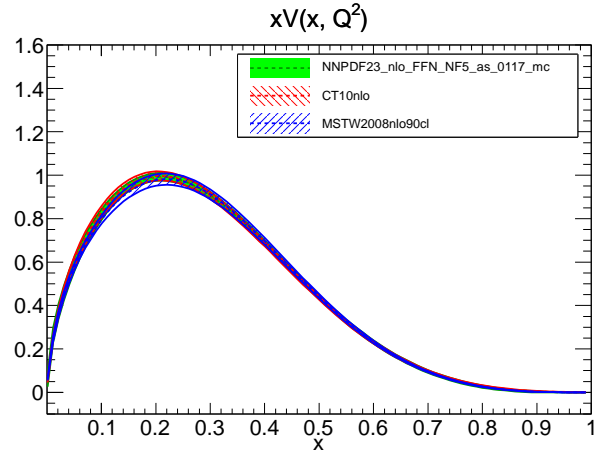
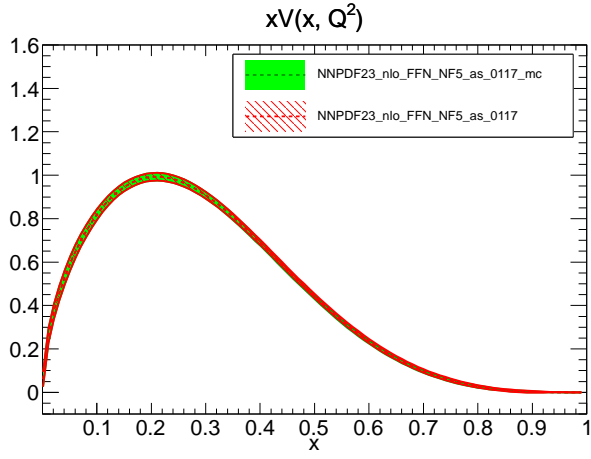
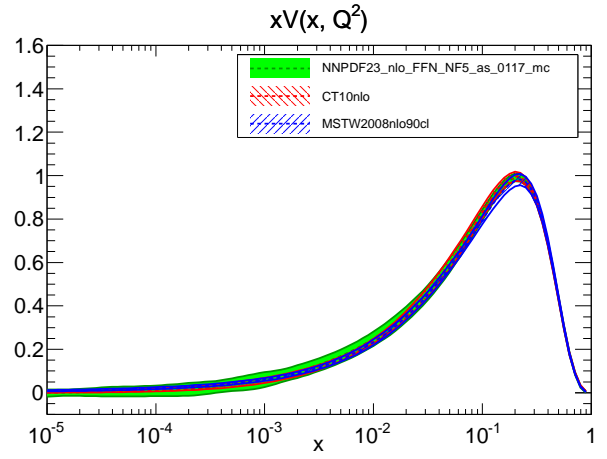
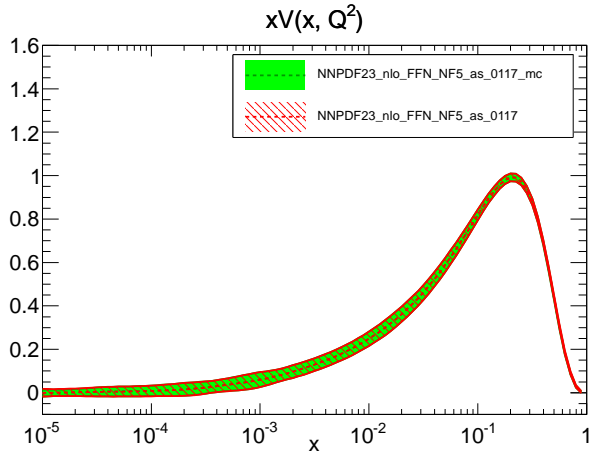


Figure 4: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

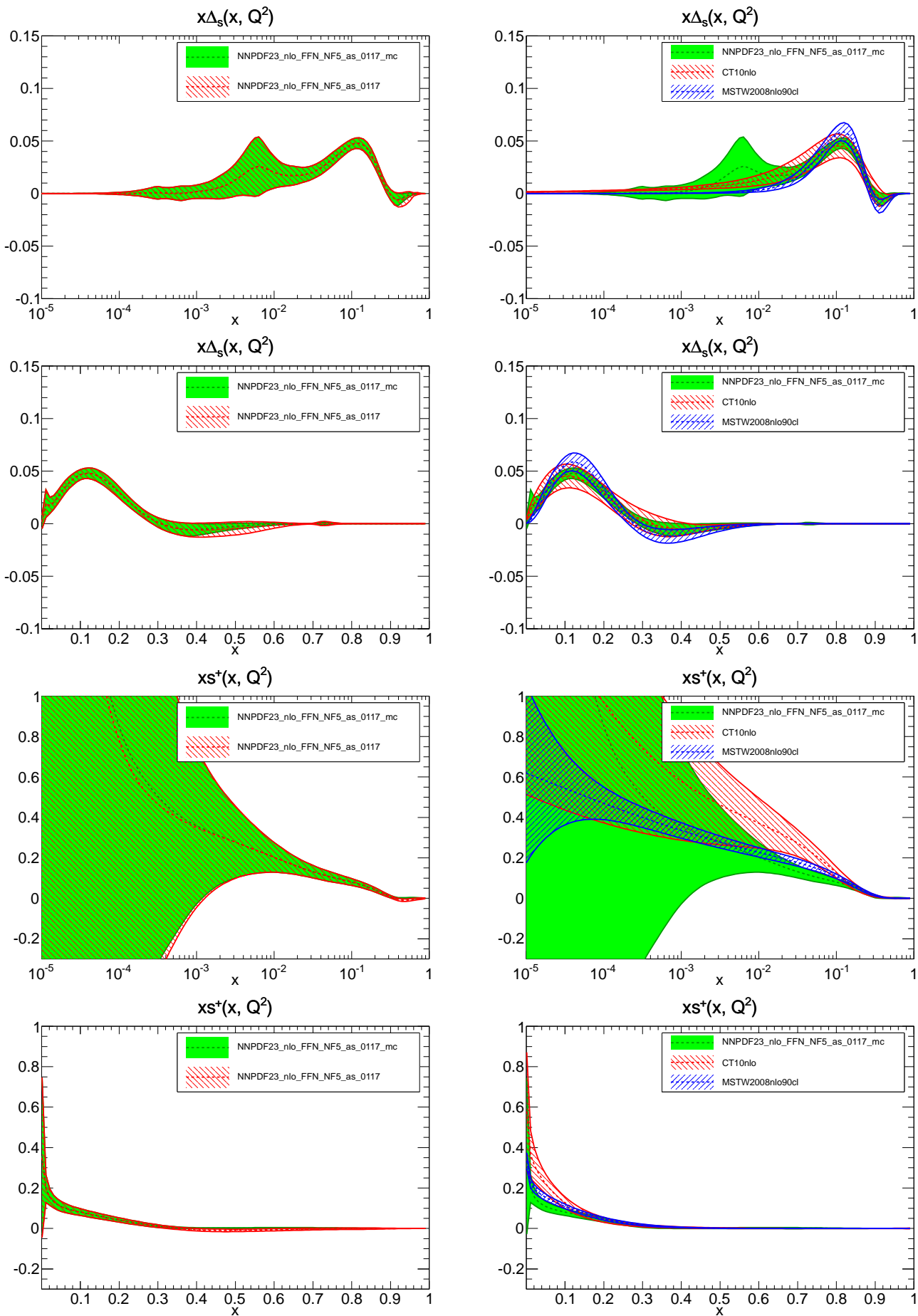


Figure 5: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

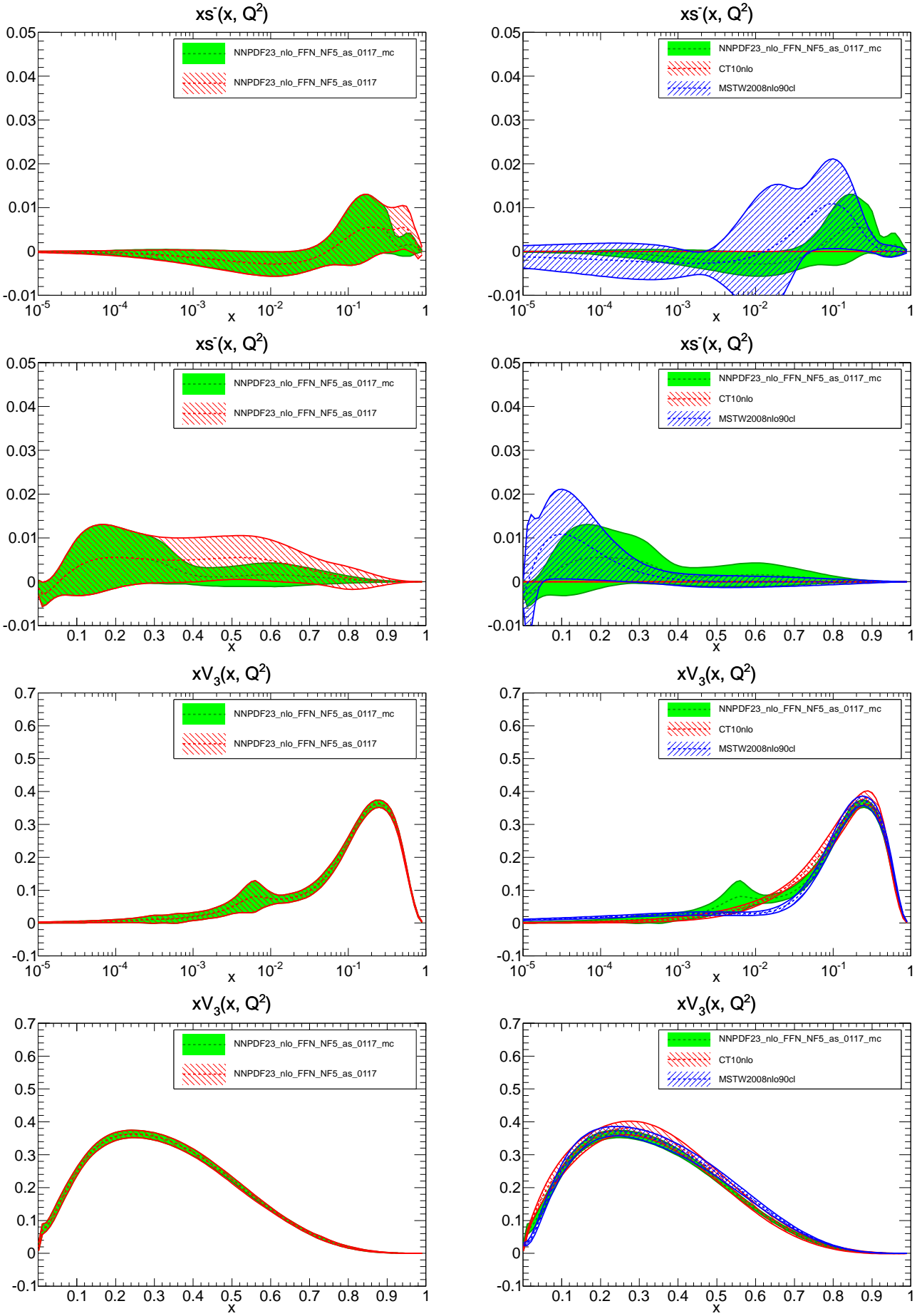


Figure 6: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

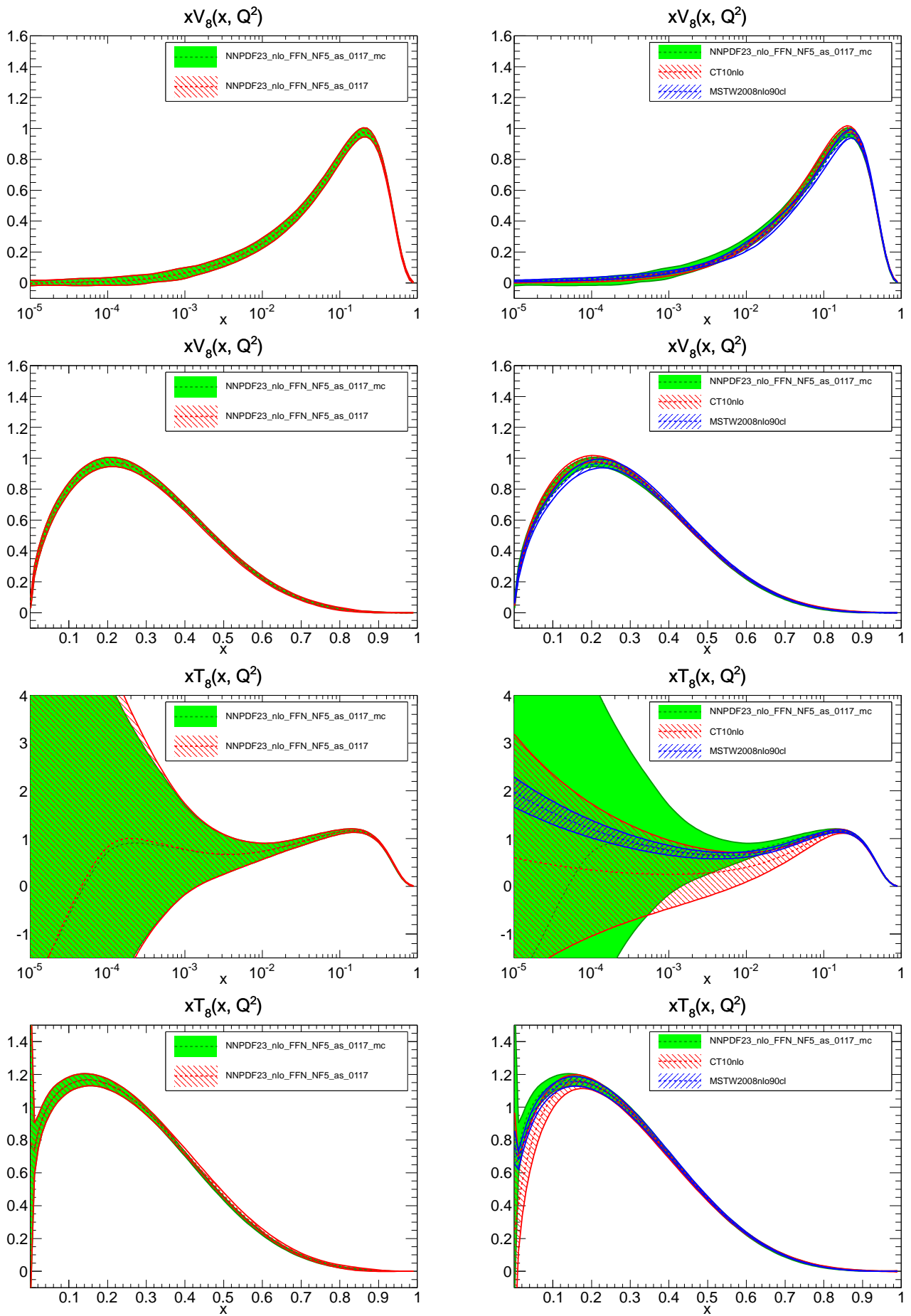


Figure 7: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

2.3 Comparing PDFs in LHA basis

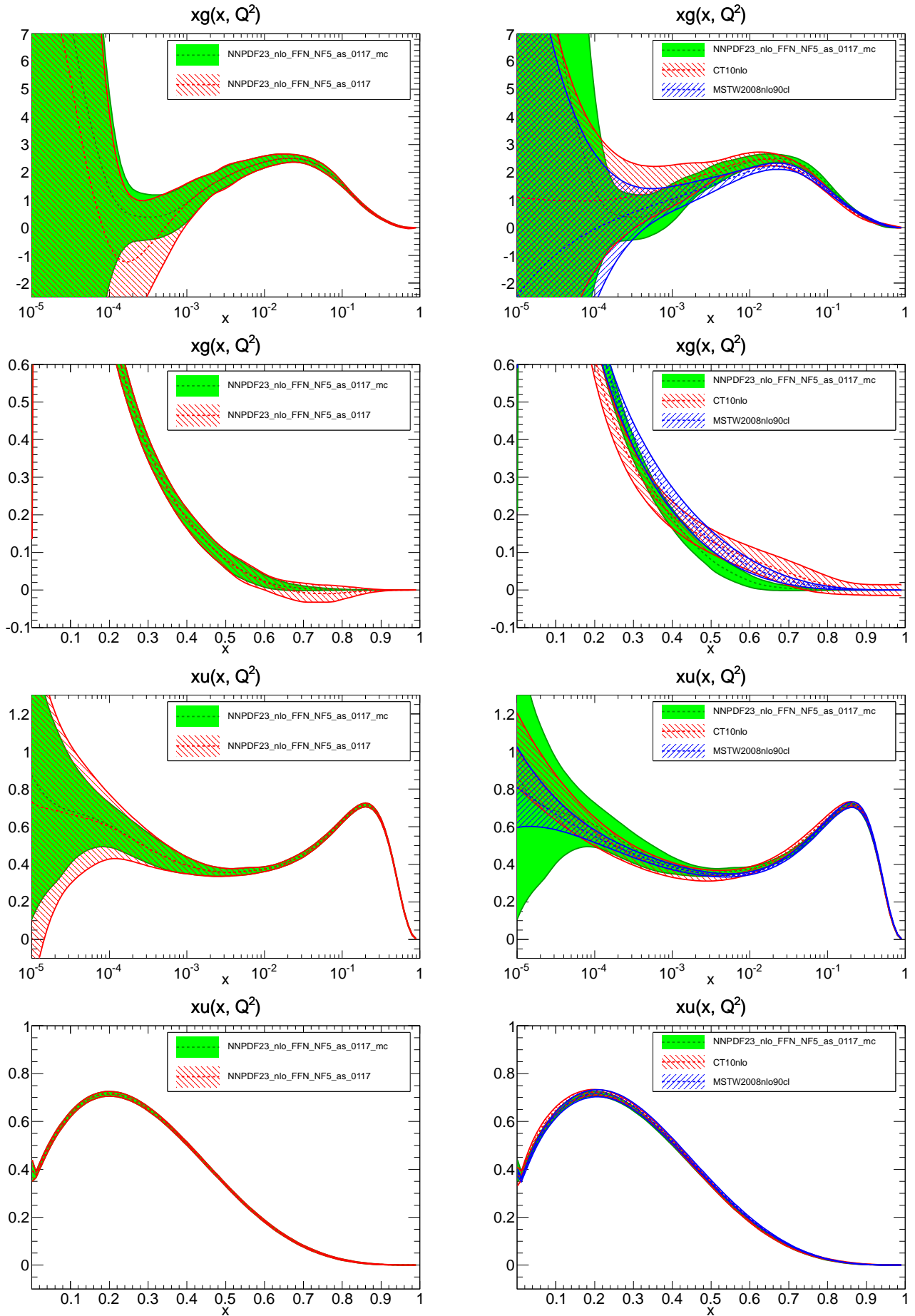


Figure 8: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

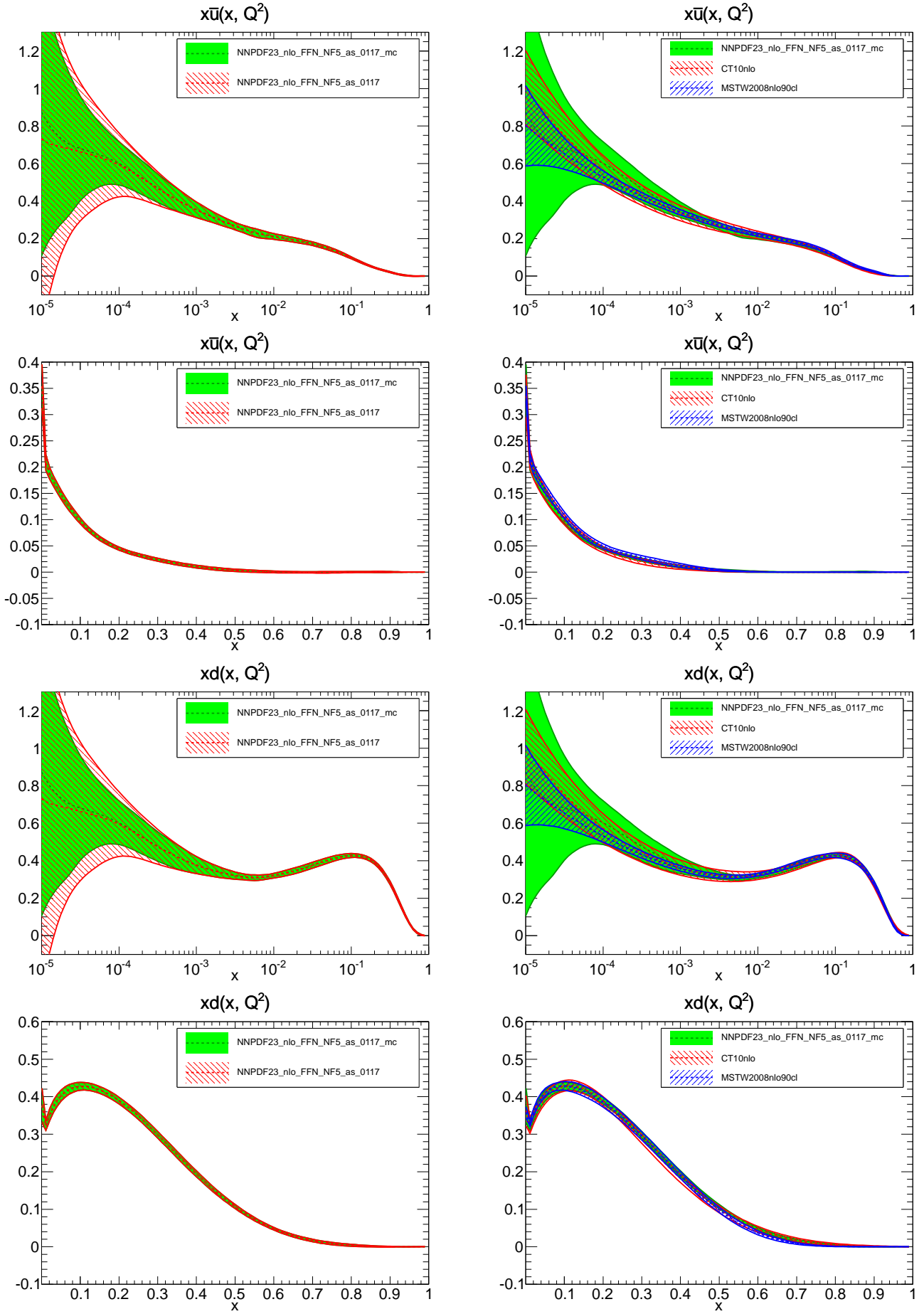


Figure 9: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

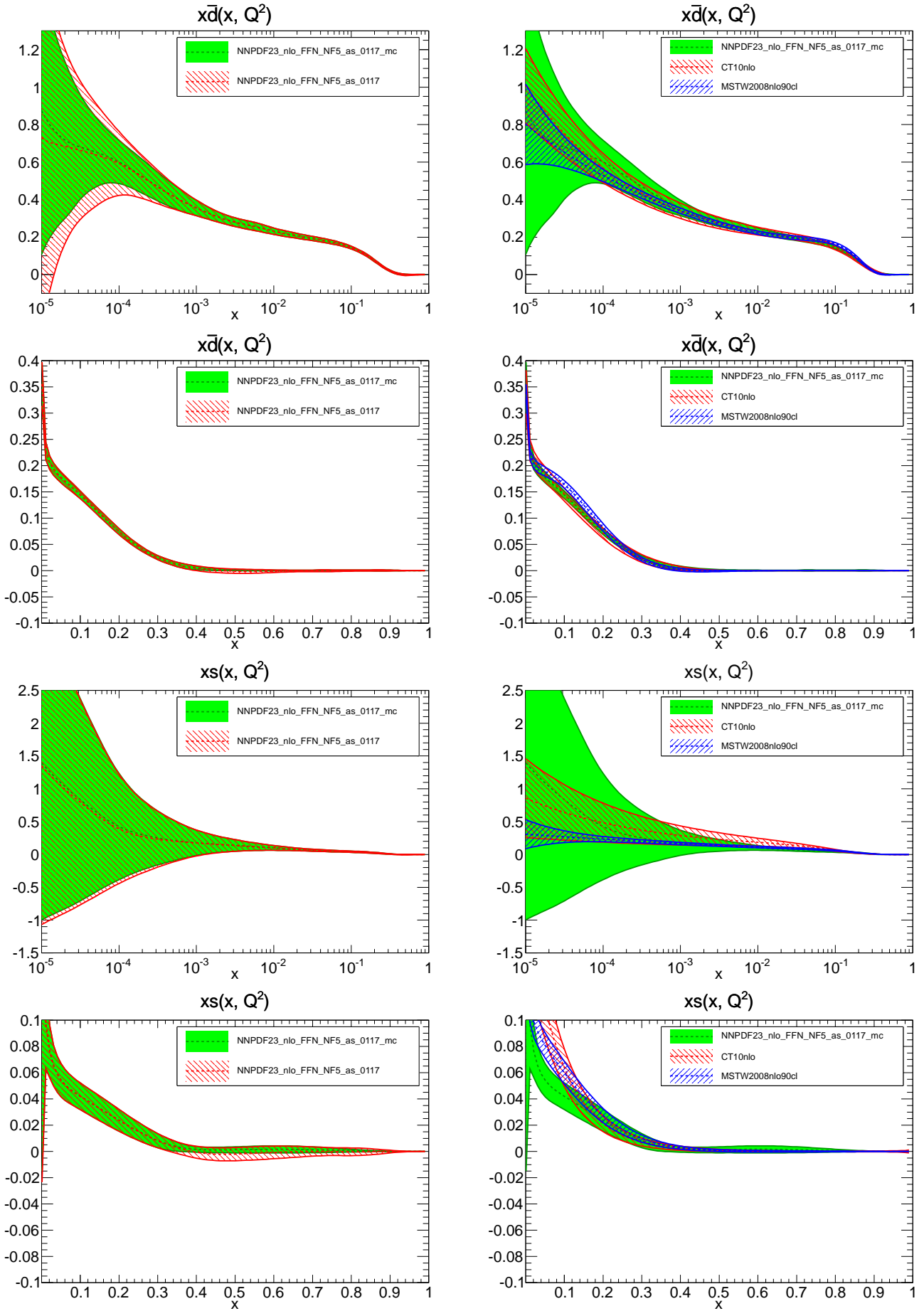


Figure 10: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

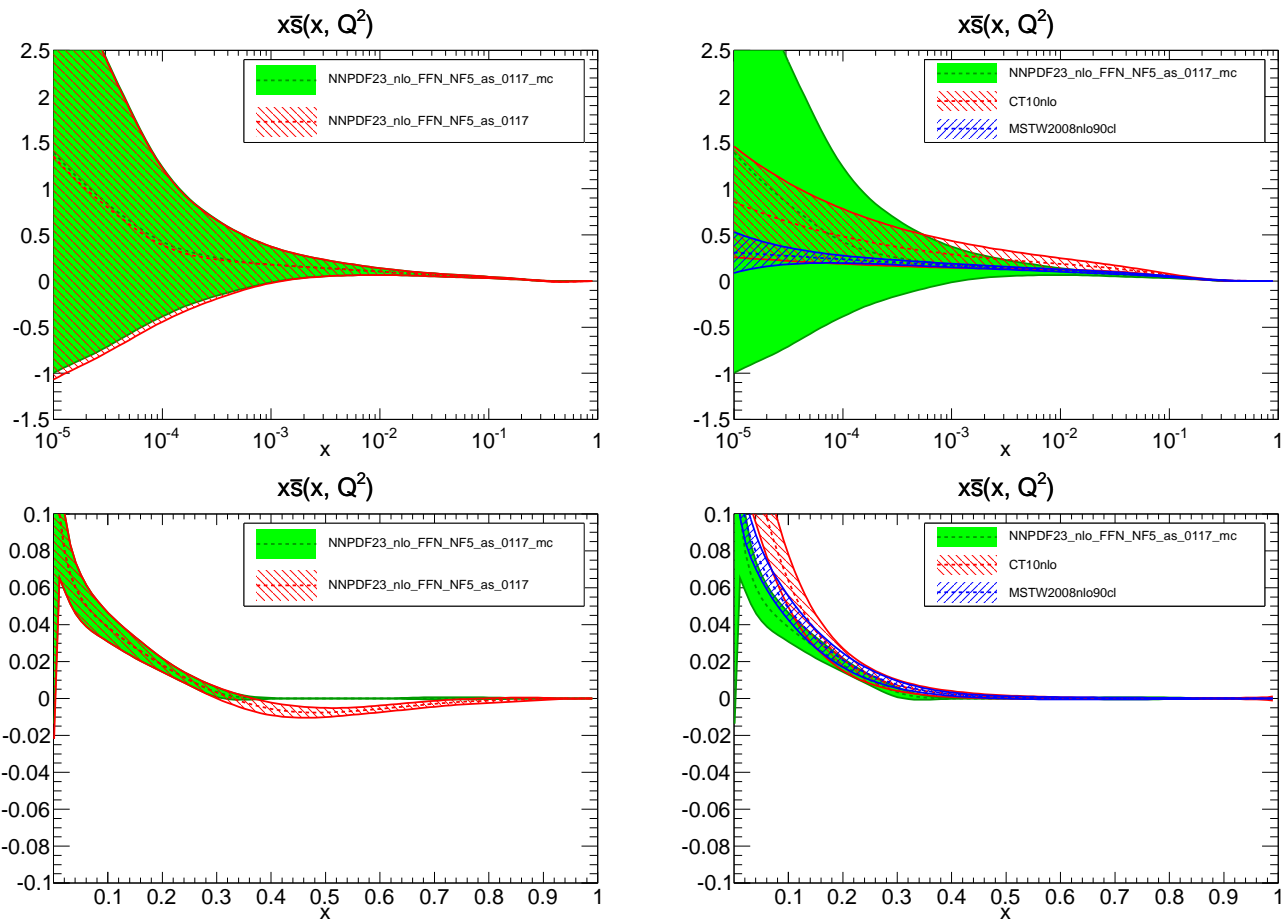


Figure 11: Comparison between PDFs at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

2.4 Replicas in the evolution basis

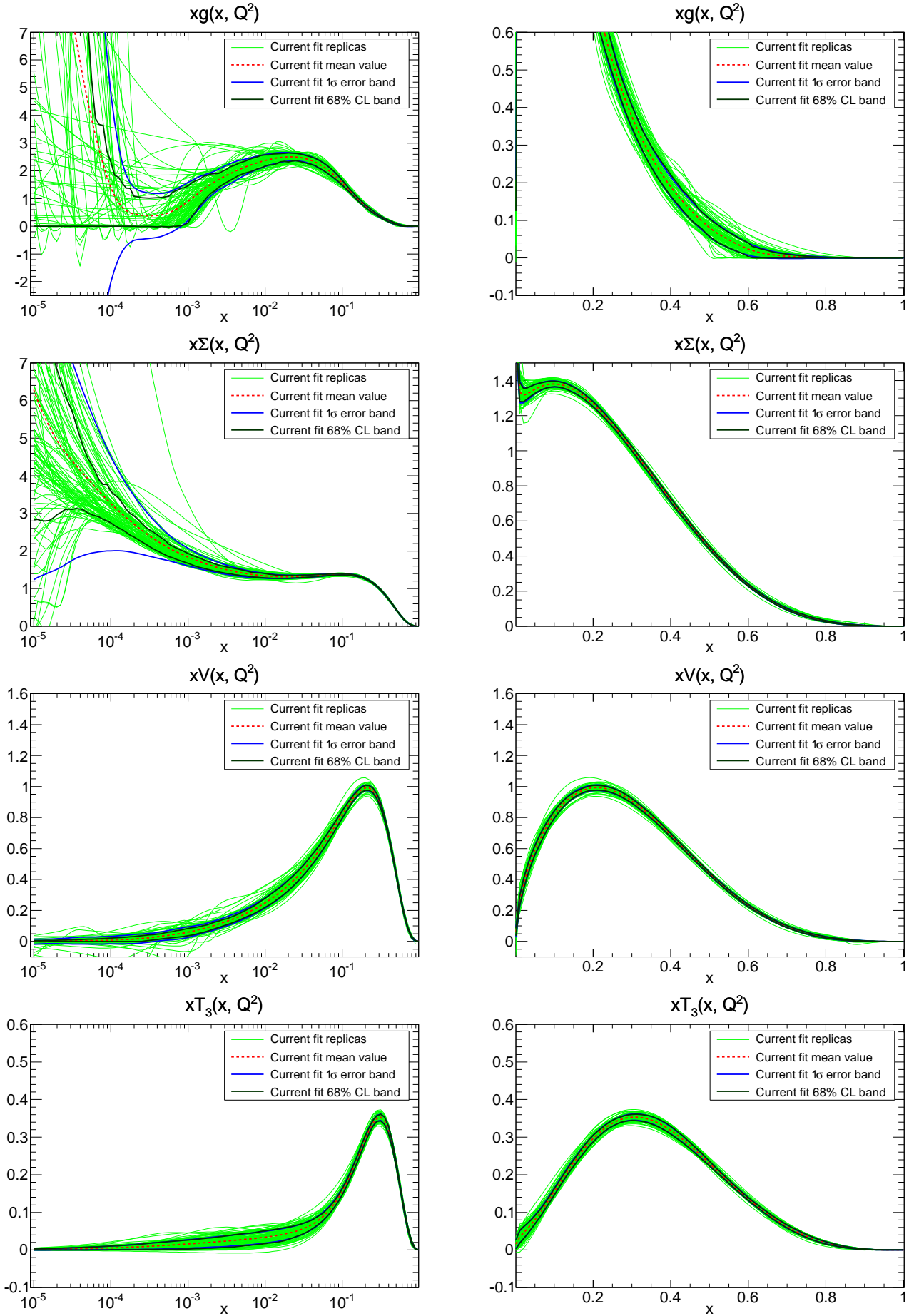


Figure 12: Current fit PDFs in the evolution basis at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

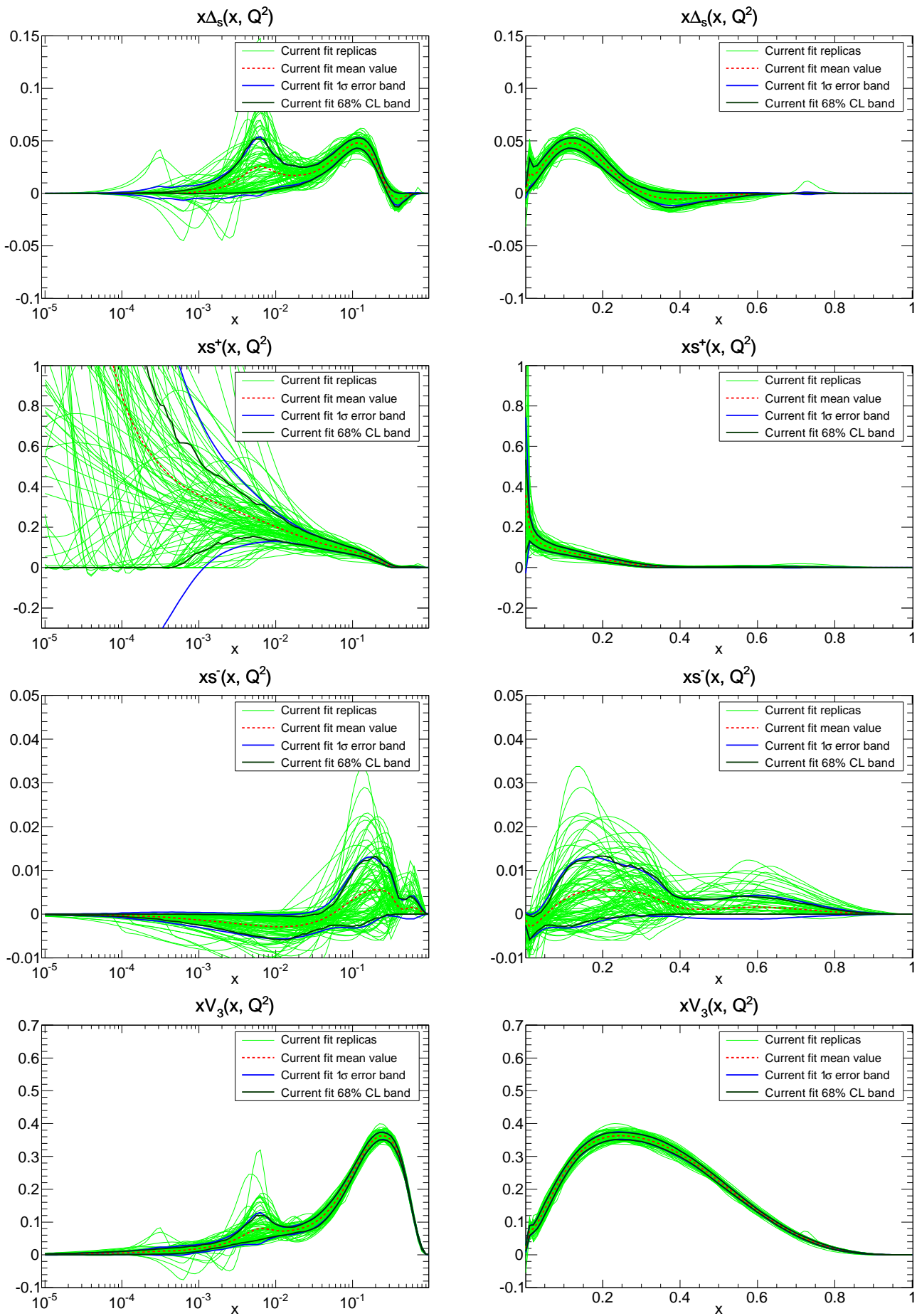


Figure 13: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00 \text{ GeV}^2$.

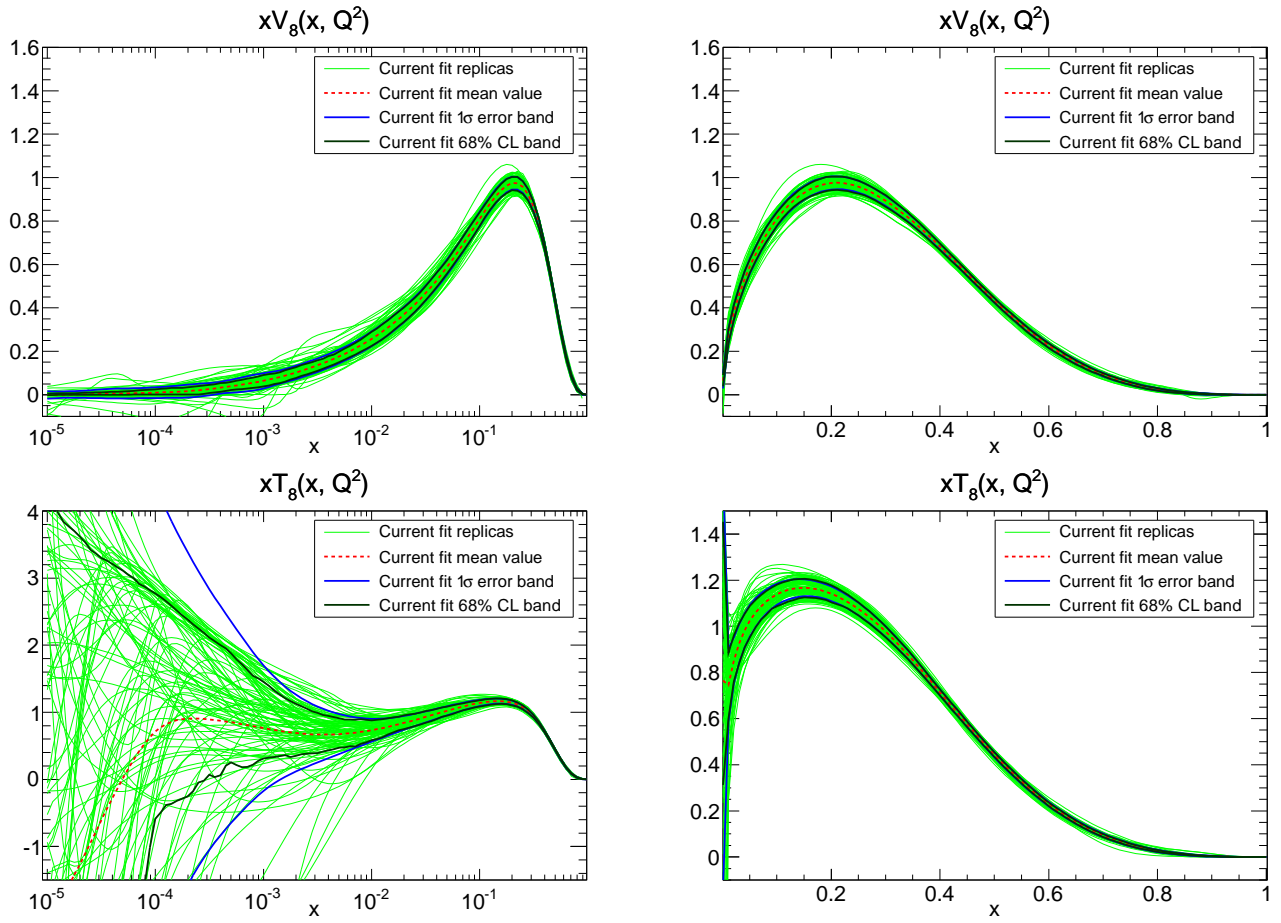


Figure 14: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00 \text{ GeV}^2$.

2.5 Replicas in the LH basis

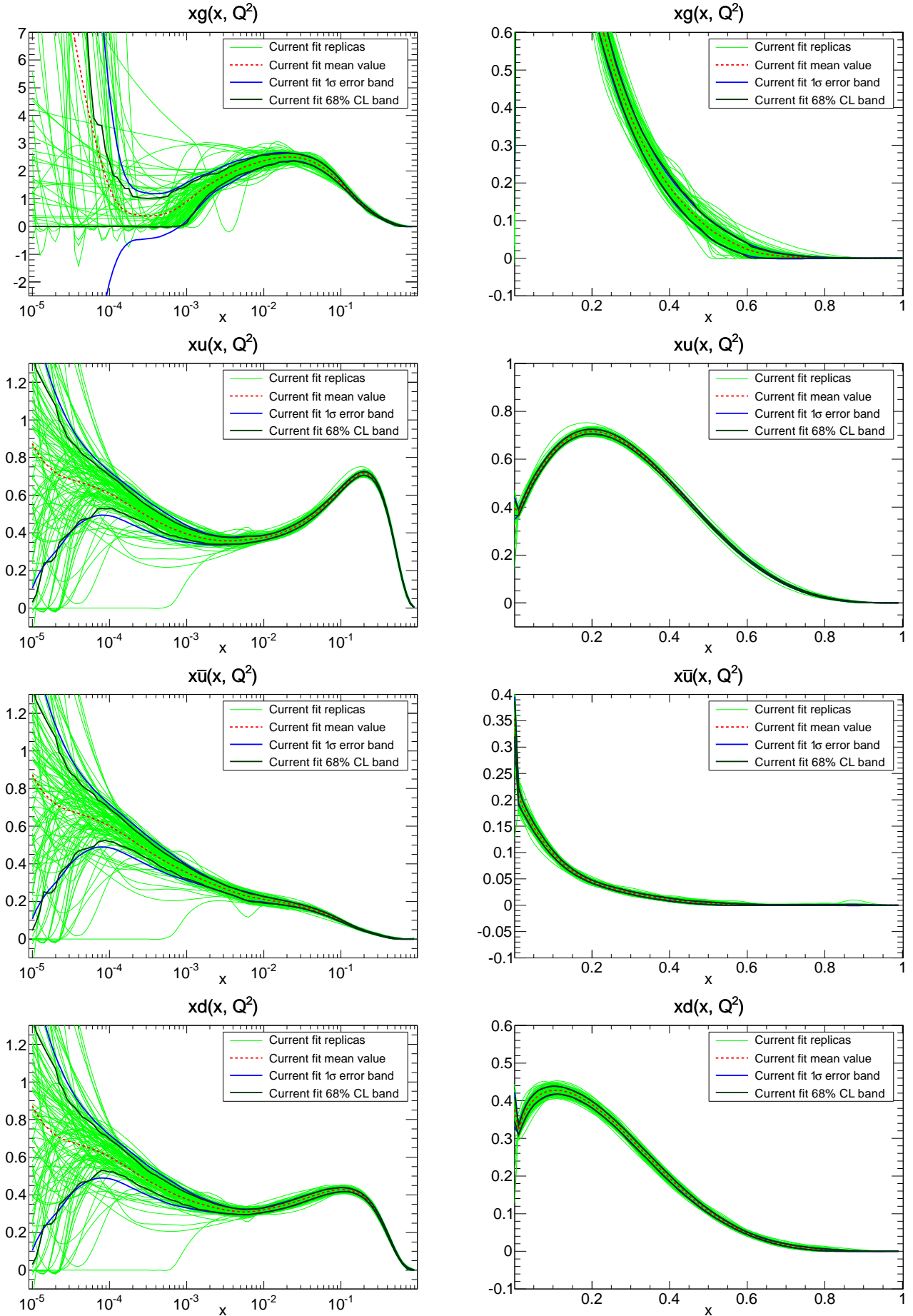


Figure 15: Current fit PDFs in the LH basis at $Q^2 = 2.0e+00 \text{ GeV}^2$.

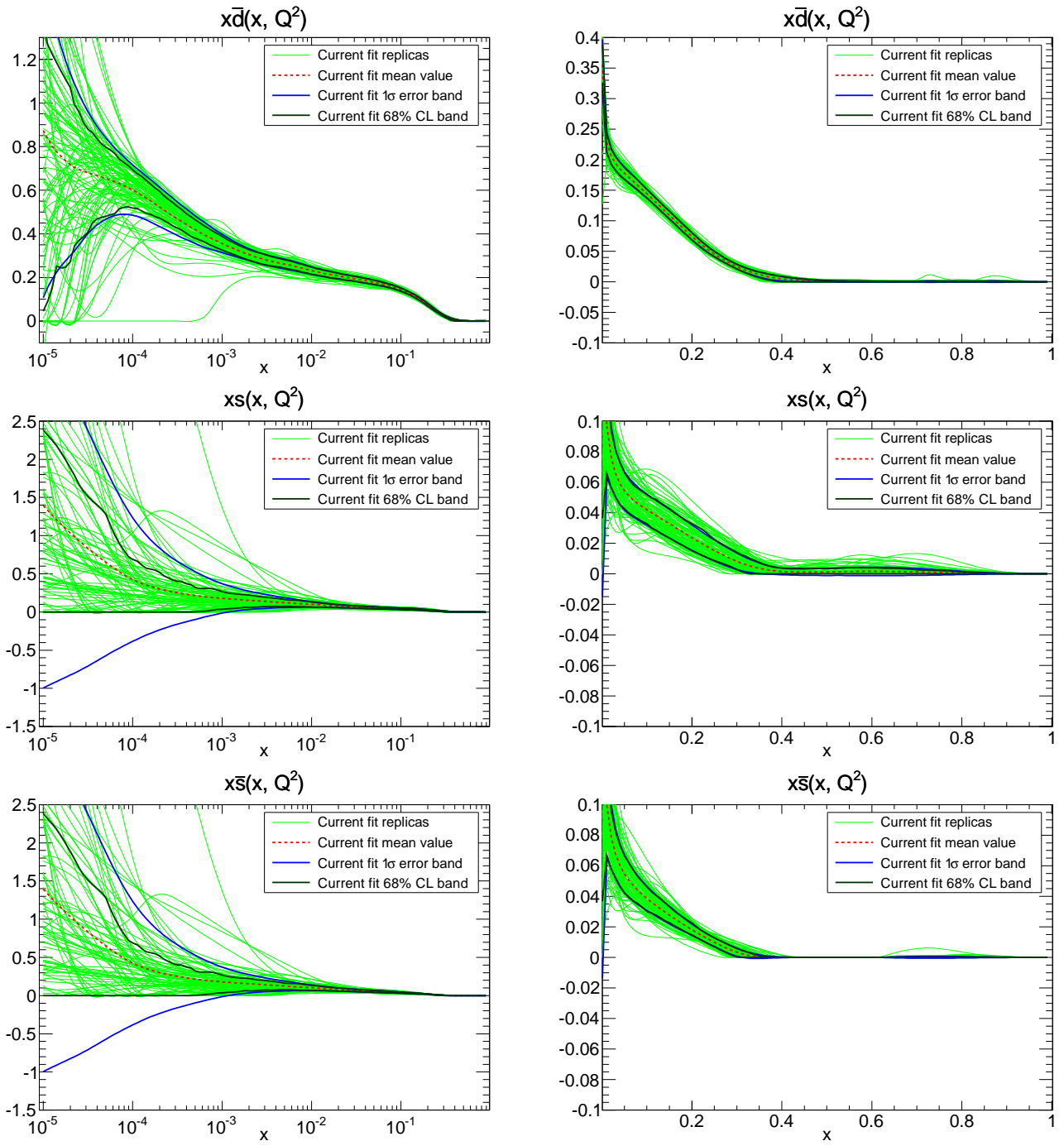


Figure 16: Current fit PDFs in the LH basis at $Q^2 = 2.0e + 00 \text{ GeV}^2$.

3 Fit properties

Distribution of χ^2 for experiments

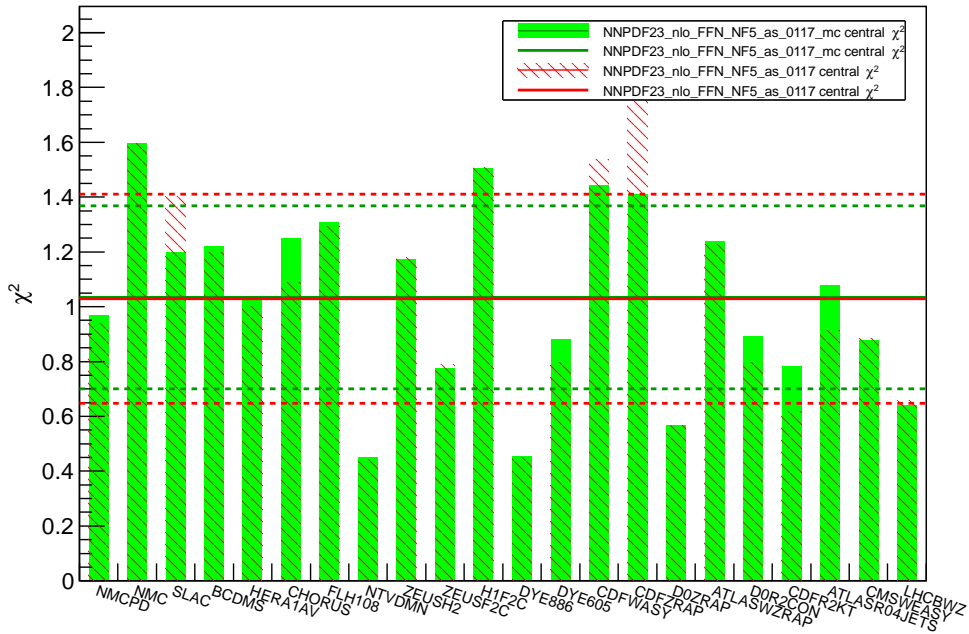


Figure 17: Total χ^2 for each experiment.

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	0.97029	0.93665	0.97220	0.99118
NMC	NMC	224	1.59557	1.59632	1.65446	1.46842
SLAC	SLAC	74	1.19969	1.40088	1.49360	1.21372
	SLACP	37	1.33224	1.48195	1.52293	1.19328
	SLACD	37	1.00112	1.24283	1.27523	1.12047
BCDMS	BCDMS	581	1.22221	1.19570	1.54013	1.37953
	BCDMSP	333	1.22037	1.21713	1.66203	1.36447
	BCDMSD	248	1.17122	1.13374	1.34416	1.30031
HERA1AV	HERA1AV	592	1.02359	0.99954	1.06247	1.58658
	HERA1NCEP	379	1.18230	1.14739	1.22286	1.98845
	HERA1NCEM	145	0.79546	0.78818	0.83824	1.09481
	HERA1CCEP	34	0.90321	0.92318	0.99722	0.91196
	HERA1CCEM	34	0.55881	0.56520	0.55712	0.54255
CHORUS	CHORUS	862	1.25035	1.08869	1.43153	1.31677
	CHORUSNU	431	1.17976	1.14206	1.38479	1.23375
	CHORUSNB	431	1.19678	0.97097	1.35769	1.29506
FLH108	FLH108	8	1.30798	1.29173	1.37703	1.31189
NTVDMN	NTVDMN	79	0.44969	0.44252	4.04424	1.00540
	NTVNUDMN	41	0.26931	0.26474	2.55603	0.63668
	NTVNBDMN	38	0.62410	0.61615	6.31061	1.65170
ZEUSH2	ZEUSH2	127	1.17214	1.18153	1.20220	1.48374
	ZO6NC	90	1.12212	1.12433	1.11607	1.53673
	ZO6CC	37	1.15427	1.18071	1.20219	1.14221
ZEUSF2C	ZEUSF2C	50	0.77545	0.78822	0.72242	0.89786
	ZEUSF2C99	14	0.72903	0.73913	0.67325	0.95232
	ZEUSF2C03	21	1.28723	1.31145	1.18144	1.46976
	ZEUSF2C08	7	0.18599	0.18557	0.20302	0.16634
	ZEUSF2C09	8	0.11817	0.11785	0.13428	0.09674
H1F2C	H1F2C	38	1.50541	1.50775	1.30627	1.41870
	H1F2C01	6	1.00816	1.01915	1.05743	1.50533
	H1F2C09	6	2.60621	2.57634	1.89054	1.74802
	H1F2C10	26	1.29474	1.30338	1.18544	1.28798
DYE886	DYE886R	15	0.45526	0.44914	0.48207	0.74068
DYE605	DYE605	119	0.88132	0.79728	0.79375	1.02817
CDFWASY	CDFWASYM	13	1.44275	1.53865	3.46204	8.91503
CDFZRAP	CDFZRAP	29	1.41083	1.76022	1.61219	1.99696
DOZRAP	DOZRAP	28	0.56910	0.56665	0.54505	0.56639
ATLASWZRAP	ATLASWZRAP36PB	30	1.24020	1.22687	1.03165	2.09614
DOR2CON	DOR2CON	110	0.89264	0.79796	1.06985	1.02583
CDFR2KT	CDFR2KT	76	0.78321	0.61918	1.11642	0.82753
ATLASR04JETS	ATLASR04JETS36PB	90	1.07842	0.91566	1.34143	1.15083
CMSWEASY	CMSWEASY840PB	11	0.87828	0.88357	1.47448	4.22287
LHCBWZ	LHCBWZ36PB	10	0.64134	0.65784	1.01100	0.93896
Total (sets)		3298	1.12	1.07	1.36	1.00
Total (exps)		3298	1.14	1.08	1.37	1.37

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 = 117
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]
```