Validphys Report
NNPDF revision 528M

The NNPDF Collaboration

February 5, 2013

Contents

VALIDPHYS 528M	**Current Fit**	**Reference**	**CTEQ**	**MSTW**
PDF set name	NNPDF23 nlo FFN NF4 as 0117 mc	NNPDF23 nlo FFN NF4 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**
$\chi^2_{\rm tot}$ (exp)	1.14	1.08
$\langle E\rangle \pm \sigma_E$	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
$\langle \chi^{2(k)}\rangle \pm \sigma_{\chi^{2(k)}}$	1.15±0.12	1.14±0.06
$\langle \sigma^{(\rm exp)}\rangle_{\rm dat}$	14.89%	14.89%
$\langle \sigma^{(\rm net)}\rangle_{\rm dat}$	3.10%	3.34%
$\langle \rho^{(\rm exp)}\rangle_{\rm dat}$	3.81e-01	3.81e-01
$\langle \rho^{(\rm net)}\rangle_{\rm dat}$	6.03e-01	5.86e-01
$\langle {\rm cov}^{(\rm exp)}\rangle_{\rm dat}$	1.87e+08	1.87e+08
$\langle {\rm cov}^{(\rm net)}\rangle_{\rm dat}$	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

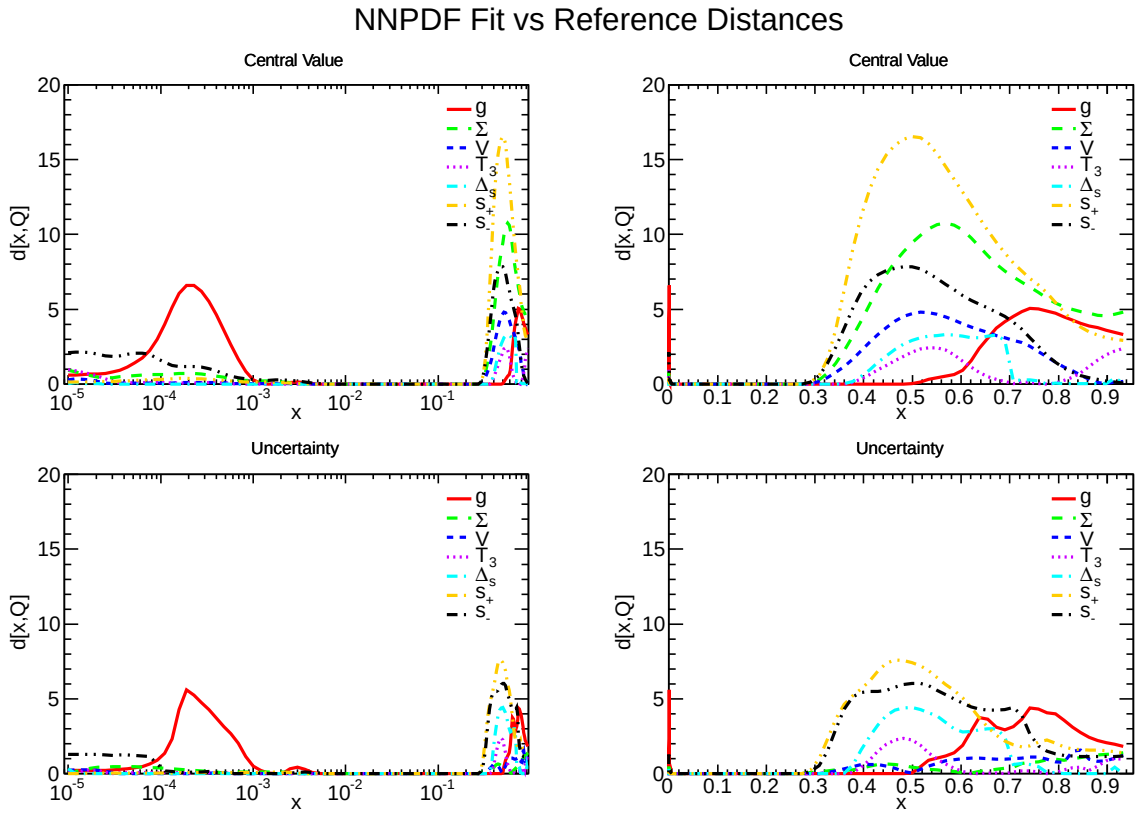

Figure 1: Distances in the fitting basis.

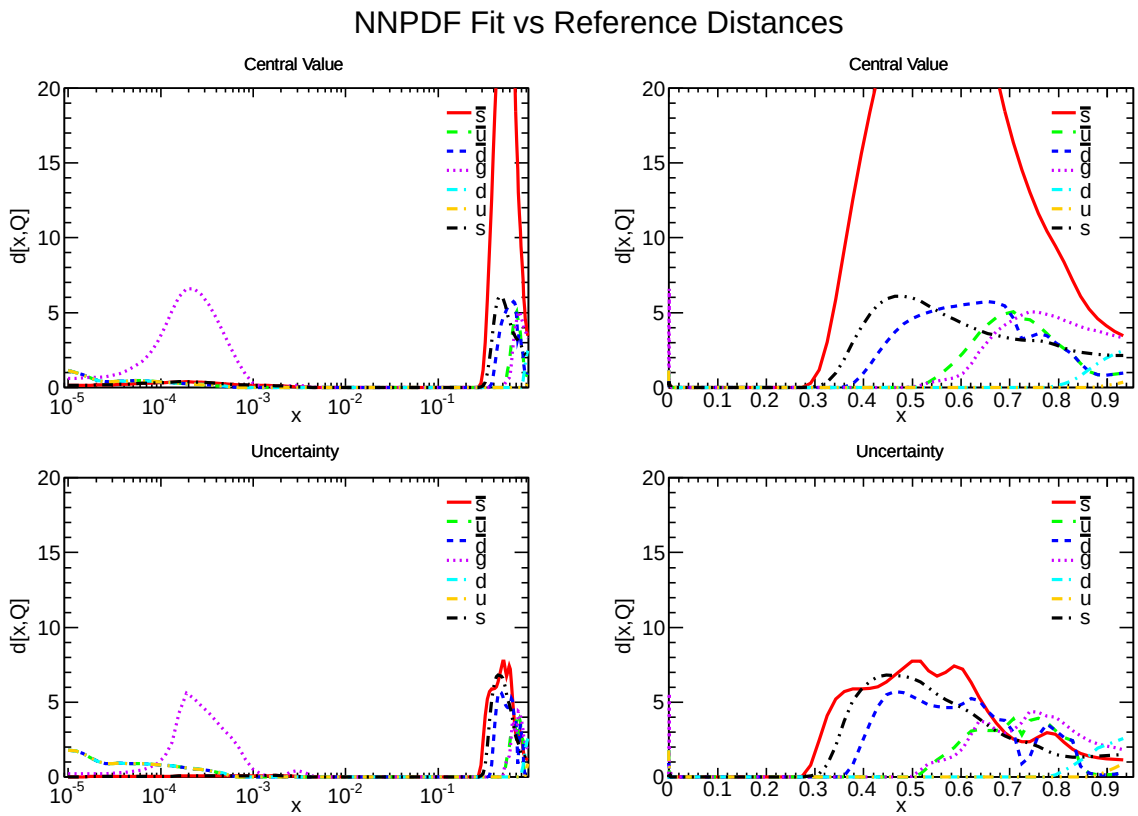

Figure 2: Distances in the flavour basis.

2.2 Comparing PDFs in evolution basis

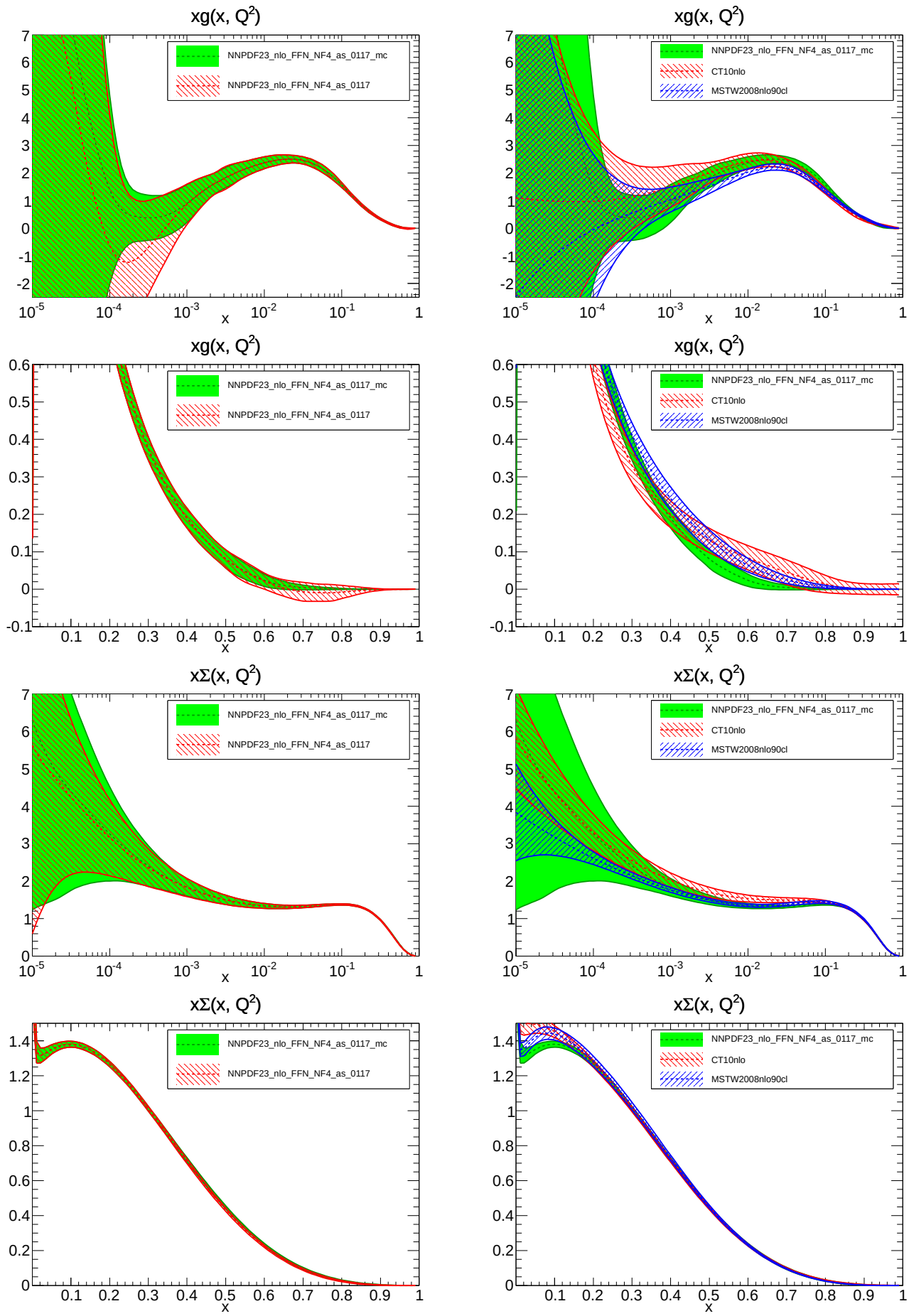

Figure 3: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

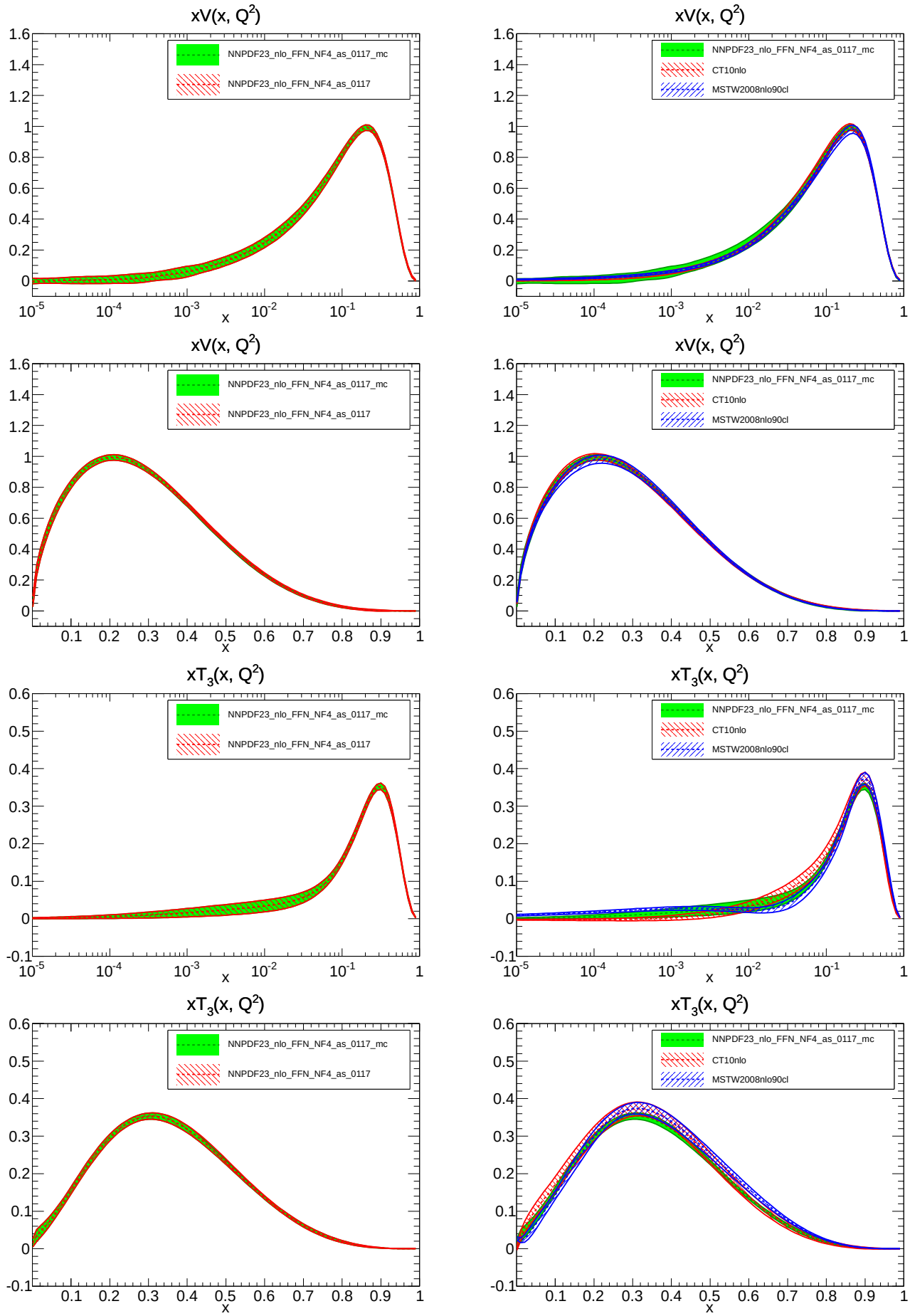

Figure 4: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

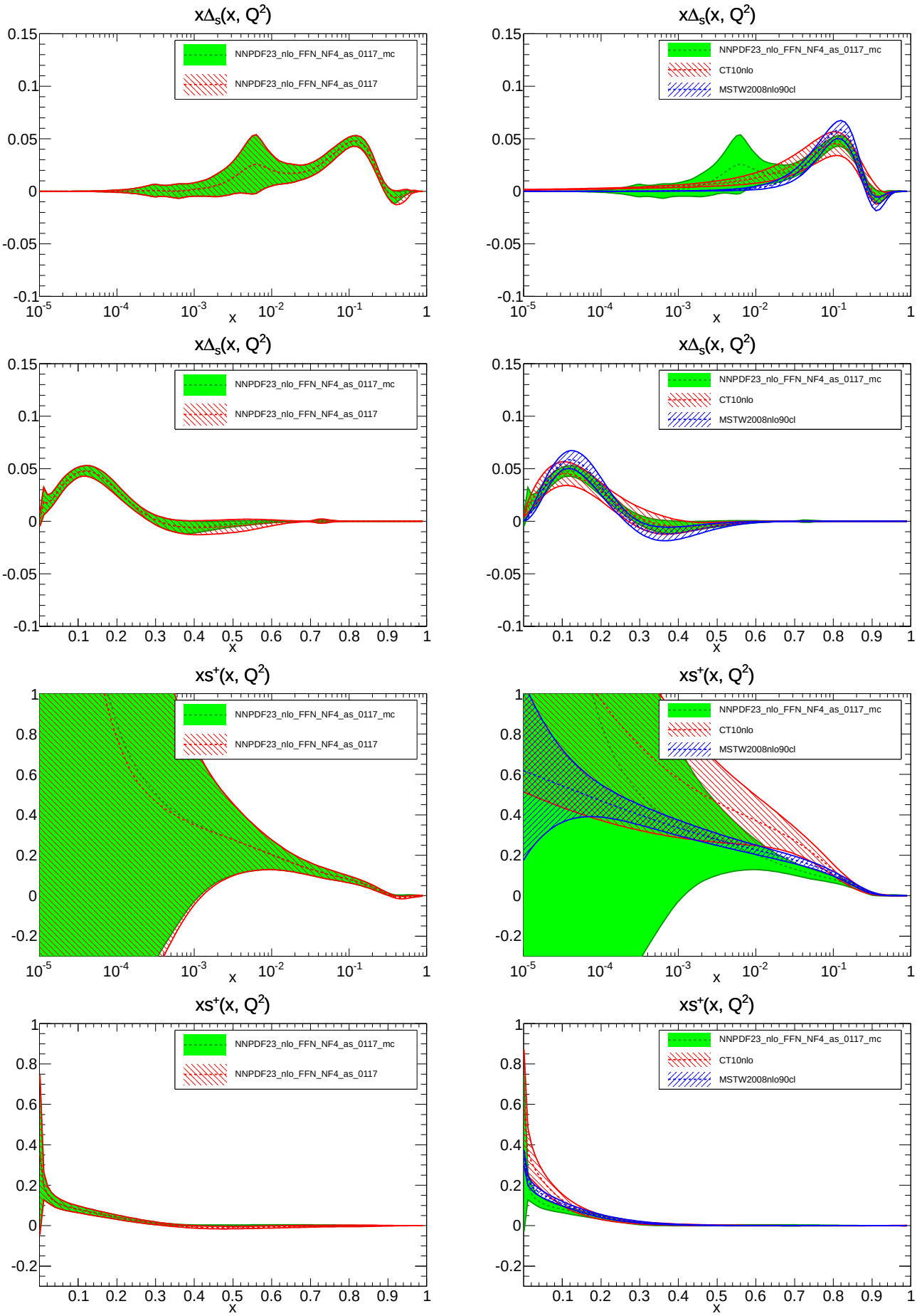

Figure 5: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

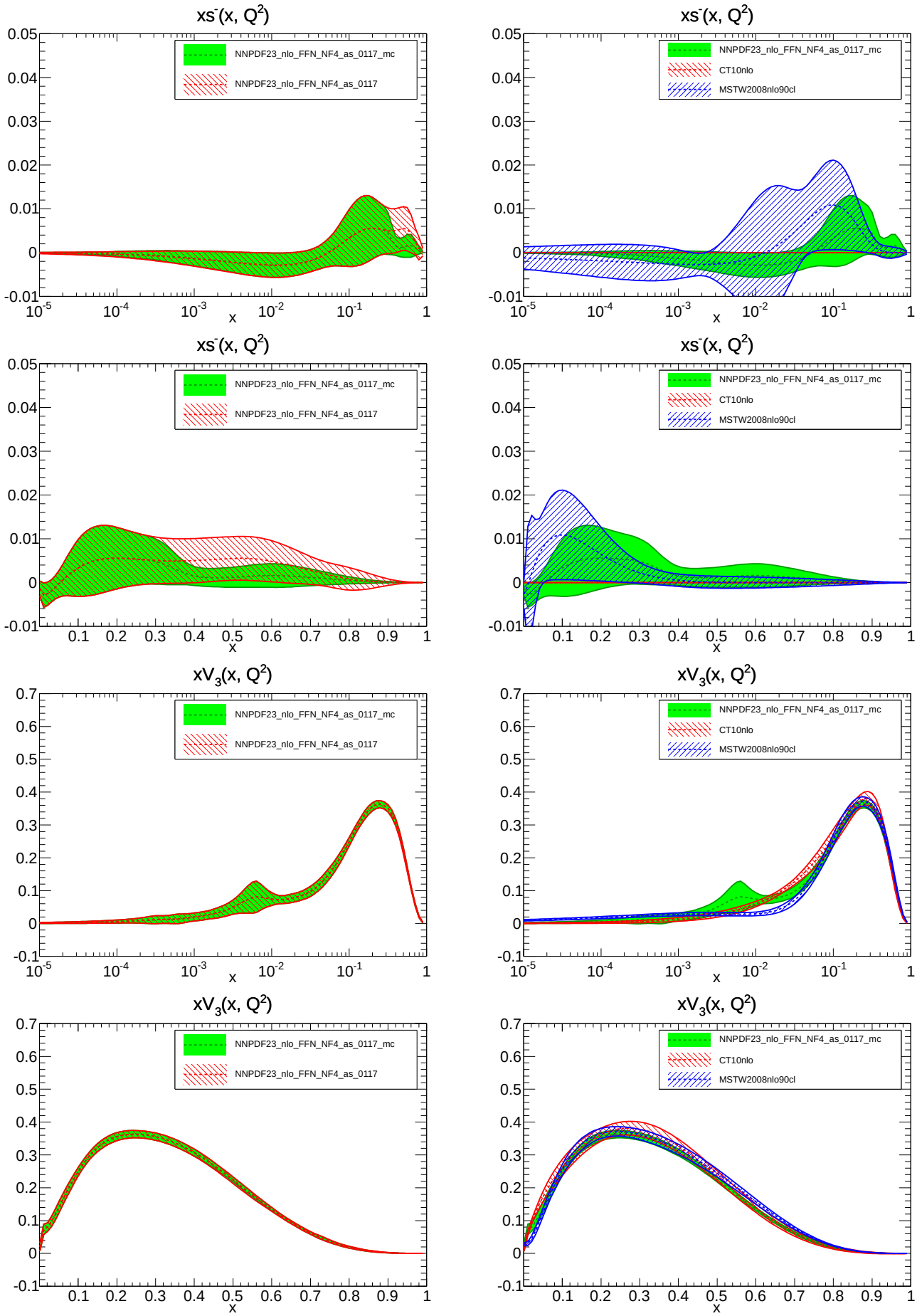

Figure 6: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

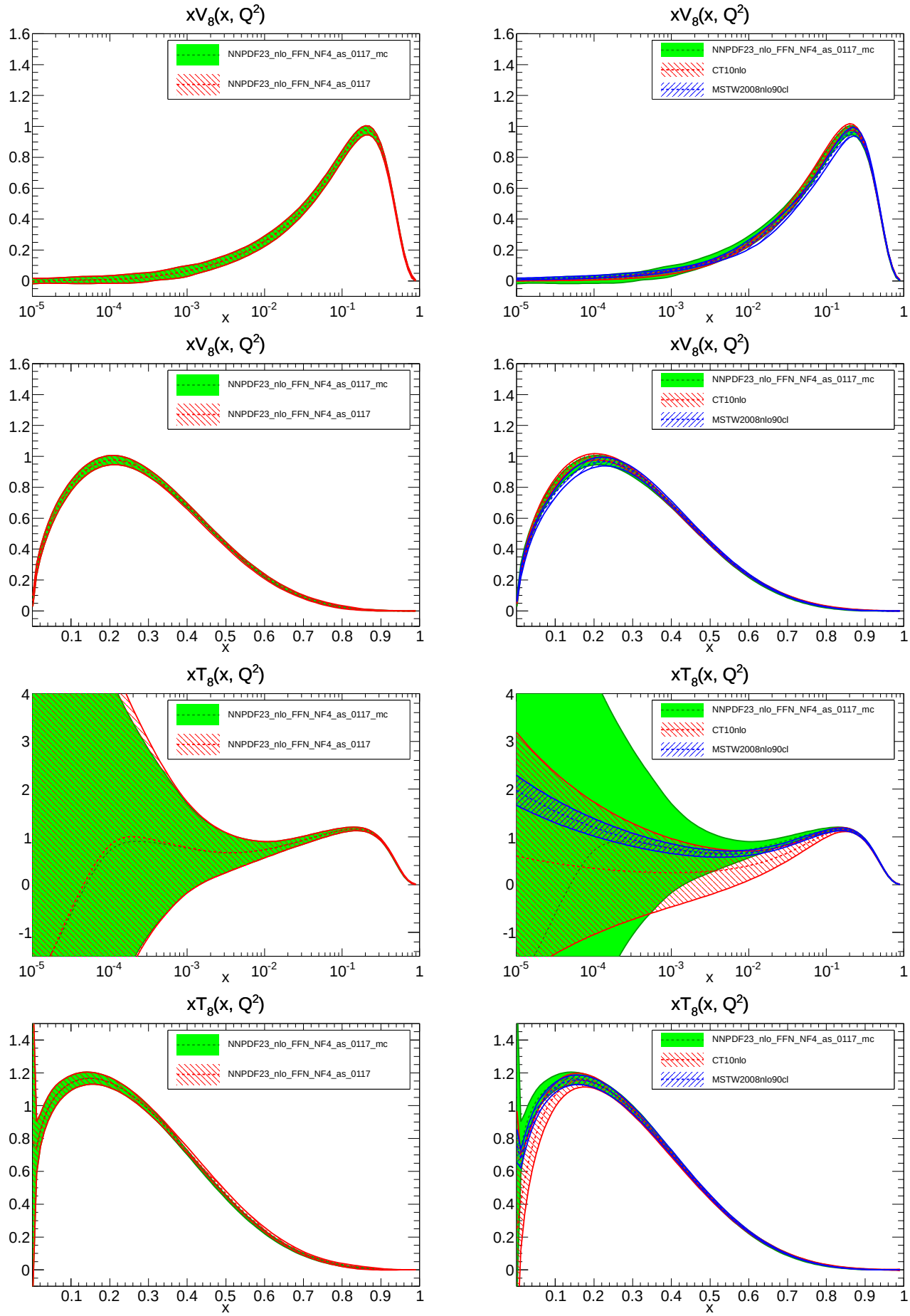

Figure 7: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

2.3 Comparing PDFs in LHA basis

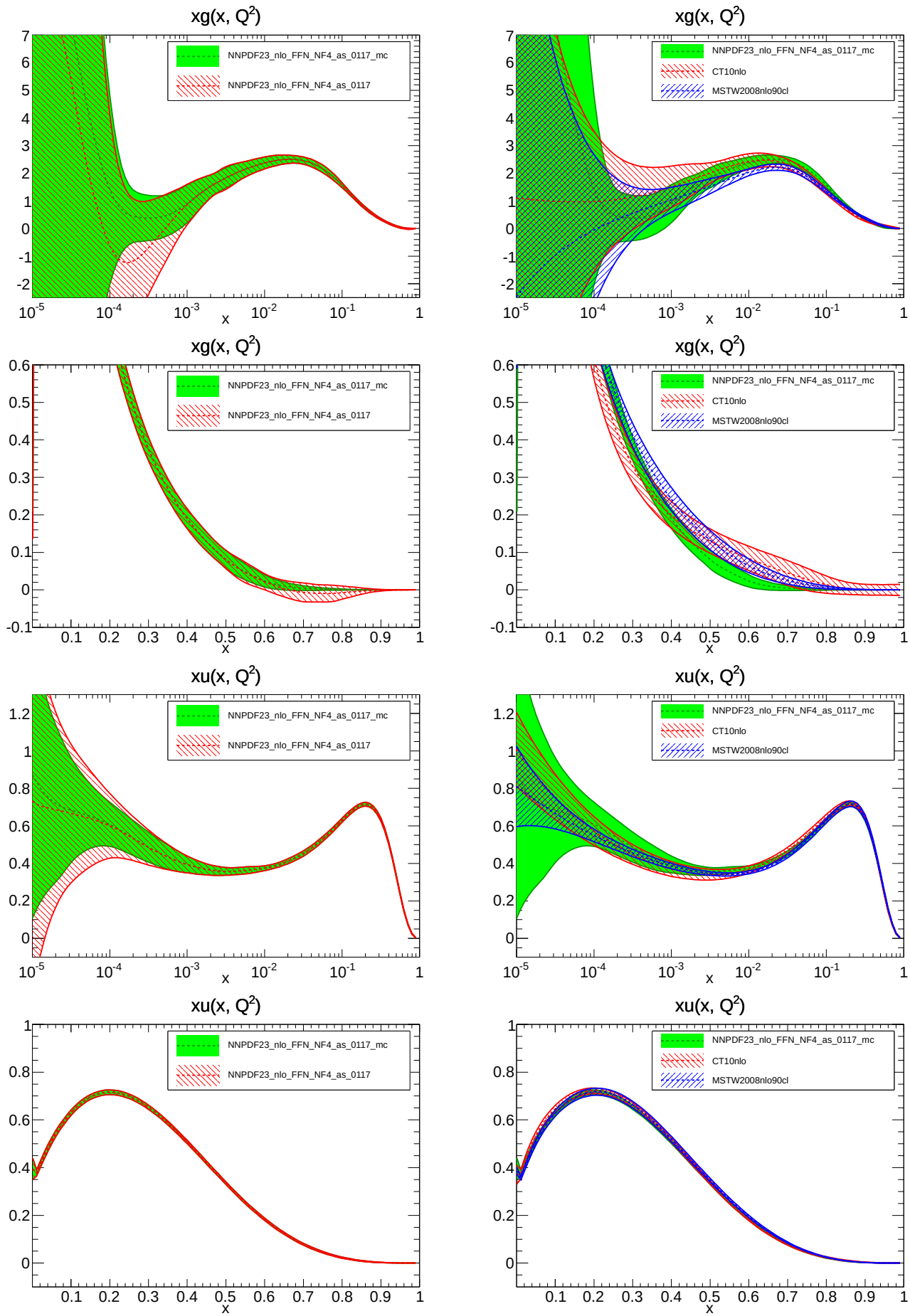

Figure 8: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

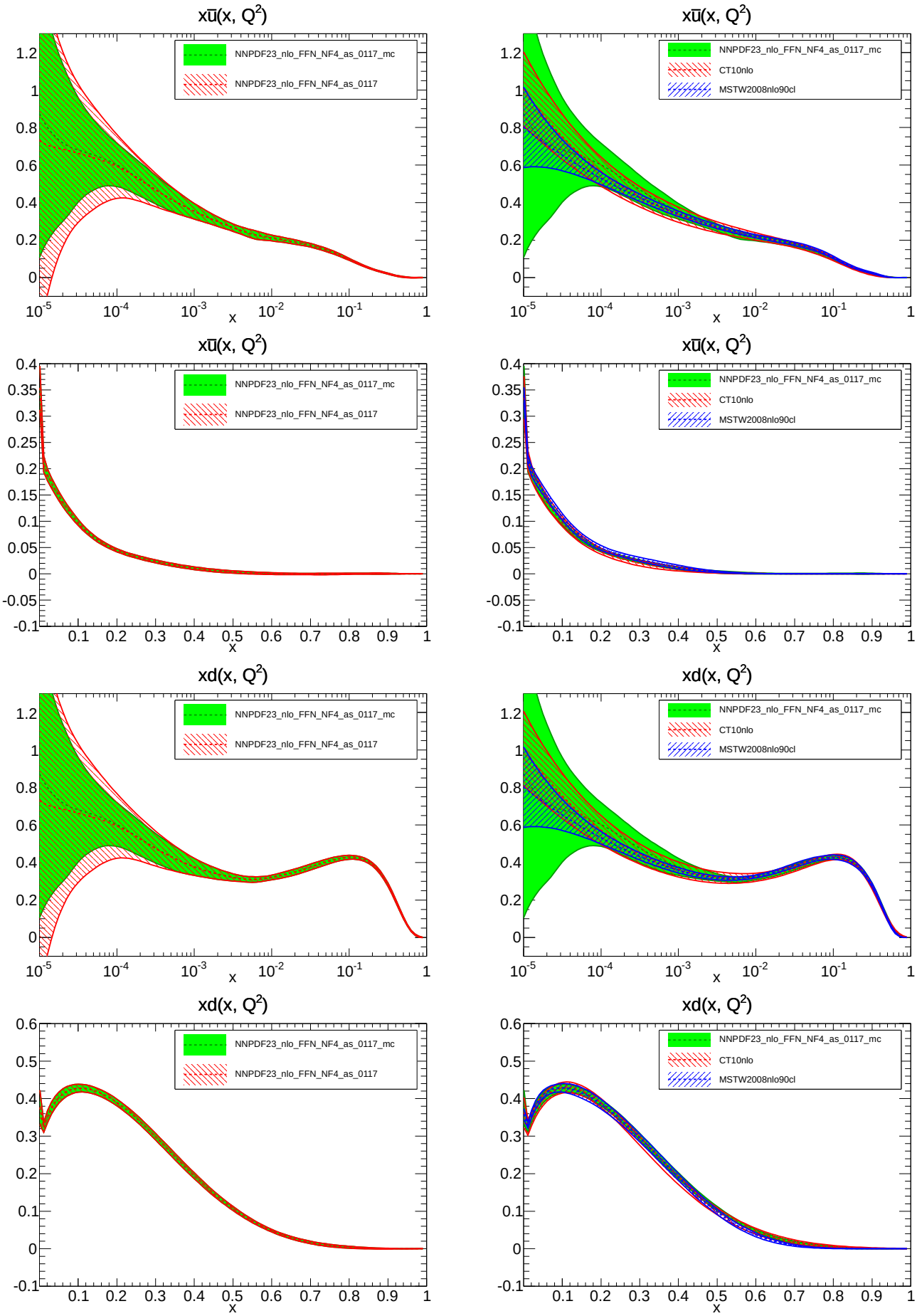

Figure 9: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

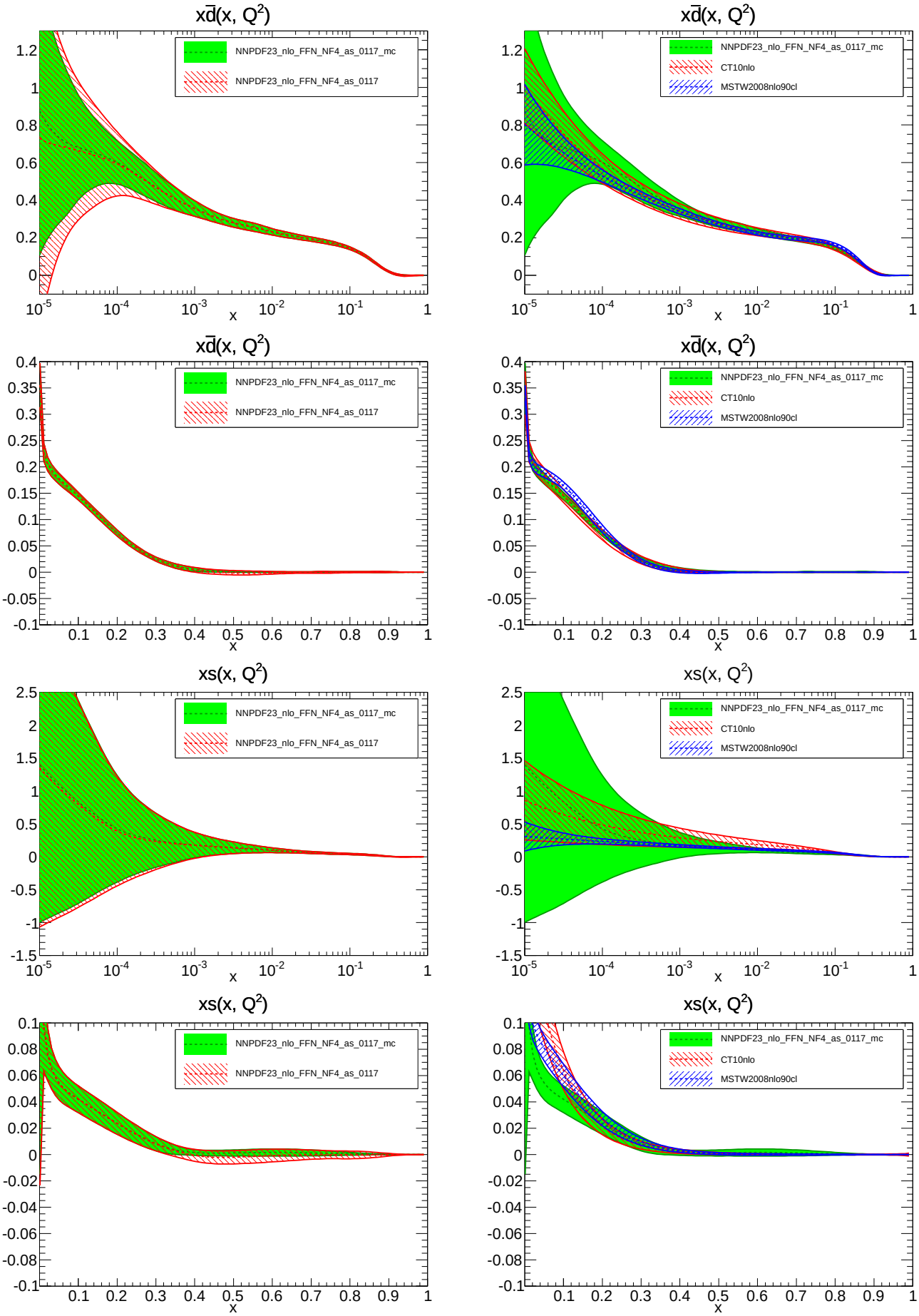

Figure 10: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

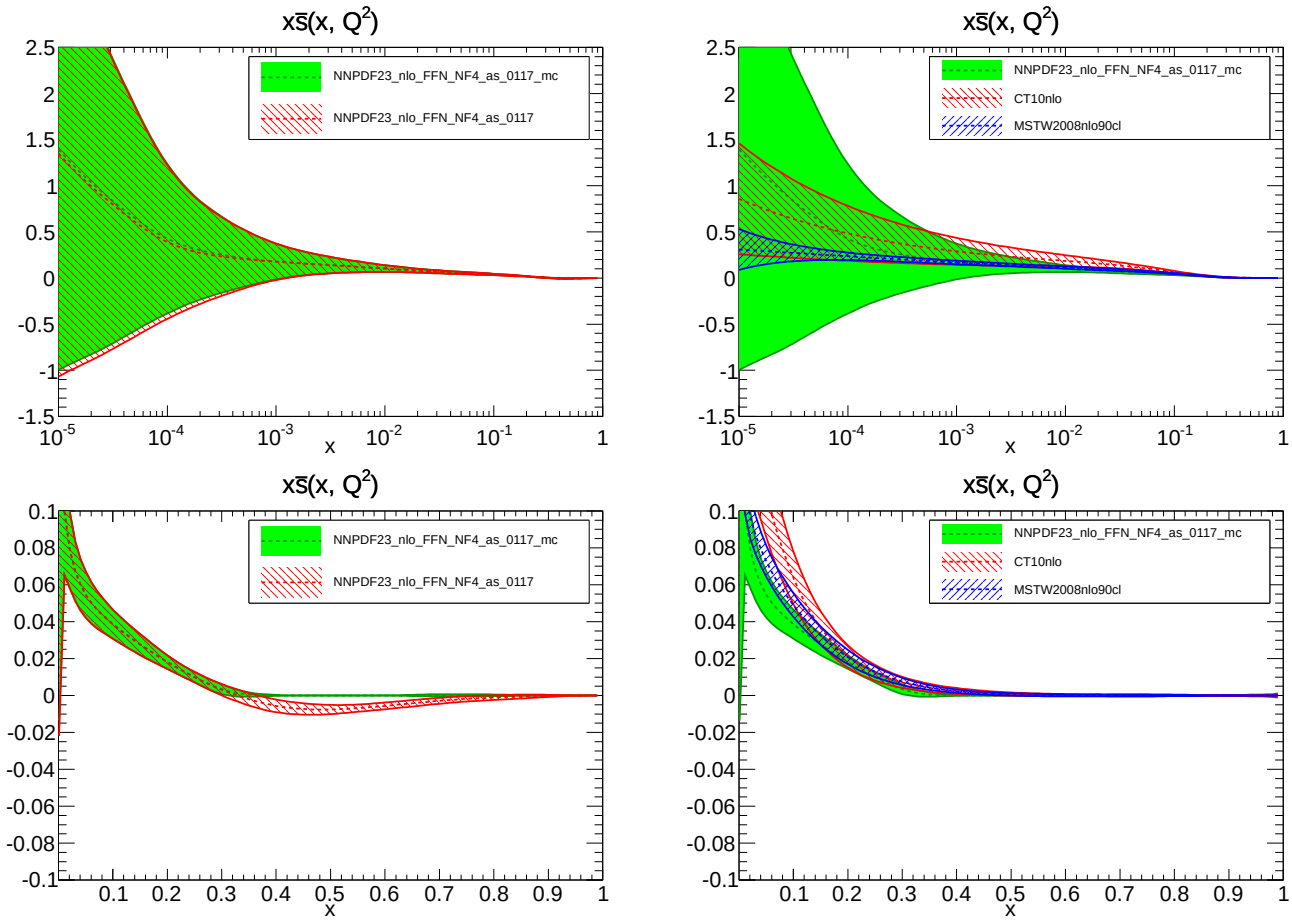

Figure 11: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

2.4 Replicas in the evolution basis

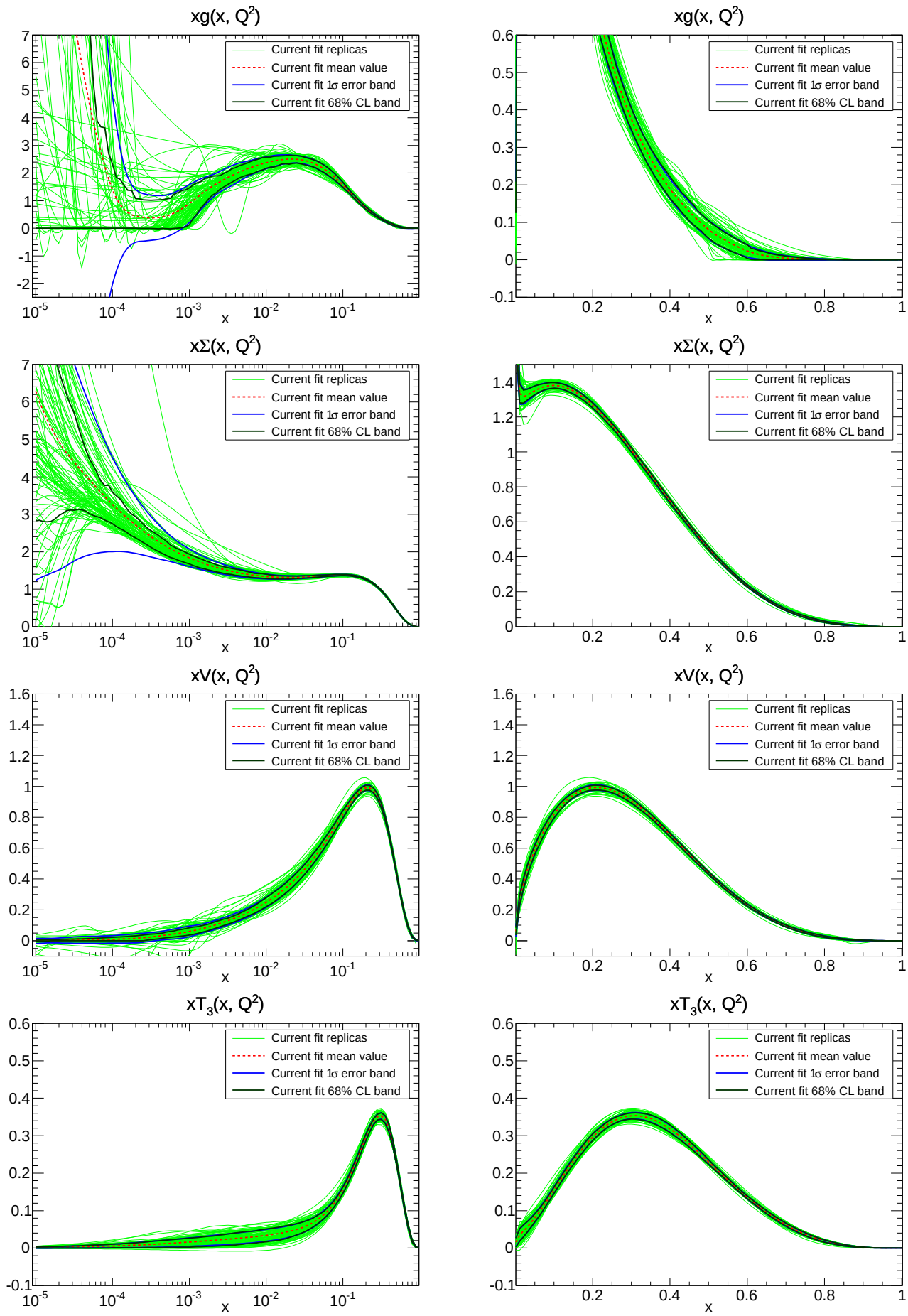

Figure 12: Current fit PDFs in the evolution basis at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

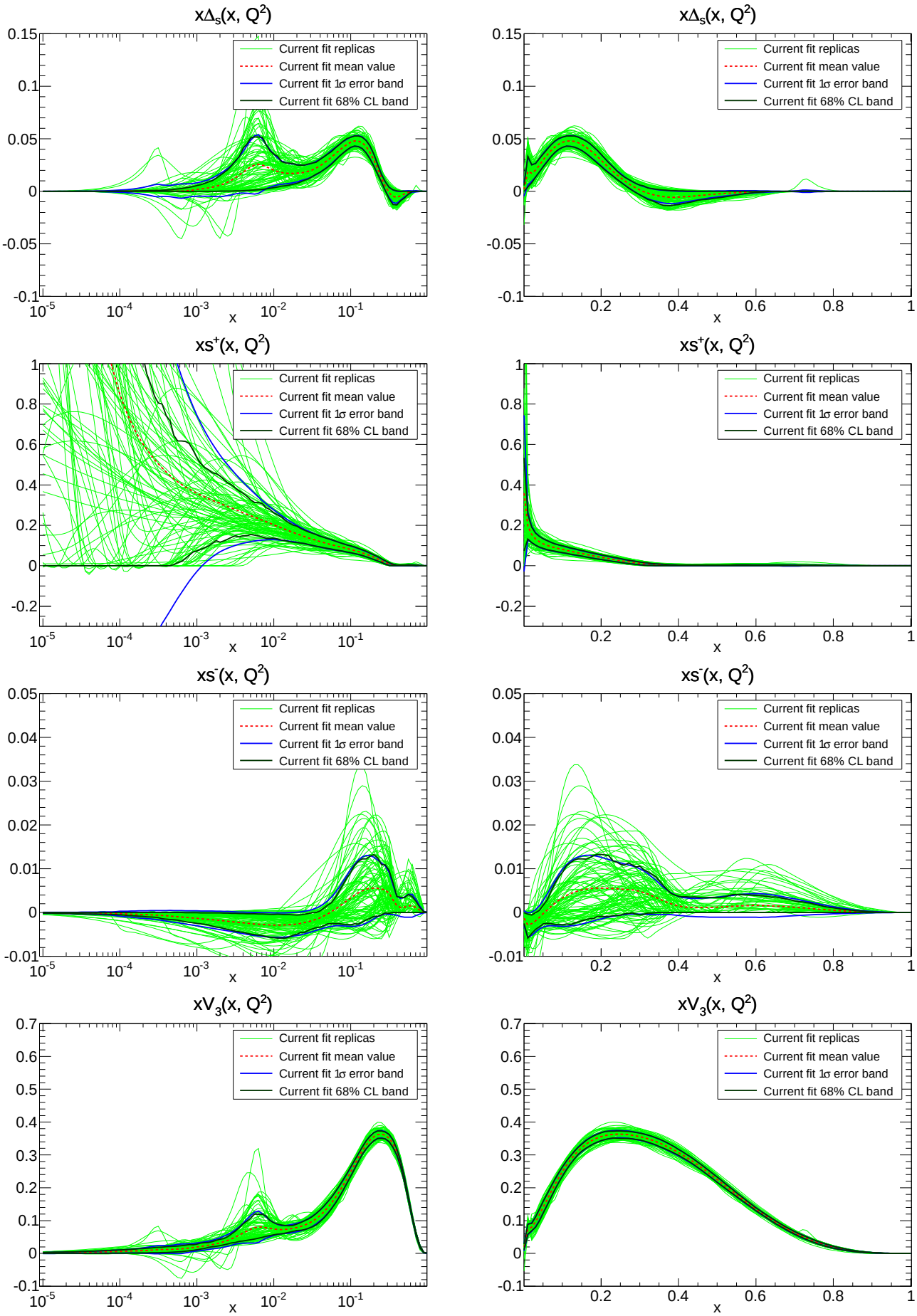

Figure 13: Current fit PDFs in the evolution basis at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

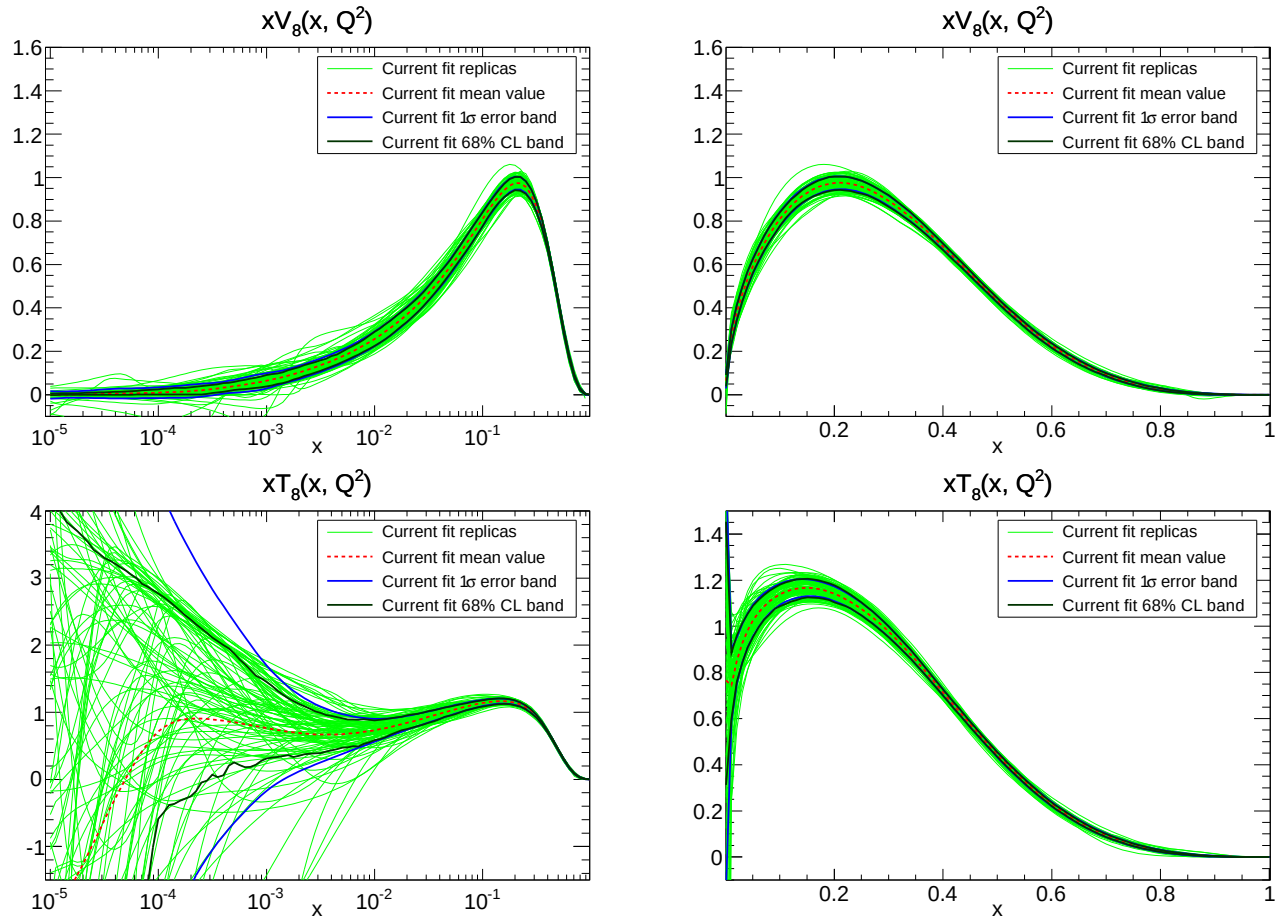

Figure 14: Current fit PDFs in the evolution basis at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

2.5 Replicas in the LH basis

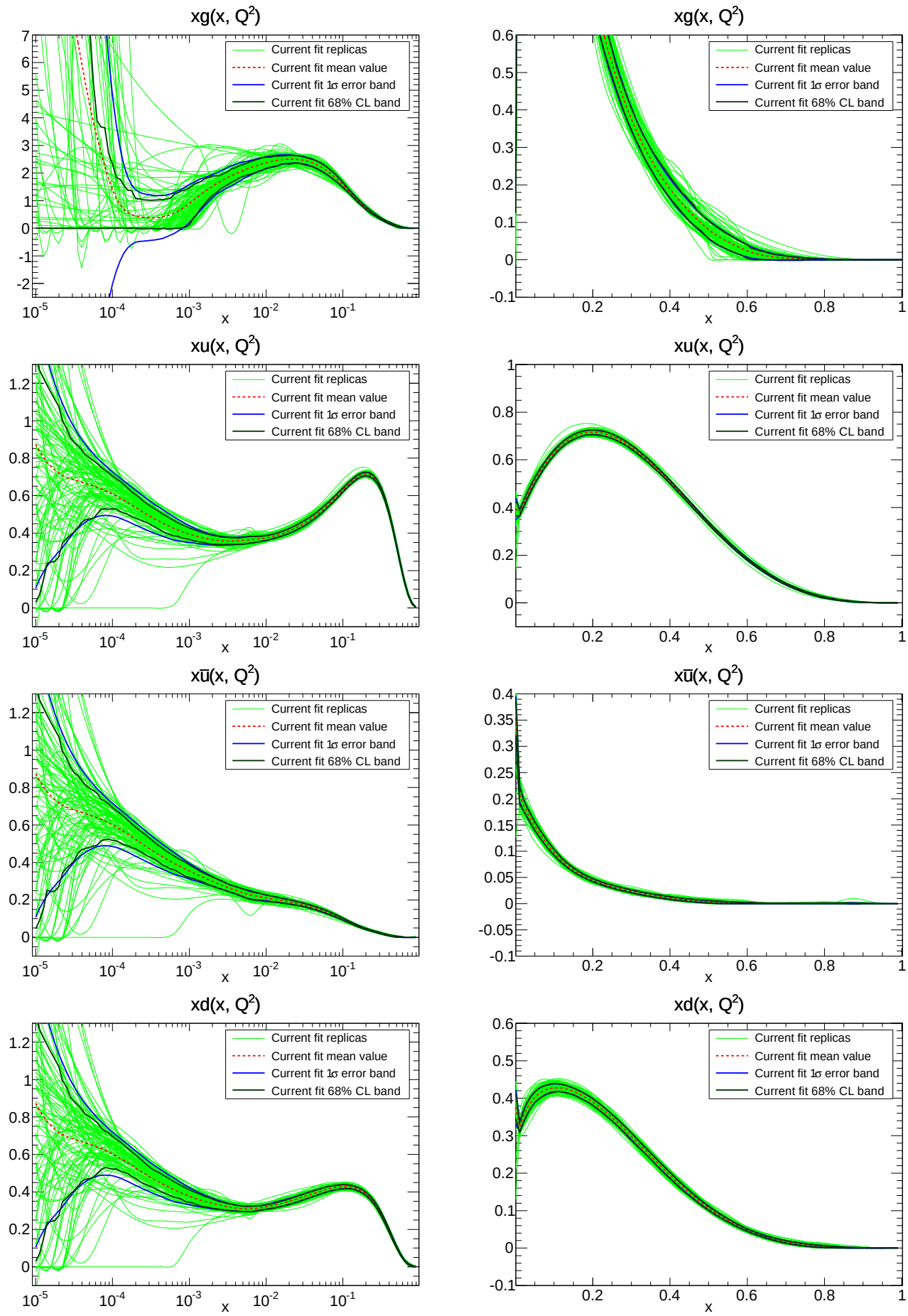

Figure 15: Current fit PDFs in the LH basis at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

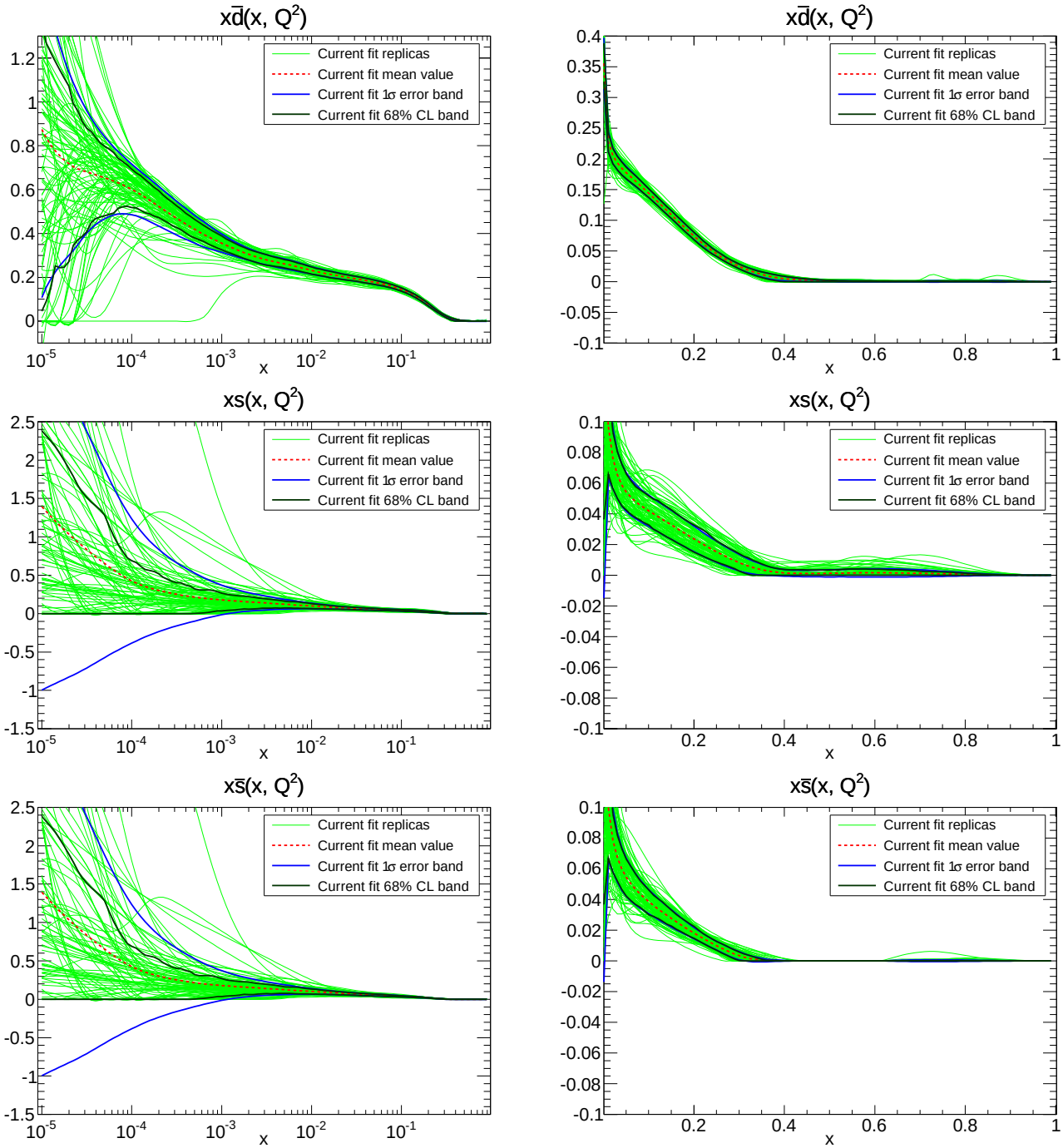

Figure 16: Current fit PDFs in the LH basis at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

3 Fit properties

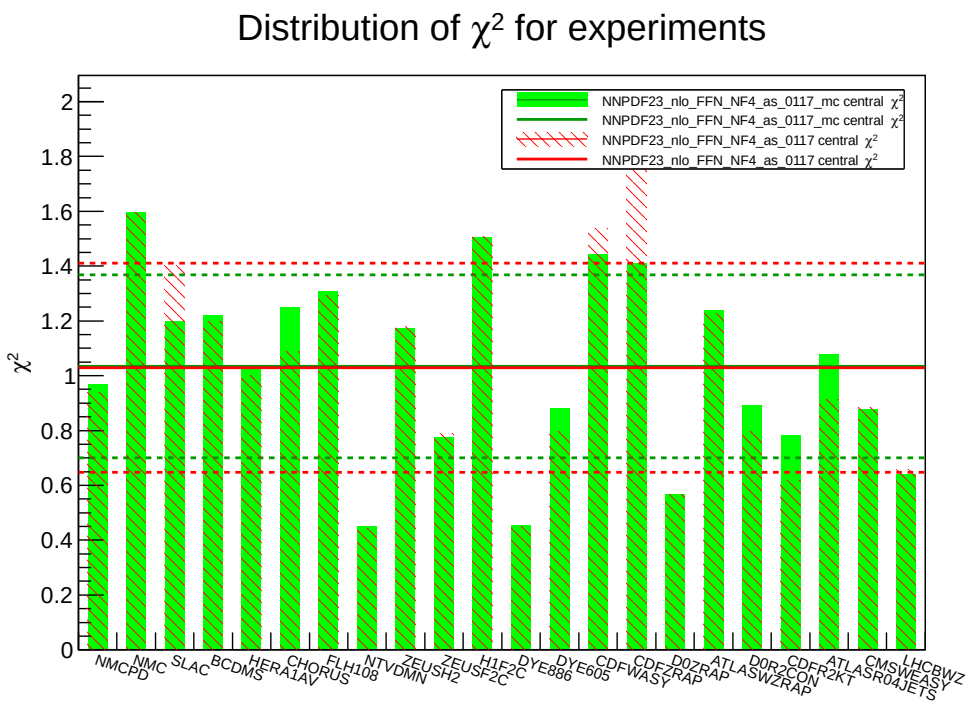

Figure 17: Total χ^2 for each experiment.

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	0.97029	0.93665	0.97220	0.99118
NMC	NMC	224	1.59557	1.59632	1.65446	1.46842
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		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		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		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		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		127	1.17214	1.18153	1.20220	1.48374
	Z06NC	90	1.12212	1.12433	1.11607	1.53673
	Z06CC	37	1.15427	1.18071	1.20219	1.14221
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		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
D0ZRAP	D0ZRAP	28	0.56910	0.56665	0.54505	0.56639
ATLASWZRAP	ATLASWZRAP36PB	30	1.24020	1.22687	1.03165	2.09614
D0R2CON	D0R2CON	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 = 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
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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: 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
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NFL      = 7
PTORD    = 1
ALPHAS   = 117
Q20      = 2
VFNS     = GMVN
VFNSTYPE = 1
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NPARSAT  = 2
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IREG     = 1
Q2MINCUT = 3
Q2MIN    = 3
W2MIN    = 12.5
[/Experimental Data]

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

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

################################################################
[Positivity]
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POSDATASET = FLPOS
POSDATASET = DMPOS
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################################################################
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NLAYERS   = 4
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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]
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