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 0118 mc	NNPDF23 nlo FFN NF4 as 0118	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	1.09
$\langle E\rangle \pm \sigma_E$	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±0.07	1.15±0.06
$\langle \sigma^{(\rm exp)}\rangle_{\rm dat}$	14.89%	14.89%
$\langle \sigma^{(\rm net)}\rangle_{\rm dat}$	2.99%	3.16%
$\langle \rho^{(\rm exp)}\rangle_{\rm dat}$	3.81e-01	3.81e-01
$\langle \rho^{(\rm net)}\rangle_{\rm dat}$	6.14e-01	5.96e-01
$\langle {\rm cov}^{(\rm exp)}\rangle_{\rm dat}$	1.87e+08	1.87e+08
$\langle {\rm cov}^{(\rm net)}\rangle_{\rm dat}$	1.41e+06	1.00e+06
$x\Sigma + xg$	1.00647e+00±3.63391e-03	1.00007e+00±9.98626e-04
u_v	2.00180e+00±2.12924e-02	2.00026e+00±3.18329e-03
d_v	1.00118e+00±2.07796e-02	9.99875e-01±3.17094e-03
s_v	-1.42822e-03±3.35335e-03	2.57373e-05±2.20505e-04
xs_v	1.96326e-03±1.37676e-03	3.11441e-03±1.91984e-03
K_s	3.48177e-01±6.90246e-02	3.01337e-01±7.88285e-02
Δ_s	1.29872e-01±3.78605e-02	1.29353e-01±3.80011e-02

Table 2: Summary.

2 Comparing PDFs

2.1 Distances

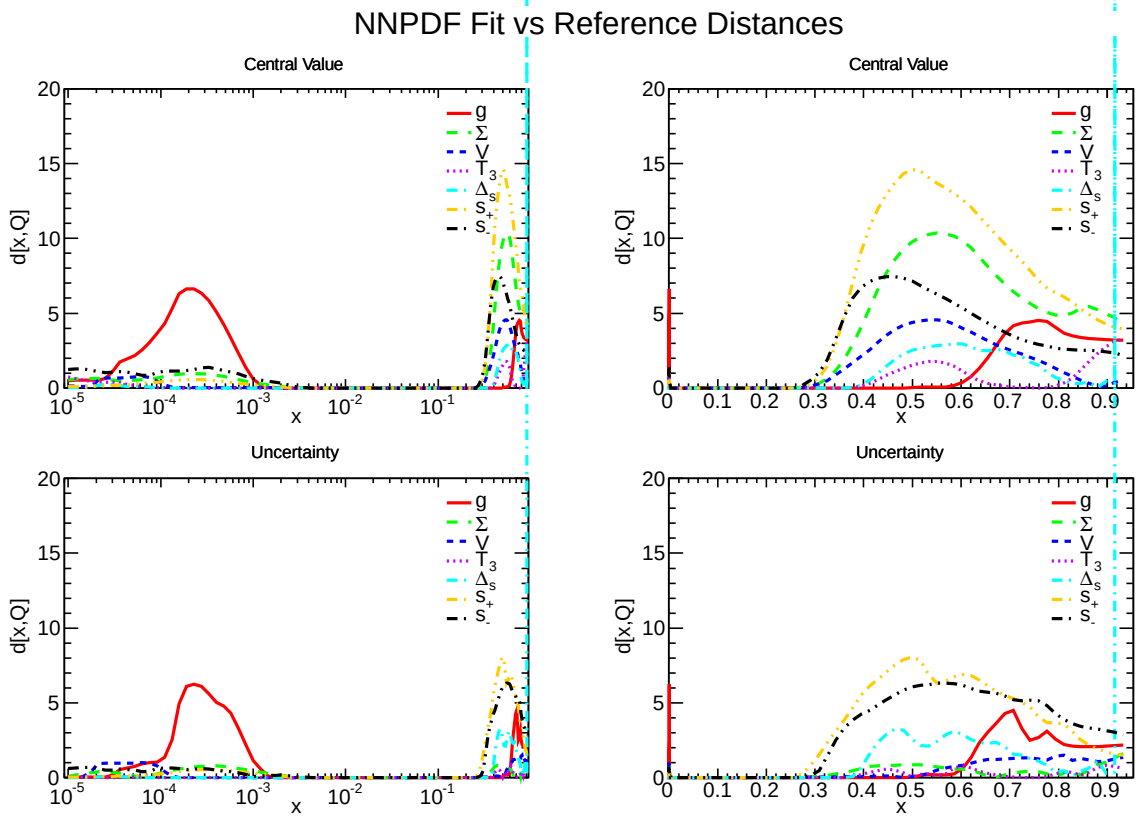

Figure 1: Distances in the fitting basis.

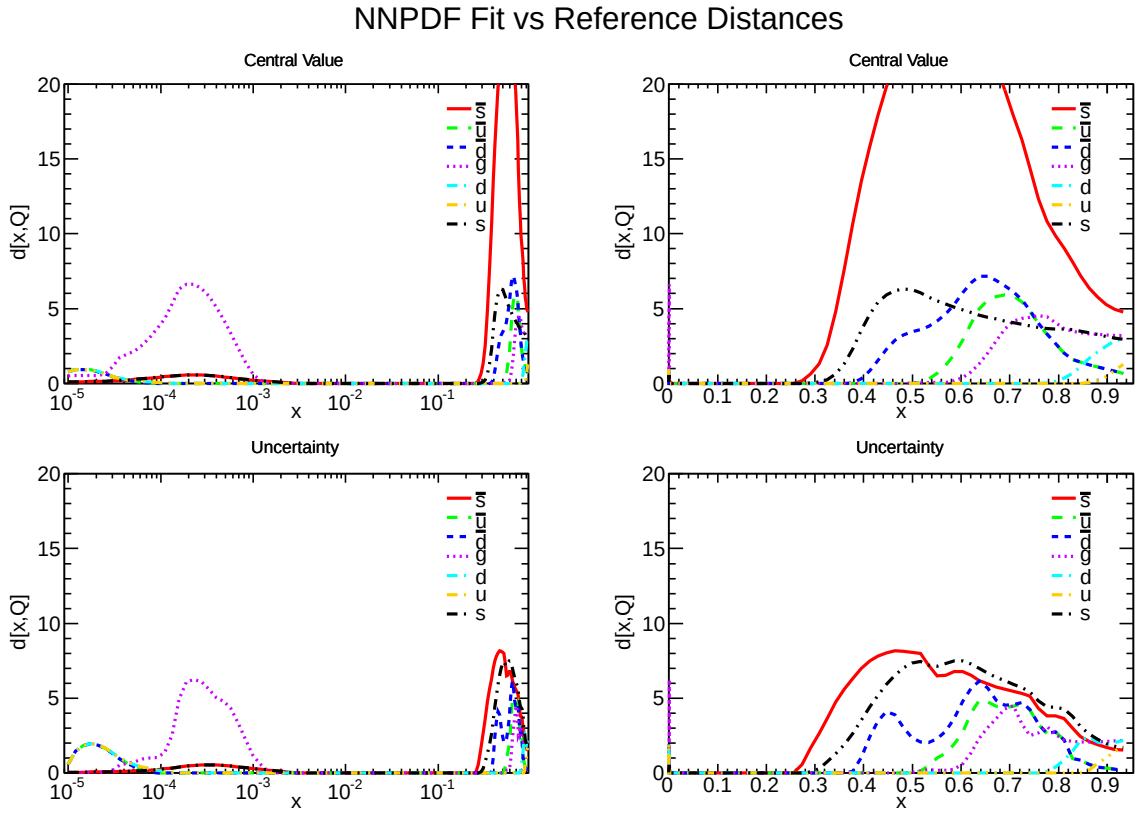

Figure 2: Distances in the flavour basis.

2.2 Comparing PDFs in evolution basis

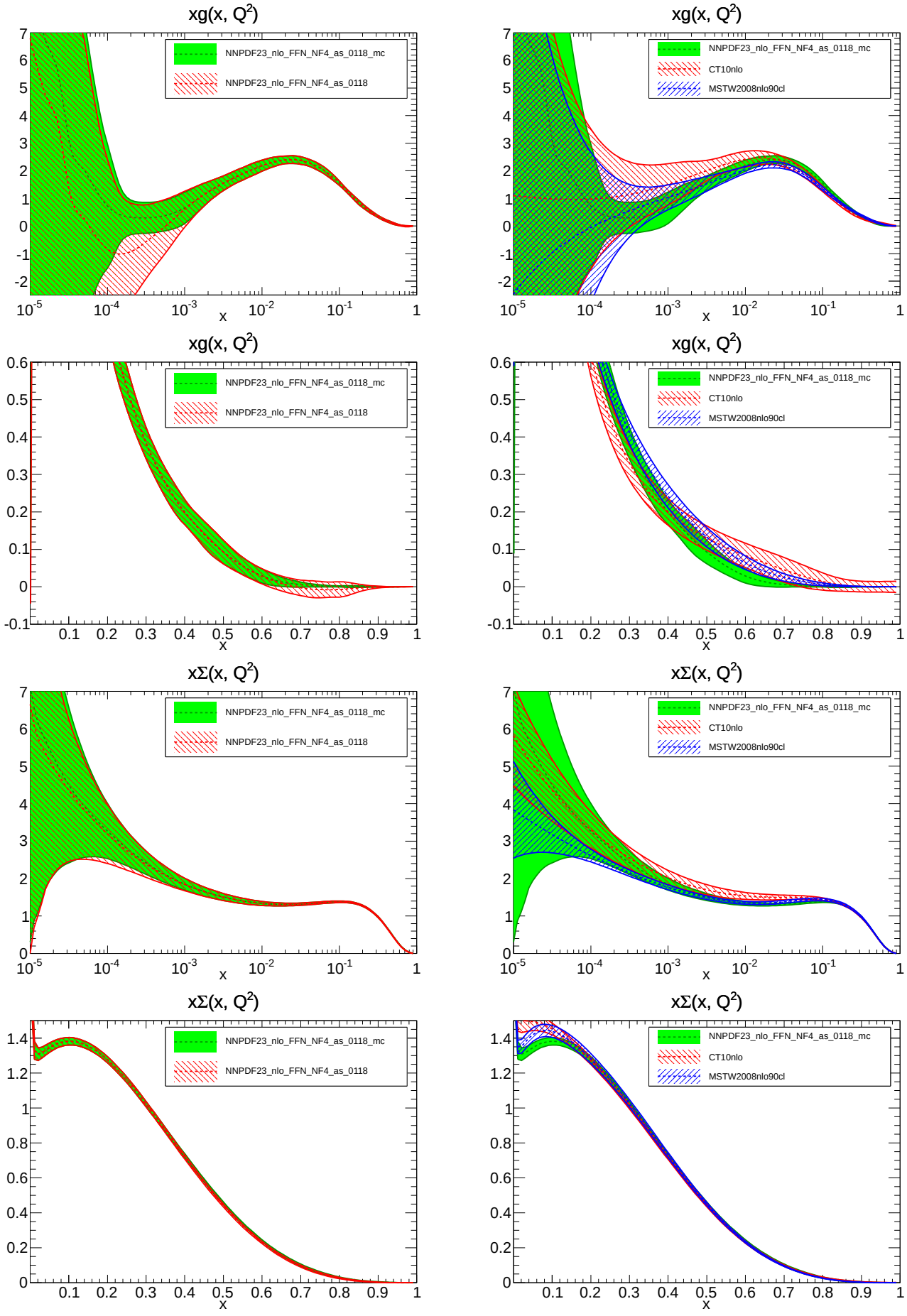

Figure 3: Comparison between PDFs at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

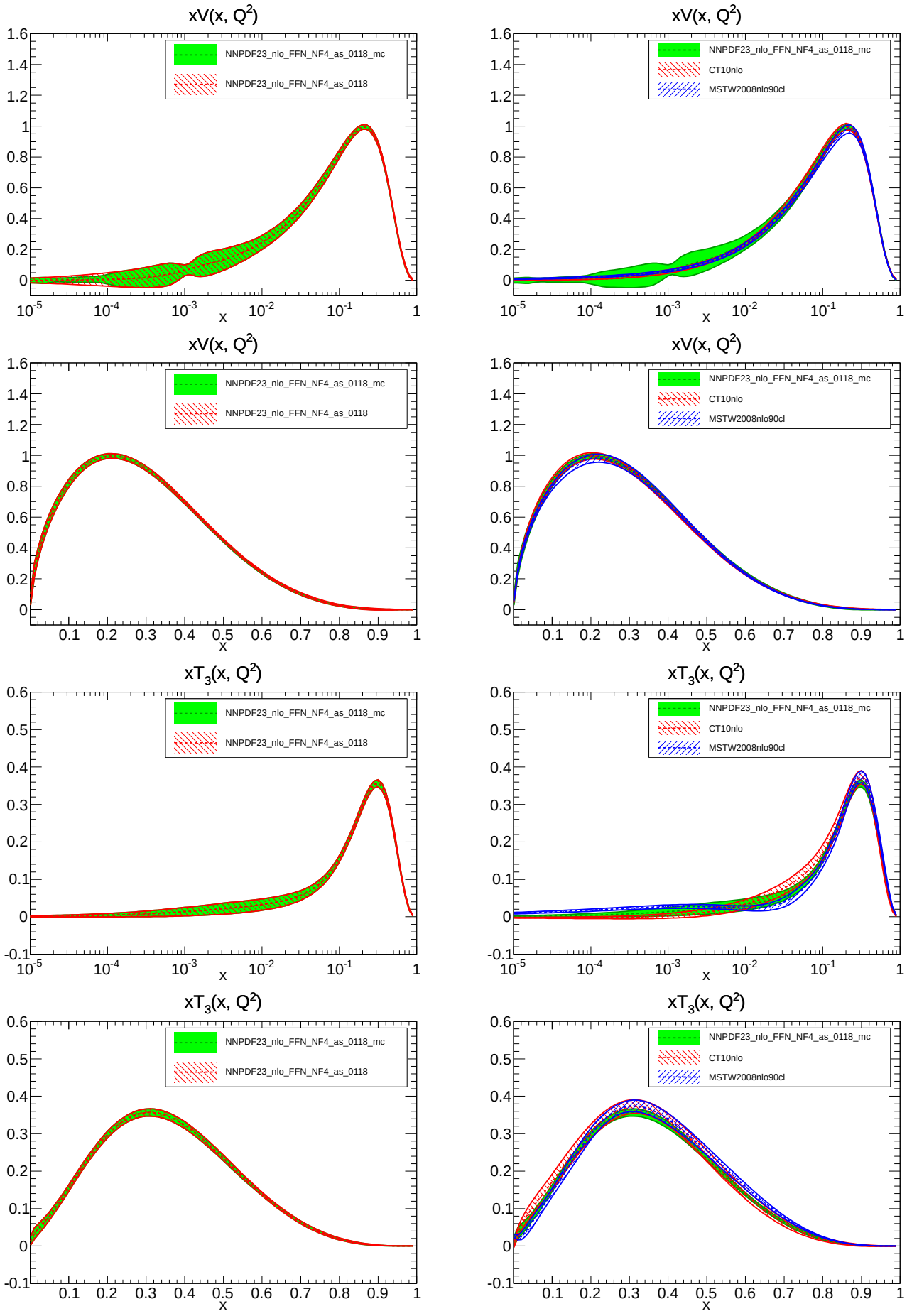

Figure 4: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

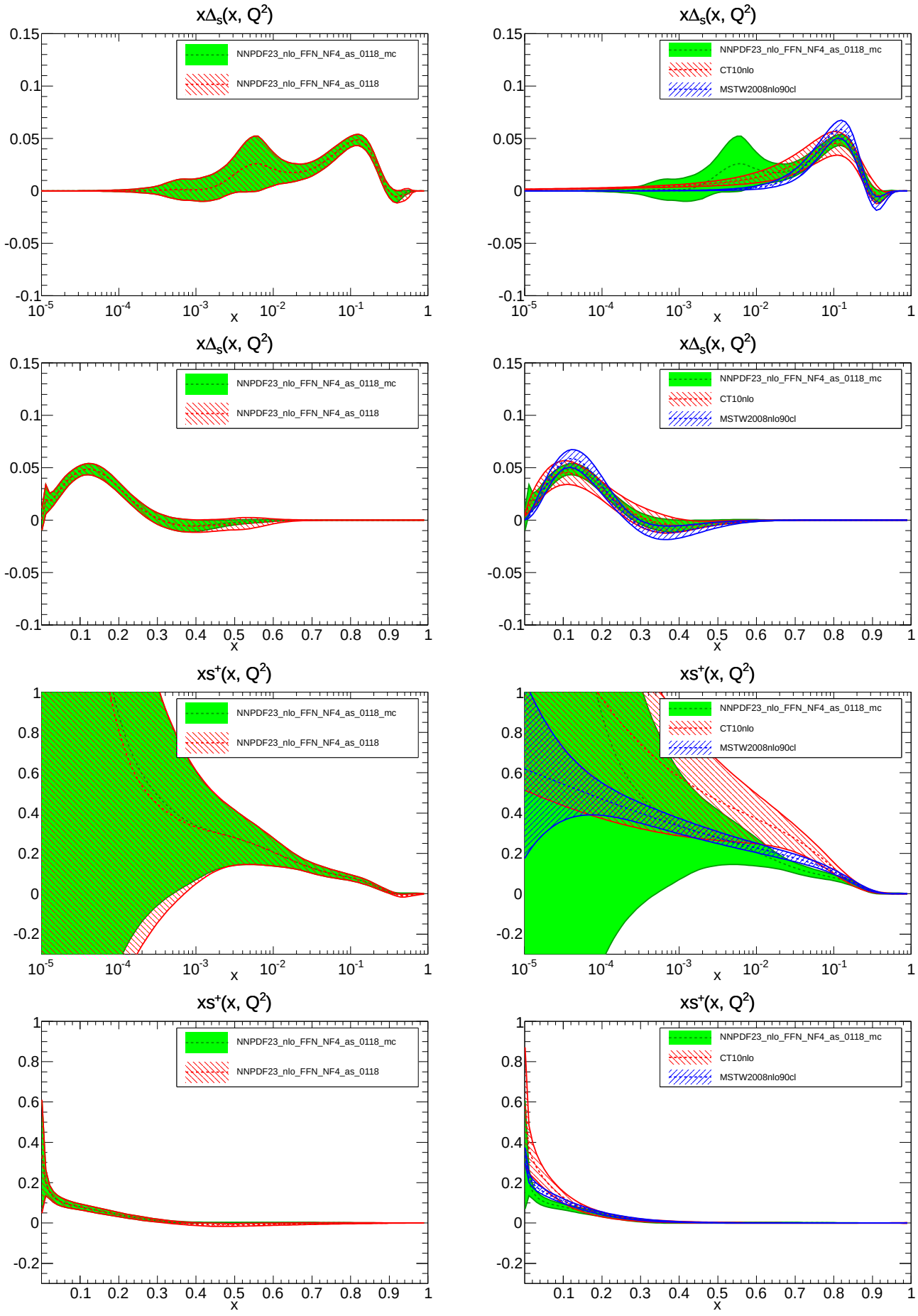

Figure 5: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

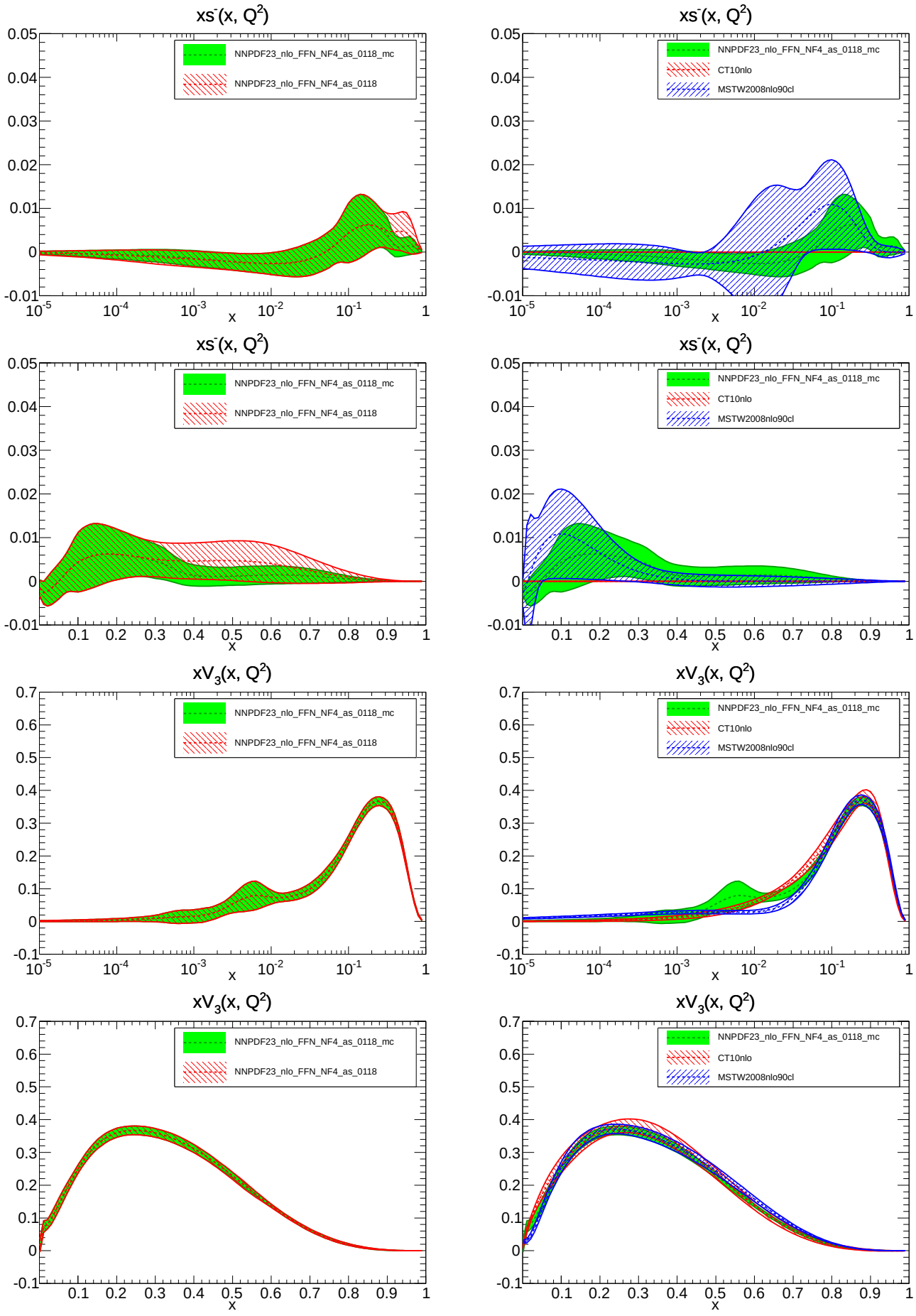

Figure 6: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

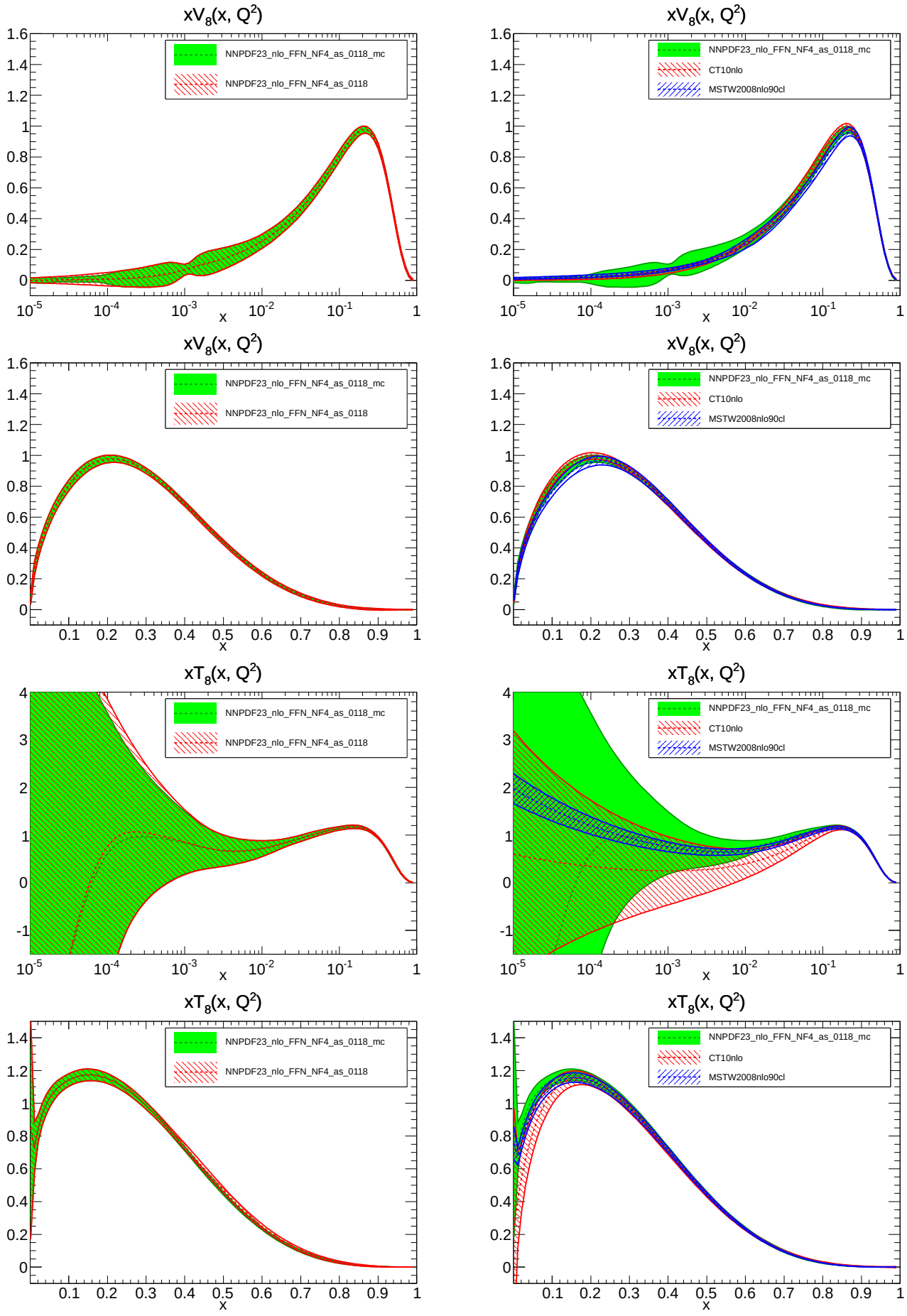

Figure 7: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

2.3 Comparing PDFs in LHA basis

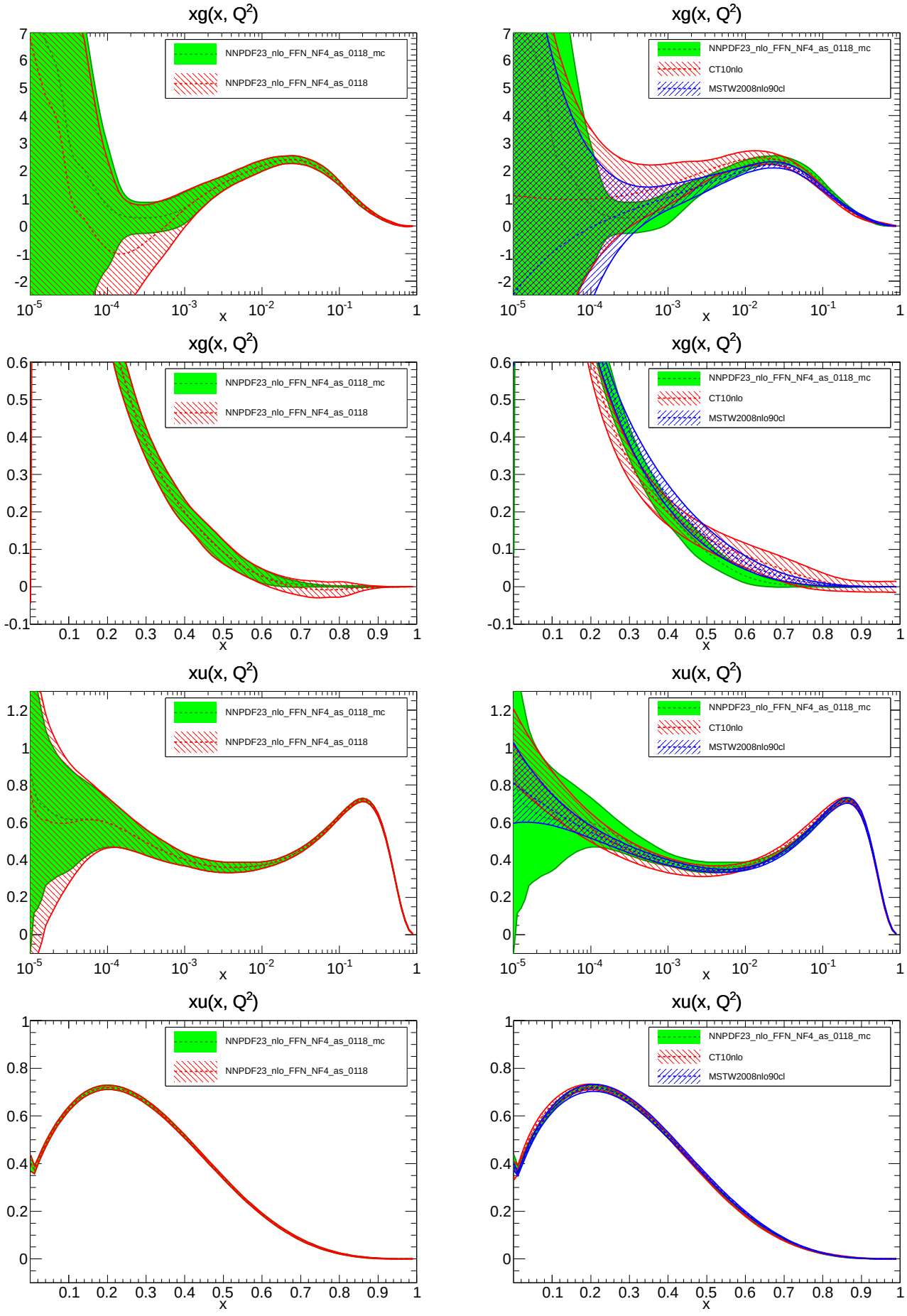

Figure 8: Comparison between PDFs at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

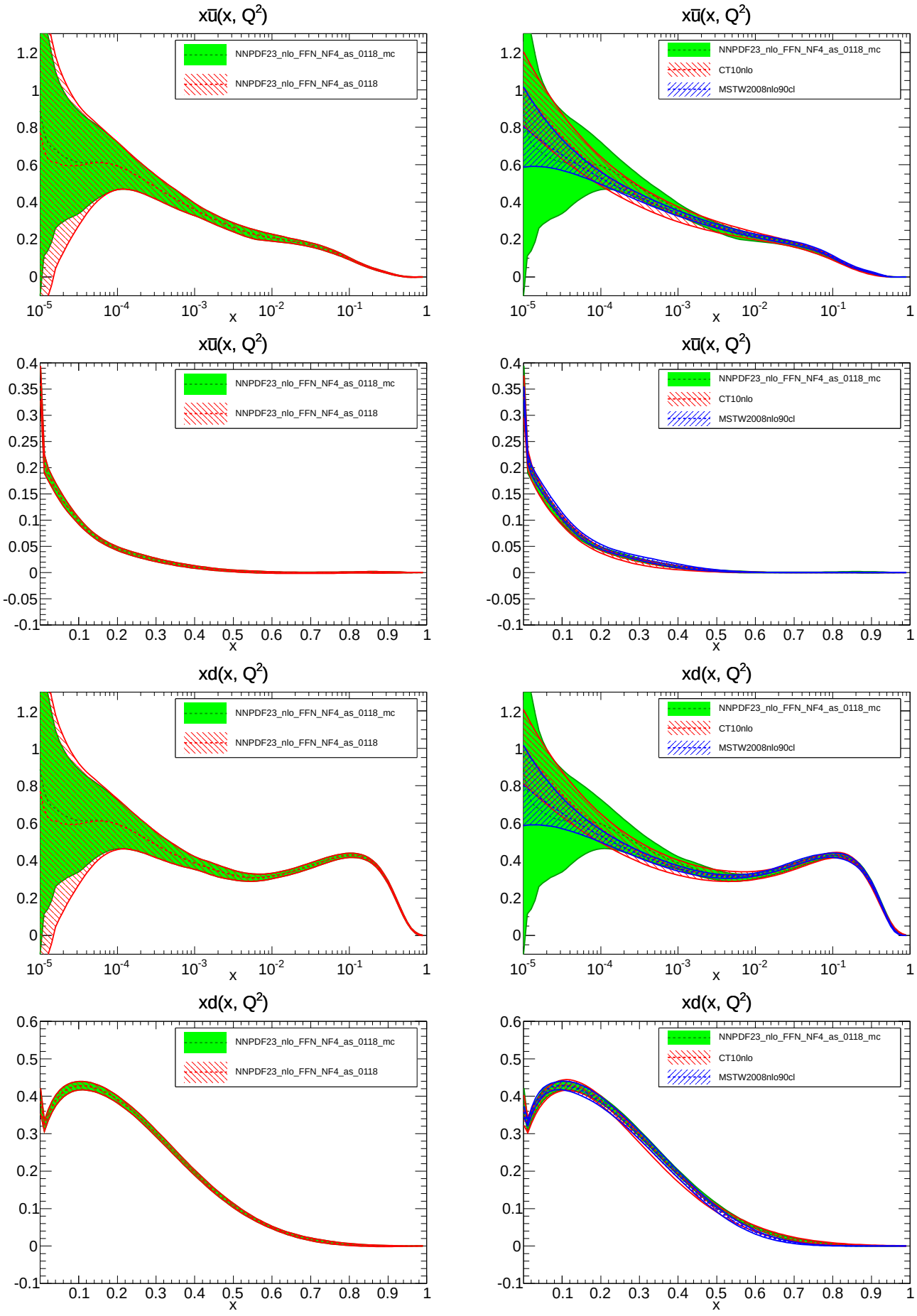

Figure 9: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

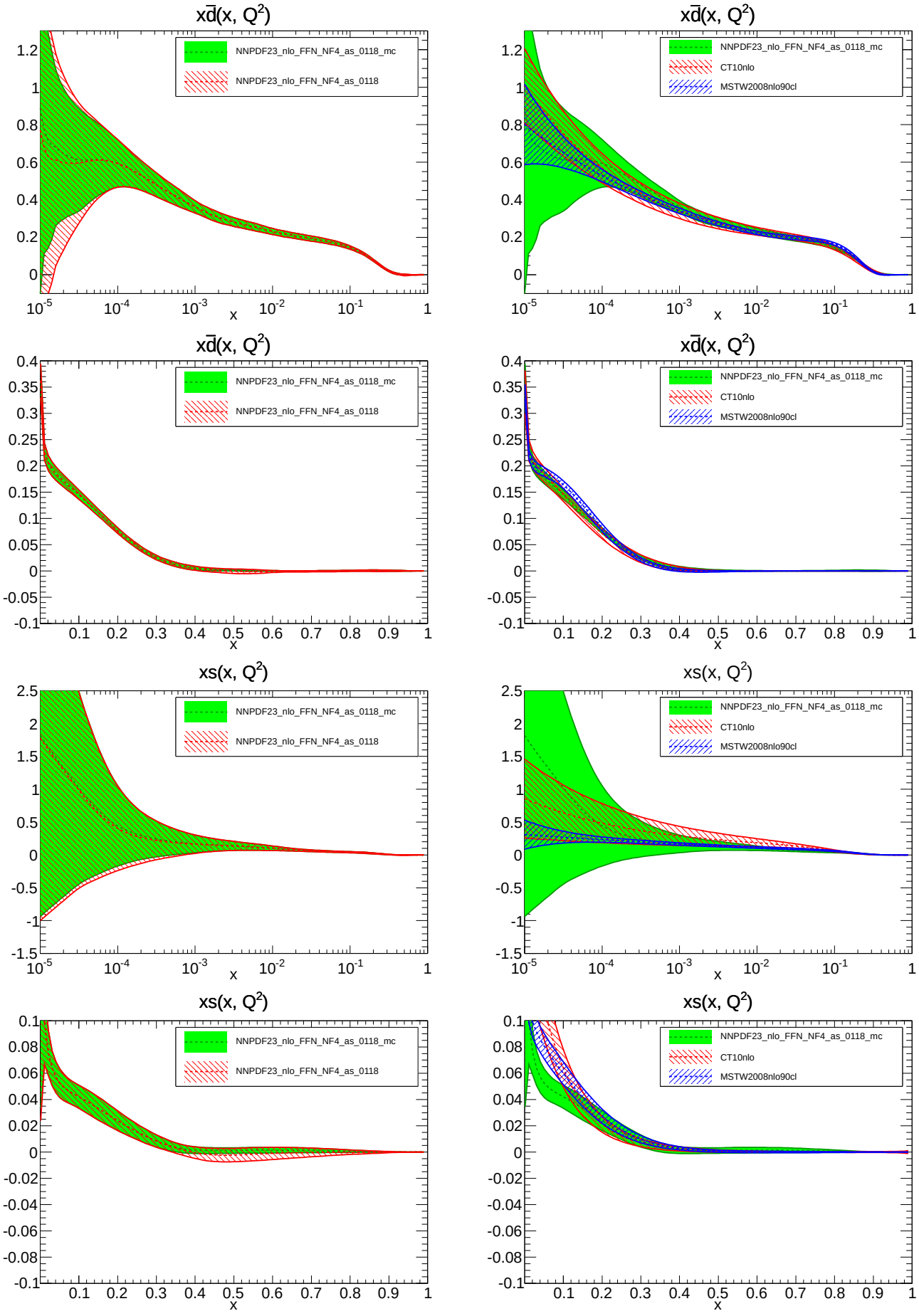

Figure 10: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

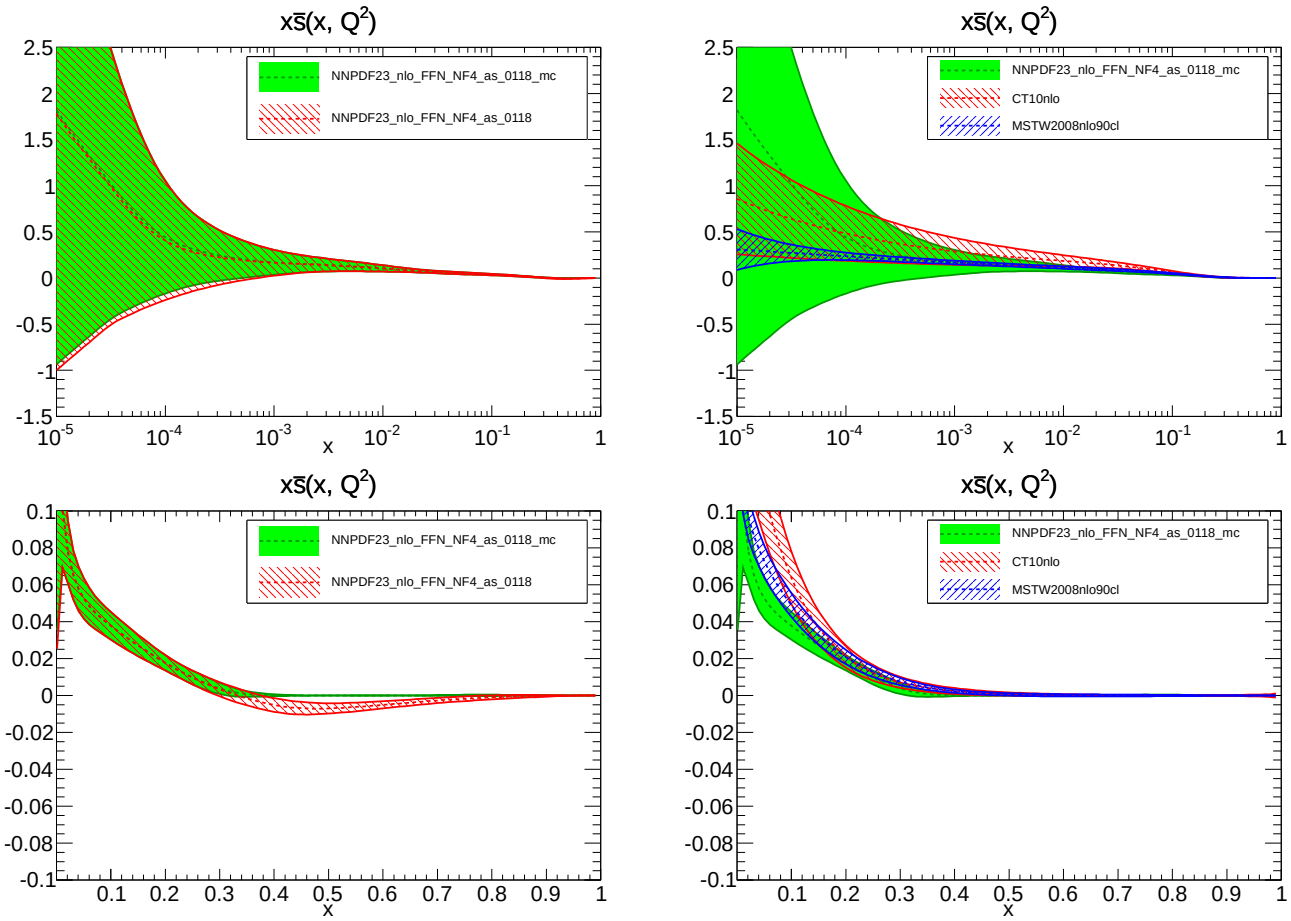

Figure 11: Comparison between PDFs at $Q^2 = 2.0e + 00\,\mathrm{GeV}^2$.

2.4 Replicas in the evolution basis

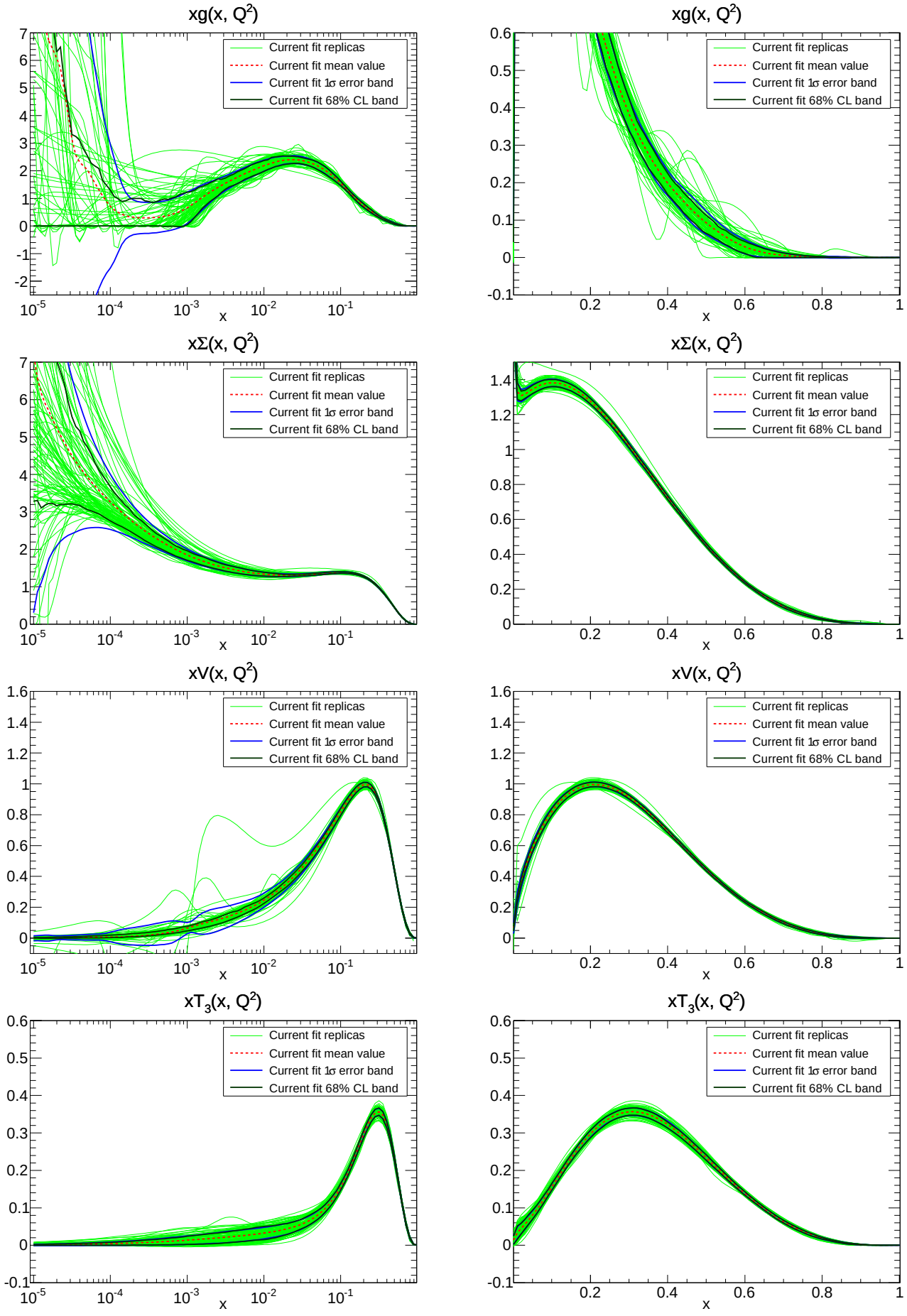

Figure 12: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

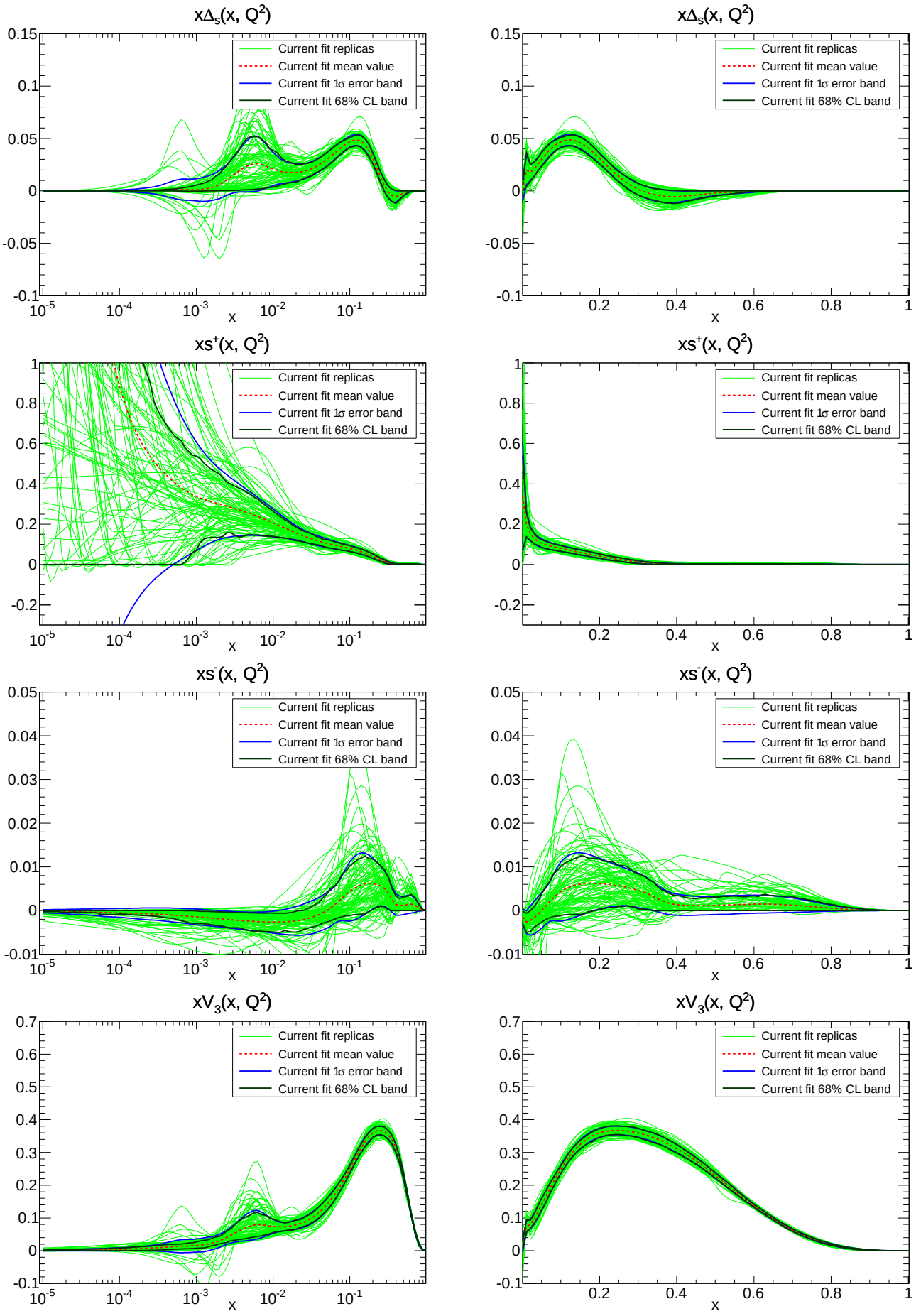

Figure 13: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

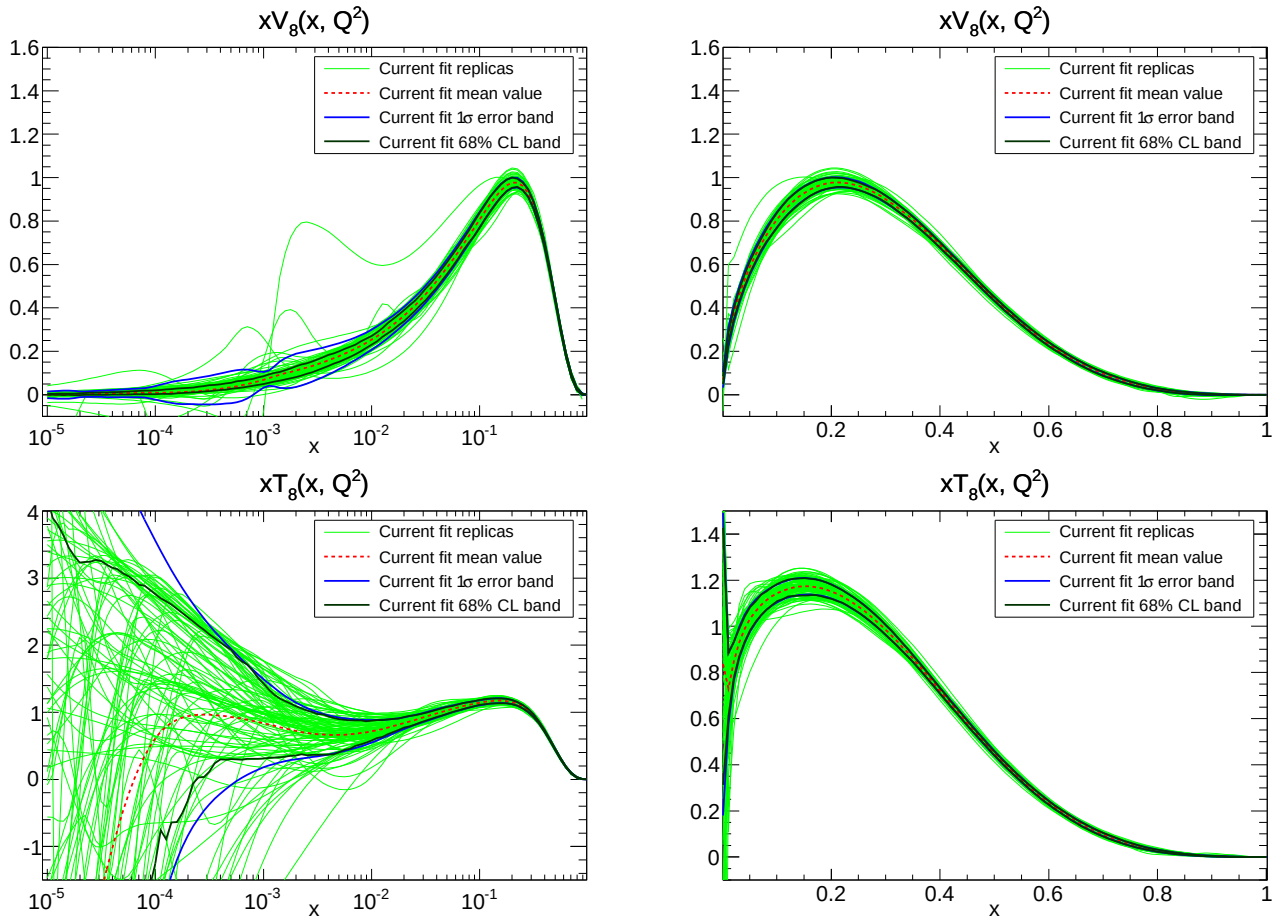

Figure 14: Current fit PDFs in the evolution basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

2.5 Replicas in the LH basis

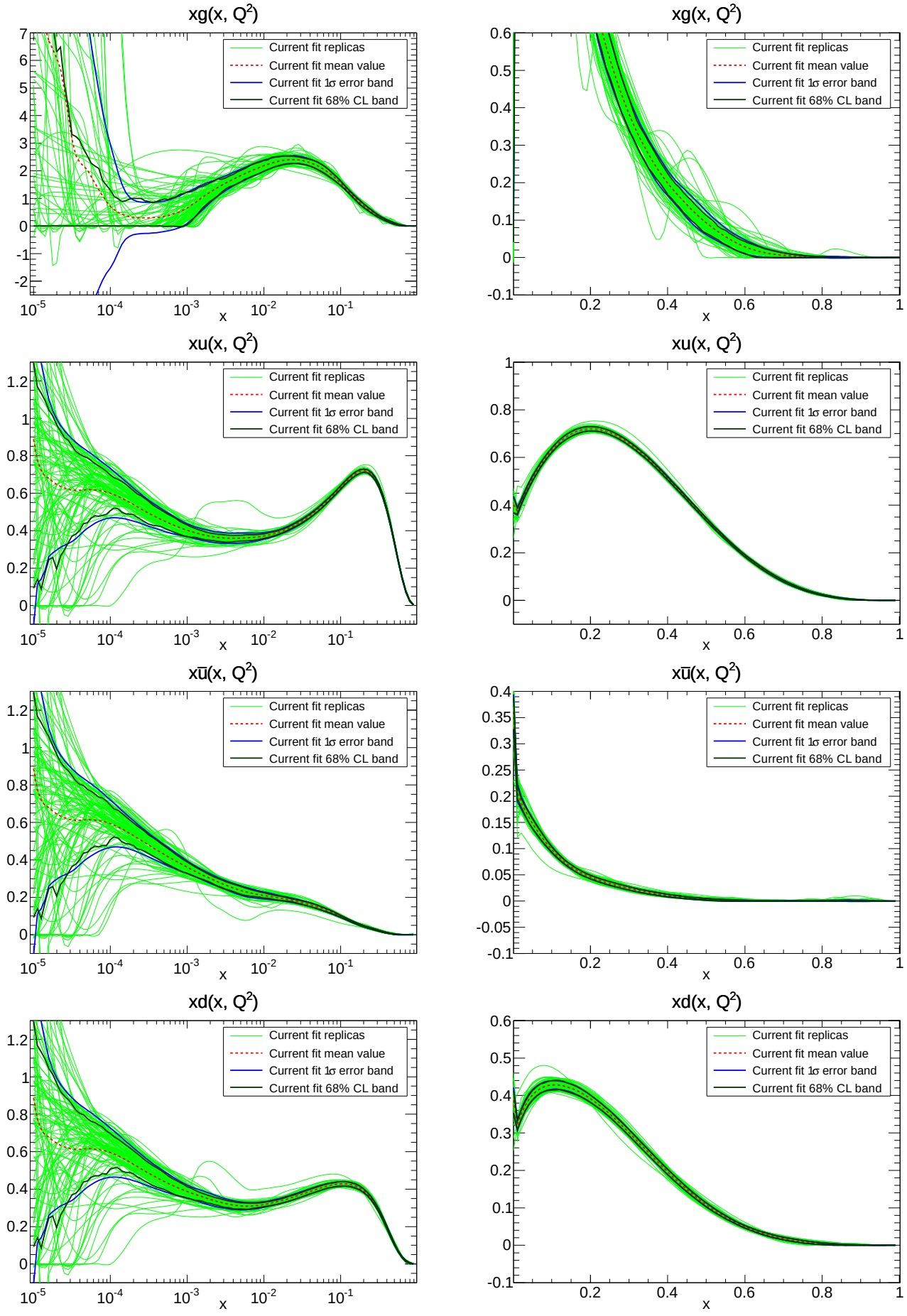

Figure 15: Current fit PDFs in the LH basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

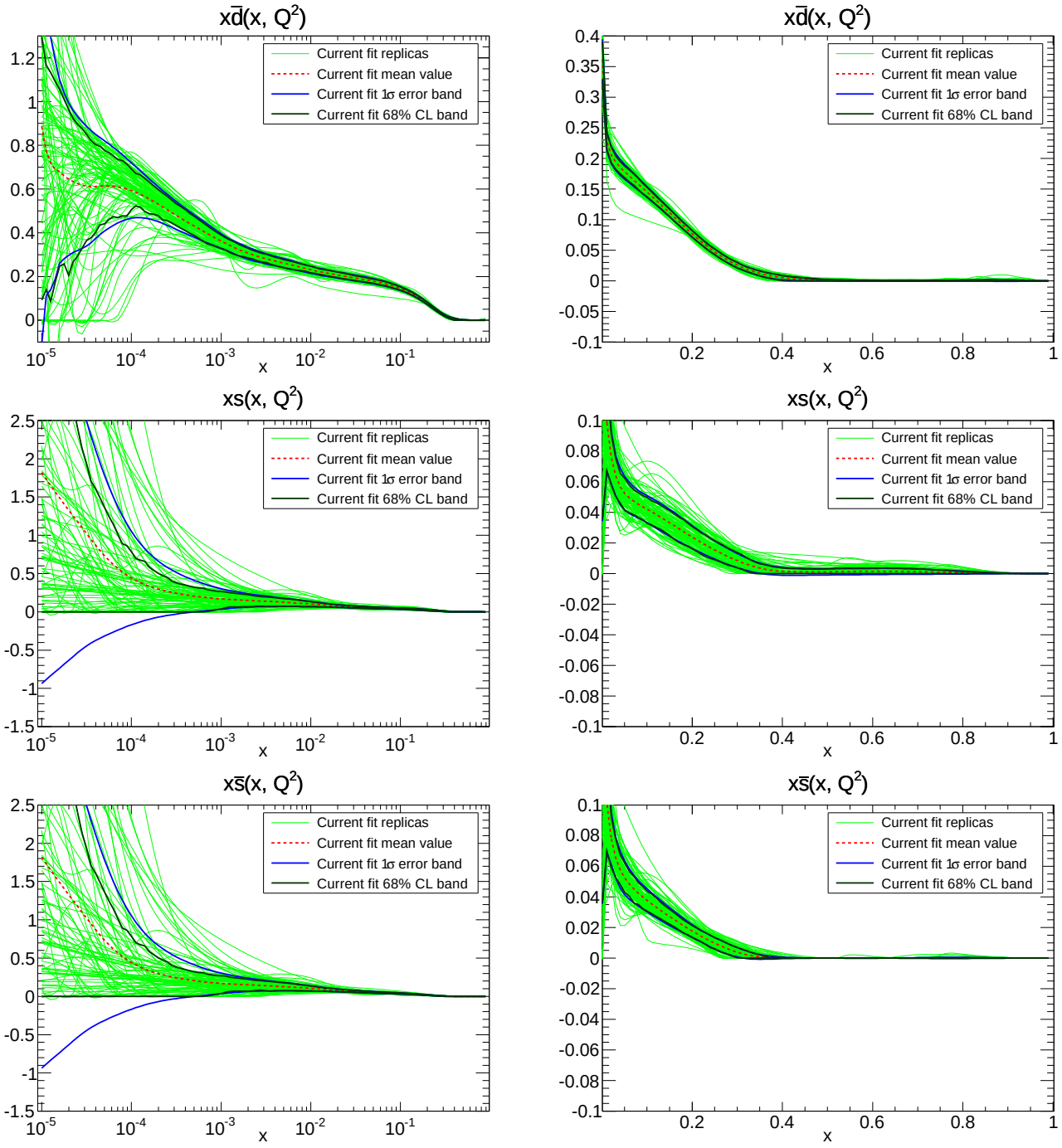

Figure 16: Current fit PDFs in the LH basis at $Q^2 = 2.0e+00\,\mathrm{GeV}^2$.

3 Fit properties

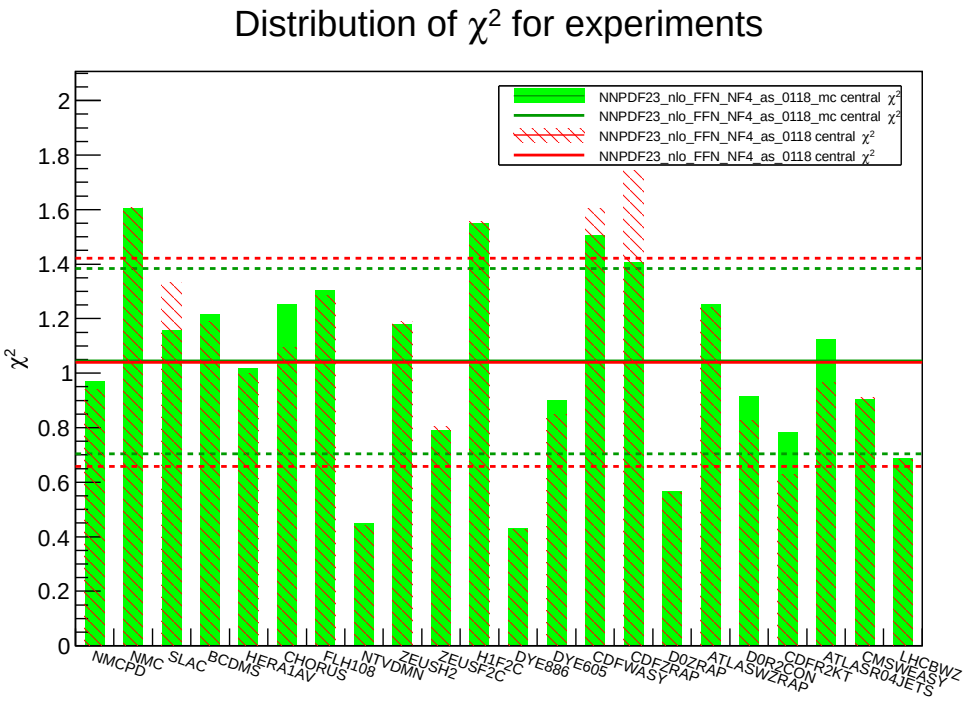

Figure 17: Total χ^2 for each experiment.

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	0.97045	0.94006	0.97318	0.98639
NMC	NMC	224	1.60683	1.60719	1.66213	1.45188
SLAC		74	1.15740	1.33165	1.57654	1.27903
	SLACP	37	1.27928	1.41126	1.58930	1.23805
	SLACD	37	0.97952	1.18689	1.36322	1.19214
BCDMS		581	1.21631	1.18919	1.59984	1.41406
	BCDMSP	333	1.20160	1.19879	1.74201	1.39422
	BCDMSD	248	1.18439	1.14361	1.38324	1.32911
HERA1AV		592	1.01760	1.00008	1.09597	1.36518
	HERA1NCEP	379	1.17285	1.14783	1.26855	1.67474
	HERA1NCEM	145	0.79018	0.78313	0.80083	0.96171
	HERA1CCEP	34	0.89367	0.91201	1.02661	0.91325
	HERA1CCEM	34	0.55967	0.56518	0.56570	0.54676
CHORUS		862	1.25135	1.09437	1.40086	1.28766
	CHORUSNU	431	1.18270	1.14337	1.35830	1.20847
	CHORUSNB	431	1.19655	0.98192	1.33197	1.26997
FLH108	FLH108	8	1.30325	1.28623	1.40253	1.32322
NTVDMN		79	0.45098	0.44272	4.06636	1.01038
	NTVNUDMN	41	0.27469	0.26671	2.58212	0.63535
	NTVNBDMN	38	0.62702	0.62125	6.31736	1.65951
ZEUSH2		127	1.17975	1.18872	1.22661	1.30392
	Z06NC	90	1.12972	1.13240	1.14726	1.29167
	Z06CC	37	1.16390	1.18775	1.23456	1.14408
ZEUSF2C		50	0.79158	0.80427	0.68270	0.80730
	ZEUSF2C99	14	0.74827	0.75887	0.59677	0.80580
	ZEUSF2C03	21	1.31579	1.33939	1.11601	1.33271
	ZEUSF2C08	7	0.18438	0.18405	0.23883	0.16653
	ZEUSF2C09	8	0.11648	0.11622	0.15473	0.09943
H1F2C		38	1.55158	1.55499	1.33553	1.40702
	H1F2C01	6	1.01485	1.02590	0.85152	1.26520
	H1F2C09	6	2.73806	2.71064	2.19089	2.01185
	H1F2C10	26	1.32459	1.33395	1.19542	1.25356
DYE886	DYE886R	15	0.43236	0.42686	0.48801	0.74632
DYE605	DYE605	119	0.90062	0.84750	0.76839	0.99336
CDFWASY	CDFWASYM	13	1.50546	1.60544	3.46417	9.02926
CDFZRAP	CDFZRAP	29	1.40840	1.74571	1.72852	2.15457
D0ZRAP	D0ZRAP	28	0.56594	0.56390	0.54960	0.57805
ATLASWZRAP	ATLASWZRAP36PB	30	1.25235	1.24007	1.05249	2.02653
D0R2CON	D0R2CON	110	0.91563	0.82667	1.01154	0.97770
CDFR2KT	CDFR2KT	76	0.78375	0.62660	1.04789	0.76482
ATLASR04JETS	ATLASR04JETS36PB	90	1.12493	0.96469	1.27345	1.09459
CMSWEASY	CMSWEASY840PB	11	0.90321	0.90975	1.43782	4.32355
LHCBWZ	LHCBWZ36PB	10	0.68625	0.68159	1.03085	0.90041
Total (sets)		**3298**	**1.12**	**1.07**	**1.37**	**1.00**
Total (exps)		**3298**	**1.14**	**1.09**	**1.38**	**1.32**

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
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: 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
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NFL      = 7
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ALPHAS   = 118
Q20      = 2
VFNS     = GMVN
VFNSTYPE = 1
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############################################################
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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]
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POSDATASET = FLPOS
POSDATASET = DMPOS
[/Positivity]

############################################################
[NN Properties]
NMUTANTS = 80
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NLAYERS   = 4
NNODES    = 2 5 3 1
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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
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LARGEXSM  = 2.55 3.45
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#################################################################
[Output Folder]
RESULTSDIR = results
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