

# Validphys Report

## NNPDF revision 528M

The NNPDF Collaboration

February 4, 2013

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VALIDPHYS 528M	Current Fit	Reference	CTEQ	MSTW
<b>PDF set name</b>	NNPDF23 nlo FFN NF5 as 0119 mc	NNPDF23 nlo FFN NF5 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
$\chi_{\text{tot}}^2$ (exp)	1.16	1.10
$\langle E \rangle \pm \sigma_E$	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
$\langle \chi^{2(k)} \rangle \pm \sigma_{\chi^{2(k)}}$	1.18±0.06	1.16±0.04
$\langle \sigma^{(\text{exp})} \rangle_{\text{dat}}$	15.66%	15.66%
$\langle \sigma^{(\text{net})} \rangle_{\text{dat}}$	3.00%	3.17%
$\langle \rho^{(\text{exp})} \rangle_{\text{dat}}$	3.78e-01	3.78e-01
$\langle \rho^{(\text{net})} \rangle_{\text{dat}}$	5.99e-01	5.75e-01
$\langle \text{cov}^{(\text{exp})} \rangle_{\text{dat}}$	1.87e+08	1.87e+08
$\langle \text{cov}^{(\text{net})} \rangle_{\text{dat}}$	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
$\Delta_s$	1.43902e-01±3.47919e-02	1.43429e-01±3.49106e-02

Table 2: Summary.

## 2 Comparing PDFs

### 2.1 Distances

NNPDF Fit vs Reference Distances

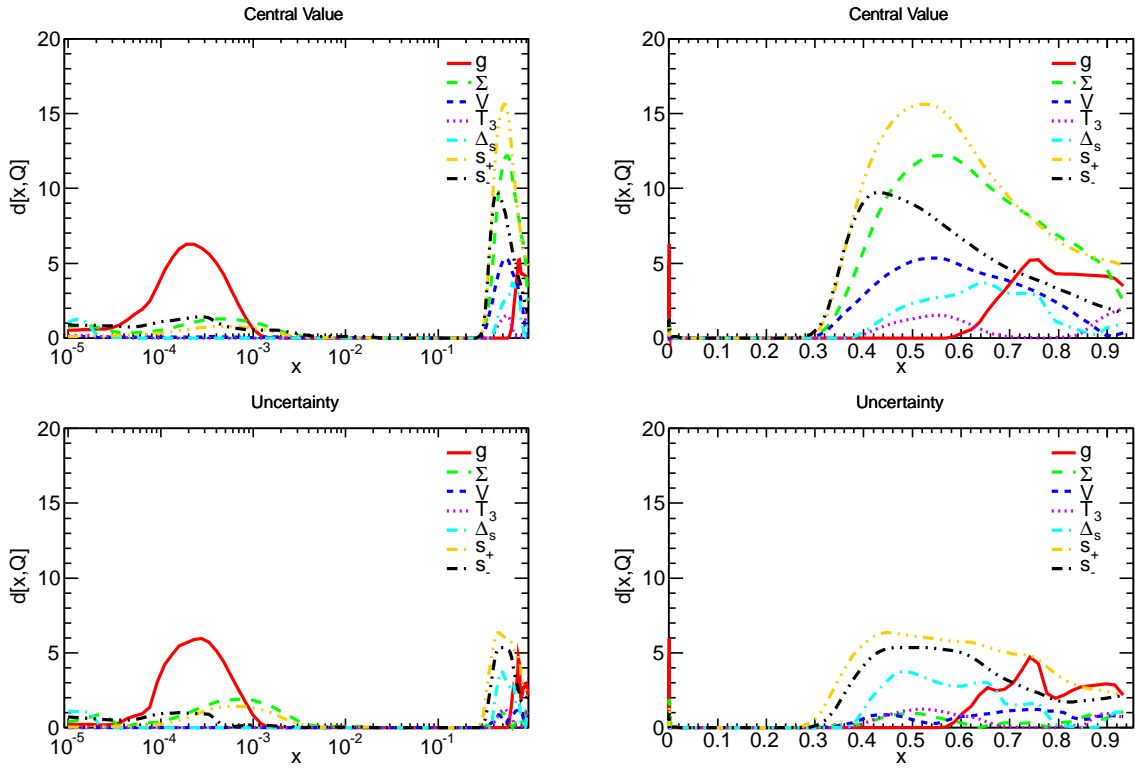


Figure 1: Distances in the fitting basis.

NNPDF Fit vs Reference Distances

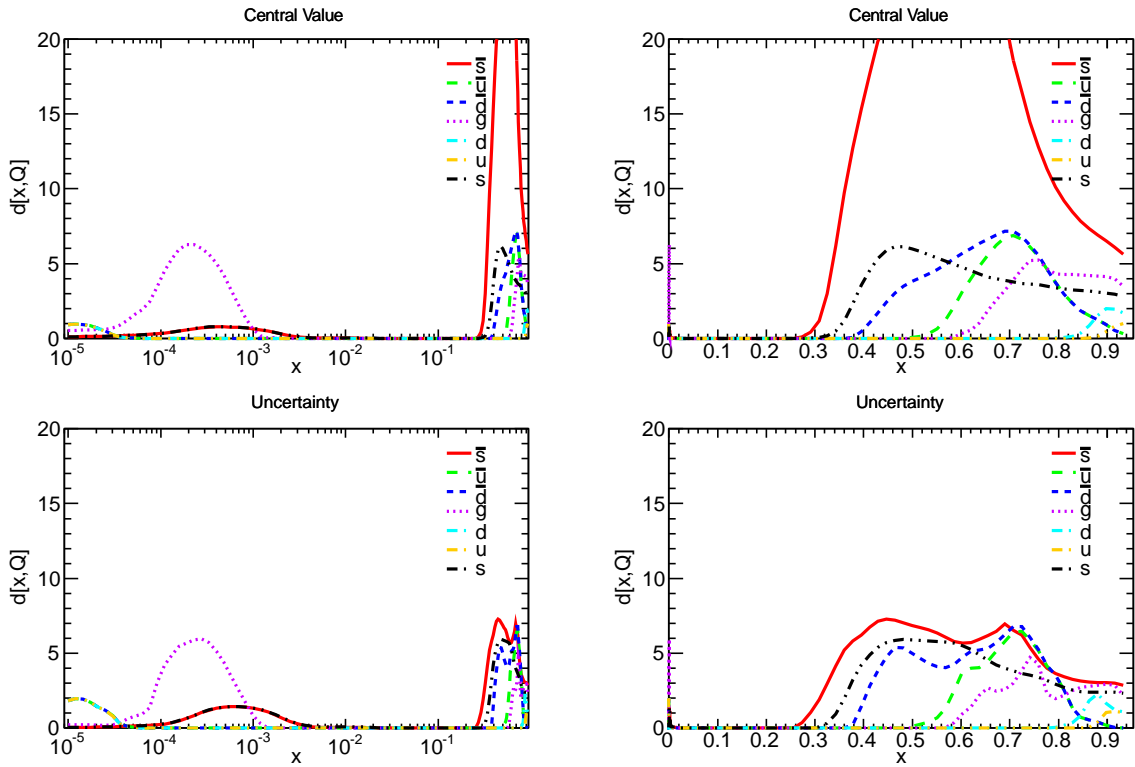


Figure 2: Distances in the flavour basis.

## 2.2 Comparing PDFs in evolution basis

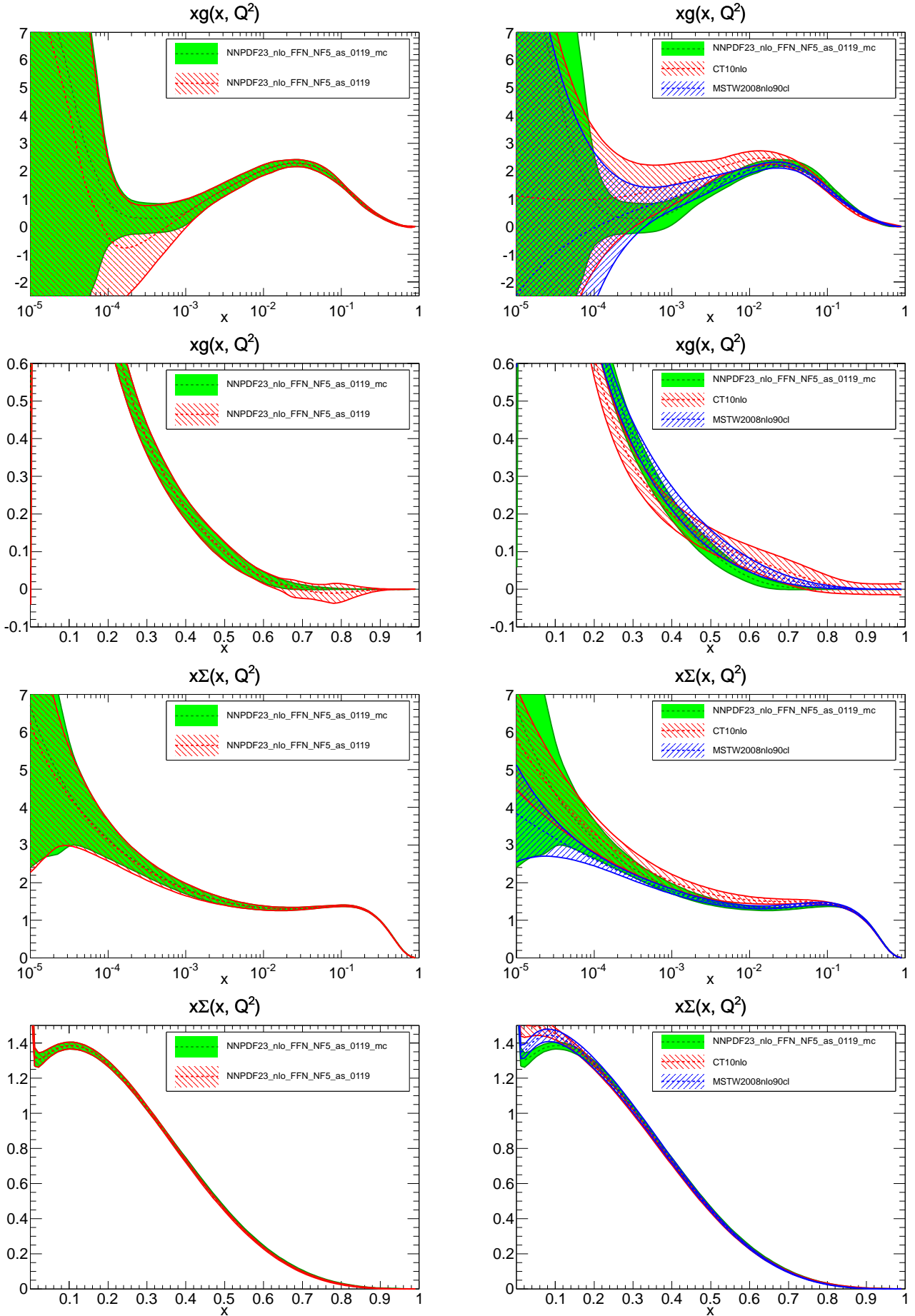


Figure 3: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

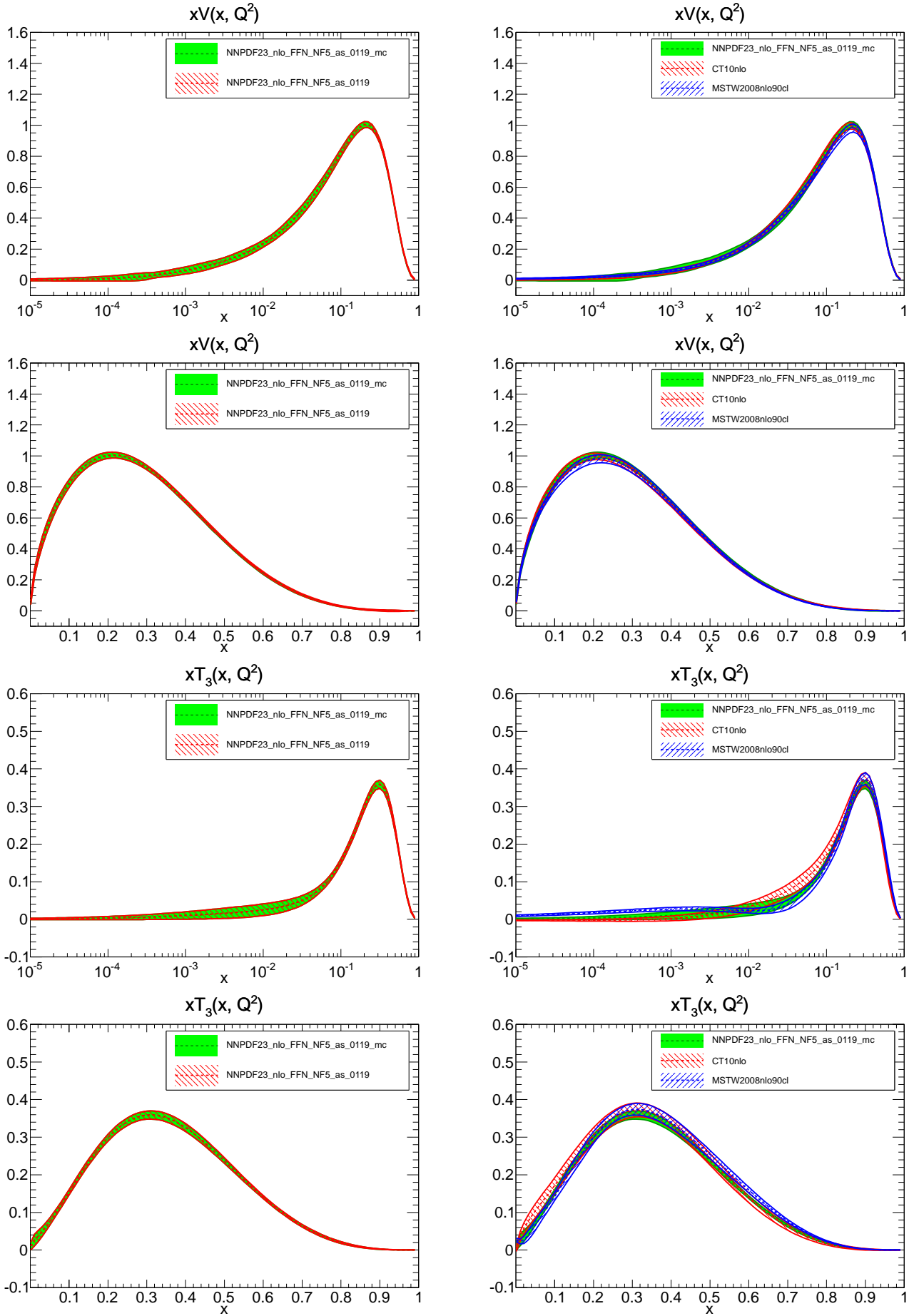


Figure 4: Comparison between PDFs at  $Q^2 = 2.0 \text{e} + 00 \text{ GeV}^2$ .

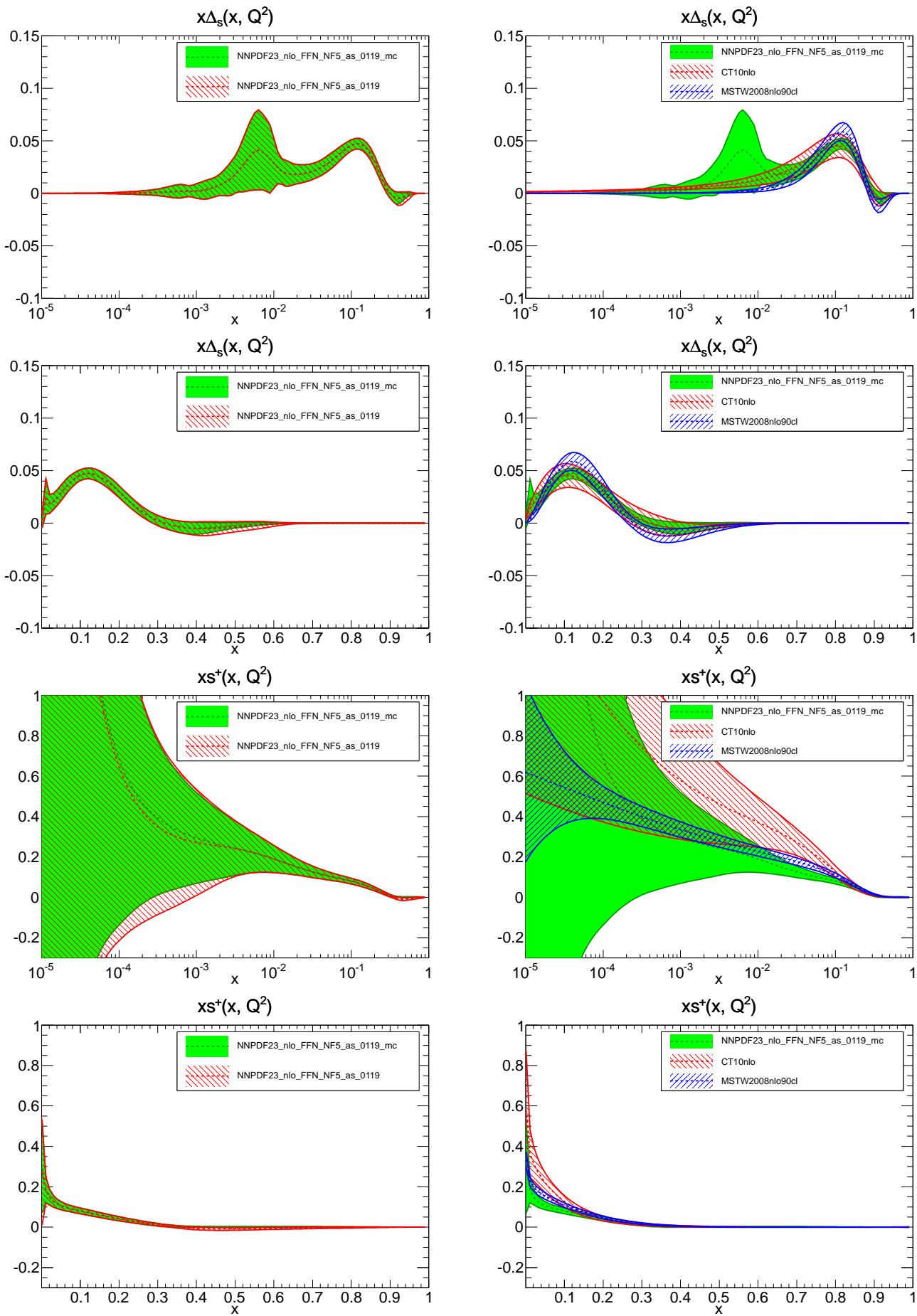


Figure 5: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

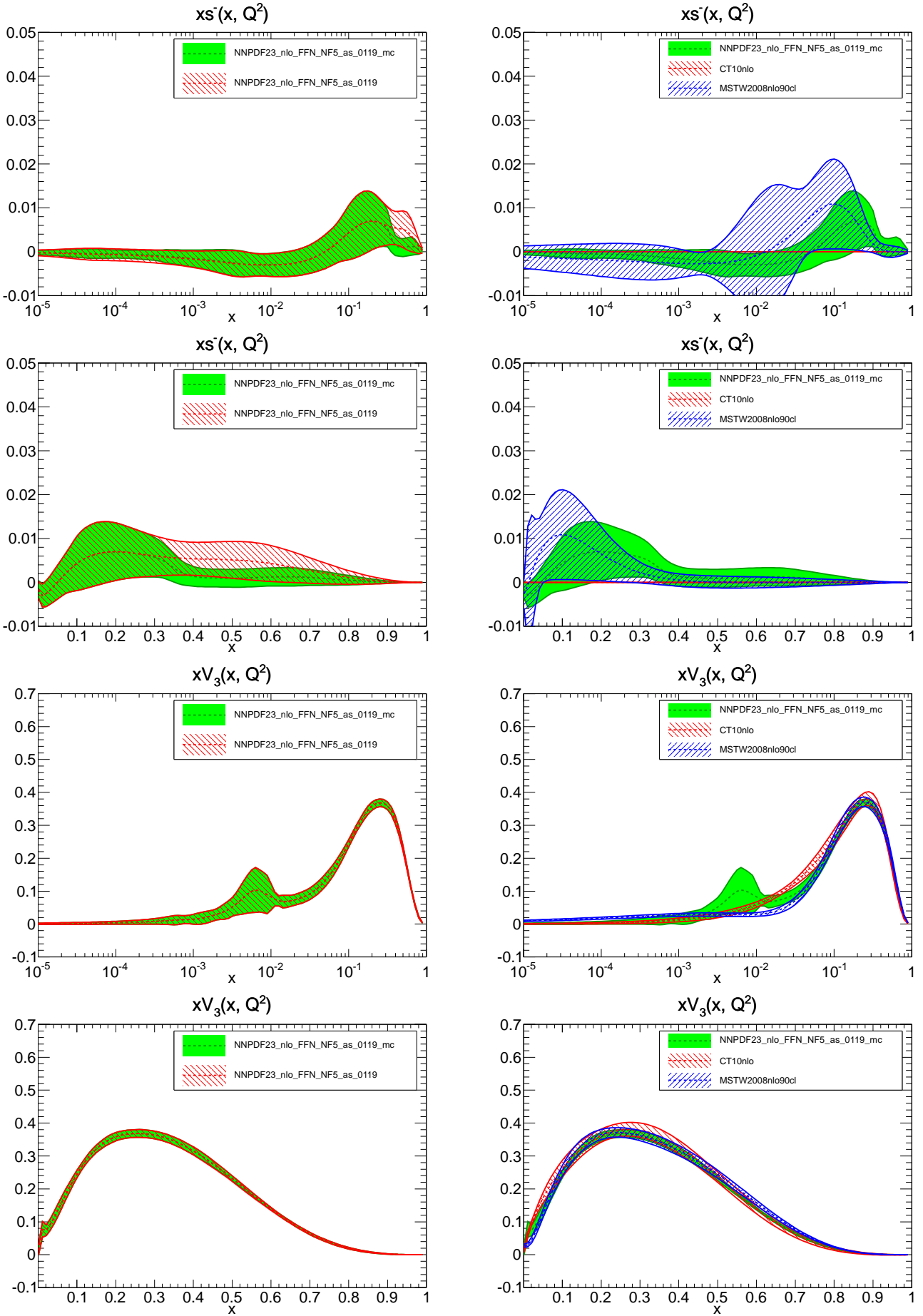


Figure 6: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

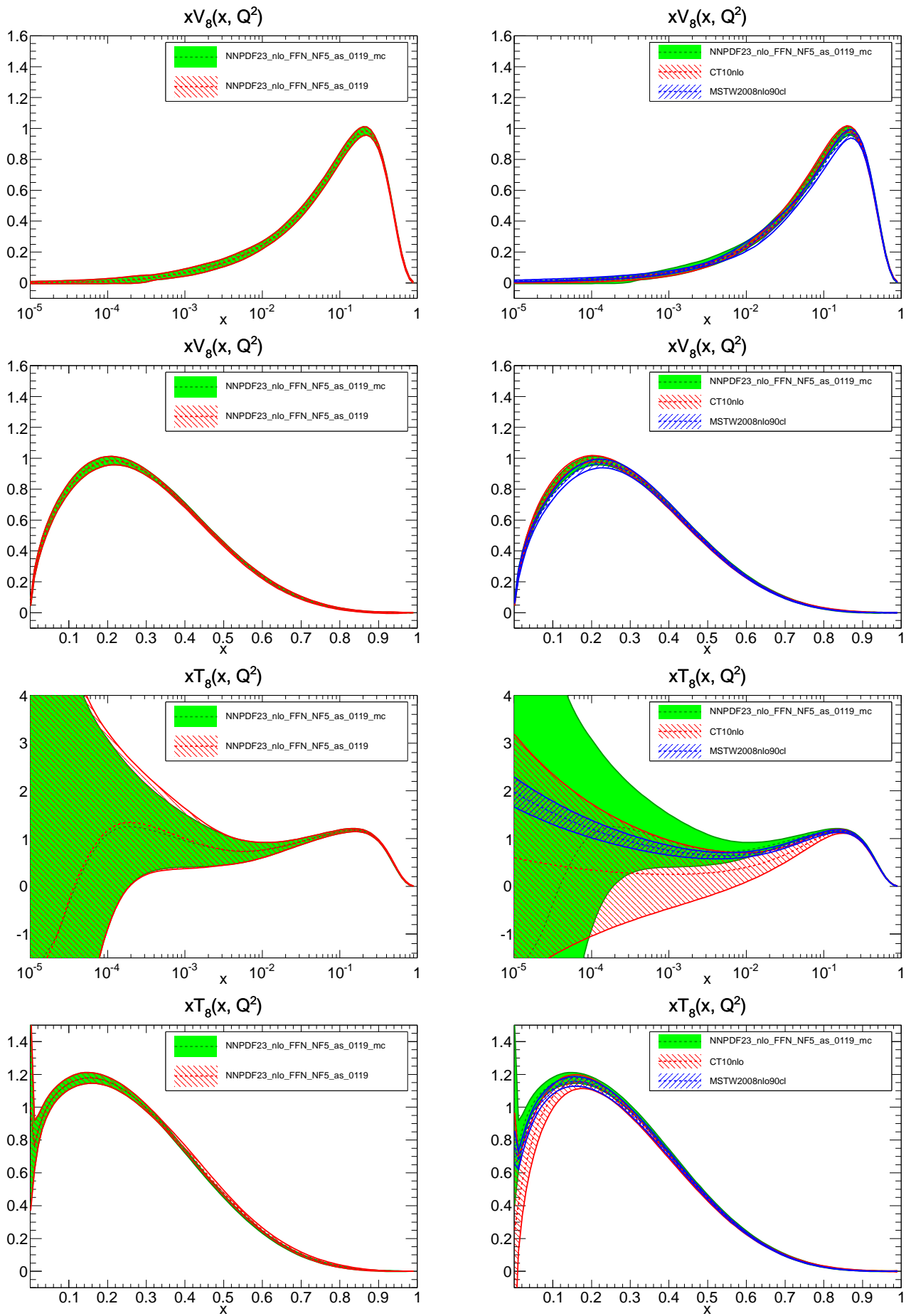


Figure 7: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

### 2.3 Comparing PDFs in LHA basis

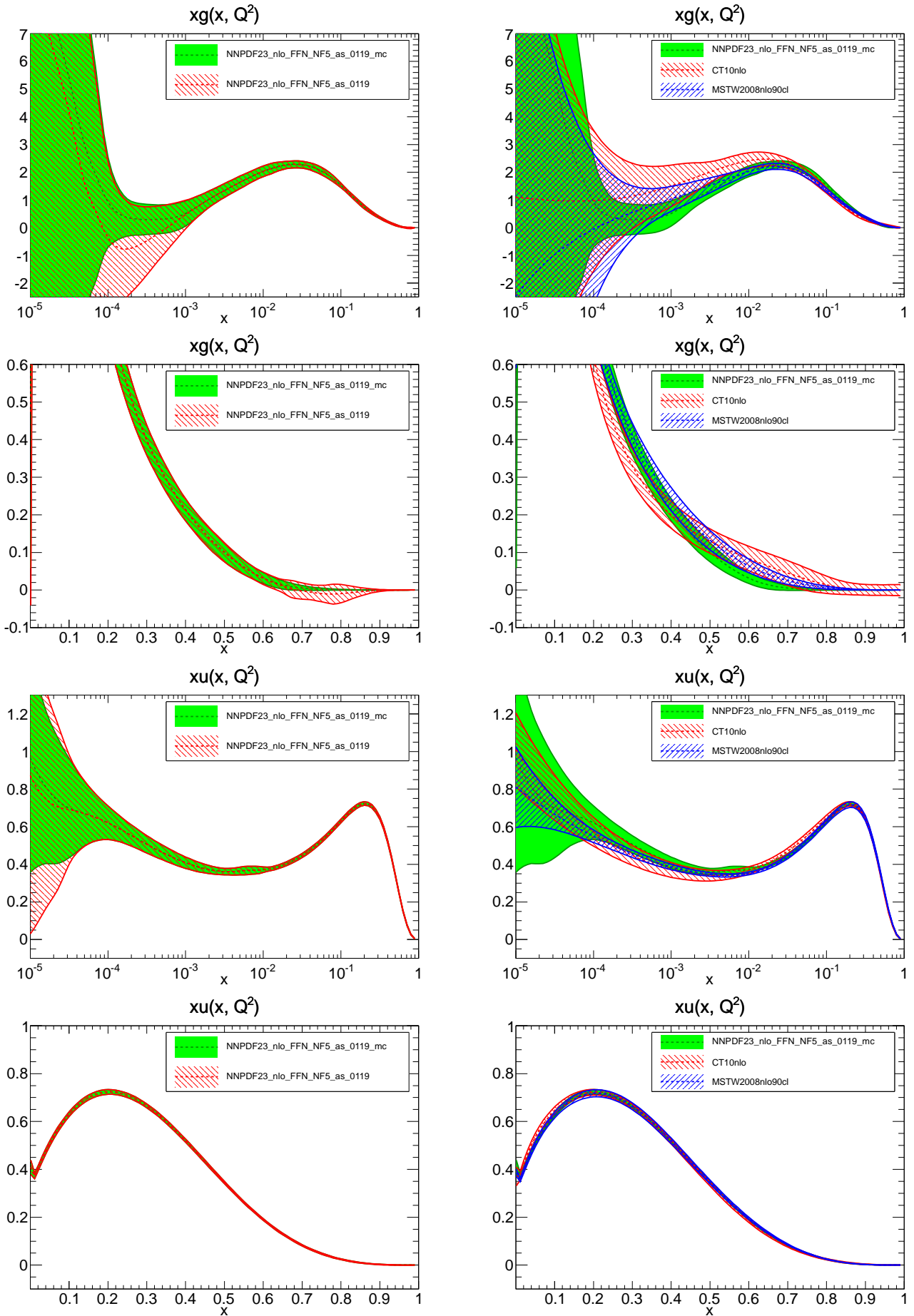


Figure 8: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .



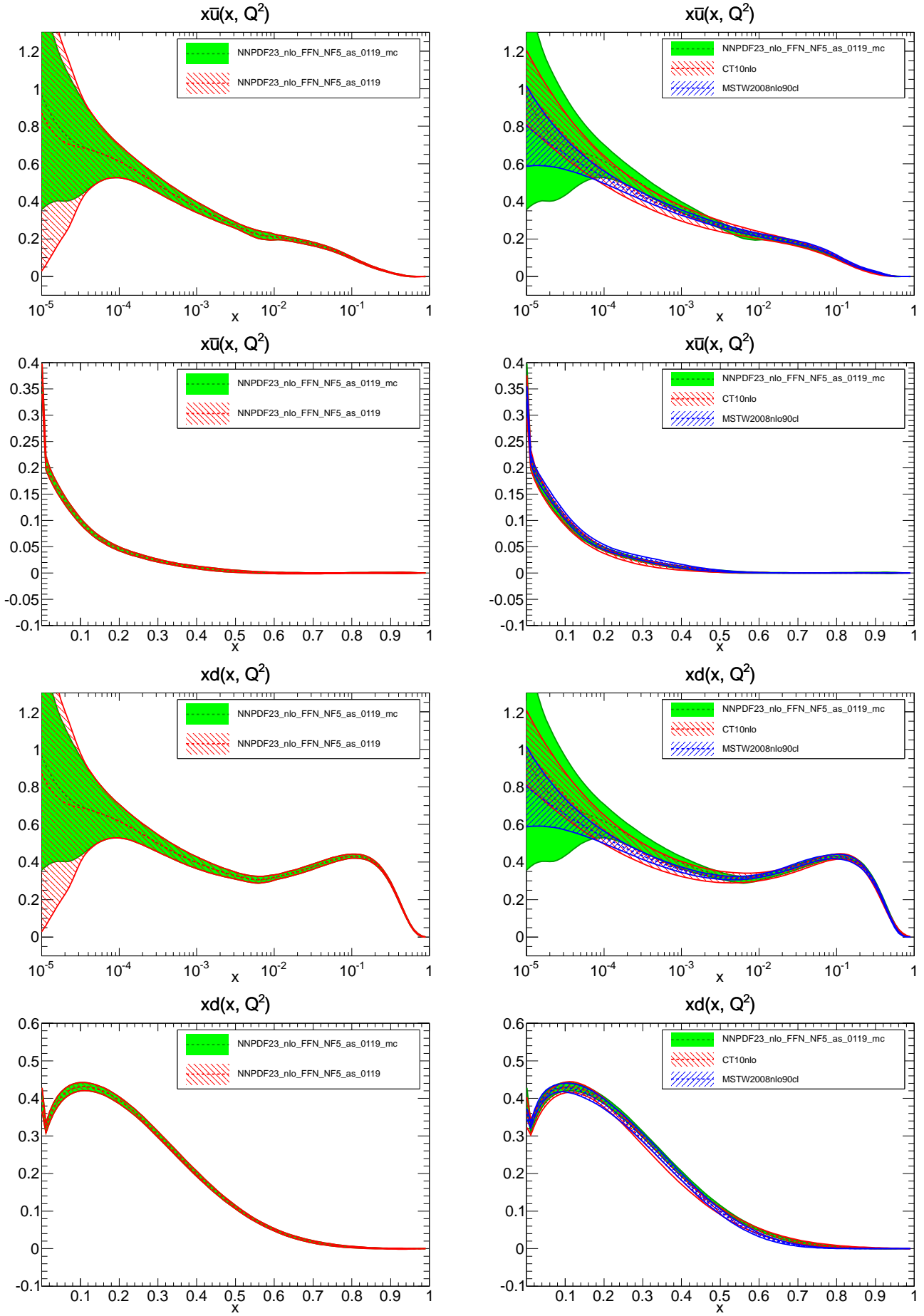


Figure 9: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

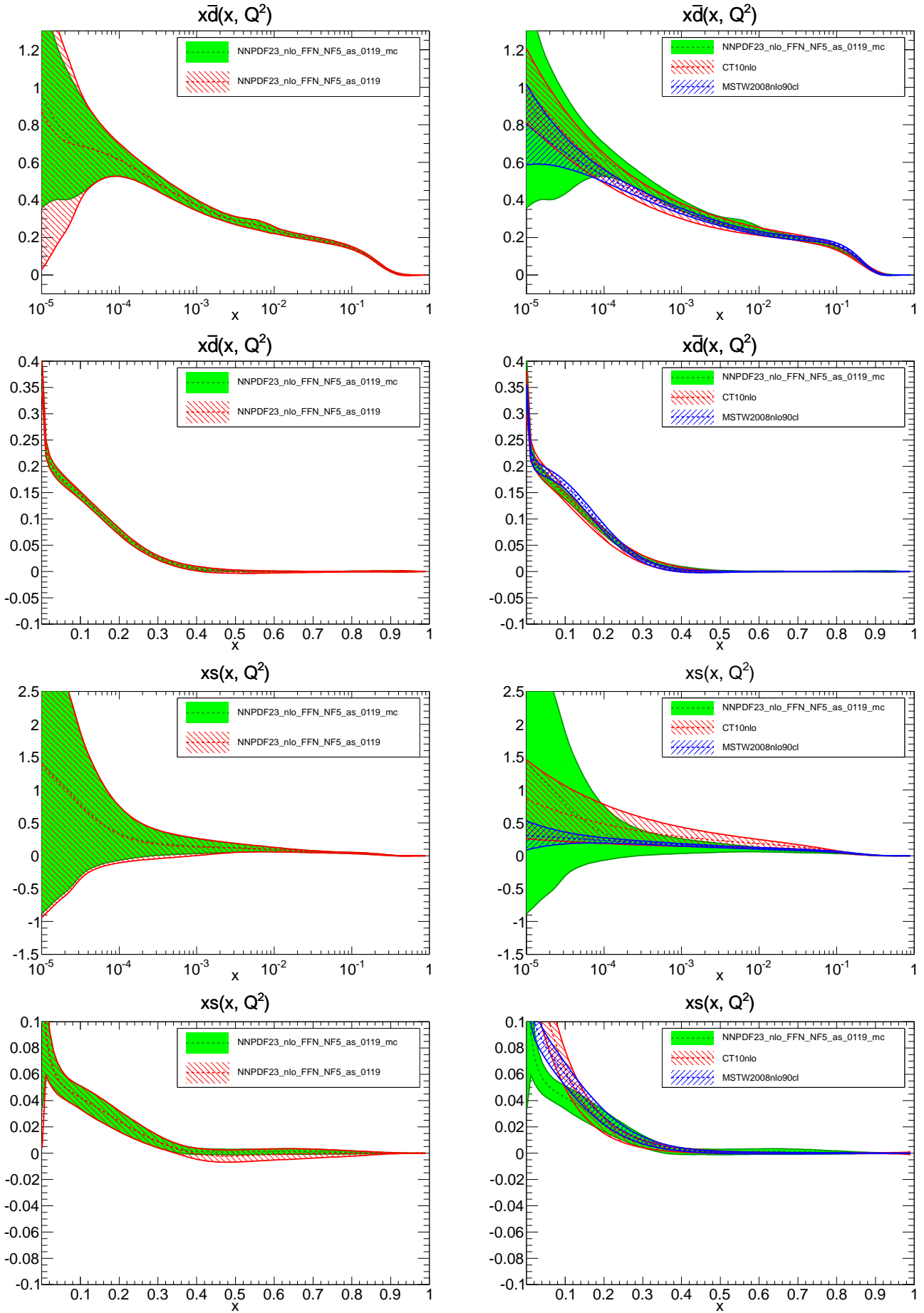


Figure 10: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

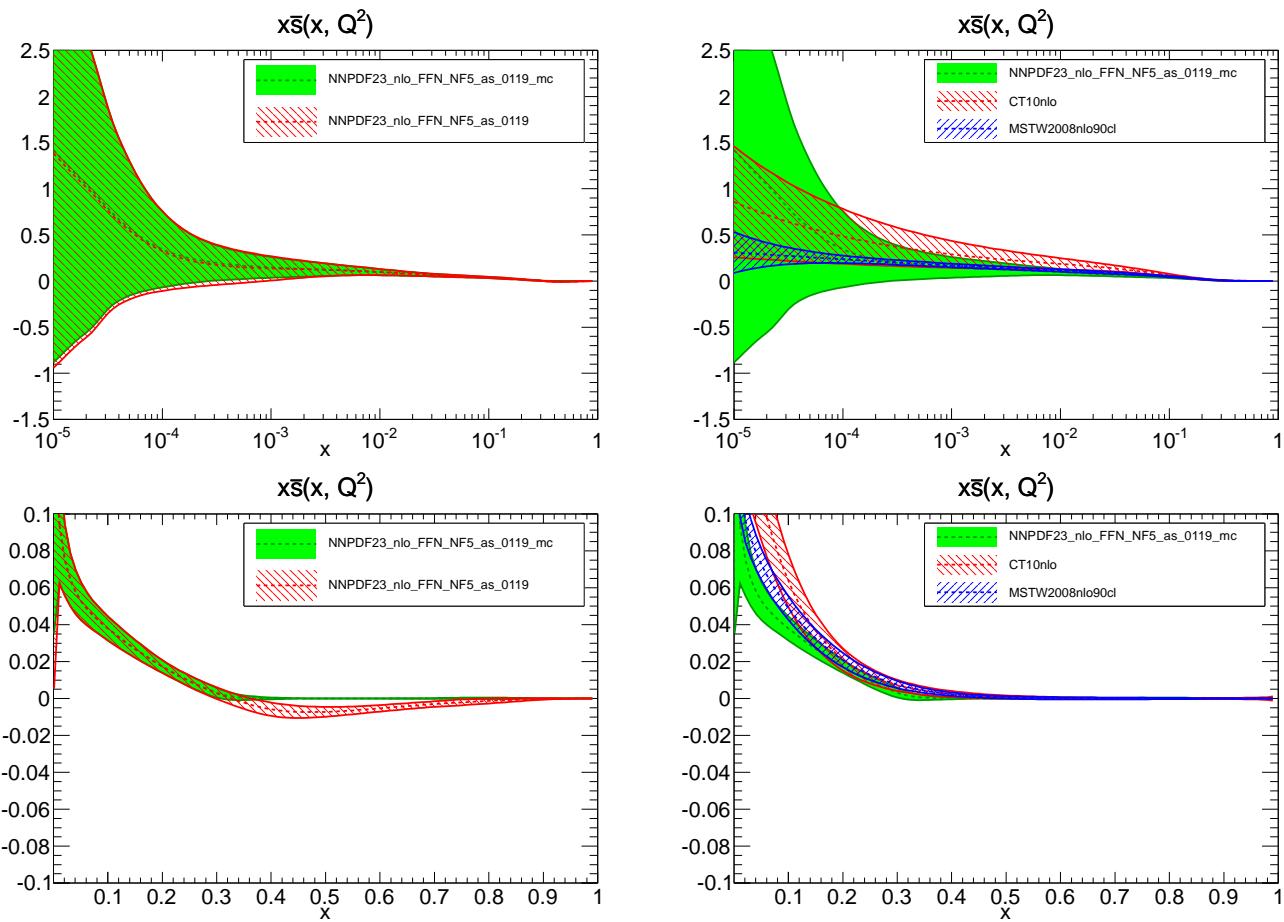


Figure 11: Comparison between PDFs at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

## 2.4 Replicas in the evolution basis

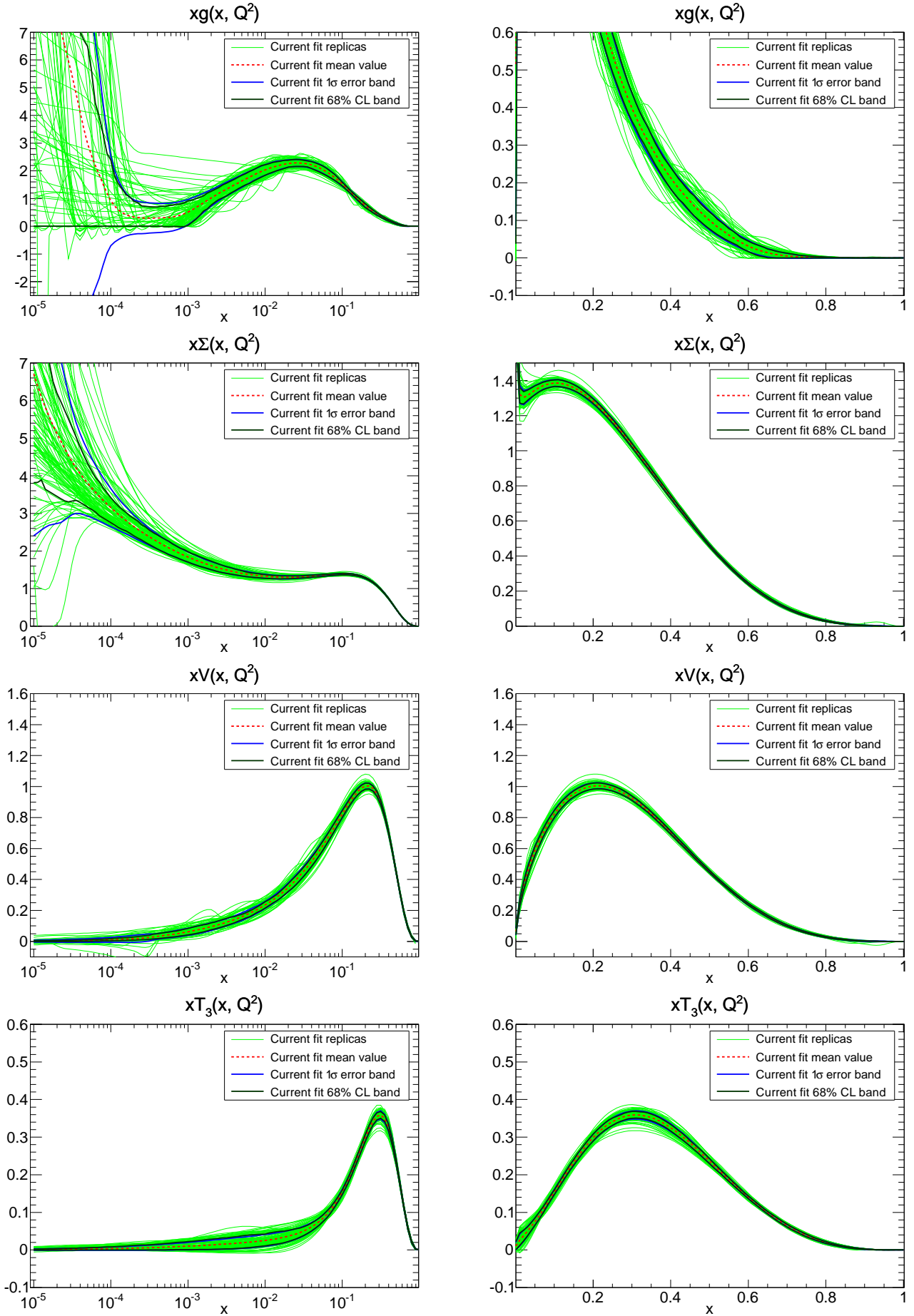


Figure 12: Current fit PDFs in the evolution basis at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

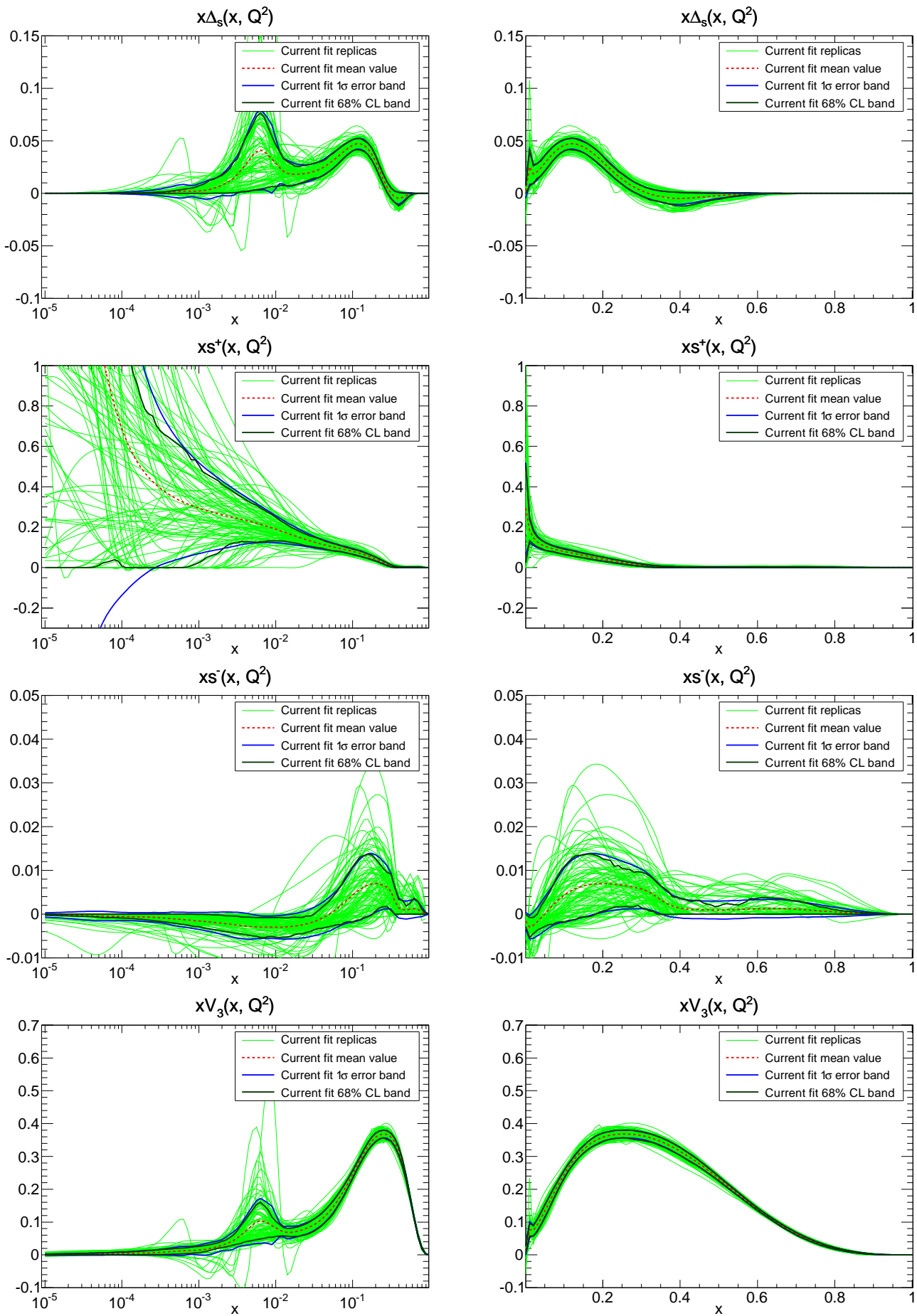


Figure 13: Current fit PDFs in the evolution basis at  $Q^2 = 2.0e+00 \text{ GeV}^2$ .

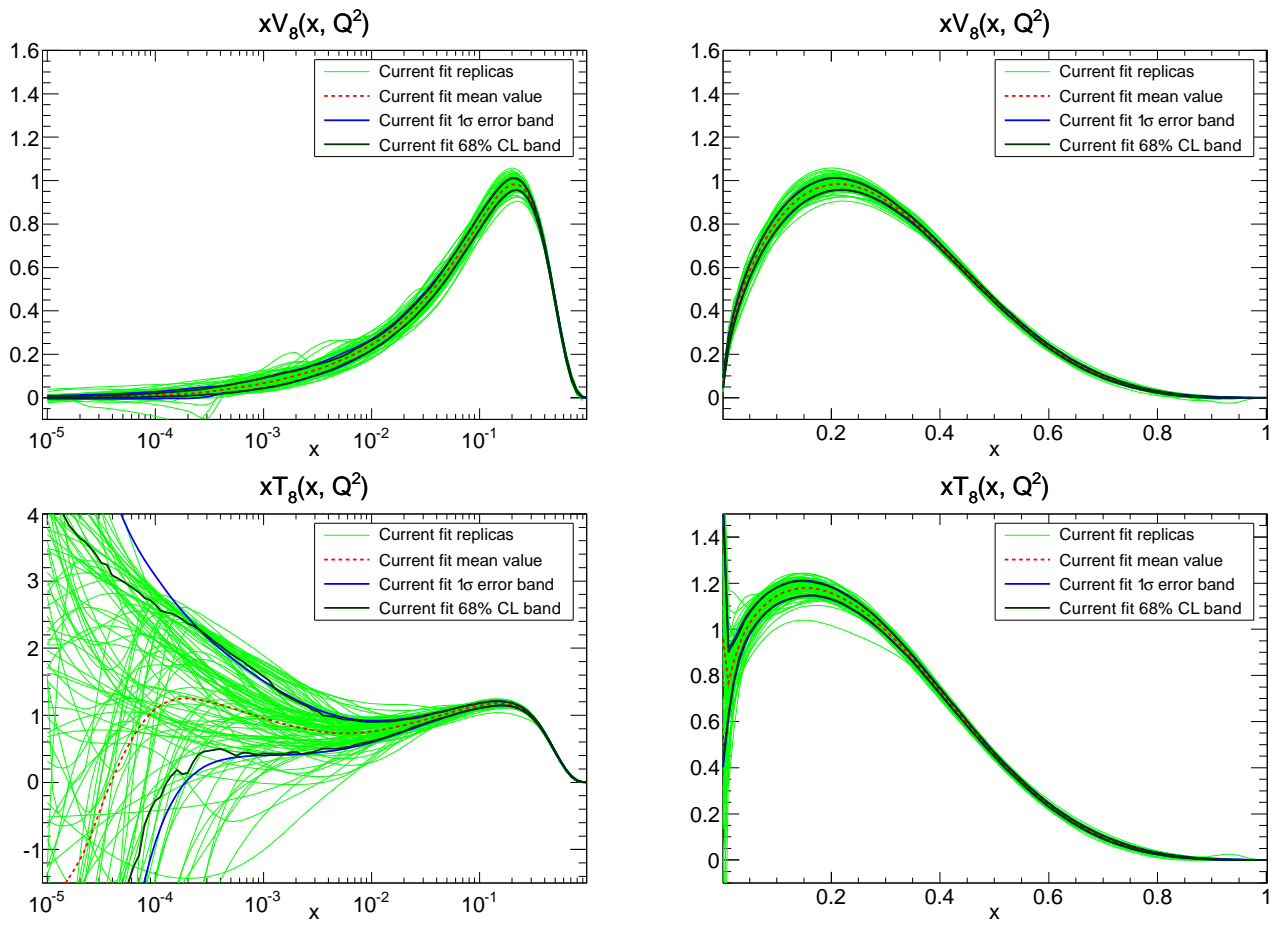


Figure 14: Current fit PDFs in the evolution basis at  $Q^2 = 2.0e+00 \text{ GeV}^2$ .

## 2.5 Replicas in the LH basis

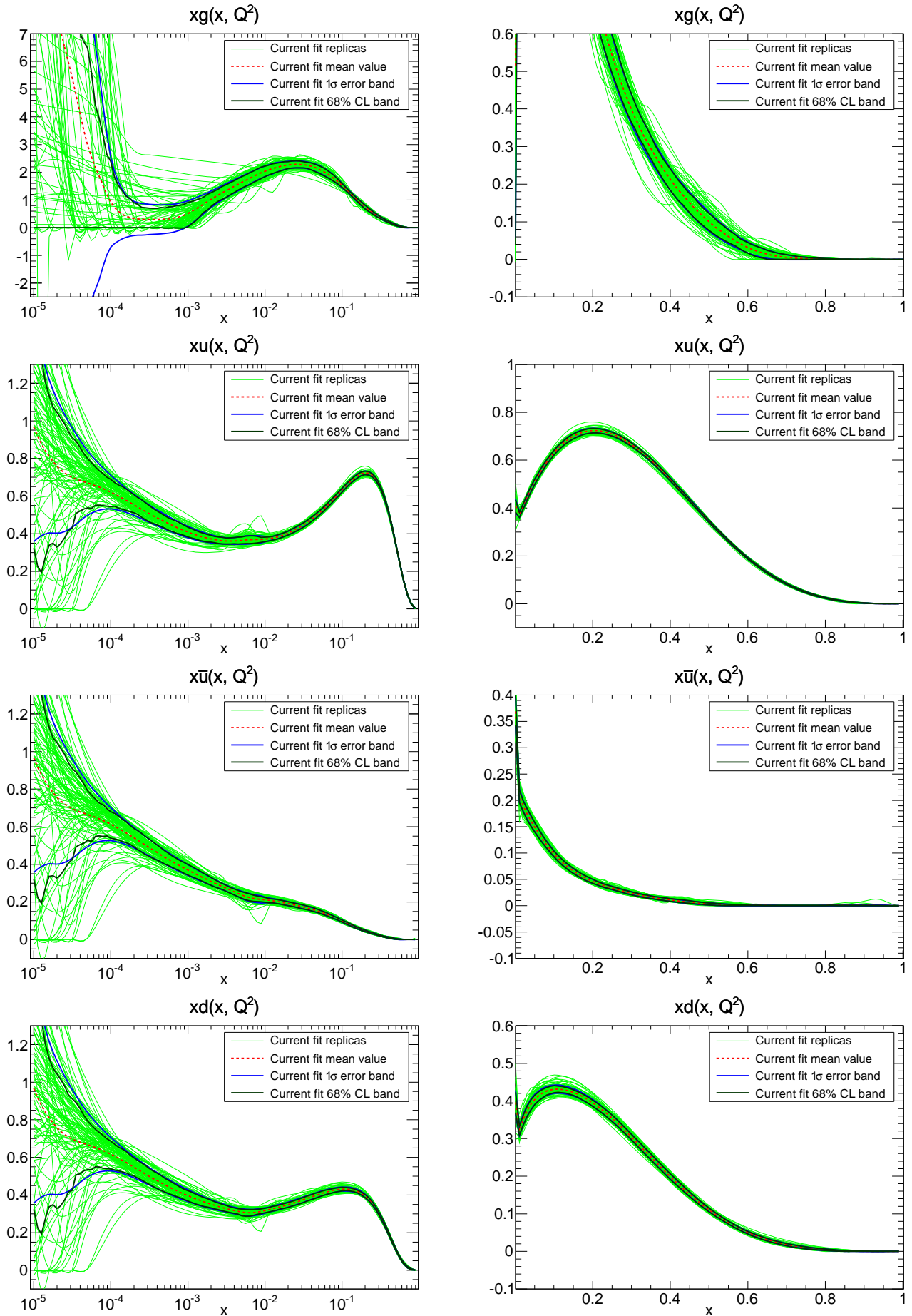


Figure 15: Current fit PDFs in the LH basis at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .

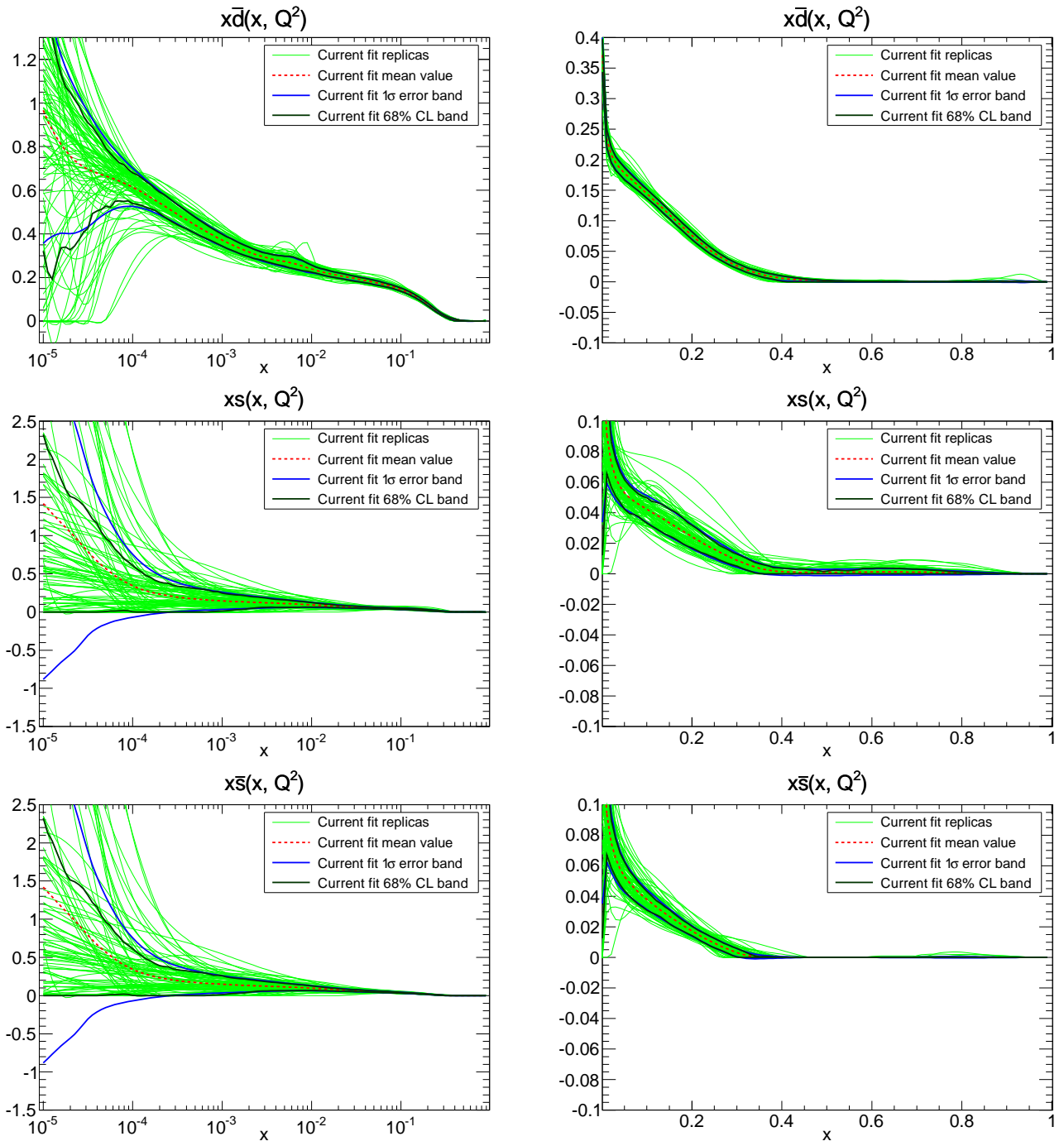


Figure 16: Current fit PDFs in the LH basis at  $Q^2 = 2.0e + 00 \text{ GeV}^2$ .



### 3 Fit properties

Distribution of  $\chi^2$  for experiments

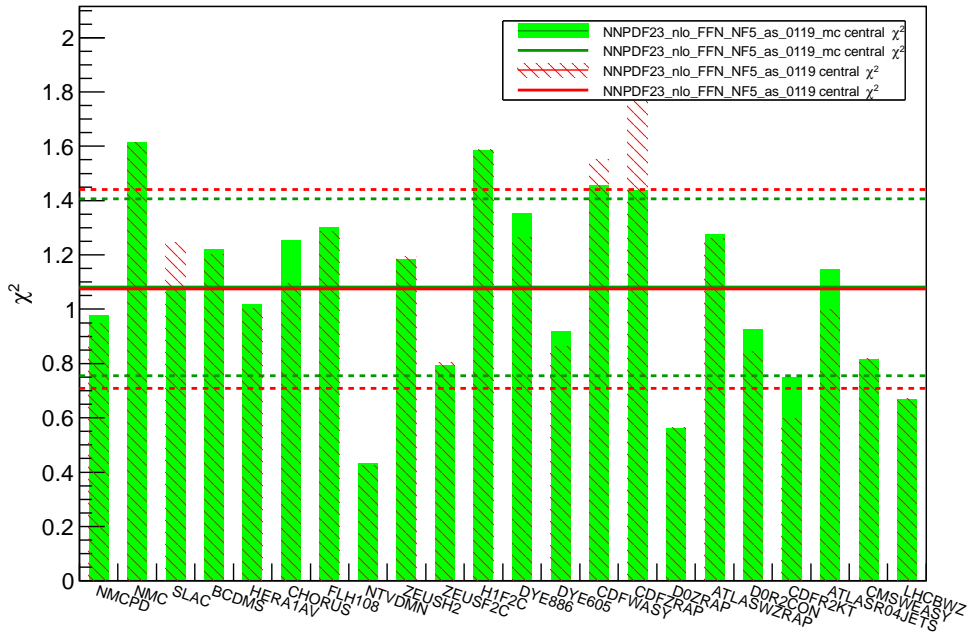


Figure 17: Total  $\chi^2$  for each experiment.

### 3.1 $\chi^2$ details - experimental covariance matrix

Experiment	Dataset	DOF	Current $\chi^2$	Reference $\chi^2$	CTEQ $\chi^2$	MSTW $\chi^2$
NMCPD	NMCPD	132	0.97650	0.94678	0.97431	0.98168
NMC	NMC	224	1.61480	1.61490	1.67544	1.44034
SLAC	SLACP	74	1.08418	1.24499	1.66775	1.35240
	SLACD	37	1.20647	1.33043	1.66336	1.29017
		37	0.91720	1.10607	1.46126	1.27373
BCDMS	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	HERA1NCEP	592	1.01753	1.00232	1.25308	1.24324
	HERA1NCEM	379	1.17202	1.15072	1.49239	1.50295
	HERA1CCEP	145	0.78328	0.77618	0.80335	0.86471
	HERA1CCEM	34	0.87550	0.89207	1.06657	0.92536
CHORUS	CHORUS	34	0.56153	0.56747	0.57770	0.55438
	CHORUSNU	862	1.25423	1.09544	1.37123	1.25963
	CHORUSNB	431	1.17459	1.13963	1.33284	1.18426
FLH108	FLH108	431	1.20165	0.98374	1.30625	1.24490
		8	1.30336	1.28842	1.43437	1.33943
NTVDMN	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	ZEUSH2	127	1.18507	1.19509	1.33659	1.20424
	ZO6NC	90	1.13571	1.13908	1.29451	1.15496
	ZO6CC	37	1.17612	1.20172	1.27789	1.15717
ZEUSF2C	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
H1F2C	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
DYE886	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
DYE605	DYE886P	184	1.42329	1.32874	1.31045	1.52605
	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
DOZRAP	DOZRAP	28	0.56059	0.56467	0.55617	0.59228
ATLASWZRAP	ATLASWZRAP36PB	30	1.27688	1.26175	1.11096	1.98904
DOR2CON	DOR2CON	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
<b>Total (sets)</b>		<b>3482</b>	<b>1.14</b>	<b>1.09</b>	<b>1.40</b>	<b>1.00</b>
<b>Total (exps)</b>		<b>3482</b>	<b>1.16</b>	<b>1.10</b>	<b>1.41</b>	<b>1.30</b>

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: 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]

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[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]
PGSDATASET = FCPGS
PGSDATASET = FLPGS
PGSDATASET = DMPGS
[/Positivity]

#####
[NN Properties]
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MMUTANTS = 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]
```