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# Demo file to test nCTEQ15 EIC YP Structure Function Tables:

Loop over all nuclei

Uses the SF tables in LHAPDF format

Demonstration to show how to use LHAPDF structure function tables with ManeParse.

This is a simpler demo file that just shows the basics of loading the tables.

## Please cite:

ManeParse : A Mathematica reader for Parton Distribution Functions

D.B.Clark, E.Godat, F.I.Olness

Published in : Comput.Phys.Commun .216 (2017) 126 - 137

e - Print : 1605.08012[hep - ph]

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21 July 2020

```
In[1]:= Clear["Global`*"];  
  
In[2]:= $Version  
  
Out[2]:= 12.1.0 for Linux x86 (64-bit) (March 14, 2020)
```

---

## Set Directory

This example notebook is written with relative directories and is intended to be run within the folder extracted from the tarball.

```
In[3]:= (* This just drops the leading path  
info to make the list of files easier to read *)  
(* OLD VERSION; DOES NOT WORK ON MULTI-LEVEL DIRECTORIES  
dropPath=Take[(FileNameSplit /@ #) //Transpose, -1][[1]]&; *)  
dropPath = ((Take[#, -1] & /@ (FileNameSplit /@ #)) // Flatten) &  
  
Out[3]= Flatten[(Take[#, -1] &) /@ FileNameSplit /@ #] &  
  
In[4]:= NotebookDirectory [];  
here = NotebookDirectory []  
  
Out[5]= /home/olness/Downloads/EIC_SF_DEMO_v04/
```

```

In[6]:= (* If there is a problem with the Mathematica working directory,
        you can enter it manually here *)
        SetDirectory[here]

Out[6]= /home/olness/Downloads/EIC_SF_DEMO_v04

In[7]:= (* This shows what files should be in this main directory *)
        FileNames["*", here] // dropPath

Out[7]= {EIC_SF_Demo_nCTEQ_v01.nb, EIC_SF_Demo_nCTEQ_v01.pdf,
        EIC_SF_Demo_v09.nb, EIC_SF_Demo_v09.pdf, f123_NC_v02.nb, f123_NC_v02.pdf,
        indexes_v01.ods, LHAPDF, log.txt~, MP_packages, qplot.pdf, xplot.pdf}

```

---

## Setup Other Directories

```

In[8]:= dirPackages = here <> "MP_packages ";
        FileNames["*", dirPackages] // dropPath

Out[9]= {pdfCalc.m, pdfErrors.m, pdfParseCTEQ.m,
        pdfParseLHA.m, README_V05.TXT, README_V05.TXT~}

In[10]:= dirFilesLHA = "/home/olness/git/txgrids/stf-grids/";
        dirFilesLHA = here <> "LHAPDF/";
        dirList = FileNames["*", dirFilesLHA];
        dirList // dropPath // TableForm

```

Out[13]/TableForm=

CT18NLO\_SF\_lo  
 CT18NLO\_SF\_nlo  
 nCTEQ15FullNuc\_SF\_108\_54\_lo  
 nCTEQ15FullNuc\_SF\_108\_54\_nlo  
 nCTEQ15FullNuc\_SF\_119\_59\_lo  
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 nCTEQ15FullNuc\_SF\_1\_1\_lo  
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 nCTEQ15FullNuc\_SF\_7\_3\_nlo  
 nCTEQ15FullNuc\_SF\_84\_42\_lo  
 nCTEQ15FullNuc\_SF\_84\_42\_nlo  
 nCTEQ15FullNuc\_SF\_9\_4\_lo  
 nCTEQ15FullNuc\_SF\_9\_4\_nlo

## Load the package

Loading the main package provides many useful functions

```
In[14]:= Get[dirPackages <> "/pdfParseLHA .m"]
```

```
Version : pdfCalc 5.0
Version : ManeParse 5.0: April 2021
- Required Package : pdfCalc --Loaded -
```

```
=====
```

```
- pdfParseLHA -
Version : 5.0: April 2021
Authors : E.J. Godat , D.B. Clark & F.I. Olness
```

```
Please cite : *****
http://ncteq.hepforge.org/code/pdf.html
```

```
For a list of available commands , enter : ?pdf*
```

```
=====
```

```
In[15]:= Get[dirPackages <> "/pdfParseCTEQ .m"]
```

```
=====
```

```
- pdfParseCTEQ -
Version : 5.0: April 2021
Authors : D.B. Clark , E.J. Godat & F.I. Olness
```

```
Please cite : *****
http://ncteq.hepforge.org/code/pdf.html
```

```
For a list of available commands , enter : ?pdf*
```

```
=====
```

In[16]:= **Get[dirPackages <> "/pdfErrors.m"]**

=====

- pdfErrors -

Version : 5.0; April 2021

Authors : D.B. Clark, E.J. Godat & F.I. Olness

Please cite: \*\*\*\*\*

<http://ncteq.hepforge.org/code/pdf.html>

For a list of available commands, enter: ?pdf\*

=====

All functions begin with 'pdf'. To obtain a list of available functions, type the command '?pdf\*'.

In[17]:= **? pdf\***

Out[17]=

▼ pdfCalc`

pdfAlphaS

pdfFlavor

pdfFunction

pdfFunctionX

pdfGetInfo

pdfGetQlist

pdfGetXlist

pdfLowFunction

pdfLuminosity

pdfNumQpartition

pdfReset

pdfSetInterpolator

pdfSetList

pdfSetListDisplay

pdfSetXpower

pdfXmin

▼ pdfErrors`

pdfError

pdfFamilyFunction

pdfHessianCorrelation

pdfHessianError

pdfMCCentral

pdfMCCentralInterval

pdfMCCorrelation

pdfMCErrors

▼ pdfParseCTEQ`

pdfFamilyParseCTEQ

pdfParseCTEQ

▼ pdfParseLHA`

pdfFamilyParseLHA

pdfParseLHA

## Individual file manipulation

```
In[18]:= pdfReset[]

Default Mathematica interpolator will be used.

All internal variables have been reset.
```

Individual files in either LHA or PDS format can be parsed using the functions loaded from the packages. Here we demonstrate the LHA parsing function

```
In[19]:= Do[
  Print["i= ", i, dirList[[i]]];
  pdfFamilyParseLHA [dirList[[i]]];
  , {i, 1, Length[dirList]}]

i= 1/home/olness /Downloads /EIC_SF_DEMO_v04 //LHAPDF /CT18NLO_SF_lo
Successfully read
/home/olness /Downloads /EIC_SF_DEMO_v04 /LHAPDF /CT18NLO_SF_lo /CT18NLO_SF_lo.info.
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/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_84_42_nlo/nCTEQ15FullNuc_SF_84_42_nlo.info.

Included 1 files in the PDF family.

i= 47/home/olness/Downloads/EIC_SF_DEMO_v04//LHAPDF/nCTEQ15FullNuc_SF_9_4_lo

Successfully read
/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_9_4_lo/nCTEQ15FullNuc_SF_9_4_lo.info.

Included 1 files in the PDF family.

i= 48/home/olness/Downloads/EIC_SF_DEMO_v04//LHAPDF/nCTEQ15FullNuc_SF_9_4_nlo

Successfully read
/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_9_4_nlo/nCTEQ15FullNuc_SF_9_4_nlo.info.

Included 1 files in the PDF family.

```

## Examine SF's

In[20]:= pdfSetListDisplay []

Set Number	File Name	Max Flavors	Valance Flavors
1	/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/CT18NLO_SF_lo/CT18NLO_SF_lo_0000.dat	5	n/a
2	/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/CT18NLO_SF_nlo/CT18NLO_SF_nlo_0000.dat	5	n/a
3	/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_108_54_lo/nCTEQ15FullNuc_SF_108_54_lo_0000.dat	5	n/a
4	/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_108_54_nlo/nCTEQ15FullNuc_SF_108_54_nlo_0000.dat	5	n/a
5	/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_119_59_lo/nCTEQ15FullNuc_SF_119_59_lo_0000.dat	5	n/a
6	/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_119_59_nlo/nCTEQ15FullNuc_SF_119_59_nlo_0000.dat	5	n/a
7	/home/olness/Downloads/EIC_SF_DEMO_v04/LHAPDF/nCTEQ15FullNuc_SF_1_1_lo/nCTEQ15FullNuc_SF_1_1_lo_0000.dat	5	n/a

8	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_1_1_nlo/ nCTEQ15FullNuc_SF_1_1_nlo_0000.dat	5	n/a
9	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_12_6_lo/ nCTEQ15FullNuc_SF_12_6_lo_0000.dat	5	n/a
10	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_12_6_nlo/ nCTEQ15FullNuc_SF_12_6_nlo_0000.dat	5	n/a
11	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_131_54_lo/ nCTEQ15FullNuc_SF_131_54_lo_0000.dat	5	n/a
12	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_131_54_nlo/ nCTEQ15FullNuc_SF_131_54_nlo_0000.dat	5	n/a
13	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_14_7_lo/ nCTEQ15FullNuc_SF_14_7_lo_0000.dat	5	n/a
14	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_14_7_nlo/ nCTEQ15FullNuc_SF_14_7_nlo_0000.dat	5	n/a
15	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_184_74_lo/ nCTEQ15FullNuc_SF_184_74_lo_0000.dat	5	n/a
16	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_184_74_nlo/ nCTEQ15FullNuc_SF_184_74_nlo_0000.dat	5	n/a
17	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_197_79_lo/ nCTEQ15FullNuc_SF_197_79_lo_0000.dat	5	n/a
18	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_197_79_nlo/ nCTEQ15FullNuc_SF_197_79_nlo_0000.dat	5	n/a
19	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_197_98_lo/ nCTEQ15FullNuc_SF_197_98_lo_0000.dat	5	n/a
20	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_197_98_nlo/ nCTEQ15FullNuc_SF_197_98_nlo_0000.dat	5	n/a

Out[20]=

21	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_20_10_lo/ nCTEQ15FullNuc_SF_20_10_lo_0000.dat	5	n/a
22	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_20_10_nlo/ nCTEQ15FullNuc_SF_20_10_nlo_0000.dat	5	n/a
23	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_207_103_lo/ nCTEQ15FullNuc_SF_207_103_lo_0000.dat	5	n/a
24	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_207_103_nlo/ nCTEQ15FullNuc_SF_207_103_nlo_0000.dat	5	n/a
25	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_208_82_lo/ nCTEQ15FullNuc_SF_208_82_lo_0000.dat	5	n/a
26	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_208_82_nlo/ nCTEQ15FullNuc_SF_208_82_nlo_0000.dat	5	n/a
27	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_27_13_lo/ nCTEQ15FullNuc_SF_27_13_lo_0000.dat	5	n/a
28	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_27_13_nlo/ nCTEQ15FullNuc_SF_27_13_nlo_0000.dat	5	n/a
29	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_3_2_lo/ nCTEQ15FullNuc_SF_3_2_lo_0000.dat	5	n/a
30	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_3_2_nlo/ nCTEQ15FullNuc_SF_3_2_nlo_0000.dat	5	n/a
31	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_40_18_lo/ nCTEQ15FullNuc_SF_40_18_lo_0000.dat	5	n/a
32	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_40_18_nlo/ nCTEQ15FullNuc_SF_40_18_nlo_0000.dat	5	n/a
33	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_40_20_lo/ nCTEQ15FullNuc_SF_40_20_lo_0000.dat	5	n/a

34	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_40_20_nlo/ nCTEQ15FullNuc_SF_40_20_nlo_0000.dat	5	n/a
35	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_4_2_lo/ nCTEQ15FullNuc_SF_4_2_lo_0000.dat	5	n/a
36	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_4_2_nlo/ nCTEQ15FullNuc_SF_4_2_nlo_0000.dat	5	n/a
37	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_56_26_lo/ nCTEQ15FullNuc_SF_56_26_lo_0000.dat	5	n/a
38	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_56_26_nlo/ nCTEQ15FullNuc_SF_56_26_nlo_0000.dat	5	n/a
39	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_6_3_lo/ nCTEQ15FullNuc_SF_6_3_lo_0000.dat	5	n/a
40	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_6_3_nlo/ nCTEQ15FullNuc_SF_6_3_nlo_0000.dat	5	n/a
41	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_64_32_lo/ nCTEQ15FullNuc_SF_64_32_lo_0000.dat	5	n/a
42	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_64_32_nlo/ nCTEQ15FullNuc_SF_64_32_nlo_0000.dat	5	n/a
43	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_7_3_lo/ nCTEQ15FullNuc_SF_7_3_lo_0000.dat	5	n/a
44	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_7_3_nlo/ nCTEQ15FullNuc_SF_7_3_nlo_0000.dat	5	n/a
45	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_84_42_lo/ nCTEQ15FullNuc_SF_84_42_lo_0000.dat	5	n/a
46	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_84_42_nlo/ nCTEQ15FullNuc_SF_84_42_nlo_0000.dat	5	n/a

47	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_9_4_lo/ nCTEQ15FullNuc_SF_9_4_lo_0000.dat	5	n/a
48	/home/olness/Downloads/EIC_SF_DEMO_v04/ LHAPDF/nCTEQ15FullNuc_SF_9_4_nlo/ nCTEQ15FullNuc_SF_9_4_nlo_0000.dat	5	n/a

## Names

```
In[21]:= setNames = pdfSetList [[All, 2]] // dropPath
Out[21]:= {CT18NLO_SF_lo_0000.dat, CT18NLO_SF_nlo_0000.dat,
  nCTEQ15FullNuc_SF_108_54_lo_0000.dat, nCTEQ15FullNuc_SF_108_54_nlo_0000.dat,
  nCTEQ15FullNuc_SF_119_59_lo_0000.dat, nCTEQ15FullNuc_SF_119_59_nlo_0000.dat,
  nCTEQ15FullNuc_SF_1_1_lo_0000.dat, nCTEQ15FullNuc_SF_1_1_nlo_0000.dat,
  nCTEQ15FullNuc_SF_12_6_lo_0000.dat, nCTEQ15FullNuc_SF_12_6_nlo_0000.dat,
  nCTEQ15FullNuc_SF_131_54_lo_0000.dat, nCTEQ15FullNuc_SF_131_54_nlo_0000.dat,
  nCTEQ15FullNuc_SF_14_7_lo_0000.dat, nCTEQ15FullNuc_SF_14_7_nlo_0000.dat,
  nCTEQ15FullNuc_SF_184_74_lo_0000.dat, nCTEQ15FullNuc_SF_184_74_nlo_0000.dat,
  nCTEQ15FullNuc_SF_197_79_lo_0000.dat, nCTEQ15FullNuc_SF_197_79_nlo_0000.dat,
  nCTEQ15FullNuc_SF_197_98_lo_0000.dat, nCTEQ15FullNuc_SF_197_98_nlo_0000.dat,
  nCTEQ15FullNuc_SF_20_10_lo_0000.dat, nCTEQ15FullNuc_SF_20_10_nlo_0000.dat,
  nCTEQ15FullNuc_SF_207_103_lo_0000.dat, nCTEQ15FullNuc_SF_207_103_nlo_0000.dat,
  nCTEQ15FullNuc_SF_208_82_lo_0000.dat, nCTEQ15FullNuc_SF_208_82_nlo_0000.dat,
  nCTEQ15FullNuc_SF_27_13_lo_0000.dat, nCTEQ15FullNuc_SF_27_13_nlo_0000.dat,
  nCTEQ15FullNuc_SF_3_2_lo_0000.dat, nCTEQ15FullNuc_SF_3_2_nlo_0000.dat,
  nCTEQ15FullNuc_SF_40_18_lo_0000.dat, nCTEQ15FullNuc_SF_40_18_nlo_0000.dat,
  nCTEQ15FullNuc_SF_40_20_lo_0000.dat, nCTEQ15FullNuc_SF_40_20_nlo_0000.dat,
  nCTEQ15FullNuc_SF_4_2_lo_0000.dat, nCTEQ15FullNuc_SF_4_2_nlo_0000.dat,
  nCTEQ15FullNuc_SF_56_26_lo_0000.dat, nCTEQ15FullNuc_SF_56_26_nlo_0000.dat,
  nCTEQ15FullNuc_SF_6_3_lo_0000.dat, nCTEQ15FullNuc_SF_6_3_nlo_0000.dat,
  nCTEQ15FullNuc_SF_64_32_lo_0000.dat, nCTEQ15FullNuc_SF_64_32_nlo_0000.dat,
  nCTEQ15FullNuc_SF_7_3_lo_0000.dat, nCTEQ15FullNuc_SF_7_3_nlo_0000.dat,
  nCTEQ15FullNuc_SF_84_42_lo_0000.dat, nCTEQ15FullNuc_SF_84_42_nlo_0000.dat,
  nCTEQ15FullNuc_SF_9_4_lo_0000.dat, nCTEQ15FullNuc_SF_9_4_nlo_0000.dat}
```



## Test Structure Functions

The function “pdf” is left to be defined by the user. Access to the PDF of the set is given by pdfFunction. The function has the canonical form: pdfFunction [setNumber , flavorNumber , x, Q]. If the function is not defined, pdfFunction returns NULL.

New in ManeParse4.0: pdfFunctionX

In[22]:= ? pdfFunctionX

```
Symbol

pdfFunctionX [setNumber , flavor , x, Q]: This
    function returns the interpolated value of the x*PDF for the
    .pds/.dat file specified by setNumber , for the given flavor and value
    of Bjorken x and scale Q .

Warning : The results of this function are only reliable between the
maximum and minimum values of x and Q in the .pds/.dat file .

This function is an alternative to pdfFunction [], and does a straight interpolation of the grid
file without multiplying by x; this can avoid issues for very small (i.e., 1.e-30) x values
```

Out[22]=

In[23]:= (\* Note, if the flavor is undefined, it will return zero \*)  
 {pdfFunctionX [1, 900, .1, 10],  
 pdfFunctionX [1, 1, .1, 10]}

Out[23]= {0.427315 , 0.}

Use "stf" as the grids store stf directly, while they store x\*pdf

In[24]:= Clear[stf]  
 stf[iset\_?IntegerQ, ipart\_?IntegerQ, x\_?NumericQ, q\_?NumericQ] :=  
 pdfFunctionX [iset, ipart, x, q]  
 SetAttributes [stf, Listable]

```
In[27]:= pdfGetInfo [1] // TableForm
```

```
Out[27]/TableForm=
```

```
SetDesc → ' Structure functions generated with nCTEQ15 PDFs: S-ACOT(chi) '
SetIndex → 0
Authors → Brandon Stevenson, Lucas Koltz, Tim Hobbs, Fred Olness
Reference → arXiv:1509.00792 nCTEQ15 nPDFs
Format → lhagrid1
DataVersion → 1
NumMembers → 1
Particle → 2212
Flavors → {-930, 930, 932, 931, -900, 900, -901, 901, -940, 940, 942, 941, -908, 908, 910,
Names → ["F1_wm", "F2_wm", "F3_wm", "FL_wm", "F1_gam", "F2_gam", "F3_gam", "FL_gam", "F1_wp", '
OrderQCD → 1
FlavorScheme → variable
NumFlavors → 5
ErrorType → no error
XMin → 5. × 10-6
XMax → 1.
QMin → 1.3
QMax → 10 000.
MZ → 91.188
MUp → 0.0
MDown → 0.0
MStrange → 0.0
MCharm → 1.3
MBottom → 4.5
MTop → 174.0
AlphaS_MZ → 1.179973 e-01
AlphaS_OrderQCD → 1
AlphaS_Type → ipol
AlphaS_Qs → {1.3, 1.6259, 2.03351, 2.5433, 3.18089, 3.97833, 4.97567, 6.22305, 7.78314, 9
AlphaS_Vals → {0.39676, 0.34313, 0.30389, 0.27365, 0.2495, 0.22957, 0.21357, 0.20084, 0.1
```

```
In[28]:= flavors = "Flavors" /. pdfGetInfo [1]
```

```
Out[28]= {-930, 930, 932, 931, -900, 900, -901, 901, -940, 940, 942, 941, -908, 908, 910, 909,
-933, 933, 935, 934, -911, 911, 913, 912, -943, 943, 945, 944, -914, 914, 916, 915,
-936, 936, 938, 937, -917, 917, 919, 918, -946, 946, 948, 947, -920, 920, 922, 921}
```

```
In[29]:= names = "Names" /. pdfGetInfo [1]
```

```
Out[29]= ["F1_wm", "F2_wm", "F3_wm", "FL_wm", "F1_gam", "F2_gam", "F3_gam", "FL_gam", "F1_wp", "
F2_wp", "F3_wp", "FL_wp", "F1_g+Z", "F2_g+Z", "F3_g+Z", "FL_g+Z", "F1c_wm", "F2c_wm", "
F3c_wm", "FLc_wm", "F1c_gam", "F2c_gam", "F3c_gam", "FLc_gam", "F1c_wp", "F2c_wp", "F3c_wp",
"F1c_g+Z", "F2c_g+Z", "F3c_g+Z", "FLc_g+Z", "F1b_wm", "F2b_wm", "F3b_wm", "
FLb_wm", "F1b_gam", "F2b_gam", "F3b_gam", "FLb_gam", "F1b_wp", "F2b_wp", "F3b_wp", "FLb_wp",
"F1b_g+Z", "F2b_g+Z", "F3b_g+Z", "FLb_g+Z"]
```

```
In[30]:= stf[1, flavors, 0.1, 10.]
Out[30]= {8.56517, 1.71298, 9.49157, -2.17223 × 10-16, 2.1366, 0.427315, 0., 5.46578 × 10-17,
5.94615, 1.18931, 6.79323, 1.8684 × 10-16, 2.13796, 0.427586, 0.0377955,
3.18358 × 10-18, 0.899787, 0.18005, -0.703893, 1.98066 × 10-17, 0.121729, 0.0243638,
0., 8.57898 × 10-19, 1.03465, 0.207016, 0.973579, 8.05036 × 10-18, 0.121781, 0.0243742,
0., -3.37278 × 10-19, 0.00066946, 0.000133979, 0.000815269, 1.16082 × 10-20,
0.00858834, 0.00171904, 0., -6.01827 × 10-20, 0.000603538, 0.000120797,
-0.000683447, -1.57683 × 10-21, 0.00860209, 0.0017218, 0., 1.64081 × 10-19}
```

## getNames Function

```
In[31]:= getNames[iset_] := Module[{names, stream, word, word2, expression},
  names = "Names" /. pdfGetInfo[iset];
  stream = names // StringToStream ;
  word = Read[stream, Word];
  word2 = StringReplace[word, {"[" → "{", "]" → "}"}];
  expression = ToExpression[word2];
  Return[expression]
]
```

```
In[32]:= getNames[1]
Out[32]= {F1_wm, F2_wm, F3_wm, FL_wm, F1_gam, F2_gam, F3_gam, FL_gam, F1_wp, F2_wp, F3_wp,
FL_wp, F1_g+Z, F2_g+Z, F3_g+Z, FL_g+Z, F1c_wm, F2c_wm, F3c_wm, FLc_wm, F1c_gam,
F2c_gam, F3c_gam, FLc_gam, F1c_wp, F2c_wp, F3c_wp, FLc_wp, F1c_g+Z, F2c_g+Z,
F3c_g+Z, FLc_g+Z, F1b_wm, F2b_wm, F3b_wm, FLb_wm, F1b_gam, F2b_gam, F3b_gam,
FLb_gam, F1b_wp, F2b_wp, F3b_wp, FLb_wp, F1b_g+Z, F2b_g+Z, F3b_g+Z, FLb_g+Z}
```

## getFnames Function

```

In[33]:= Clear[getFname];
         fnamesTmp = getNames[1]
         flavors = "Flavors" /. pdfGetInfo[1]
         Do[
           n = flavors[[i]];
           tmp = fnamesTmp[[i]];
           getFname[n] = tmp;
           (* Print[ n, " ", fname[n]]; *)
           , {i, 1, Length[flavors]}]

Out[34]= {F1_wm, F2_wm, F3_wm, FL_wm, F1_gam, F2_gam, F3_gam, FL_gam, F1_wp, F2_wp, F3_wp,
          FL_wp, F1_g+Z, F2_g+Z, F3_g+Z, FL_g+Z, F1c_wm, F2c_wm, F3c_wm, FLc_wm, F1c_gam,
          F2c_gam, F3c_gam, FLc_gam, F1c_wp, F2c_wp, F3c_wp, FLc_wp, F1c_g+Z, F2c_g+Z,
          F3c_g+Z, FLc_g+Z, F1b_wm, F2b_wm, F3b_wm, FLb_wm, F1b_gam, F2b_gam, F3b_gam,
          FLb_gam, F1b_wp, F2b_wp, F3b_wp, FLb_wp, F1b_g+Z, F2b_g+Z, F3b_g+Z, FLb_g+Z}

Out[35]= {-930, 930, 932, 931, -900, 900, -901, 901, -940, 940, 942, 941, -908, 908, 910, 909,
          -933, 933, 935, 934, -911, 911, 913, 912, -943, 943, 945, 944, -914, 914, 916, 915,
          -936, 936, 938, 937, -917, 917, 919, 918, -946, 946, 948, 947, -920, 920, 922, 921}

In[37]:= SetAttributes[getFname, Listable]
         getFname[flavors]

Out[38]= {F1_wm, F2_wm, F3_wm, FL_wm, F1_gam, F2_gam, F3_gam, FL_gam, F1_wp, F2_wp, F3_wp,
          FL_wp, F1_g+Z, F2_g+Z, F3_g+Z, FL_g+Z, F1c_wm, F2c_wm, F3c_wm, FLc_wm, F1c_gam,
          F2c_gam, F3c_gam, FLc_gam, F1c_wp, F2c_wp, F3c_wp, FLc_wp, F1c_g+Z, F2c_g+Z,
          F3c_g+Z, FLc_g+Z, F1b_wm, F2b_wm, F3b_wm, FLb_wm, F1b_gam, F2b_gam, F3b_gam,
          FLb_gam, F1b_wp, F2b_wp, F3b_wp, FLb_wp, F1b_g+Z, F2b_g+Z, F3b_g+Z, FLb_g+Z}

In[39]:= getFname[900]

Out[39]= F2_gam

```

## Example: Alpha-s

```

In[40]:= pdfAlphaS[1, 91.1876]

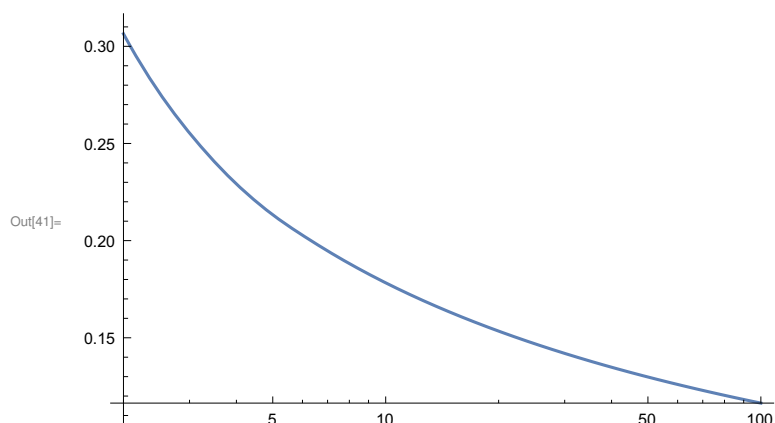
         Created pdfAlphaS for iSet = 1

         1 has 1 sub-grid

Out[40]= 0.117995

```

```
In[41]:= LogLinearPlot [pdfAlphaS[1, q], {q, 2, 100}]
```



## Example: Plotting

```
In[42]:= flavors
```

```
Out[42]:= {-930, 930, 932, 931, -900, 900, -901, 901, -940, 940, 942, 941, -908, 908, 910, 909,
           -933, 933, 935, 934, -911, 911, 913, 912, -943, 943, 945, 944, -914, 914, 916, 915,
           -936, 936, 938, 937, -917, 917, 919, 918, -946, 946, 948, 947, -920, 920, 922, 921}
```

```
In[43]:= len = Length[pdfSetList]
```

```
Out[43]:= 48
```

```
In[44]:= q0 = 10.;
```

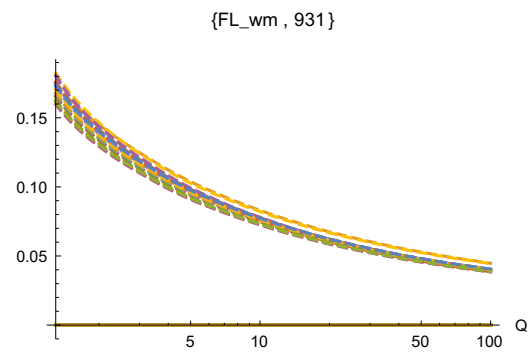
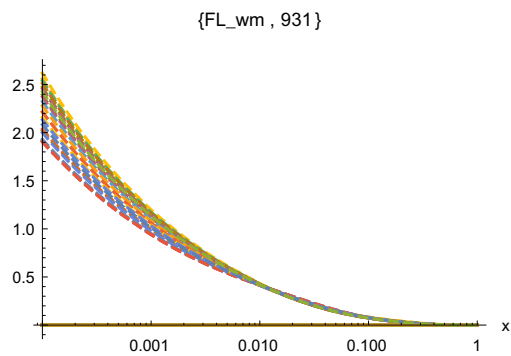
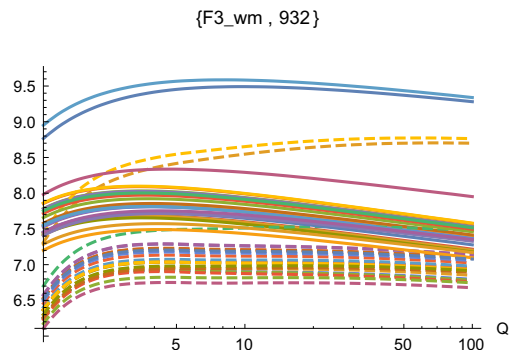
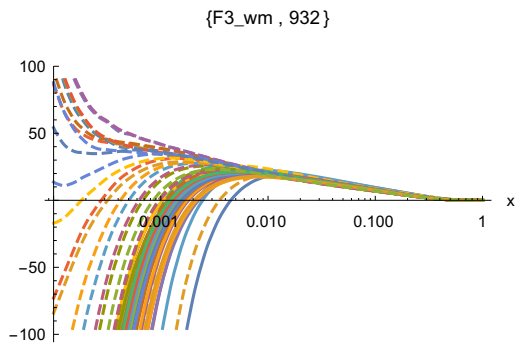
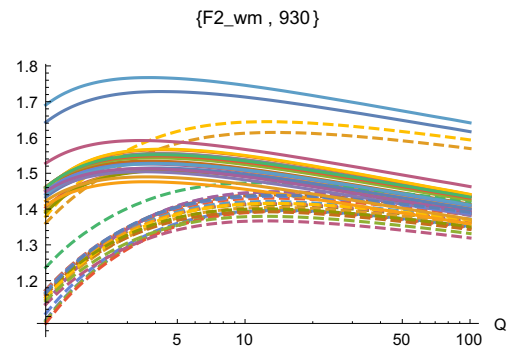
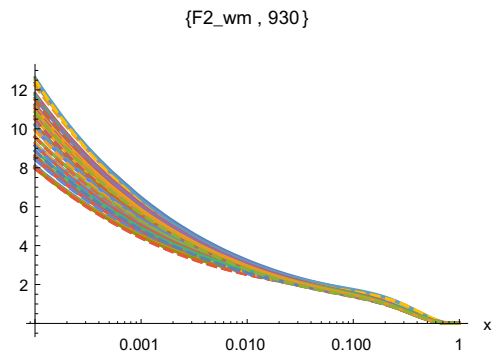
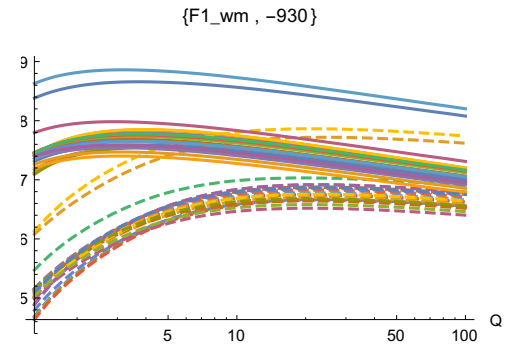
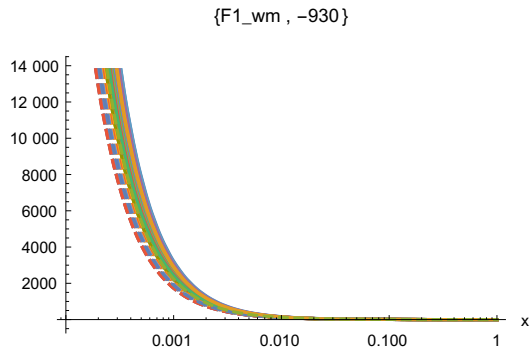
```
x0 = 0.1;
```

```
Do[
```

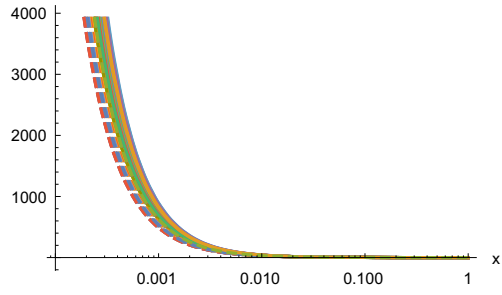
```
  ppX[i] = LogLinearPlot [ stf[Range[len], flavors[[i]], x, q0] // Evaluate ,
    {x, 10-4, 1},
    PlotStyle → {}, Dashed},
    PlotPoints → 5,
    AxesLabel → {"x"},
    PlotLabel → {getNames[1][[i]], flavors[[i]]} ;
```

```
  ppQ[i] = LogLinearPlot [ stf[Range[len], flavors[[i]], x0, q] // Evaluate ,
    {q, 1.3, 100},
    PlotStyle → {}, Dashed},
    AxesLabel → {"Q"},
    PlotPoints → 5,
    PlotLabel → {getNames[1][[i]], flavors[[i]]} ;
```

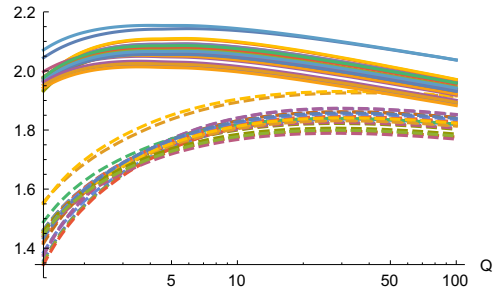
```
GraphicsGrid [{{ppX[i], ppQ[i]}}] // Print ,
{i, 1, Length[flavors]}
```



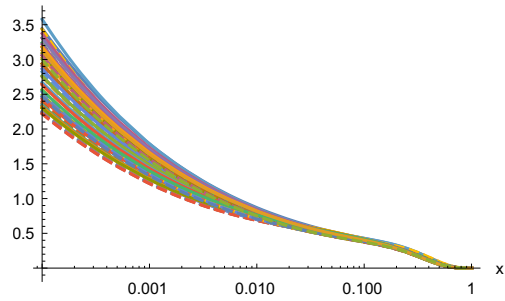
{F1\_gam , -900}



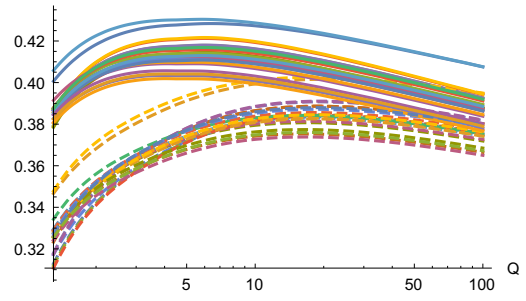
{F1\_gam , -900}



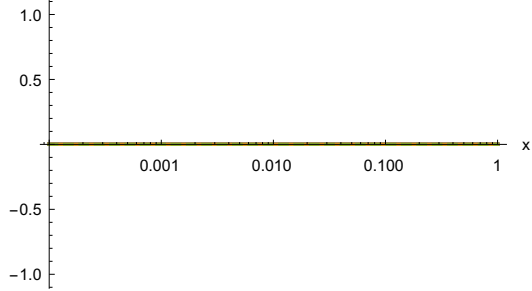
{F2\_gam , 900}



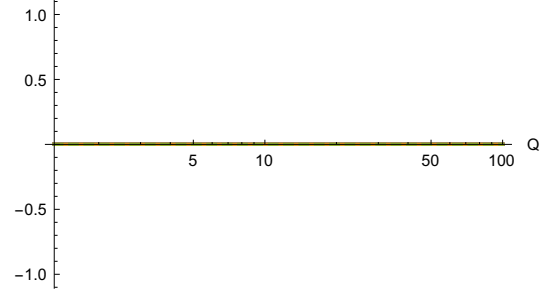
{F2\_gam , 900}



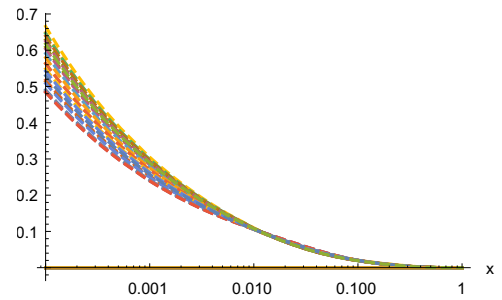
{F3\_gam , -901}



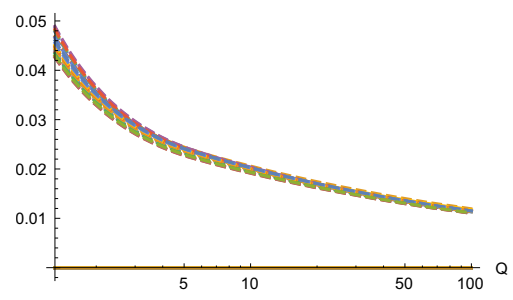
{F3\_gam , -901}

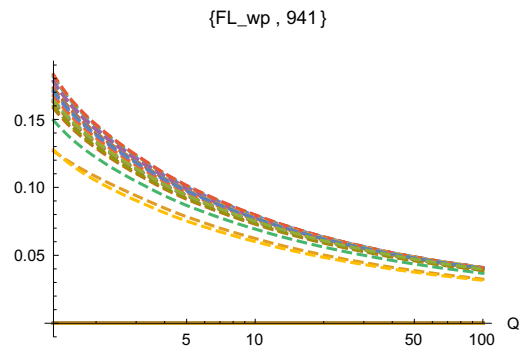
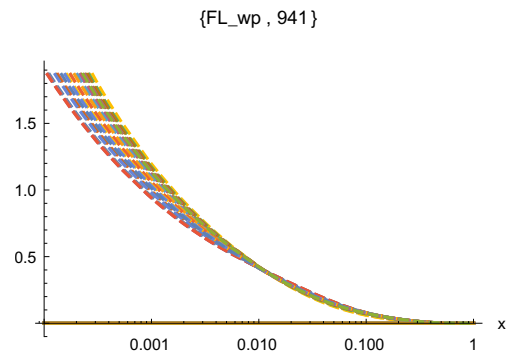
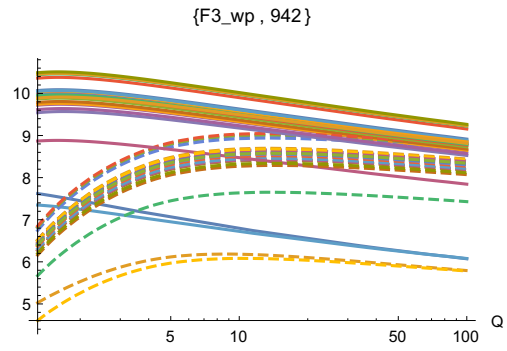
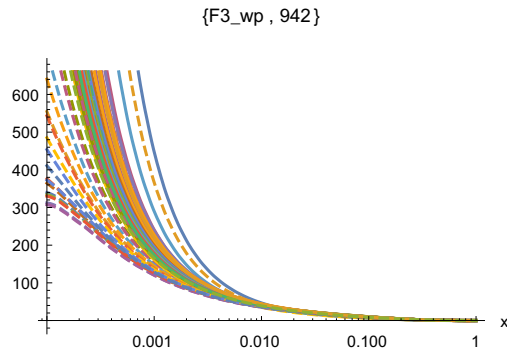
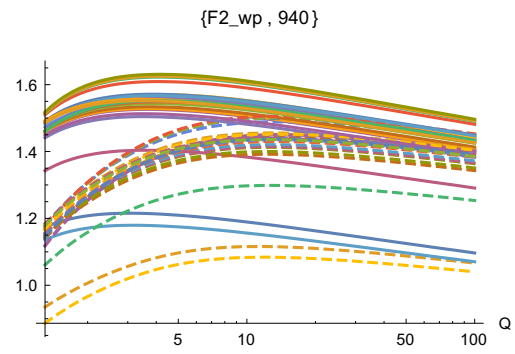
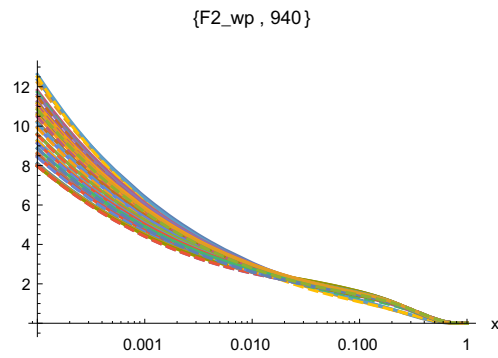
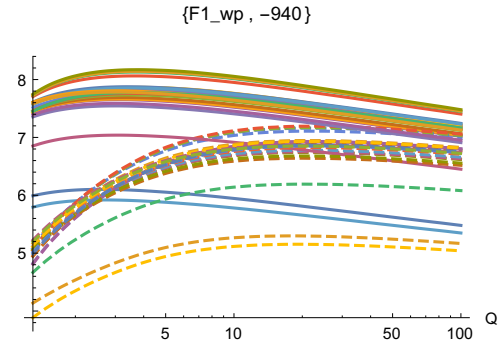
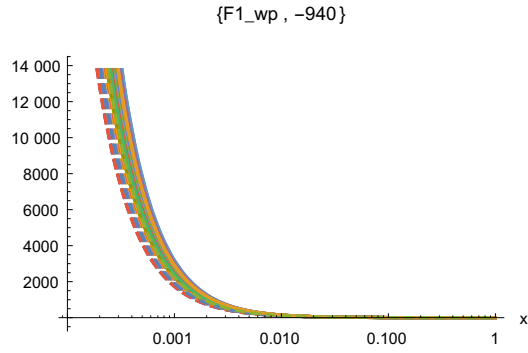


{FL\_gam , 901}



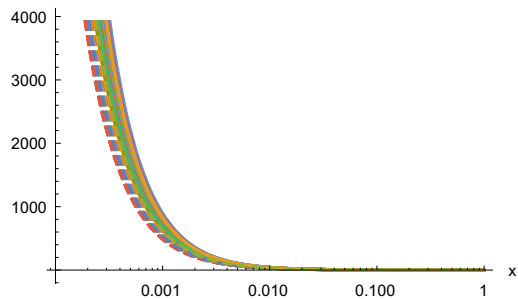
{FL\_gam , 901}



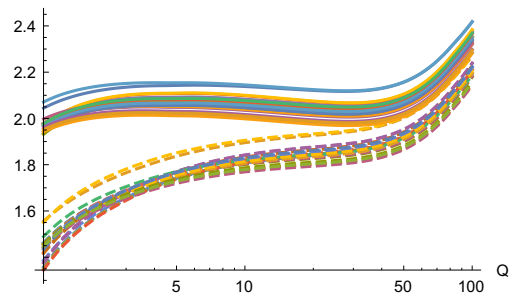




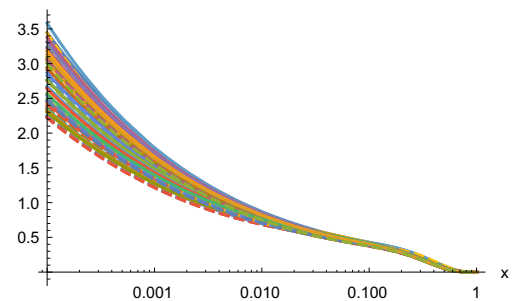
{F1\_g+Z, -908}



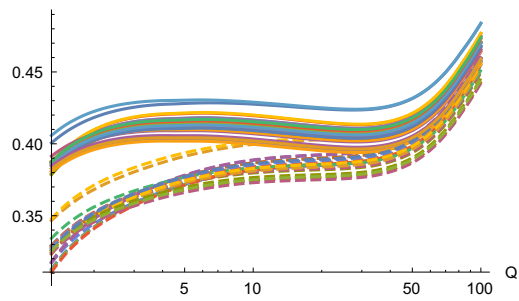
{F1\_g+Z, -908}



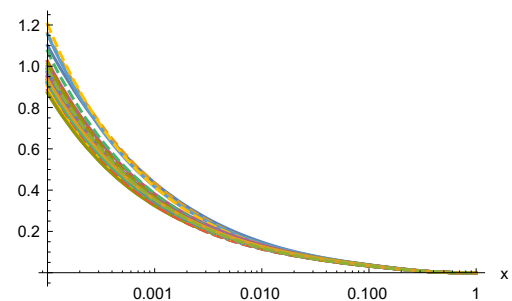
{F2\_g+Z, 908}



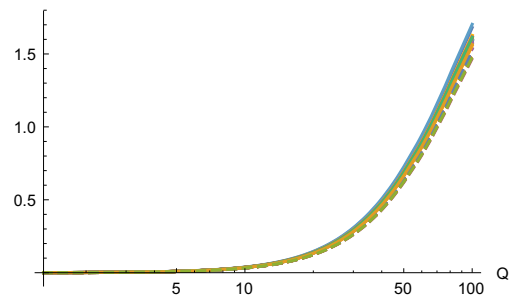
{F2\_g+Z, 908}



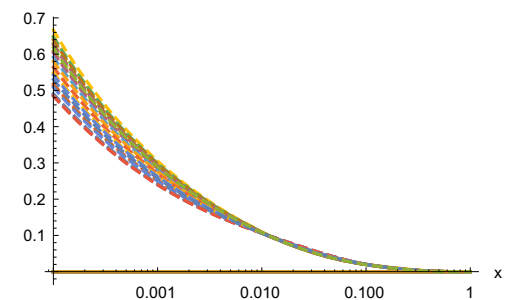
{F3\_g+Z, 910}



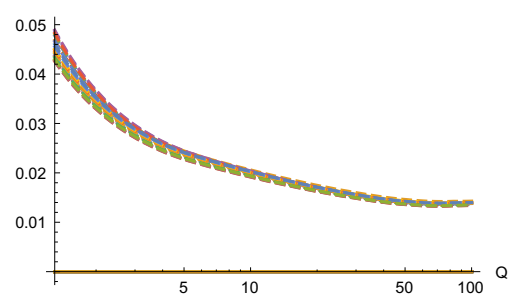
{F3\_g+Z, 910}

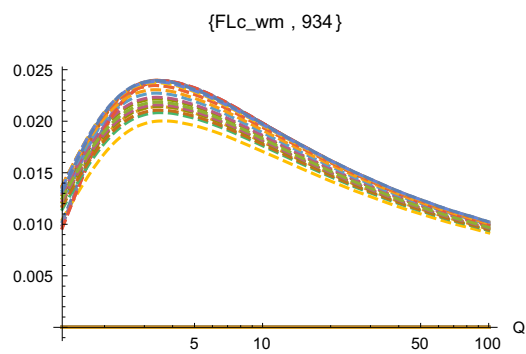
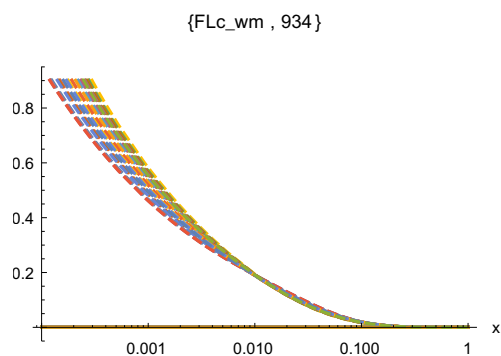
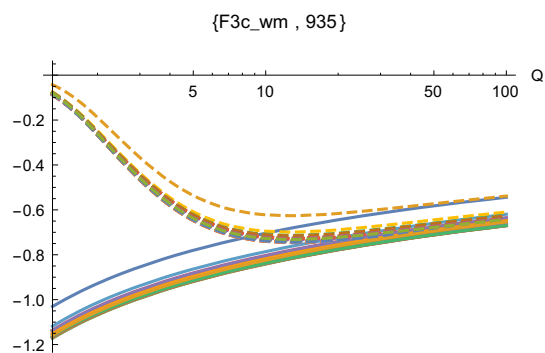
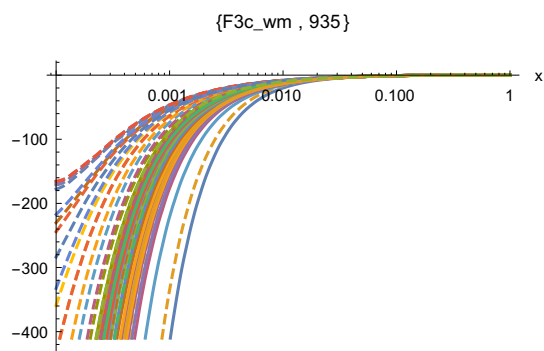
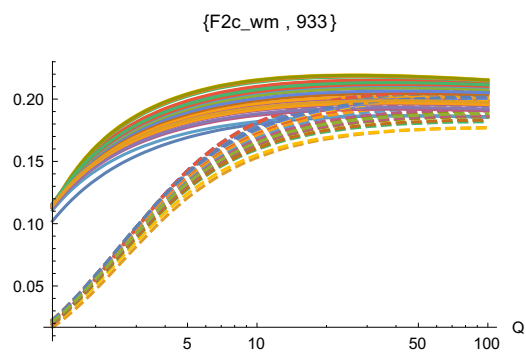
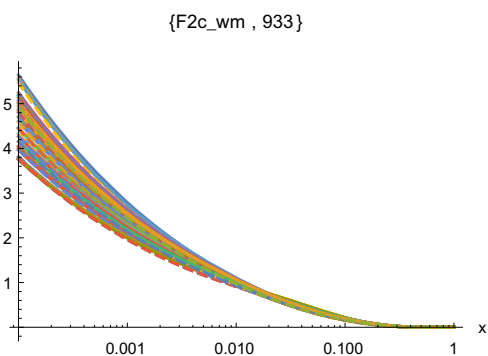
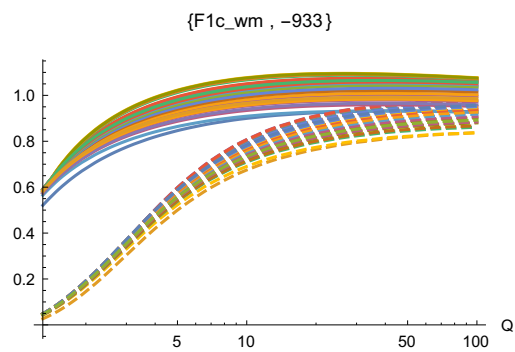
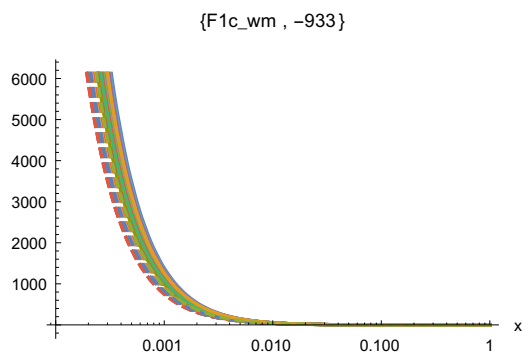


{FL\_g+Z, 909}

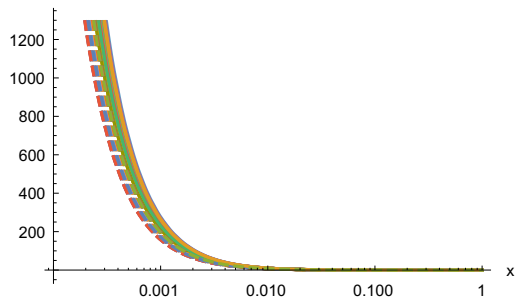


{FL\_g+Z, 909}

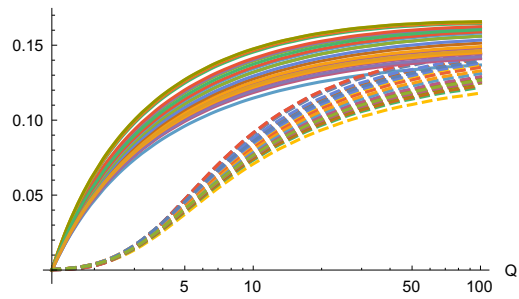




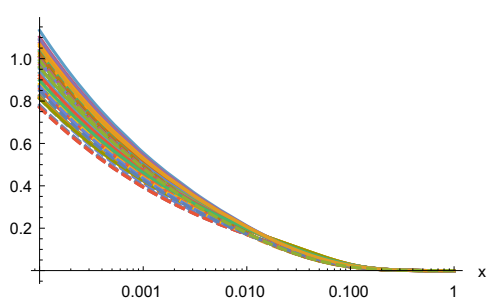
{F1c\_gam , -911}



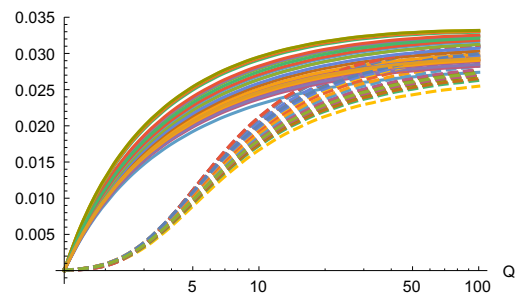
{F1c\_gam , -911}



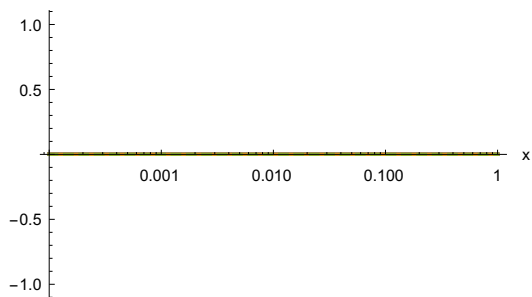
{F2c\_gam , 911}



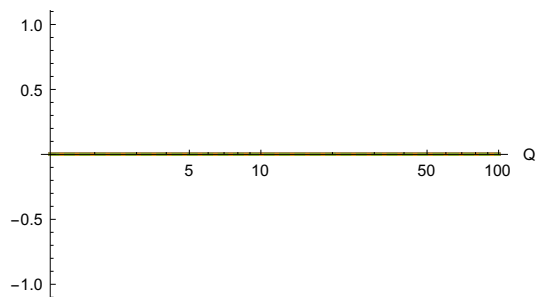
{F2c\_gam , 911}



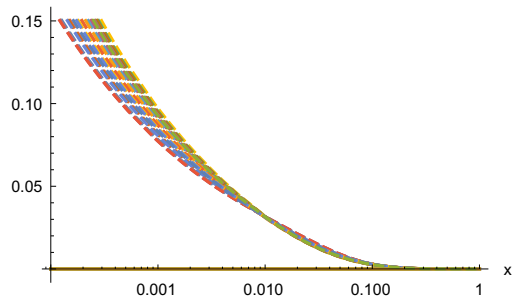
{F3c\_gam , 913}



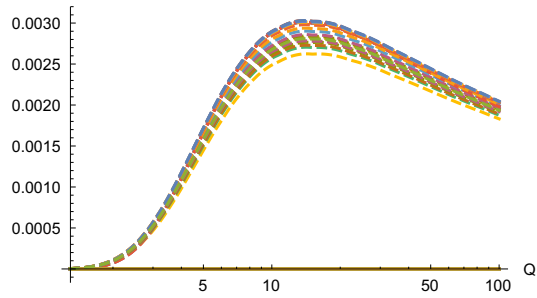
{F3c\_gam , 913}

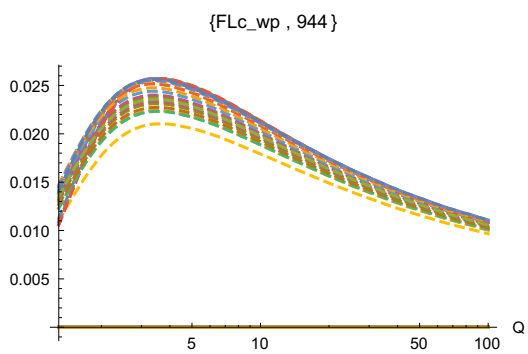
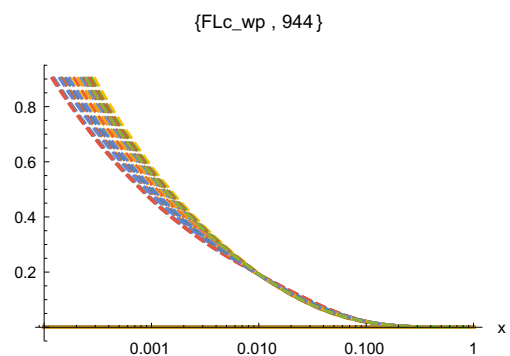
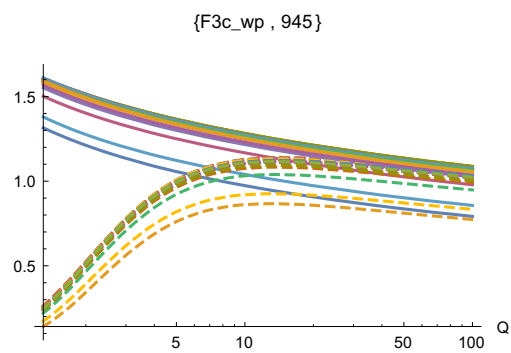
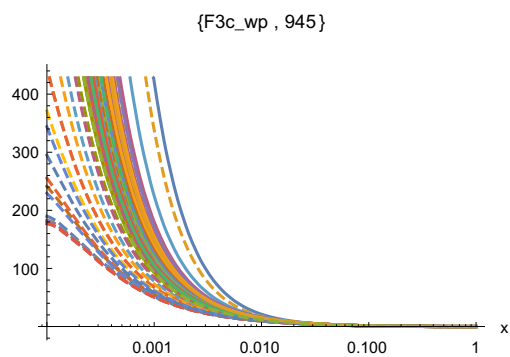
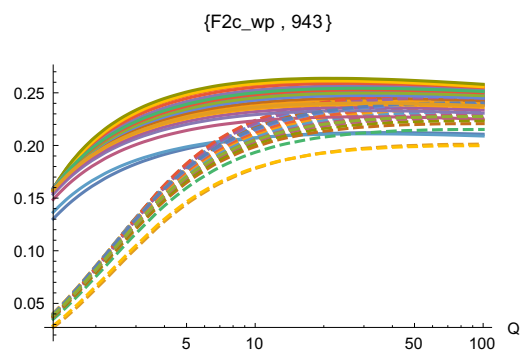
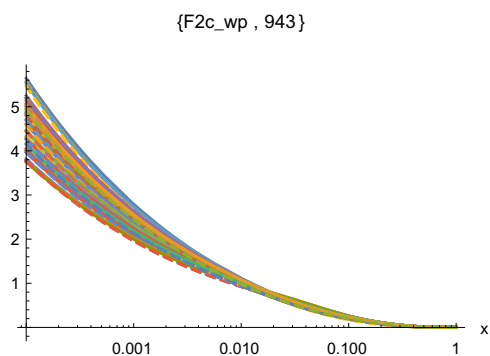
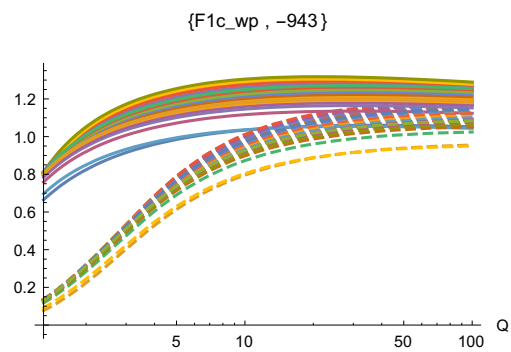
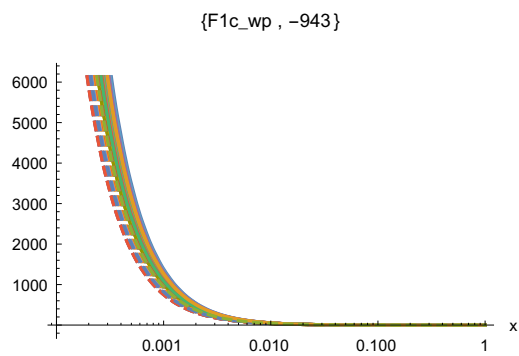


{FLc\_gam , 912}

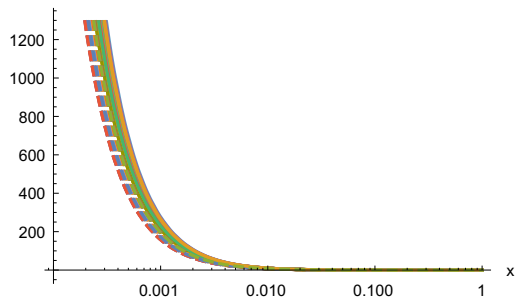


{FLc\_gam , 912}

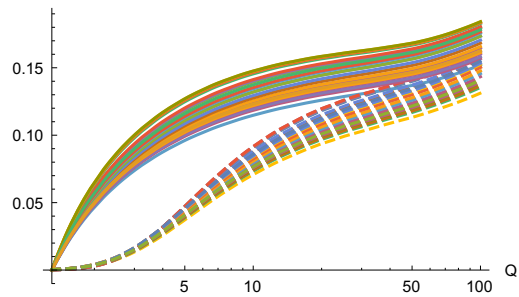




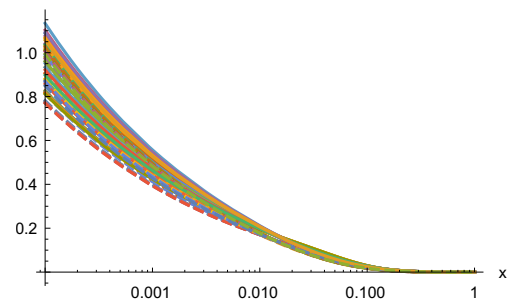
{F1c\_g +Z, -914}



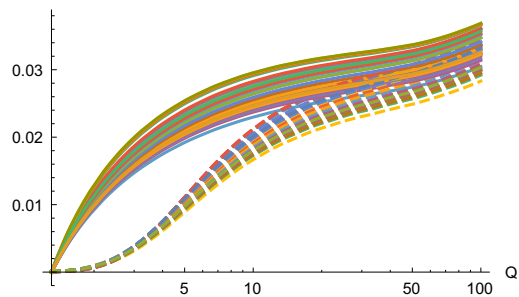
{F1c\_g +Z, -914}



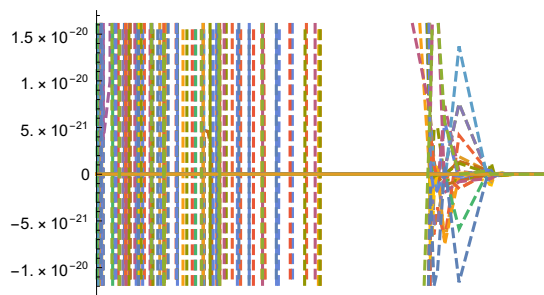
{F2c\_g +Z, 914}



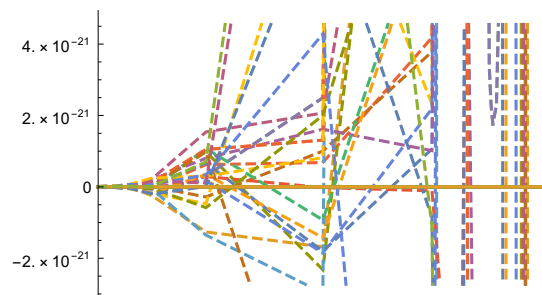
{F2c\_g +Z, 914}



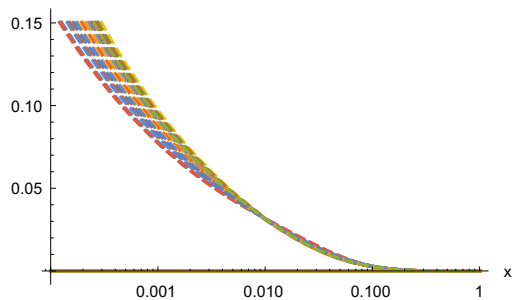
{F3c\_g +Z, 916}



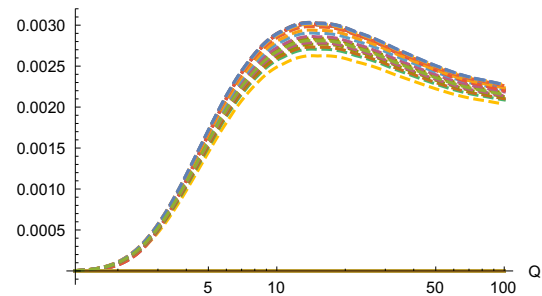
{F3c\_g +Z, 916}

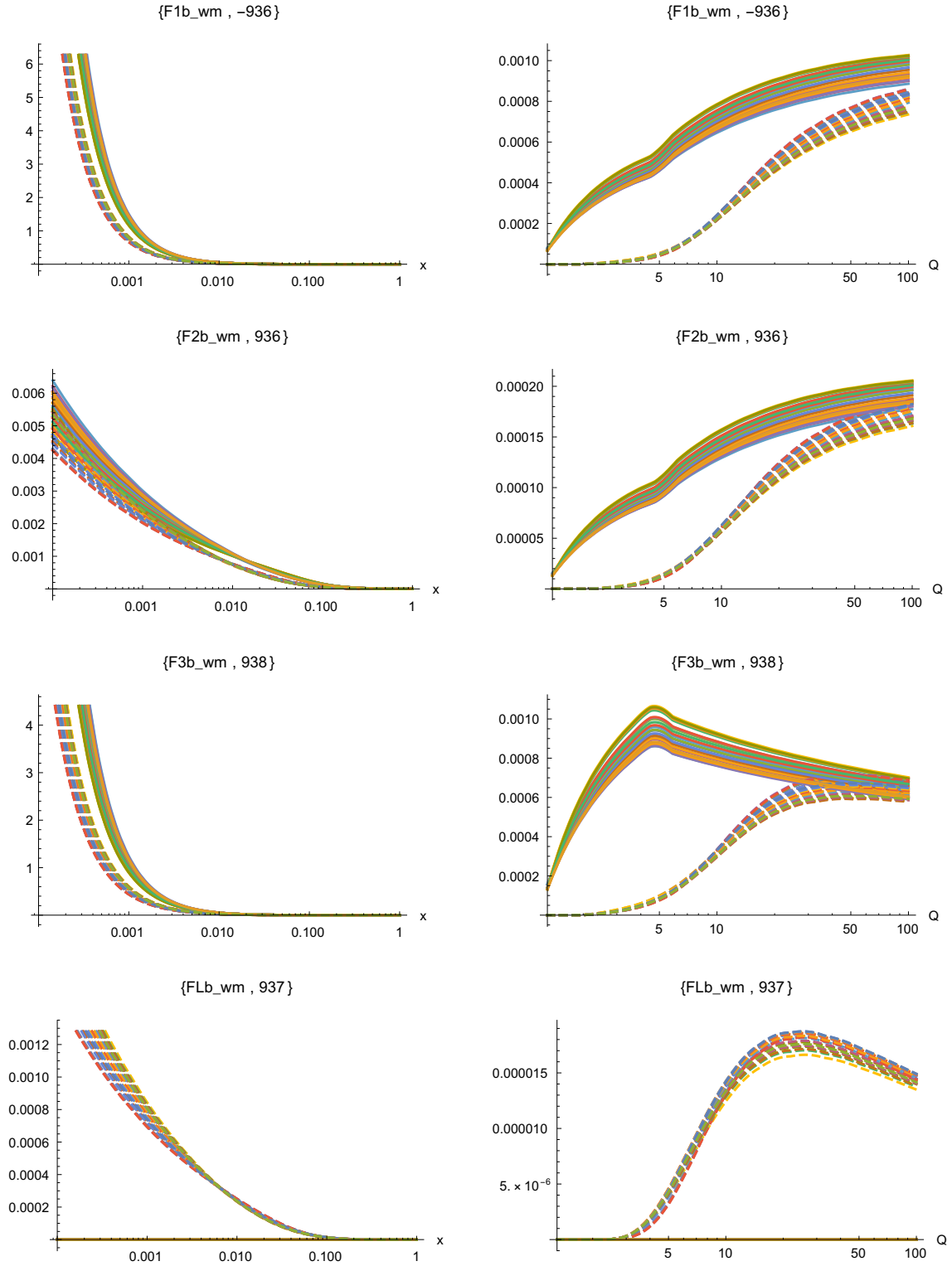


{FLc\_g +Z, 915}

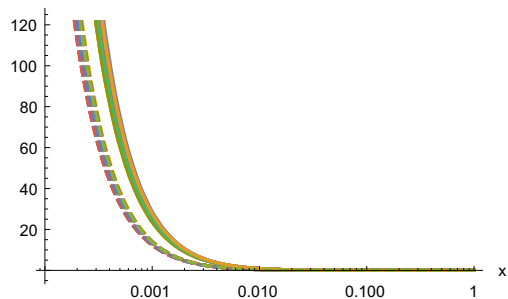


{FLc\_g +Z, 915}

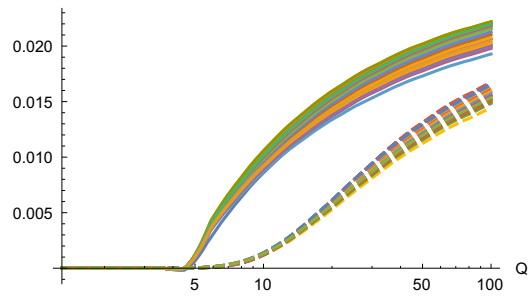




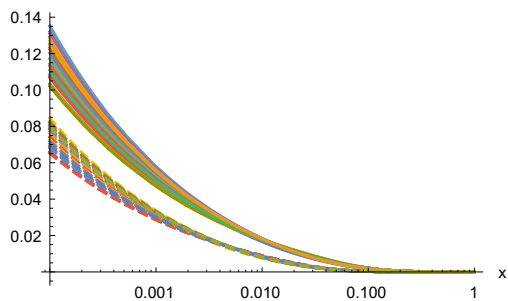
{F1b\_gam , -917}



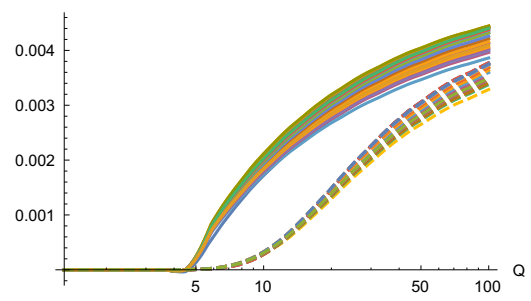
{F1b\_gam , -917}



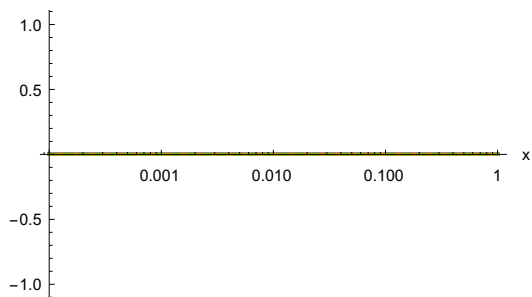
{F2b\_gam , 917}



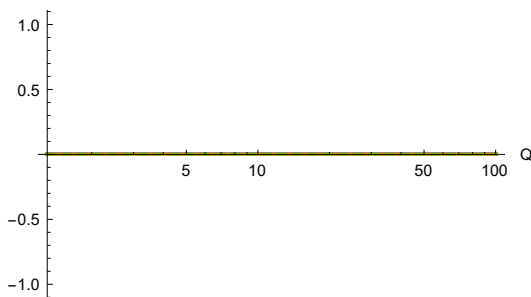
{F2b\_gam , 917}



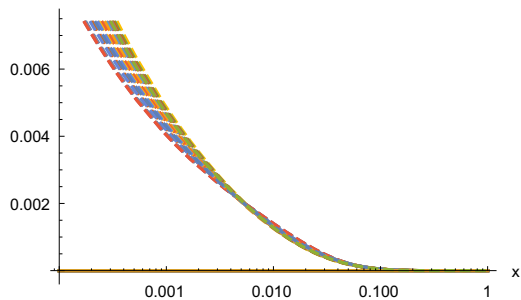
{F3b\_gam , 919}



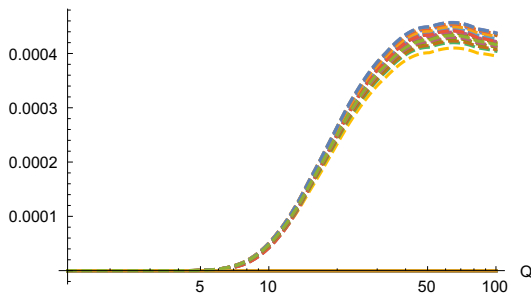
{F3b\_gam , 919}

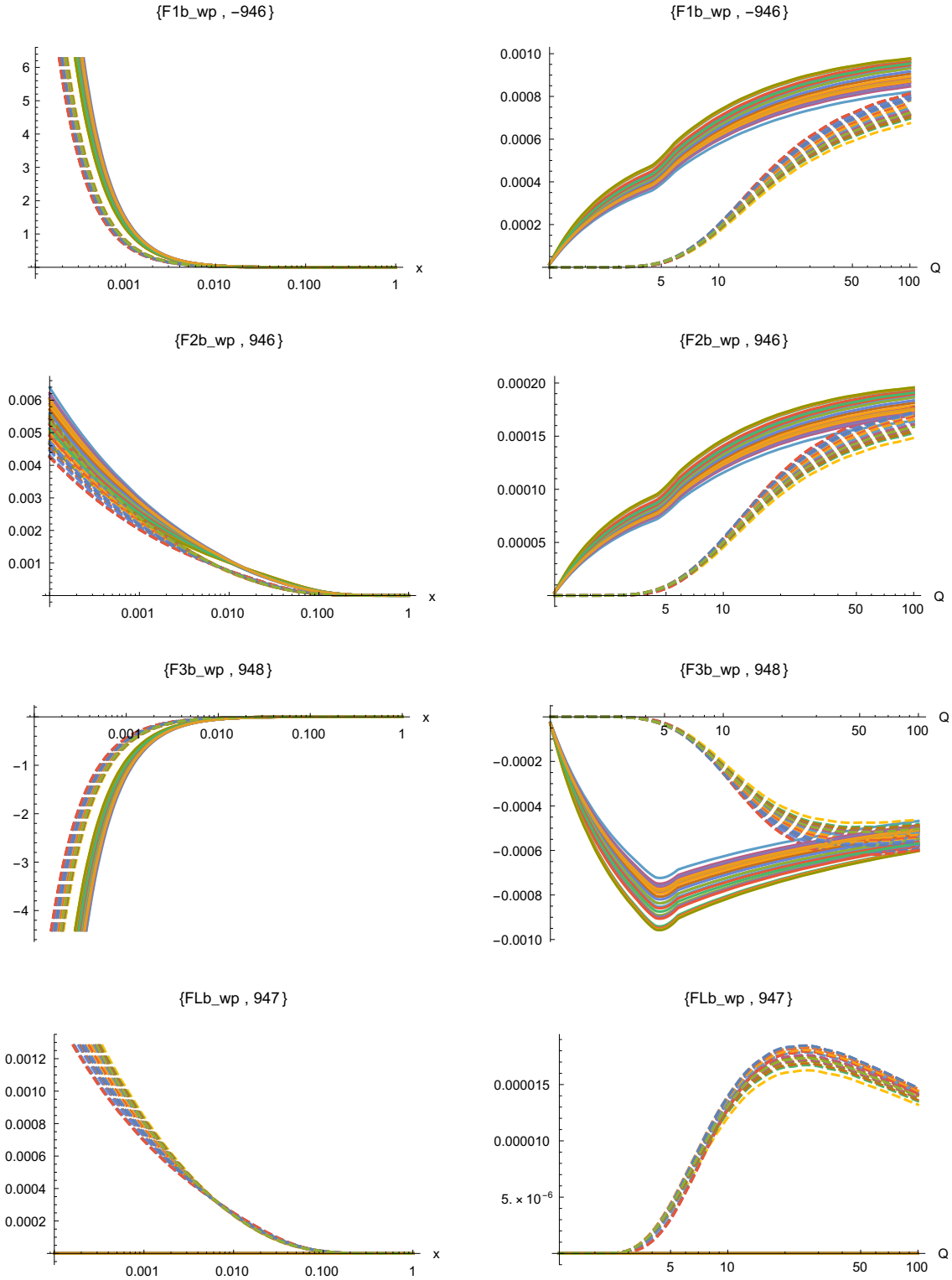


{FLb\_gam , 918}



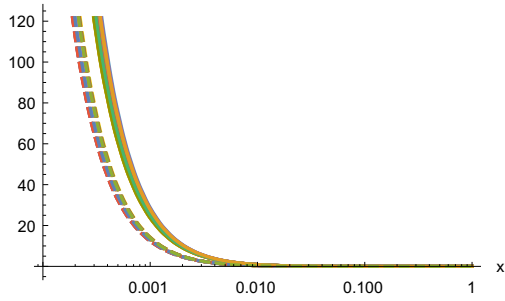
{FLb\_gam , 918}



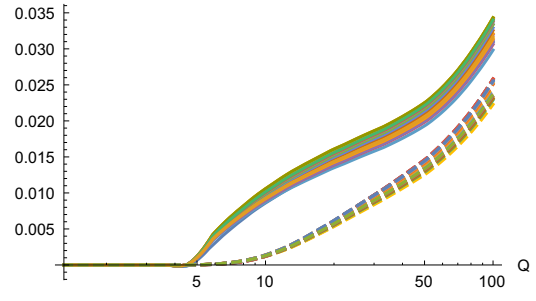




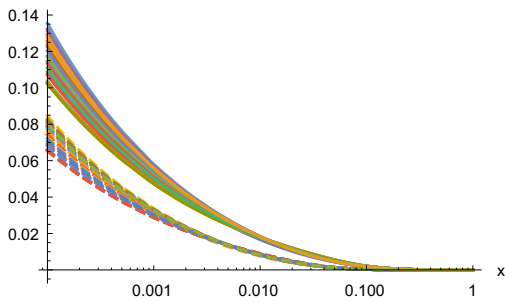
{F1b\_g +Z, -920}



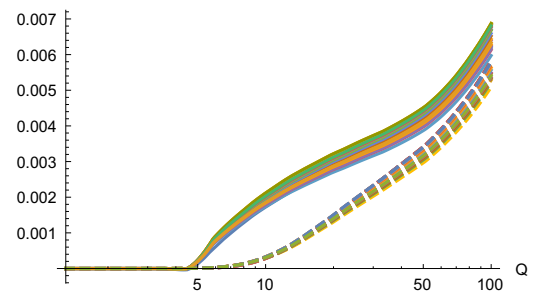
{F1b\_g +Z, -920}



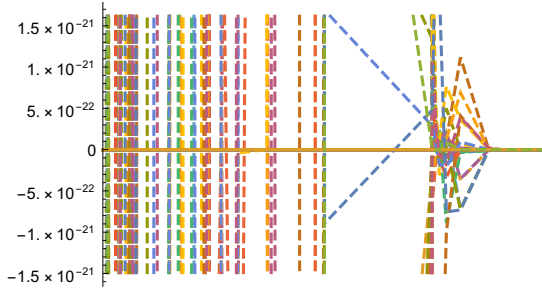
{F2b\_g +Z, 920}



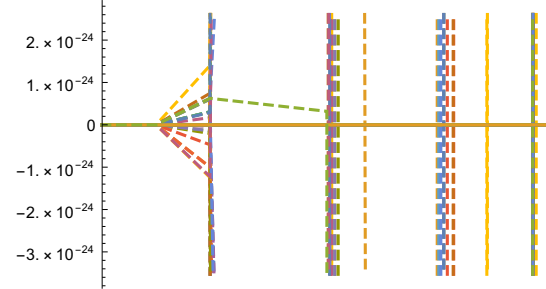
{F2b\_g +Z, 920}



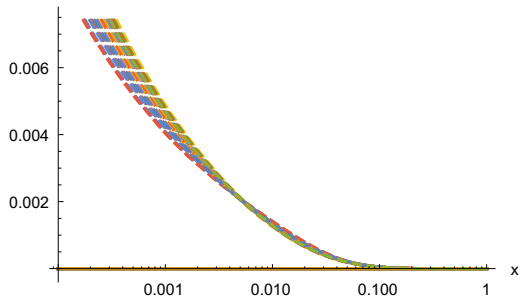
{F3b\_g +Z, 922}



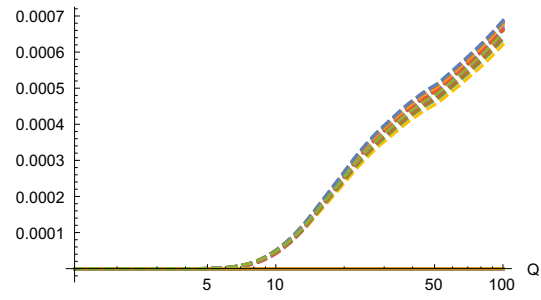
{F3b\_g +Z, 922}



{FLb\_g +Z, 921}

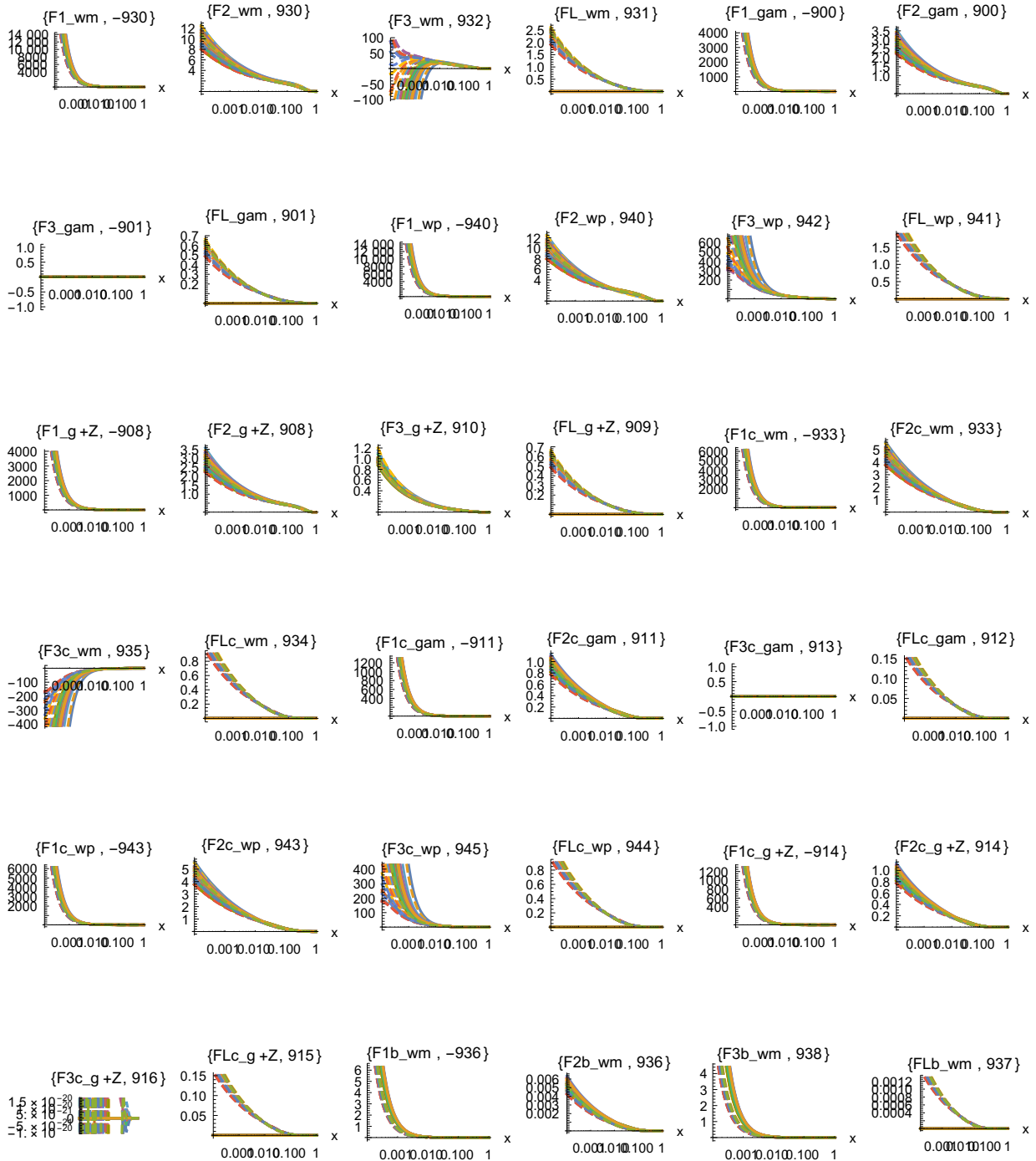


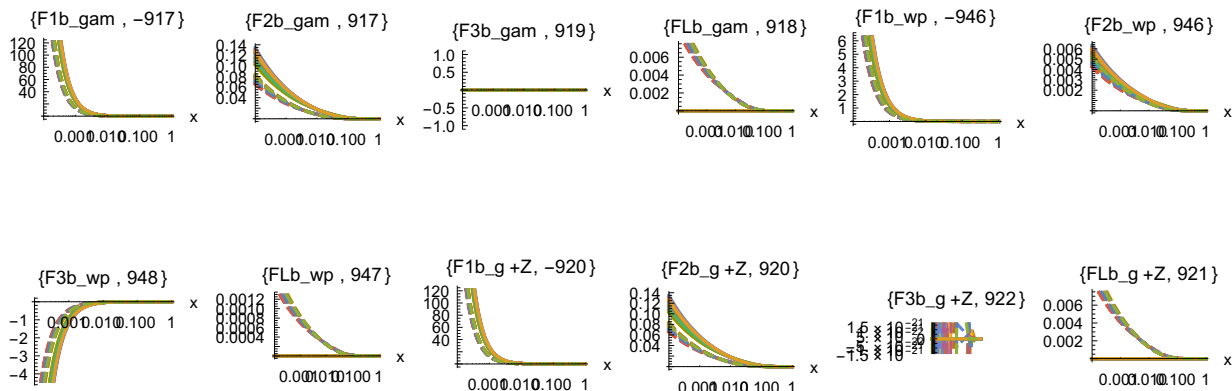
{FLb\_g +Z, 921}



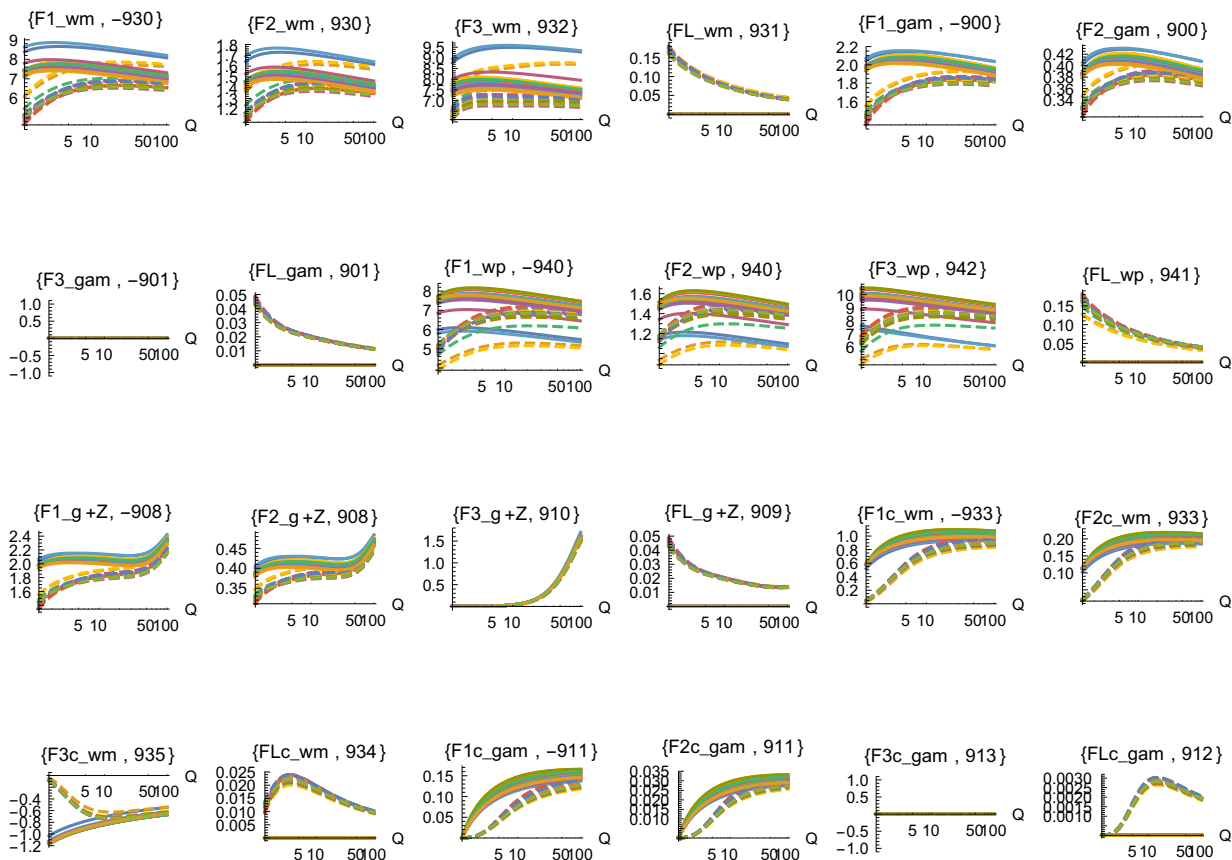
## Output Results:

```
In[47]:= outX = ppX /@ Range[48] // Partition[#, 6] & // Grid
```

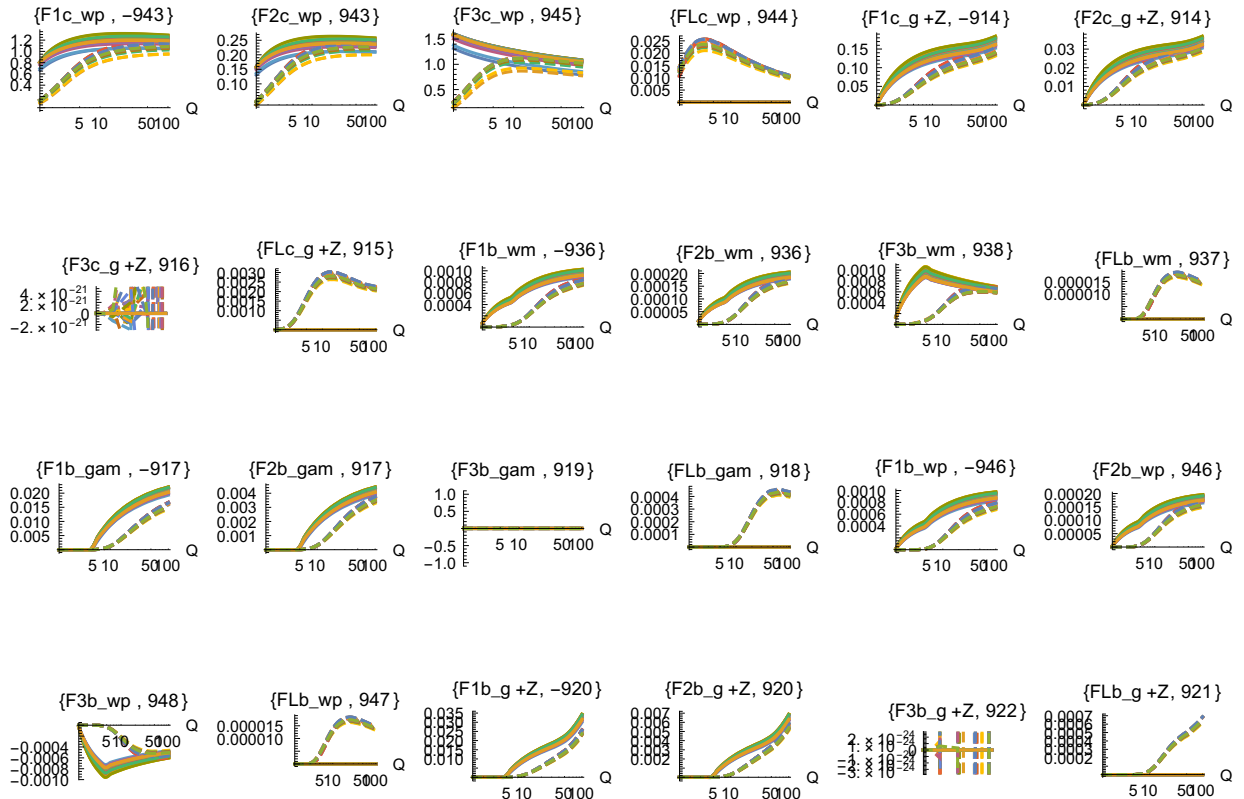




In[48]:= outQ = ppQ /@ Range[48] // Partition[#, 6] & // Grid



Out[48]=



## Save to PDF

In[49]:= **Directory[]**

Out[49]= /home/olness/Downloads/EIC\_SF\_DEMO\_v04

In[50]:= **Export["xplot.pdf", outX, "PDF"]**

**Export["qplot.pdf", outQ, "PDF"]**

Out[50]= xplot.pdf

Out[51]= qplot.pdf