
Simple Demo file to read all LHAPDF Tables:

Demonstration to show how to use LHAPDF PDF tables with ManeParse
This is a simpler demo file that just shows the basics of loading the PDFs.

Please cite:

ManeParse : A Mathematica reader for Parton Distribution Functions
D.B.Clark, E.Godat, F.I.Olness
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e - Print : 1605.08012[hep - ph]

Fred : 19 April 2021

```
In[ ]:= Clear["Global`*"];  
  
In[ ]:= $Version  
  
Out[ ]:= 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[ ]:= (* This just drops the leading path  
info to make the list of files easier to read *)  
dropPath = Take[(FileNameSplit /@ #) // Transpose, -1][[1]] &;  
  
In[ ]:= NotebookDirectory [];  
here = NotebookDirectory []  
  
Out[ ]:= /home/olness/Documents/TMP/nCTEQ15HIX_CHECK /  
  
In[ ]:= (* If there is a problem with the Mathematica working directory,  
you can enter it manually here *)  
SetDirectory[here]  
  
Out[ ]:= /home/olness/Documents/TMP/nCTEQ15HIX_CHECK  
  
In[ ]:= (* This shows what files should be in this main directory *)  
FileNames["*", here] // dropPath  
  
Out[ ]:= {LHAPDF, MP_packages, nCTEQ15HIX_TESTING, Read_nCTEQ15HIX.nb}
```

Setup Other Directories

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

```
Out[ ]:= {pdfCalc.m, pdfErrors.m, pdfParseCTEQ.m, pdfParseLHA.m, README_V05.TXT}
```

```
In[ ]:= dirFilesLHA = "./LHAPDF";  
       dirList = Select[FileNames["nCTEQ15HIX*", dirFilesLHA], DirectoryQ];  
       dirList // dropPath
```

```
Out[ ]:= {nCTEQ15HIX_108_47, nCTEQ15HIX_1_1, nCTEQ15HIX_119_50, nCTEQ15HIX_12_6,  
         nCTEQ15HIX_131_54, nCTEQ15HIX_14_7, nCTEQ15HIX_184_74, nCTEQ15HIX_197_79,  
         nCTEQ15HIX_208_82, nCTEQ15HIX_2_1, nCTEQ15HIX_27_13, nCTEQ15HIX_3_2,  
         nCTEQ15HIX_40_20, nCTEQ15HIX_4_2, nCTEQ15HIX_56_26, nCTEQ15HIX_6_3,  
         nCTEQ15HIX_64_29, nCTEQ15HIX_7_3, nCTEQ15HIX_84_36, nCTEQ15HIX_9_4}
```

```
In[ ]:= Length[dirList]
```

```
Out[ ]:= 20
```

Load the package

Loading the main package provides many useful functions

```
In[ ]:= 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[ ]:= 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[ ]:= 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[ ]:= ? pdf*
```

```
Out[ ]:=
```

▼ 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

Read All PDFs but ONLY central PDFs

```

In[ ]:= pdfReset []
Do[
  datafile = FileNames["*_0000.dat", dirList[[i]]] // First;
  infofile = FileNames["*info", dirList[[i]]] // First;
  pdfParseLHA[infofile, datafile] // Print;
  datafile = "";
  infofile = "";
  Print[" i = ", i];
  , {i, 1, Length[dirList]}]

Default Mathematica interpolator will be used.

All internal variables have been reset.

Successfully read ./LHAPDF/nCTEQ15HIX_108_47/nCTEQ15HIX_108_47.info.
Successfully read ./LHAPDF/nCTEQ15HIX_108_47/nCTEQ15HIX_108_47_0000.dat.
1
  i = 1
Successfully read ./LHAPDF/nCTEQ15HIX_1_1/nCTEQ15HIX_1_1.info.
Successfully read ./LHAPDF/nCTEQ15HIX_1_1/nCTEQ15HIX_1_1_0000.dat.
2
  i = 2
Successfully read ./LHAPDF/nCTEQ15HIX_119_50/nCTEQ15HIX_119_50.info.
Successfully read ./LHAPDF/nCTEQ15HIX_119_50/nCTEQ15HIX_119_50_0000.dat.
3
  i = 3
Successfully read ./LHAPDF/nCTEQ15HIX_12_6/nCTEQ15HIX_12_6.info.
Successfully read ./LHAPDF/nCTEQ15HIX_12_6/nCTEQ15HIX_12_6_0000.dat.
4
  i = 4
Successfully read ./LHAPDF/nCTEQ15HIX_131_54/nCTEQ15HIX_131_54.info.
Successfully read ./LHAPDF/nCTEQ15HIX_131_54/nCTEQ15HIX_131_54_0000.dat.
5
  i = 5
Successfully read ./LHAPDF/nCTEQ15HIX_14_7/nCTEQ15HIX_14_7.info.
Successfully read ./LHAPDF/nCTEQ15HIX_14_7/nCTEQ15HIX_14_7_0000.dat.
6

```

```

i = 6
Successfully read ./LHAPDF/nCTEQ15HIX_184_74/nCTEQ15HIX_184_74.info.
Successfully read ./LHAPDF/nCTEQ15HIX_184_74/nCTEQ15HIX_184_74_0000.dat.
7
i = 7
Successfully read ./LHAPDF/nCTEQ15HIX_197_79/nCTEQ15HIX_197_79.info.
Successfully read ./LHAPDF/nCTEQ15HIX_197_79/nCTEQ15HIX_197_79_0000.dat.
8
i = 8
Successfully read ./LHAPDF/nCTEQ15HIX_208_82/nCTEQ15HIX_208_82.info.
Successfully read ./LHAPDF/nCTEQ15HIX_208_82/nCTEQ15HIX_208_82_0000.dat.
9
i = 9
Successfully read ./LHAPDF/nCTEQ15HIX_2_1/nCTEQ15HIX_2_1.info.
Successfully read ./LHAPDF/nCTEQ15HIX_2_1/nCTEQ15HIX_2_1_0000.dat.
10
i = 10
Successfully read ./LHAPDF/nCTEQ15HIX_27_13/nCTEQ15HIX_27_13.info.
Successfully read ./LHAPDF/nCTEQ15HIX_27_13/nCTEQ15HIX_27_13_0000.dat.
11
i = 11
Successfully read ./LHAPDF/nCTEQ15HIX_3_2/nCTEQ15HIX_3_2.info.
Successfully read ./LHAPDF/nCTEQ15HIX_3_2/nCTEQ15HIX_3_2_0000.dat.
12
i = 12
Successfully read ./LHAPDF/nCTEQ15HIX_40_20/nCTEQ15HIX_40_20.info.
Successfully read ./LHAPDF/nCTEQ15HIX_40_20/nCTEQ15HIX_40_20_0000.dat.
13
i = 13
Successfully read ./LHAPDF/nCTEQ15HIX_4_2/nCTEQ15HIX_4_2.info.
Successfully read ./LHAPDF/nCTEQ15HIX_4_2/nCTEQ15HIX_4_2_0000.dat.
14
i = 14
Successfully read ./LHAPDF/nCTEQ15HIX_56_26/nCTEQ15HIX_56_26.info.
Successfully read ./LHAPDF/nCTEQ15HIX_56_26/nCTEQ15HIX_56_26_0000.dat.
15

```

```

i = 15
Successfully read ./LHAPDF/nCTEQ15HIX_6_3/nCTEQ15HIX_6_3.info.
Successfully read ./LHAPDF/nCTEQ15HIX_6_3/nCTEQ15HIX_6_3_0000.dat.
16
i = 16
Successfully read ./LHAPDF/nCTEQ15HIX_64_29/nCTEQ15HIX_64_29.info.
Successfully read ./LHAPDF/nCTEQ15HIX_64_29/nCTEQ15HIX_64_29_0000.dat.
17
i = 17
Successfully read ./LHAPDF/nCTEQ15HIX_7_3/nCTEQ15HIX_7_3.info.
Successfully read ./LHAPDF/nCTEQ15HIX_7_3/nCTEQ15HIX_7_3_0000.dat.
18
i = 18
Successfully read ./LHAPDF/nCTEQ15HIX_84_36/nCTEQ15HIX_84_36.info.
Successfully read ./LHAPDF/nCTEQ15HIX_84_36/nCTEQ15HIX_84_36_0000.dat.
19
i = 19
Successfully read ./LHAPDF/nCTEQ15HIX_9_4/nCTEQ15HIX_9_4.info.
Successfully read ./LHAPDF/nCTEQ15HIX_9_4/nCTEQ15HIX_9_4_0000.dat.
20
i = 20

In[ ]:= Length[dirList]
Out[ ]:= 20

In[ ]:= pdfSetListDisplay []

```

Define PDF

```

In[ ]:= pdf[x_] := pdfFunction[x]
      SetAttributes[pdf, Listable]

In[ ]:= Clear[dropPath]

In[ ]:= (* This just drops the leading path
      info to make the list of files easier to read *)
      (* dropPath=((Take[#, -1]&/@(FileNameSplit /@#)))& *)
      dropPath = (# // FileNameSplit // Last) &

Out[ ]:= Last[FileNameSplit [ #1]] &

```

Look at PDFs:

```
In[ ]:= q0 = 10;
      len = Length[pdfSetList];

In[ ]:= Do[
  LogLinearPlot[x pdf[Range[len], i, x, q0] // Evaluate,
    {x, 0.001, 0.9}, PlotLabel -> pdfFlavor[i]] // Print;
,
  {i,
    -2,
    3,
    1}]
```

Read All PDFs INCLUDING error PDFs

```
In[ ]:= dirLen = Length[dirList]

Out[ ]:= 20

In[ ]:= pdfReset []
      Do[
        pdfFamilyParseLHA [ dirList[[i]] ] // Print;
        Print[" i = ", i];
        , {i, 1, dirLen}]
```

Look at PDFs

```
In[ ]:= q0 = 10;
      x0 = 0.1;
      ipart0 = 1;
      len = Length[pdfSetList]

Out[ ]:= 860

In[ ]:= nsets = Length[dirList]

Out[ ]:= 20

In[ ]:= pdf[Range[len], 0, 0.1, 10]
```



```

In[ ] := (* Extract the directory names *)
npdfDirs = Map[(Take[StringSplit[#, "/"], {-2}]) &, pdfSetList[[All, 2]] // Flatten;
(* Count the number in each *)
nErrorPdfs = Select[npdfDirs, StringMatchQ[npdfDirs[[1]], #] &] // Length

Out[ ] := 43

In[ ] := Table[pdfFunction[iset, 0, 0.1, 10.], {iset, 1, nErrorPdfs, 1}]
Out[ ] := {12.9506, 13.457, 13.0072, 12.7839, 13.3262, 12.9475, 13.3523, 12.8857, 13.2532,
13.0225, 12.9067, 13.0485, 12.9283, 13.0995, 12.7838, 13.0778, 12.7189,
13.0206, 13.1804, 12.4115, 13.3343, 12.8482, 13.0163, 12.7661, 12.6102,
12.803, 13.0856, 12.9676, 12.9346, 12.8863, 13.024, 12.9687, 12.9272, 13.4133,
12.6389, 12.895, 13.0015, 13.0476, 12.8366, 13.1659, 12.4517, 12.4078, 13.3447}

```

```

In[ ] := nsets

```

```

Out[ ] := 20

```

```

In[ ] := Do[
  range = Range[nErrorPdfs] + i nErrorPdfs;
  index = nErrorPdfs (i + 1);
  Print["index = ", index, "\n range = ", range];
  LogLinearPlot[x pdf[range, ipart0, x, q0] // Evaluate,
    {x, 0.001, 0.9}, PlotLabel -> {pdfFlavor[ipart0], npdfDirs[[index]]} // Print;
  , {i, 0, nsets - 1}]

```

```

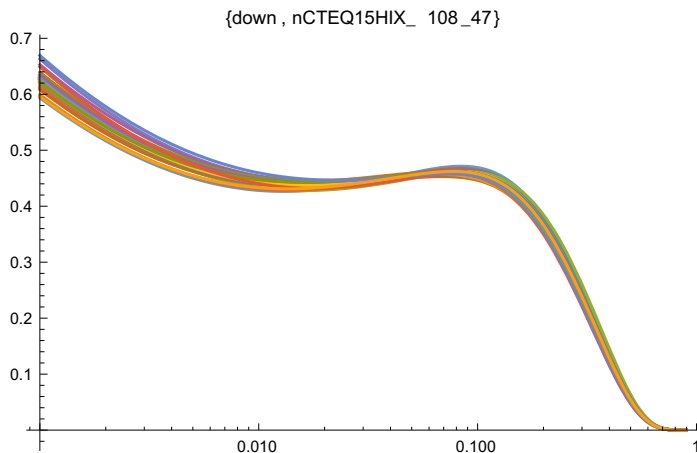
index = 43

```

```

range = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43}

```



```

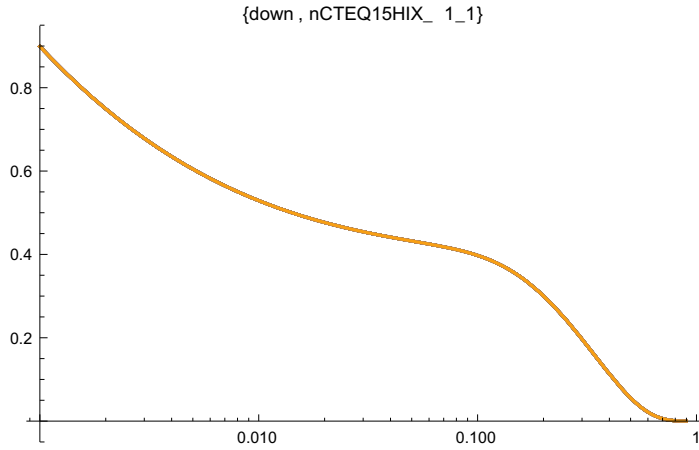
index = 86

```

```

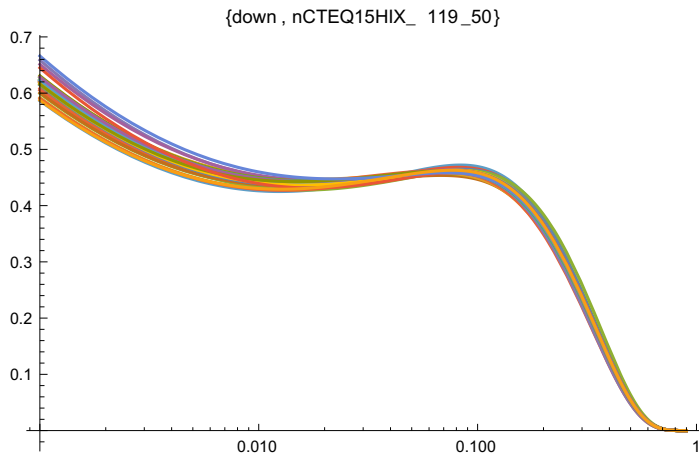
range = {44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64,
65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86}

```



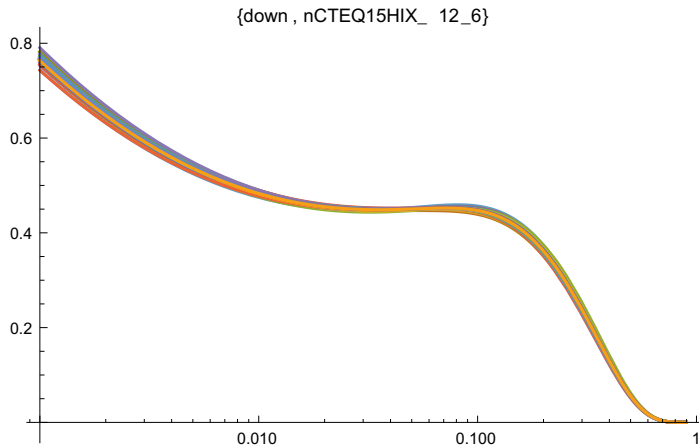
index = 129

range = {87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99,
100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114,
115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129}



index = 172

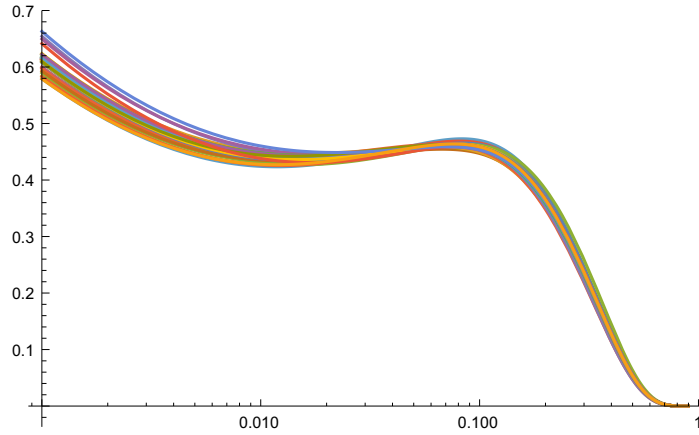
range = {130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141,
142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156,
157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172}



```
index = 215
```

```
range = {173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184,
  185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199,
  200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215}
```

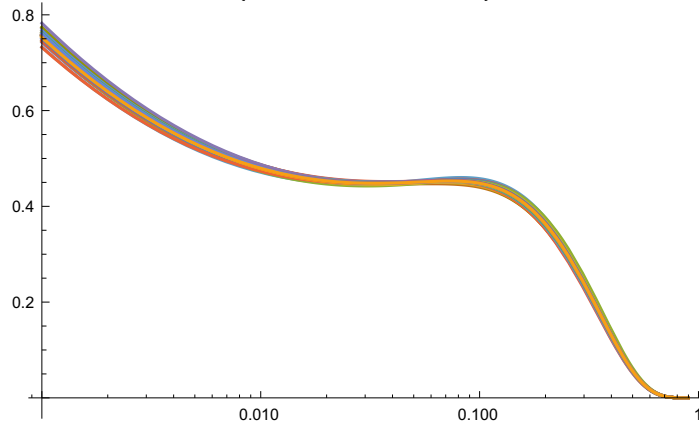
```
{down, nCTEQ15HIX_ 131_54}
```



```
index = 258
```

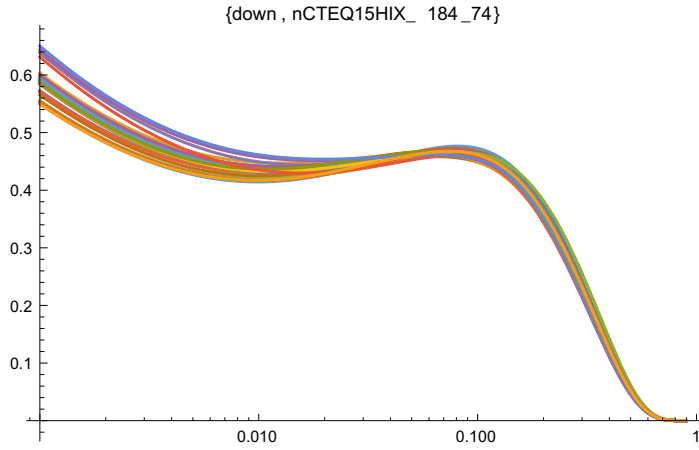
```
range = {216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227,
  228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242,
  243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258}
```

```
{down, nCTEQ15HIX_ 14_7}
```



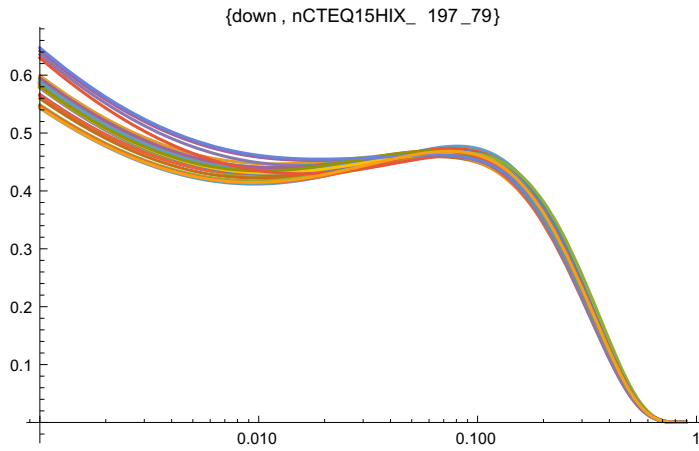
```
index = 301
```

```
range = {259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270,
  271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285,
  286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301}
```



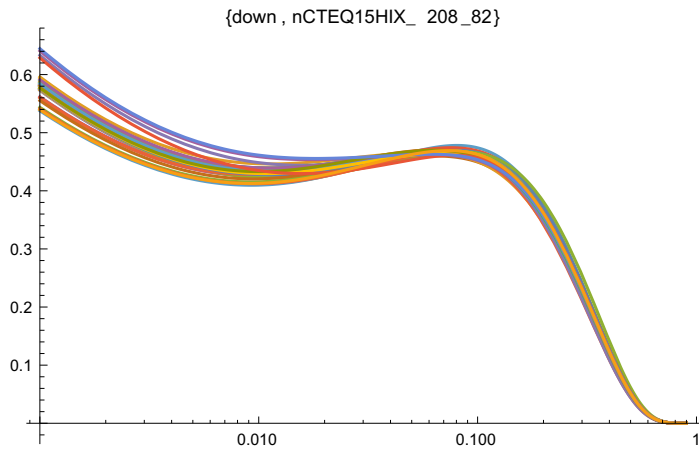
index = 344

range = {302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313,
314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328,
329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344}



index = 387

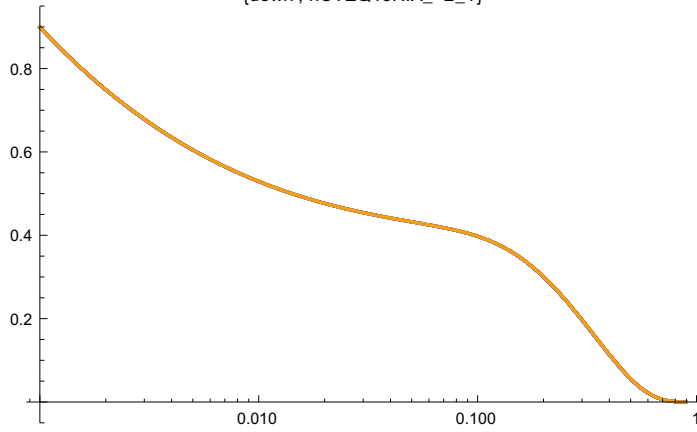
range = {345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356,
357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371,
372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387}



```
index = 430
```

```
range = {388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399,
  400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414,
  415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430}
```

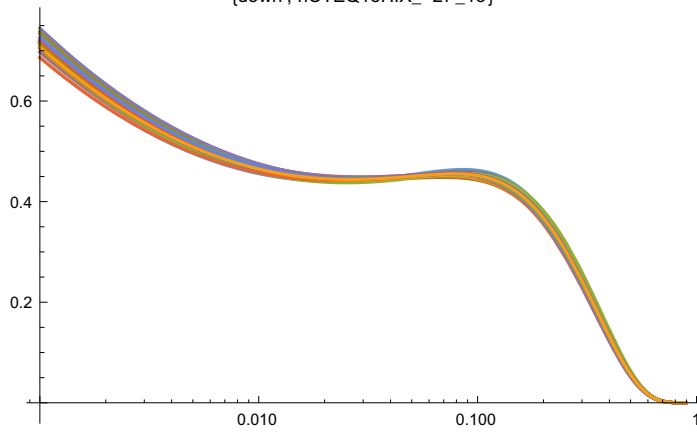
```
{down, nCTEQ15HIX_2_1}
```



```
index = 473
```

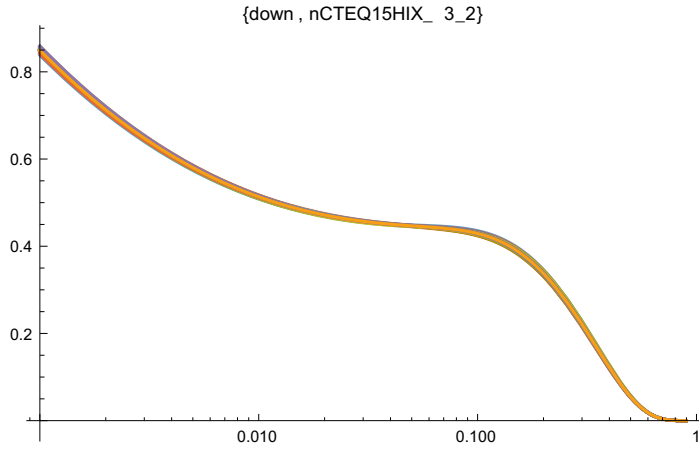
```
range = {431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442,
  443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457,
  458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473}
```

```
{down, nCTEQ15HIX_27_13}
```



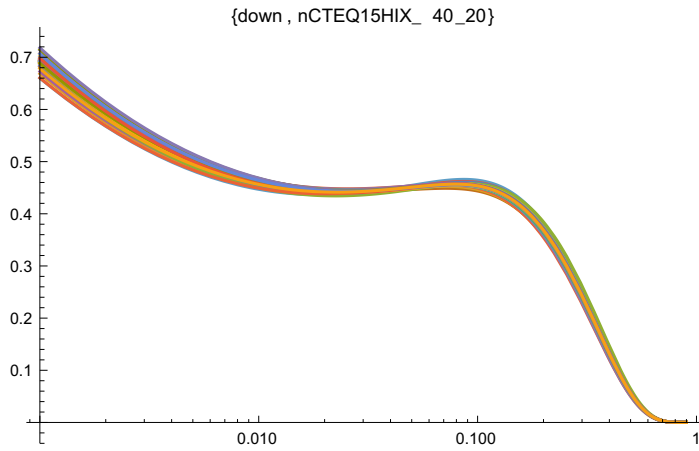
```
index = 516
```

```
range = {474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485,
  486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500,
  501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516}
```



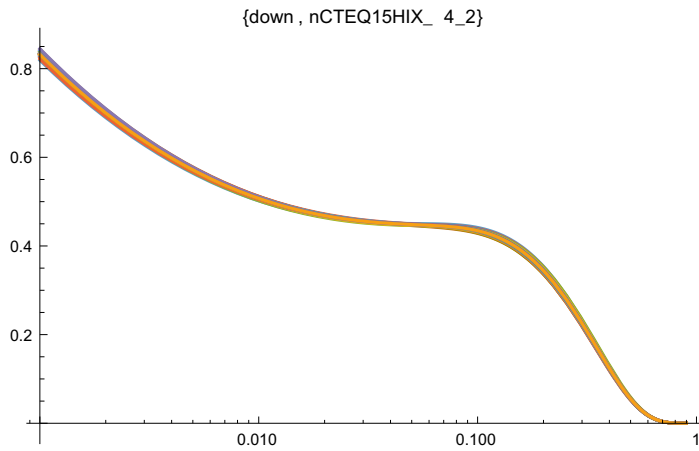
index = 559

range = {517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528,
529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543,
544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559}



index = 602

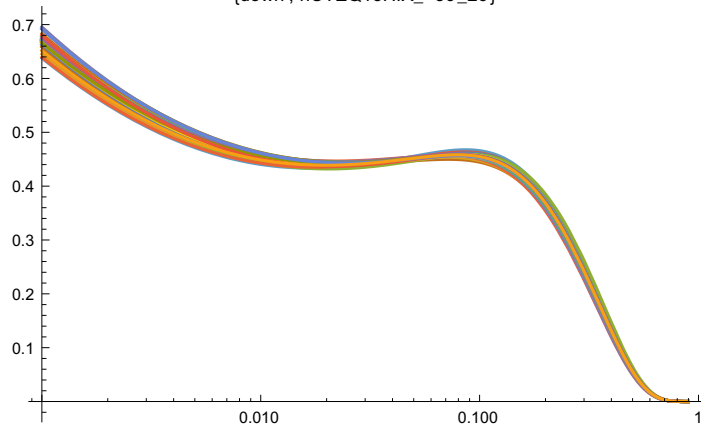
range = {560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571,
572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586,
587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602}



```
index = 645
```

```
range = {603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614,
        615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629,
        630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645}
```

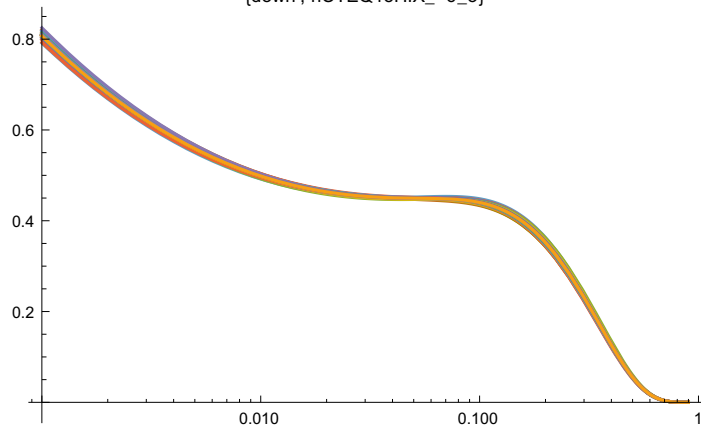
```
{down, nCTEQ15HIX_ 56_26}
```



```
index = 688
```

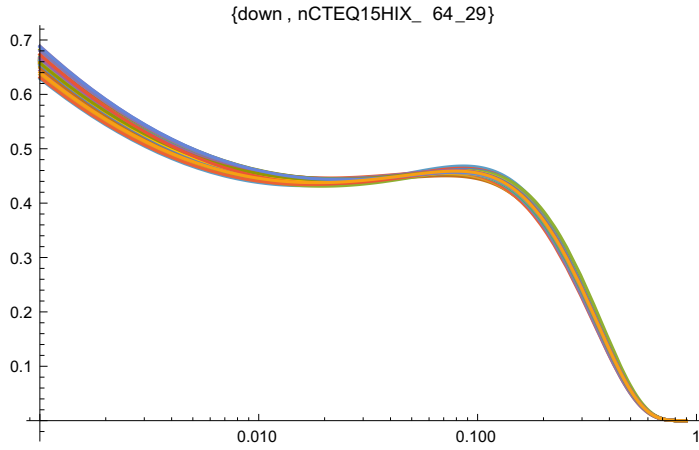
```
range = {646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657,
        658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672,
        673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688}
```

```
{down, nCTEQ15HIX_ 6_3}
```



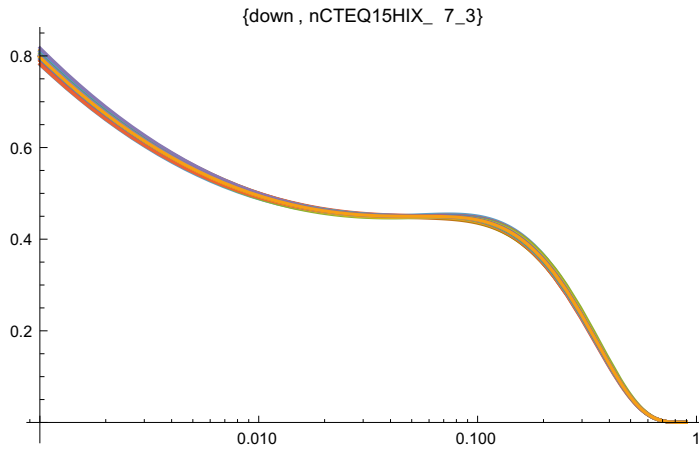
```
index = 731
```

```
range = {689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700,
        701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715,
        716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731}
```



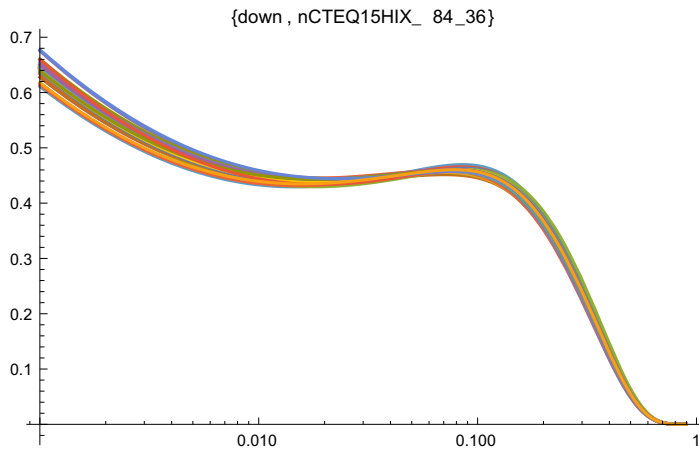
index = 774

range = {732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743,
744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758,
759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774}



index = 817

range = {775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786,
787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801,
802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817}




```
index = 860
```

```
range = {818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829,  
830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844,  
845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860}
```

```
{down, nCTEQ15HIX_9_4}
```

