

# Simple instructions on using MCNPydE

## *Data reduction tool for MCNP output*

by Megat Harun Al Rashid bin Megat Ahmad and Rafhayudi bin Jamro

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MCNPydE is a Python library for extracting data from MCNP output file. It requires Python, Matplotlib and Numpy. It is a data reduction tool for MCNP output for ease of results analysis and viewing.

To start using the program, first import the library:

In [1]:

```
from MCNPydE import *
```

To view the MCNP output file, it is best to assign it to a variable by passing a file name to the dataExtract class (e.g. *var1*):

In [2]:

```
var1 = dataExtract('NUR13o.txt')
```

by default it will pass the strings *'There are 20 grid points along the s-axis'* as identifier. It is also possible to use a different strings identifier but the strings identifier must be unique as a starting line to extract the block of data:

In [3]:

```
var1 = dataExtract('NUR13o.txt', 'There are      20 grid points along the s-axis')
```

The total line number of the file can then be viewed:

In [4]:

```
var1.lineNumber()
```

76713

The content of the file can also be viewed even though it is advisable not to view the whole MCNP output file as it is usually very large. The rawContent() function allows viewing the first 100 lines (i.e. the header) of the output file and by passing arguments allow user to view specific range of the file:

In [5]:

```
var1.rawContent()
```

```
0 lmcnp version 27a ld=Fri Oct 31 08:00:00 MST 2008 1
2/10/14 16:23:42
0
*****
*****      probid = 12/10/14 16:23:42
0 i=NUR13.txt o=NUR13o
0
0 *****
0 *
0 *
0 *          MCNPX
0 *
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0 *
0 *****
0 1-      NUR II CONE DESIGN FULL BEAM D=3.48cm 5cmBi/5cmPb
0 2-      c CELL CARD
0 3-      c SMALL CYLINDER
0 4-      530 0 -500 520 -510 (-501 -510 520 ) #600 #601 #610 #620
0 5-      #630 #640 #611 #621 imp:n=1 imp:p=1
0 6-      501 3 -2.7 -500 501 -510 520 imp:n=1 imp:p=1
0 7-      541 0 -503 510 -521 (-504 510 -521 )(504 :-505 :-510
:511 )
0 8-      (504 :-505 :-511 :512 )(504 :-505 :-512 :513 )
0 9-      imp:n=1 imp:p=1
0 10-     506 3 -2.7 -503 504 510 -521 imp:n=1 imp:p=1
0 11-     507 3 -2.7 -504 505 510 -511 imp:n=1 imp:p=1
0 12-     508 5 -11 4 -504 505 511 -512 imp:n=1 imp:p=1
```

```

0 12- 500 8 -1.12 -504 505 512 -513 imp:n=1 imp:p=1
0 13- 509 8 -1.12 -504 505 512 -513 imp:n=1 imp:p=1
0 14- c
0 15- c OUTSIDE COLLIMATOR
0 16- 510 4 -3.52 520 -521 522 -523 524 -525 (500 520 -510 :5
03 510 -521 )
0 17- imp:n=1 imp:p=1
0 18- c NR EXPOSURE ROOM SHEILDING
0 19- 511 4 -3.52 521 -530 522 -523 524 -525 (-521 :532 :-533
:534 :-535 :536)
0 20- imp:n=1 imp:p=1
0 21- c INSIDE EXPOSURE ROOM
0 22- 513 0 521 -532 533 -534 535 -536 (-540 :541 :-542 :543:-5
44 :545 )
0 23- imp:n=1 imp:p=1
0 24- c CCD SHEILDING OUTSIDE
0 25- 514 3 -2.7 540 -541 542 -543 544 -545 (-546 :547 :-548 :5
49 :-550 :551)
0 26- imp:n=1 imp:p=1
0 27- c CCD SHEILDING INSIDE
0 28- 515 0 546 -547 548 -549 550 -551 (-552 :553 :-554
:555:-556 :557 )
0 29- imp:n=1 imp:p=1
0 30- c CCD CAMERA
0 31- 516 3 -2.7 552 -553 554 -555 556 -557 imp:n=1 imp:p=1
0 32- c Collimator
0 33- 600 0 -611 -501 520 #610 #611 imp:n=1 imp:p=1
0 34- 601 0 -612 -501 -510 #610 #611 imp:n=1 imp:p=1
0 35- 610 6 -9.8 -620 508 -569 imp:n=1 imp:p=1
0 36- 611 10 -3.9 -620 569 -562 imp:n=1 imp:p=1
0 37- 620 6 -9.8 -501 620 508 -569 #610 imp:n=1 imp:p=1
0 38- 621 10 -3.9 -501 620 569 -562 #610 imp:n=1 imp:p=1
0 39- 630 9 -0.957 611 520 -508 -501 imp:n=1 imp:p=1
0 40- 640 5 -11.4 612 562 -501 imp:n=1 imp:p=1
0 41- c UNIVERSE
0 42- 9999 0 -520 :530 :-522 :523 :-524 :525 imp:n=0 imp:p=0
0 43-
0 44- c SURFACE CARD
0 45- 500 cx 7.6
0 46- 501 cx 6.6
0 47- 502 cx 5.6
0 48- c
0 49- 503 cx 10
0 50- 504 cx 9
0 51- 505 cx 6.6
0 52- 506 cx 2
0 53- c
0 54- 509 px -40
0 55- 511 px 1
0 56- c ccccccccccccccccccccccccccccccccccccc
0 57- c NEW PLANE FOR SMALL CYLINDER 03/11/2014 HZB
0 58- c ccccccccccccccccccccccccccccccccccccc
0 59- 560 px -95
0 60- 561 px -90
0 61- 508 px -80
0 62- 562 px -70
0 63- 569 nx -75

```

To see the whole file (which is not advisable):

In [ ]:

```
var1.rawContent(1,-1)
```

To view an instance of the block of data:

In [6]:

```
var1.dataBlockContent()
```

Use the index position to select mapping energy when plotting

Line Number--->Energy Index--->Line Content

944                    starting at -9.00000E+00 and ending at  9.00000E+00

945

946

947            s-axis        -9.00000E+00 to -8.10000E+00

948            t-axis        -9.00000E+00 to -8.10000E+00

949                    energy

950        1            0.0000E+00    0.00000E+00 0.0000

951        2            1.0000E-09    0.00000E+00 0.0000

952        3            5.0000E-09    0.00000E+00 0.0000

953        4            1.0000E-08    0.00000E+00 0.0000

954        5            1.5000E-08    0.00000E+00 0.0000

955        6            2.0000E-08    0.00000E+00 0.0000

956        7            2.5000E-08    0.00000E+00 0.0000

957        8            3.0000E-08    0.00000E+00 0.0000

958        9            5.0000E-08    0.00000E+00 0.0000

959       10            1.0000E-07    0.00000E+00 0.0000

960       11            1.0000E-06    0.00000E+00 0.0000

961       12            1.0000E-05    0.00000E+00 0.0000

962	13	1.0000E-02	0.00000E+00	0.0000
963	14	1.0000E+00	0.00000E+00	0.0000
964	15	1.0000E+01	0.00000E+00	0.0000
965	16	total	0.00000E+00	0.0000
966	17			
967	18	Shadow radiography image detector:		
968	19	Image grid centered at x,y,z =-9.90000E+01 0.00000E+00		
		0.00000E+00		
969	20			



Here it can be seen that by default it automatically display up to 25 lines of the first block data starting from the identifying strings. The first column shows the line numbers of the output file whereas second column shows the index number of the energy data which later can be used for plotting. The third column shows the constant of block of data.

To view other block of data, then it must be known beforehand all the lines in the file that contains the identifying strings. This can be done by using the `listLinenumber()` function.

In [7]:

```
var1.listLinenumber()
```

The line number list that contain the passed strings is:

```
[944, 975, 1006, 1037, 1068, 1099, 1130, 1161, 1192, 1223, 1254, 1285, 131
6, 1347, 1378, 1409, 1440, 1471, 1502, 1533, 1564, 1595, 1626, 1657, 1688,
1719, 1750, 1781, 1812, 1843, 1874, 1905, 1936, 1967, 1998, 2029, 2060, 209
1, 2122, 2153, 2184, 2215, 2246, 2277, 2308, 2339, 2370, 2401, 2432, 2463,
2494, 2525, 2556, 2587, 2618, 2649, 2680, 2711, 2742, 2773, 2804, 2835, 286
6, 2897, 2928, 2959, 2990, 3021, 3052, 3083, 3114, 3145, 3176, 3207, 3238,
3269, 3300, 3331, 3362, 3393, 3424, 3455, 3486, 3517, 3548, 3579, 3610, 364
1, 3672, 3703, 3734, 3765, 3796, 3827, 3858, 3889, 3920, 3951, 3982, 4013,
4044, 4075, 4106, 4137, 4168, 4199, 4230, 4261, 4292, 4323, 4354, 4385, 441
6, 4447, 4478, 4509, 4540, 4571, 4602, 4633, 4664, 4695, 4726, 4757, 4788,
4819, 4850, 4881, 4912, 4943, 4974, 5005, 5036, 5067, 5098, 5129, 5160, 519
1, 5222, 5253, 5284, 5315, 5346, 5377, 5408, 5439, 5470, 5501, 5532, 5563,
5594, 5625, 5656, 5687, 5718, 5749, 5780, 5811, 5842, 5873, 5904, 5935, 596
6, 5997, 6028, 6059, 6090, 6121, 6152, 6183, 6214, 6245, 6276, 6307, 6338,
6369, 6400, 6431, 6462, 6493, 6524, 6555, 6586, 6617, 6648, 6679, 6710, 674
1, 6772, 6803, 6834, 6865, 6896, 6927, 6958, 6989, 7020, 7051, 7082, 7113,
7144, 7175, 7206, 7237, 7268, 7299, 7330, 7361, 7392, 7423, 7454, 7485, 751
6, 7547, 7578, 7609, 7640, 7671, 7702, 7733, 7764, 7795, 7826, 7857, 7888,
7919, 7950, 7981, 8012, 8043, 8074, 8105, 8136, 8167, 8198, 8229, 8260, 829
1, 8322, 8353, 8384, 8415, 8446, 8477, 8508, 8539, 8570, 8601, 8632, 8663,
8694, 8725, 8756, 8787, 8818, 8849, 8880, 8911, 8942, 8973, 9004, 9035, 906
```

6, 9097, 9128, 9159, 9190, 9221, 9252, 9283, 9314, 9345, 9376, 9407, 9438, 9469, 9500, 9531, 9562, 9593, 9624, 9655, 9686, 9717, 9748, 9779, 9810, 9841, 9872, 9903, 9934, 9965, 9996, 10027, 10058, 10089, 10120, 10151, 10182, 10213, 10244, 10275, 10306, 10337, 10368, 10399, 10430, 10461, 10492, 10523, 10554, 10585, 10616, 10647, 10678, 10709, 10740, 10771, 10802, 10833, 10864, 10895, 10926, 10957, 10988, 11019, 11050, 11081, 11112, 11143, 11174, 11205, 11236, 11267, 11298, 11329, 11360, 11391, 11422, 11453, 11484, 11515, 11546, 11577, 11608, 11639, 11670, 11701, 11732, 11763, 11794, 11825, 11856, 11887, 11918, 11949, 11980, 12011, 12042, 12073, 12104, 12135, 12166, 12197, 12228, 12259, 12290, 12321, 12352, 12383, 12414, 12445, 12476, 12507, 12538, 12569, 12600, 12631, 12662, 12693, 12724, 12755, 12786, 12817, 12848, 12879, 12910, 12941, 12972, 13003, 13034, 13065, 13096, 13127, 13158, 13189, 13220, 13251, 13282, 13313, 13344, 13376, 13408, 13440, 13472, 13504, 13536, 13568, 13600, 13632, 13664, 13696, 13728, 13760, 13792, 13824, 13856, 13888, 13920, 13952, 13984, 14016, 14048, 14080, 14112, 14144, 14176, 14208, 14240, 14272, 14304, 14336, 14368, 14400, 14432, 14464, 14496, 14528, 14560, 14592, 14624, 14656, 14688, 14720, 14752, 14784, 14816, 14848, 14880, 14912, 14944, 14976, 15008, 15040, 15072, 15104, 15136, 15168, 15200, 15232, 15264, 15296, 15328, 15360, 15392, 15424, 15456, 15488, 15520, 15552, 15584, 15616, 15648, 15680, 15712, 15744, 15776, 15808, 15840, 15872, 15904, 15936, 15968, 16000, 16032, 16064, 16096, 16128, 16160, 16192, 16224, 16256, 16288, 16320, 16352, 16384, 16416, 16448, 16480, 16512, 16544, 16576, 16608, 16640, 16672, 16704, 16736, 16768, 16800, 16832, 16864, 16896, 16928, 16960, 16992, 17024, 17056, 17088, 17120, 17152, 17184, 17216, 17248, 17280, 17312, 17344, 17376, 17408, 17440, 17472, 17504, 17536, 17568, 17600, 17632, 17664, 17696, 17728, 17760, 17792, 17824, 17856, 17888, 17920, 17952, 17984, 18016, 18048, 18080, 18112, 18144, 18176, 18208, 18240, 18272, 18304, 18336, 18368, 18400, 18432, 18464, 18496, 18528, 18560, 18592, 18624, 18656, 18688, 18720, 18752, 18784, 18816, 18848, 18880, 18912, 18944, 18976, 19008, 19040, 19072, 19104, 19136, 19168, 19200, 19232, 19264, 19296, 19328, 19360, 19392, 19424, 19456, 19488, 19520, 19552, 19584, 19616, 19648, 19680, 19712, 19744, 19776, 19808, 19840, 19872, 19904, 19936, 19968, 20000, 20032, 20064, 20096, 20128, 20160, 20192, 20224, 20256, 20288, 20320, 20352, 20384, 20416, 20448, 20480, 20512, 20544, 20576, 20608, 20640, 20672, 20704, 20736, 20768, 20800, 20832, 20864, 20896, 20928, 20960, 20992, 21024, 21056, 21088, 21120, 21152, 21184, 21216, 21248, 21280, 21312, 21344, 21376, 21408, 21440, 21472, 21504, 21536, 21568, 21600, 21632, 21664, 21696, 21728, 21760, 21792, 21824, 21856, 21888, 21920, 21952, 21984, 22016, 22048, 22080, 22112, 22144, 22176, 22208, 22240, 22272, 22304, 22336, 22368, 22400, 22432, 22464, 22496, 22528, 22560, 22592, 22624, 22656, 22688, 22720, 22752, 22784, 22816, 22848, 22880, 22912, 22944, 22976, 23008, 23040, 23072, 23104, 23136, 23168, 23200, 23232, 23264, 23296, 23328, 23360, 23392, 23424, 23456, 23488, 23520, 23552, 23584, 23616, 23648, 23680, 23712, 23744, 23776, 23808, 23840, 23872, 23904, 23936, 23968, 24000, 24032, 24064, 24096, 24128, 24160, 24192, 24224, 24256, 24288, 24320, 24352, 24384, 24416, 24448, 24480, 24512, 24544, 24576, 24608, 24640, 24672, 24704, 24736, 24768, 24800, 24832, 24864, 24896, 24928, 24960, 24992, 25024, 25056, 25088, 25120, 25152, 25184, 25216, 25248, 25280, 25312, 25344, 25376, 25408, 25440, 25472, 25504, 25536, 25568, 25600, 25632, 25664, 25696, 25728, 25760, 25792, 25824, 25856, 25888, 25920, 25952, 25984, 26016, 26048, 26080, 26112, 26144, 26176, 26208, 26240, 26272, 26304, 26336, 26368, 26400, 26432, 26464, 26496, 26528, 26560, 26592, 26624, 26656, 26688, 26720, 26752, 26784, 26816, 26848, 26880, 26912, 26944, 26976, 27008, 27040, 27072, 27104, 27136, 27168, 27200, 27232, 27264, 27296, 27328, 27360, 27392, 27424, 27456, 27488, 27520, 27552, 27584, 27616, 27648, 27680, 27712, 27744, 27776, 27808, 27840, 27872, 27904, 27936, 27968, 28000, 28032, 28064, 28096, 28128, 28160, 28192, 28224, 28256, 28288, 28320, 28352, 28384, 28416, 28448, 28480, 28512, 28544, 28576, 28608, 28640, 28672, 28704, 28736, 28768, 28800, 28832, 28864, 28896, 28928, 28960, 28992, 29024, 29056, 29088, 29120, 29152, 29184, 29216, 29248, 29280, 29312, 29344, 29376, 29408, 29440, 29472, 29504, 29536, 29568, 29600, 29632, 29664, 29696, 29728, 29760, 29792, 29824, 29856, 29888, 29920, 29952, 29984, 30016, 30048, 30080, 30112, 30144, 30176, 30208, 30240, 30272, 30304, 30336, 30368, 30400, 30432, 30464, 30496, 30528, 30560, 30592, 30624, 30656, 30688, 30720, 30752, 30784, 30816, 30848, 30880, 30912, 30944, 30976, 31008, 31040, 31072, 31104, 31136, 31168, 31200, 31232, 31264, 31296, 31328, 31360, 31392, 31424, 31456, 31488, 31520, 31552, 31584, 31616, 31648, 31680, 31712, 31744, 31776, 31808, 31840, 31872, 31904, 31936, 31968, 32000, 32032, 32064, 32096, 32128, 32160, 32192, 32224, 32256, 32288, 32320, 32352, 32384, 32416, 32448, 32480, 32512, 32544, 32576, 32608, 32640, 32672, 32704, 32736, 32768, 32800, 32832, 32864, 32896, 32928, 32960, 32992, 33024, 33056, 33088, 33120, 33152, 33184, 33216, 33248, 33280, 33312, 33344, 33376, 33408, 33440, 33472, 33504, 33536, 33568, 33600, 33632, 33664, 33696, 33728, 33760, 33792, 33824, 33856, 33888, 33920, 33952, 33984, 34016, 34048, 34080, 34112, 34144, 34176, 34208, 34240, 34272, 34304, 34336, 34368, 34400, 34432, 34464, 34496, 34528, 34560, 34592, 34624, 34656, 34688, 34720, 34752, 34784, 34816, 34848, 34880, 34912, 34944, 34976, 35008, 35040, 35072, 35104, 35136, 35168, 35200, 35232, 35264, 35296, 35328, 35360, 35392, 35424, 35456, 35488, 35520, 35552, 35584, 35616, 35648, 35680, 35712, 35744, 35776, 35808, 35840, 35872, 35904, 35936, 35968, 36000, 36032, 36064, 36096, 36128, 36160, 36192, 36224, 36256, 36288, 36320, 36352, 36384, 36416, 36448, 36480, 36512, 36544, 36576, 36608, 36640, 36672, 36704, 36736, 36768, 36800, 36832, 36864, 36896, 36928, 36960, 36992, 37024, 37056, 37088, 37120, 37152, 37184, 37216, 37248, 37280, 37312, 37344, 37376, 37408, 37440, 37472, 37504, 37536, 37568, 37600, 37632, 37664, 37696, 37728, 37760, 37792, 37824, 37856, 37888, 37920, 37952, 37984, 38016, 38048, 38080, 38112, 38144, 38176, 38208, 38240, 38272, 38304, 38336, 38368, 38400, 38432, 38464, 38496, 38528, 38560, 38592, 38624, 38656, 38688, 38720, 38752, 38784, 38816, 38848, 38880, 38912, 38944, 38976, 39008, 39040, 39072, 39104, 39136, 39168, 39200, 39232, 39264, 39296, 39328, 39360, 39392, 39424, 39456, 39488, 39520, 39552, 39584, 39616, 39648, 39680, 39712, 39744, 39776, 39808, 39840, 39872, 39904, 39936, 39968, 40000, 40032, 40064, 40096, 40128, 40160, 40192, 40224, 40256, 40288, 40320, 40352, 40384, 40416, 40448, 40480, 40512, 40544, 40576, 40608, 40640, 40672, 40704, 40736, 40768, 40800, 40832, 40864, 40896, 40928, 40960, 40992, 41024, 41056, 41088, 41120, 41152, 41184, 41216, 41248, 41280, 41312, 41344, 41376, 41408, 41440, 41472, 41504, 41536, 41568, 41600, 41632, 41664, 41696, 41728, 41760, 41792, 41824, 41856, 41888, 41920, 41952, 41984, 42016, 42048, 42080, 42112, 42144, 42176, 42208, 42240, 42272, 42304, 42336, 42368, 42400, 42432, 42464, 42496, 42528, 42560, 42592, 42624, 42656, 42688, 42720, 42752, 42784, 42816, 42848, 42880, 42912, 42944, 42976, 43008, 43040, 43072, 43104, 43136, 43168, 43200, 43232, 43264, 43296, 43328, 43360, 43392, 43424, 43456, 43488, 43520, 43552, 43584, 43616, 43648, 43680, 43712, 43744, 43776, 43808, 43840, 43872, 43904, 43936, 43968, 44000, 44032, 44064, 44096, 44128, 44160, 44192, 44224, 44256, 44288, 44320, 44352, 44384, 44416, 44448, 44480, 44512, 44544, 44576, 44608, 44640, 44672, 44704, 44736, 44768, 44800, 44832, 44864, 44896, 44928, 44960, 44992, 45024, 45056, 45088, 45120, 45152, 45184, 45216, 45248, 45280, 45312, 45344, 45376, 45408, 45440, 45472, 45504, 45536, 45568, 45600, 45632, 45664, 45696, 45728, 45760, 45792, 45824, 45856, 45888, 45920, 45952, 45984, 46016, 46048, 46080, 46112, 46144, 46176, 46208, 46240, 46272, 46304, 46336, 46368, 46400, 46432, 46464, 46496, 46528, 46560, 46592, 46624, 46656, 46688, 46720, 46752, 46784, 46816, 46848, 46880, 46912, 46944, 46976, 47008, 47040, 47072, 47104, 47136, 47168, 47200, 47232, 47264, 47296, 47328, 47360, 47392, 47424, 47456, 47488, 47520, 47552, 47584, 47616, 47648, 47680, 47712, 47744, 47776, 47808, 47840, 47872, 47904, 47936, 47968, 48000, 48032, 48064, 48096, 48128, 48160, 48192, 48224, 48256, 48288, 48320, 48352, 48384, 48416, 48448, 48480, 48512, 48544, 48576, 48608, 48640, 48672, 48704, 48736, 48768, 48800, 48832, 48864, 48896, 48928, 48960, 48992, 49024, 49056, 49088, 49120, 49152, 49184, 49216, 49248, 49280, 49312, 49344, 49376, 49408, 49440, 49472, 49504, 49536, 49568, 49600, 49632, 49664, 49696, 49728, 49760, 49792, 49824, 49856, 49888, 49920, 49952, 49984, 50016, 50048, 50080, 50112, 50144, 50176, 50208, 50240, 50272, 50304, 50336, 50368, 50400, 50432, 50464, 50496, 50528, 50560, 50592, 50624, 50656, 50688, 50720, 50752, 50784, 50816, 50848, 50880, 50912, 50944, 50976, 51008, 51040, 51072, 51104, 51136, 51168, 51200, 51232, 51264, 51296, 51328, 51360, 51392, 51424, 51456, 51488, 51520, 51552, 51584, 51616, 51648, 51680, 51712, 51744, 51776, 51808, 51840, 51872, 51904, 51936, 51968, 52000, 52032, 52064, 52096, 52128, 52160, 52192, 52224, 52256, 52288, 52320, 52352, 52384, 52416, 52448, 52480, 52512, 52544, 52576, 52608, 52640, 52672, 52704, 52736, 52768, 52800, 52832, 52864, 52896, 52928, 52960, 52992, 53024, 53056, 53088, 53120, 53152, 53184, 53216, 53248, 53280, 53312, 53344, 53376, 53408, 53440, 53472, 53504, 53536, 53568, 53600, 53632, 53664, 53696, 53728, 53760, 53792, 53824, 53856, 53888, 53920, 53952, 53984, 54016, 54048, 54080, 54112, 54144, 54176, 54208, 54240, 54272, 54304, 54336, 54368, 54400, 54432, 54464, 54496, 54528, 54560, 54592, 54624, 54656, 54688, 54720, 54752, 54784, 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59392, 59424, 59456, 59488, 59520, 59552, 59584, 59616, 59648, 59680, 59712, 59744, 59776, 59808, 59840, 59872, 59904, 59936, 59968, 60000, 60032, 60064, 60096, 60128, 60160, 60192, 60224, 60256, 60288, 60320, 60352, 60384, 60416, 60448, 60480, 60512, 60544, 60576, 60608, 60640, 60672, 60704, 60736, 60768, 60800, 60832, 60864, 60896, 60928, 60960, 60992, 61024, 61056, 61088, 61120, 61152, 61184, 61216, 61248, 61280, 61312, 61344, 61376, 61408, 61440, 61472, 61504, 61536, 61568, 61600, 61632, 61664, 61696, 61728, 61760, 61792, 61824, 61856, 61888, 61920, 61952, 61984, 62016, 62048, 62080, 62112, 62144, 62176, 62208, 62240, 62272, 62304, 62336, 62368, 62400, 62432, 62464, 62496, 62528, 62560, 62592, 62624, 62656, 62688, 62720, 62752, 62784, 62816, 62848, 62880, 62912, 62944, 62976, 63008, 63040, 63072, 63104, 63136, 63168, 63200, 63232, 63264, 63296, 63328, 63360, 63392, 63424, 63456, 63488, 63520, 63552, 63584, 63616, 63648, 63680, 63712, 63744, 63776, 63808, 63840, 63872, 63904, 63936, 63968, 64000, 64032, 64064, 64096, 64128, 64160, 64192, 64224, 64256, 64288, 64320, 64352, 64384, 64416, 64448, 64480, 64512, 64544, 64576, 64608, 64640, 64672, 64704, 64736, 64768, 64800, 64832, 64864, 64896, 64928, 64960, 64992, 65024, 65056, 65088, 65120, 65152, 65184, 65216, 65248, 65280, 65312, 65344, 65376, 65408, 65440, 65472, 65504, 65536, 65

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Other block data can be viewed by selecting the starting line (from the above list) and the range of lines (number of lines after the string identifier). For instance by selecting the range starting from line of 8508 to 8538:

In [8]:

```
var1.dataBlockContent(8508,30)
```

Use the index position to select mapping energy when plotting

Line Number--->Energy Index--->Line Content

8508                      starting at -9.00000E+00 and ending at 9.00000E+00

8509

8510

8511                      s-axis                      1.80000E+00 to 2.70000E+00

8512                      t-axis                      -5.40000E+00 to -4.50000E+00

8513		energy	
8514	1	0.0000E+00	0.00000E+00 0.0000
8515	2	1.0000E-09	1.41266E-08 0.4593
8516	3	5.0000E-09	5.78881E-05 0.6207
8517	4	1.0000E-08	3.38473E-04 0.5224
8518	5	1.5000E-08	1.09083E-04 0.4567
8519	6	2.0000E-08	1.75430E-04 0.3763
8520	7	2.5000E-08	5.32154E-04 0.8067
8521	8	3.0000E-08	2.38874E-04 0.4508
8522	9	5.0000E-08	1.78793E-03 0.3645
8523	10	1.0000E-07	1.13526E-03 0.2257
8524	11	1.0000E-06	6.12968E-04 0.2384
8525	12	1.0000E-05	1.34599E-04 0.1674
8526	13	1.0000E-02	3.34907E-04 0.2768
8527	14	1.0000E+00	1.28669E-03 0.1756
8528	15	1.0000E+01	5.32264E-04 0.0822
8529	16	total	7.27654E-03 0.1727
8530	17		
8531	18	Shadow radiography image detector:	
8532	19	Image grid centered at x,y,z =-9.90000E+01 0.00000E+00	
8533	20		
8534	21		
8535	22	There are 20 grid points along the t-axis	
8536	23	starting at -9.00000E+00 and ending at 9.00000E+00	
8537	24		
8538	25	There are 20 grid points along the s-axis	

Viewing the data block above allows the user to select the range of data and by default the `allBlockData()` will select the range from line 8511 to line 8532.

If satisfied, the user can then run the `allBlockData()` function to extract all the data blocks into a list.

In [9]:

```
var1.allBlockData()
```

The number of blocks are 2400  
There would be 3 groups of data

Here the `allBlockData()` function informs that there are 2400 blocks of data in three spatial groups (usually starting upstream to downstream of the MCNP simulation). This with the index of 15 different energies as viewed with `dataBlockContent()`.

If the output is specified to list only 2 different energies than it is more practical to specify the range of data to be extracted, e.g.:

```
var1.allBlockData(lowLim = 3, upLim = 5)
```

The `lowLim` variable default value is 3 (which is the listing start of energy index) whereas `upLim` default value is 23. The position of 1 is for the s-axis and 2 is for the t-axis as viewed previously (s-axis and t-axis number points can be specified using the `axisPt` variable, by default the value is 20).

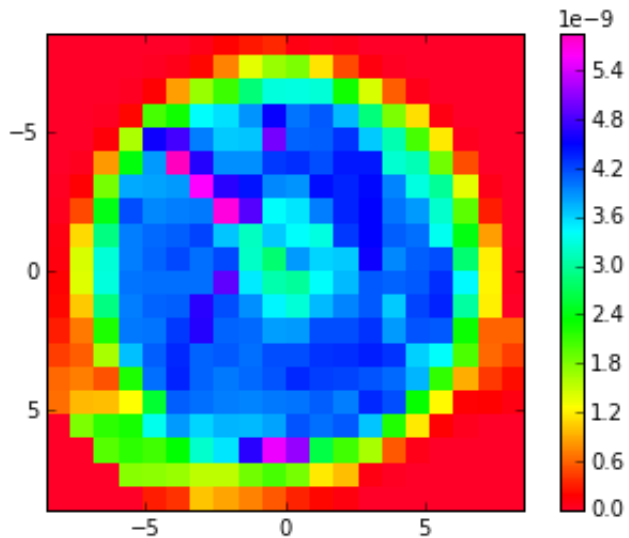
Plotting of the results is only possible after executing the `allBlockData()` function. Plot can be made into 2D or 3D image, showing the intensity of particles with specific energy in the cross section of the model. In this instance there are 3 cross section groups as indicated after executing `allBlockData()`.

For instance, if the user wants to plot a 2D representation of the intensity at the second spatial or cross section group for particles with energy of 0.025 eV, the user can pass the index value of 2 (for the spatial group) and 7 (by referring to the index of the energy data when viewing the data block) to the `Plot2D` function:

In [10]:

```
%pylab inline  
var1.plot2D(2,7)
```

Populating the interactive namespace from numpy and matplotlib

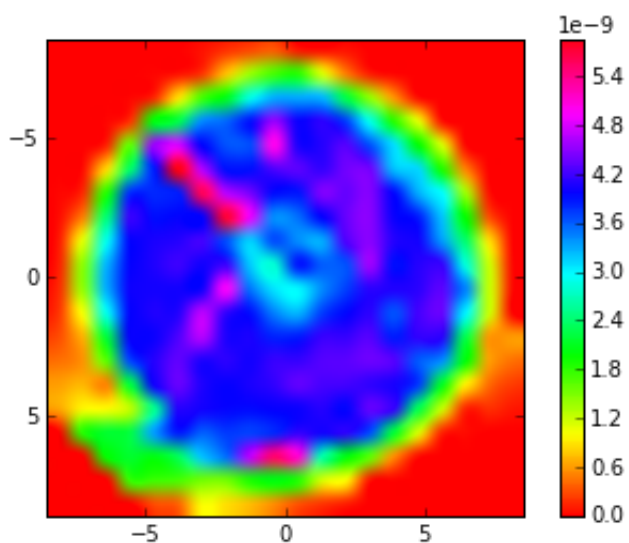


Energy : 2.5000E-08 MeV

It is possible to filter, save and specified the color map of the plot (as shown in the same sequence below):

In [11]:

```
var1.plot2D(2,7, intPol = 'catrom', figName = 'plot2D.tiff', colorMap=cm.hsv)
```

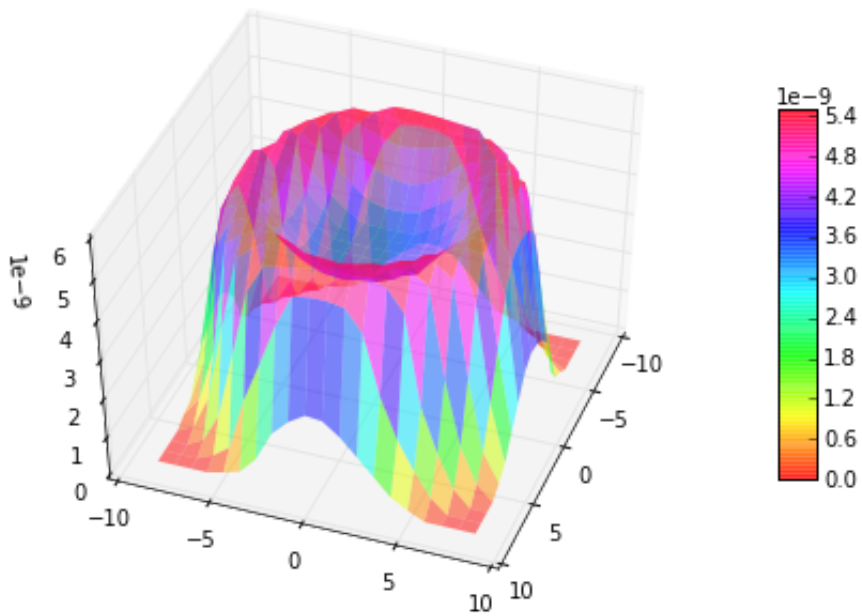


Energy : 2.5000E-08 MeV

and for instance the 3D plot for the intensity at the third spatial group for particles with energy of 1 MeV:

In [12]:

```
var1.plot3D(3,14)
```

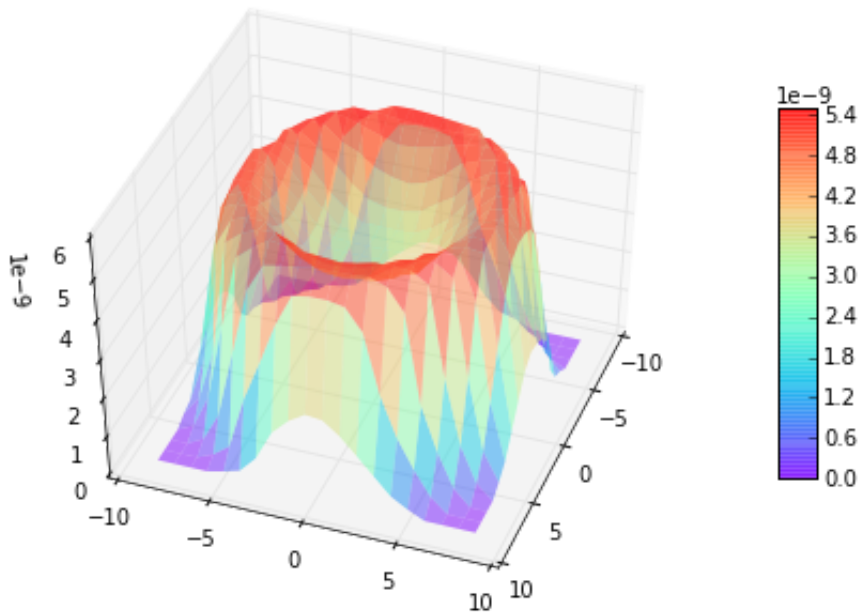


Energy : 1.0000E+00 MeV

and by assigning the rainbow color map and save the plot file:

In [13]:

```
var1.plot3D(3,14, figName = 'plot3D.tiff', colorMap=cm.rainbow)
```



Energy : 1.0000E+00 MeV

To process a different MCNP output file, the user can assign a new variable and process the data (this allows ease of comparison between different MCNP output files):

In [14]:

```
var2 = dataExtract('TAN44o.txt')
```

The total line number for 'TAN44o.txt' file:

In [15]:

```
var2.lineNumber()
```

216808

Checking the format of the data block:

In [16]:

```
var2.dataBlockContent()
```

Use the index position to select mapping energy when plotting

Line Number--->Energy Index--->Line Content

```
2781          starting at -9.00000E+00 and ending at  9.00000E+00
2782
2783
2784          s-axis          -9.00000E+00 to -8.10000E+00
2785          t-axis          -9.00000E+00 to -8.10000E+00
2786          energy
2787  1          0.0000E+00    0.00000E+00 0.0000
2788  2          2.5000E-08    0.00000E+00 0.0000
2789  3          total        0.00000E+00 0.0000
2790  4
2791  5          Shadow radiography image detector:
2792  6          Image grid centered at x,y,z =-9.90000E+01 0.00000E+00
0.00000E+00
2793  7
2794  8
2795  9          There are      20 grid points along the t-axis
2796 10          starting at -9.00000E+00 and ending at  9.00000E+00
```

```

2797      11
2798      12          There are      20 grid points along the s-axis
2799      13          starting at -9.00000E+00 and ending at  9.00000E+00
2800      14
2801      15
2802      16      s-axis      -9.00000E+00 to -8.10000E+00
2803      17      t-axis      -8.10000E+00 to -7.20000E+00
2804      18          energy
2805      19          0.0000E+00   0.00000E+00  0.0000
2806      20          2.5000E-08   0.00000E+00  0.0000

```



In this output file only two index of energies recorded. Extracting all the data blocks into a list:

In [17]:

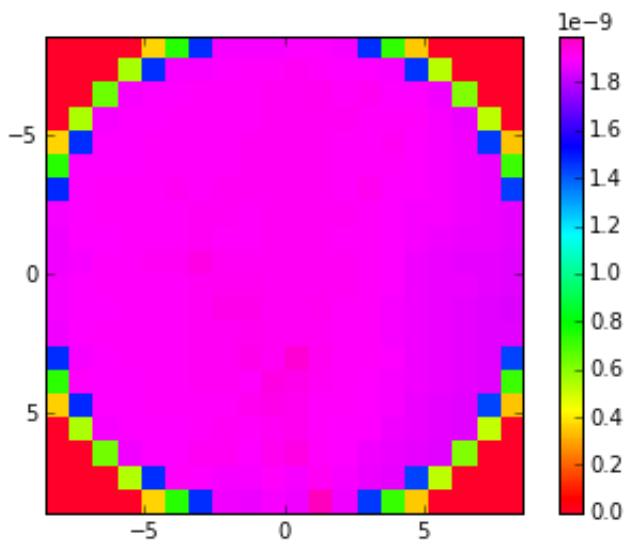
```
var2.allBlockData()
```

The number of blocks are 2400  
There would be 3 groups of data

Lastly, viewing the particles intensity in 2D and 3D:

In [18]:

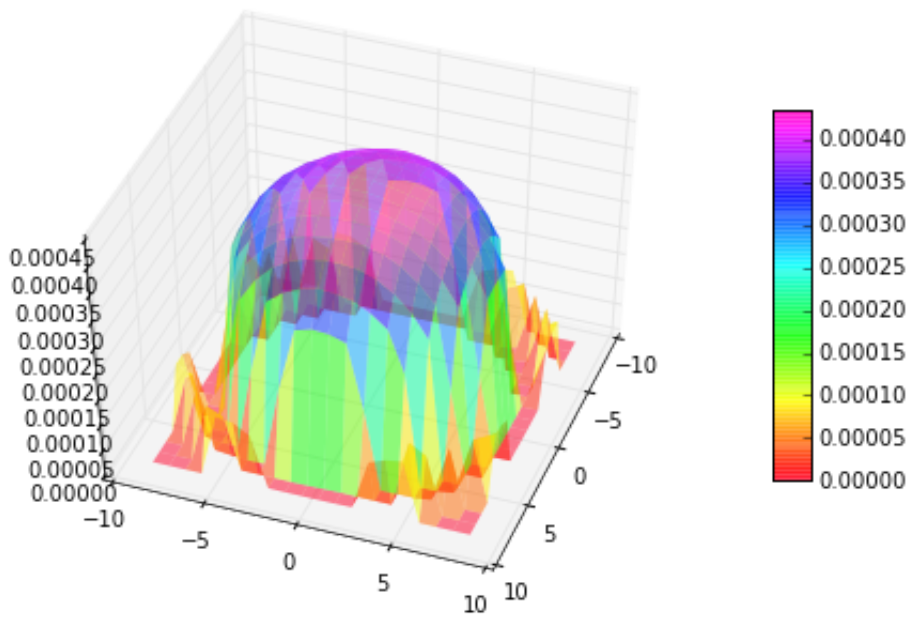
```
var2.plot2D(3,2, figName = 'plot2D.tiff', colorMap=cm.gist_rainbow)
```



Energy : 2.5000E-08 MeV

In [19]:

```
var2.plot3D(1,2, figName = 'plot2D.tiff', colorMap=cm.gist_rainbow)
```



Energy : 2.5000E-08 MeV

I hope the MCNPYdE library and this simple instructions will be useful to MCNP users. Thank you.