PCMAG field map (cont'd)

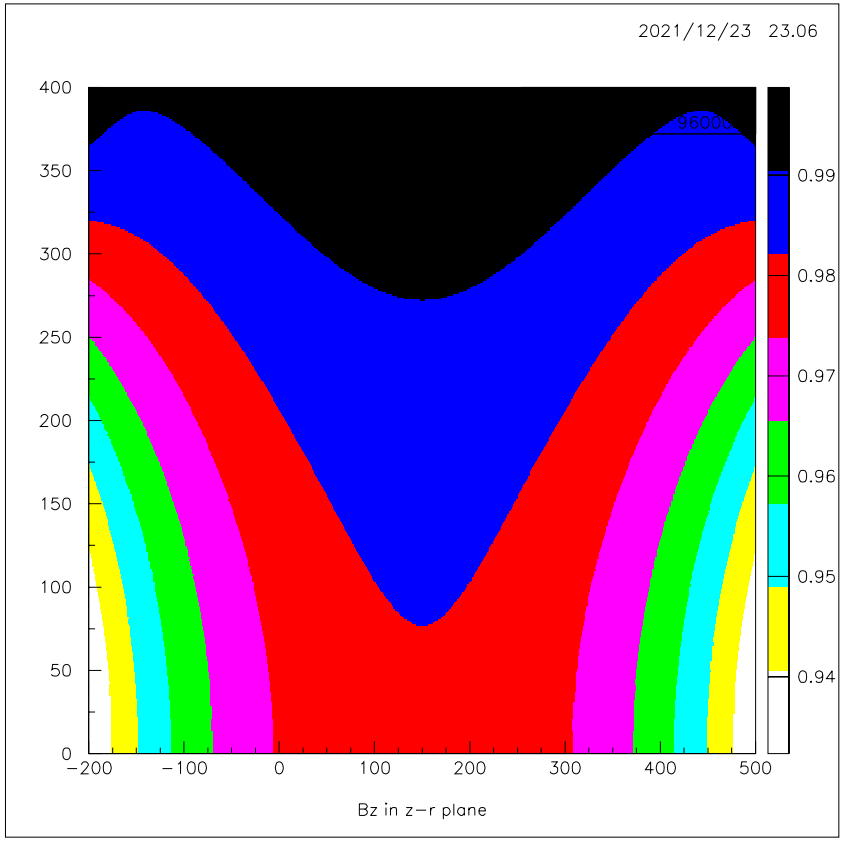
And some effects on curved tracks

/data/lepcol/testbeam_DESY_june21/PCMAG/PCMagFieldMap.dat

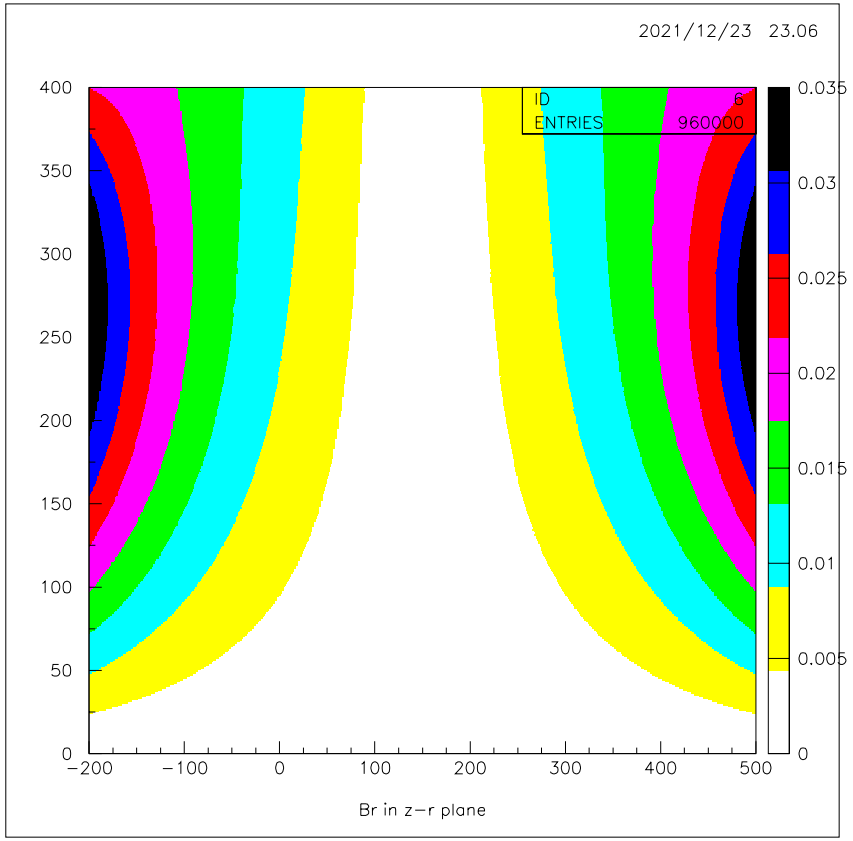
(28.784171 Mb)

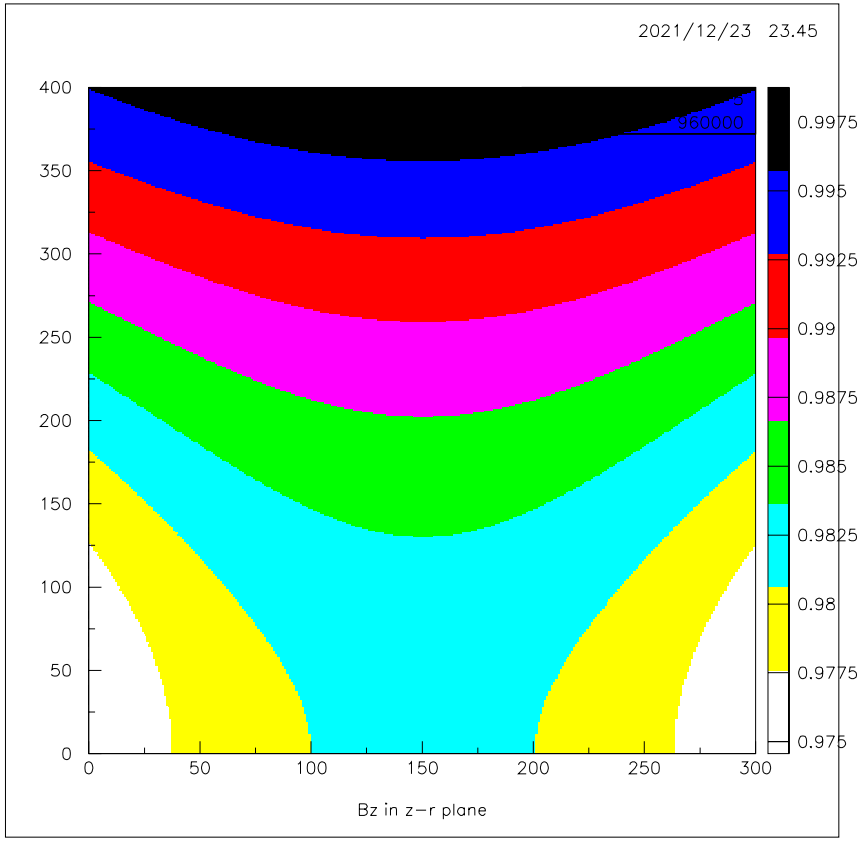
- Solenoidal field (cylindrical symmetry)
- Simple textfile, 960000 data point lines: r, z, B_r , B_z (r, z in mm; B_r , B_z in Tesla)
- 1600 points along z from -799.5 to +799.5 in steps of 1 mm
- 600 groups with r from 0.5 to 599.5 in steps of 1 mm
- r=0 magnet axis
- z=0 does NOT correspond to maximum in B_z ; B_{max} approx. at z = +150.5

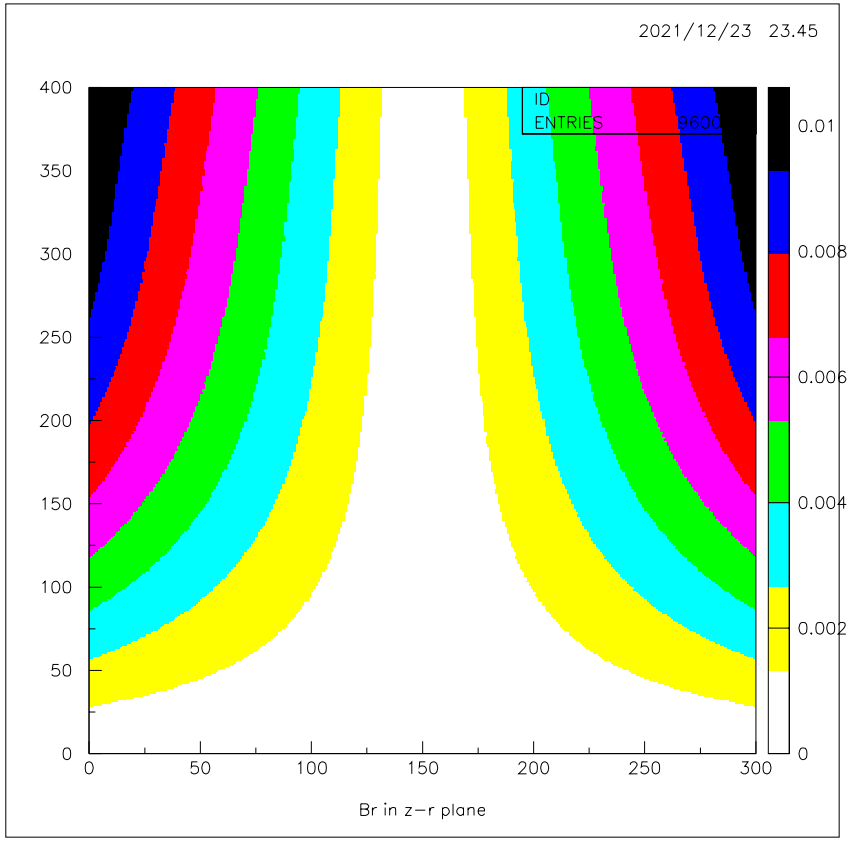
B_z

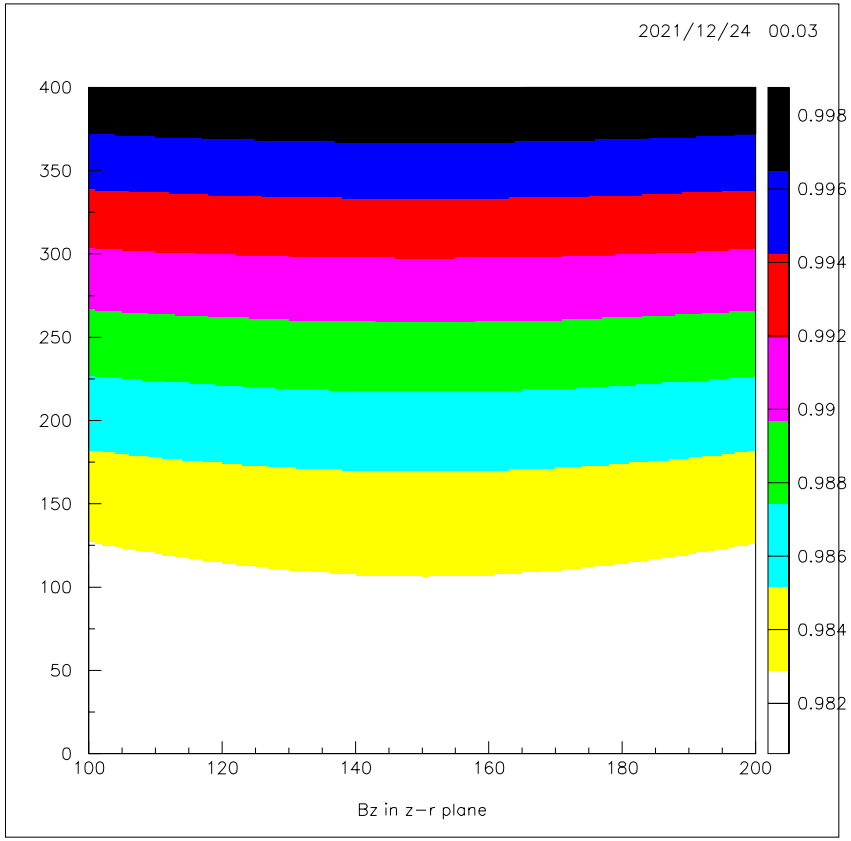

2021/12/23 23.06
960000
0.99
0.98
0.97
0.96
0.95
0.94
400
350
300
250
200
150
100
50
0
−200
−100
0
100
200
300
400
500
Bz in z−r plane

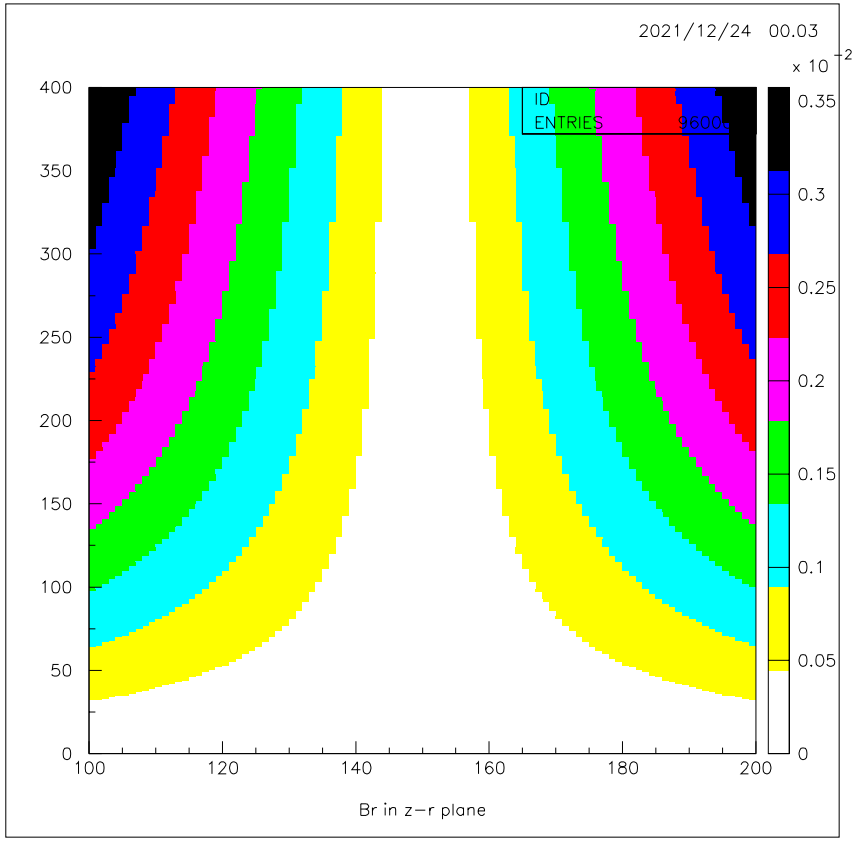
B_r


2021/12/23 23.06
ID 6
ENTRIES 960000
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
400
350
300
250
200
150
100
50
0
−200
−100
0
100
200
300
400
500
Br in z−r plane

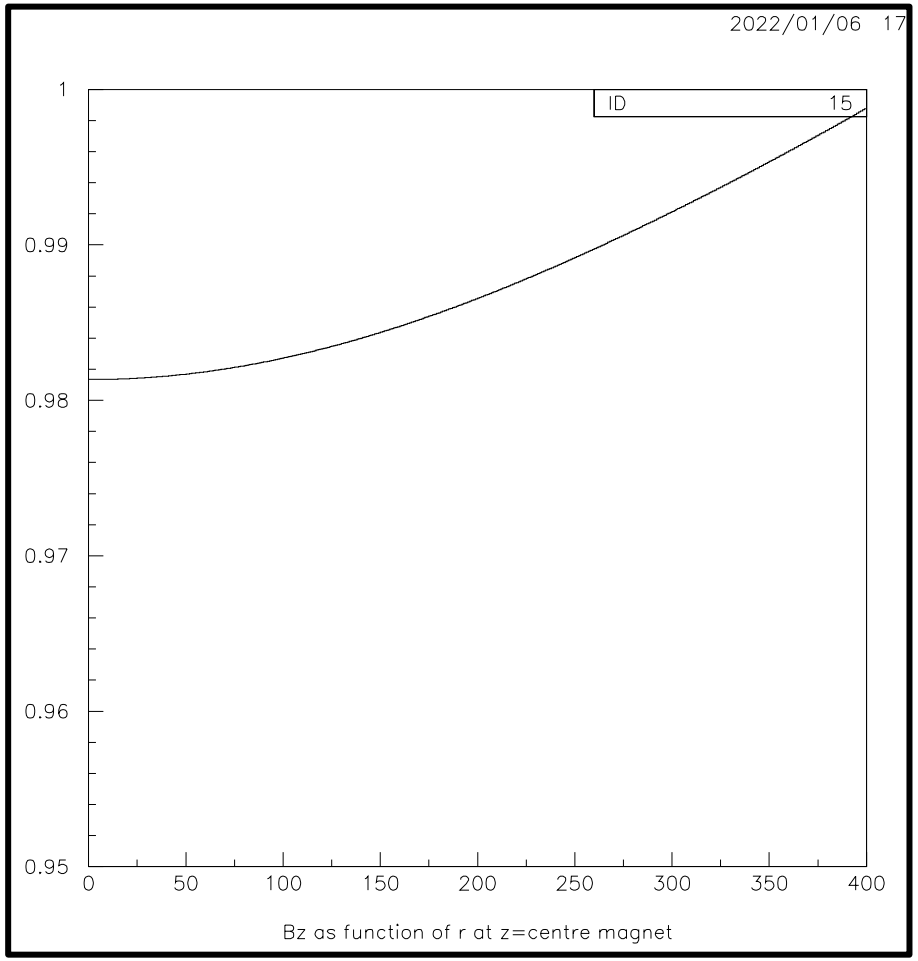

2021/12/23 23.45
ENTRIES 960000
400
350
300
250
200
150
100
50
0
0 50 100 150 200 250 300
0.9975
0.995
0.9925
0.99
0.9875
0.985
0.9825
0.98
0.9775
0.975
Bz in z−r plane


2021/12/23 23.45
ID
ENTRIES 9600
400
350
300
250
200
150
100
50
0
0 50 100 150 200 250 300
0.01
0.008
0.006
0.004
0.002
0
Br in z−r plane


2021/12/24 00.03
400
350
300
250
200
150
100
50
0
100
120
140
160
180
200
0.998
0.996
0.994
0.992
0.99
0.988
0.986
0.984
0.982
Bz in z−r plane

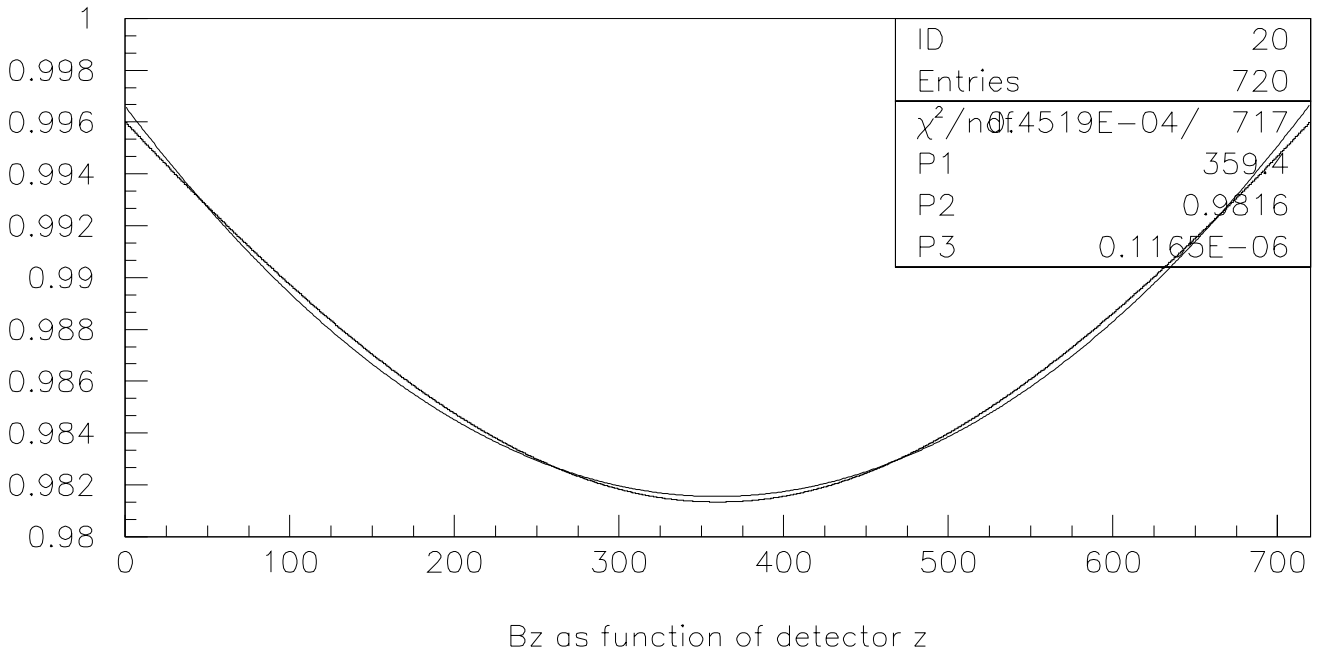

2021/12/24 00.03
x 10 +2
ID
ENTRIES 9600
400
350
300
250
200
150
100
50
0
100
120
140
160
180
200
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Br in z−r plane

Bz as function of r at z=centre-of-magnet; Br at this z is 0 T

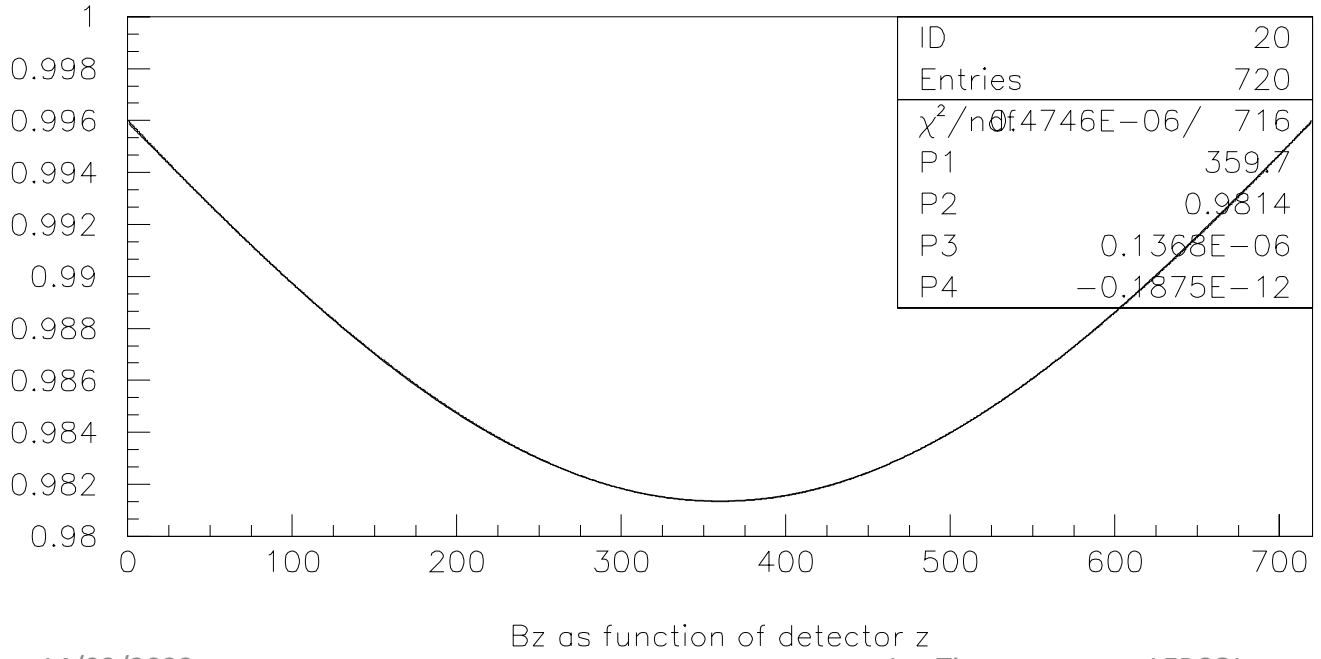


Give B_z value in Tesla:
B-value = 1.0000, 0.9900, 0.9800 Tesla

momentum:	p= 1.	p= 2.	p= 3.	p= 4.	p= 5.	p= 6.
y= 0.0 beam posit. =	0.000	0.000	0.000	0.000	0.000	0.000
y= 0.0 beam posit. =	0.000	0.000	0.000	0.000	0.000	0.000
y= 0.0 beam posit. =	0.000	0.000	0.000	0.000	0.000	0.000
y= 156.5 beam posit. =	3.676	1.837	1.225	0.918	0.735	0.612
y= 156.5 beam posit. =	3.639	1.819	1.212	0.909	0.727	0.606
y= 156.5 beam posit. =	3.602	1.800	1.200	0.900	0.720	0.600
y= 182.0 beam posit. =	4.972	2.485	1.656	1.242	0.994	0.828
y= 182.0 beam posit. =	4.923	2.460	1.640	1.230	0.984	0.820
y= 182.0 beam posit. =	4.873	2.435	1.623	1.217	0.974	0.812
y= 207.5 beam posit. =	6.465	3.230	2.153	1.615	1.292	1.076
y= 207.5 beam posit. =	6.400	3.198	2.132	1.599	1.279	1.066
y= 207.5 beam posit. =	6.335	3.165	2.110	1.582	1.266	1.055
y= 360.0 beam posit. =	19.497	9.727	6.482	4.861	3.888	3.240
y= 360.0 beam posit. =	19.301	9.630	6.417	4.812	3.850	3.208
y= 360.0 beam posit. =	19.105	9.532	6.352	4.764	3.811	3.175
y= 512.5 beam posit. =	39.634	19.728	13.141	9.853	7.882	6.567
y= 512.5 beam posit. =	39.233	19.531	13.010	9.755	7.803	6.502
y= 512.5 beam posit. =	38.832	19.333	12.878	9.656	7.724	6.436
y= 538.0 beam posit. =	43.703	21.744	14.483	10.859	8.686	7.237
y= 538.0 beam posit. =	43.260	21.526	14.338	10.750	8.599	7.165
y= 538.0 beam posit. =	42.818	21.308	14.193	10.641	8.512	7.093
y= 563.5 beam posit. =	47.975	23.858	15.889	11.913	9.529	7.940
y= 563.5 beam posit. =	47.488	23.618	15.730	11.794	9.433	7.860
y= 563.5 beam posit. =	47.002	23.379	15.571	11.674	9.338	7.781



(symmetric) Quadratic fit to B-field

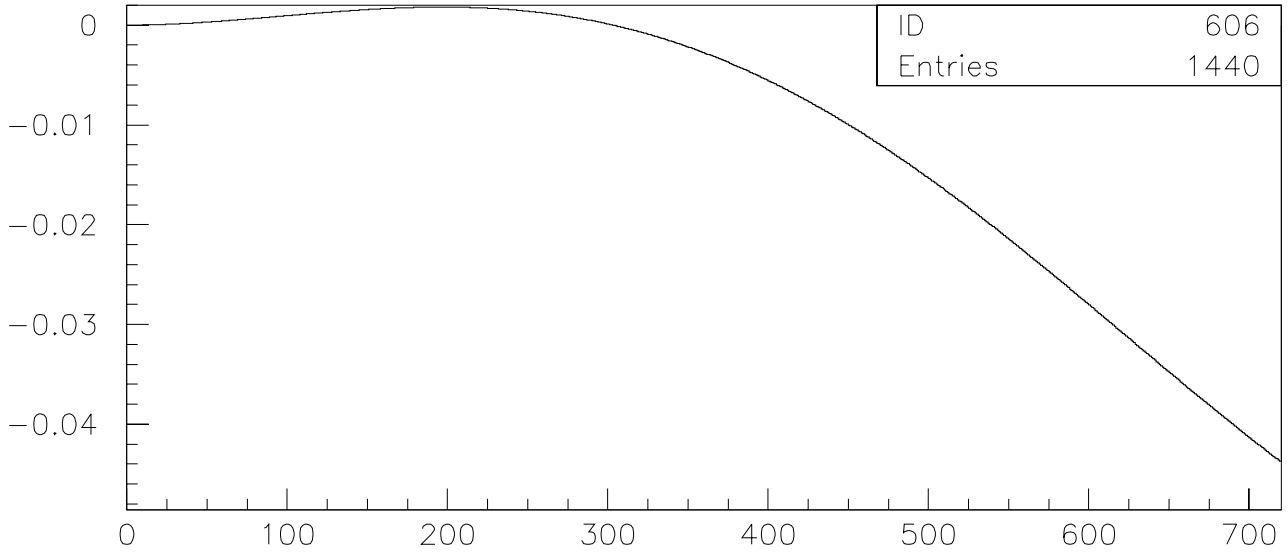


(symmetric) Quartic fit to B-field
So only z^2 and z^4 terms

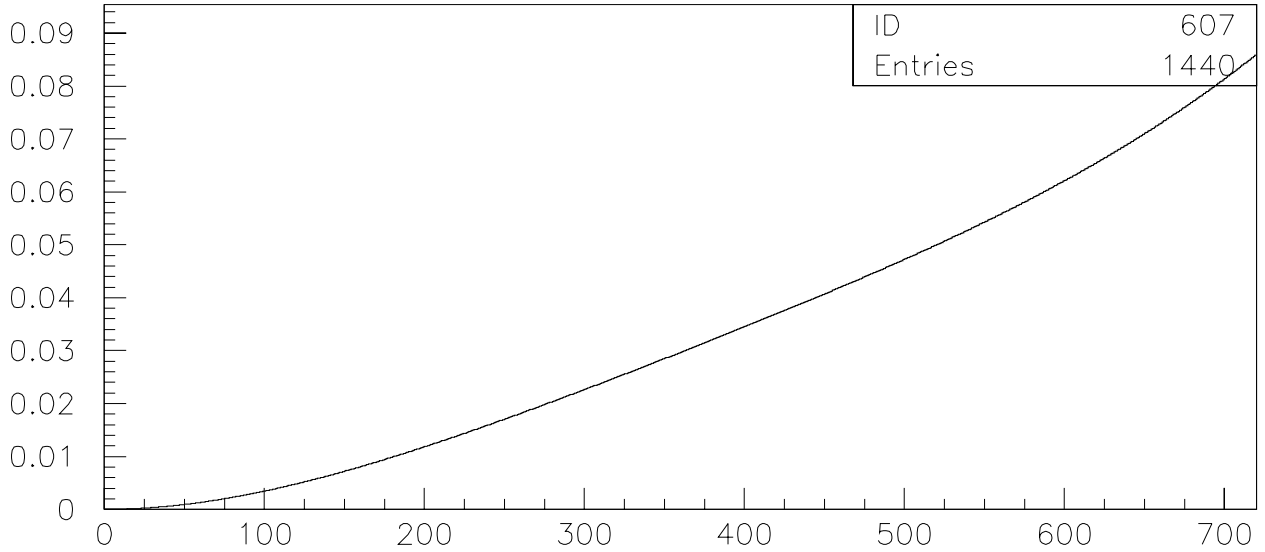
```
 Detector name/positions:
 Entr       0.00
 Mim0     156.50
 Mim1     182.00
 Mim2     207.50
 TpxE     280.00
 TpxC     360.00
 TpxB     440.00
 Mim3     512.50
 Mim4     538.00
 Mim5     563.50

Entr
     B=1.000T  z=   0.00 beam posit. =     -0.000    -0.000    -0.000    -0.000    -0.000    -0.000
     B=0.990T  z=   0.00 beam posit. =     -0.000    -0.000    -0.000    -0.000    -0.000    -0.000
     B=0.980T  z=   0.00 beam posit. =     -0.000    -0.000    -0.000    -0.000    -0.000    -0.000
     Buse_map  z=   0.00 beam posit. =      0.000     0.000     0.000     0.000     0.000     0.000

Mim0
     B=1.000T  z= 156.50 beam posit. =     -3.676    -1.837    -1.225    -0.919    -0.735    -0.612
     B=0.990T  z= 156.50 beam posit. =     -3.640    -1.819    -1.213    -0.909    -0.728    -0.606
     B=0.980T  z= 156.50 beam posit. =     -3.603    -1.801    -1.200    -0.900    -0.720    -0.600
     Buse_map  z= 156.50 beam posit. =     -3.649    -1.824    -1.216    -0.912    -0.729    -0.608

Mim1
     B=1.000T  z= 182.00 beam posit. =     -5.000    -2.499    -1.666    -1.249    -0.999    -0.833
     B=0.990T  z= 182.00 beam posit. =     -4.950    -2.474    -1.649    -1.237    -0.989    -0.824
     B=0.980T  z= 182.00 beam posit. =     -4.900    -2.449    -1.632    -1.224    -0.979    -0.816
     Buse_map  z= 182.00 beam posit. =     -4.961    -2.479    -1.653    -1.239    -0.991    -0.826

Mim2
     B=1.000T  z= 207.50 beam posit. =     -6.465    -3.230    -2.153    -1.615    -1.292    -1.077
     B=0.990T  z= 207.50 beam posit. =     -6.401    -3.198    -2.132    -1.599    -1.279    -1.066
     B=0.980T  z= 207.50 beam posit. =     -6.336    -3.166    -2.110    -1.583    -1.266    -1.055
     Buse_map  z= 207.50 beam posit. =     -6.411    -3.203    -2.135    -1.601    -1.281    -1.068

TpxE
     B=1.000T  z= 280.00 beam posit. =    -11.824    -5.904    -3.935    -2.951    -2.361    -1.967
     B=0.990T  z= 280.00 beam posit. =    -11.705    -5.845    -3.896    -2.922    -2.337    -1.948
     B=0.980T  z= 280.00 beam posit. =    -11.587    -5.786    -3.856    -2.892    -2.314    -1.928
     Buse_map  z= 280.00 beam posit. =    -11.710    -5.847    -3.897    -2.923    -2.338    -1.948

TpxC
     B=1.000T  z= 360.00 beam posit. =    -19.552    -9.755    -6.500    -4.875    -3.899    -3.249
     B=0.990T  z= 360.00 beam posit. =    -19.356    -9.657    -6.435    -4.826    -3.860    -3.217
     B=0.980T  z= 360.00 beam posit. =    -19.159    -9.559    -6.370    -4.777    -3.821    -3.184
     Buse_map  z= 360.00 beam posit. =    -19.339    -9.649    -6.430    -4.822    -3.857    -3.214

TpxB
     B=1.000T  z= 440.00 beam posit. =    -29.236   -14.570    -9.707    -7.279    -5.822    -4.852
     B=0.990T  z= 440.00 beam posit. =    -28.941   -14.424    -9.610    -7.206    -5.764    -4.803
     B=0.980T  z= 440.00 beam posit. =    -28.646   -14.278    -9.513    -7.133    -5.706    -4.755
     Buse_map  z= 440.00 beam posit. =    -28.885   -14.396    -9.592    -7.192    -5.753    -4.794

Mim3
     B=1.000T  z= 512.50 beam posit. =    -39.636   -19.729   -13.142    -9.854    -7.882    -6.568
     B=0.990T  z= 512.50 beam posit. =    -39.235   -19.531   -13.010    -9.755    -7.803    -6.502
     B=0.980T  z= 512.50 beam posit. =    -38.834   -19.333   -12.879    -9.656    -7.724    -6.436
     Buse_map  z= 512.50 beam posit. =    -39.131   -19.481   -12.977    -9.730    -7.783    -6.485

Mim4
     B=1.000T  z= 538.00 beam posit. =    -43.787   -21.785   -14.510   -10.879    -8.702    -7.251
     B=0.990T  z= 538.00 beam posit. =    -43.343   -21.567   -14.365   -10.770    -8.615    -7.179
     B=0.980T  z= 538.00 beam posit. =    -42.900   -21.348   -14.220   -10.661    -8.528    -7.106
     Buse_map  z= 538.00 beam posit. =    -43.220   -21.506   -14.325   -10.740    -8.591    -7.159

Mim5
     B=1.000T  z= 563.50 beam posit. =    -47.977   -23.858   -15.890   -11.913    -9.529    -7.940
     B=0.990T  z= 563.50 beam posit. =    -47.490   -23.619   -15.731   -11.794    -9.434    -7.861
     B=0.980T  z= 563.50 beam posit. =    -47.004   -23.380   -15.572   -11.675    -9.338    -7.781
     Buse_map  z= 563.50 beam posit. =    -47.347   -23.549   -15.684   -11.759    -9.406    -7.838
```

Beam deflections at the various detectors:

1. B=1.000 T
2. B=0.990 T
3. B=0.980 T
4. Use B-map info



Difference track position for B=0.990 T and B-map at p=6 GeV



Difference track position for B=0.980 T and B-map at p=6 GeV

Next step(s):

- fit circle trough Mimosa detector positions (in dependence) of which/how many detectors participate in track and compare with actual track (and ofcourse also in our TPX detector)