Endcap and Barrel Layout Simulation

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6.28

Tracker Dimension (Barrel)

Components	Radius(mm)	Half Z (mm)	$\sigma_{R\phi}(\mu m)$	$\sigma_Z(\mu m)$	Thickness(X_0 %)
Beam Pipe	10.35	-	-	-	0.172
VTX (3 double layers)	12.3/14.7/27.9/30.8/43.8/47.5	130/130/247/247374/374	**3/3/3/3/3/3**	**3/3/3/3/3/3**	0.17
VTX-shell	84		-	-	0.139
SITs (3 layers)	150/250/500	740/1340/1890	**7.2**	**86.6**	0.650
TPC inner wall	610	2980	-	-	0.110
TPC cell	612-1800	-	**400**	**700**	0.000239×2300
DC outer wall	1802	-	-	-	1.349
SET	1811	2980	**7.2**	**28800**	0.182

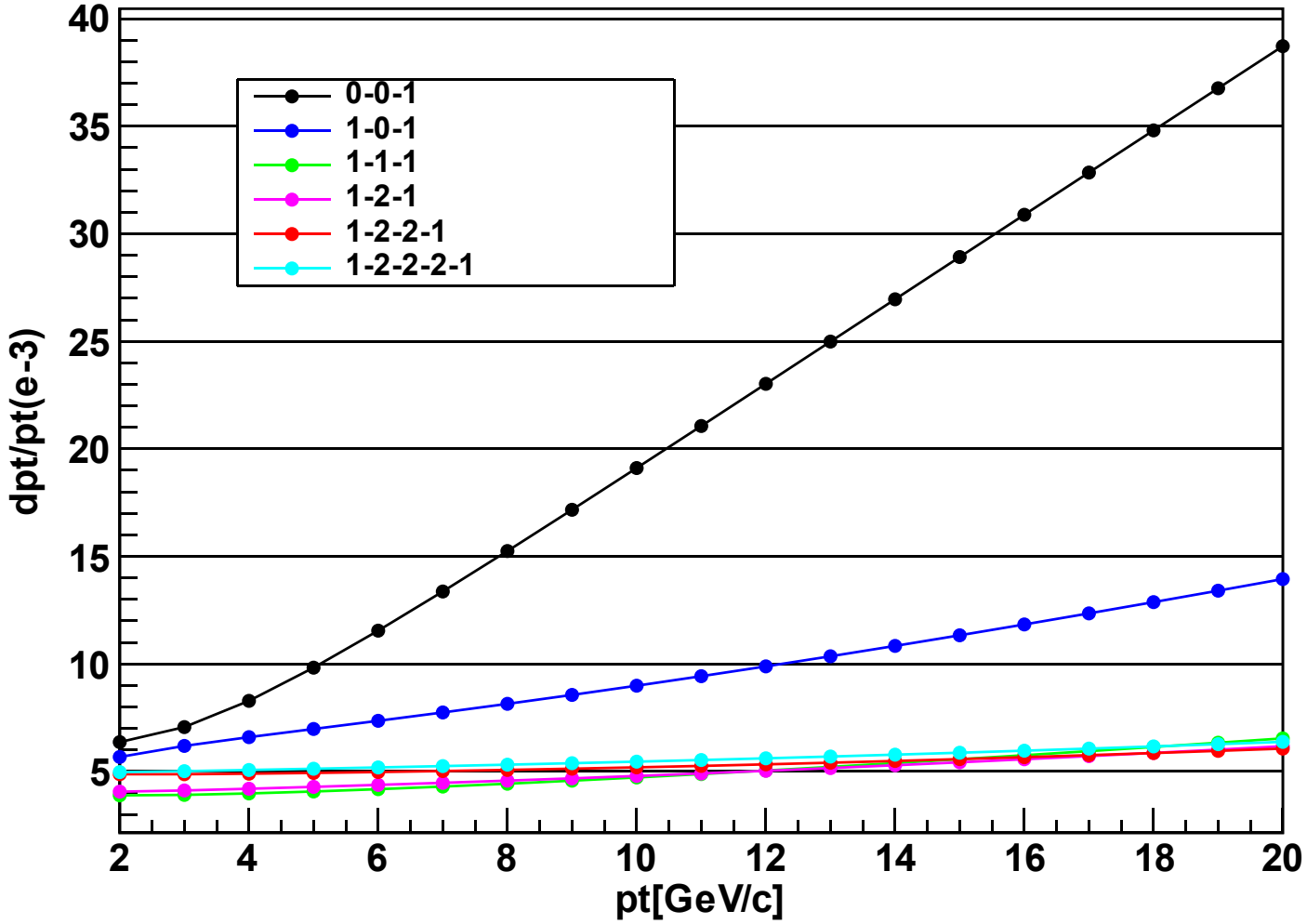
Tracker Dimension (End Caps)

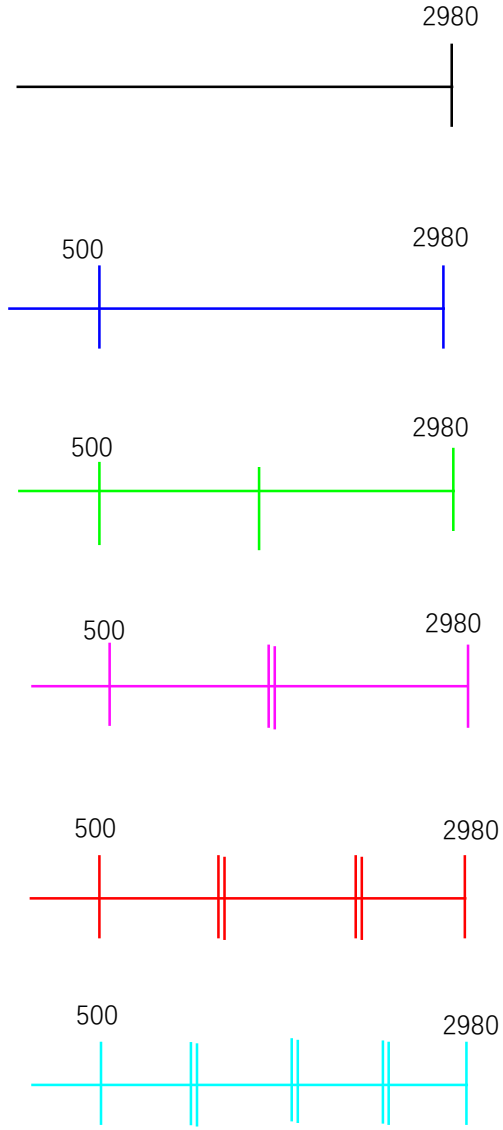
Components	Z (mm)	Rin(mm)	Rout(mm)	$\sigma_{R\phi}$(um)	σ_R(um)	Thickness(X_0 %)
SIT1	740	105	150	7.2	86.6	0.60
SIT2	1340	191	250	7.2	86.6	0.60
SIT3	1890	269	500	7.2	86.6	0.60
SIT4	2400	342	600	**7.2**	**86.6**	**0.60**
SET	2980	424	1811	7.2	86.6	10

endcap的z 位置与Rin、Rout（红色显示的参数）会随着endcap不同摆放随之变化

θ = 10°

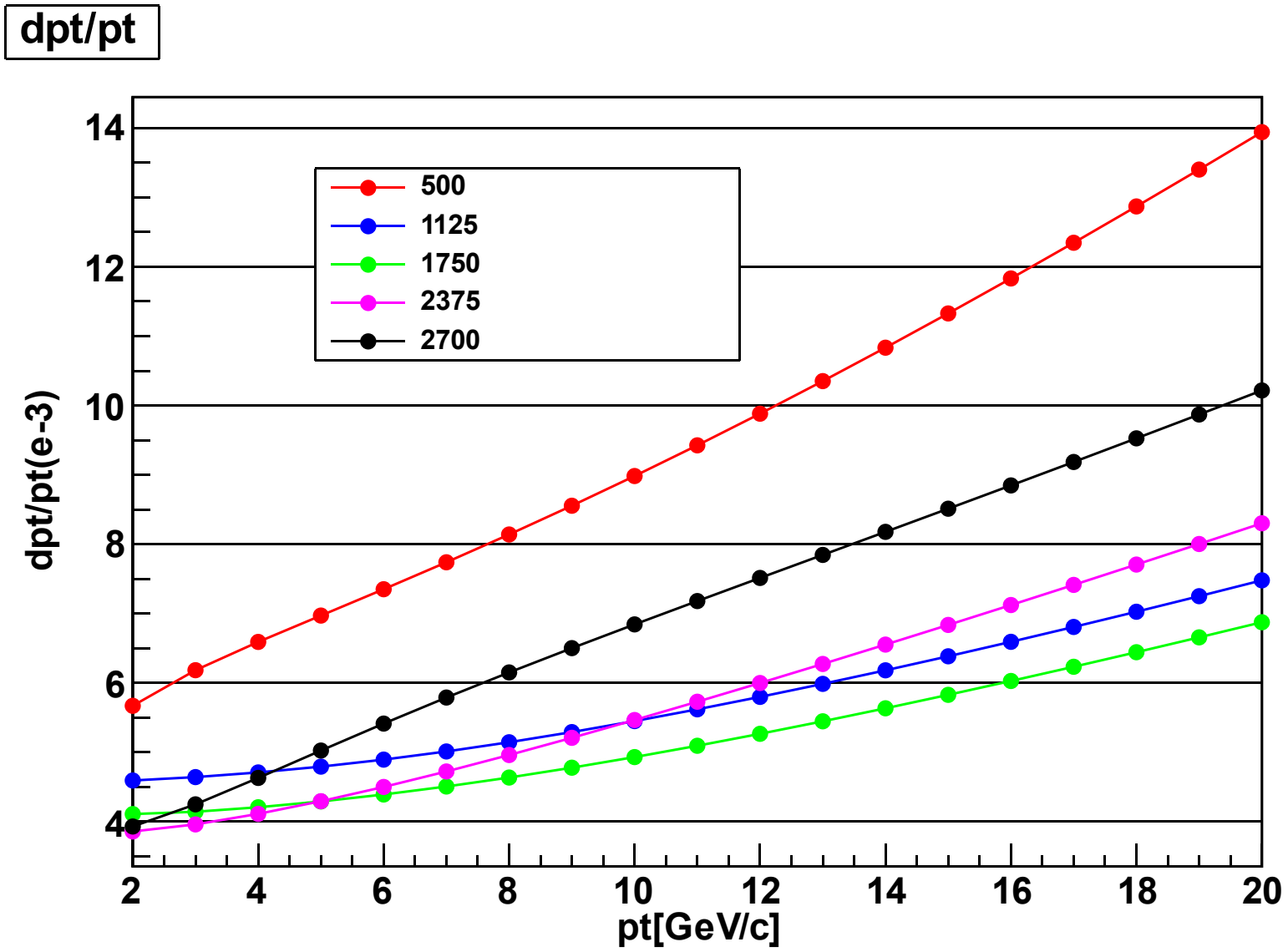
dpt/pt

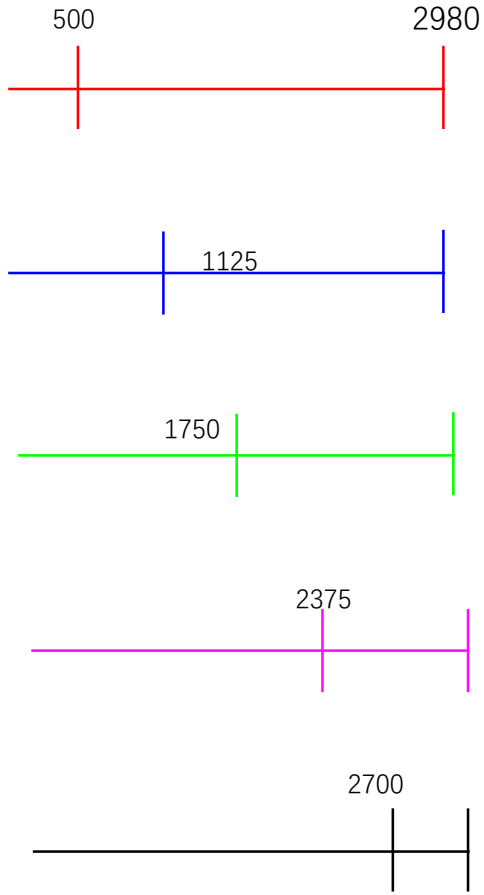




端盖的数目在两层或以上时，对动量分辨影响的差别已经较小；
使用double layers 和signal layer 基本无差别

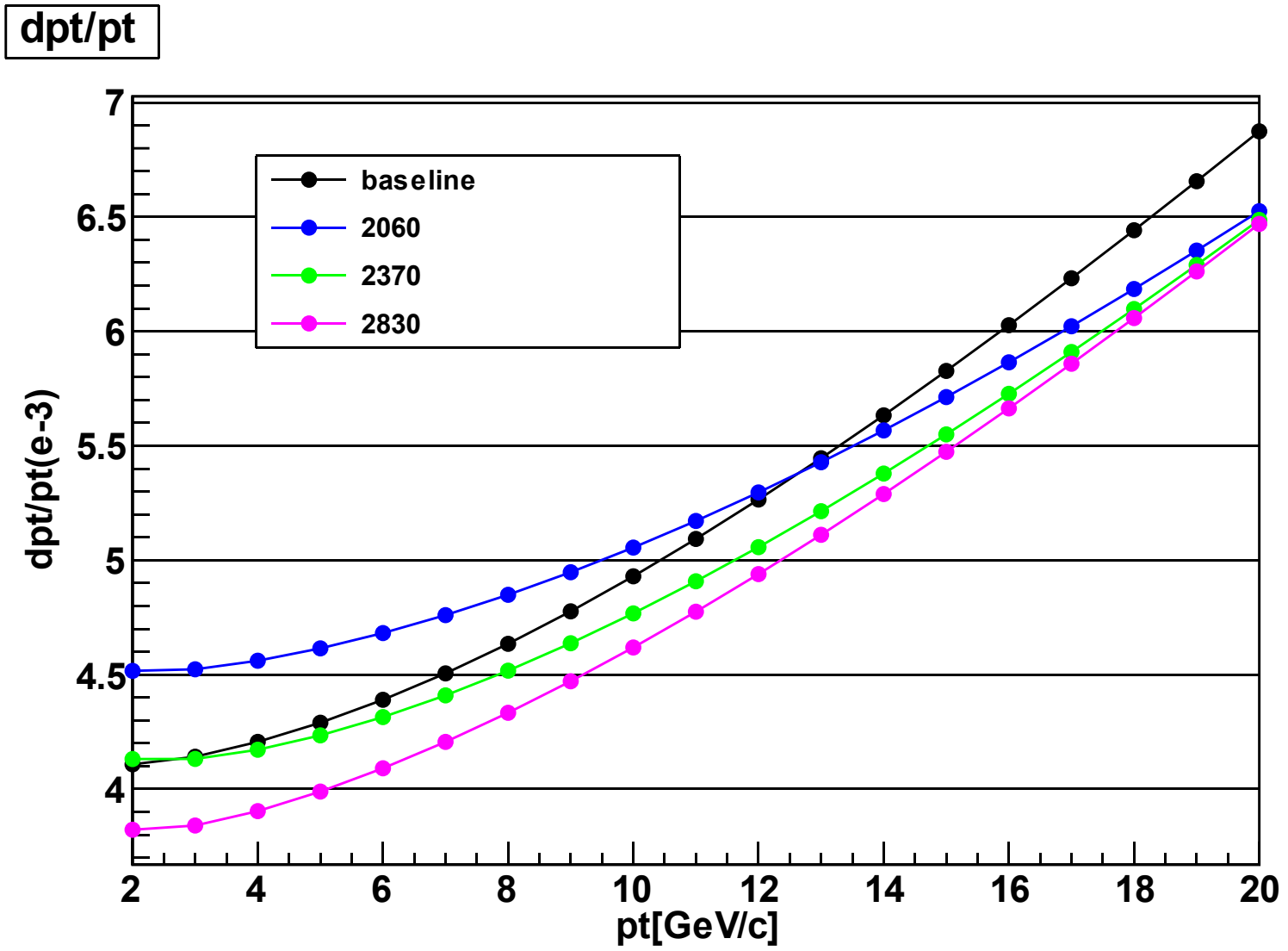
只放置一个disk，在不同的位置

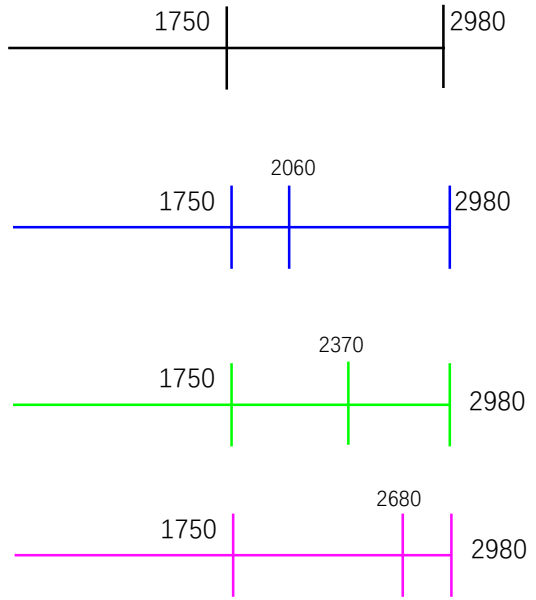




在只放一个disk的情况下，放在接近中间位置最好

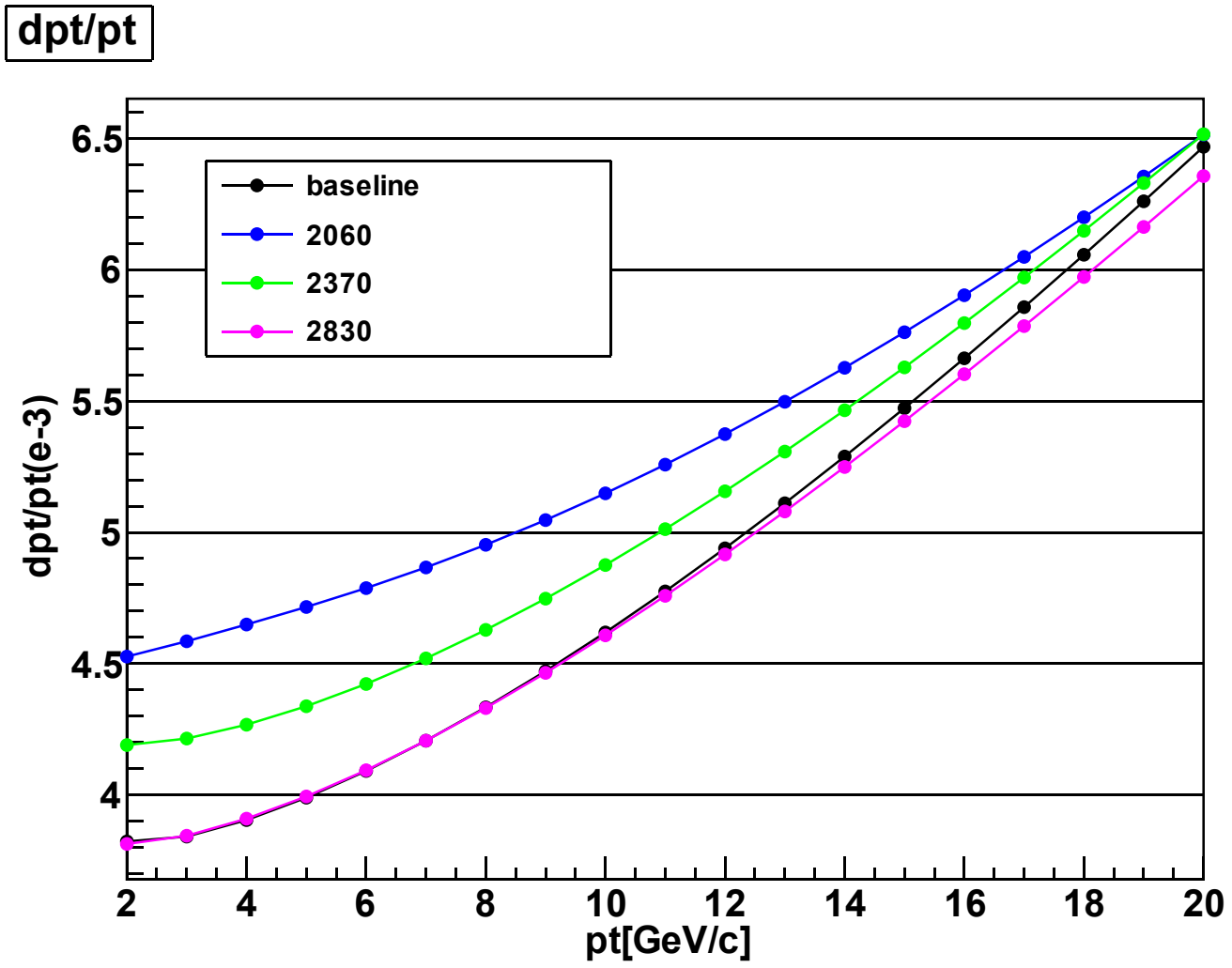
放置两个disk，最内层在1750mm

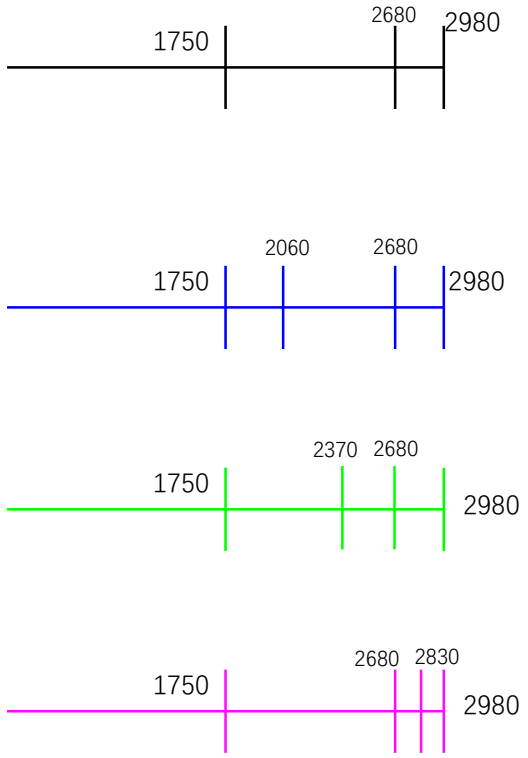




最内层在1750mm，放两个disk时，靠近外侧更好

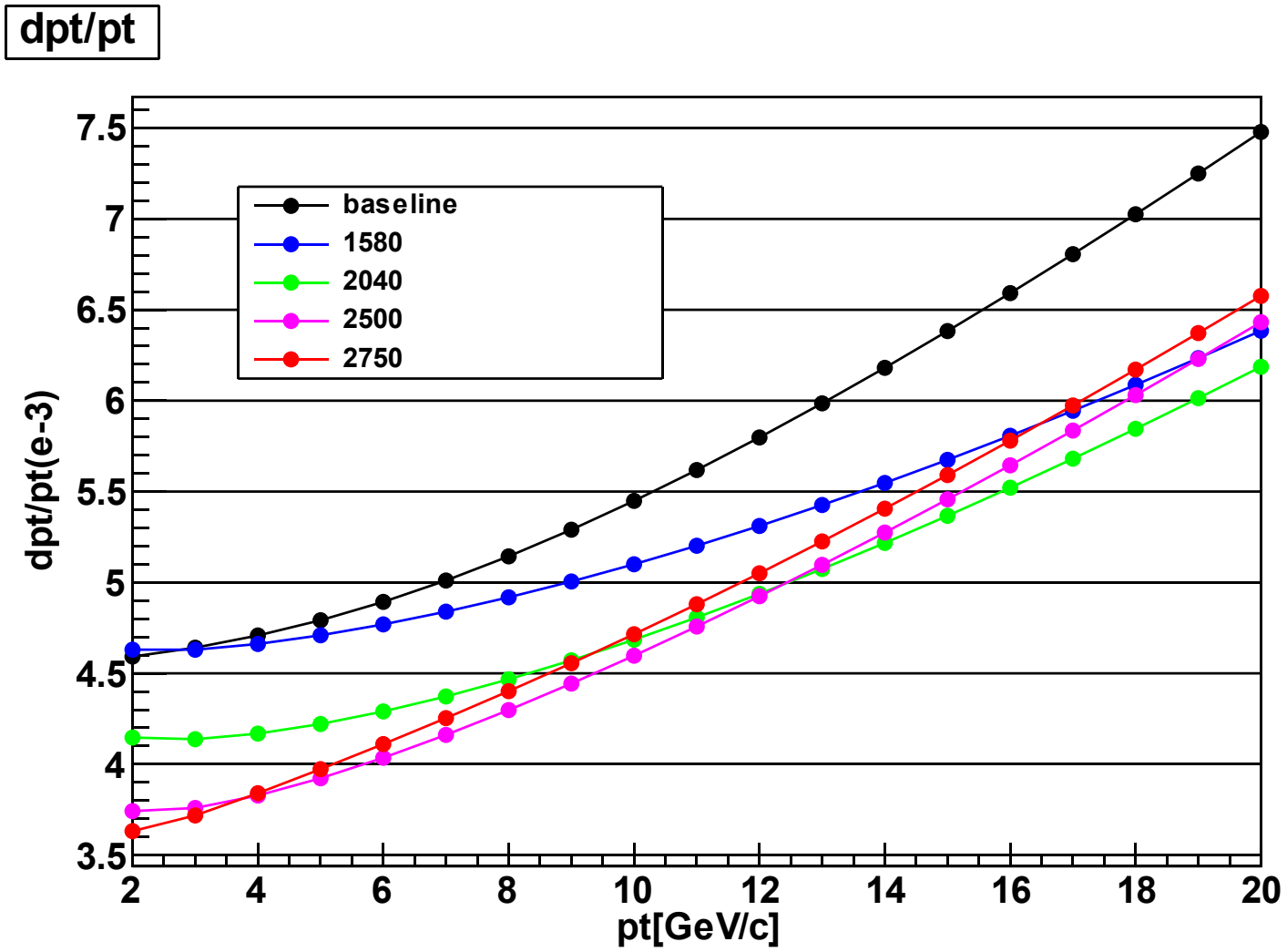
放置三个disk，最内层在1750mm

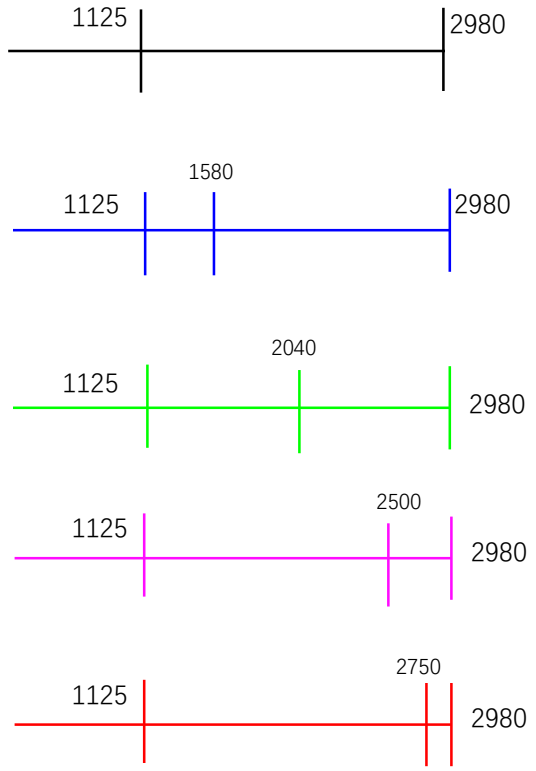




最内层在1750mm，放三个disk时，靠近外侧放更好

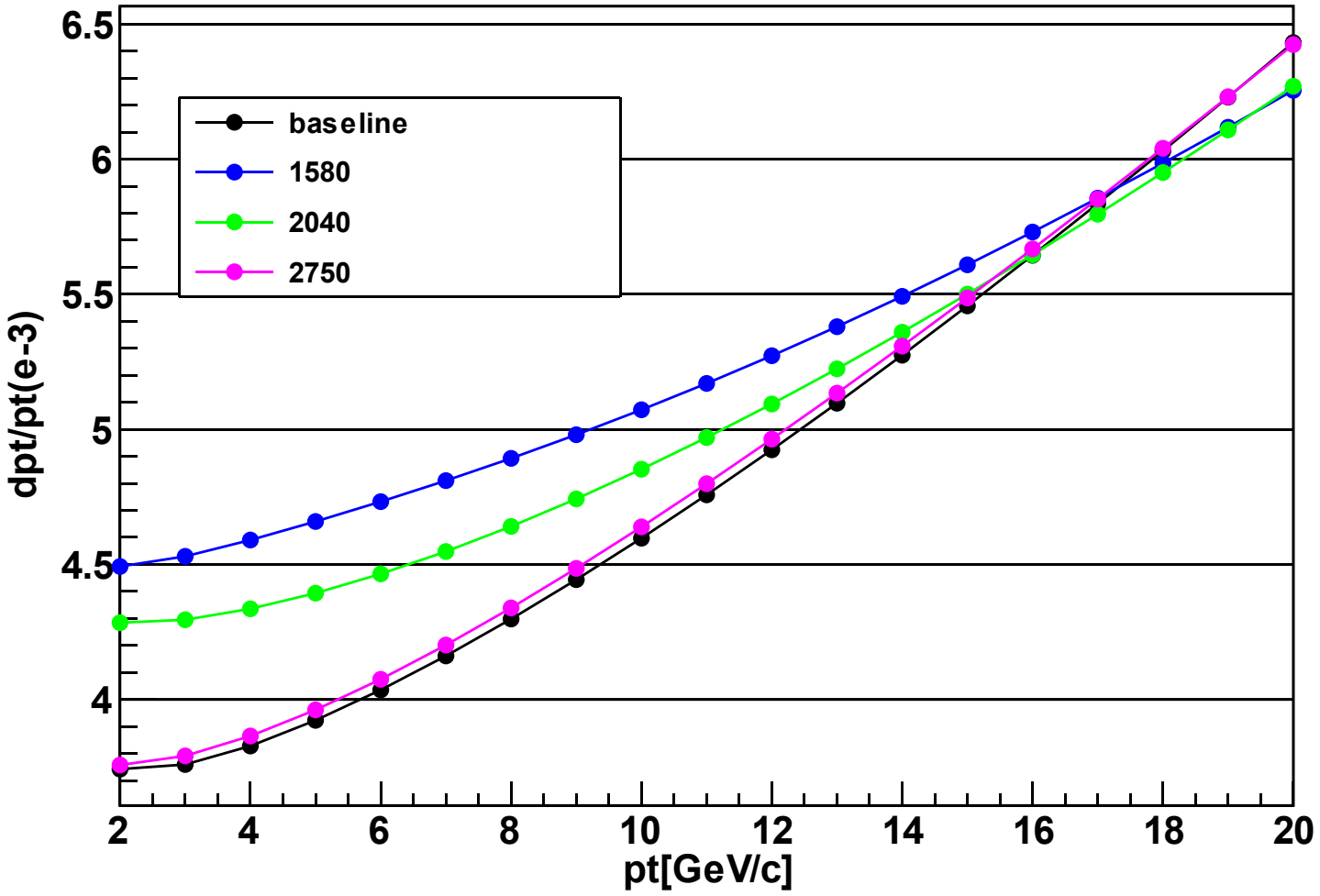
放置两个disk，最内层在1125mm

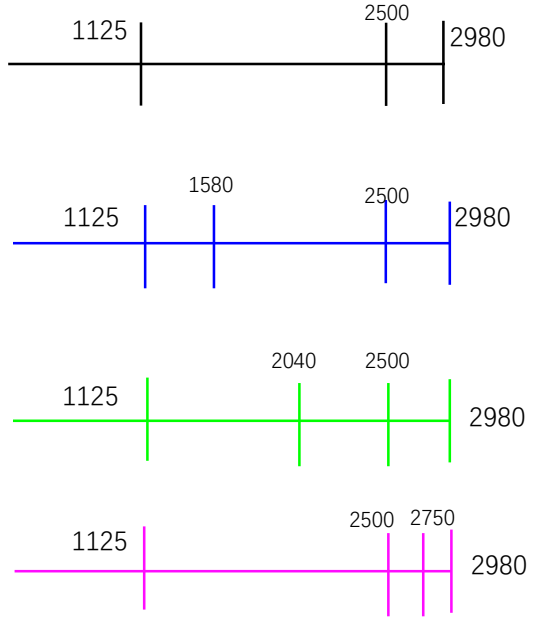




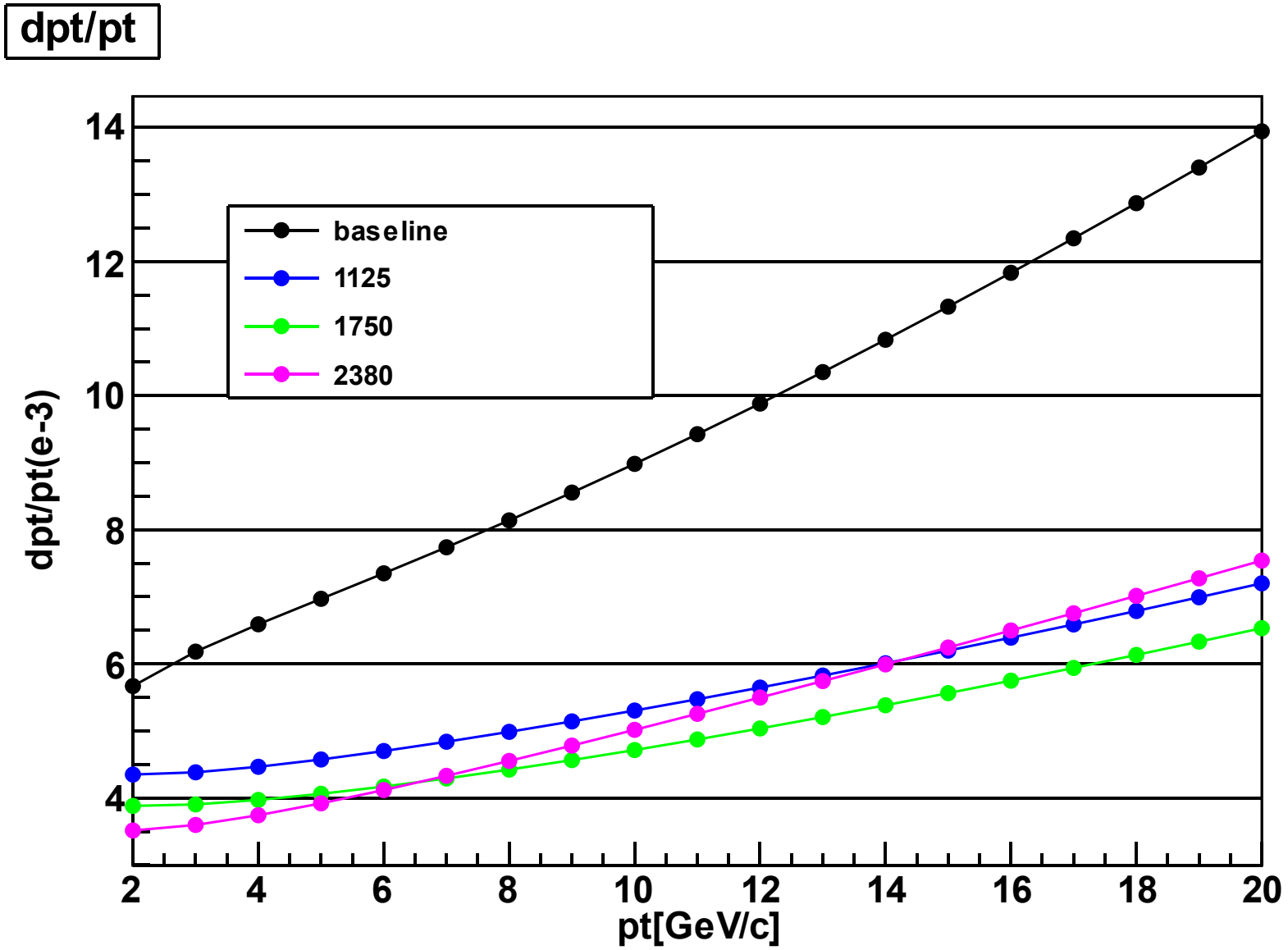
放置三个disk，最内层在1125mm

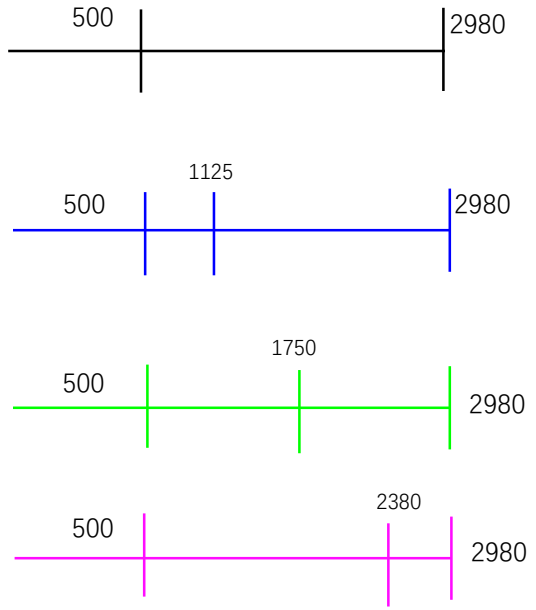
dpt/pt





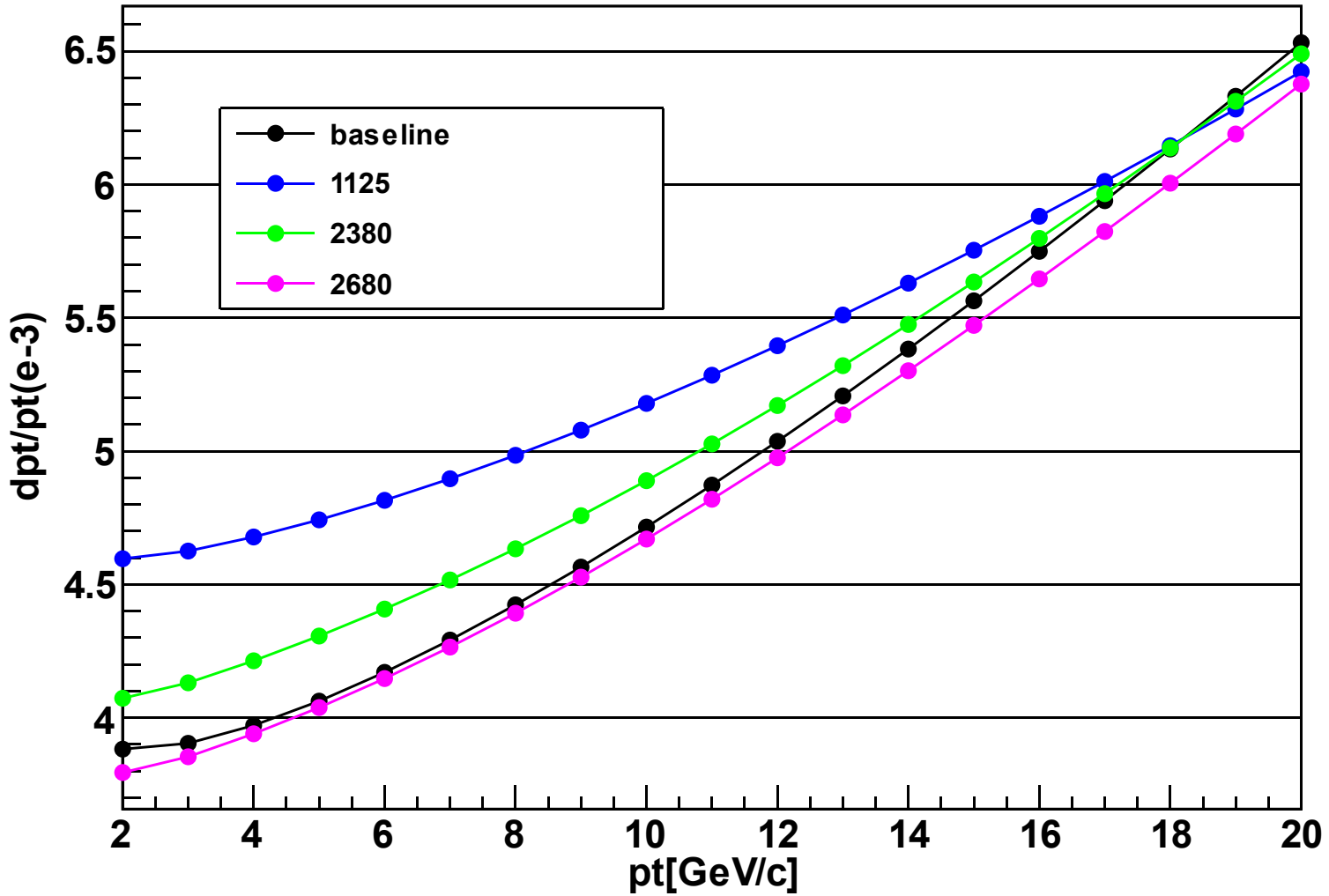
放置两个disk，最内层在500mm

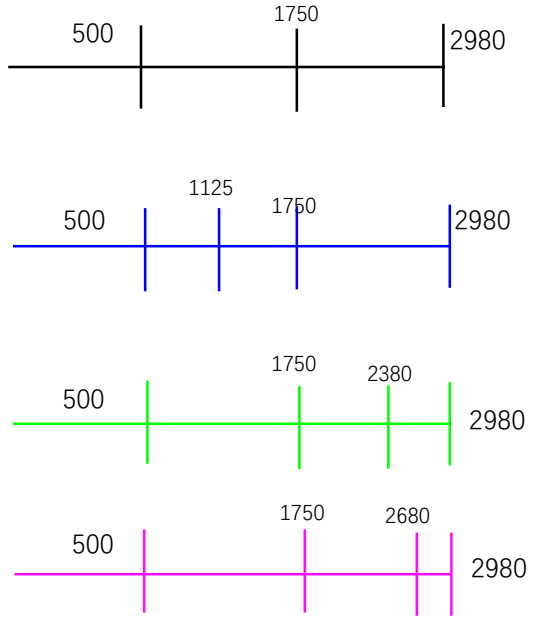




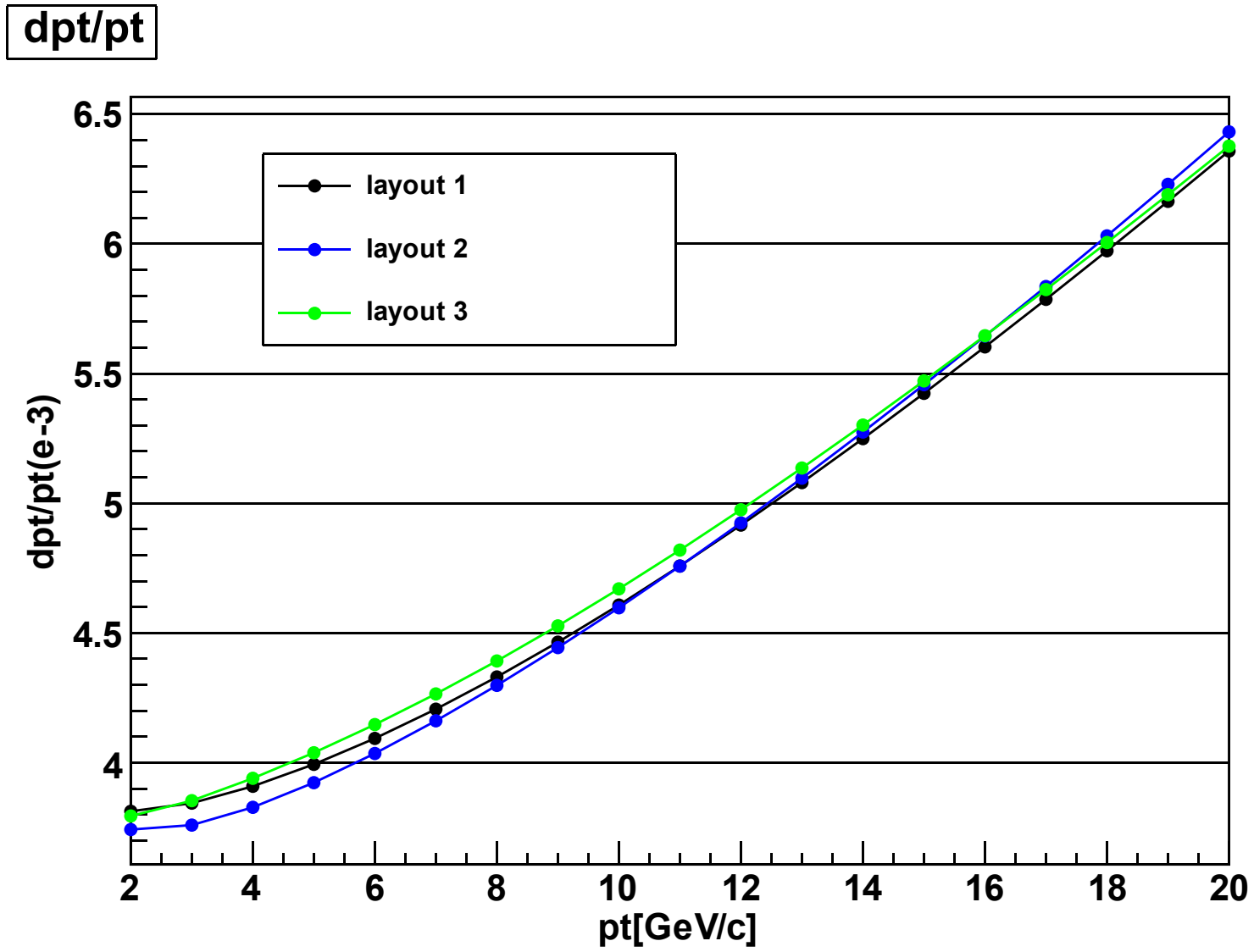
放置三个disk，最内层在500mm

dpt/pt

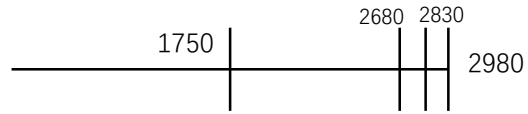




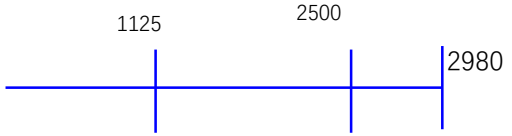
最优结果比较



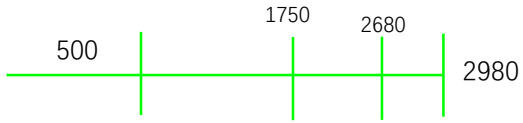
layout 1



layout 2



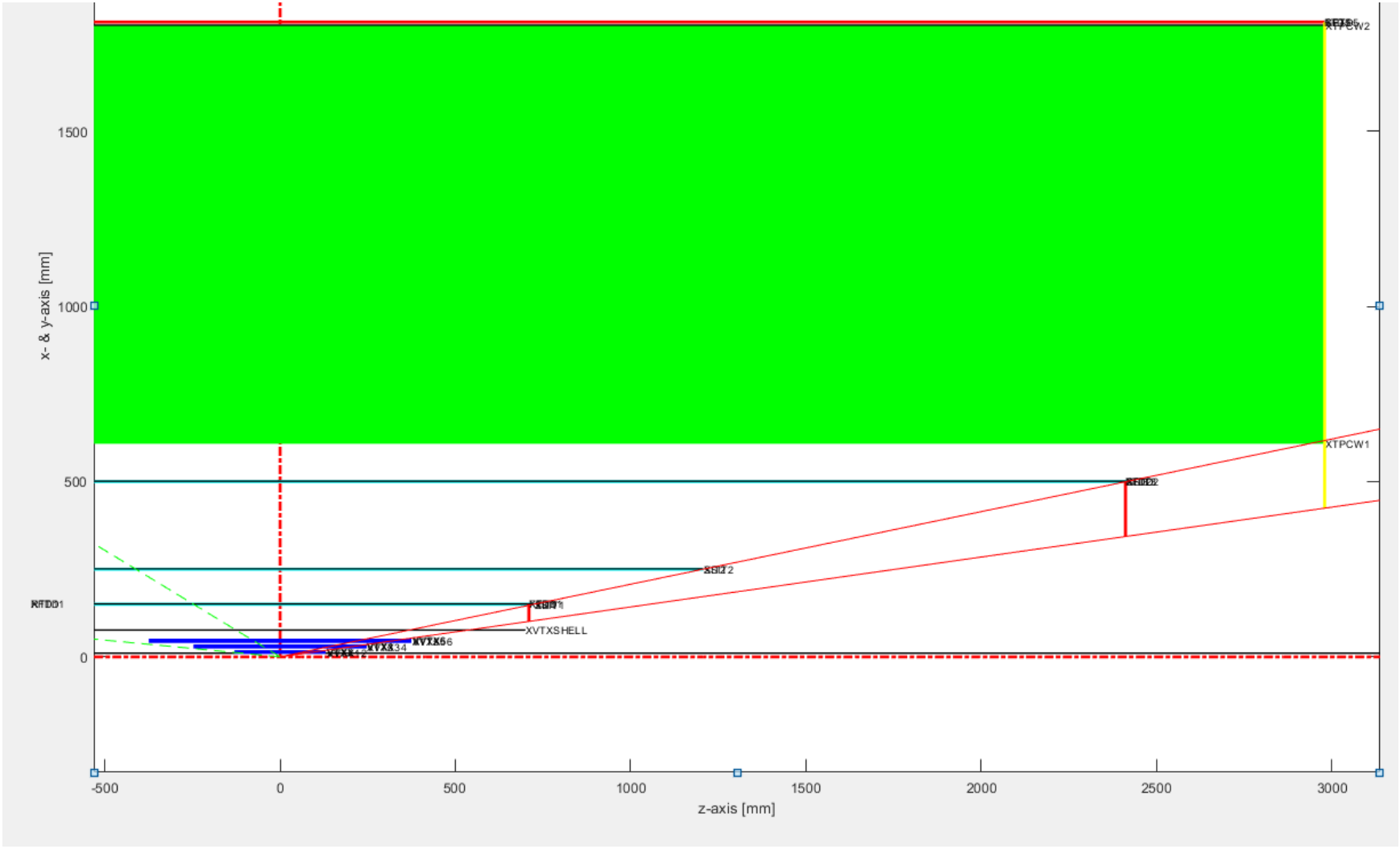
layout 3



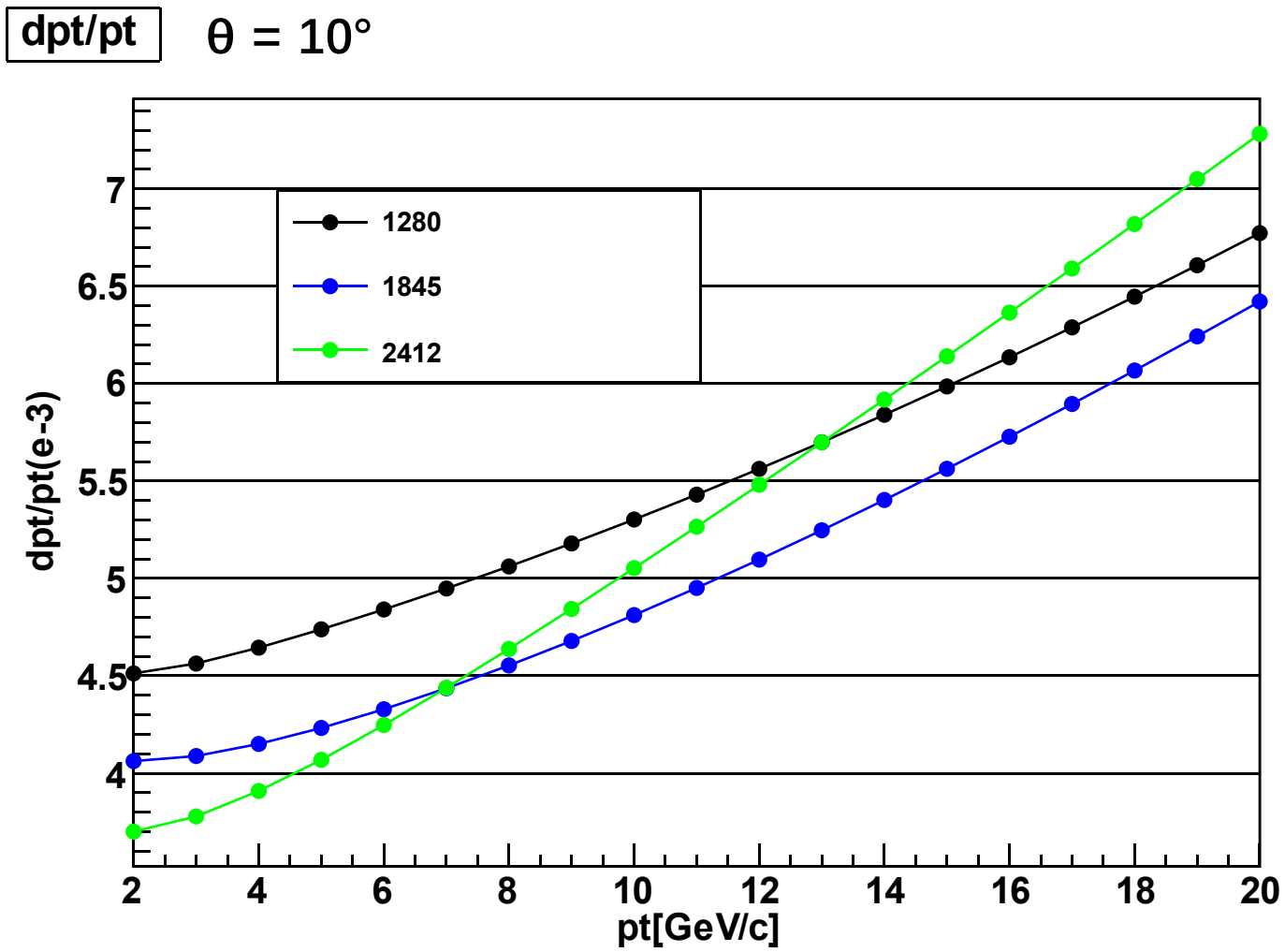
summary

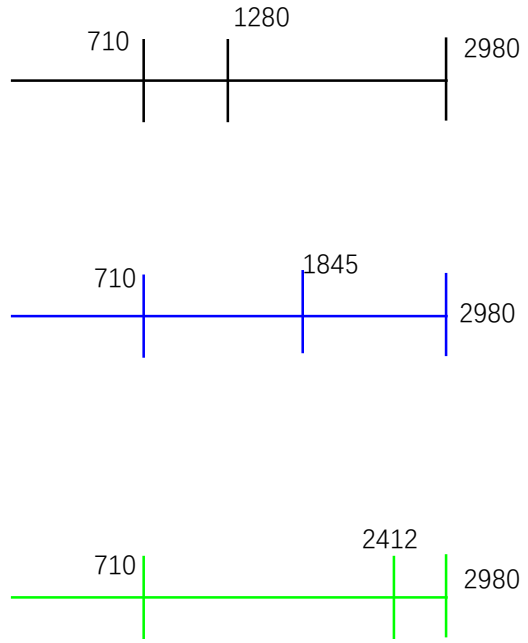
- disk的数目若为1时，放在中间位置结果最好
- disk数目为2或3时，动量分辨的相对差别较小在1‰以内；绝对值在3.5~8‰之间。
- 对disk的位置摆放，更倾向与靠近外侧或中间，动量分辨更好。

探测器几何二维示意图


1500
1000
500
0
x- & y-axis [mm]
XTPCW1
XVTXSHELL
-500
0
500
1000
1500
2000
2500
3000
z-axis [mm]

放置两个disk，最内层在710mm



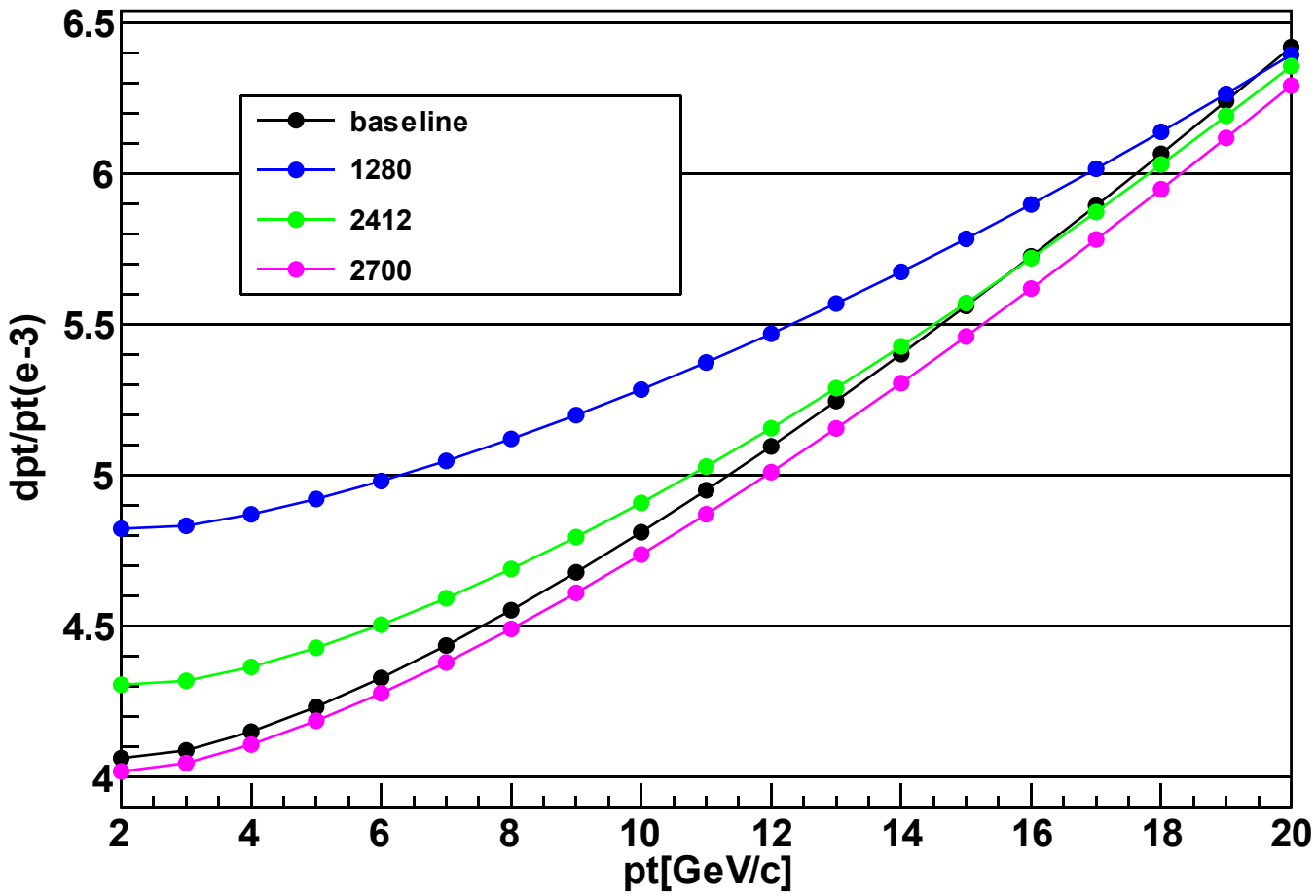


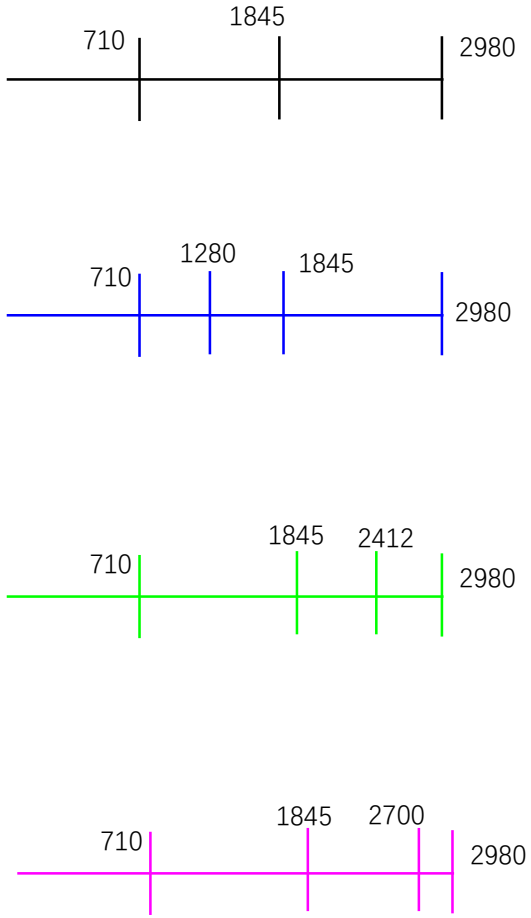
Pt	2	3	4	5	6	7
P	11.5	17.3	23.0	28.8	34.5	40.3

最内层在710mm，放两个disk时，
第二个disk越往外越好

放置三个disk，最内层在710mm

dpt/pt　　θ = 10°

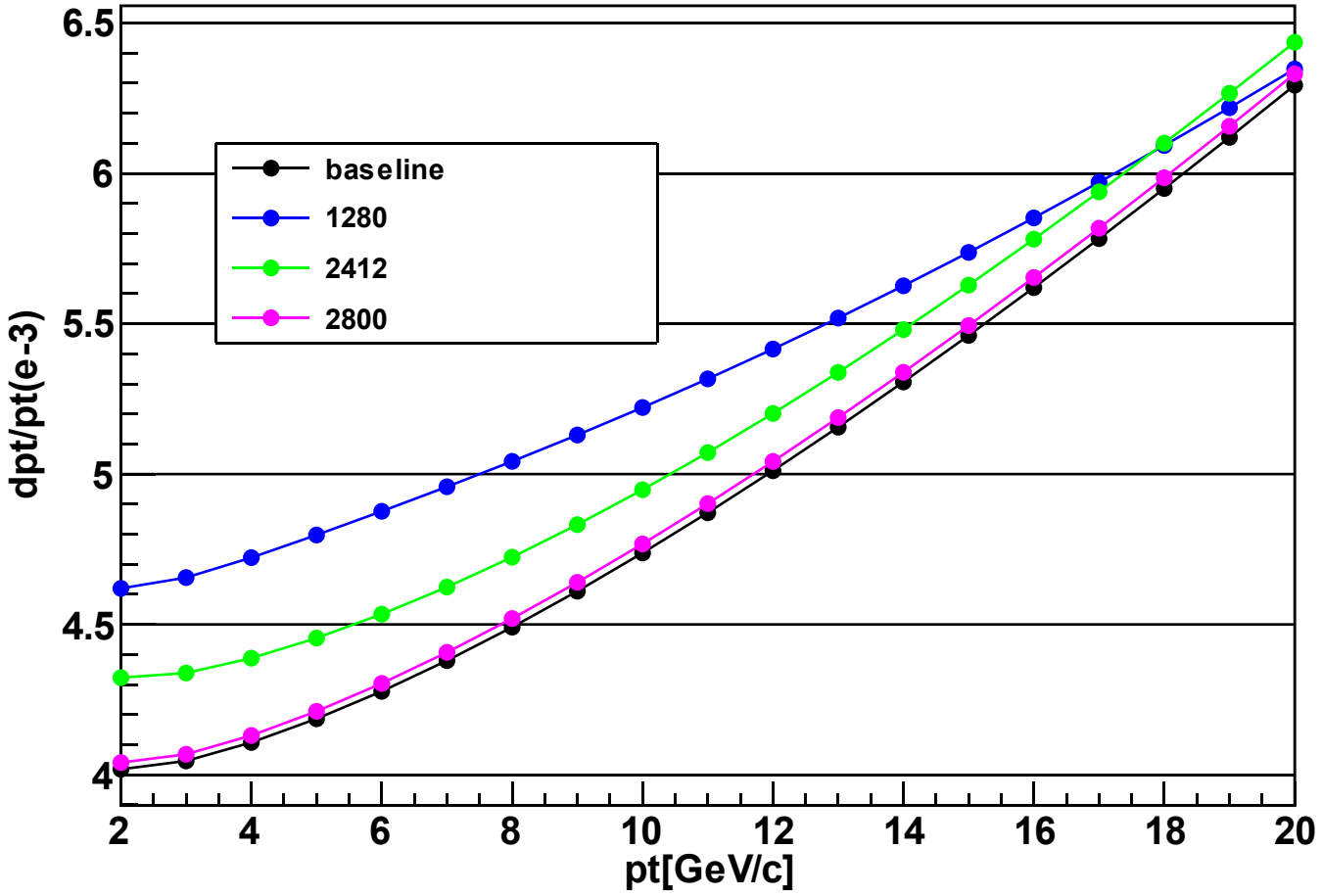


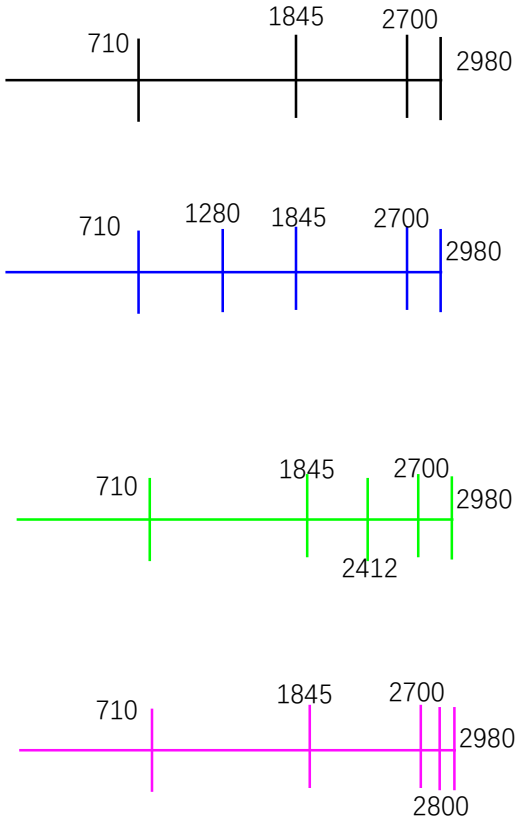


最内层在710mm，放三个disk时，
第三个disk越往外越好

放置四个disk，最内层在710mm

dpt/pt　θ = 10°





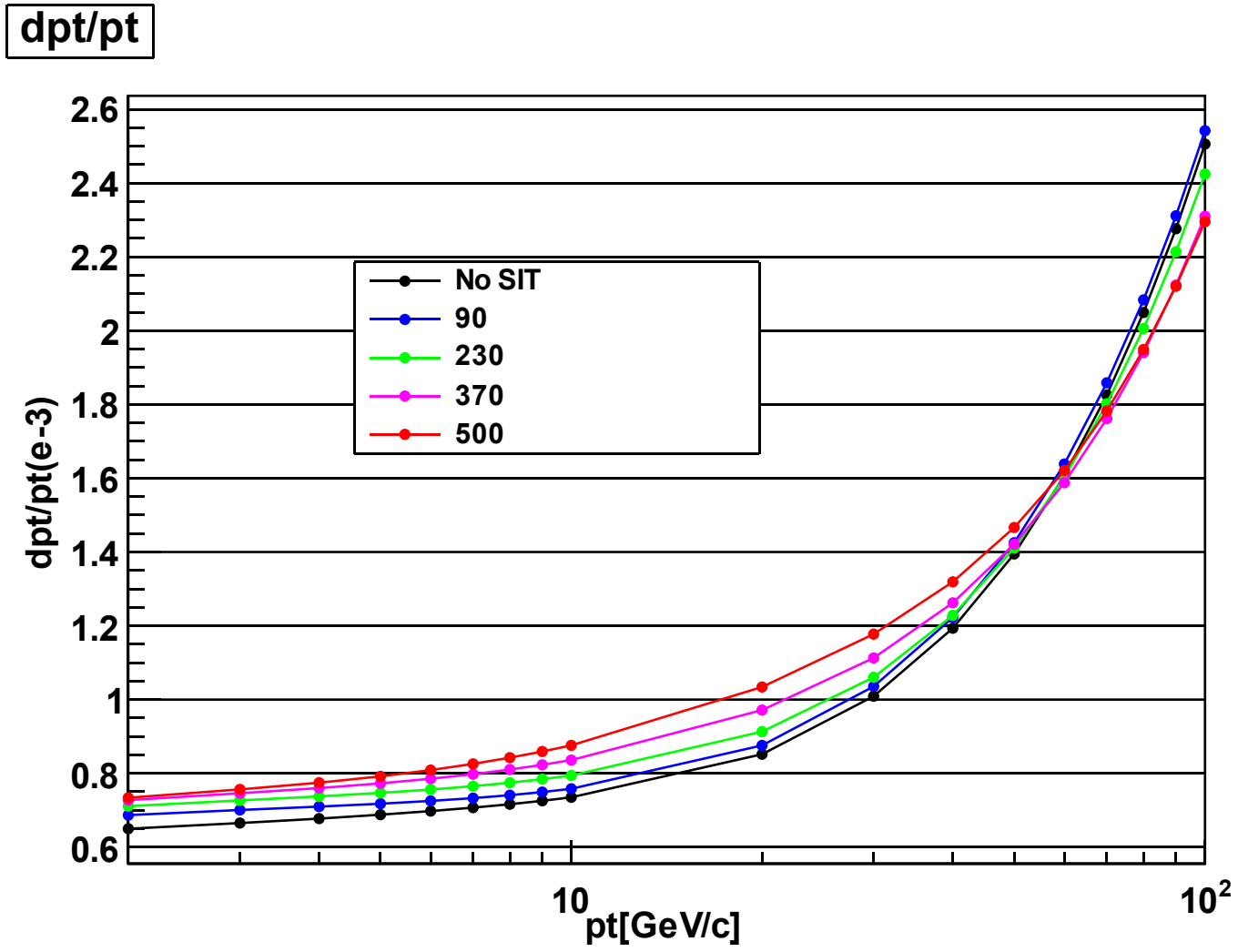
最内层在710mm，放四个disk时，
不如放三个disk

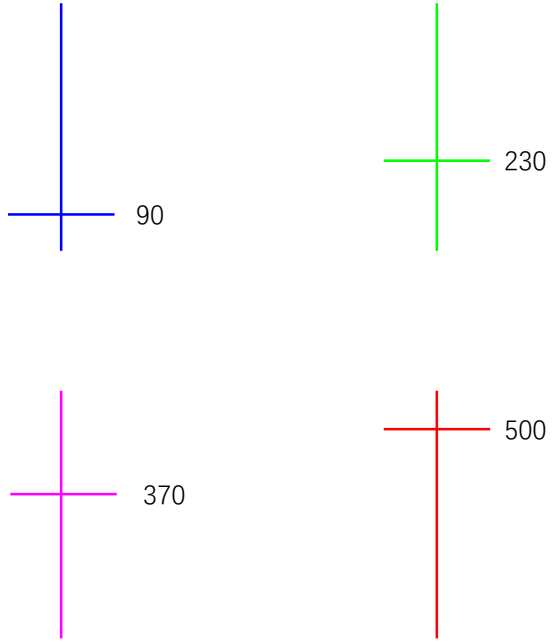
Tracker Dimension (Barrel)

Components	Radius(mm)	Half Z (mm)	$\sigma_{R\phi}(\mu m)$	$\sigma_Z(\mu m)$	Thickness(X_0 %)
Beam Pipe	10.35	-	-	-	0.172
VTX (3 double layers)	12.3/14.7/27.9/30.8/43.8/47.5	130/130/247/247374/374	**3/3/3/3/3/3**	**3/3/3/3/3/3**	0.17
VTX-shell	84		-	-	0.139
SITs (3 layers)	150/250/500	740/1340/1890	**7.2**	**86.6**	0.650
TPC inner wall	610	2980	-	-	0.110
TPC cell	612-1800	-	**80**	**1000**	0.000239×186
DC outer wall	1802	-	-	-	1.349
SET	1811	2980	**7.2**	**28800**	0.182

筒部一层SIT和没有SIT动量分辨的对比

θ = 85°

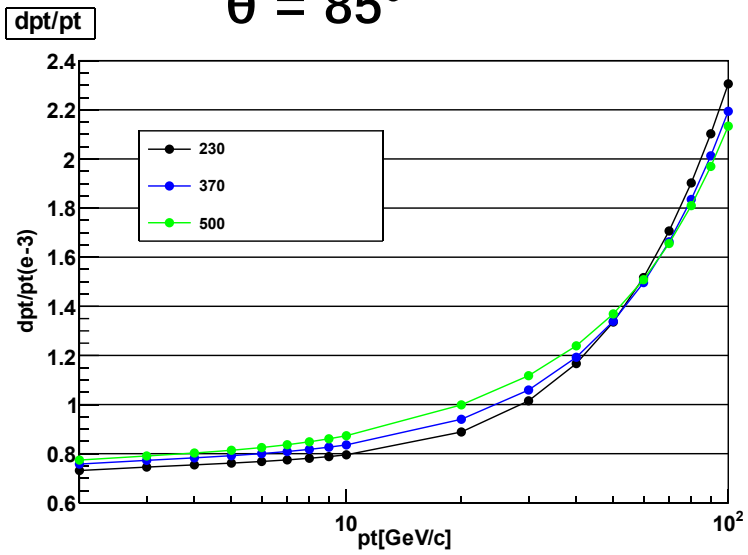




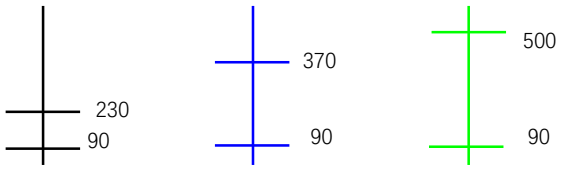
在较低动量只放一层时，越靠近内侧越好

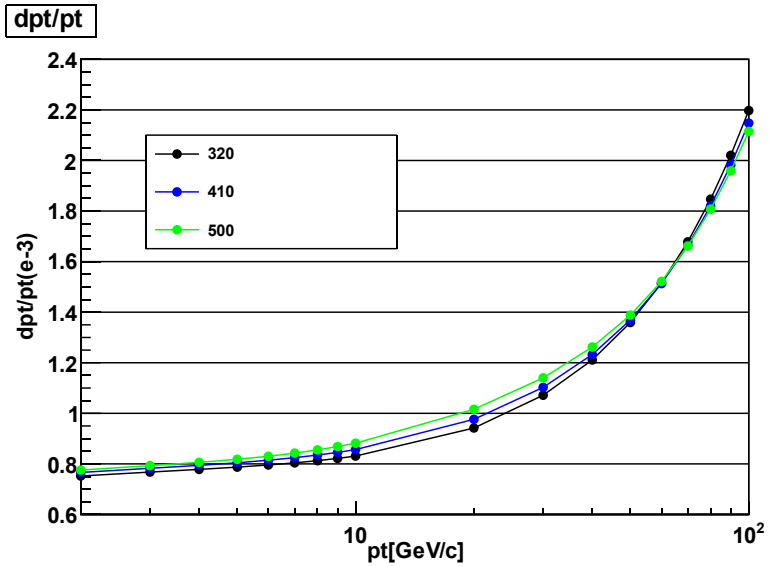
筒部放两层SIT各位置动量分辨对比

θ = 85°

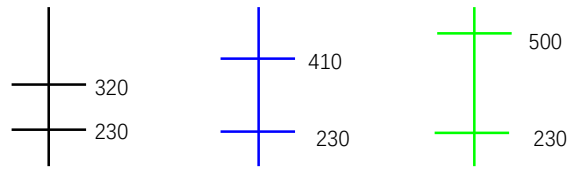


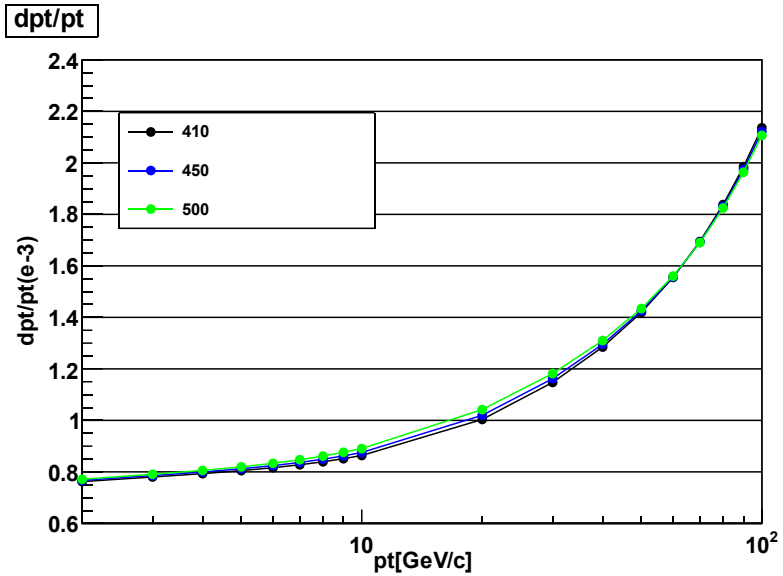
第一层SIT R= 90mm
dpt/pt：~0.75-2.3



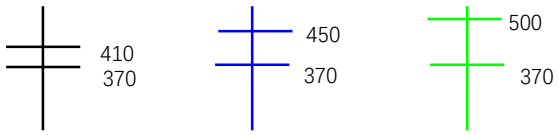


第一层SIT R= 230mm
dpt/pt：~0.75-2.2





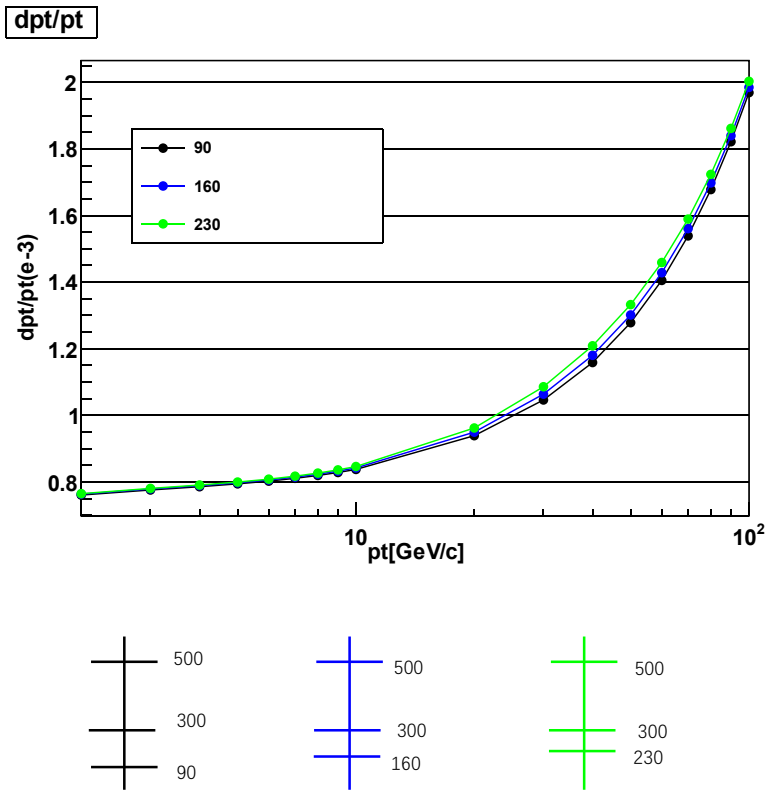
第一层SIT R= 370mm
dpt/pt：~0.75-2.1

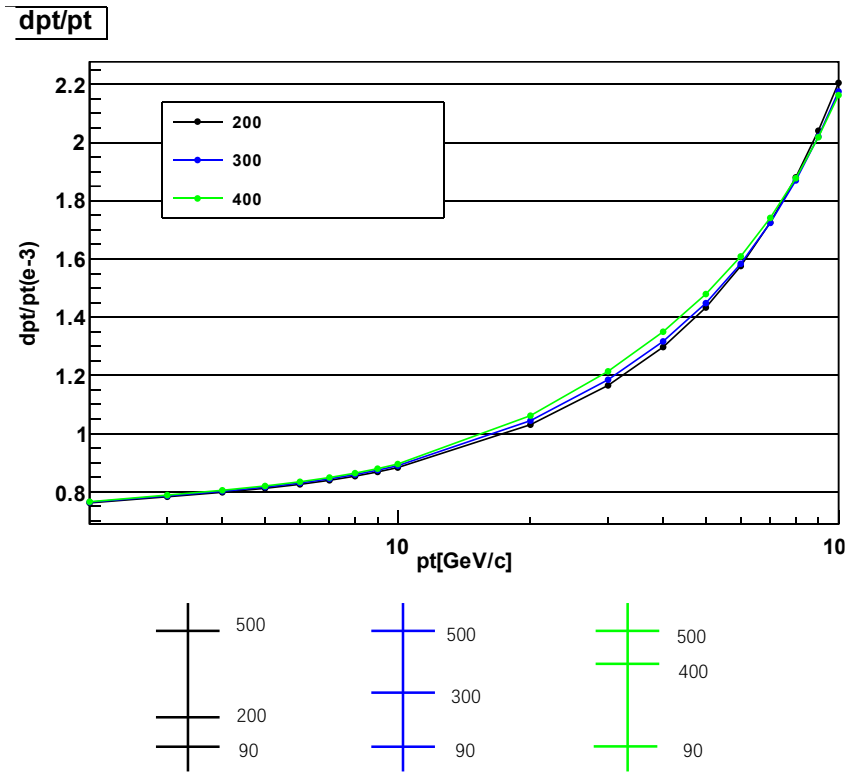


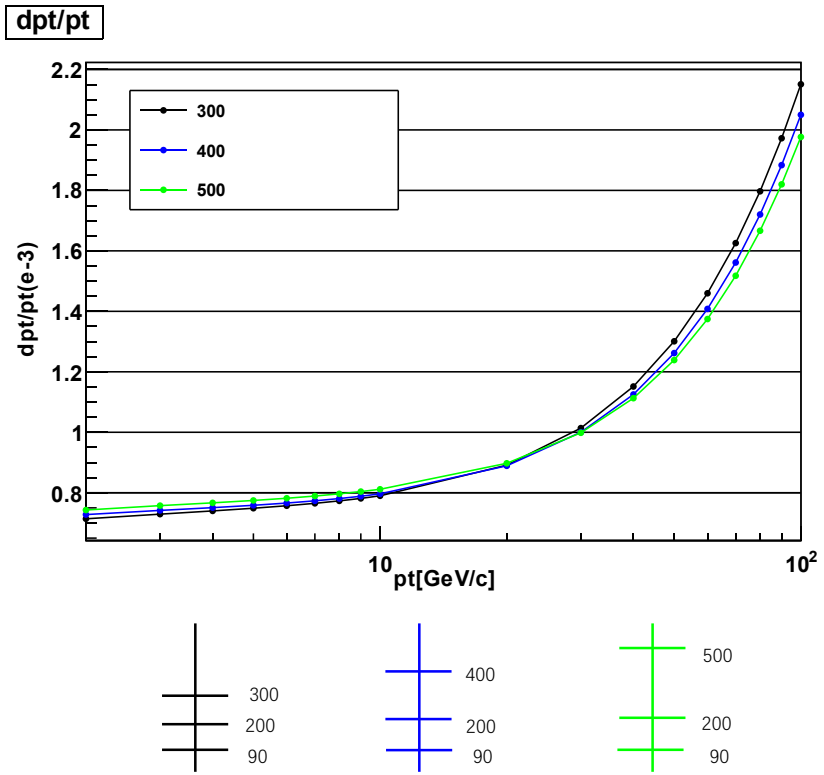
低动量时越靠近内侧越好。

筒部放三层SIT各位置动量分辨对比

θ = 85°

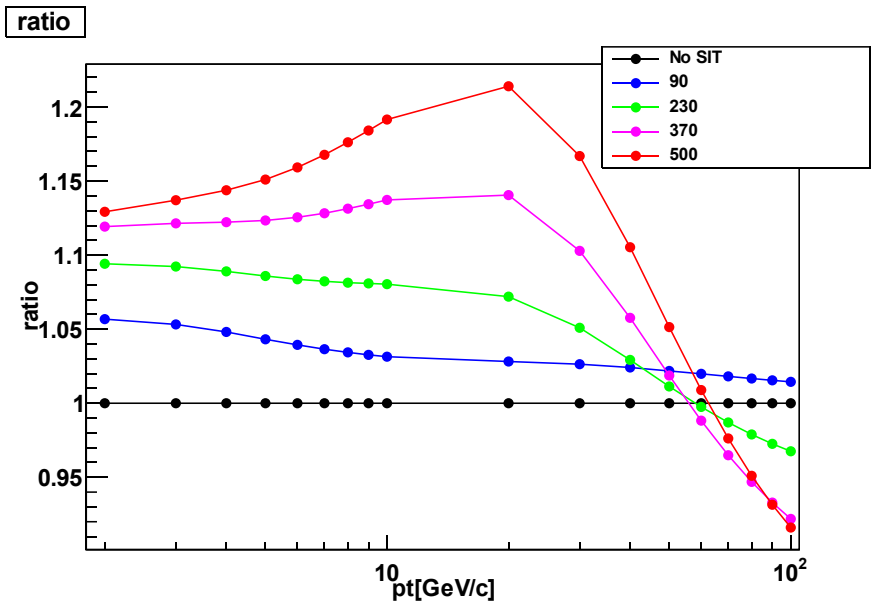


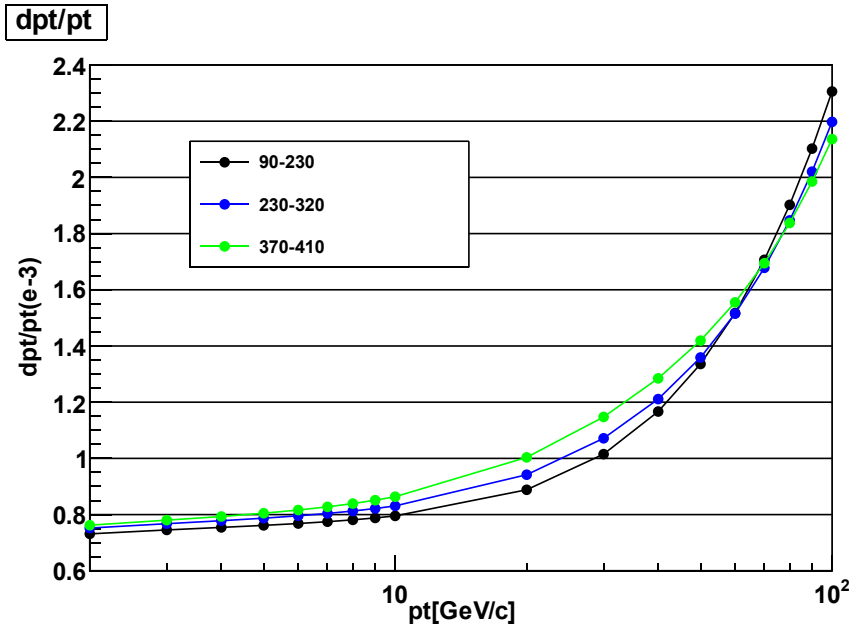




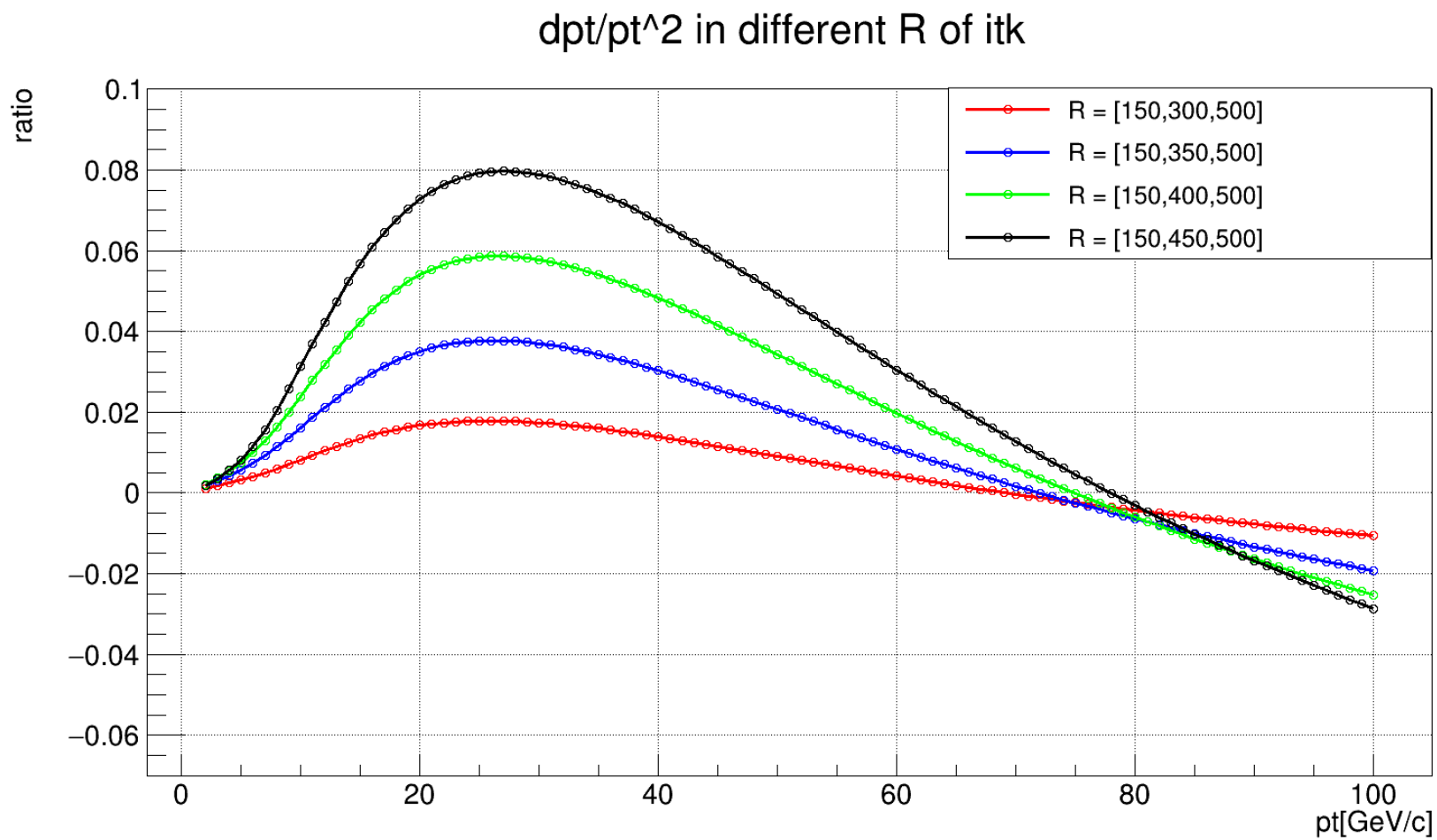
低动量时越靠近内侧越好。

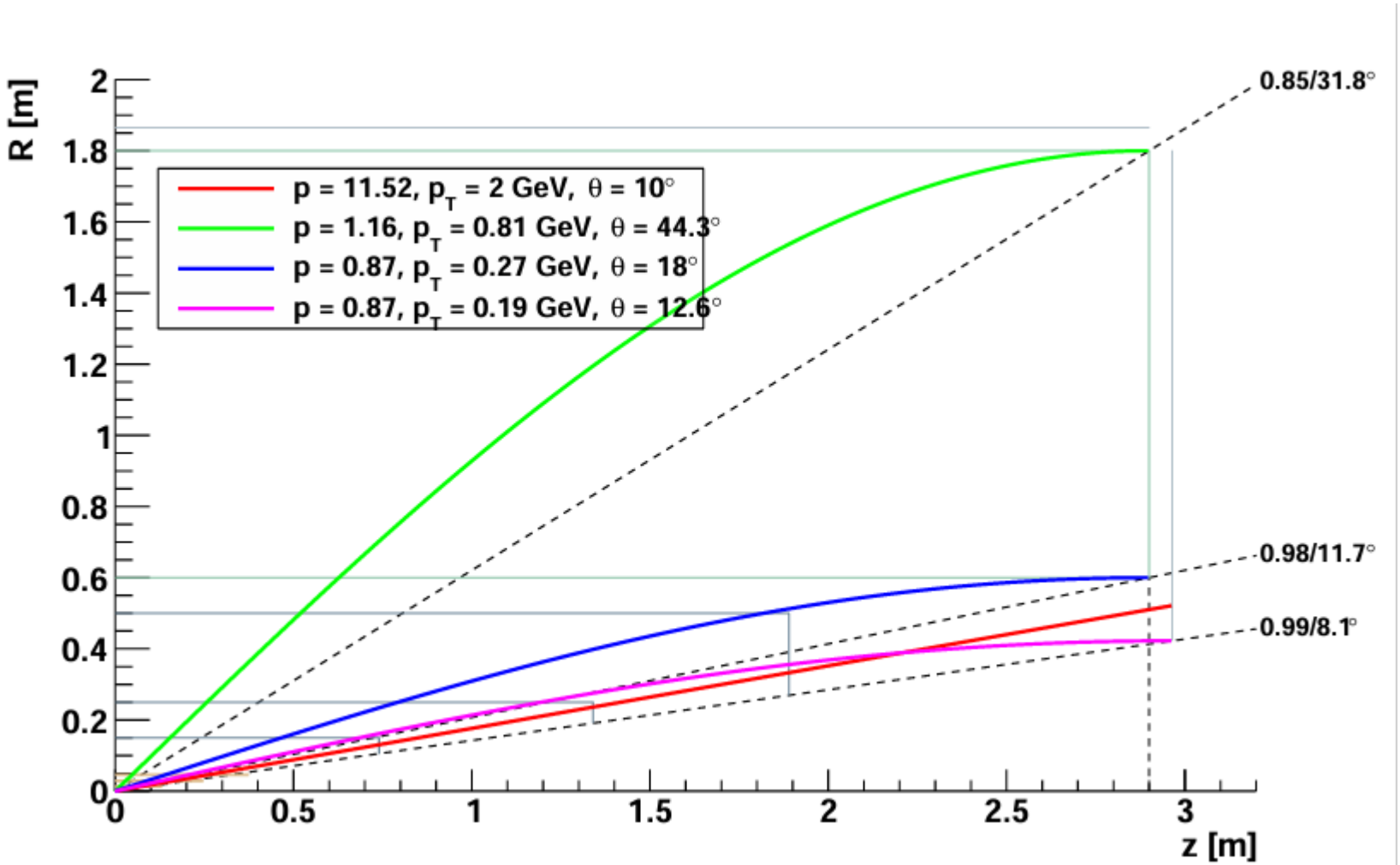
Back up





ratio of
0 SIT&1 SIT


dpt/pt^2 in different R of itk
ratio
0.1
0.08
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
0
20
40
60
80
100
pt[GeV/c]
R = [150,300,500]
R = [150,350,500]
R = [150,400,500]
R = [150,450,500]


R [m]
z [m]
p = 11.52, p_T = 2 GeV, θ = 10°
p = 1.16, p_T = 0.81 GeV, θ = 44.3°
p = 0.87, p_T = 0.27 GeV, θ = 18°
p = 0.87, p_T = 0.19 GeV, θ = 12.6°
0.85/31.8°
0.98/11.7°
0.99/8.1°