

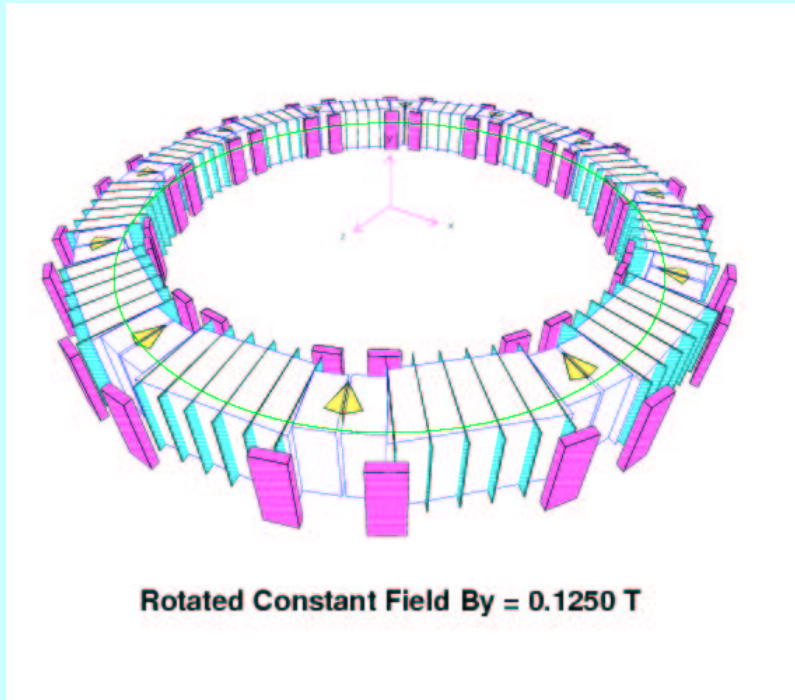
RFOFO in GEANT Status

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- GEANT Simulation
 - **Geometry and Material**
 - **GRID Magnetic Fields**
- RF Cavities Tuning
- Beam Profile
- GEANT Output
- Emittance Calculation

GEANT Simulation



- 12 cells and each cell is 2.75 m long
- RF frequency is 201.25 MHz
- Overall dipole B is 0.125 Tesla
- Alternating Solenoids B is ± 3.0 Tesla
- RFOFO's circumference is 33.43 m

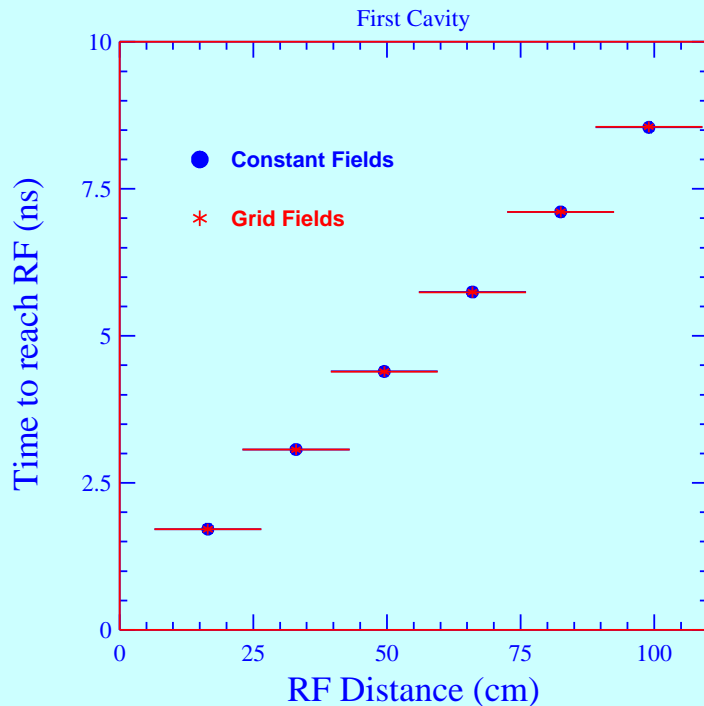
GRID Magnetic Fields

- We determine the closed orbit using constant magnetic fields
- We generate 1cm x 1cm x 1cm GRID fields map with tilt angle of 53 mrad (S. Bracker, MUCOOL-271)
- Satisfy fundamental Maxwell's equations
 $\Rightarrow \nabla \cdot B = 0$ and $\nabla \times B = 0$
- We use FINT interpolation routine with result of 10^{-4} Tesla differences compared to the real fields
- We applied the GRID fields into GEANT with satisfying its geometry

RF & Wedges

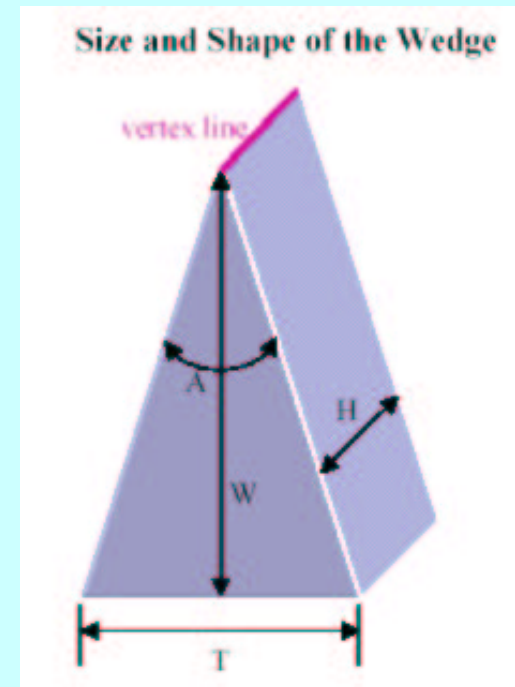
RF Tuning

File: rf_times.dat						
ID	IDB	Symb	Date/Time	Area	Mean	R.M.S.
200	0	-41	000000/0000	30.58	70.60	25.14
300	0	-48	000000/0000	30.58	70.62	25.14



- Time to reach the first RF cavity is 1.7 ns
- Constant B fields gives the same result in timing compared to the GRID fields

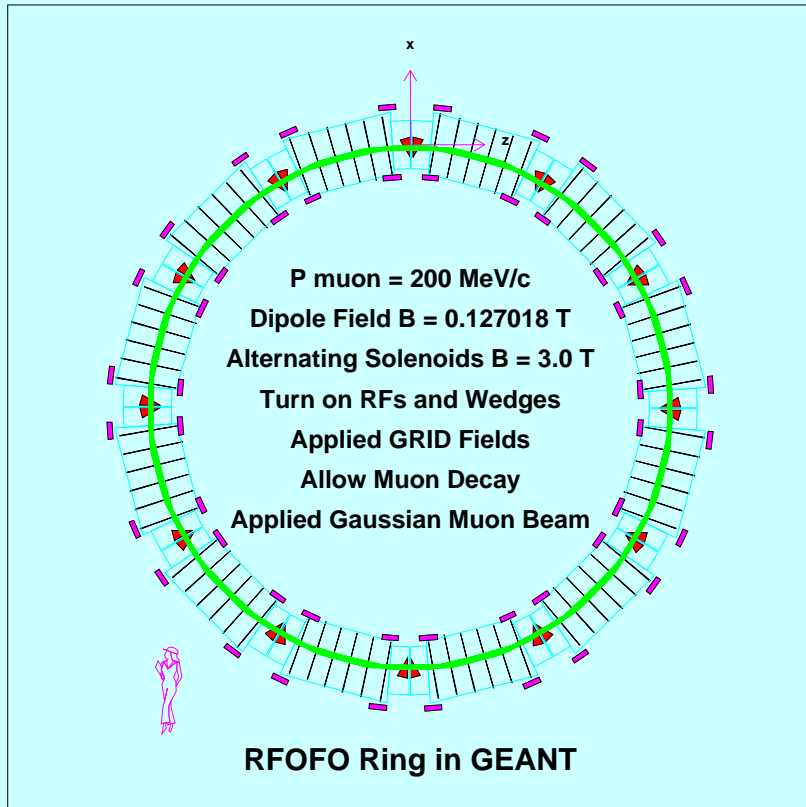
Wedges Profile



- $W = 40$ cm, $H = 40$ cm, $T = 62.56$ cm
- Wedges are made of liquid hydrogen with a full angle $A = 76.93^\circ$ at vertex
- **No windows at the moment**

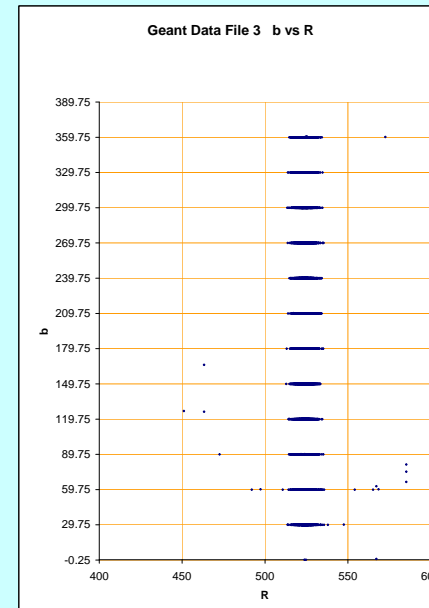
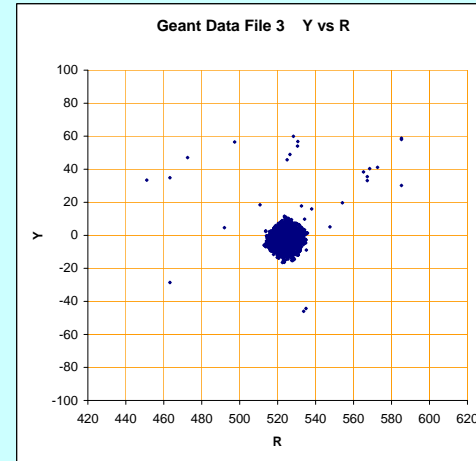
μ -Beam in RFOFO Ring

RFOFO Ring



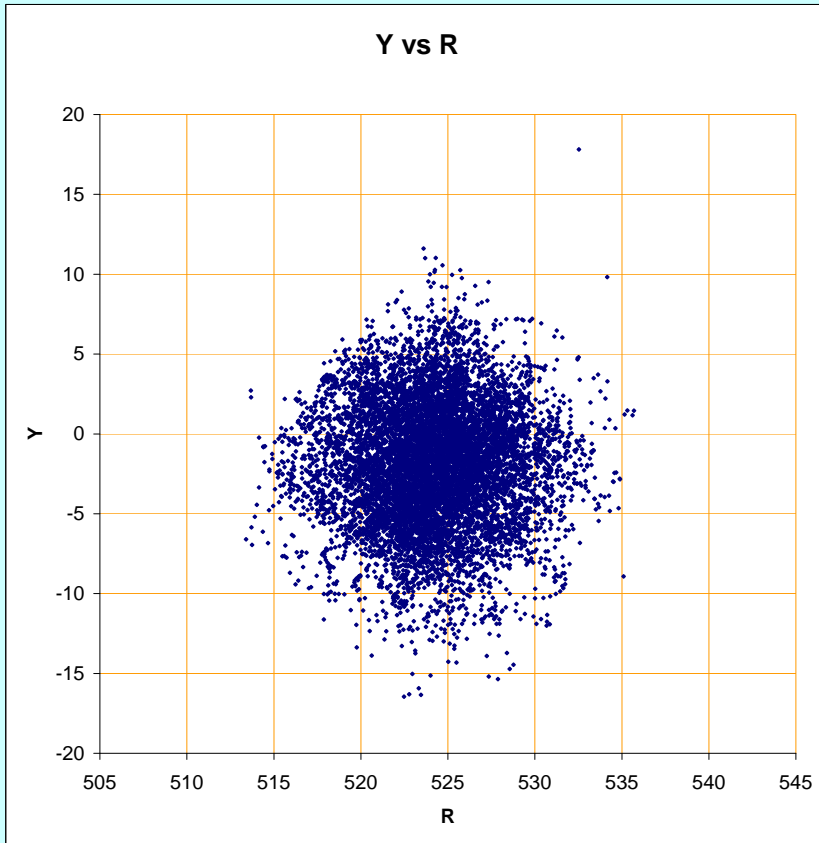
- Injection point: $X=Y=0\text{cm}$; $Z=525.2\text{ cm}$
- $R \equiv$ radial distance of particles from center of the ring

Radial Position vs Y Direction



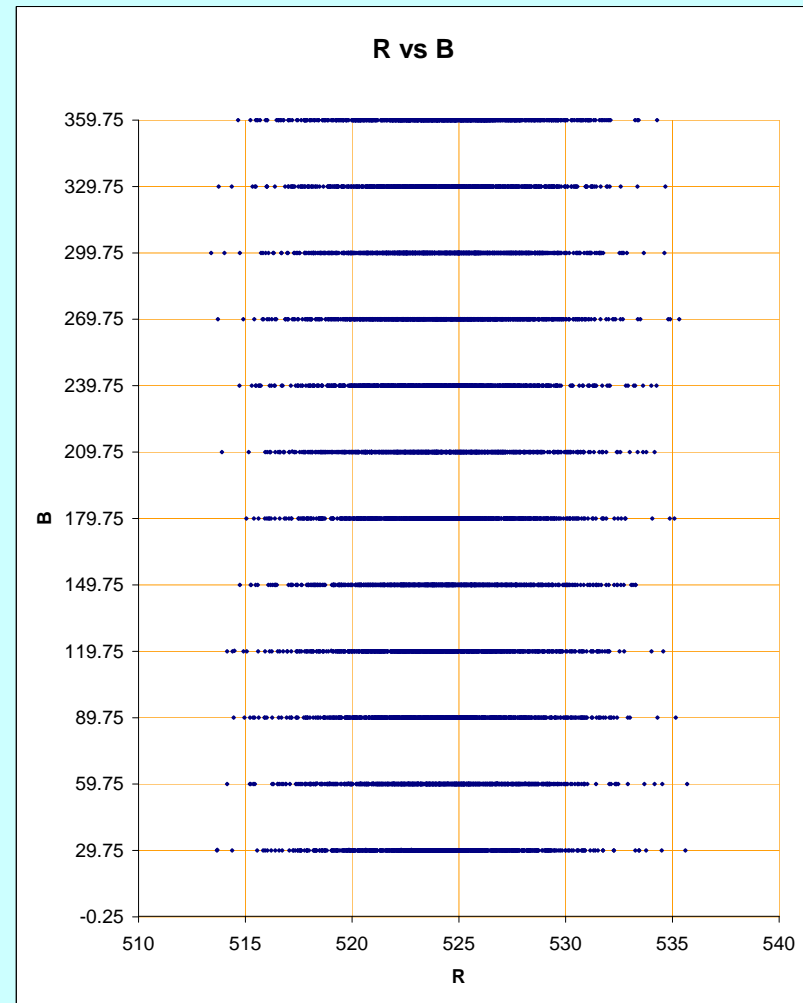
BEAM PROFILE

Cleaning Up The Beam Noise



- $513.2 < R < 537.2$ cm
- $-30 < Y < 30$ cm

Position Angle vs Radial Distance



The μ -beam is cleaned

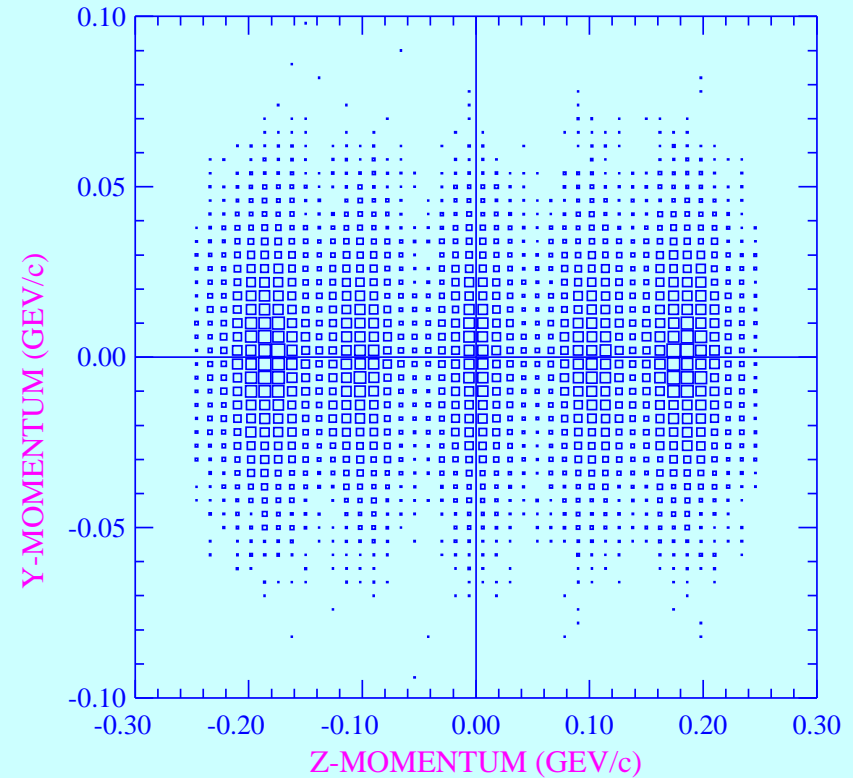
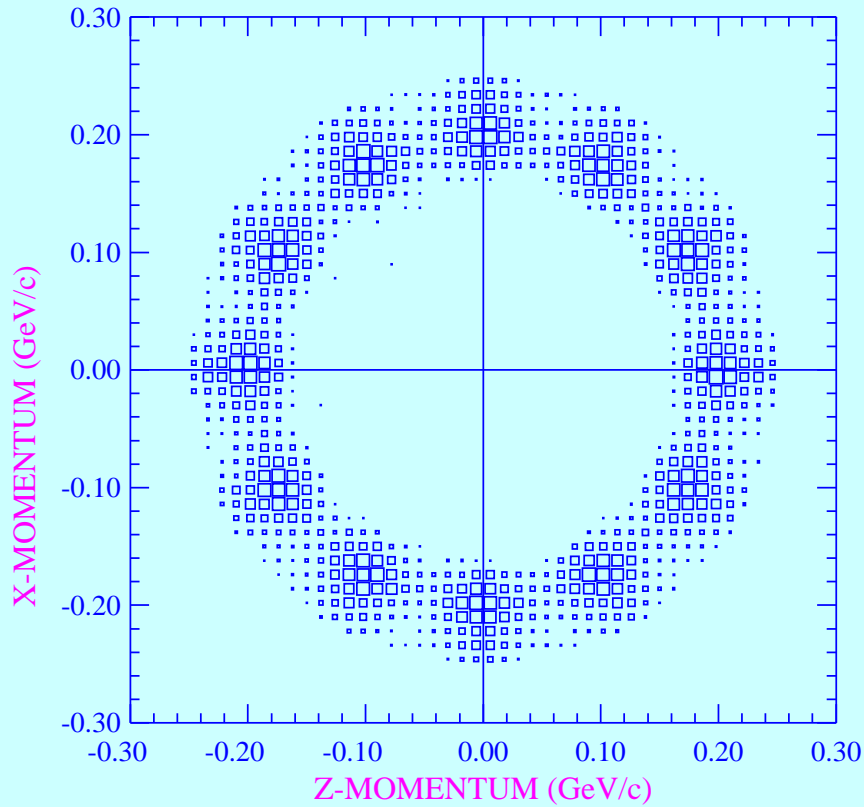
BEAM PROFILE

P_x vs P_z

P_y vs P_z

File: plot_noxvar.plt

ID	IDB	Symb	Date/Time	Area	Mean	R.M.S.
42	0	12	040308/1629	3.8690E+04	-1.0573E-03 3.4593E-04	0.1452 2.1242E-02



- The particle's parameters is recorded in each cell (12 cells)

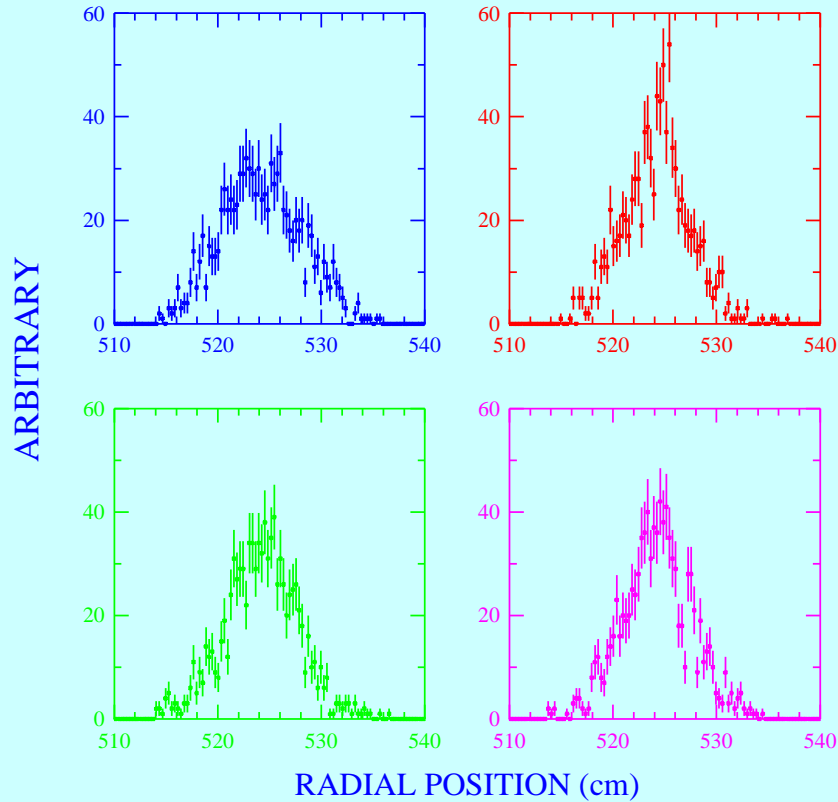
- Momentum profile in Y-Z (GeV/c)

GEANT Output

Radial Position

File: plot_10turn.plt

ID	IDB	Symb	Date/Time	Area	Mean	R.M.S.
30	0	-31	040308/1332	967.0	524.2	3.915
230	0	-31	040308/1330	960.0	524.2	3.250
330	0	-31	040308/1337	957.0	524.2	3.603
430	0	-31	040308/1337	963.0	524.2	3.385

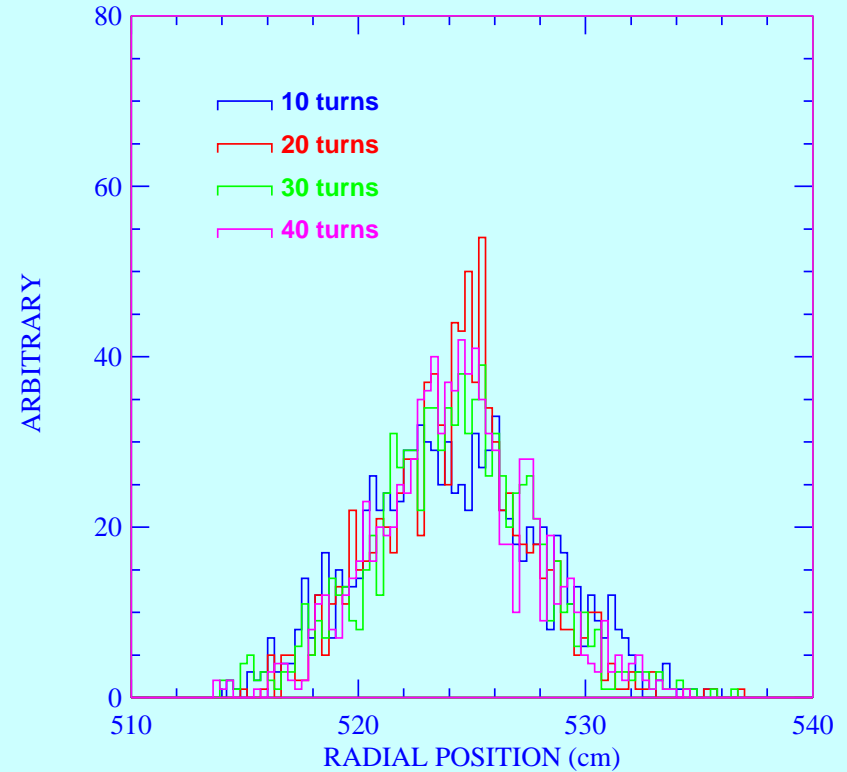


- Radial position for 10-40 turns

Radial Position Overlay

File: plot_10turn.plt

ID	IDB	Symb	Date/Time	Area	Mean	R.M.S.
30	0	1	040308/1332	967.0	524.2	3.915
230	0	1	040308/1330	960.0	524.2	3.250
330	0	1	040308/1337	957.0	524.2	3.603
430	0	1	040308/1337	963.0	524.2	3.385

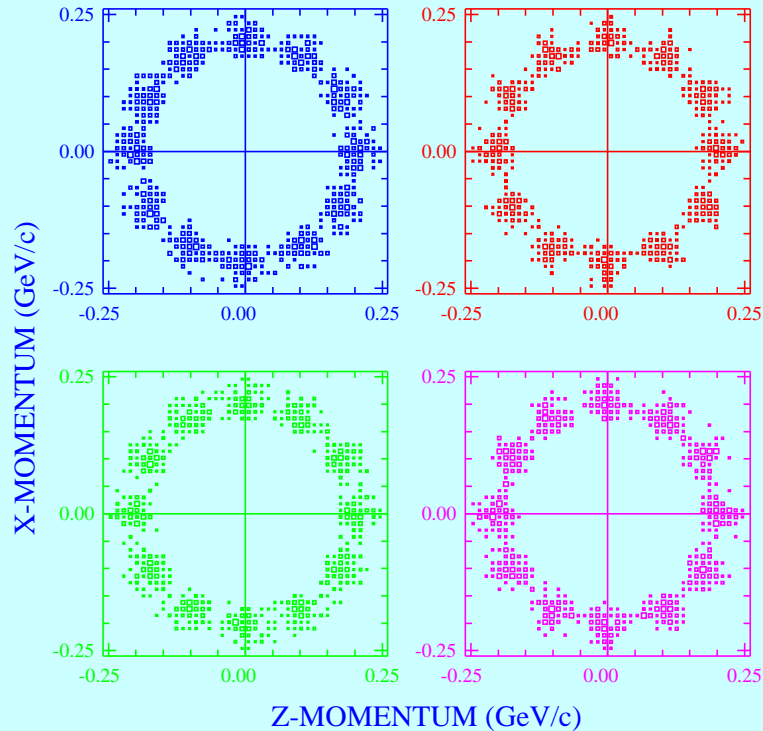


- R for 10, 20, 30 and 40 turns

GEANT Output

P_x vs P_z Comparison

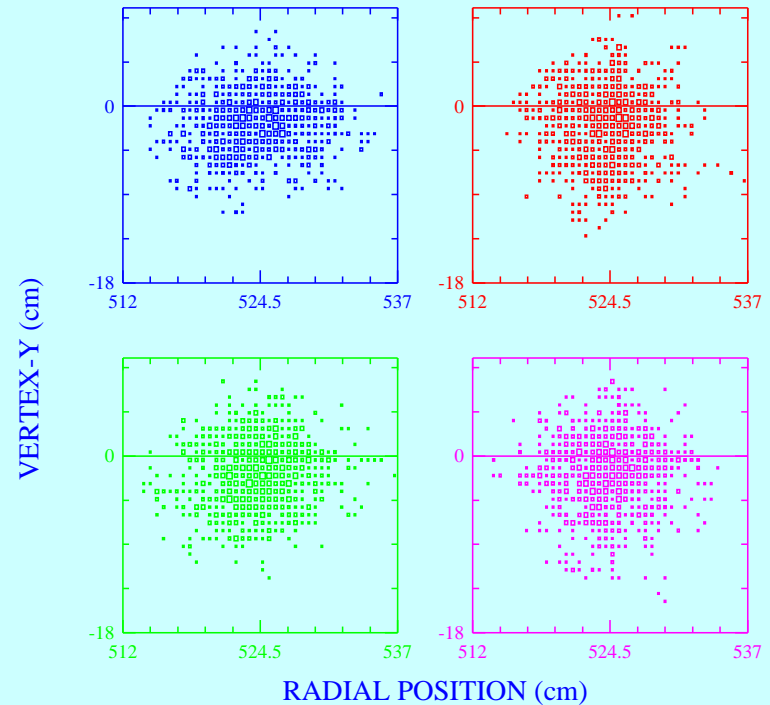
File: plot_10turn.plt				Area	Mean	R.M.S.
ID	IDB	Symb	Date/Time			
50	0	12	040308/1332	967.0	-1.4333E-03	0.1457
250	0	12	040308/1330	960.0	-2.2125E-03	0.1449
350	0	12	040308/1337	957.0	-1.0470E-03	0.1449
					-1.8182E-04	0.1454



- Particle momentum in X-Z for 10, 20, 30 and 40 turns

Y-R Position

File: plot_10turn.plt				Area	Mean	R.M.S.
ID	IDB	Symb	Date/Time			
60	0	12	040308/1332	967.0	524.2	3.918
260	0	12	040308/1330	960.0	-1.848	3.050
360	0	12	040308/1337	957.0	524.2	3.252
					-1.832	3.741
					524.2	3.615
					-1.817	3.416



- Y-R: 10, 20, 30 and 40 turns

Summary and Plan

We injected the μ -beam with no vertex in X
in order to start the particles at the same time

We clean up the beam noise prior to ECAL9 calculation

The radial position of the μ -beam looks promising

We need to understand the clock time in GEANT

Emittance calculation using ECAL9 is under way