Improved Boundary Conditions for 7-Pole Field and Tracking Comparison for 7-Pole and 8-Pole Fields

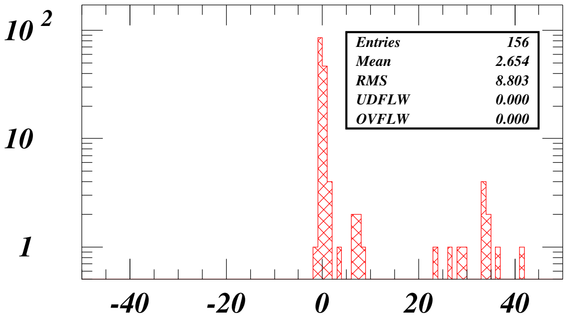
1. **7-pole field up to now violated boundary conditions at a level up to 100 gauss**
   - Improved by extending fine-grain region of finite-element mesh
   - Expect to improve agreement between tracking with table of field values and fit function for symplectic integration

2. **VF tracking comparison for 7-pole and 8-pole fields**
   - 8-pole field shows less total kick for Θ_x vs x on horizontal midplane
   - 8-pole field also shows desirable symmetry properties

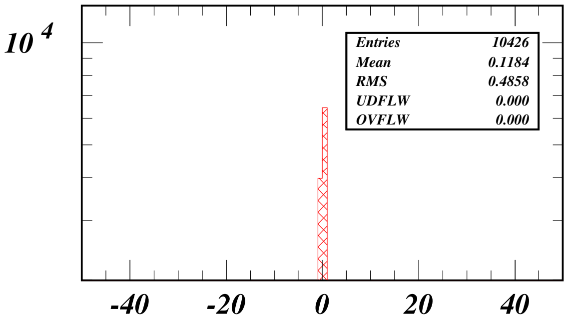
     $\Rightarrow$ **Need to further investigate 8-pole field properties**

02/05/23 17.48

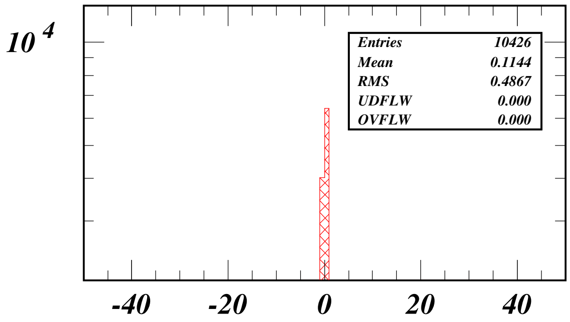
Test Boundary Conditions for w7-20_15



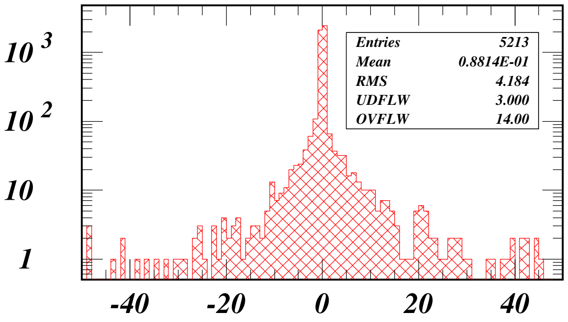
B_Z on X-Y Plane (gauss)



B_X on X-Z Plane (gauss)



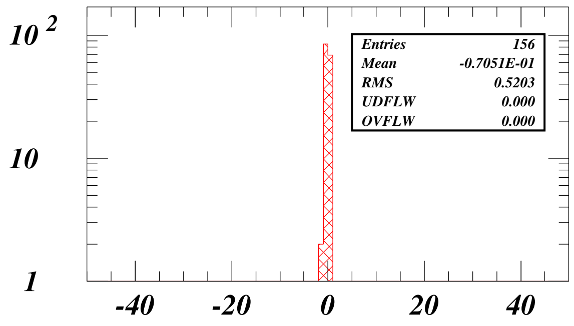
B_Z on X-Z Plane (gauss)



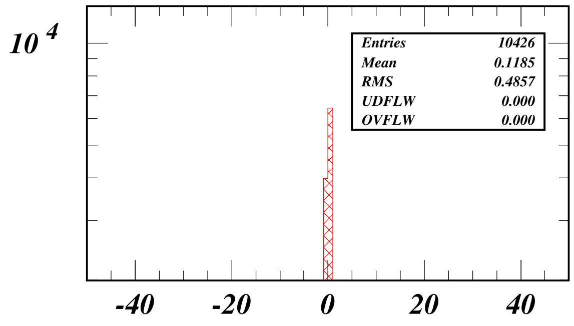
B_Y on Y-Z Plane (gauss)

Test Boundary Conditions for w7-20_19

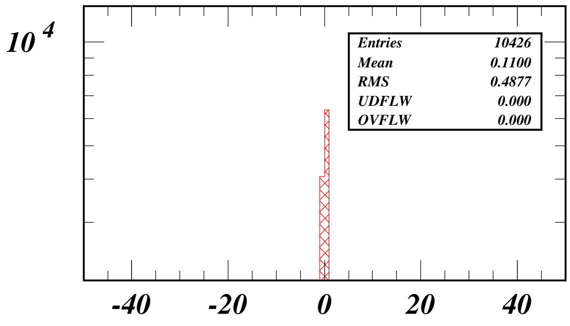
02/05/23 17.44



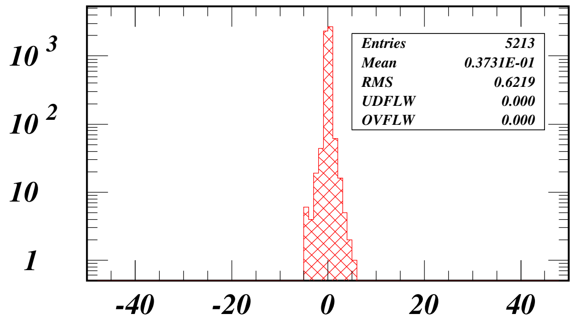
B_Z on X-Y Plane (gauss)



B_X on X-Z Plane (gauss)

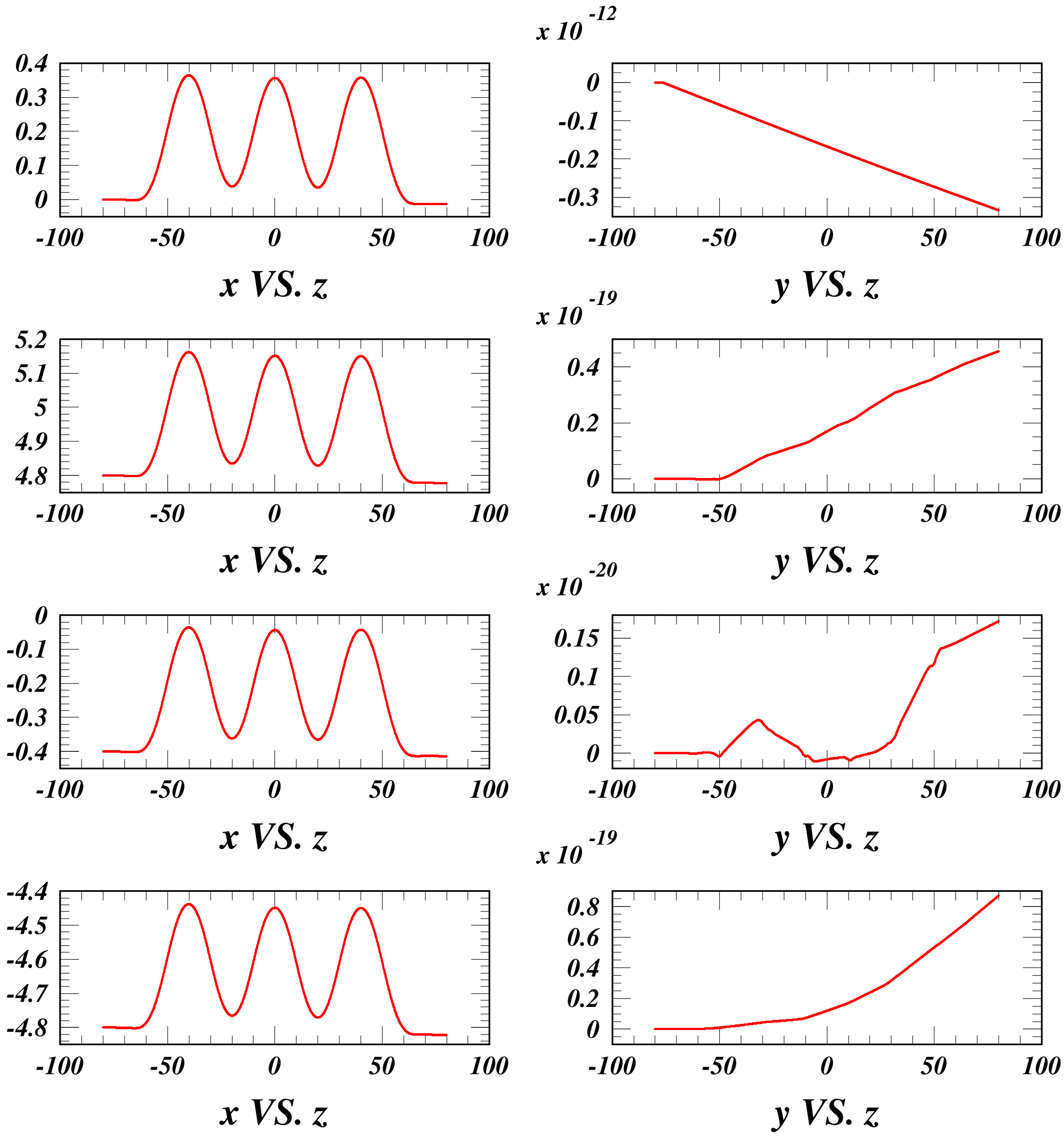


B_Z on X-Z Plane (gauss)



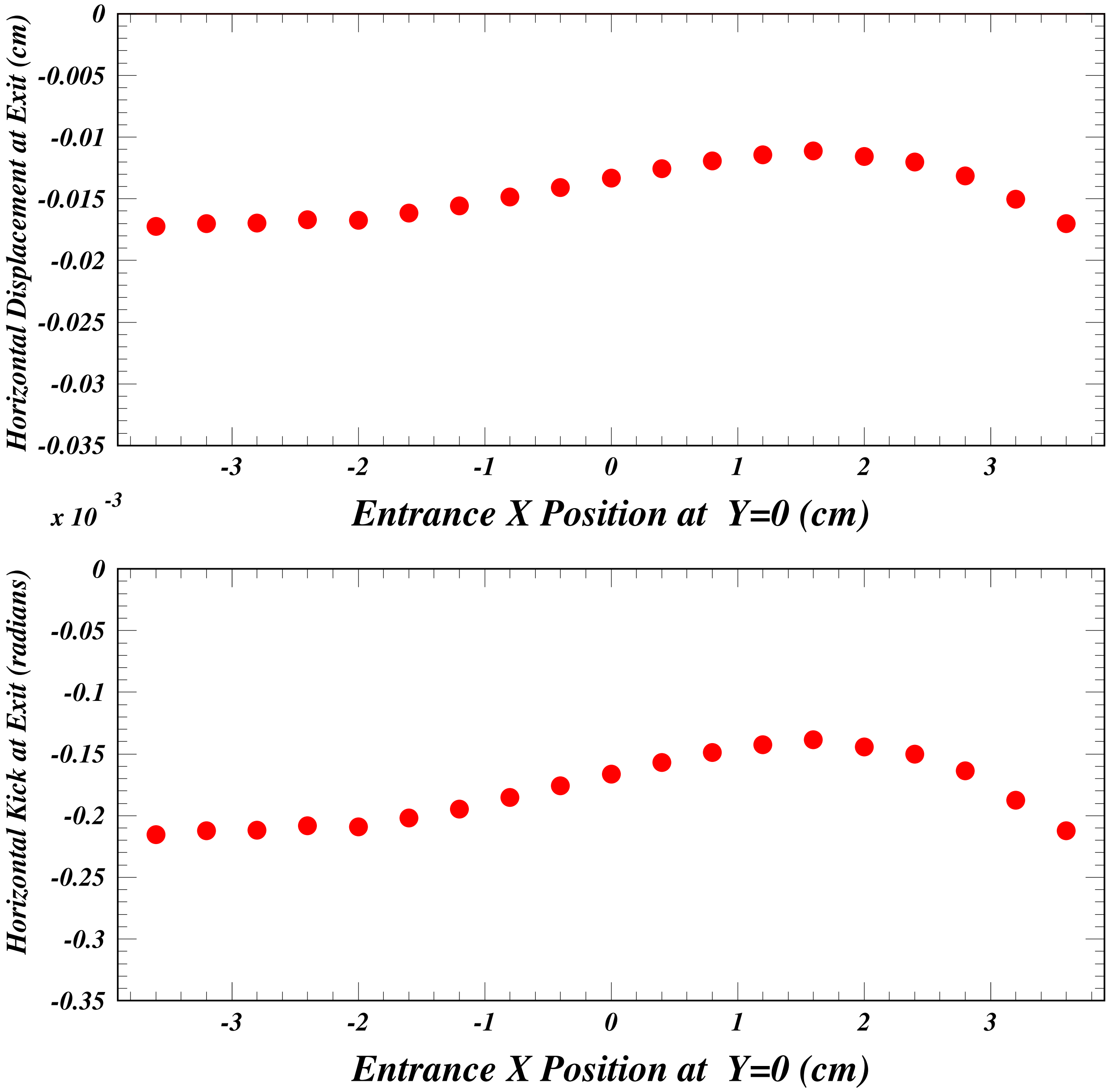
B_Y on Y-Z Plane (gauss)

w7-20_19_ Tracks: 0.7 Amps in Trim Coil 02/05/23 16.22

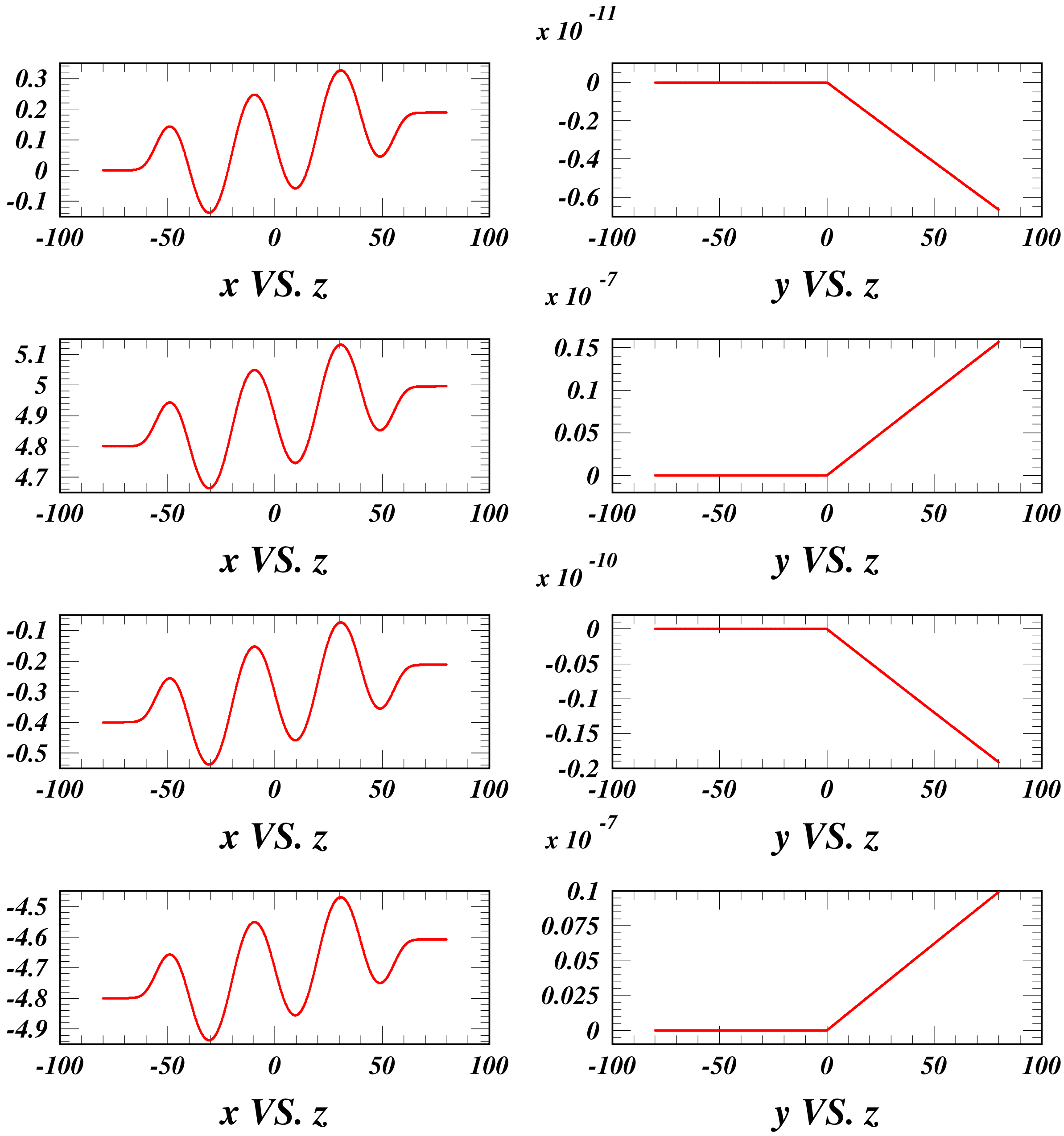


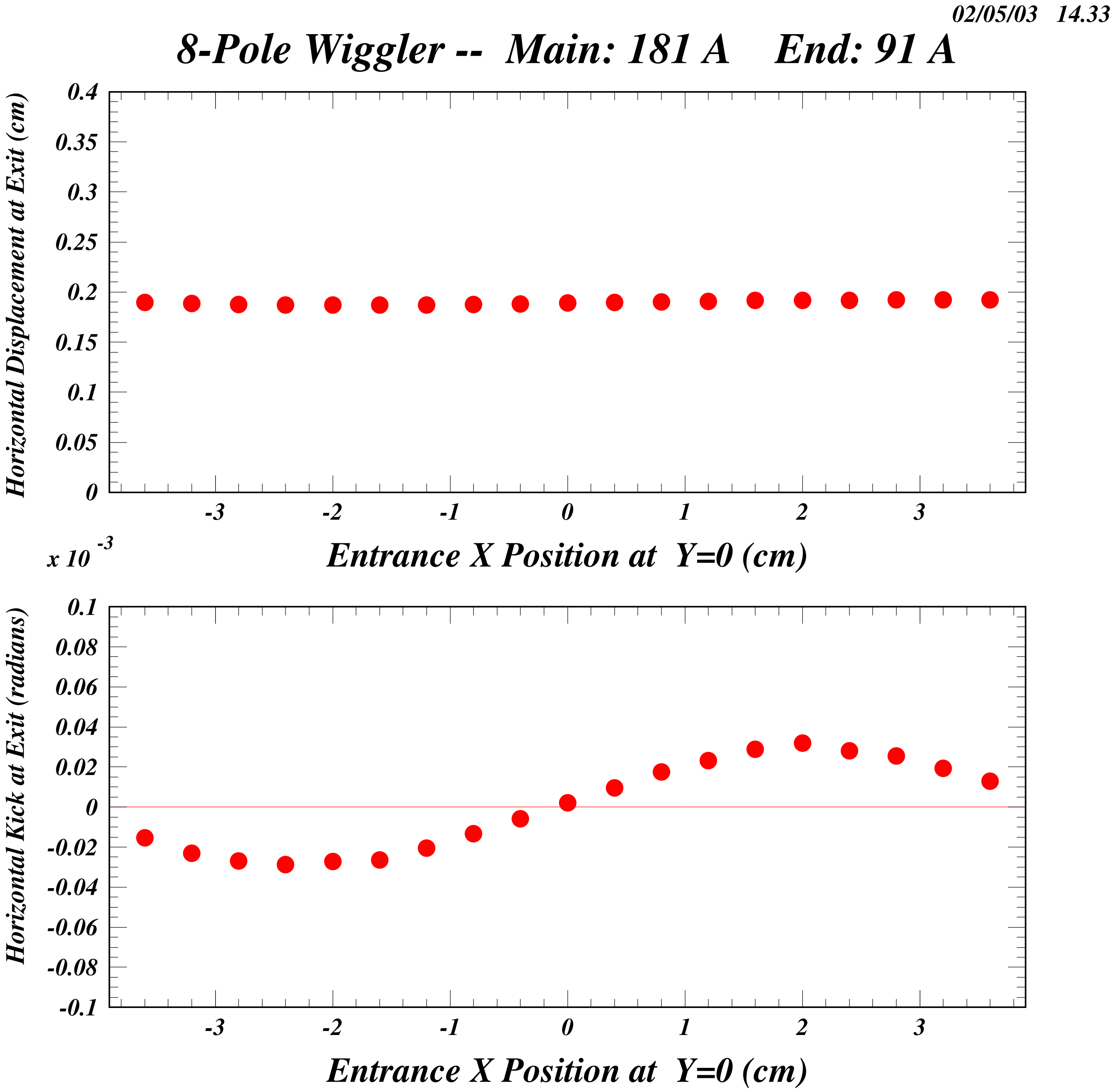
02/05/23 16.22

w7-20_19_ Tracks: 0.7 Amps in Trim Coil

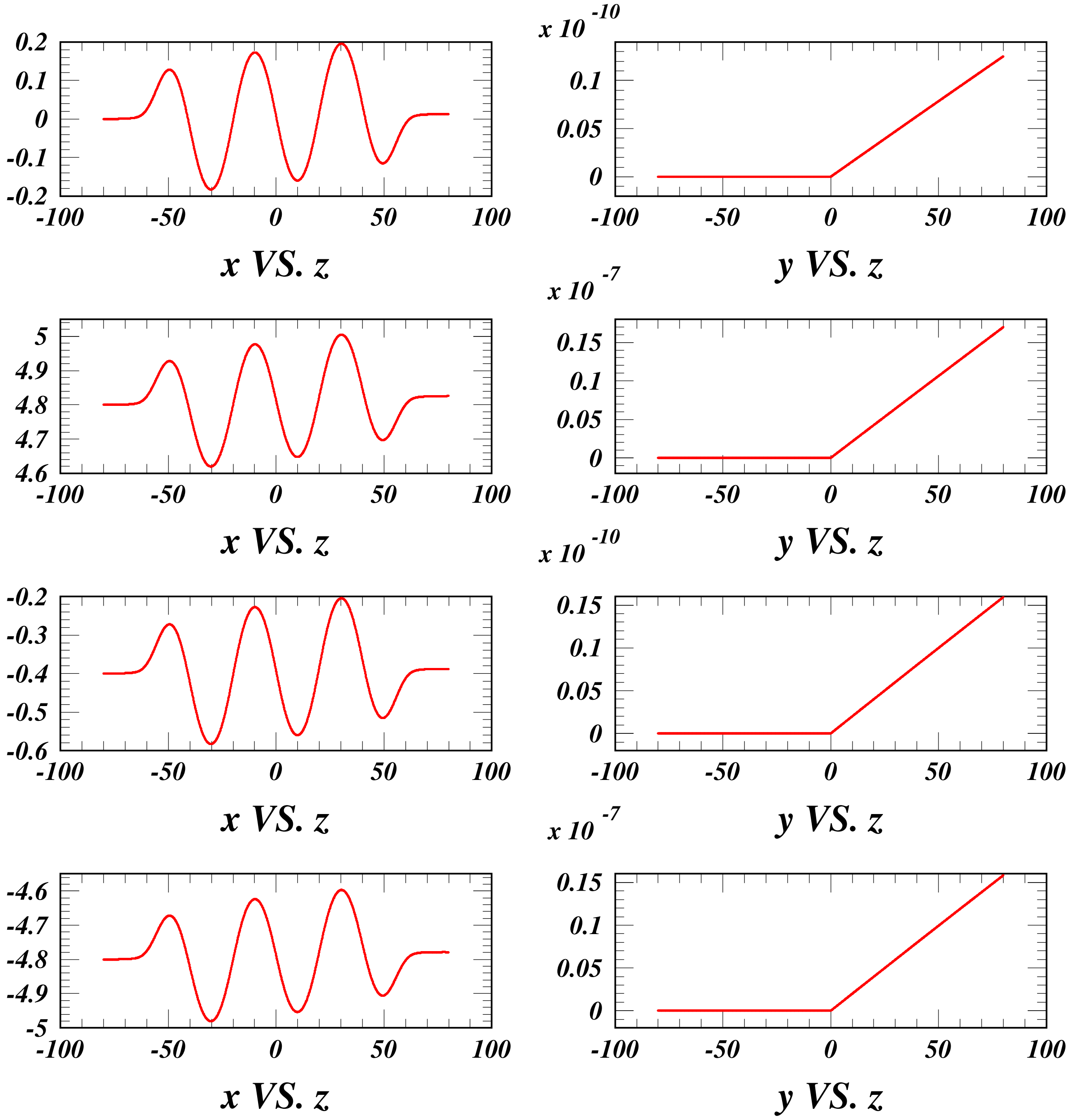


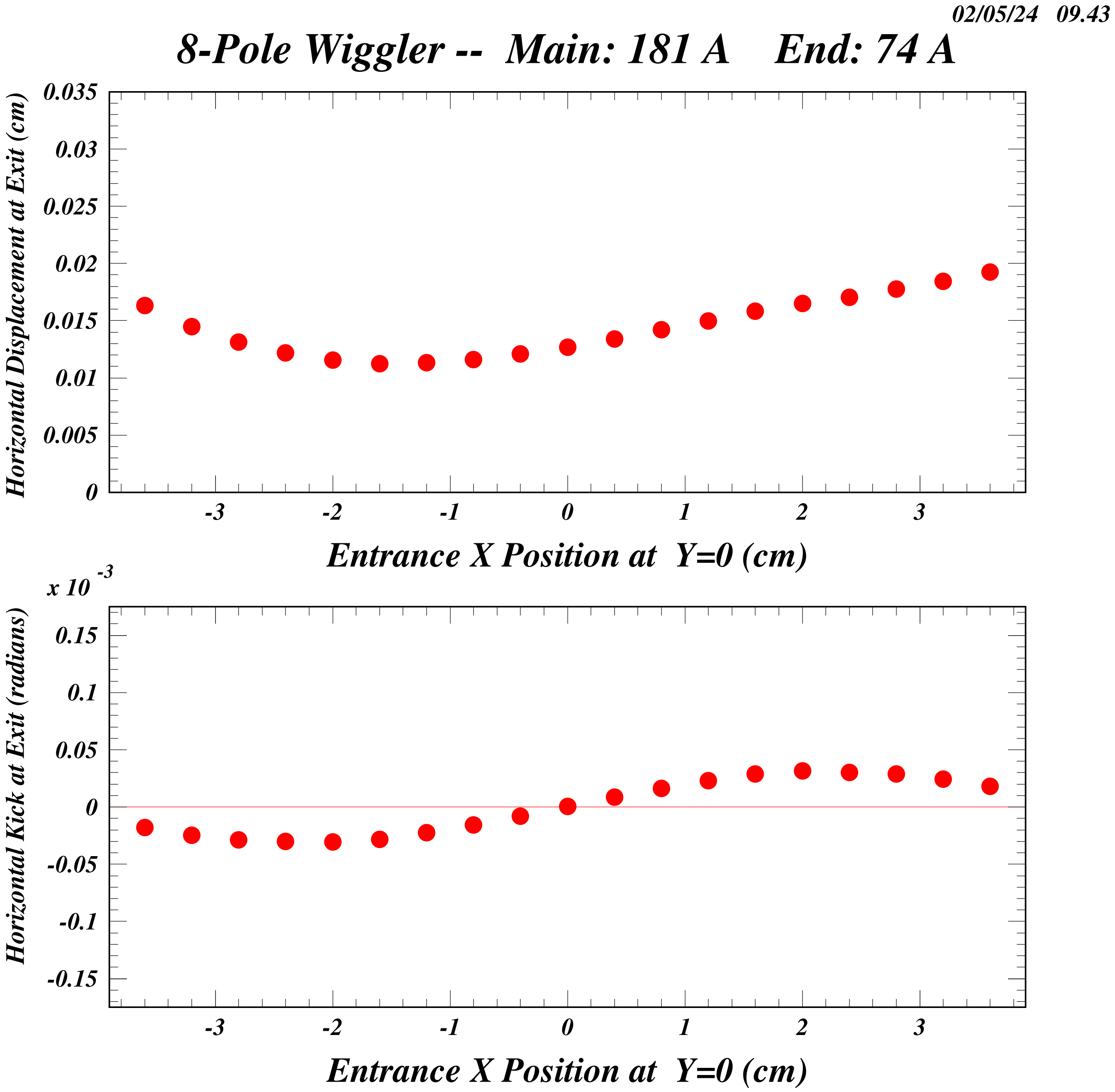
8-Pole Wiggler -- Main: 181 A End: 91 A 02/05/03 14.32




02/05/03 14.33
8-Pole Wiggler -- Main: 181 A End: 91 A
Horizontal Displacement at Exit (cm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-3
-2
-1
0
1
2
3
Entrance X Position at Y=0 (cm)
x 10 -3
Horizontal Kick at Exit (radians)
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-3
-2
-1
0
1
2
3
Entrance X Position at Y=0 (cm)

8-Pole Wiggler -- Main: 181 A End: 74 A 02/05/24 09.43




02/05/24 09.43
8-Pole Wiggler -- Main: 181 A End: 74 A
Horizontal Displacement at Exit (cm)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
-3
-2
-1
0
1
2
3
Entrance X Position at Y=0 (cm)
x 10 -3
Horizontal Kick at Exit (radians)
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-3
-2
-1
0
1
2
3
Entrance X Position at Y=0 (cm)