Particle transport simulations for the MEBT Laserdiagnostic Status

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FETS meeting at RAL

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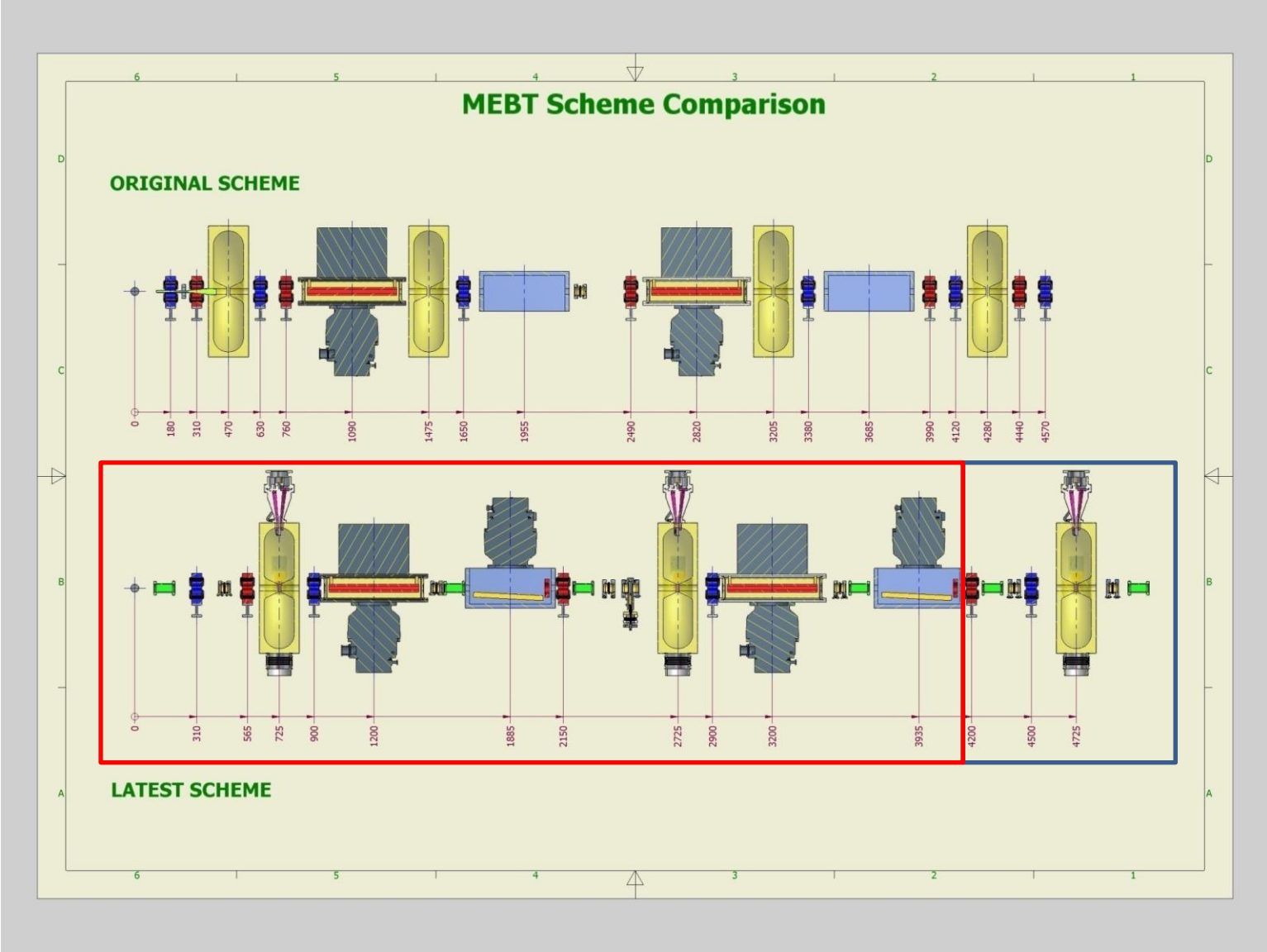
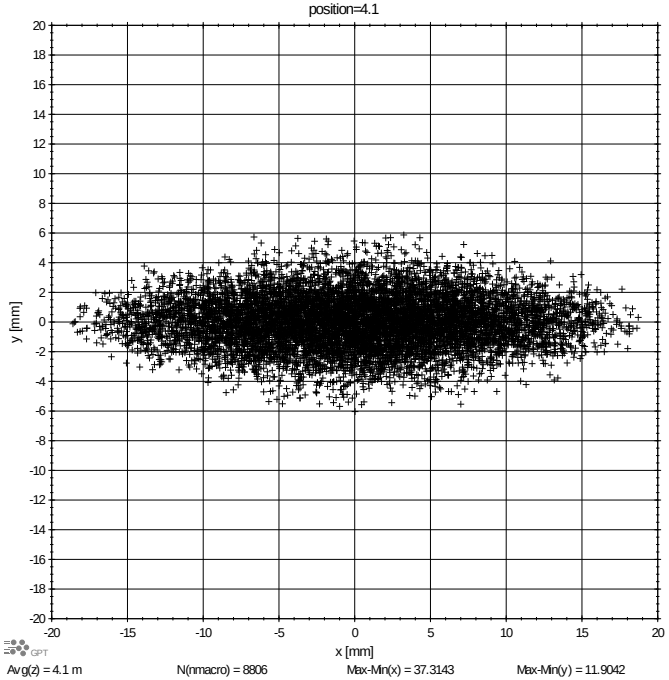
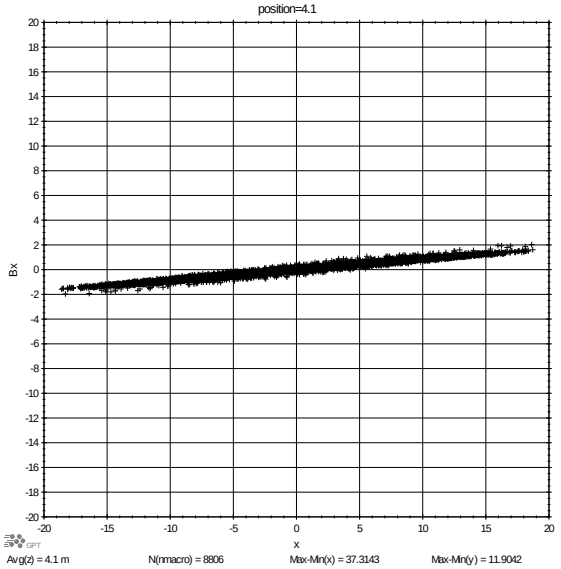
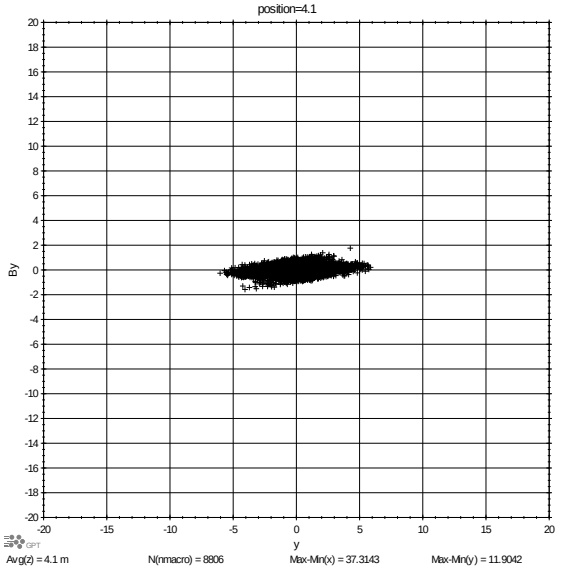
MEBT transport simulation stopped at 4.10 m to allow to produce input file for particle transport in following section.

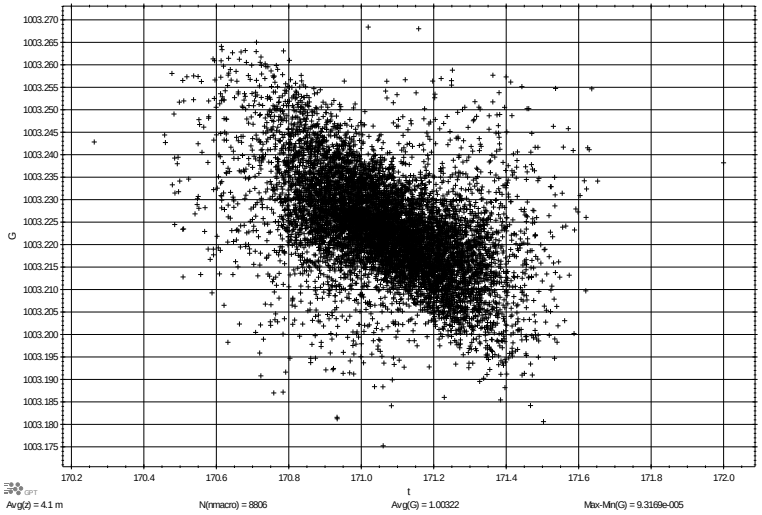


Input distribution for particle transport in LD section.



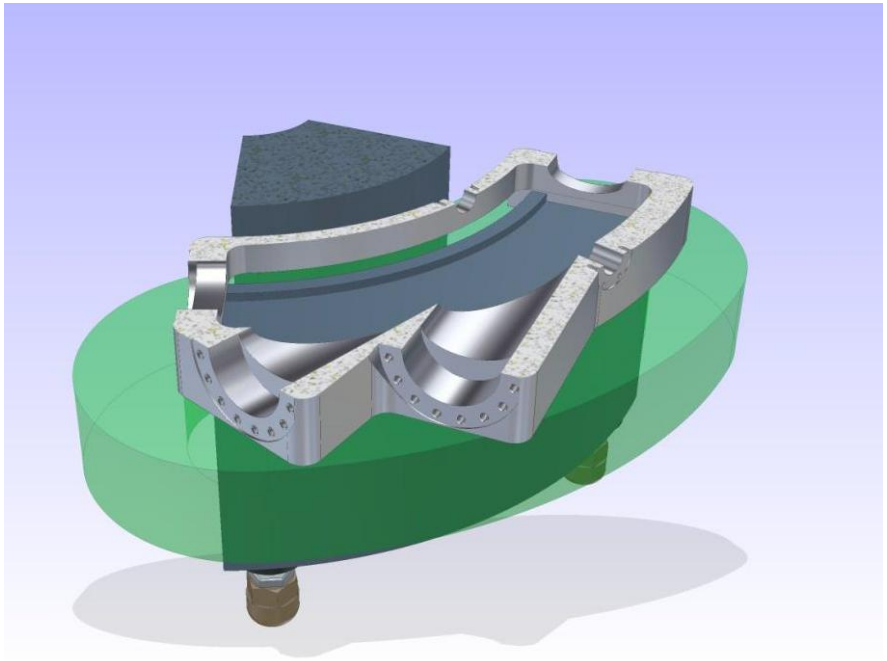






1) ~8800 particle with 100 k an option
2) 2 quads following for manipulation of phase space.
3) 3rd cavity for bunching optional

Detailed parameter list of vessel required



Detailed parameter list of vessel required, assumptions used so far :

Z= 5 m (input phase)

Aperture in : (x=80 mm , y = 40 mm, z =10 mm)

Bending radius = 0.48 m

Bending angle = 60 degree

Laser angle = 20 degree

Z= 5.545 m (output phase straight)

Aperture in : (x=80 mm , y = 40 mm, z =10 mm)

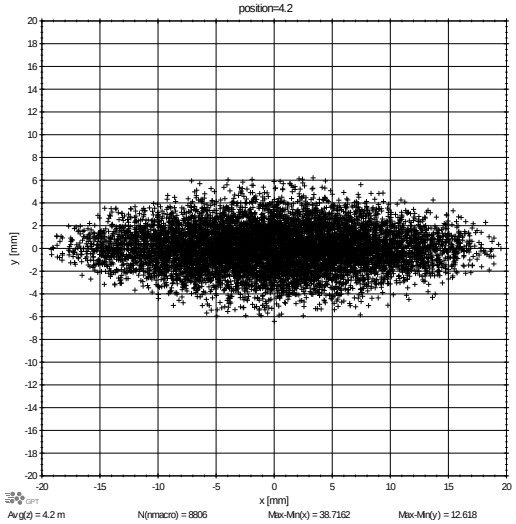
Z*= 0.295, m (output unneutralized)

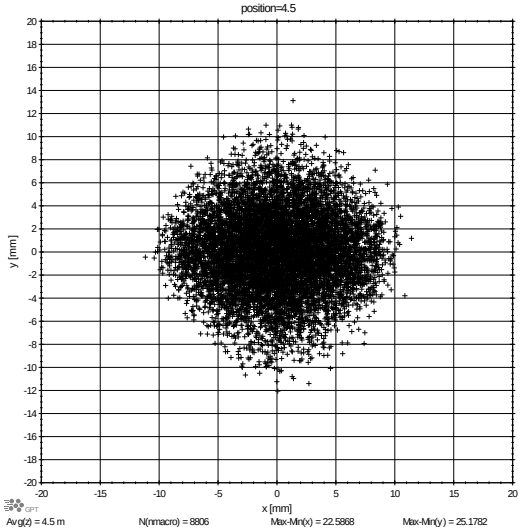
Aperture in : (x=80 mm , y = 40 mm, z =10 mm)

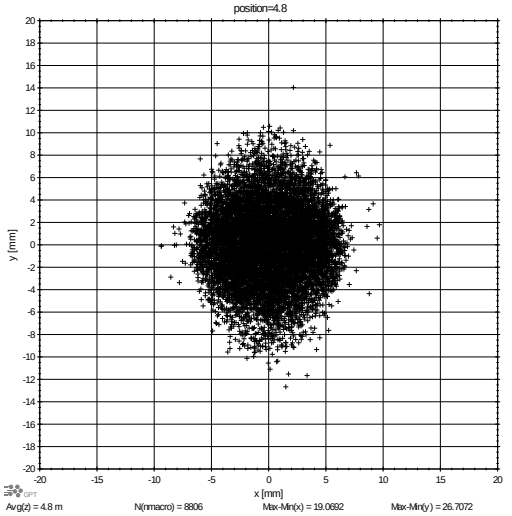
Z**= 0.005 m (output neutralized)

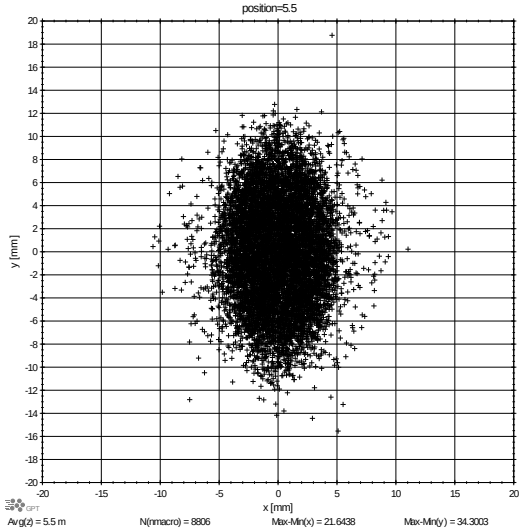
Aperture in : (x=80 mm , y = 40 mm, z =10 mm)

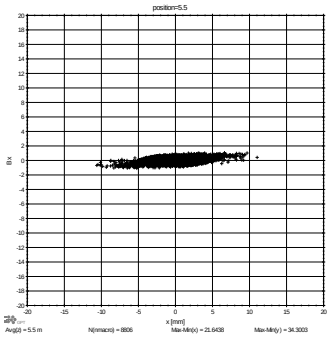
Simulations for dipole off (Q 7& 8 7/20 & 8/20 T/m)

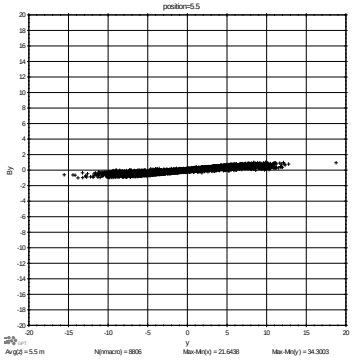


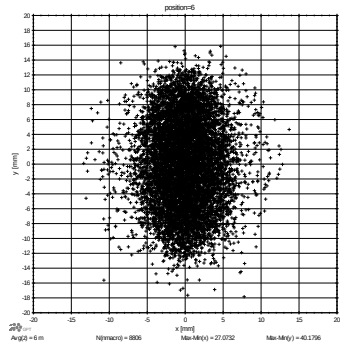


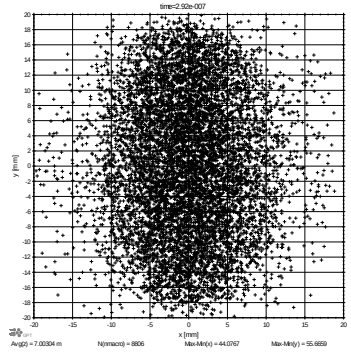




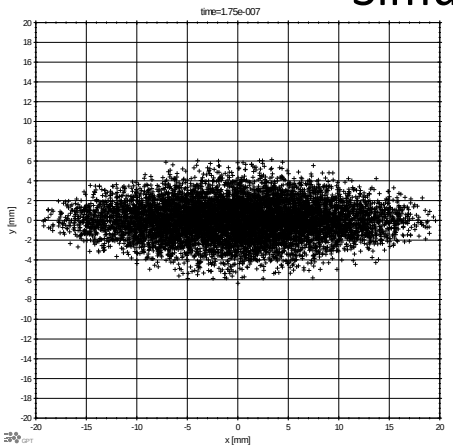


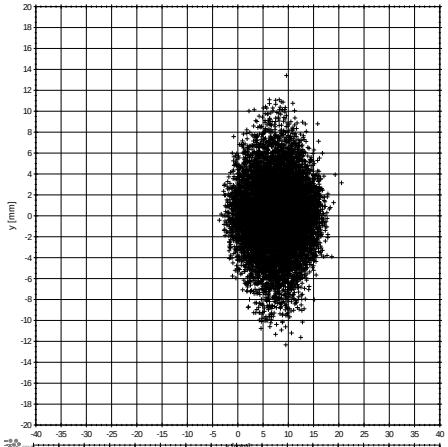


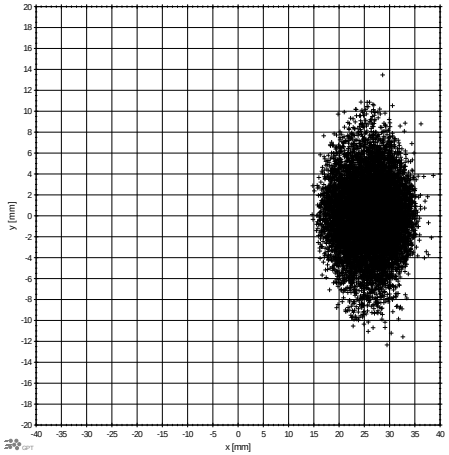


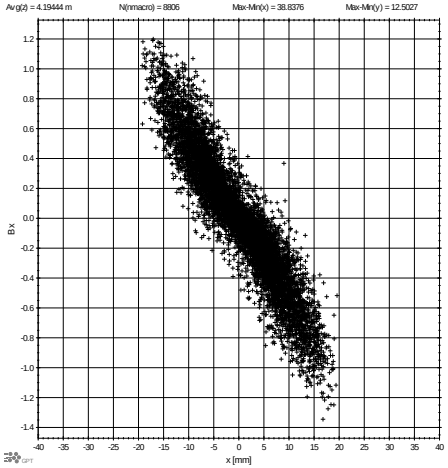


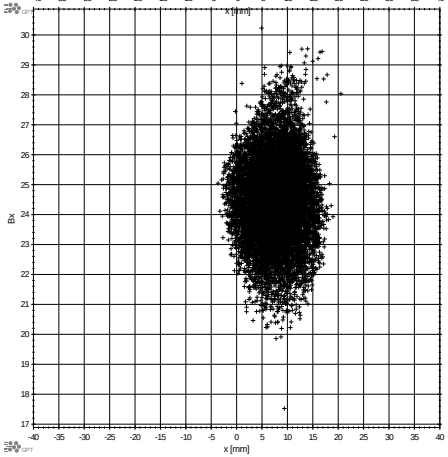
Simulations for dipole on (Q 7& 8 7/20 & 8/20 T/m)

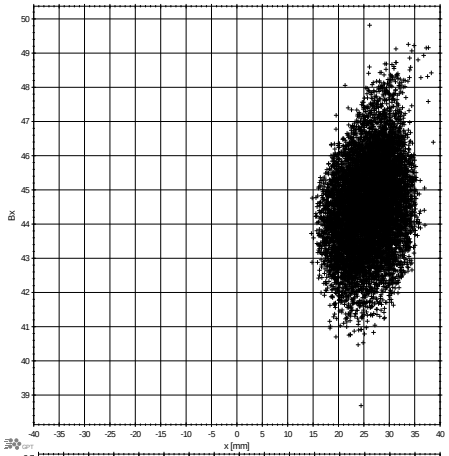


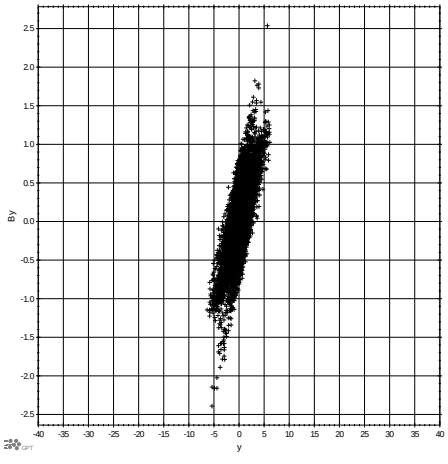


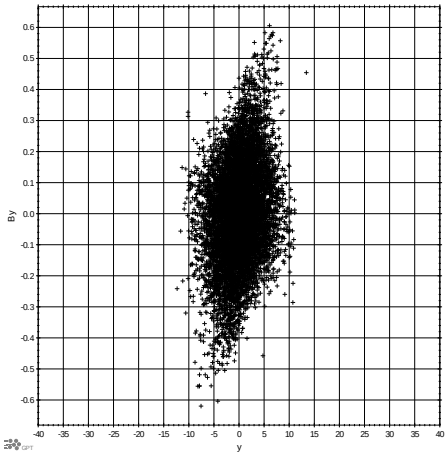


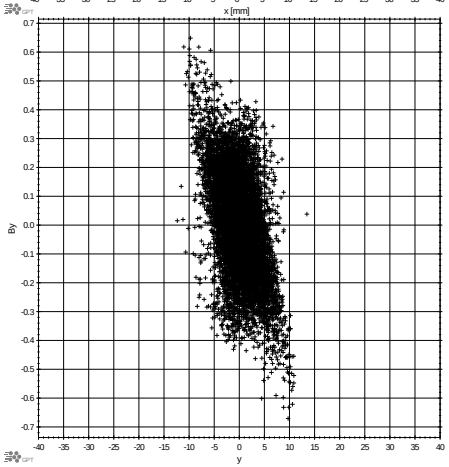












Inputfile

```
setfile("beam", "Laserdiagnosticin10k.gdf");  #about 10,000 particles
#setfile("beam", "Laserdiagnosticin10k.gdf"); #about 100,000 particles
settotalcharge("beam", Qtot);
spacecharge3Dmesh("MeshNtotal",38,38,80,"SolverAcc",0.01);
# Lattice Set-up

Bfac7=-8; # Q7
map3D_B("wcs", "z", 4.200,"MEBTquadFieldmapcorrtest2.gdf","x","y","z","Bx","By","Bz",Bfac7/20);  # Scott Field-map  Q7
Bfac8=7; # Q8;
map3D_B("wcs", "z", 4.500,"MEBTquadFieldmapcorrtest2.gdf","x","y","z","Bx","By","Bz",Bfac8/20);  # Scott Field-map  Q8
SCALE3=0.3; # C3
PHASE3=2.4;
frequency3=324e6;
k3=0.0;
map25D_TM("wcs","z",4.725,"mebt_sf_map.gdf","R","Z","Er","Ez","H",SCALE3,k3,PHASE3, 2*pi*frequency3); #C3  right for the new combined field map
rmax ("wcs","z",4.725, 0.015,0.02); # aperture of cavity
#Bending magnet
#ccs("wcs", - 0.02894, 0, 5.164169, 0.0603,0,0.3420 ,0,1,0, "laserinteraction");
#ccs("wcs", - 0.24, 0, 5.41569, 0.5,0,-0.8660 ,0,1,0, "Dipoleout");
Rbend = 0.48;
Bbend = -m*c*G*beta/(Rbend*q) ;
pp("Bbend=",Bbend) ;
xymax("wcs","z",5.005, 0.04, 0.08,0.01); # aperture of dipole at input
#sectormagnet("wcs","Dipoleout", Rbend,Bbend,0.25,0.25,0.0,0,0); #use edge focussing to balance both transversal focal points
#sectormagnet("wcs","Dipoleout", Rbend,Bbend,0.25,0.25,0.08,160,0);#with fringe field optimisation is required.....
xymax("wcs","z",5.545, 0.04, 0.08,0.01); # aperture of dipole at output straight
#xymax("laserinteraction","z",0.295, 0.04, 0.08,0.01); # aperture of dipole at output neutralized
#xymax("Dipoleout","z",0.005, 0.04, 0.08,0.01); # aperture of dipole at output unneutralized
#Simulation output control
dtmax = 5E-10;
tmax = 3.0E-7;
tout(1.750e-7, 3.0e-7, 1e-9);                                  # Generate output files between t=0 to t=t in steps of delta t)
screen("wcs","I",4.2); #Screen
screen("wcs","I",4.5); #Screen
screen("wcs","I",4.8); #Screen
screen("wcs","I",5.5); #Screen straight behind dipole
screen("wcs","I",6); #Screen straight at dump
#screen("Dipoleout","I",0.1); #unneutralized behind dipole
#screen("Dipoleout","I",0.1); #unneutralized behind dipole
#screen("Dipoleout","I",0.2); #unneutralized behind dipole
#screen("laserinteraction","I",0.0); #neutralized behind dipole
#screen("laserinteraction","I",0.1); #neutralized behind dipole
#screen("laserinteraction","I",0.2); #neutralized behind dipole
```

Still some way to go....

1) Check if geometric description is correct
2) Definition of new coordinate systems not correct
3) 3 part of simulation input file to be defined (with Dipole and laser interaction
4) Variation of QP 7 & 8 to sample acceptance.
5) Suggest to meet (Christoph, Stephen, Juergen, Pete ?) on 12th June (13:00 RAL) to discuss results and next steps.