Update on LUXE GEANT4 Simulation

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MC e_laser_provisional_10xi^3

For 8000nm

wc /nfs/dust/ilc/user/oborysov/hics_list/hics_w0_8000nm_provisional_10xi3_list_no_nan.txt
440 440 90972

Number of positrons: 111; 0.25 per BX.

```
#-------------------------------------------------------------------------------------------------------------------------------------------------------------------
#  Final state particles.
#-------------------------------------------------------------------------------------------------------------------------------------------------------------------
#  First interacting species: electron     Second interacting species: laser
#  First initial particle energy = 16.5000 +/- .16 GeV,  Sigma_xyz = 5.00 5.00 24.00  microns,  Emit_xy = 1.401.40 mm mrad
#  Laser Intensity = 15.92 x 10^18 W/cm^2,  Wavelength = 800.00 nm,  pulse length = 25.00 fs,  spot size = 201.06 micron^2
#  Pulse peak xi =1.9413, Pulse peak chi =.3438, Misalignment = .0000 microns
#-------------------------------------------------------------------------------------------------------------------------------------------------------------------
#    E (GeV)          x (um)          y (um)          z(um)              beta_x              beta_y              beta_z              PDG_NUM      MP_Wgt      MP_ID
#-------------------------------------------------------------------------------------------------------------------------------------------------------------------
   14.064813      -0.22355843      -0.59149532       48.639494      0.2778145022487599E-04 -0.9811510623921948E-05  0.99999999890596550658       11      750000.          1
   16.492305       -3.1316079        1.9577002       56.190891      0.1387997540093713E-04 -0.5803402144908274E-06  0.99999999942349812989       11      750000.          2
   16.504397       -5.8199964        4.6201334      -1.9479474      0.3578683928978525E-05  0.6319626296458995E-05  0.99999999949432415971       11      750000.          3
   13.865624      -0.21753143E-01   -4.2123130       84.182795      0.1137989031861179E-04 -0.1232177809444427E-04  0.99999999918024007204       11      750000.          4
   16.502075       -11.088729      -0.80530575       69.178631      0.6840563643332166E-05  0.3662067983610447E-05  0.99999999949045955387       11      750000.          5
```

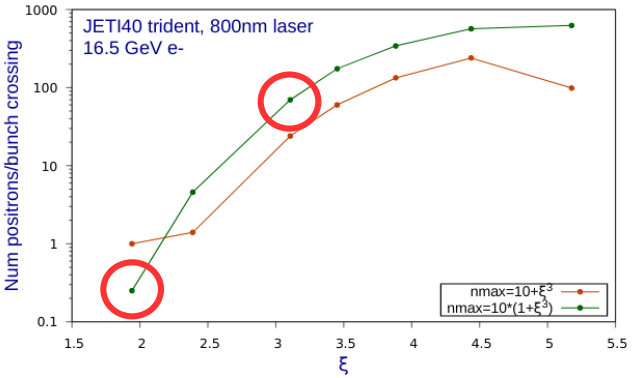
Each file contains ~2856 macroparticles (σ=32); ~5 minutes for G4 simulation.

For 5000nm:

wc /nfs/dust/ilc/user/oborysov/hics_list/hics_w0_5000nm_provisional_10xi3_list_no_nan.txt
496 496 102564

Each file contains ~3221 macroparticles (σ=231);
~7 minutes for G4 simulation.

Number of positrons: 34489; 69.5 per BX.



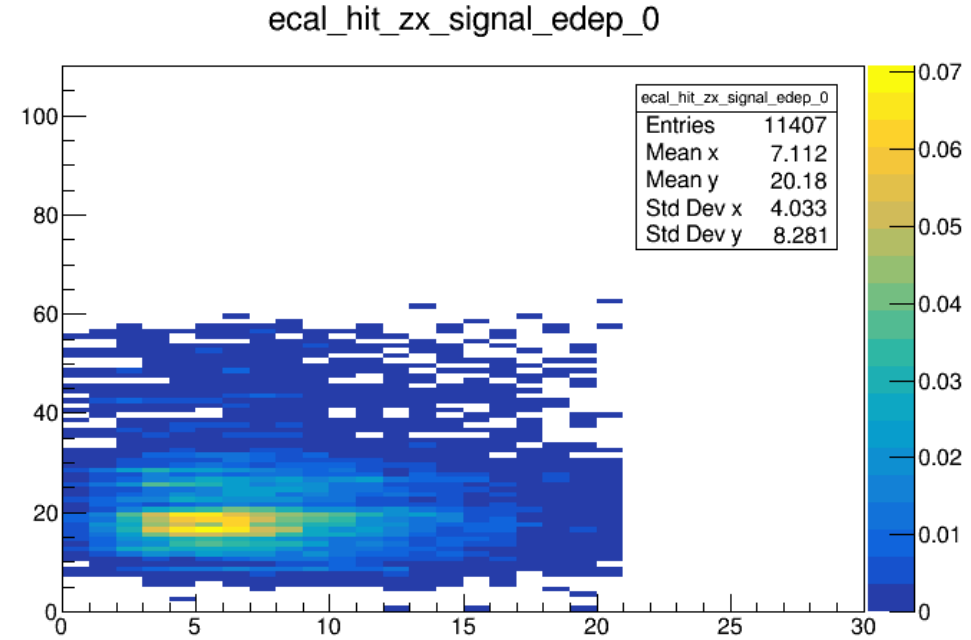
G4

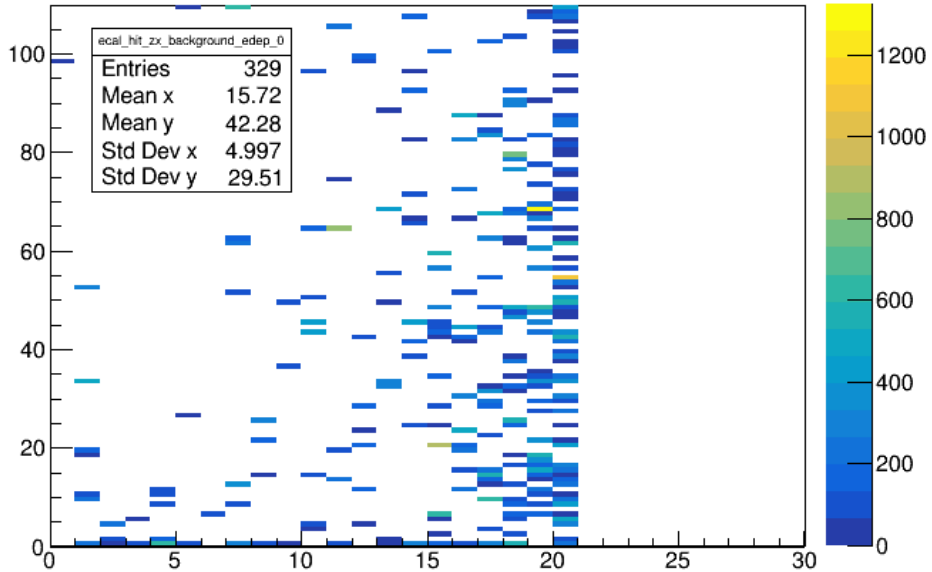
https://confluence.desy.de/display/LS/GEANT4+MC

MC	# MC out (BX)	Processed (BX)	Location	Notes
w0_5000nm	4774	4664	/nfs/dust/ilc/user/oborysov/hics_list/list_root_hics_165gev_w0_5000nm_6cee466a.txt	geometry corresponds to commit 6cee466a, but thick Cherenkov outer wall
w0_8000nm	9479	9320	/nfs/dust/ilc/user/oborysov/hics_list/list_root_hics_165gev_w0_8000nm_6cee466a.txt	geometry corresponds to commit 6cee466a, but thick Cherenkov outer wall
w0_50000nm	4764	2268	/nfs/dust/ilc/user/oborysov/hics_list/list_root_hics_165gev_w0_50000nm_6cee466a.txt	geometry corresponds to commit 6cee466a, 2T field
w0_8000nm_provisional_10_xi^3	440	434	/nfs/dust/ilc/user/oborysov/hics_list /list_root_hics_165gev_w0_8000nm_provisional_10xi3_6cee466a.txt	geometry corresponds to commit 6cee466a, 1T field. MC provisional with $10(1+\xi^3)$.
w0_8000nm_provisional_10_xi^3	440	439	/nfs/dust/ilc/user/oborysov/hics_list /list_root_hics_165gev_w0_8000nm_provisional_10xi3_6cee466a_scale15.txt	geometry corresponds to commit 6cee466a, 1T field. MC provisional with $10(1+\xi^3)$. Each macro-particle simulated 15 times if weight >= 15.
w0_5000nm_provisional_10_xi^3	496	494	/nfs/dust/ilc/user/oborysov/hics_list /list_root_hics_165gev_w0_5000nm_provisional_10xi3_6cee466a.txt	geometry corresponds to commit 6cee466a, 1T field. MC provisional with $10(1+\xi^3)$.
w0_5000nm_provisional_10_xi^3	496	484	/nfs/dust/ilc/user/oborysov/hics_list /list_root_hics_165gev_w0_5000nm_provisional_10xi3_6cee466a_scale15.txt	geometry corresponds to commit 6cee466a, 1T field. MC provisional with $10(1+\xi^3)$. Each macro-particle simulated 15 times if weight >= 15.

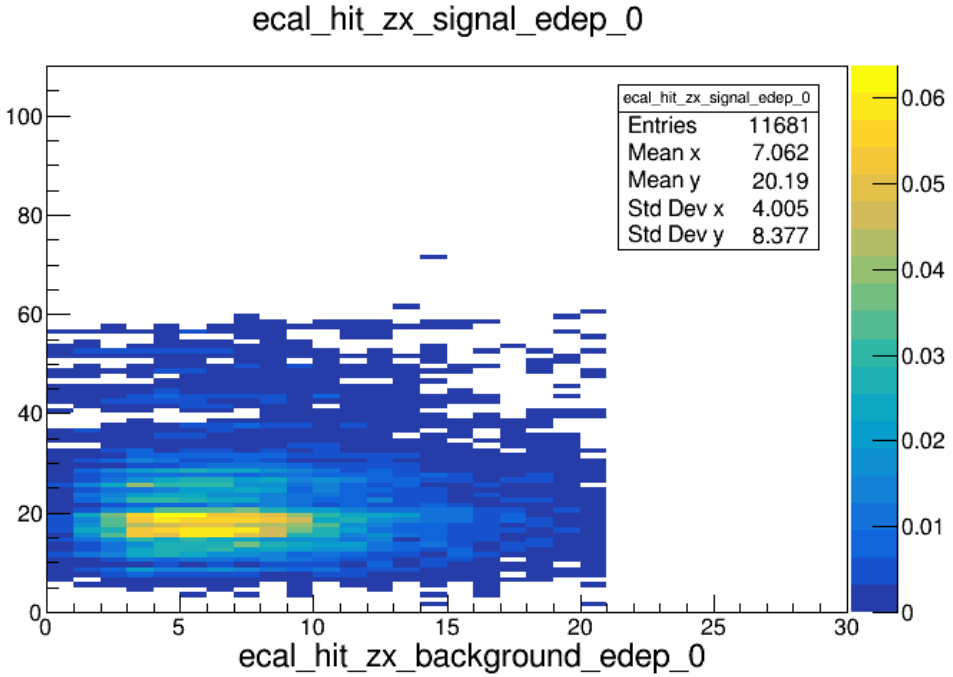
Background with and without weight scale

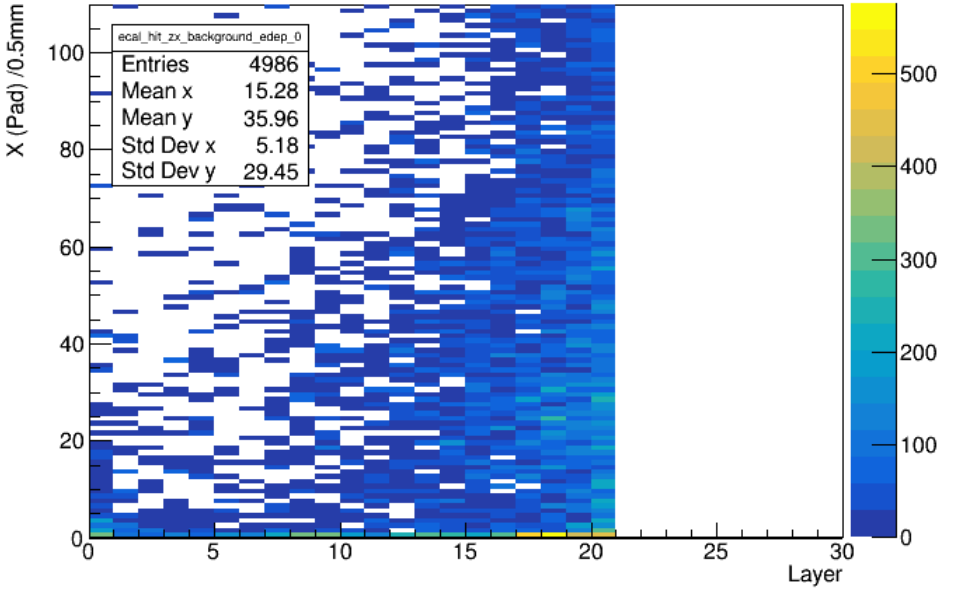
Each MC particle is simulated once with MC weight





Each MC particle is simulated 15 times with MC weight divided by 15





Electrons around the target

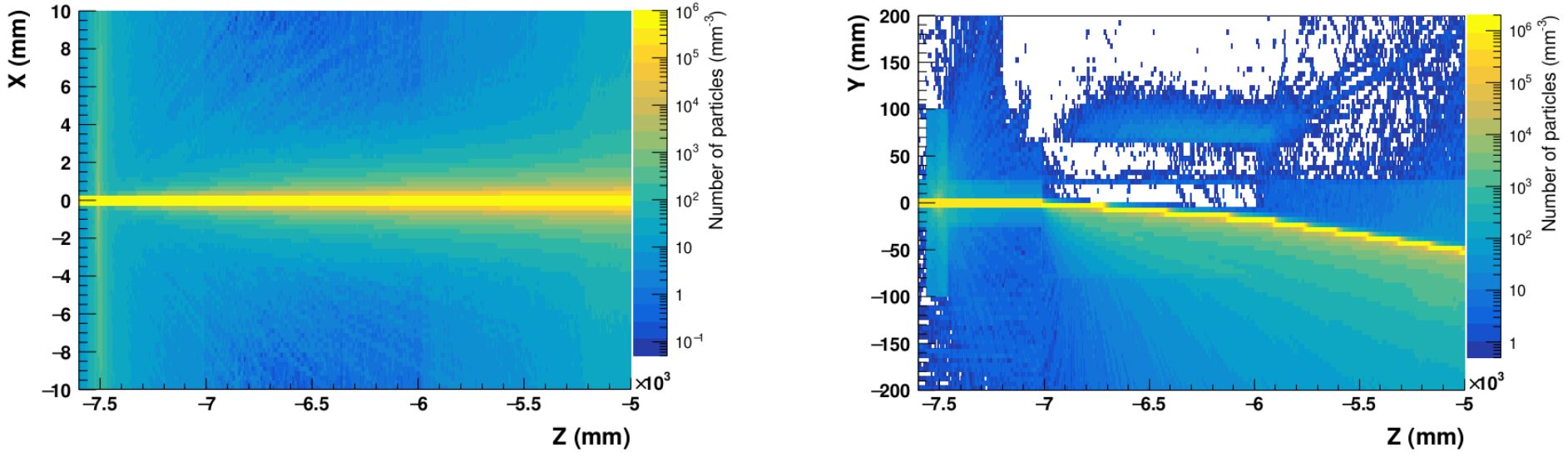
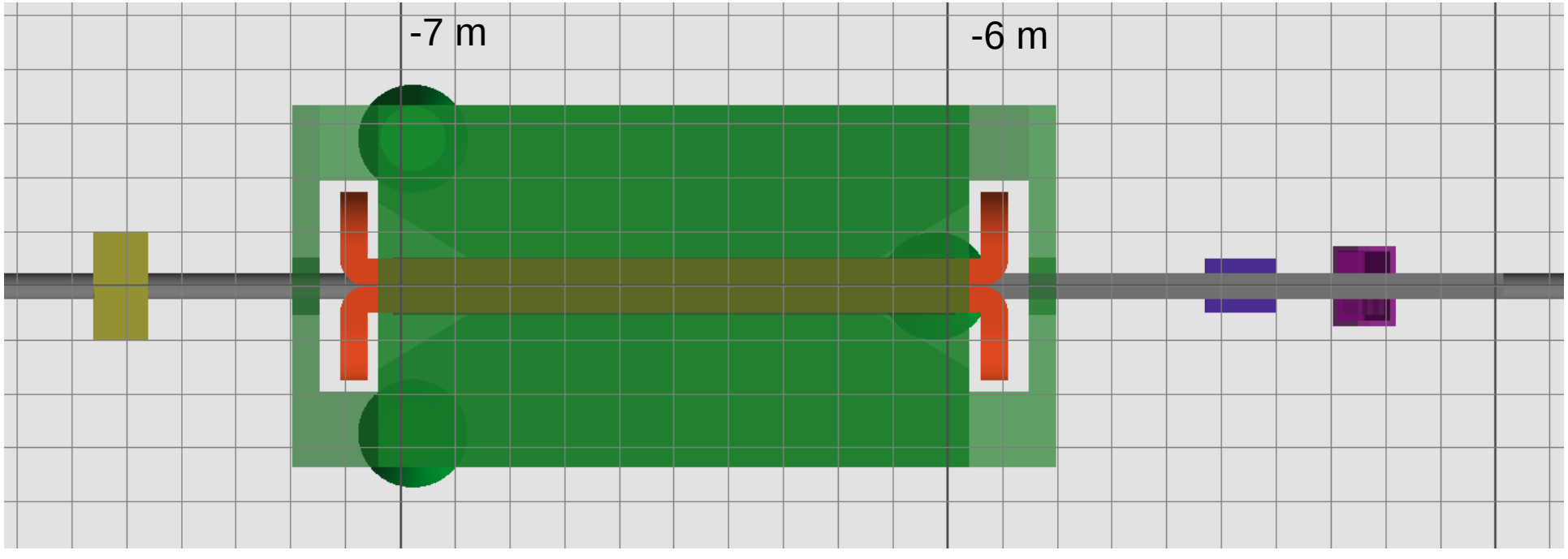


Figure 10: Average number of electrons distribution projected to XZ (left) and YZ (right) planes in the area of the target for bremsstrahlung photons production followed by the magnet.



Photons and positrons around target

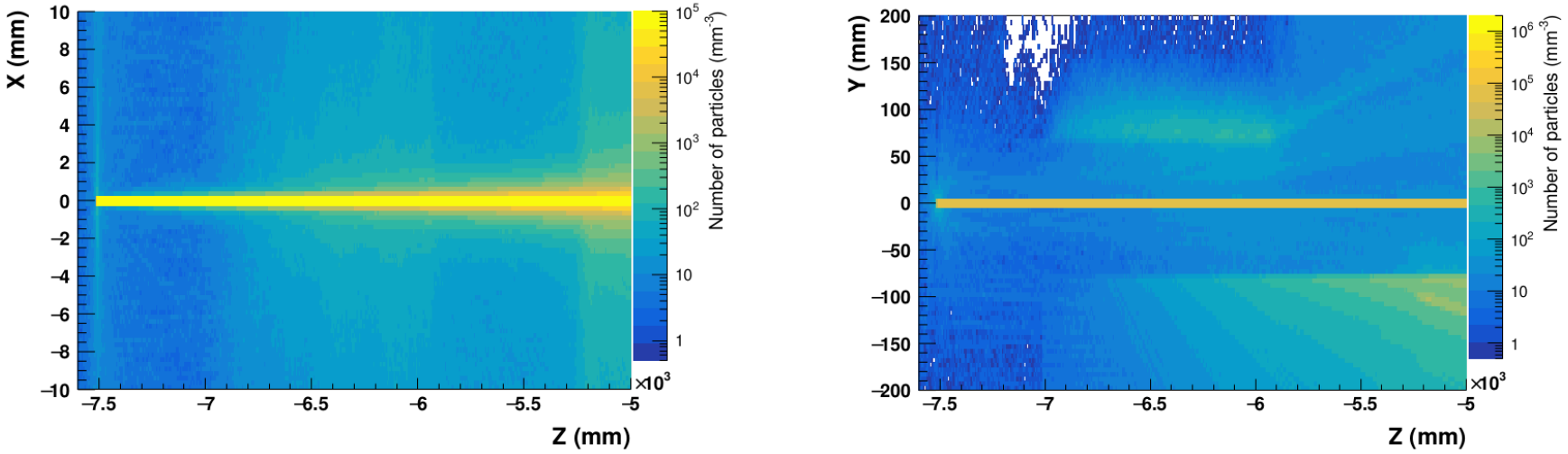


Figure 12: Average number of photons distribution projected to XZ (left) and YZ (right) planes in the area of the target for bremsstrahlung photons production followed by the magnet.

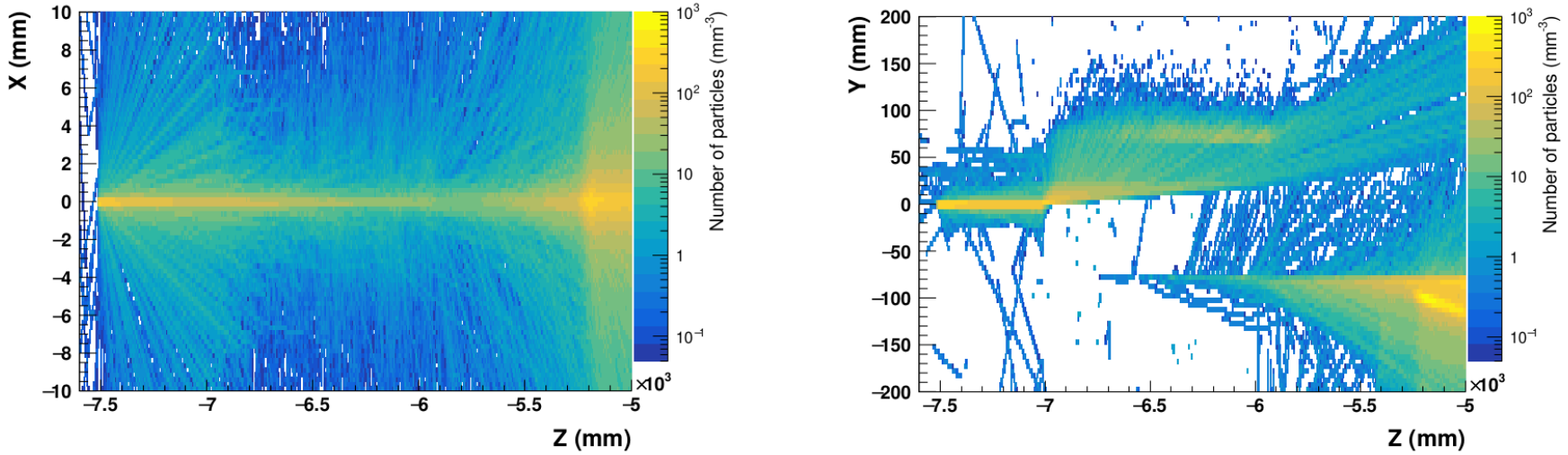


Figure 14: Average number of positrons distribution projected to XZ (left) and YZ (right) planes in the area of the target for bremsstrahlung photons production followed by the magnet.

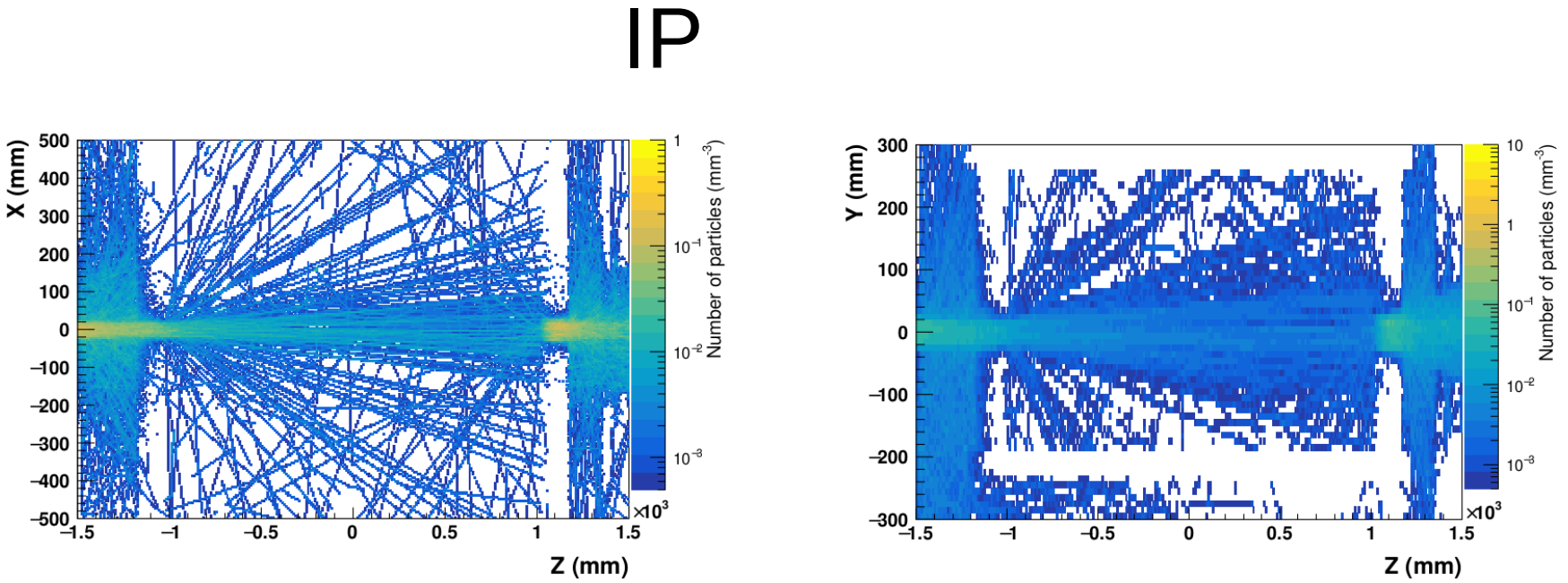


Figure 15: Average number of electrons distribution projected to XZ (left) and YZ (right) planes around interaction point. Rectangular areas with low particle population corresponds to the walls of interaction chamber.

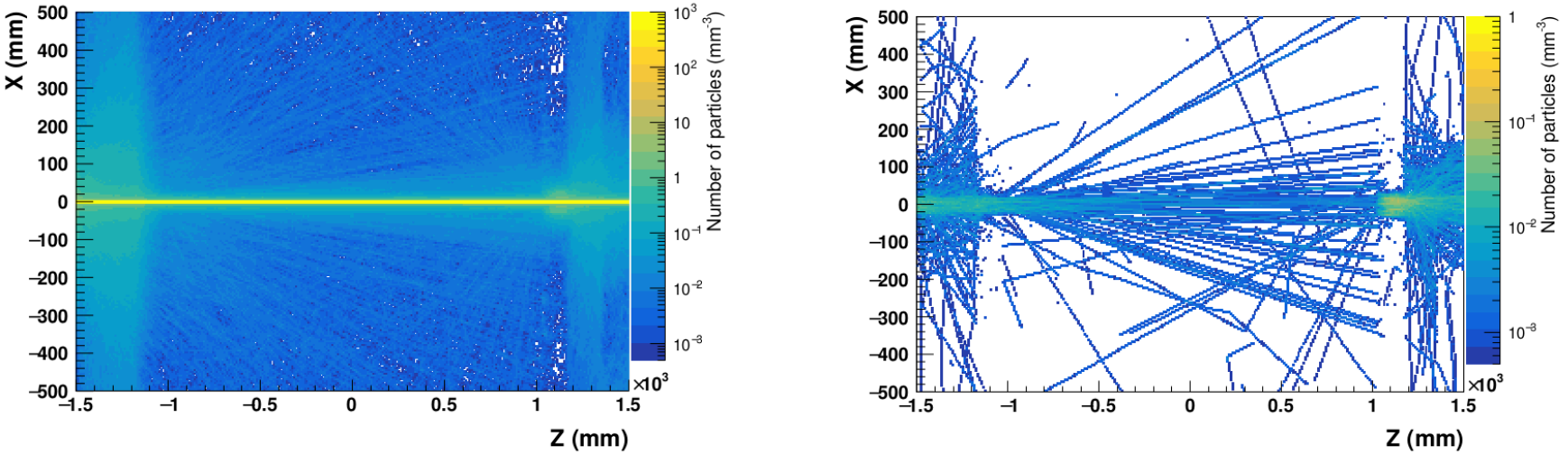


Figure 16: Average number of photons (left) and positrons (right) distributions projected to XZ plane around interaction point. Vertical shaded lines correspond to rectangular areas of interaction chamber.

Zoom in around target

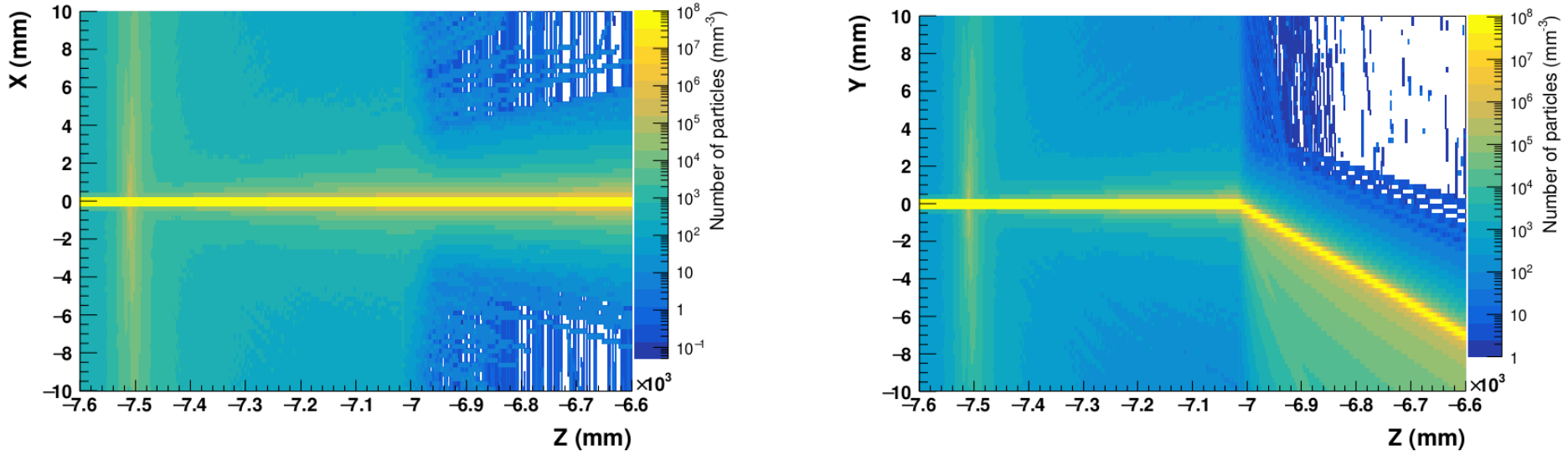
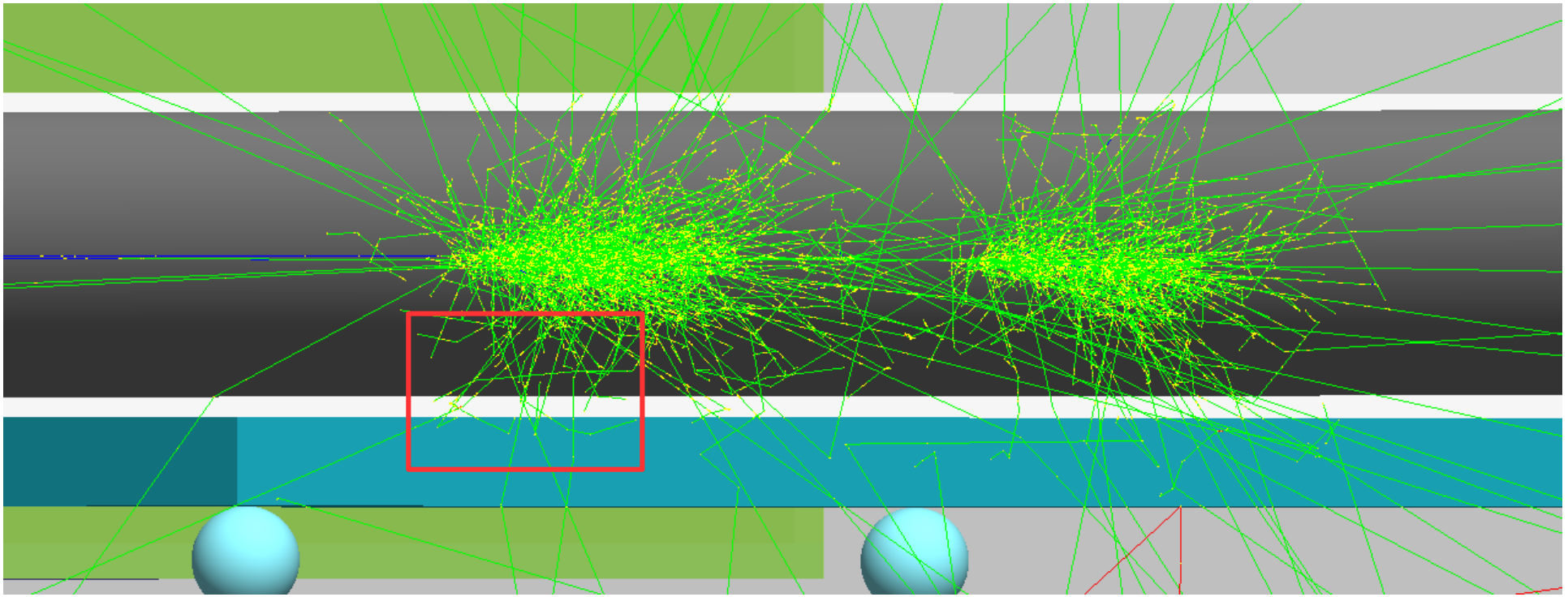
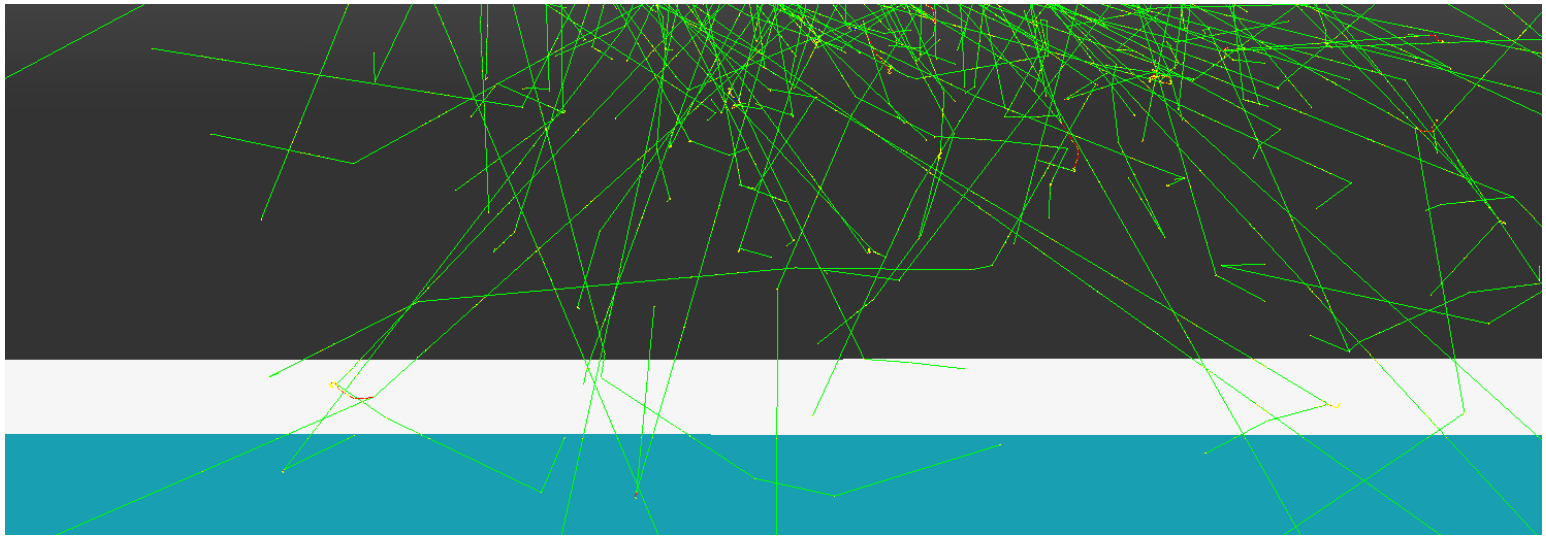


Figure 9: Average number of electrons distribution projected to XZ (left) and YZ (right) planes in the area of the target for bremsstrahlung photons production.

Positrons 2 GeV and 3 GeV





ECAL signal with primary positron

MC: 3000nm, 9508 BX