Update on LUXE GEANT4 Geometry

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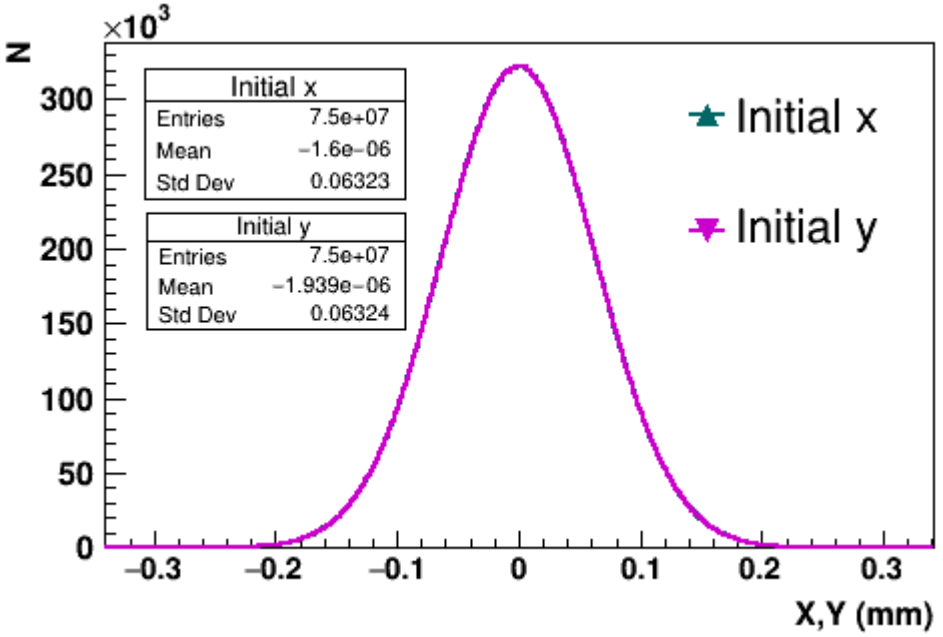
Outline

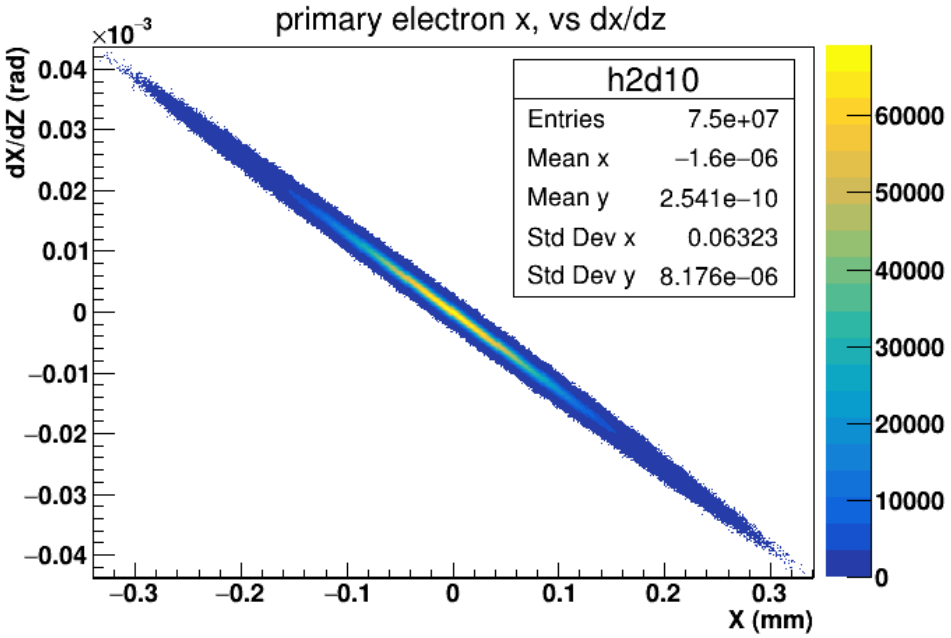
- Bremsstrahlung for BPPP
- LUXE HICS setup

Electron beam parameters

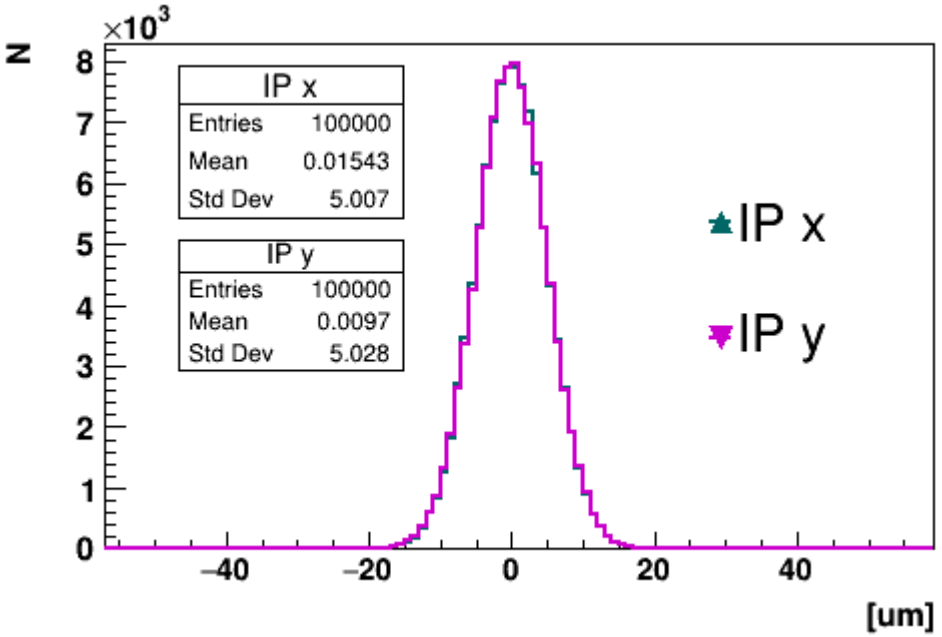
Crossing angle, rad	Laser σxy, μm	Laser σz, ps	N Electrons	Electron σx, μm	Electron σy, μm	Electron σz, ps	Emitt (mm mrad)	E, GeV
0.3	3, 8	0.035	1.5E+09	5	5	0.08 (24 μm)	1.4	16.5

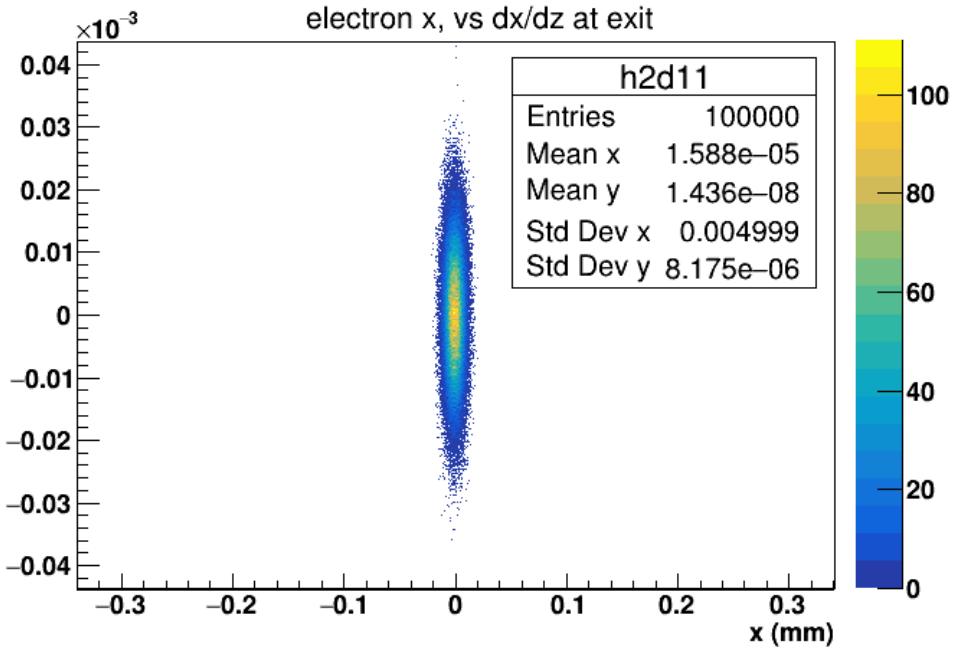
- Gaussian beam, focused on IP;
- Tungsten target 1%X0 (35um) thickness
- 7.51 m from IP;
- 15 M electrons (BX/100); (also 75M)
- Production cut: 1 μm.

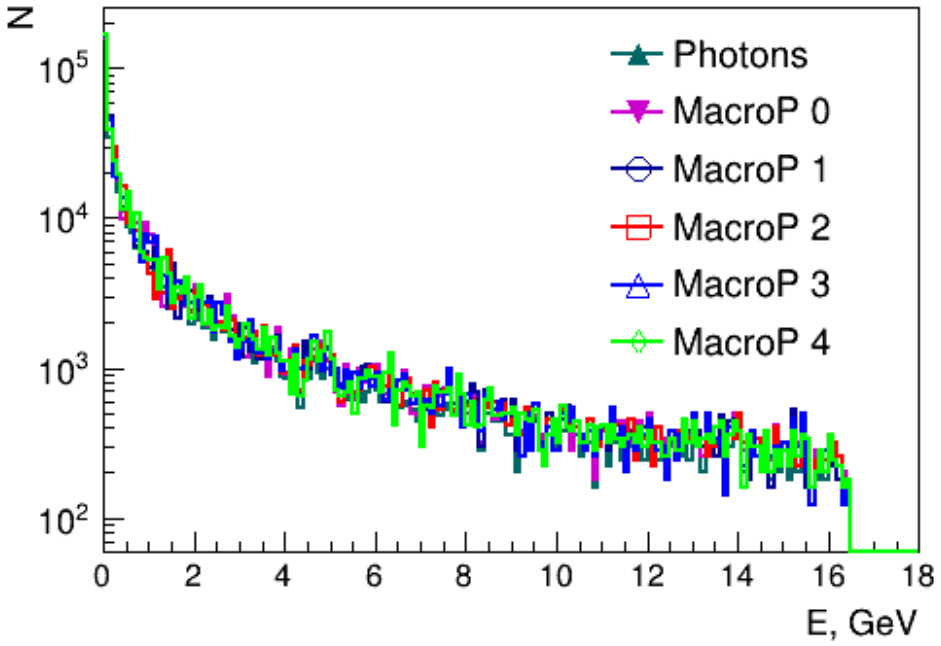


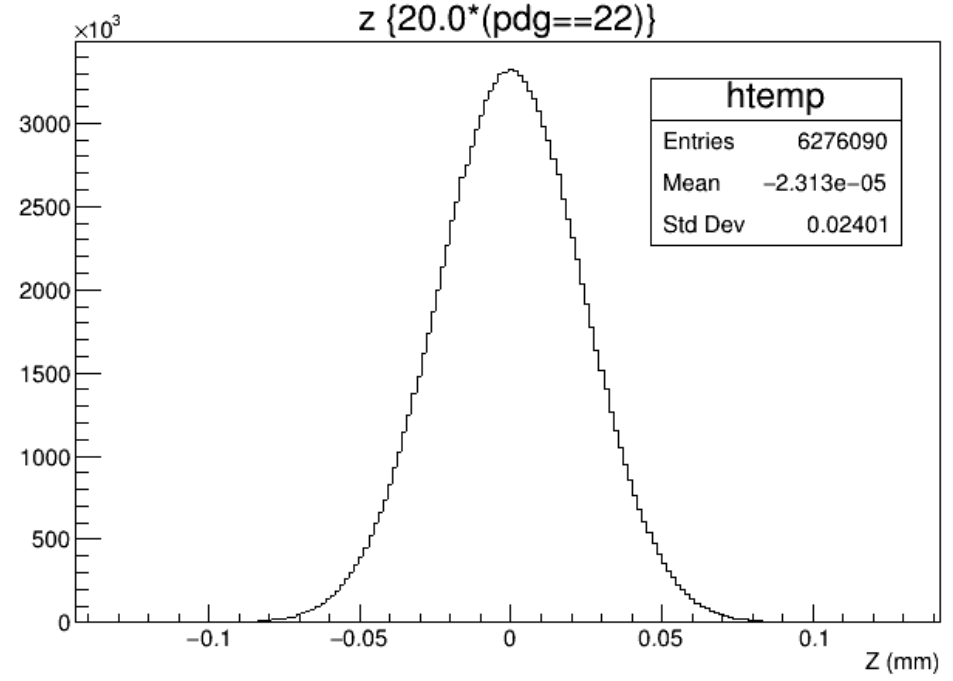


Electrons in IP without target and photons in IP







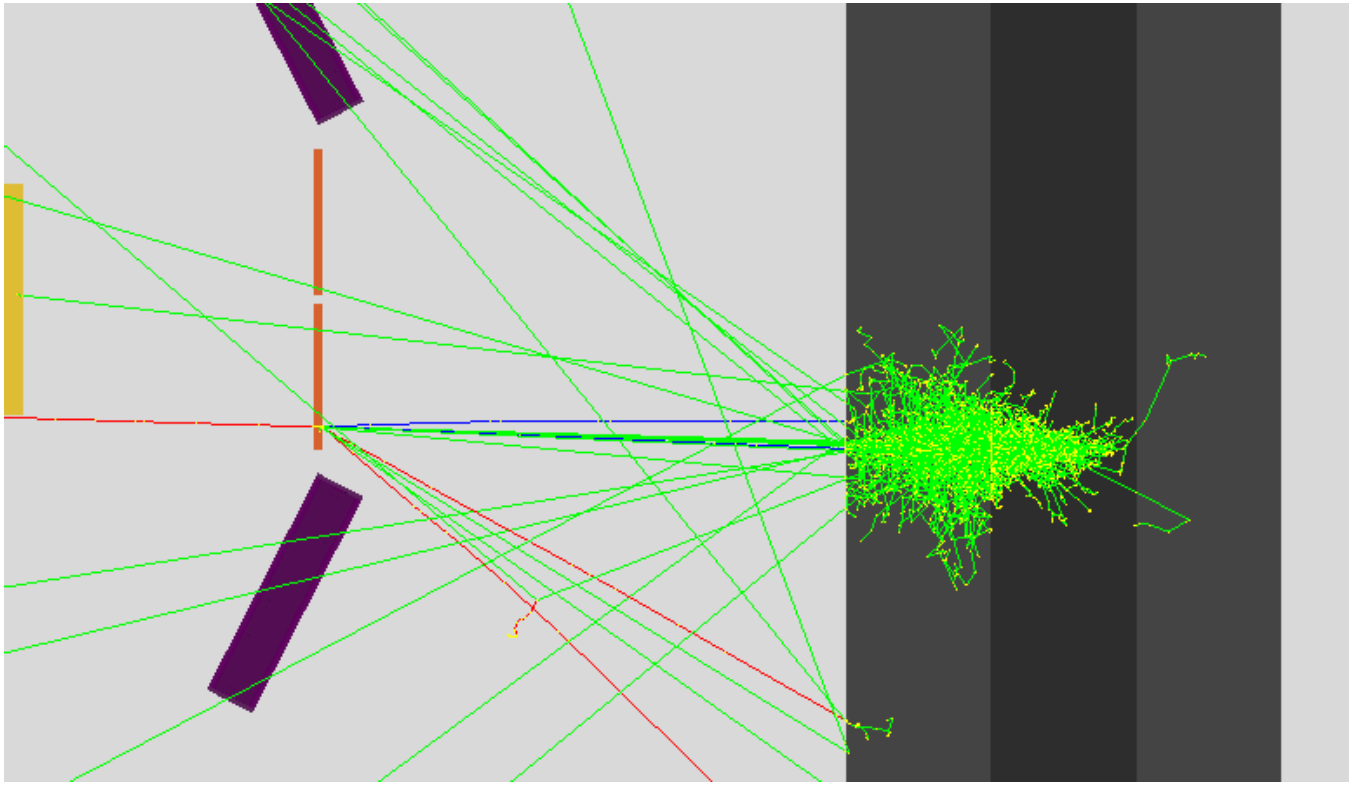


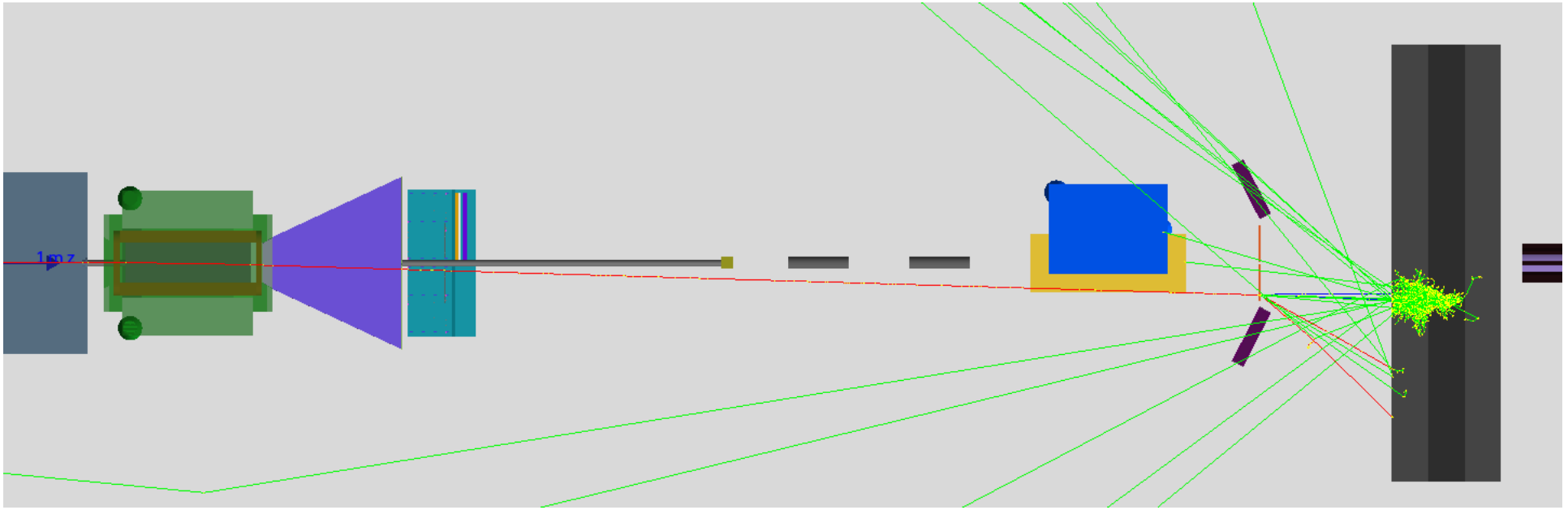
HICS setup

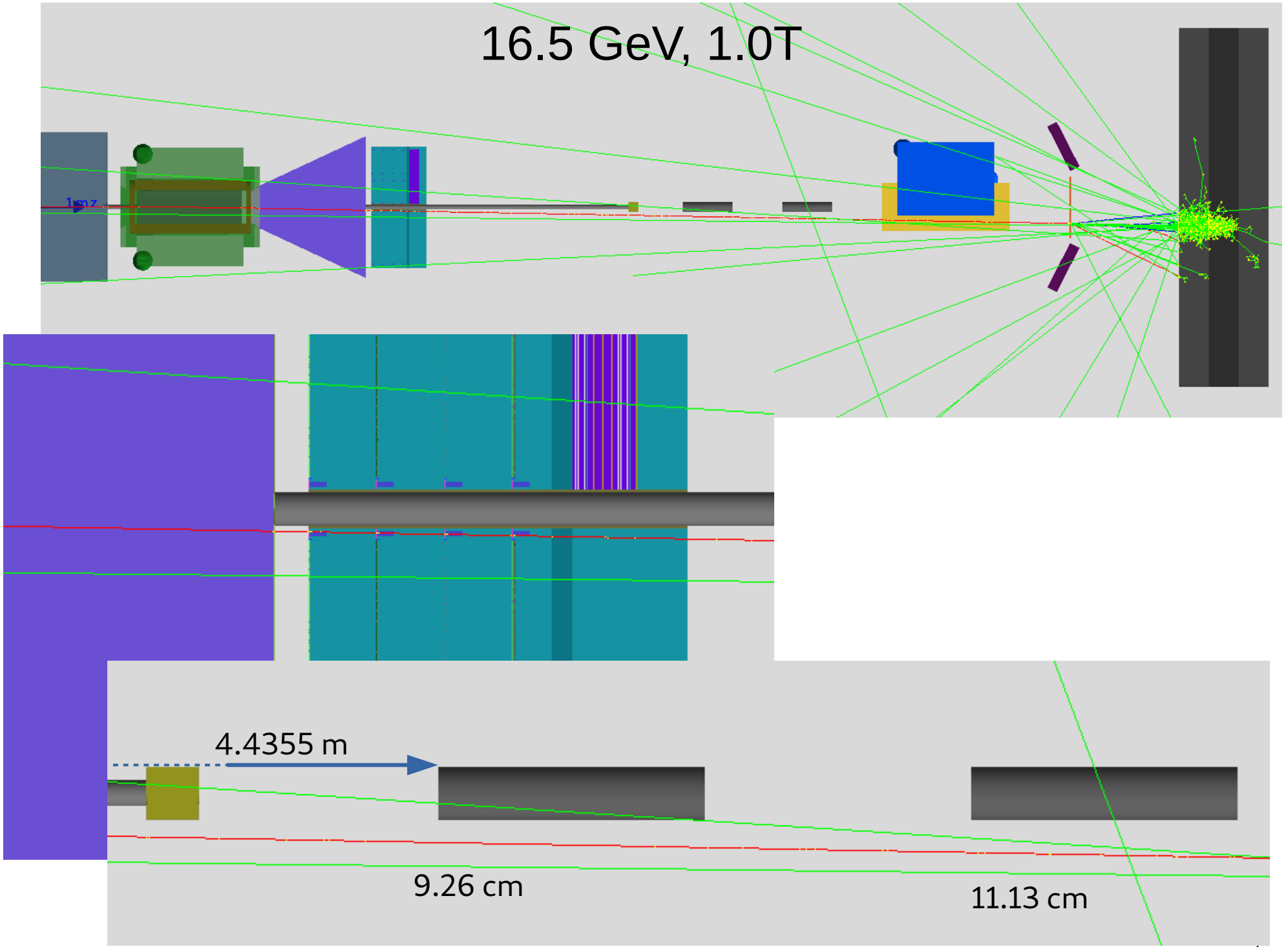
16.5 GeV, 1.6T

Shielding (Al-Fe-Al)

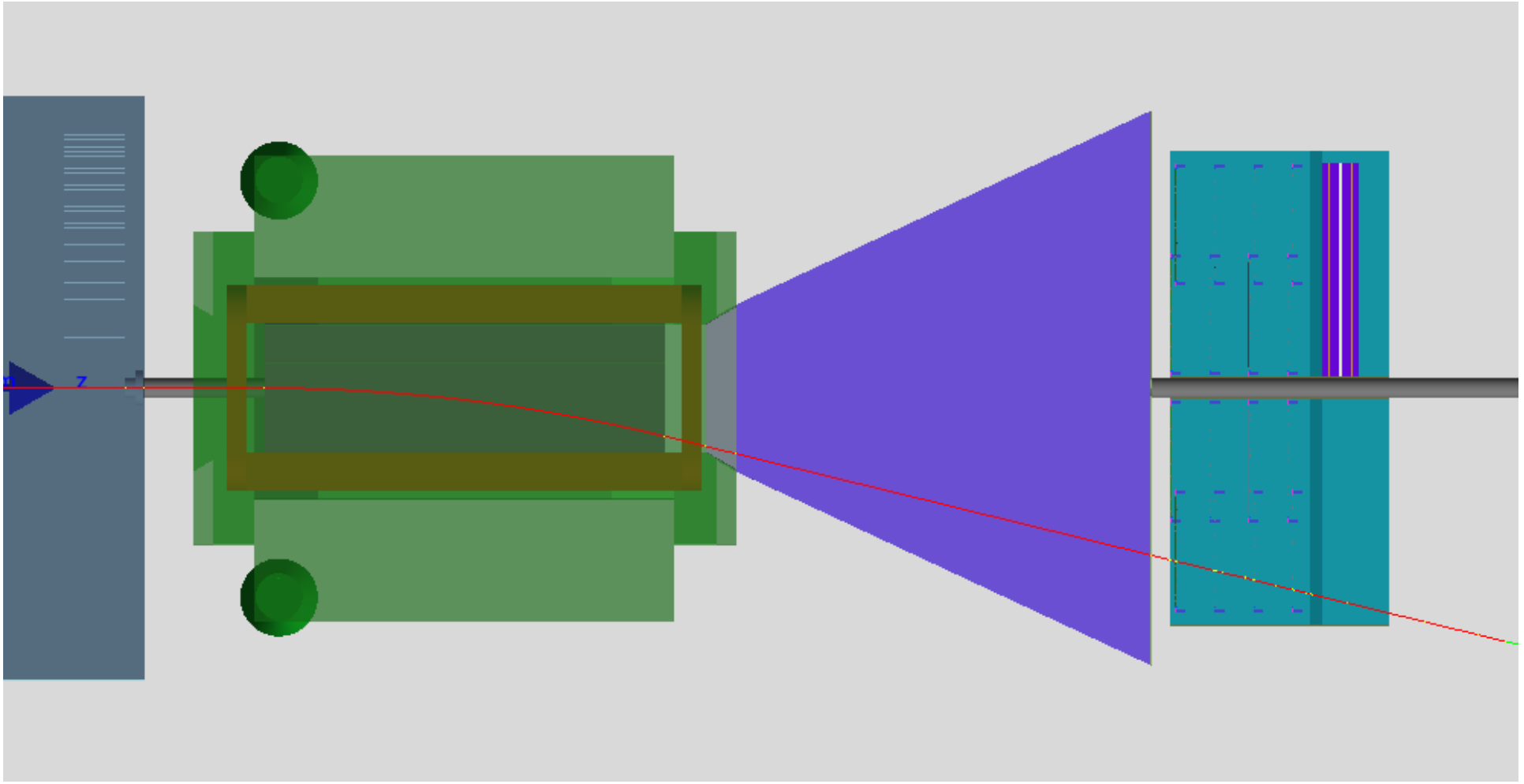
	Al	Fe	Total
Thickness (cm)	30	30	
X0 (cm)	8.897	1.757	
Thickness (X0)	3.37	17.07	20.45



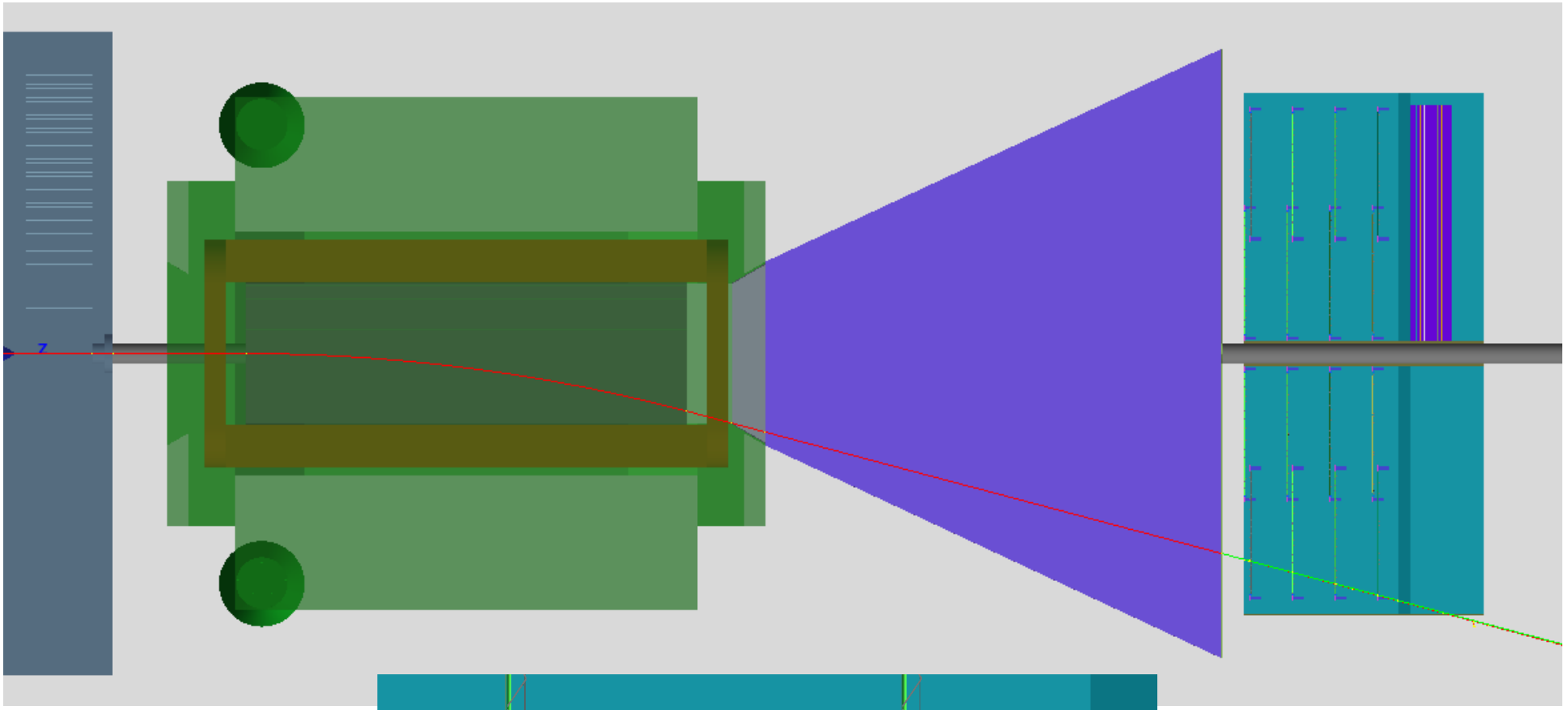


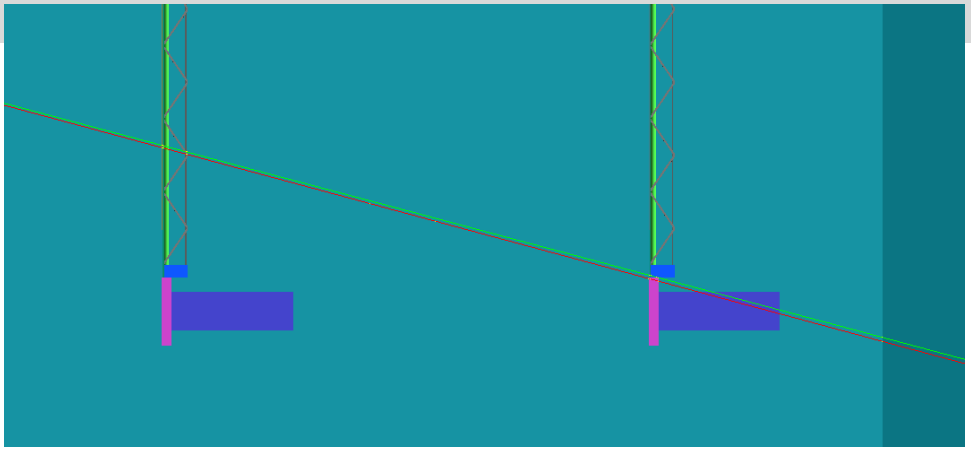

16.5 GeV, 1.0T
4.4355 m
9.26 cm
11.13 cm
8.73 cm
17.5 GeV
10.49 cm

1.3 GeV, 1.0T

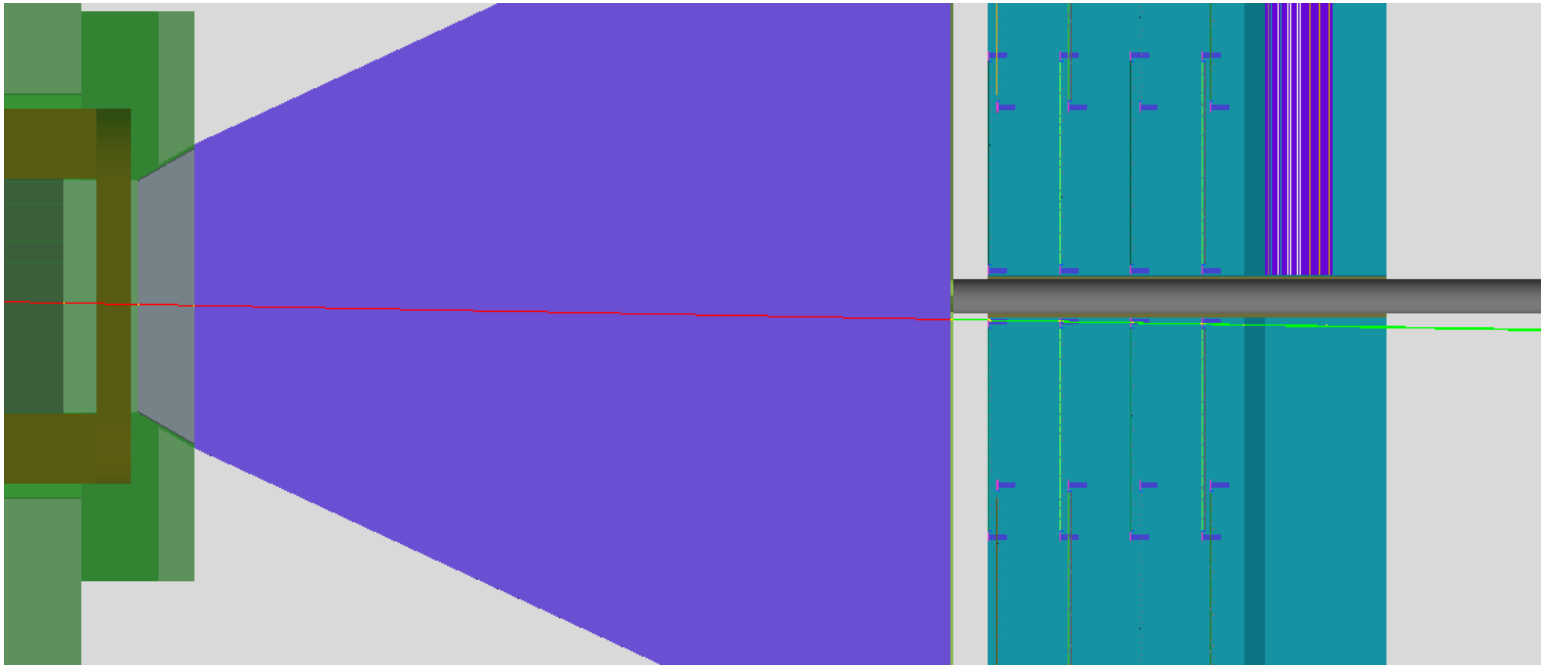


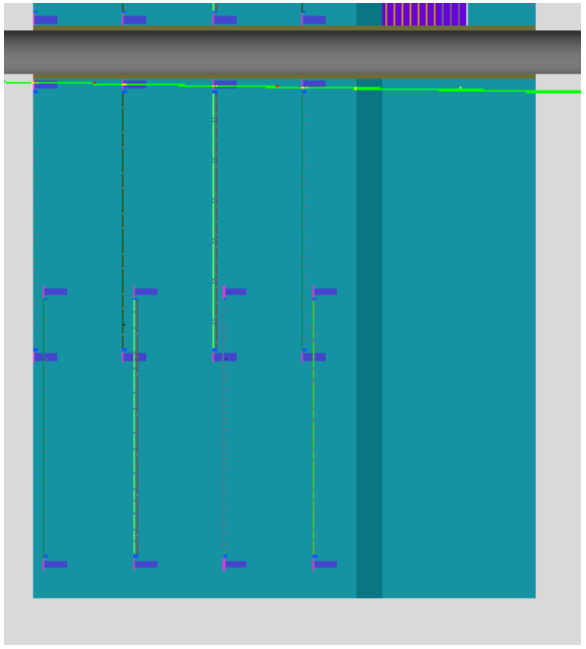
1.2 GeV, 1.0T





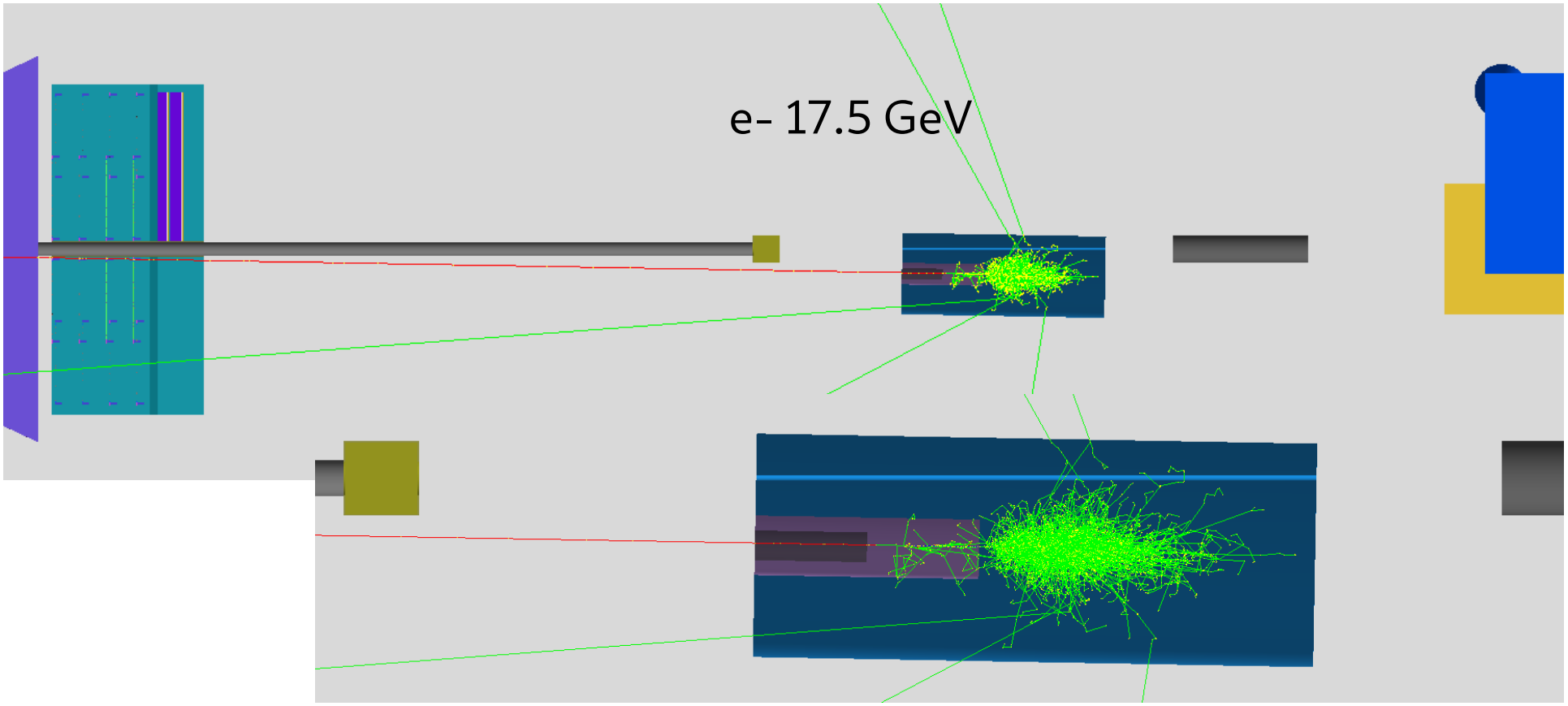
Electron X distribution at a possible location of Cherenkov detector



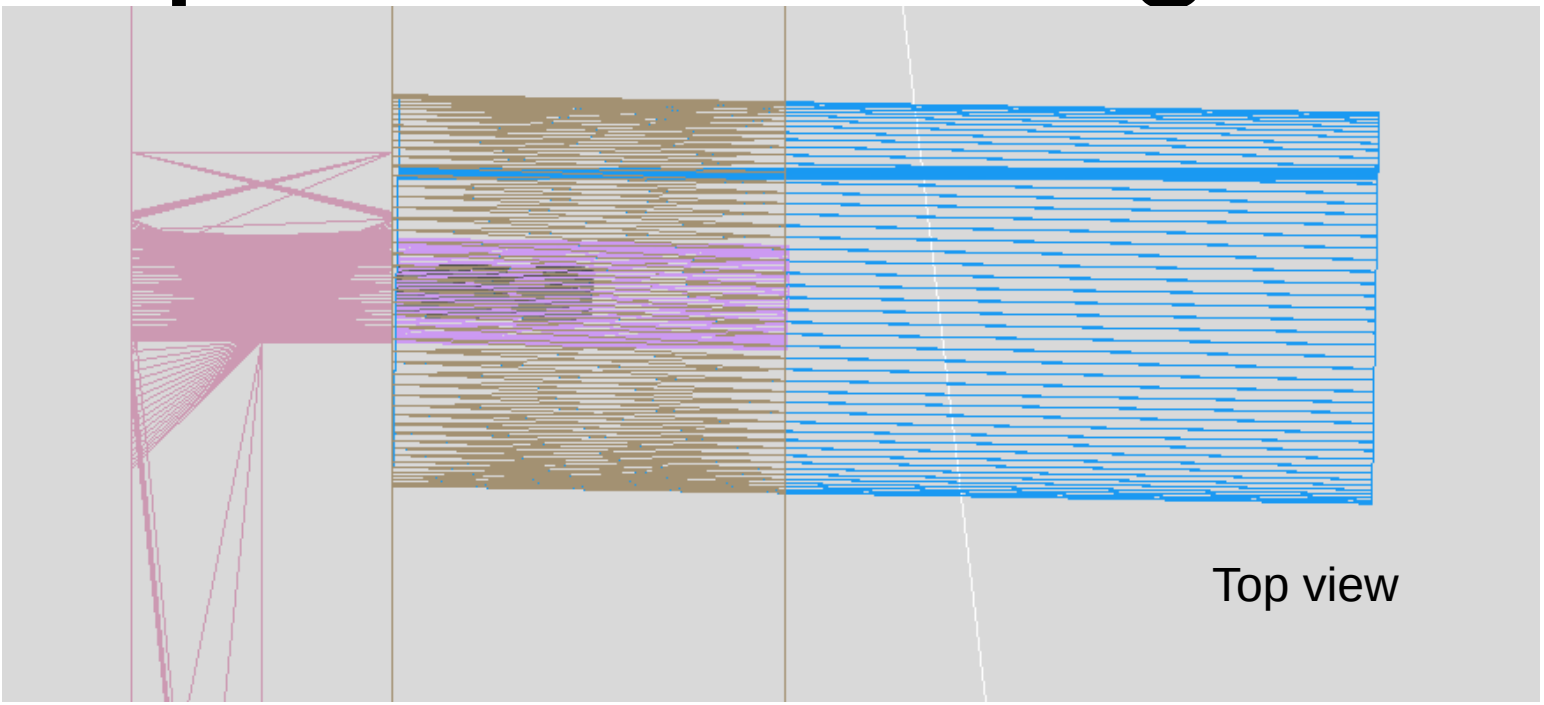


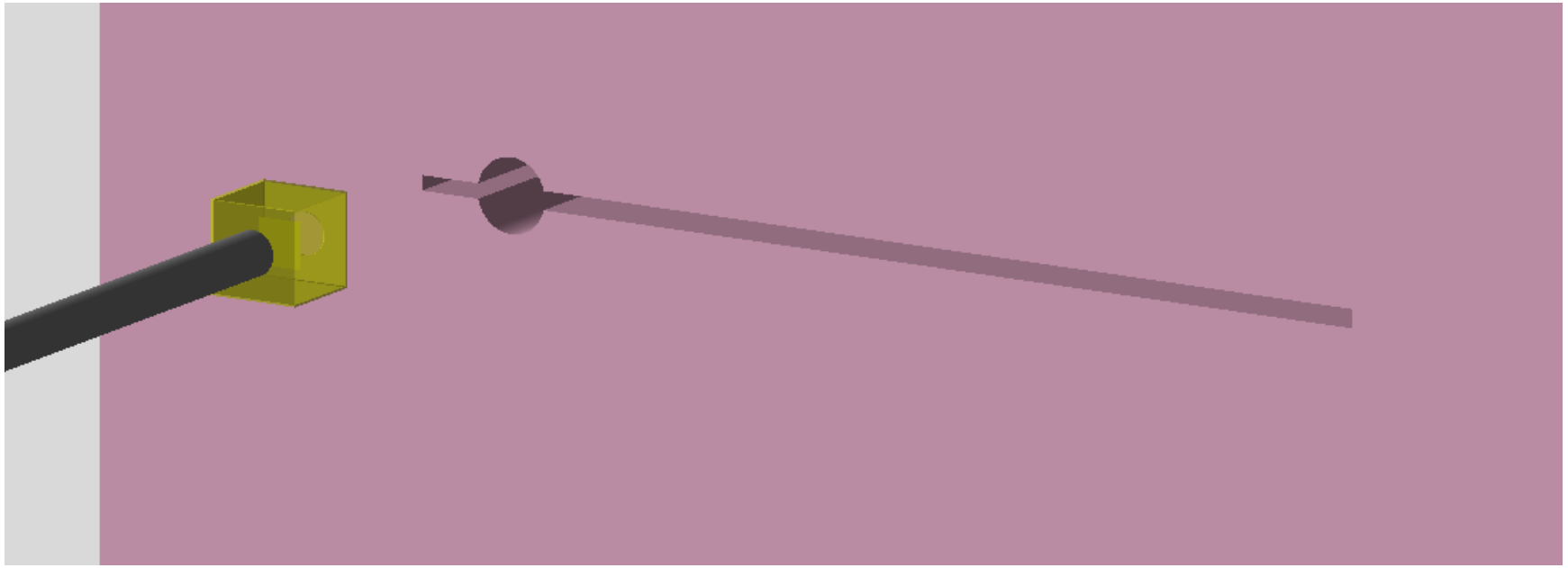
E (GeV)	X (mm)	dX (mm)
16.5	41.22	0
15	45.35	4.12
14	48.59	7.36
13	52.33	11.10
12	56.69	15.47
11	61.85	20.62
10	68.03	26.81

Dump with collimation hole

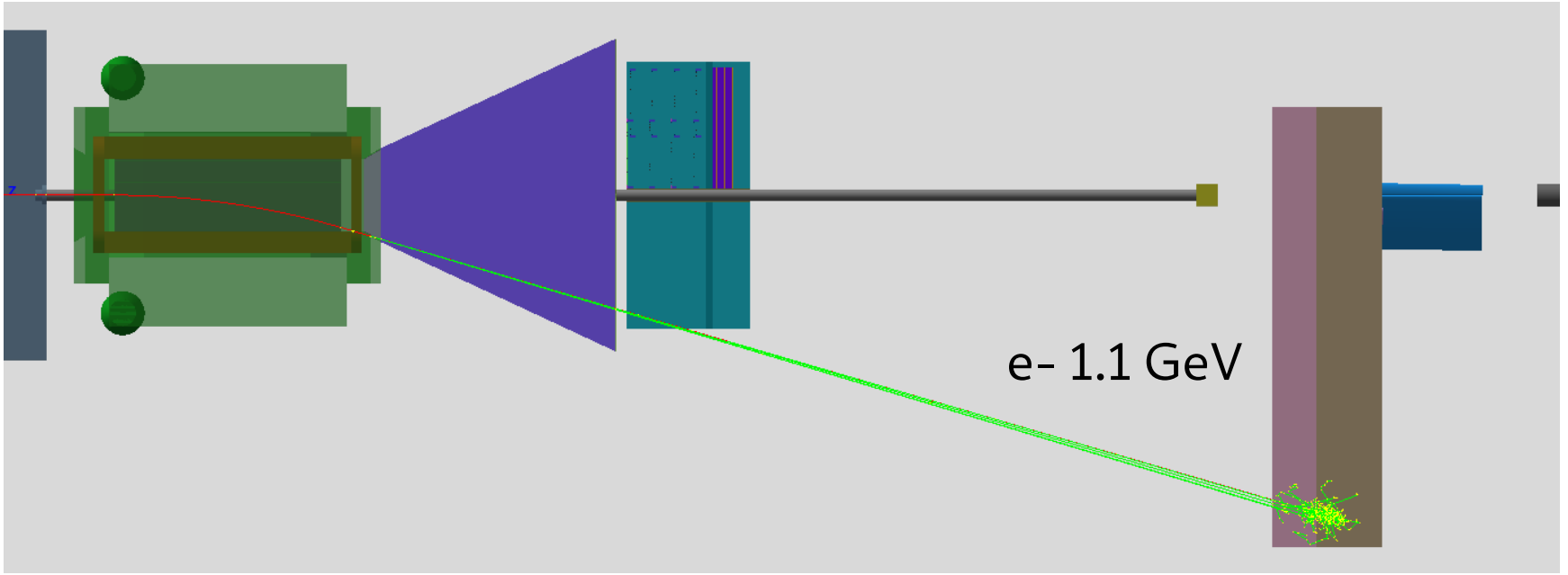


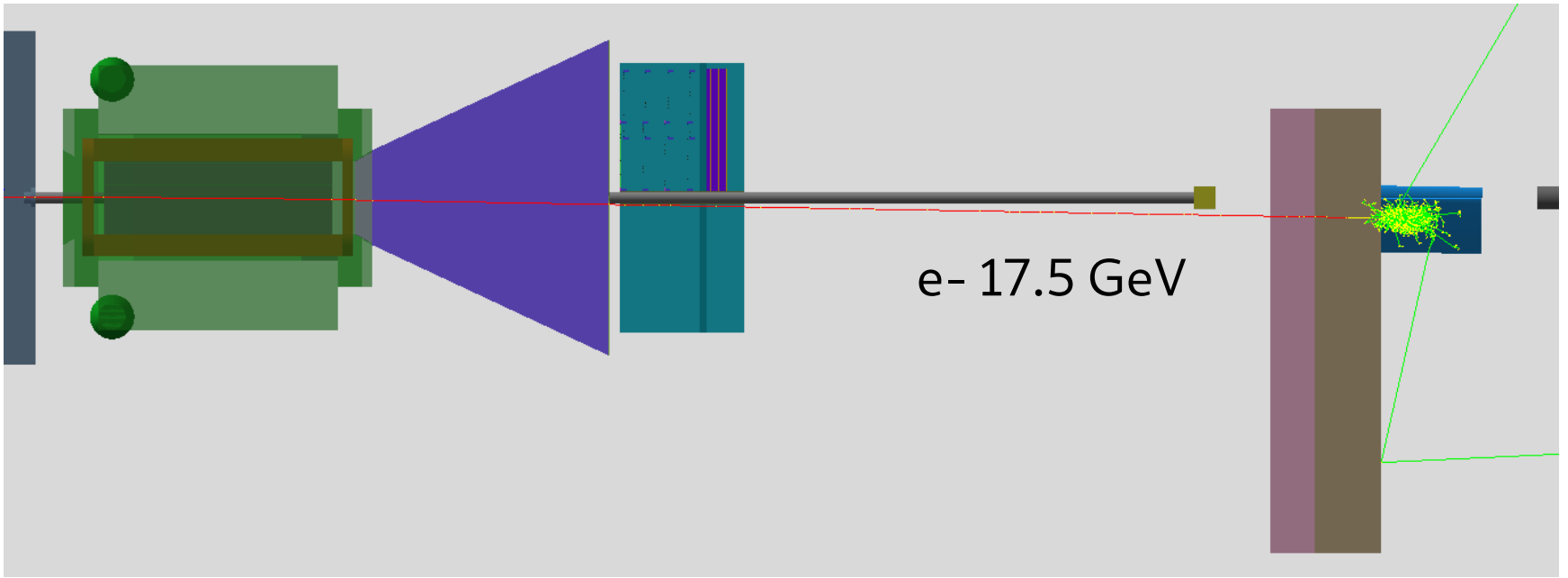
Dump and shielding



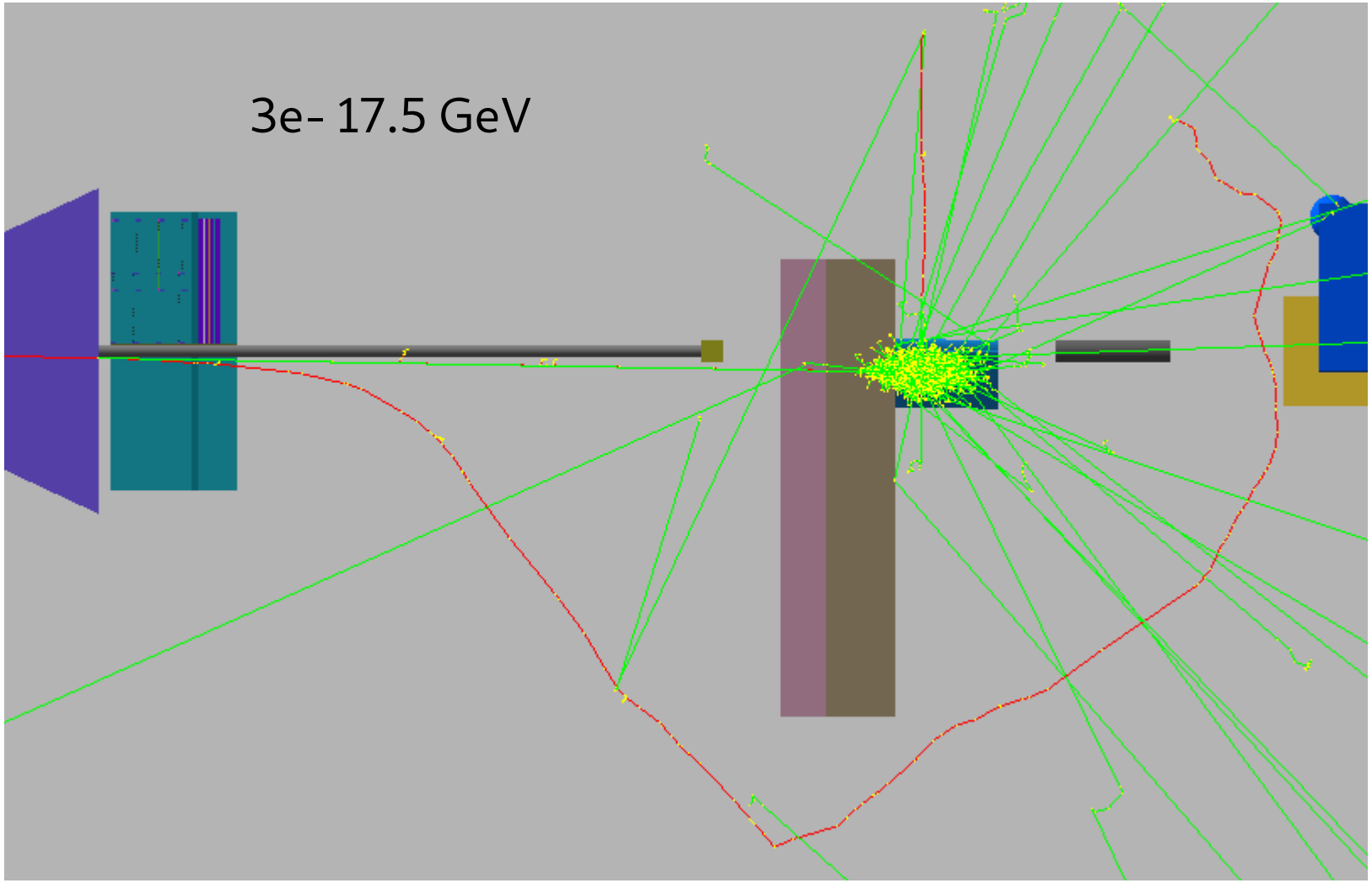


Electrons hitting the dump and shielding

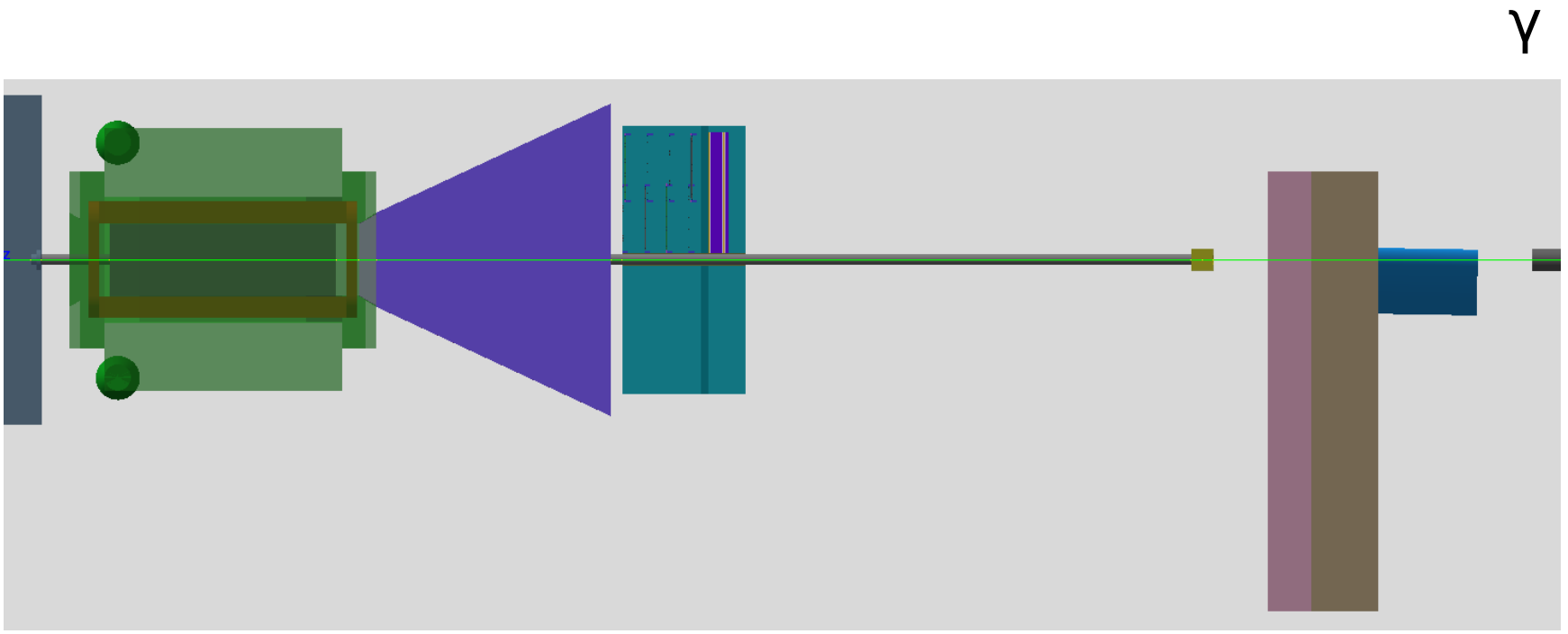




Three electrons

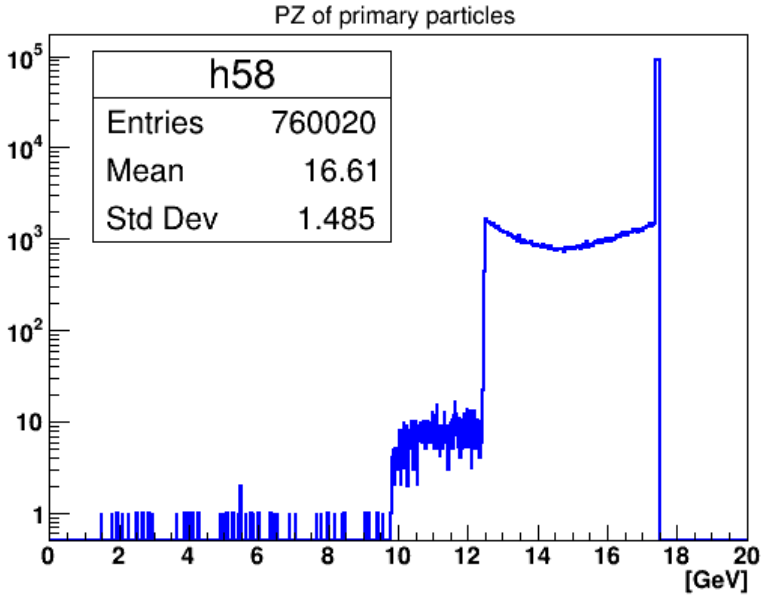


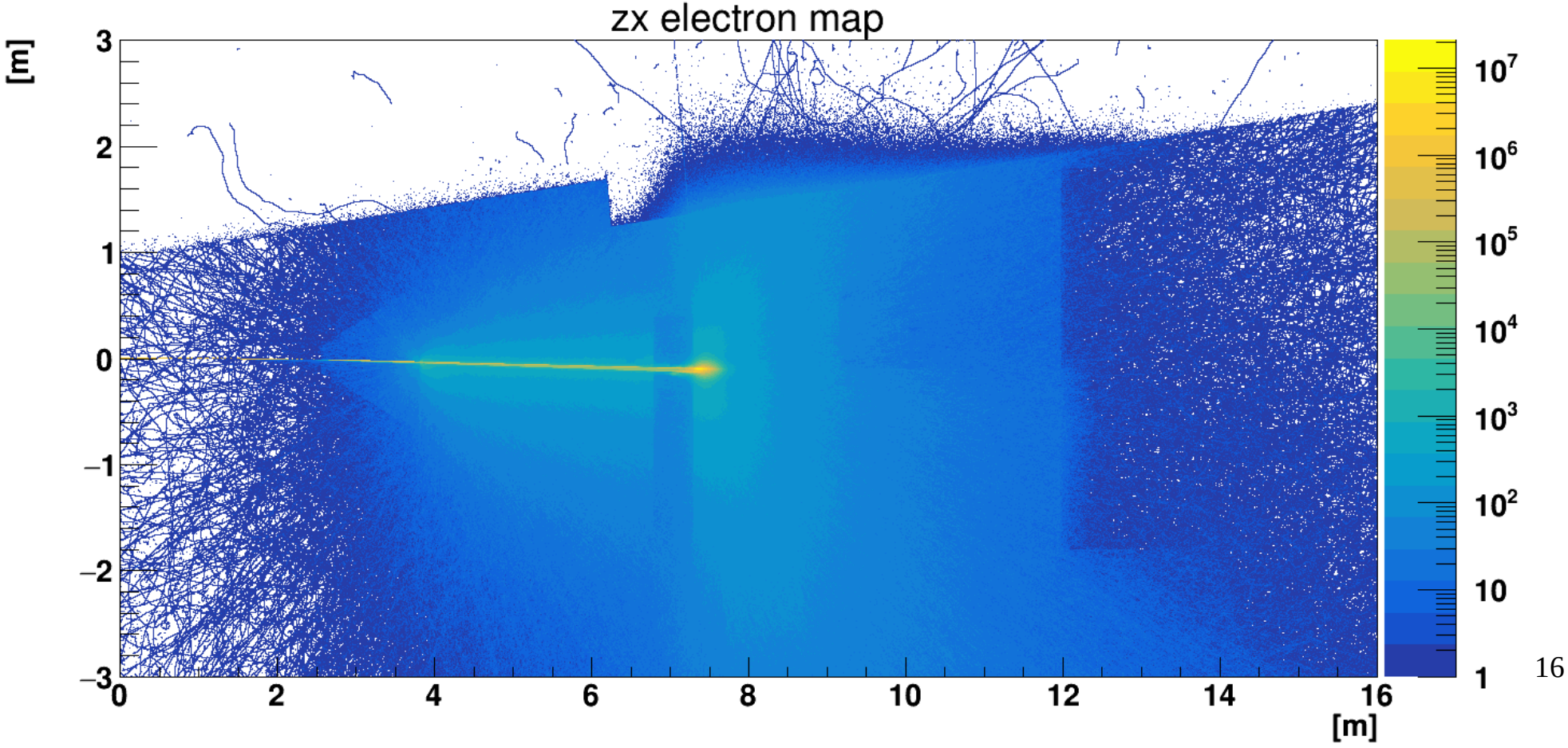
Photon passing through hole in the dump (collimator)



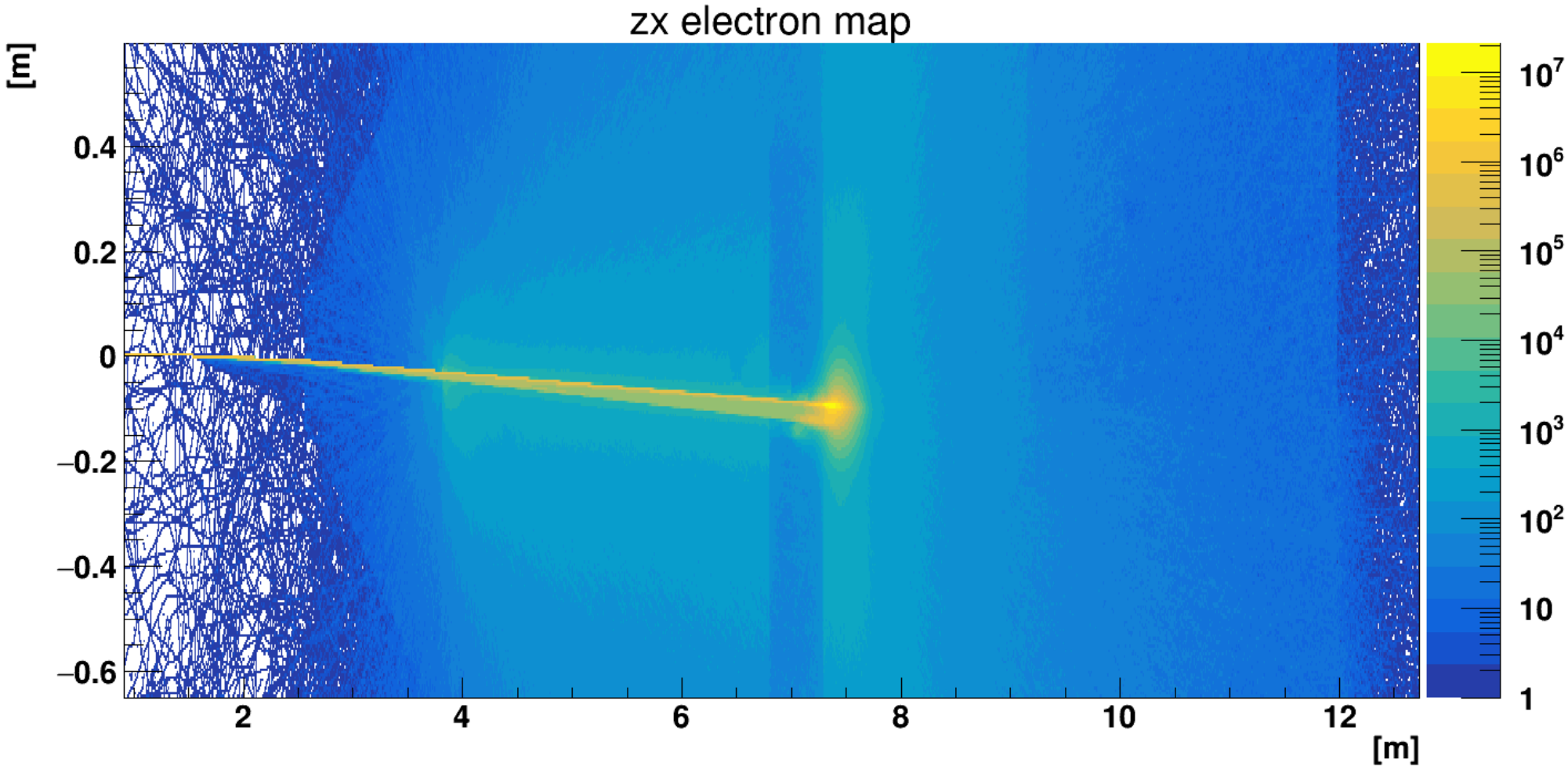
Electron map

Spectra of Compton electrons

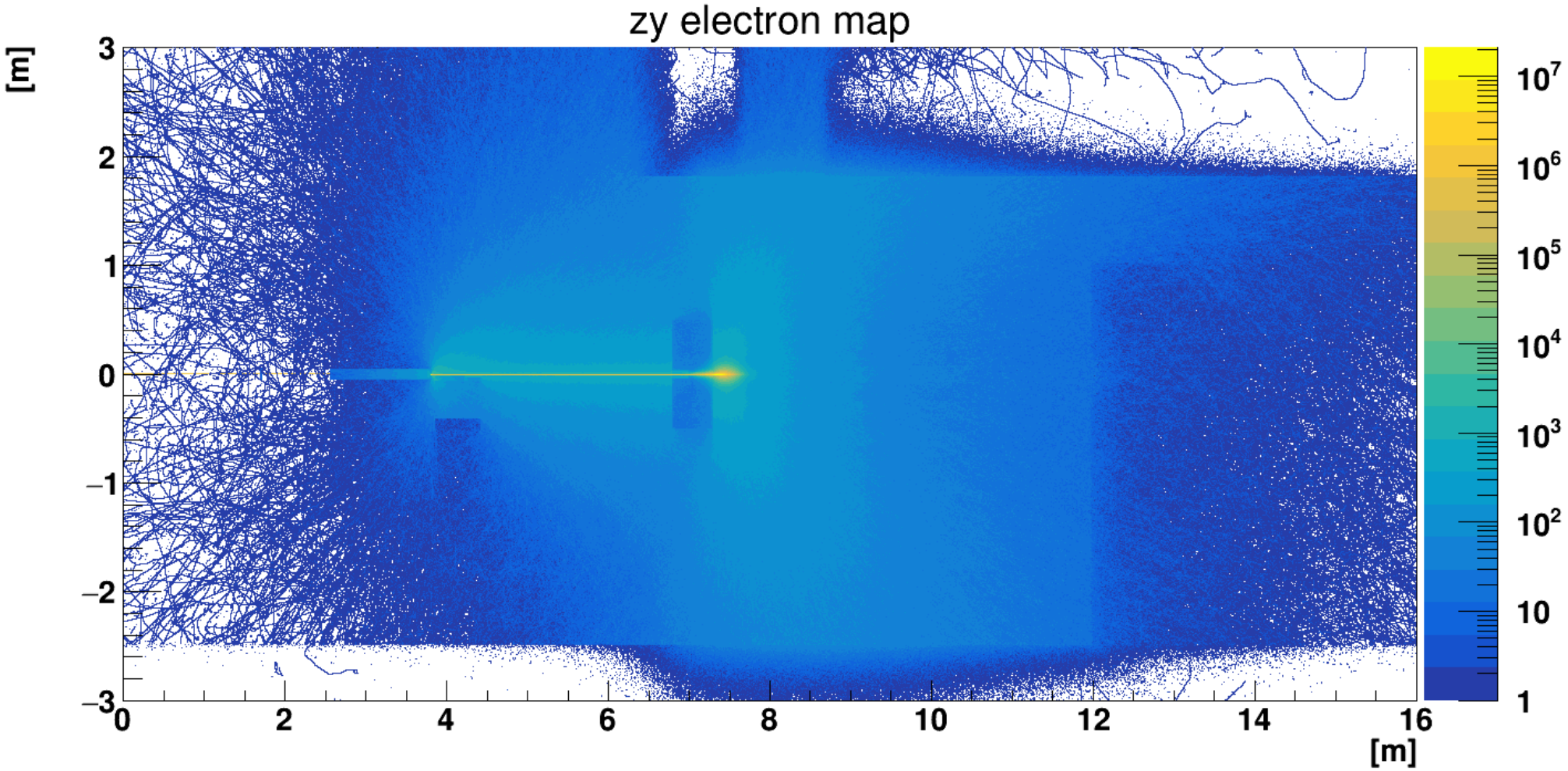




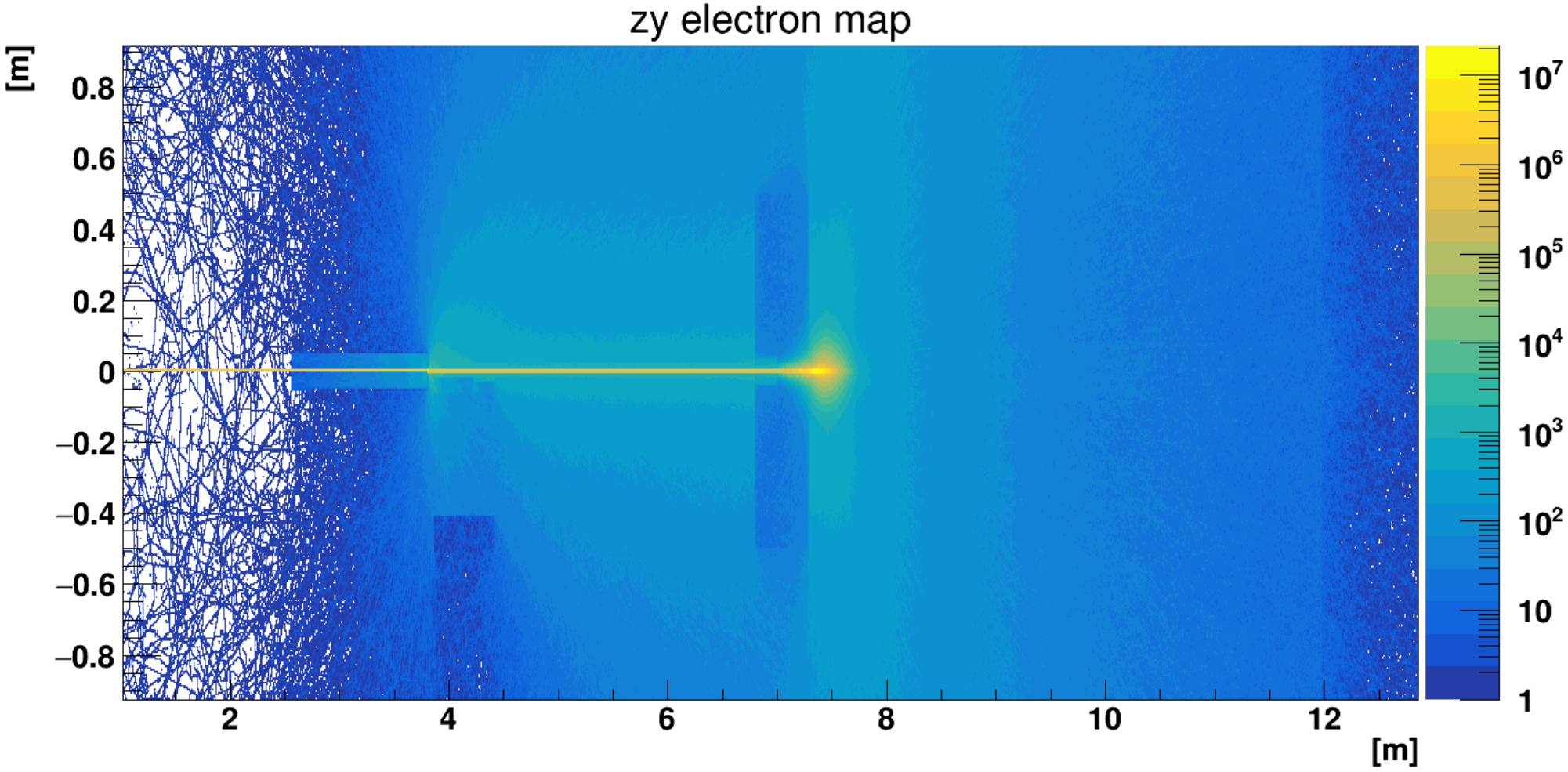
ZX electron map, zoom



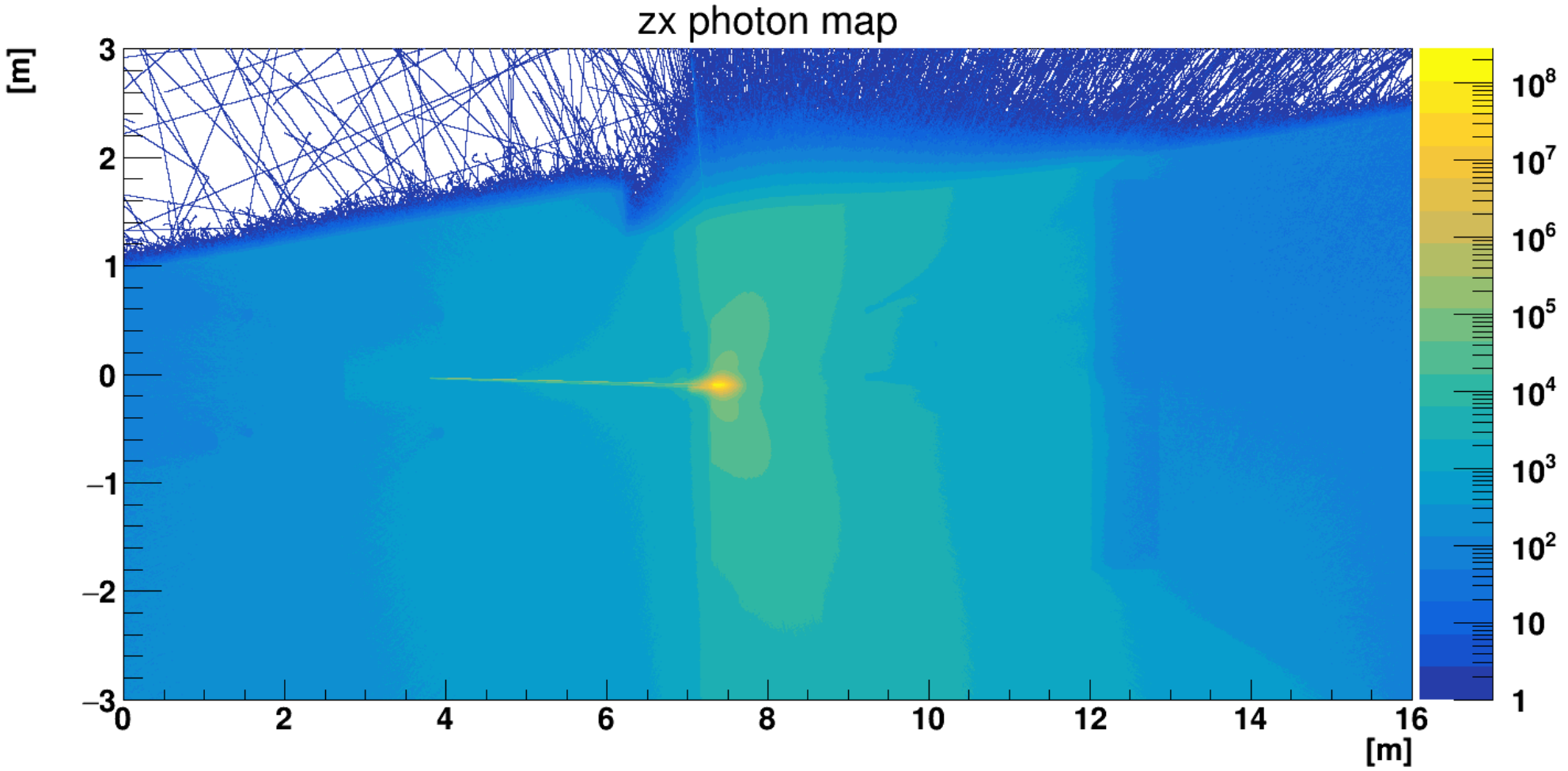
ZY electron map



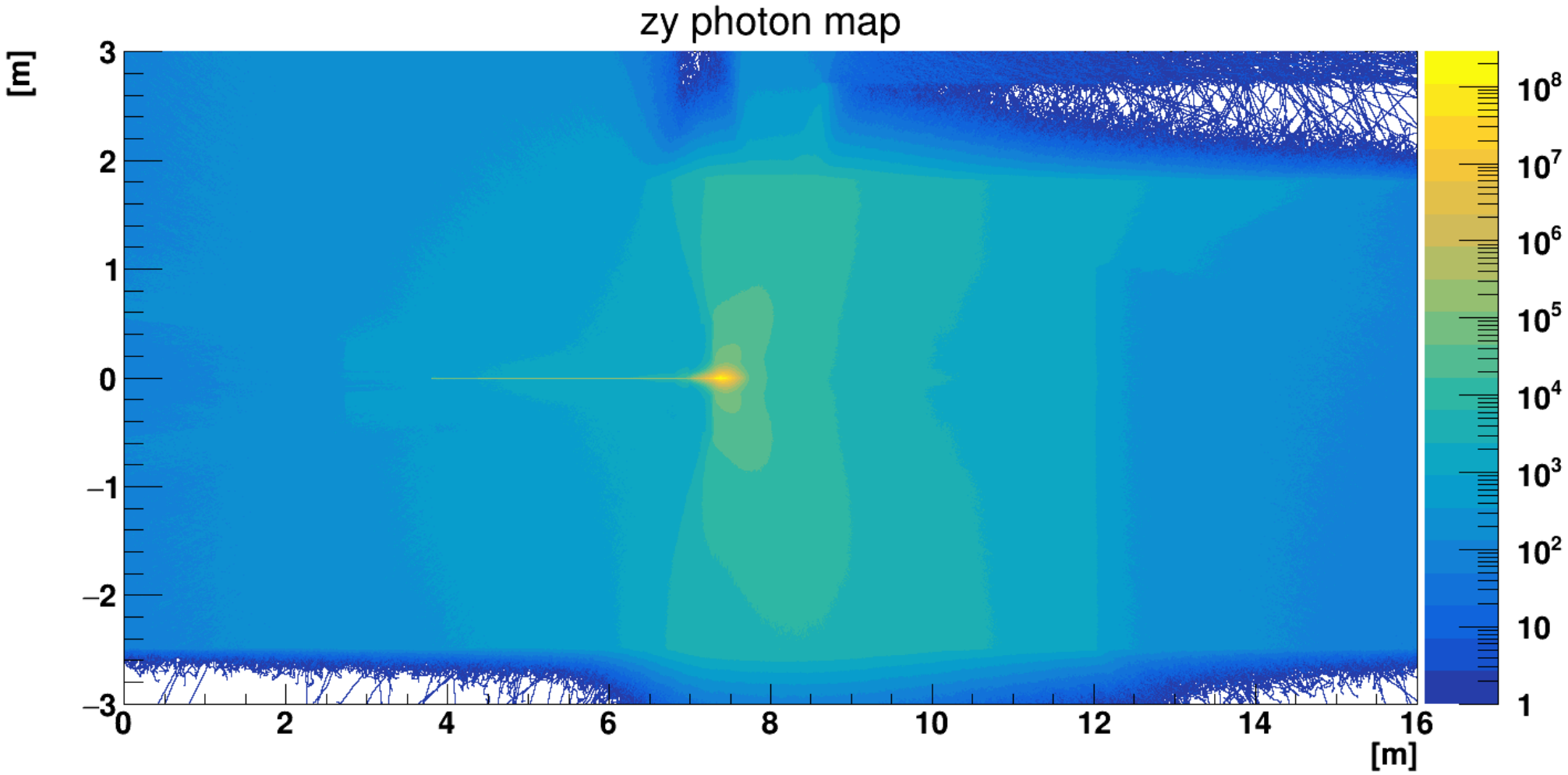
ZY electron map, zoom



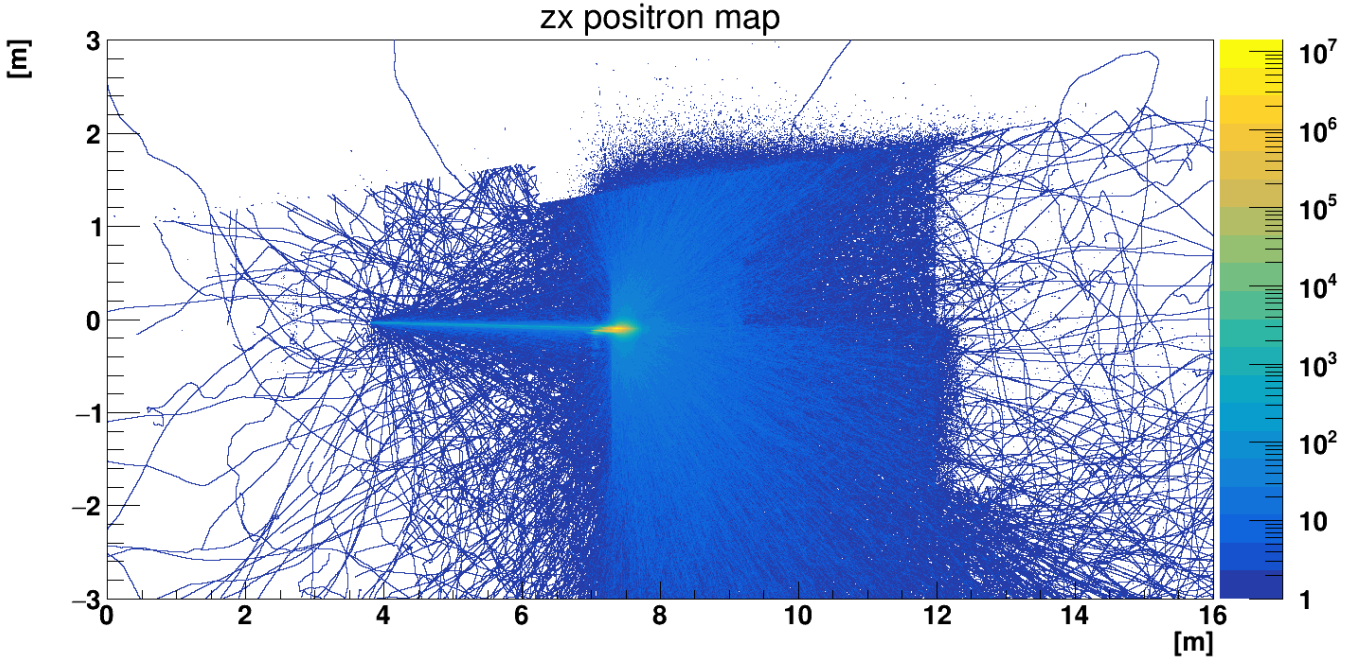
ZX photon map

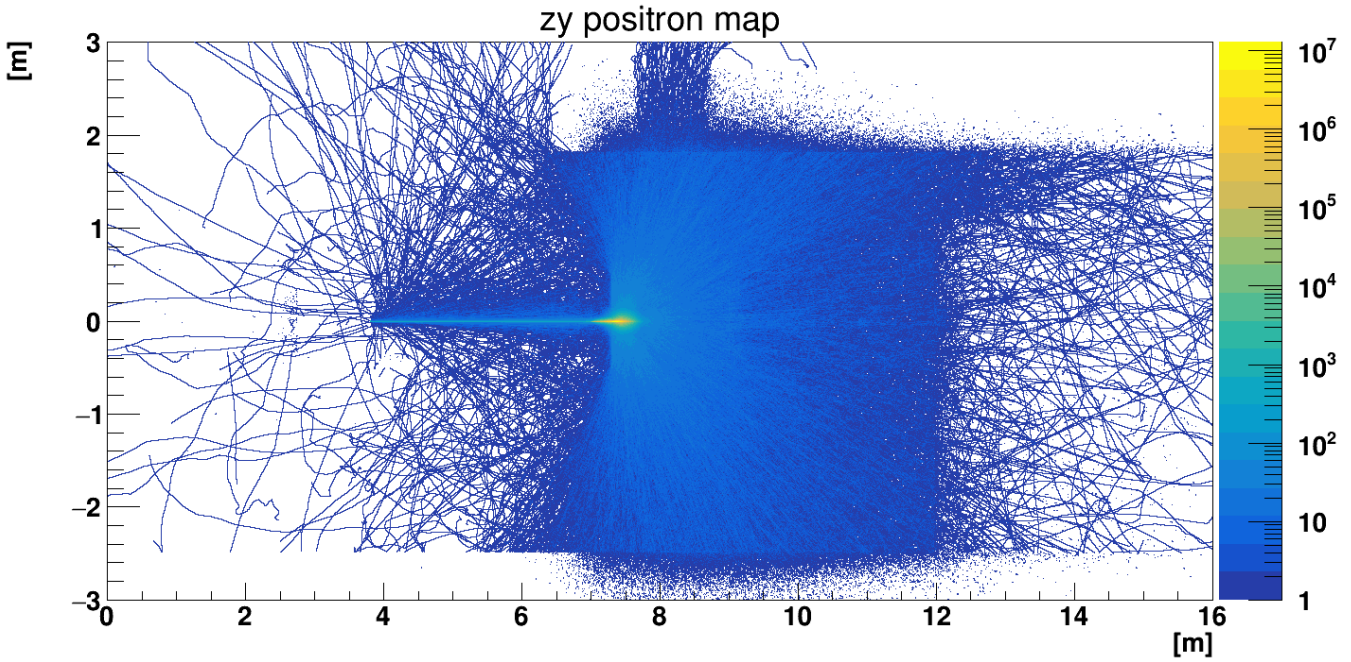


ZY photon map

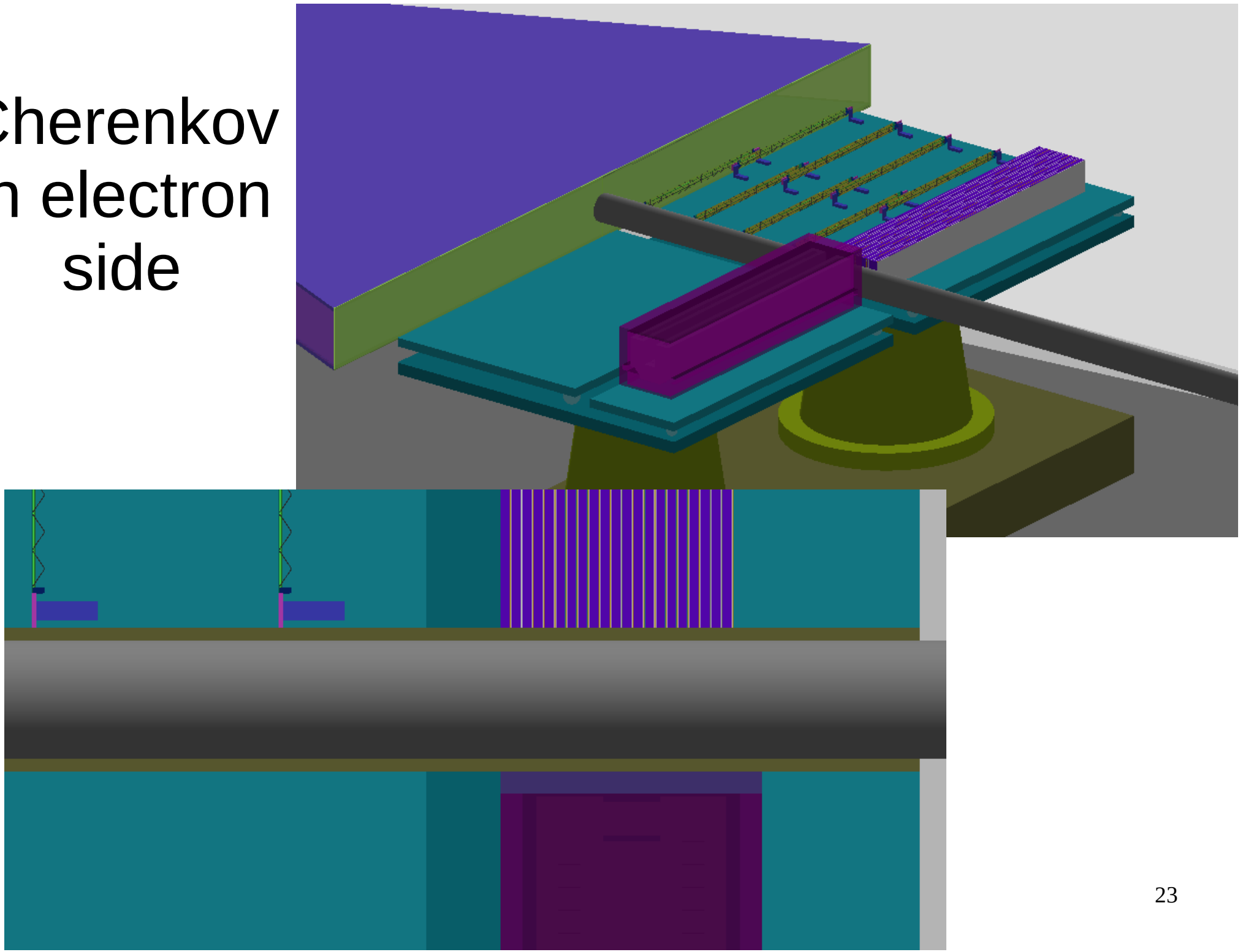


ZX and ZY positron map





Cherenkov in electron side



Summary

- Bremsstrahlung for IP at a distance of 7.51m from the target is generated. There are more and less detailed samplings of the phase space for macroparticles.
- Beam dump and shielding for HICS setup is implemented in Geant4 model;
- Preliminary study in simulation with HICS-like electron spectrum showed reasonably good performance.
- Transverse size of the beam dump might be increased to suppress lateral leakage.
- Detector for the HICS electrons?

Backup

Photon macro particles