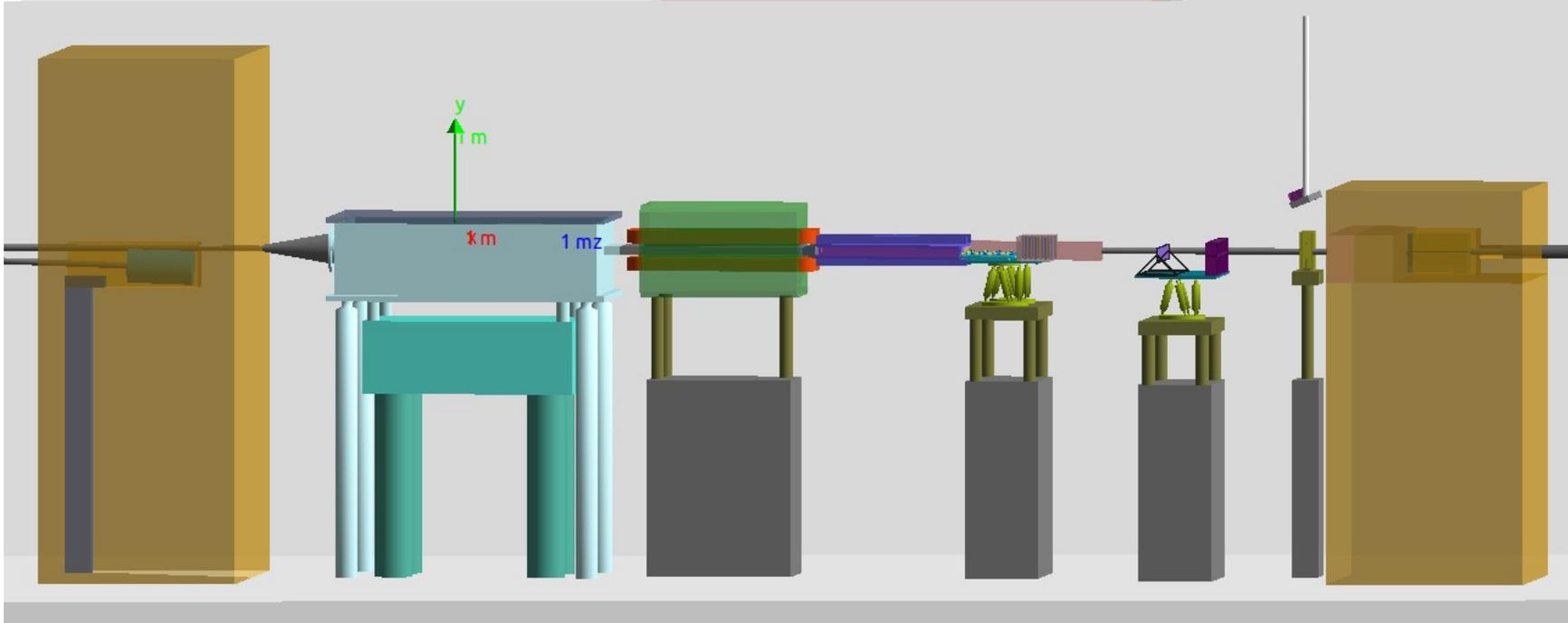
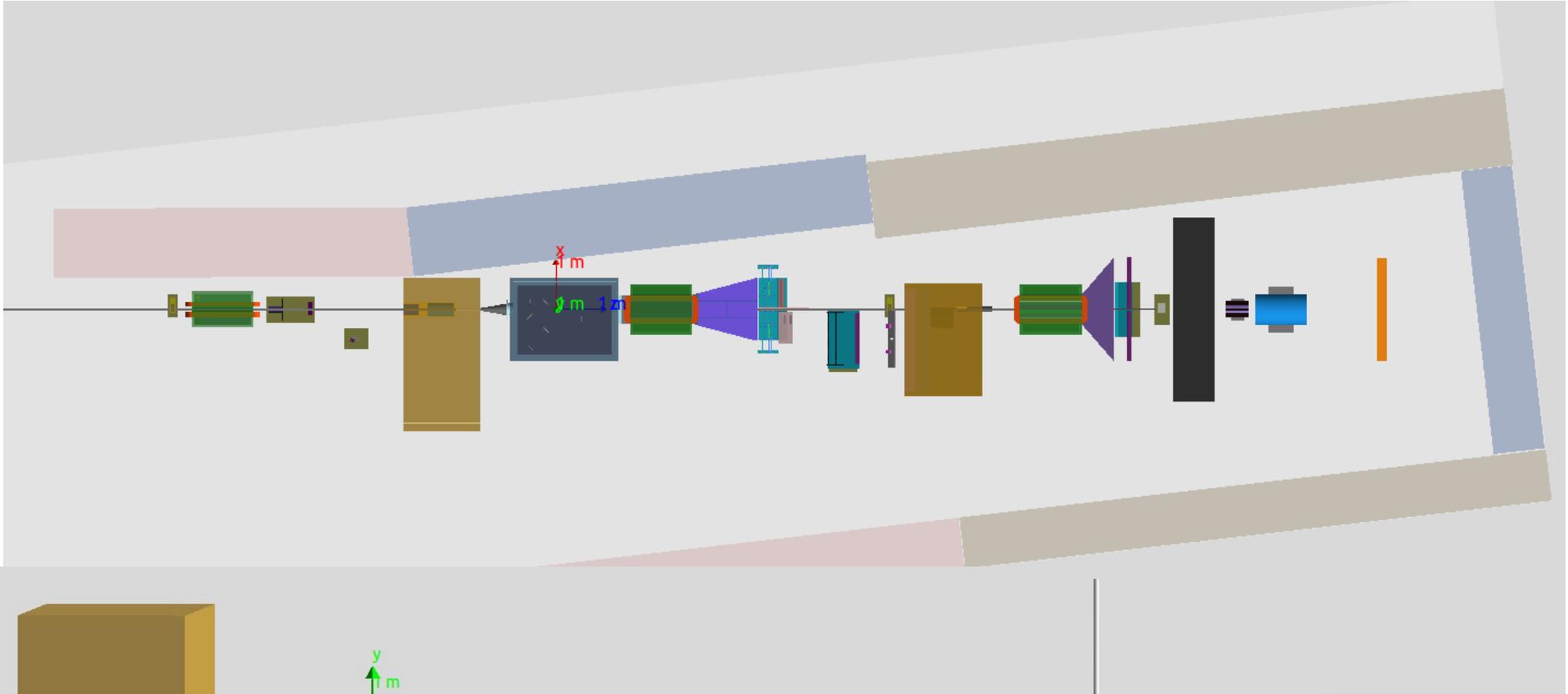


Update of LUXE GEANT4 Simulation

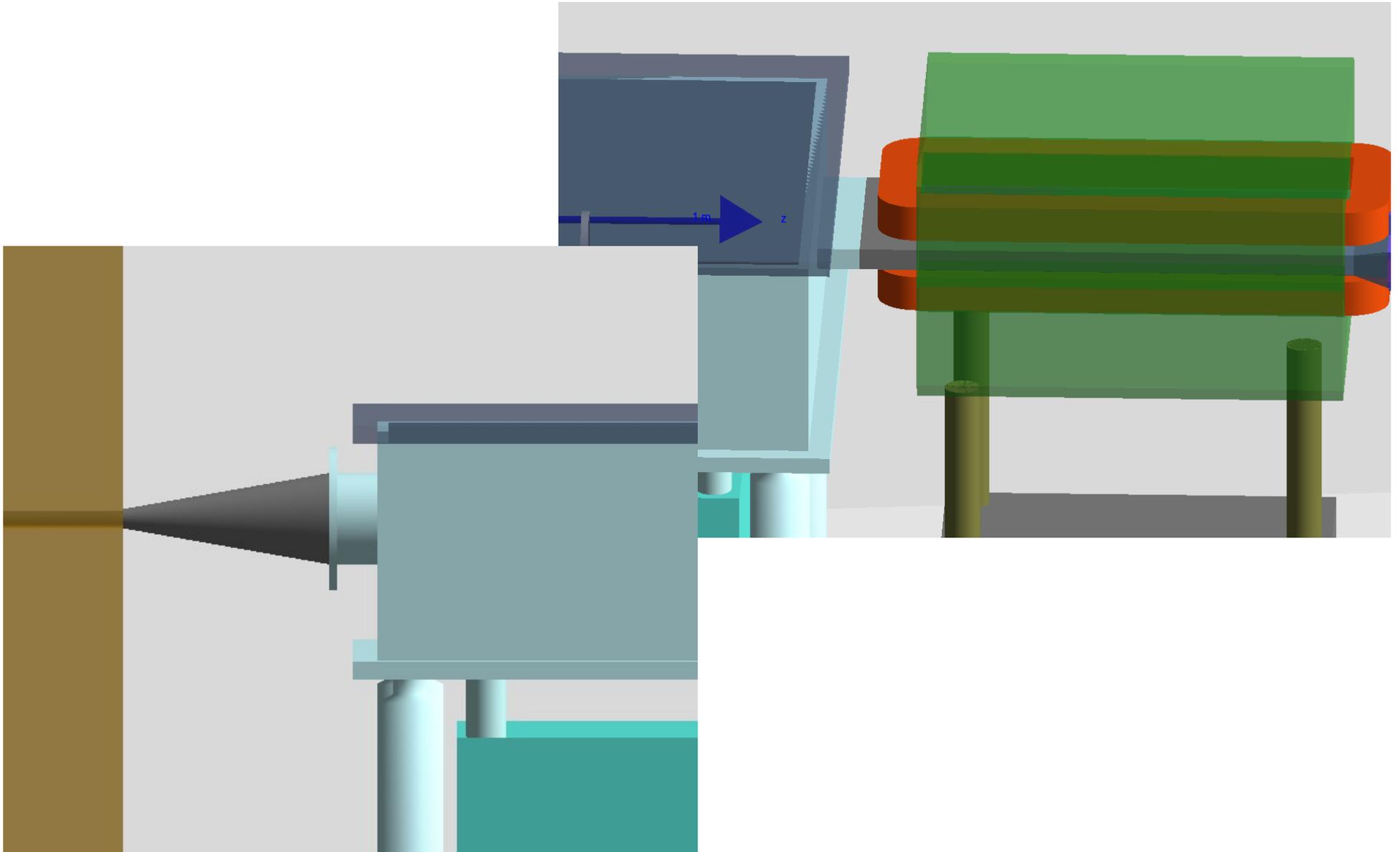
Oleksandr Borysov

LUXE S&A Meeting
October 19, 2021

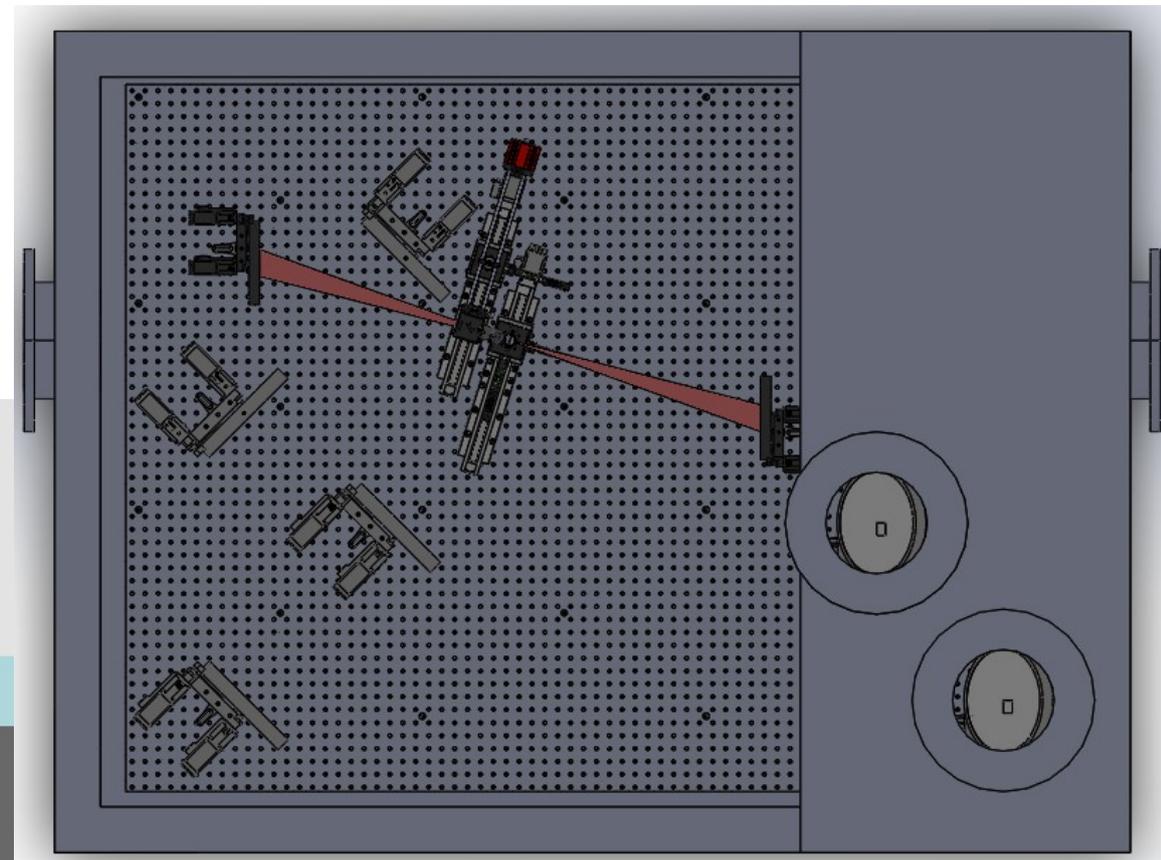
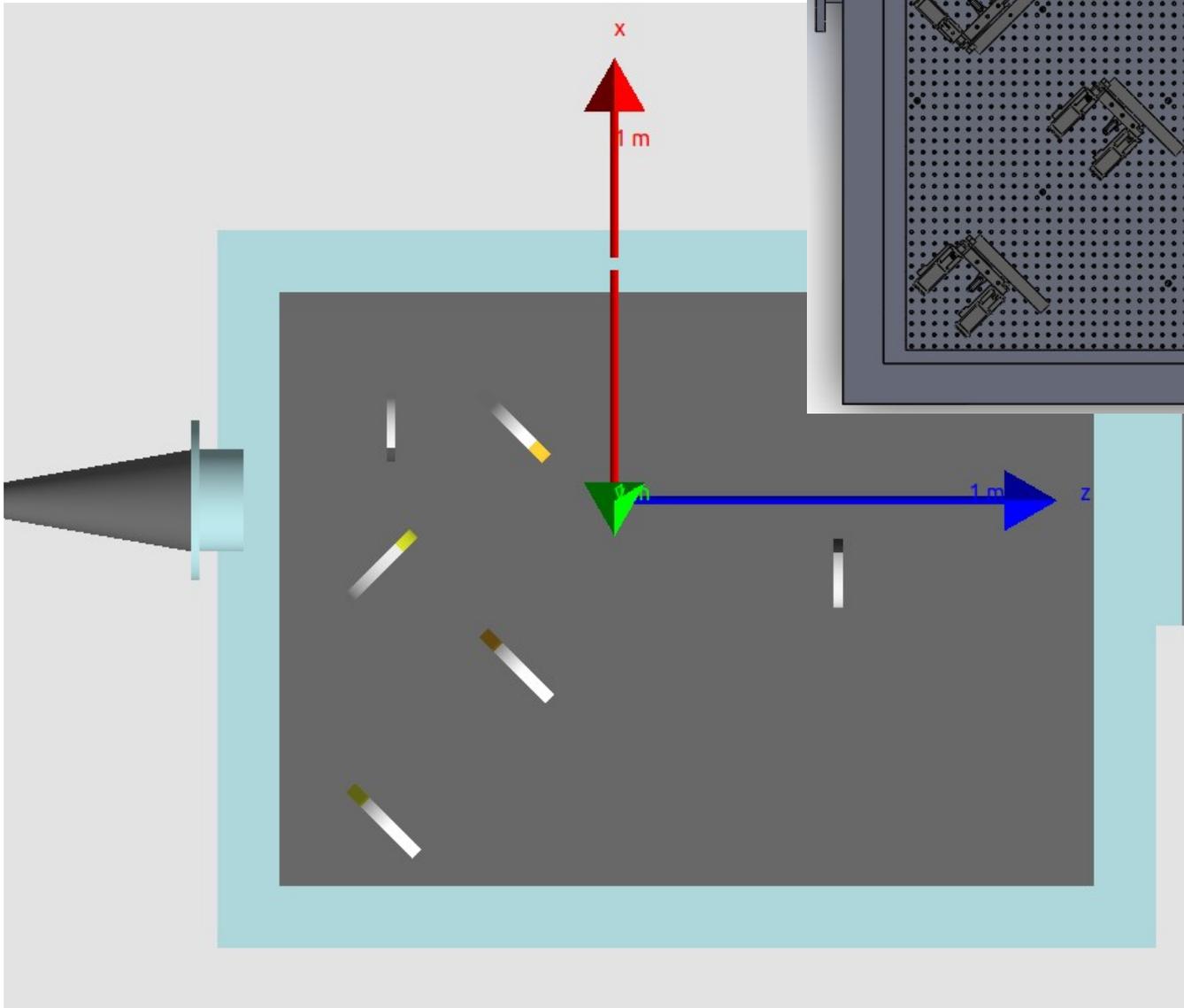
Gamma laser setup



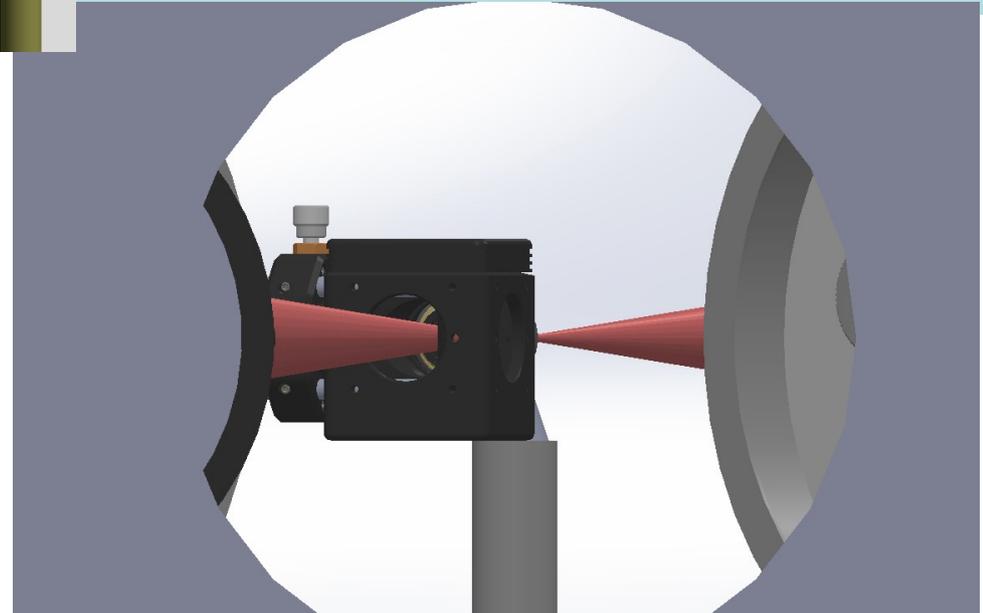
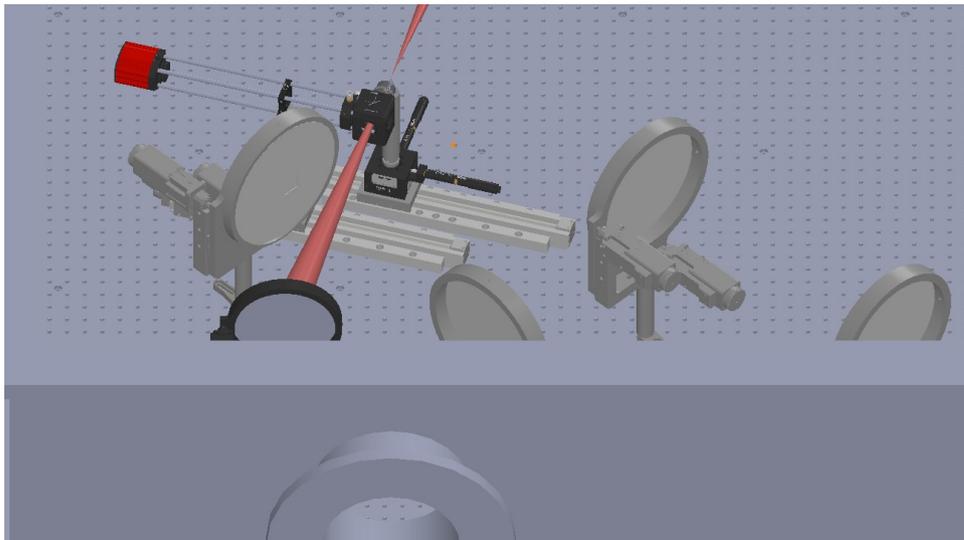
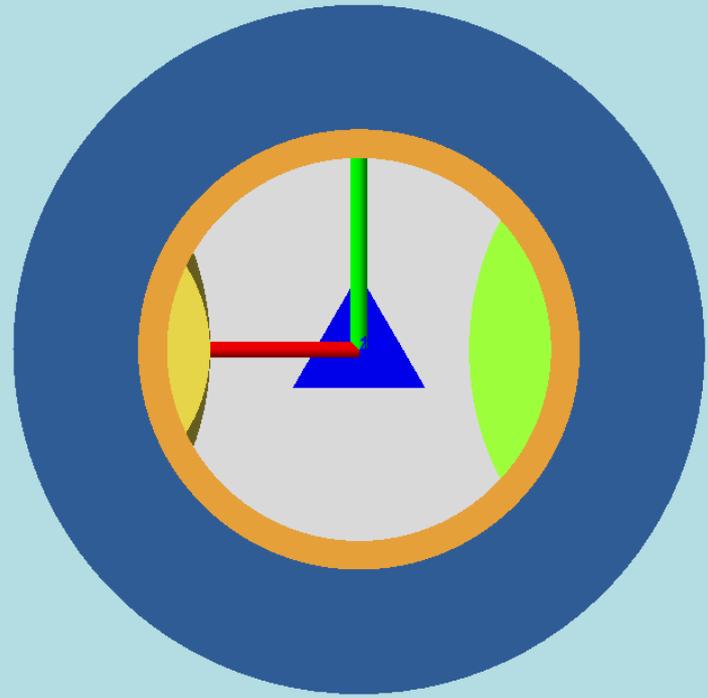
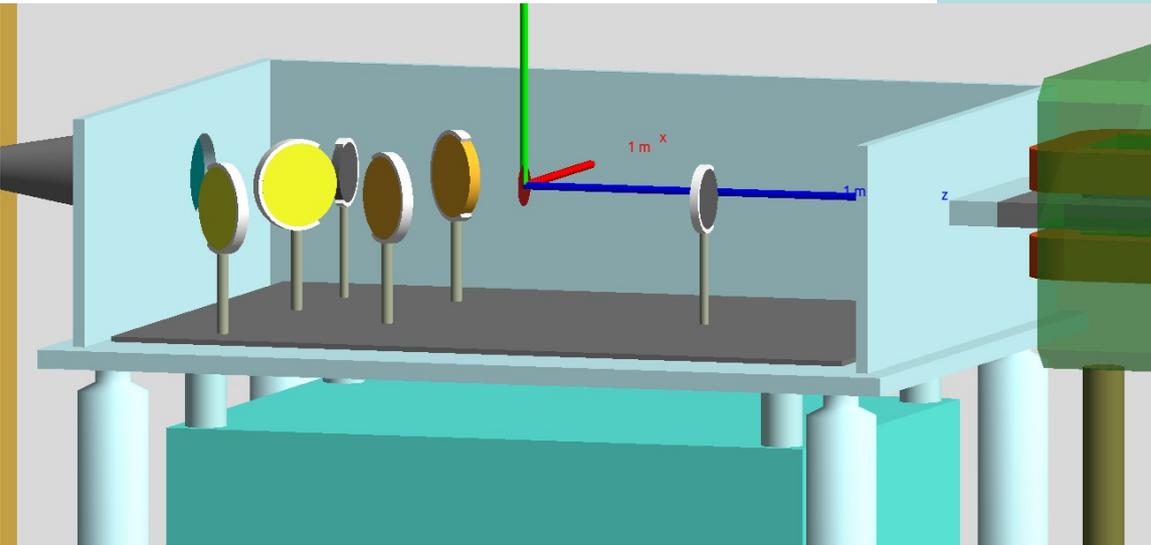
IC and beam pipes



IC and mirrors



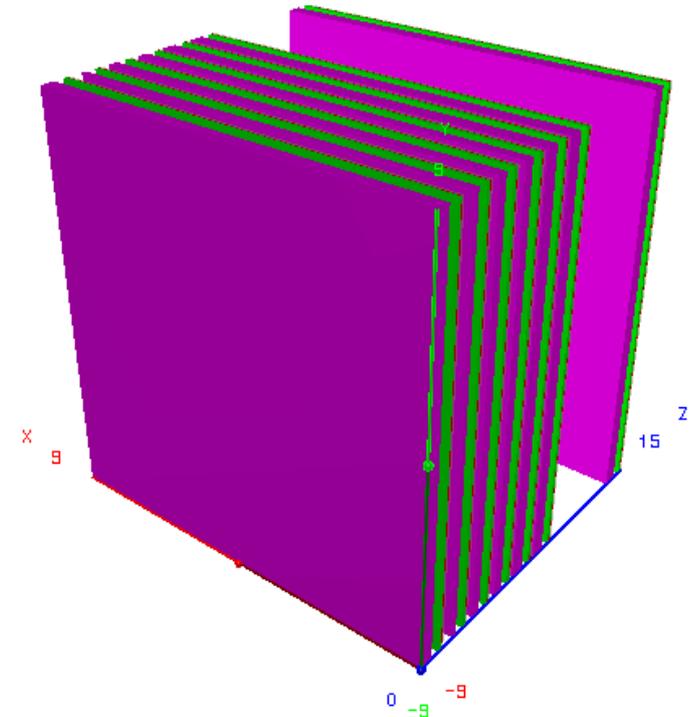
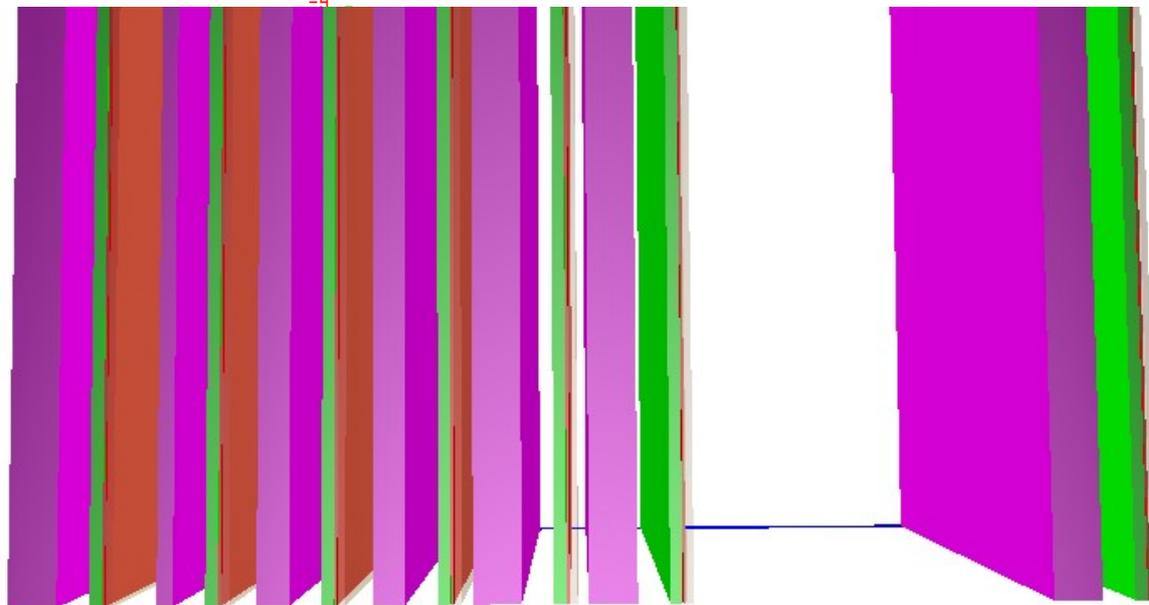
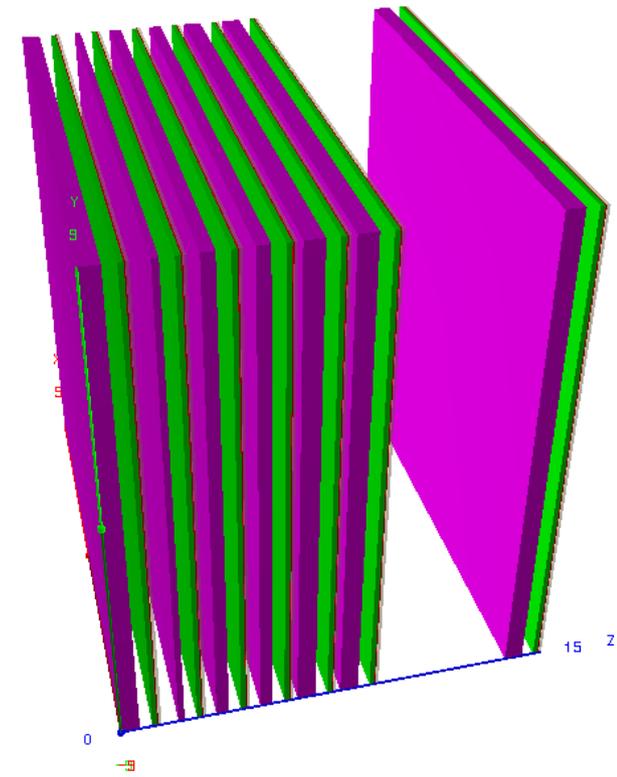
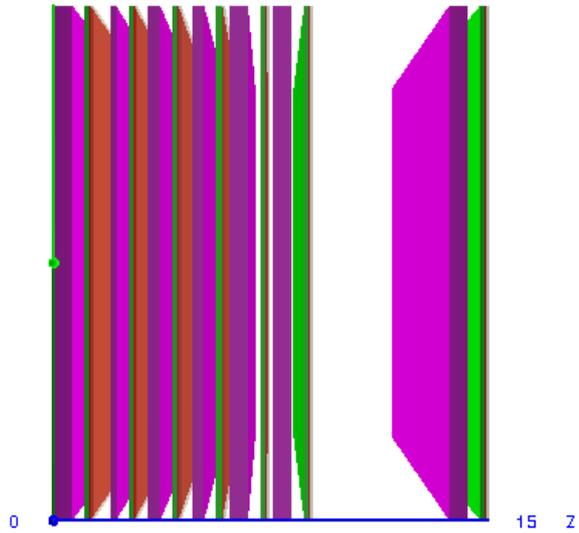
IC and mirrors

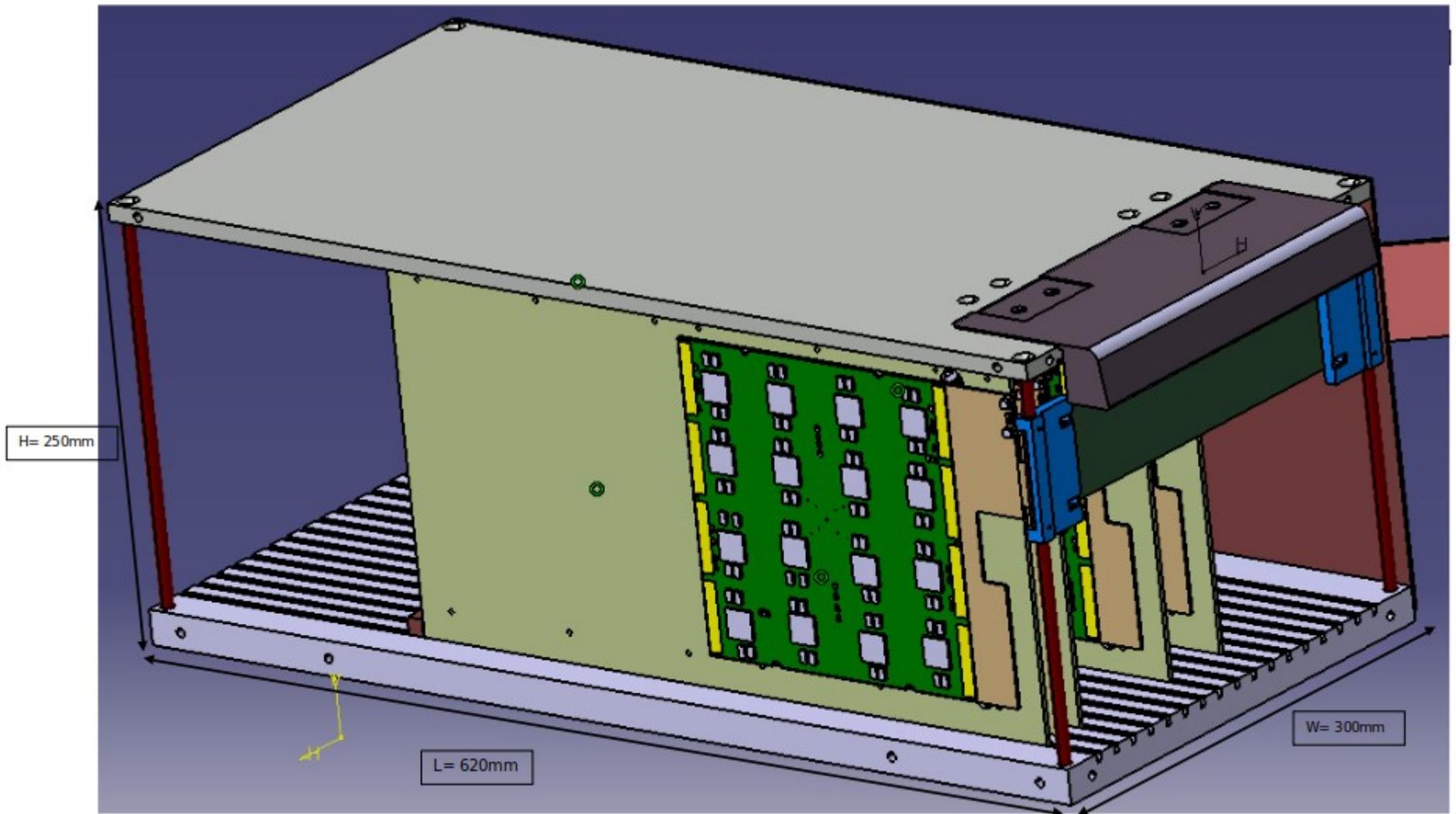


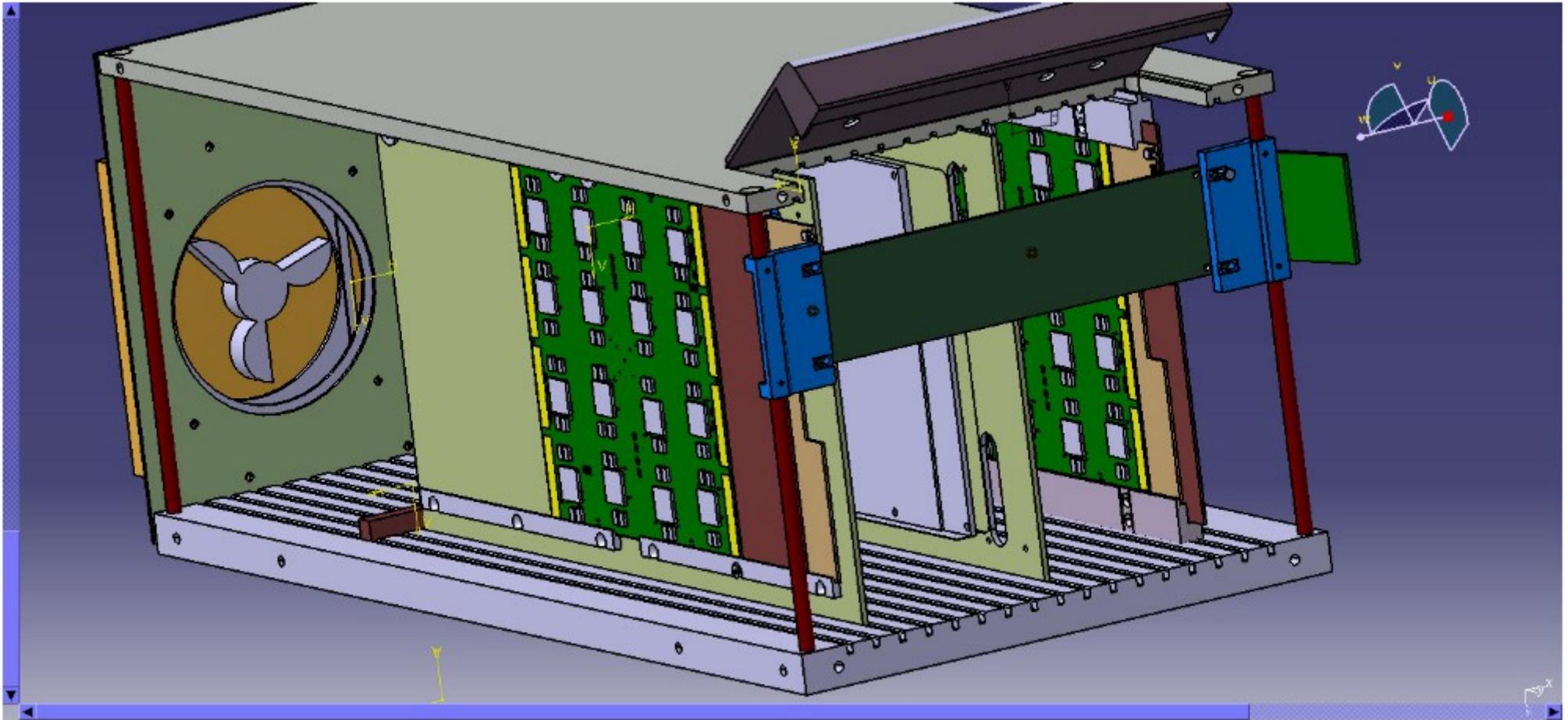
CALICE Ecal

- DD4Hep implementation;
- most probably for beam tests, 3 configurations.

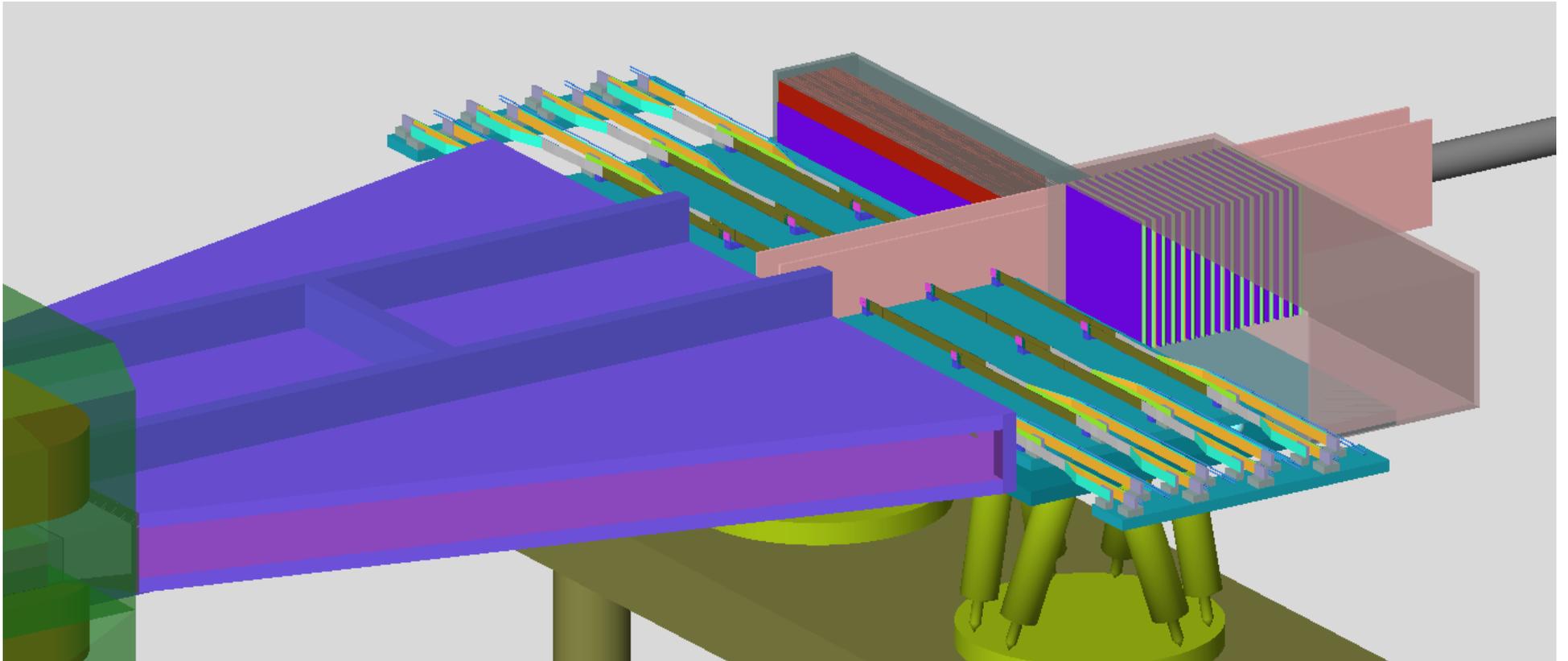
config_3







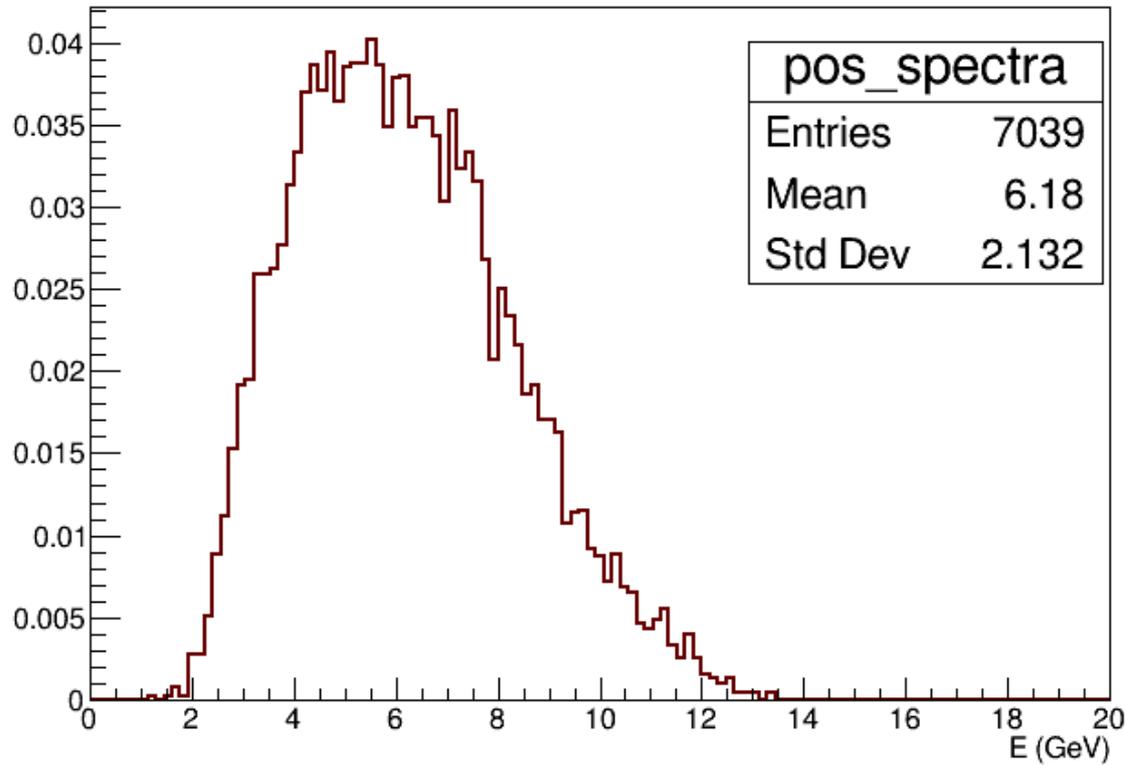
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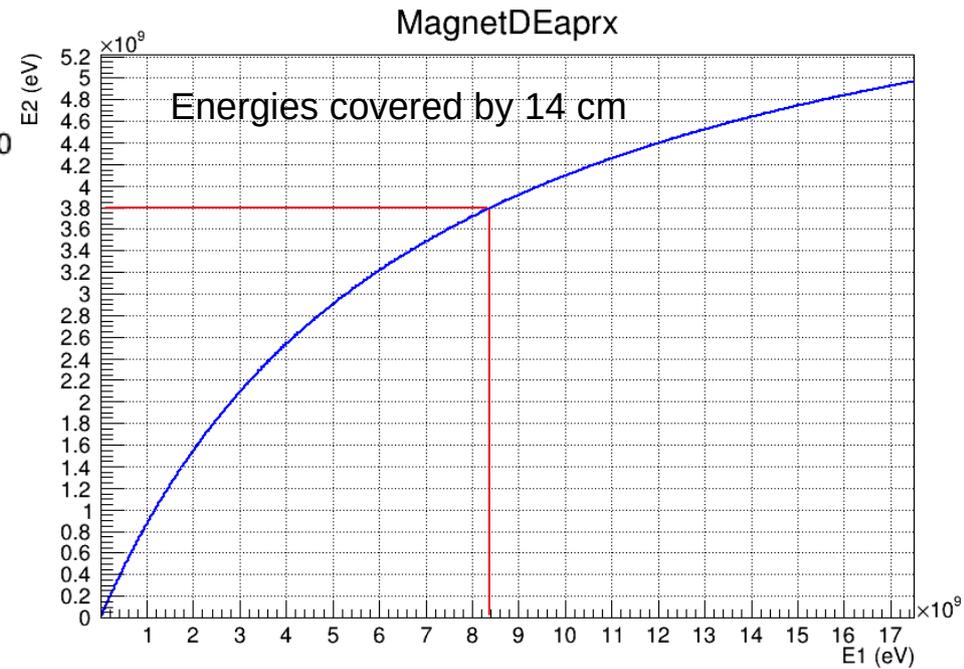
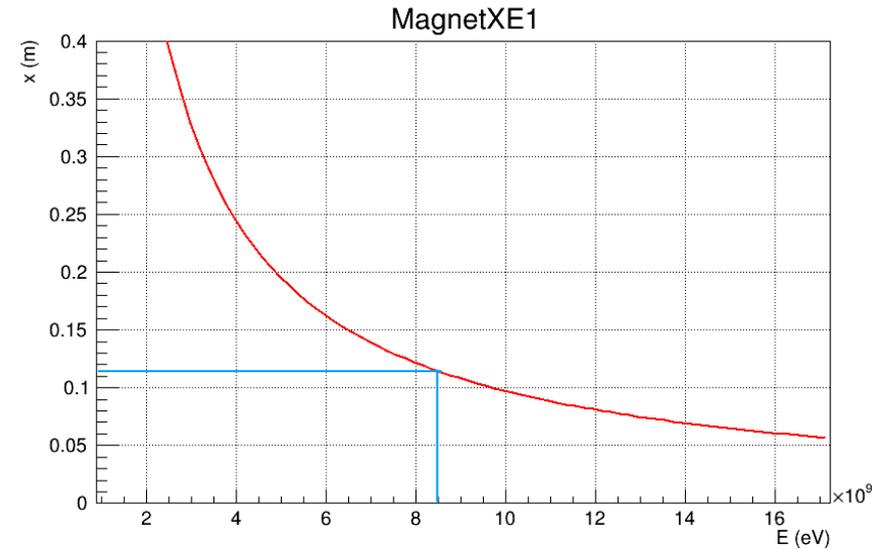
CALICE Ecal position

/nfs/dust/luxe/group/MCProduction/Signal/ptarmigan-v0.8.1/brem-laser/phase0/gpc/b0gpc_5.0_0_particles.h5

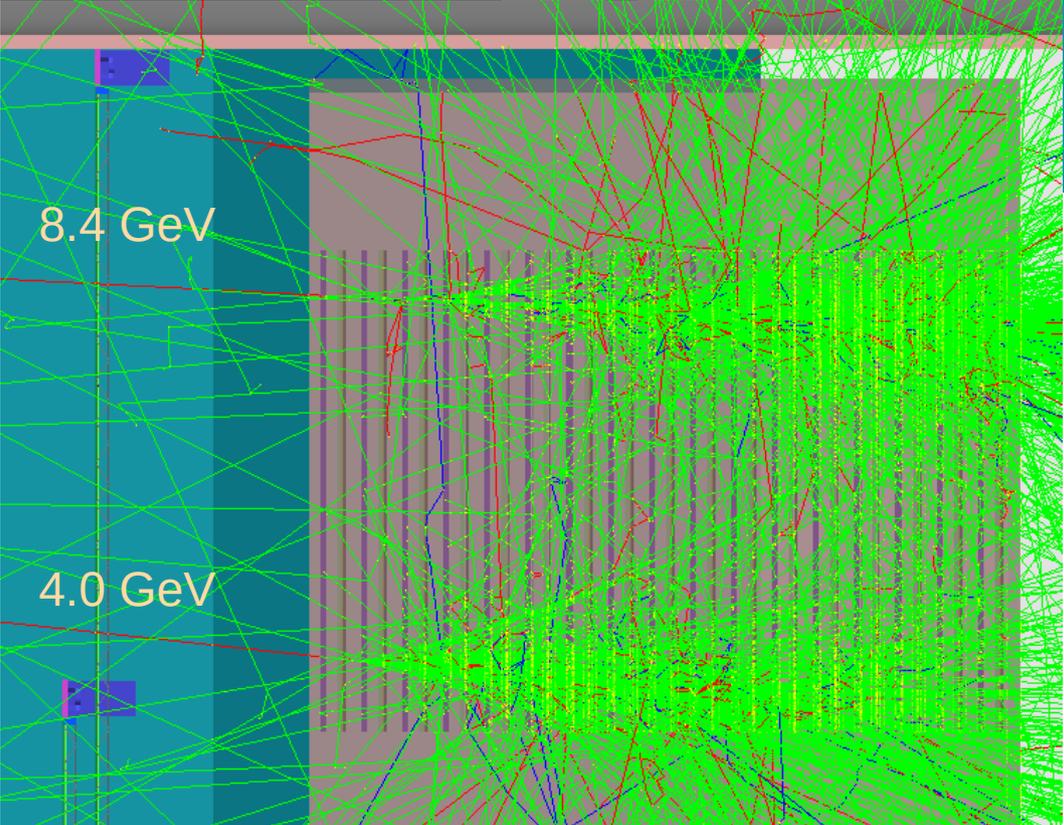
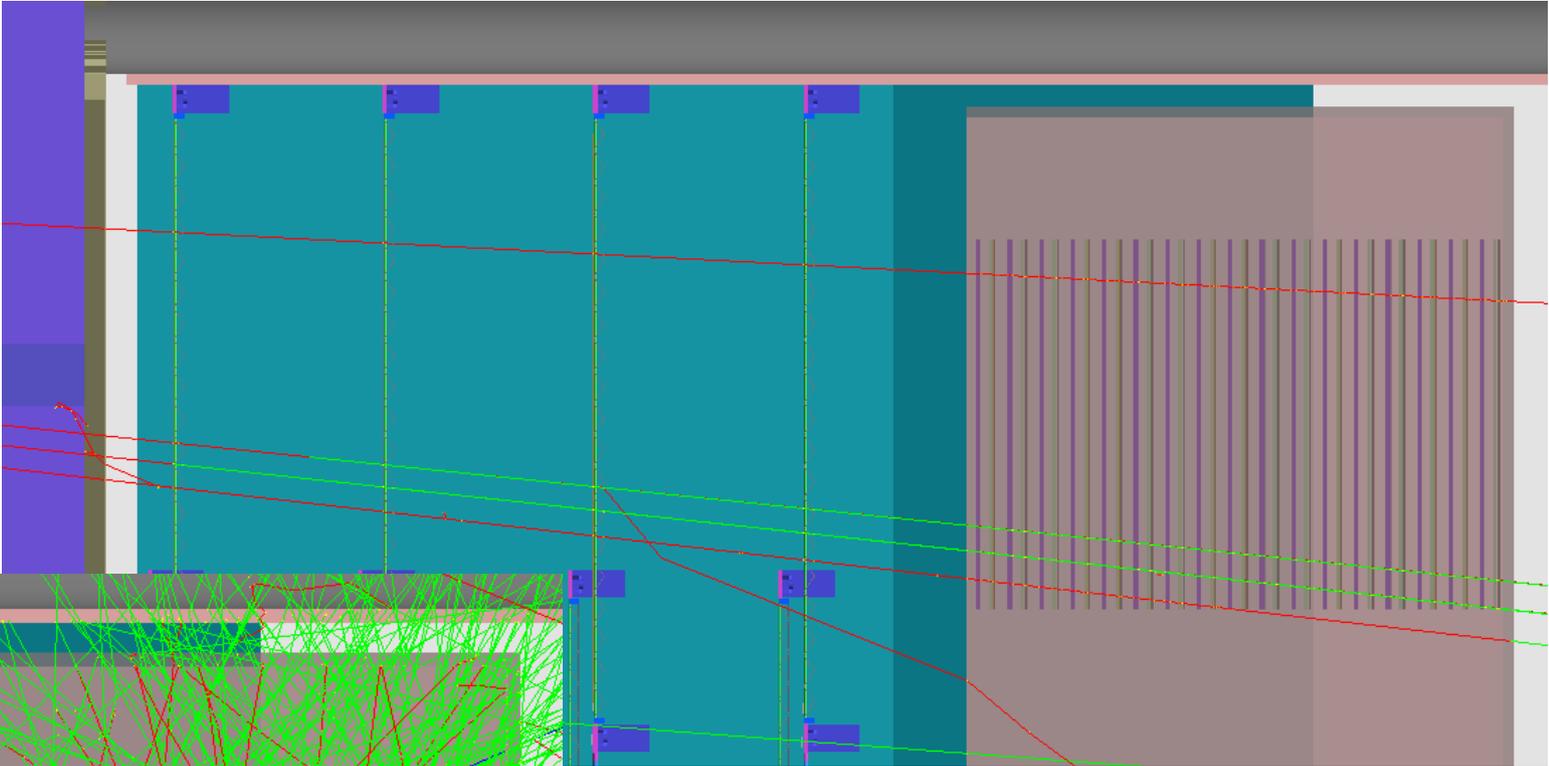
positron spectra in gamma laser phase_0 $\xi=5$, $w_0=4.7\mu\text{m}$



Energy range covered by CALICE ECAL
corresponds to $\sim dX = 14\text{cm}$;
($17.6 - 2 \cdot 1.8$)

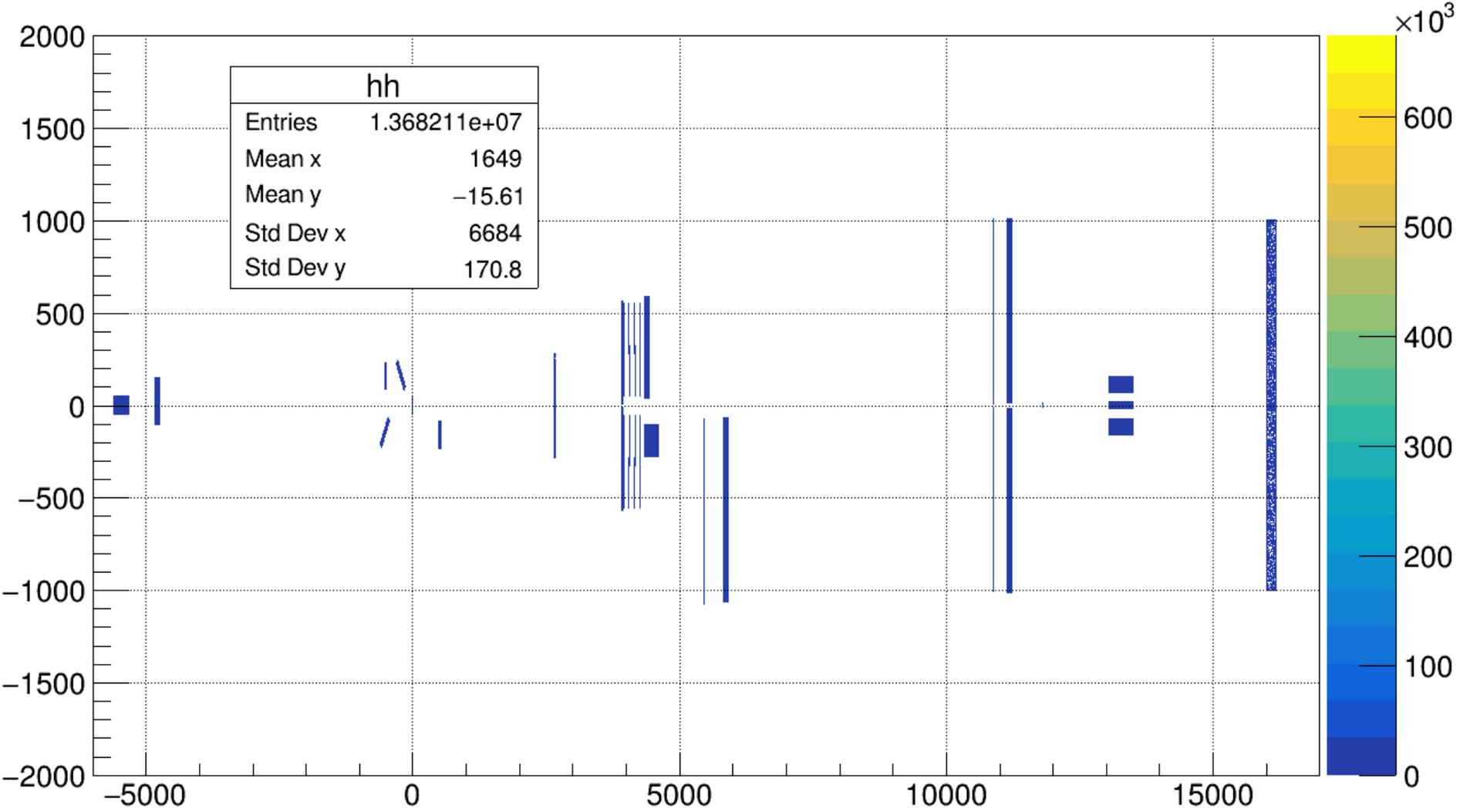


Electrons 8.4 GeV and 4.2, 4.0, 3.8 GeV



Gamma laser background: Tracks XZ

X:Z



G4 Background

Background

Oleksandr Borysov posted on 11. Feb. 2021 11:03h - last edited by Oleksandr Borysov on 19. Oct. 2021 09:46h

The background studies were conducted by shooting electrons one-by-one (an "event") into the setups without the appearance of laser.

- [Electron-laser 16.5 GeV](#)
- [Gamma-laser 16.5 GeV](#)

Electron-laser 16.5 GeV

Simulation	ID	# particles	Processed (BX)	Location	Notes
Background for electron-laser setup	tdr_el_01	3.04e9	2.024	/nfs/dust/luxe/group/MCProduction/Background/elaser/31082021_7671ee4c/list_root_7671ee4c.txt	Setup corresponds to commit 7671ee4c305 (hics branch) elaer_tdr_v0.1
Background for electron-laser setup	tdr_el_f_01	1.12e10	7.45	/nfs/dust/luxe/group/MCProduction/Background/elaser/10102021_7671ee4c_fast	Setup corresponds to commit 7671ee4c305 (hics branch) elaer_tdr_v0.1 with the option to stop tracking particles which hit beam dumps or shielding.

Gamma-laser 16.5 GeV

Simulation	ID	# particles	Processed (BX)	Location	Notes
Background for gamma-laser setup	tdr_gl_01			/nfs/dust/luxe/group/MCProduction/Background/gammalaser/18102021_55ae8938	Setup corresponds to commit 55ae8938 (glaser branch).

Signal MC

<https://confluence.desy.de/display/LS/Signal+MC>

PTarmigan_V0.8.1
JET140 (Phase 0, circularly polarized laser)
e_laser 16.5 GeV

MC	Intensity param. xi	laser waist w0 (um)	# MC out (BX)	Processed (BX)	Location	Notes
e0gpc_0.5_g4{0-9}	0.5	47.3	10	10	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/gpc/e0gpc_0.5	IP magnet 0.95T, MC: e0gpc_0.5{0-9}
e0gpc_1.0_g4{0-9}	1.0	23.7	10	10	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/gpc/e0gpc_1.0	IP magnet 0.95T, MC: e0gpc_1.0{0-9}
e0gpc_3.0_g4{0-9}	3.0	7.88	10	10	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/gpc/e0gpc_3.0	IP magnet 0.95T, MC: e0gpc_3.0{0-9}
e0ppw_3.0_g4{0-4}	3.0	7.88	4	4	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/gpc/e0ppw_3.0	IP magnet 0.95T, MC: e0ppw_3.0{0-4}
e0ppw_7.0_g4{0-4}	7.0	3.38	4	4	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/gpc/e0ppw_7.0	IP magnet 0.95T, MC: e0ppw_7.0{0-4}

PTarmigan_V0.8.1
JET140 (Phase 0, linearly polarized laser)
e_laser 16.5 GeV

MC	Intensity param. xi	laser waist w0 (um)	# MC out (BX)	Processed (BX)	Location	Notes
e0lp_5_g4_0	5.0	6.69	1	1	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/lp/e0lp_5_0_0_particles_g4.root	IP magnet 0.95T; MC: e0lp_5_0
e0lp_7_g4_0	7.0	4.78	1	1	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/lp/e0lp_7_0_0_particles_g4.root	IP magnet 0.95T; MC: e0lp_7_0
e0lp_10_g4_0	10.0	3.35	1	1	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/lp/e0lp_10_0_0_particles_g4.root	IP magnet 0.95T; MC: e0lp_10_0
e0lp_5x20_g4_0	5.0	20	1	1	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/lp/e0lp_5x20_0_0_particles_g4.root	hics: beedd92a; MC: e0lp_5x20_0
e0lp_7x20_g4_0	7.0	20	1	1	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/lp/e0lp_7x20_0_0_particles_g4.root	hics: beedd92a; MC: e0lp_7x20_0
e0lp_10x20_g4_0	10.0	20	1	1	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/lp/e0lp_10x20_0_0_particles_g4.root	hics: beedd92a; MC: e0lp_10x20_0
e0lp_5x40_g4_0	5.0	40	1	1	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase0/lp/e0lp_5x40_0_0_particles_g4.root	hics: beedd92a; MC: e0lp_5x40_0

PTarmigan_V0.8.1
Phase I
e_laser 16.5 GeV

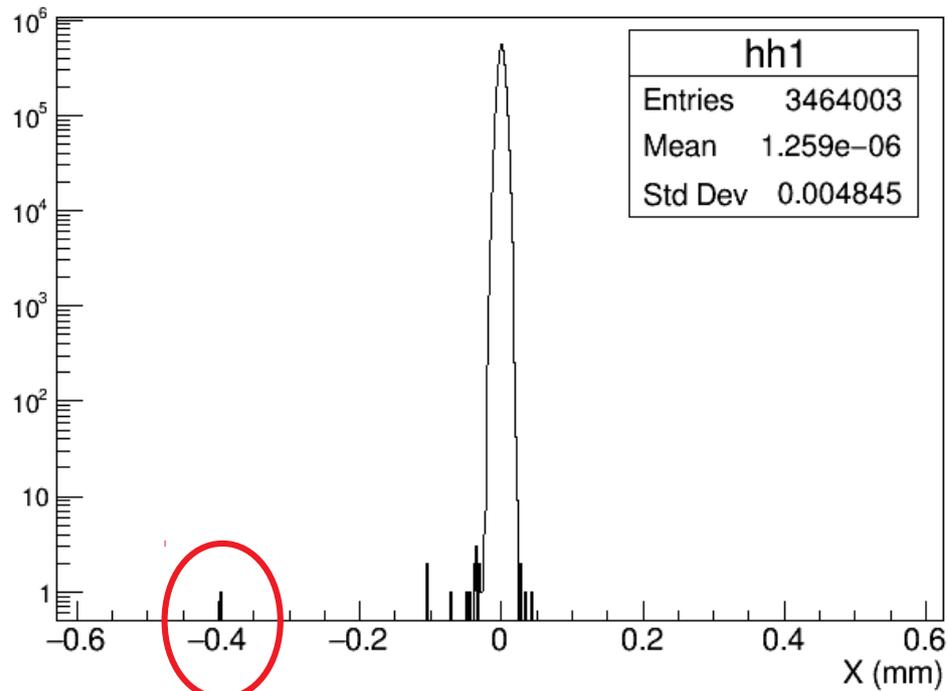
MC	Intensity param. xi	# MC out (BX)	Processed (BX)	Location	Notes
b1gpc_10.0_g4{0-9}	10	10	10	/nfs/dust/luxe/group/MCProduction/Signal/g4/ptarmigan-v0.8.1/e-laser/phase1/gpc/	G4 hics: beedd92a; MC: b1gpc_10.0_{0-9}

hics: beedd92a; MC: e0lp_7x40_0
hics: beedd92a; MC: e0lp_10x40_0

Comparison MC and its copy in G4

e0lp_5x20_0_0_particles_g4.root

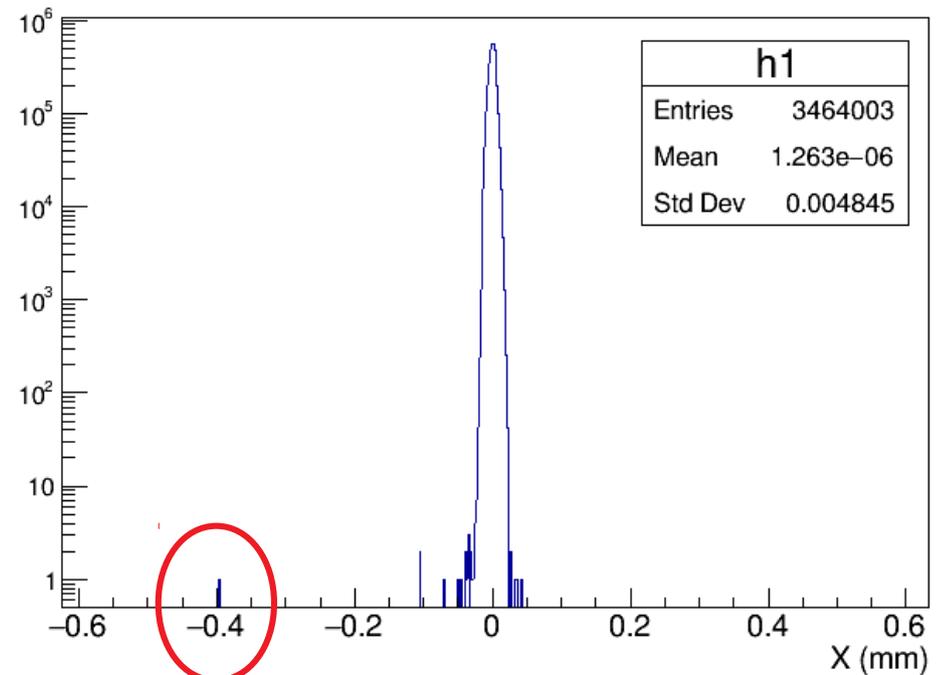
x {detid==-1}



Vertex x of primary particles

e0lp_5.0x20_0_particles.h5

h1



x {detid==-1 && pdg==22}

