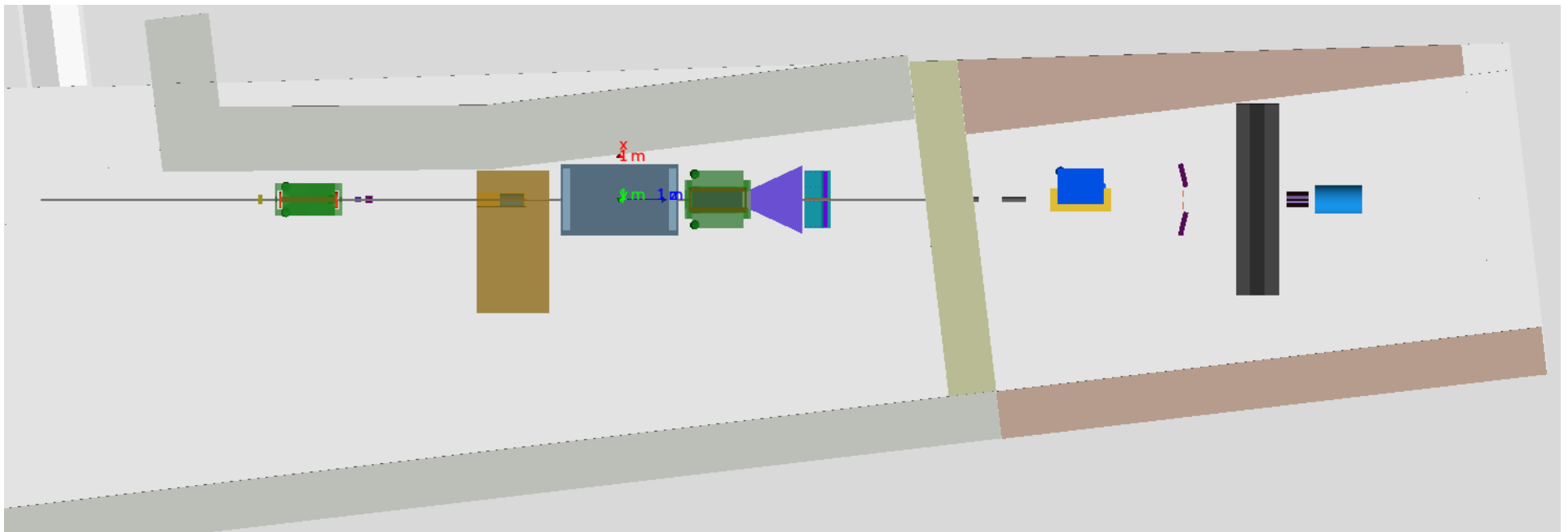
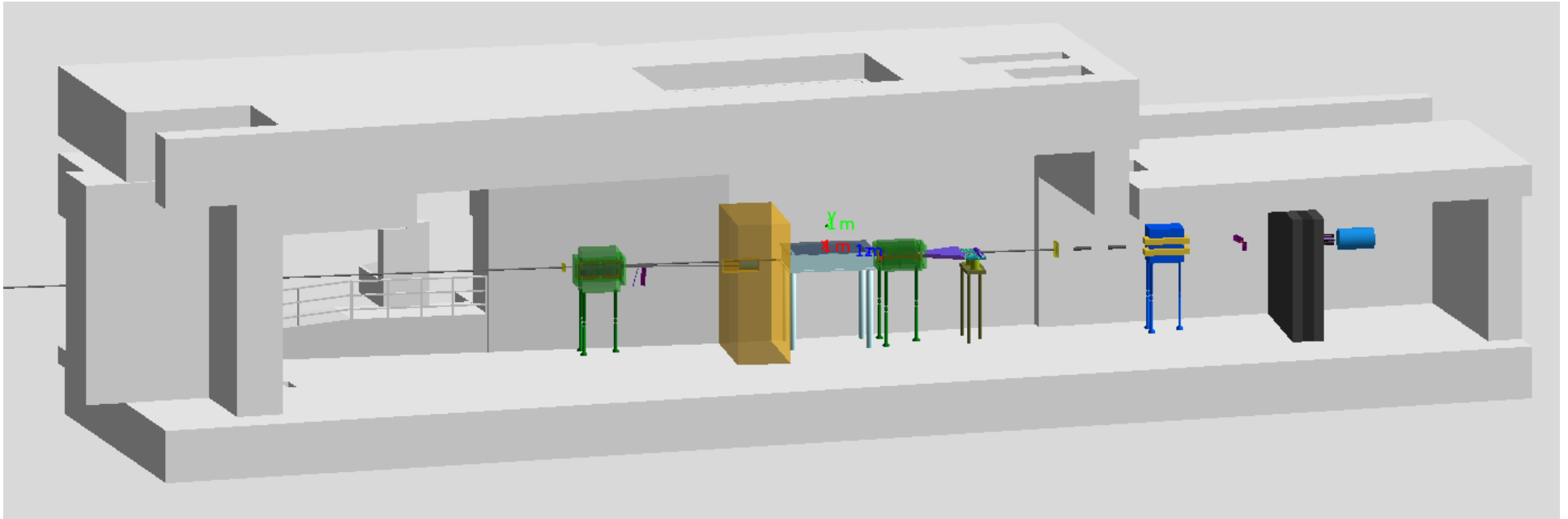


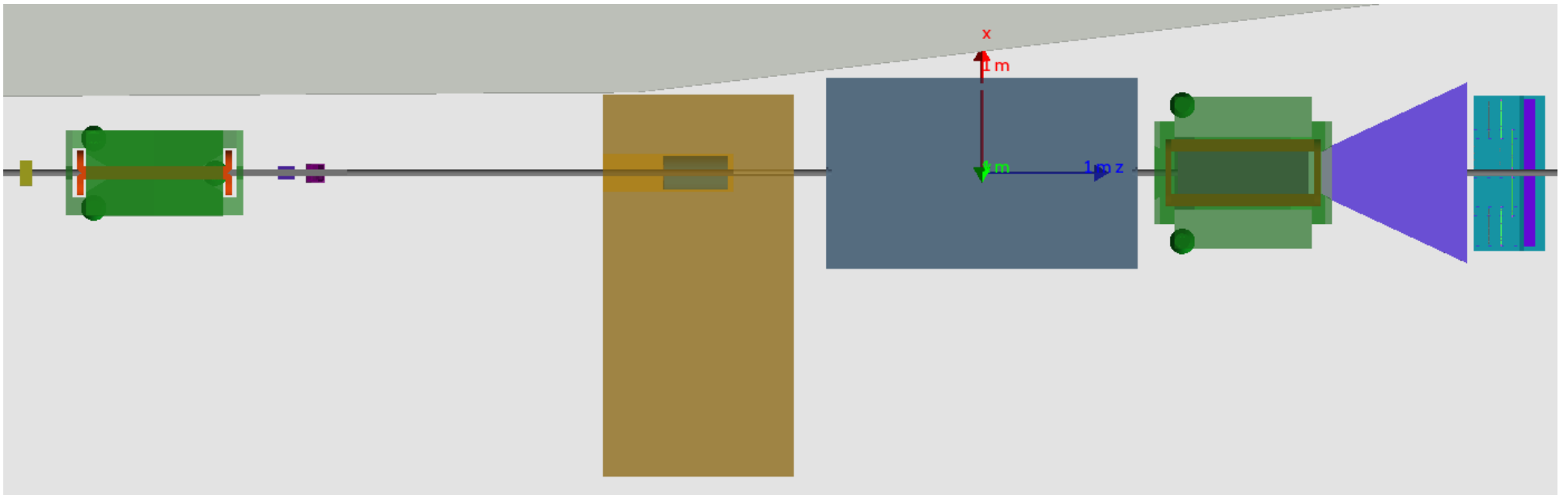
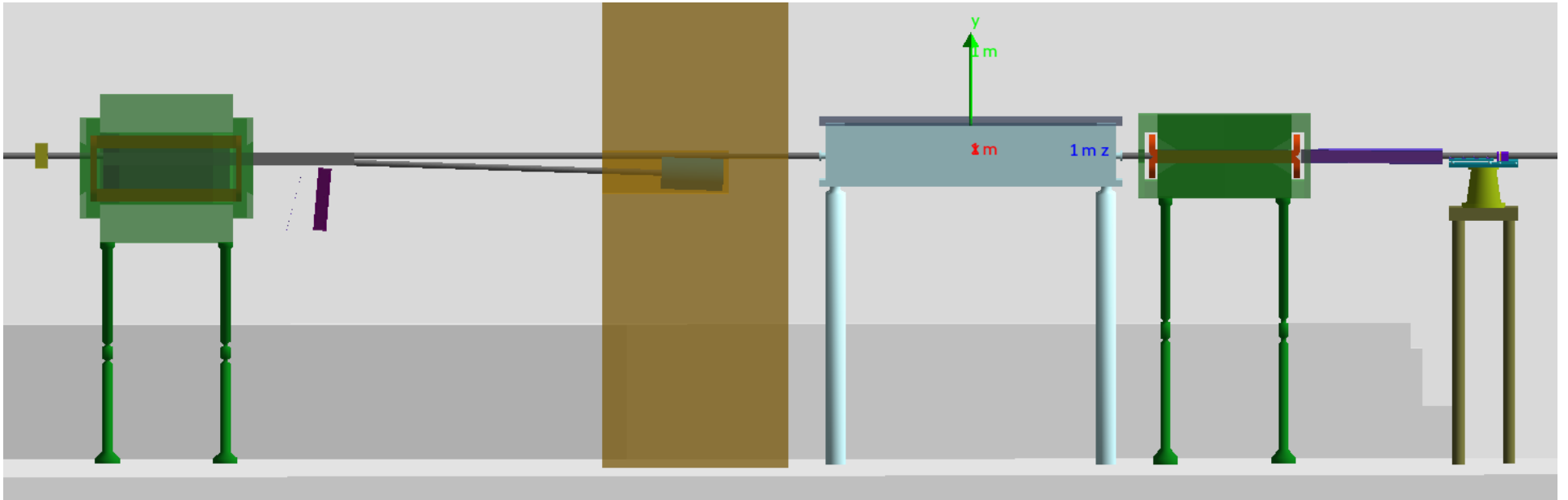
Update on Background Simulation.

Oleksandr Borysov

Geant4 geometry

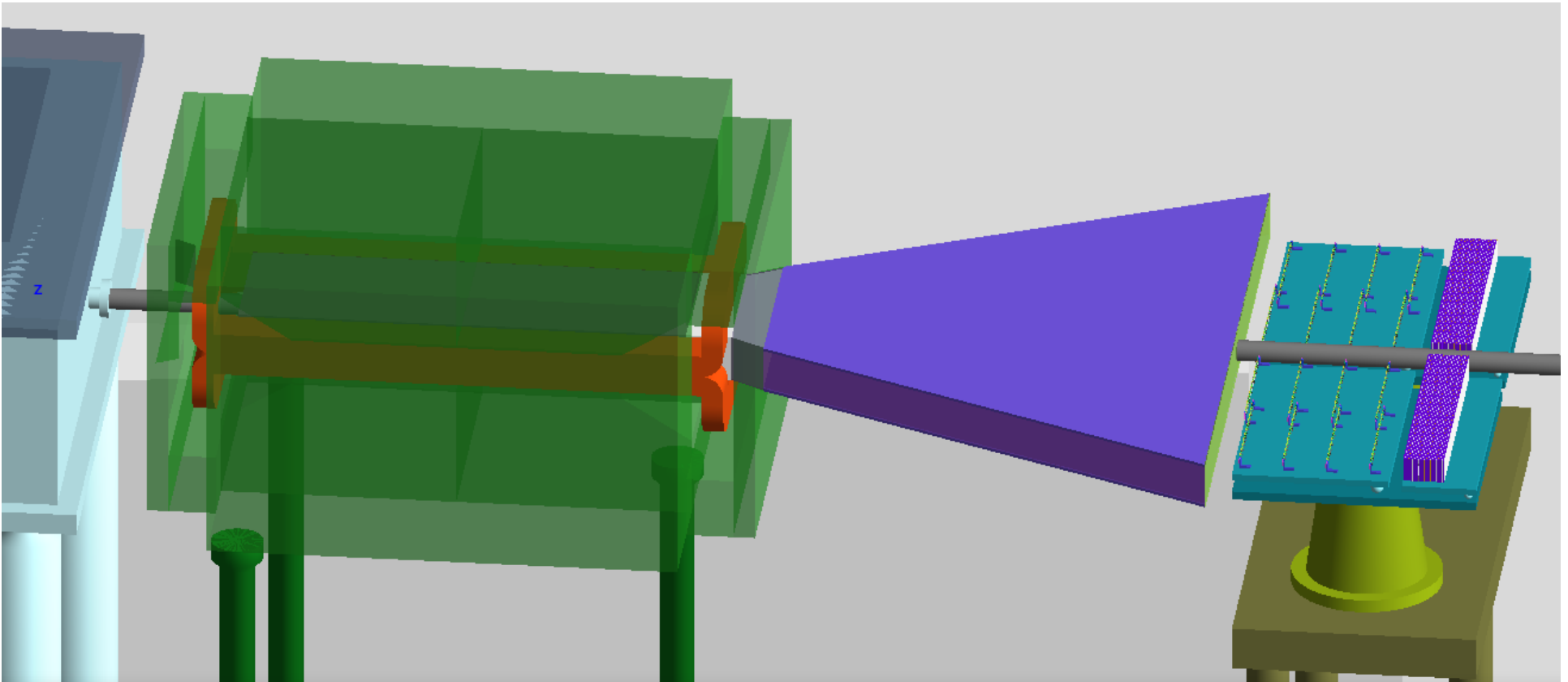


Geant4 geometry



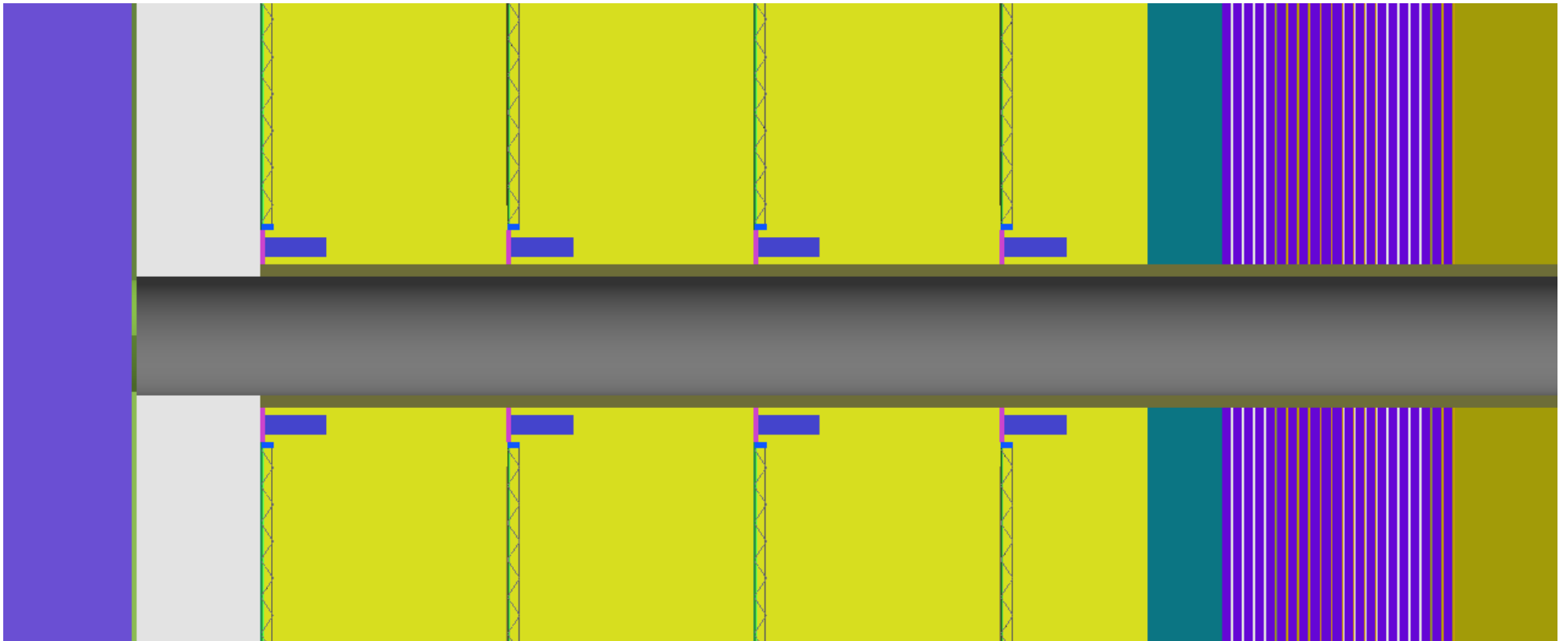
Geant4 geometry

IP chamber, magnet, vacuum chamber, tracker staves and calorimeters



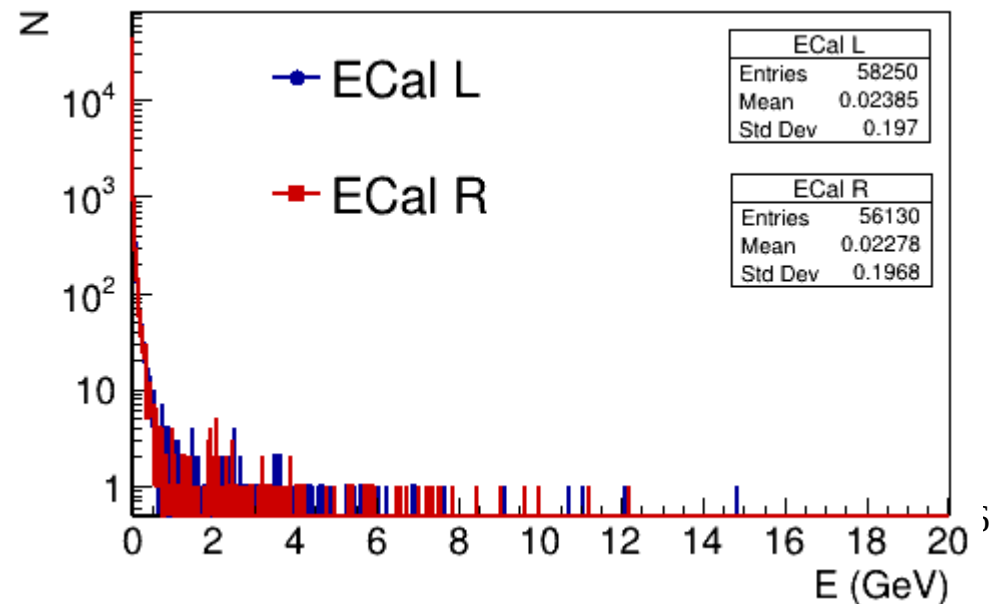
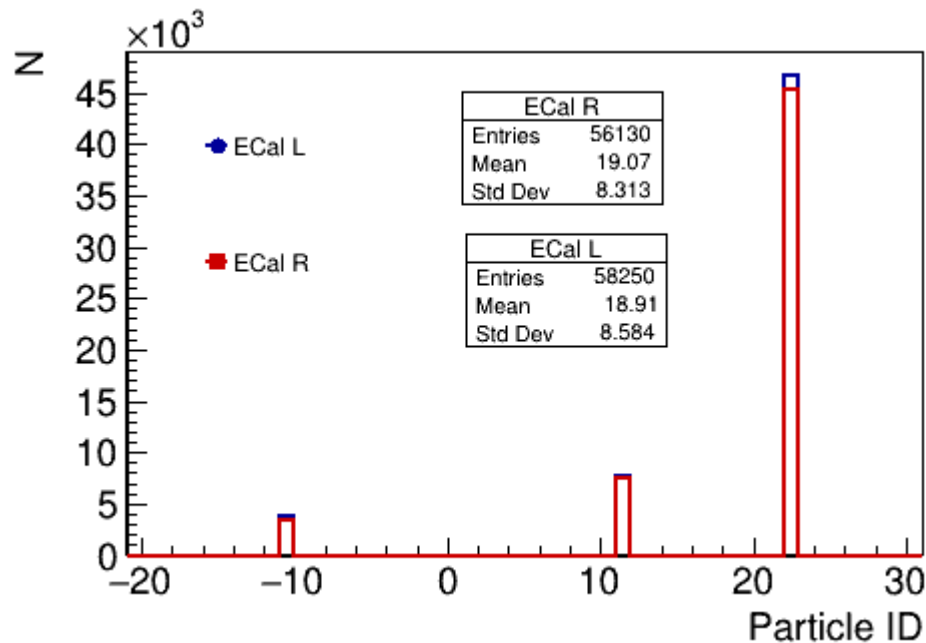
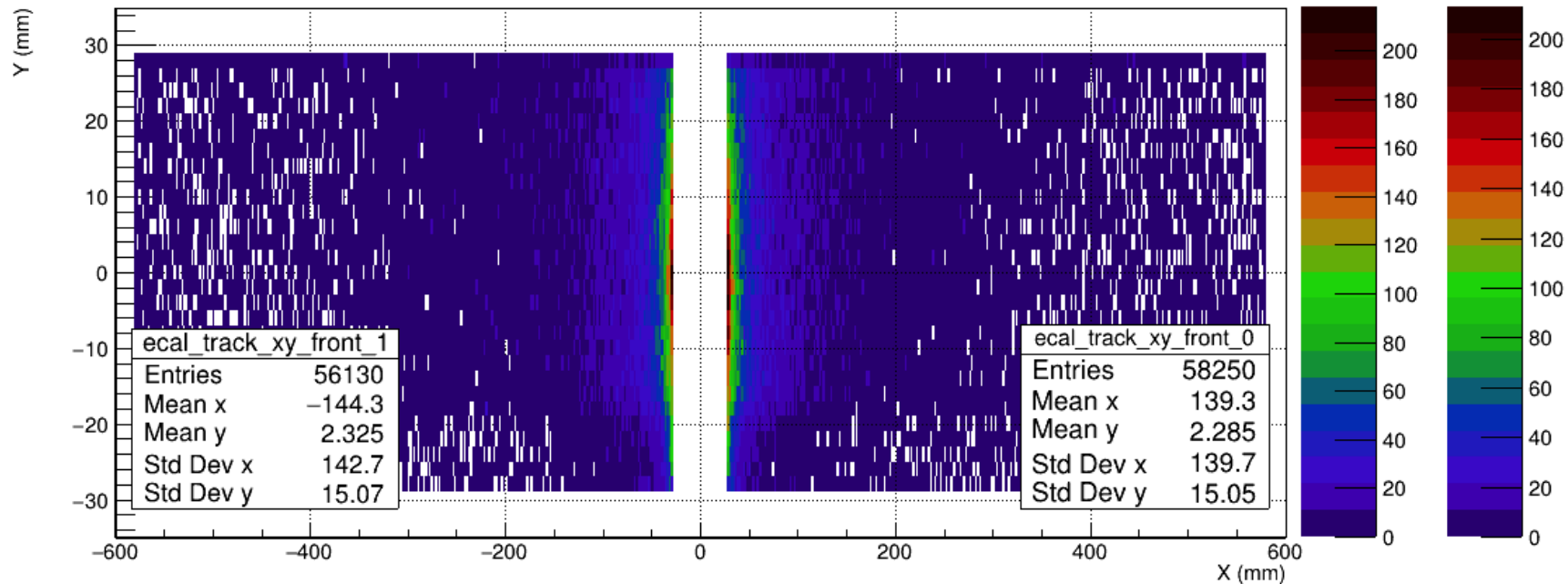
Geant4 geometry

Top view: vacuum chamber, tracker staves, calorimeters and beam pipe in the middle



Particles XY hitting front of the calorimeter

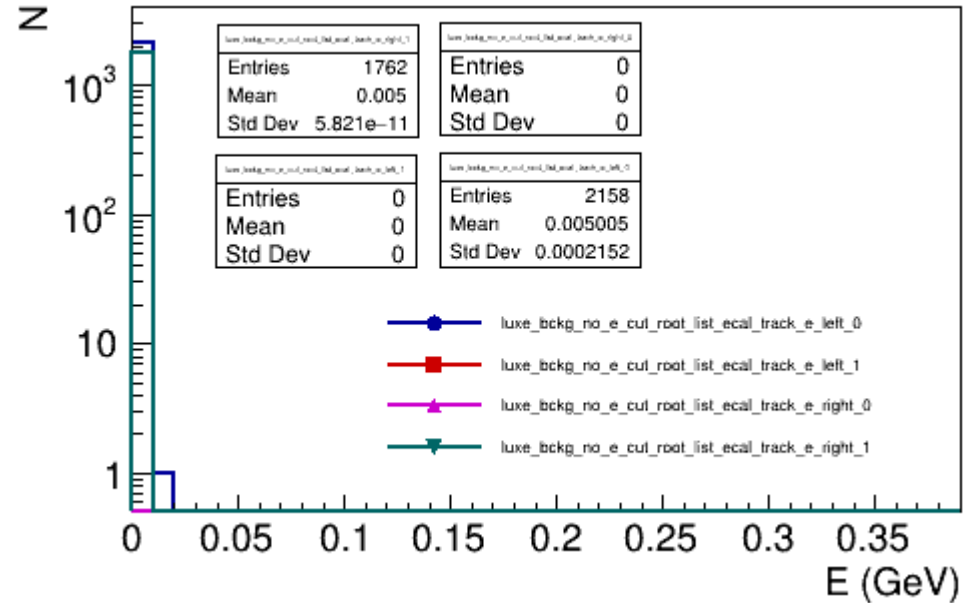
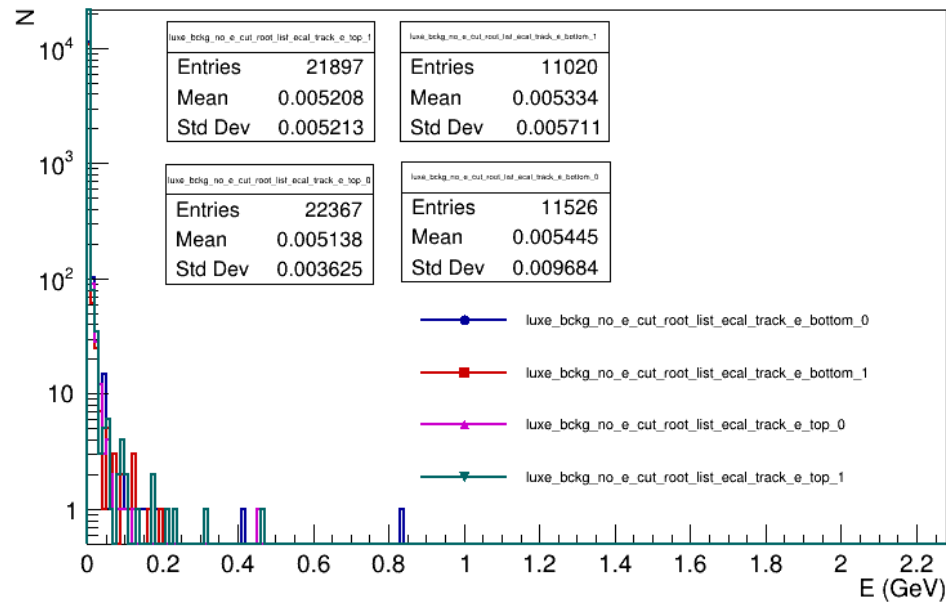
e- $\sim 6.5e9 \sim 4BX$



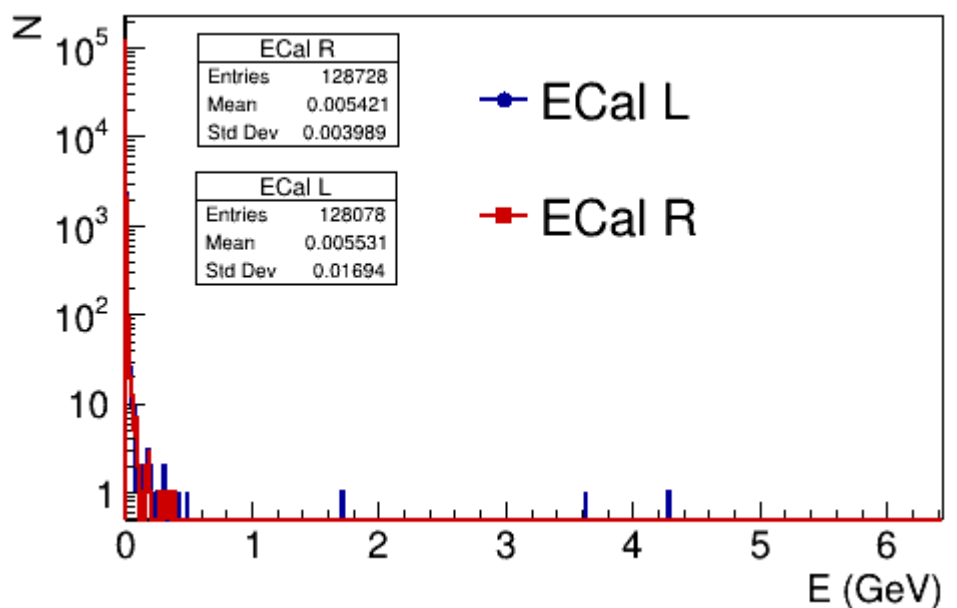
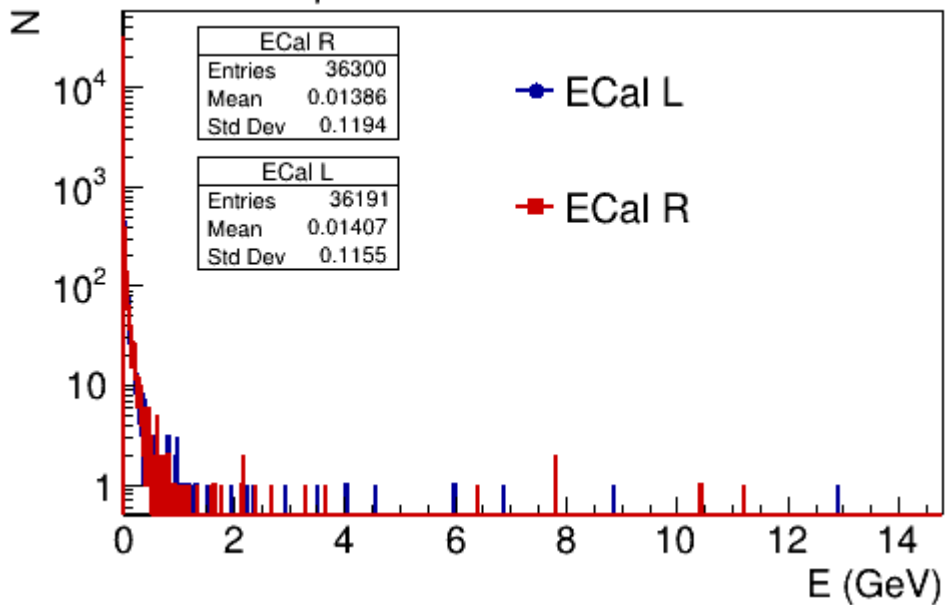
Spectra of particles hitting calorimeter from different sides

e- $\sim 6.5e9 \sim 4BX$

Top and bottom tracks spectra

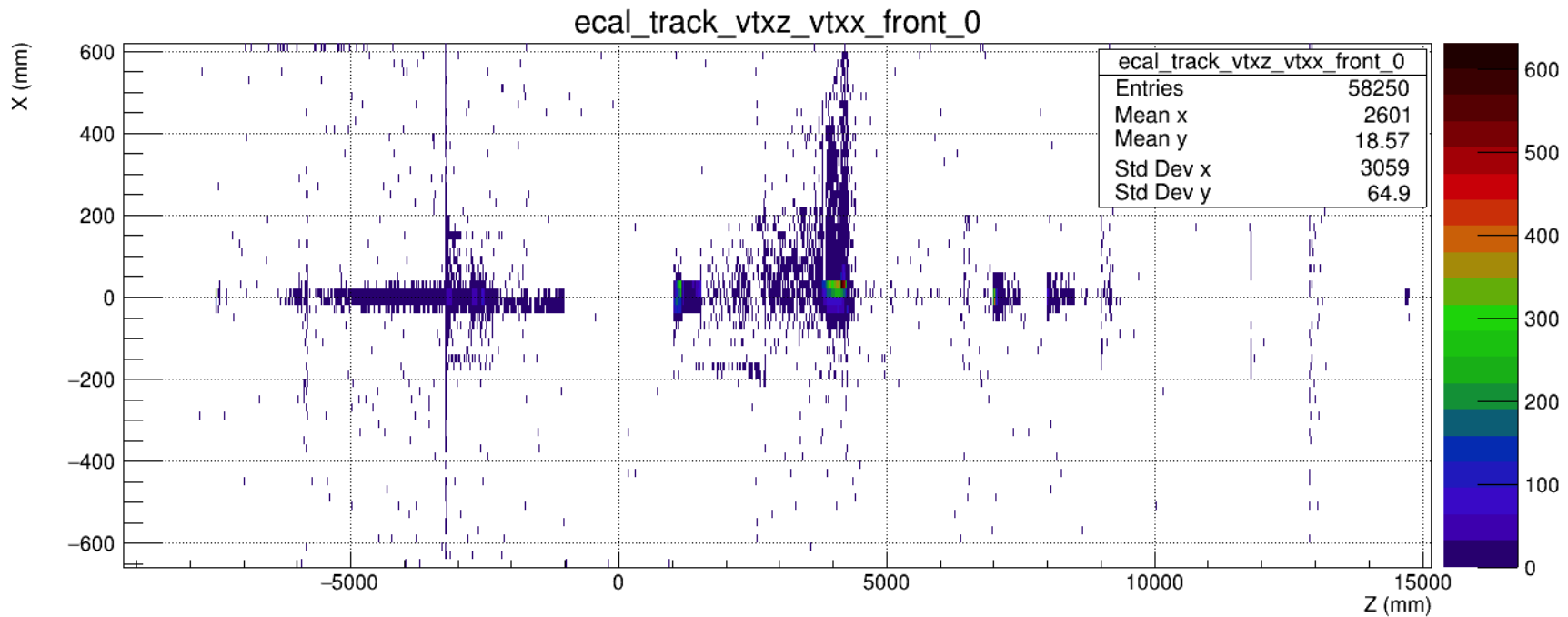
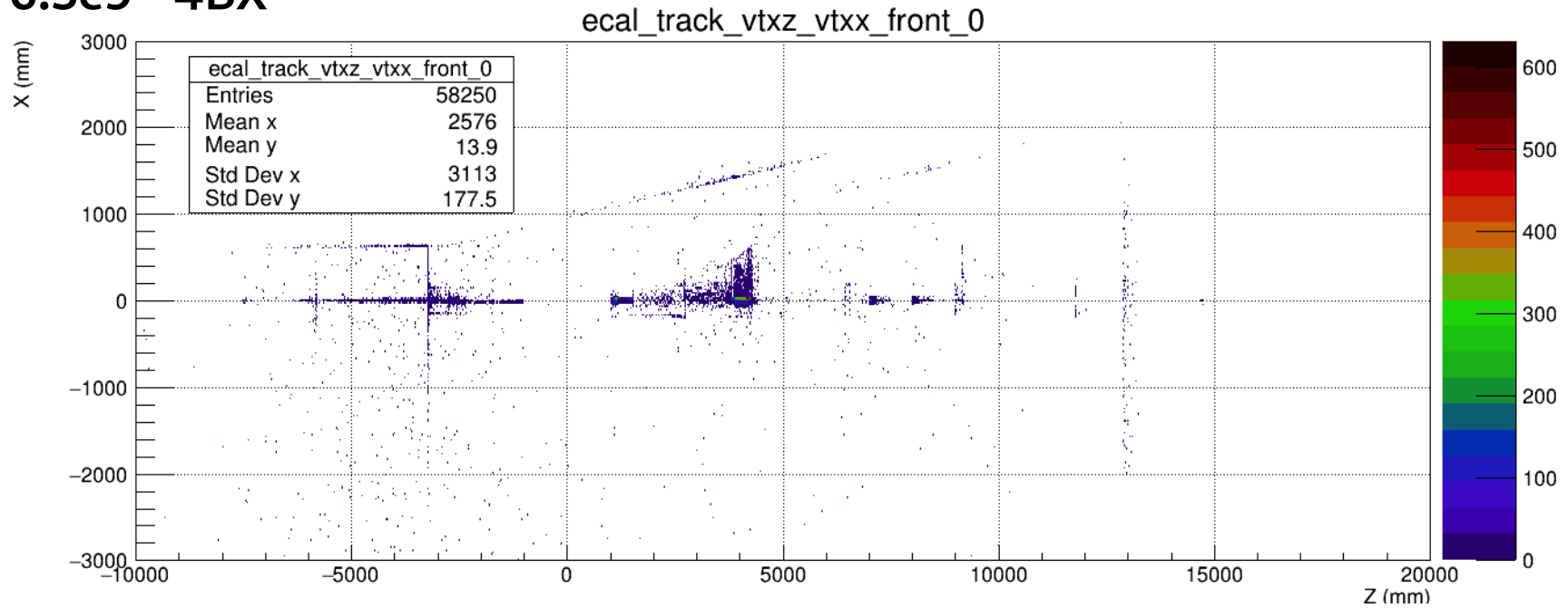


Spectra of inner side tracks



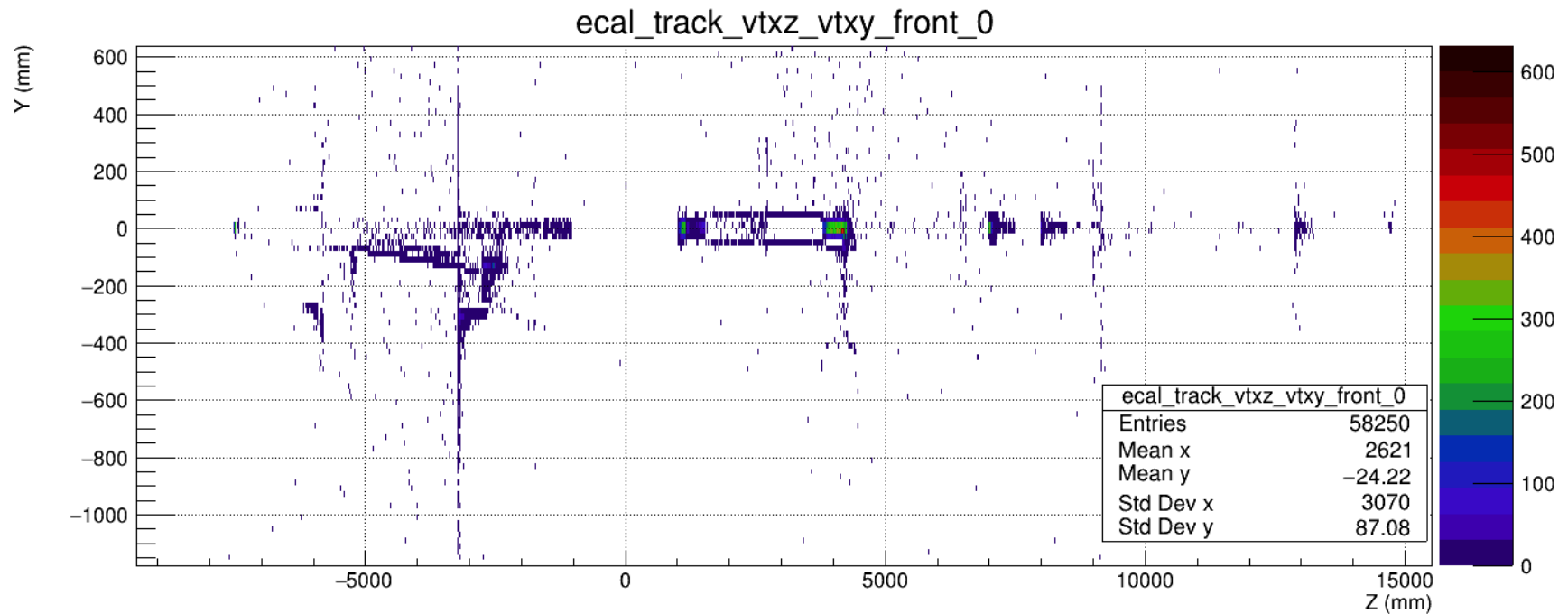
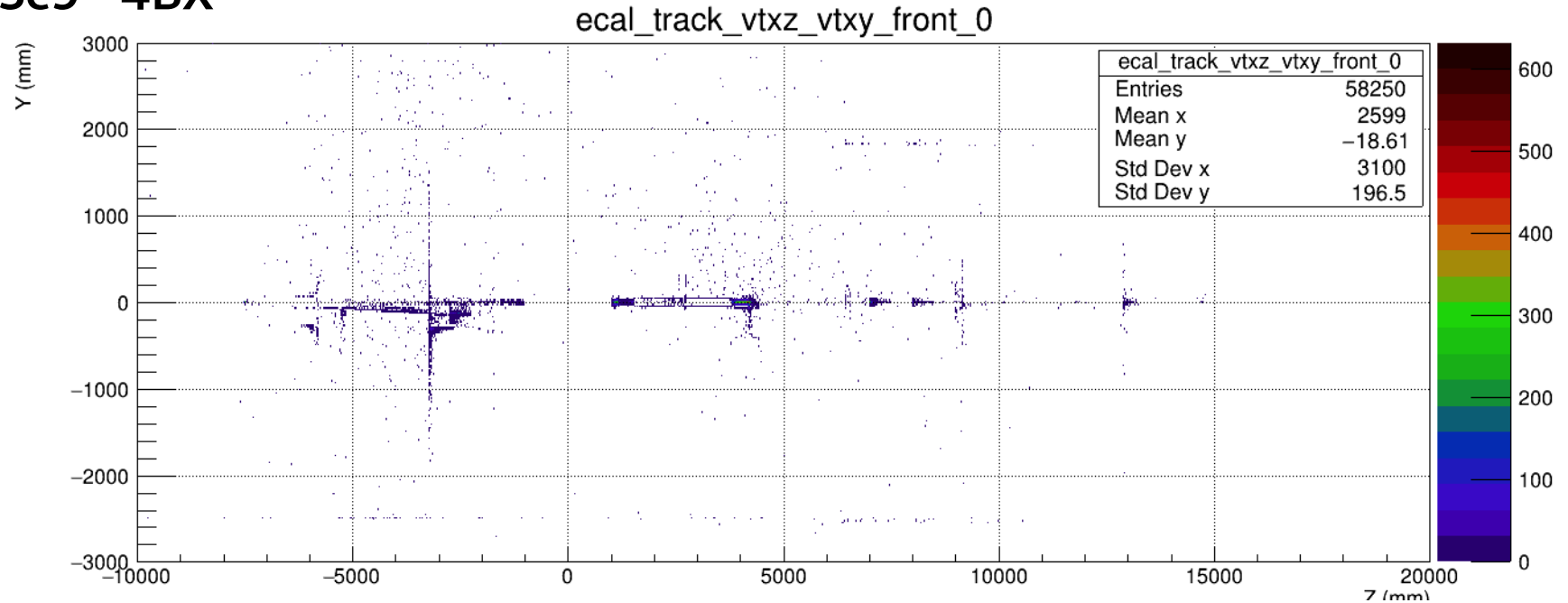
Vertexes ZX of the particles hitting front of the calorimeter

e- $\sim 6.5e9 \sim 4BX$



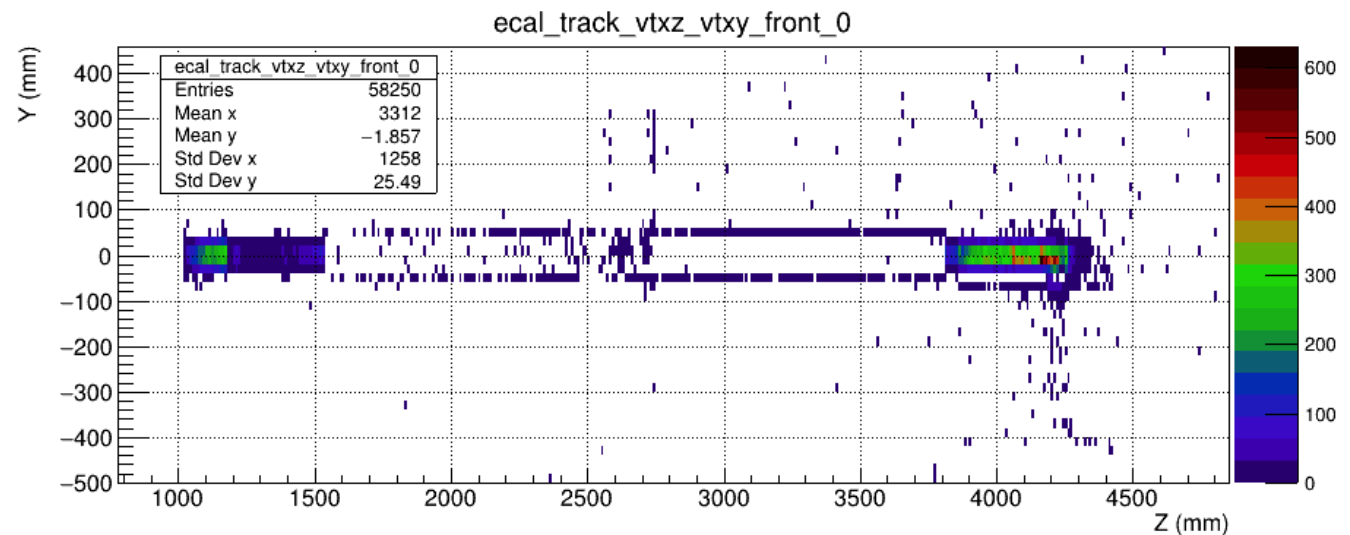
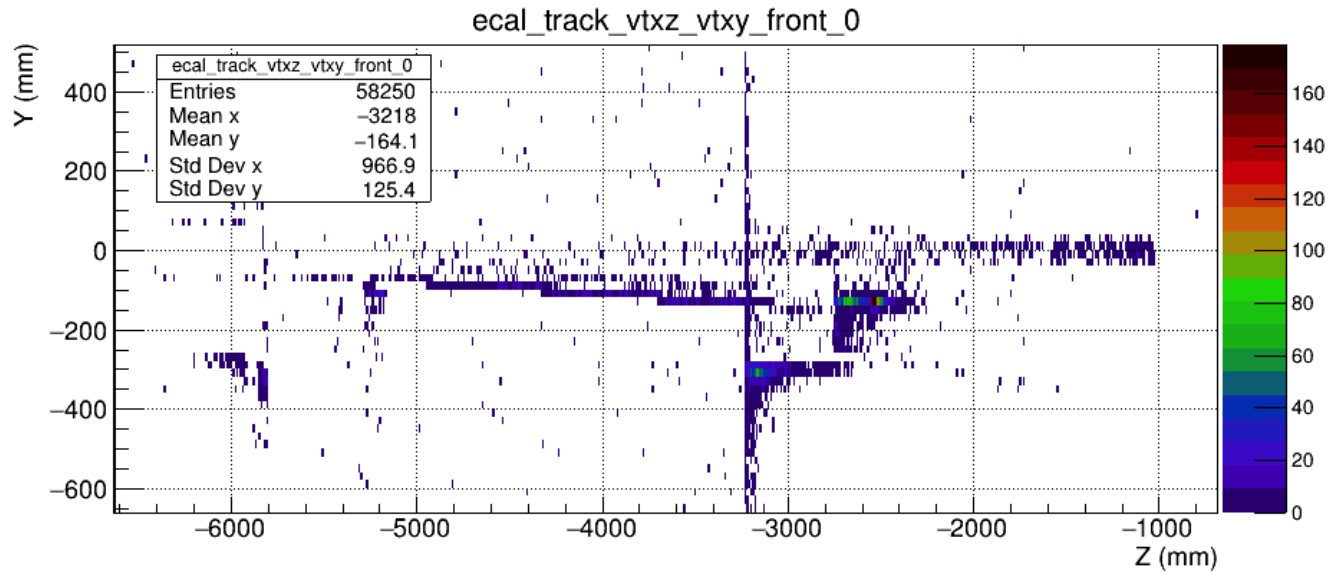
Vertexes ZY of the particles hitting front of the calorimeter

e- $\sim 6.5e9 \sim 4BX$



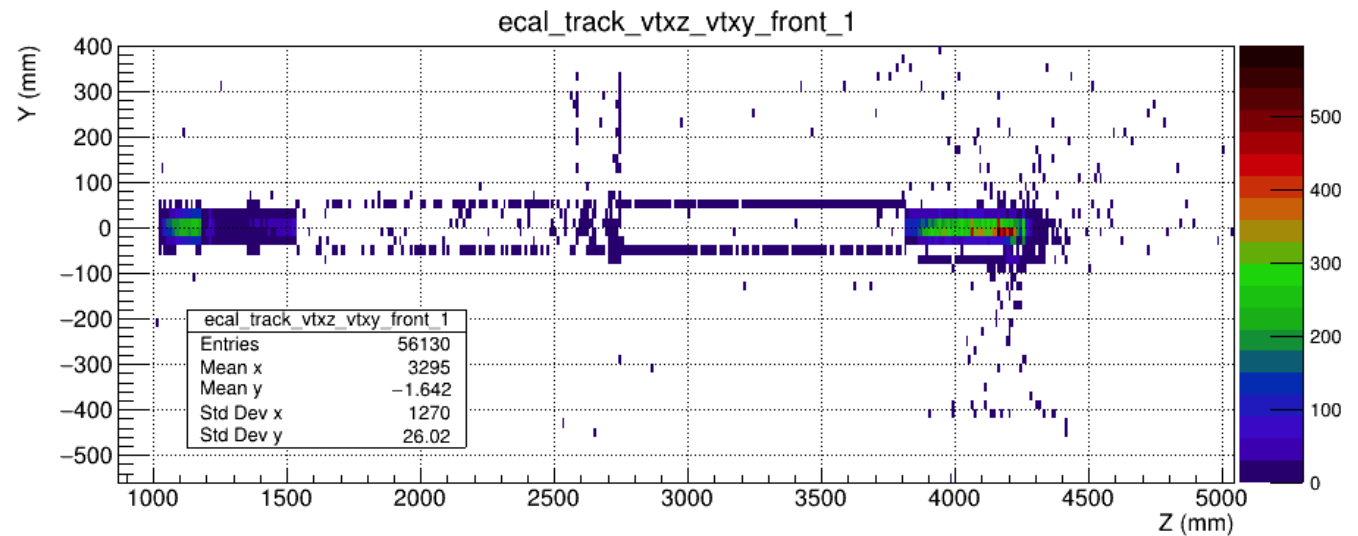
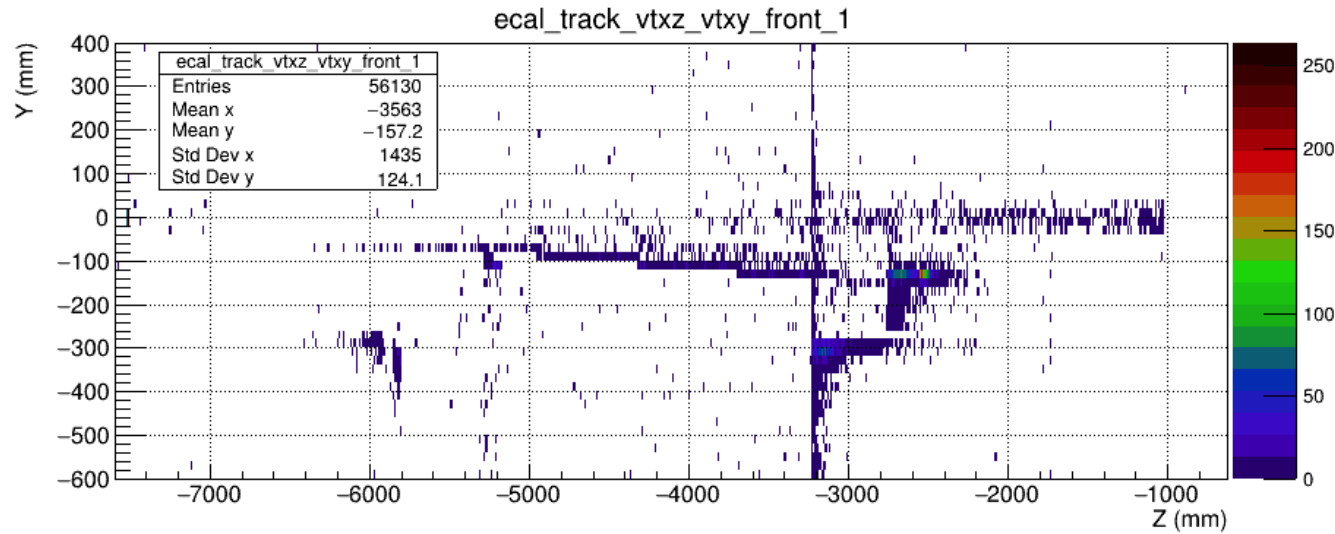
Vertexes ZY of the particles hitting front of the calorimeter, right arm

e- $\sim 6.5\text{e}9$ $\sim 4\text{BX}$

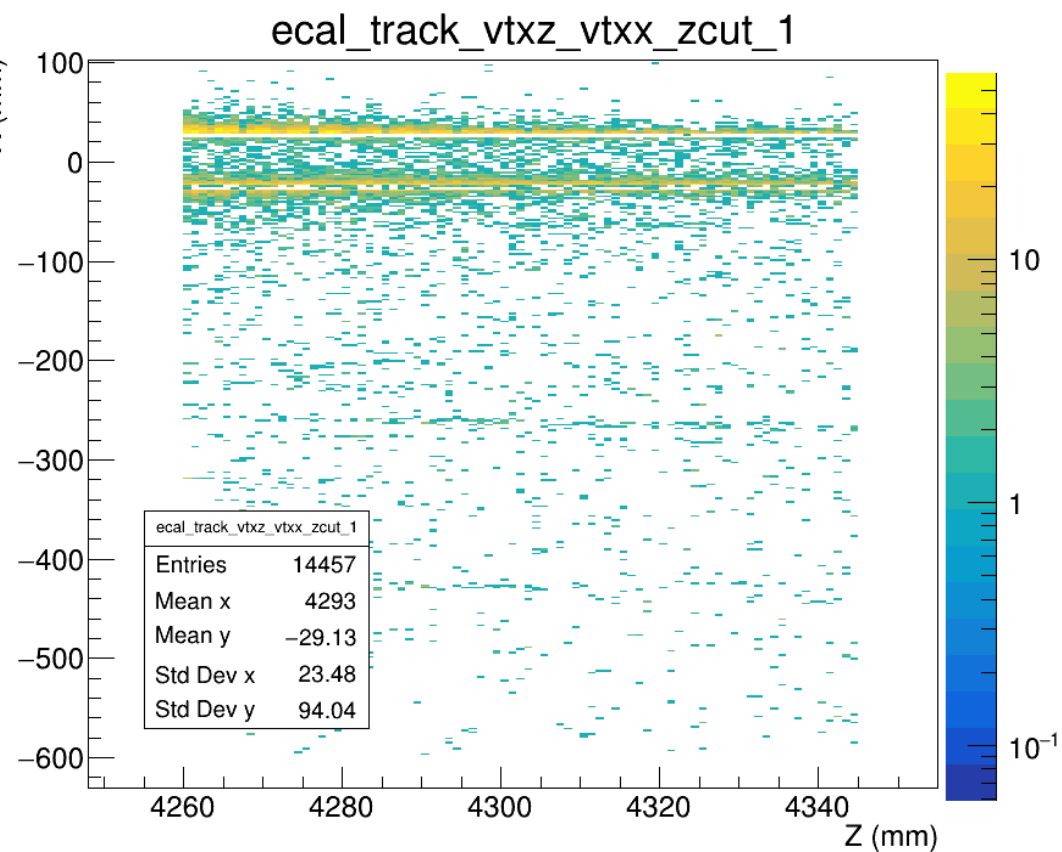
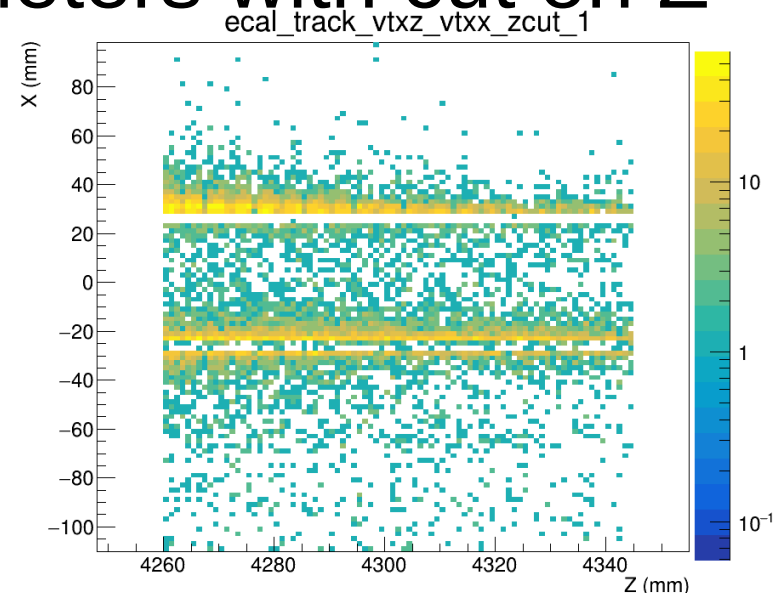
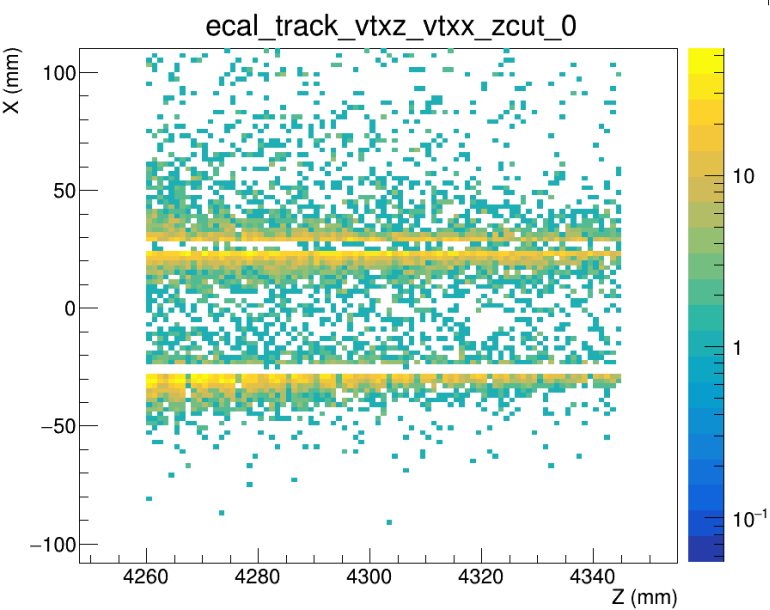
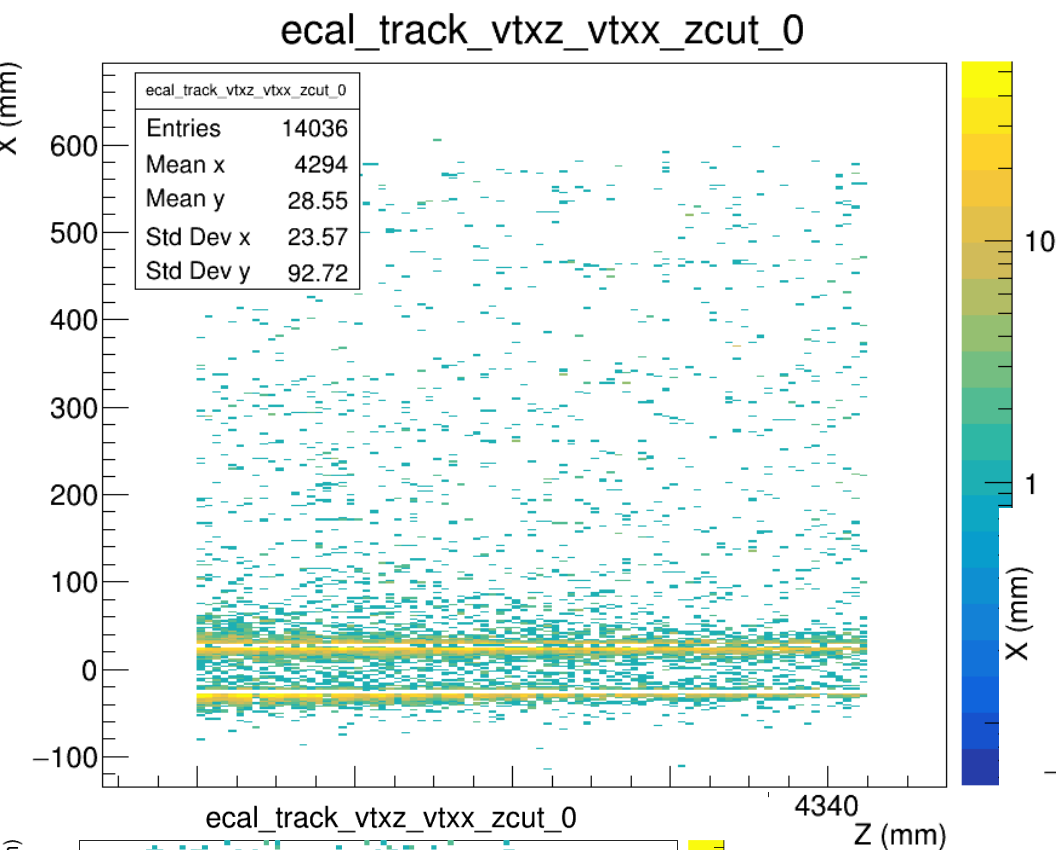


Vertexes ZY of the particles hitting front of the calorimeter, right arm

e- $\sim 6.5e9$ $\sim 4BX$

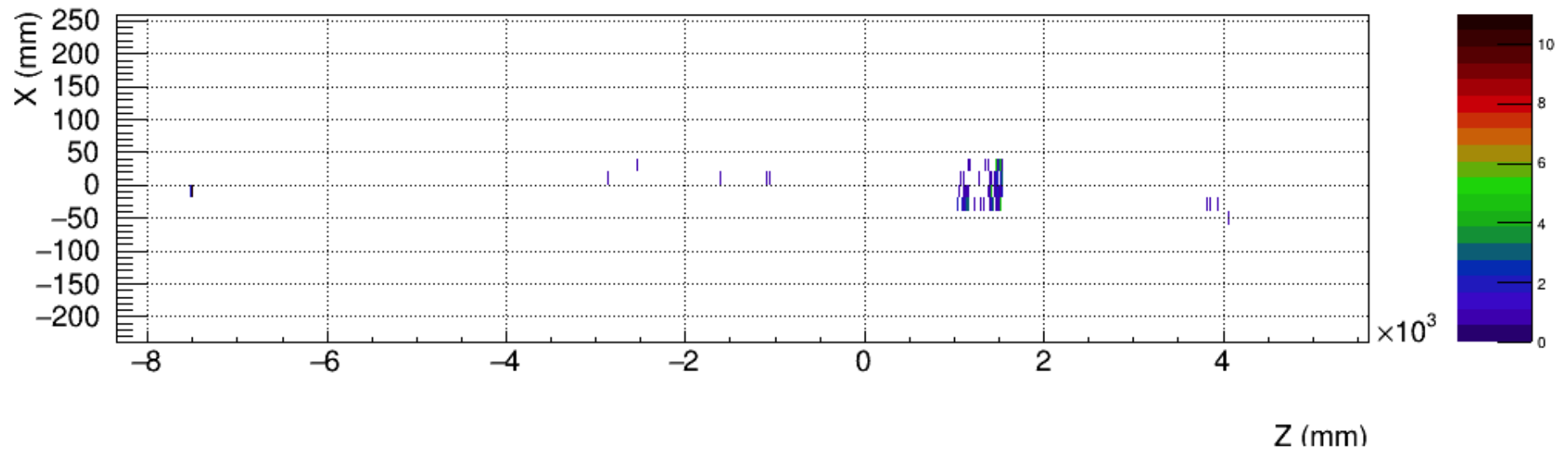
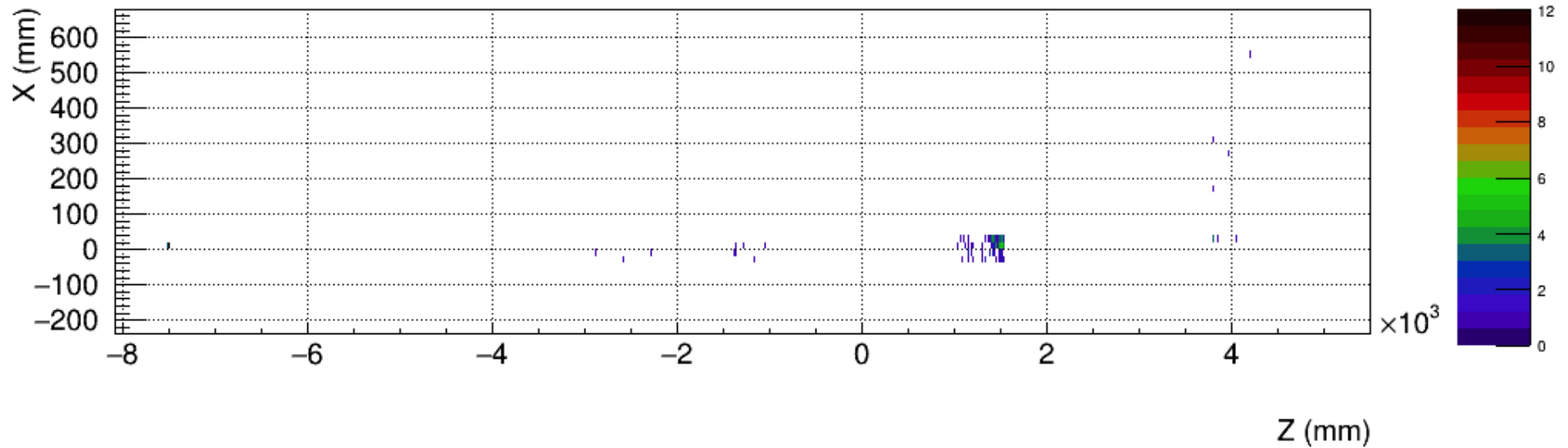


Vertexes of tracks hitting calorimeters with cut on Z



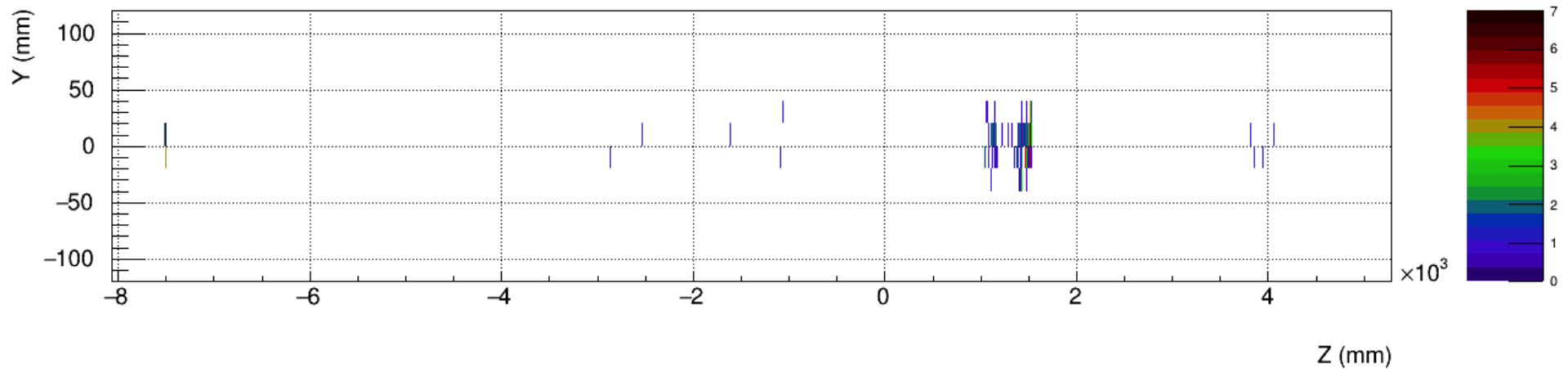
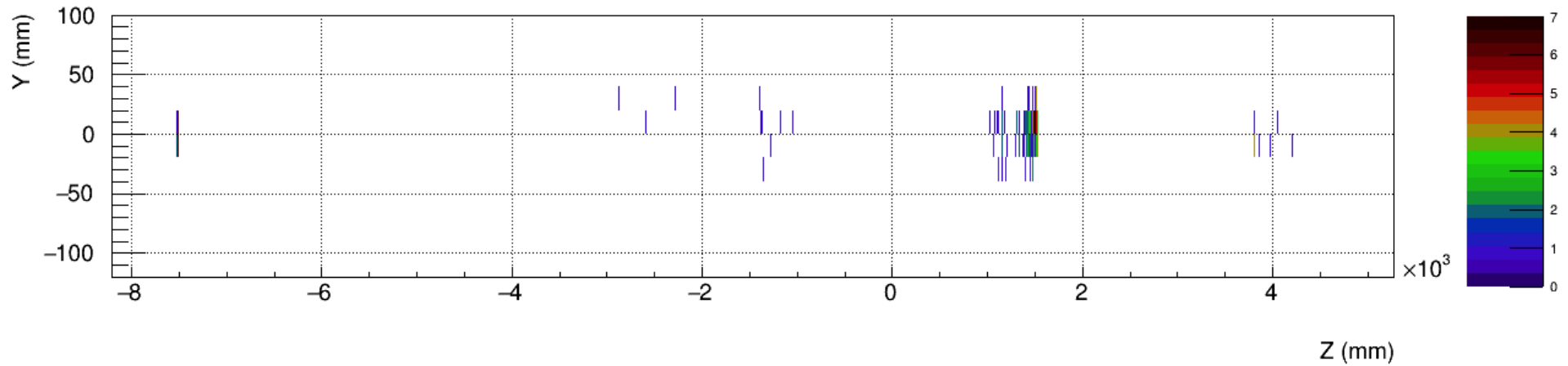
Vertexes ZX of the particles $E > 1\text{GeV}$ hitting front of the calorimeter

e- $\sim 6.5e9$ $\sim 4\text{BX}$



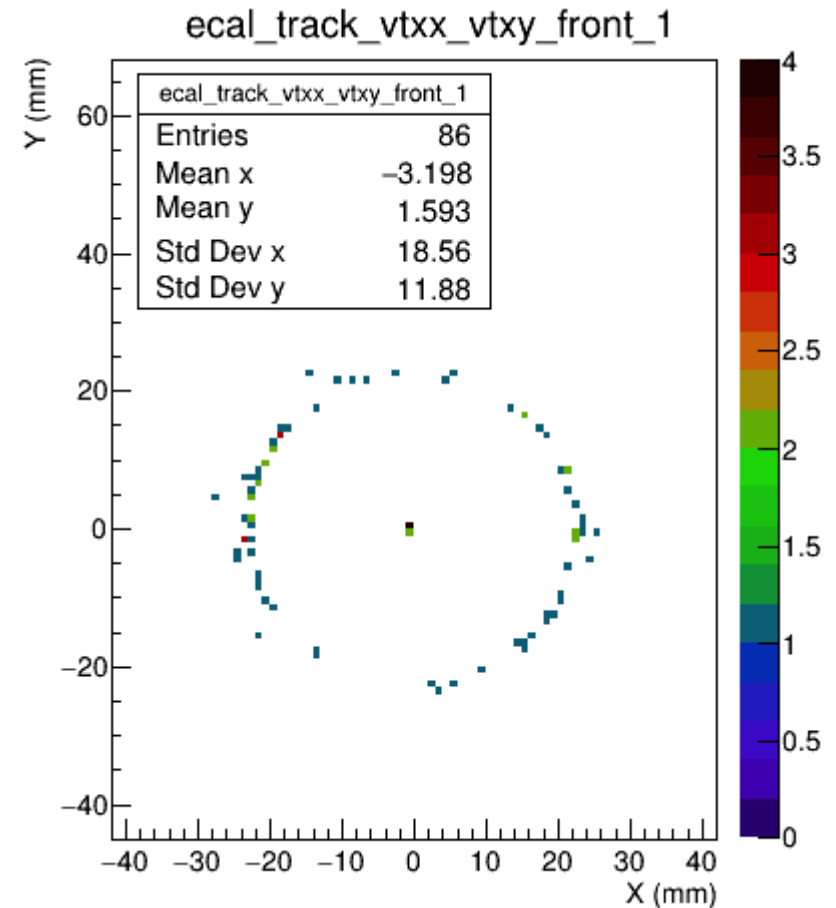
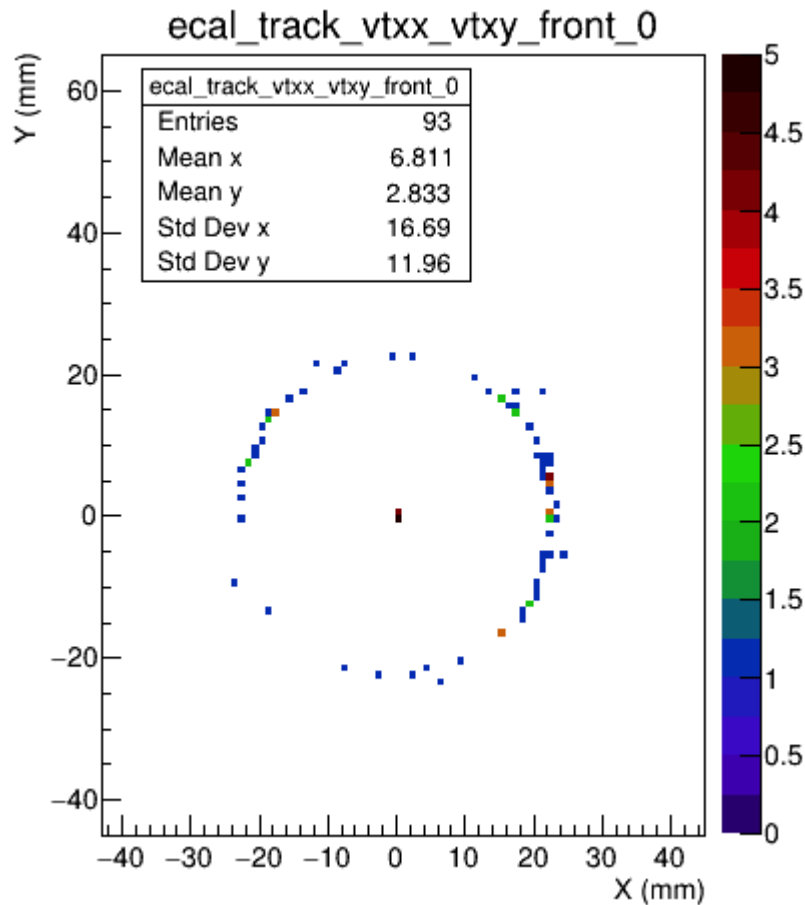
Vertexes ZY of the particles $E > 1\text{GeV}$ hitting front of the calorimeter

e- $\sim 6.5e9 \sim 4\text{BX}$



Verteces XY of the particles $E > 1\text{GeV}$ hitting front of the calorimeter

e^- $\sim 4.3e9$ $\sim 3\text{BX}$



List of tracks hitting right arm of calorimeter generated in the target

4.33e9 e-

Det_Id == 2001 && Vertex_Z < -7500.0

Track_Id	Det_Id	PDG	E (GeV)	X (mm)	Y (mm)	Z (mm)	Vertex_X (mm)	Vertex_Y (mm)	Vertex_Z (mm)
3	2001	22	1.12852	-29.2983	-1.65689	4254.5	-2.61E-05	-8.39E-07	-7510
3	2001	22	5.73564	-29.1715	-0.294828	4254.5	-5.11E-05	-2.57E-08	-7509.98
3	2001	22	1.49676	-29.1713	3.91713	4254.5	-1.06E-05	1.93E-06	-7510
3	2001	22	1.8963	-29.1703	-2.03494	4254.5	-3.55E-06	1.12E-06	-7509.99
3	2001	22	7.22223	-29.1658	3.2569	4254.5	-3.75E-06	1.73E-07	-7510
3	2001	22	7.87456	-29.1406	1.10235	4254.5	-3.71E-05	9.32E-07	-7509.99
4	2001	22	2.18591	-29.13	0.427191	4261.28	-3.08E-06	-1.86E-06	-7509.98
3	2001	22	2.40618	-29.13	0.939027	4264.79	-4.80E-05	2.17E-06	-7509.99
3	2001	22	3.67144	-29.13	4.96976	4268.18	-1.37E-05	2.39E-06	-7510.01
3	2001	22	6.40131	-29.13	-2.69163	4269.92	-7.32E-05	-6.31E-06	-7509.99
3	2001	22	2.15638	-29.13	0.115825	4289.17	-1.59E-05	1.02E-07	-7509.99
3	2001	22	10.4311	-29.13	-4.84373	4304.75	-2.70E-05	-5.05E-06	-7509.99
3	2001	22	1.66846	-29.13	-1.54025	4326.89	-2.67E-05	-1.60E-06	-7509.99

List of tracks hitting left arm of calorimeter generated in the target

4.33e9 e-

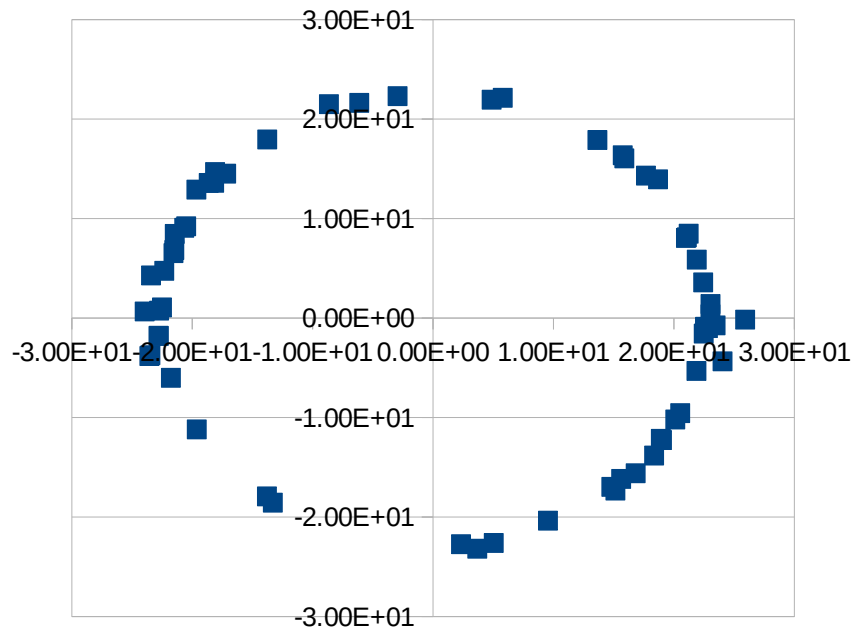
Det_Id == 2000 && Vertex_Z < -7500.0

Track_Id	Det_Id	PDG	E (GeV)	X (mm)	Y (mm)	Z (mm)	Vertex_X (mm)	Vertex_Y (mm)	Vertex_Z (mm)
3	2000	22	11.2078	29.13	2.13725	4256.01	2.97E-05	3.00E-06	-7510
3	2000	22	4.57468	29.13	-2.22532	4279.57	9.95E-06	-1.49E-06	-7509.99
4	2000	22	2.25318	29.13	0.39313	4293.59	6.02E-05	1.09E-06	-7509.99
3	2000	22	3.52396	29.13	5.09604	4295.06	4.35E-05	8.20E-06	-7509.99
3	2000	22	3.29882	29.13	-4.19378	4311.3	2.01E-05	-3.31E-06	-7509.99
3	2000	22	1.07829	29.13	-3.12034	4320.02	1.67E-05	1.89E-05	-7509.98
3	2000	22	12.9101	29.13	-0.911835	4328.7	2.28E-05	-8.46E-07	-7509.99
3	2000	22	1.01026	29.13	0.980076	4341.12	2.89E-05	6.73E-07	-7510
3	2000	22	2.36206	29.13	-3.91586	4341.82	1.72E-06	-2.80E-07	-7510.01
3	2000	22	3.15213	29.1411	4.89586	4254.5	6.48E-05	1.18E-05	-7509.99
3	2000	22	3.20852	29.2161	-2.93062	4254.5	3.76E-05	-5.90E-06	-7509.99
3	2000	22	1.46822	29.2246	0.303269	4254.5	3.12E-06	7.78E-07	-7509.99
3	2000	22	1.10837	29.53	-0.629877	4254.5	1.40E-05	-8.08E-07	-7509.99
3	2000	22	11.0386	29.6988	1.30471	4254.5	8.18E-05	2.59E-06	-7509.98
4	2000	22	12.0892	29.7844	-0.178885	4254.5	6.73E-05	-7.05E-07	-7509.99
3	2000	22	1.10746	29.8987	0.622927	4254.5	1.48E-05	-4.27E-07	-7509.99
3	2000	22	1.88714	35.2421	10.5014	4254.5	2.21E-06	-1.01E-06	-7509.99

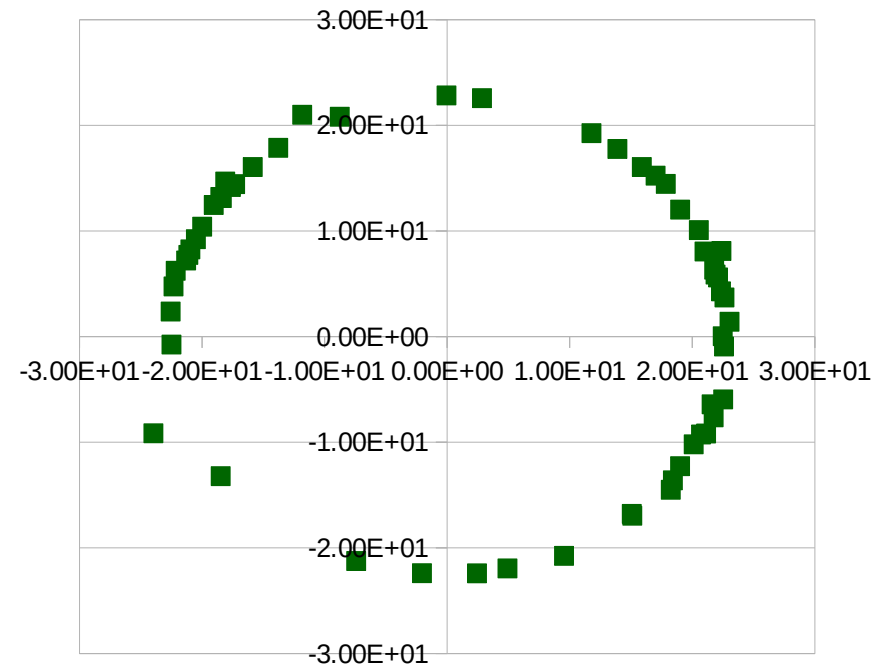
Vertices XY of the particles $E > 1\text{GeV}$ hitting the calorimeter

4.33e9 e-

Det_Id == 2001
&& (pdg == 11 || pdg == -11)

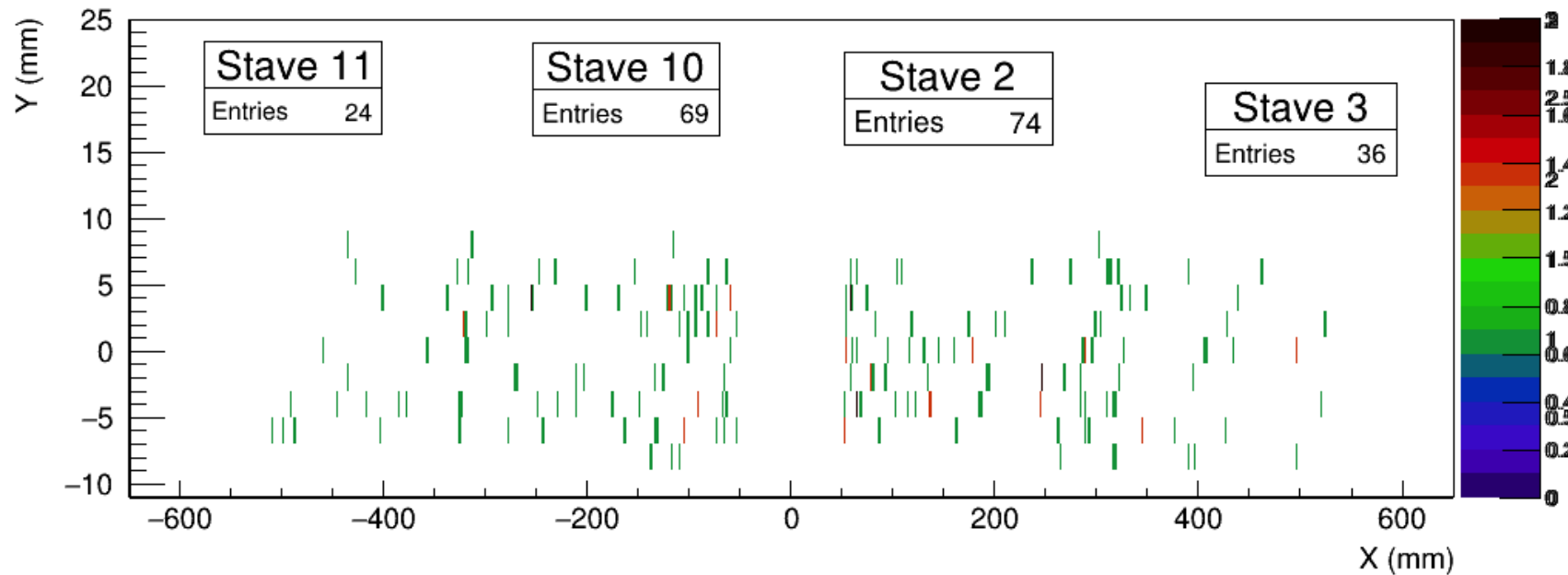
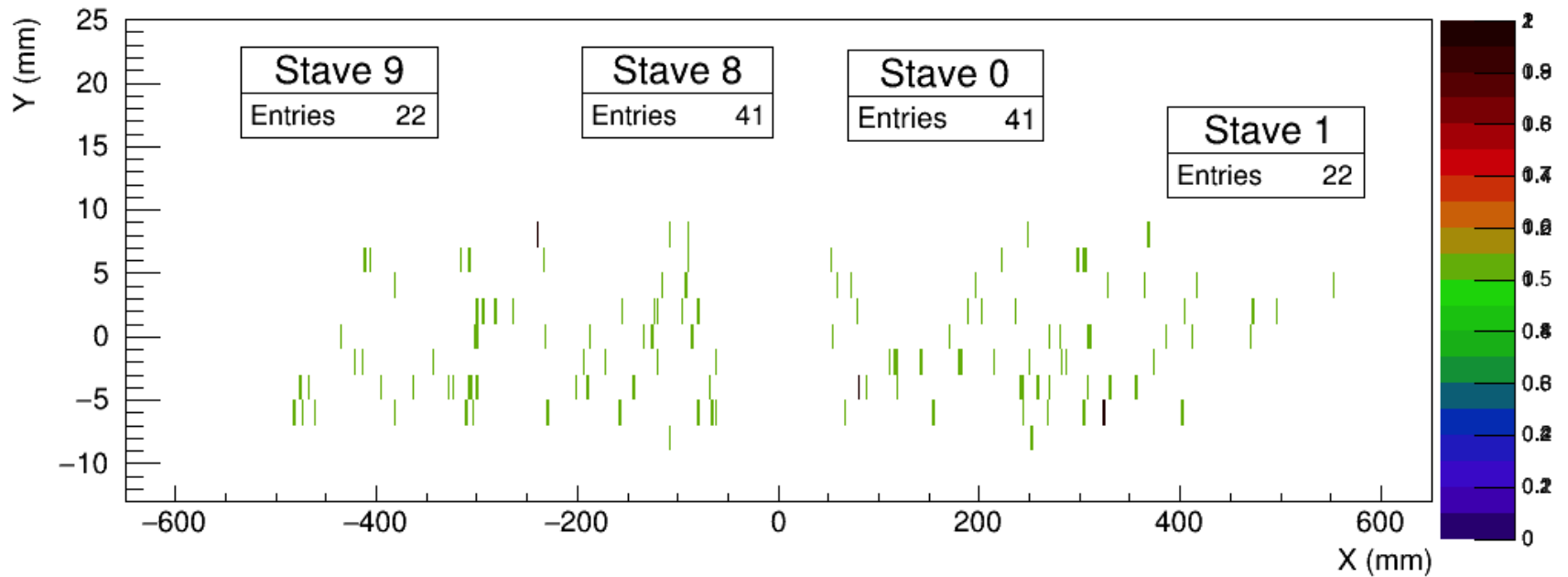


Det_Id == 2000
&& (pdg == 11 || pdg == -11)



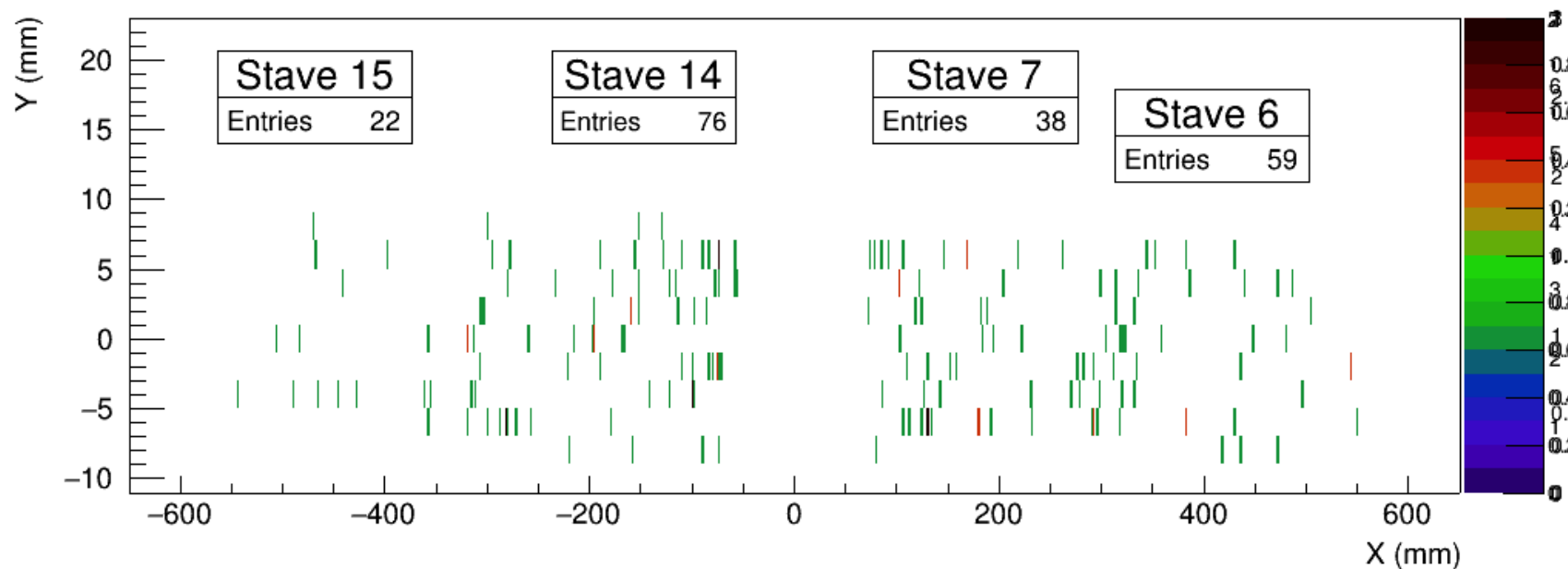
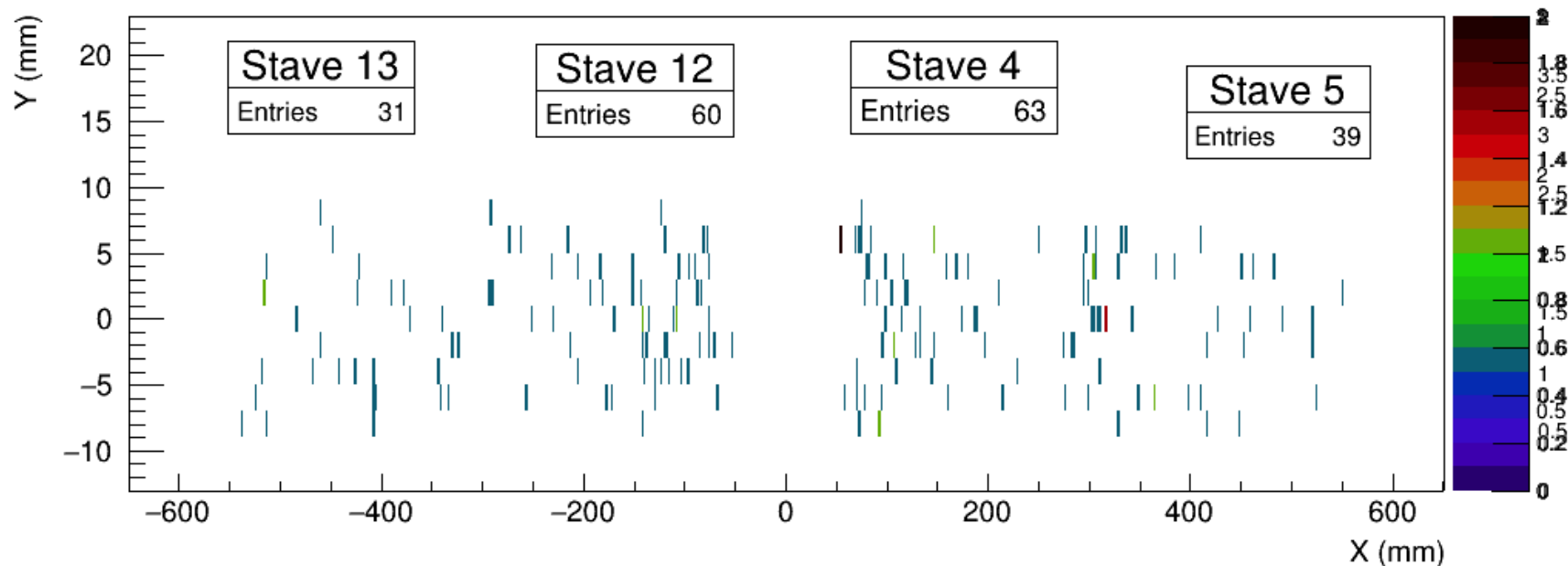
Charged particles crossing at least 3 staves

e- $\sim 6.5e9$ $\sim 4BX$



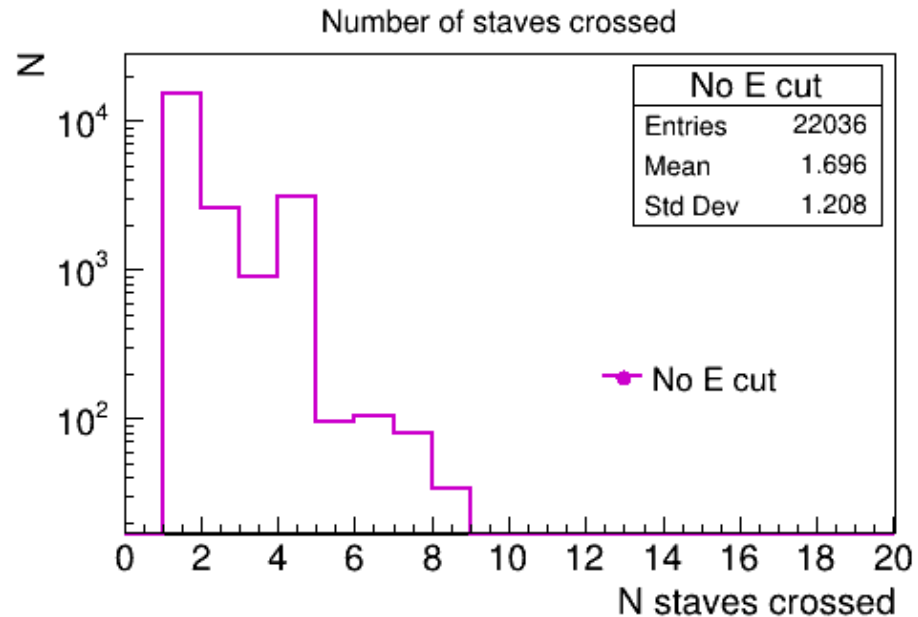
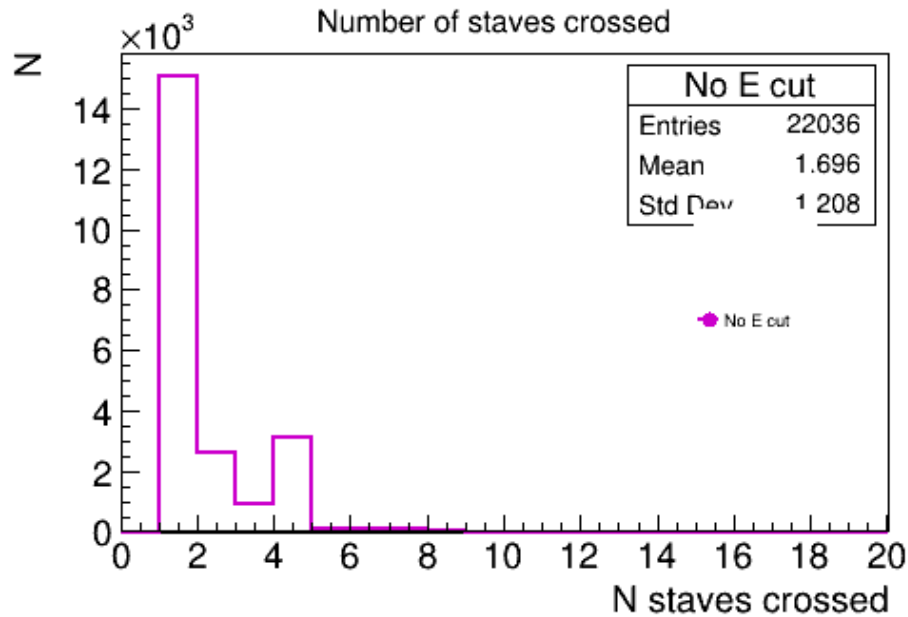
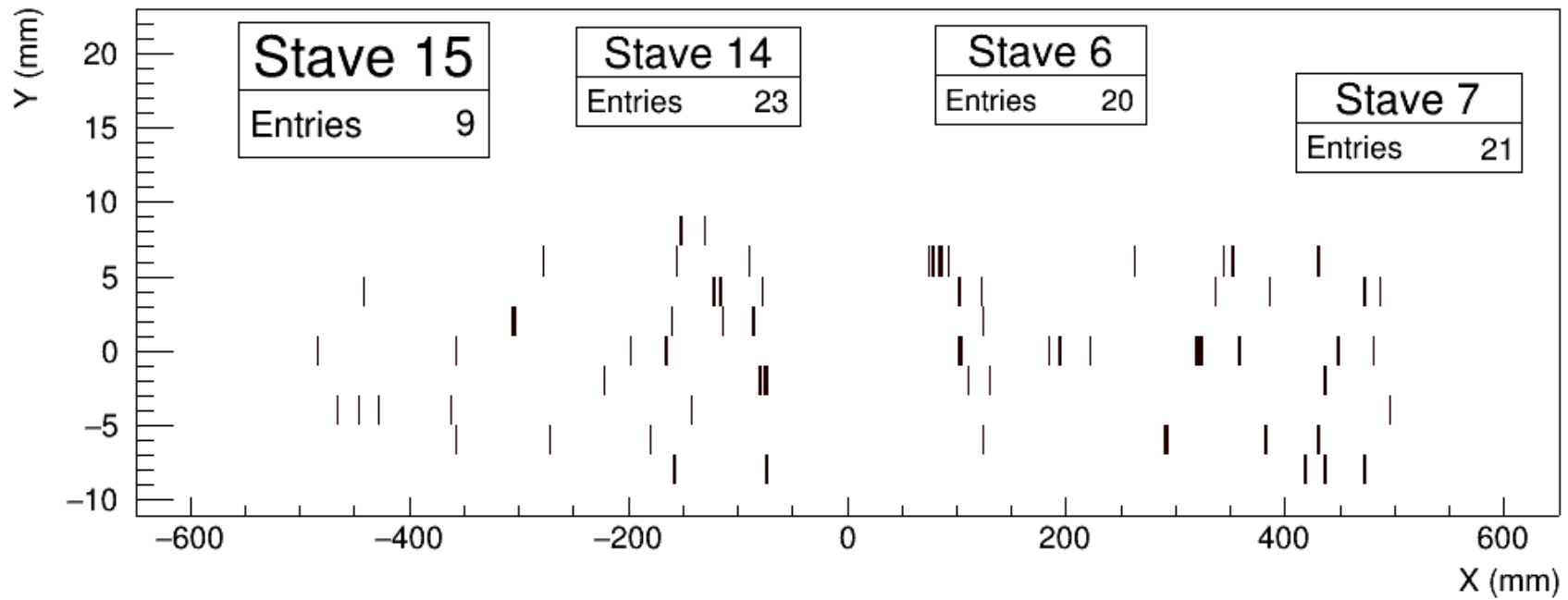
Charged particles crossing at least 3 staves

e- $\sim 6.5e9 \sim 4BX$



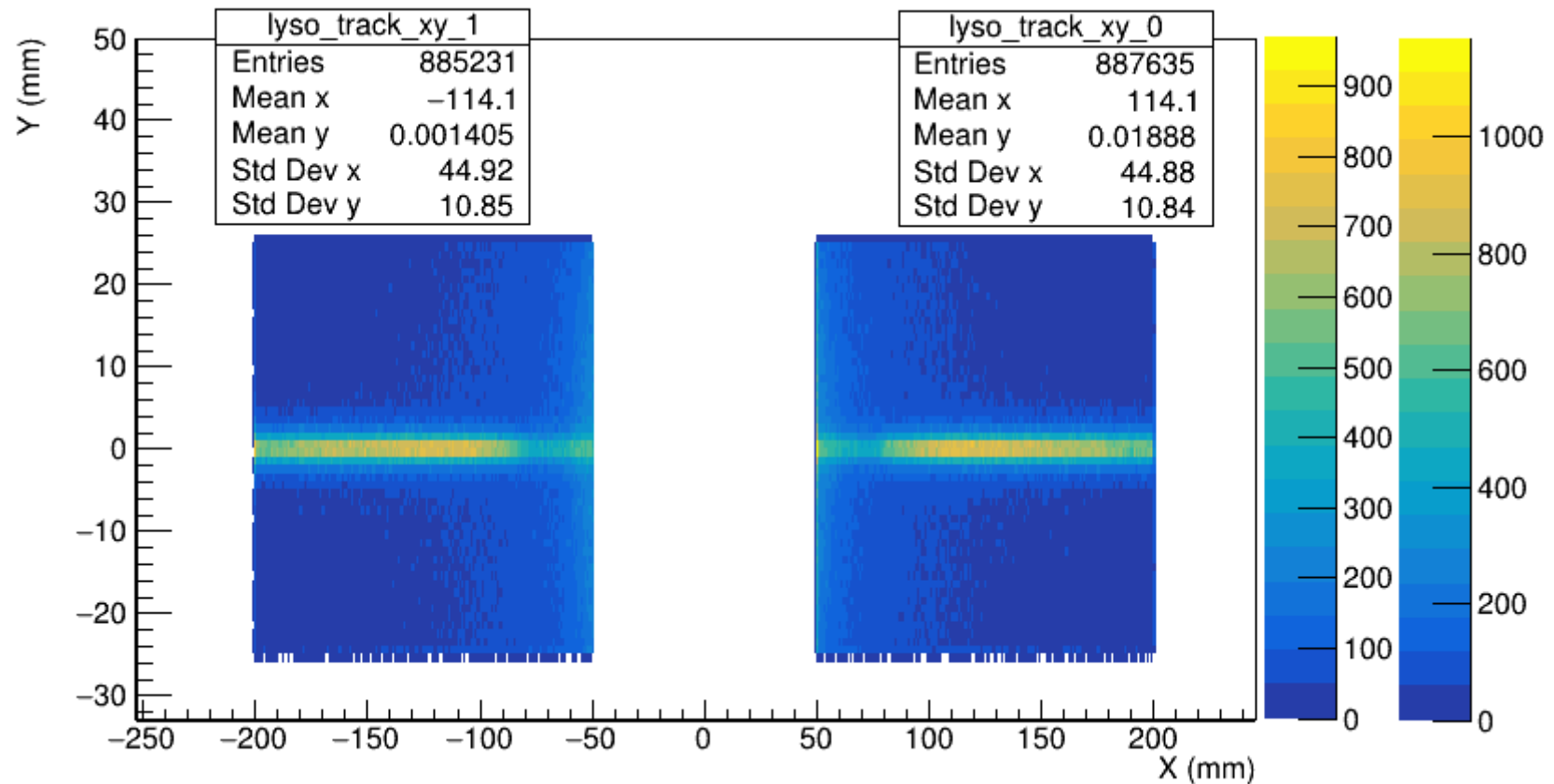
Charged particles crossing at least 3 staves with momentum pointing toward magnet

e- $\sim 6.5e9$ $\sim 4BX$

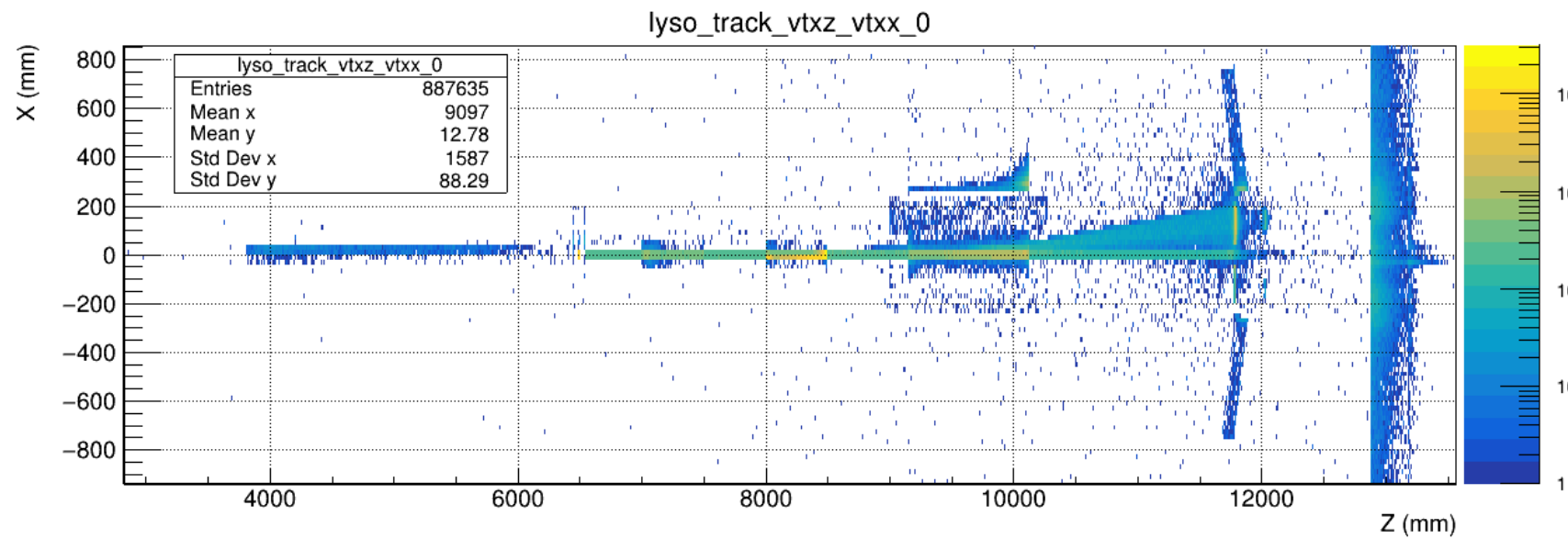
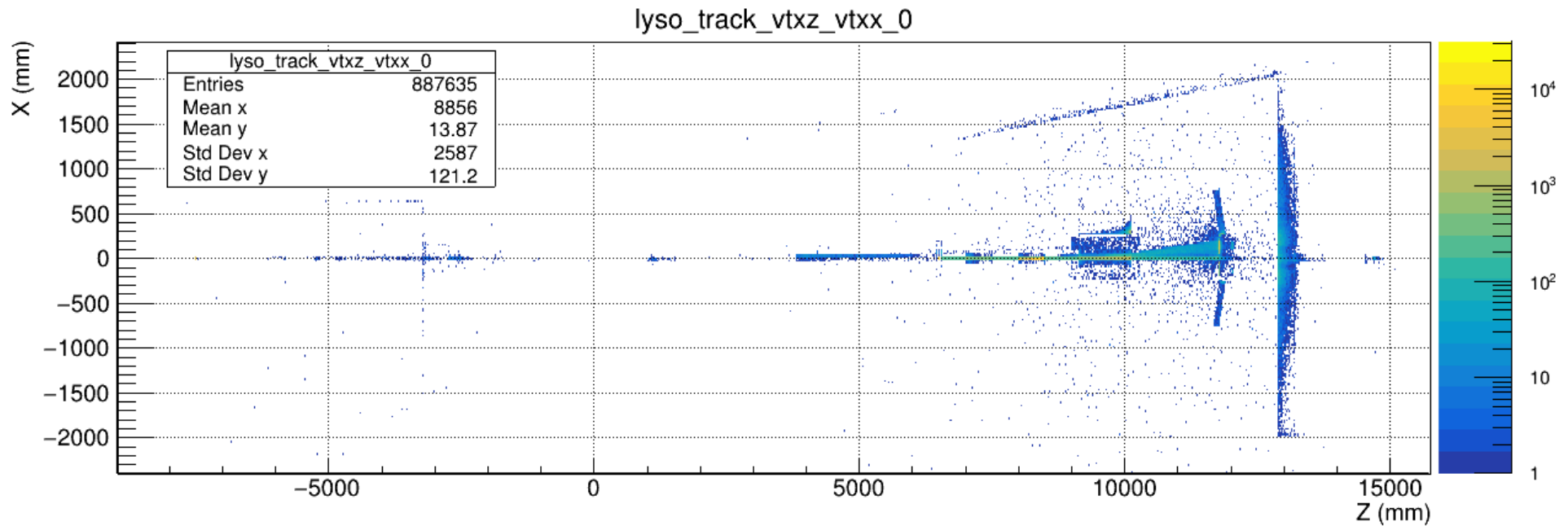


Particles XY hitting LYSO detector

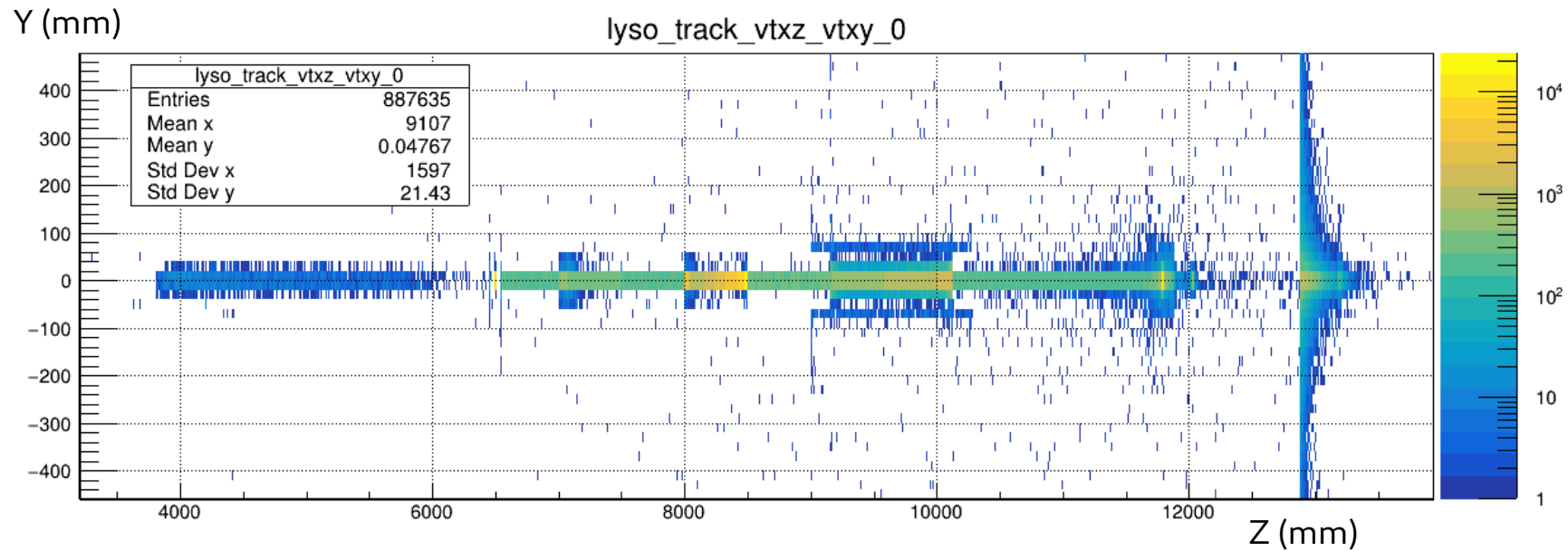
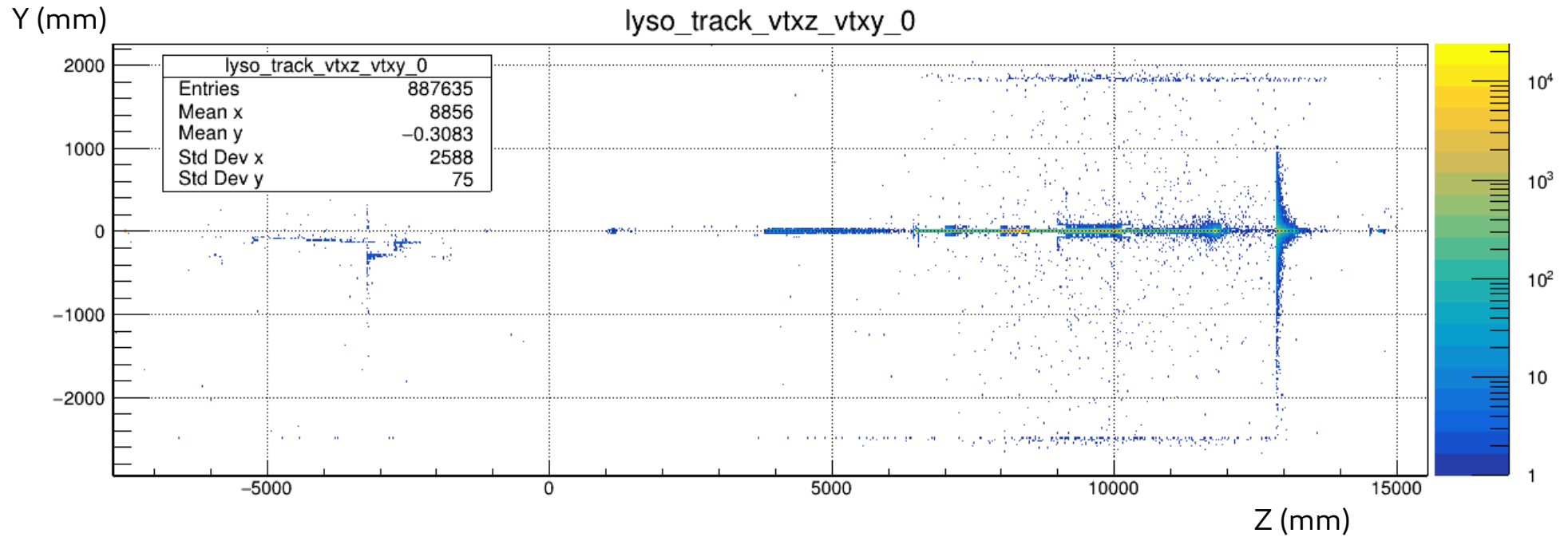
e- $\sim 6.5e9 \sim 4BX$



LYSO



LYSO



Summary

- About 3-4 BX are available for background analysis.
- Most of the background particles hitting the calorimeter volume are of low energy, significantly below 1 GeV.
- There are high energy photons generated in the target and hitting front plane of the calorimeters directly.
- A lot of particles which reach the calorimeter volume are generated in beam pipe material.
- Calorimeter might need some shielding to reduce tracks entering its volume from backside, top (and bottom).