Signal and background in Gamma monitor

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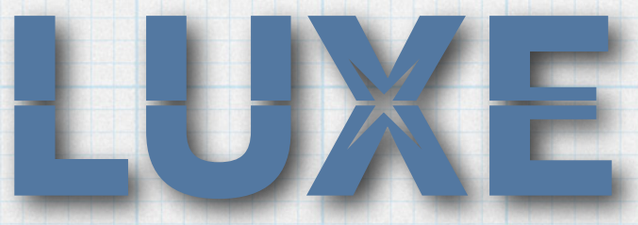
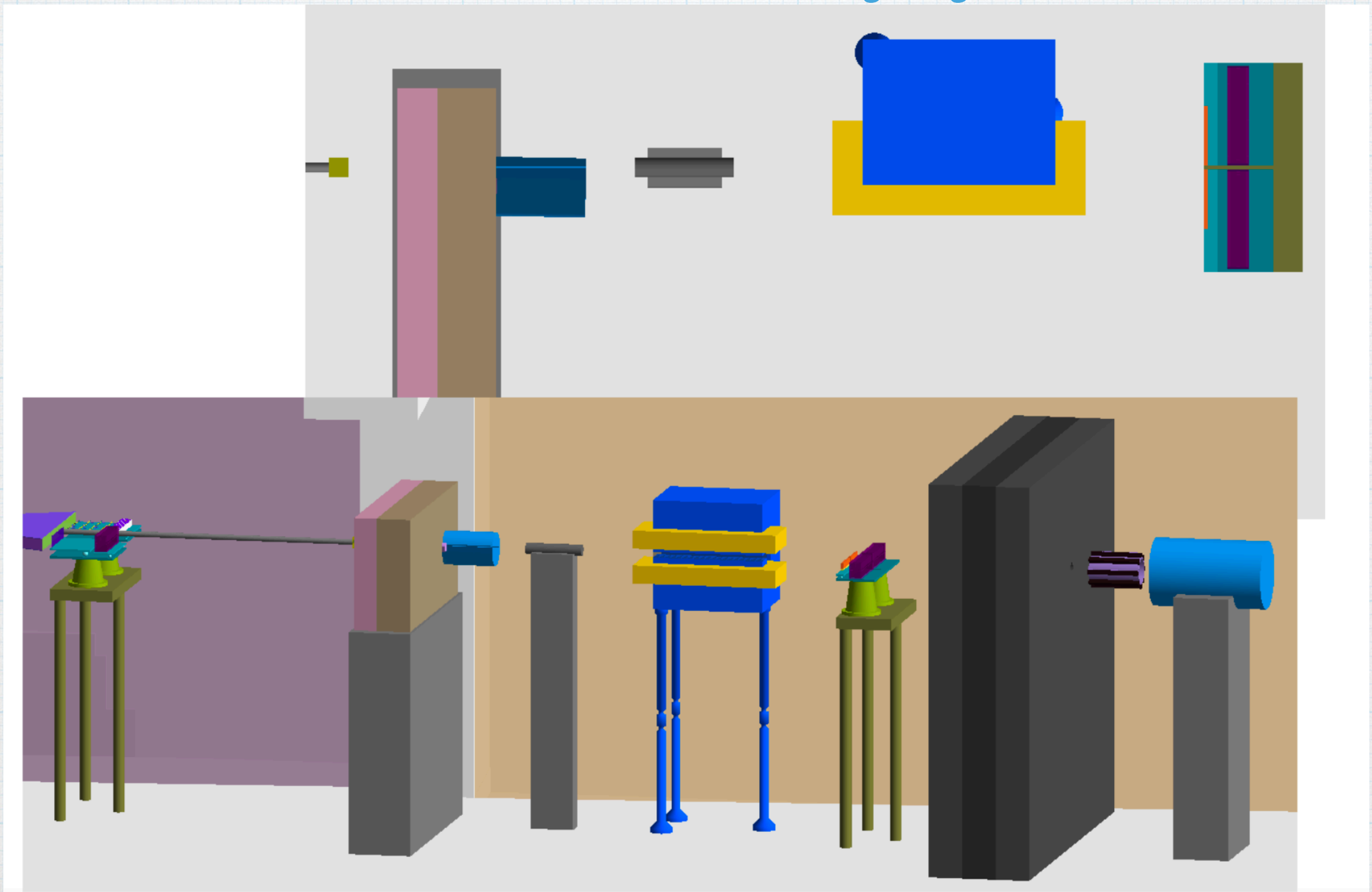
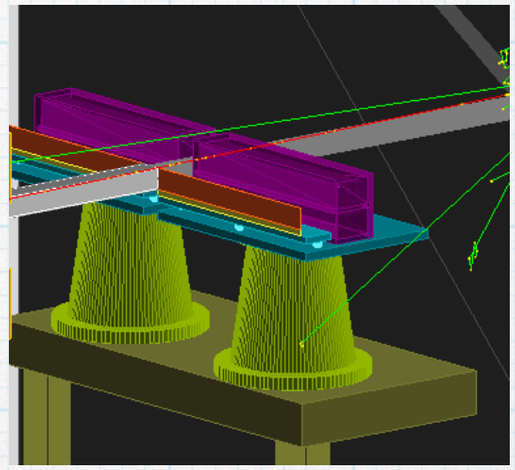
27/10/20
LUXE analysis meeting



Forward detector system w/o beam pipe

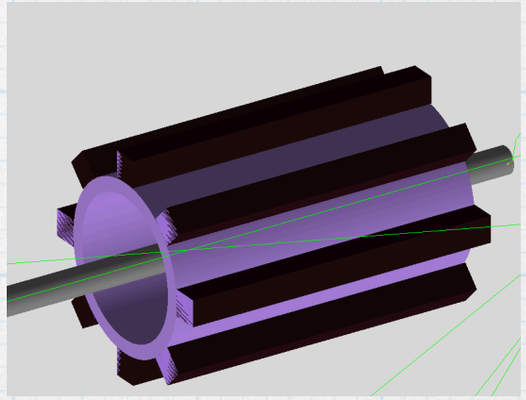


JETI40, 16.5 GeV, 50 um



- the technologies:
  conversion detector (Lanex srceens)

backscattering calorimeter

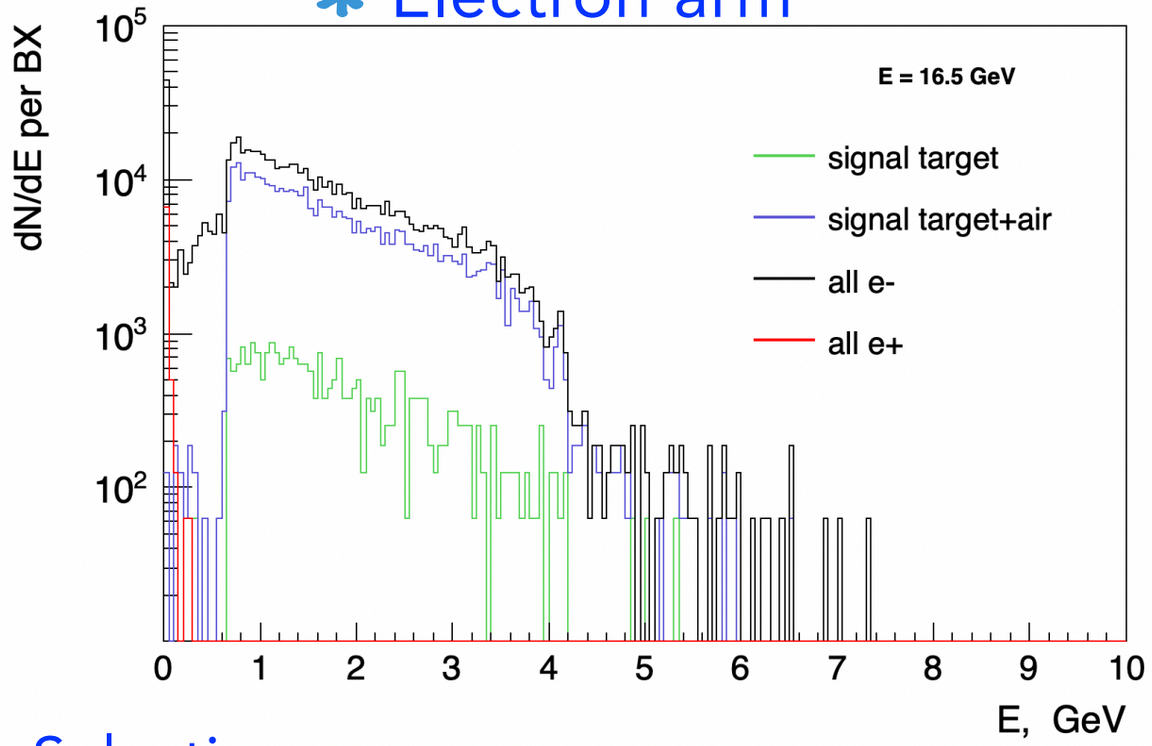


Lanex screens, Spectra

JETI40, 16.5 GeV, 50 um

- Electrons/positrons generated in target by primary photon and which are hitting Lanex screens
- Consider air before the magnet as a target too

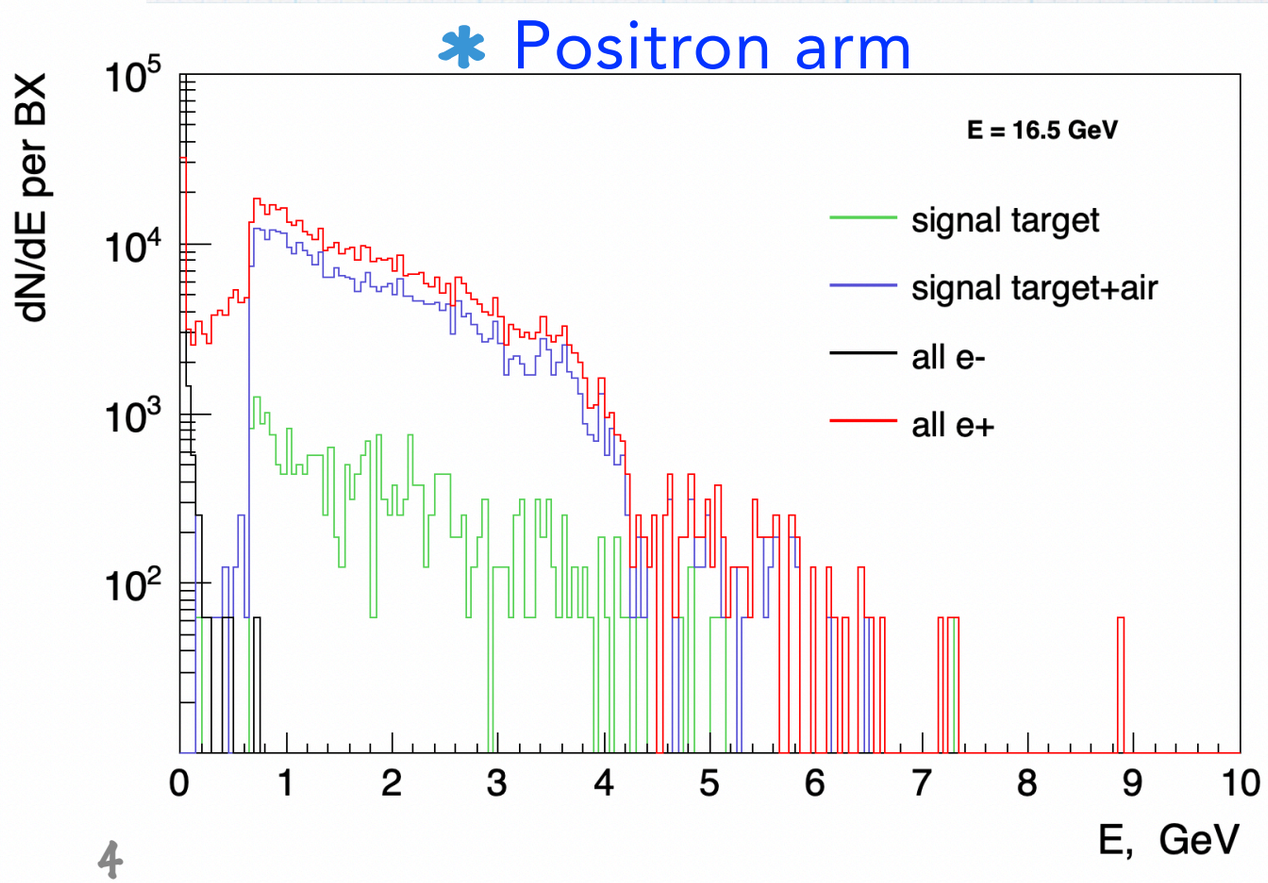
✱ Electron arm



✱ Selection

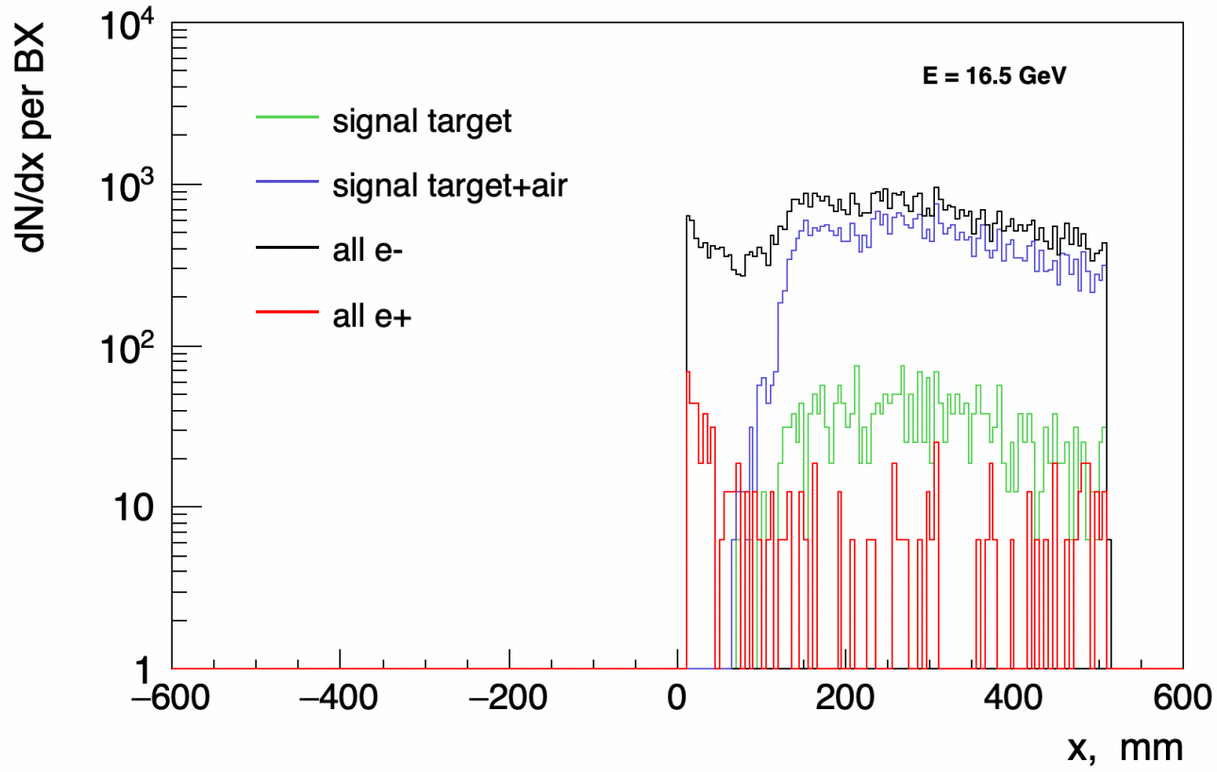
- detid == 3000/3001
- pdg ==11/-11
- Parent pdg ==22
- Parent == primary
- Primary pdg ==22
- |vtx x,y |<25 mm
- |vtx z - 6.5 m |< 100 um
- vtx z > 6.5m -100um && vtx z < 9m

✱ Positron arm



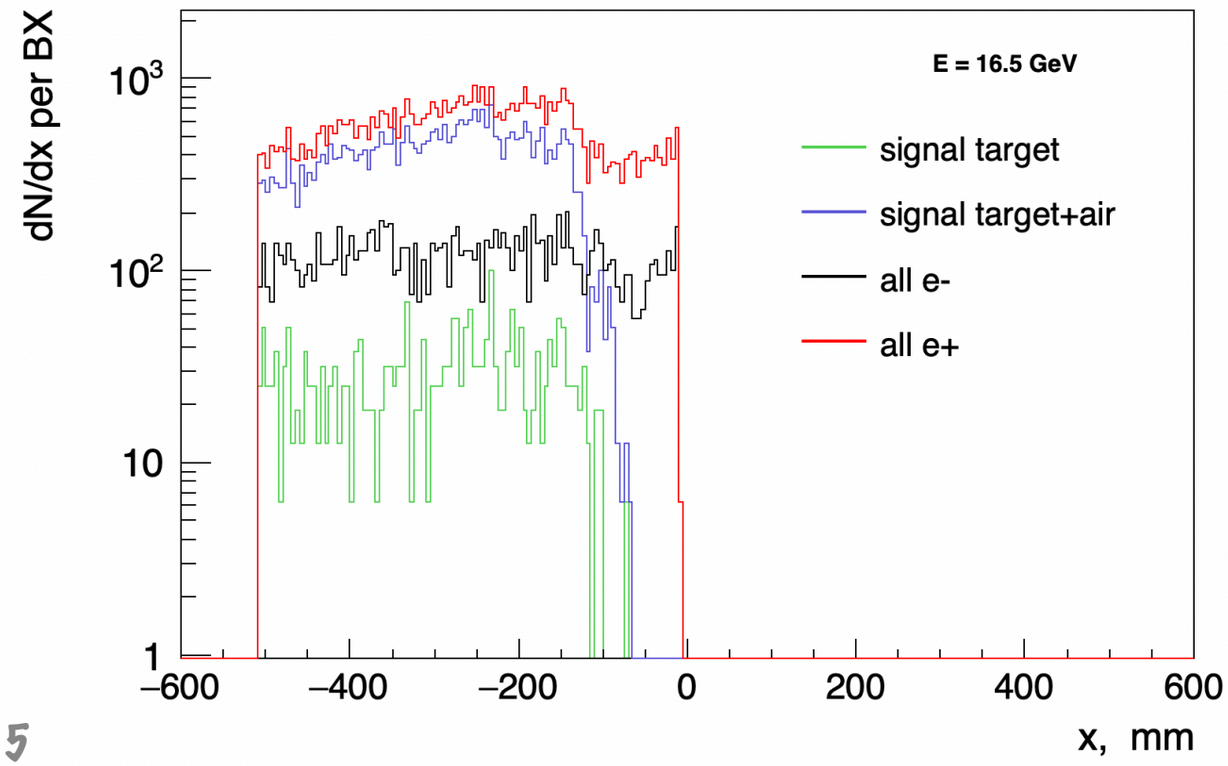
Lanex screens, X-distributions

* Electron arm

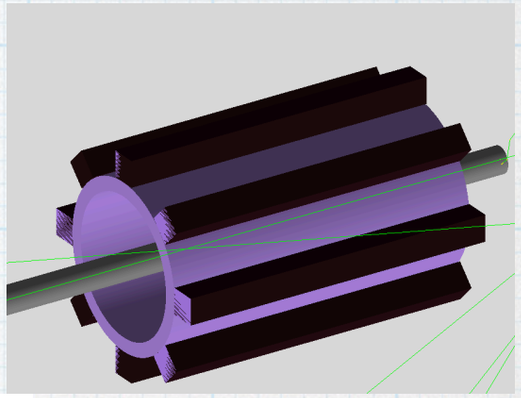


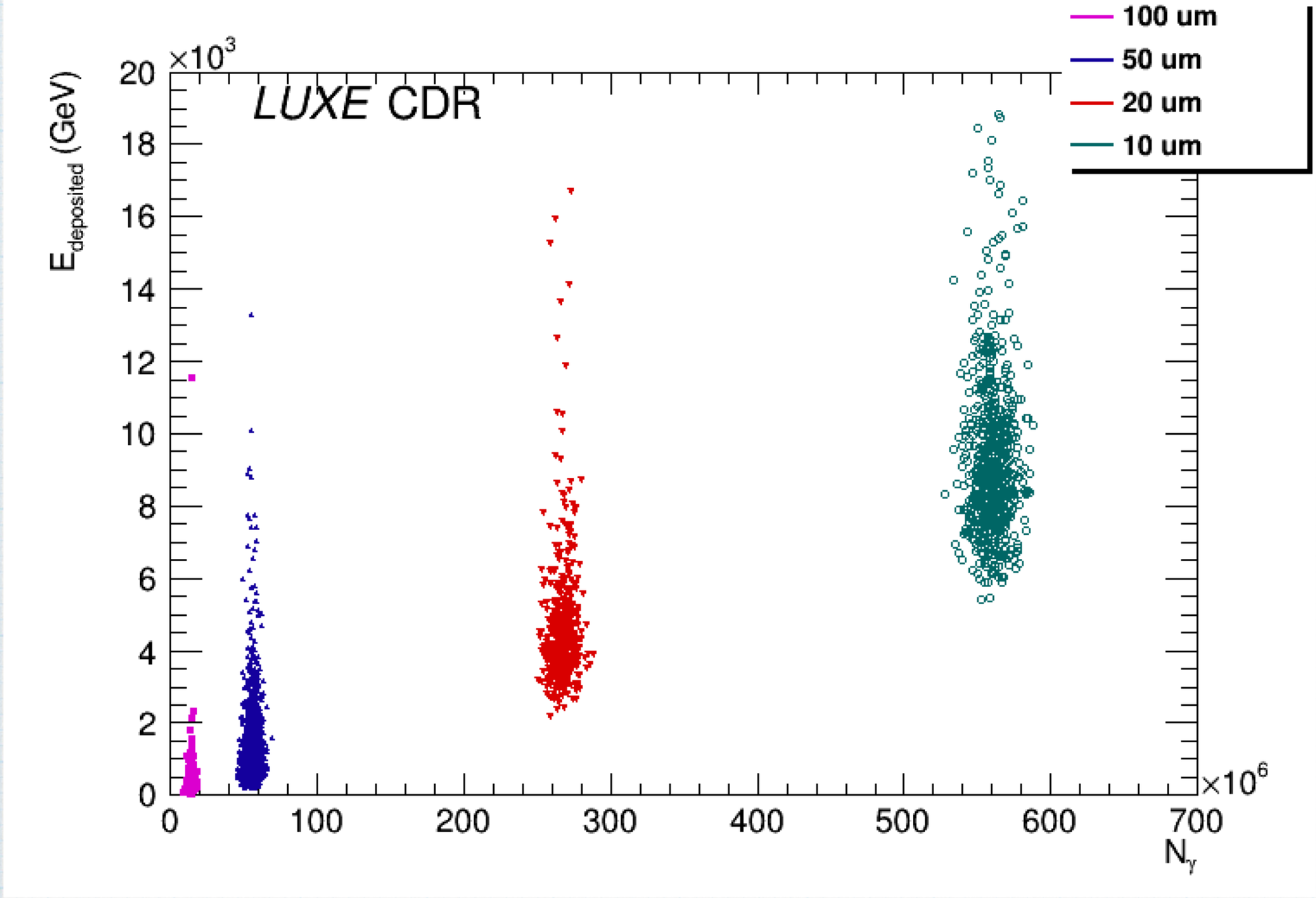
Material	X0,(cm)	Thickness	Fraction X0
Air	3.04E+04	350	1.15 %
Kapton	28.57	2.00E-02	0.07 %

* Positron arm

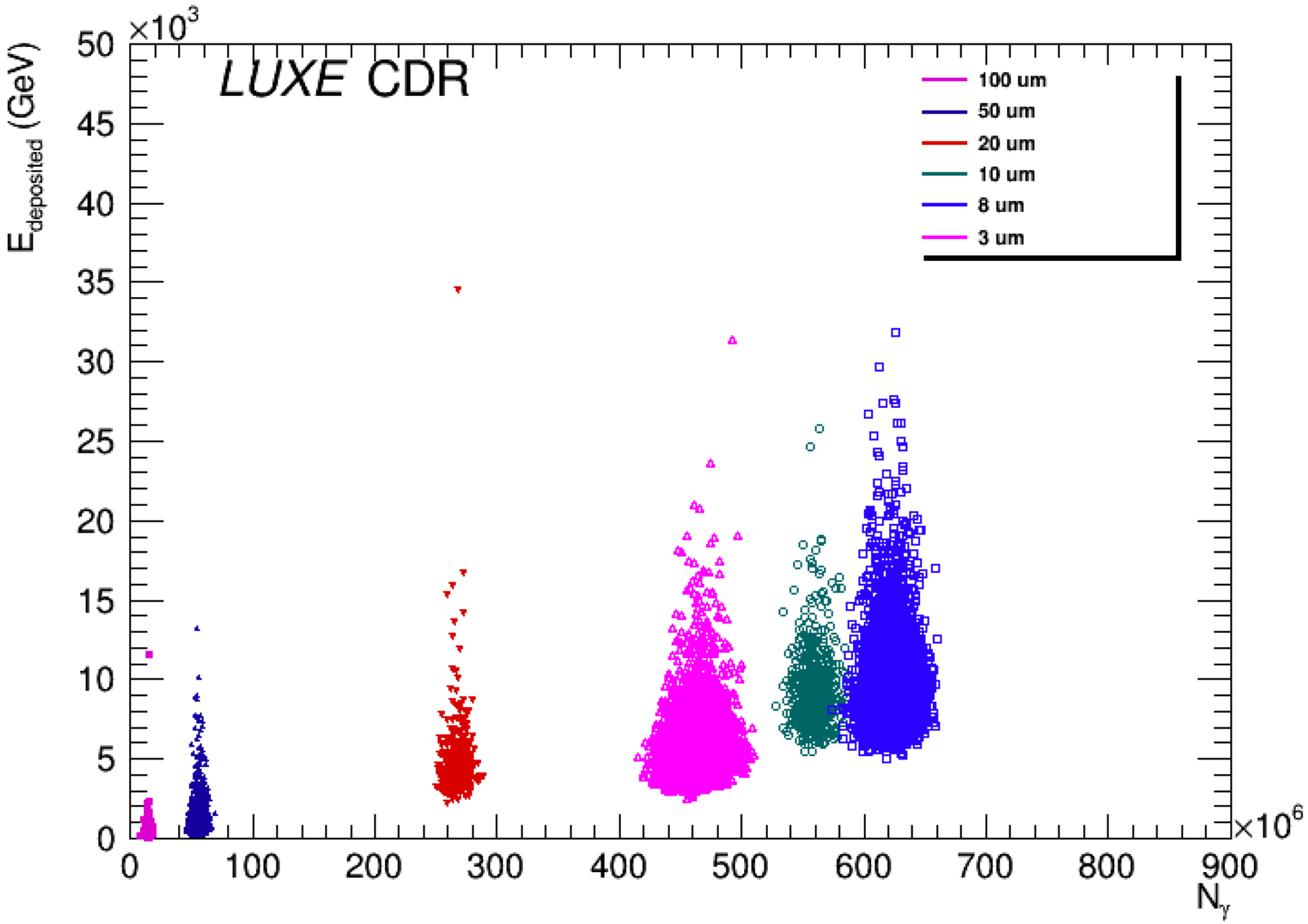


Deposited energy versus true number of photons.

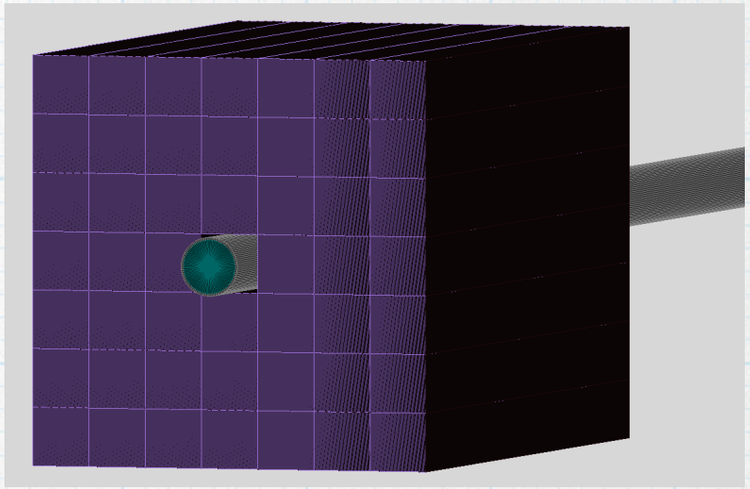


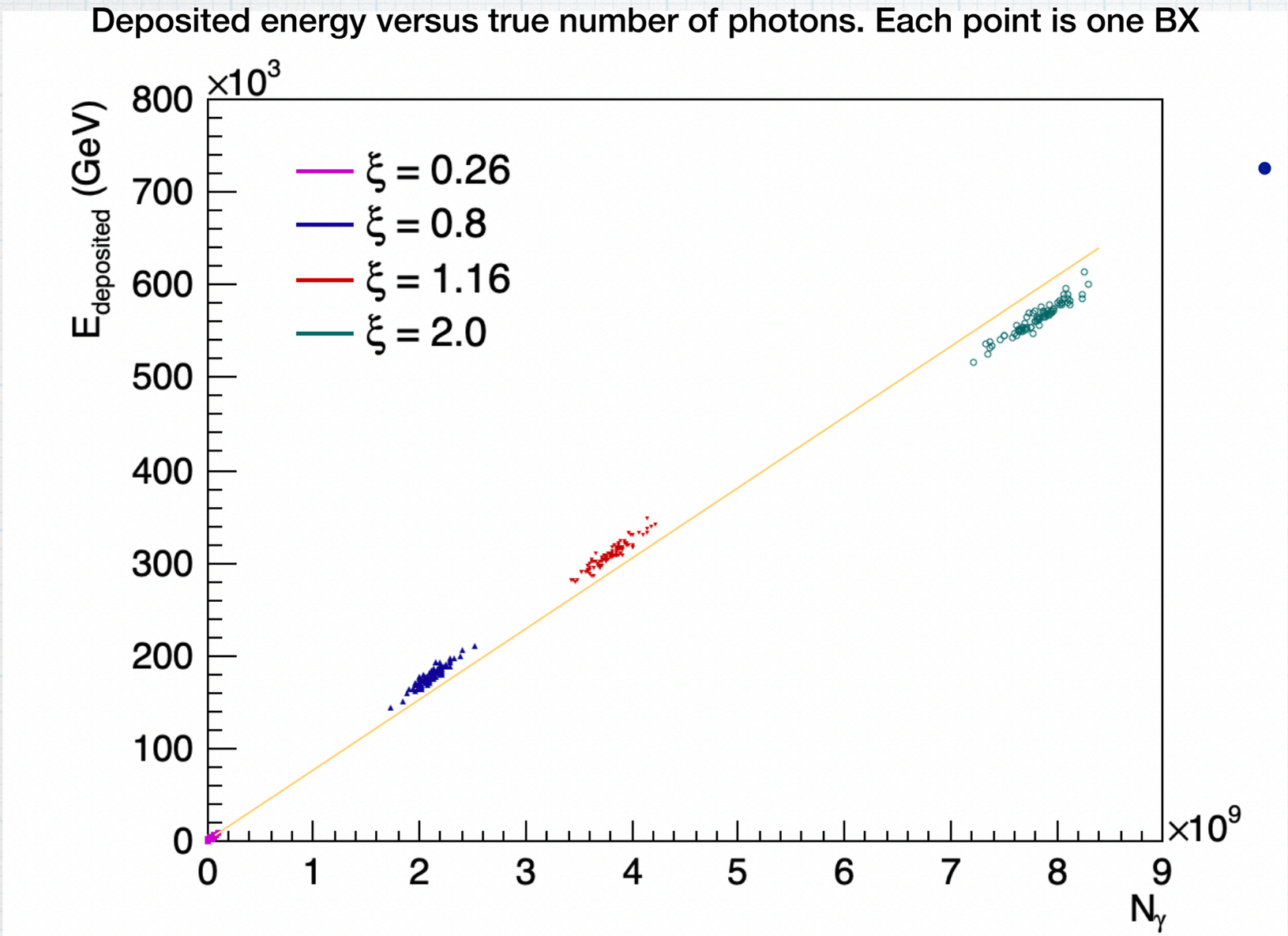


Deposited energy versus N of incident photons



Deposited energy versus true number of photons.

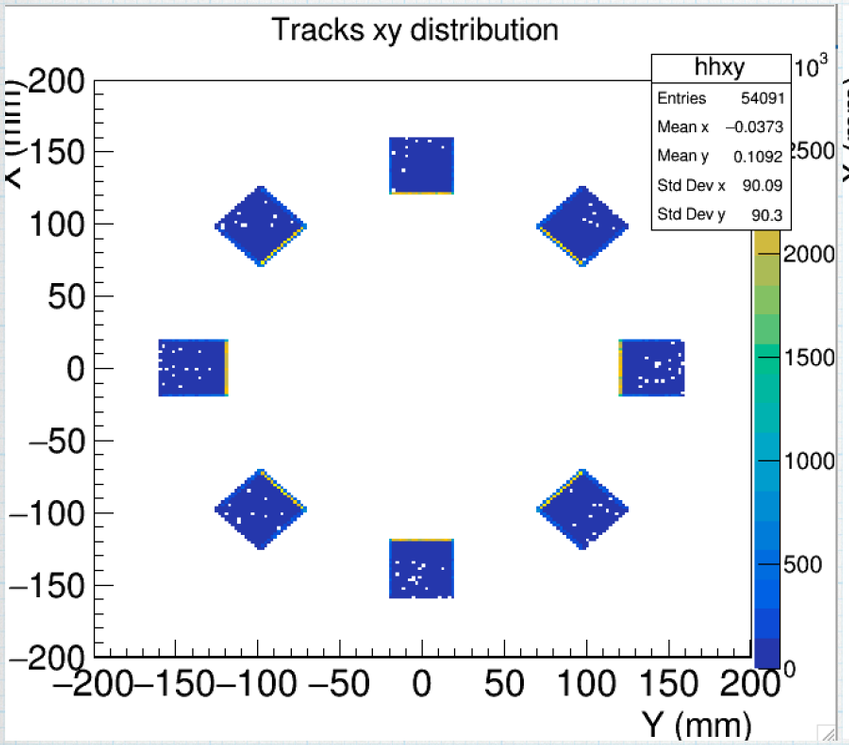


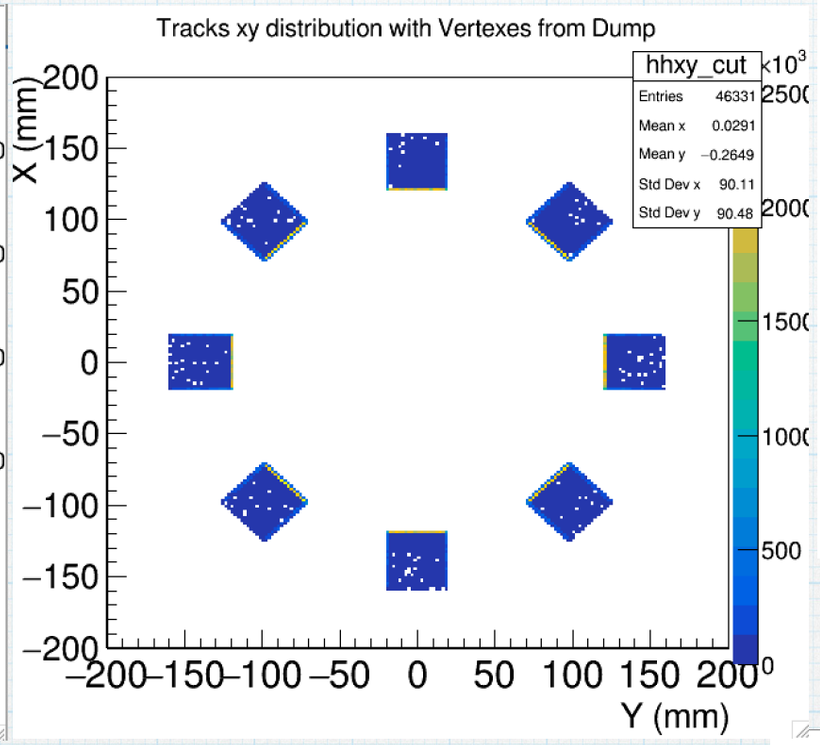


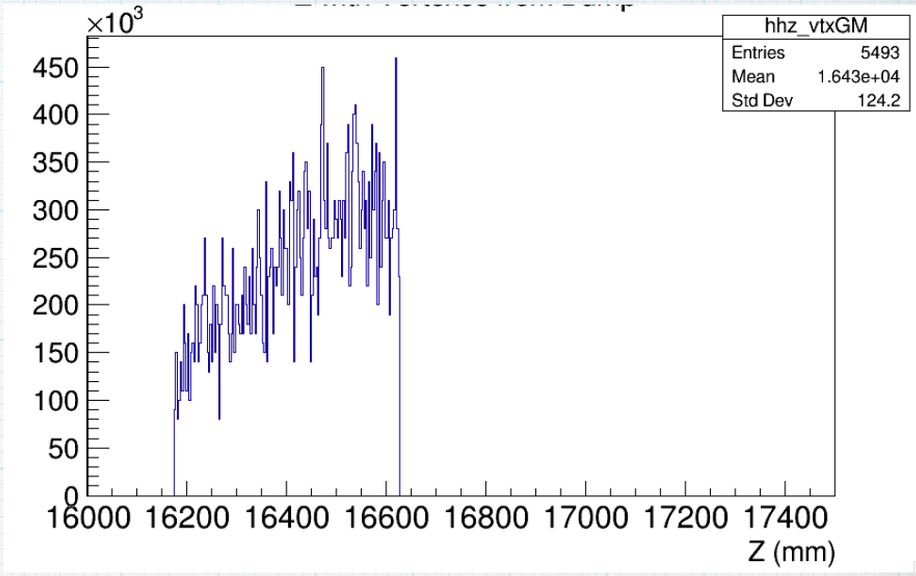
- The (almost) linear dependence of deposited energy on number of incoming photons in GM allows the usage of backscatters for monitoring the photon flux

Background

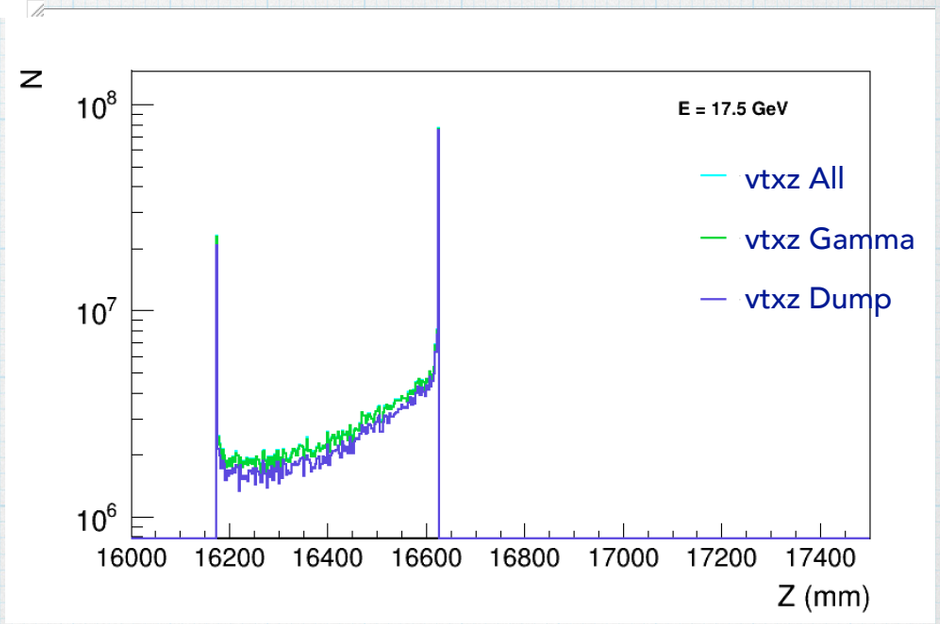
- Z distributions
- Tracks with vertexes only from the GM







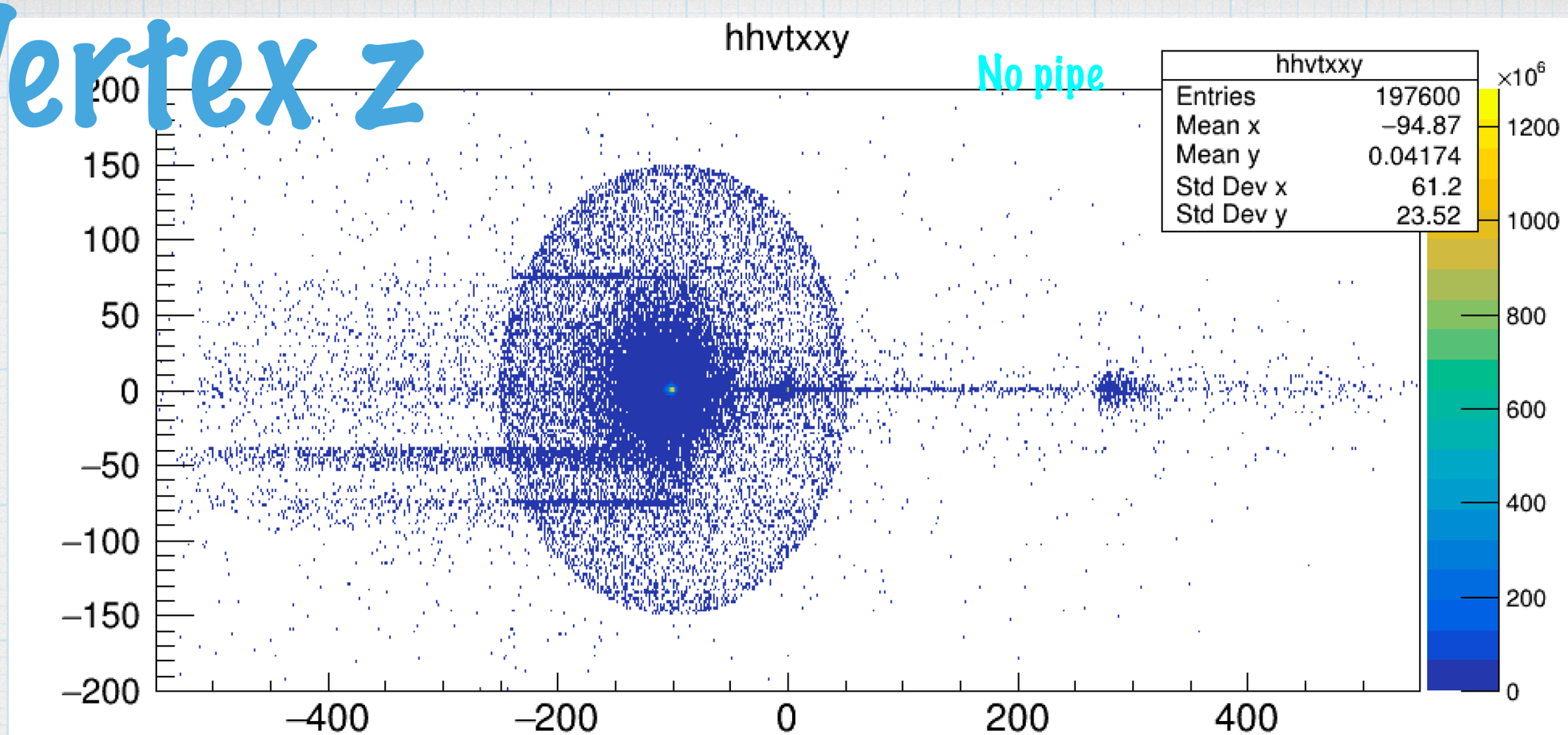
- Background events 54091- 46331 -5493 =2267
- Background per BX ~ 4%

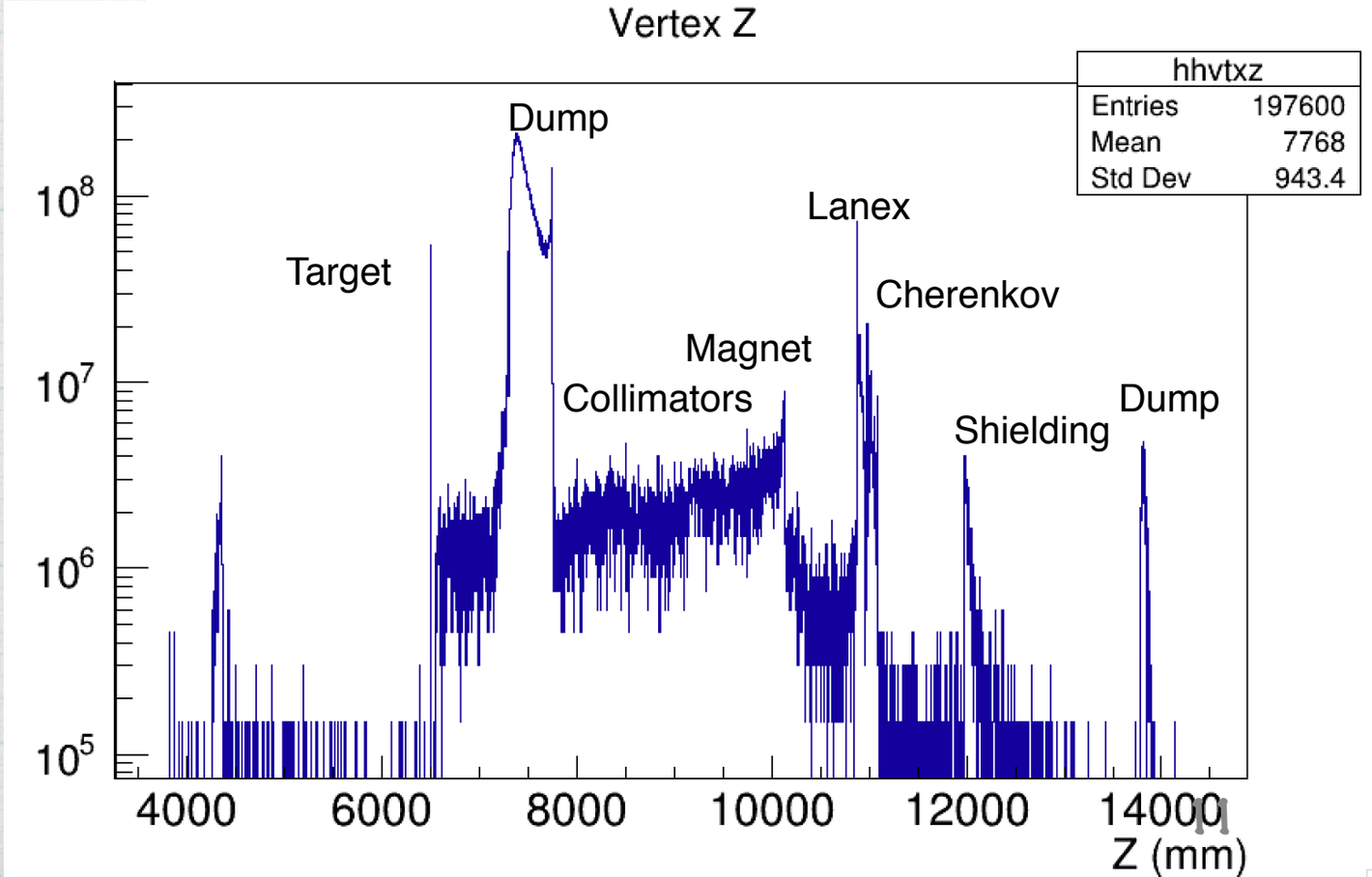


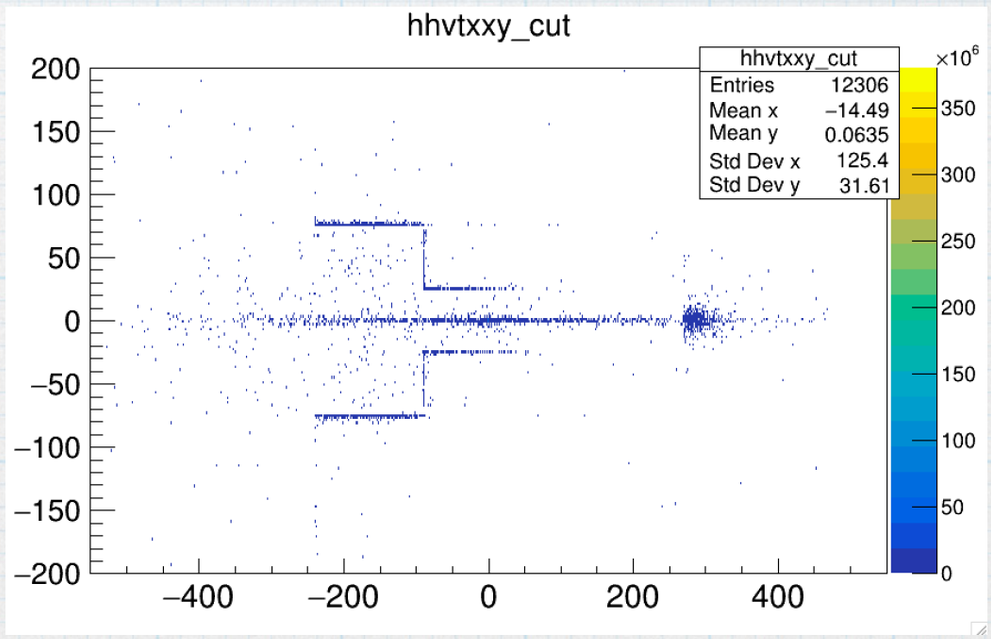
Summary

* First glance at the backgrounds for GM and Lanex screens

Vertex z


hhvtxxy
No pipe
hhvtxxy
Entries 197600
Mean x −94.87
Mean y 0.04174
Std Dev x 61.2
Std Dev y 23.52
×10^6
1200
1000
800
600
400
200
0
200
150
100
50
0
−50
−100
−150
−200
−400
−200
0
200
400


Vertex Z
hhvtxz
Entries 197600
Mean 7768
Std Dev 943.4
Dump
Target
Lanex
Cherenkov
Magnet
Collimators
Shielding
Dump
10^8
10^7
10^6
10^5
4000
6000
8000
10000
12000
14000
Z (mm)


hhvtxxy_cut
hhvtxxy_cut
Entries 12306
Mean x −14.49
Mean y 0.0635
Std Dev x 125.4
Std Dev y 31.61
×10^6
350
300
250
200
150
100
50
0
200
150
100
50
0
−50
−100
−150
−200
−400
−200
0
200
400

Back up