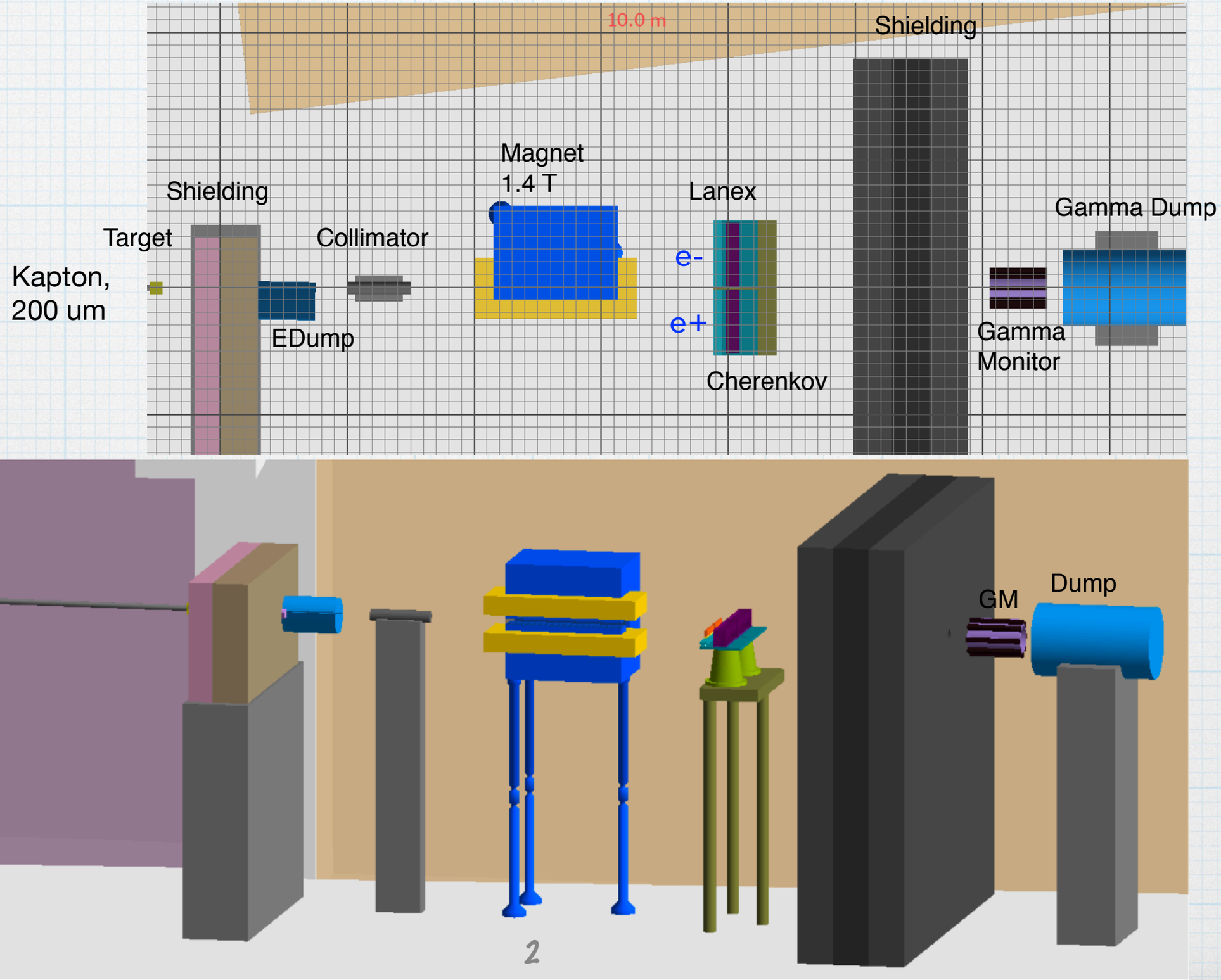
FDS: plots for simulation chapter

Borysova Maryna (KINR)
26/11/20
LUXE weekly technical meeting

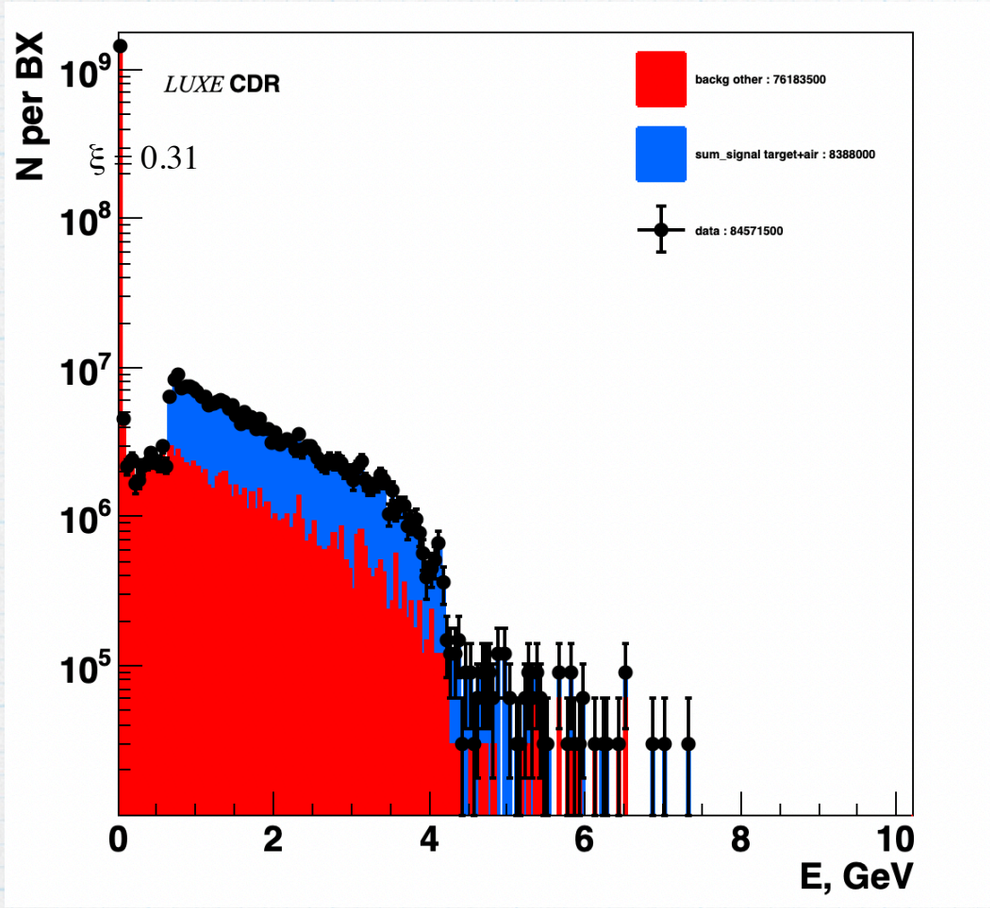
LUXE

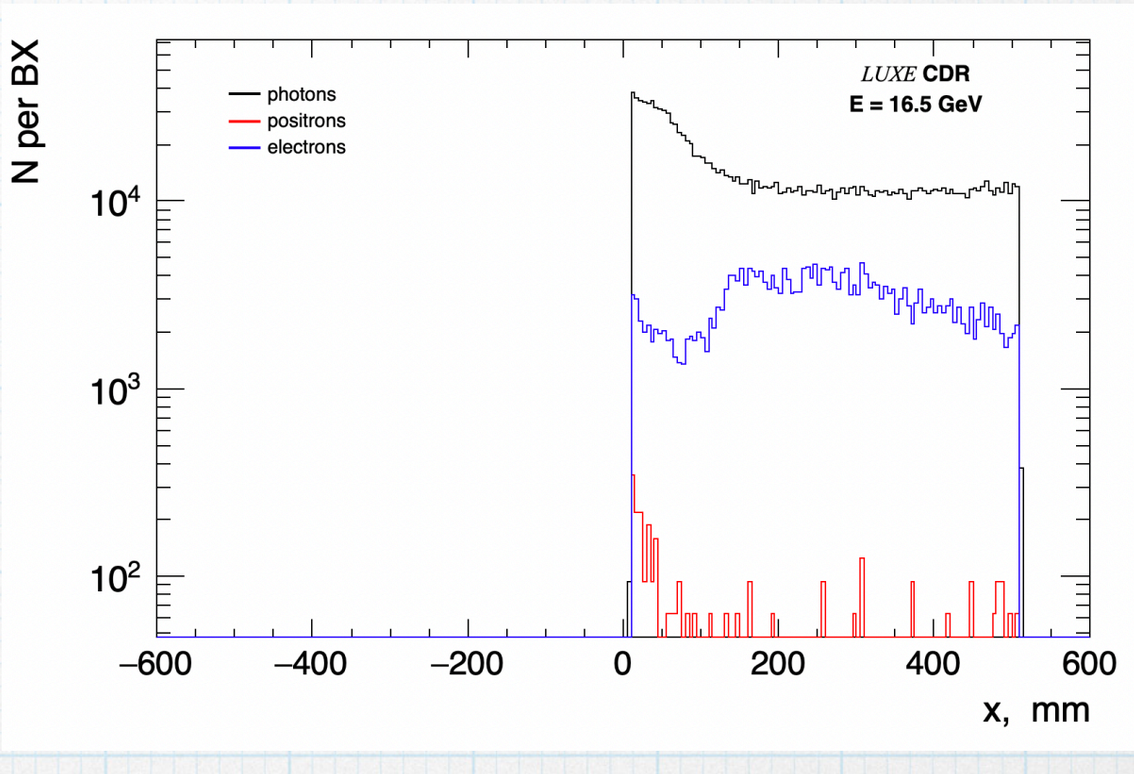
Forward detector system w/o beam pipe

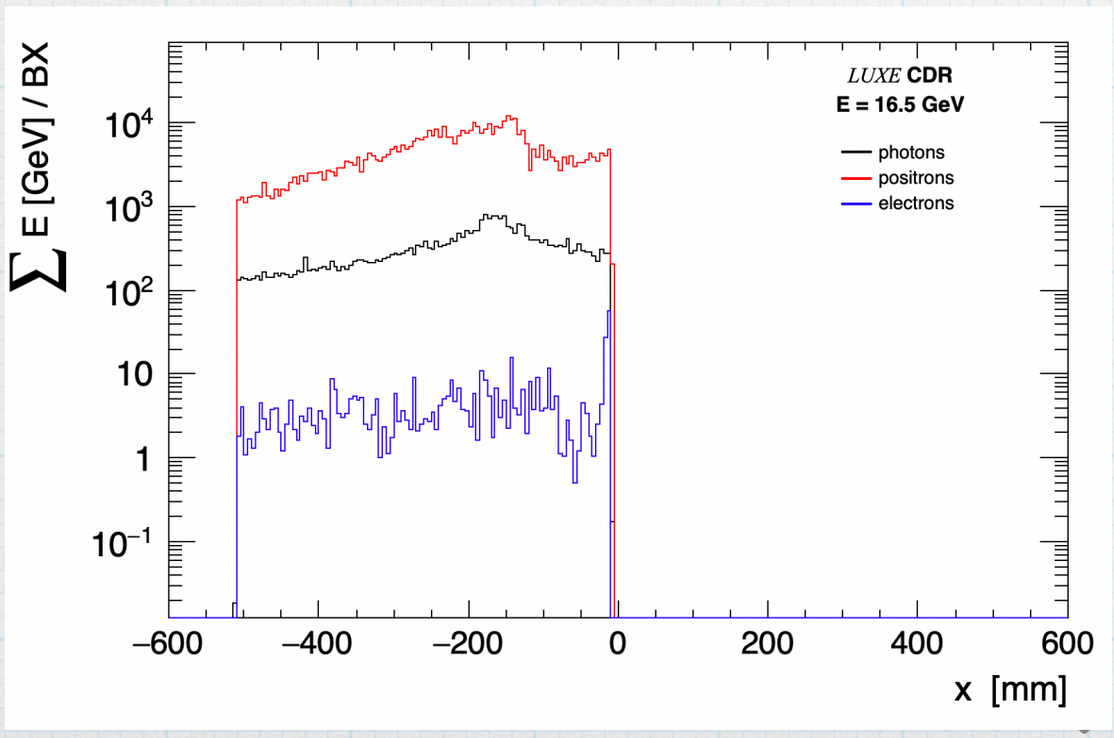


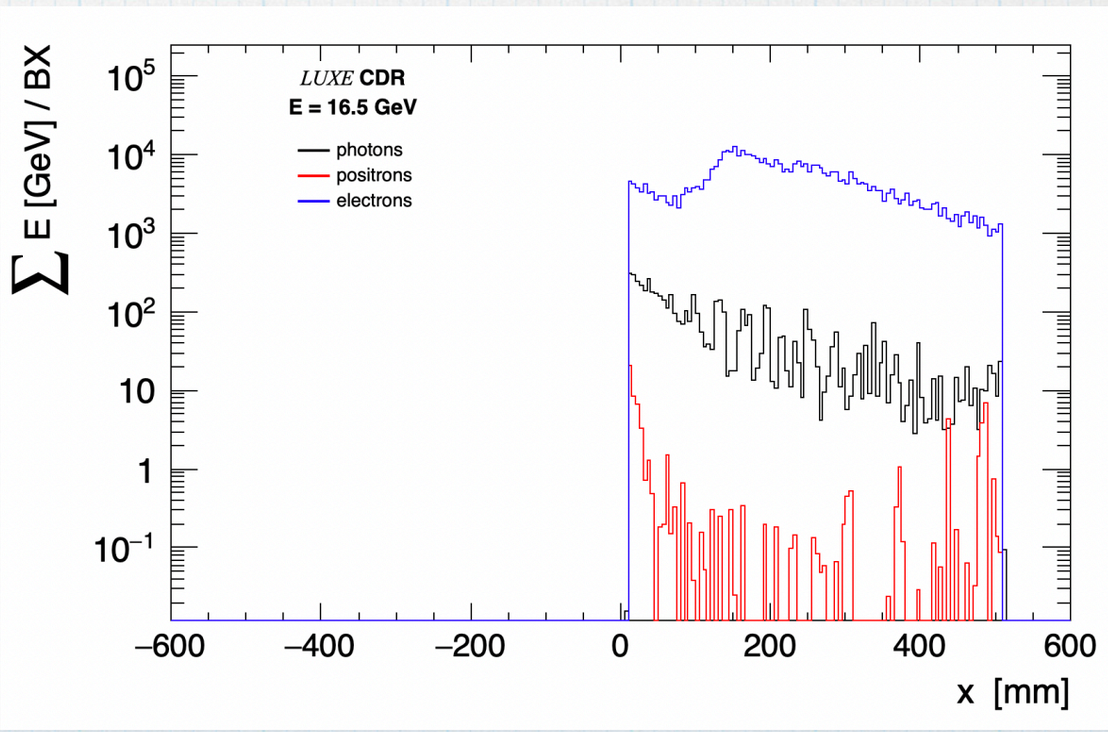
Lanex Spectrometer, e+laser, JETI40

JETI40, 16.5 GeV, 50 um



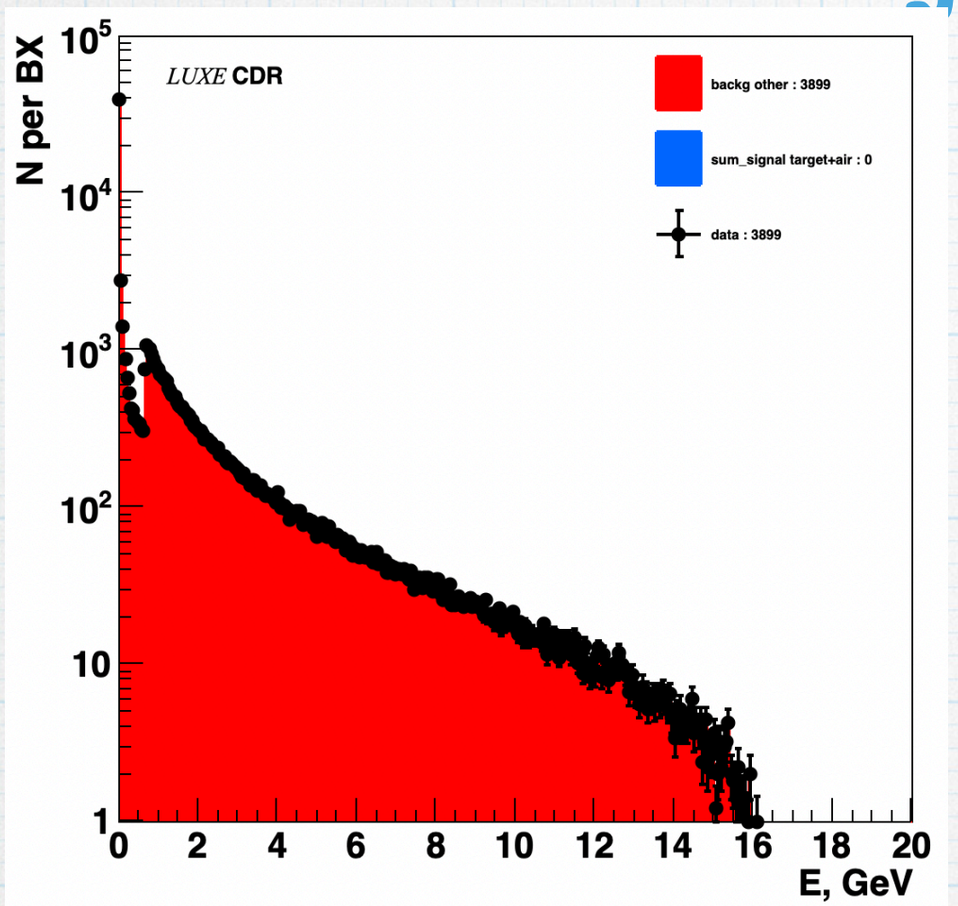


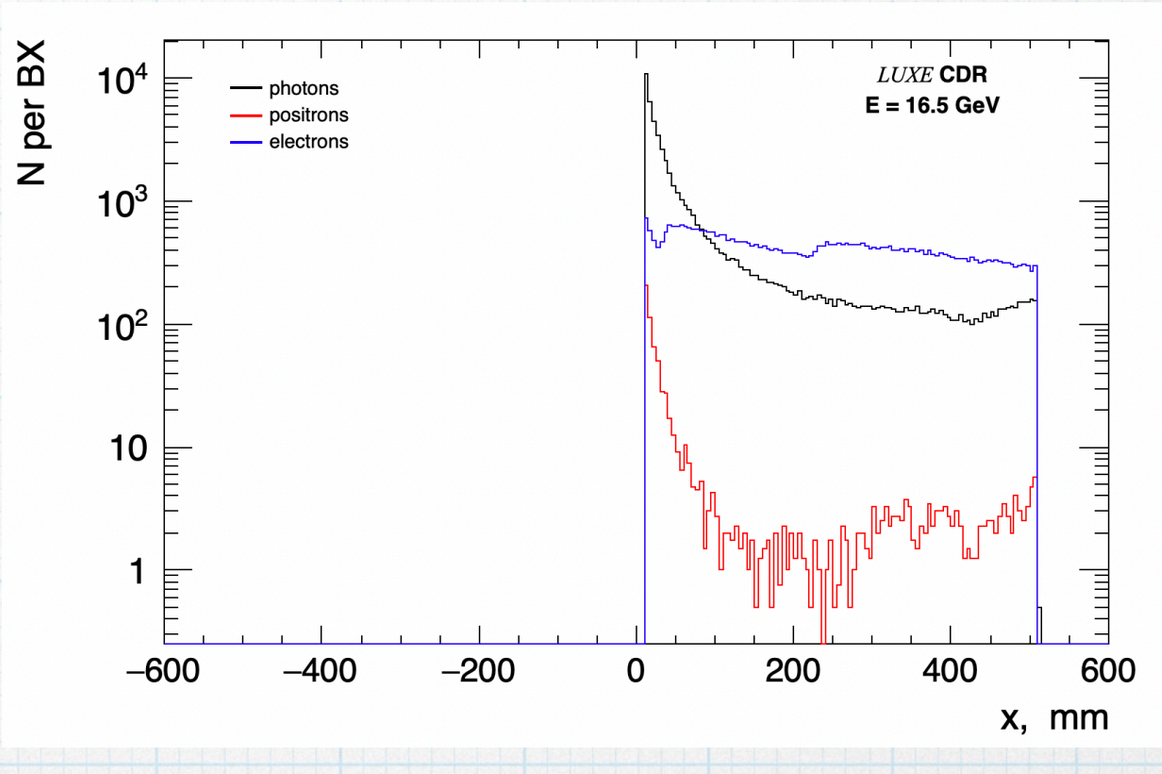


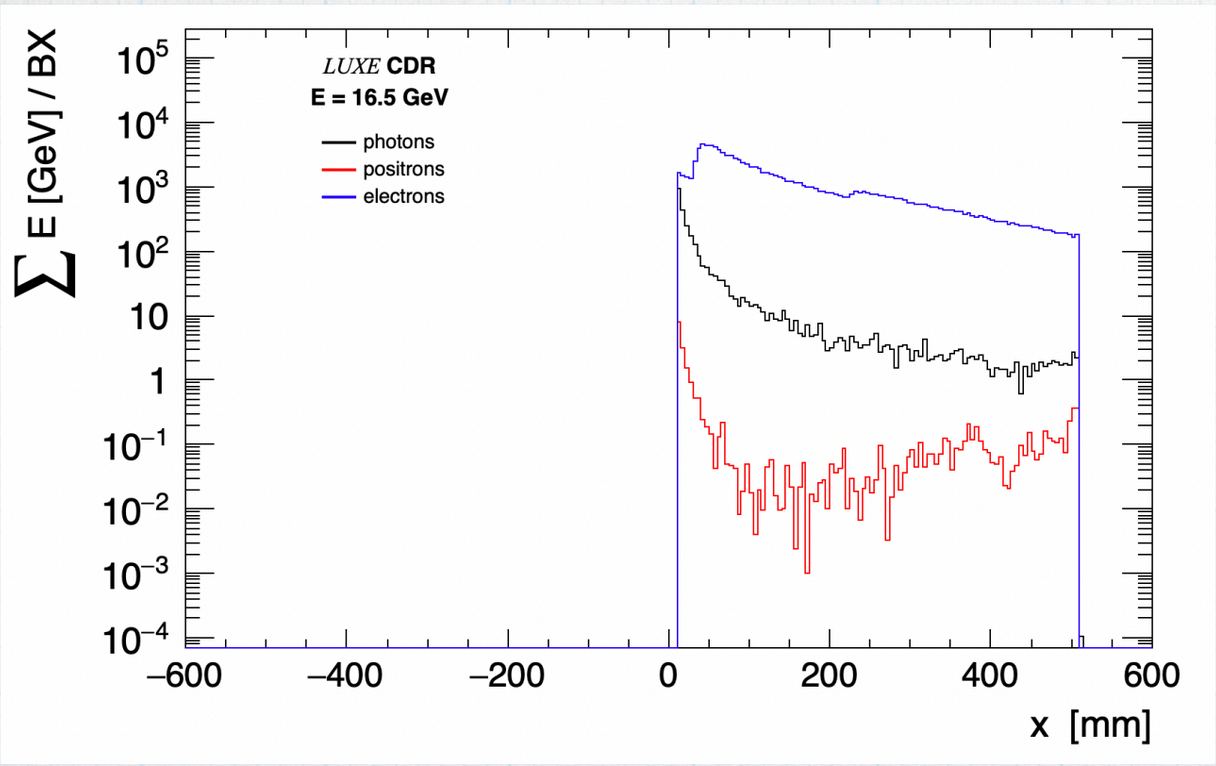


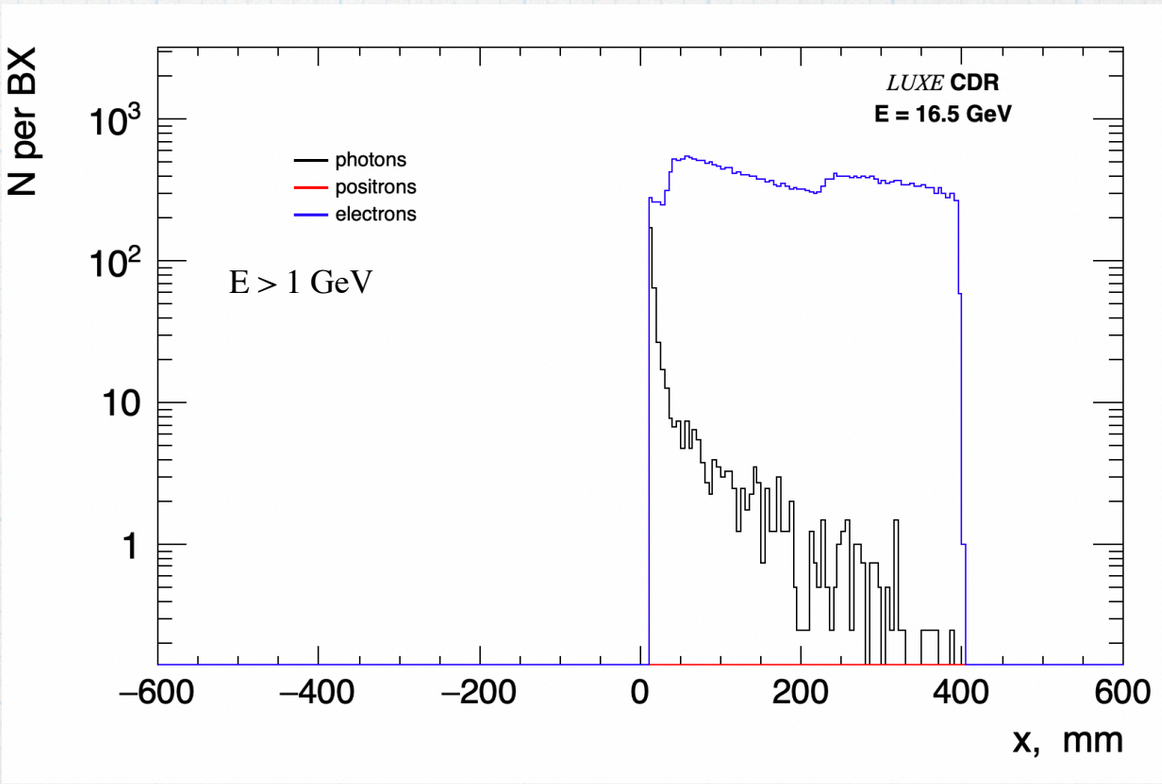
gamma+ laser bkg, 4 BX

Electron arm of Lanex Spectrometer



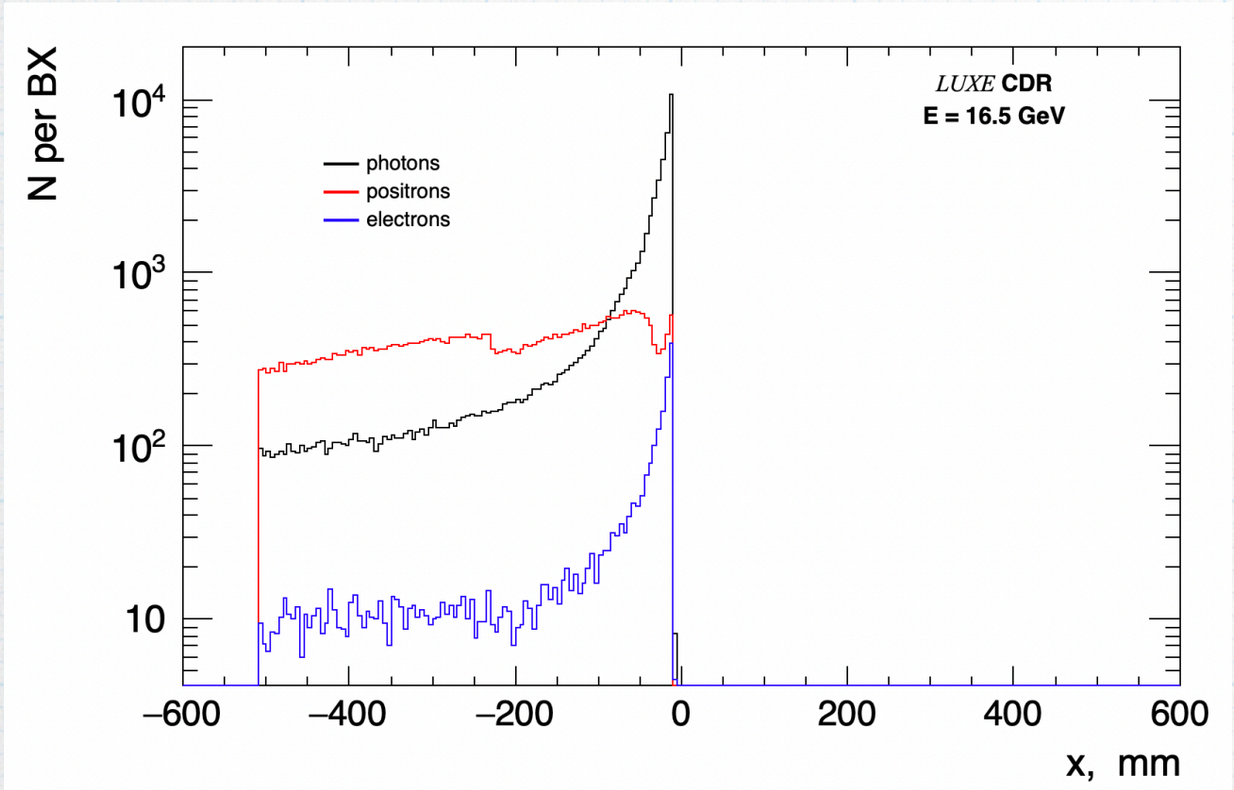


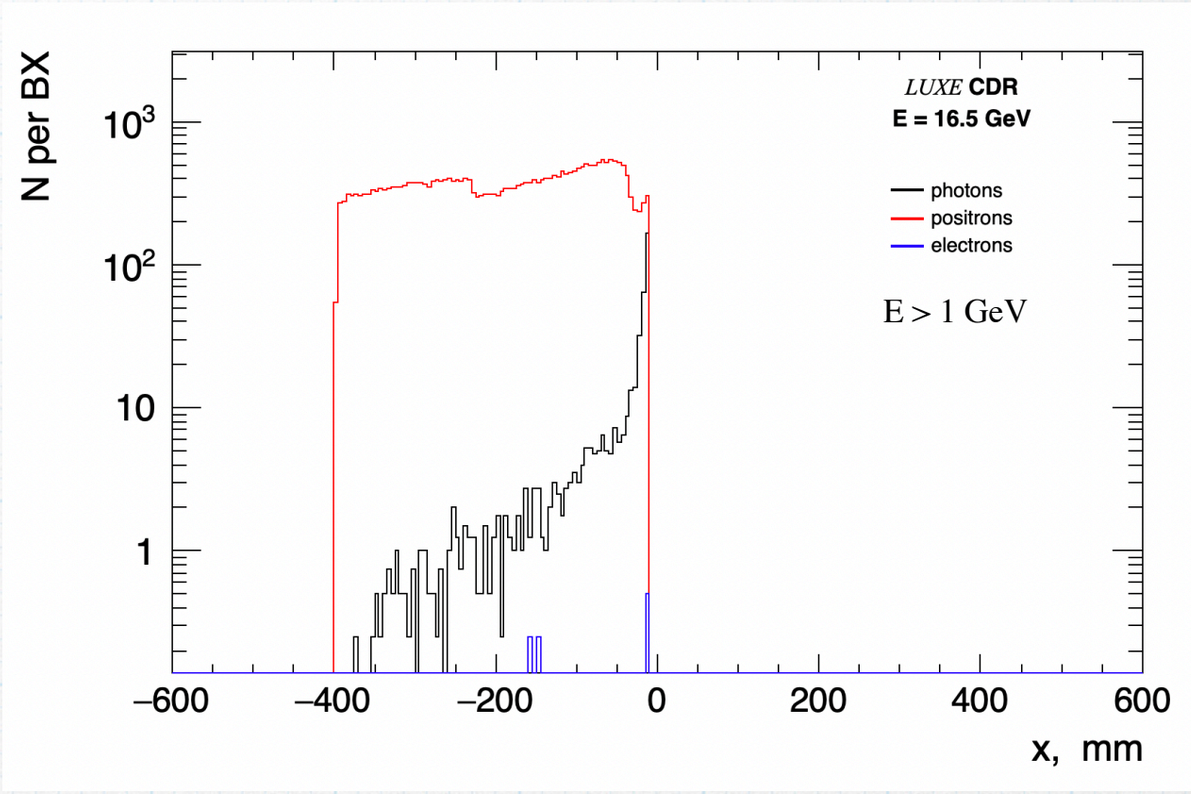


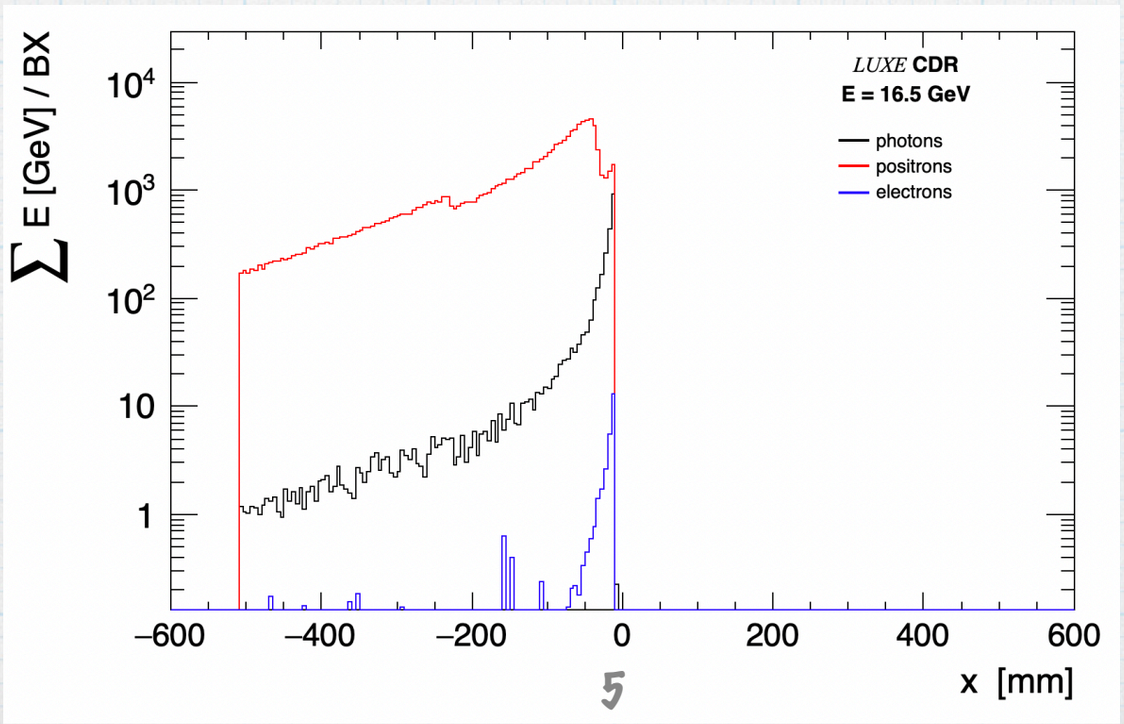


gamma+ laser bkg, 4 BX

Positron arm of Lanex Spectrometer

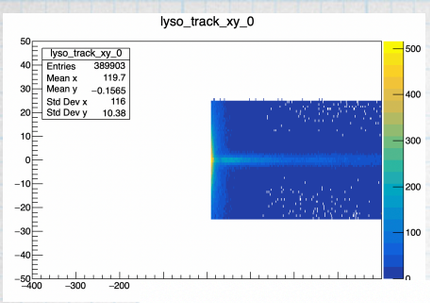


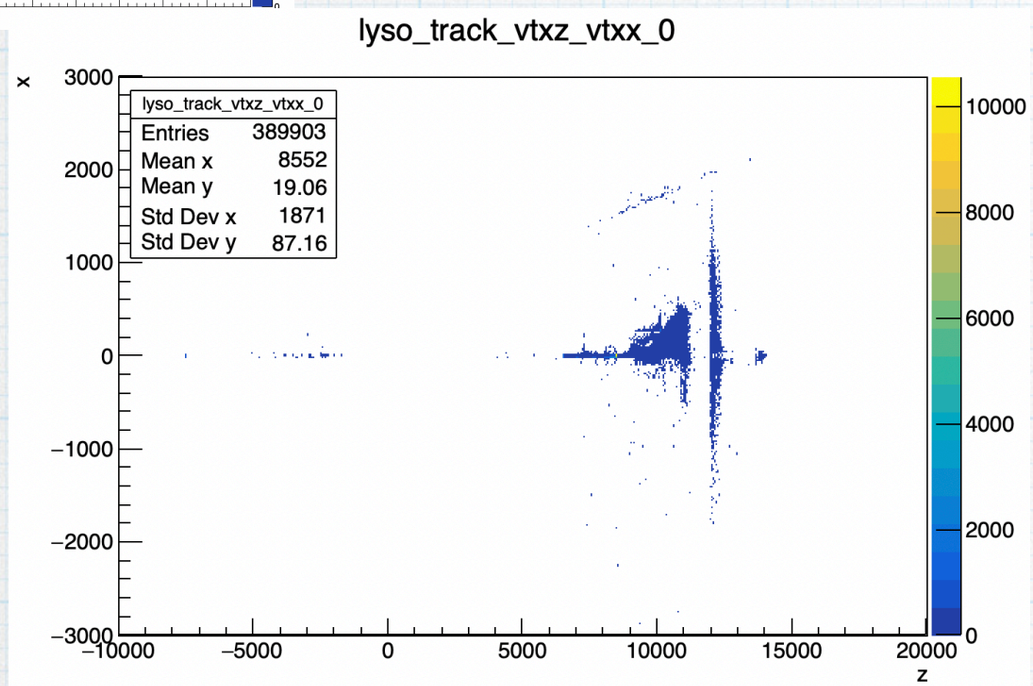


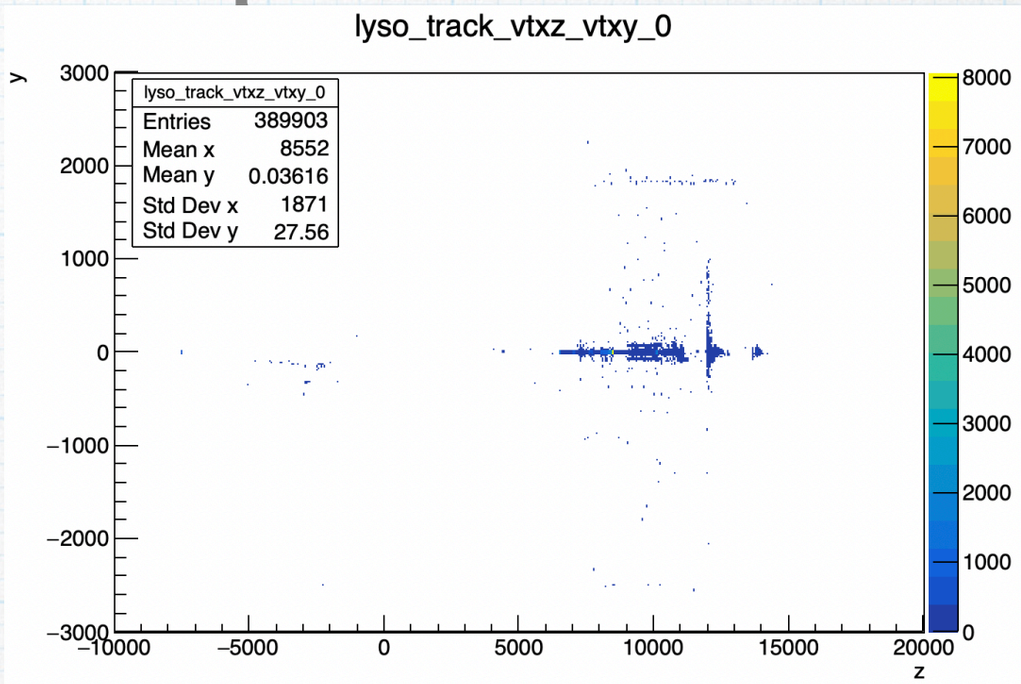


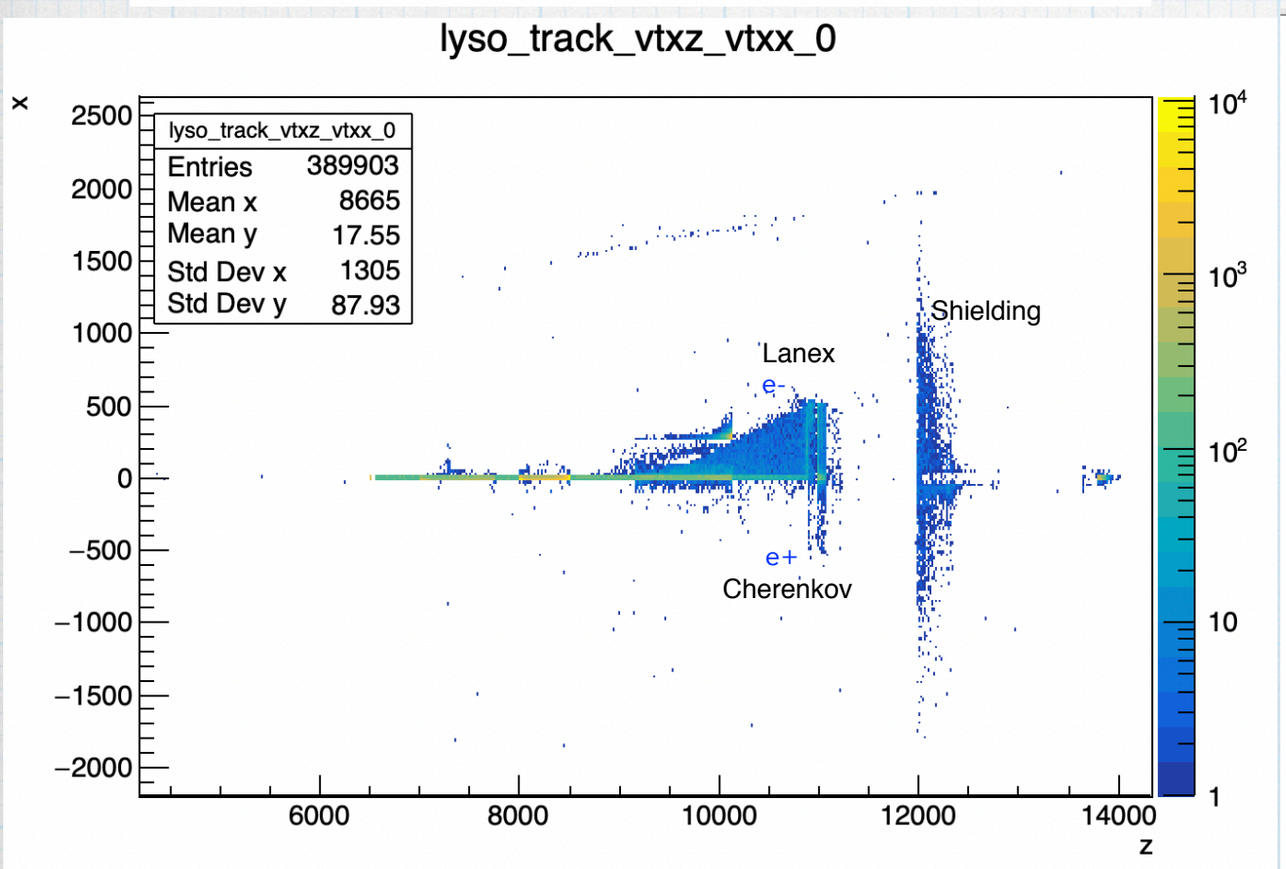
gamma+ laser bkg, 4 BX

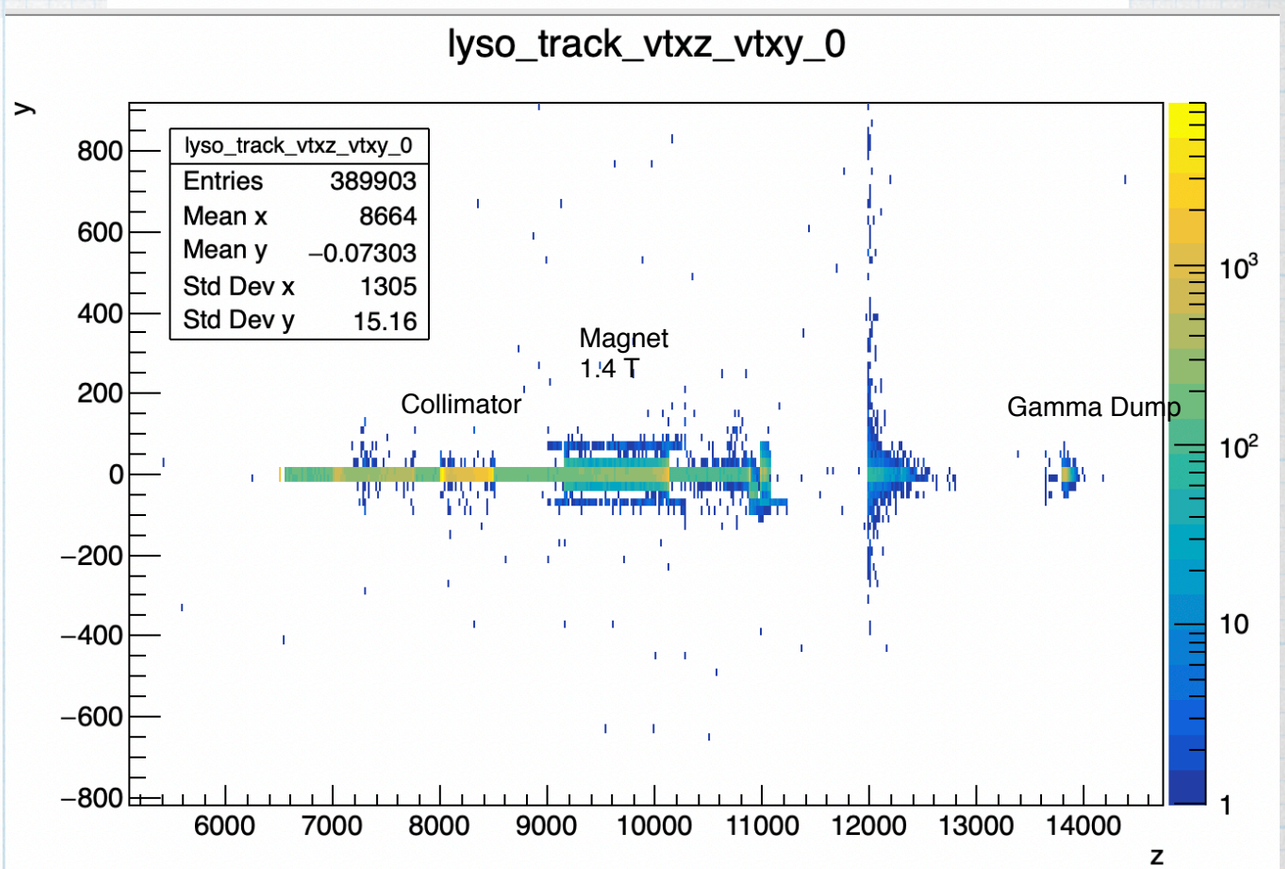
Electron arm of Lanex Spectrometer





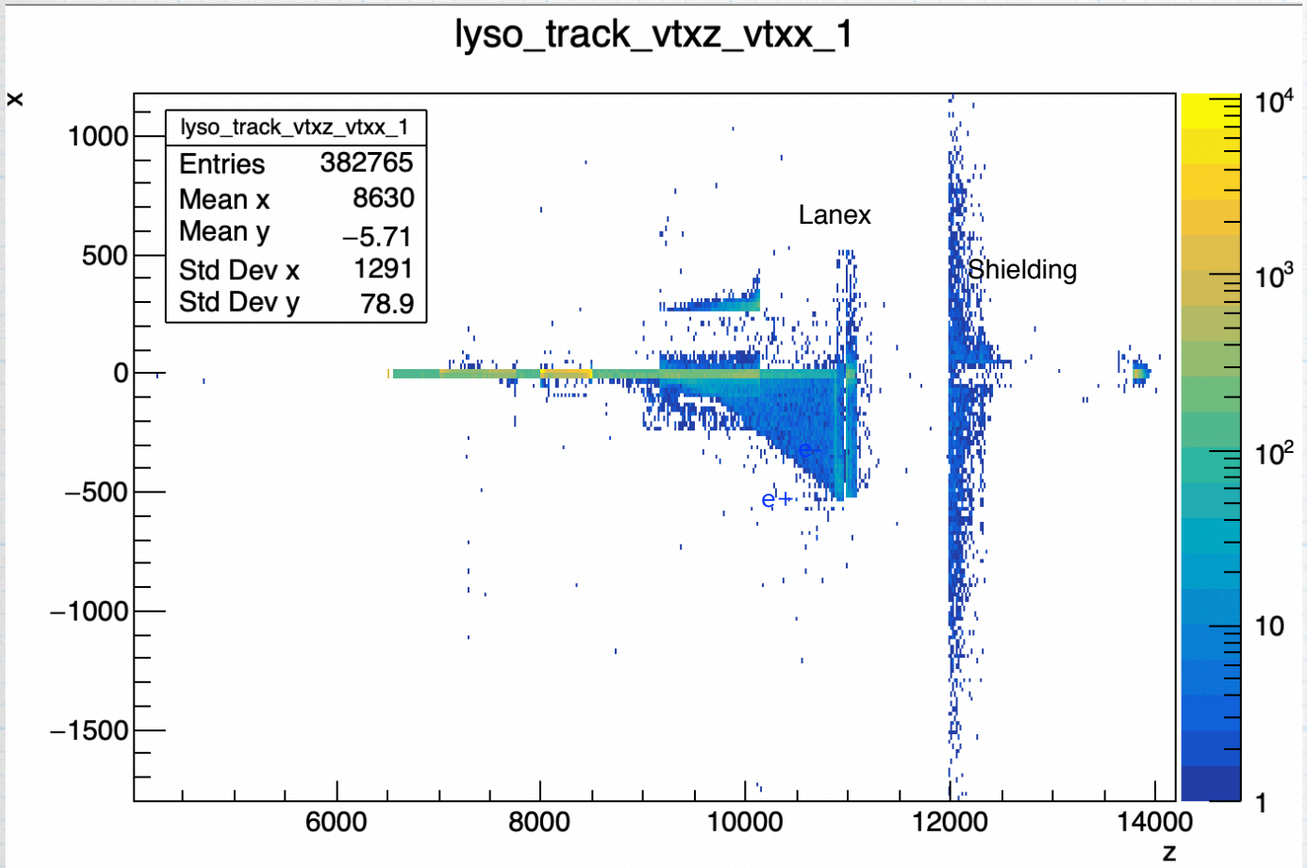


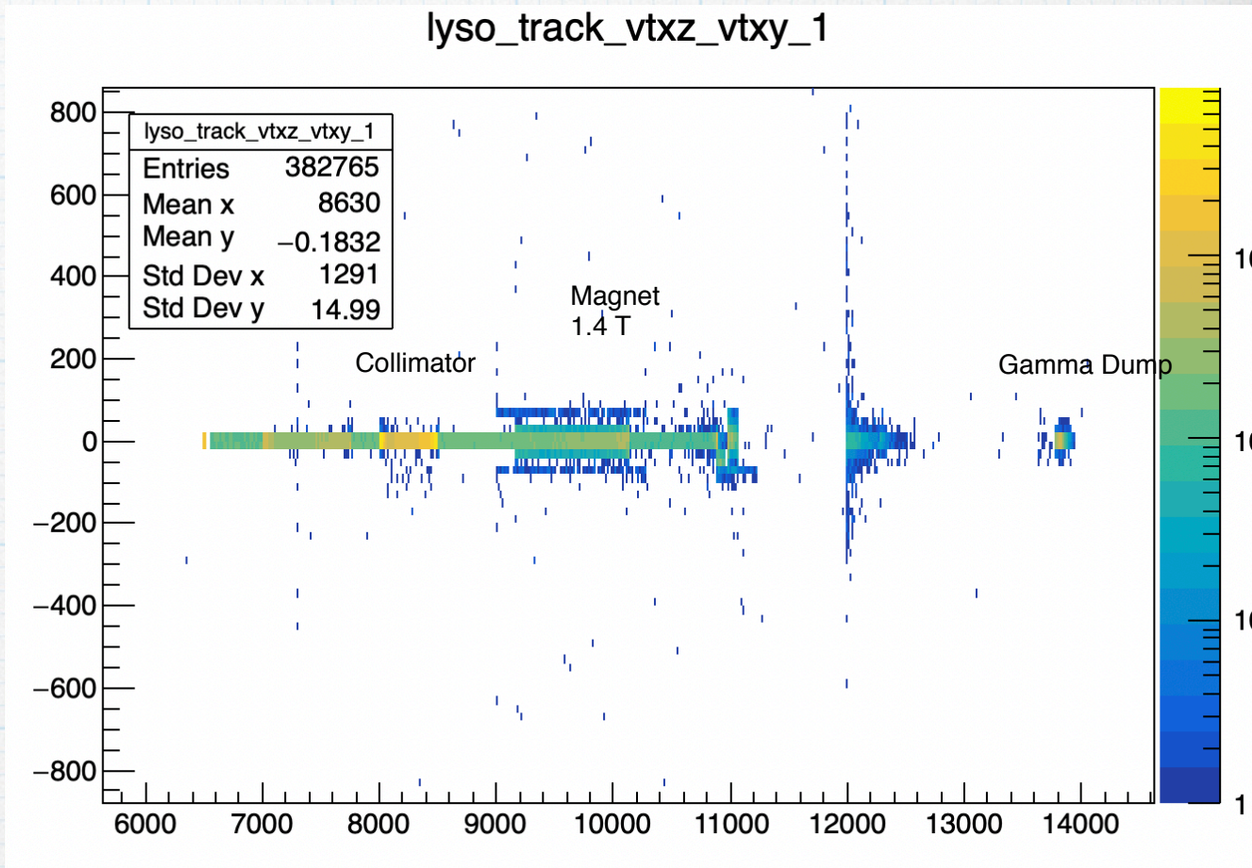




gamma+ laser bkg, 4 BX

Positron arm of Lanex Spectrometer





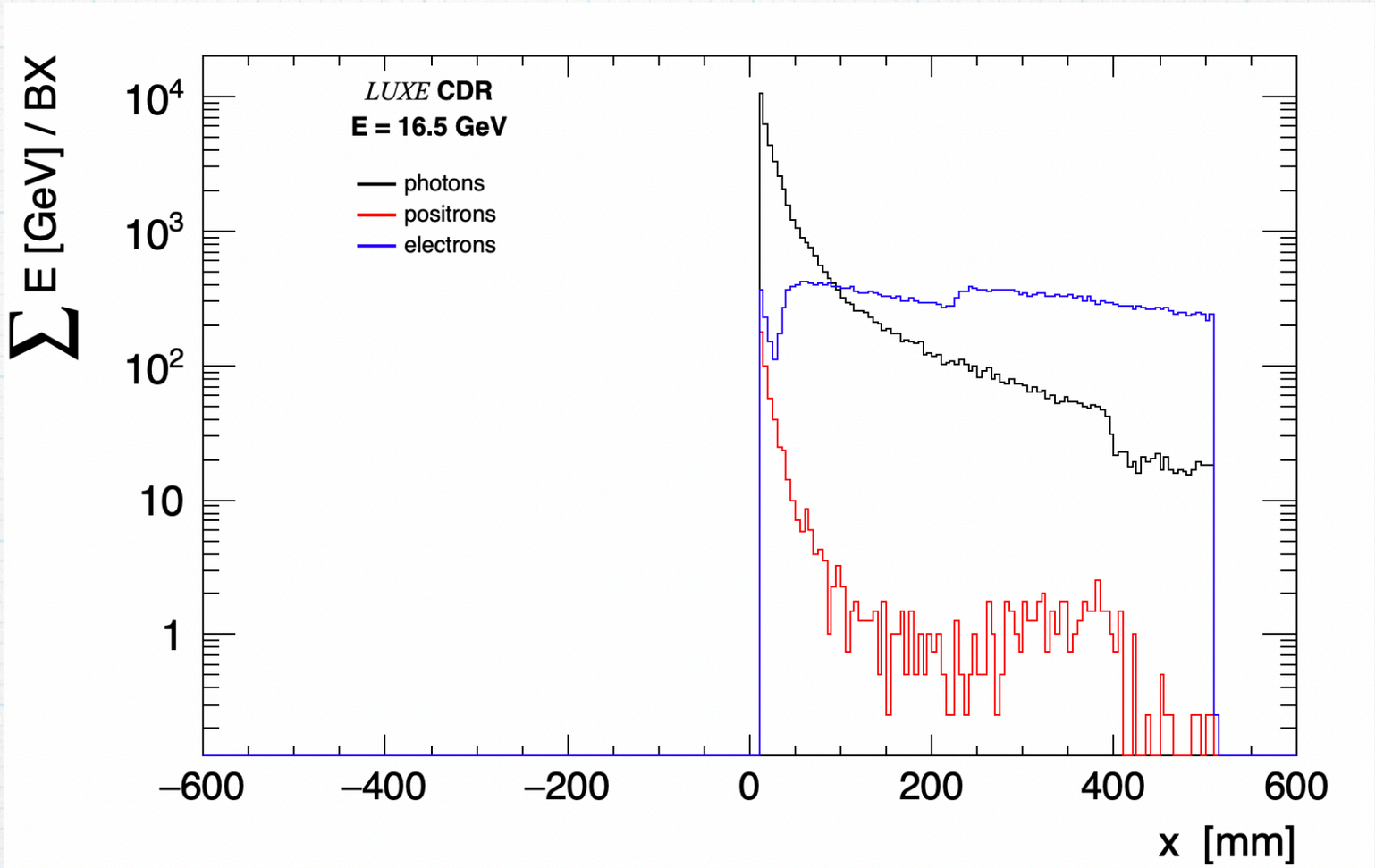
Summary

✱ The plots for FDS setup w/o beam

- S/B and Npart , sum E, plots for FDS for electron-laser setup: $\xi = 0.31$, $\xi = 1.55$ and $\xi = 3.9$. These correspond to $w_0 = 50$ μm, $w_0 = 10$ μm and $w_0 = 5$ μm, respectively.
- S/B and Npart plots for FDS for electron-laser setup, Phase II: $\xi = 1.94$ (correspond to $w_0 = 8$ μm).
- S/B and Npart plots for FDS for gamma-laser setup, background, 4BX
- For Photon spectrometer and backscattering calorimeter new “provisional” MC are run through Geant simulation; reproduce the plot to illustrate that number of hits in LANEX and in Gamma Monitor correlate well with number of photons produced in interaction vs ξ

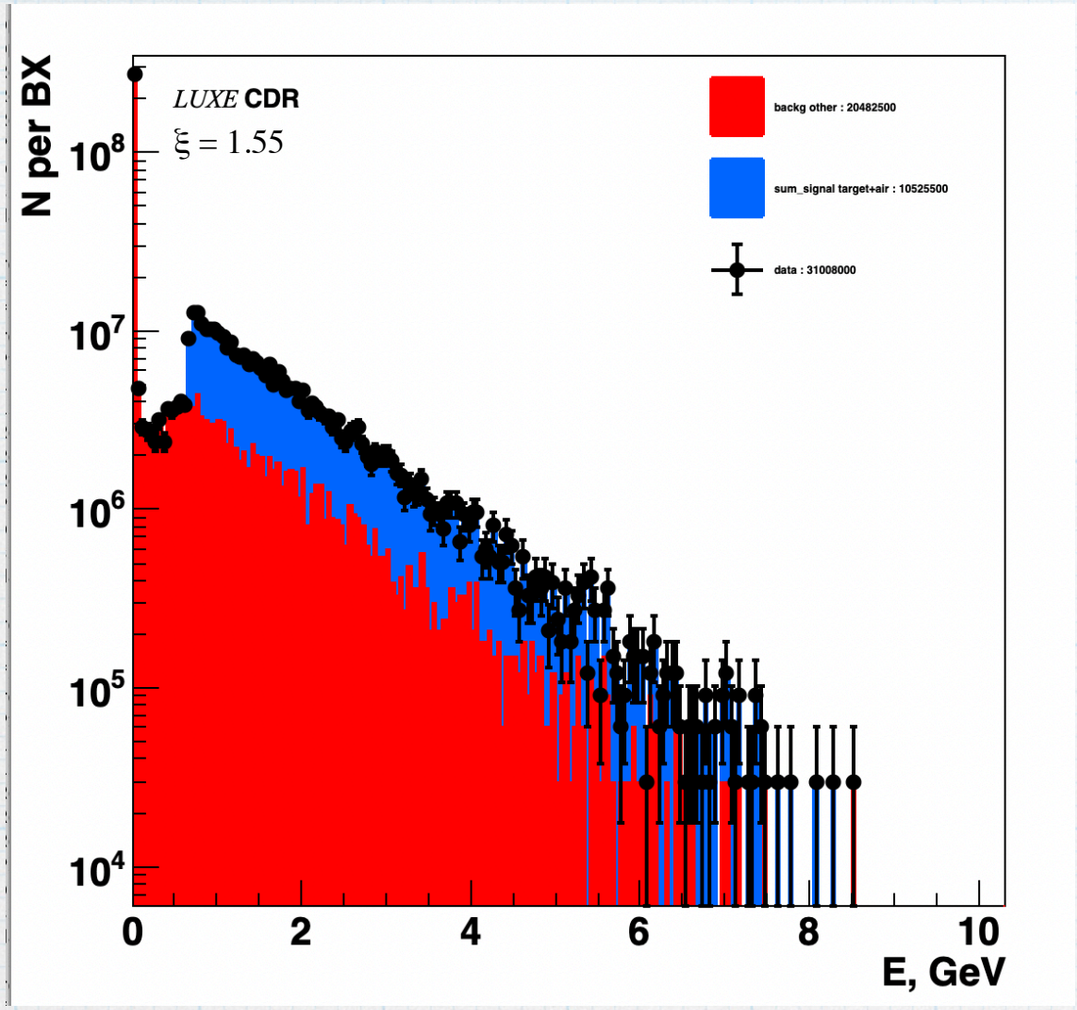
Back up

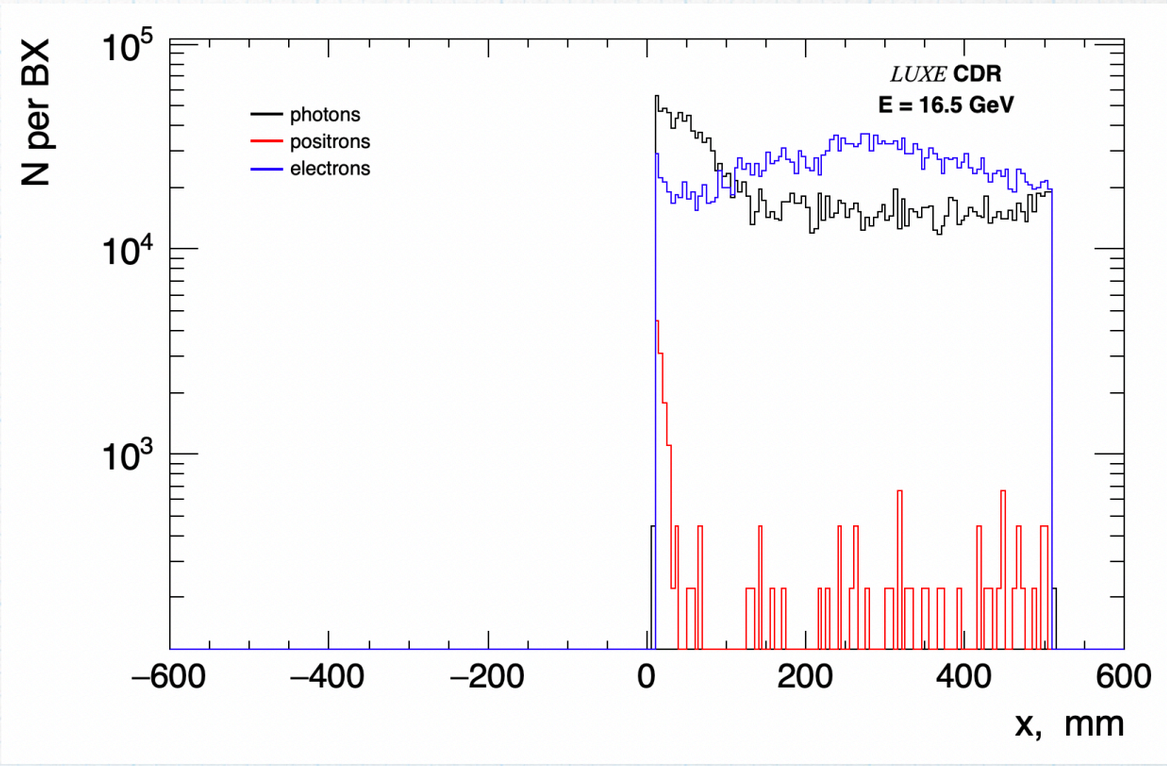
With cut on magnet corner



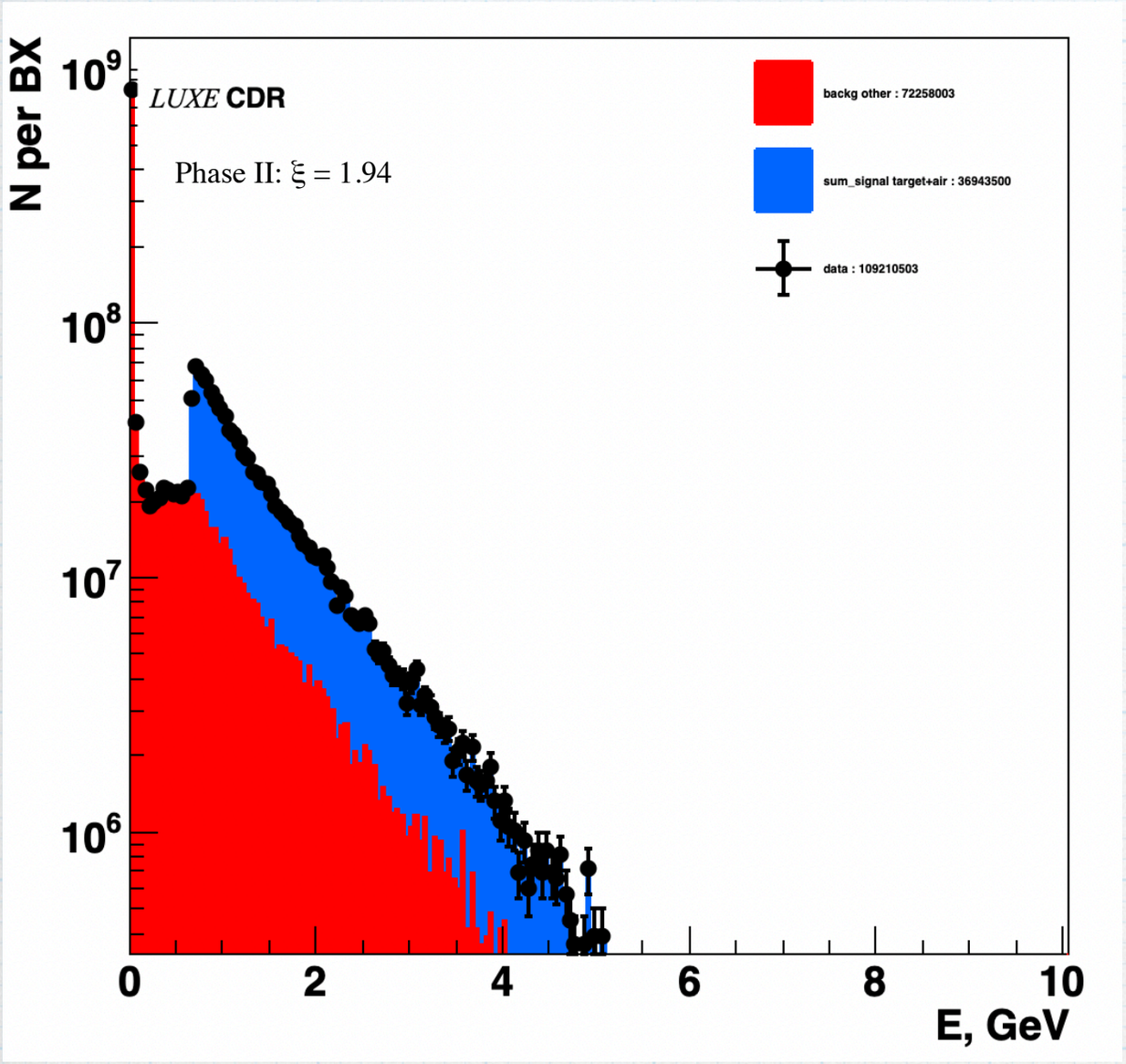
Electron arm of Lanex Spectrometer

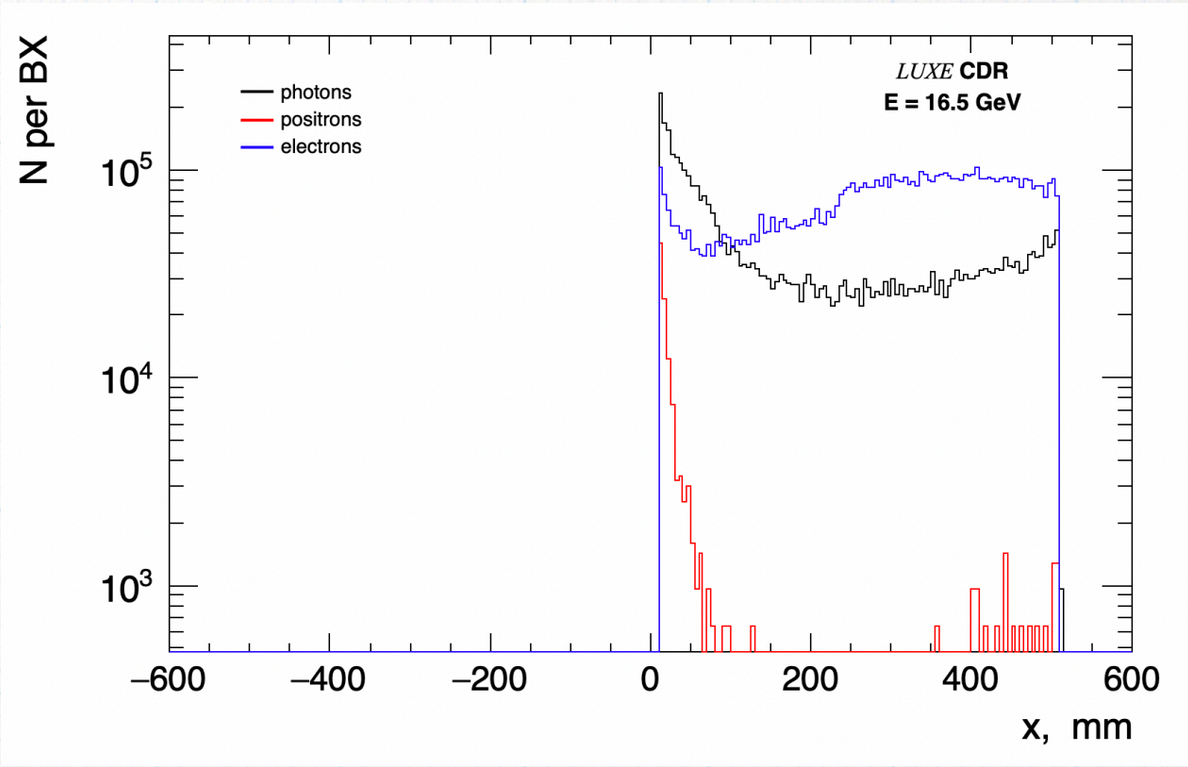
JETI40, 16.5 GeV, 10 um

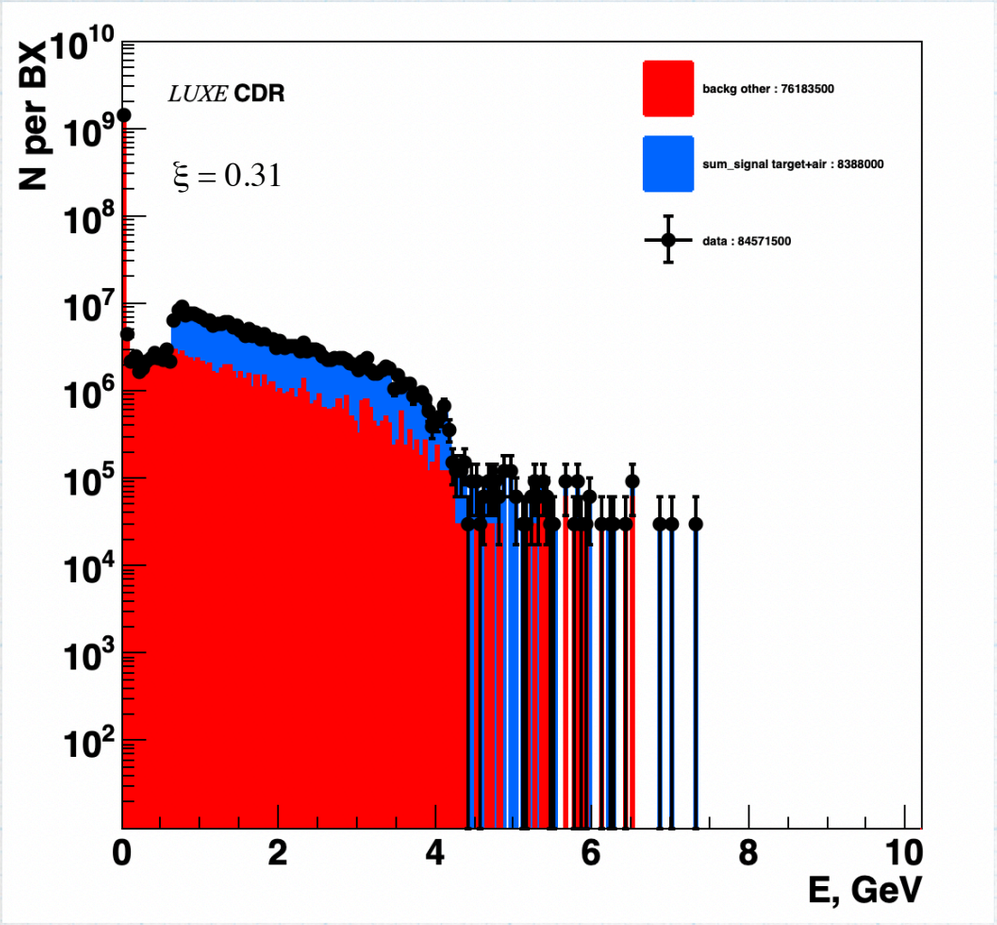




Phase II, 16.5 GeV, 8 um, 941 BX



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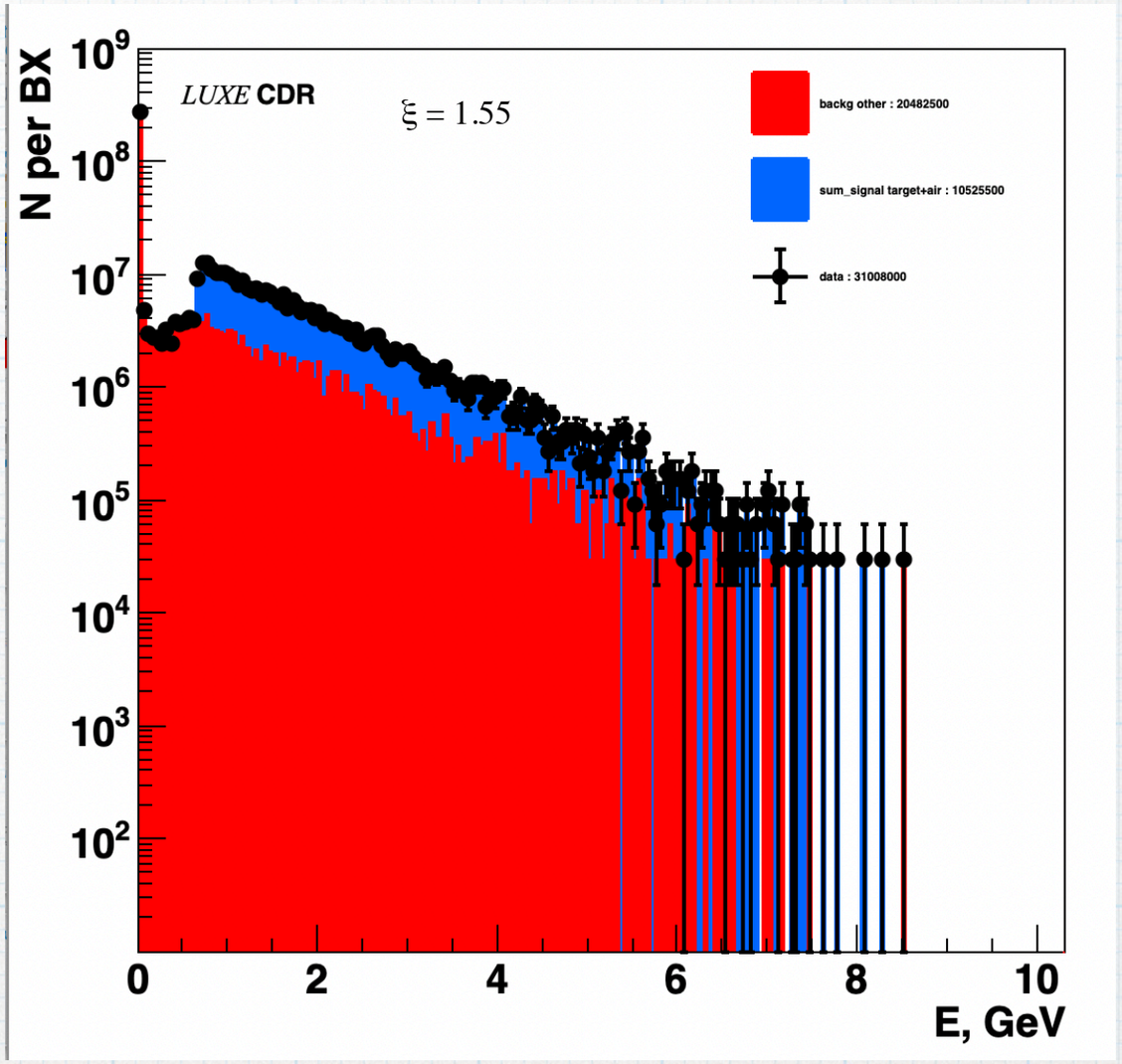
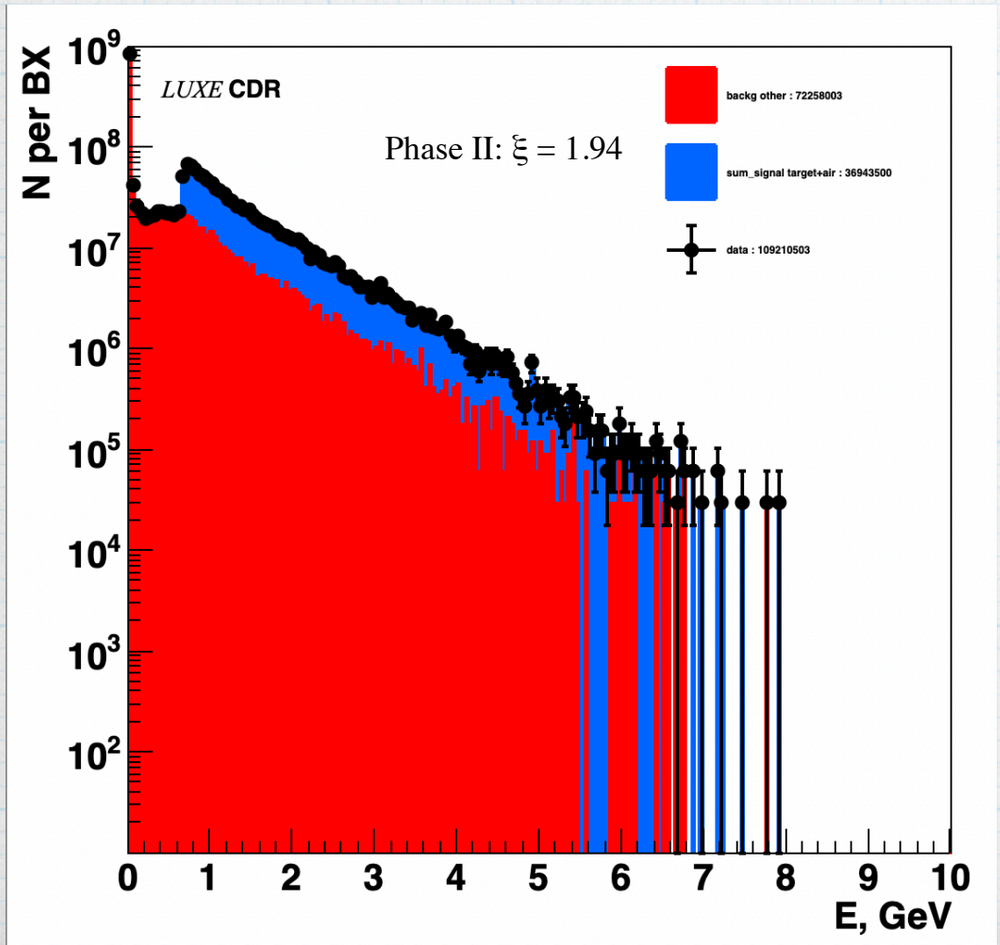
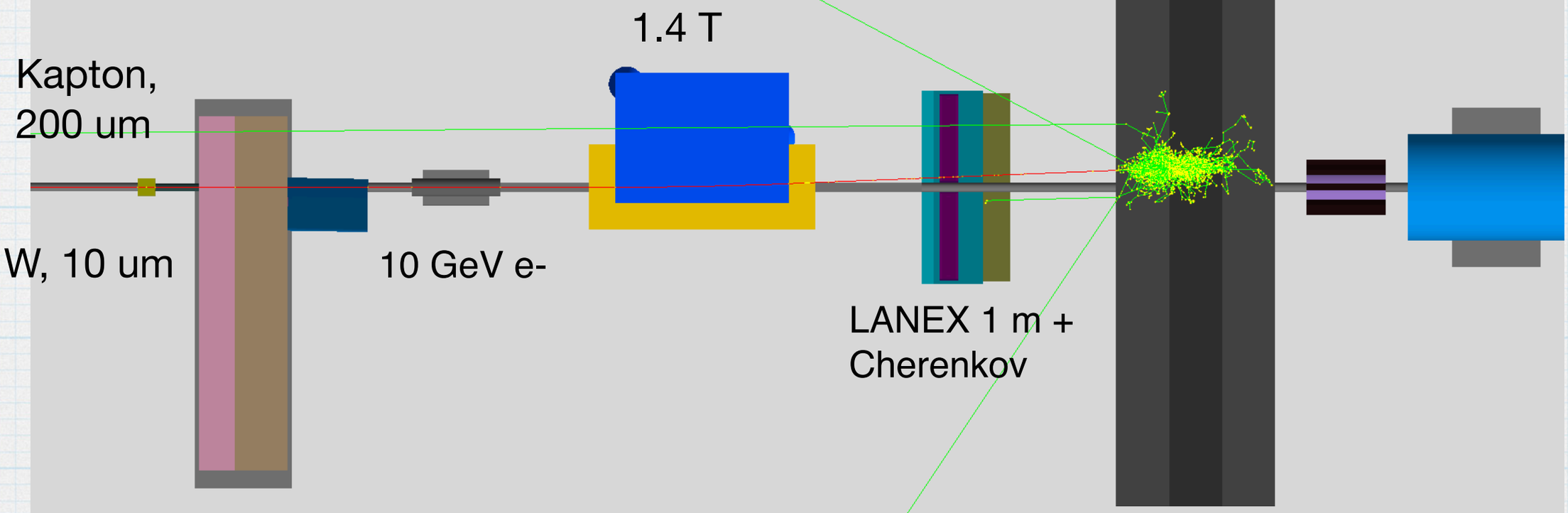
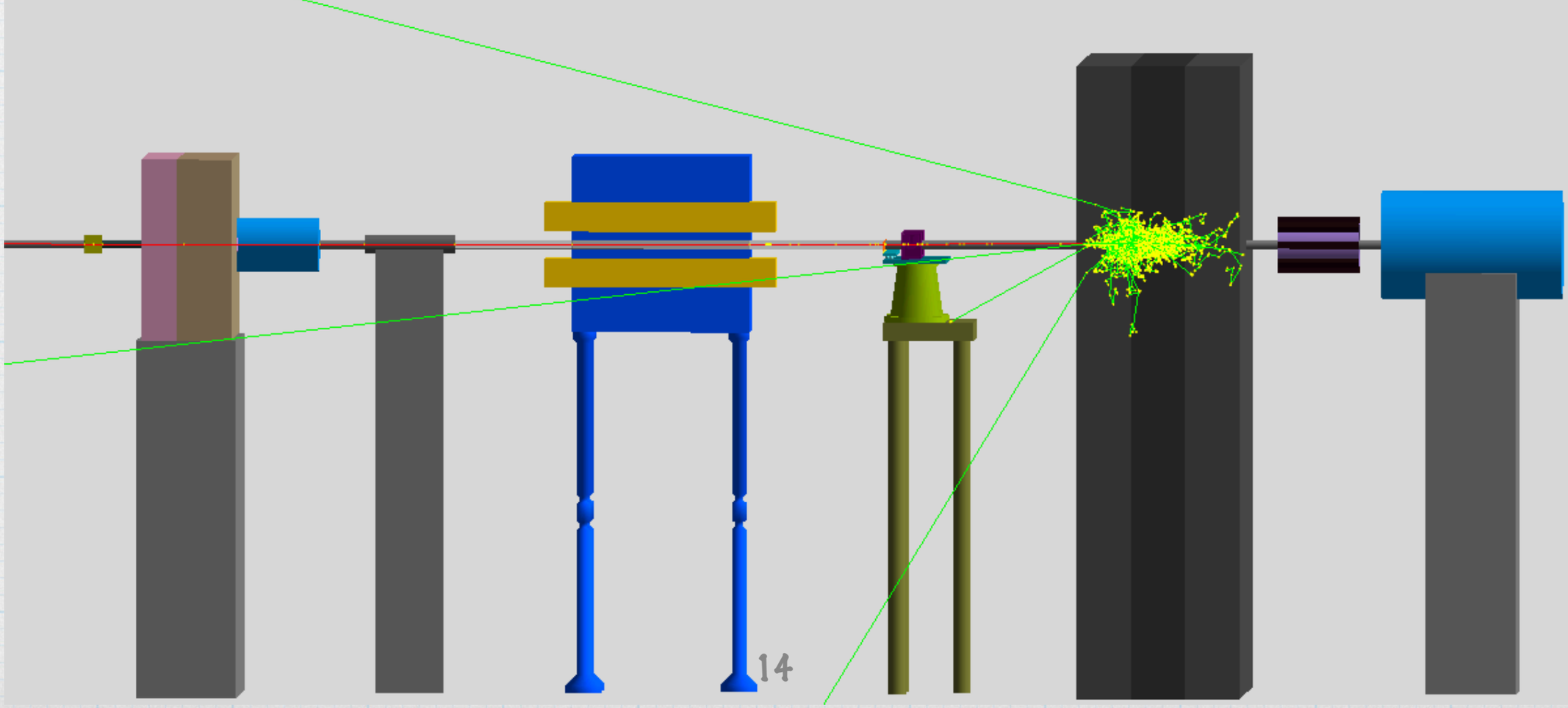
ξ = 0.31
backg other : 76183500
sum_signal target+air : 8388000
data : 84571500
N per BX
E, GeV


LUXE CDR
ξ = 1.55
backg other : 20482500
sum_signal target+air : 10525500
data : 31008000
N per BX
E, GeV


LUXE CDR
Phase II: ξ = 1.94
backg other : 72258003
sum_signal target+air : 36943500
data : 109210503
N per BX
E, GeV

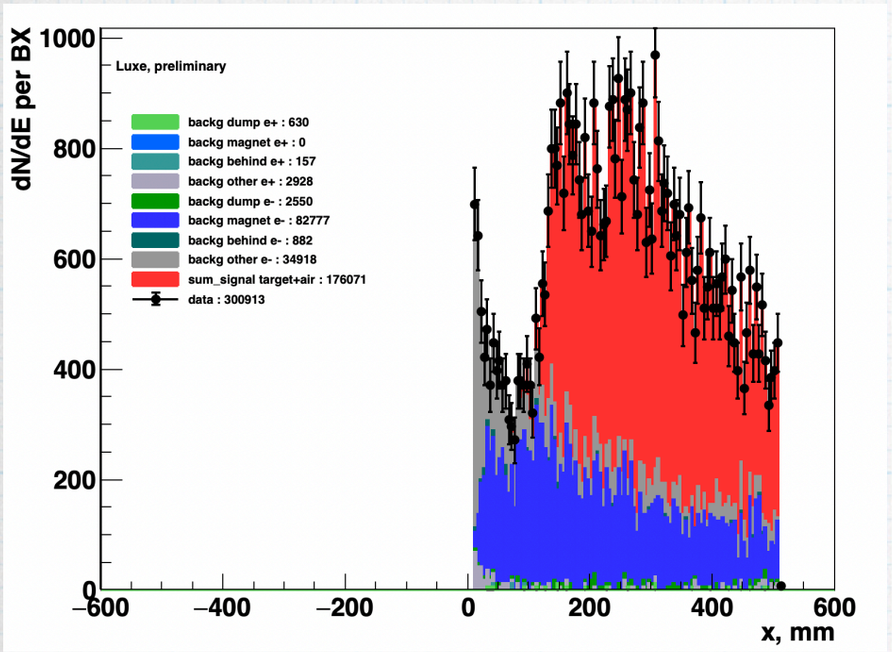
Updated FDS setup with pipe

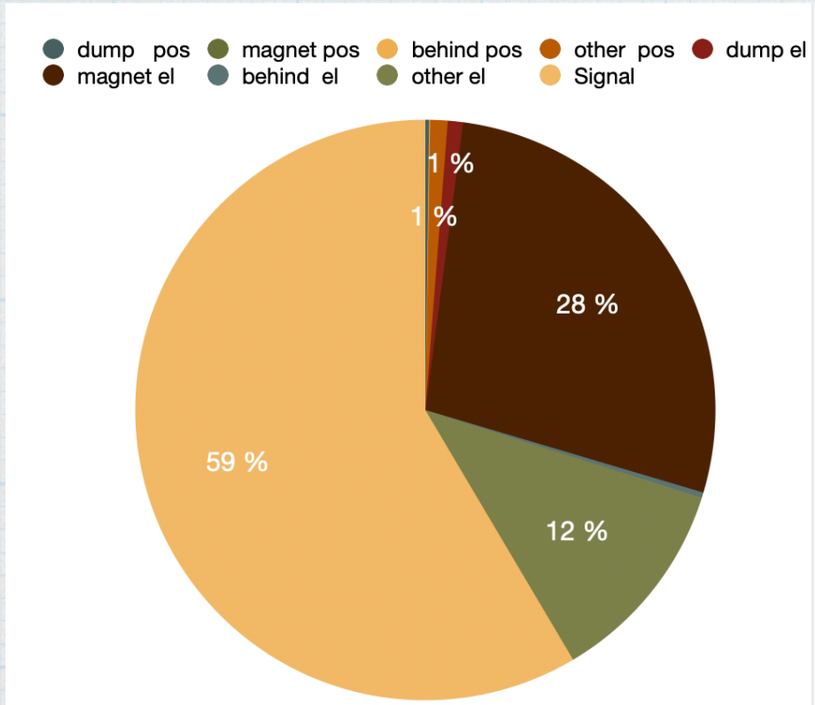




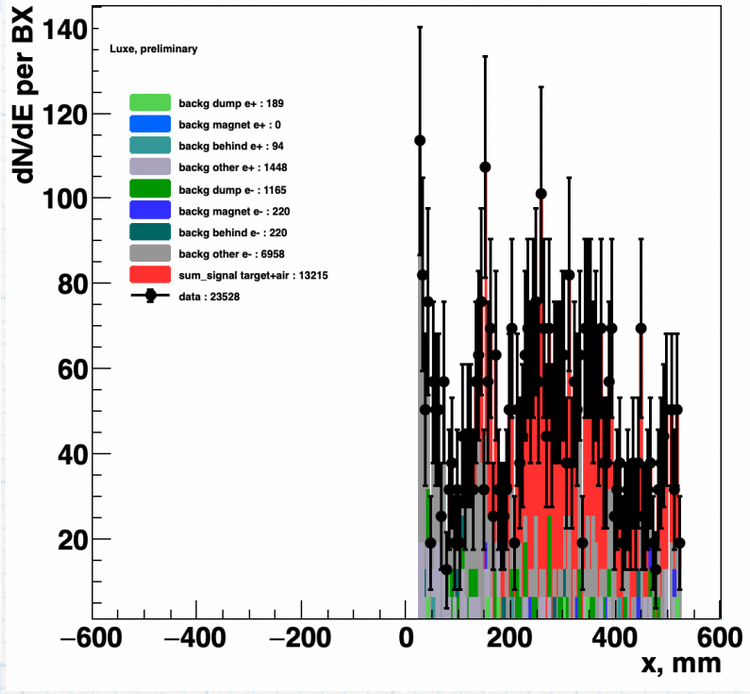
✱ Electron arm of Lanex Spectrometer

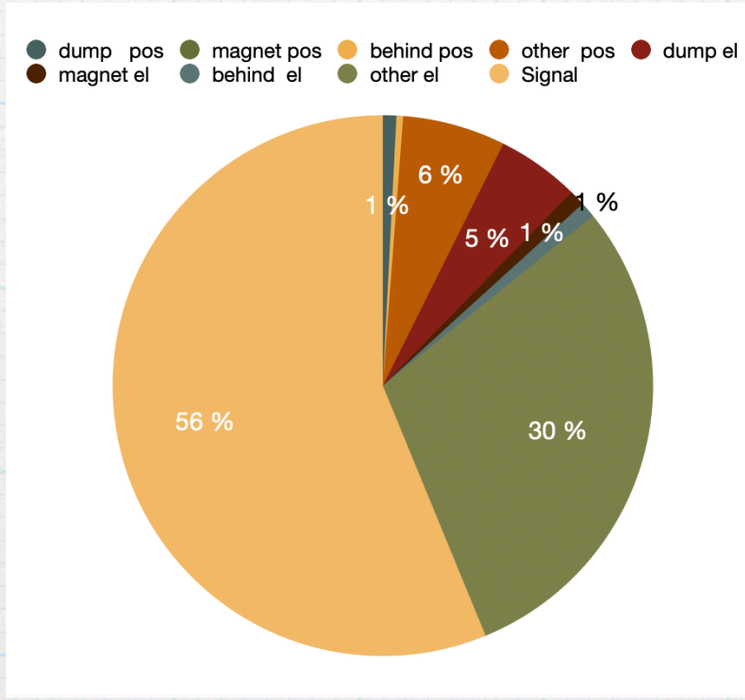
NO Beam Pipe
Kapton, 200 um



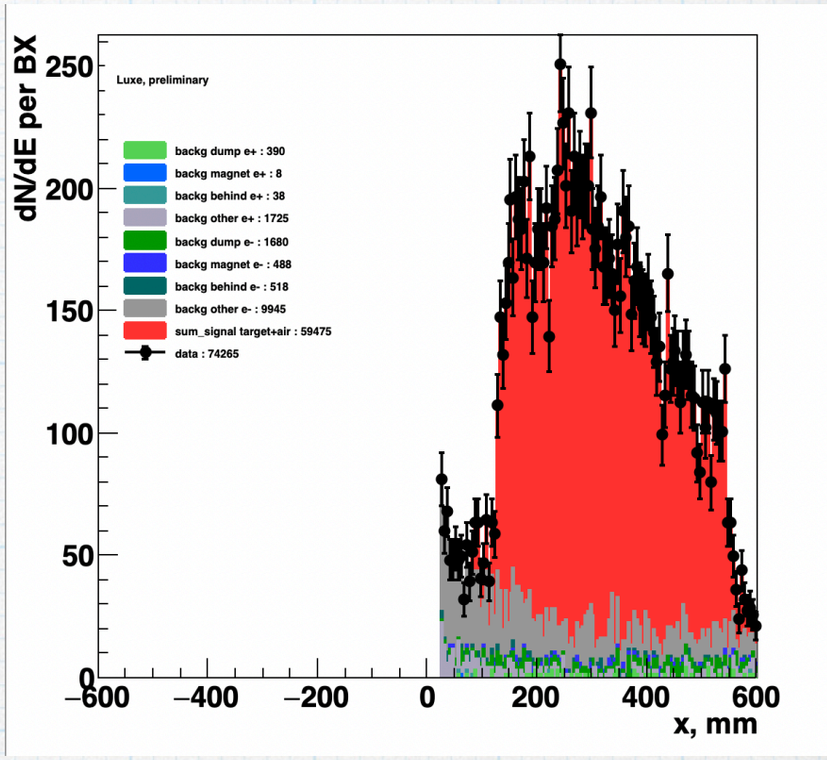


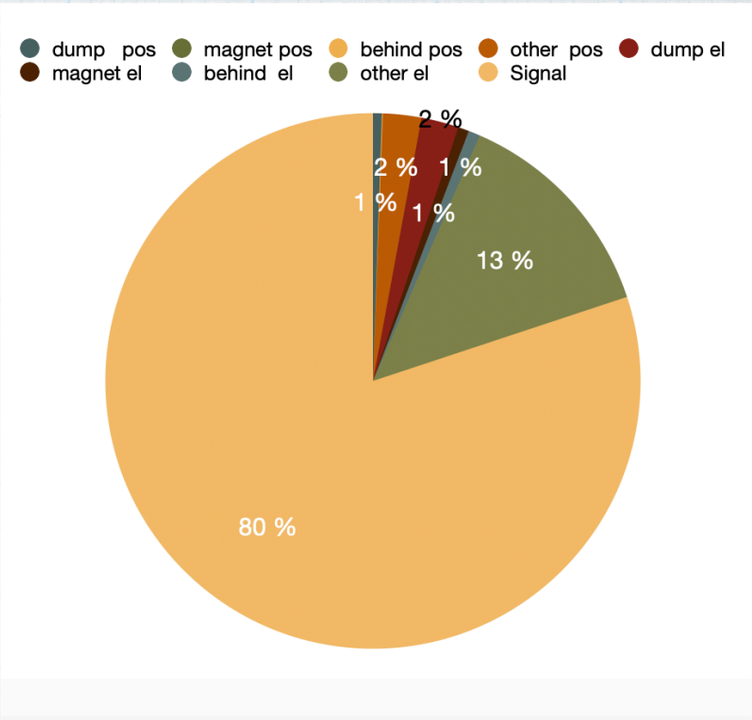
Beam Pipe 5 cm
Kapton, 200 um





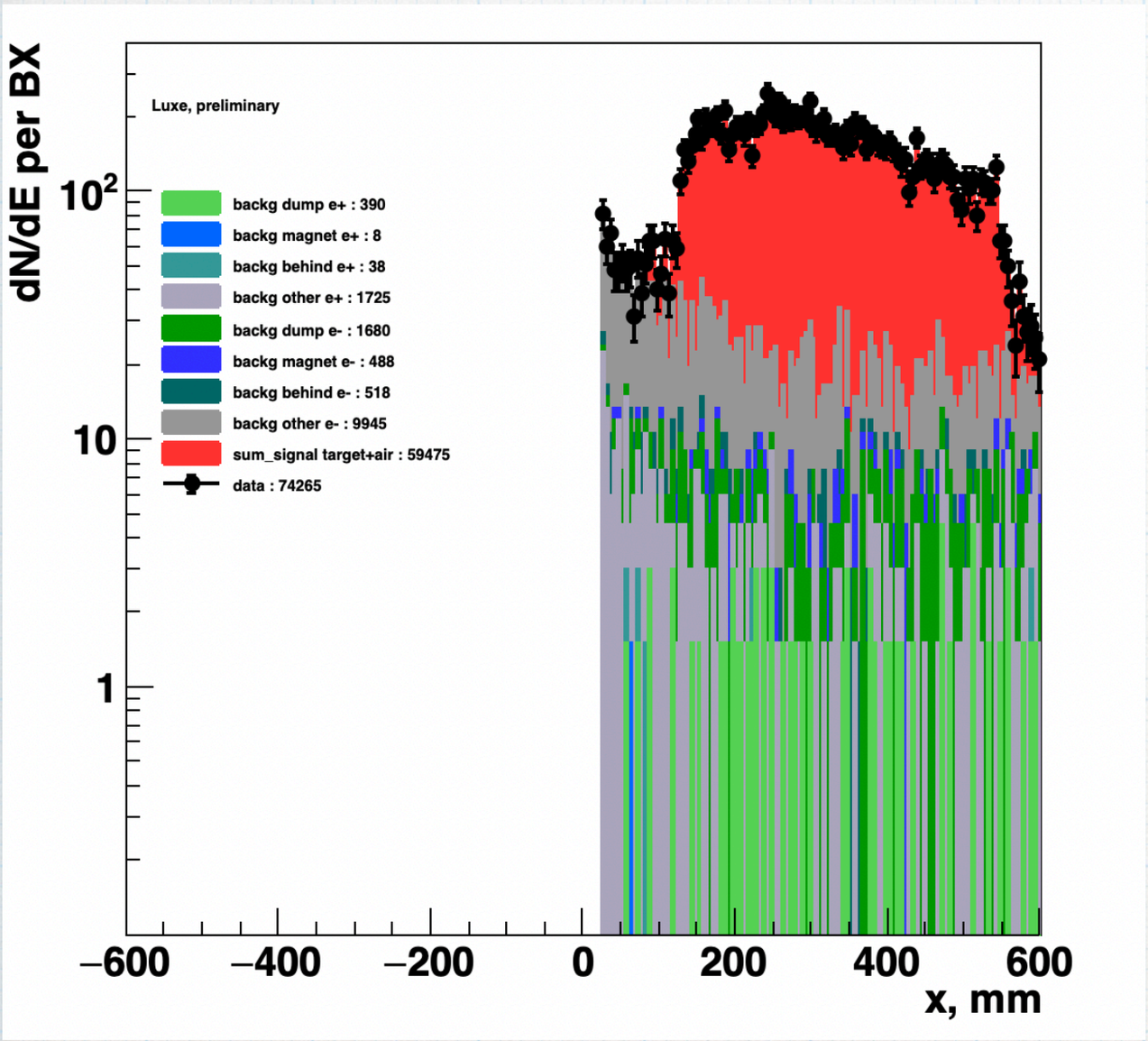
Beam Pipe 5 cm
W, 10 um



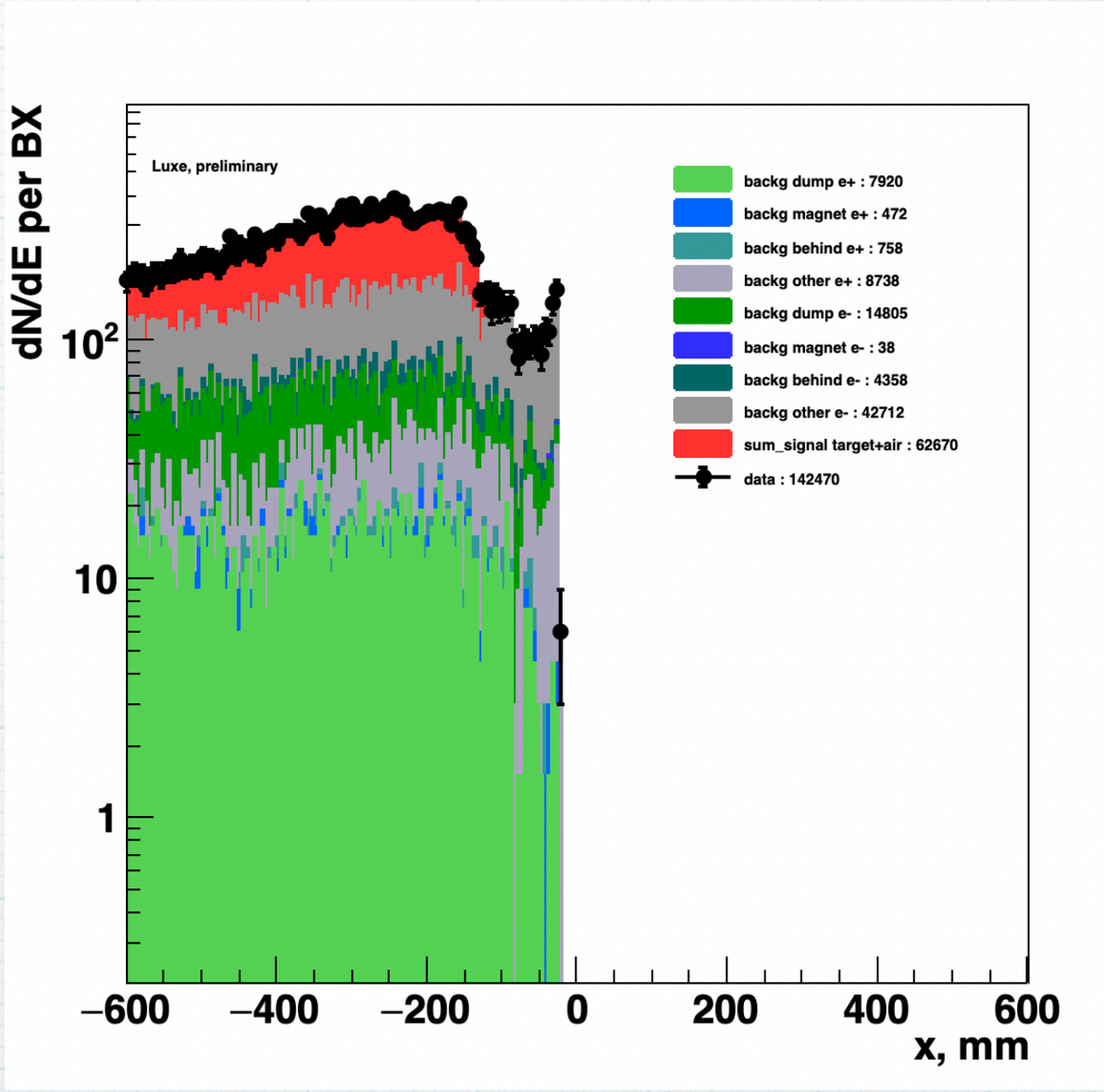


Background: Beam Pipe 5 cm ,W 10 um, log scale

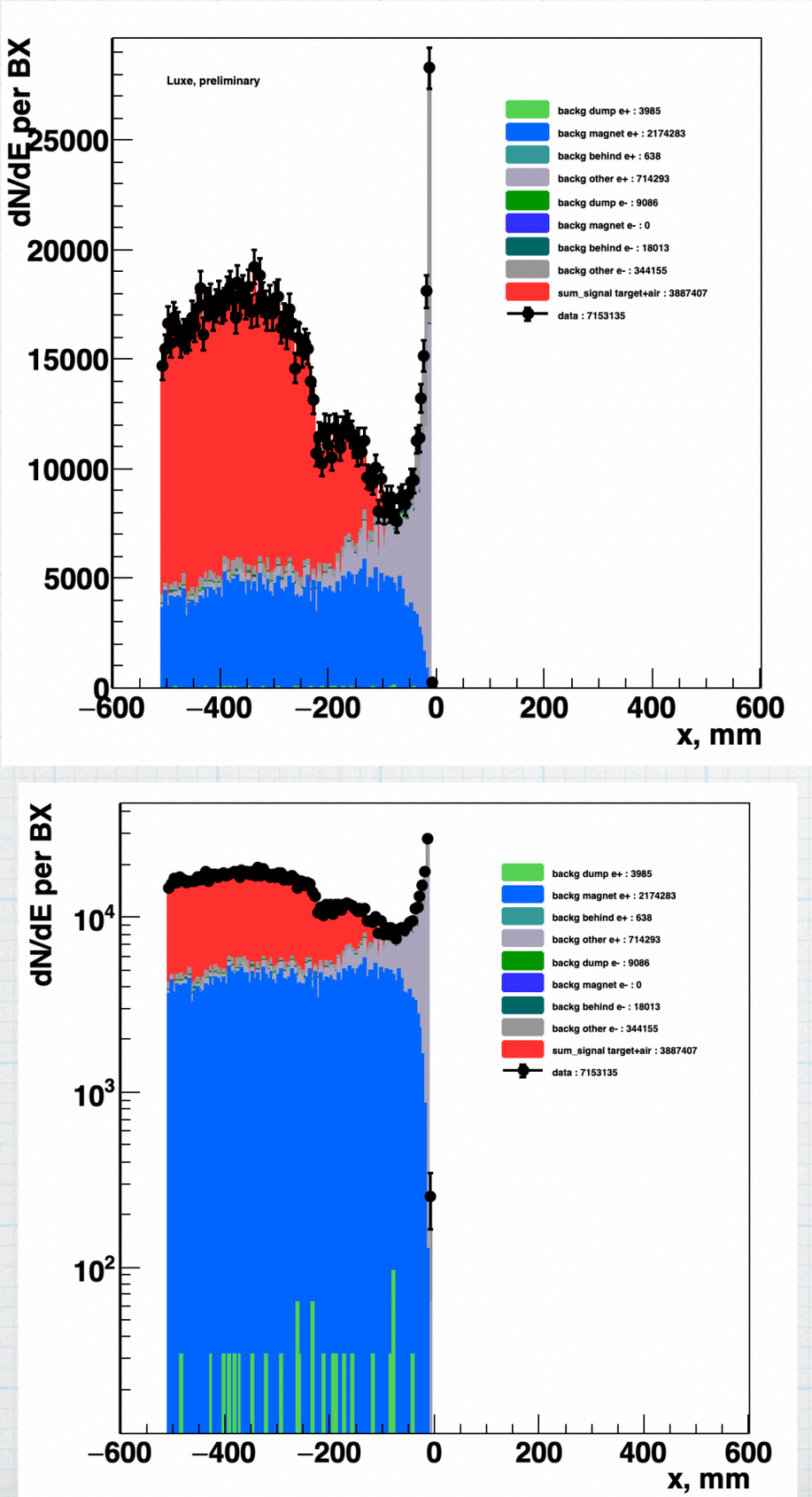
* Electron arm

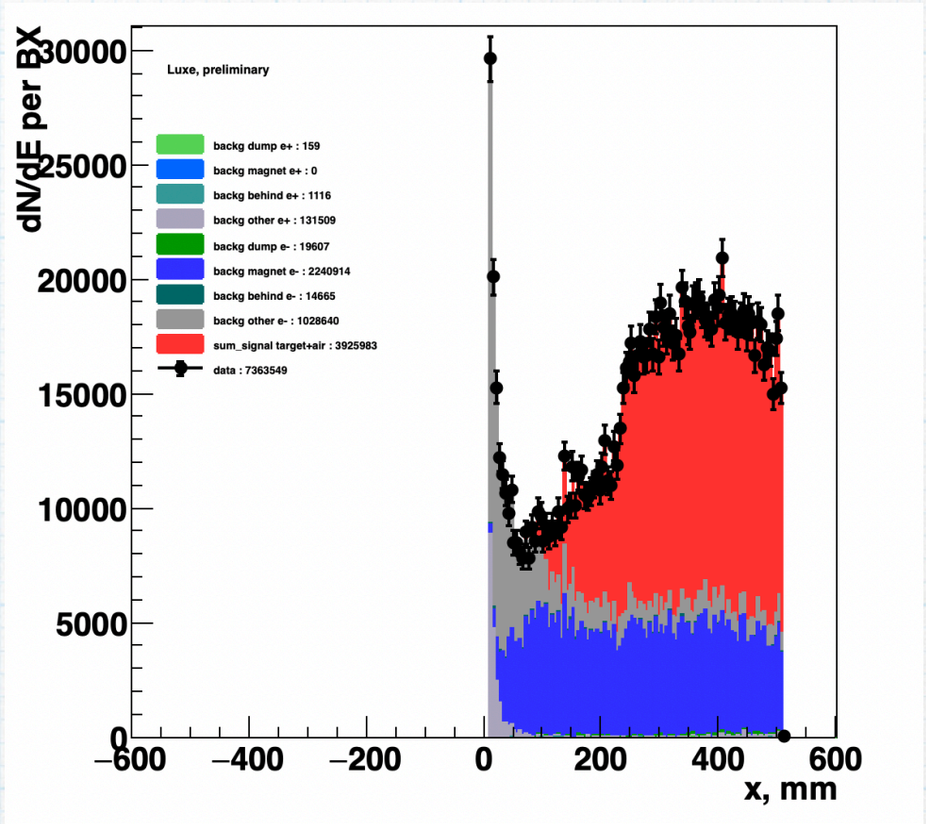


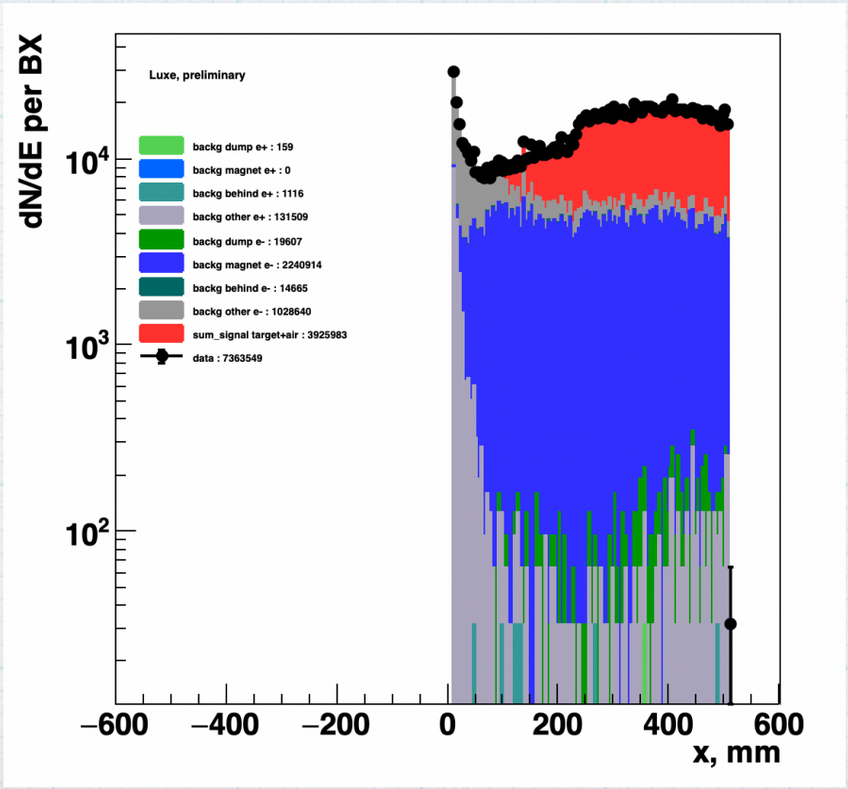
* Positron arm



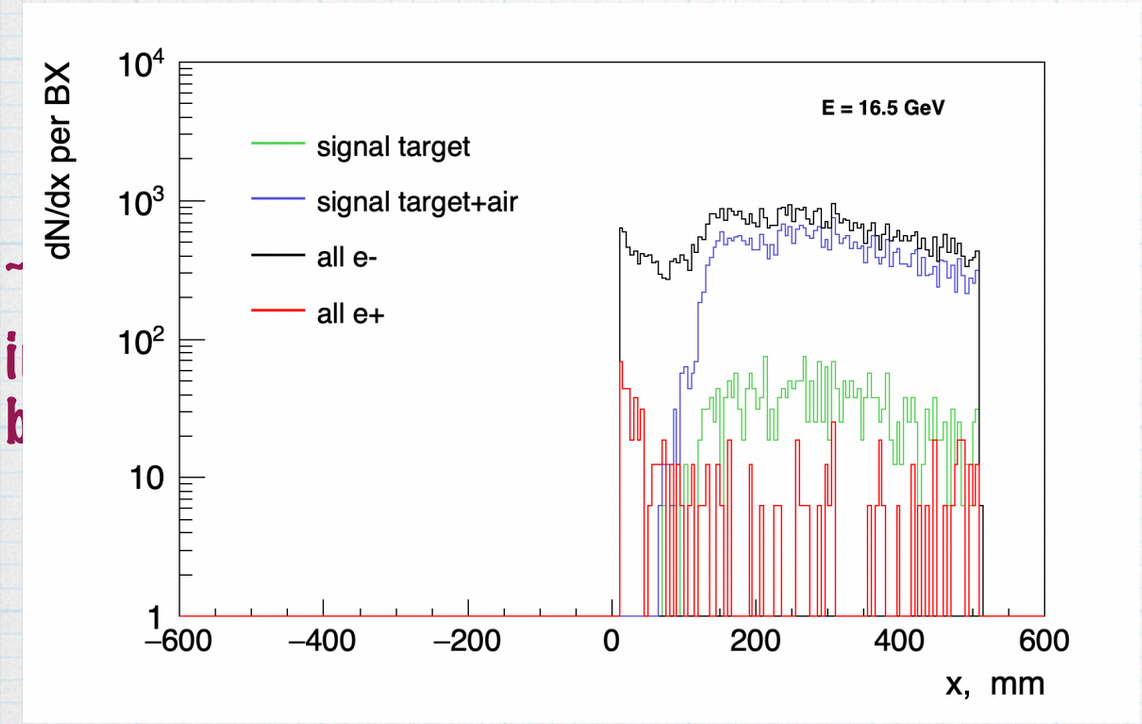
Phase II, 16.5 GeV, 8 um, 941 BX

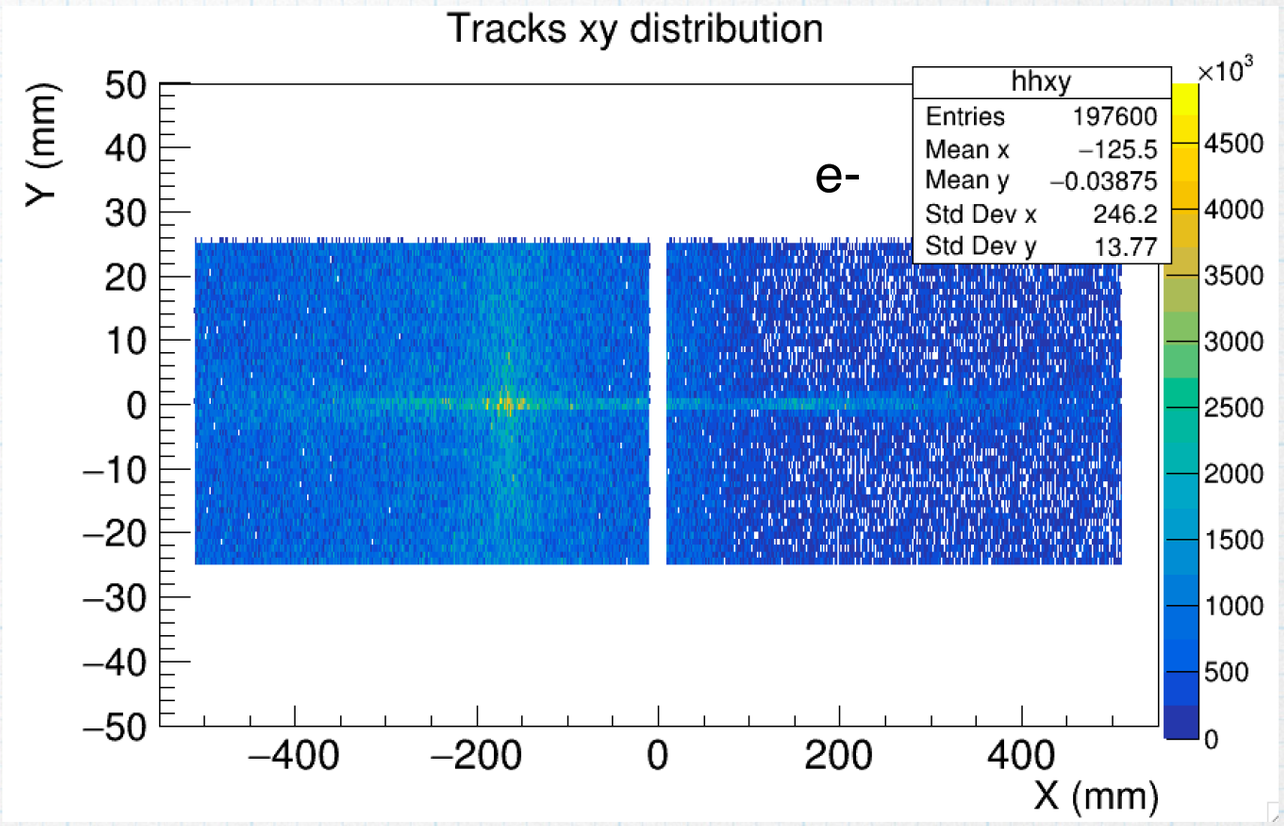


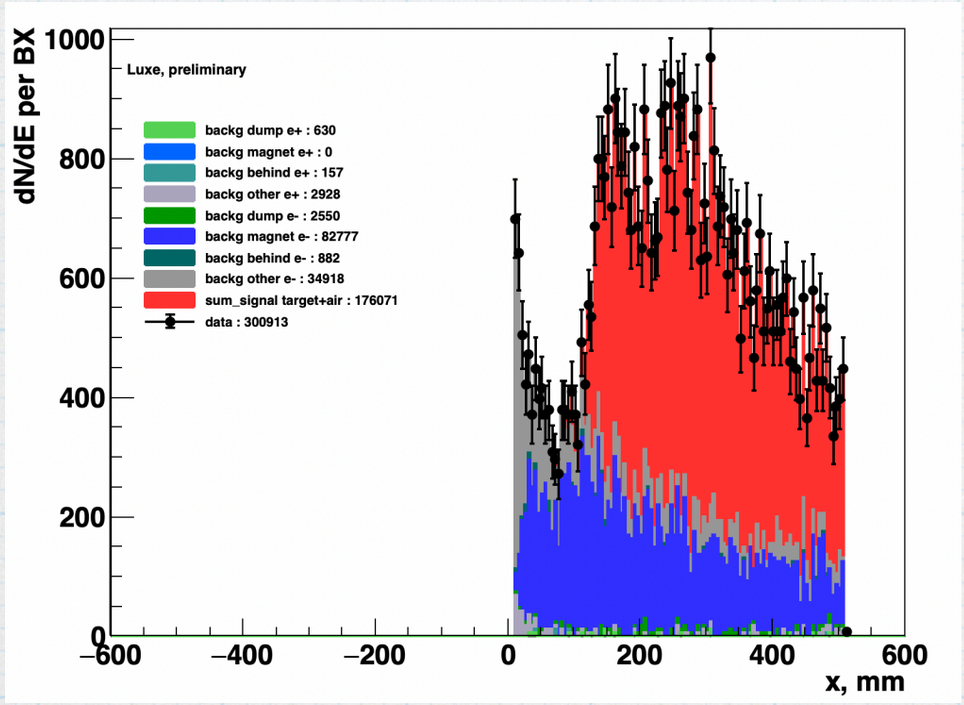


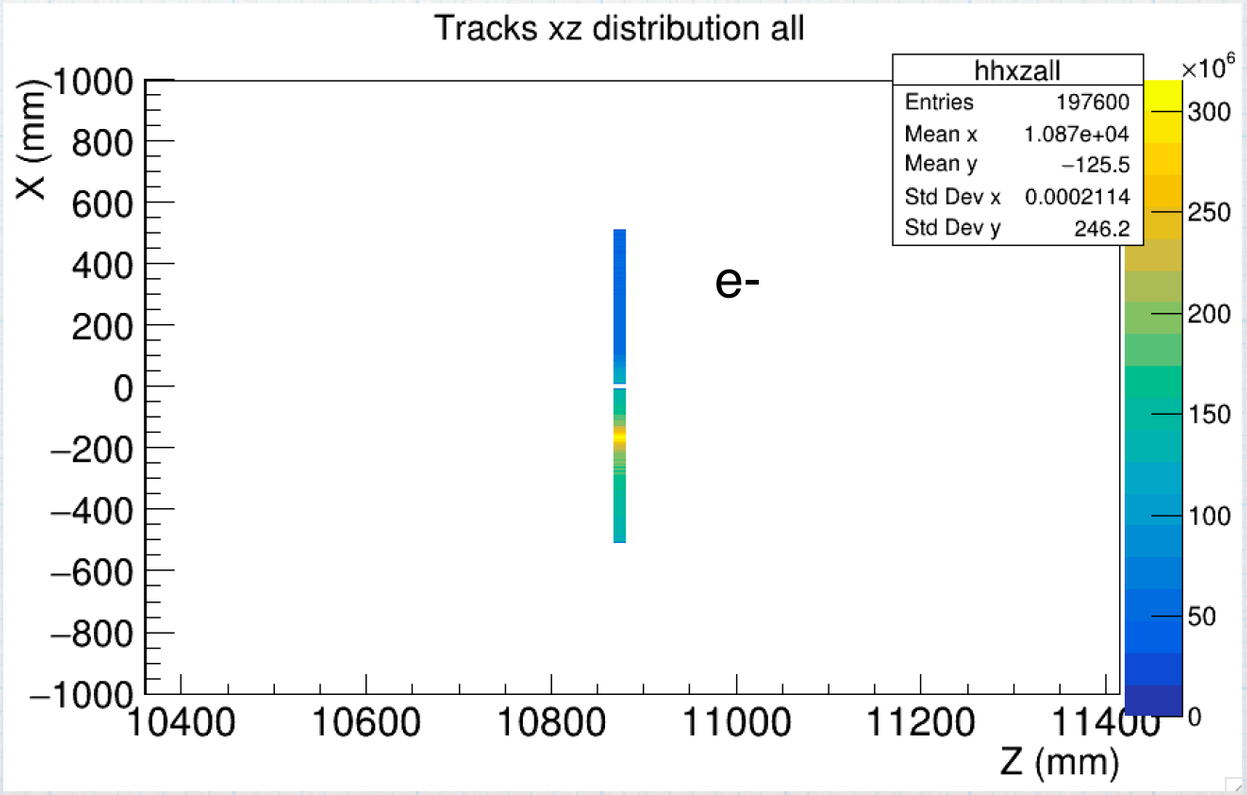


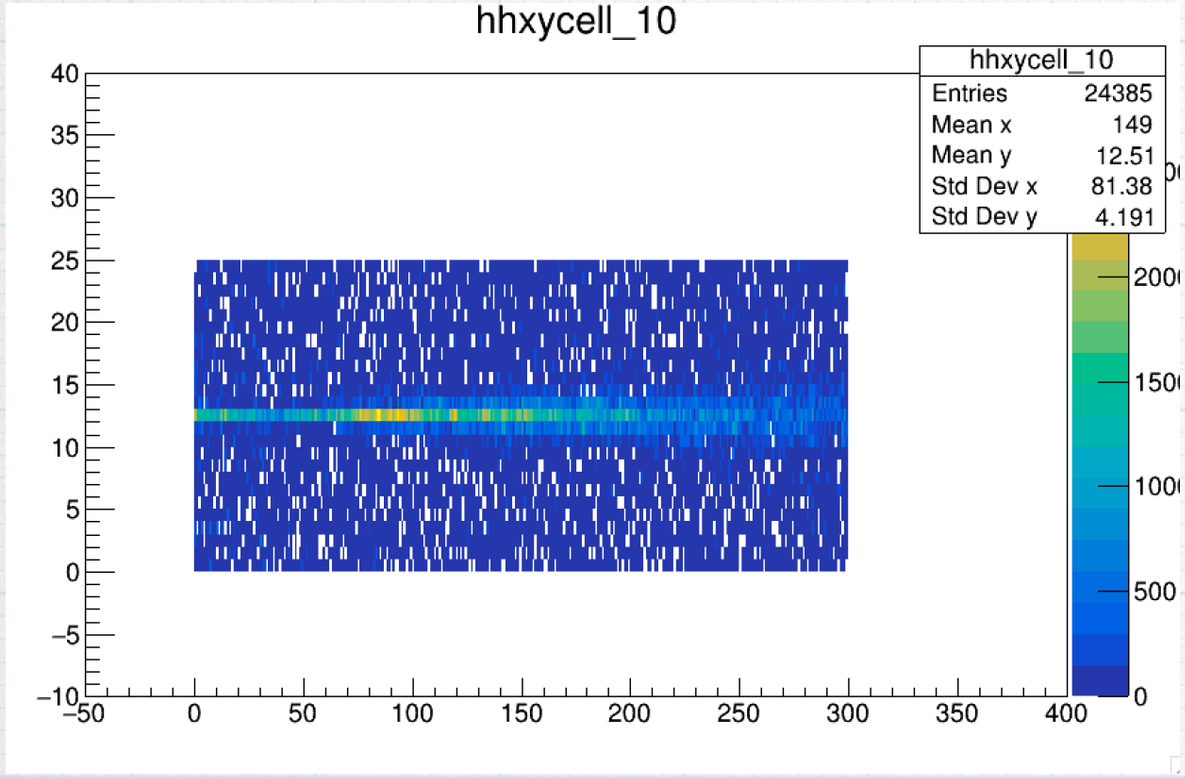
* Electron arm of Lanex Spectrometer







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hhxycell_10
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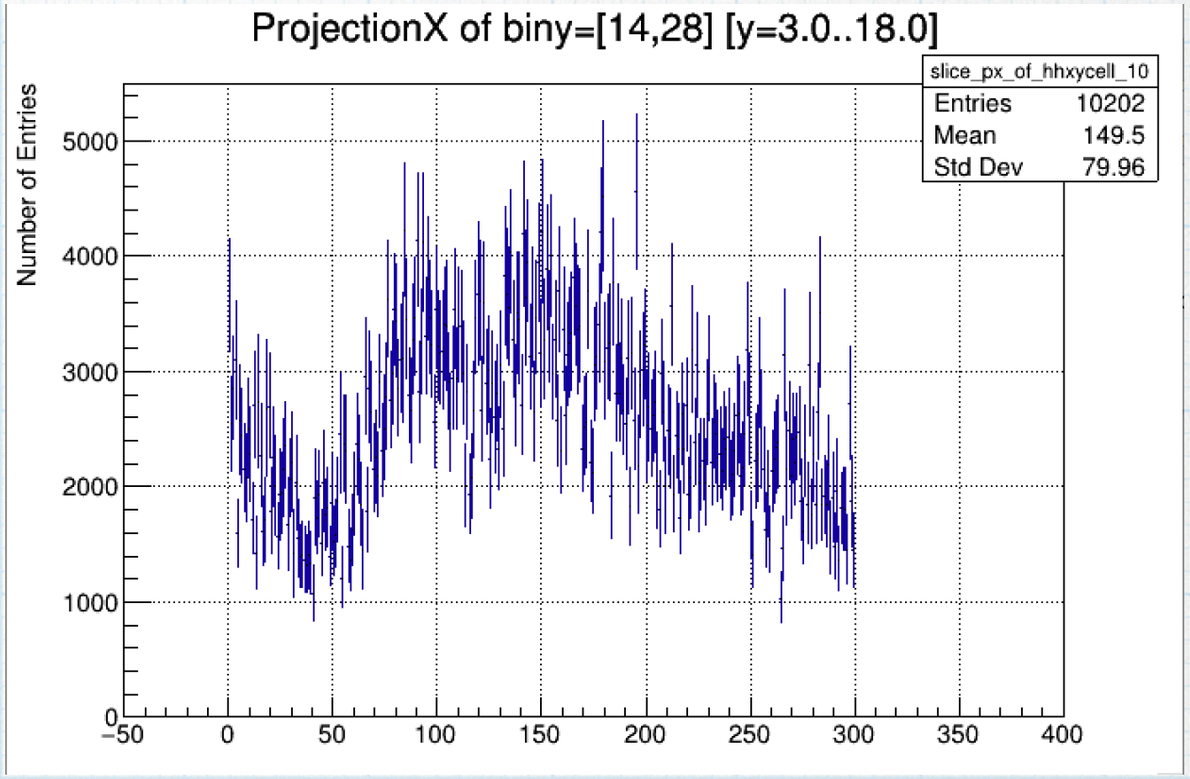
Mean x 149
Mean y 12.51
Std Dev x 81.38
Std Dev y 4.191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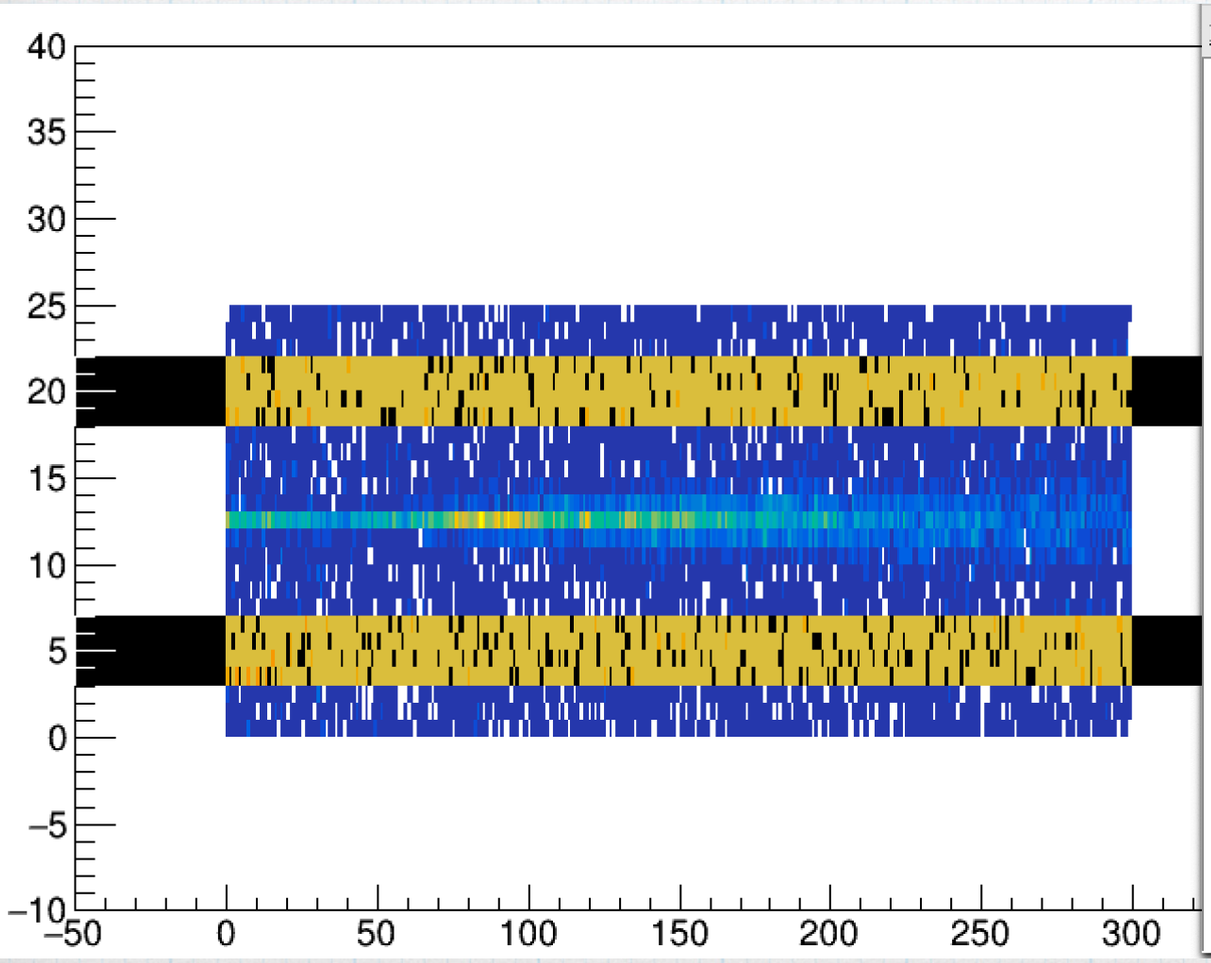
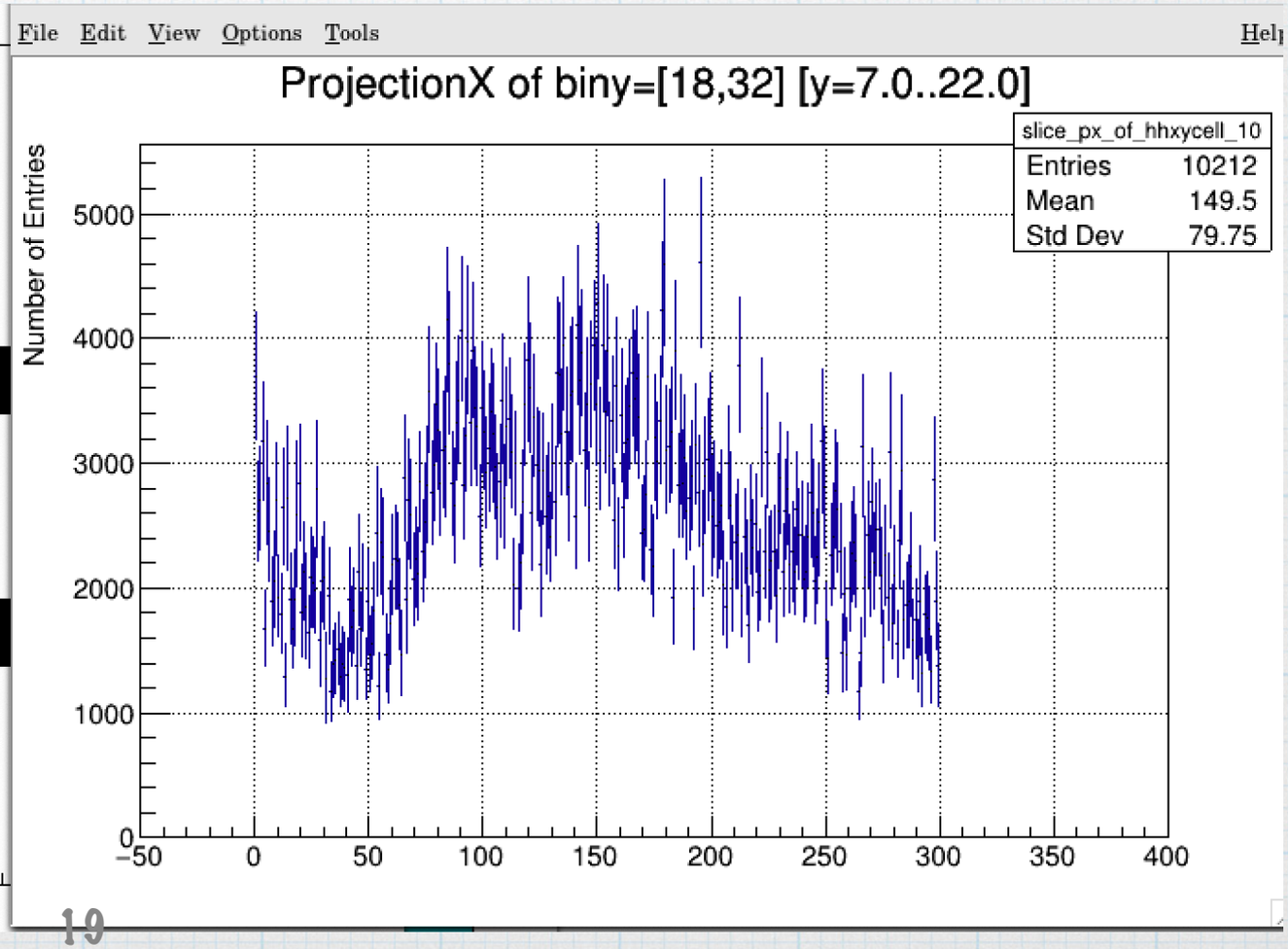
Std Dev 79.96
Number of Entries

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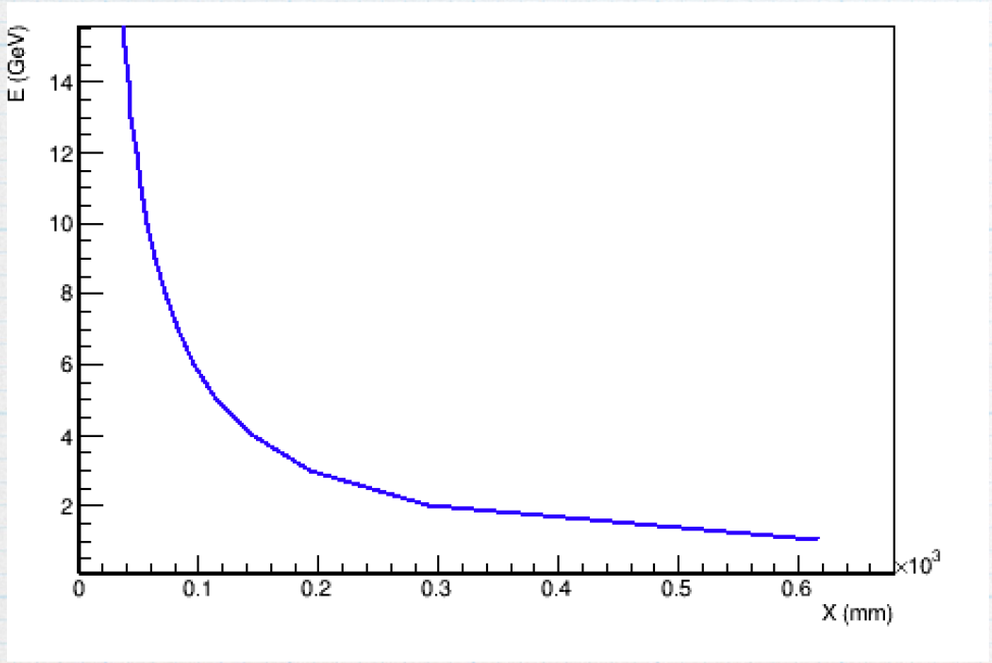
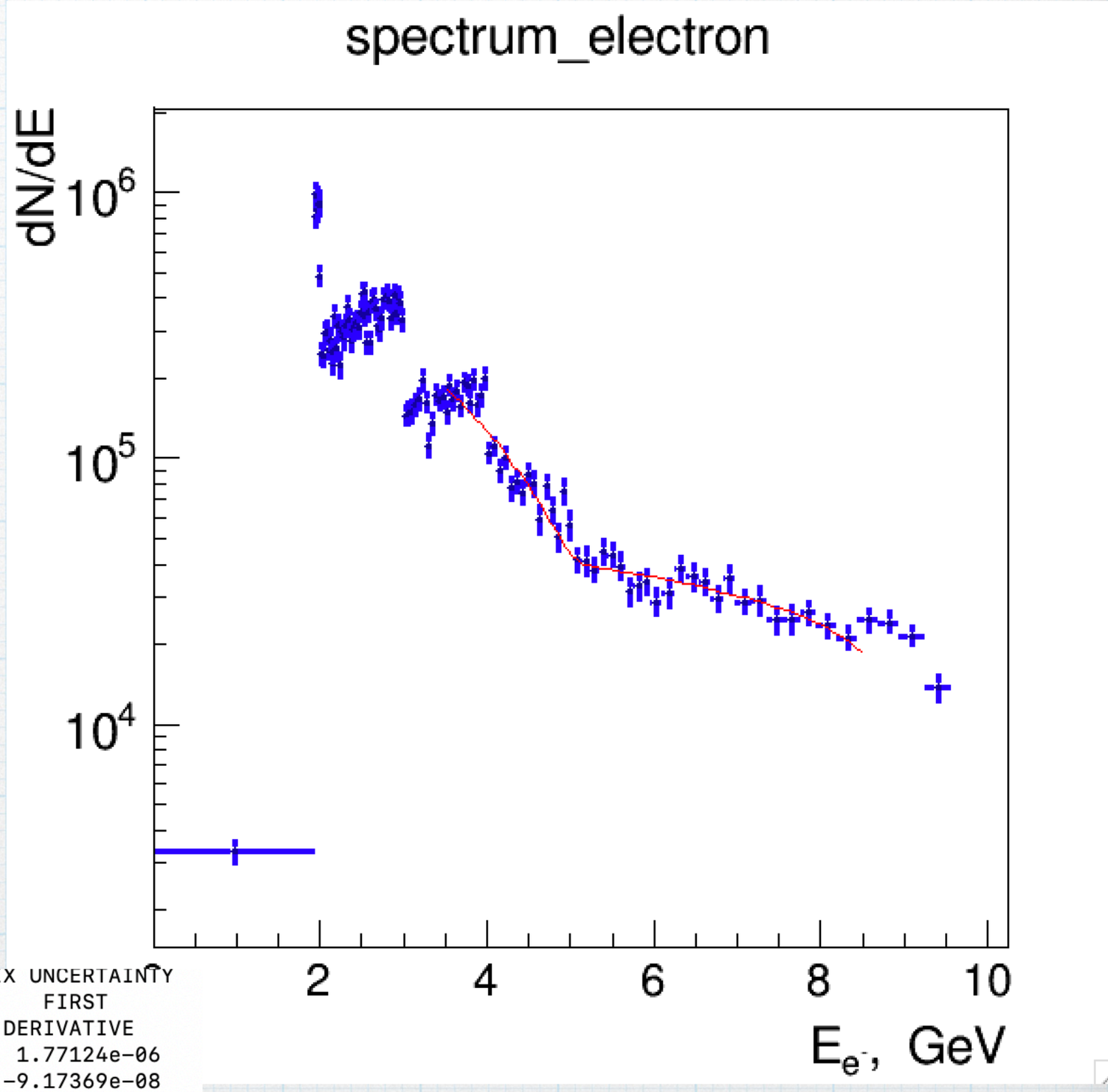
Mean 149.5
Std Dev 79.75
Number of Entries

Spectra reconstruction for the Lanex case





EXT NO.	PARAMETER NAME	VALUE	APPROXIMATE ERROR	STEP SIZE	FIRST DERIVATIVE
		EDM=3.45767	STRATEGY= 1	ERROR MATRIX UNCERTAINTY	
1	p0	-1.13129e+06	2.26562e+04	-2.47452e-02	1.77124e-06
2	p1	8.52709e+06	1.03972e+05	6.18410e-02	-9.17369e-08
3	p2	4.99979e+00	1.95217e-01	6.12022e-05	-2.60964e+00
4	p3	1.32018e+05	5.26539e+01	-5.57651e-06	2.62956e-05
5	p4	-3.82289e+05	6.92345e+03	3.70539e-03	-2.29557e-06
6	p5	8.42734e+00	1.79782e-01	-1.42424e-05	3.17284e+00
7	p6	1.86312e+05	2.00261e+00	-6.18804e-09	4.60353e-05
8	p7	9.31179e+00	4.96505e-01	4.46513e-05	-6.73901e-02
9	p8	0.00000e+00	1.48007e+00	-0.00000e+00	0.00000e+00