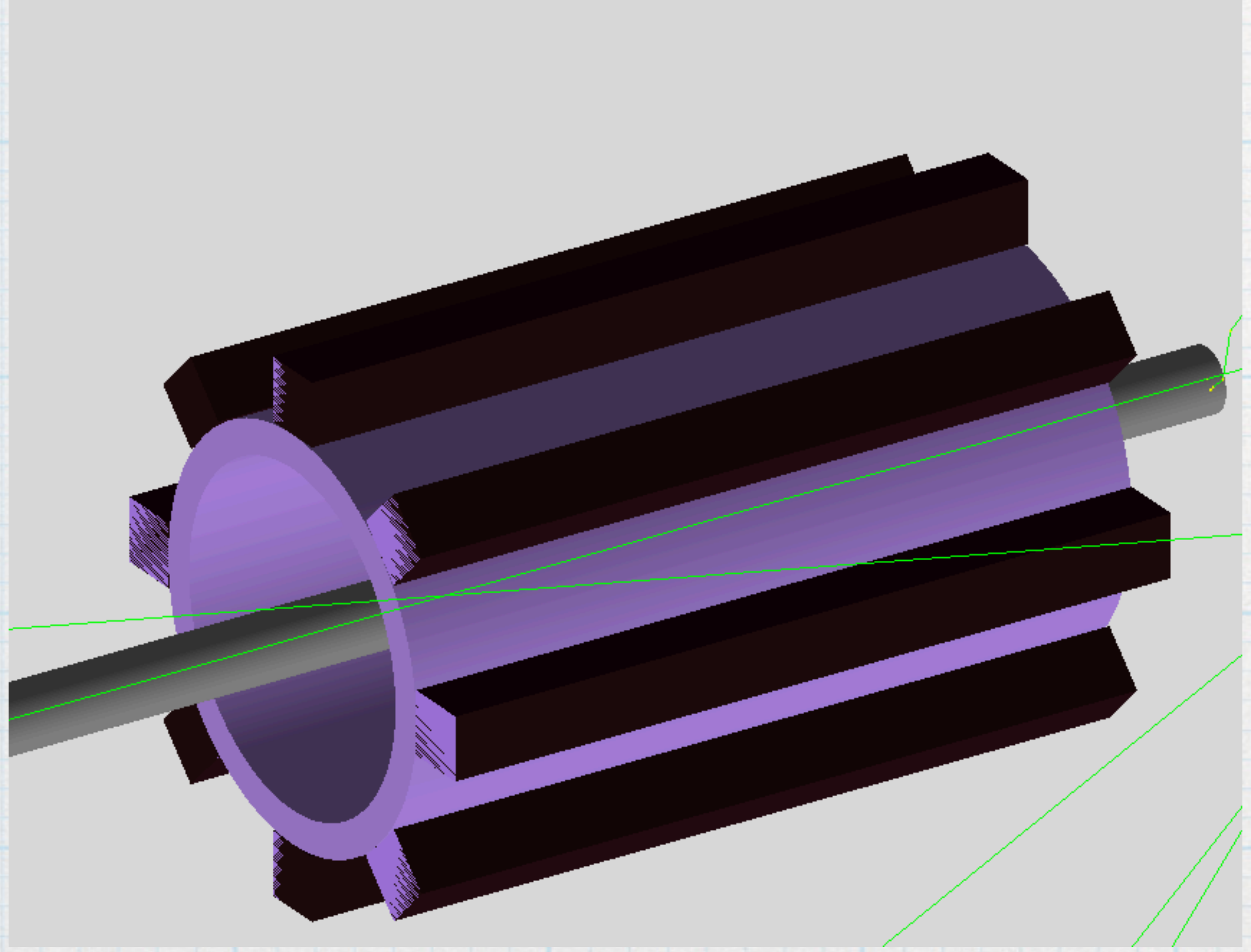
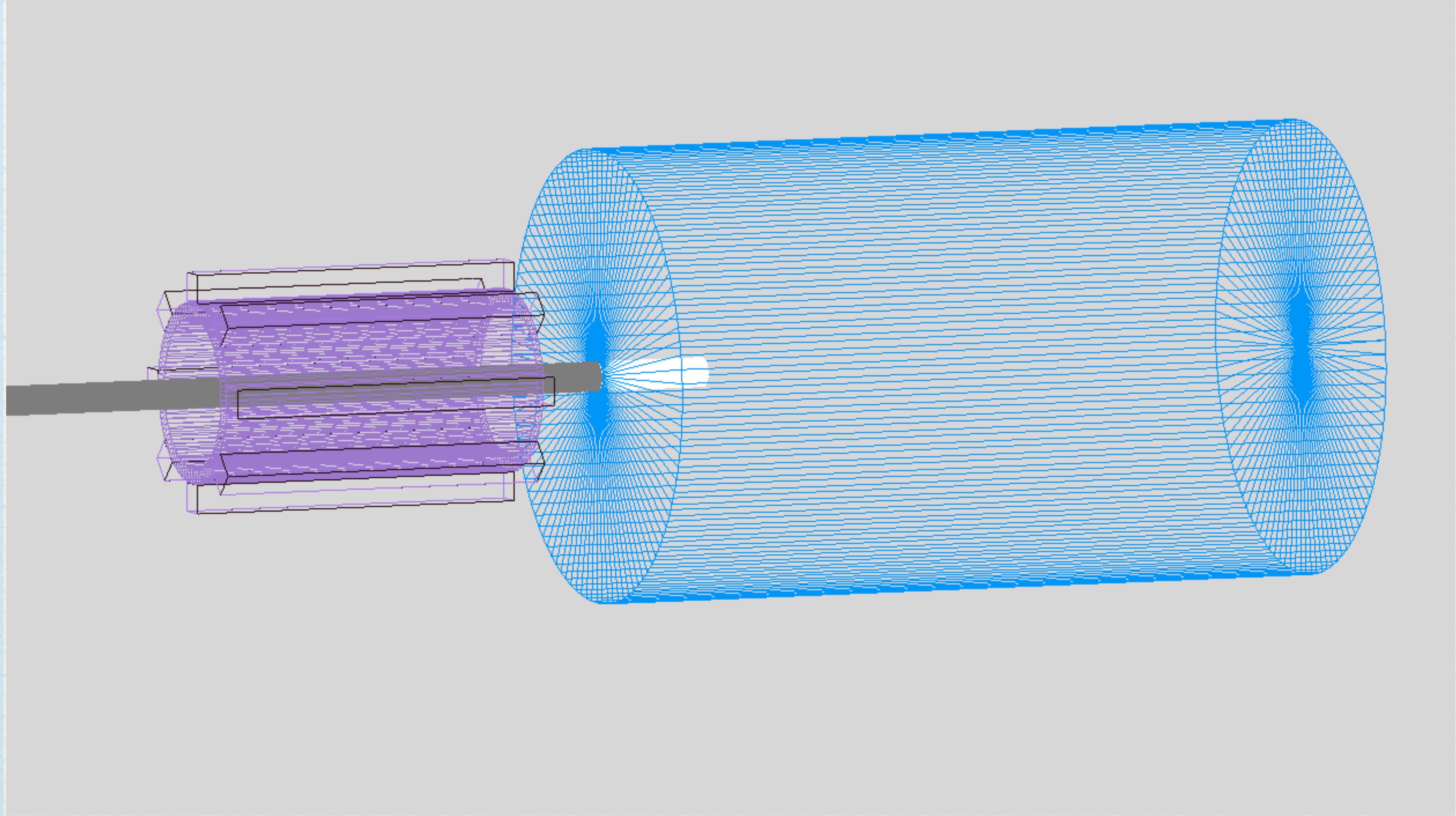
Gamma Flux Monitor & BeamDump

- The implementation of FDS in Luxe geometry with the LG Gamma Monitor made of new LG blocks in front of Cu Dump with a hole of 15 cm,
- LG w/ measures 3.8 × 3.8 cm^2, length is 45 cm
- Wrapped with Aluminium foil of 0.016 mm (typical household foil; no account for air)

- Beam Dump: R=30 cm, L=100 cm
- GM Support: Stainless Steel of 1 cm thickness

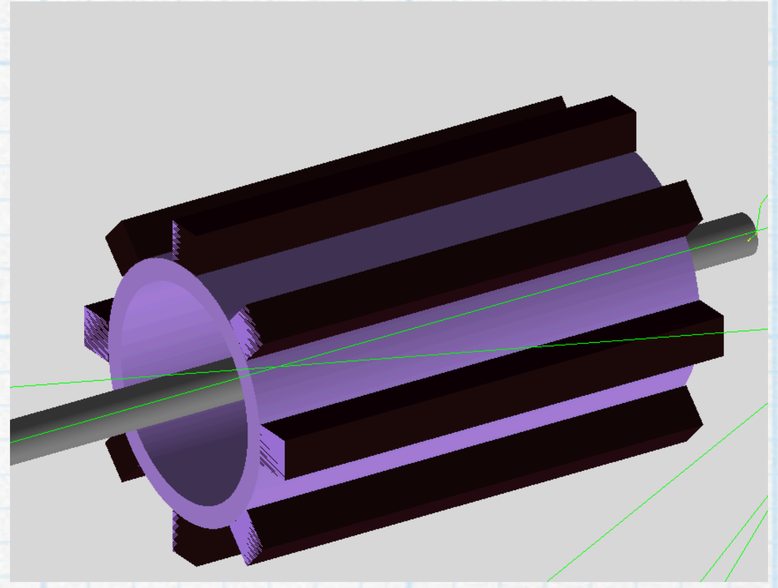
- Distance between Monitor and Dump 10 cm

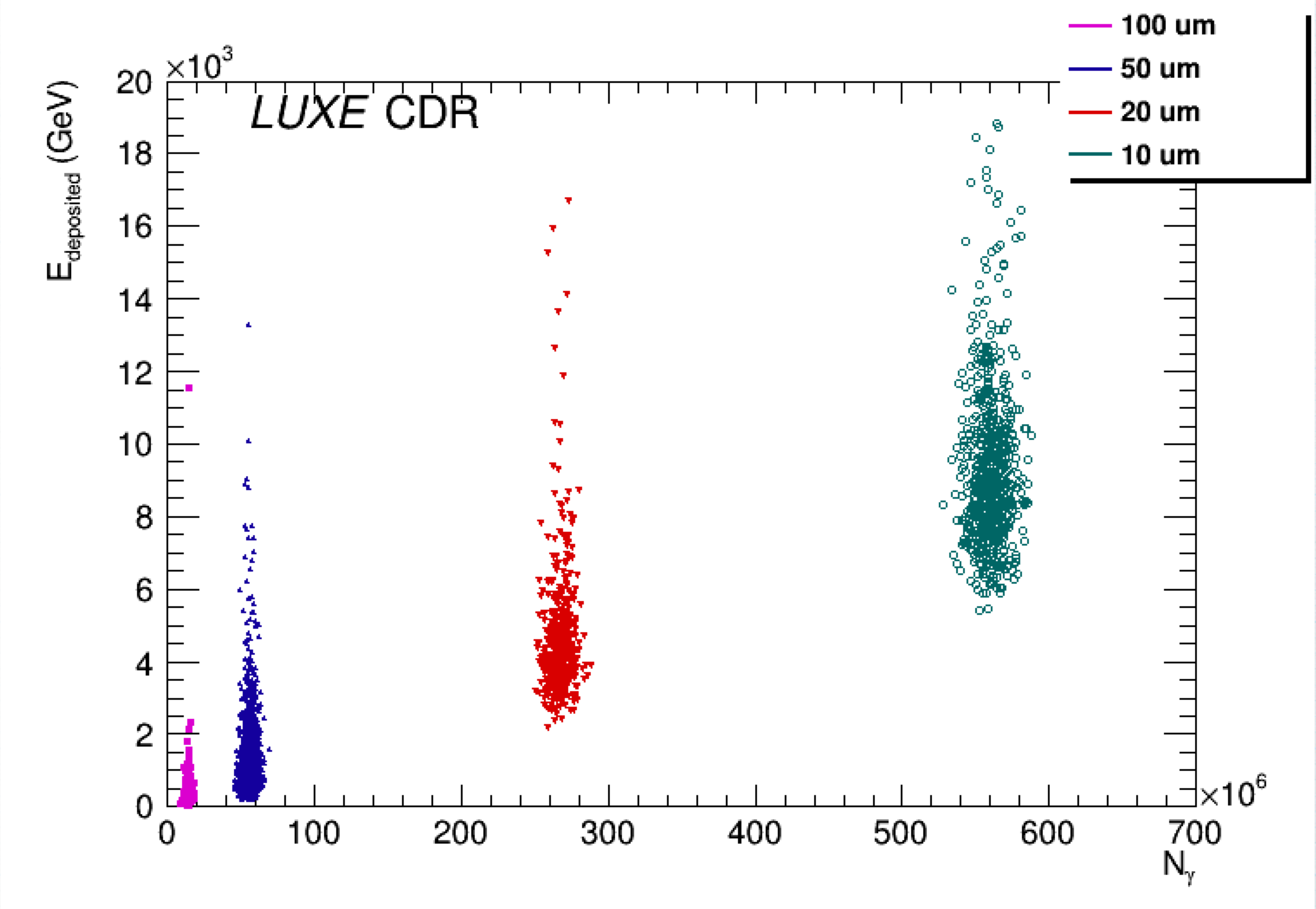


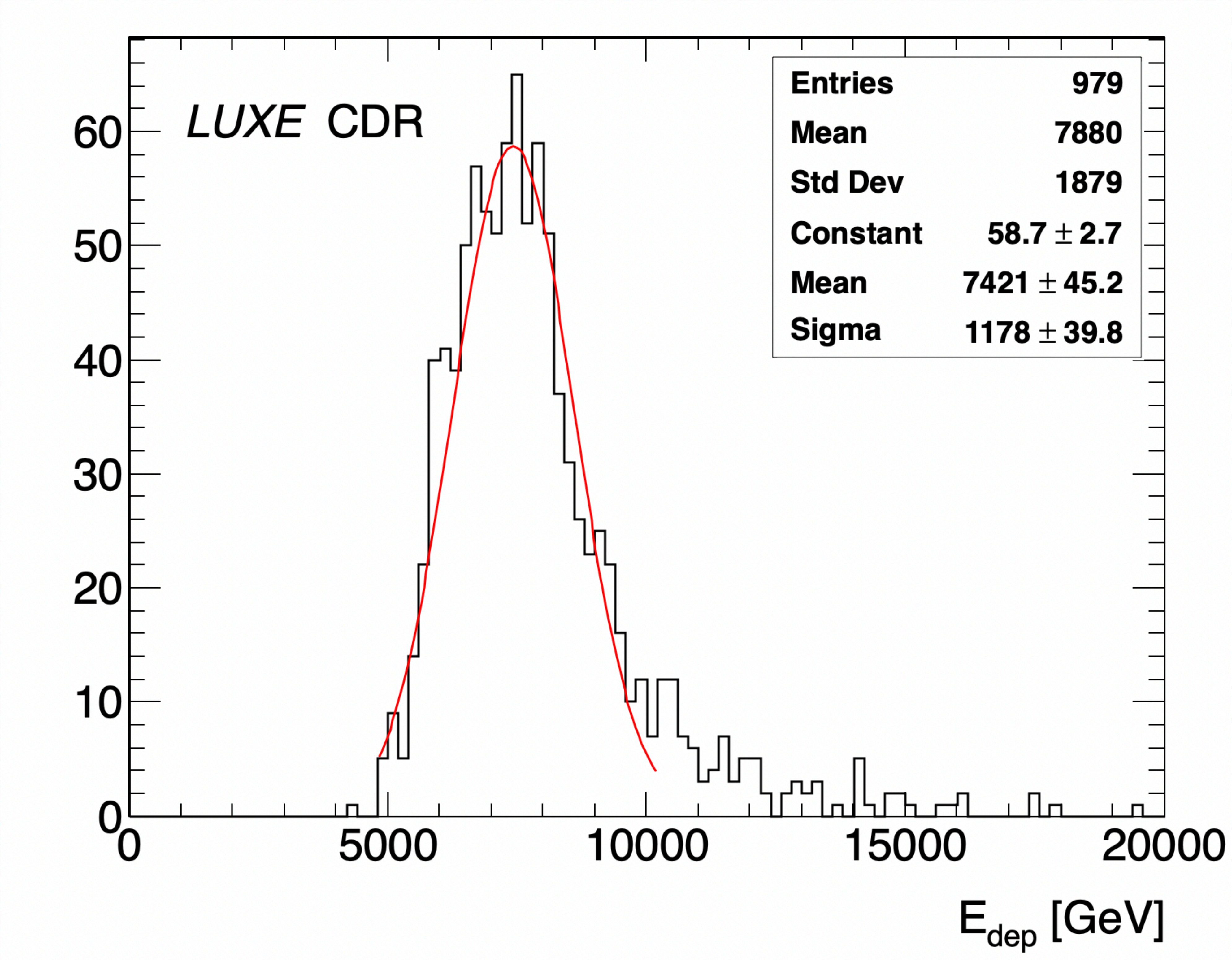


38 mm
38 mm

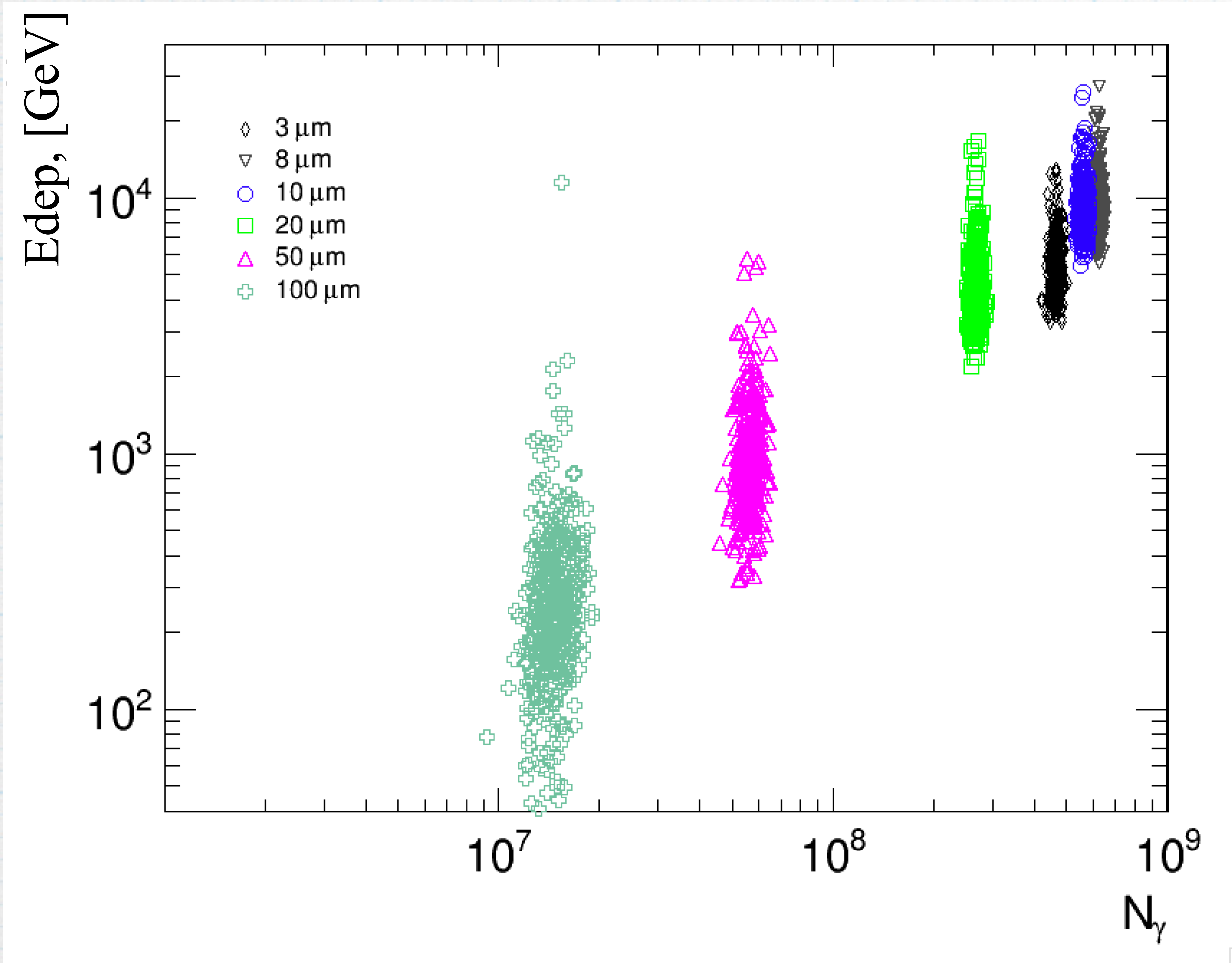
Deposited energy versus true number of photons.

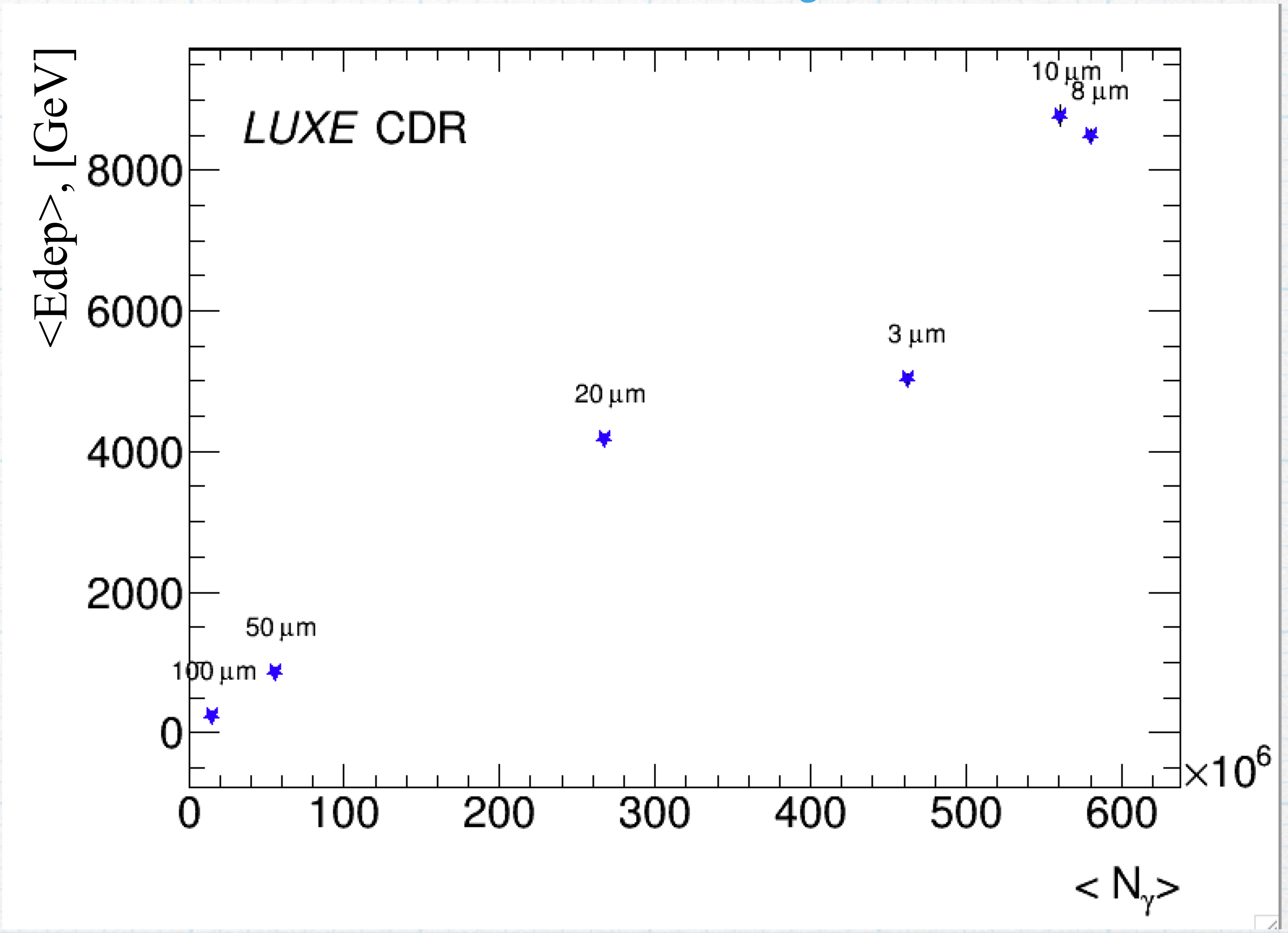


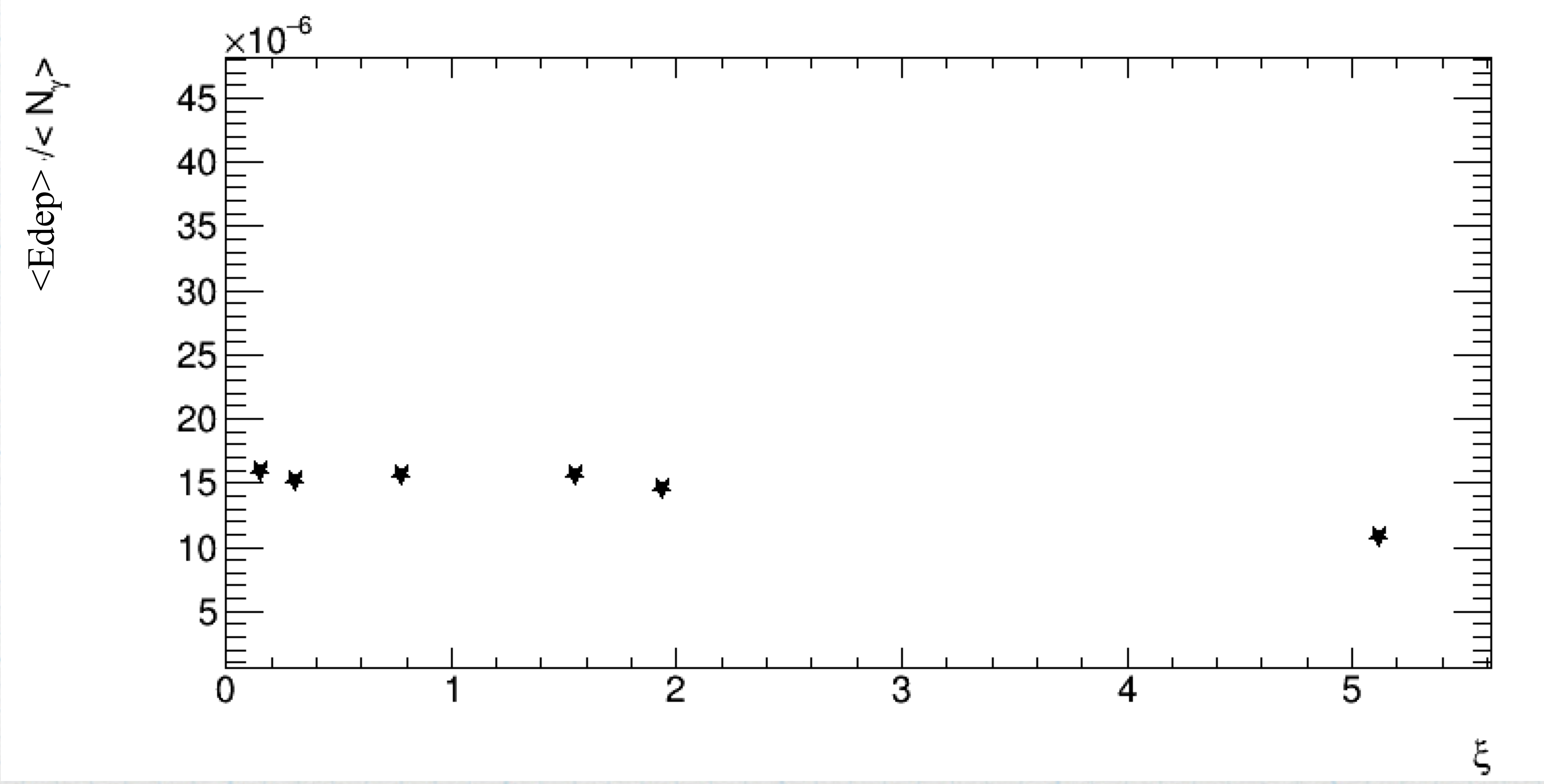


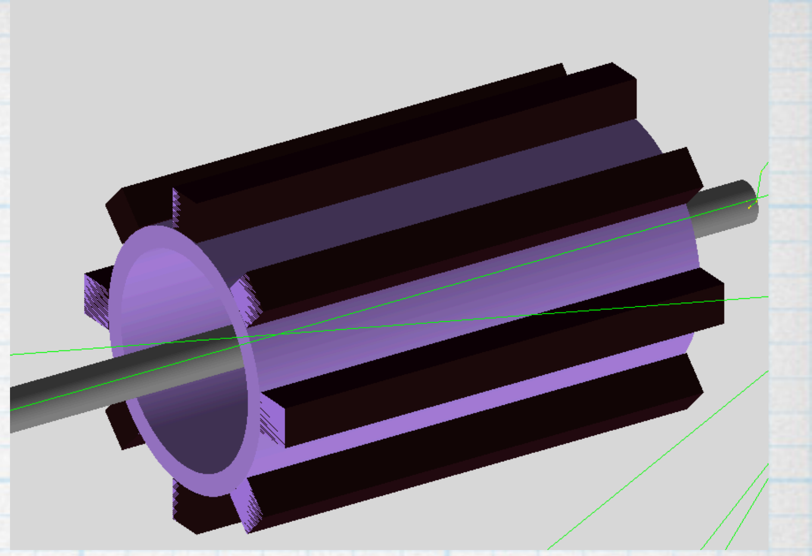


Deposited energy versus true number of photons.









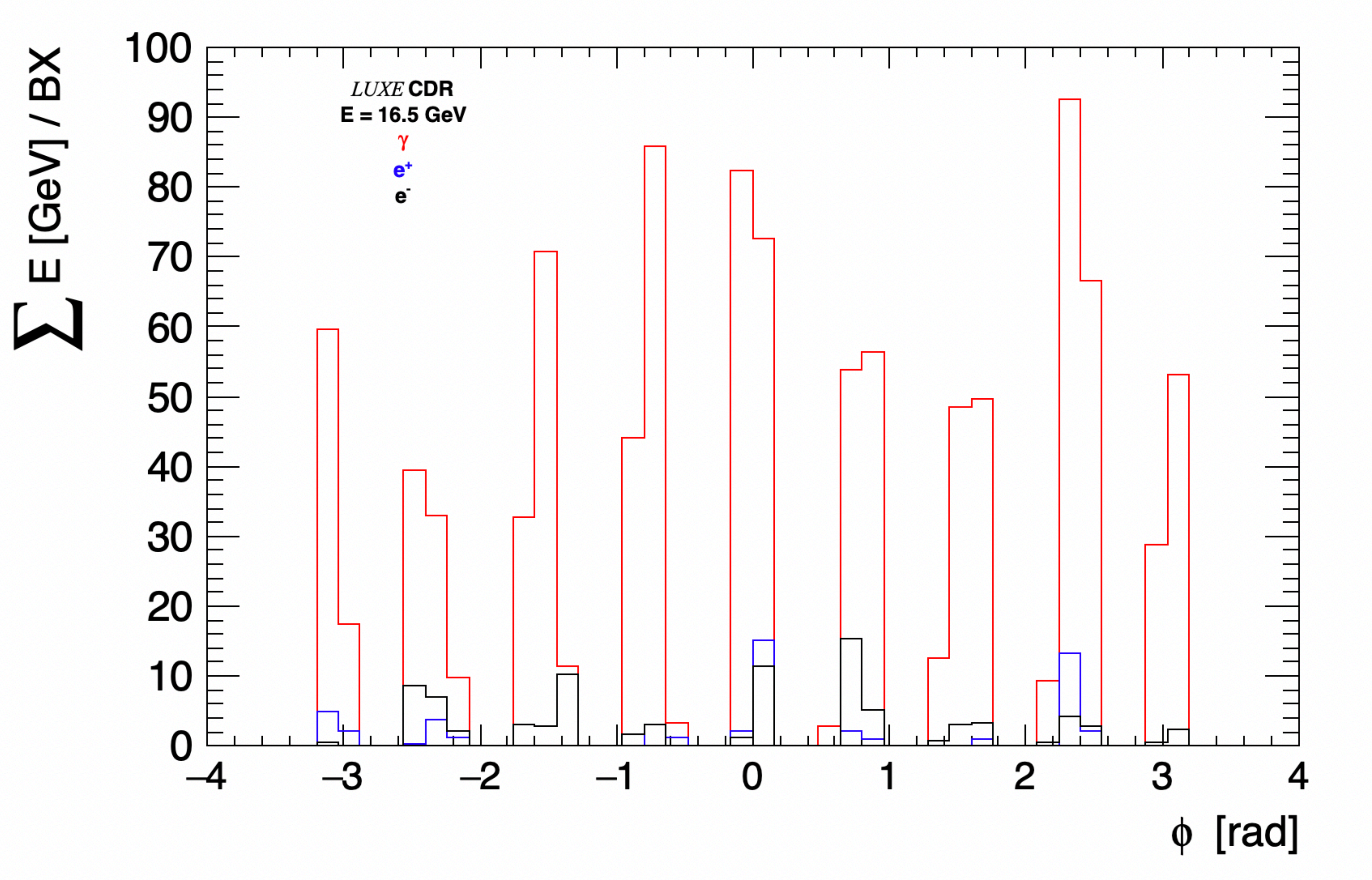
the photon flux

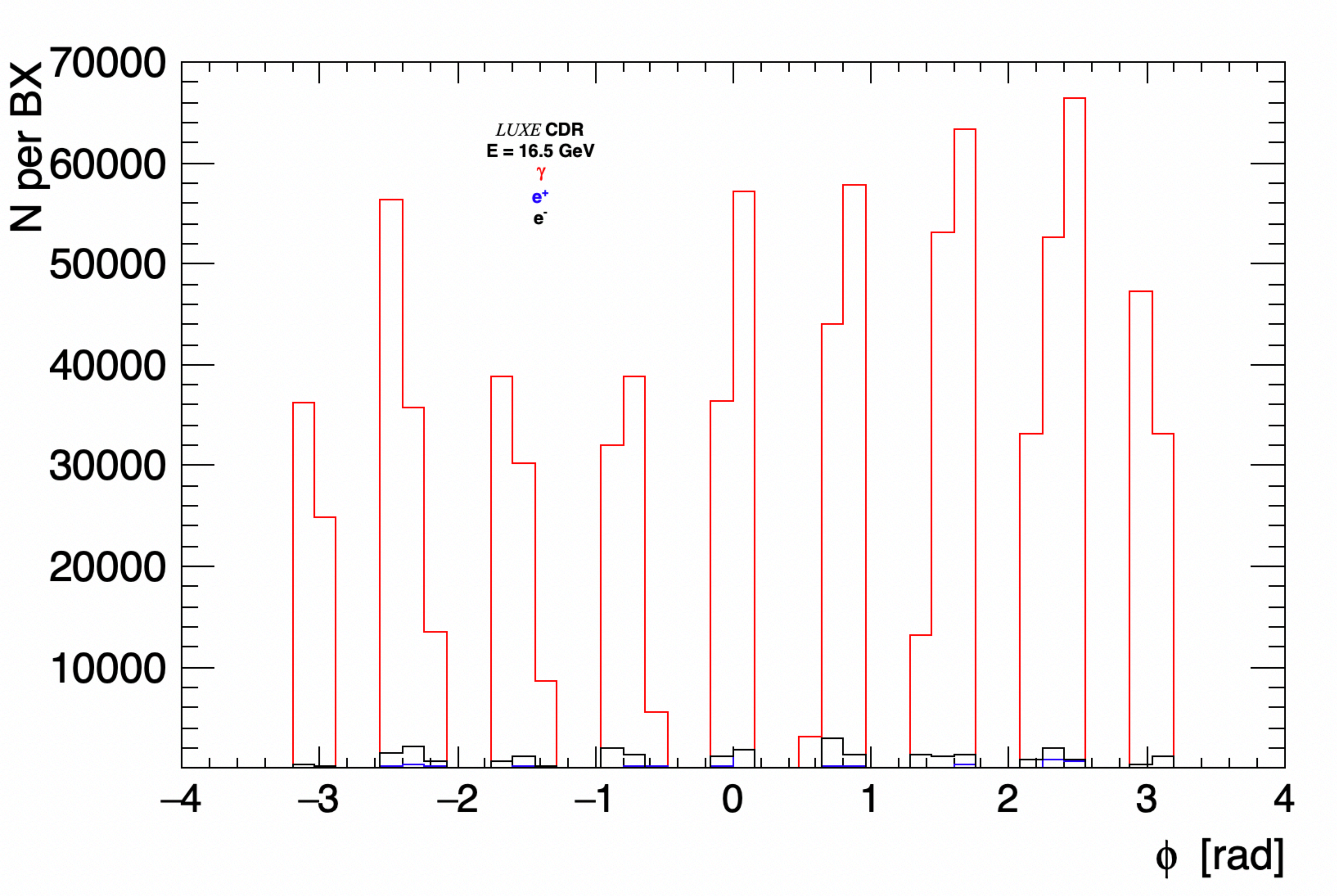
- Old MC
- no threshold
- the errors are small as given as RMS/√<N_BX>

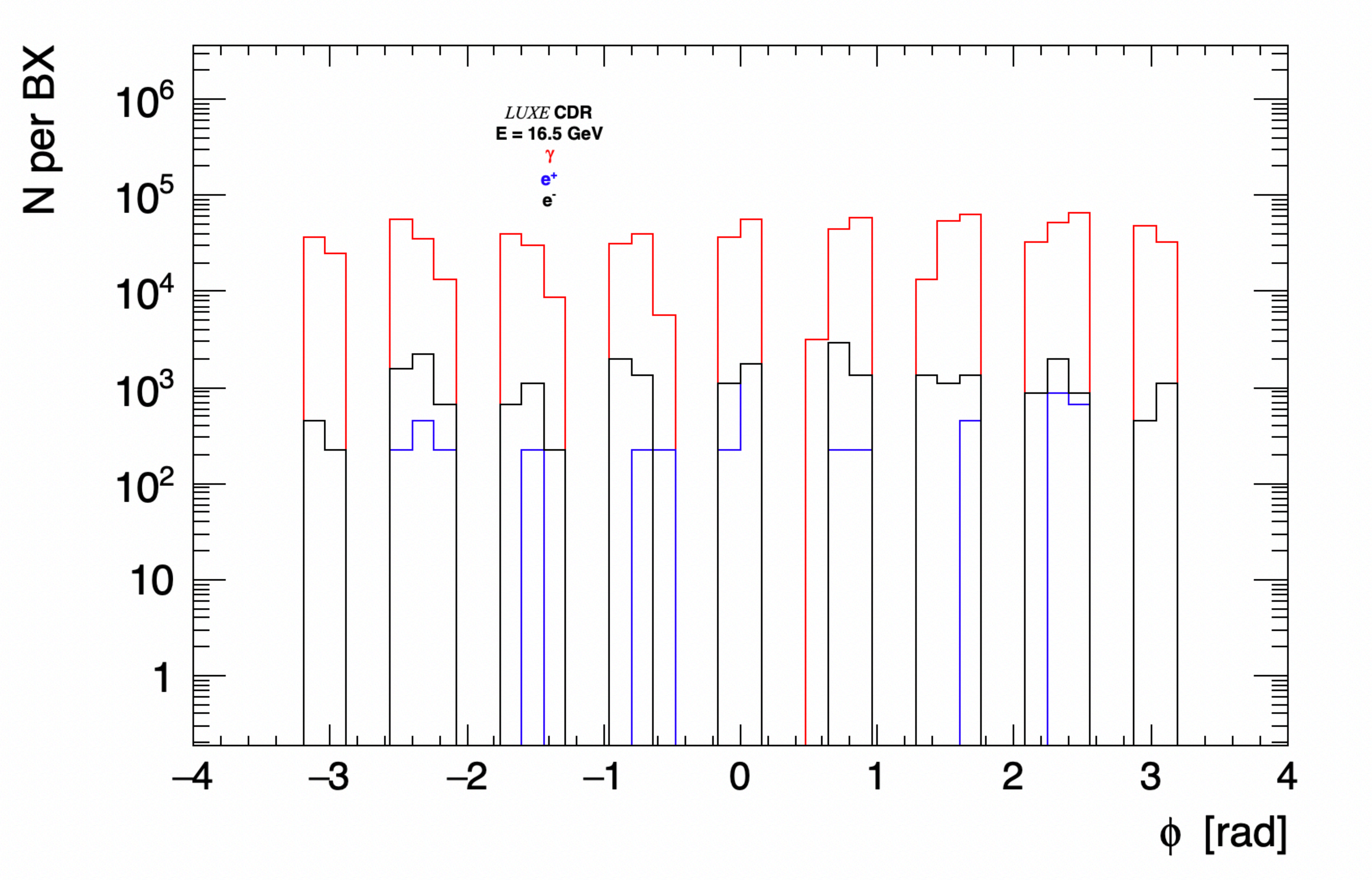
w0, um	xi
100	0.15
50	0.31
20	0.78
10	1.55
8	1.94
3	5.12

Backup

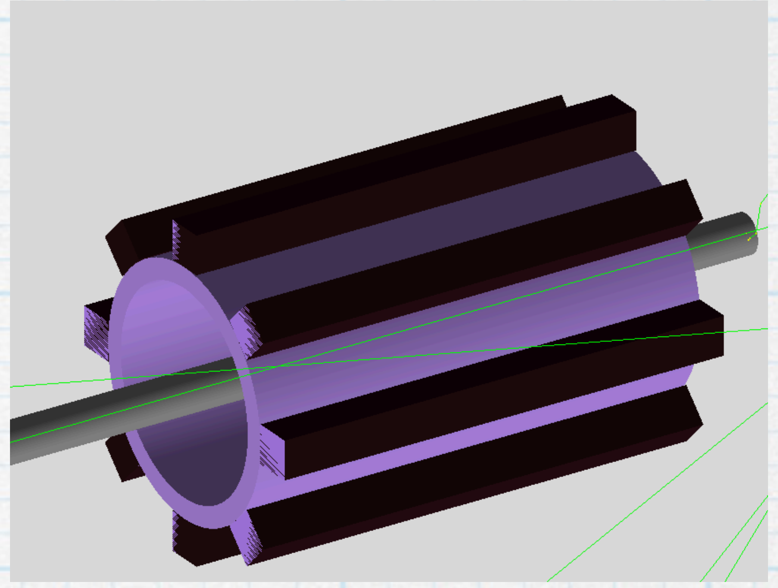
Background for Gamma Monitor

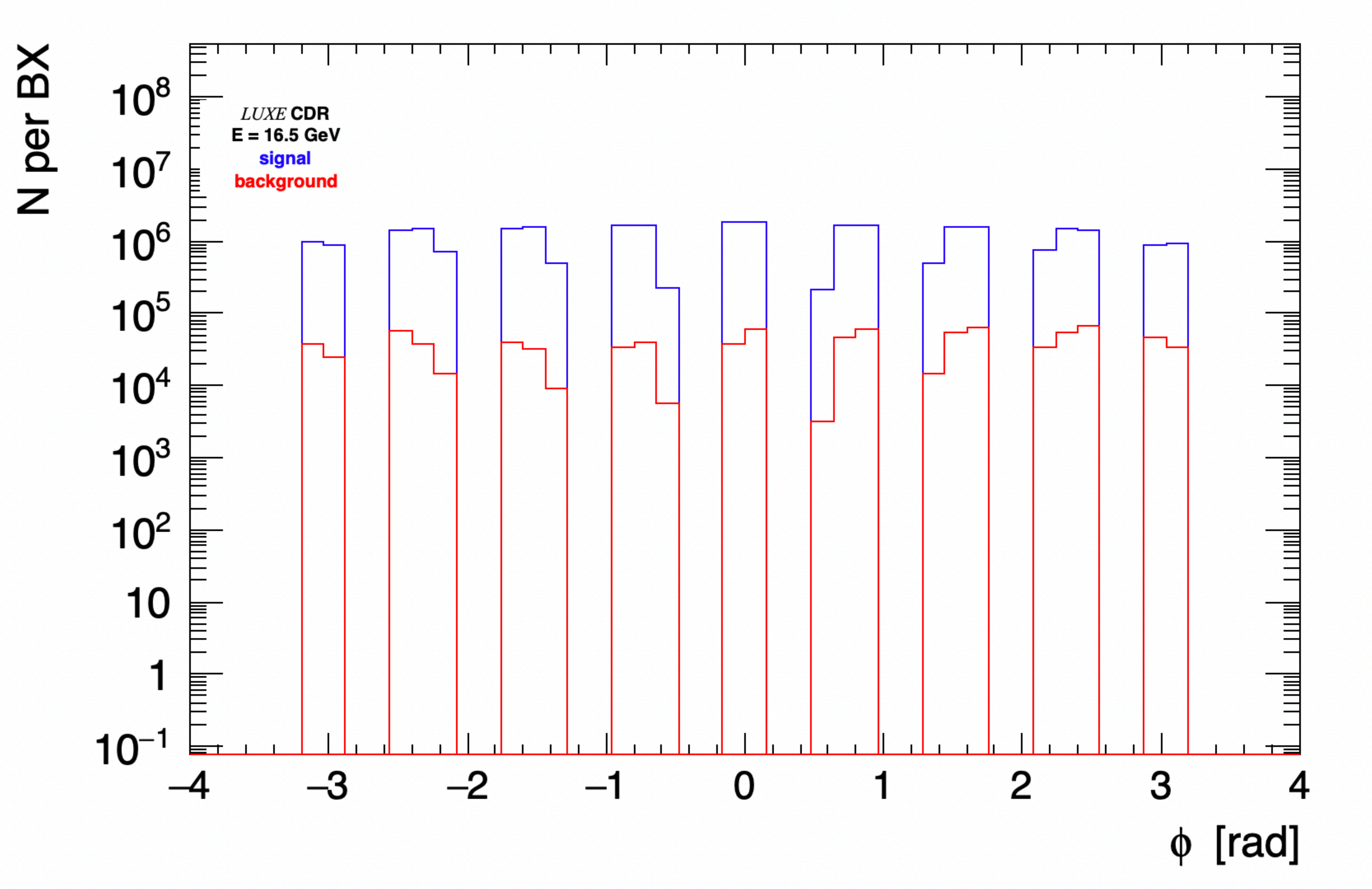




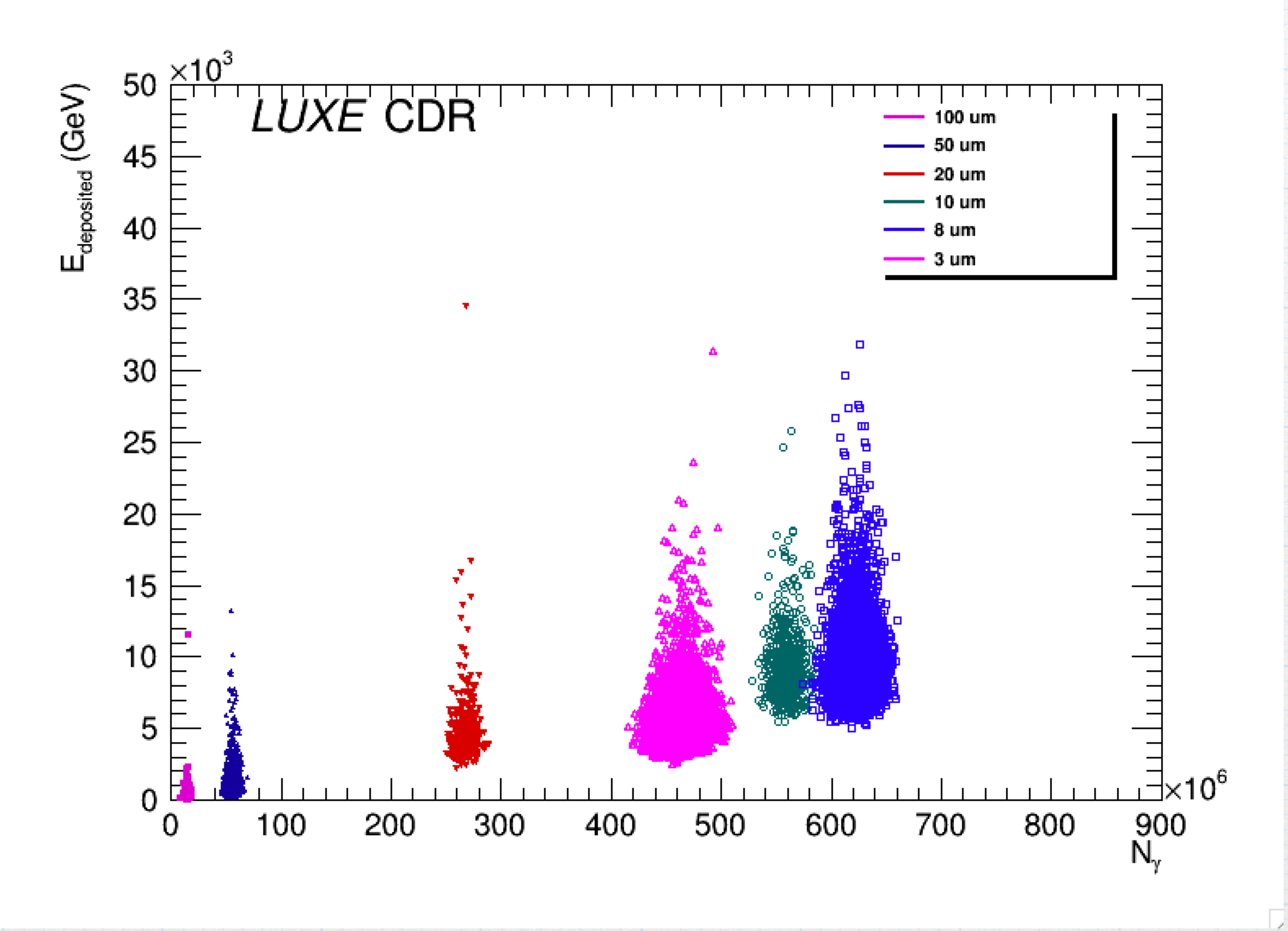


Signal/background



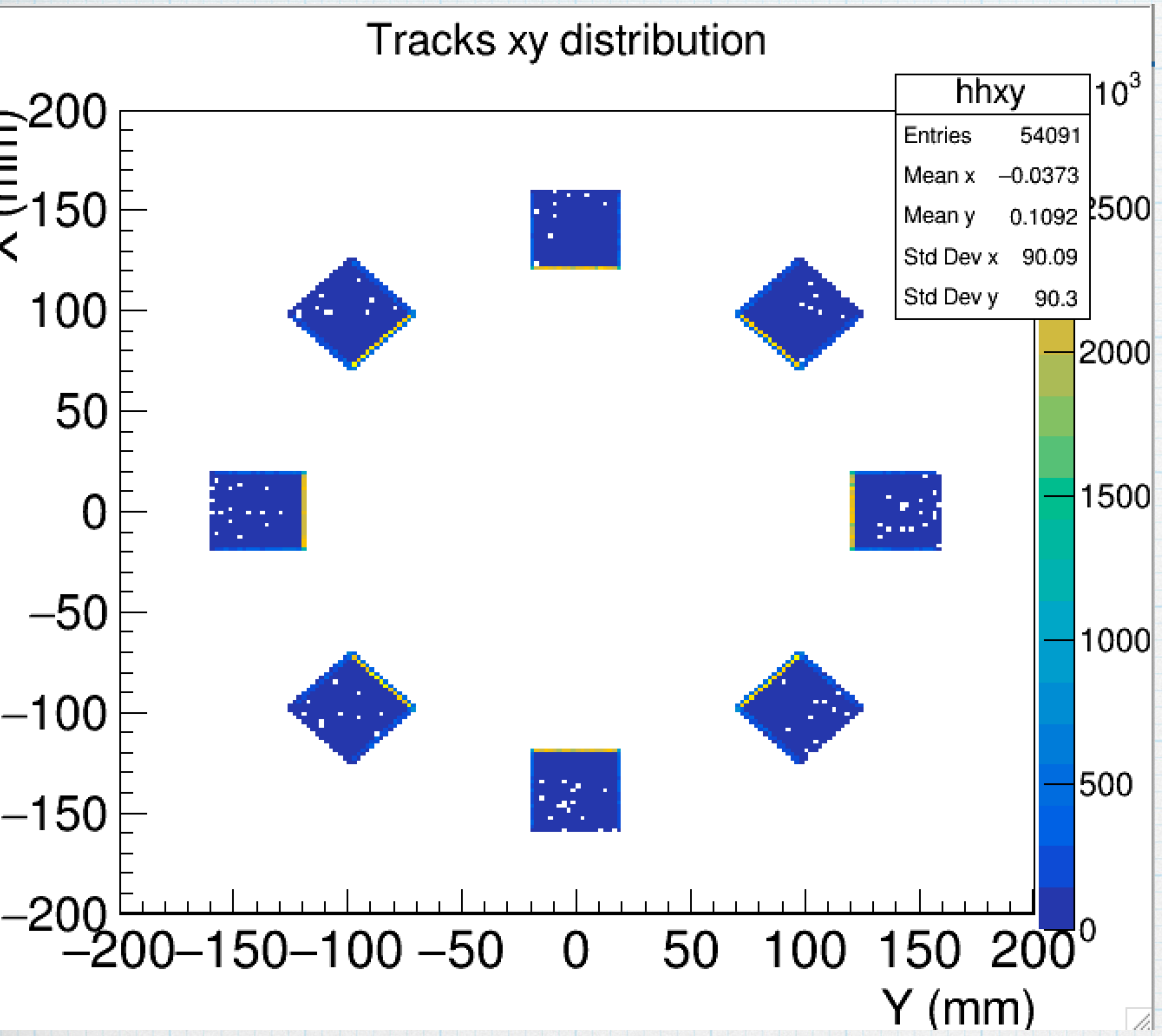


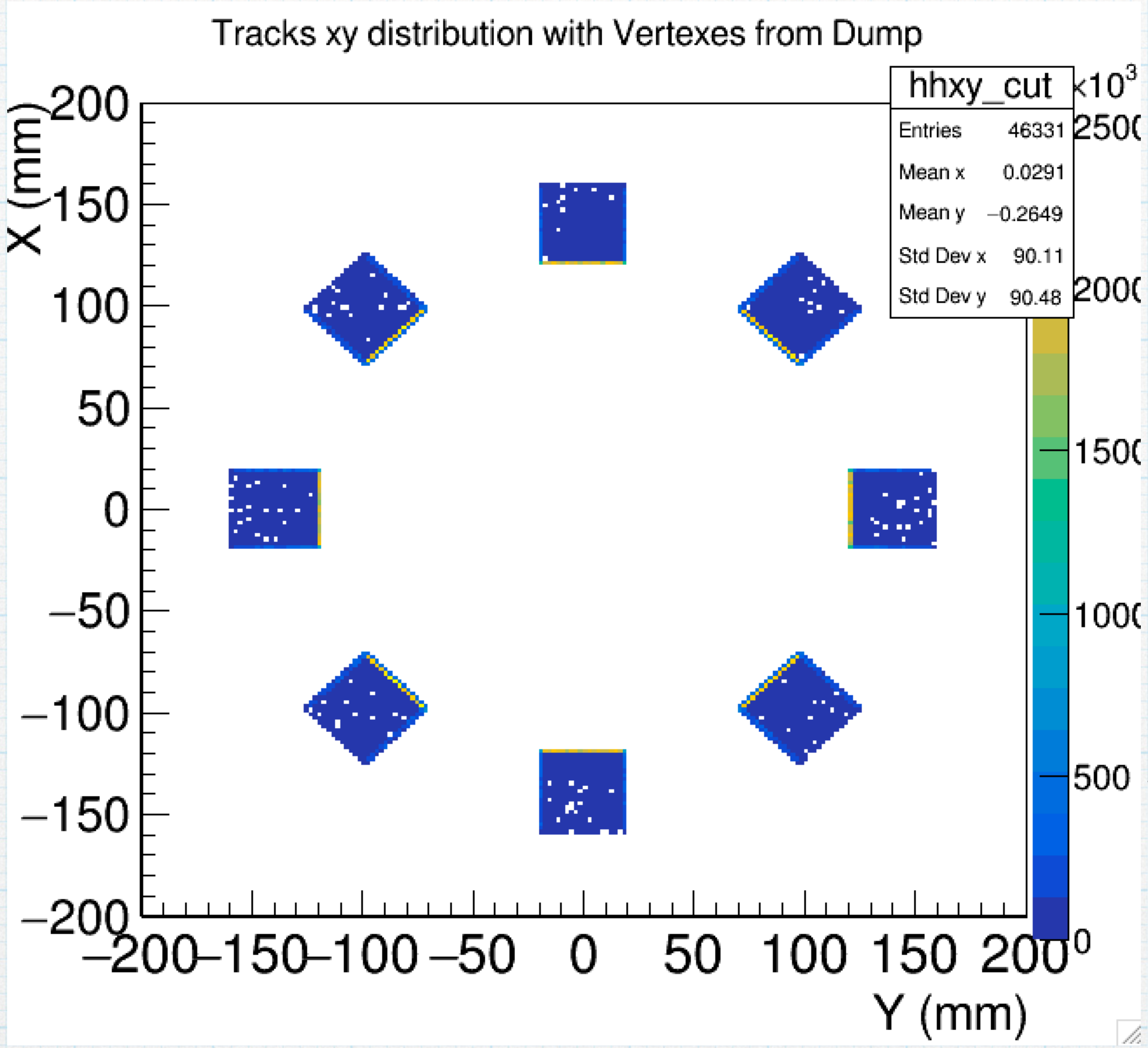
Deposited energy versus N of incident photons

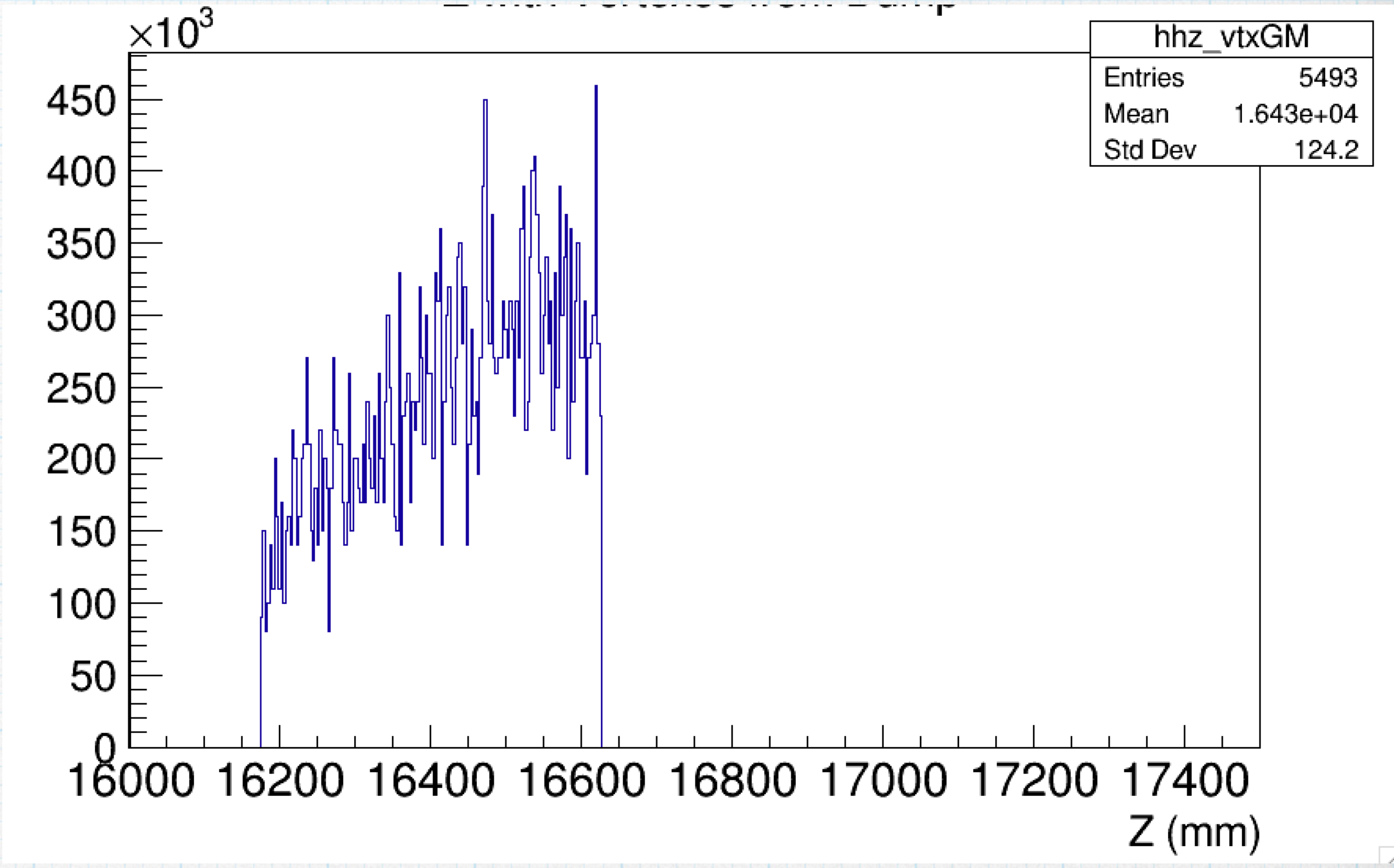


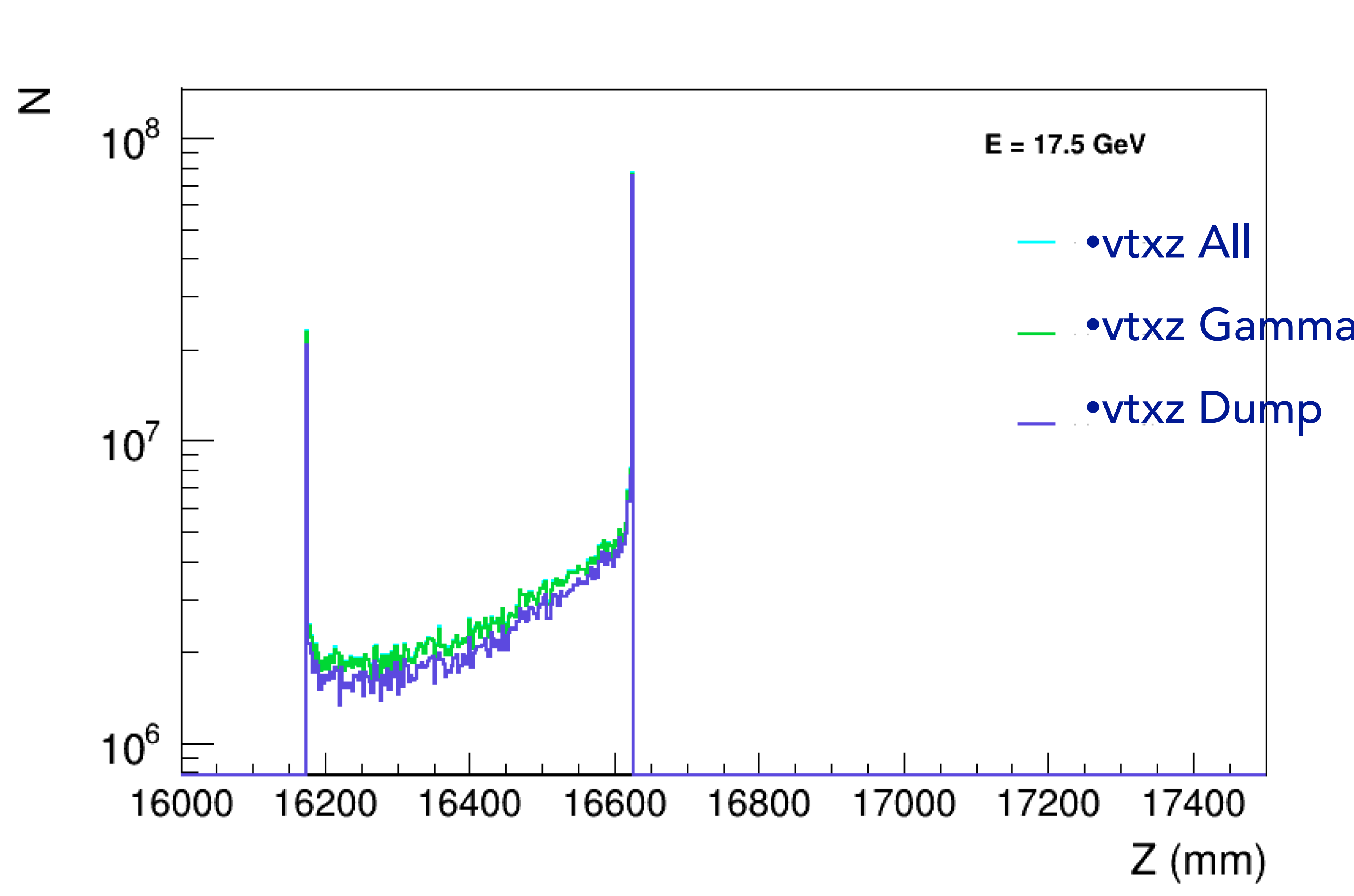
Background

- Z distributions
- Tracks with vertexes only from the GM





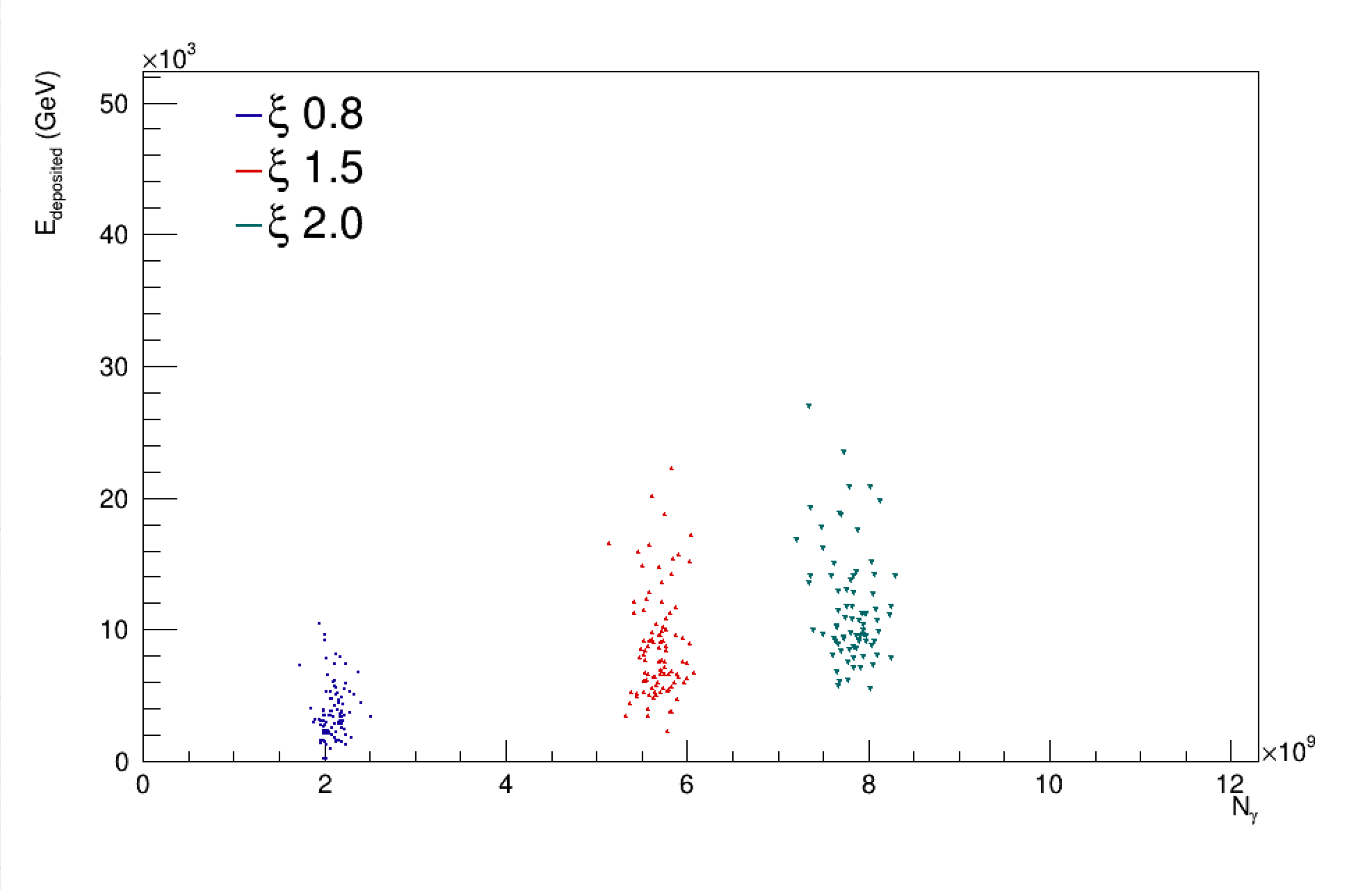




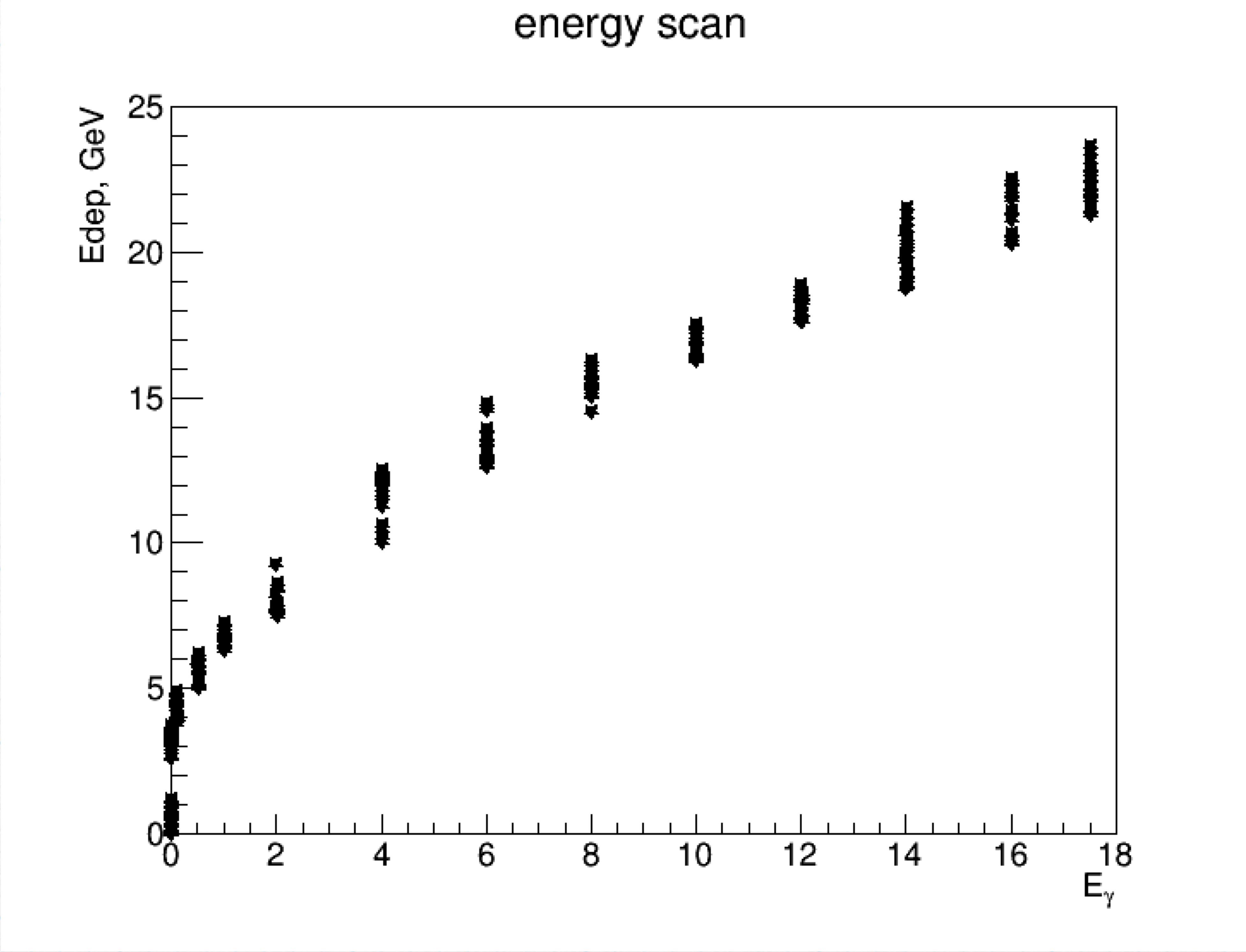
- Background events 54091- 46331 -5493 =2267
  - Background per BX ~ 4%

Simulation and Performance

Deposited energy versus true number of photons. Each point is one BX



- The (almost) linear dependence of deposited energy on number of incoming photons in GM allows the usage of backscatters for monitoring the photon flux
- For small ξ the HICS spectrum is softer and soft photons produce less back-scatters. This is the reason of small deviation from linearity in Edep on Eγ dependence

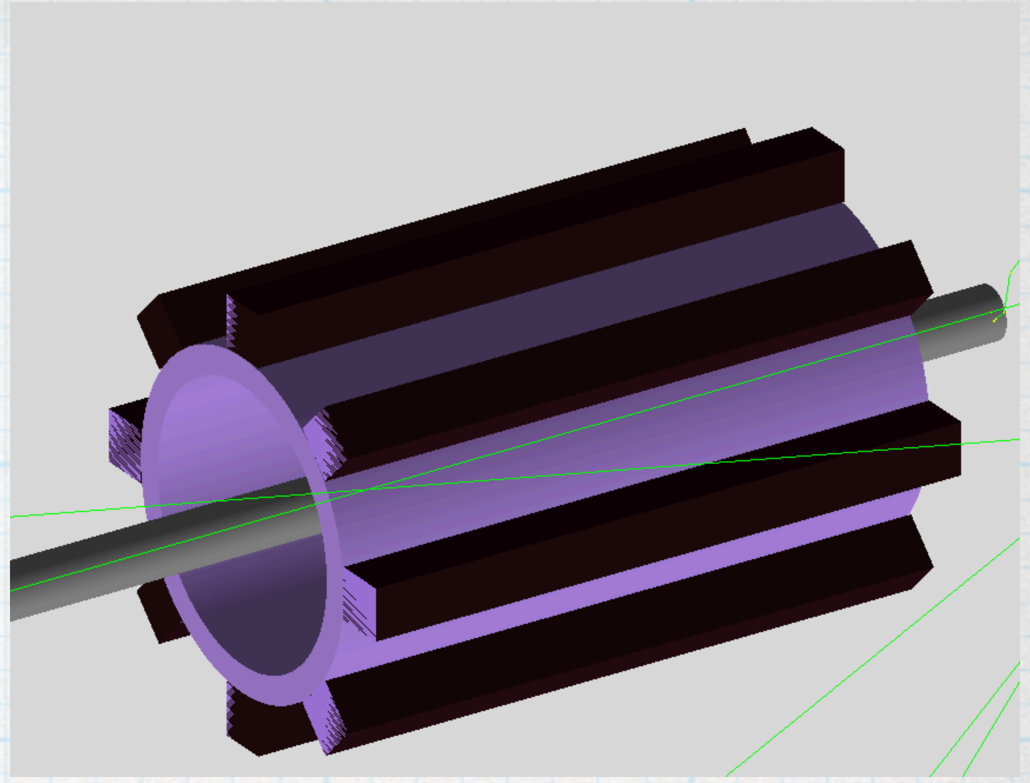


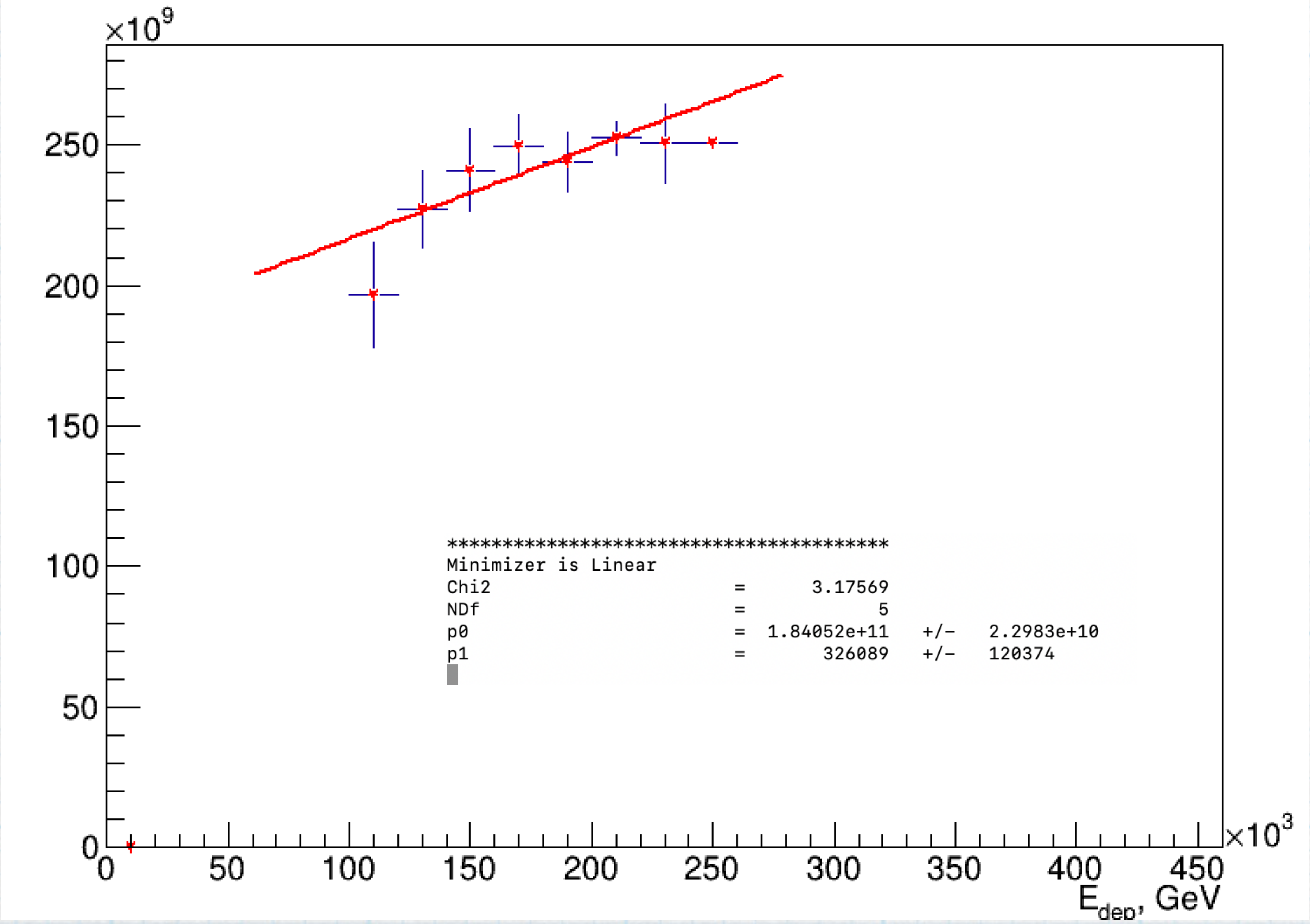
Uncertainties estimation on Number of photons

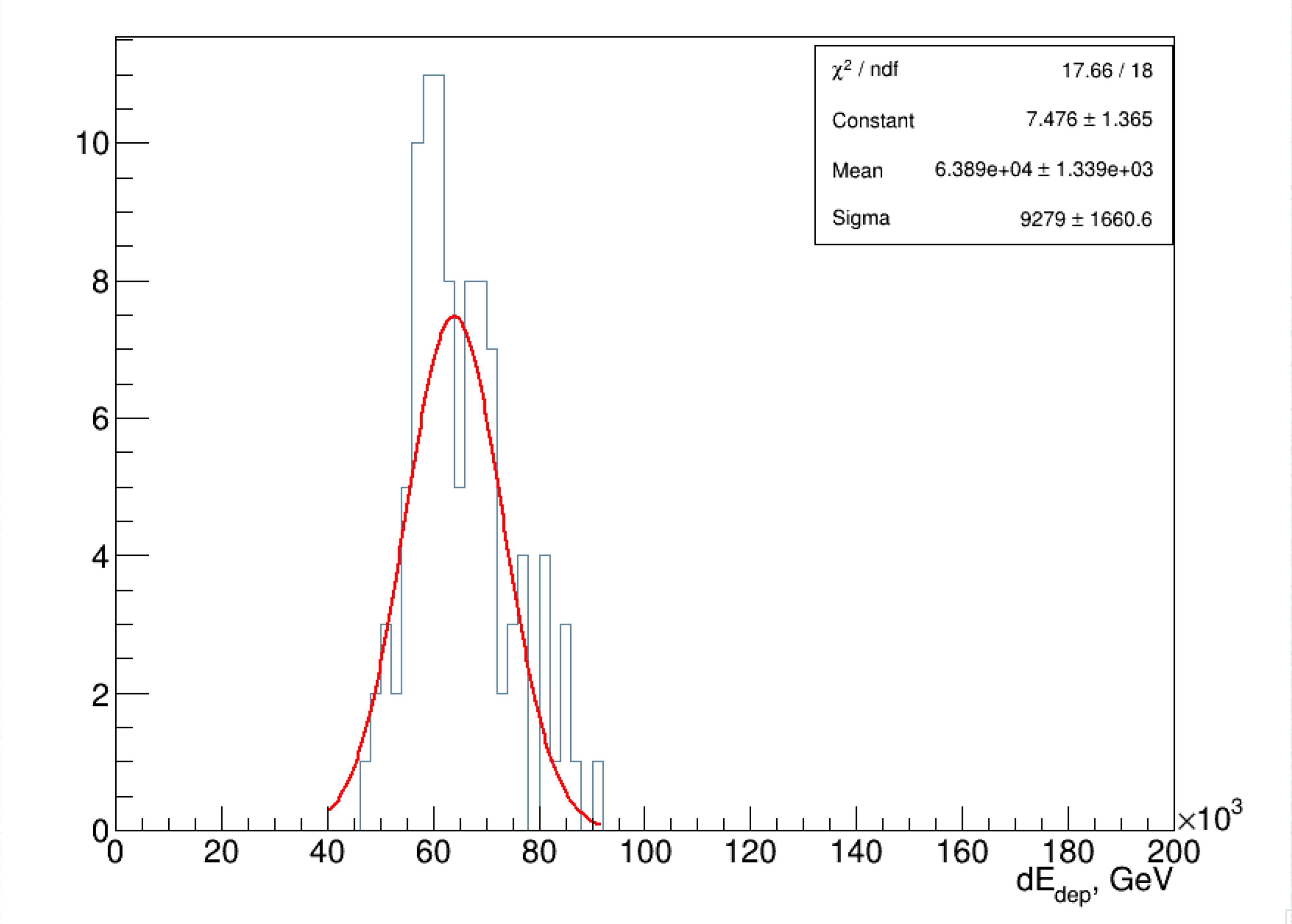
N(E) number of photons

$$\Delta N = \frac{\partial N}{\partial E}\Delta E \quad \Rightarrow \quad \frac{\Delta N}{N} = \frac{1}{N}\frac{\partial N}{\partial E}\Delta E$$

- $\xi = 2.0$





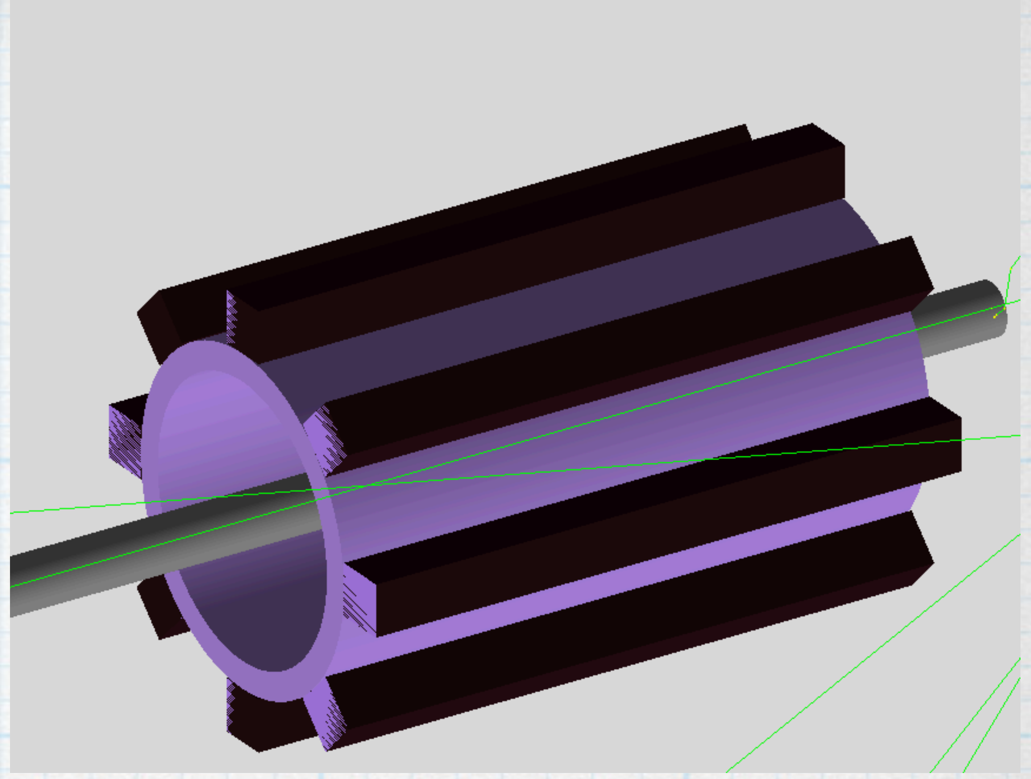


$\xi = 2.0 : \Delta N/N = 9.3*10^3*3.3*10^5/4.3*10^{10} = 7.1*10^{-2}$

$\xi = 2.6 : \Delta N/N = 3.3*10^4*3.3*10^5/2.5*10^{11} = 4.4*10^{-2}$

the uncertainty on number of measured photons will be ~ 3.5 $*10^{-3}$ - 7.1 $*10^{-2}$.

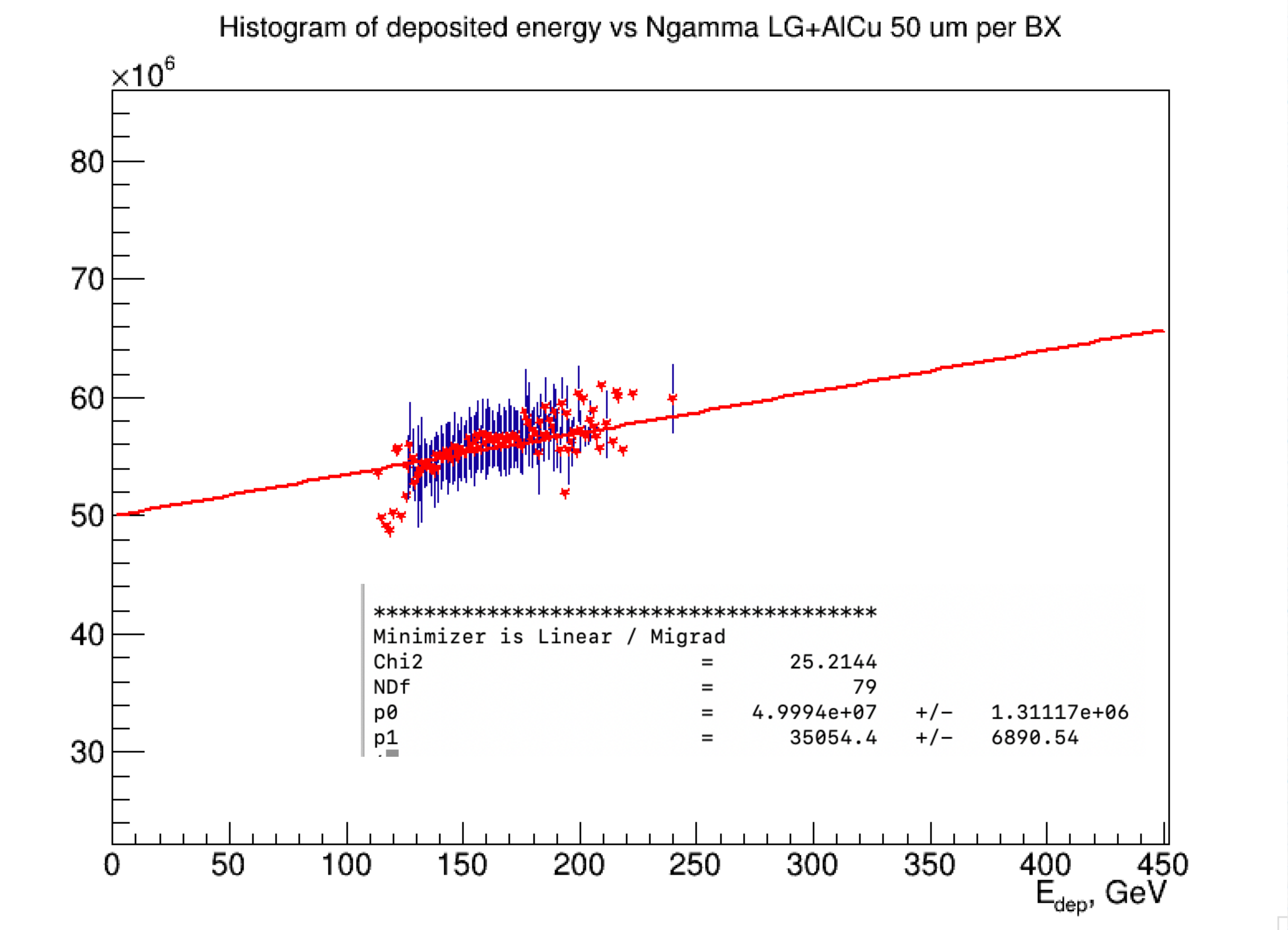
Uncertainties estimation on Number of photons

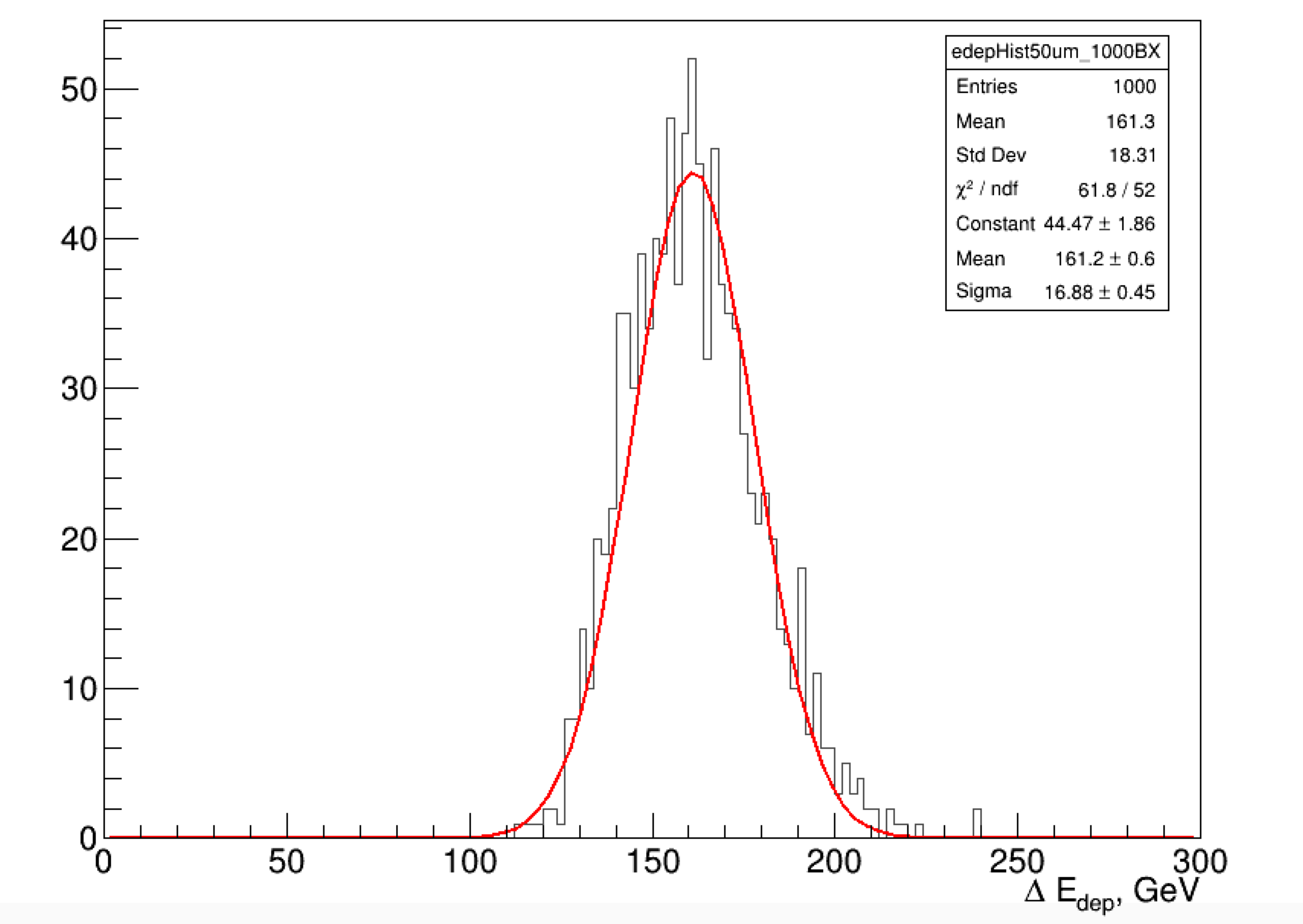


- ξ = 0.31, 50 um laser spot

N(E) number of photons

$$\Delta N = \frac{\partial N}{\partial E}\Delta E \quad \Rightarrow \quad \frac{\Delta N}{N} = \frac{1}{N}\frac{\partial N}{\partial E}\Delta E$$

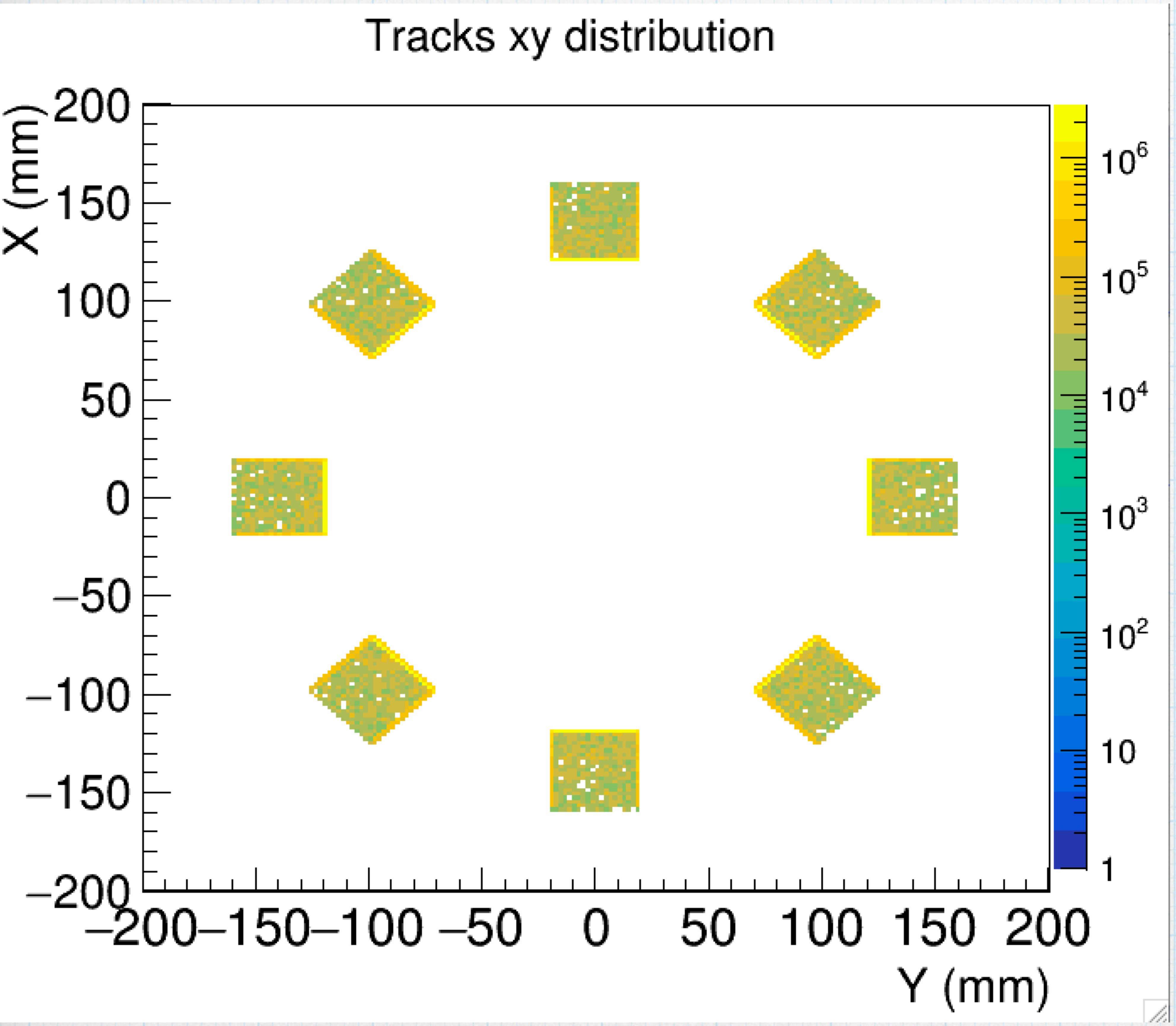


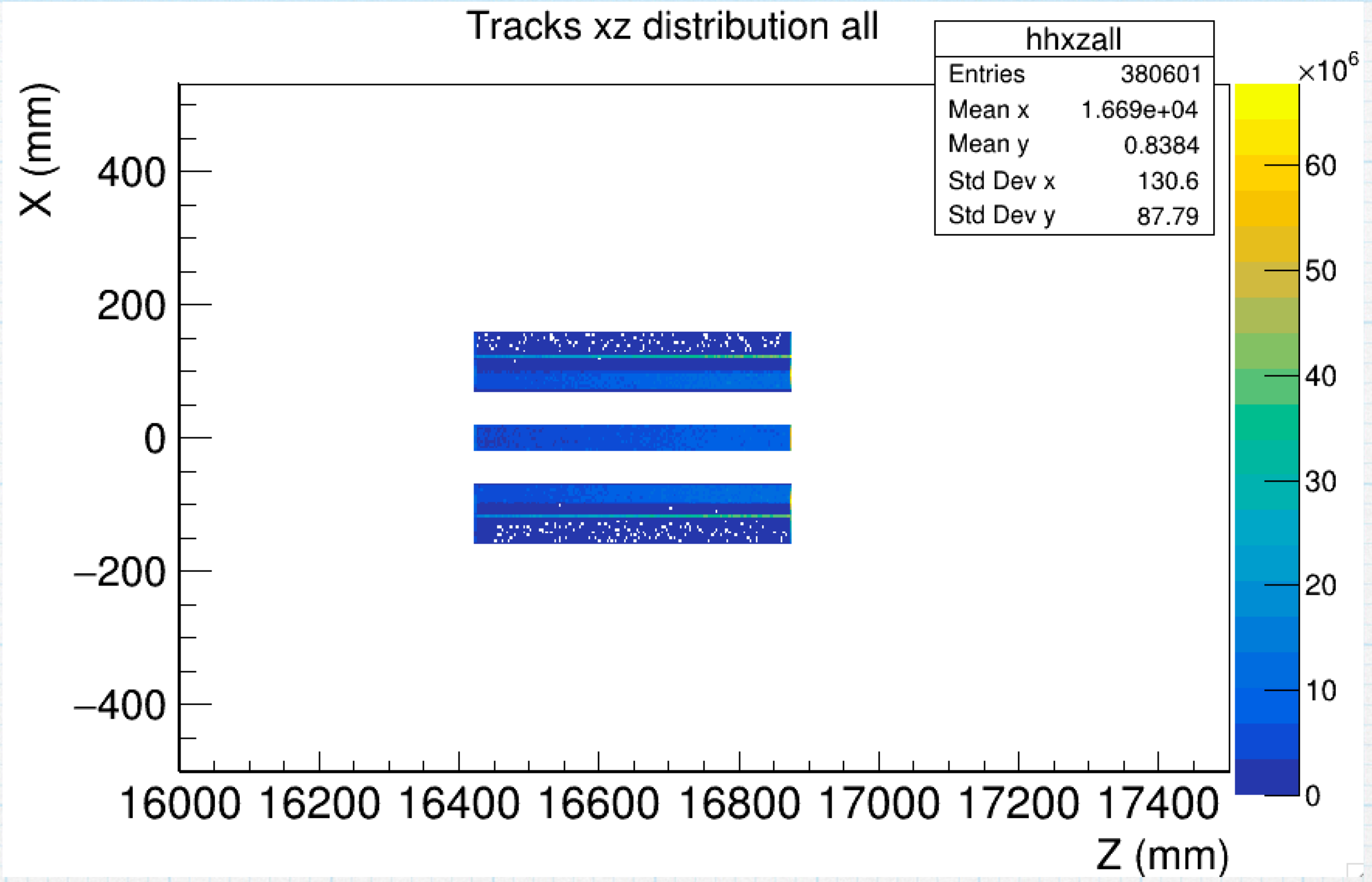


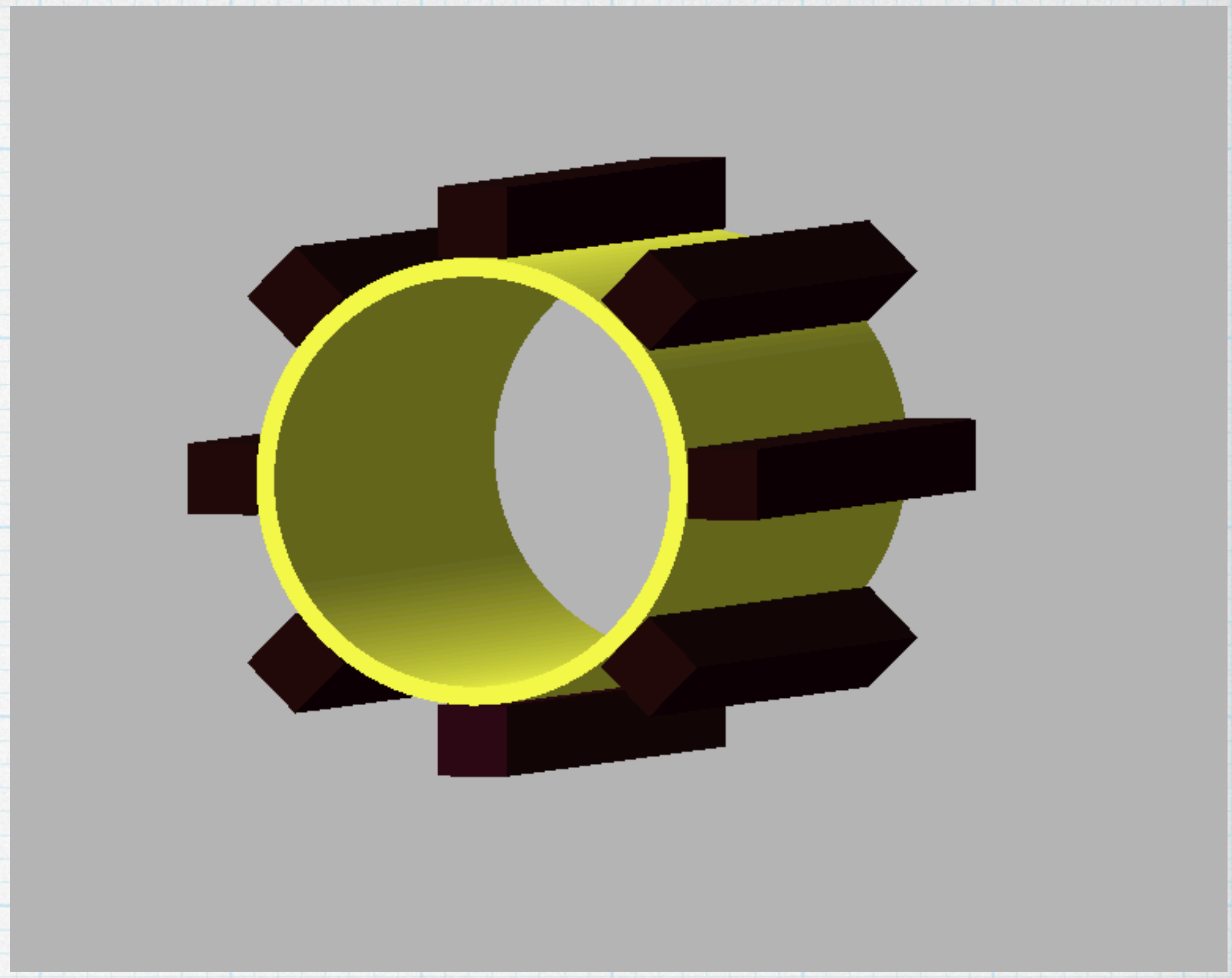
the uncertainty on number of measured photons will be ~ 10^{-2}.

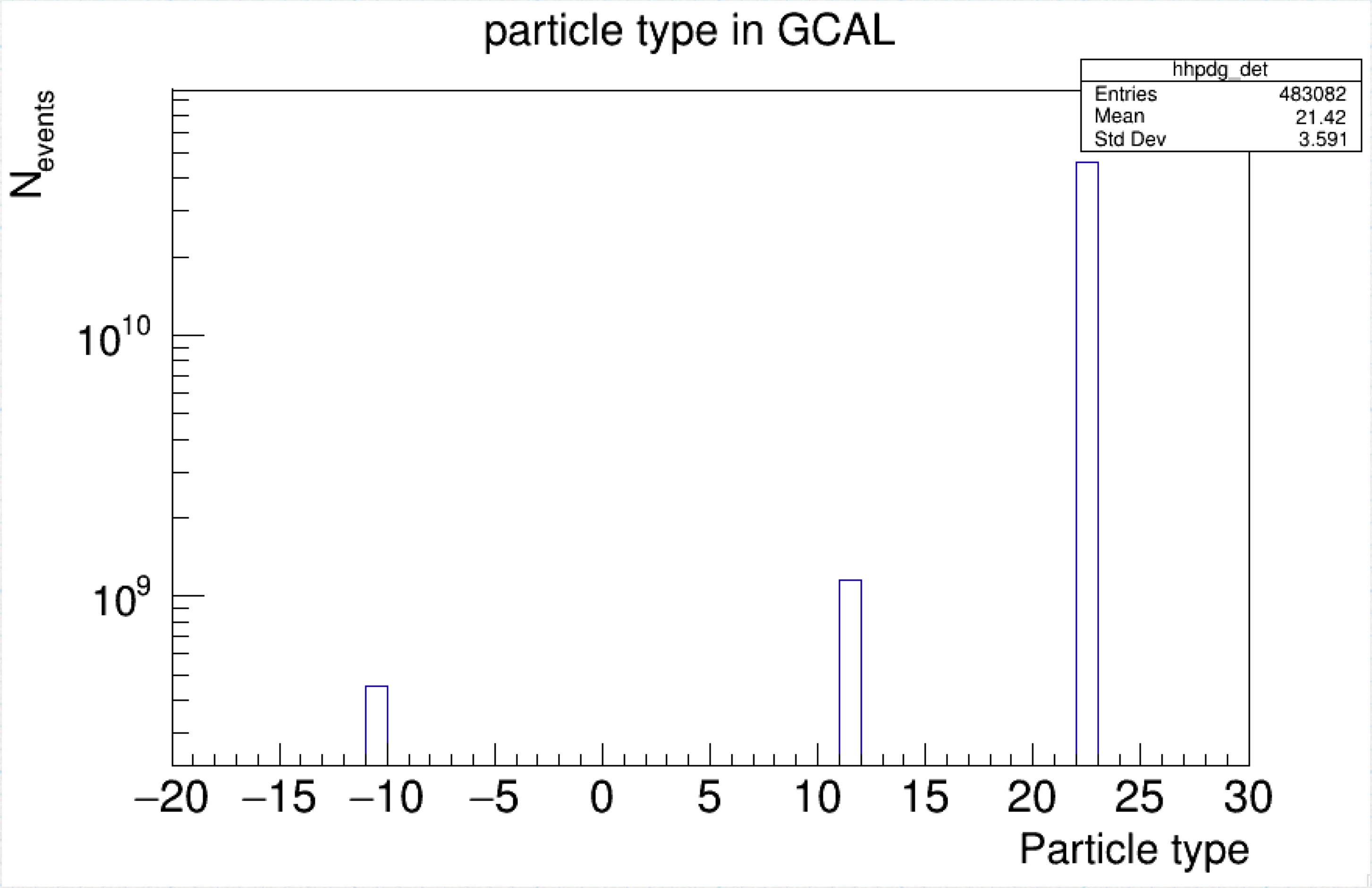
ξ = 0.3 : $\Delta N/N = 3.5 \cdot 10^{4} \cdot 16.88/5.67 \cdot 10^{7}$ = **$1 \cdot 10^{-2}$**

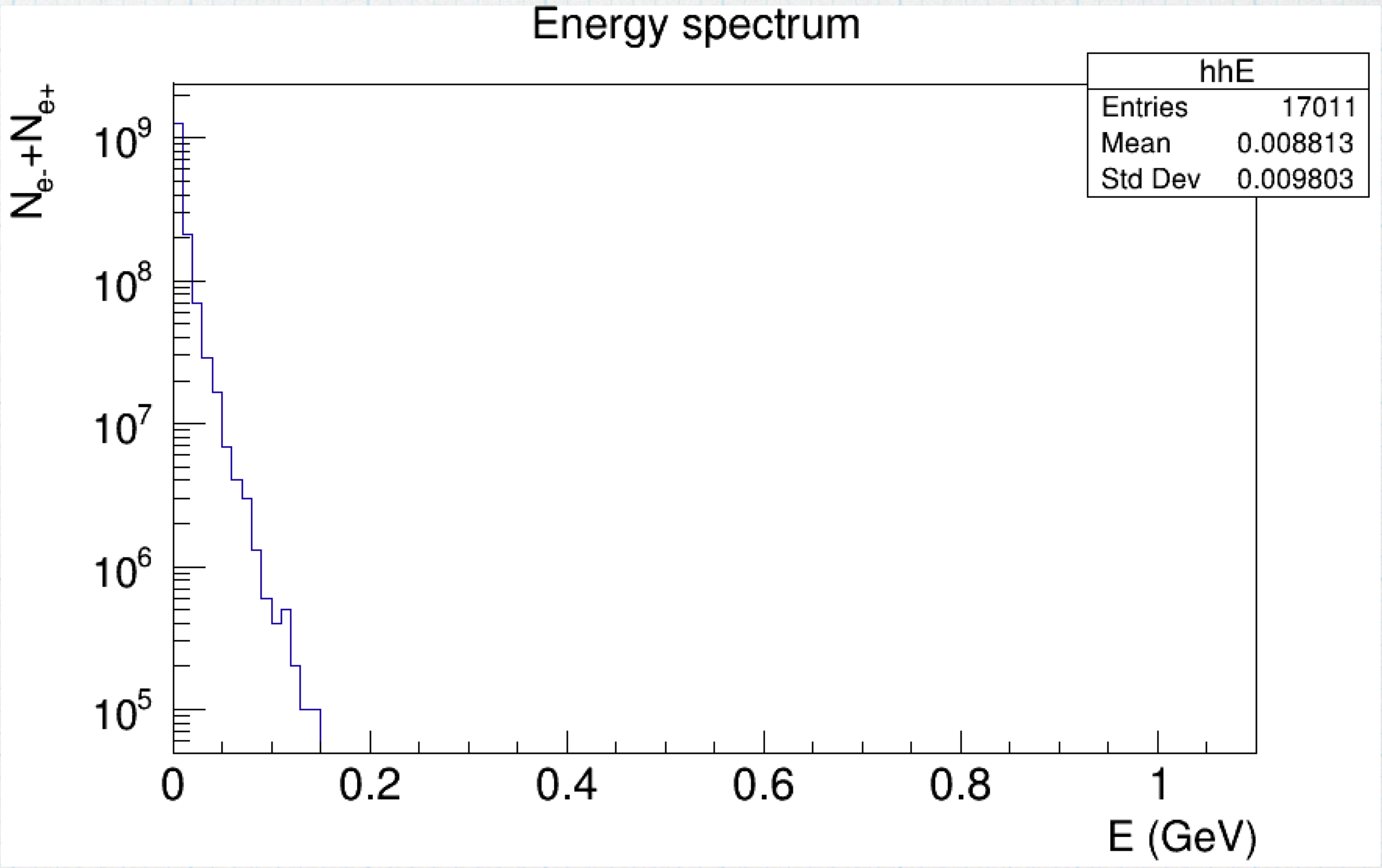
Gamma Flux Monitor











- At high laser intensities ξ =2.6 (1J)