

Forward detector system for the LUXE experiment

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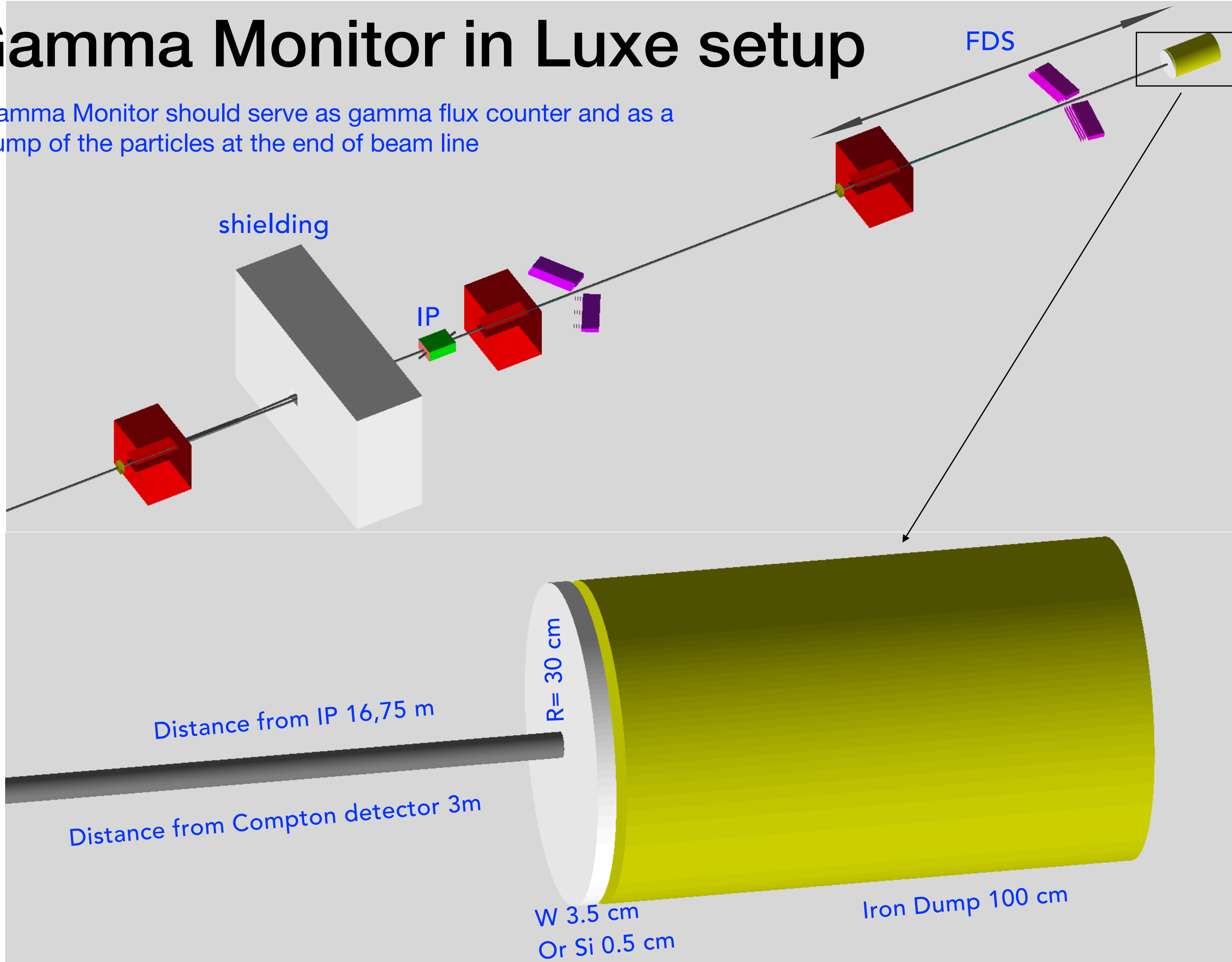
Luxe Technical meeting

DESY Hamburg

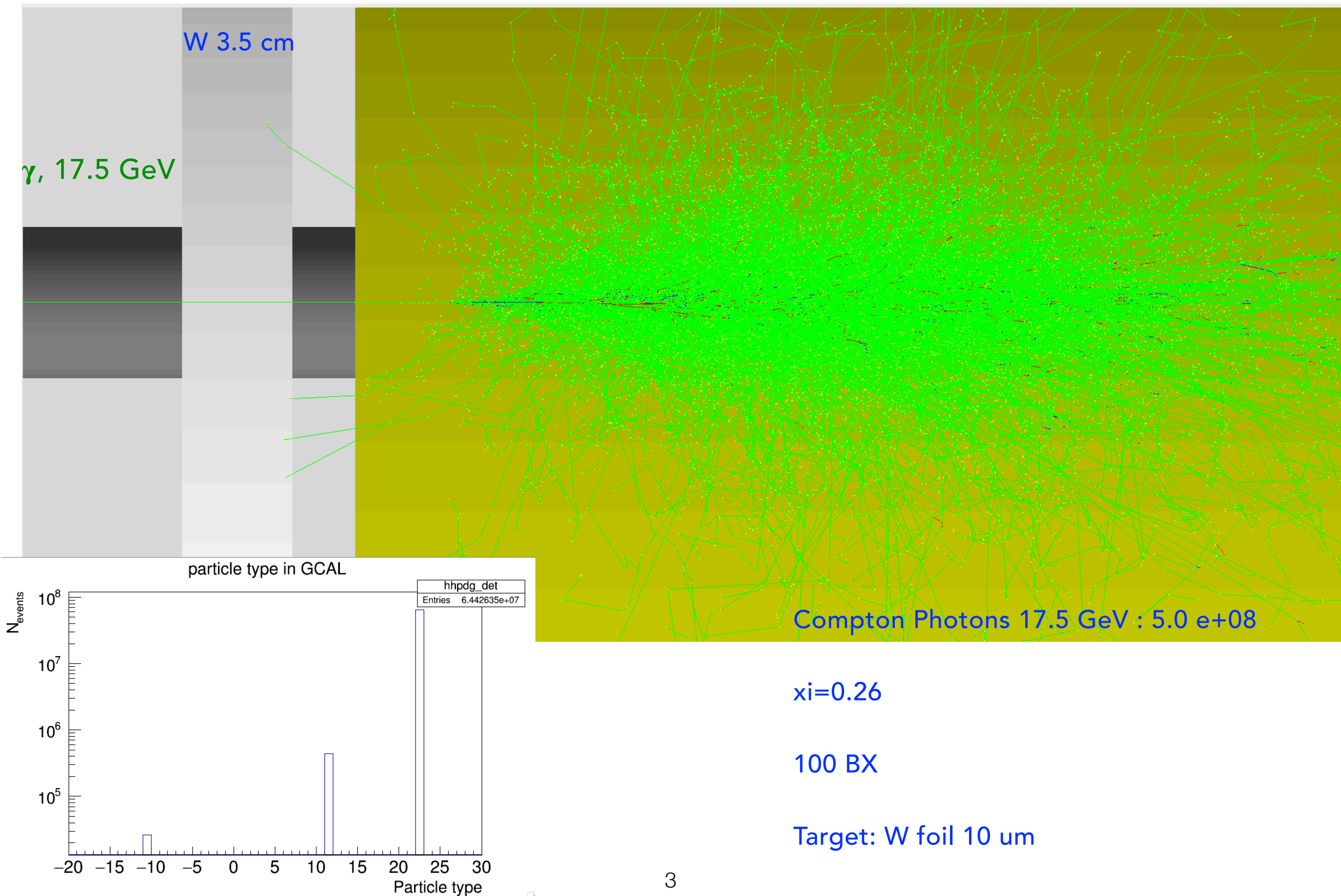
The logo for the LUXE experiment, featuring the word "LUXE" in a bold, blue, sans-serif font. A stylized, multi-pointed star or asterisk is positioned over the letter "X".

Gamma Monitor in Luxe setup

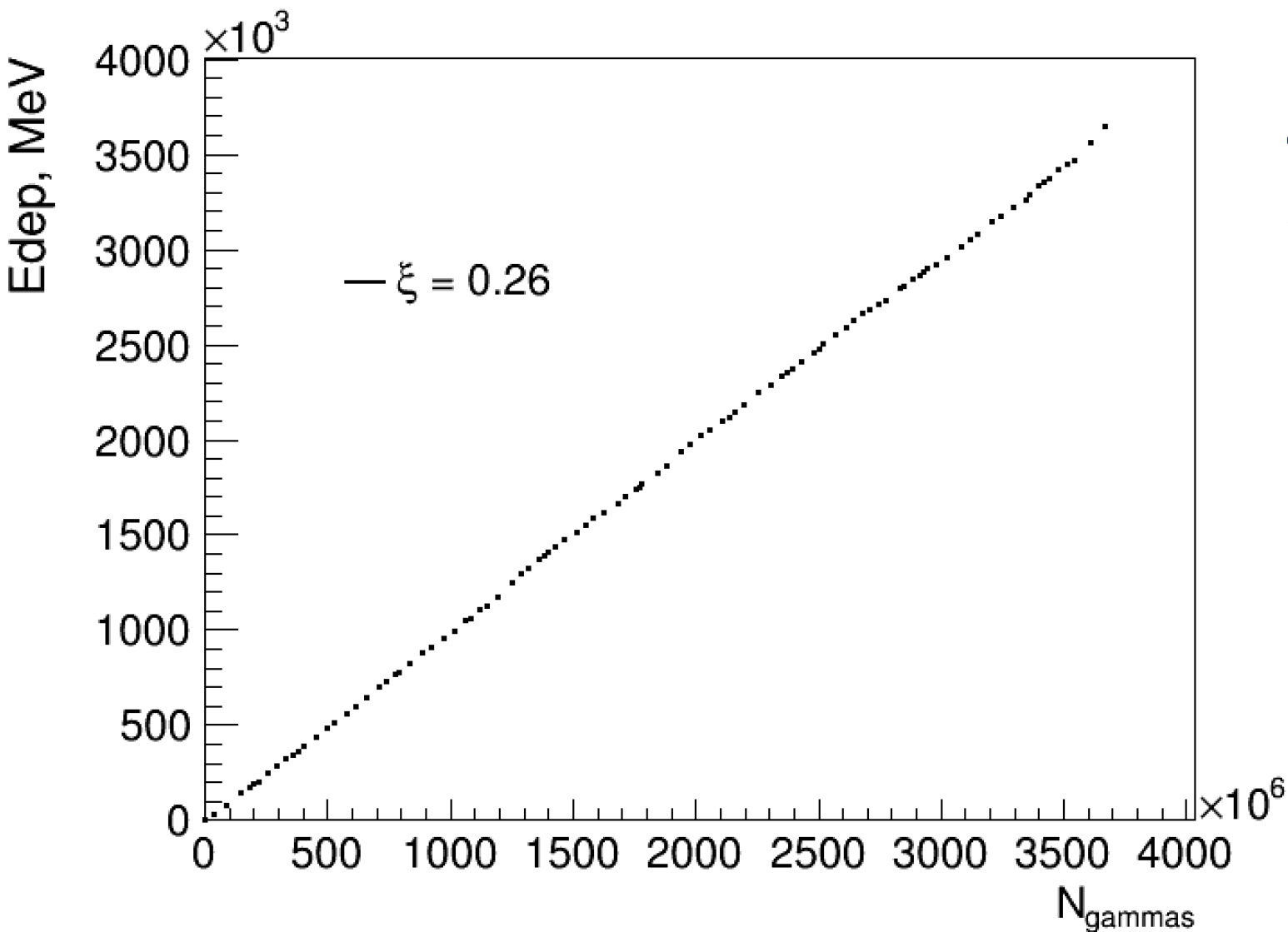
Gamma Monitor should serve as gamma flux counter and as a dump of the particles at the end of beam line



One event of 17.5 GeV photon in Gamma Monitor

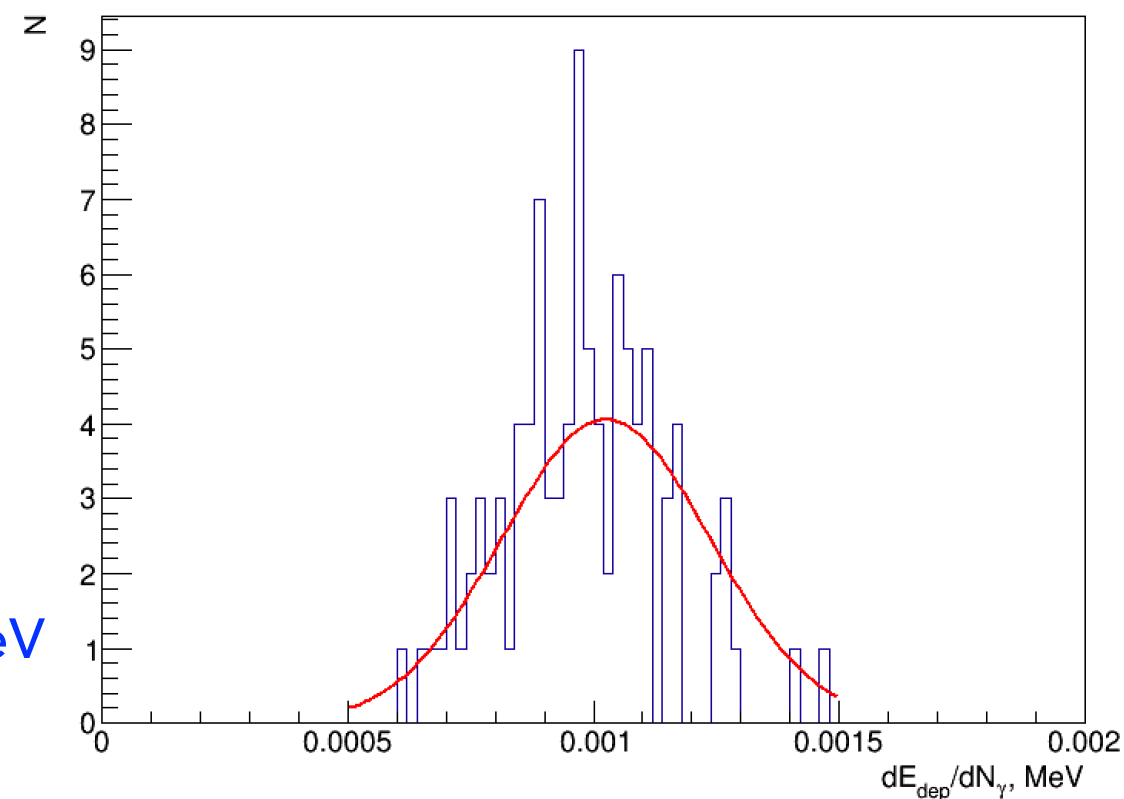


Energy dependence on number of incoming photons



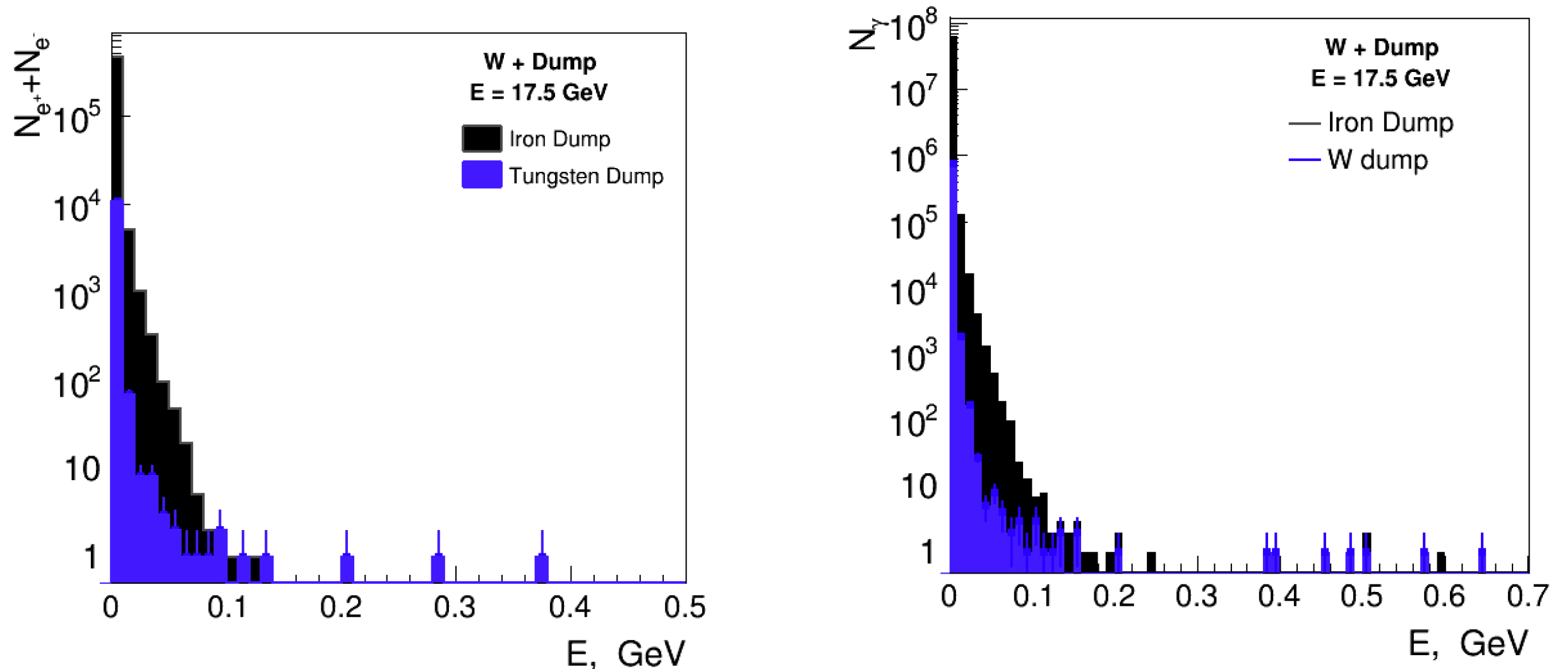
The linear dependence of deposited energy on number of incoming photons allows the usage of backscatters for estimating the photon flux

Ratio of deposited energy to the number of photons per BX



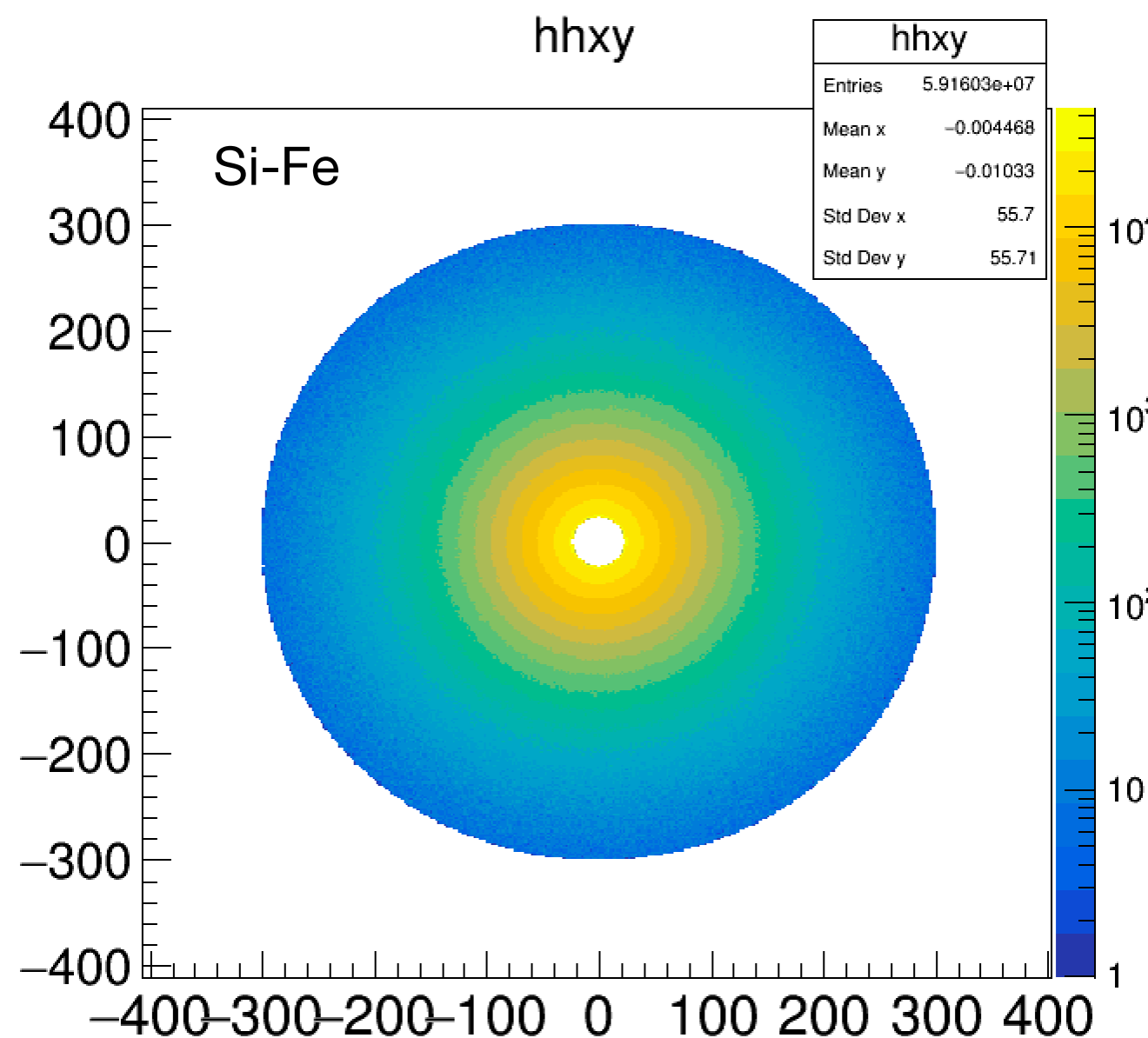
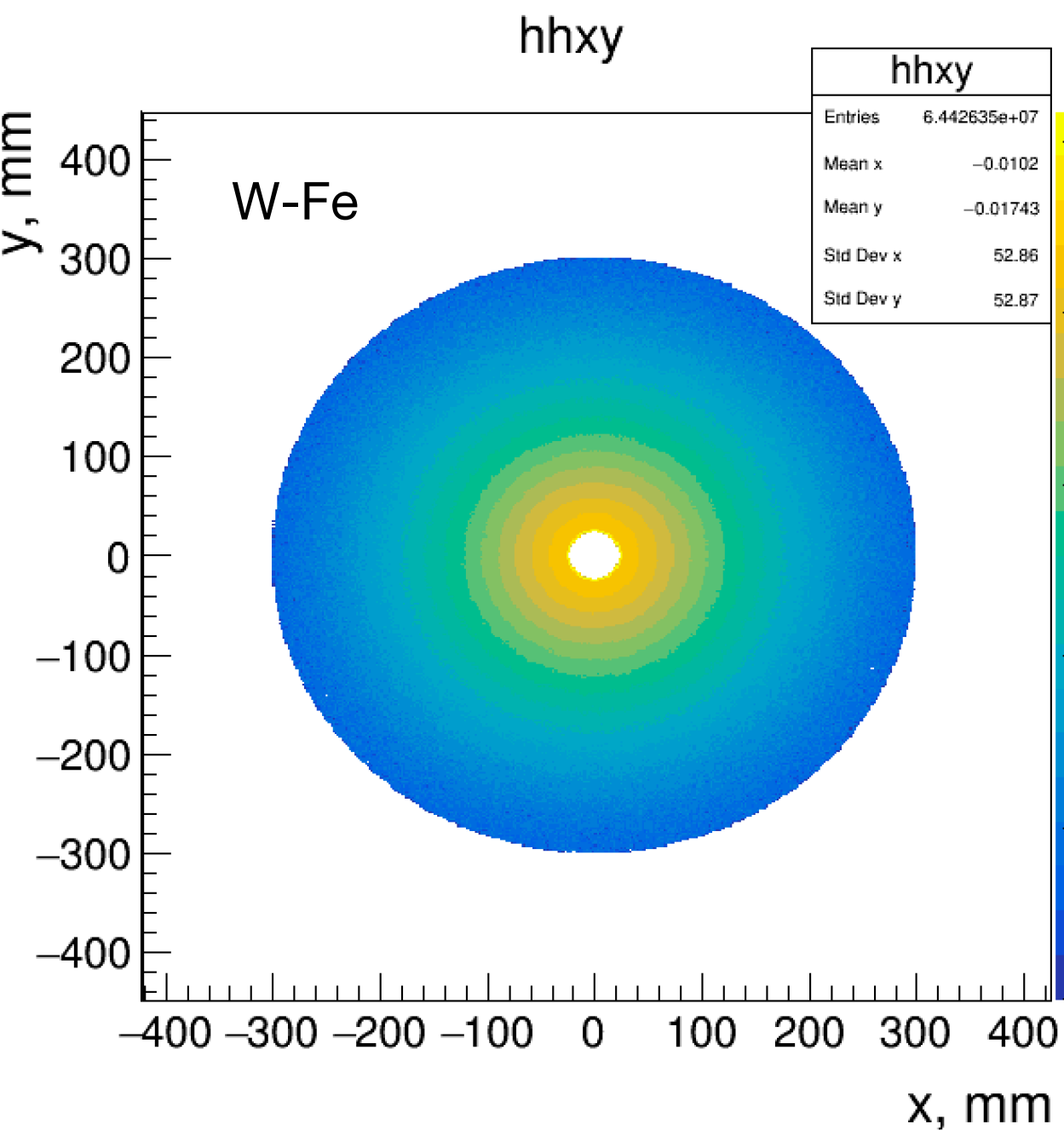
In average one γ deposits ~ 1 keV; w/ the sigma 0.2 keV

Energy of tracks hitting the W calorimeter

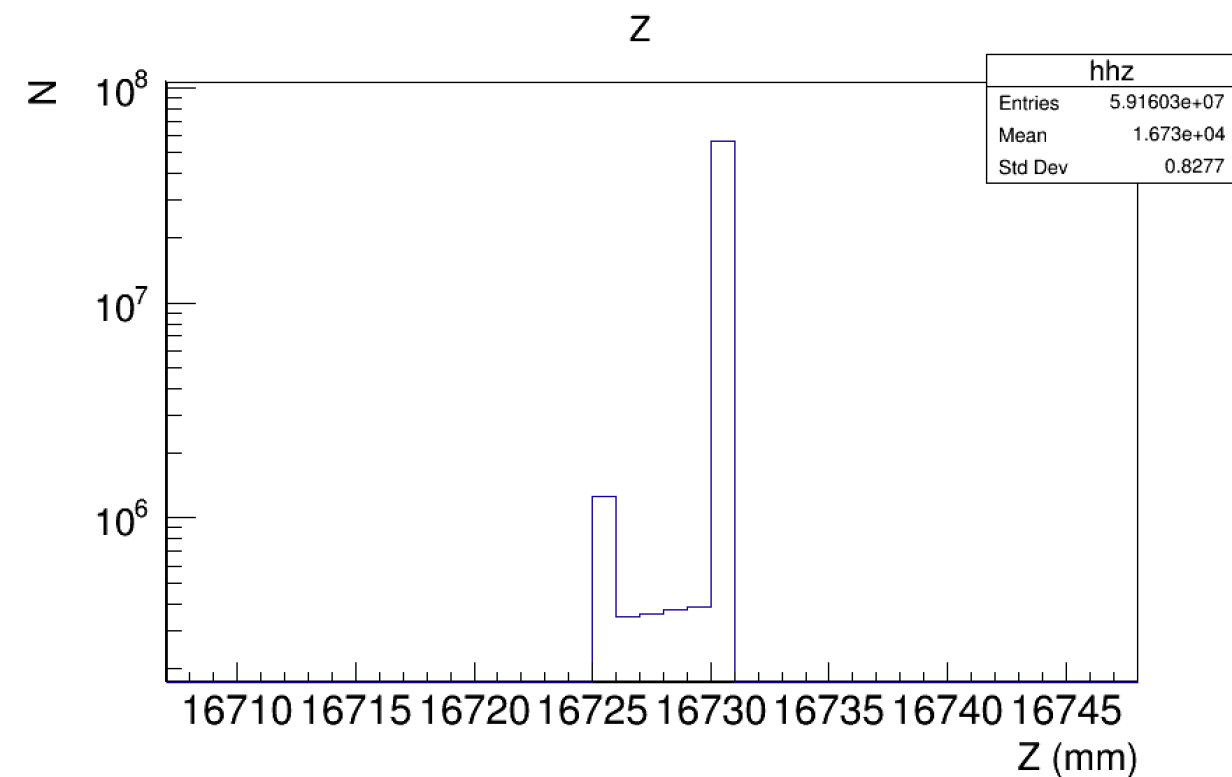
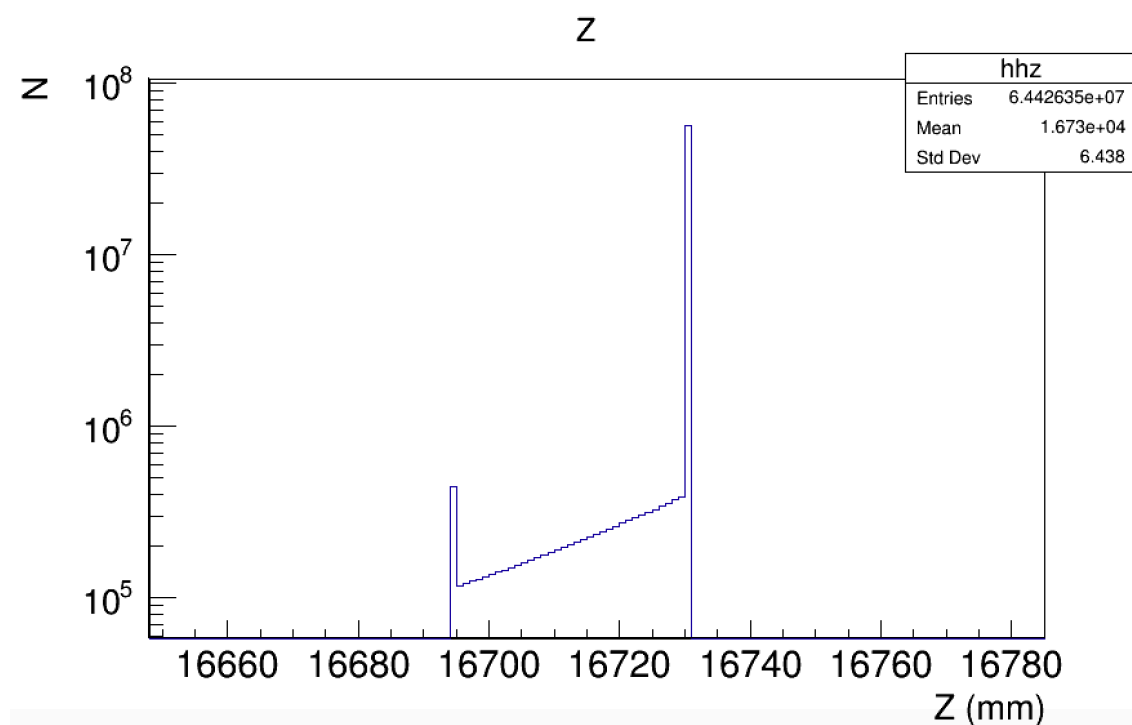
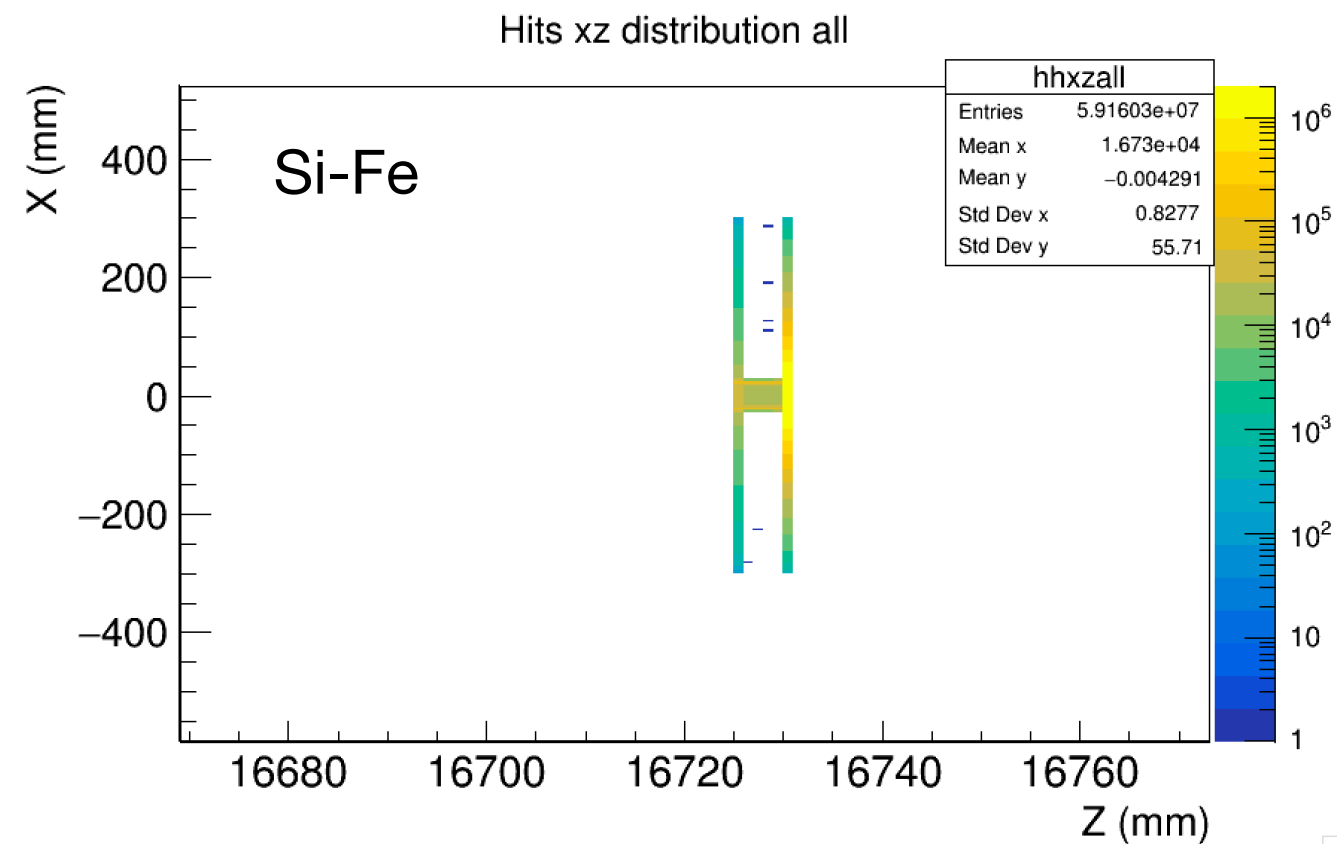
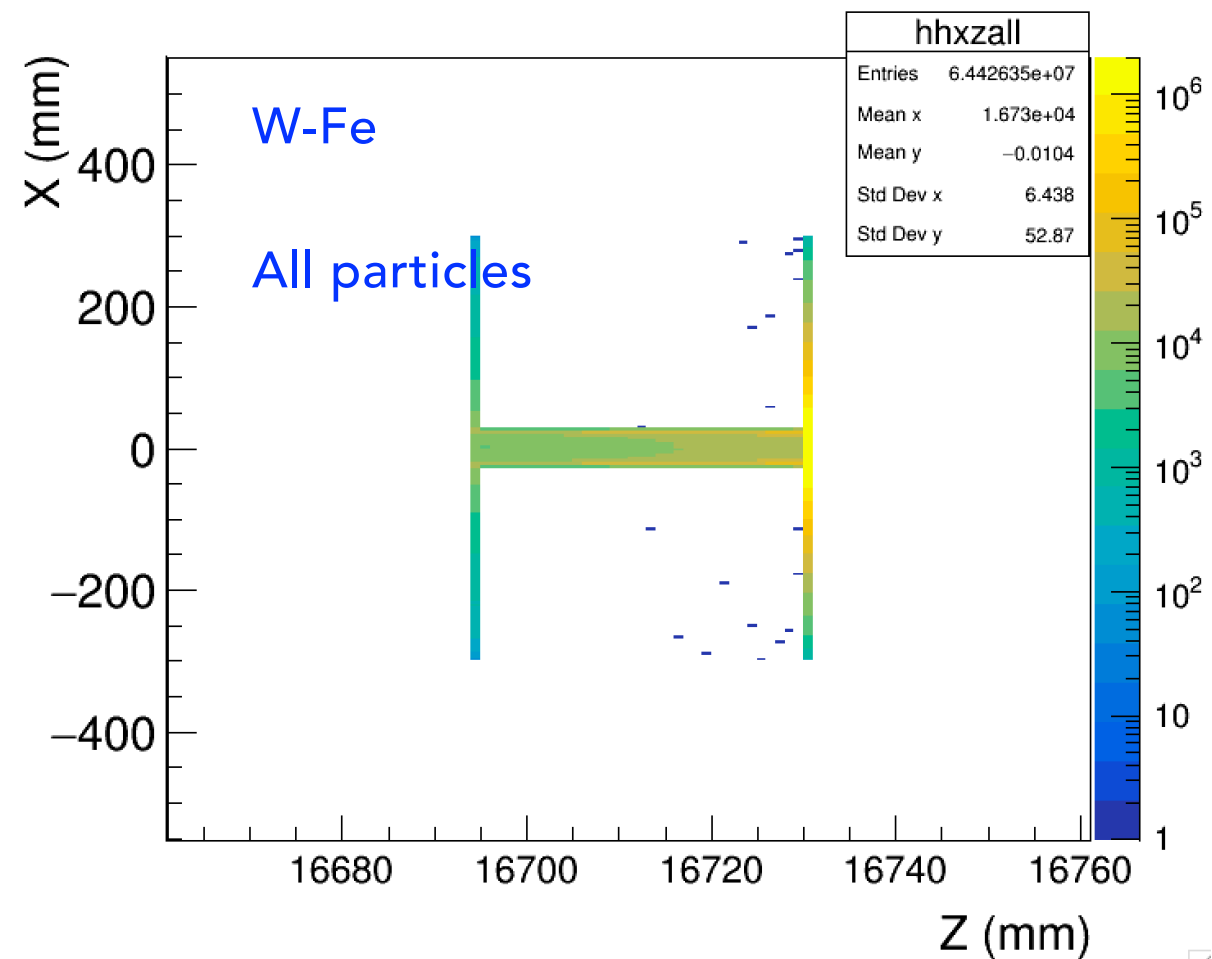


The energy spectrum of backscatters is below 1 GeV and for the vast majority is below critical energy for the most detector materials

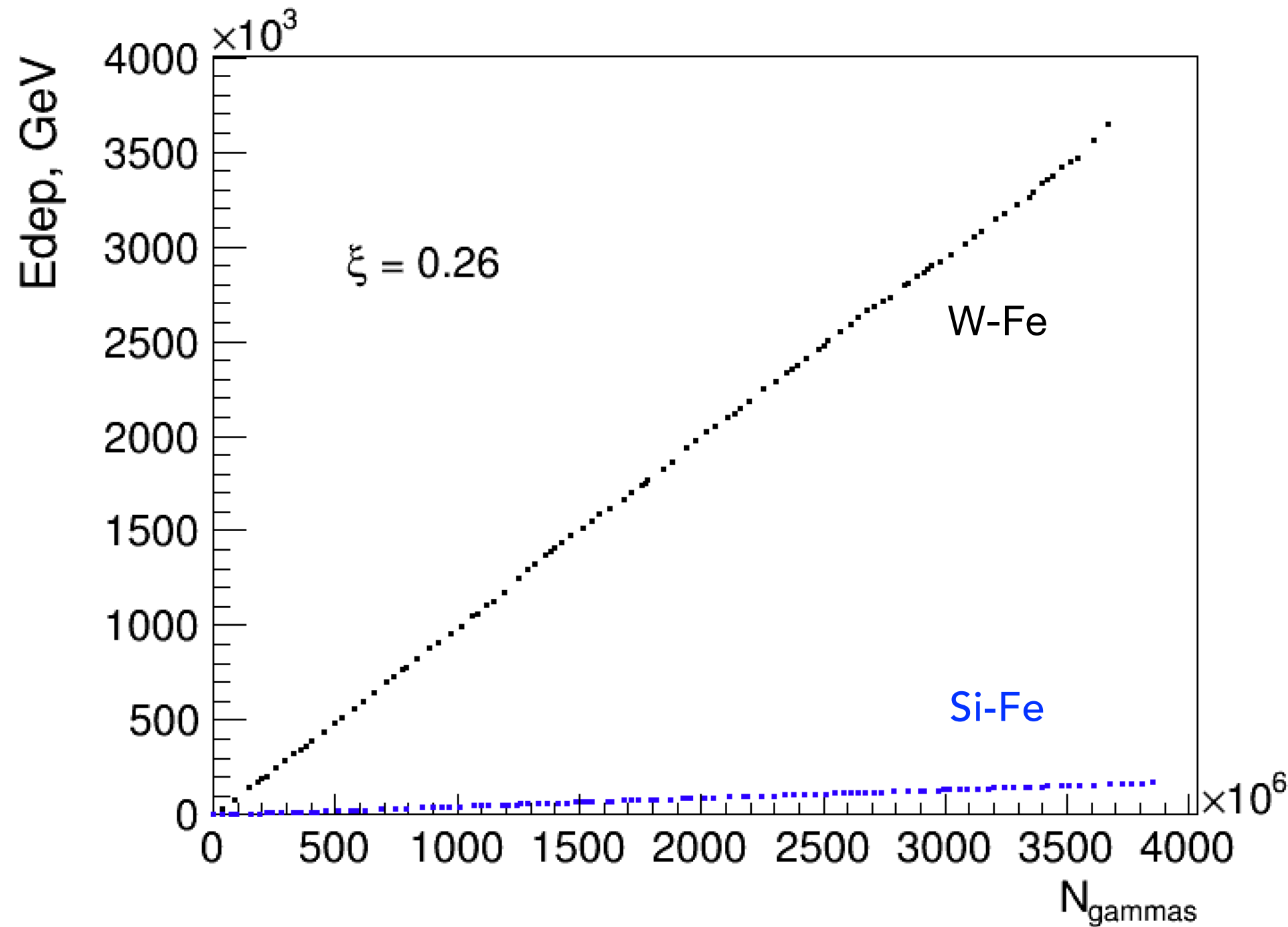
Distribution of tracks entering the XY plane of W vs Si Gamma monitors for backscatters



Distribution of tracks entering the XZ plane of W & Si calorimeters for backscatters

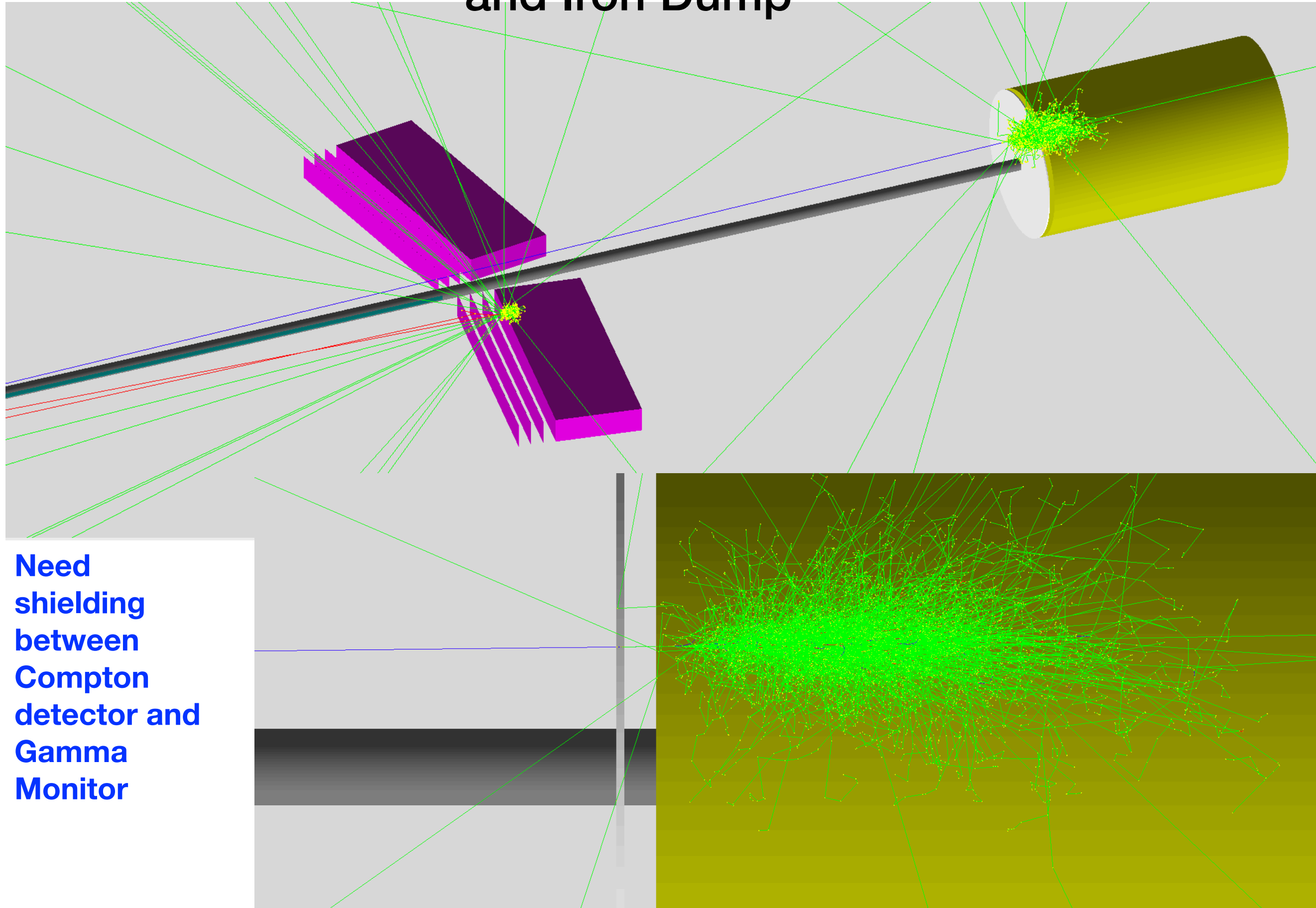


Energy dependence on number of incoming photons for Si vs W Gamma monitors



In average one γ deposits ~ 1 keV; w/ the sigma 0.2 keV

One event of 17.5 GeV photon in 5 mm Si Gamma Monitor and Iron Dump



Outlook

- **Gamma monitor studies:**

- ✱ **Gamma Monitor is studied in simple configuration in GEANT4 w/ W Calorimeter in front of Iron Dump**
- ✱ **The linear dependence of deposited energy on number of incoming photons allows the usage of backscatters for counting the photon flux**
- ✱ **The energy spectrum of backscatters is below 1 GeV and for the vast majority is below critical energy for the most detector materials**
- ✱ **The distribution of track entering the W calorimeter in XZ plane has non-negligible background, particles hit the Gamma Monitor directly and need to be studied**

Further studies:

To consider more realistic model of the detector

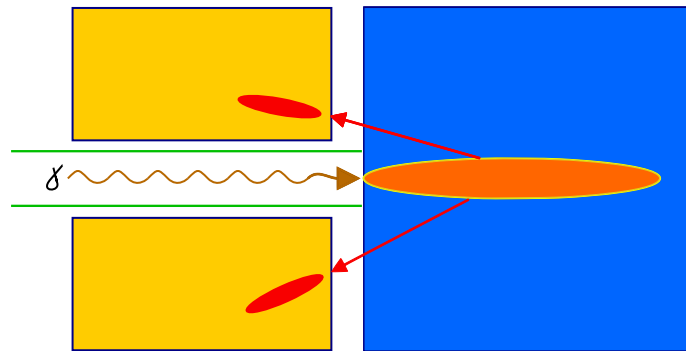
To add shielding after Compton detector

To study background

Back up

Possible realisation for GCAL

- * Considering the energies the LumiCal in present configuration couldn't be an option but we could use probably Iron-Si sampling calorimeter (couple of layers)
- * Sapphire (Al_2O_3) could be an option , need ~10 cm



Si Gamma Monitor and Iron Dump

