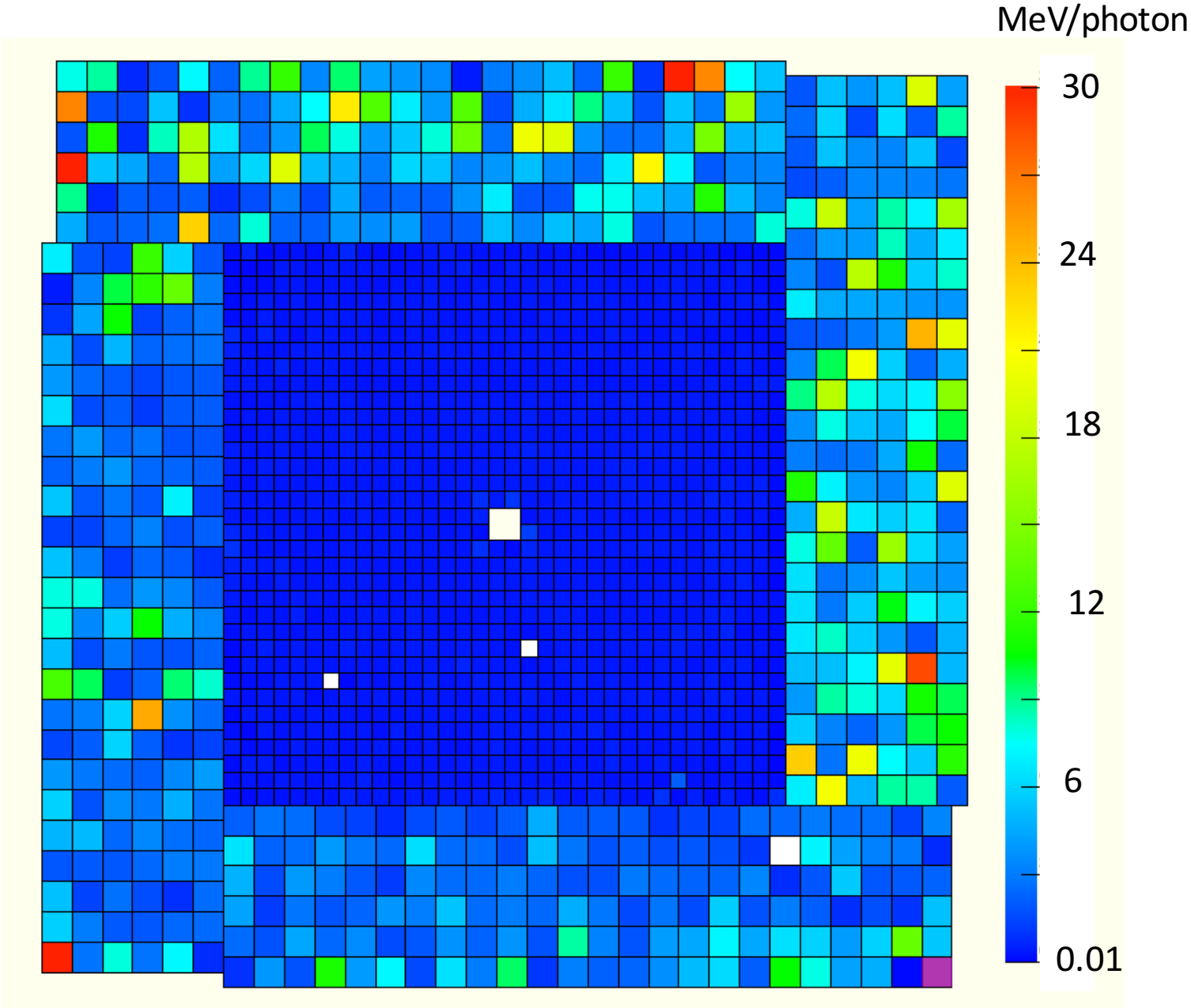
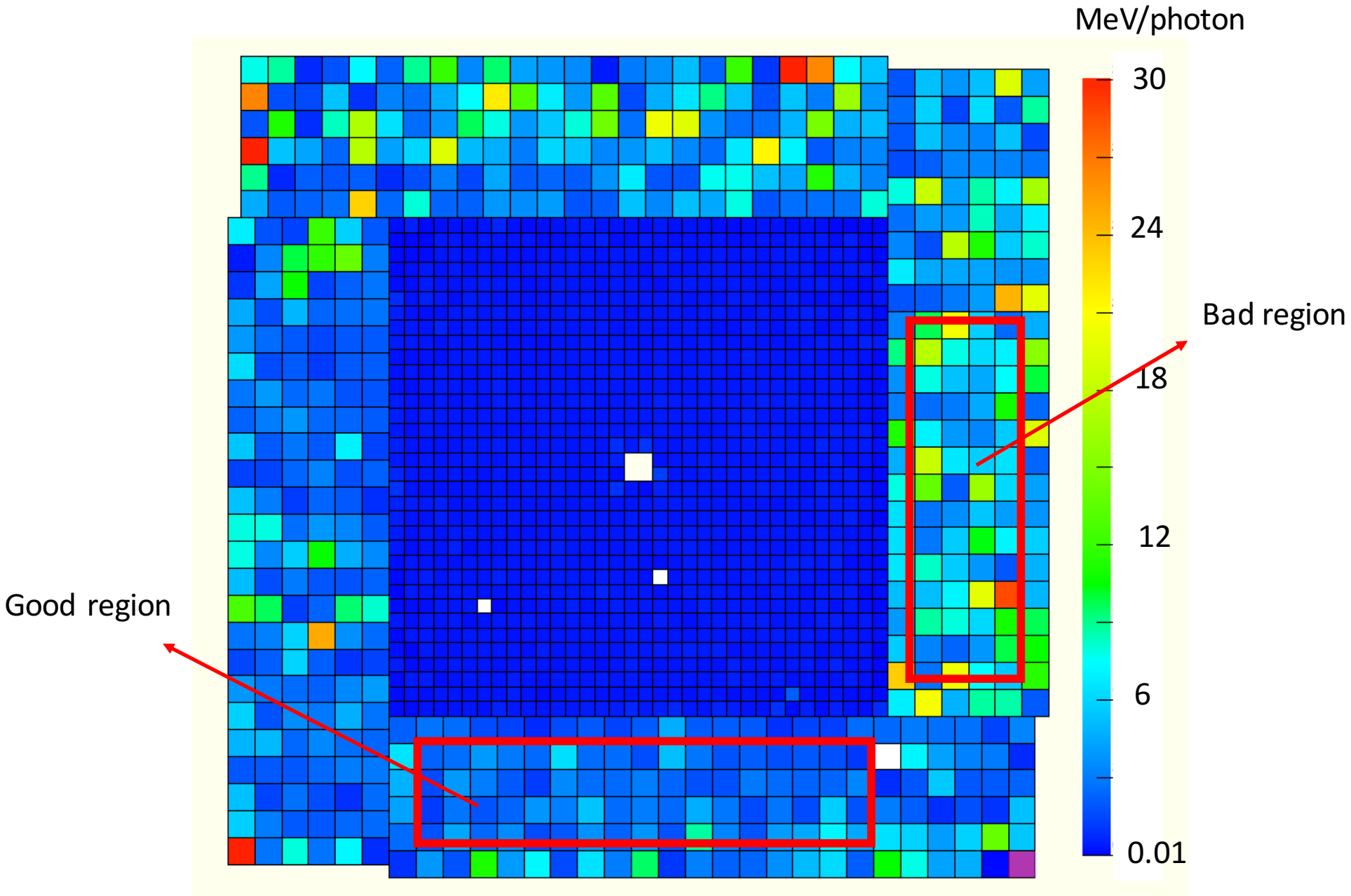
Poisson Smearing

- For each more we introduce a photon conversion factor *c*
- Using a Poisson random number generator to get the total number of photon produced: N = random->Poisson(edep/*c*)
- The “measured” energy deposition is then *c* x N
- The larger the *c* factor, the larger the relative width of the distribution
- The *c* factor is determined by tuning the simulation so that for each module the width of the elastic peak approximately match that from the data

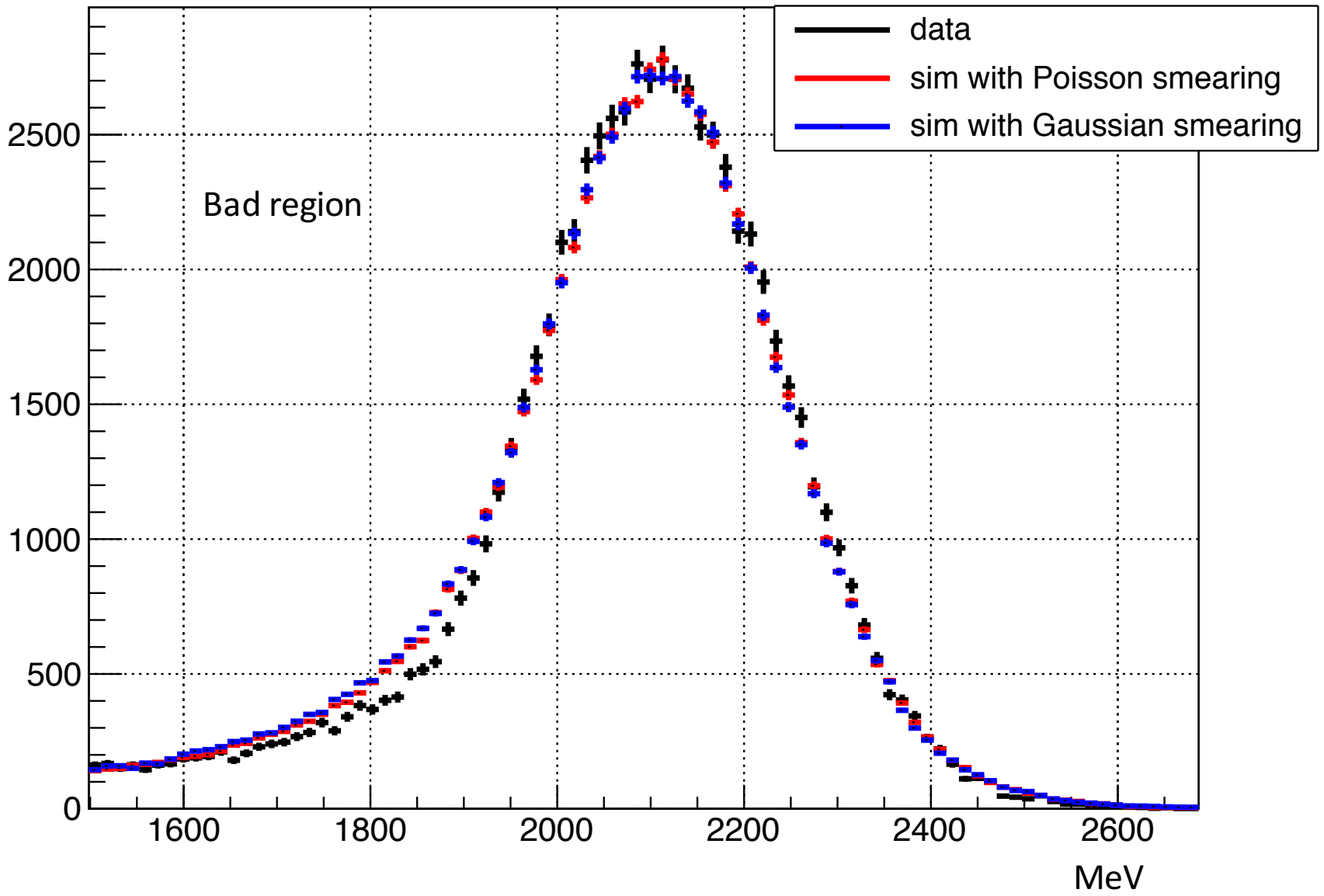
Photon conversion factor



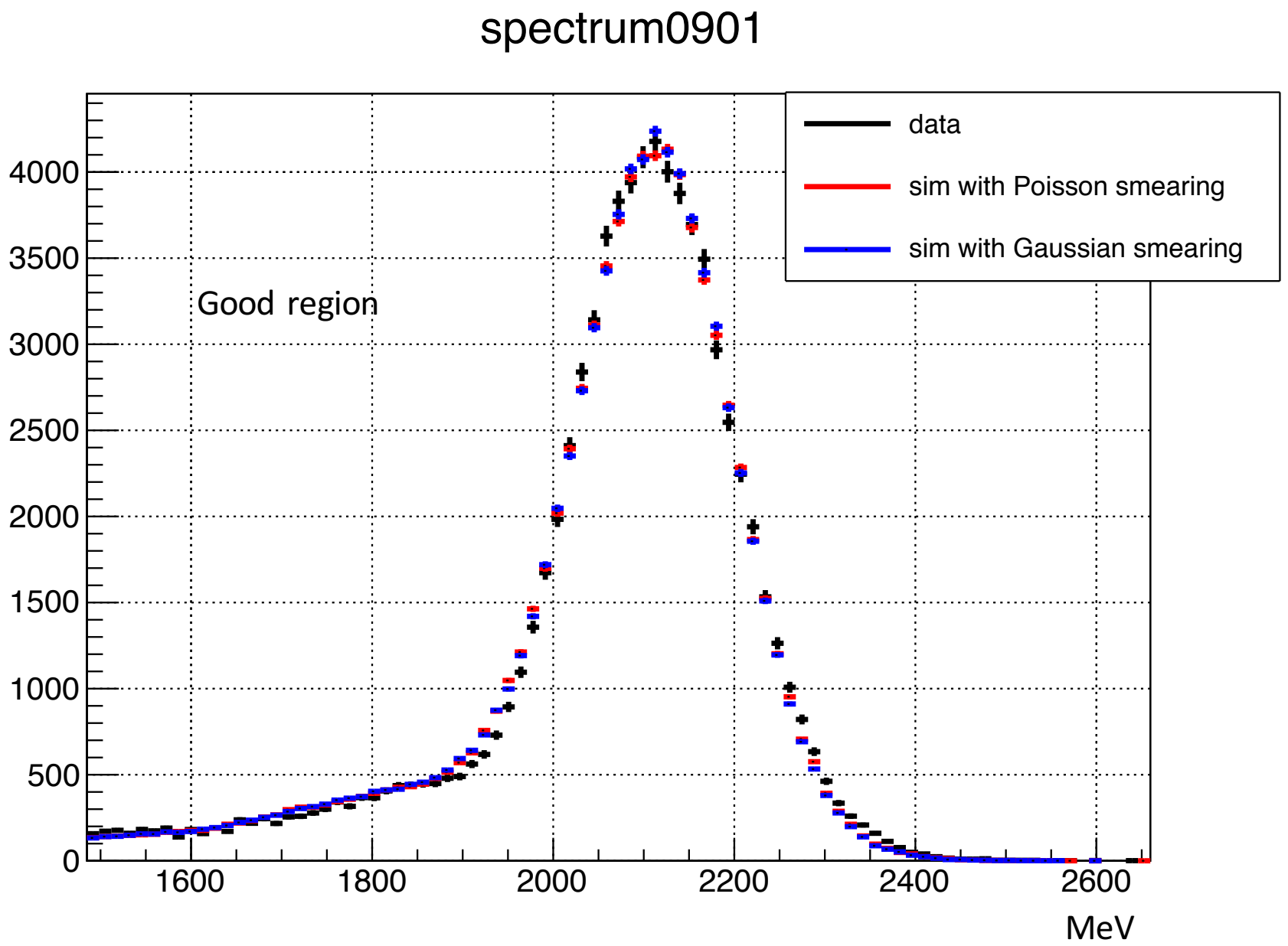
Photon conversion factor



Poisson vs Gaussian smearing

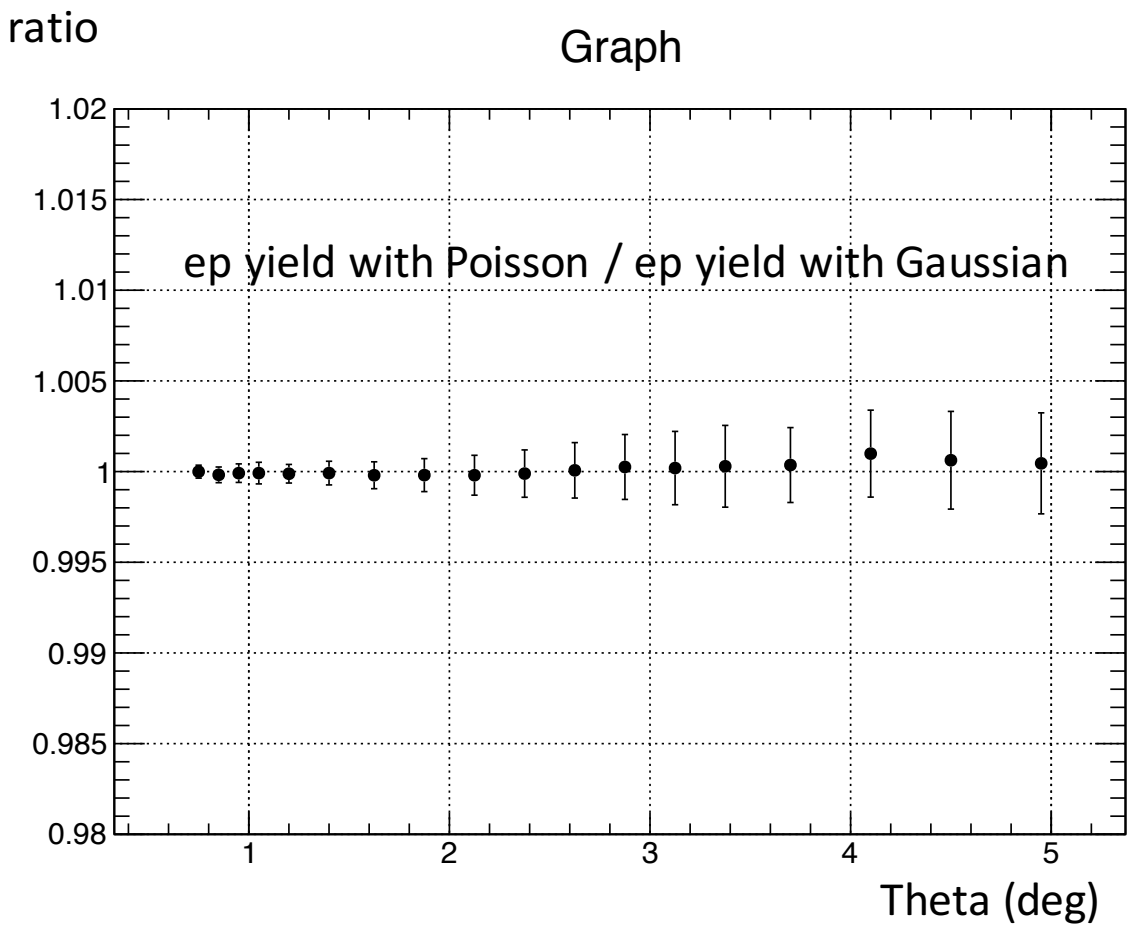


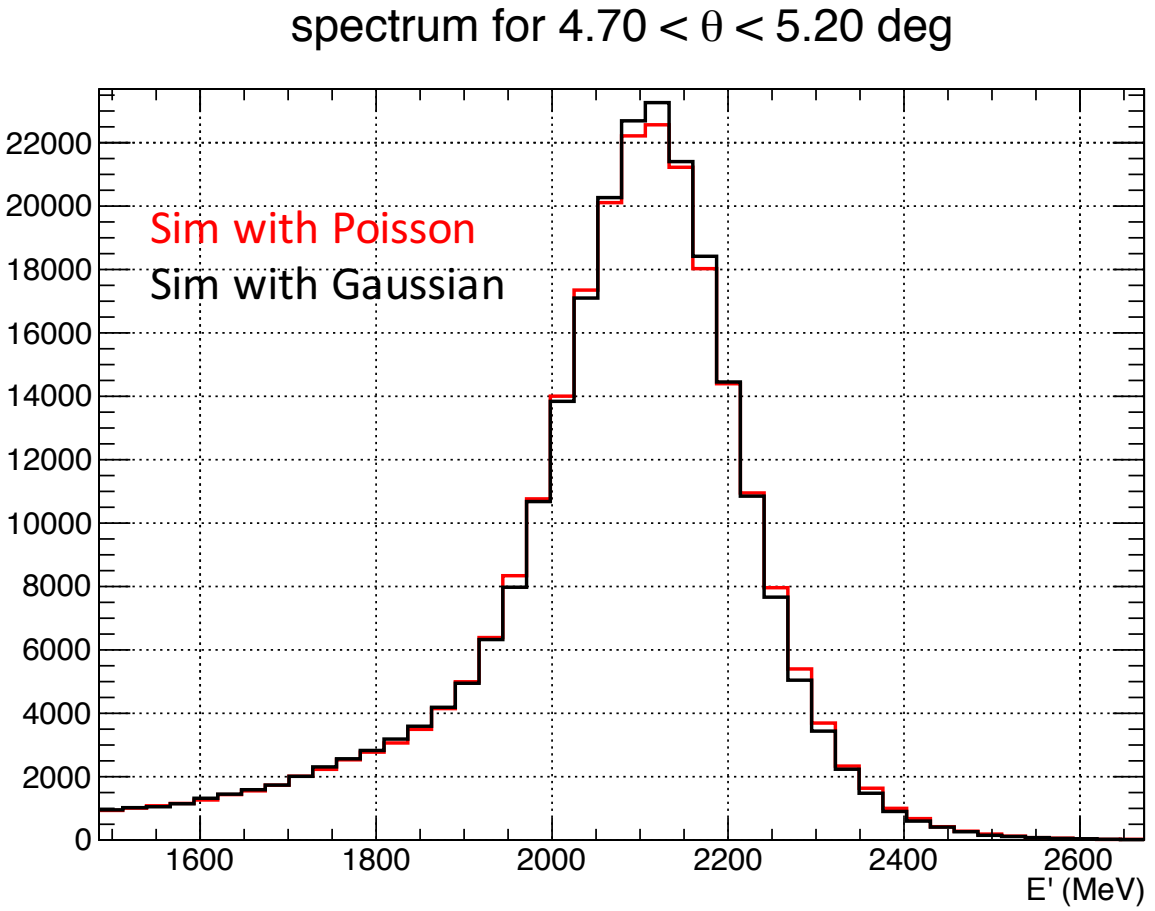
Poisson vs Gaussian smearing



Poisson vs Gaussian smearing

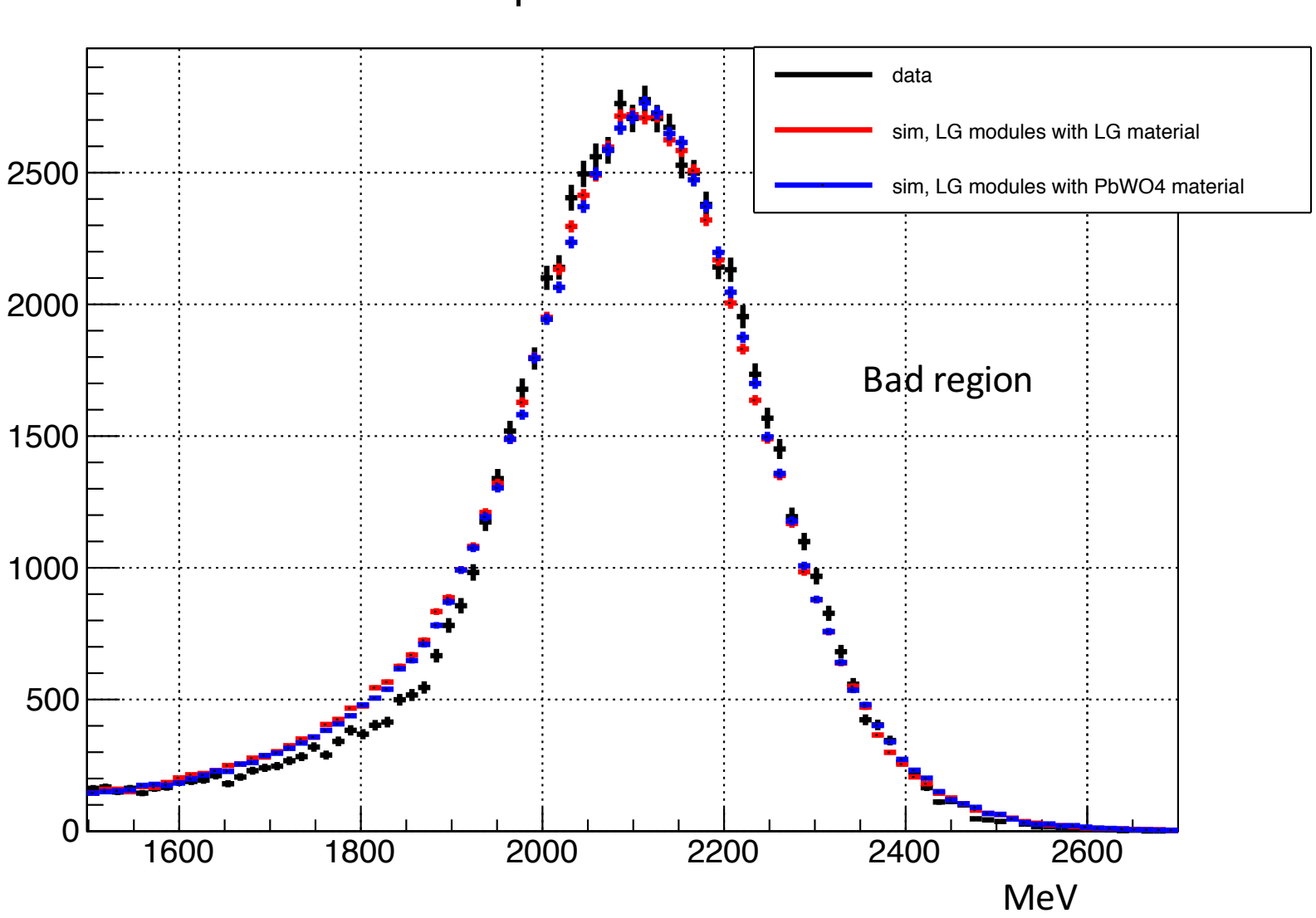
Simulation





Changing material for LG modules

Changing the LG modules material from LG to PbWO4 see if it has impact on the tail



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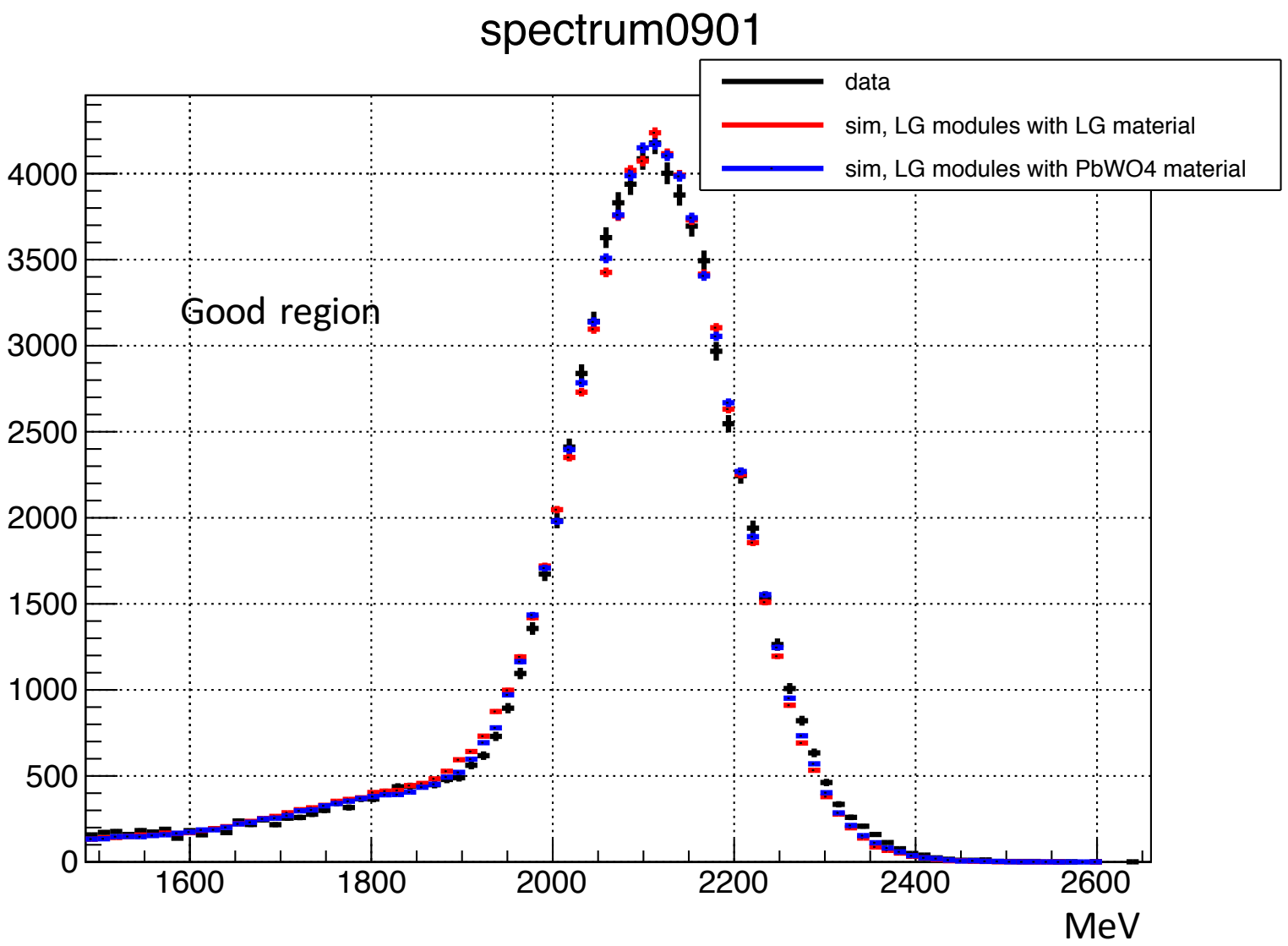

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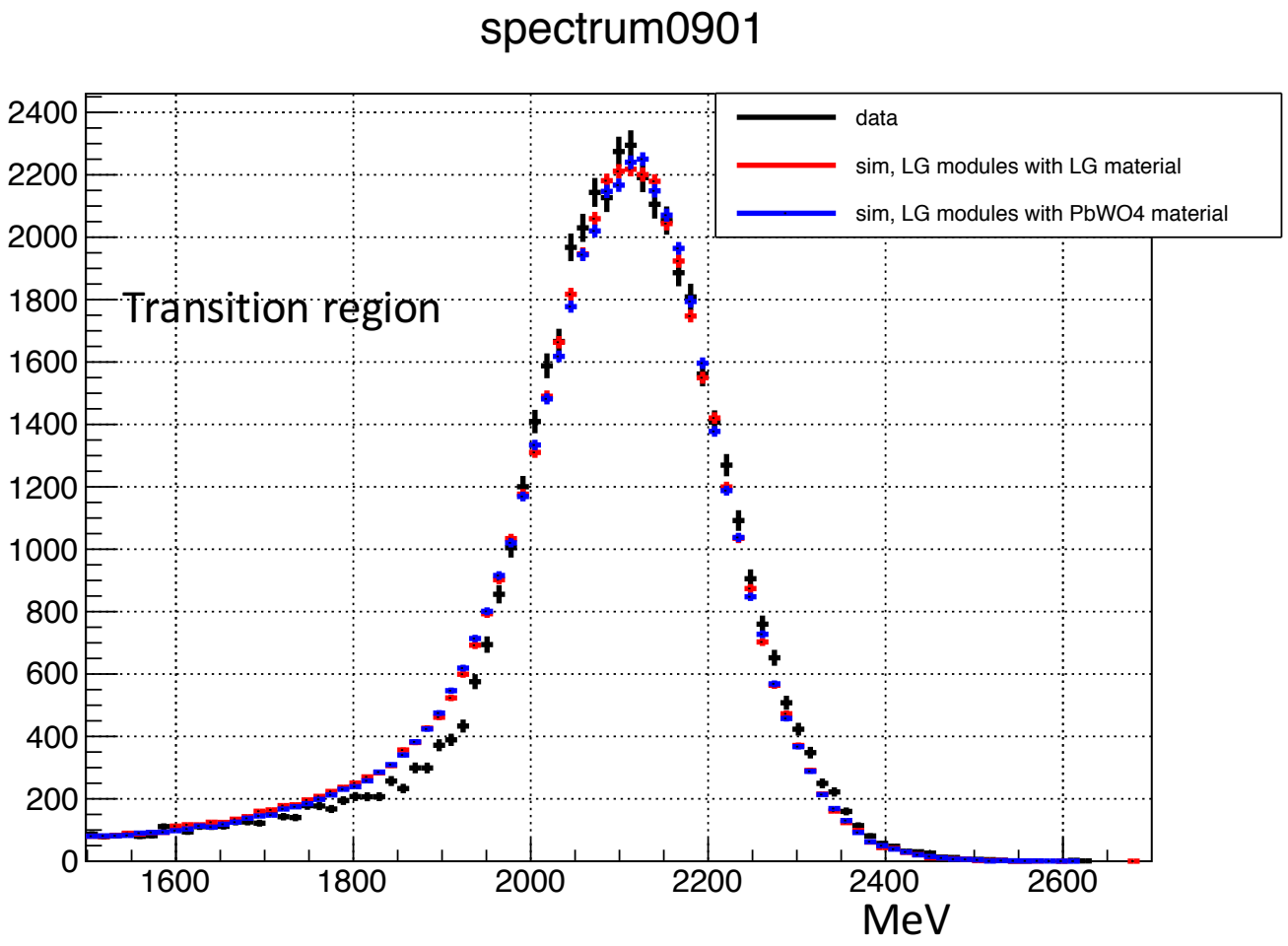
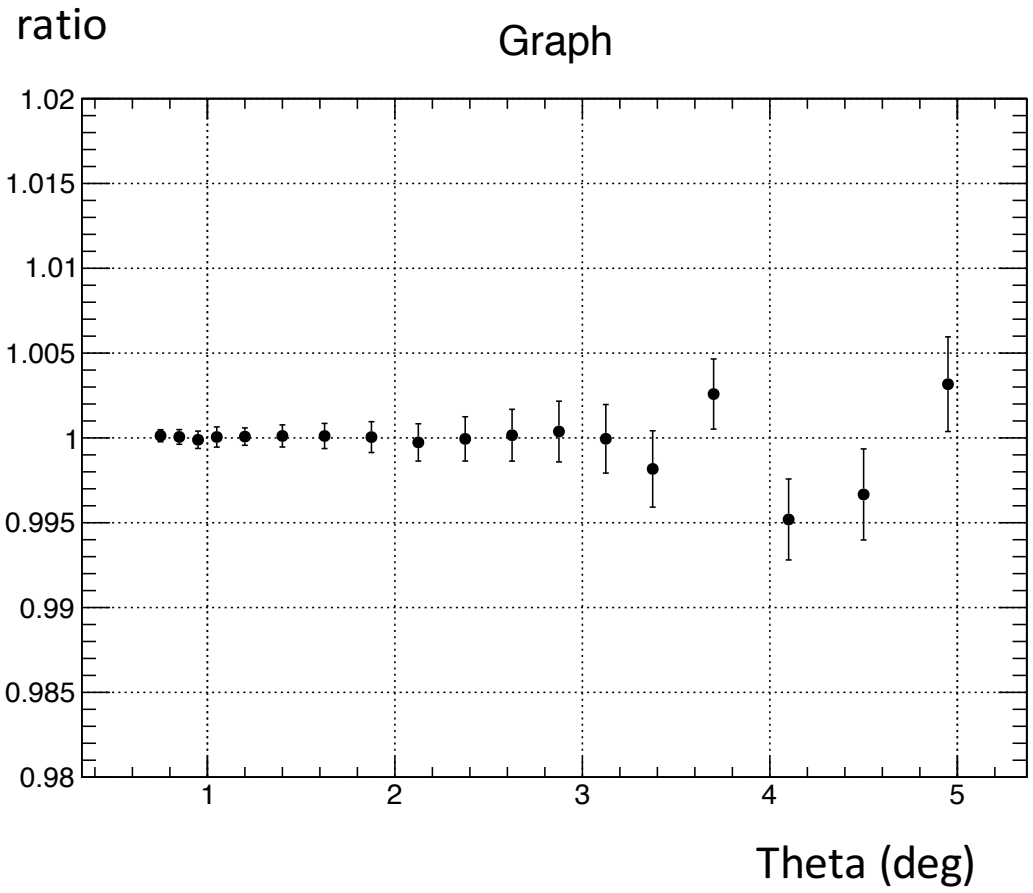
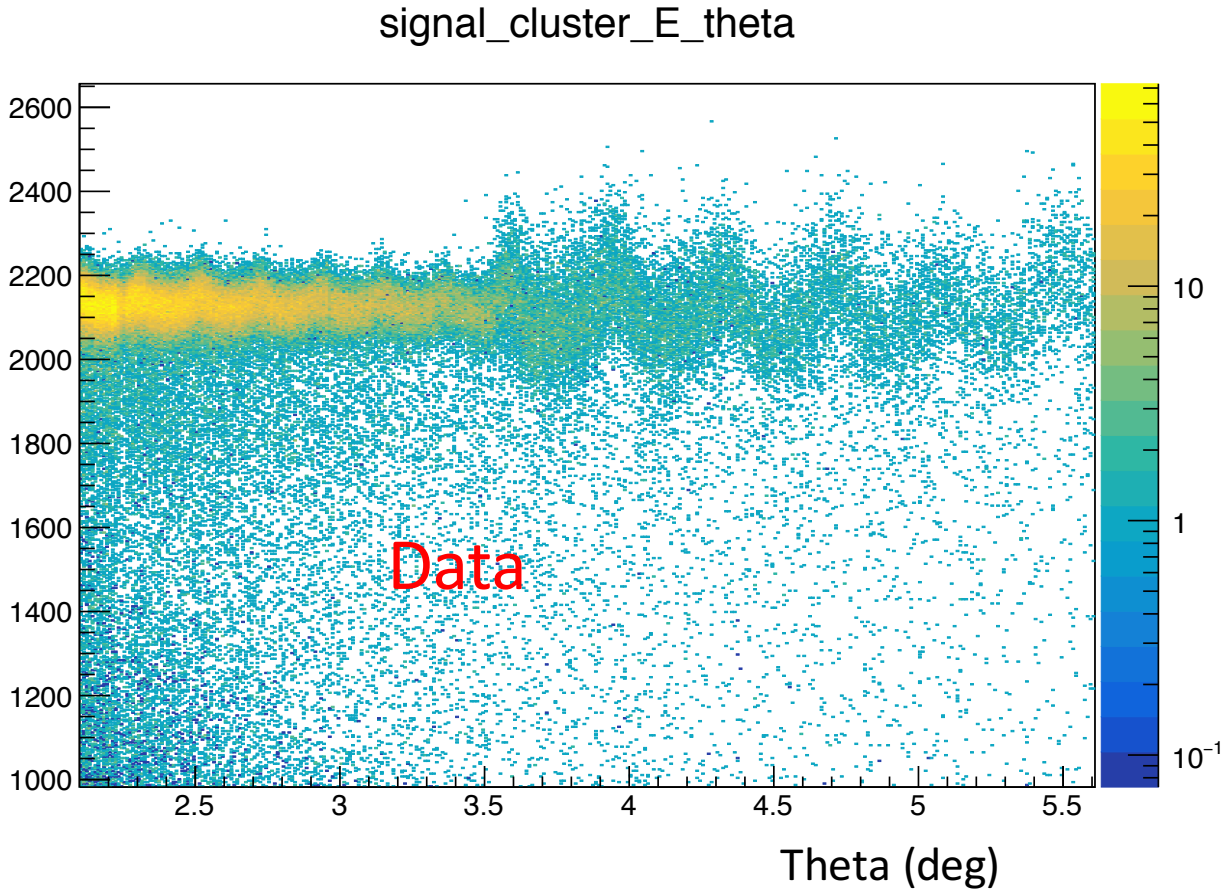
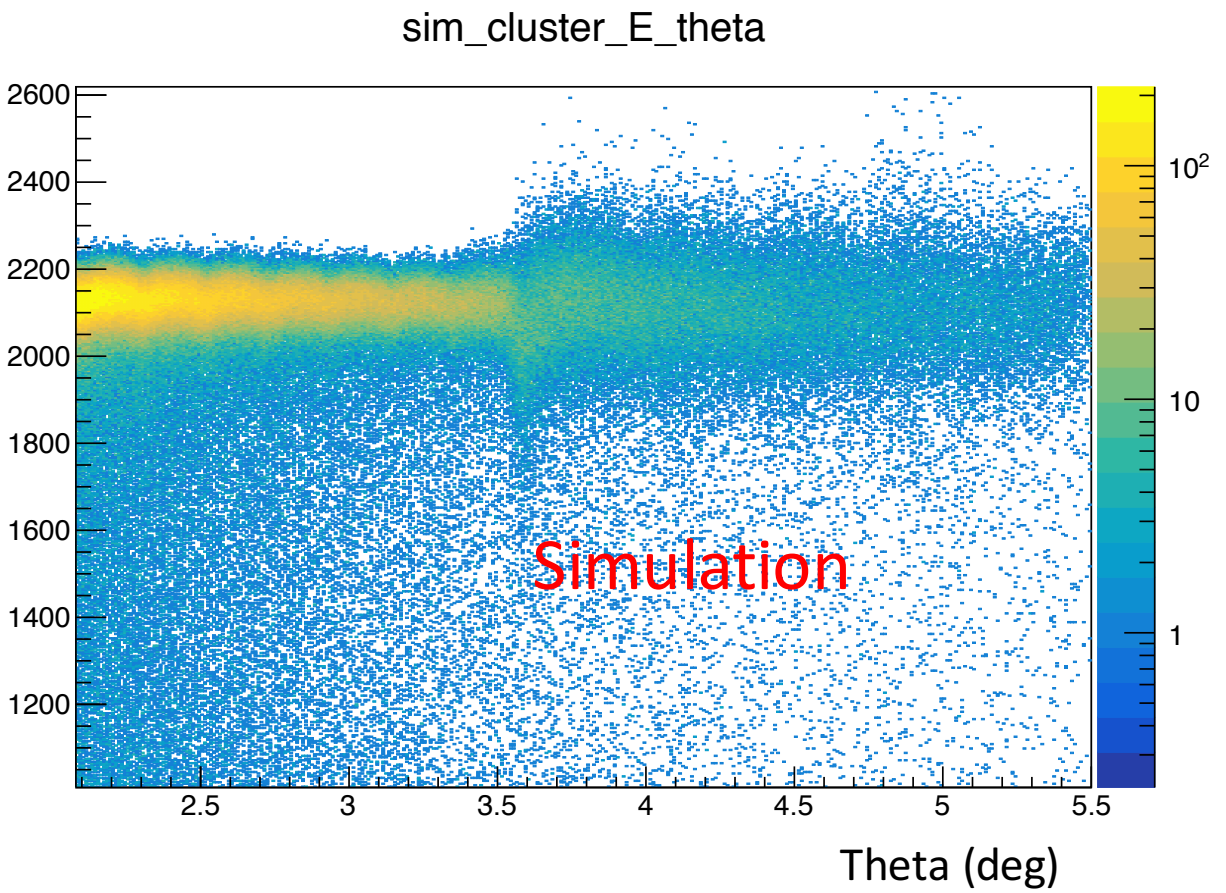


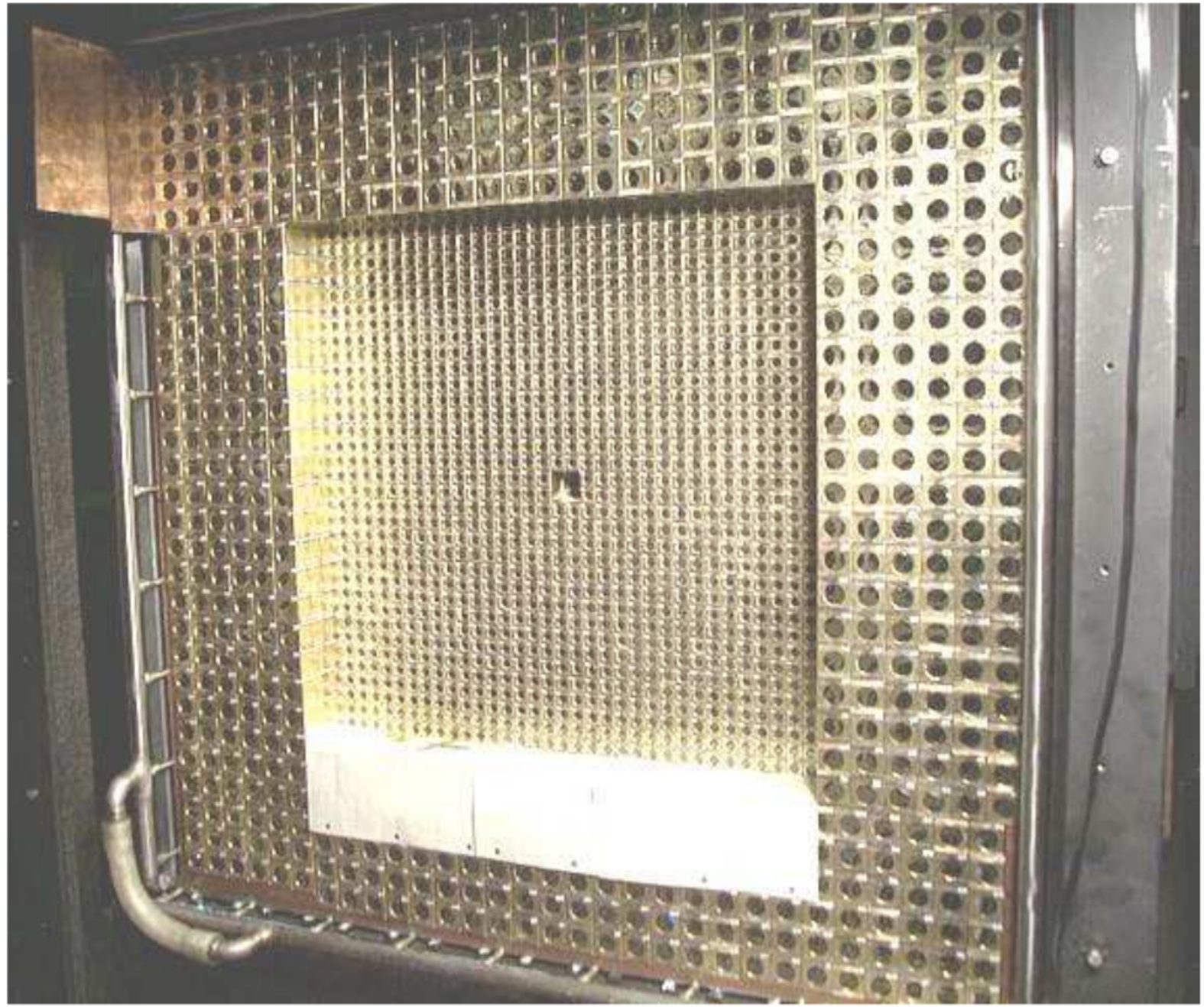


Cluster E vs theta

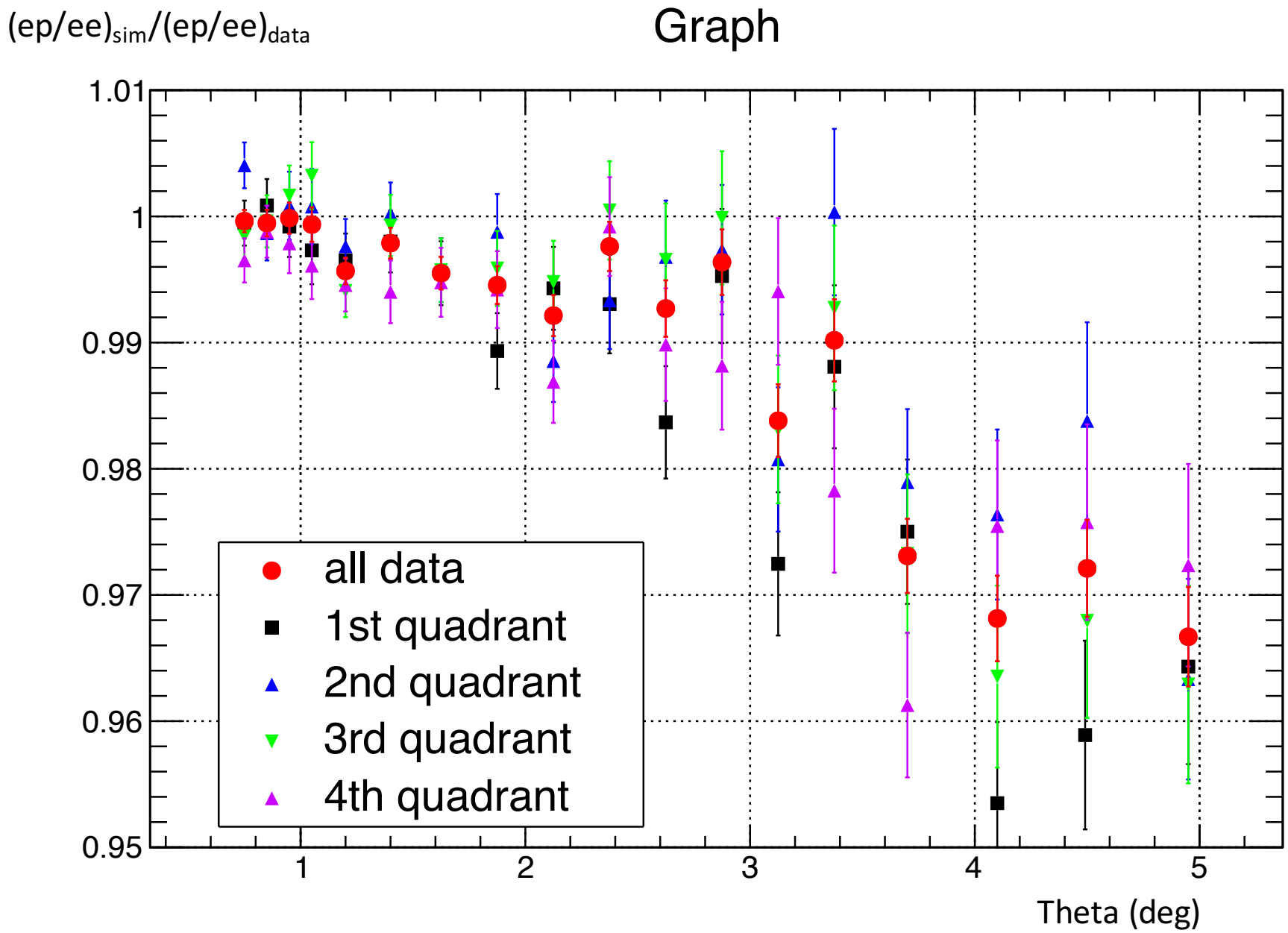
- In both case, require – 30 mm < x < 30 mm
- Data has a S-shape for the reconstructed energy, observed from PrimEx data also, can be corrected using method mentioned in Ilya's note (Maxime is working on this)
- Simulation has a leakage tail at the transition, not obverse in the data. May be improved by doing Cherenkov simulation (Chao Gu is working on this)







Super ration in different quadrants



Summary

- Simulation has a larger tail compared to the data
- The size of the tail in simulation does not seem to strongly depend on:
  - Using Poisson or Gaussian smearing model
  - Material of the LG modules

- Possible reason: LG is a Cherenkov-type calorimeter, photon produced by Cherenkov radiation. So directly using energy deposition from the simulation might not be the right approach.