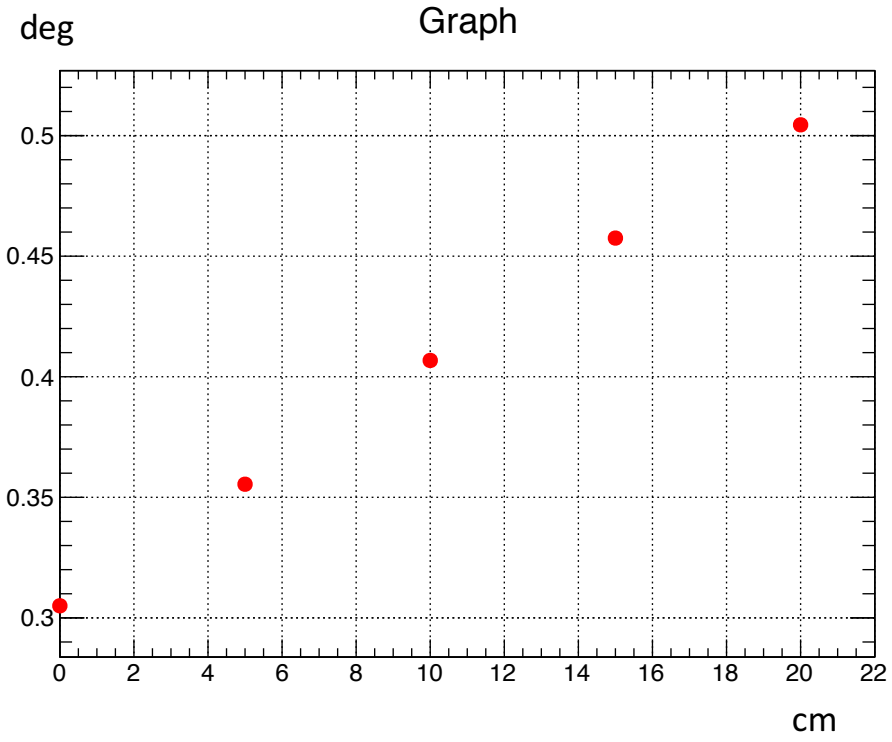
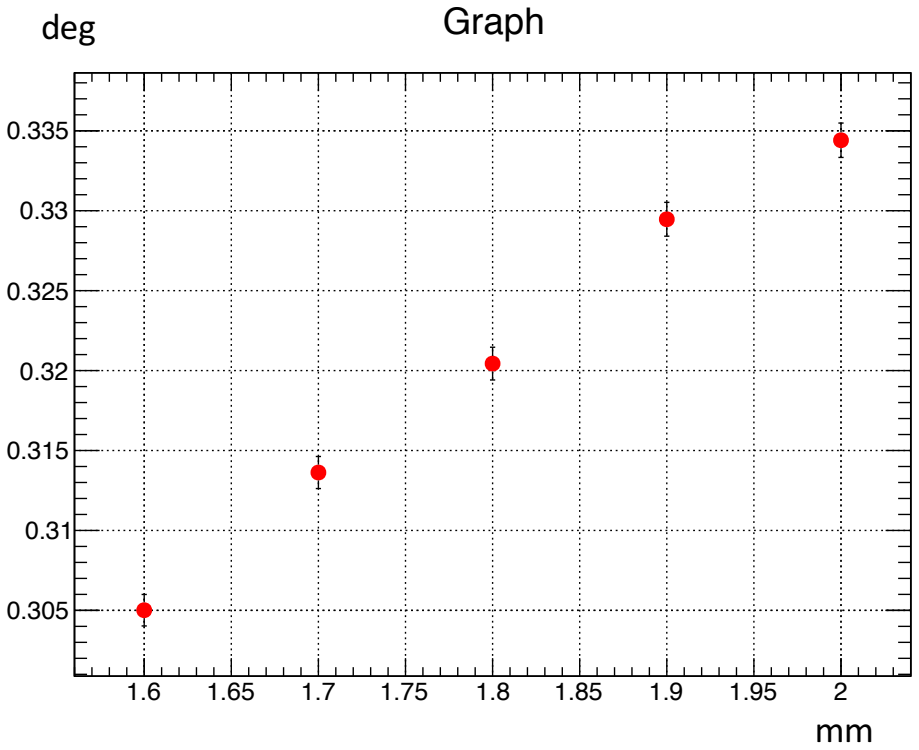
Simulation Comparison

Weizhi Xiong

Coplanarity – 2GeV

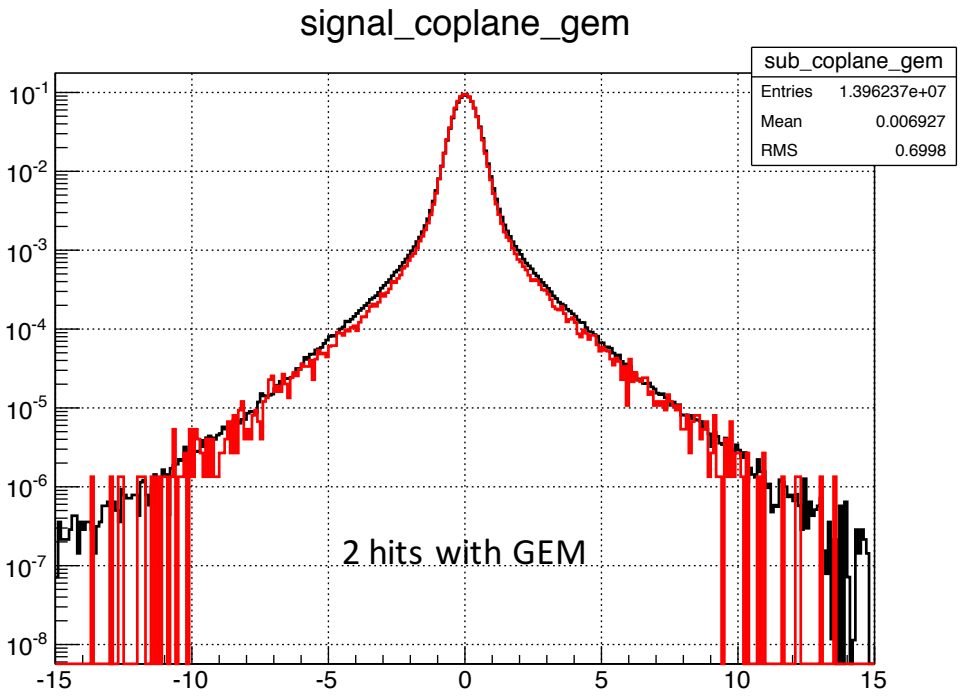
- Coplanarity for the data has about 0.4 deg for the central peak (if using GEMs), but simulation has about 0.3 deg
- Shift the vaccum window upstream or increase its thickness see what happen

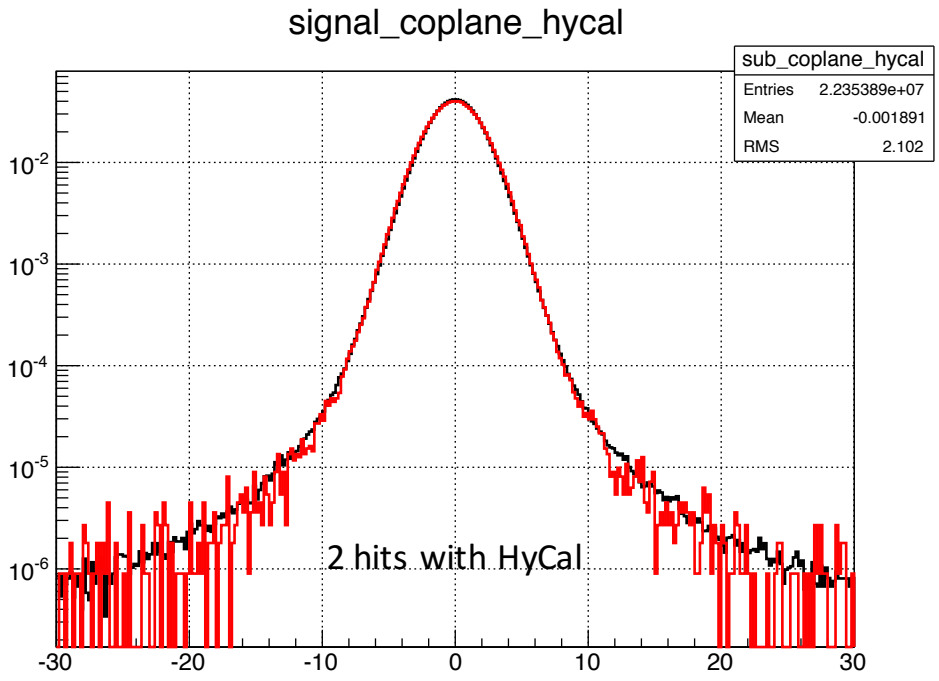




Coplanarity – 2GeV

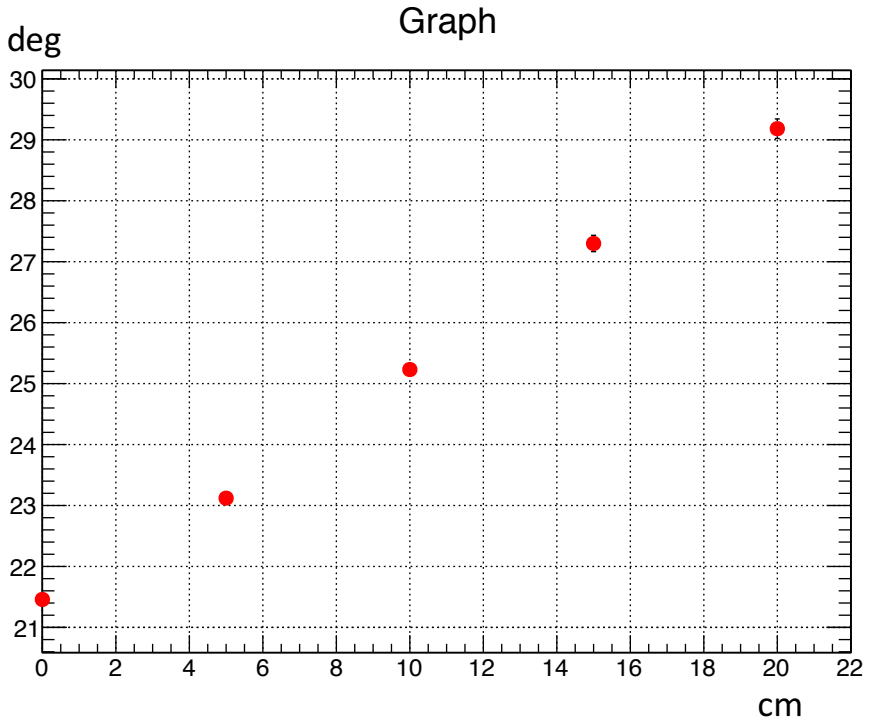
Red histogram is simulation, black is data

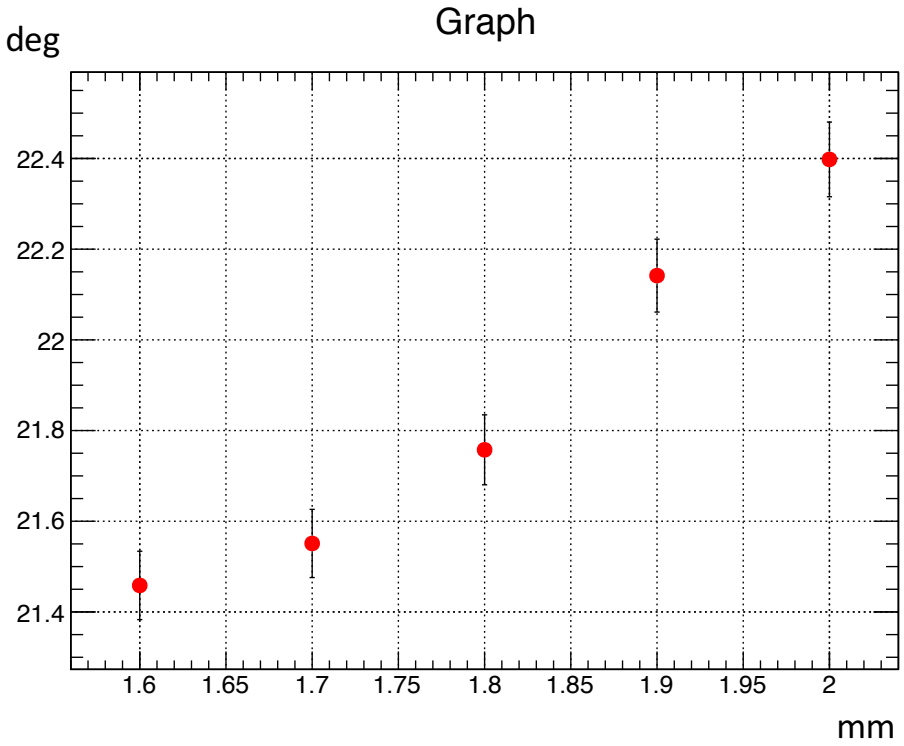




Vertex z – 2GeV

- Vertex z for the data has about 25mm for the central peak (if using GEMs), but simulation has about 21mm
- Shift the vaccum window upstream or increase its thickness see what happen

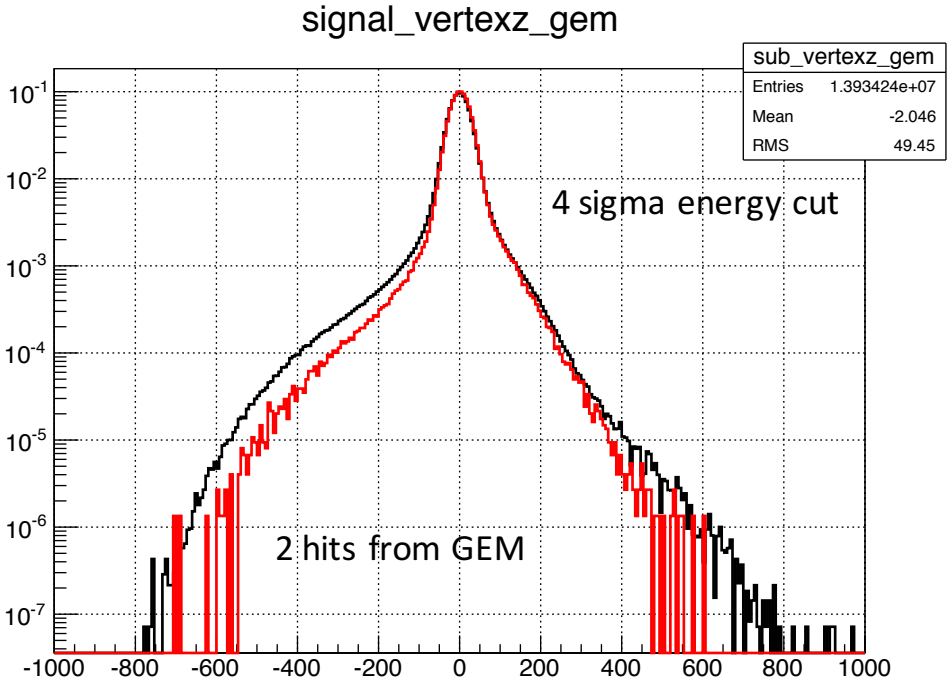


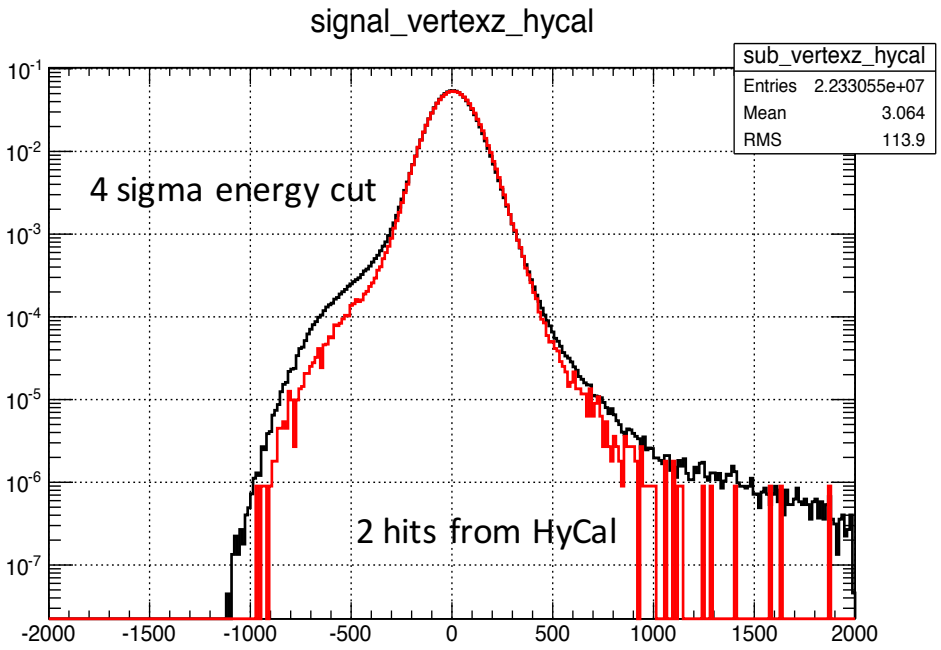


Vertex z – 2GeV

Red histogram is simulation, black is data

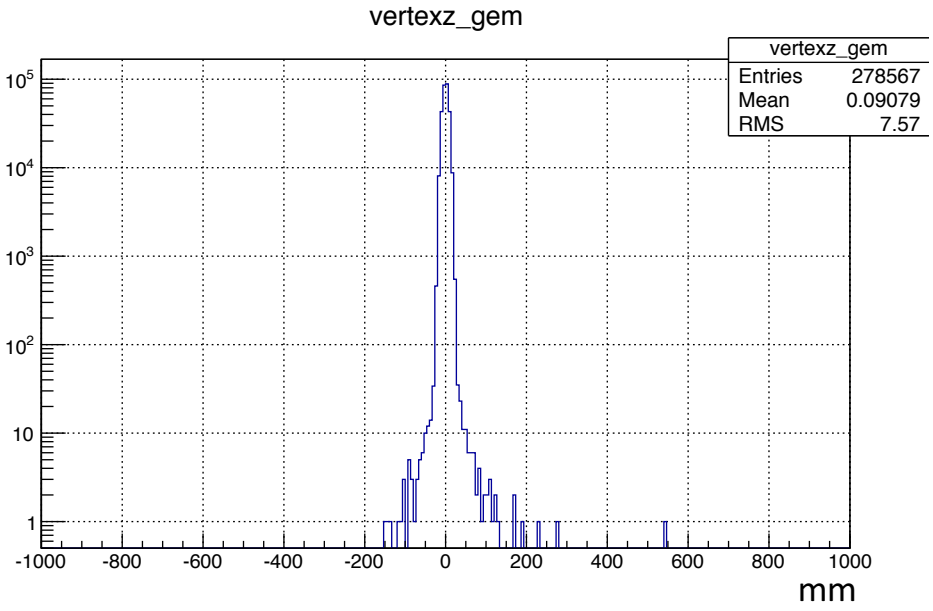
Much larger tail from the data than simulation, still investigating. Might due to some background from ep internal radiation.





Vertex z – 2GeV

Vertex z with all material removed (except GEM and HyCal). Internal radiative photon not allowed



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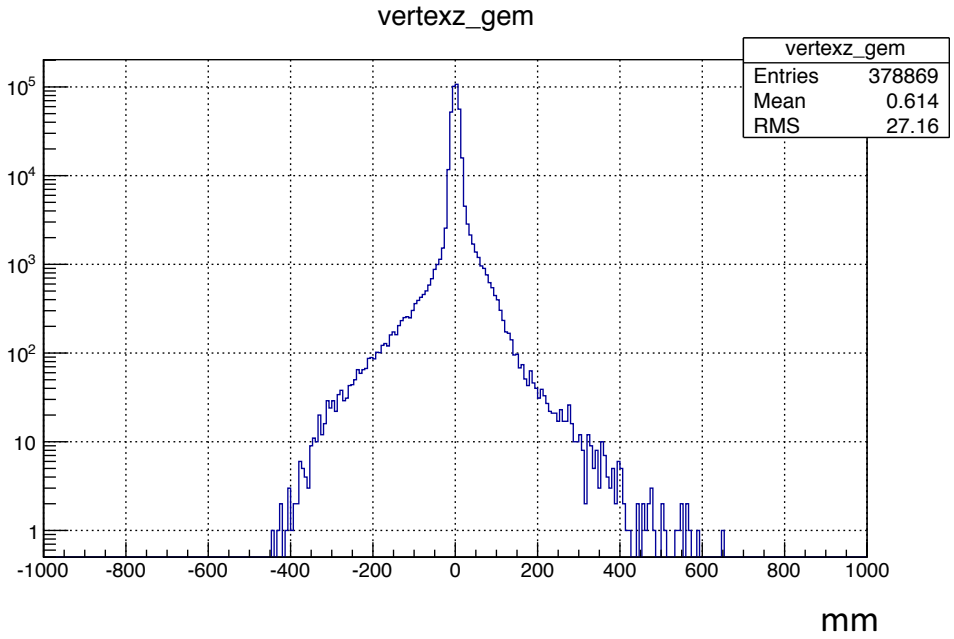
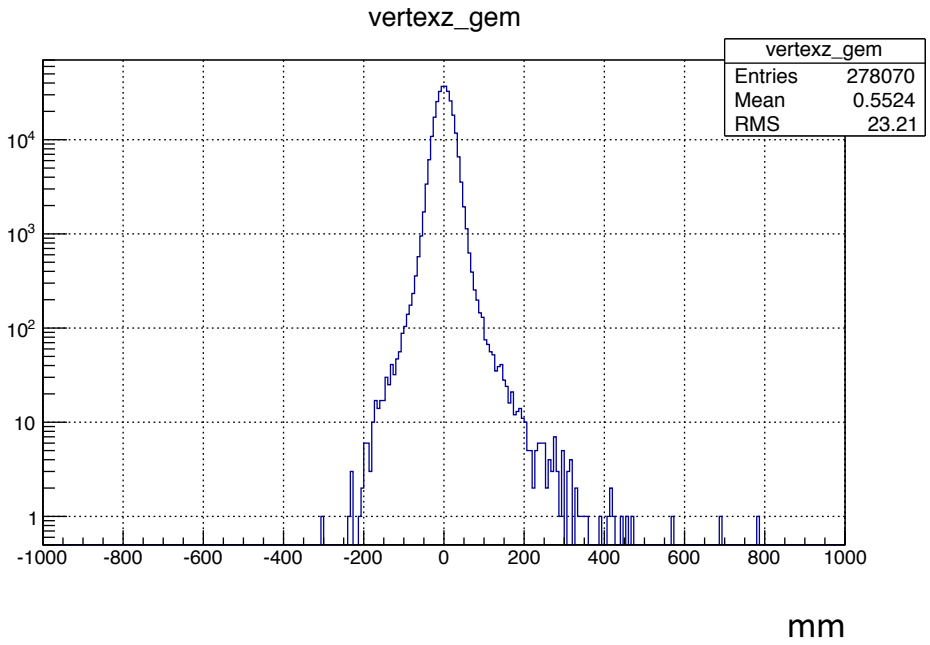


Vertex z – 2GeV

Vertex z with all material in. Internal radiative photon not allowed



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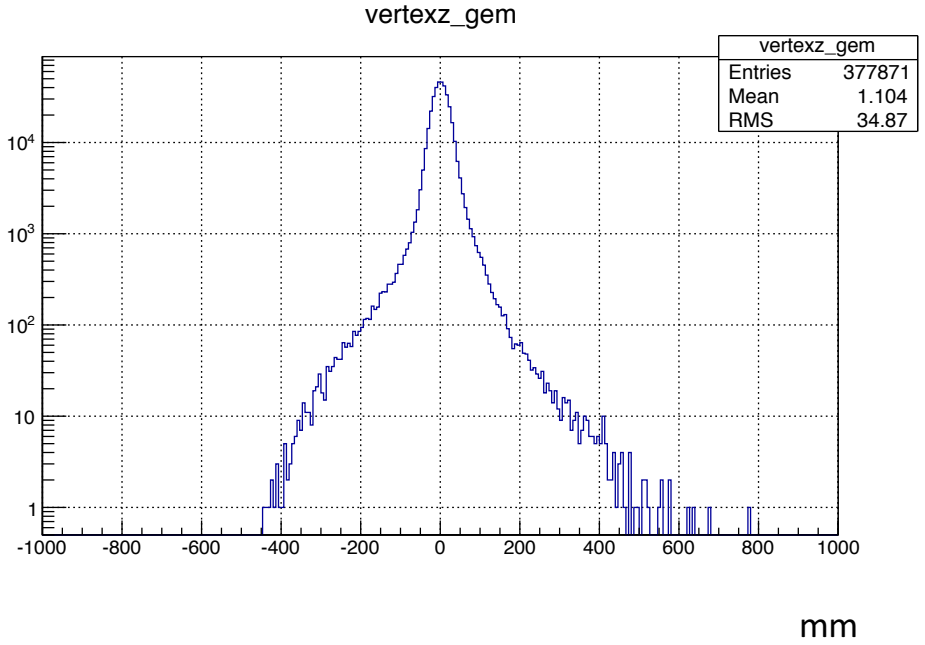
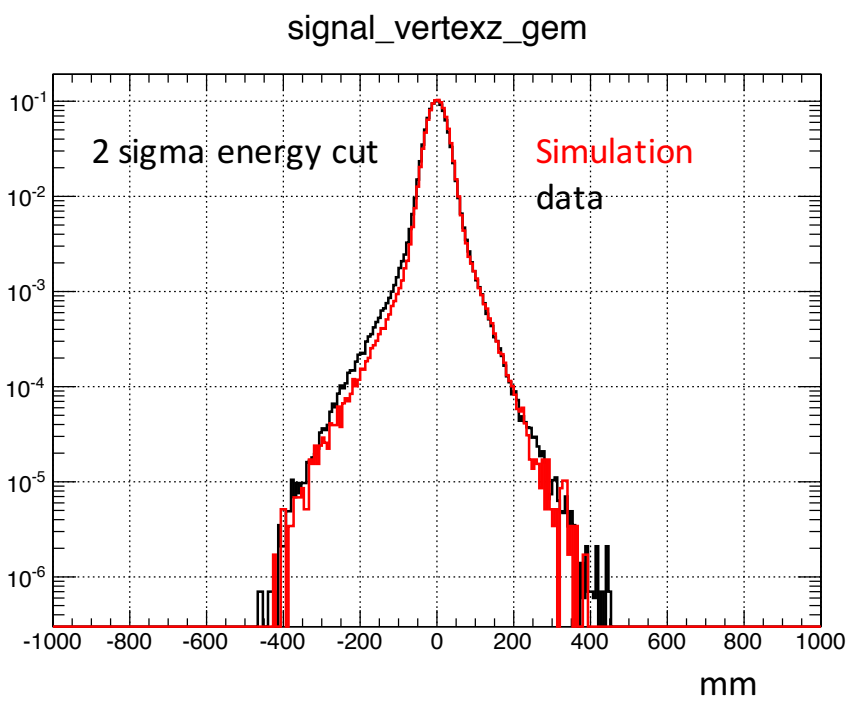
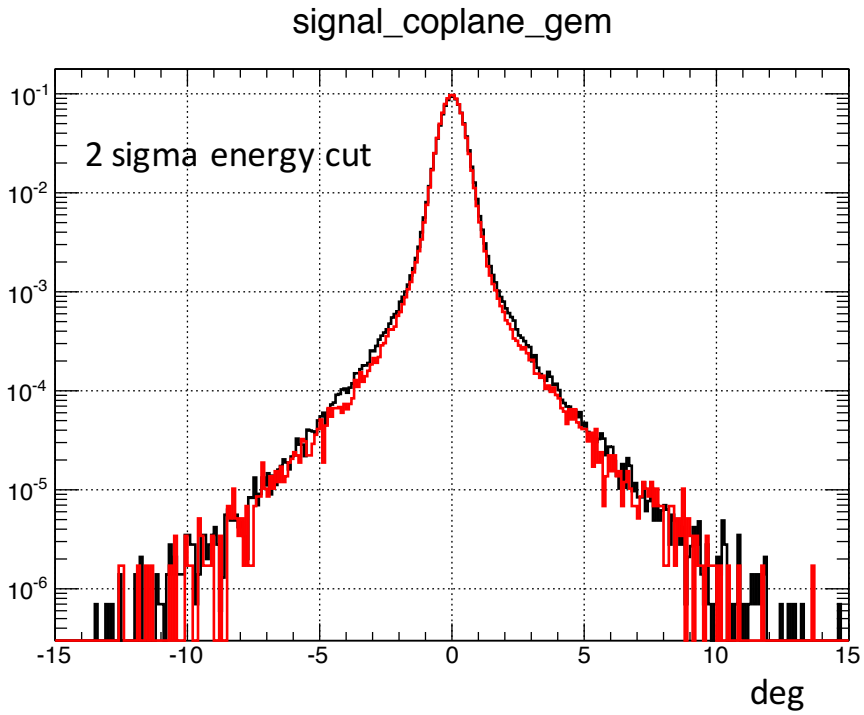


Vertex z – 2GeV

- Gramolin's Moller event generator use only soft photon approximation, cannot fully reproduce the radiative tail, so the difference might be related to this





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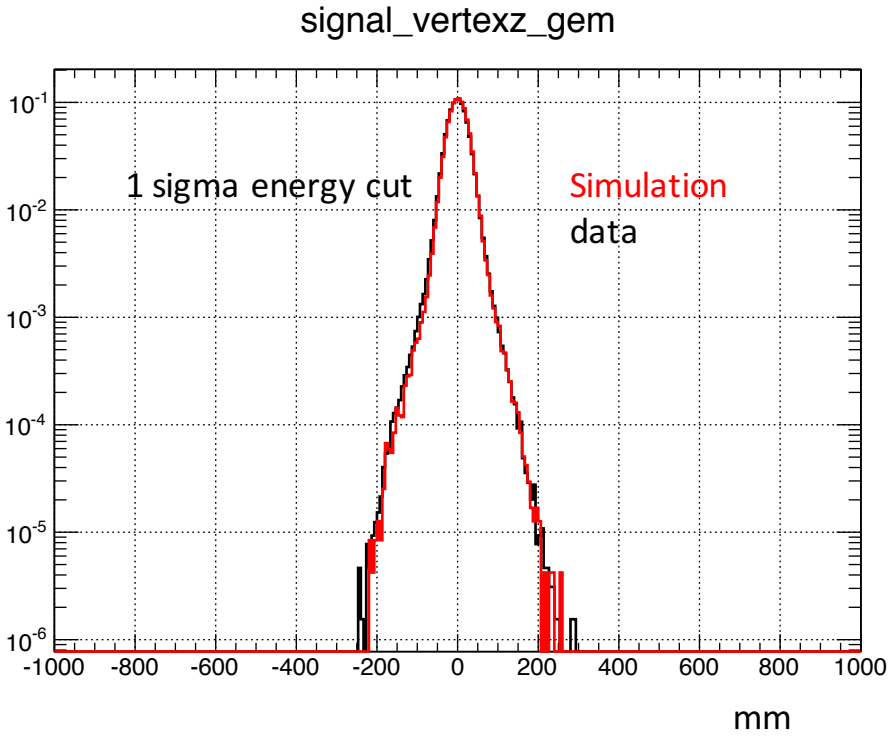
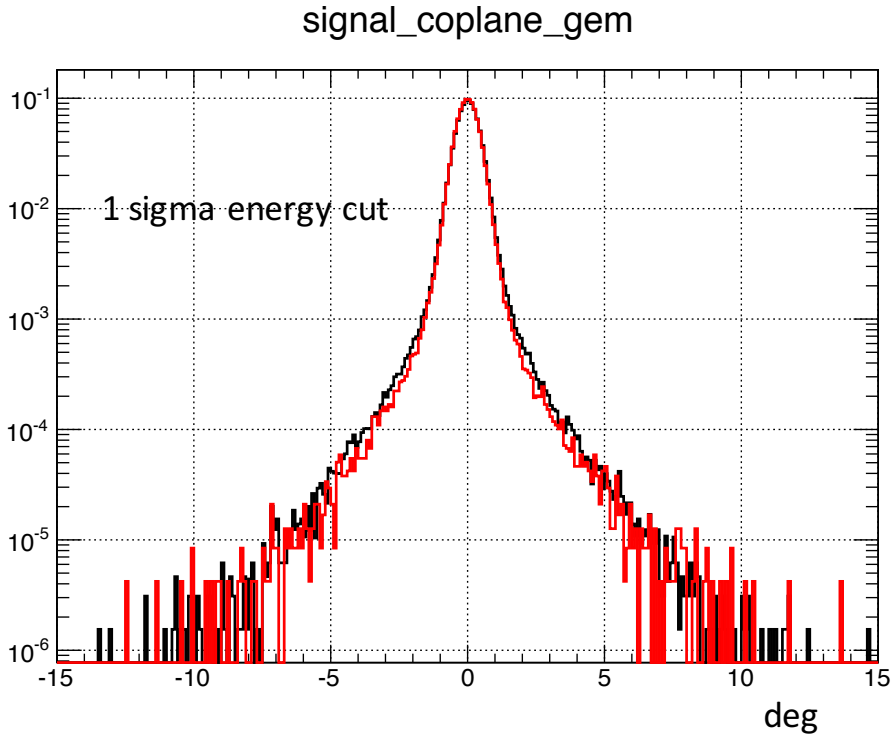
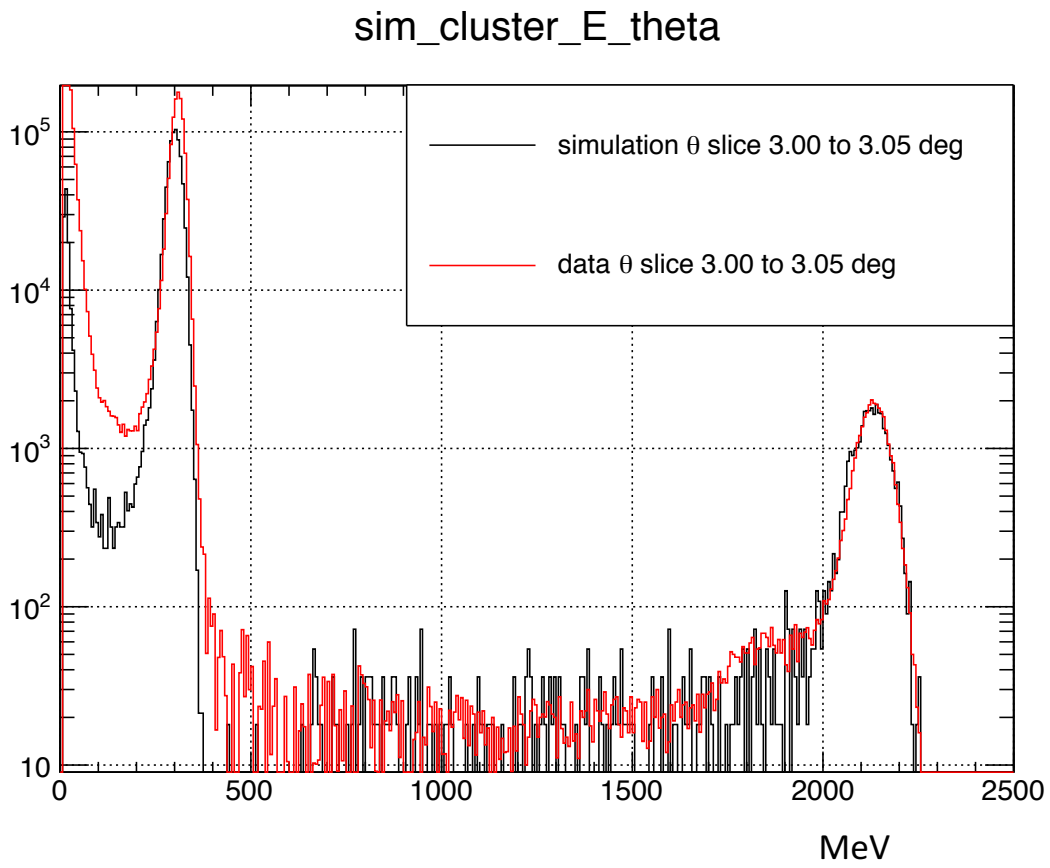




Energy spectrum – slice of cluster E vs theta plot

- ep and ee are mixed with the same integrated luminosity in the simulation
- Integrate +/- 300 MeV around the ep peak to normalize the two histogram
- ee peak may suffer strongly from the low energy background (presumably coming from HyCal collimator and beam pipe).
- This background may also affect ep peak at small angle. Cannot be subtracted by empty target runs
- We may need calibration on the MC data



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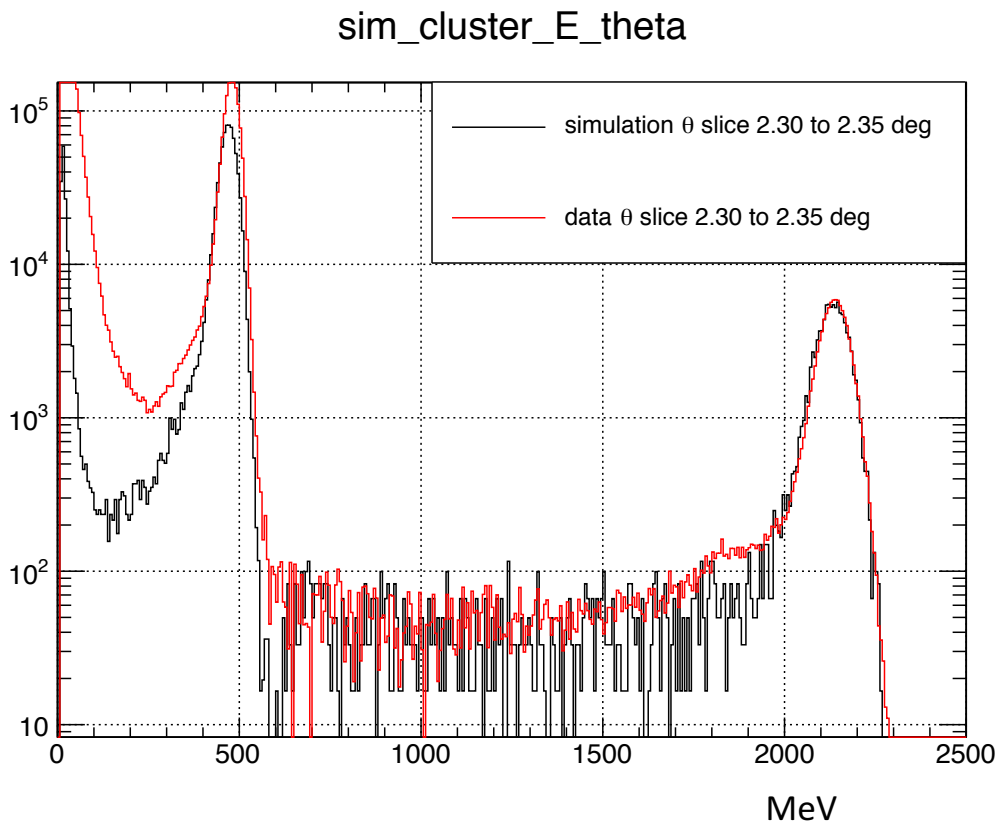

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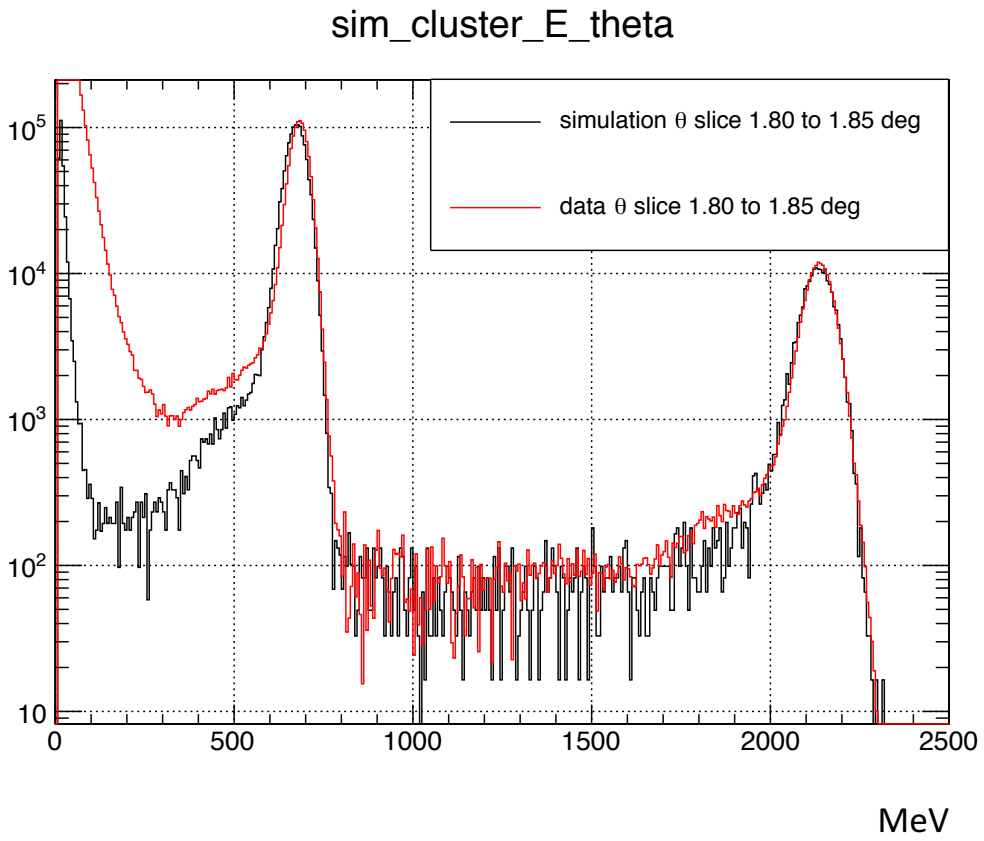

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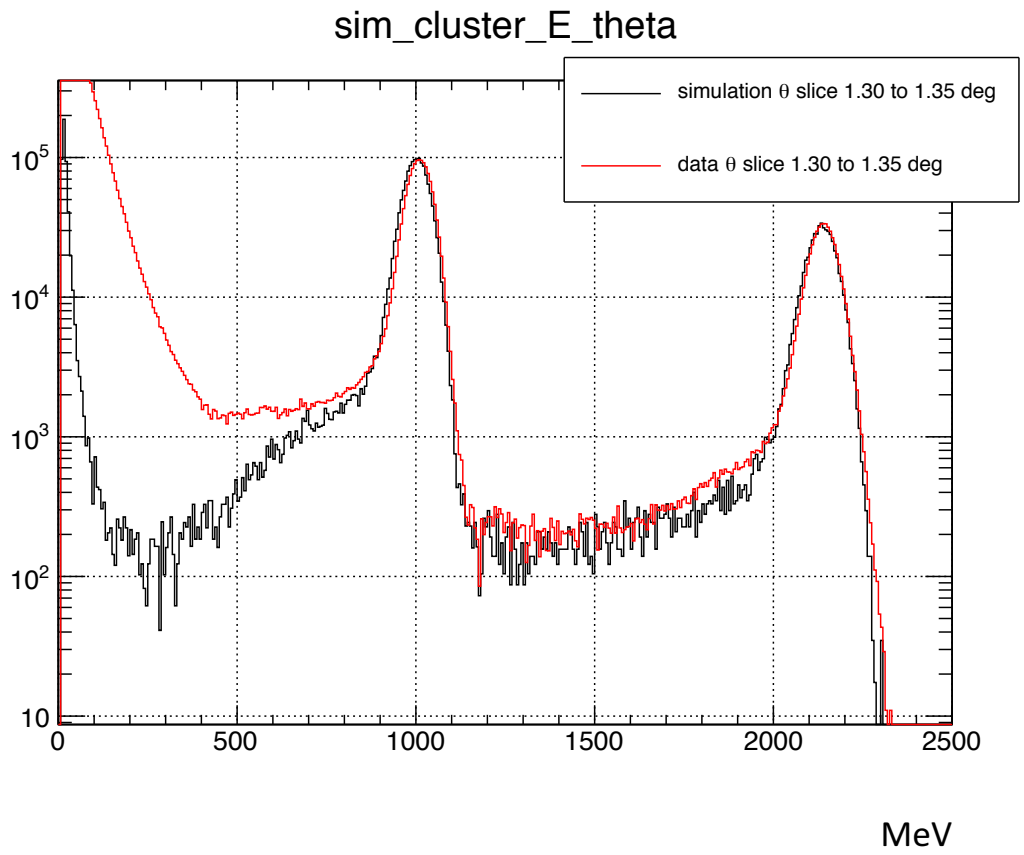

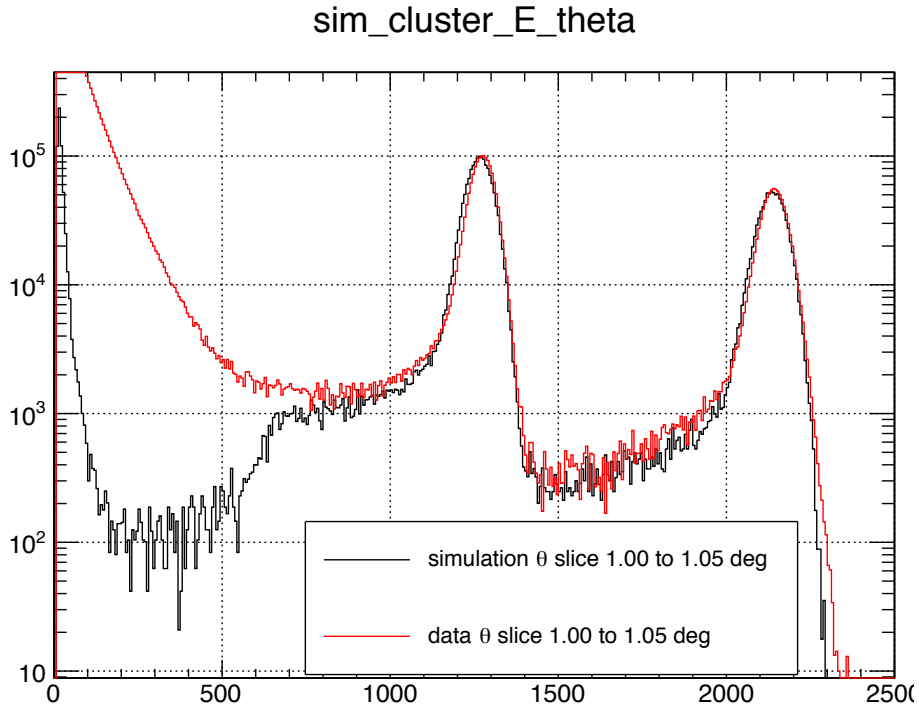
sim_cluster_E_theta
simulation θ slice 1.00 to 1.05 deg
data θ slice 1.00 to 1.05 deg
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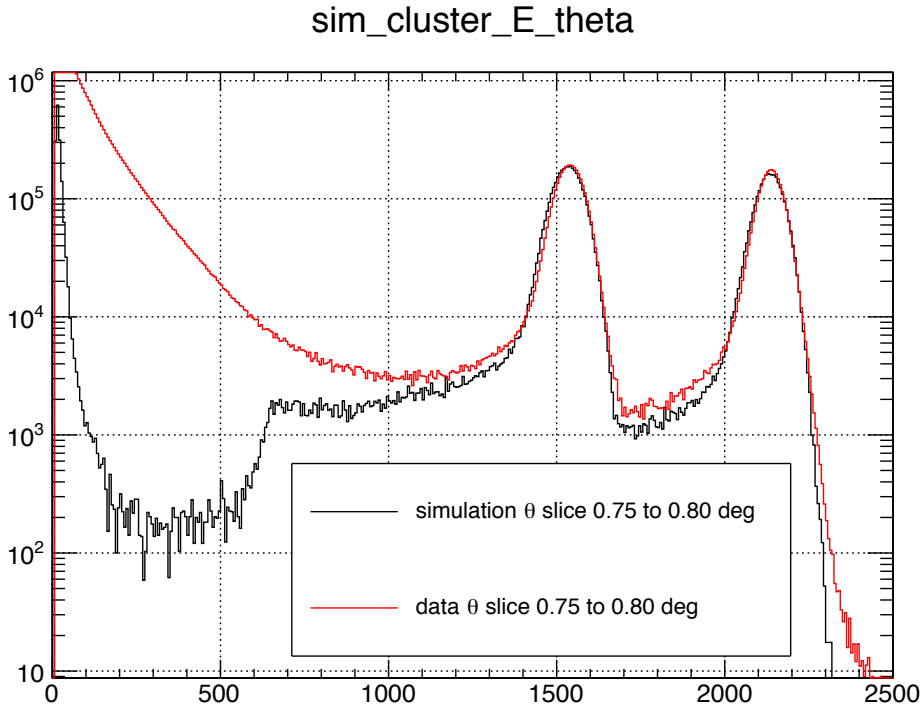
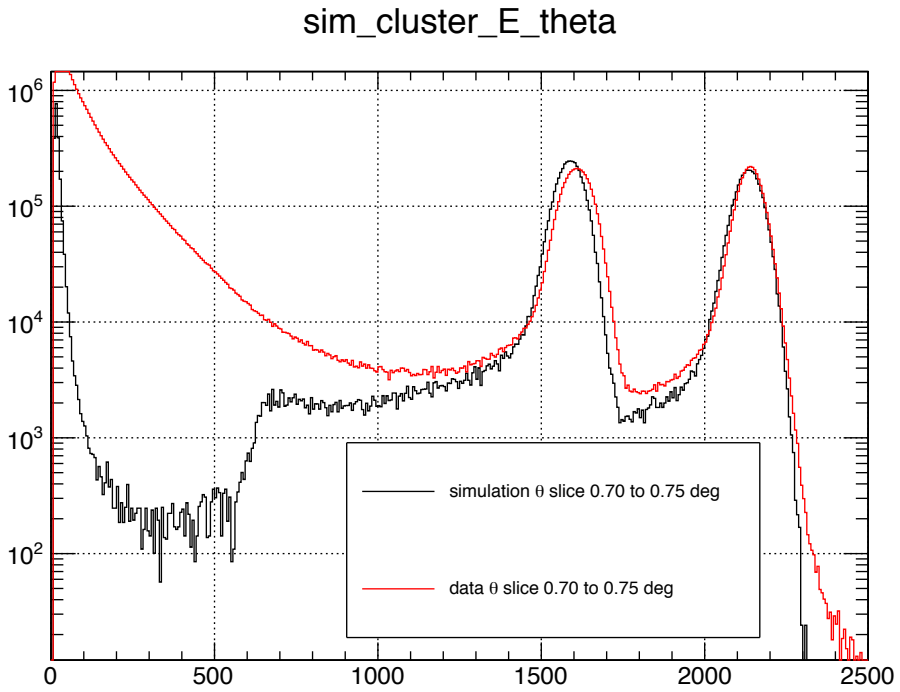
10^2
10^3
10^4
10^5
0
500
1000
1500
2000
2500


sim_cluster_E_theta
simulation θ slice 0.75 to 0.80 deg
data θ slice 0.75 to 0.80 deg
10
10^2
10^3
10^4
10^5
10^6
0
500
1000
1500
2000
2500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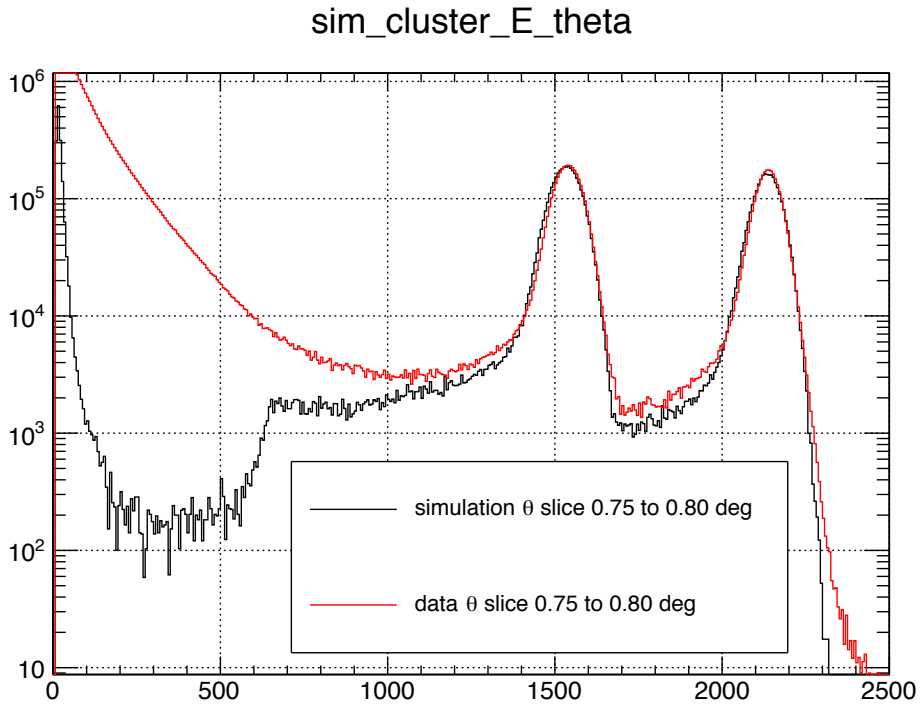
sim_cluster_E_theta
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data θ slice 0.75 to 0.80 deg

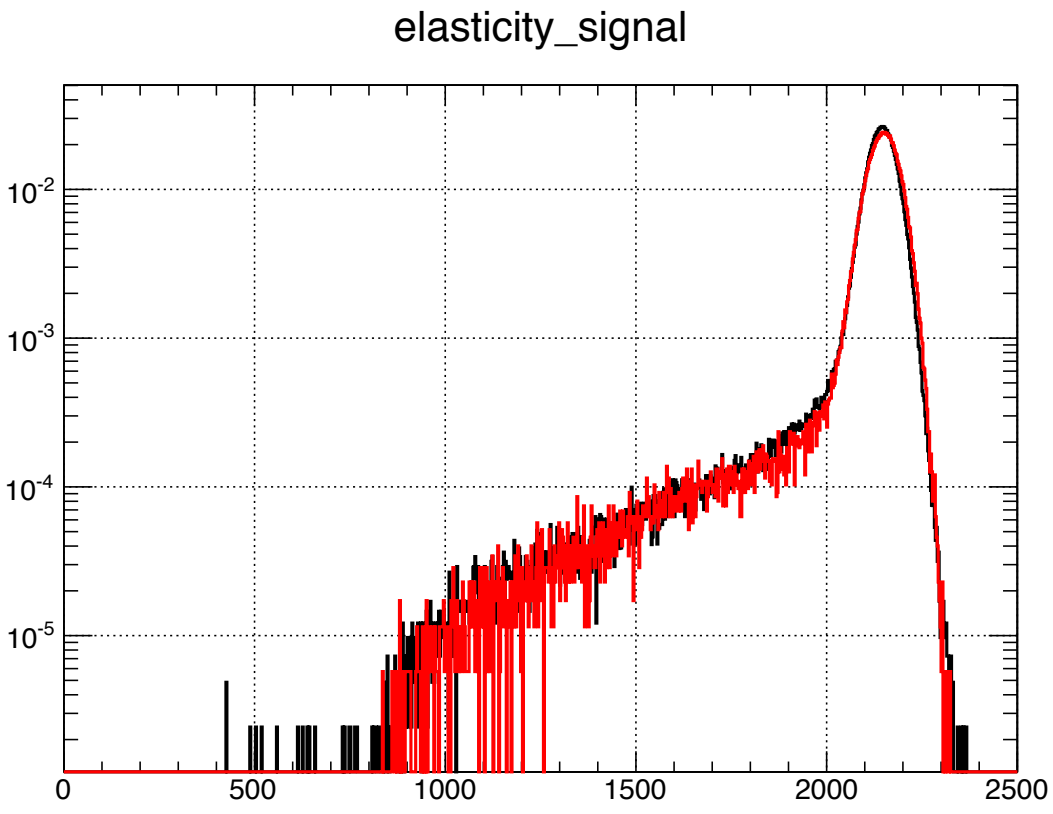
Elasticity – 2GeV

- Cuts:
  - 2 clusters
  - Coplanarity 5 deg
  - Theta from 1 to 2 deg

- If apply the vertex z cut, there is no radiative tail from the simulation, but there is still a small tail from data (might be related to the tail we see from the vertex z distribution)

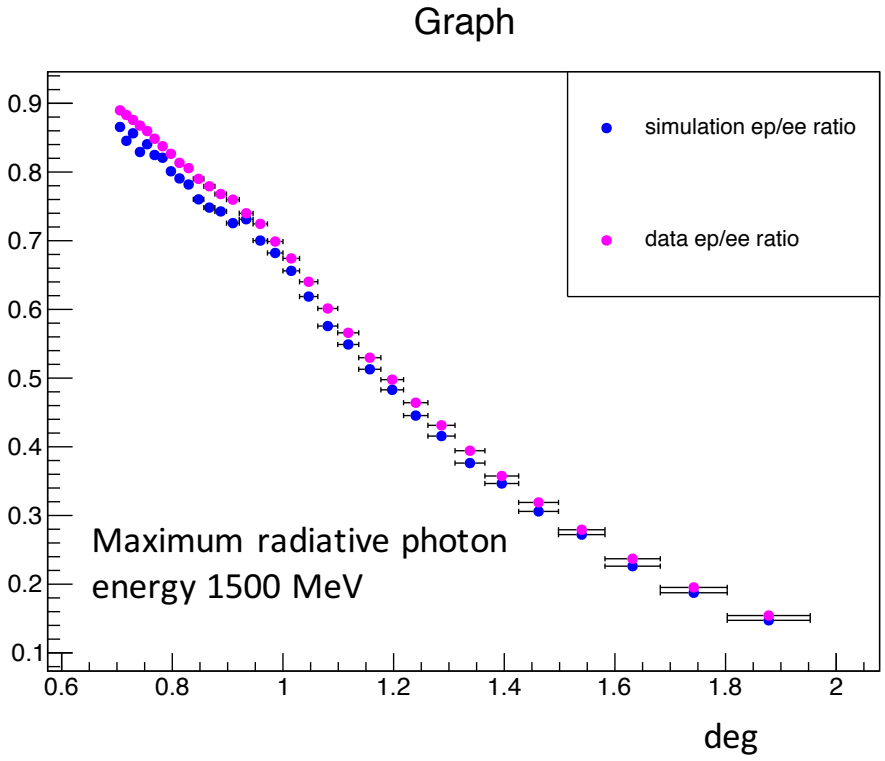
- This vertex z is not the same as traditional vertex z, which is obtained in a geometric calculation.

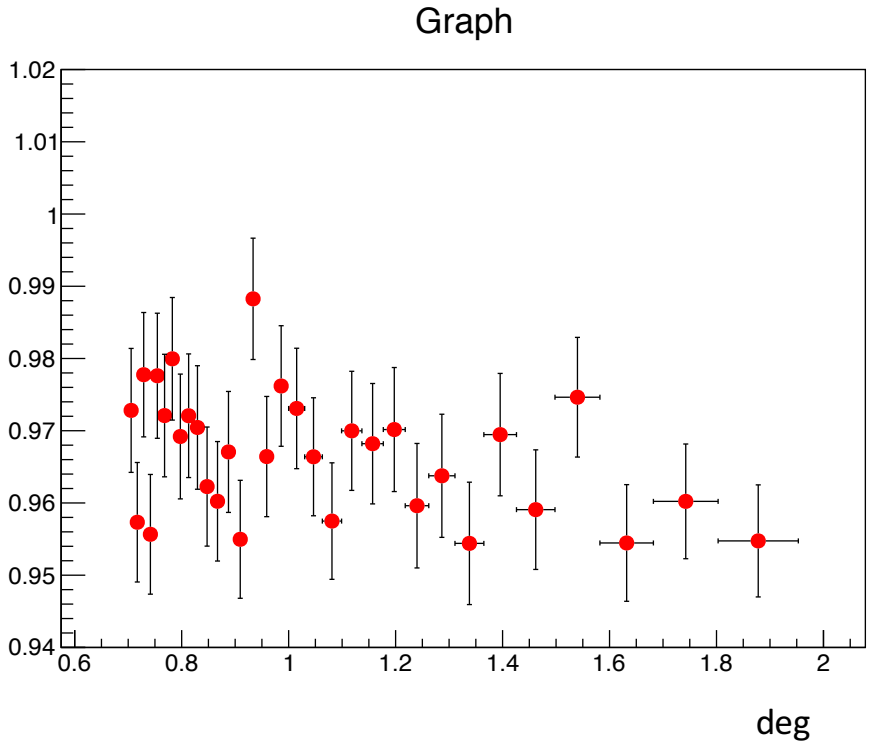
- This vertex z is from kinematic (conservation laws), so it might not be surprising it is related to elasticity



ep/ee ratio

- Using the HyCal and GEM hybrid method for ee selection
- Mixing ep and ee in the simulation with equal integrated luminosity





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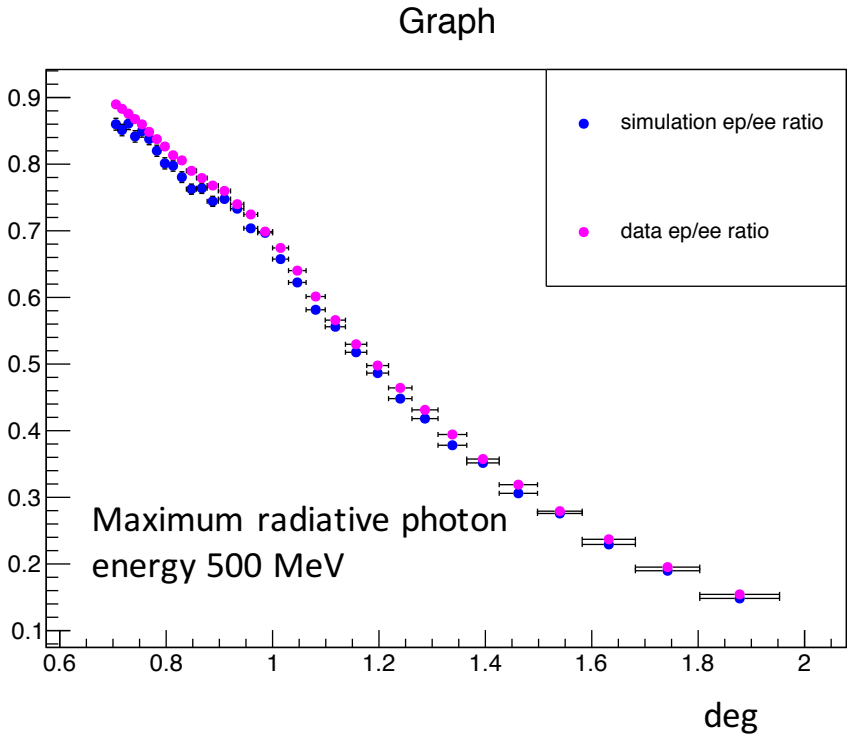

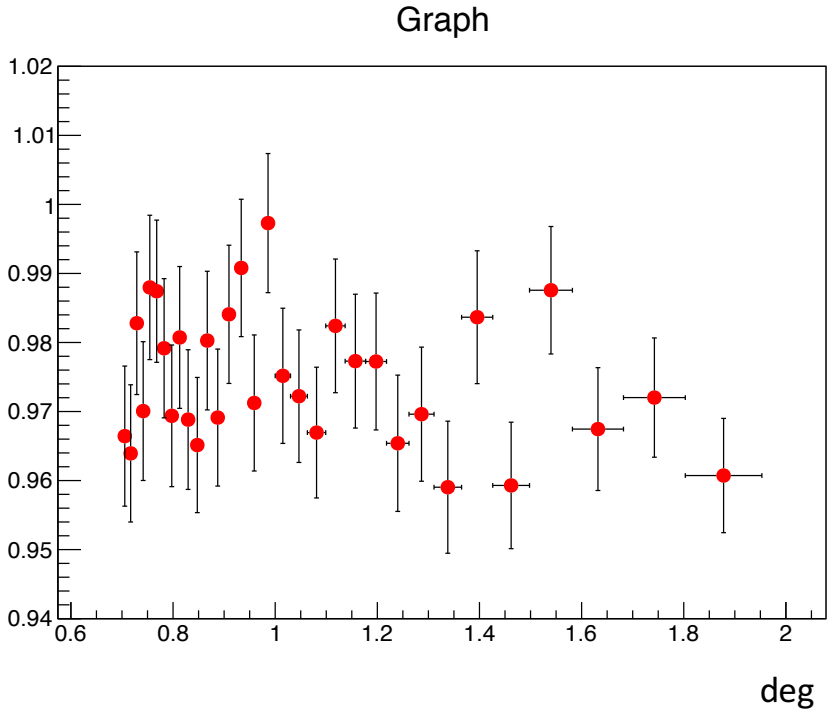

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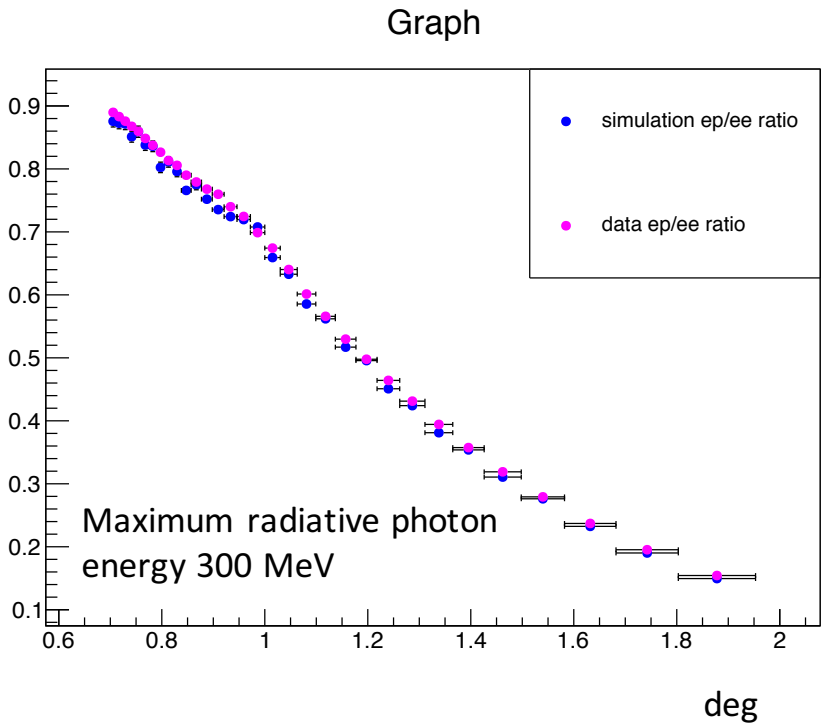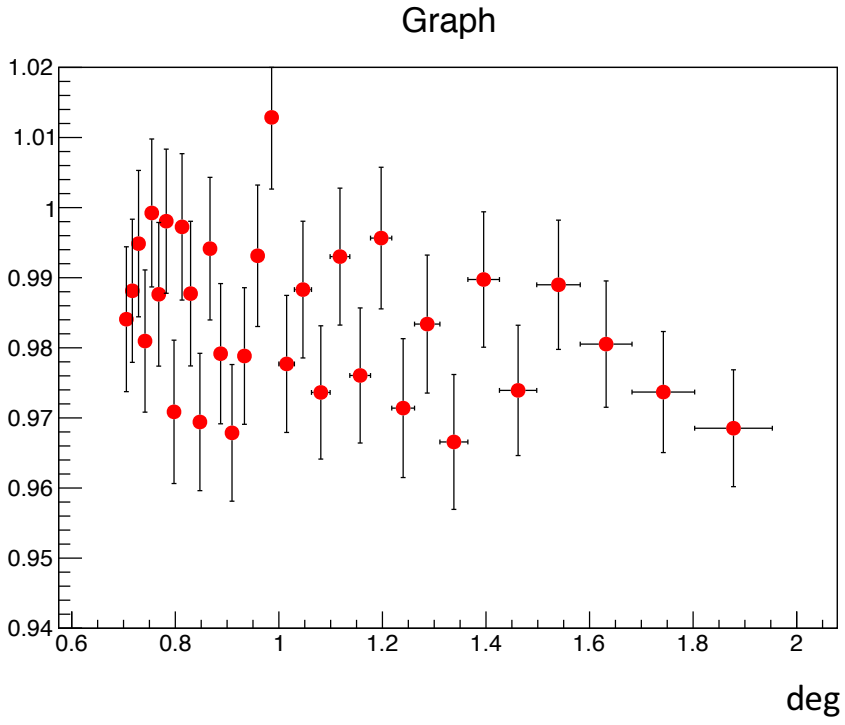
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