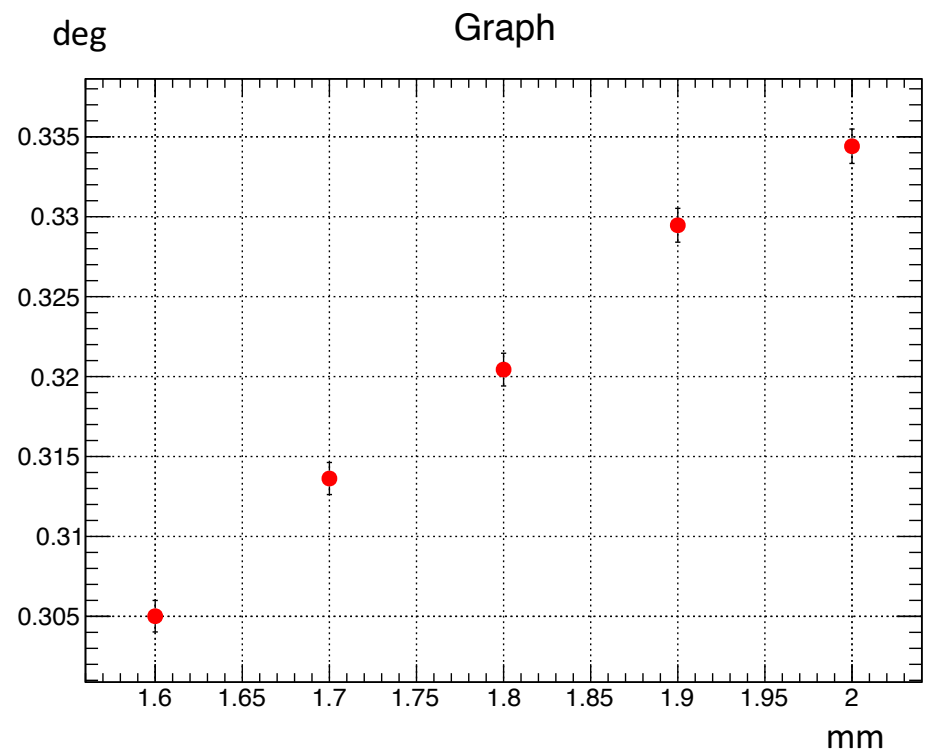
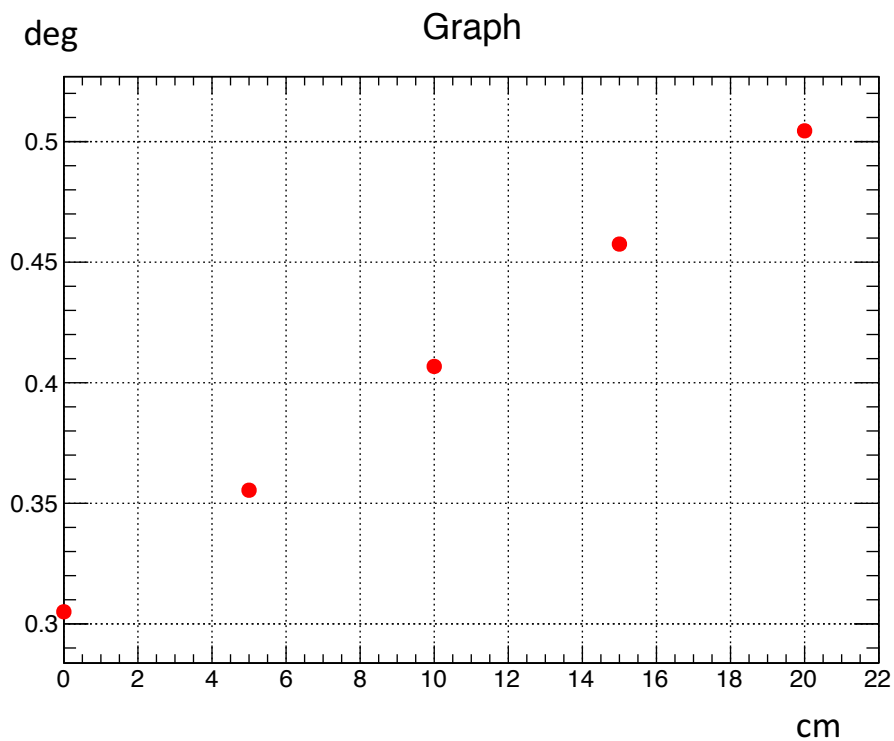


Simulation Comparison

Weizhi Xiong

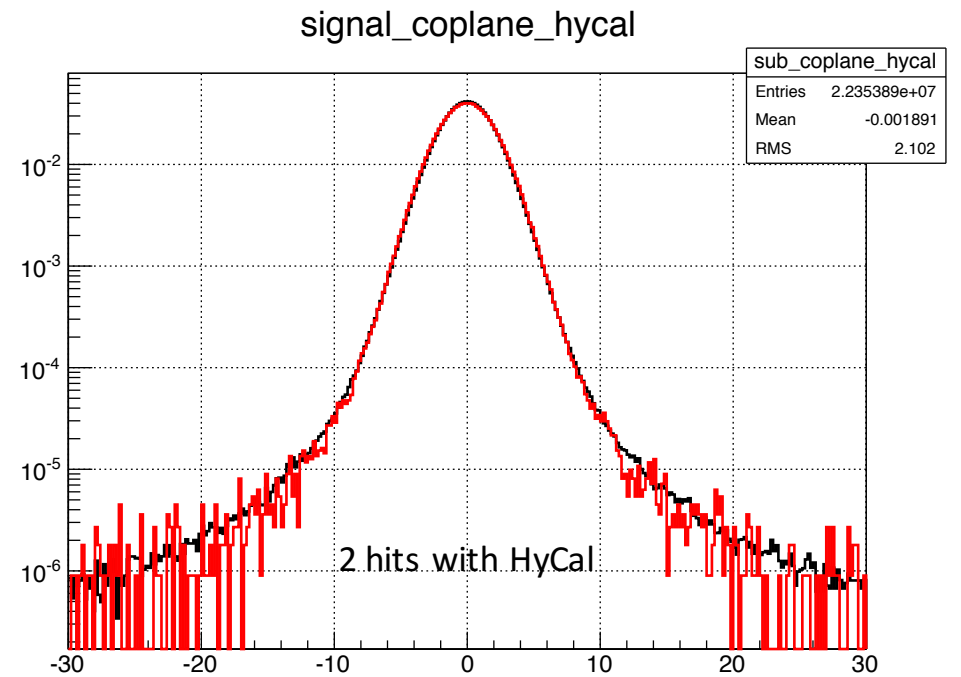
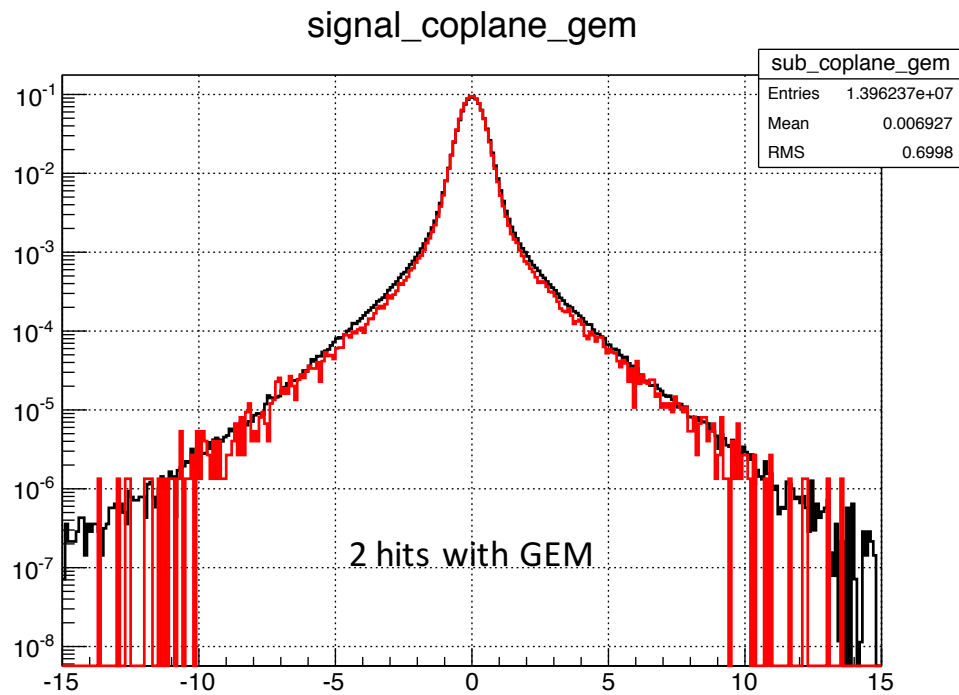
Coplanarity – 2GeV

- 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 vacuum window upstream or increase its thickness see what happen



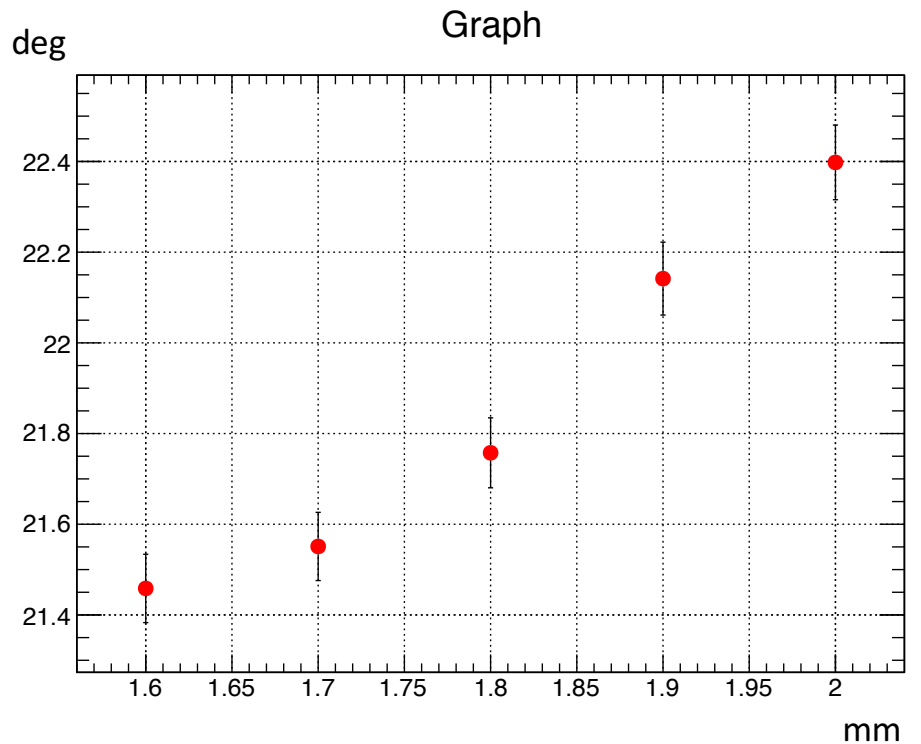
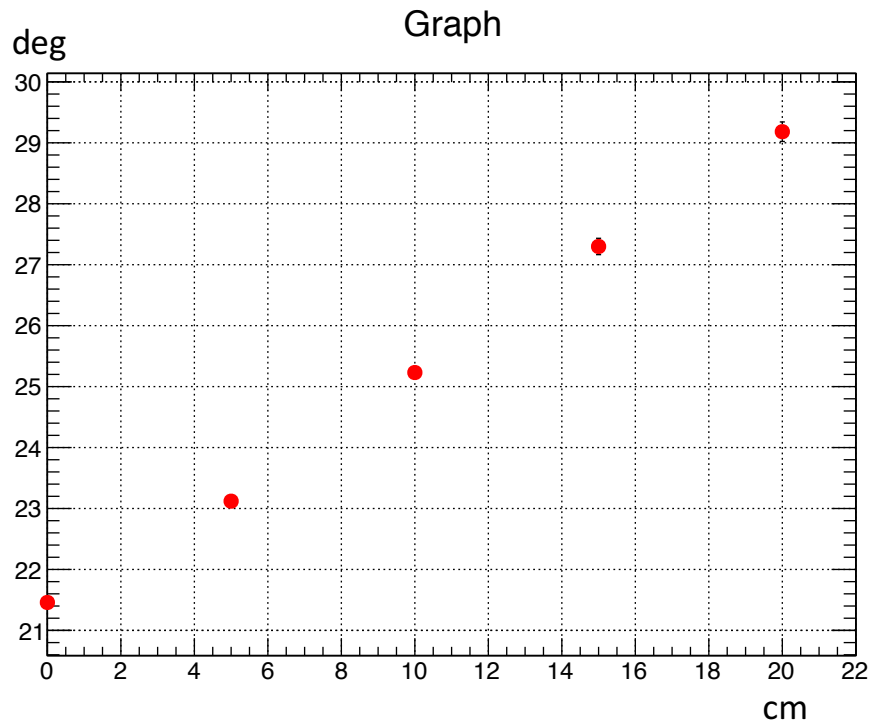
Coplanarity – 2GeV

Red histogram is simulation, black is data



Vertex z – 2GeV

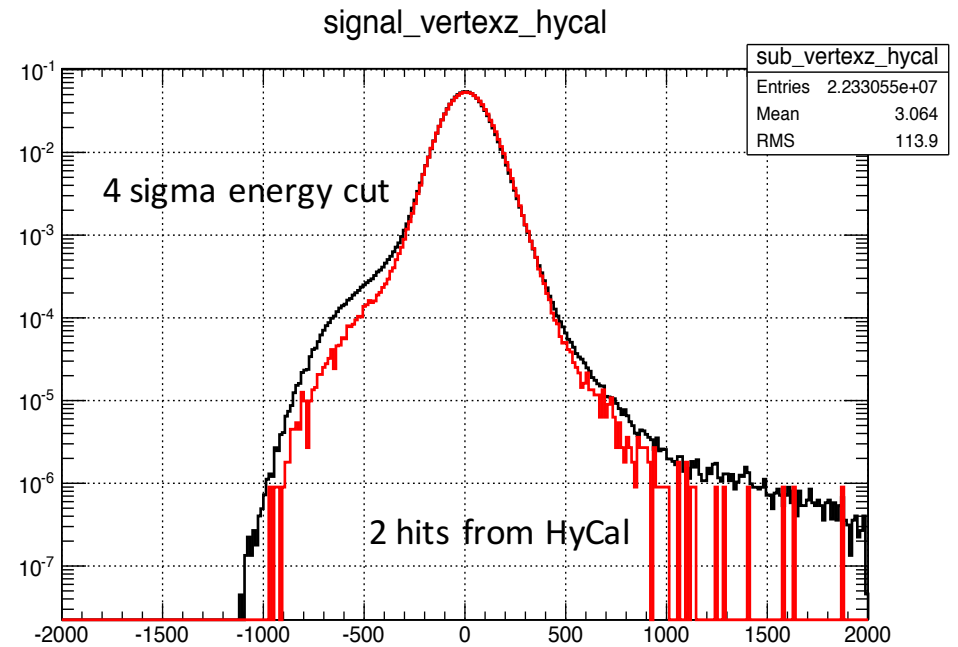
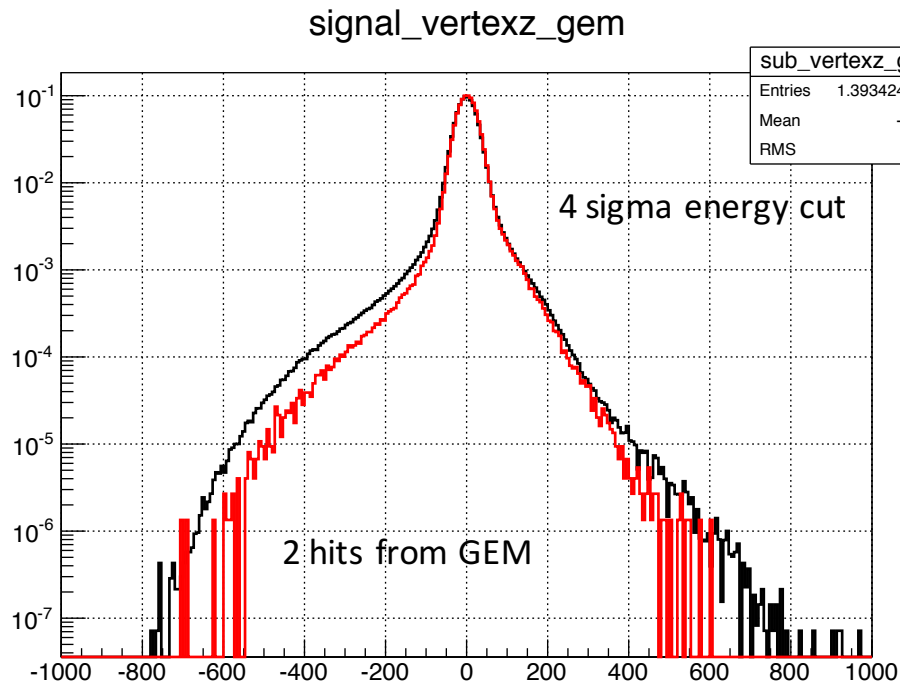
- Vertex z for the data has about 25mm for the central peak (if using GEMs), but simulation has about 21mm
- Shift the vacuum window upstream or increase its thickness see what happen



Vertex z – 2GeV

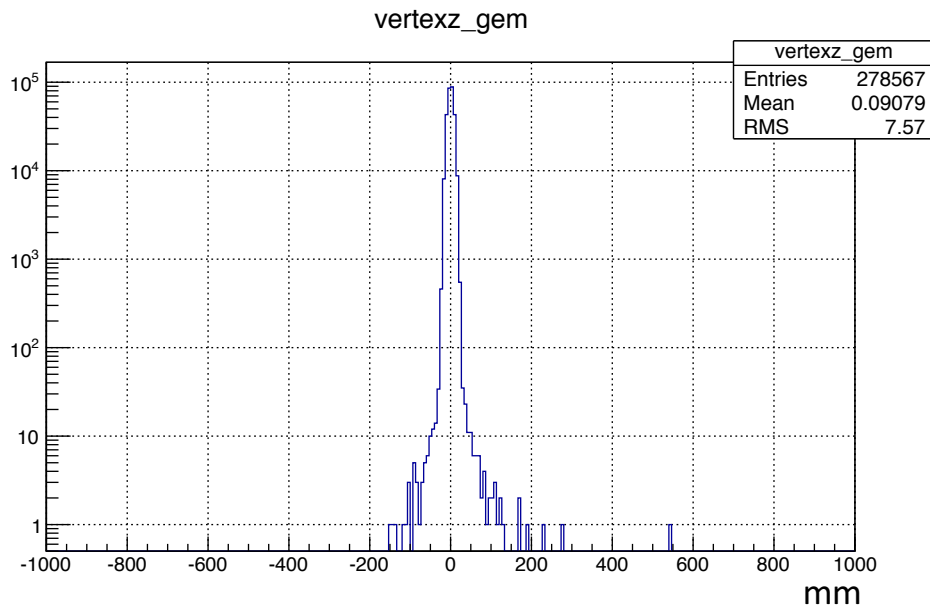
Red histogram is simulation, black is data

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

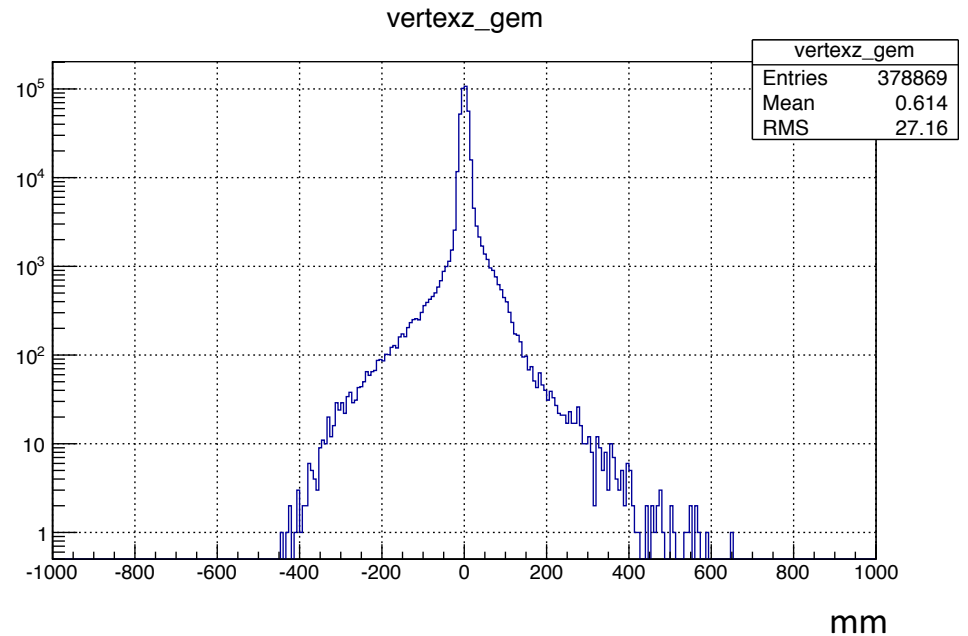


Vertex z – 2GeV

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

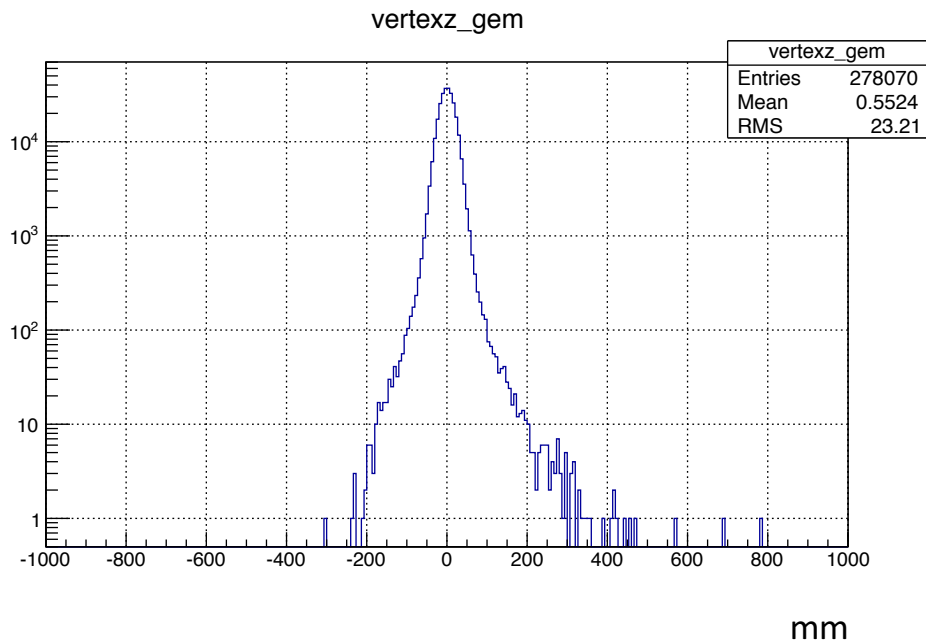


Vertex z with all material removed (except GEM and HyCal), internal radiative photon **allowed**

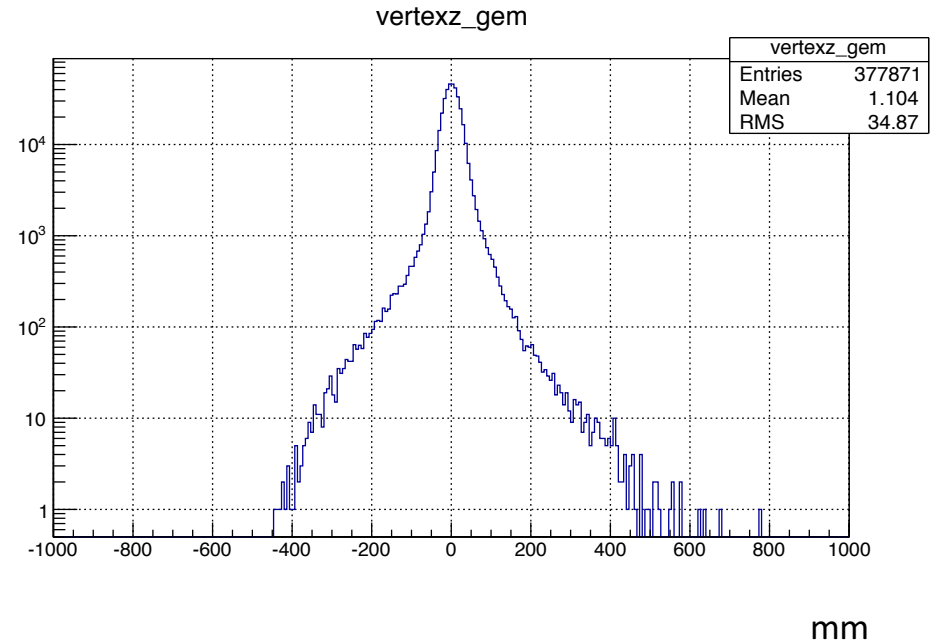


Vertex z – 2GeV

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

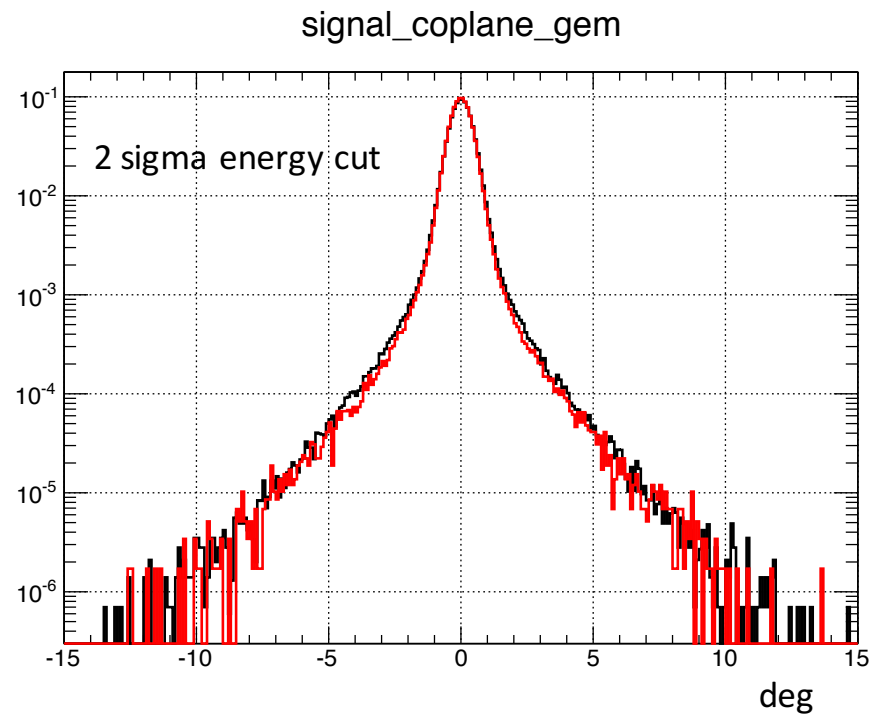
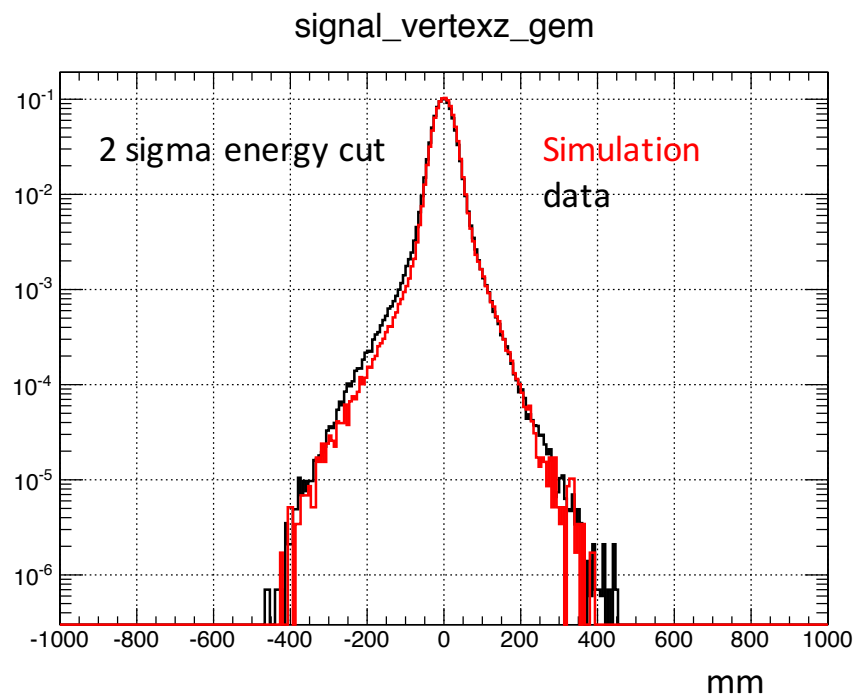


Vertex z with all material in, internal radiative photon **allowed**



Vertex z – 2GeV

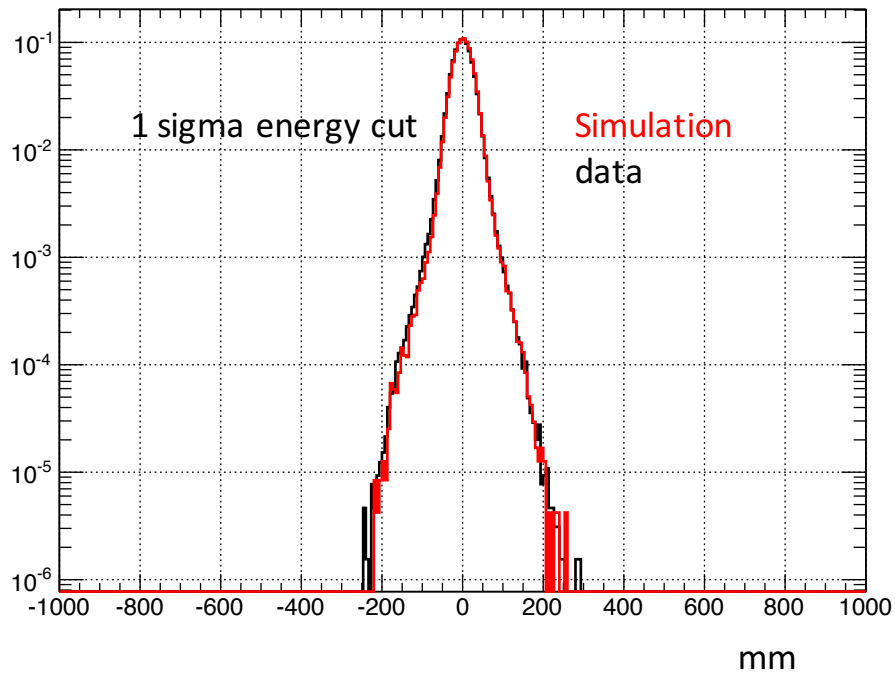
- Gramolin's Moller event generator use only soft photon approximation, cannot fully reproduce the radiative tail, so the difference might be related to this



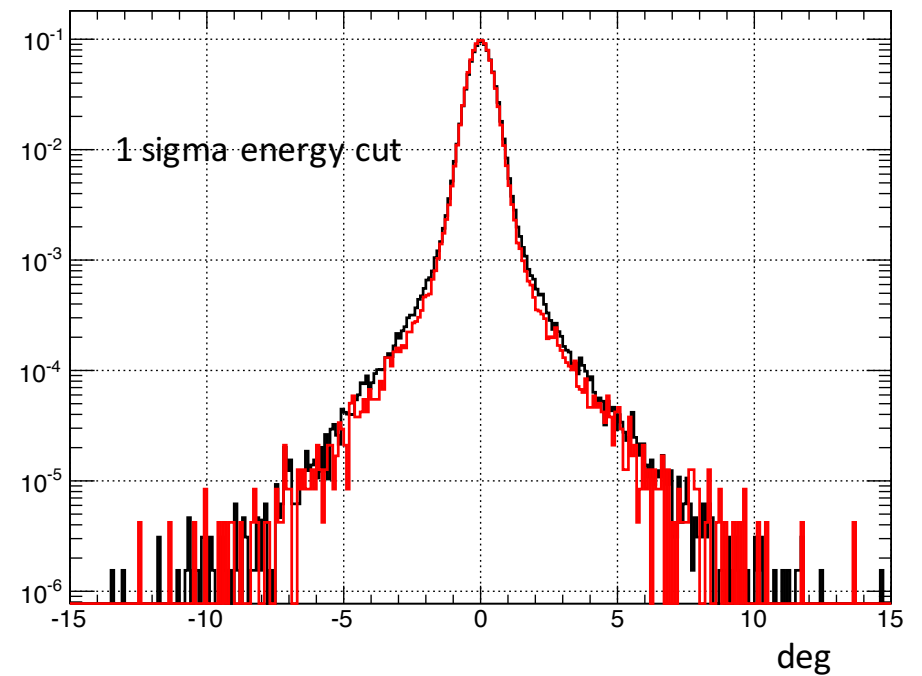
Vertex z – 2GeV

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signal_vertexz_gem

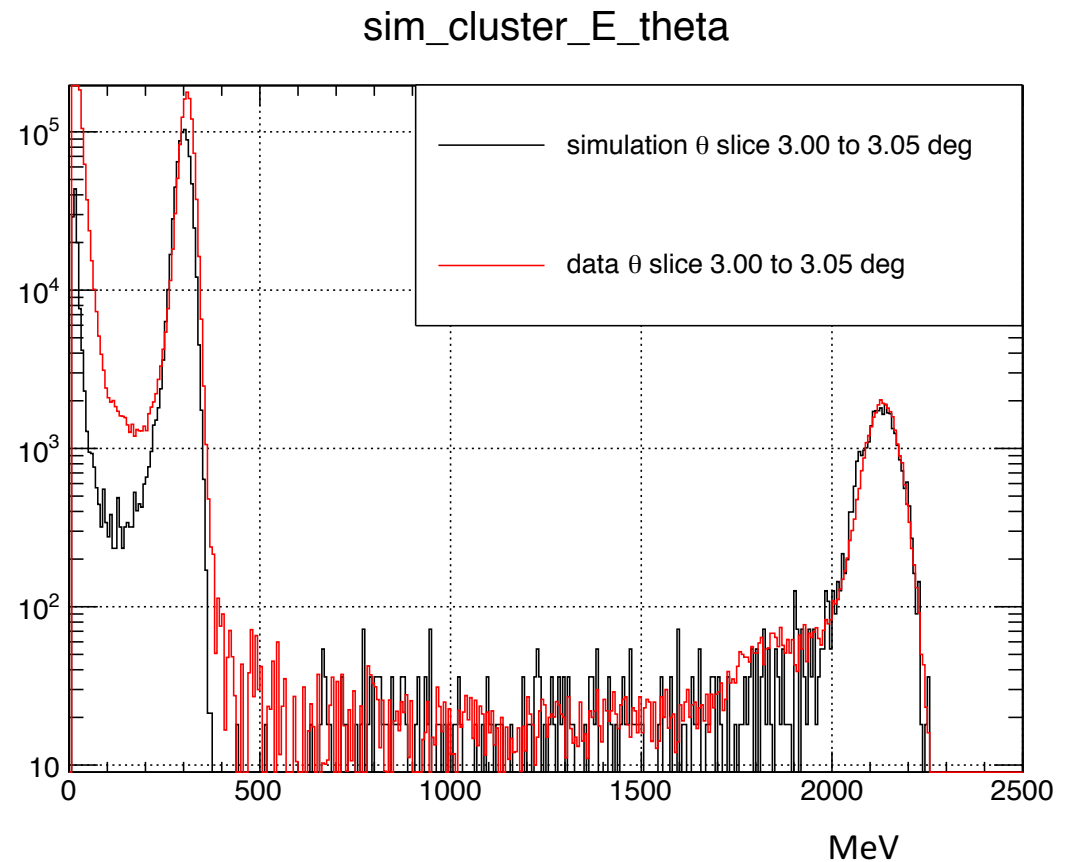


signal_coplaner_gem



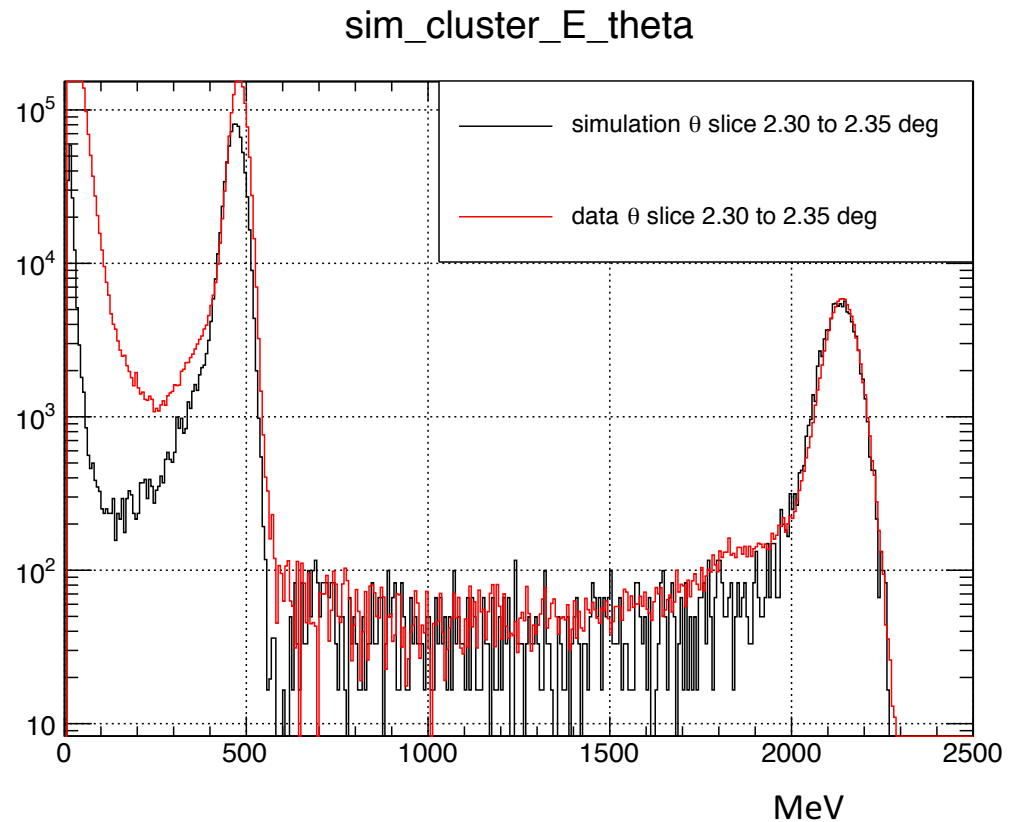
Energy spectrum – slice of cluster E vs theta plot

- 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



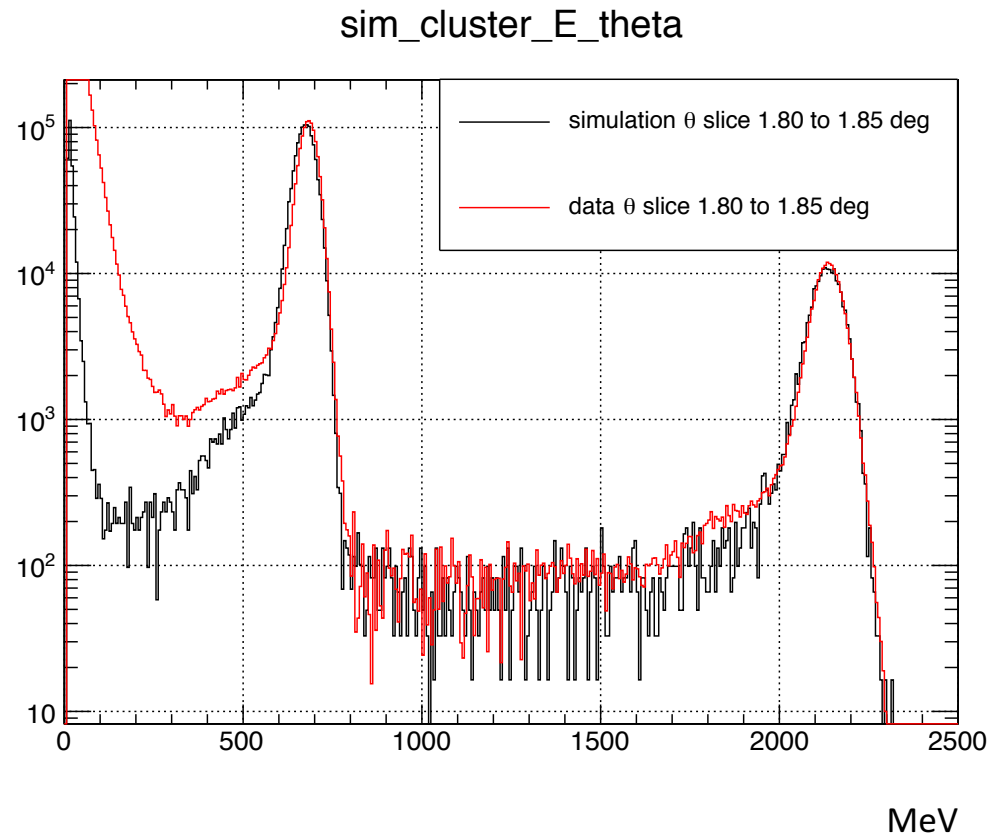
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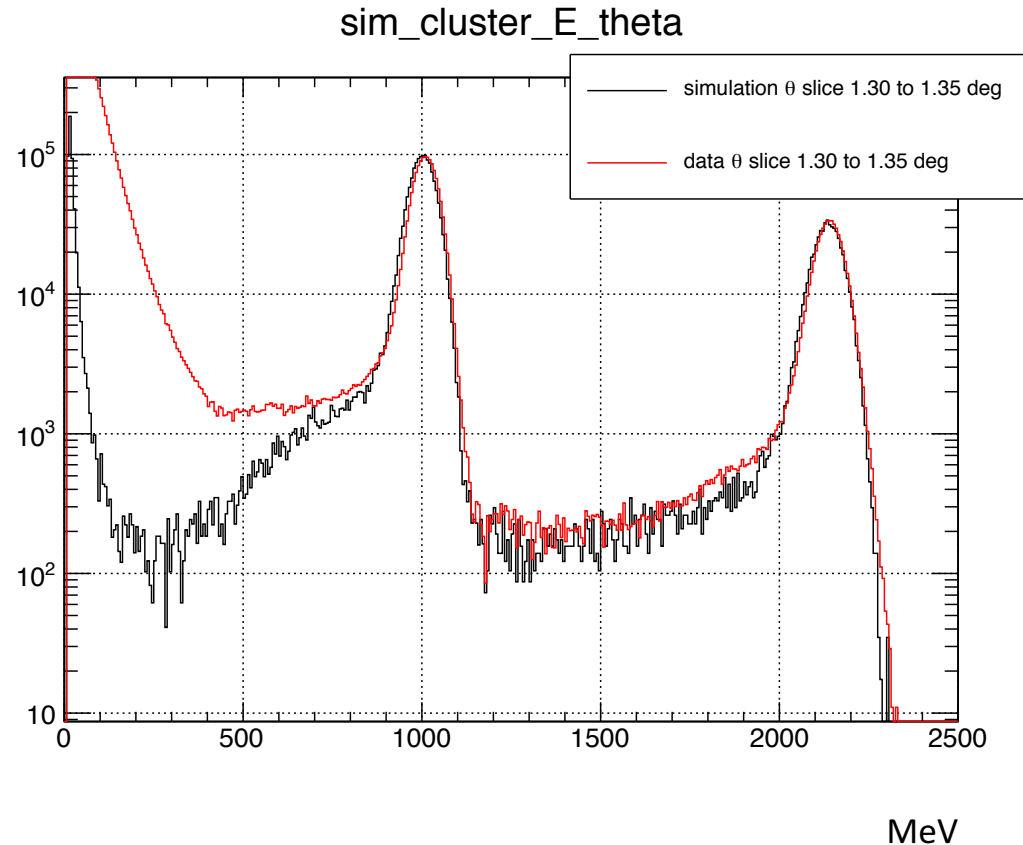
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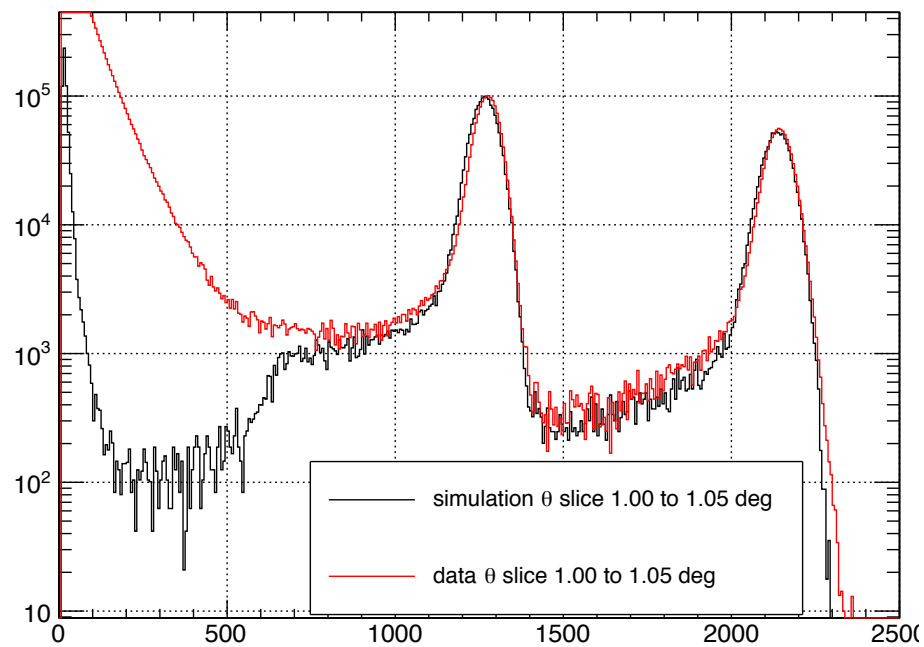


Energy spectrum – slice of cluster E vs theta plot

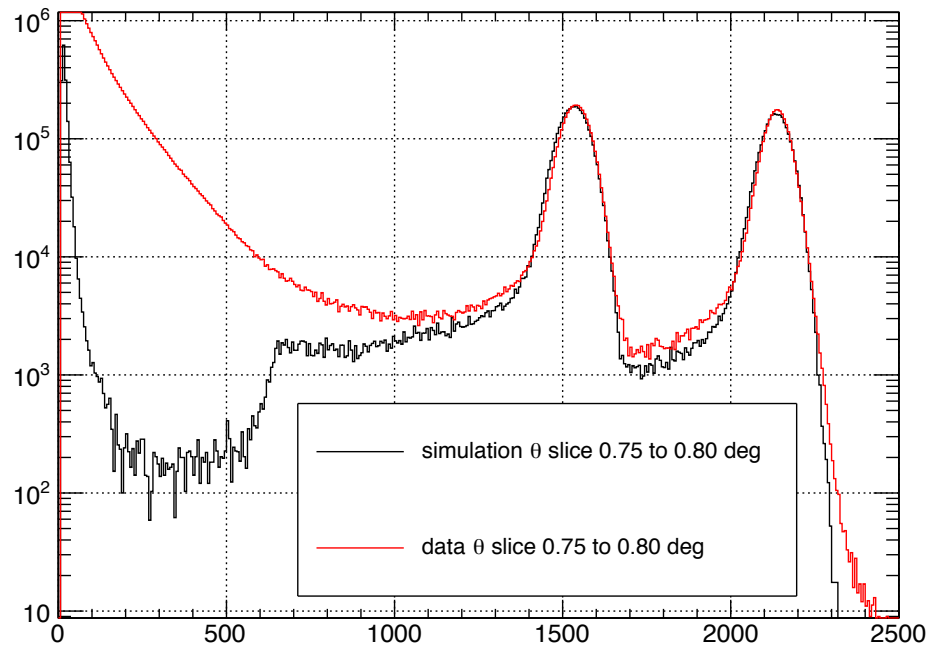
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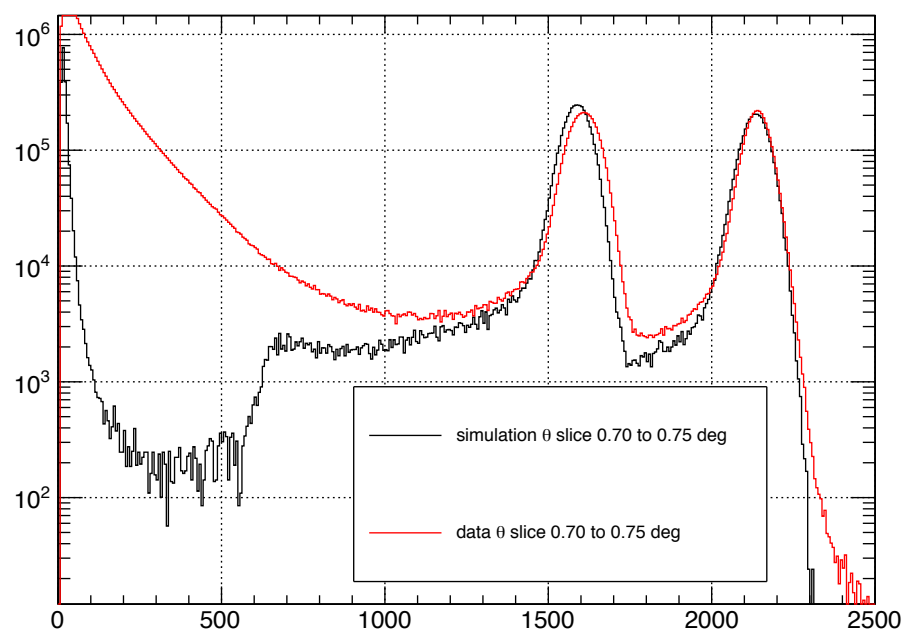
sim_cluster_E_theta



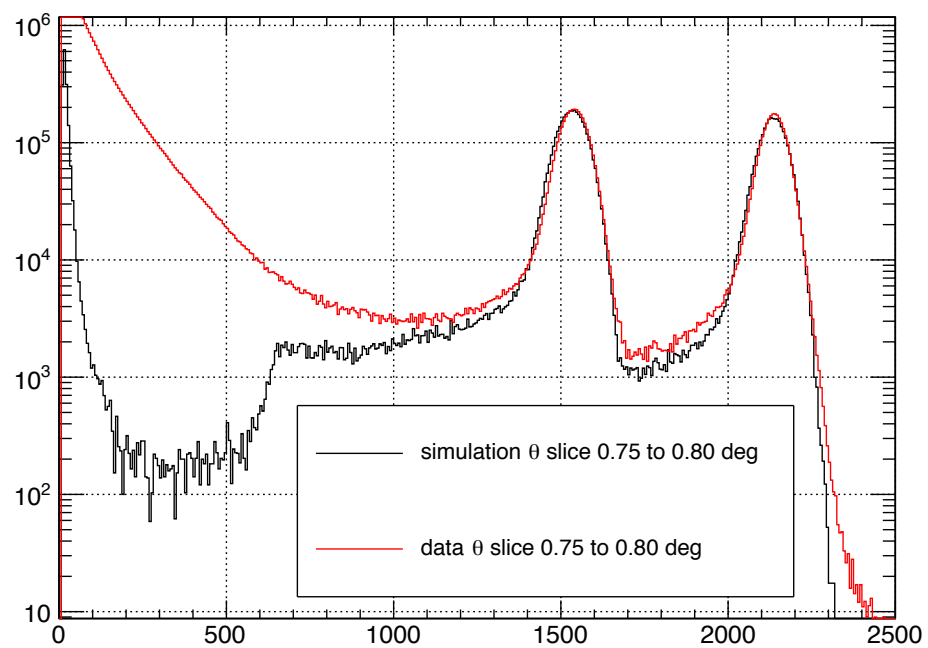
sim_cluster_E_theta



sim_cluster_E_theta



sim_cluster_E_theta



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

