

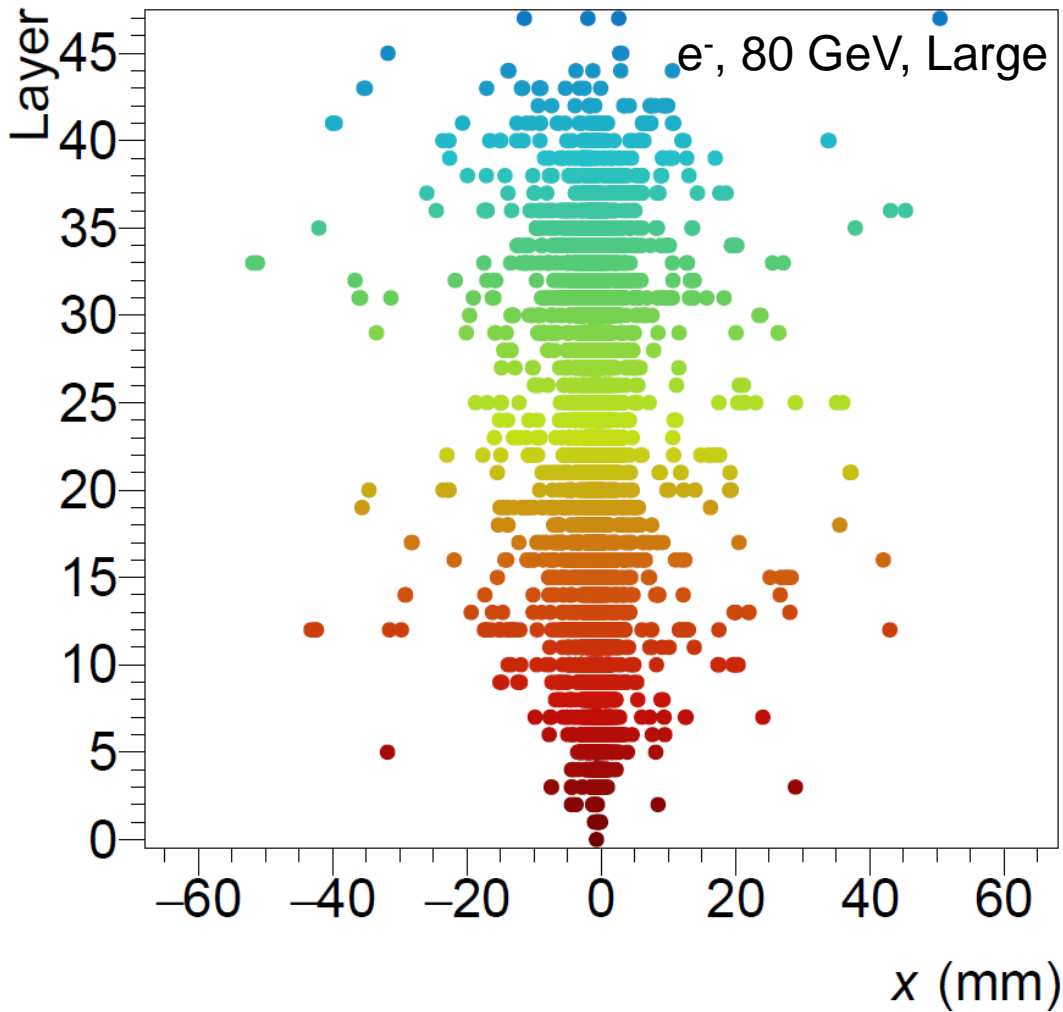
Elongated Events in Simulation

Johannes Keul

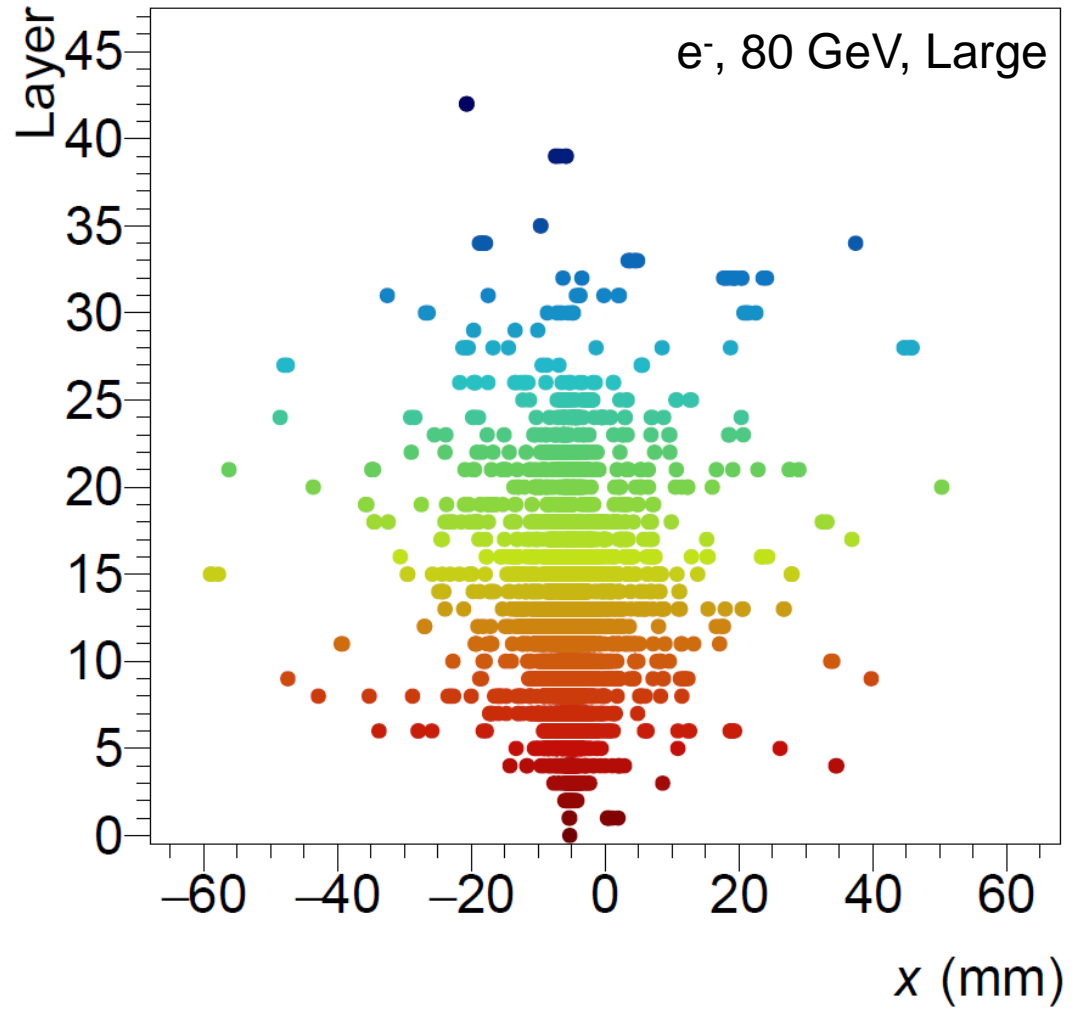


Reminder: Strange behaviour in simulation

Side view

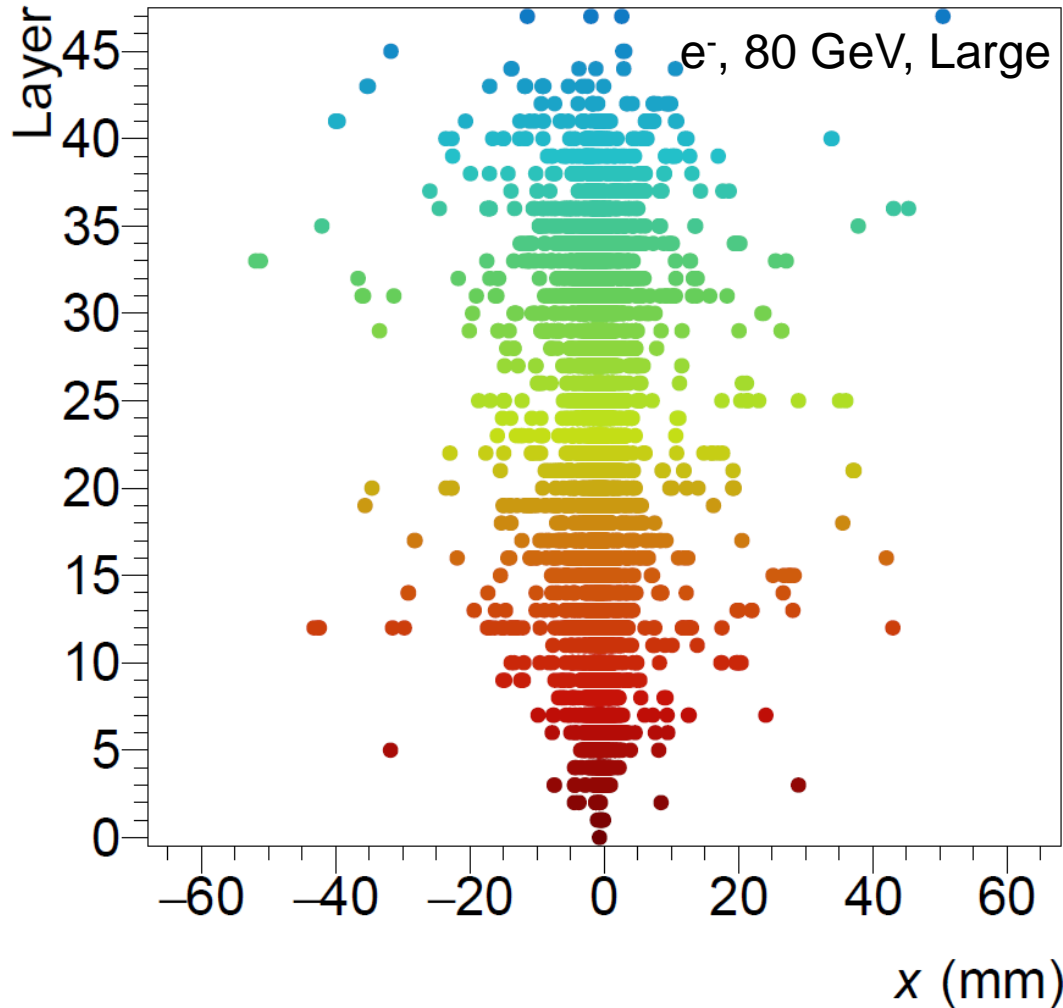


Side view

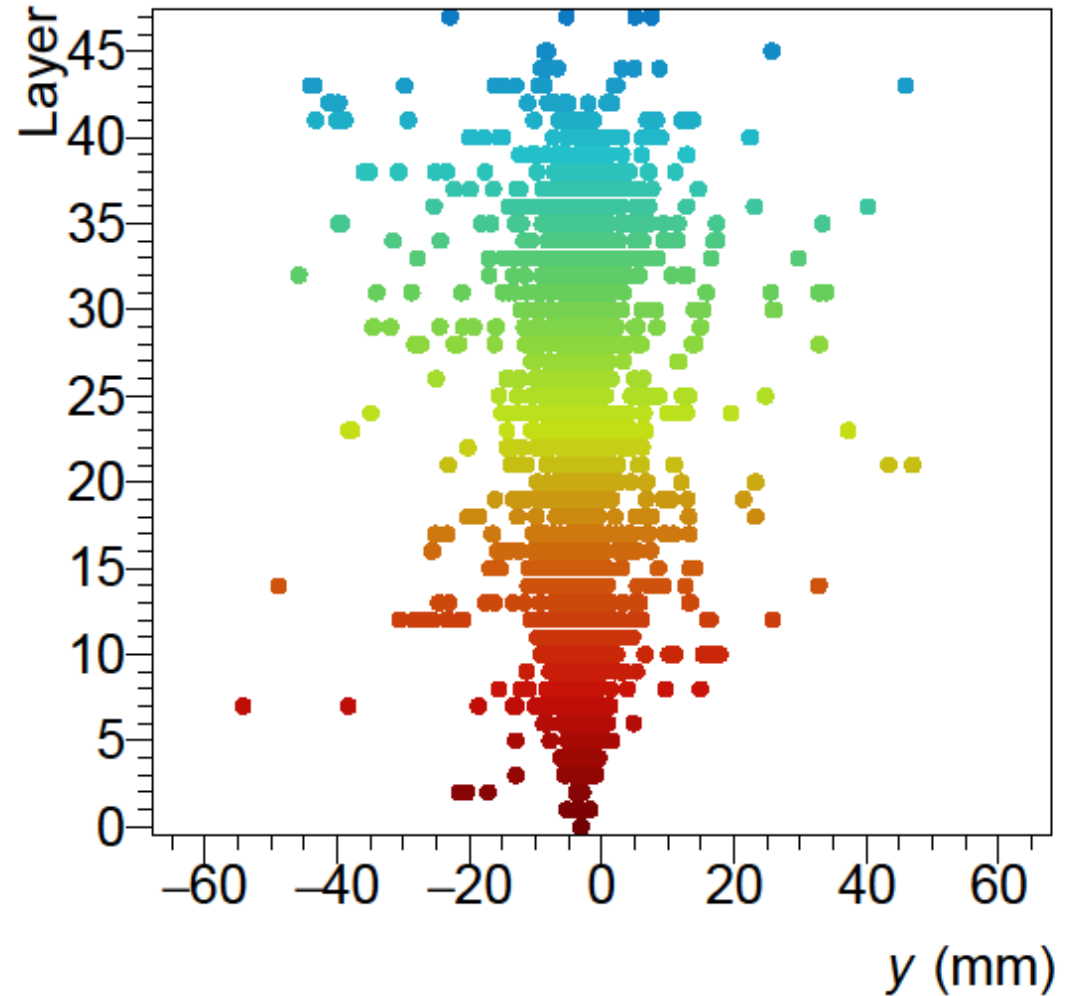


Strange behaviour in simulation: inclination

Side view

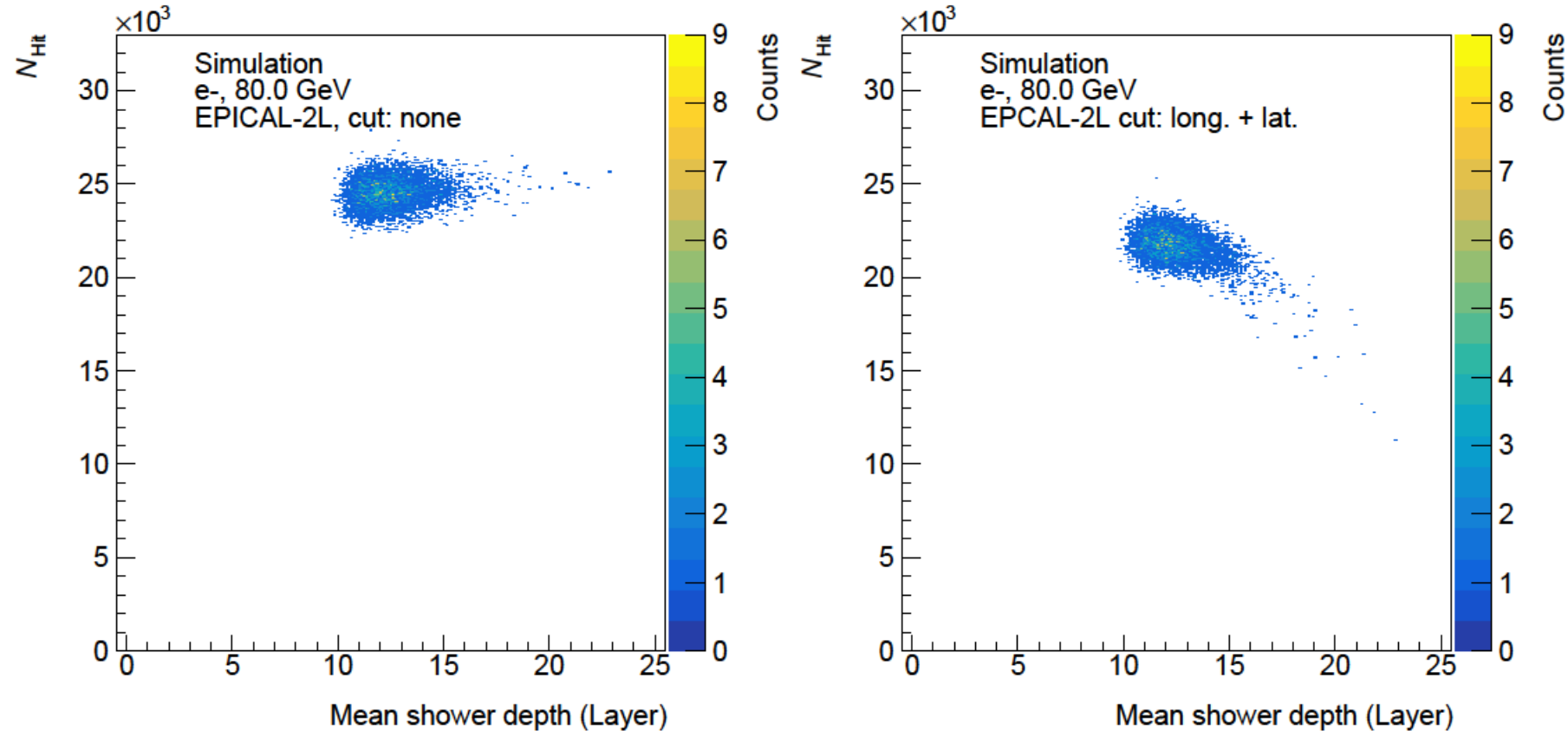


Side view



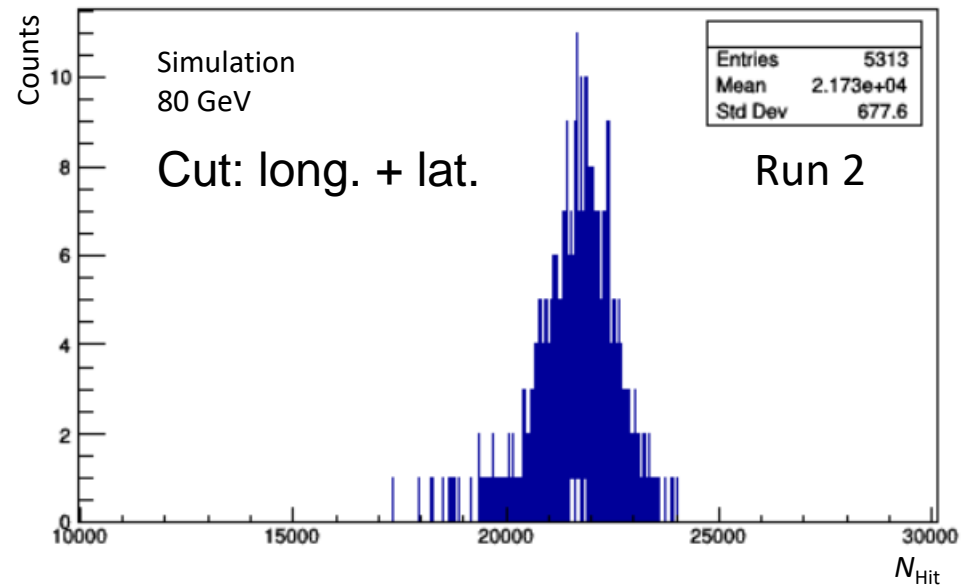
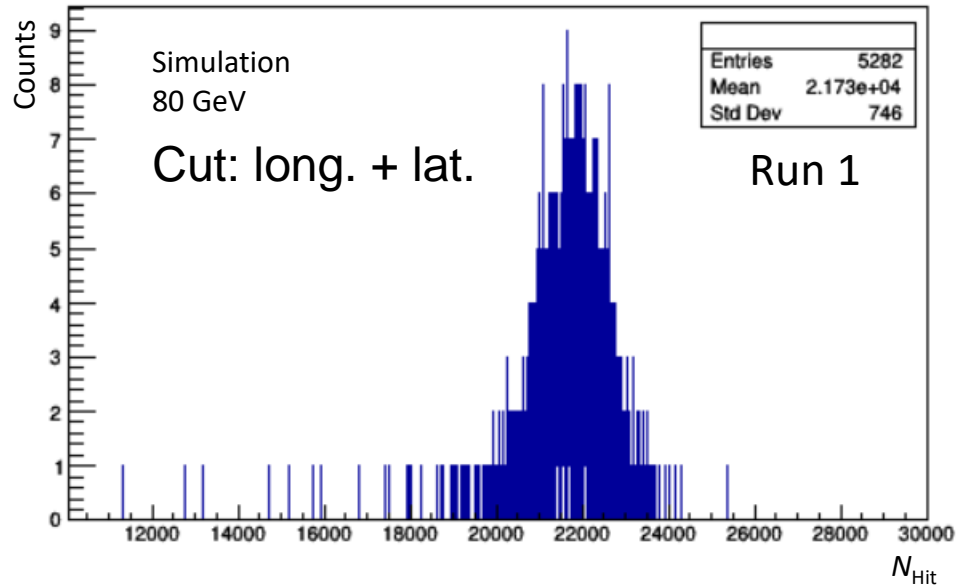
- The event is straight in both directions

Correlation of N_{Hit} to shower depth



- Elongated events show less hits in short EPICAL-2 variants
- No correlation in long EPICAL-2 variants

Rerunning the large simulation for 80 GeV

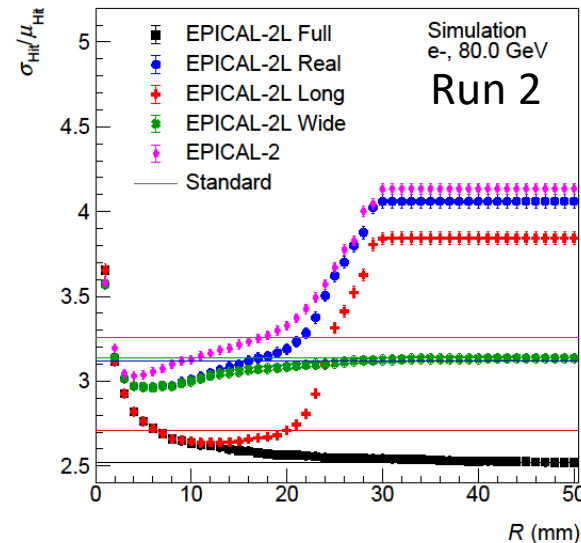
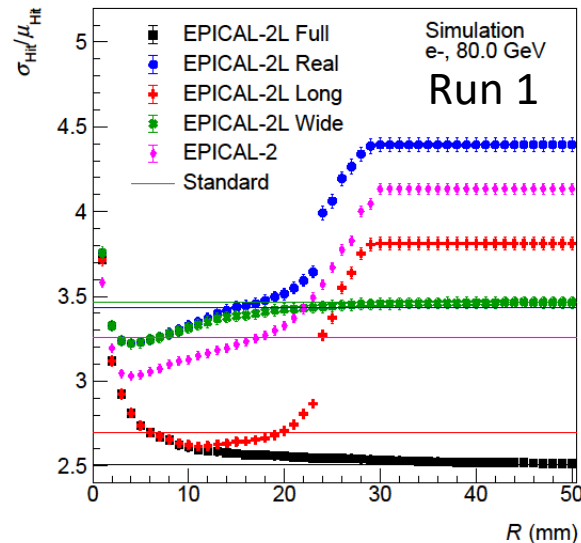
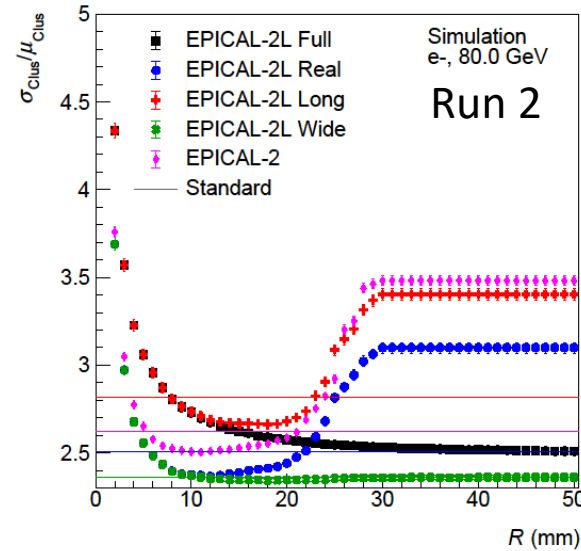
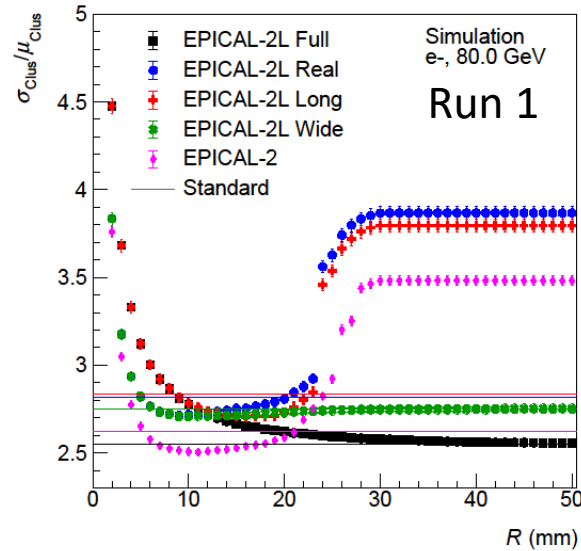


- In the new run the tail towards low N_{Hit} is less pronounced

Rerunning the large Simulation for 80 GeV

Full: 4096 x 4096 pixel, 96 layers
 Real: 1024 x 1024 pixel, 24 layers
 Long: 1024 x 1024 pixel, 96 layers
 Wide: 4096 x 4096 pixel, 24 layers
 Normal: 1024 x 1024 pixel, 24 layers
 Normal simulation is not rerun

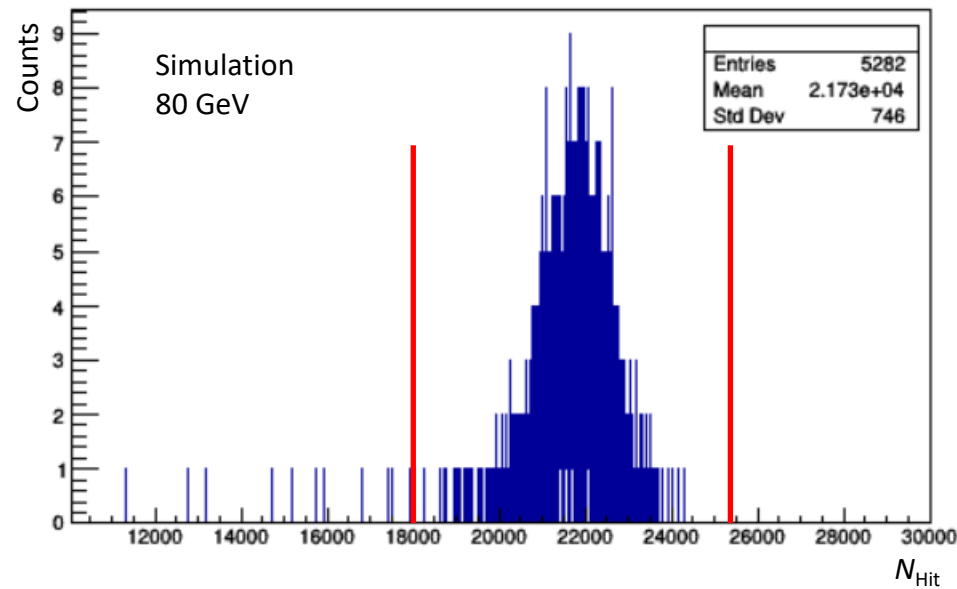
- Very different results for short EPICAL-2 versions
- Almost no difference for long EPICAL-2 versions



Why?

- Events in the tail of the distribution are rare but have a large impact on resolution
- With limited statistics in the simulation (10000 Evt) the effect of the tail is random

Using a cut to suppress the tail

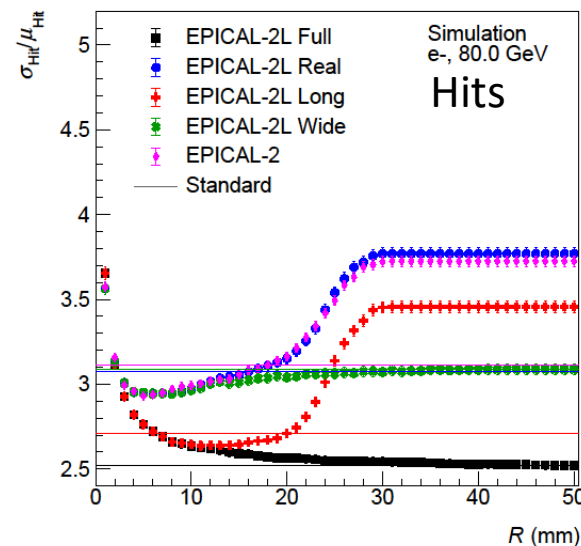
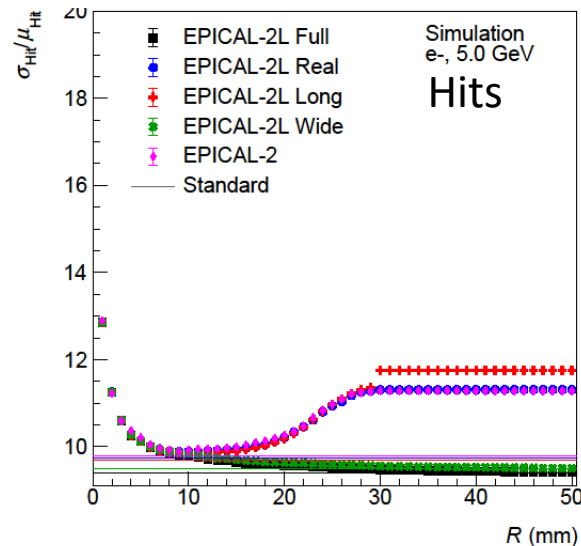
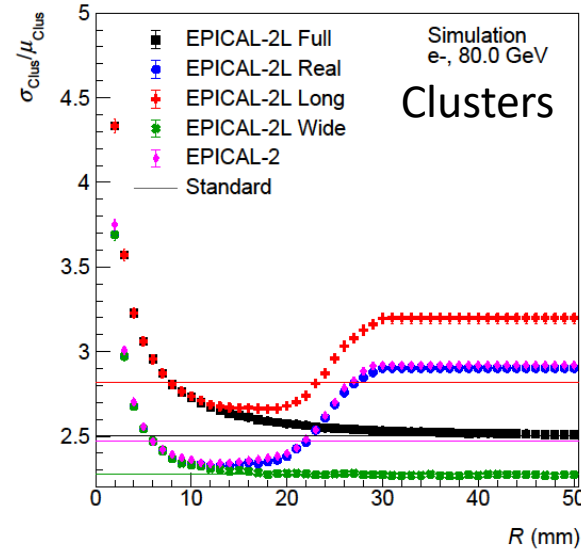
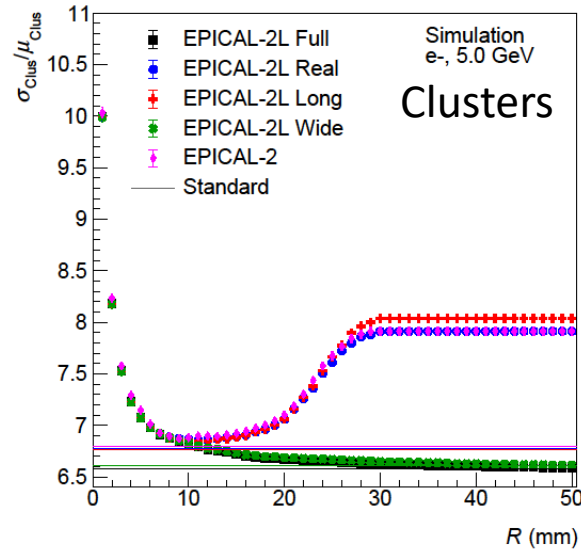


- Do a 5σ cut: $\mu - 5\sigma < N_{\text{Hit}} < \mu + 5\sigma$
- For test-beam data, this cut is done within the event selection

Results with 5σ cut

Full: 4096 x 4096 pixel, 96 layers
 Real: 1024 x 1024 pixel, 24 layers
 Long: 1024 x 1024 pixel, 96 layers
 Wide: 4096 x 4096 pixel, 24 layers
 Normal: 1024 x 1024 pixel, 24 layers

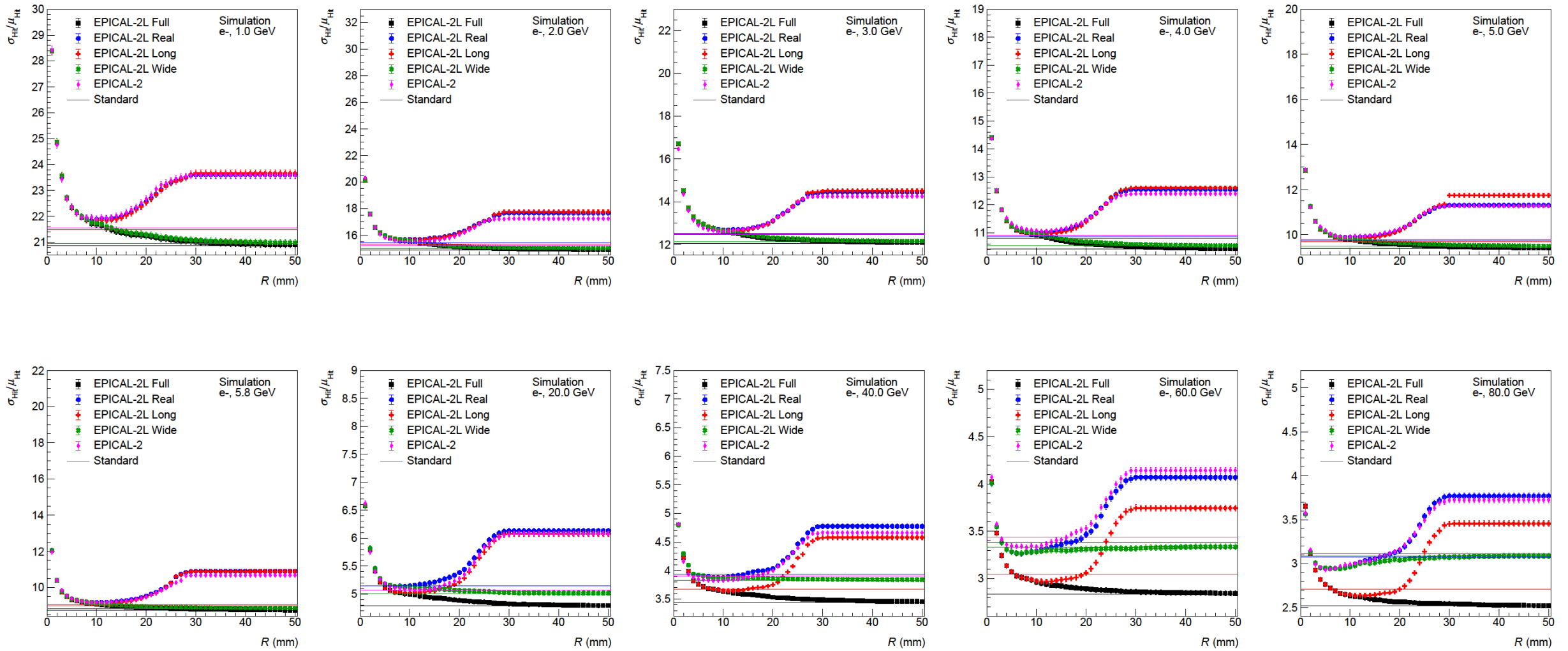
- Normal and real are similar
- Convergence of wide and non-wide variants for small R
- For Hits: better resolution for long variants
- For Clusters: better resolution for short variants?!?



- I still don't understand why these elongated events occur in the simulation.
- If we exclude these events with a 5σ cut, most of the behavior of the resolution as a function of R makes sense.

Backup

Resolution for hits with acceptance correction and 5σ cut



Resolution for clusters with acceptance correction and 5σ cut

