Molière Radius correction with particle info

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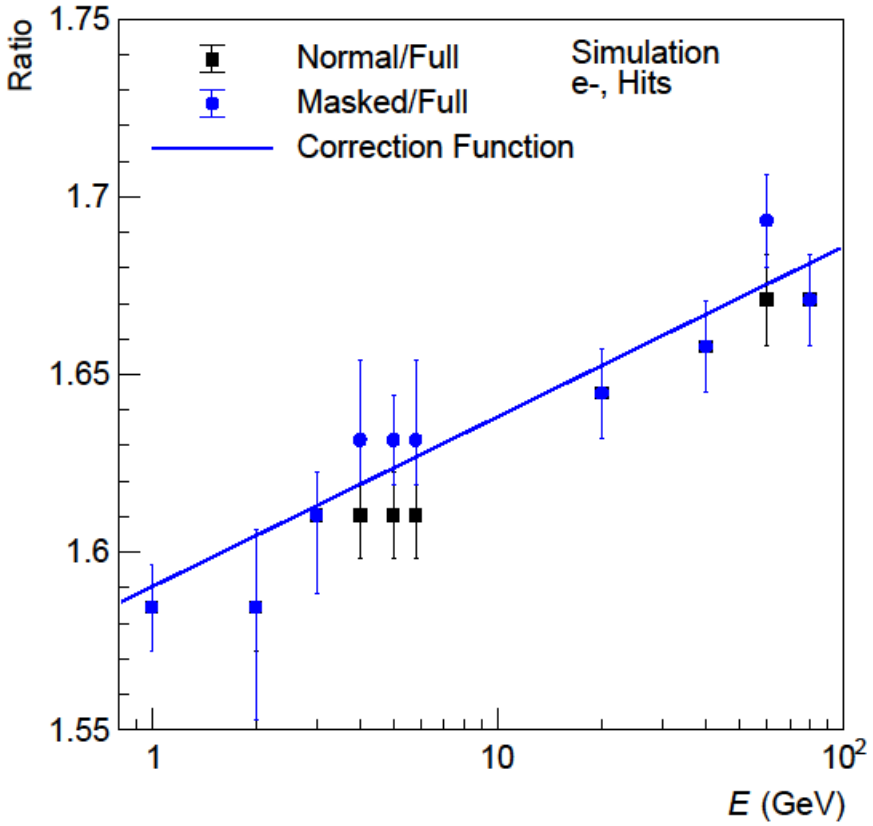
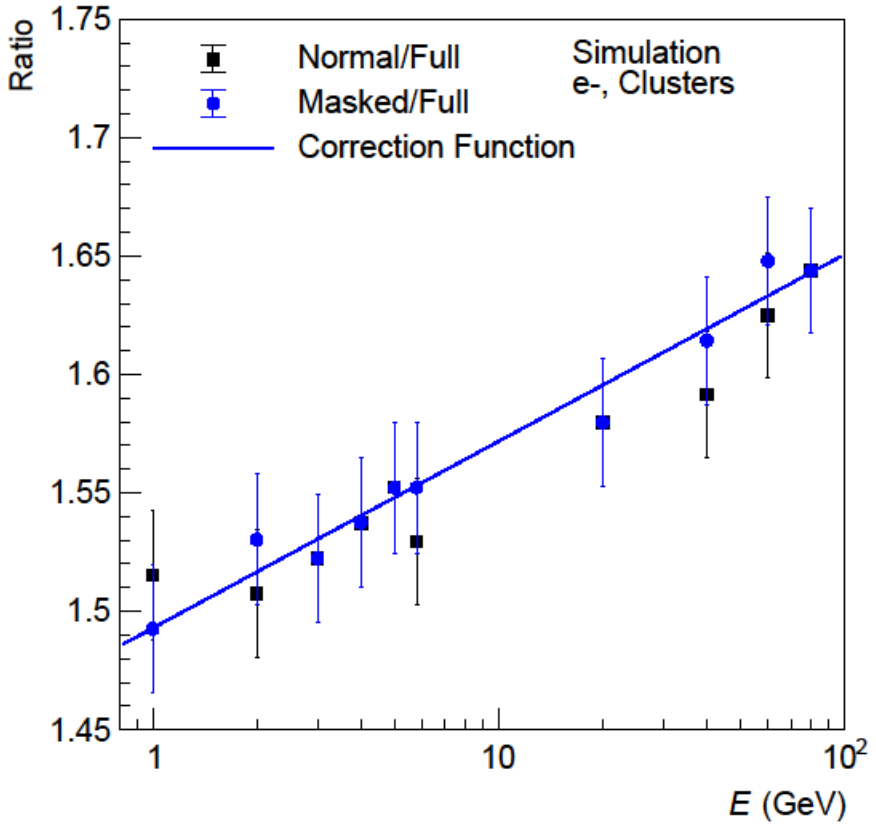
Reminder: correcting the Molière radius

- Masked pixels and the dead chip in layer 21 might also influence the result
- ➢ Compare the Normal to the Full simulation to get a correction factor for the data

- Correction function:

$$f(E) = a * \log(\frac{E}{1GeV}) + b$$

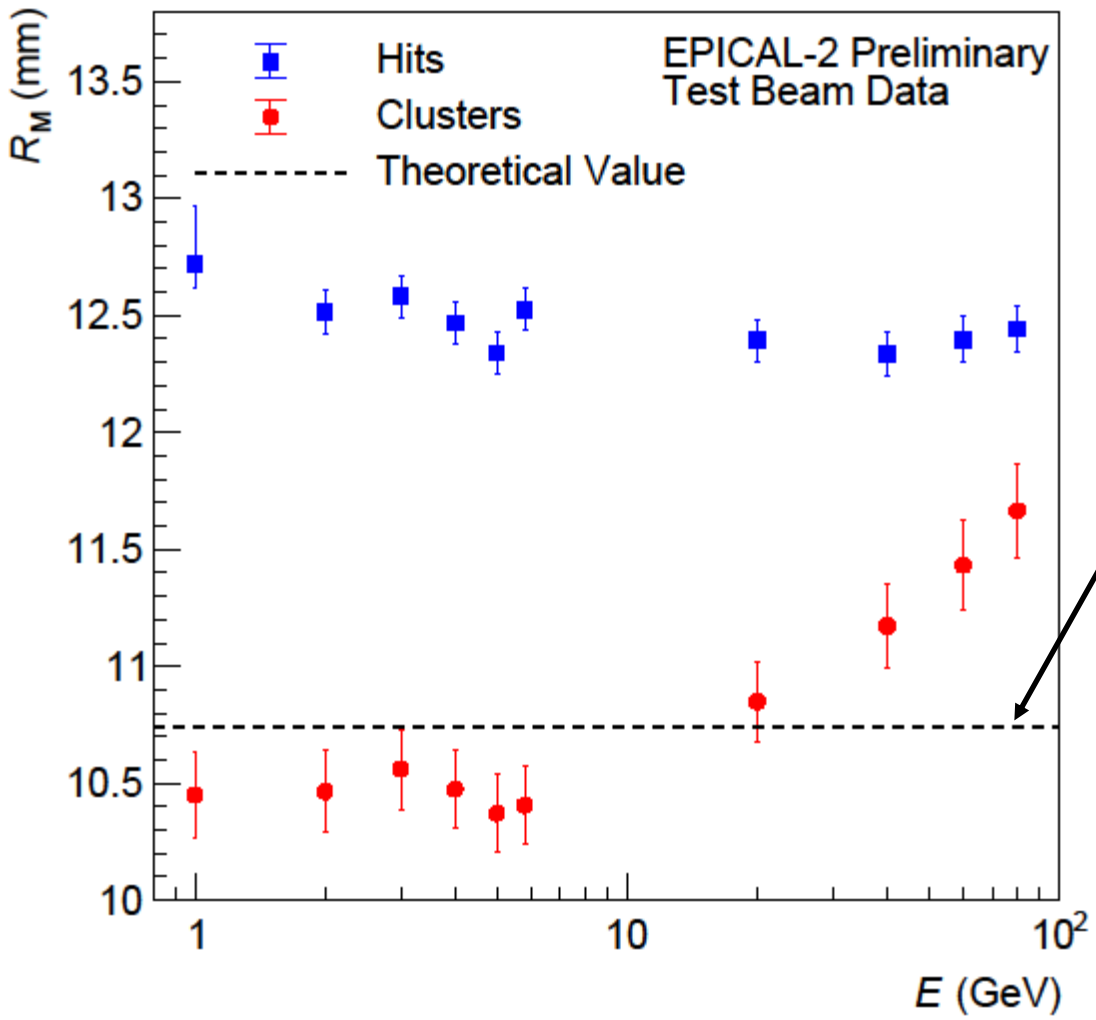




- ➢ Pixel masking has no significant effect on the measurement of R_M

Reminder: Corrected Molière radius

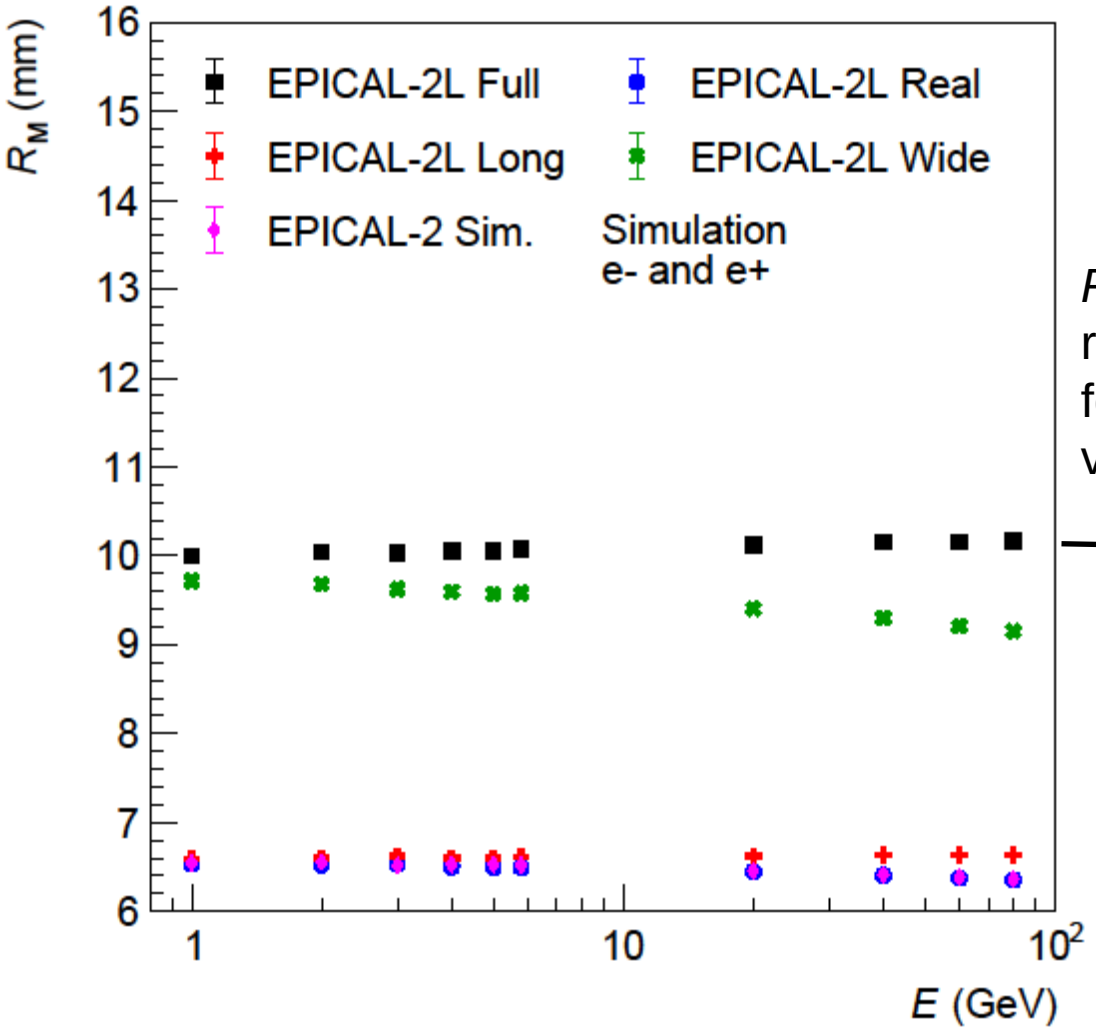
- Results for Clusters at small *E* comparable to theoretically calculated R_M
- R_M for clusters at large *E* increases due to saturation
- R_M for hits is constant and significantly larger than the theoretical value, probably due to the angle under which particles traverse the ALPIDEs increasing with *R*



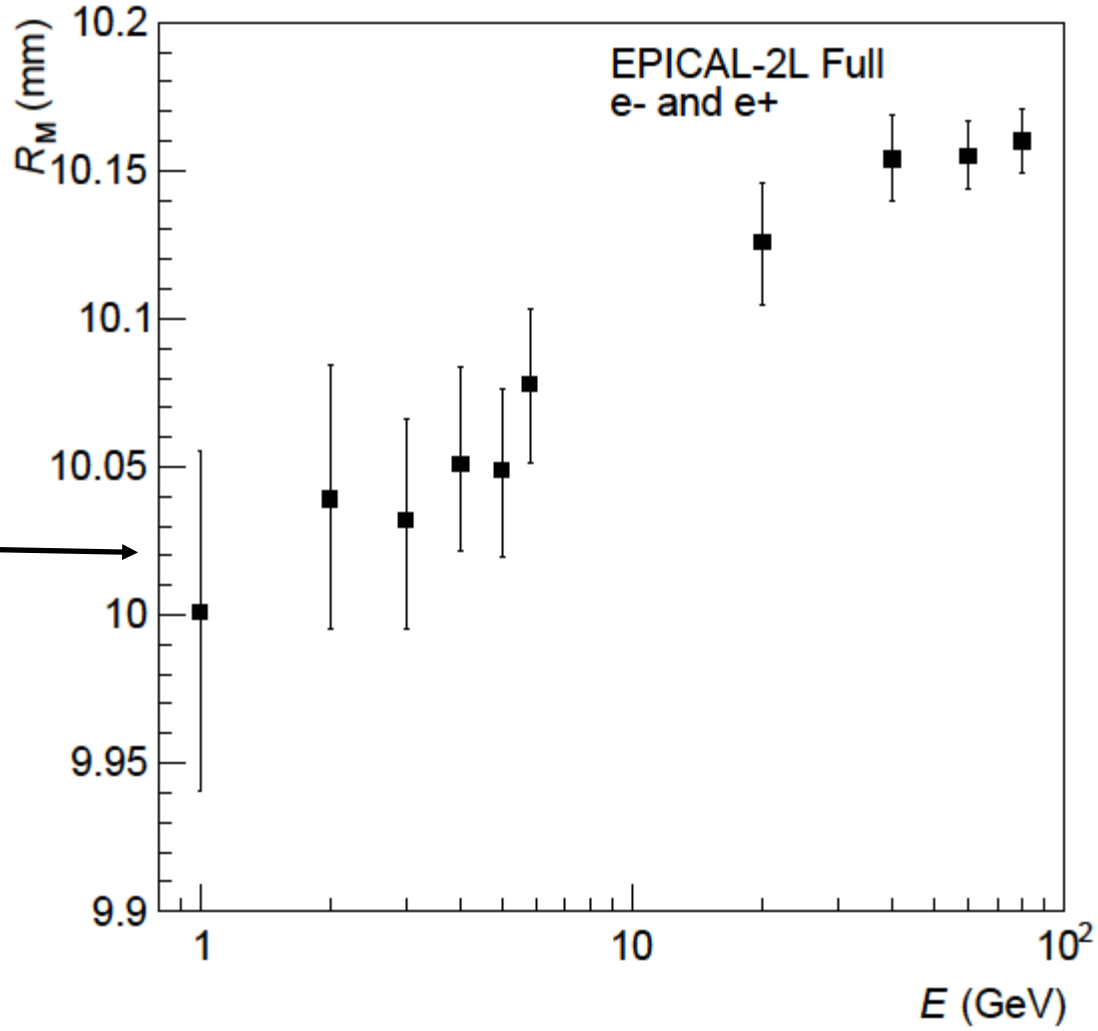
Theoretically calculated R_M assuming per layer:

- 3000µm Tungsten
- 175µm Kapton
- 55µm Silicon
- 30µm Aluminum
- 240µm Air

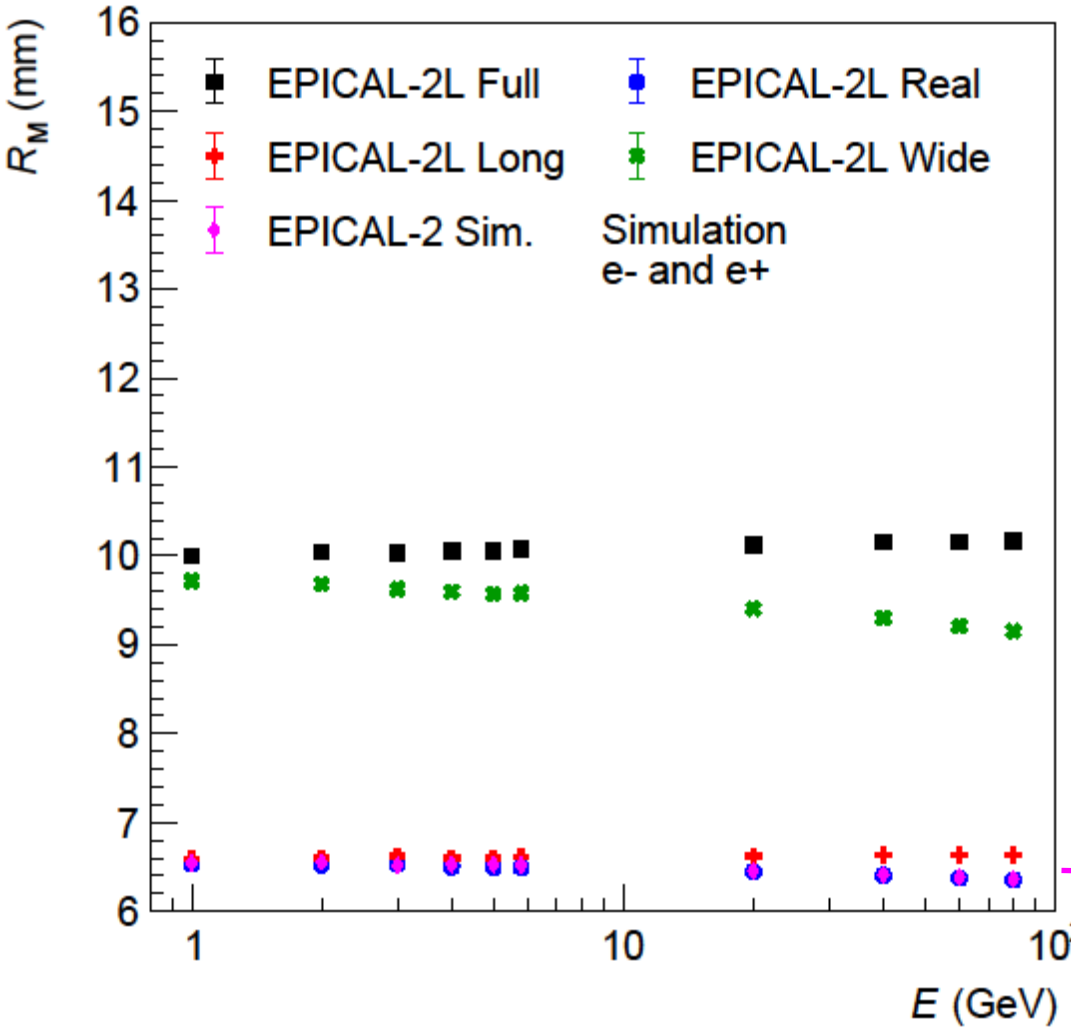
Molière radius on particle level



R_M slightly rising with E for long variants

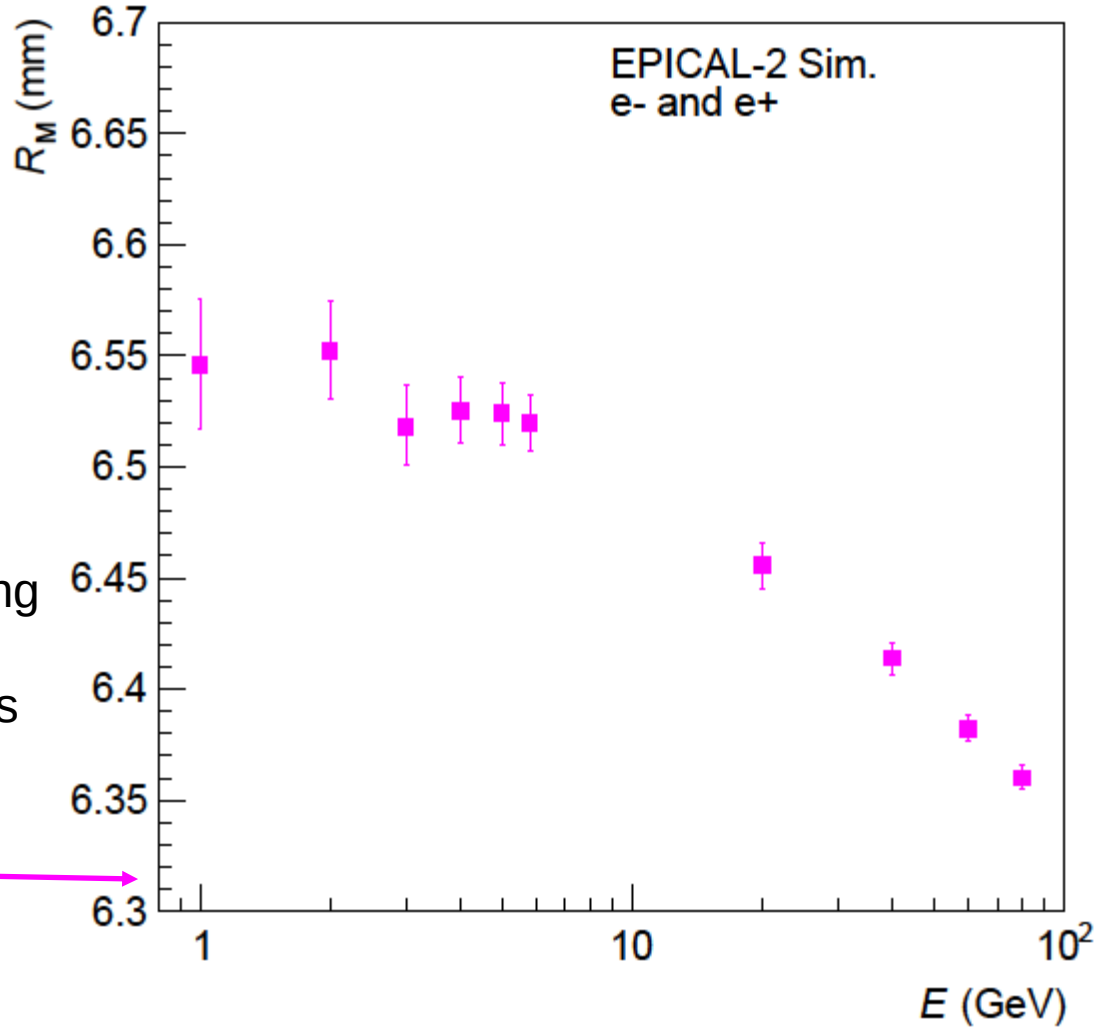


Molière radius on particle level

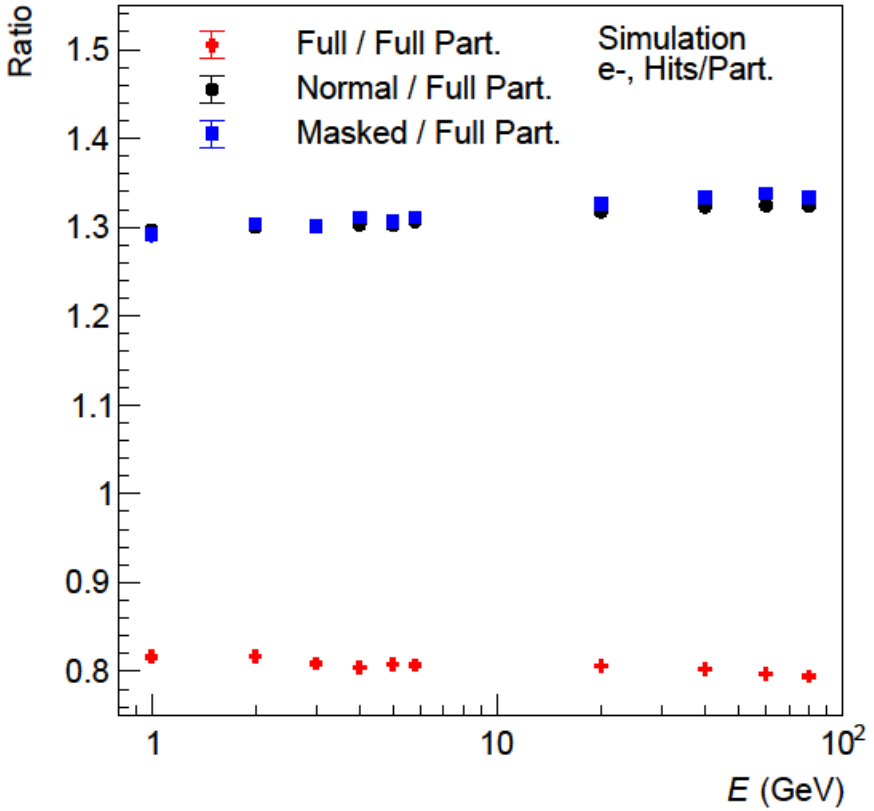


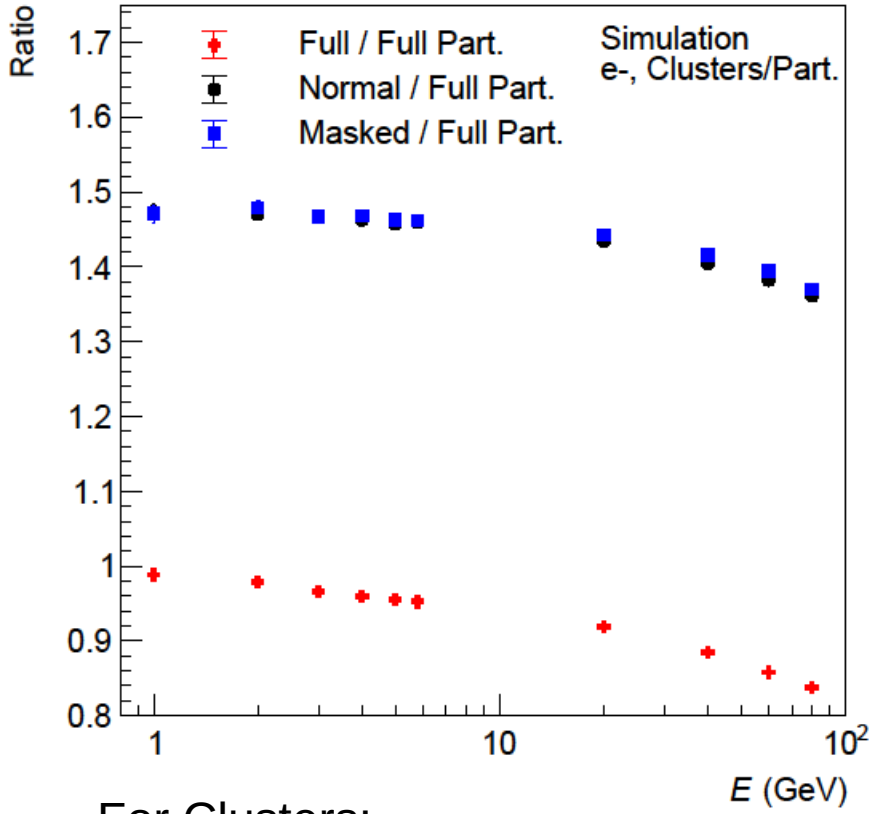
R_M slightly rising with E for long variants

R_M decreasing with E for short variants



Correction factor





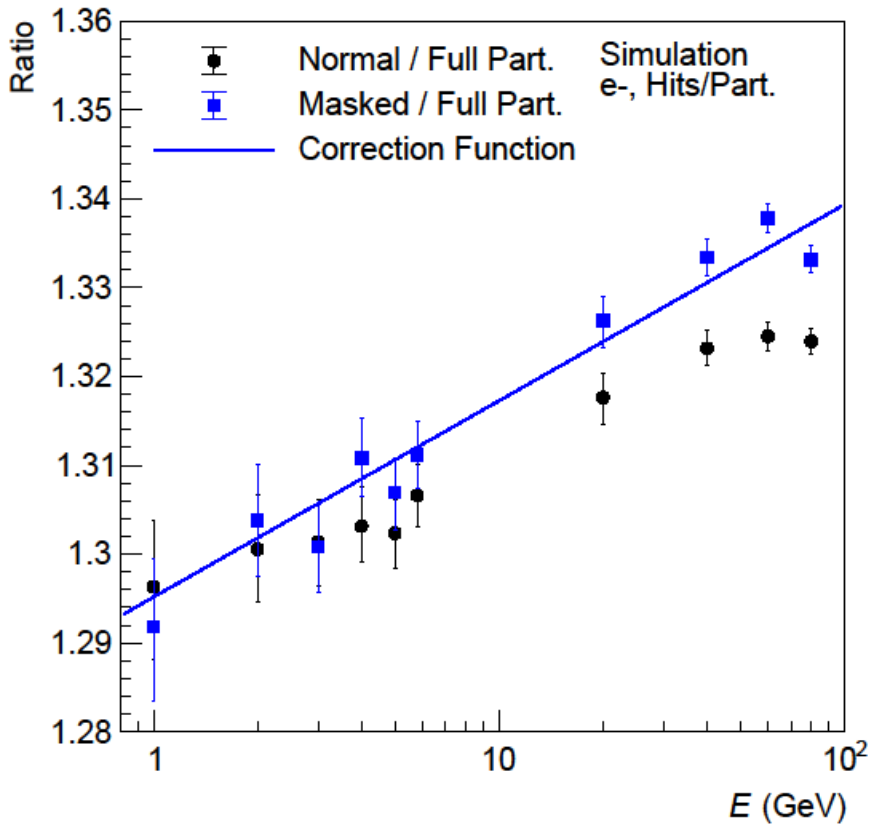
For Hits:

- Particle info correction factor about constant
  → corrects angular cluster enlargement
- Overall correction factor slightly rising
  → corrects longitudinal leakage

For Clusters:

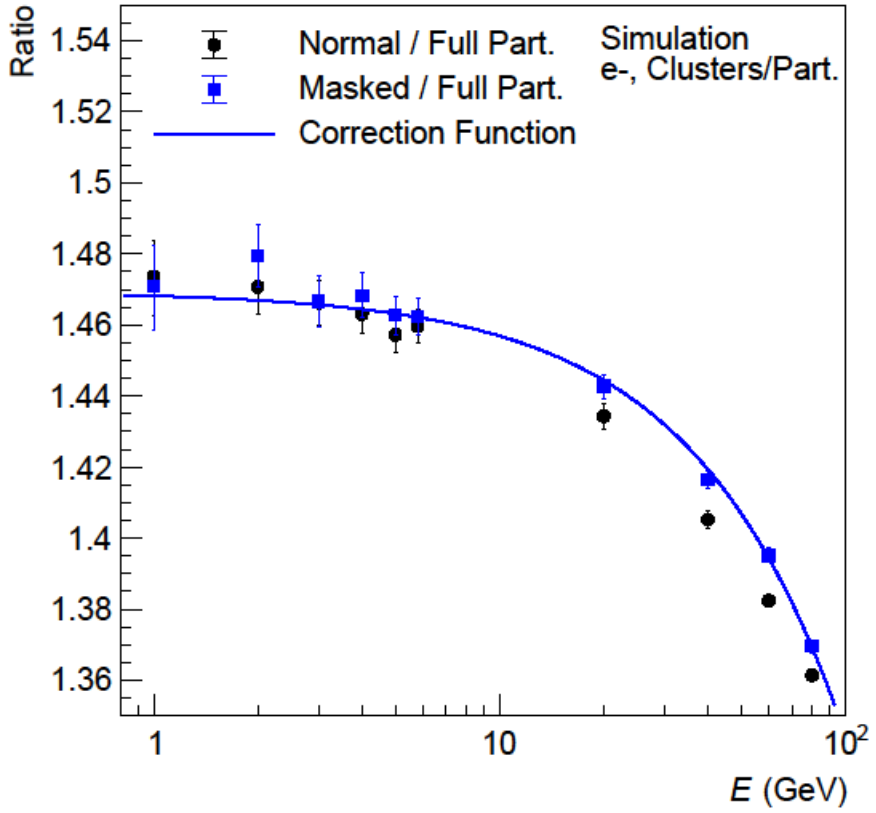
- Particle info and overall correction factors decrease
  → corrects saturation

Correction factor



Correction function Hits

$$f(E) = a * \log(\frac{E}{1GeV}) + b$$



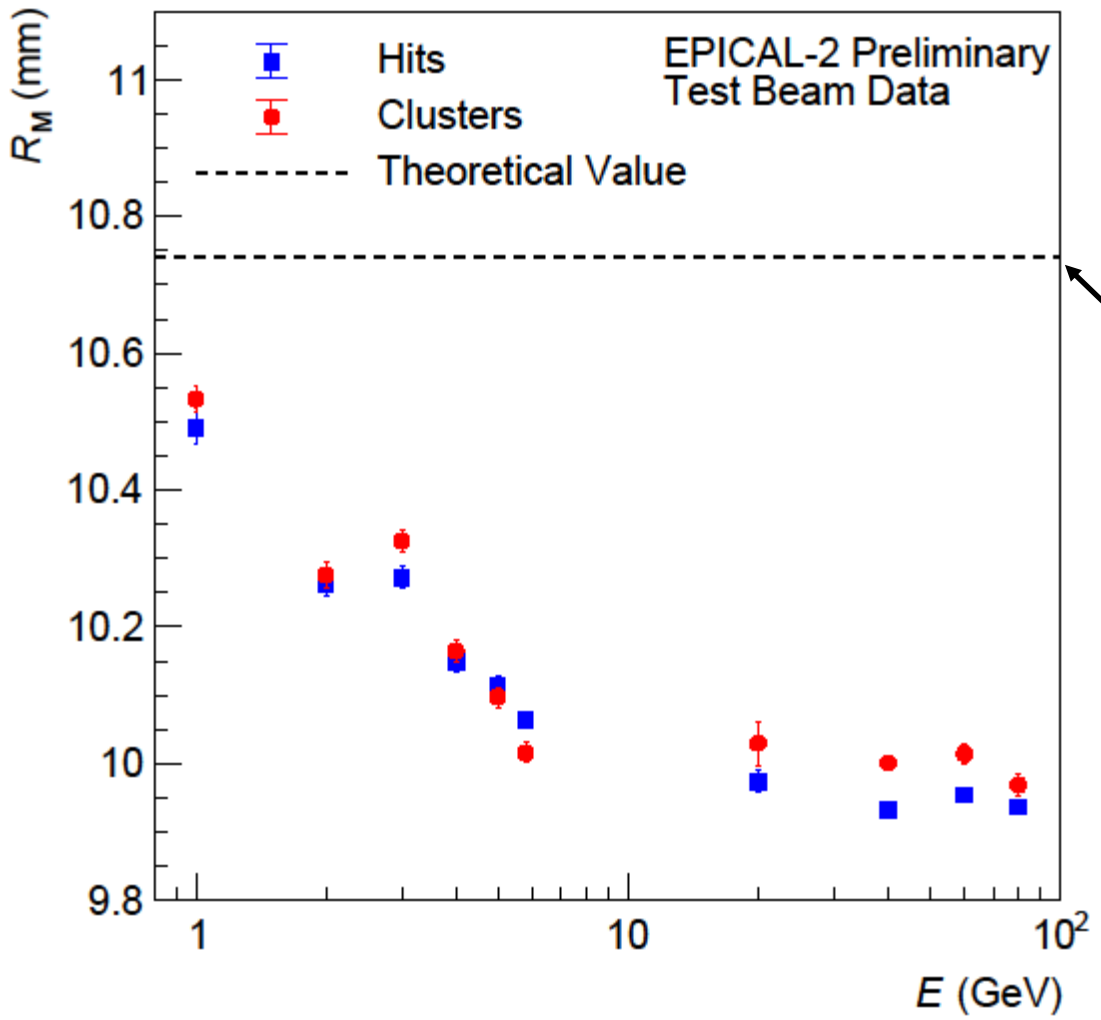
Correction function Clusters

$$f(E) = a * \frac{E}{1GeV} + b$$

Results

Molière radius decreases with *E*

- Noise?
- Pileup?
- Maybe particles in different parts of the detector have different energy deposits?



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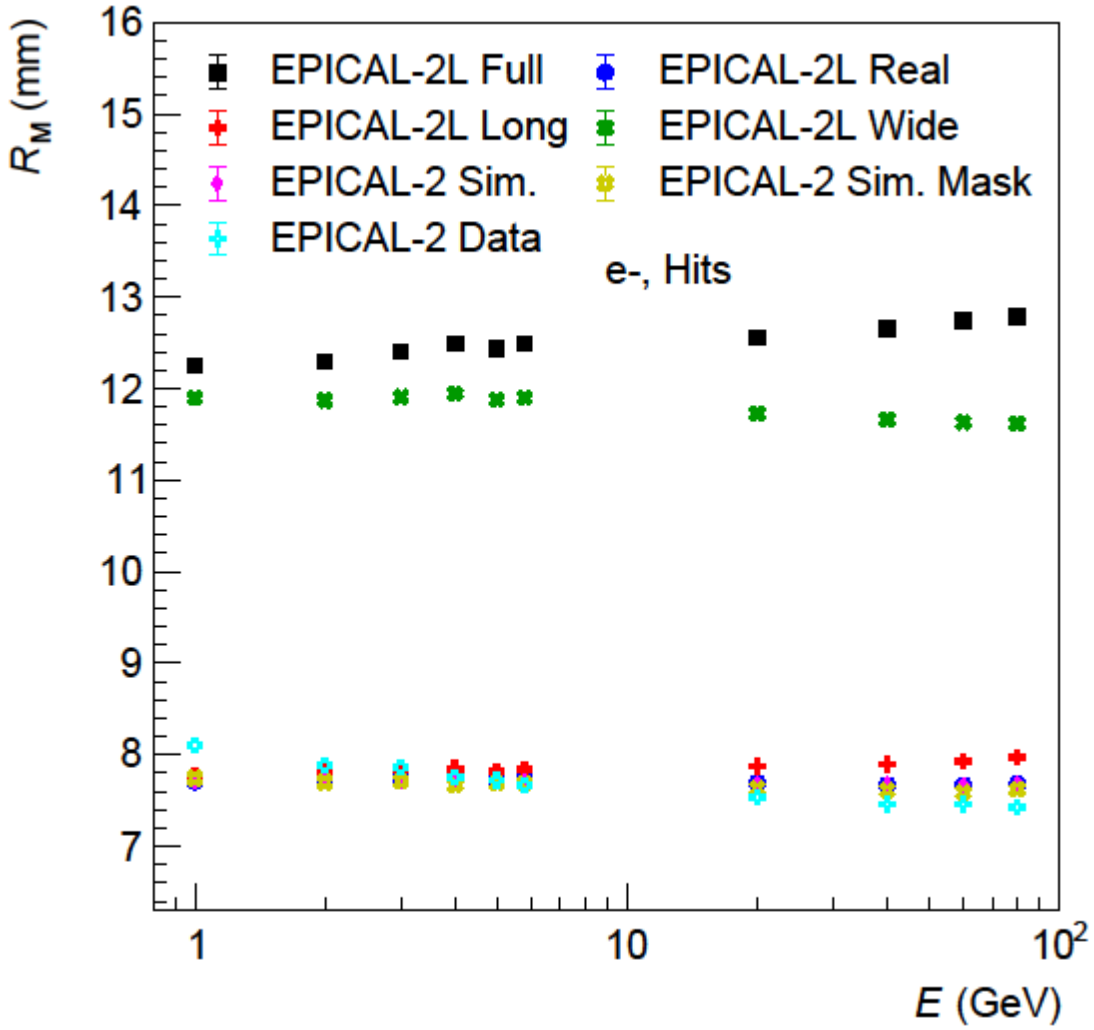
- 30µm Aluminum
- 240µm Air

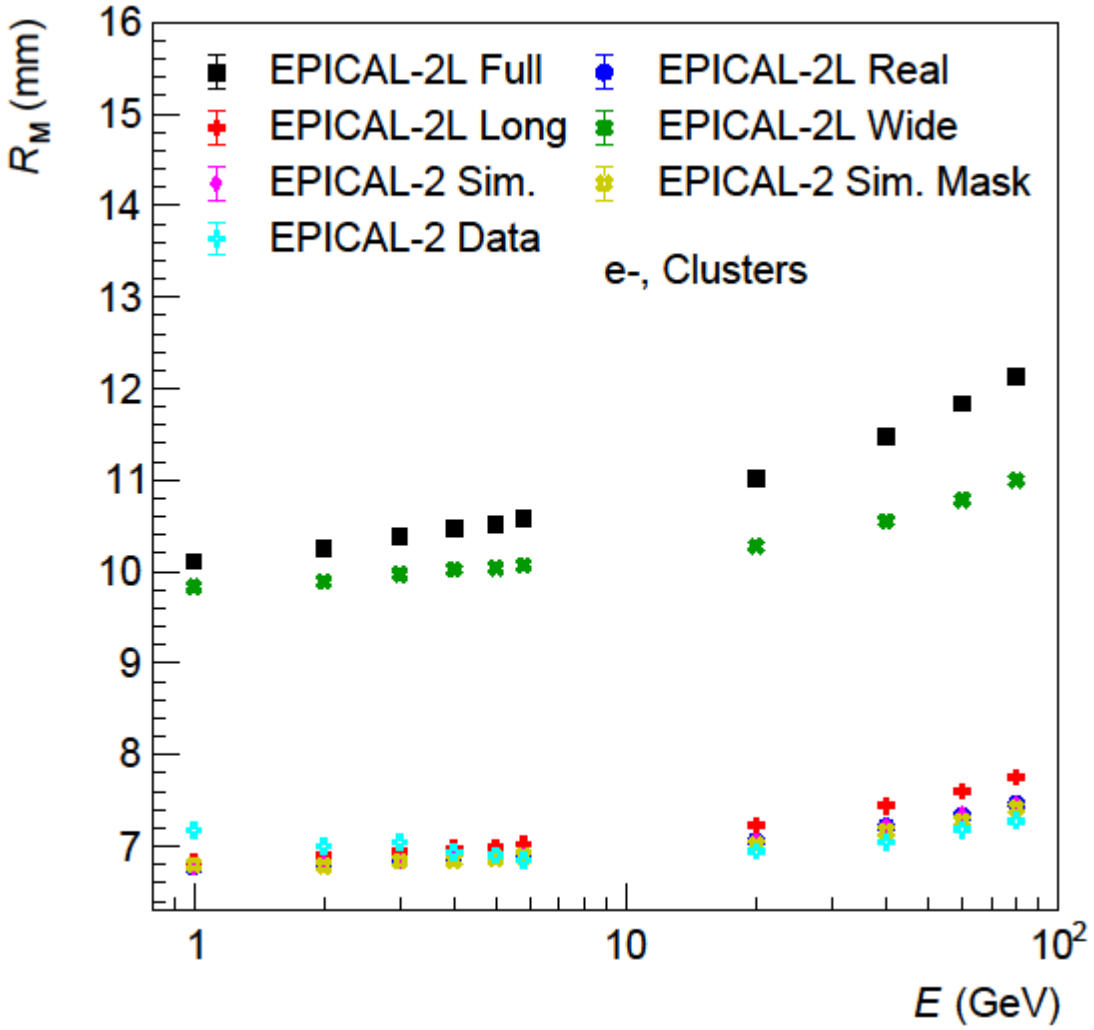
To Do

- Check if the behavior of the Molière radius is affected by noise or pileup
- Check the energy deposit of the particles (in the silicon)

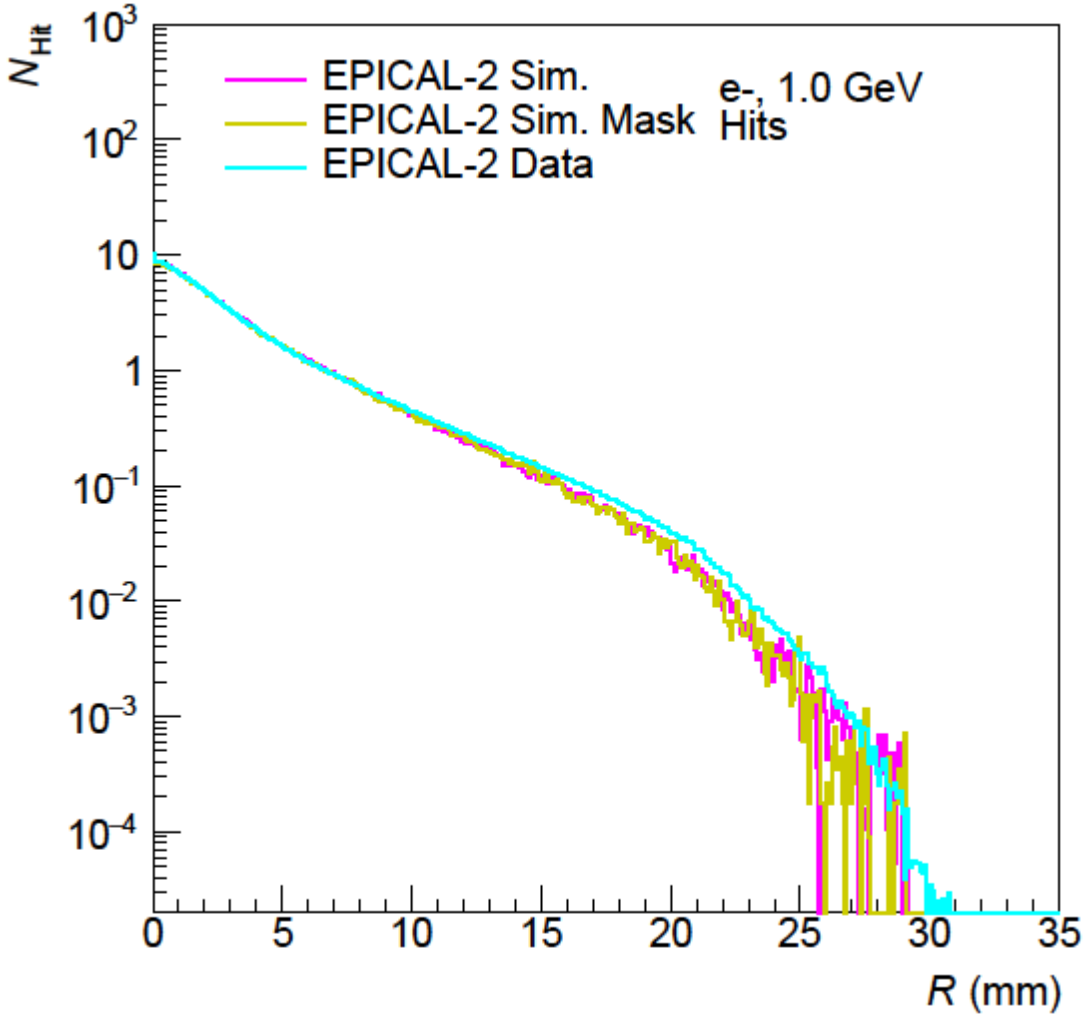
Backup

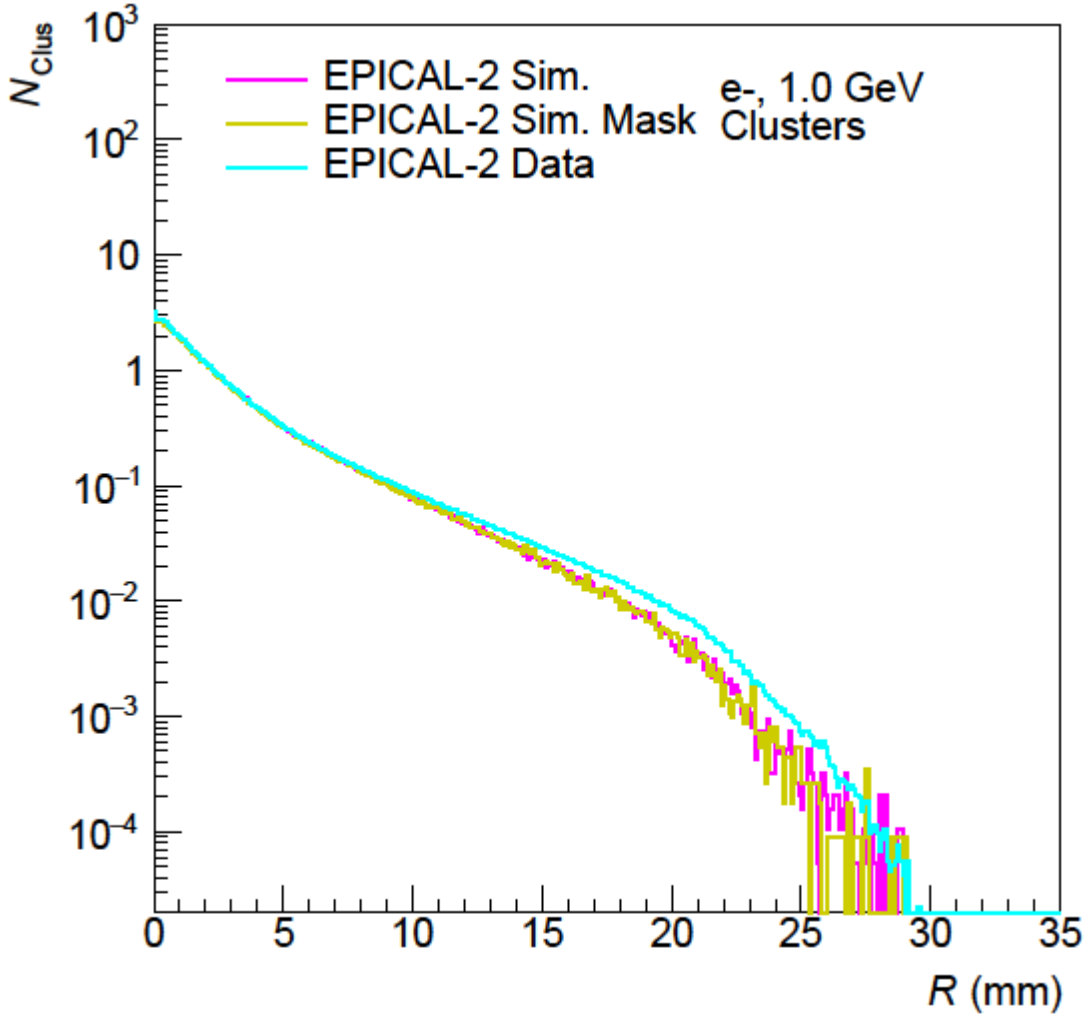
Uncorrected Molière Radius



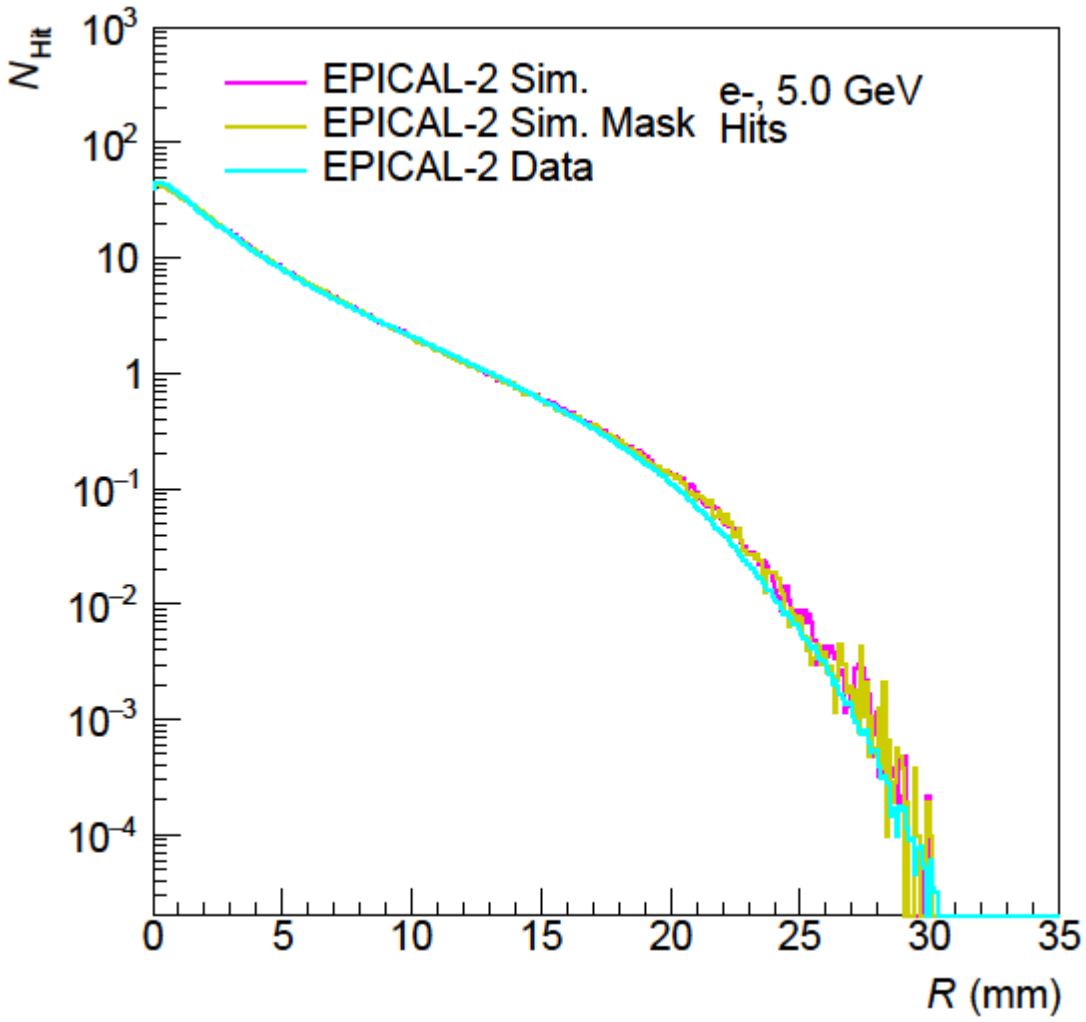


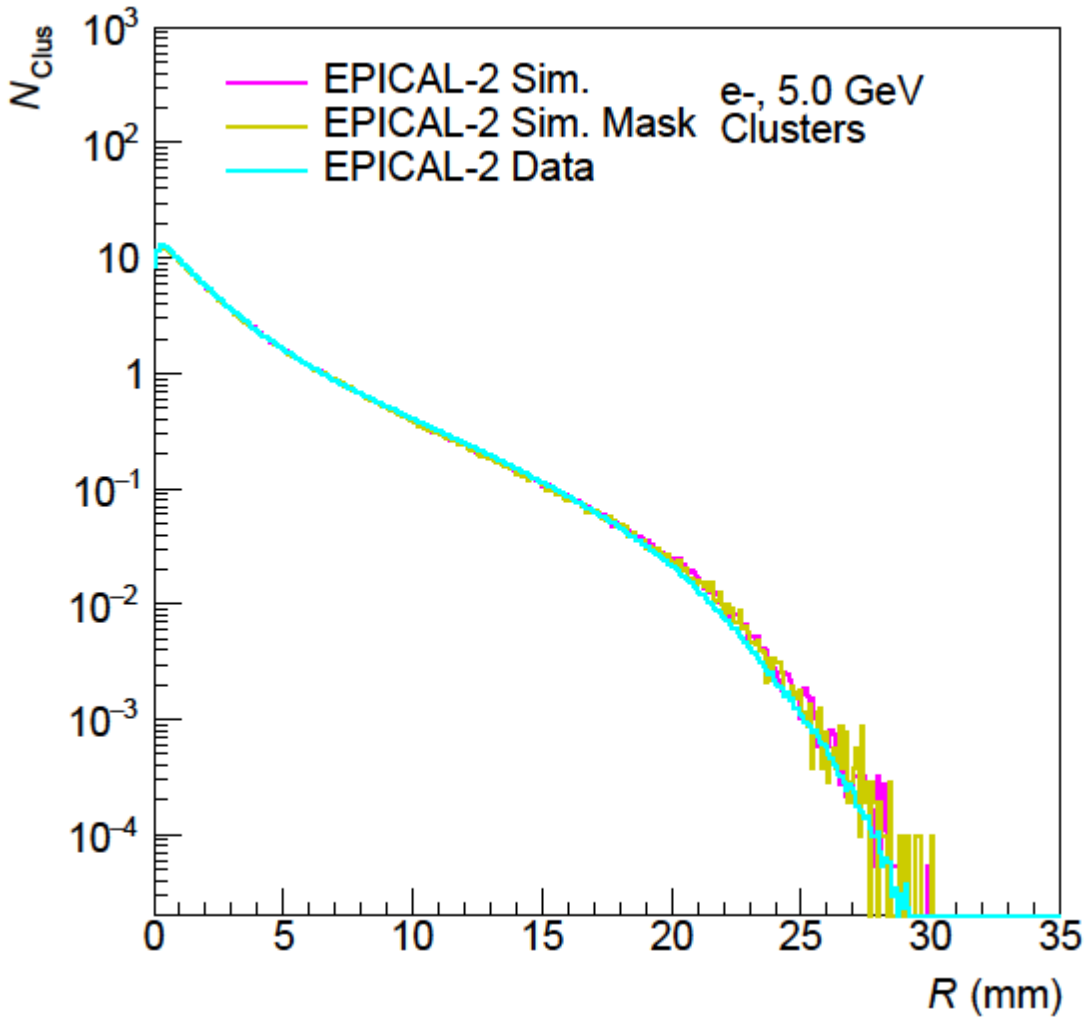
Lateral number of hit and cluster distributions



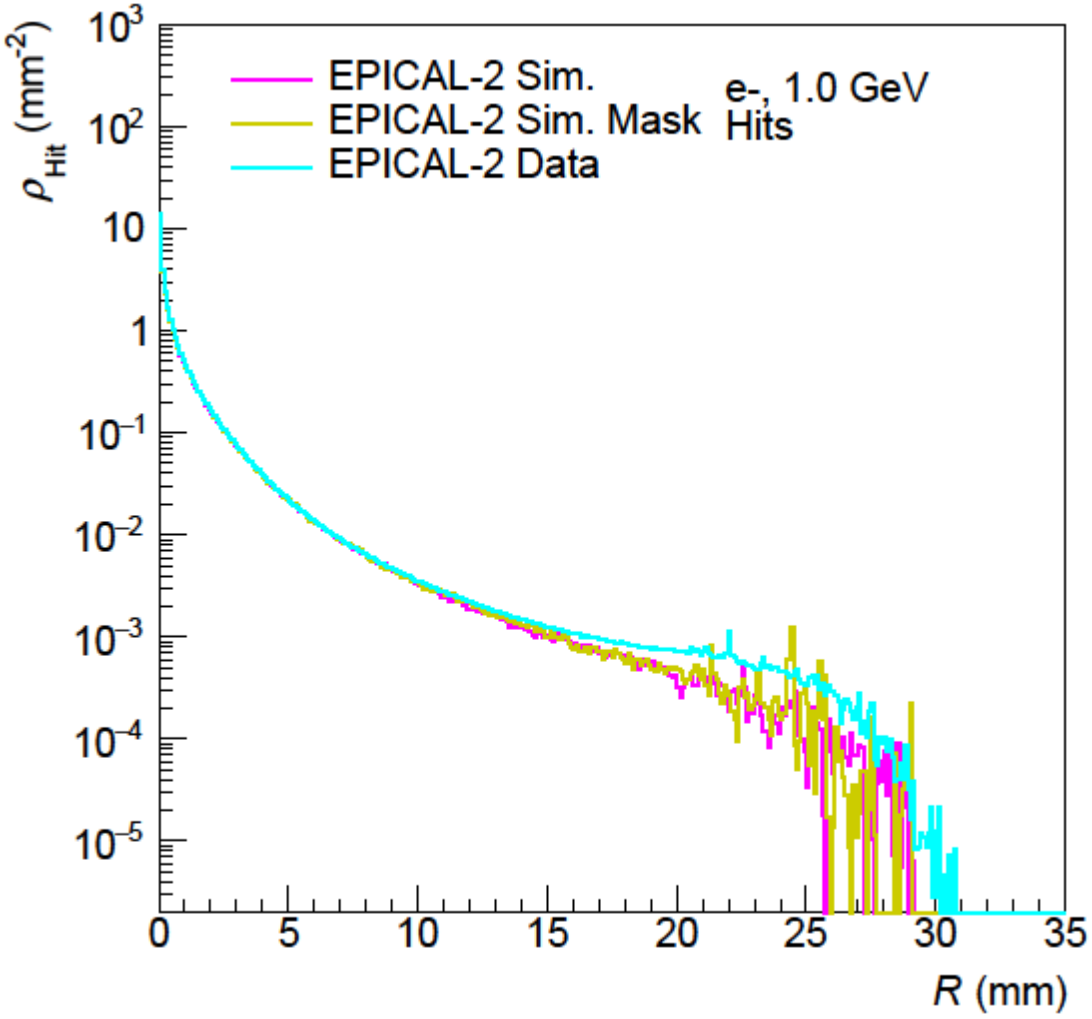


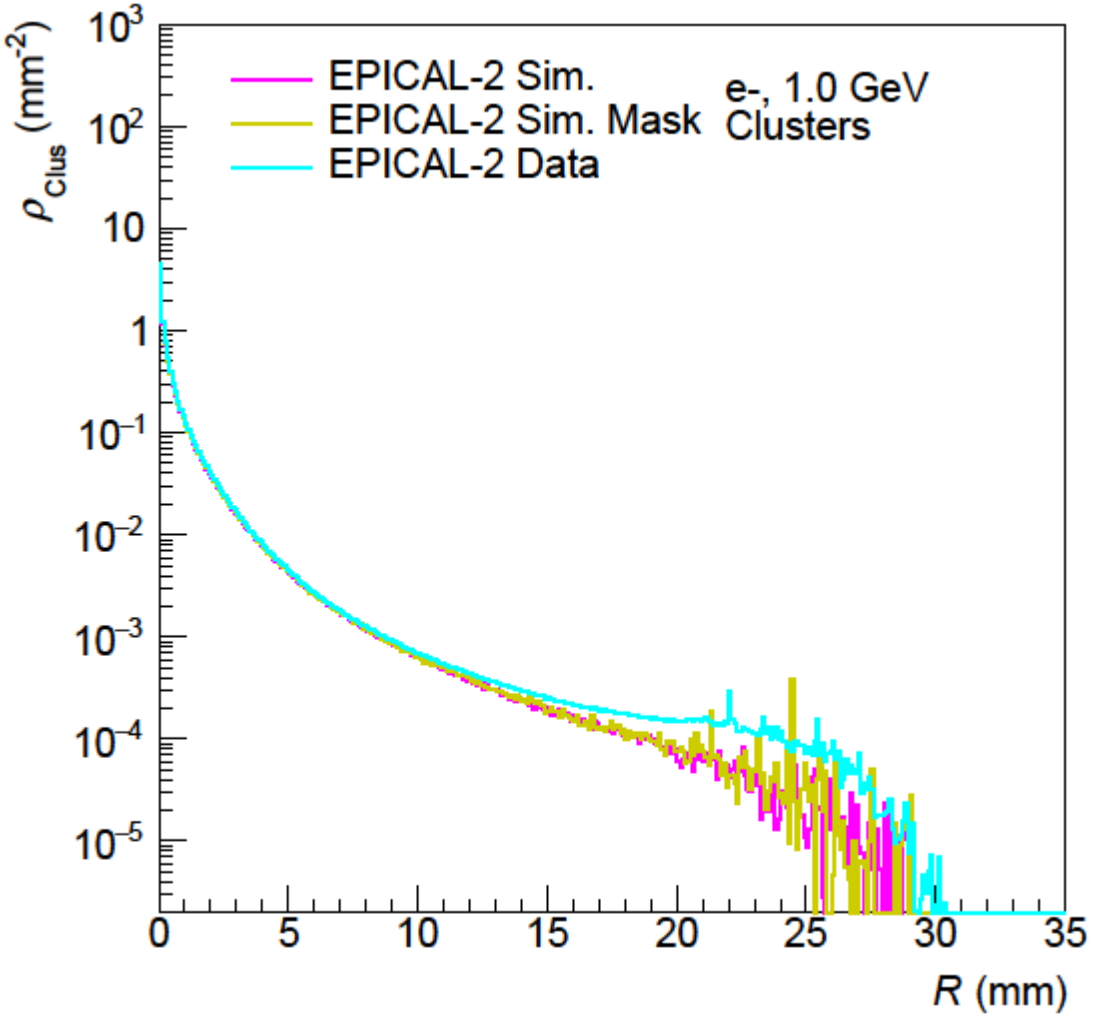
Lateral number of hit and cluster distributions





Lateral hit and cluster density distributions





Lateral hit and cluster density distributions