Which Detector Response Should We Use?

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Methods

1. **Standard**: Count the number of pixel hits or clusters in the entire detector
2. **Radial cut**: Count the number of pixel hits or clusters inside a cylinder with radius *R* around the beam position
3. **Acceptance corrected**: Calculate the pixel hit or cluster density in rings around the beam position. Then integrate over the rings until a certain radius *R*.

Methods: radial cut

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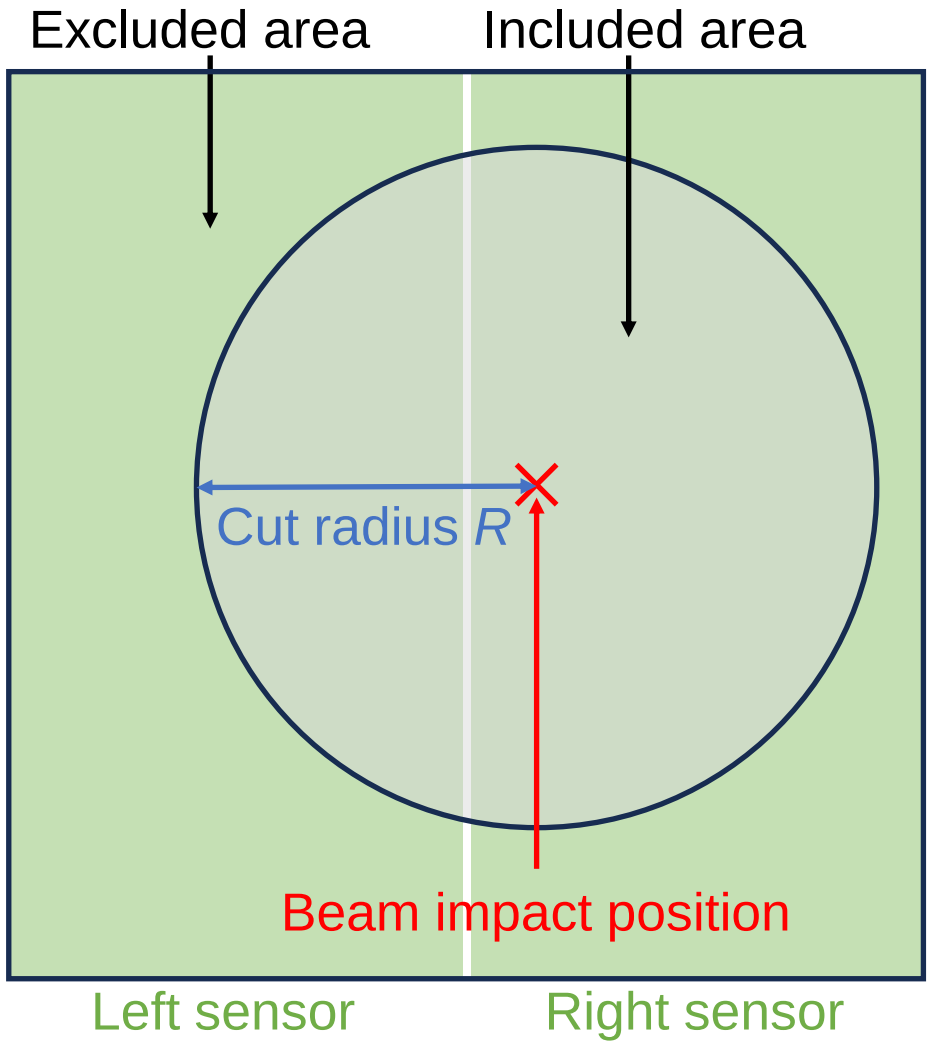
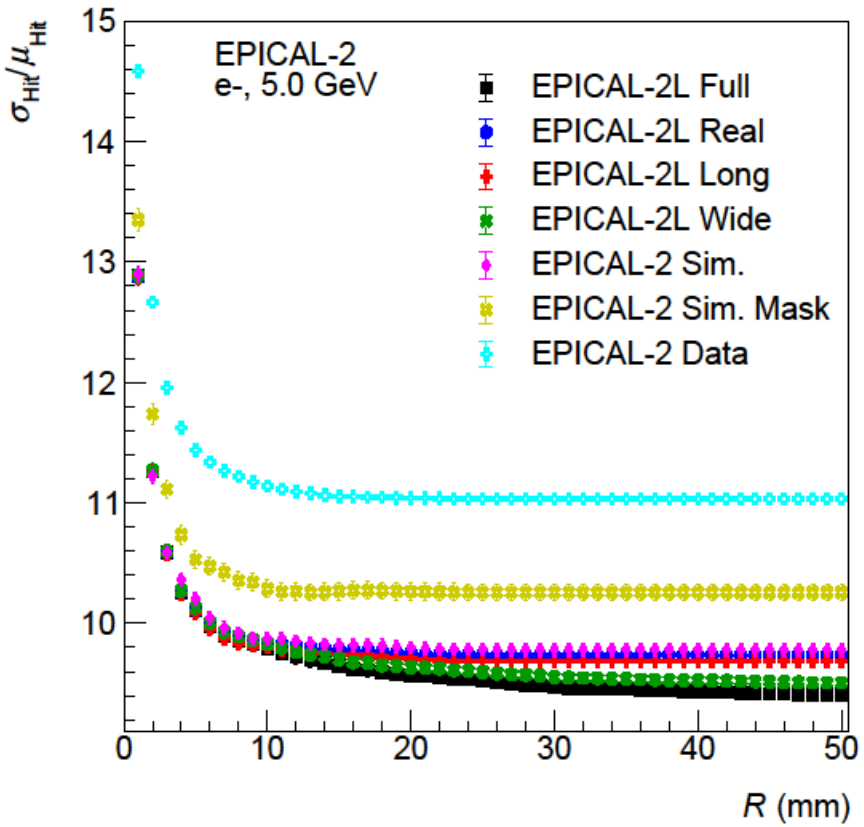
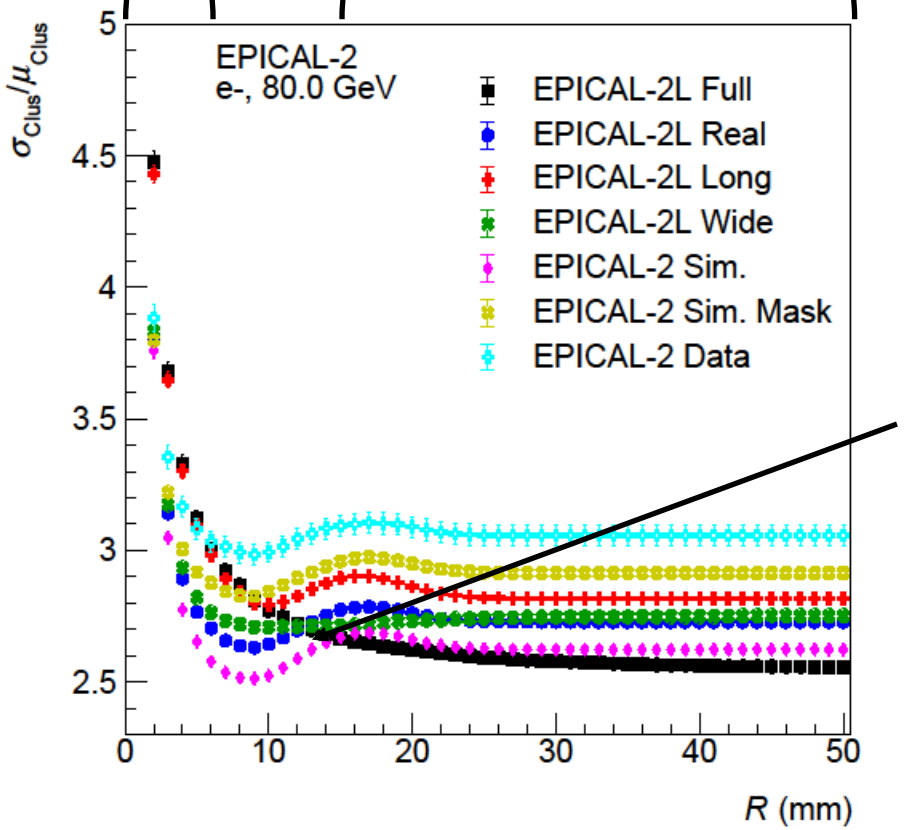


Methods: radial cut

Resolution improves due to increasing shower statistics

Resolution worsens due to edge effects





Difference between Real and Normal simulation still not fully understood

- Resolution minimum is not present at low energies, likely due to lower shower statistics

Methods: acceptance corrected

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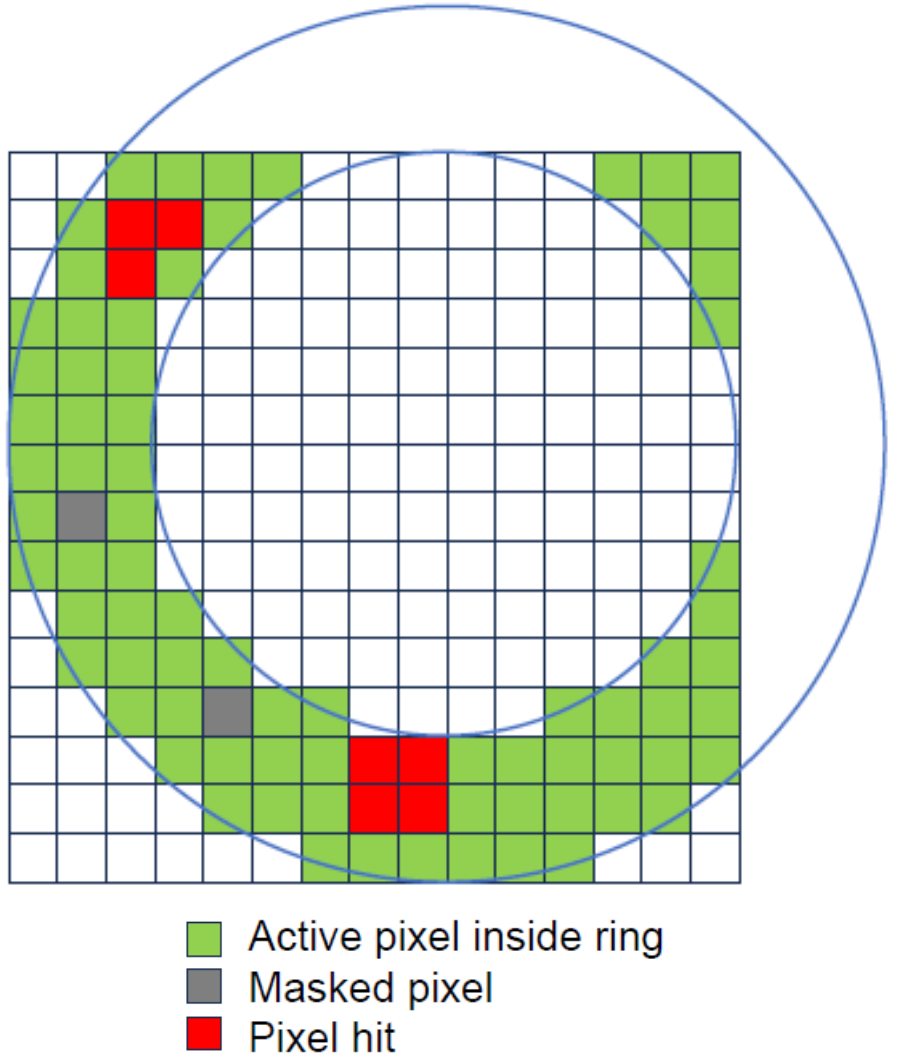
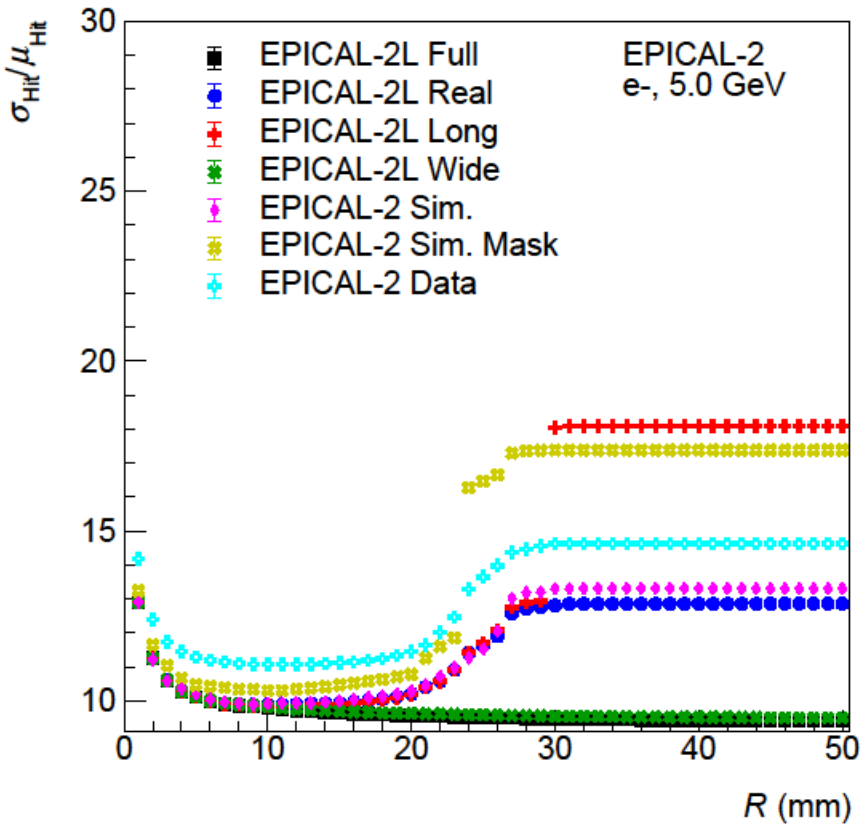
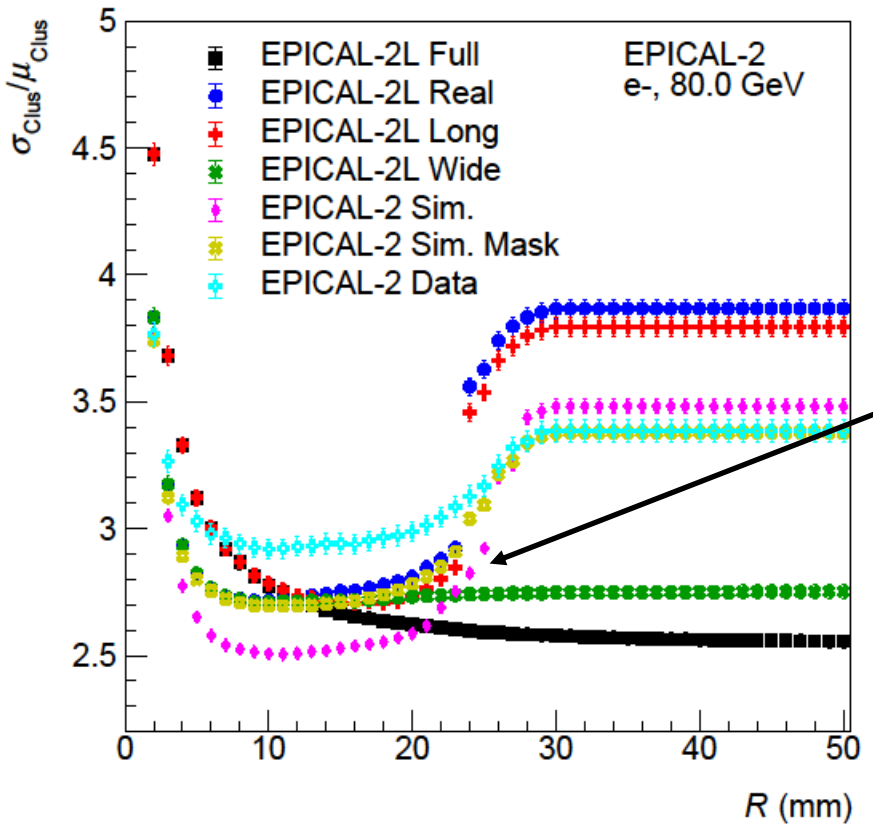


Methods: acceptance corrected

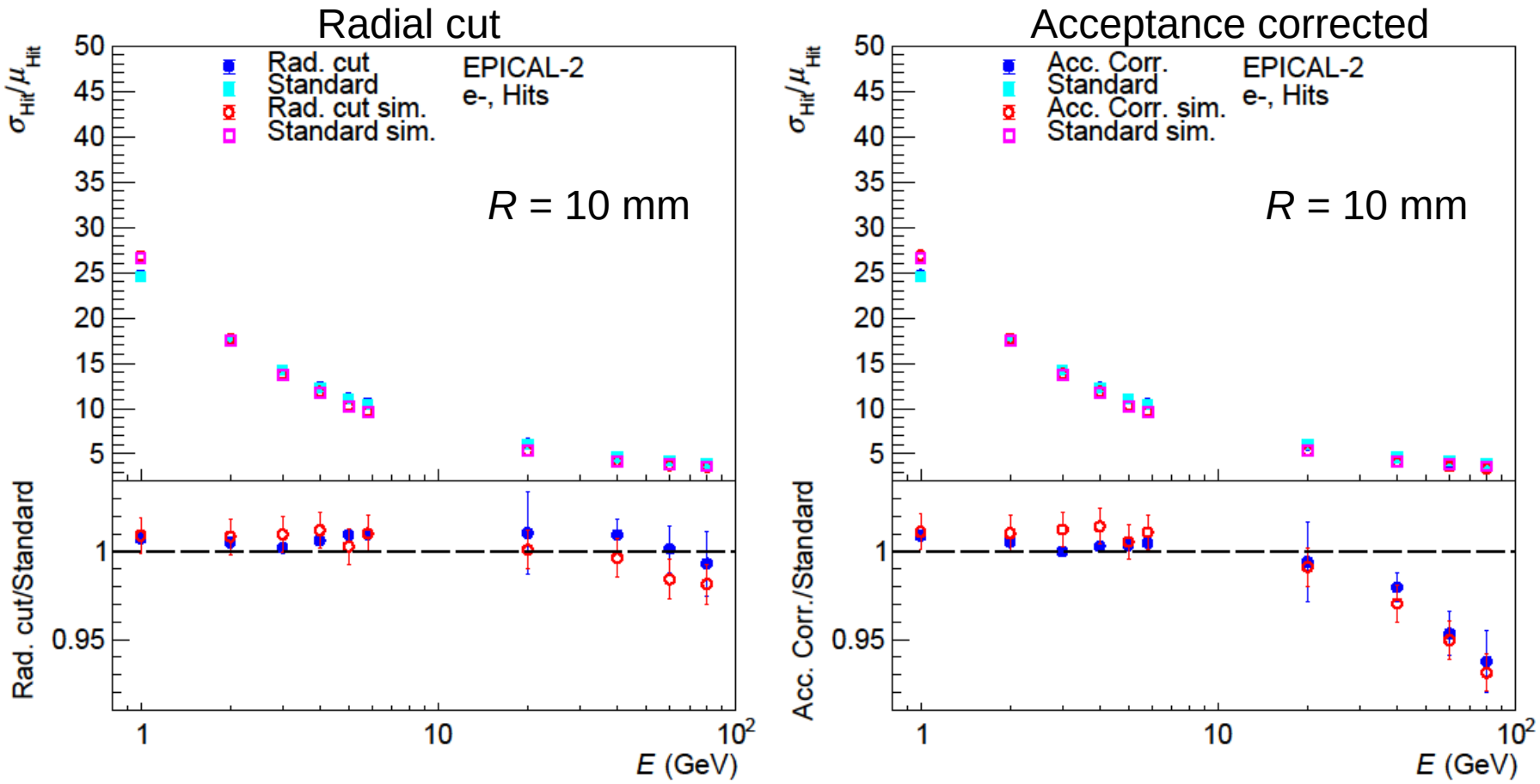




Difference between Real and Normal simulation still not fully understood and even larger than with radial cut method

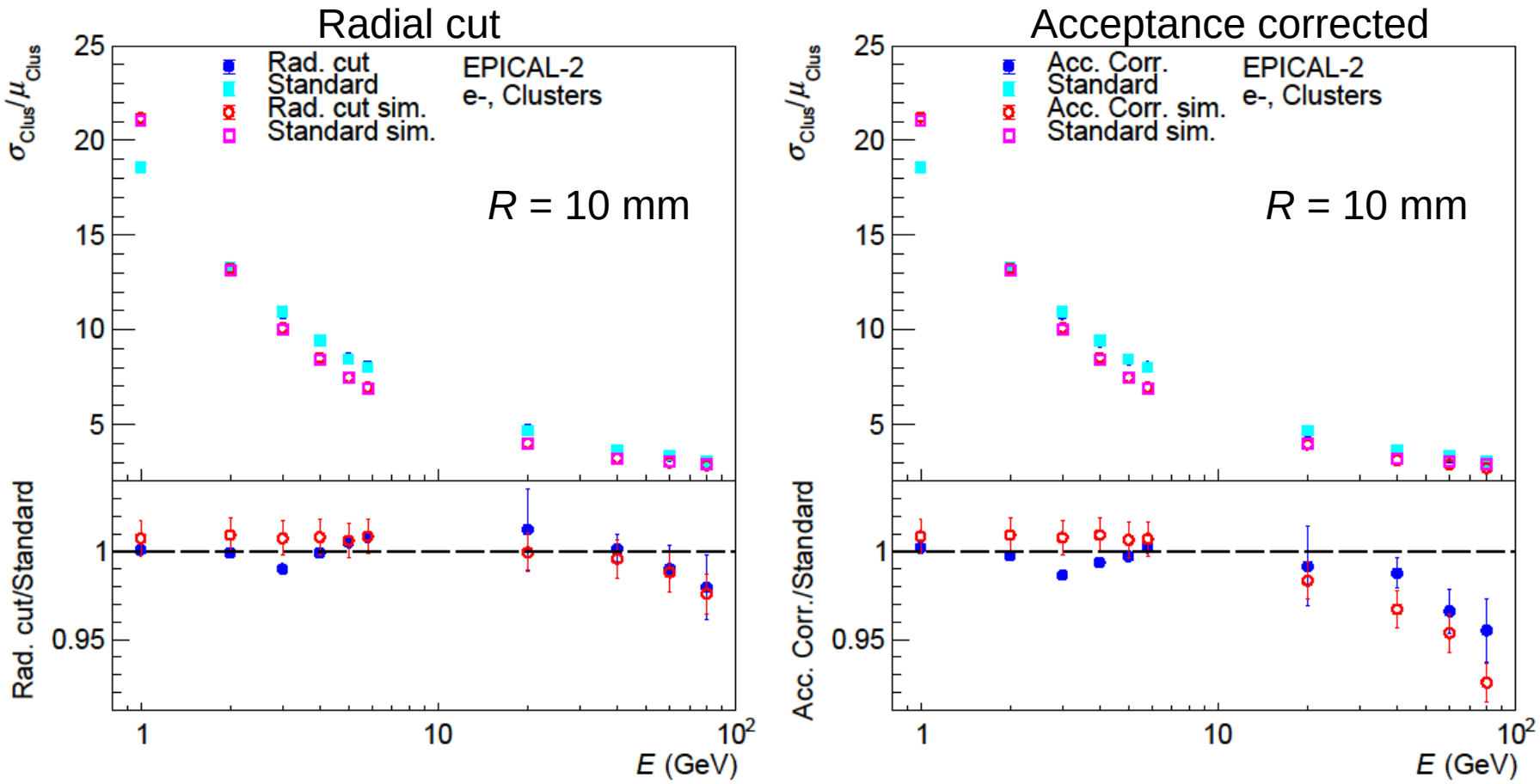
- Effects are similar as with radial cut, but the increase in resolution at large *R* is greater due to fluctuation at the edges of the detector being projected on the whole ring and therefore, getting amplified.

Comparison of methods: hits



- Resolution at low E slightly worse than standard method
- Improvement of resolution at large E

Comparison of methods: clusters



- Resolution at low *E* similar to the standard method
- Improvement of resolution at large *E*

Pro and contra for each method

Disclaimer:
This pro and contra list might be missing some aspects and be influenced by personal bias. It is only intended as a starting point for discussions.

Standard:
+ Simple method
+ Largely understood
+ Fast to calculate
+ Consistent to DESY paper
+ Best resolution for hits at small *E*
- Worse resolution at large *E*

Radial Cut:
+ Relatively simple method
+ Fast to calculate
+- Better resolution than standard at large *E*
- Some aspects not fully understood
- Worse resolution for hits at small *E*

Acceptance corrected:
+ Best resolution at large *E*
+- Slow to calculate for data (although most calculations are already done)
- Complicated Method
- Some aspects not fully understood
- Worse resolution for hits at small *E*