Optimizing fiducial region and radial cut for alternative detector response

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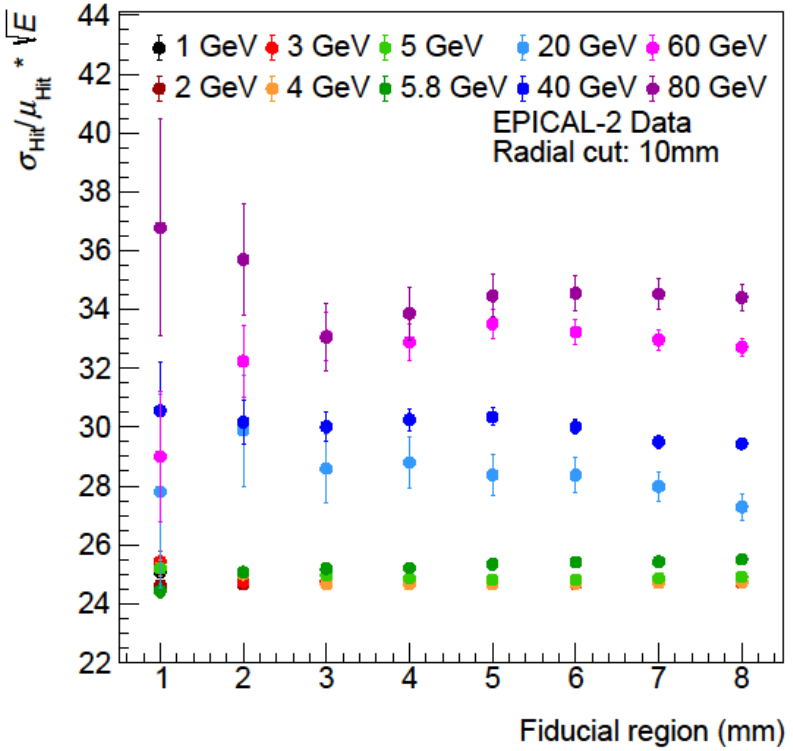
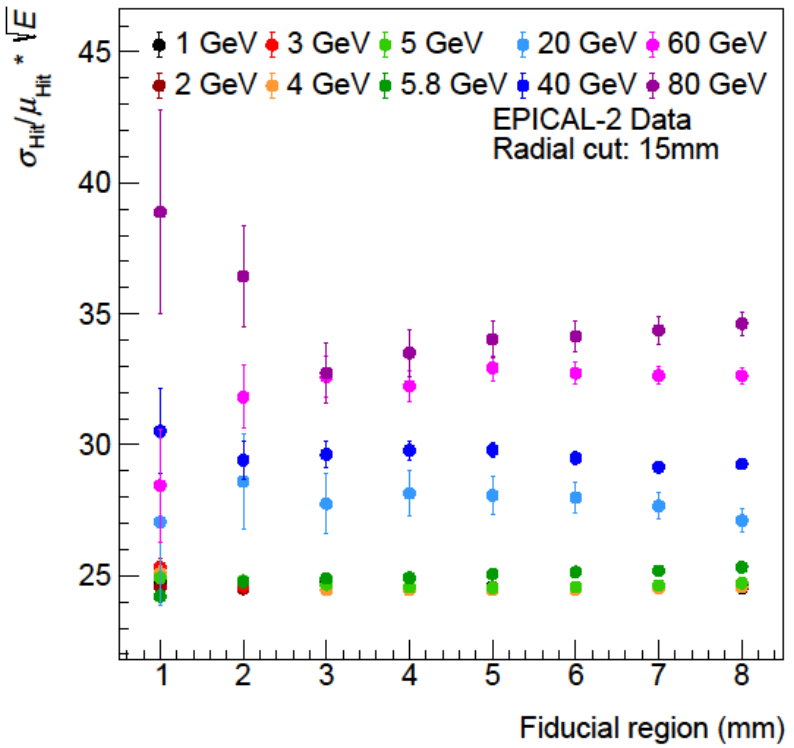
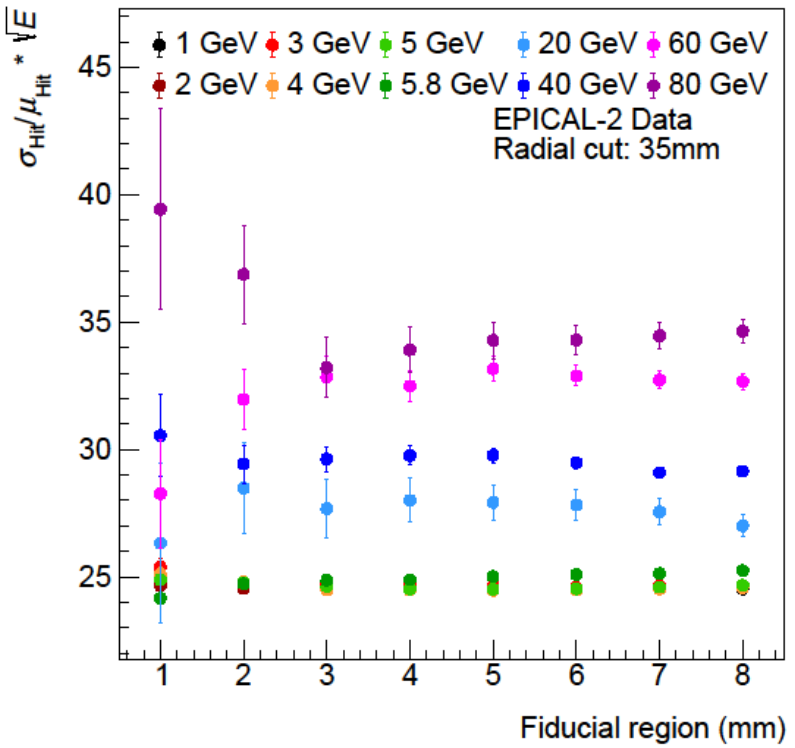
Optimization:

- Trying different combinations of:
  - Cut radius (1 to 35 mm)
  - Half length of fiducial region box (1 to 8 mm)

Changing the fiducial region

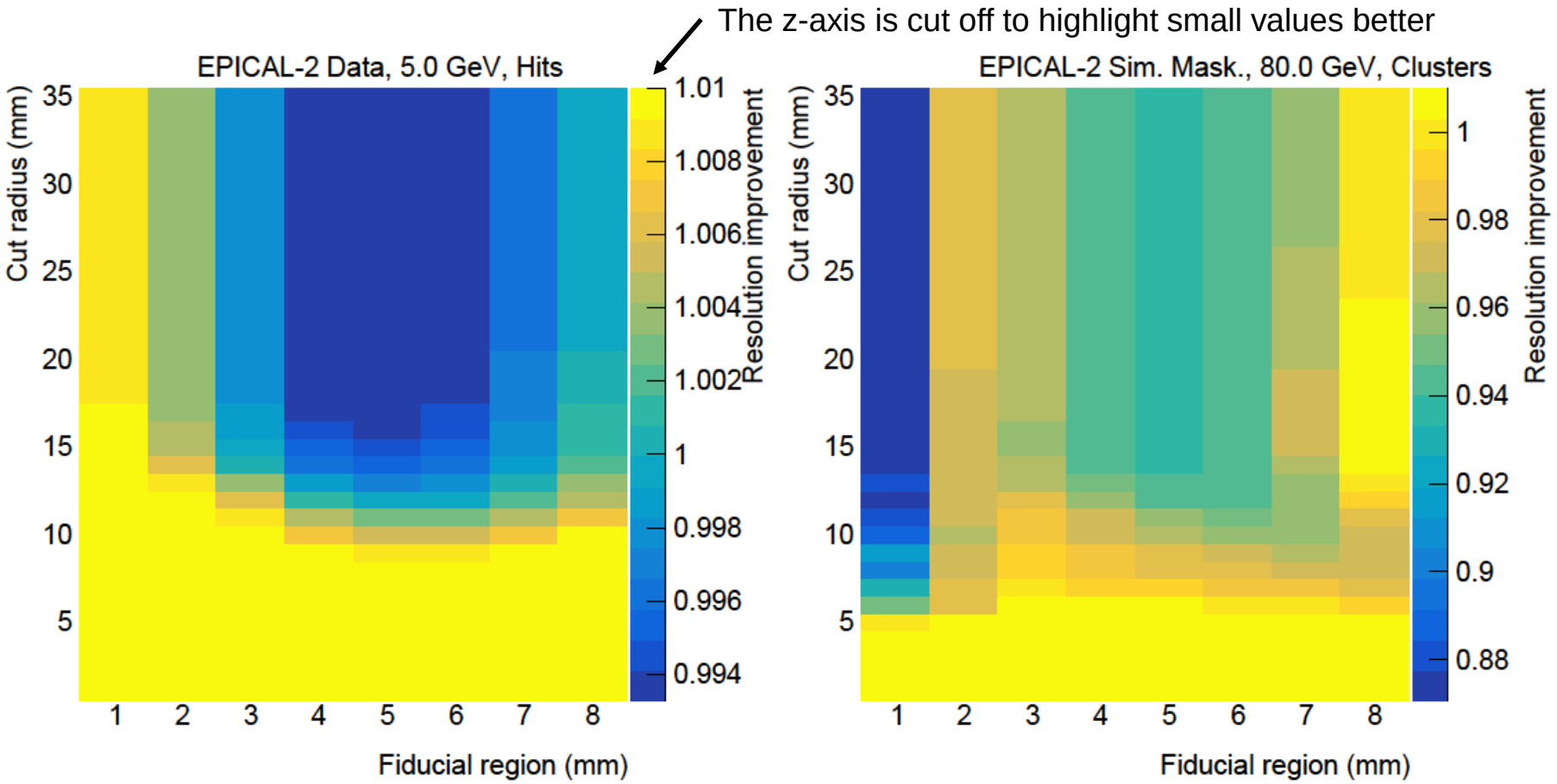






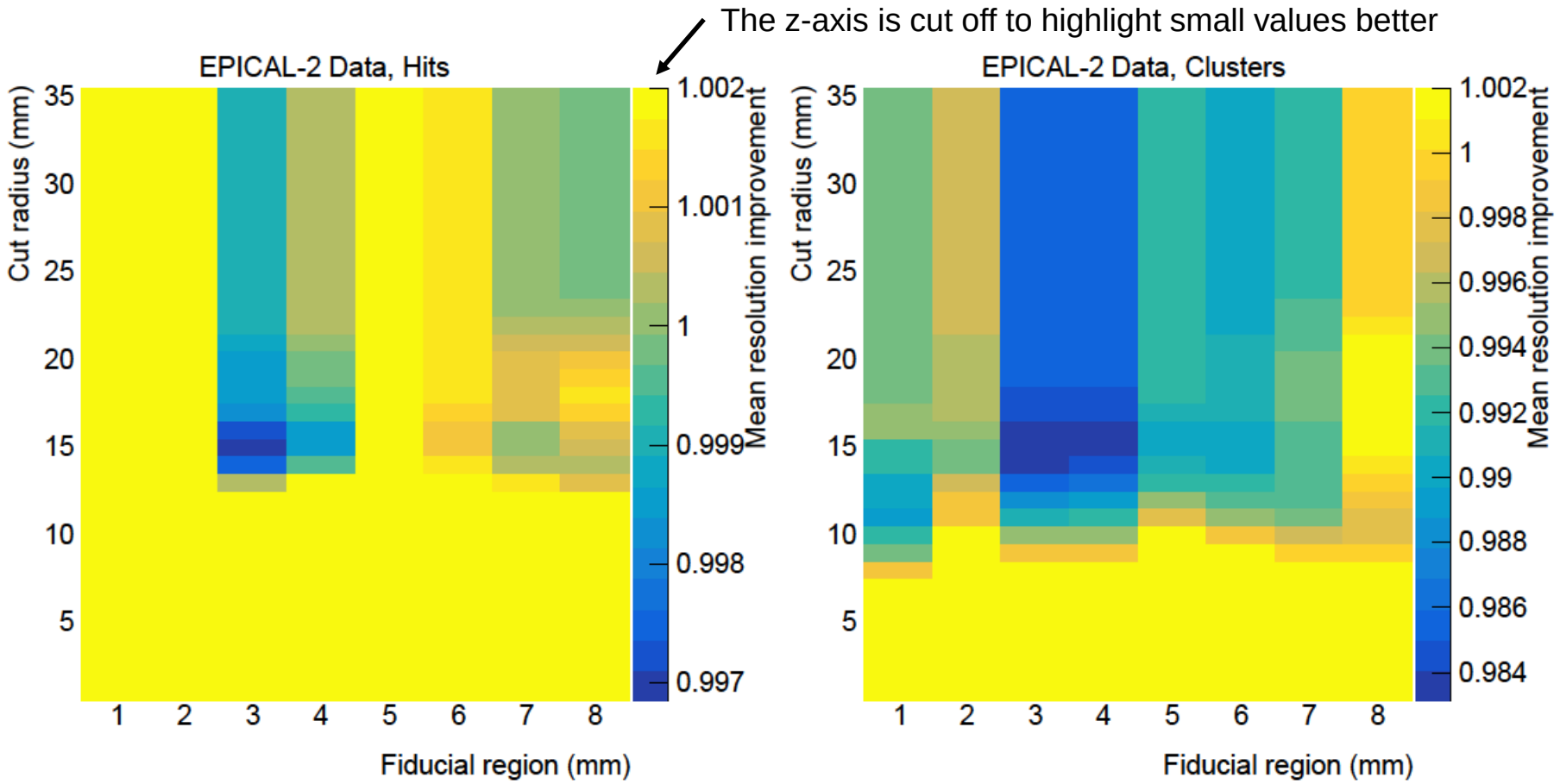
- The radial cut seems to have only a minor impact on the behavior of the resolution under fiducial region variation

Optimization: finding the best combination



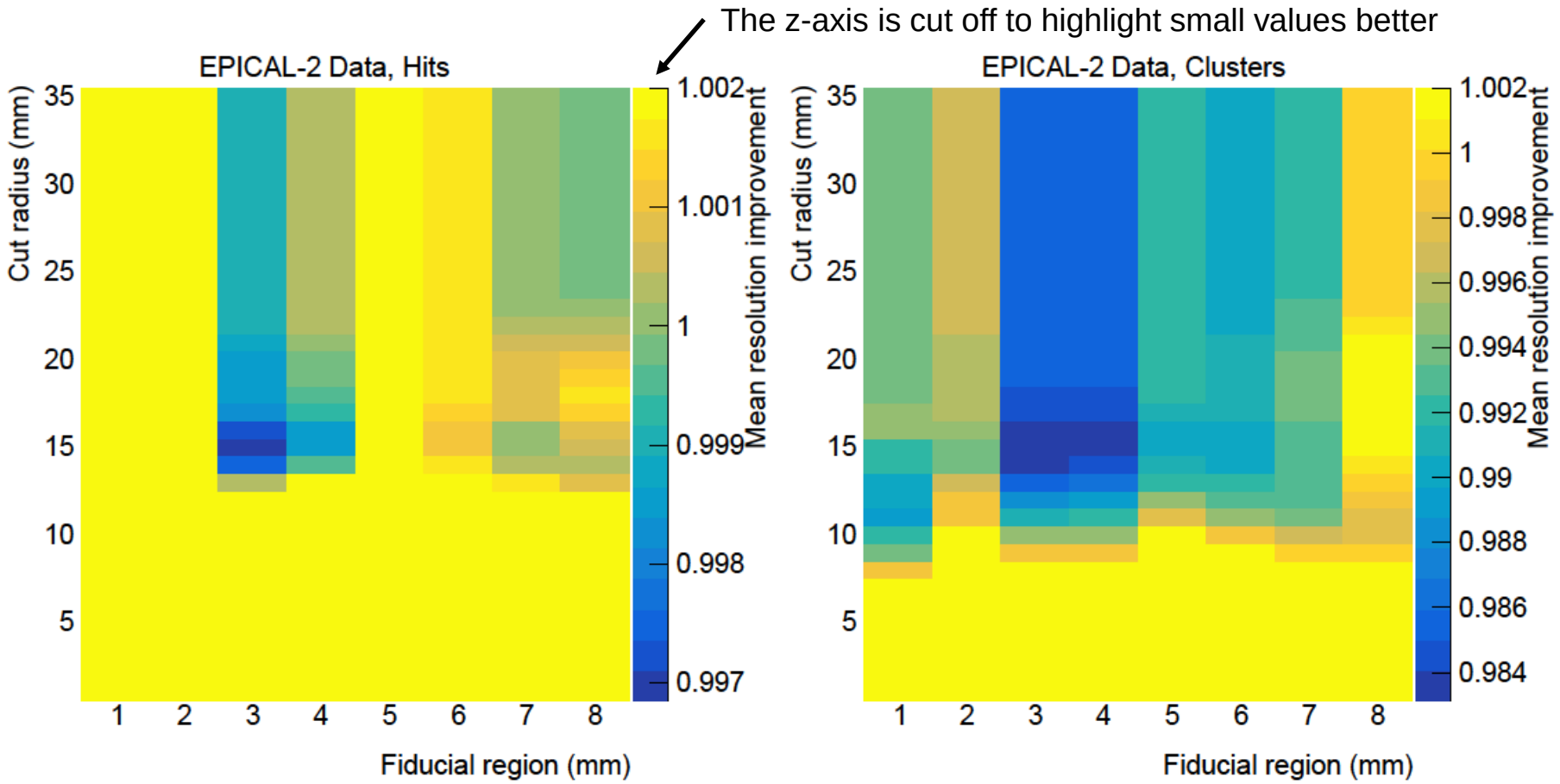
- Resolution improvement: Alternative resolution / Standard resolution

Optimization: finding the best combination



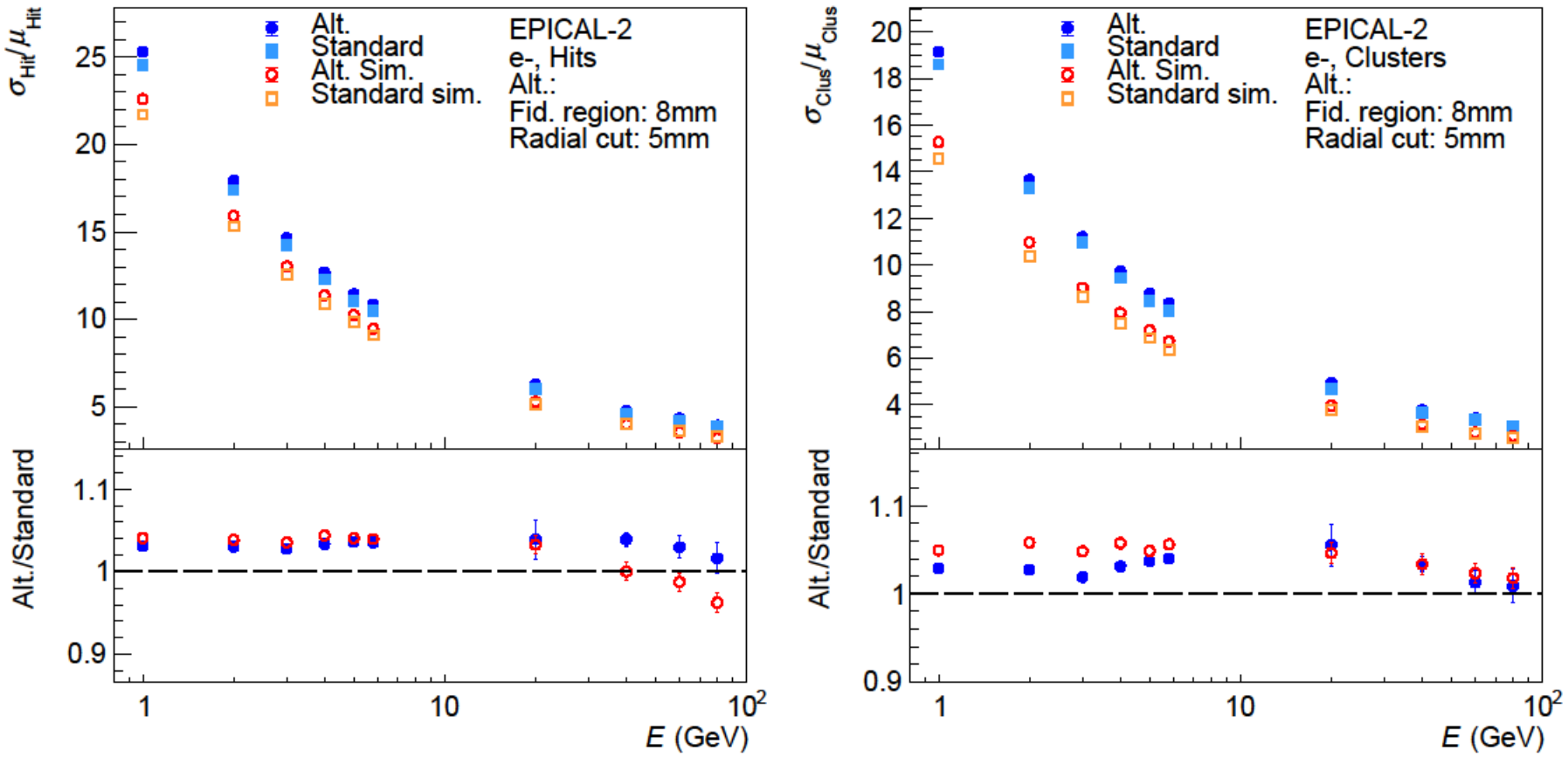
- Mean resolution improvement: Alternative resolution / Standard resolution, averaged over all energies
- ➢ Highest overall resolution improvement at 3mm/15mm for hits and around 4mm/15mm for clusters

Optimization: finding the best combination



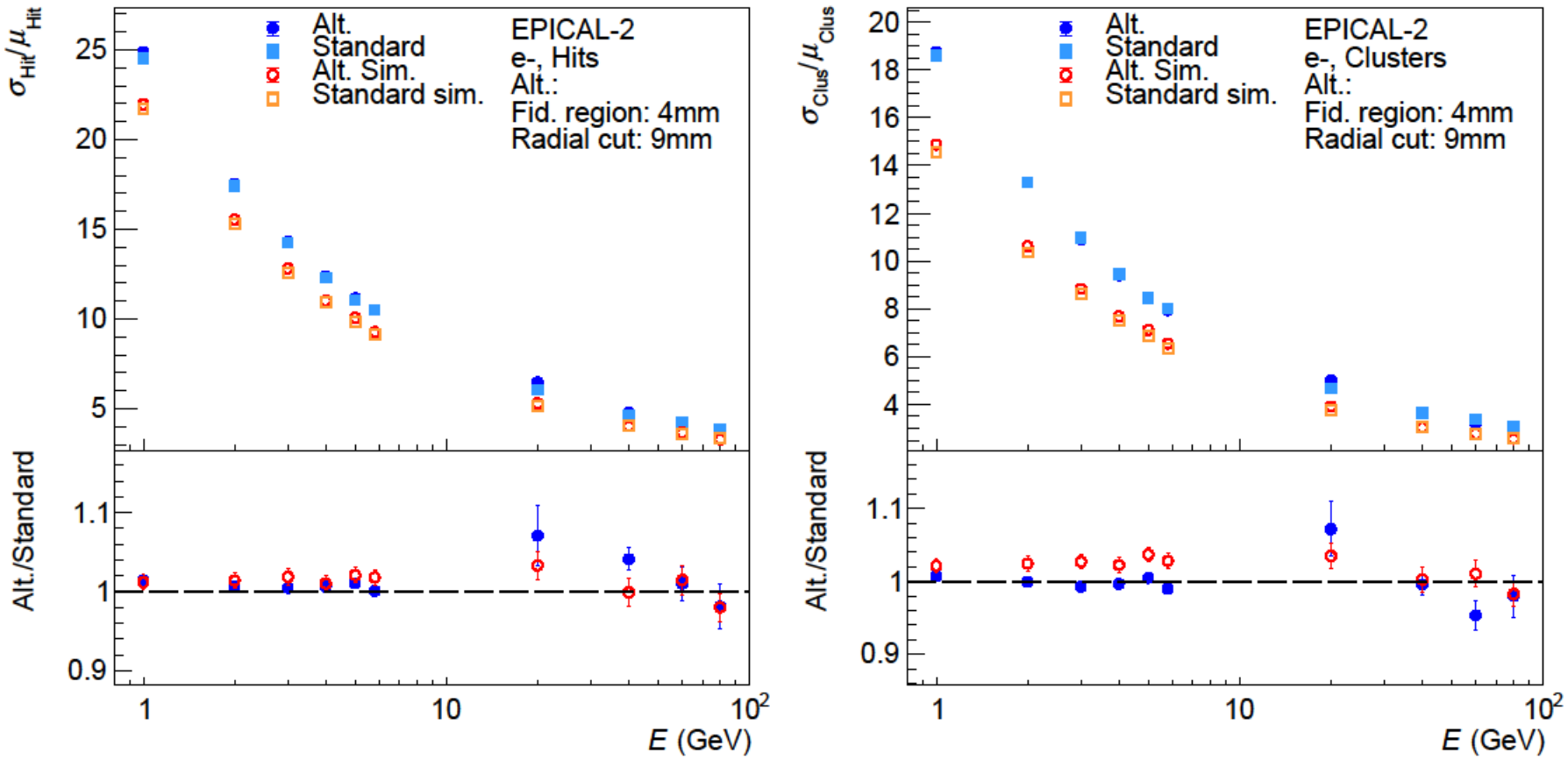
- Highest overall resolution improvement at 3mm/15mm for hits and around 4mm/15mm for clusters
- Statistics for fiducial region <4mm very low for Simulation and 20GeV data
- I suggest we use at least 4mm fiducial region, this still allows for a slight improvement in the hit resolution

Using the 8mm/5mm cut to ensure the cut radius does not overlap with the detector edges



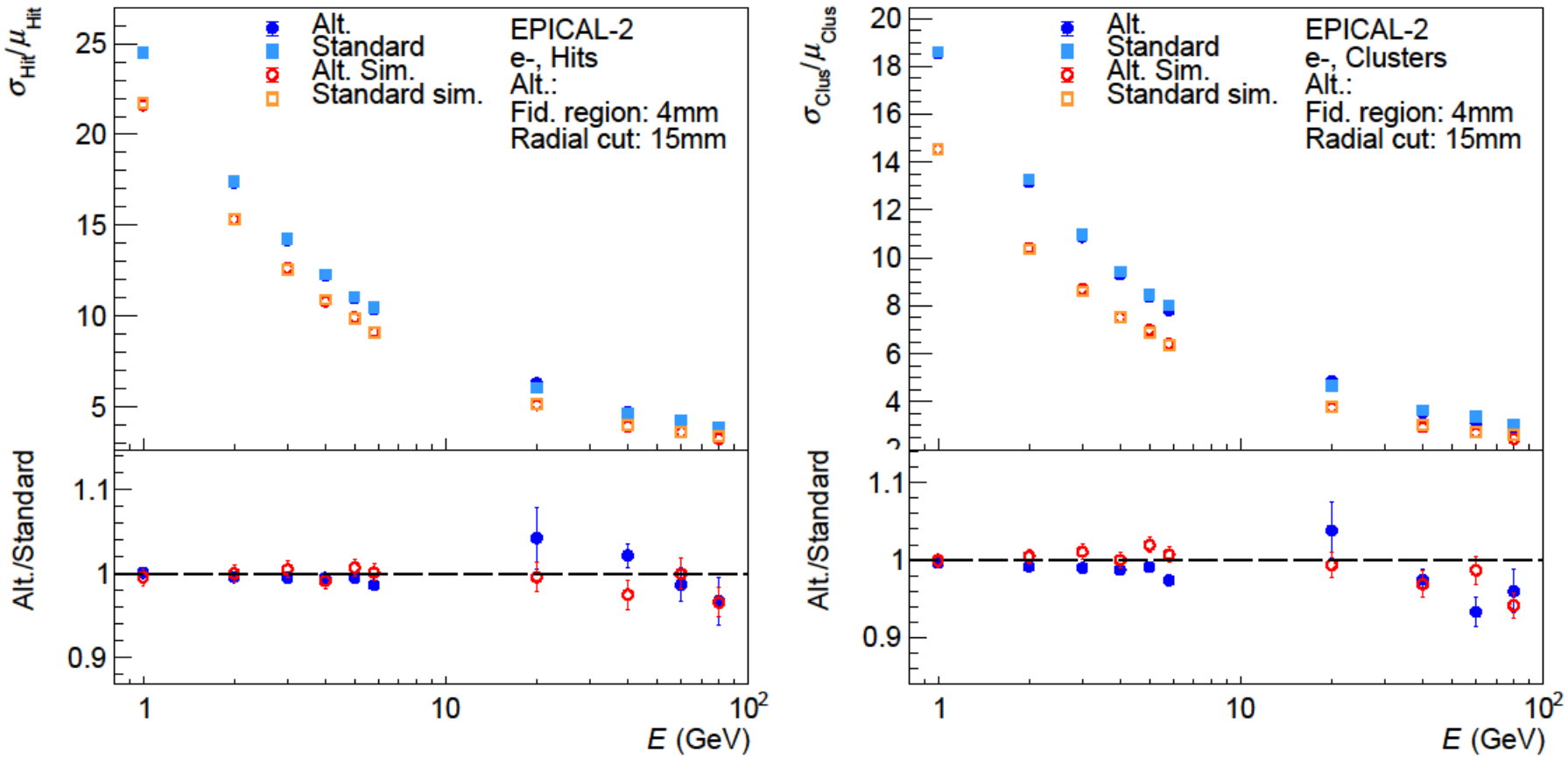
- Resolution worsens by up to 5%, except for sim. at high energies

Using the 4mm/9mm cut to ensure the cut radius does not overlap with the detector edges



- Resolution worsening not as bad as for the 8mm/5mm setting, except for 20GeV data (might be a statistical fluctuation)

Using the 4mm/15mm cut to achieve optimal performance for clusters in data



- We should probably use either 4mm/15mm or 4mm/9mm for the alternative response in the paper, depending on what we want to achieve. (optimal performance or 100% contained response)