



Pion rejection factor in SciGlass ECal

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ECCE proposal

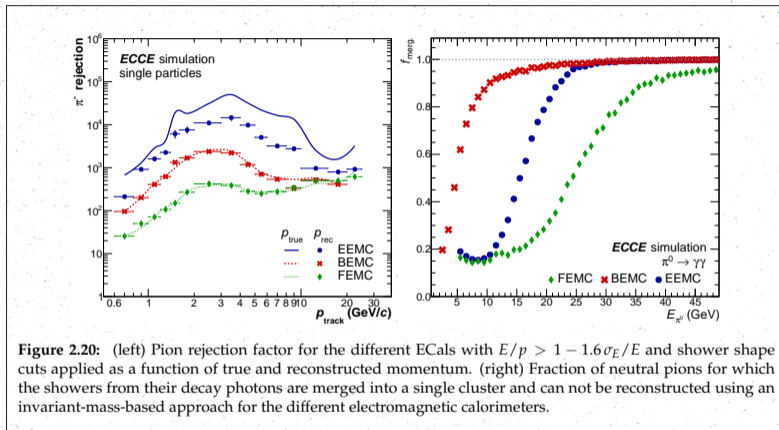


Figure 2.20: (left) Pion rejection factor for the different ECals with $E/p > 1 - 1.6\sigma_E/E$ and shower shape cuts applied as a function of true and reconstructed momentum. (right) Fraction of neutral pions for which the showers from their decay photons are merged into a single cluster and can not be reconstructed using an invariant-mass-based approach for the different electromagnetic calorimeters.

<https://doi.org/10.5281/zenodo.6537588>

For a Gaussian peak $(1 + \text{erf}(1.6/\sqrt{2}))/2 = 94.5\%$ efficiency - **that's not how they've defined, it's more like $(1 + \text{erf}(0.6/\sqrt{2}))/2 = 72.5\%$**



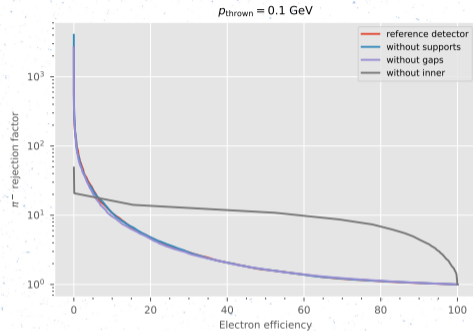
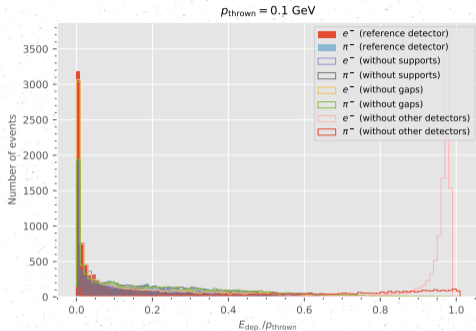
Last week

- » Sum of all towers after smearing/digitization in EICrecon (clustering not used)
- » 22.10.0 geometry
- » Ill-defined polar angles (missing data for certain energies/rapidities)

This week

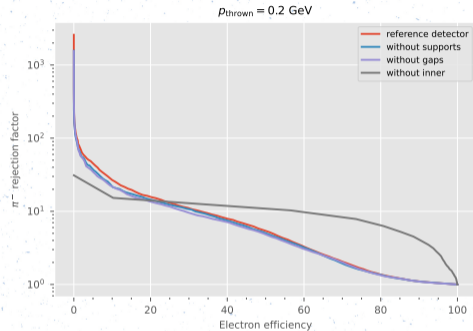
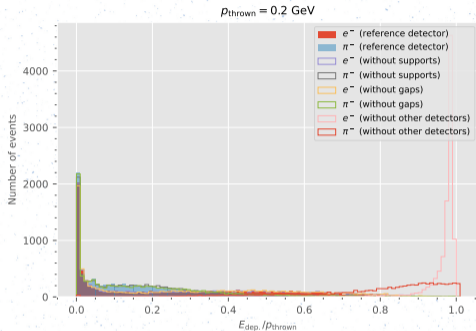
- » Sum of all towers directly after simulation in DD4hep+Geant4 (clustering not used)
- » 22.11.1 geometry (full 12 mm sector gap introduced)
- » Particles thrown within acceptance of the calorimeter ($29^\circ < \theta < 160^\circ$)

Pion rejection (0.10 GeV)



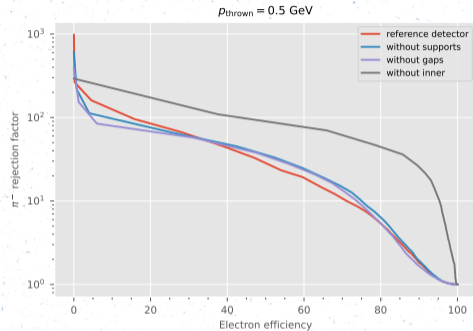
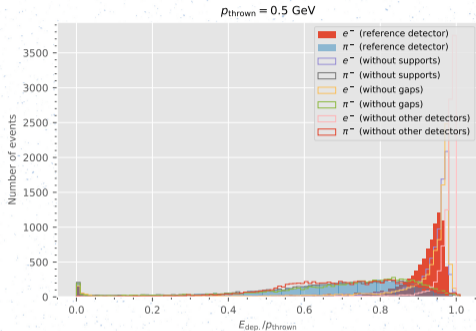
- » **without supports** - carbon fiber and wedge box removed
- » **no gaps** - remove longitudinal gap and increase height (1 mm \rightarrow 0 mm), increase tower width (and ignore volume overlaps)
- » **without other detectors** - remove all material not related to EcalBarrel, keep the magnetic field

Pion rejection (0.20 GeV)



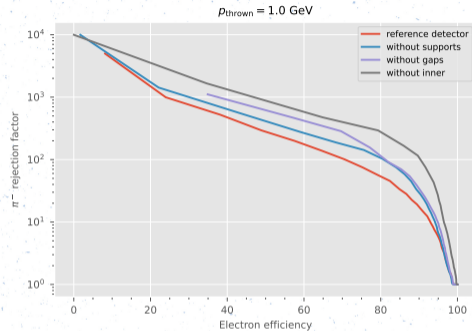
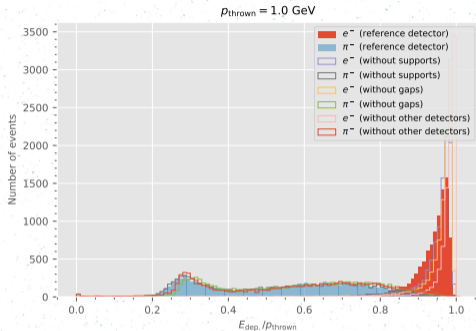
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Pion rejection (0.50 GeV)



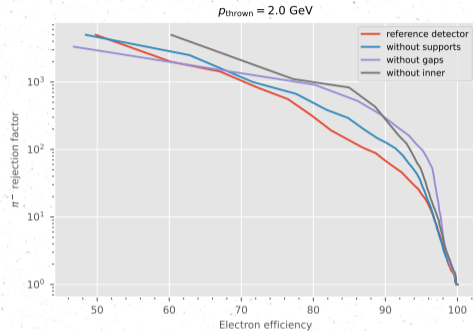
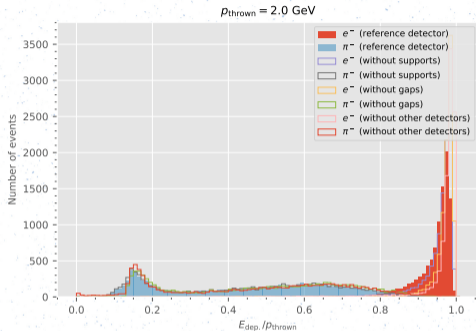
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Pion rejection (1.00 GeV)



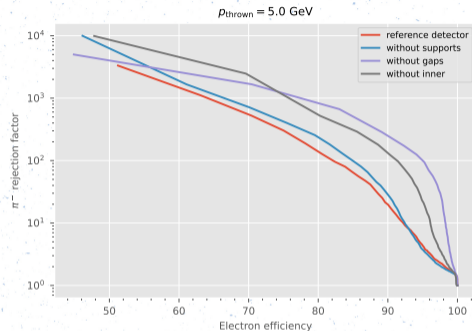
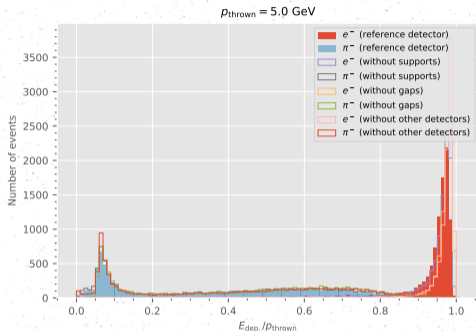
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Pion rejection (2.00 GeV)



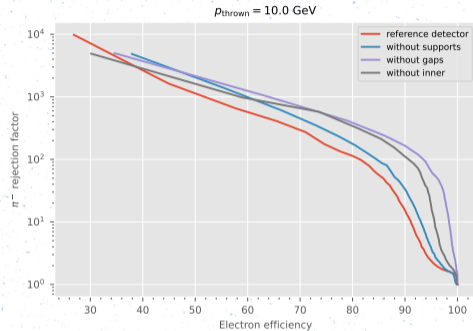
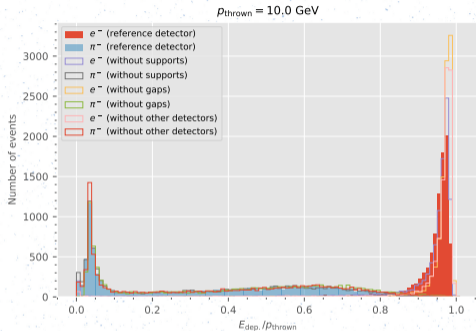
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Pion rejection (5.00 GeV)



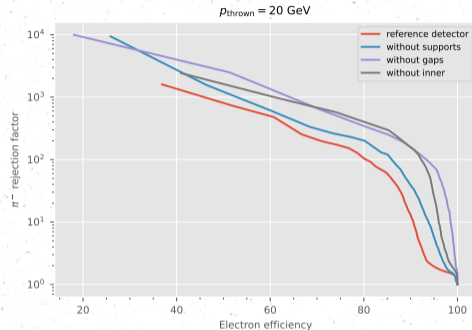
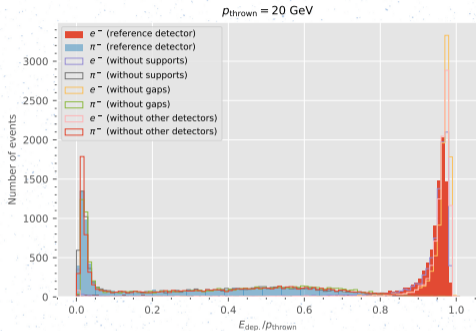
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Pion rejection (10.00 GeV)



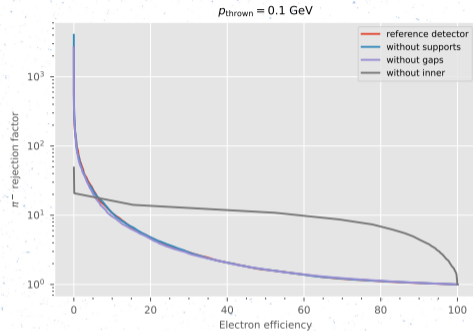
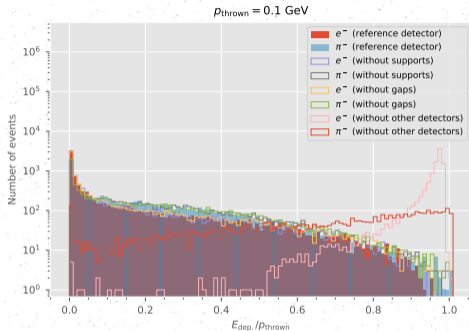
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Pion rejection (20.00 GeV)



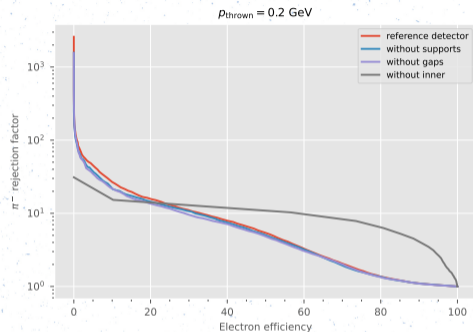
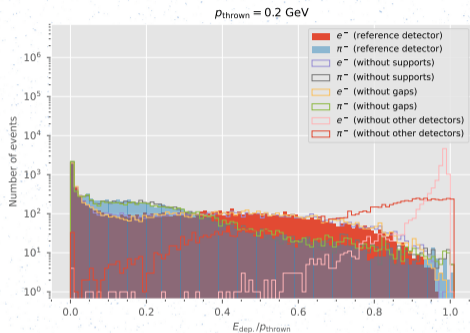
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Pion rejection (0.10 GeV, logarithmic scale)



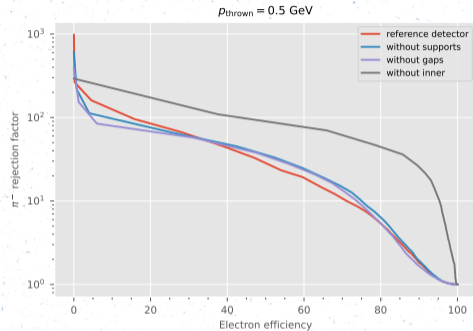
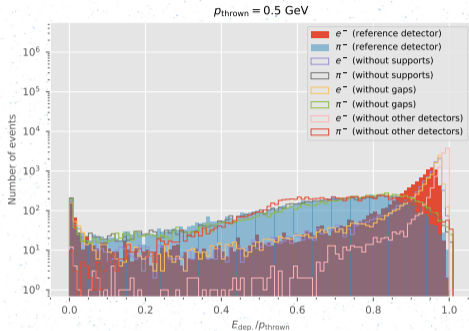
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Pion rejection (0.20 GeV, logarithmic scale)



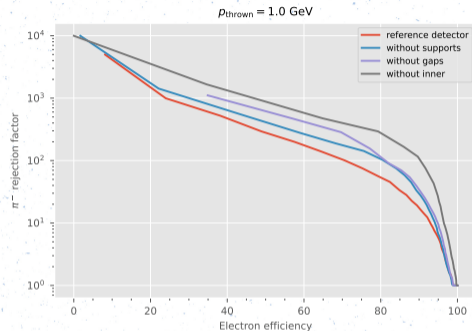
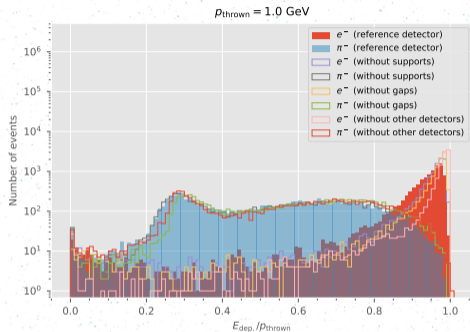
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Pion rejection (0.50 GeV, logarithmic scale)



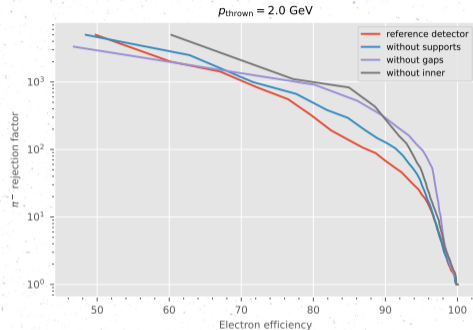
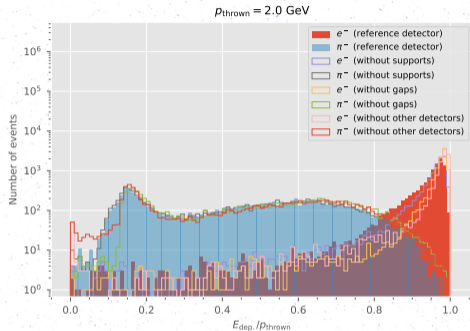
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Pion rejection (1.00 GeV, logarithmic scale)



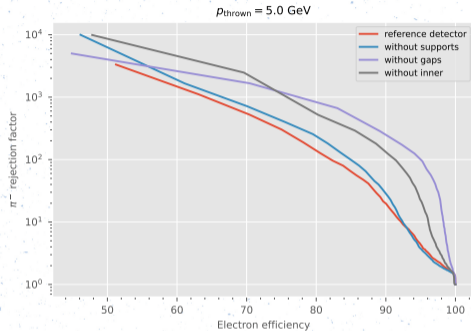
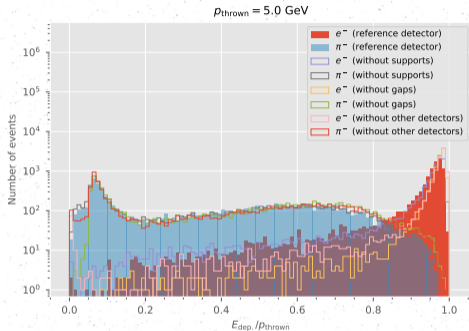
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Pion rejection (2.00 GeV, logarithmic scale)



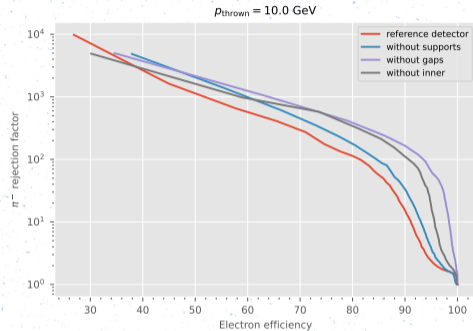
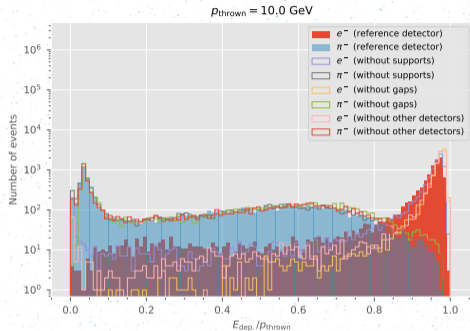
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Pion rejection (5.00 GeV, logarithmic scale)



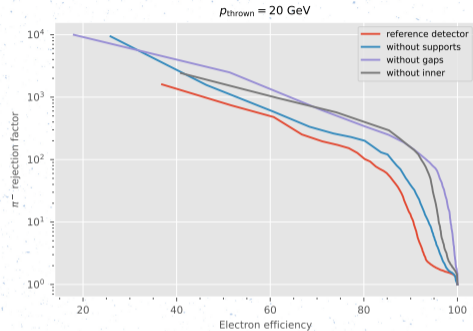
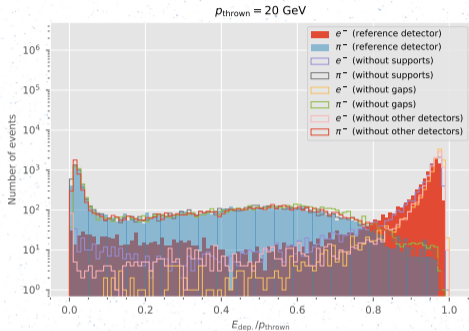
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Pion rejection (10.00 GeV, logarithmic scale)



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Pion rejection (20.00 GeV, logarithmic scale)



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Pion rejection: energy dependency

