

EEEMCal-Barrel-fwdECal gaps study

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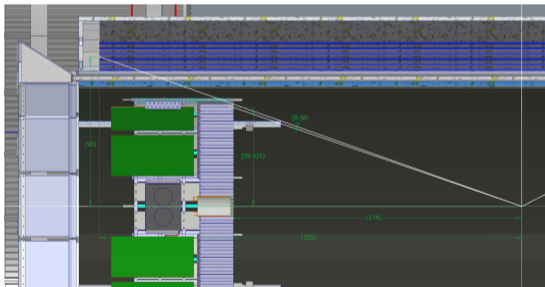
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Problem?

Geometry in CAD

Backward Direction

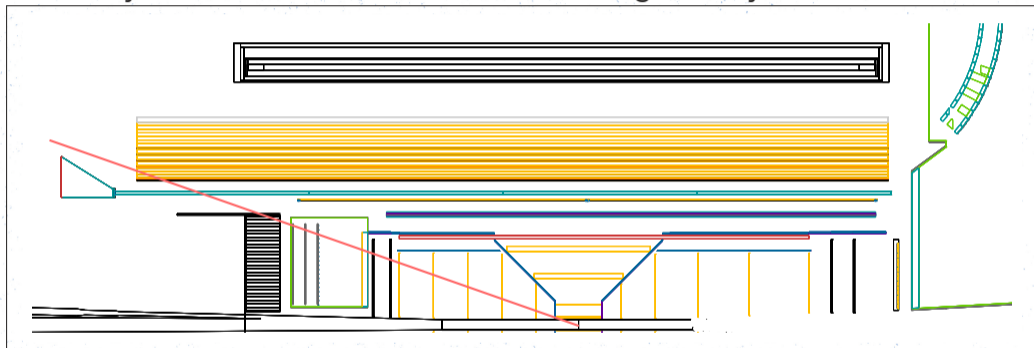
- 0.58-degree gap between Barrel EMCAL and EEEMCAL
- For the EEEMCAL the 1st layer of blocks was ignored, so the top of the second layer was used (174cm in Z, 59.4cm in Y)
- For the Barrel EMCAL the mid point of all the imaging layers was used (255cm in Z, 90cm in Y)



Drawing a straight line indicates an apparent gap. Is it any worse for electrons?

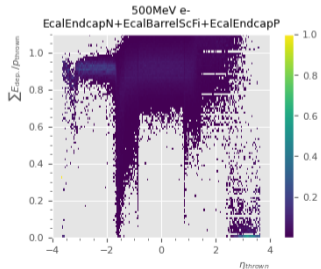
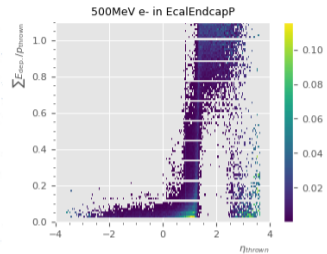
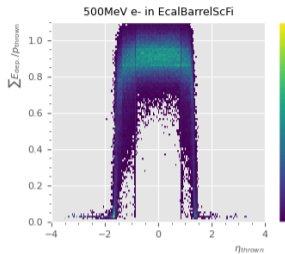
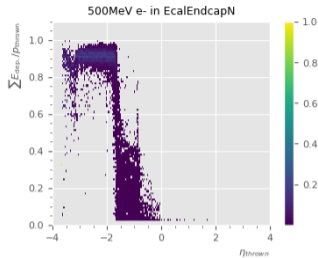
Simulation geometry

Geometry schematic based on the main branch geometry:



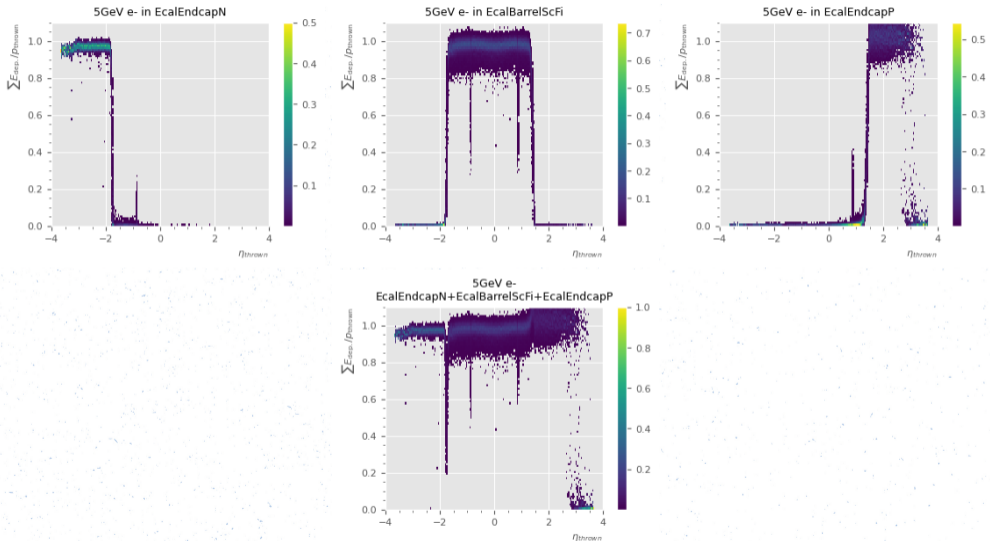
No support material implemented.

Total energy deposition vs η_{thrown}



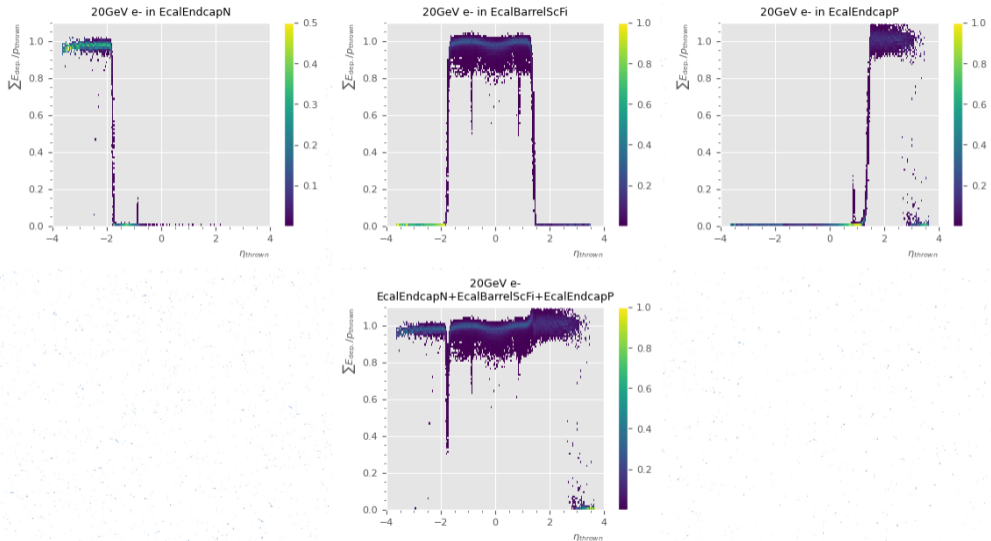
Tracker cone visible at $\eta \approx \pm 1$

Total energy deposition vs η_{thrown}



Tracker cone visible at $\eta \approx \pm 1$

Total energy deposition vs η_{thrown}

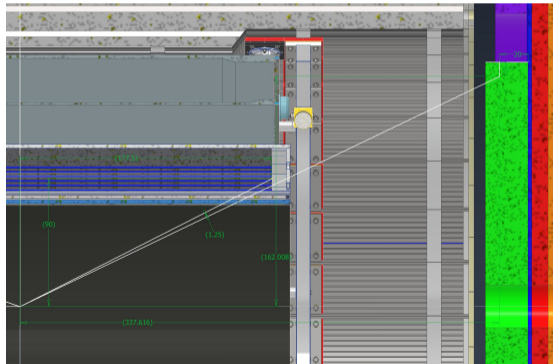


Tracker cone visible at $\eta \approx \pm 1$

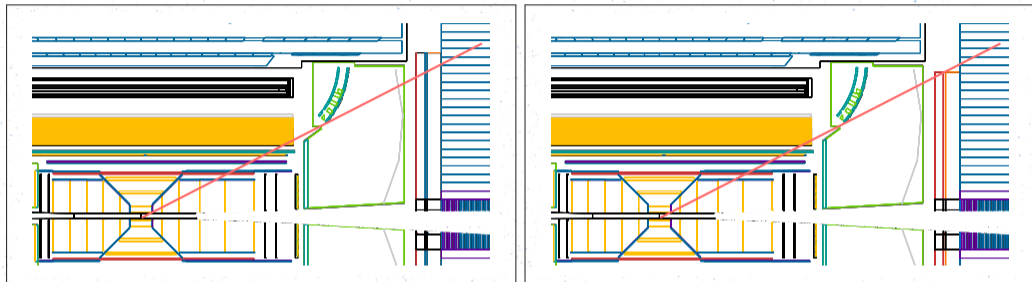
There is no gap effect seen with the current geometry, however the correct dimensions have to be considered.

Forward Direction

- 1.25-degree gap between Barrel EMCAL and Hadron EMCAL
- For the Hadron EMCAL the 1st layer of blocks was ignored, so the top of the second layer was used (337.6cm in Z, 162cm in Y)
- For the Barrel EMCAL the mid point of all the imaging layers was used (177.5cm in Z, 90cm in Y)



Simulation geometry: adjusting fwdEcal radius

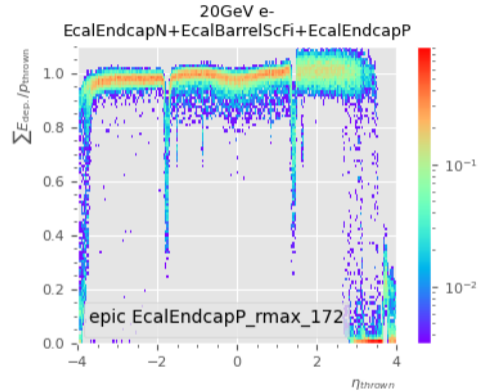
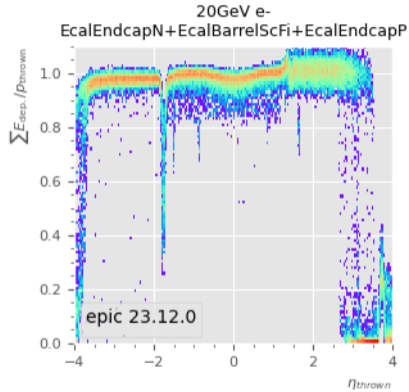


Left: nominal geometry (195 cm), Right: geometry with `EcalEndcapP_rmax = 172 cm`¹

Following simulations are a private simulation based on 23.12.0 software.

¹<https://github.com/eic/epic/pull/639>

Total energy deposition vs η_{thrown} (adjusted fwdECal radius)



At a $r_{\text{max}} = 172$ cm the gap appears for fwdECal.

Conclusion

- » Looks like there is a significant gap in acceptance between negative and barrel ecal
- » At lower momentum $|\vec{p}|$, the effect of the gap is reduced
- » For the electron-going side, the minor gap in Q^2 could be filled using data at different collision energies. There may, however, be a larger concern for exclusive physics