

EEEMCal: inner support geometry and embedded background study

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April 11, 2024

Geometry update

Slides from Carlos

Crystal layout options

Regular positioning

Shifting rows to maximize acceptance

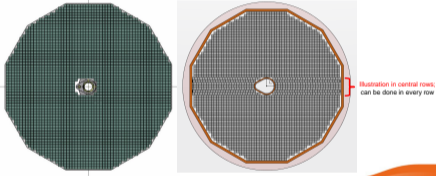


Illustration in central rows; can be done in every row

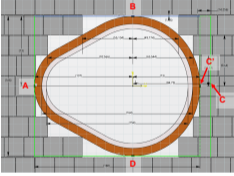
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Pseudo-rapidity coverage at small angle

Pseudo-rapidity value of crystal edge
(with $z = -174$ cm – latest value in [geometry database](#)):

- **A** ($x=-107$ mm): $\eta = 3.48$
- **B/D** ($y=\pm 74.66$ mm): $\eta = 3.84$
- **C** (option 1): $\eta = 3.71$ ($x=84.79$ mm)
- **C'** (option 2): $\eta = 3.86$ ($x=73$ mm); **0.15 higher η**

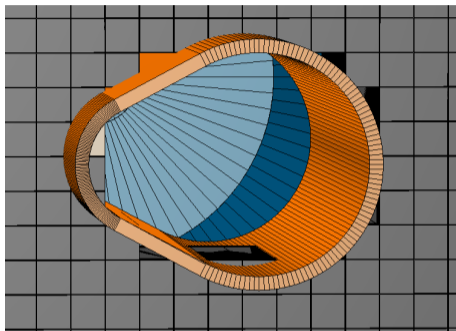
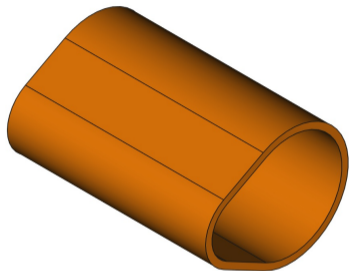
Shifting rows allows also to increase coverage at the outer radius



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CAD drawing for the collar

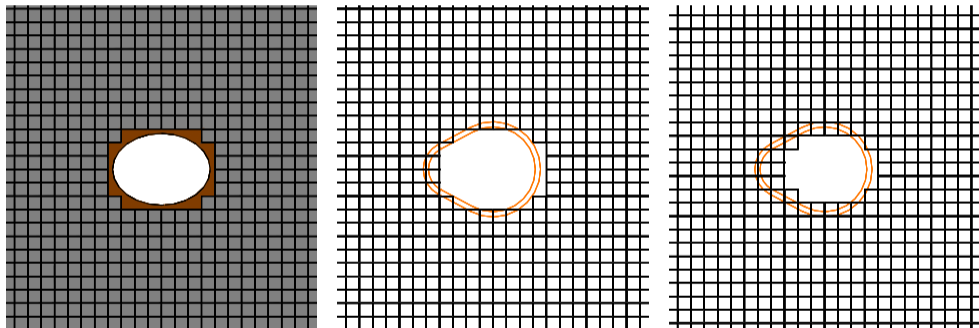
Received CAD drawing for the collar from Carlos



- ▶ Reverse-engineered into a DD4hep geometry
<https://github.com/eic/epic/pull/704>
- ▶ Issue 1: Obvious overlaps with the cells
- ▶ Issue 2: Surrounding cells now float in the air (used to be full-copper). What is the new material in-between?

Next steps for DD4hep implementation

Left: current (solid shading), Center: new collar (wireframe), Right: new collar + shift cells up



- ▶ Just shifting cells up doesn't fit like on the slides

Background embedding

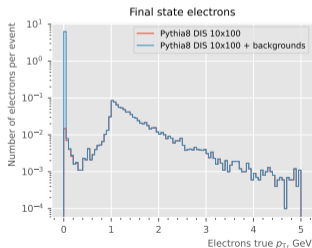
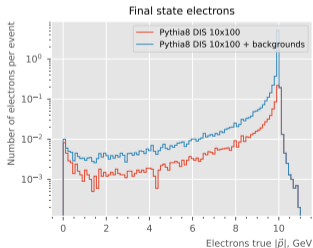
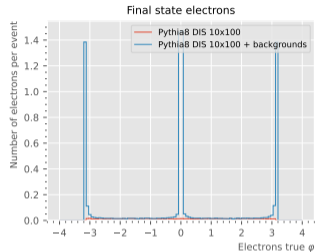
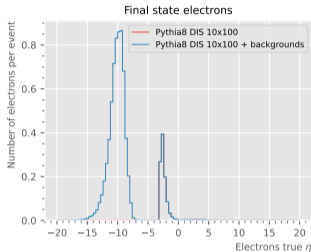
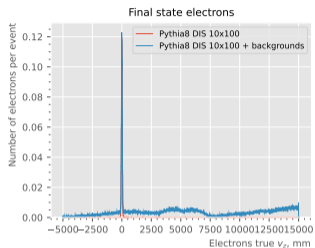
Quick reminder

Passing `--squashTime` option to the `signal_background_merger.py` fixes missing signal in the calorimeters.

With that, I'm continuing the study of my full event embedding sample.

Truth electron distributions

This is based on MCParticles

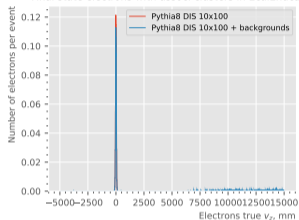


Funky ϕ can't be due to the crossing angle (see slide 4 of [this](#), also peaks of the same height)

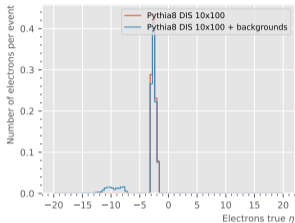
Truth electron distributions: those with clusters

This is based on MCParticles with associated clusters in EcalEndcapN

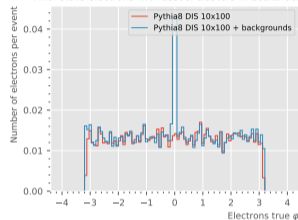
Final state electrons with assoc. clusters in EcalEndcapN



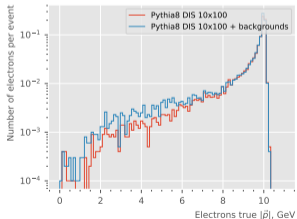
Final state electrons with assoc. clusters in EcalEndcapN



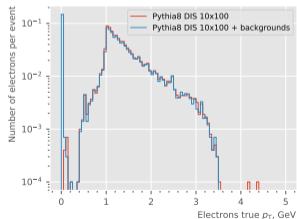
Final state electrons with assoc. clusters in EcalEndcapN



Final state electrons with assoc. clusters in EcalEndcapN

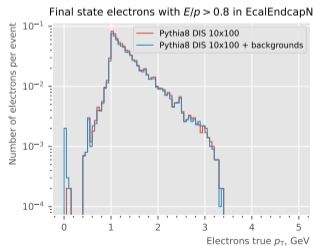
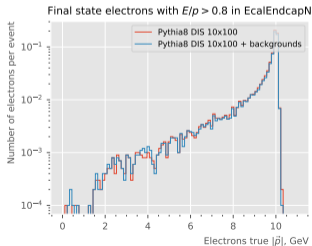
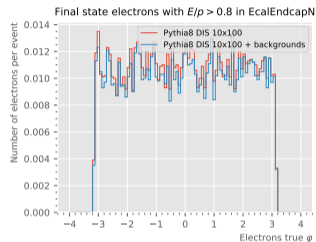
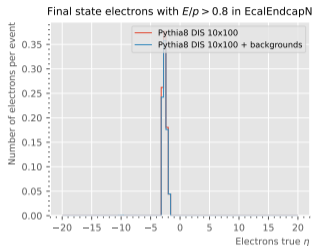
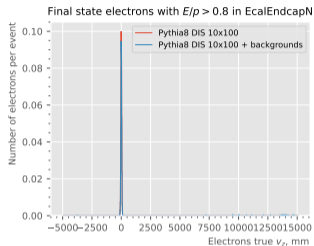


Final state electrons with assoc. clusters in EcalEndcapN



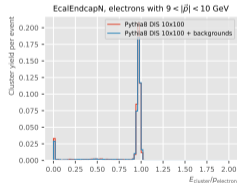
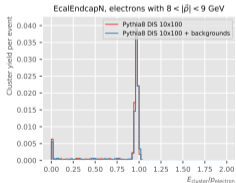
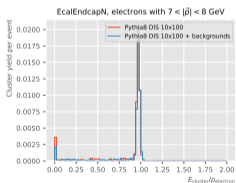
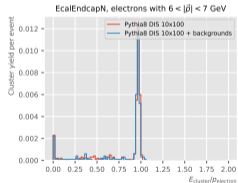
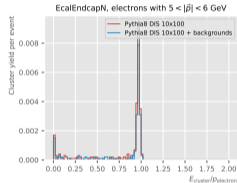
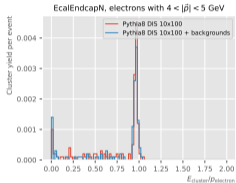
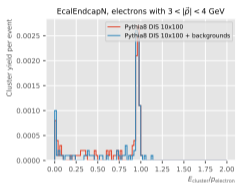
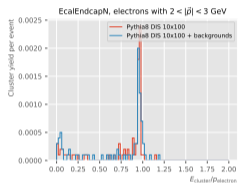
Truth electron distributions: those with clusters

This is based on MCParticles with associated clusters in EcalEndcapN, $E/p > 0.8$



E/p distributions

This uses truth associations to match EcalEndcapN clusters to the electrons among MCParticles



Effect on the resolution is small, would be hard to quantify without more statistics