

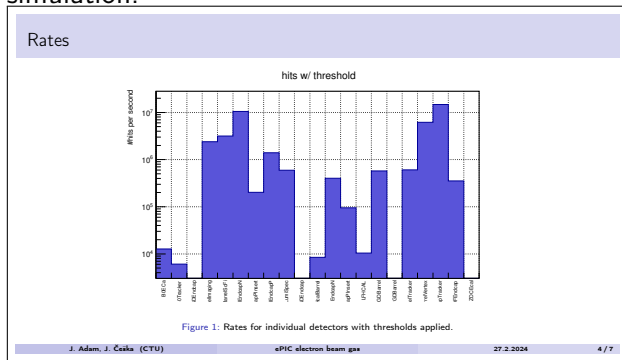
EEEMCal gap and background studies

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March 1st, 2024

News

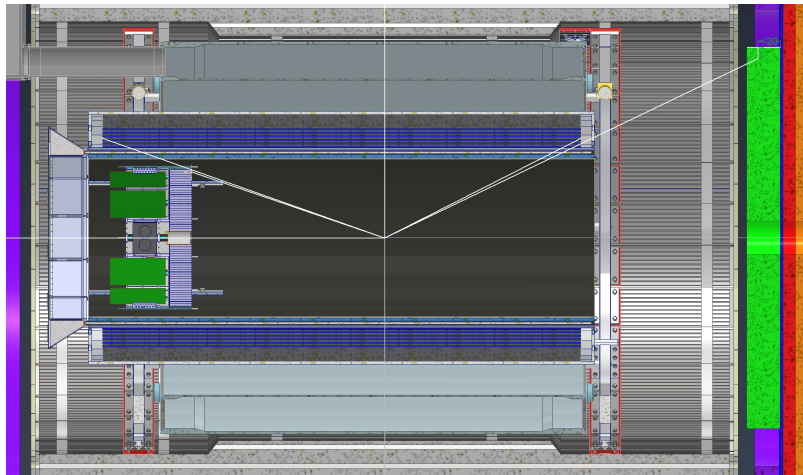
- ▶ The gap study published as benchmark https://github.com/eic/detector_benchmarks/pull/13
- ▶ Barrel ECal length adjustment <https://github.com/eic/epic/pull/648>
- ▶ New study by Jakub on electron beam gas rates featuring updated MC simulation:



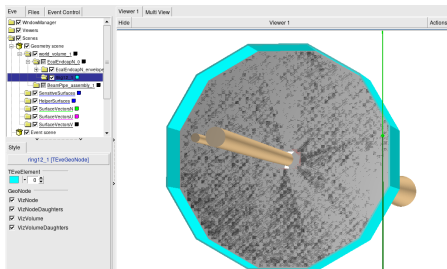
(rates given per detector)

Gap

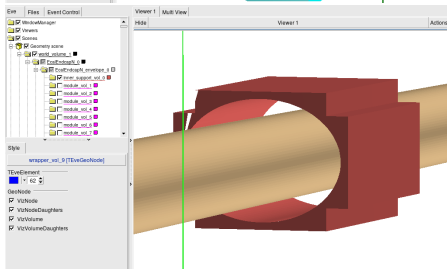
EMCAL Coverage



Simulation geometry (as of 24.02)

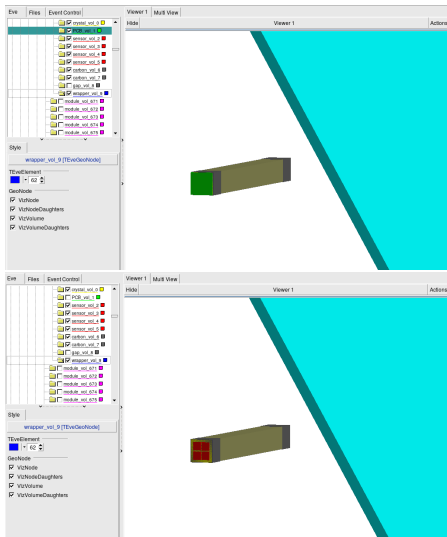


- ▶ “ring12” (cyan) – 0.9 cm thick StainlessSteel
- ▶ “EcalEndcapN_envelope” (grey) – StainlessSteel (only applies where children volumes don't override)



- ▶ “Inner_support_vol” (rust) – Copper
- ▶ modules (black) – Vacuum (only applies where children volumes don't override)

Simulation geometry (as of 24.02)



▶ Air gap volume manually placed around each crystal with the same thickness as carbon fiber (0.2 mm)

Remove aluminum supports

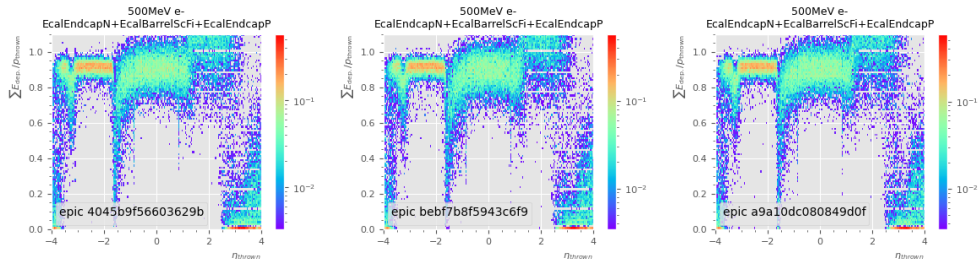
```
src/HomogeneousCalorimeter_geo.cpp

@@ -257,7 +257,7 @@ static std::tuple<int, std::pair<int, int>> add_12surface_disk(Detector& desc, A
//=====
257 257 //=====
258 258
259 259 PolyhedraRegular solid_ring12(12, r12min, r12max, structure_frame_length);
260 - Volume ring12_vol("ring12", solid_ring12, outer_ring_material);
260 + Volume ring12_vol("ring12", solid_ring12, desc.material("Air"));
261 261 Transform3D tr_global_Oring = RotationZYX(Prot, 0., 0.) * Translation3D(0., 0., Oring_shift);
262 262 ring12_vol.setVisAttributes(desc.visAttributes(plm.attr<std::string>(_Unicode(vis_struc))));
263 263

@@ -287,7 +287,7 @@ static std::tuple<int, std::pair<int, int>> add_12surface_disk(Detector& desc, A
287 287 EllipticalTube solid_sub(Innera, Innerb, calo_module_length / 2.);
288 288 Transform3D subtract_pos = RotationZYX(Nrot, 0., 0.) * Translation3D(0., 0., 0.);
289 289 SubtractionSolid calo_subtract(solid_world, solid_sub, subtract_pos);
290 - Volume env_vol(std::string(env.name()) + "_envelope", calo_subtract, outer_ring_material);
290 + Volume env_vol(std::string(env.name()) + "_envelope", calo_subtract, desc.material("Air"));
291 291 Transform3D tr_global = RotationZYX(Prot, 0., 0.) * Translation3D(0., 0., 0.);
292 292 env_vol.setVisAttributes(desc.visAttributes(plm.attr<std::string>(_Unicode(vis_steel_gap))));
293 293
```

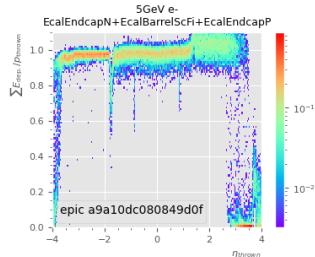
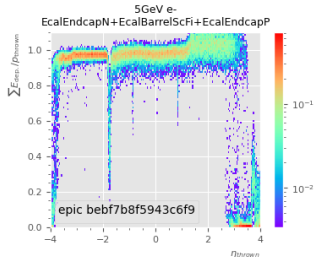
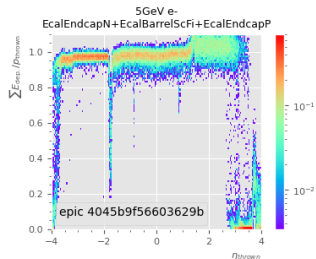
(not in the main branch, of course)

Total energy deposition vs φ



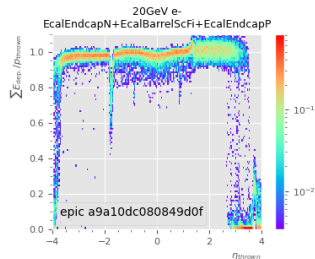
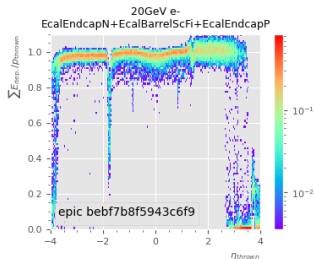
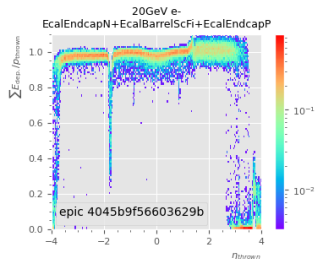
Left: nominal | Center: barrel adjusted PR#648 | Right: remove steel

Total energy deposition vs φ



Left: nominal | Center: barrel adjusted PR#648 | Right: remove steel

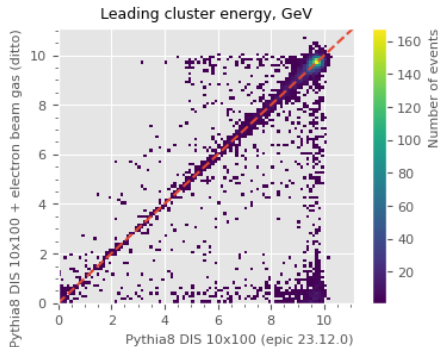
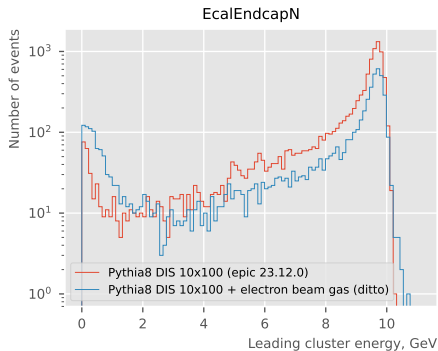
Total energy deposition vs φ



Left: nominal | Center: barrel adjusted PR#648 | Right: remove steel

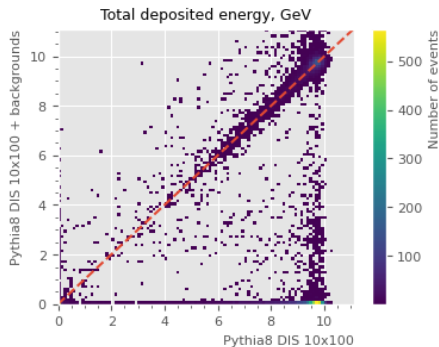
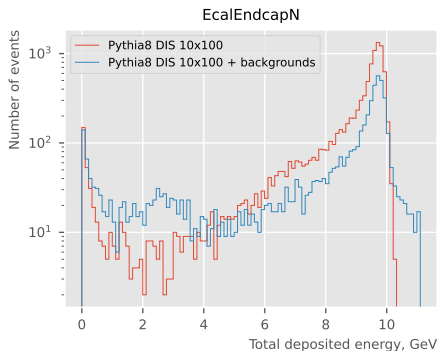
Background embedding

First look with clustering

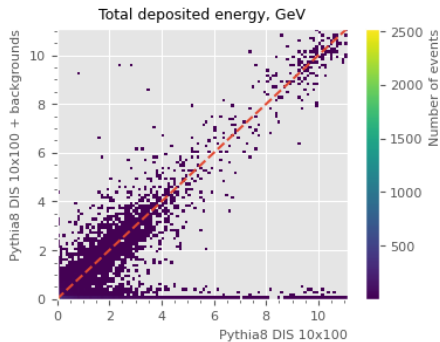
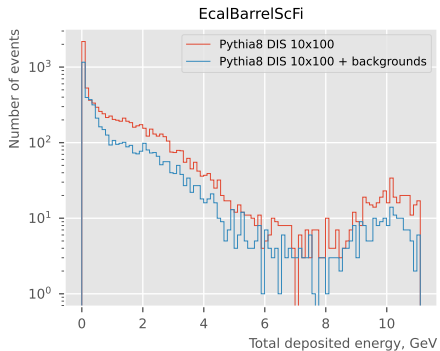


Result from 2 weeks ago

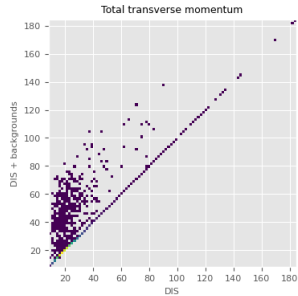
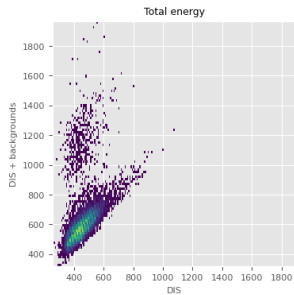
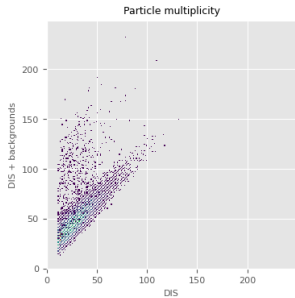
Look without clustering (Backwards ECal)



Look without clustering (Barrel ECal)



Look at HepMC



Looks fine!