

Electron-going ECal (EEMC) improved detector design

**ECCE Bi-weekly Meeting
December 6, 2021**

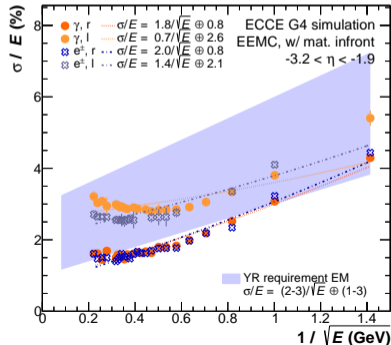
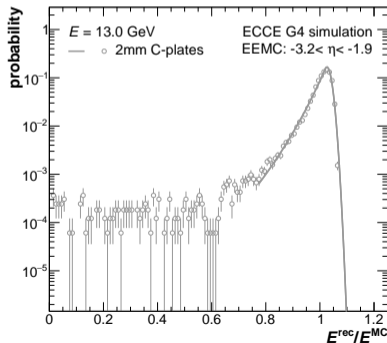
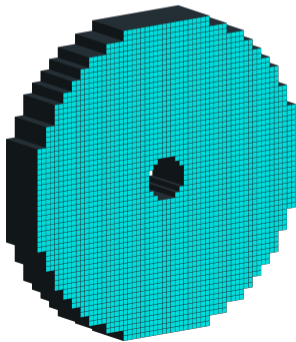
Nicolas Schmidt (ORNL)



Previous EEMC setup

- Crystal size: $1.8 \times 1.8 \times 20 \text{ cm}^3$
→ smaller than EEEMCAL mechanical design
- $8 < R < 61 \text{ cm}$ → 2876 crystals in total
- Tower material: lead-tungstate crystal (PbWO_4)
- **Carbon support:**
→ 2mm carbon between neighboring crystals
→ strong tail in energy resolution
→ different than EEEMCAL design of 0.5mm plates

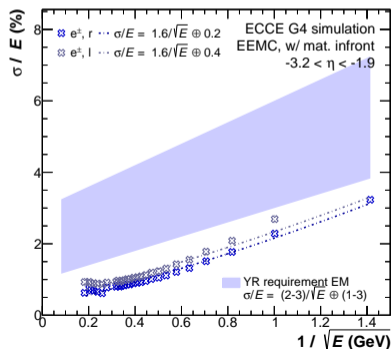
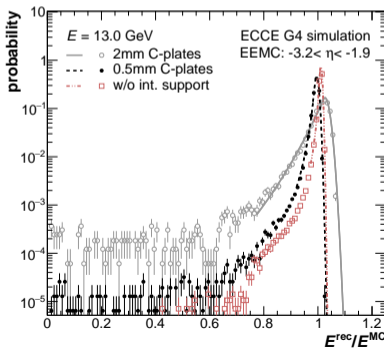
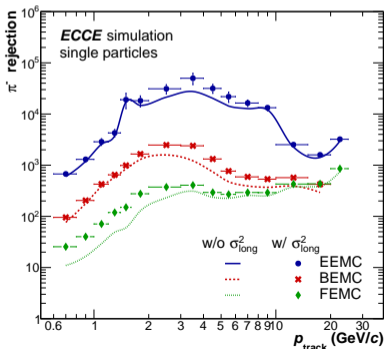
Please note: This previous EEMC setup was no longer used in detector performance section in the proposal!

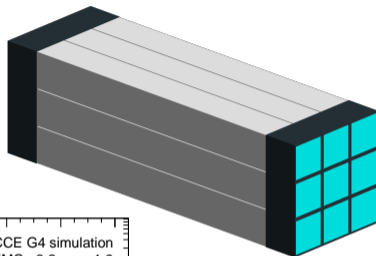
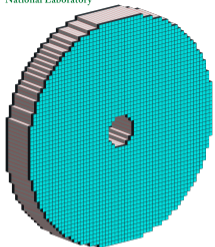


0.5mm Carbon Performance

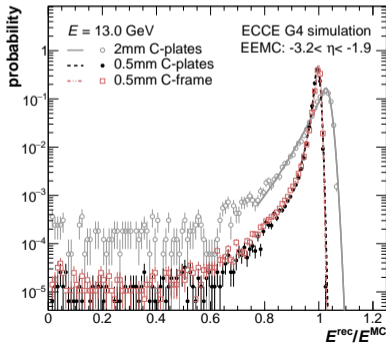
- Large amounts of simulation run on ORNL Cades
 - in total > 50M events for proposal
 - allowed for fast performance studies of detector changes
- Significant improvement compared to previous 2mm C-plates
 - much reduced tail in energy resolution
- Improvement will be included in new central simulations
 - expect improved physics performance in backward region!

This EEMC improvement is already included in calorimeter performance section in the proposal!

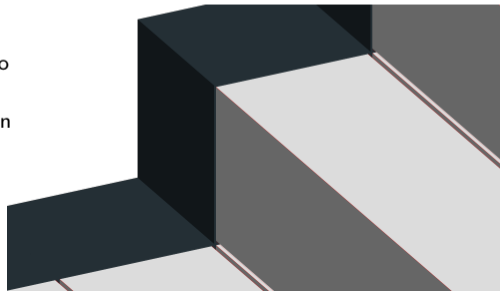




- Crystals:
 - size changed to design value of 2×2 cm
 - 2656 crystals for $7 < R < 61$ cm
- Carbon frame:
 - thickness reduced to 0.5mm between crystals
 - change to 2cm deep front and back spacing frame
- Additional material:
 - reflective foil (VM2000) $66\mu\text{m}$ wrapping
 - optional Tedlar (Tyvek) $50.8\mu\text{m}$ wrapping

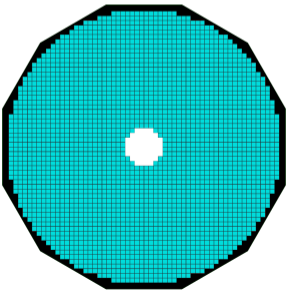
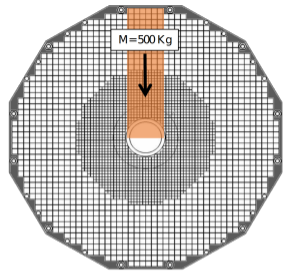


- Performance comparable to solid 0.5mm plates
- Further reduction of carbon thickness under discussion
 - engineer inputs needed



Backup

EEMC Support and more



- EEMCAL design contains thick steel support frame attached to DIRC frame
 - multiple cm of steel
 - large X/X_0 in BEMC outer acceptance
 - is there a CAD file available or Geant4 geometry?
- Inner radius of EEMC comparably wide
 - could it be reduced for higher η coverage?

