

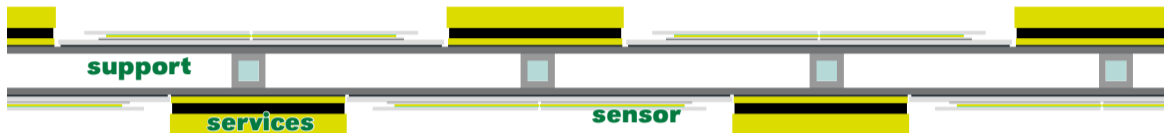
# Timing Tracking Layer (TTL) Impact on calorimeter performance

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# TTL Geant4 Material Assumptions



## Support:

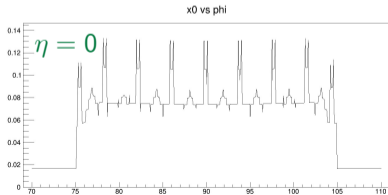
Layer	material	thickness
Top plate	aluminum	1mm
air gap	air	5mm
bottom plate	aluminum	1mm
cooling	aluminum	5mm diam. tube 1mm wall

## Services:

Layer	material	thickness
Thermal pad	graphite	0.25mm
High Speed Board	polystyrene	1mm
Power board	polystyrene	3.1 mm

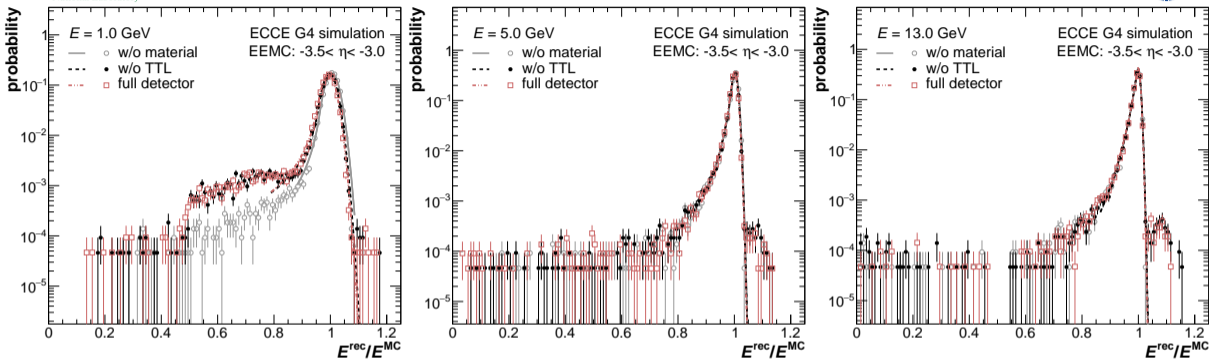
## Sensor:

Layer	material	thickness
Thermal pad	graphite	0.25mm
AIN	AIN	0.79mm
Laird Film	graphite	0.08mm
ROC	plastic	0.25mm
Solder (Tin)	tin	0.03mm
Sensor	silicium	0.3mm
Epoxy	epoxy	0.08mm
AIN	AIN	0.51mm



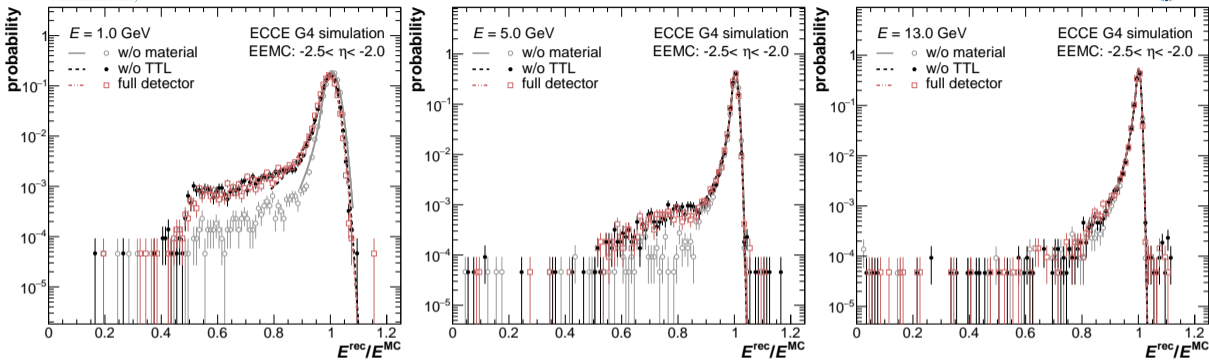
More infos in CMS ETL TDR [\[\[Link\]\]](#)

# Impact of TTL on EEMC performance



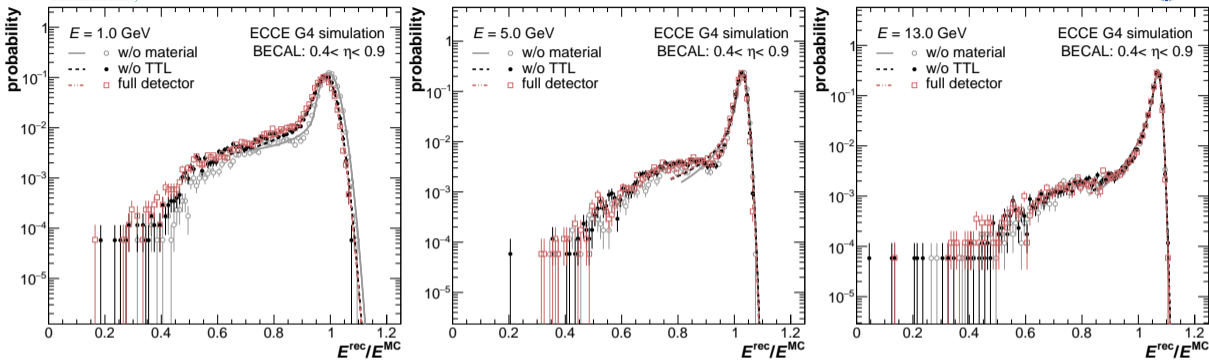
- For particles above  $\sim 2$  GeV/c no visible impact from inner material of all detectors (red vs gray)
- Removing TTL material only (red vs black) very marginal improvement
- Possible improvement of cluster reco through better cluster center from TTL not explored yet
- Main problem leakage in between towers

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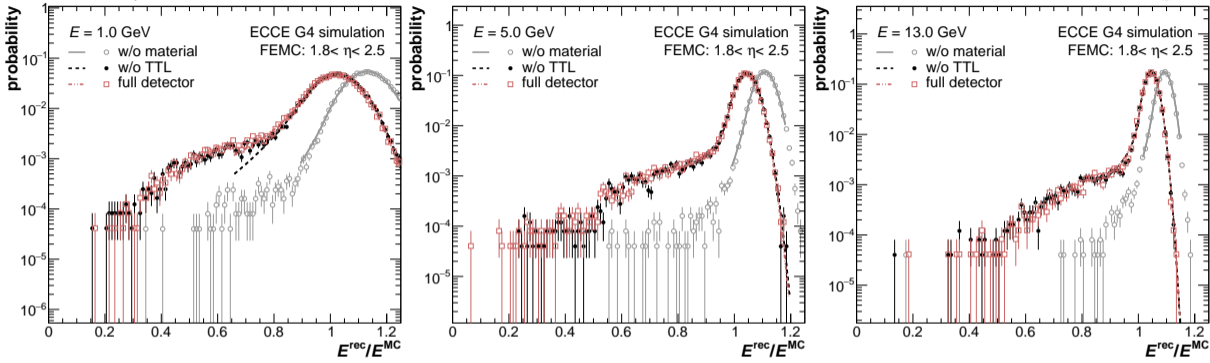
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# Impact of TTL on BEMC performance



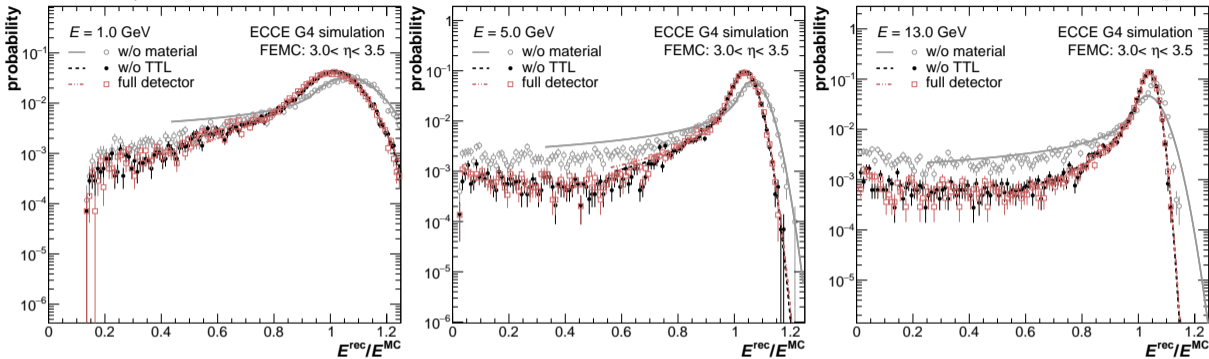
- For particles above  $\sim 2$  GeV/ $c$  no visible impact from inner material of all detectors (red vs gray)
- Removing TTL material only (red vs black) slightly larger improvement for lower energies compare to EEMC
- TTL layer  $\sim 20$ -25cm from calo surface
- Main problem leakage in between towers & other support material in front of BEMC (DIRC frame)

# Impact of TTL on FEMC performance



- Small degradation of resolution w/ inner material of all detectors (red vs gray), clear shift in calibration
- High energy electrons severely less impacted
- Removing TTL material only (red vs black) slightly larger improvement for lower energies compare to EEMC
- Main problem intrinsic resolution & other support material in front of FEMC

# Impact of TTL on FEMC performance



- Small degradation of resolution w/ inner material of all detectors (red vs gray), clear shift in calibration
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**Questions?**