

Effects of the CGEM material on MC single γ reconstruction with EMC

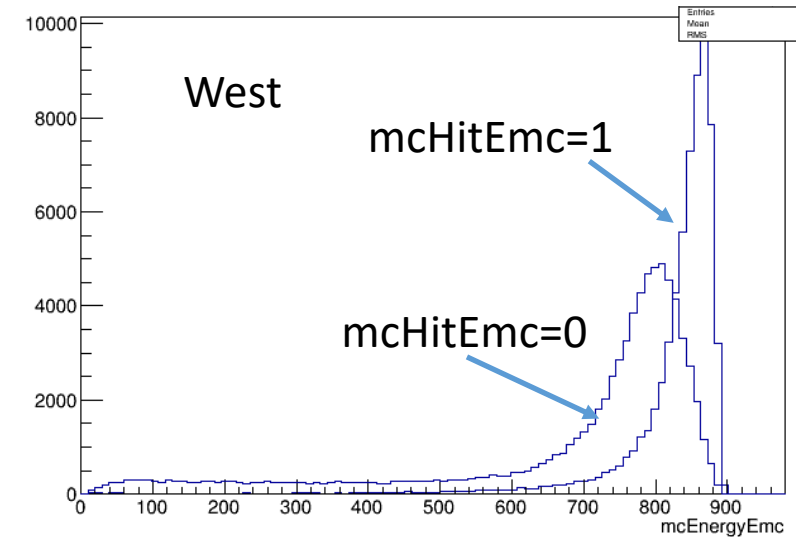
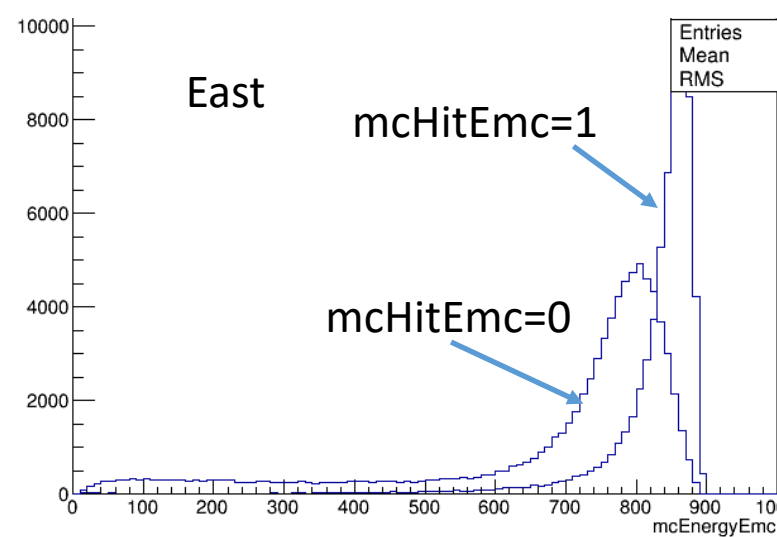
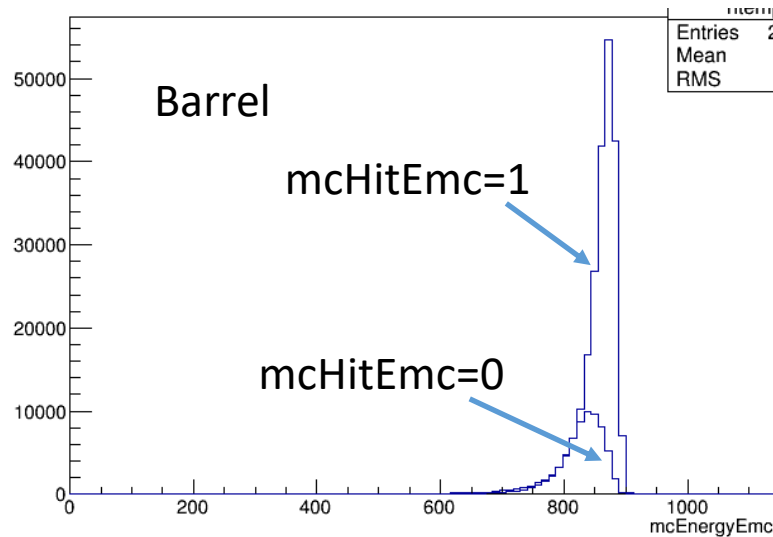
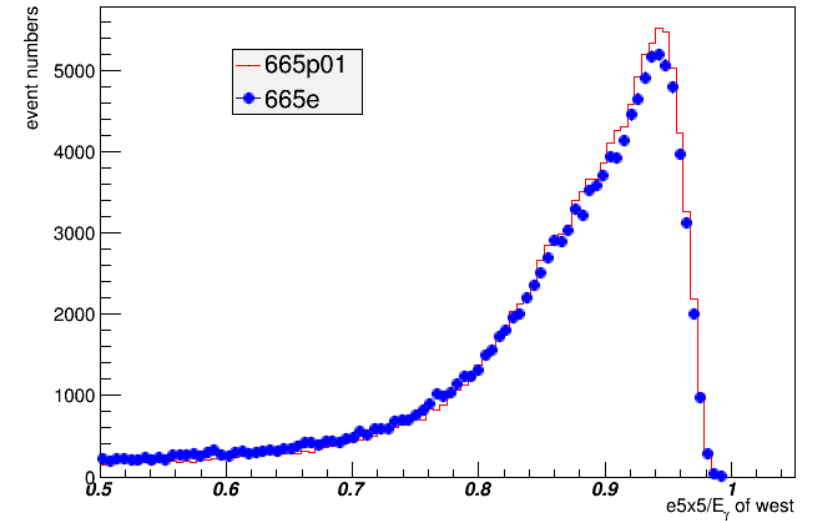
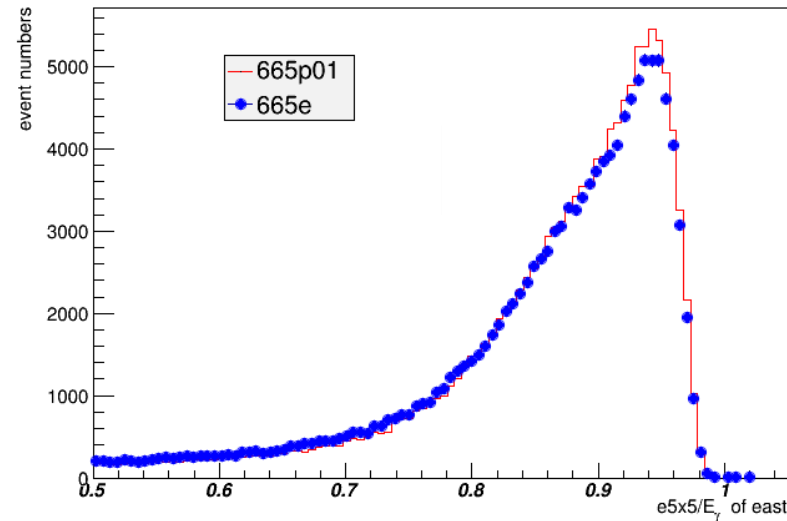
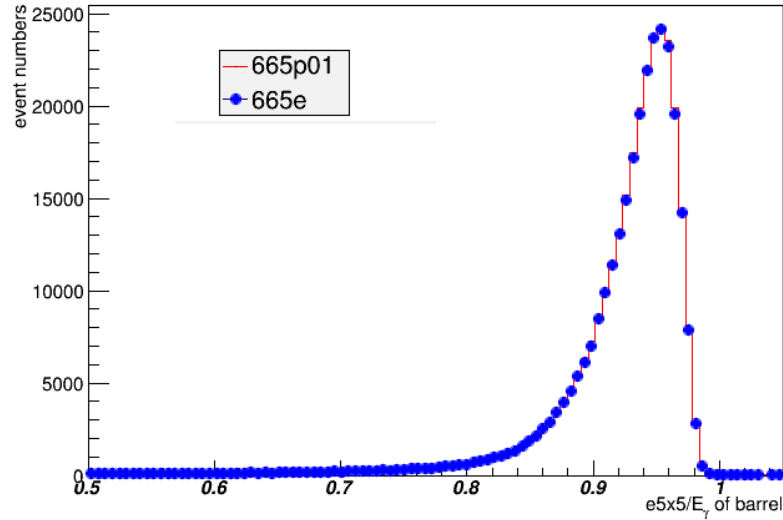
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Event Classification according to *whether the* primary particles hit EMC

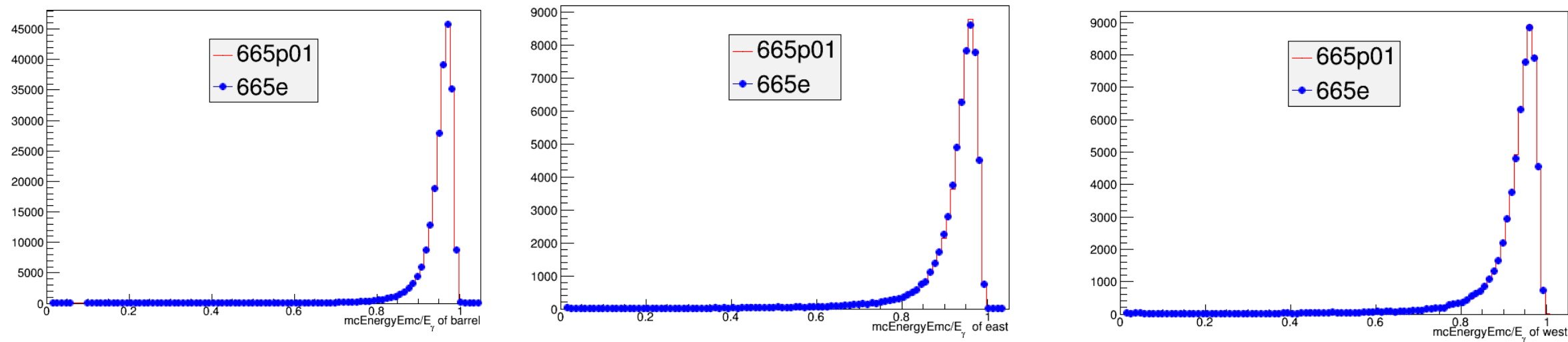
- To use the information of *whether the* primary particles hit EMC
- /Event/MC/EmcMcHitCol#1 :
 - **int** getHitEmc() **const**;
 - 1- primary particles hit EMC;
 - 0- *the primary particle doesn't hit emc*
- Compare the distribution of the EMC energy deposited between 665e and 665p01

Energy distribution of Single gamma with 0.9 GeV

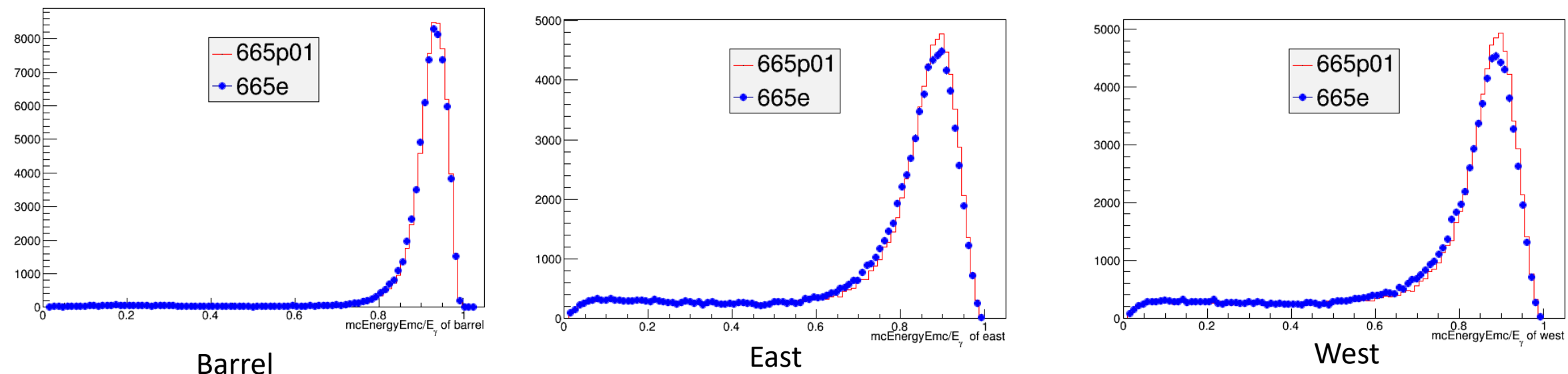


mcHitEmc=1: primary particles hit EMC; mcHitEmc=0 : *the primary particle doesn't hit emc*

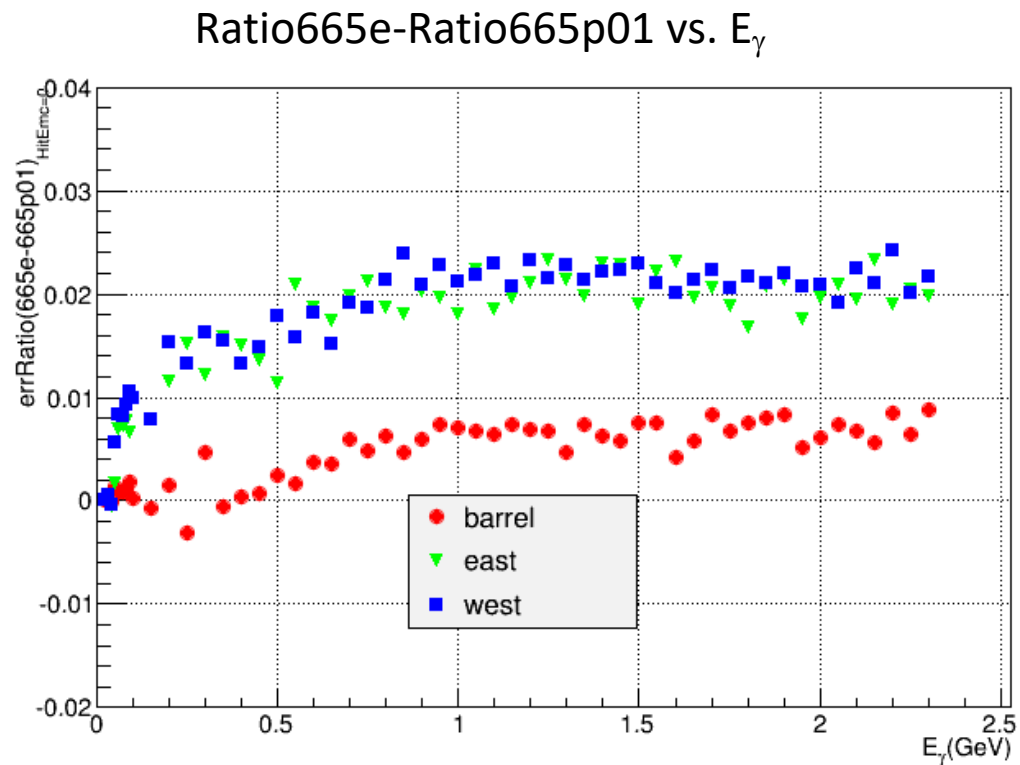
mcHitEmc=1, there is almost no difference between 665p01 and 665e.



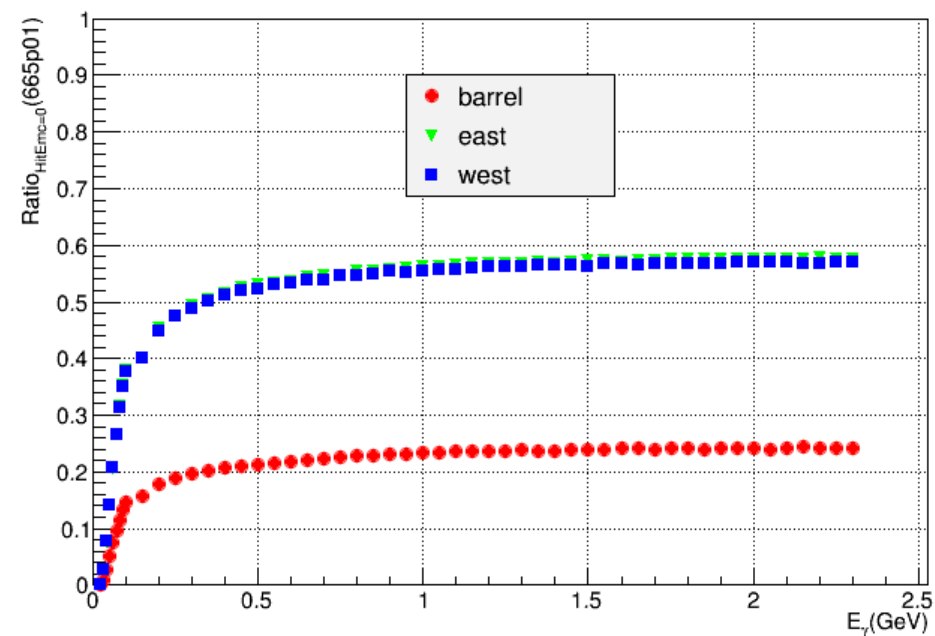
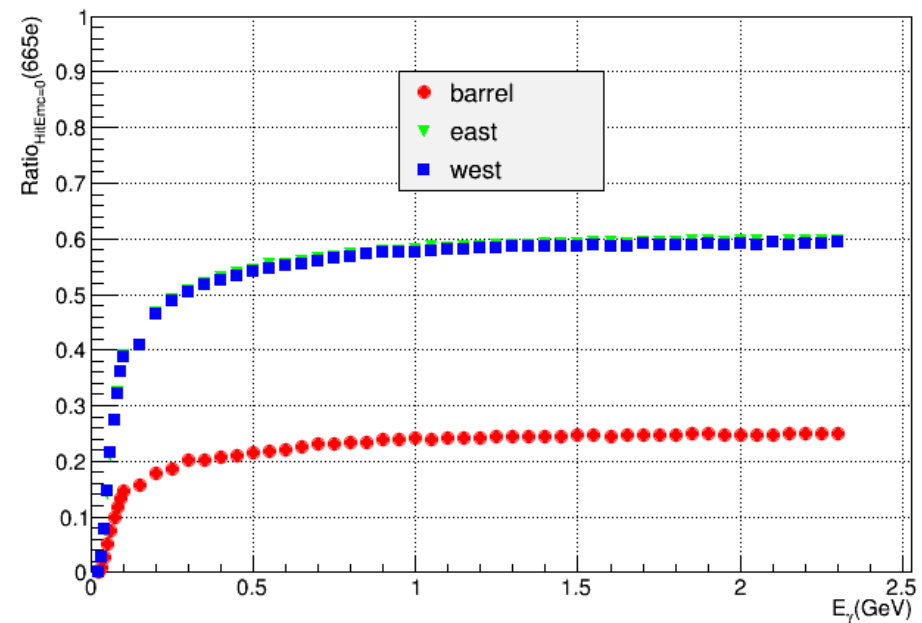
mcHitEmc=0, there are small differences, especially in east and west endcap, between 665p01 and 665e.



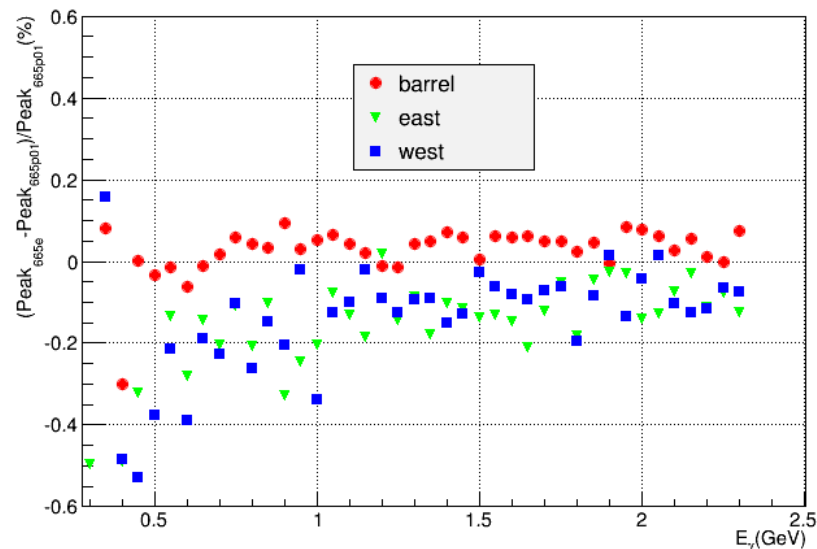
The events with $\text{mcHitEmc}=0$ increase for the 665e data.



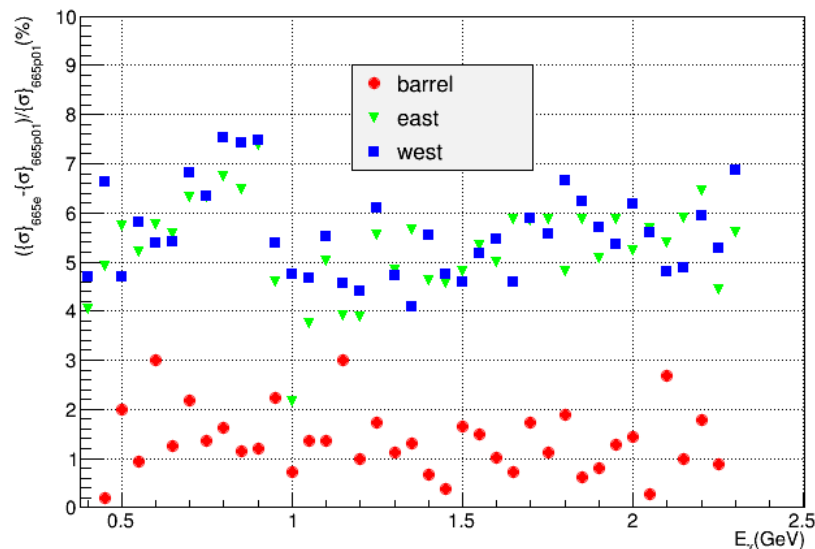
Ratio of this event vs. gamma energy(GeV)



$$(\text{Peak}_{665e} - \text{Peak}_{665p01}) / \text{Peak}_{665p01}$$

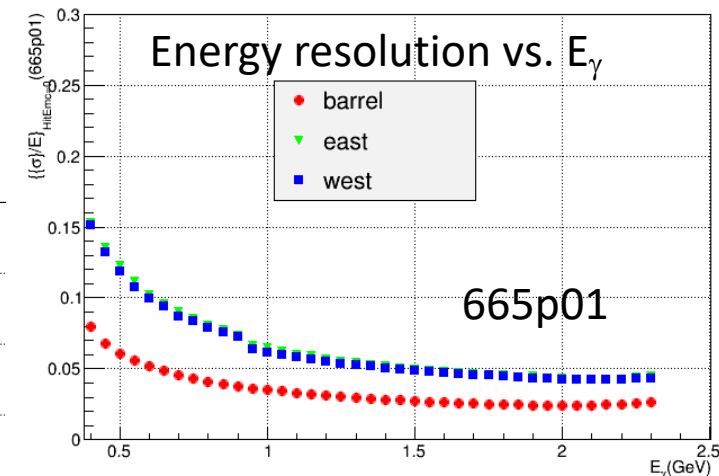
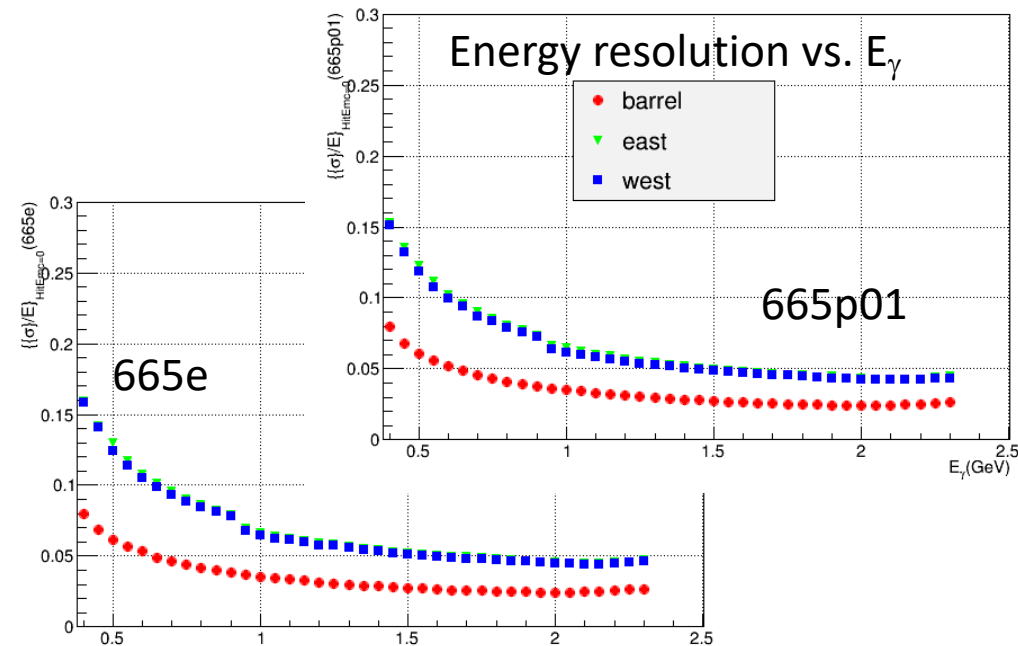
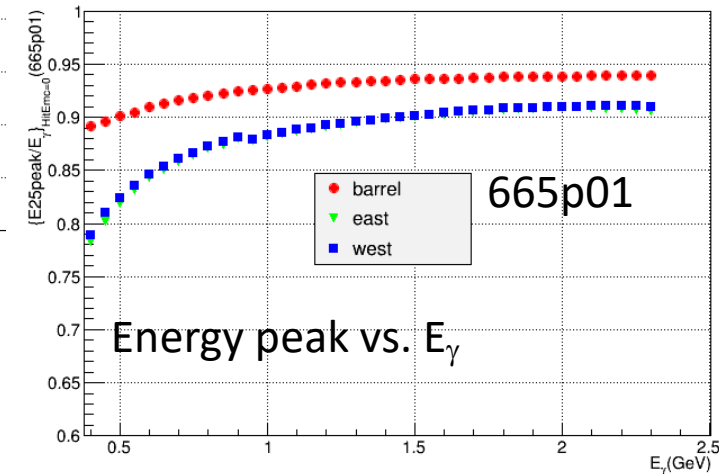
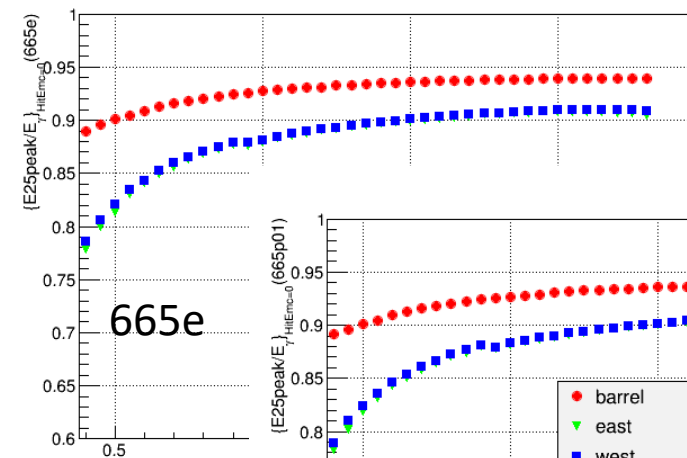


$$(\sigma_{665e} - \sigma_{665p01}) / \sigma_{665p01}$$



For 665e data with mcHitEmc=0, in EMC Endcap,
Energy peak is smaller, and energy resolution is worse.

mcHitEmc=0



Efficiency decrease for single gamma events

- Calculate the efficiency decrease:
 - $\Delta\epsilon = (N_{665e} - N_{665p01}) / N_{665p01}$ with $e5x5/E_\gamma > 0.5$

γ energy(GeV)	0.1	0.5	0.7	0.8	0.9	1.0	1.4	1.5	2.0	Digamma (3097)
$\Delta\epsilon_{\text{Barrel}}(\%)$	-0.8	-0.5	-0.2	-0.2	-0.17	-0.16	-0.14	-0.1	-0.1	-0.15
$\Delta\epsilon_{\text{East}}(\%)$	-3.4	-2.1	-1.1	-1.1	-0.9	-1.0	-0.9	-0.9	-0.7	-0.36
$\Delta\epsilon_{\text{West}}(\%)$	-3.6	-1.8	-1.2	-1.1	-0.9	-0.8	-1.0	-0.9	-0.7	-0.36

- Single MC :the maximum energy cluster selected

Summary

- Single γ events Classification according to *whether the* primary particles hit EMC
 - ✓ mcHitEmc=1, there is almost no difference between 665p01 and 665e.
 - ✓ mcHitEmc=0, there are small differences, especially in east and west endcap, between 665p01 and 665e.
- The events with mcHitEmc=0 increase for the 665e data.
 - ✓ In EMC Endcap, energy peak is smaller, and energy resolution is worse for 665e
 - ✓ Efficiency for single γ is decreased due to CGEM material by
 - 0.7% ~ 4.6% in endcaps
 - 0.1% ~ 0.8% in barrel