

Photon Updates

Rose Powers

Princeton

9 Sept 2025



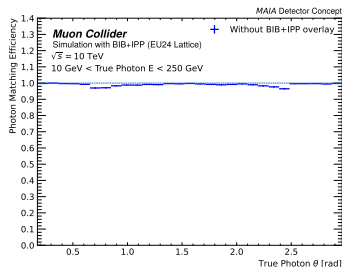
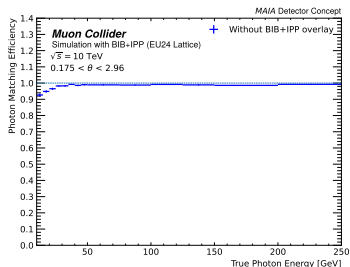
Overview

- ▶ Latest no-BIB photon samples located on OSG at
/data/DataMuC_MAIA_v0/v5nofragremoval/photonGun*
- ▶ With Greg's latest recipe, which removes all fragment removal algs (see [Greg's slides](#))
 - ▶ Timing info based on one charged pion in the endcap region
- ▶ Getting rid of frag removal algs leads to higher cluster multiplicity
- ▶ Investigated how more clusters affect performance (especially resolution)

Reco Job Type	Total Time	Pandora Time
No reconstruction	3 hrs, 45 min	---
Basic Pandora	4 hrs, 45 min	1 hr
Larry's Config	9 hrs	5 hrs, 15 min
Larry + tight calo hit isolation	9 hrs, 45 min	6 hrs
Reduced Topological Merging	8 hrs, 30 min	4 hrs, 45 min
No fragment removal	6 hrs, 15 min	2 hrs, 30 min

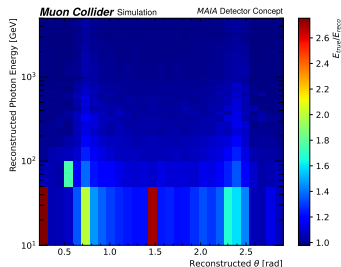
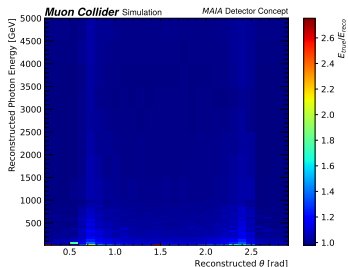
Efficiency

Matching efficiency plotted against energy (left) and theta (right). As expected, no significant efficiency degradation occurs without fragment removal.



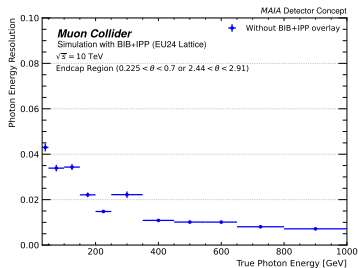
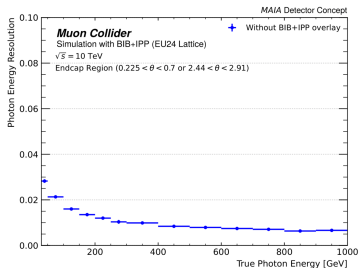
Response Maps

Average energy response (E_{true}/E_{reco}), with the energy axis scaled linearly (left) and log (right). While the overall shape is symmetric and corresponds to the solenoid geometry, the two lowest-E bins display asymmetry and unexpectedly erratic response in the central barrel.



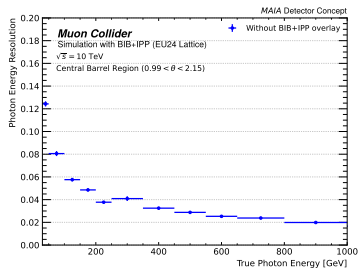
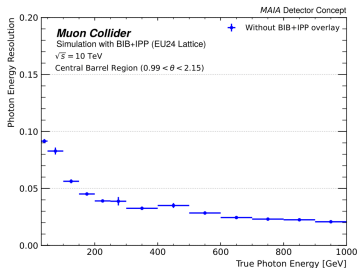
Resolution (Endcaps)

Energy resolution in the endcap region, comparing v5 (left) to v5 with no fragment removal (right). Calibrated with response map.



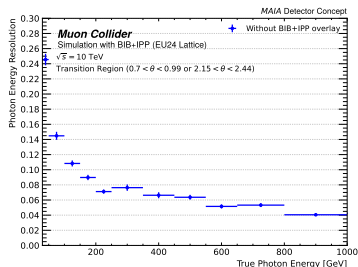
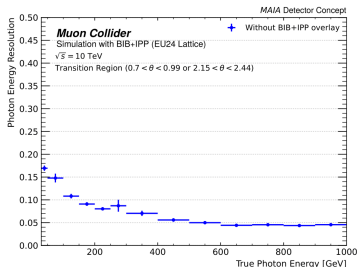
Resolution (Barrel)

Energy resolution in the barrel region, comparing v5 (left) to v5 with no fragment removal (right) (calibrated with response map). These resolutions are nearly identical.



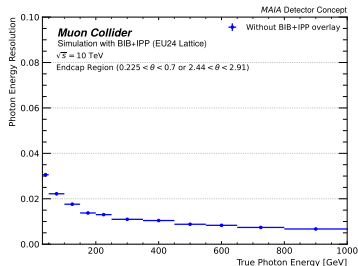
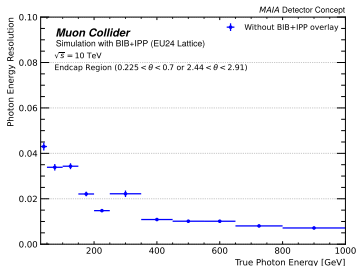
Resolution (Transition Region)

Energy resolution in the transition region, comparing v5 (left) to v5 with no fragment removal (right) (calibrated with response map). They are similar; we see slight degradation without fragment removal (note the different y-scales as well).



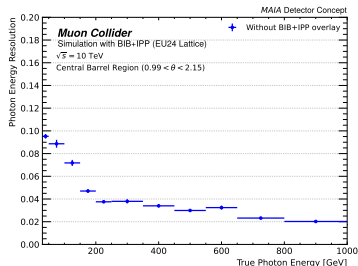
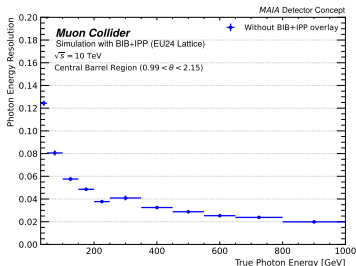
Resolution (Endcap – Calib vs No Calib)

Latest v5 (no fragment removal), with (left) and without (right) calibration. In the endcap region, the uncalibrated resolution is far better, especially in the low-E regions. The presence of many more low-E clusters may skew the calibration.



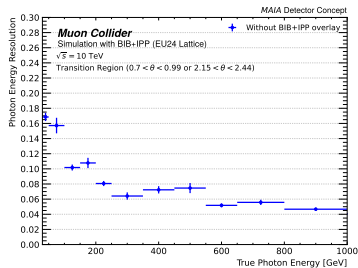
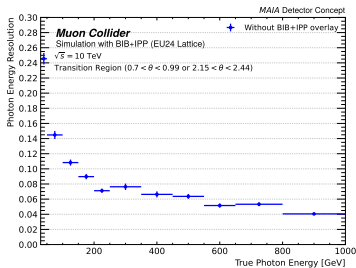
Resolution (Barrel – Calib vs No Calib)

Latest v5 (no fragment removal), with (left) and without (right) calibration. In the barrel region, the two resolution curves are very similar; uncalibrated curve performs slightly better in low-energy bins.

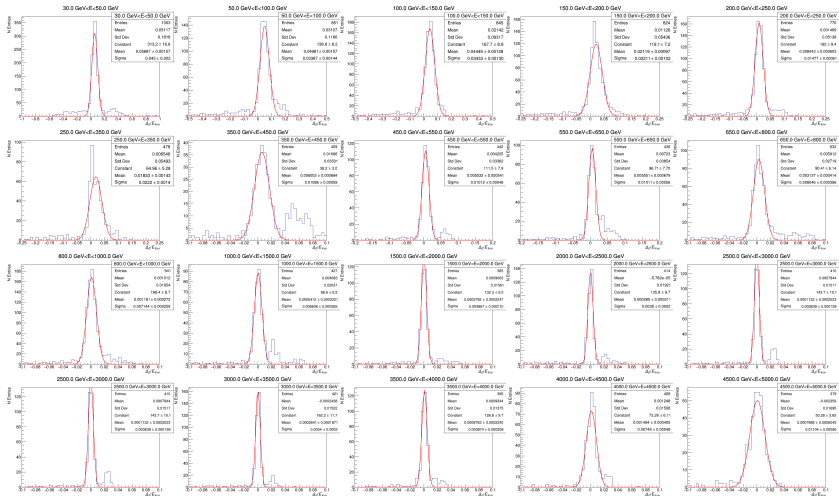


Resolution (Transition – Calib vs No Calib)

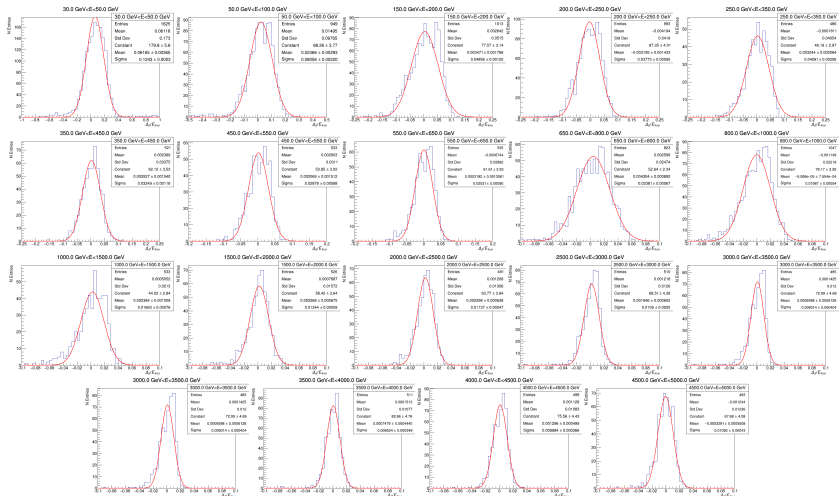
Latest v5 (no fragment removal), with (left) and without (right) calibration. Calibrated curve performs slightly better except at lowest-E bin.



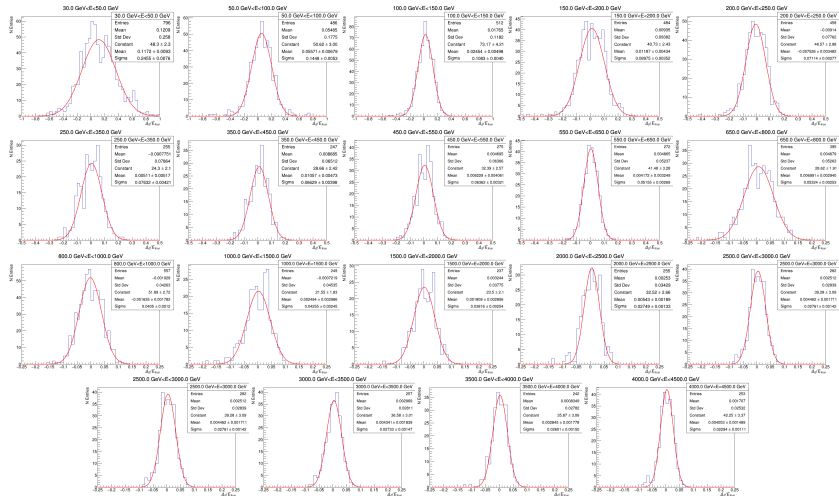
Gaussian Slices (Endcaps – Calibrated)



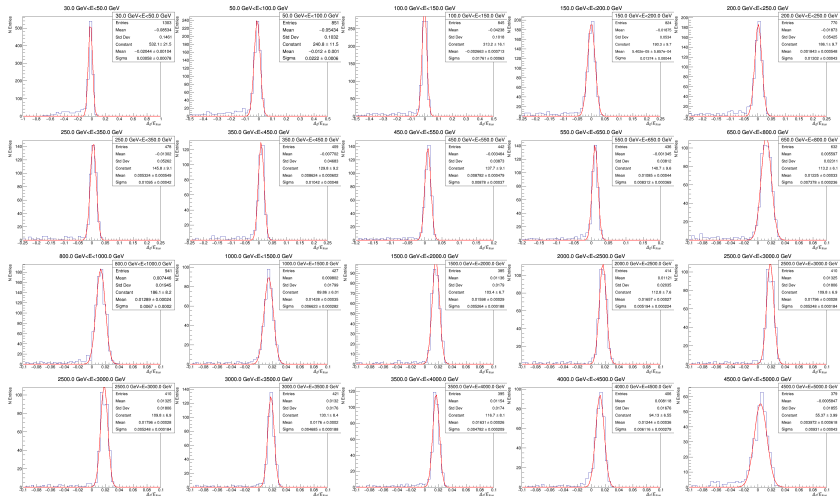
Gaussian Slices (Barrel – Calibrated)



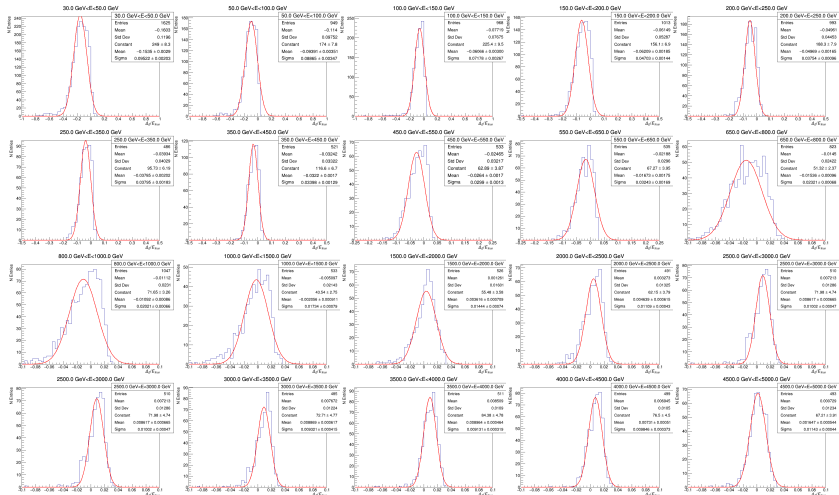
Gaussian Slices (Transition – Calibrated)



Gaussian Slices (Endcaps – uncalibrated)



Gaussian Slices (Barrel – uncalibrated)



Gaussian Slices (Transition – uncalibrated)

