

# Photon Studies/10TeV

## Paper Updates

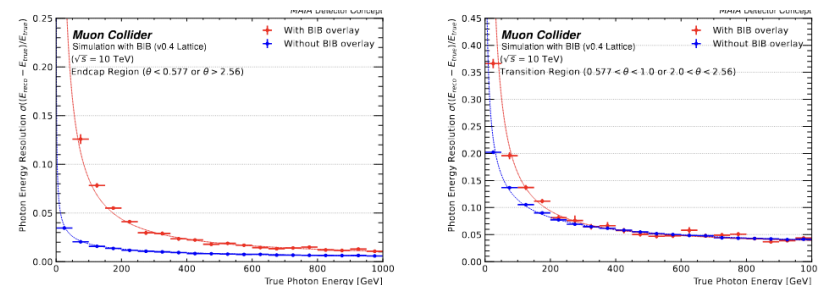
12/04/24

### Overview:

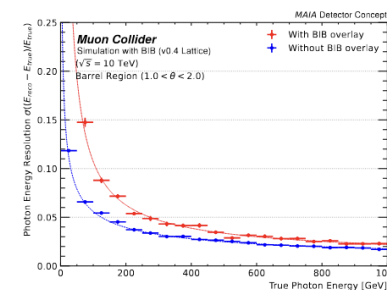
- Inserted latest plots to Overleaf draft
- Addressed comments on photon section, made tentative additions to text

# 3 New Photon Reso Plots, Split by Region

- Created a new figure with the endcap, transition, and barrel region reso curves
- Right now, we also still have the all-theta reso curves and the fine-grain binning of 0-50GeV range
- **Question:** do we want to keep the original two plots?



(a) Photon energy resolution, endcap region (b) Photon energy resolution, transition region



(c) Photon energy resolution, barrel region

FIG. 19: Photon energy resolution of reconstructed photons, split into the three regions by theta. The endcap region suffers no interaction with the solenoid, while the transition region suffers the most.

# Addressing Lorenzo's Comments

- Went through all of the comments on the photon section
- Question: were the photonGun samples generated with variable thresholding?
- Most of the comments seem to express a lack of clarity on why/how our performance wrt photons (a) degrades at low energy and (b) is affected by the solenoid
- Added some lines of text attempting to clarify these questions (my edits are in orange text, labeled by “RP Addition”)

# The Bottom Line (as I understand it)

- My edits aim to express what I believe to be the ‘bottom line’ of our photon reconstruction performance, i.e. the two sources of degradation that need to be addressed in future work
1. **Pandora.** Though it was already mentioned in the text that Pandora has not been optimized for a MuCol environment, I reiterated this in the photon section, specifically addressing difficulties with BIB contamination of soft clusters. I believe this is a satisfactory explanation for our reso and efficiency degradation at low energies.
  2. **The Solenoid.** As we have seen, a simple 2D calibration is insufficient to completely mitigate resolution broadening in regions with magnetic material. I believe this is due to the stochastic nature of EM showering. A more nuanced calibration method is likely needed.