Angle and Energy Conditioning

28.04.2022

BIBAE E and A cond.: Steps towards completion

- Sort out method for latent space sampling

- Improve Energy sum performance

- Refine Post Processing

- Final steps:

  - Computational performance

  - Check correlations

# BIBAE E and A cond.: Latent Space Sampling

- Using Sascha's coupling flow: now generate (24 +2) variables

- Should scale to allow for Esum conditioning etc. (as Sascha found for testbeam data)

- Training for ~3hrs gives 200 epochs

- Learns latent distributions well
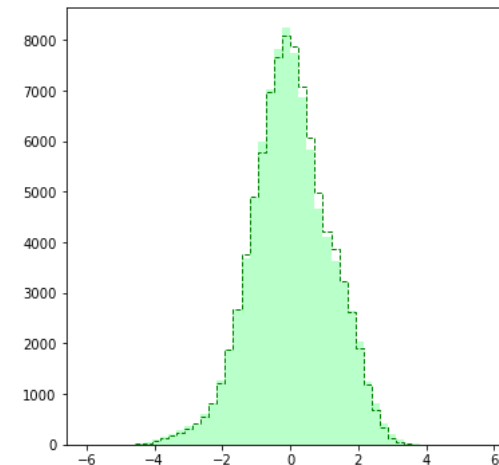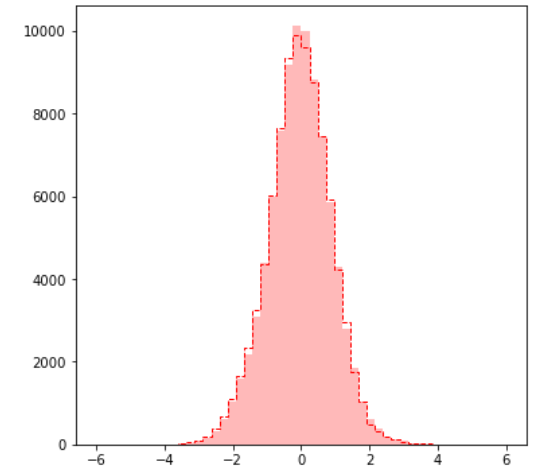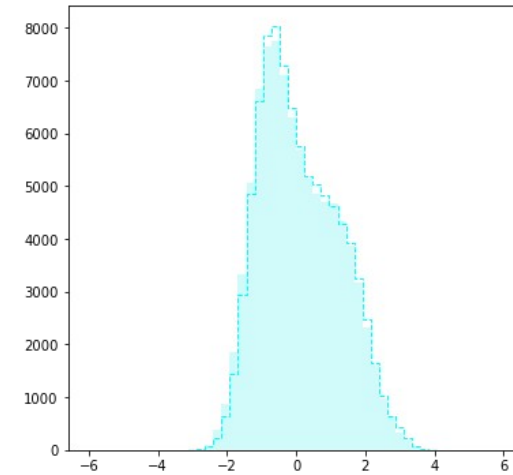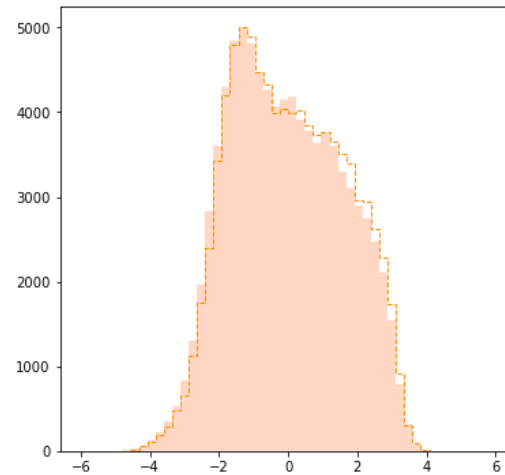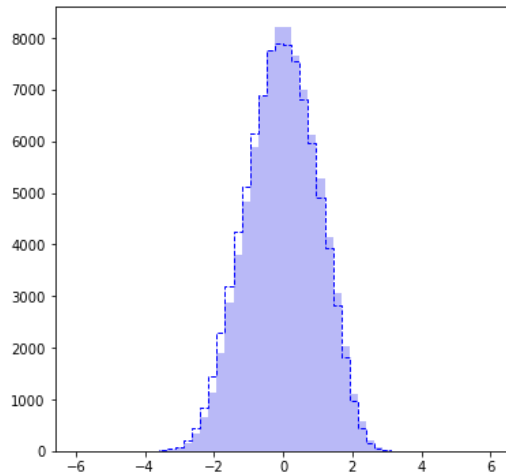
BIBAE E and A cond.: Trying to improve energy sum

- Quite a difficult problem- focus on trying to obtain best performance simultaneously for all 9 Energy Sums and 9 angular distributions

- Scale angular labels and energy labels

- NOTE: What I will show has not had any PP yet!!!

- Trainings attempted:

    - E + A conditioning only

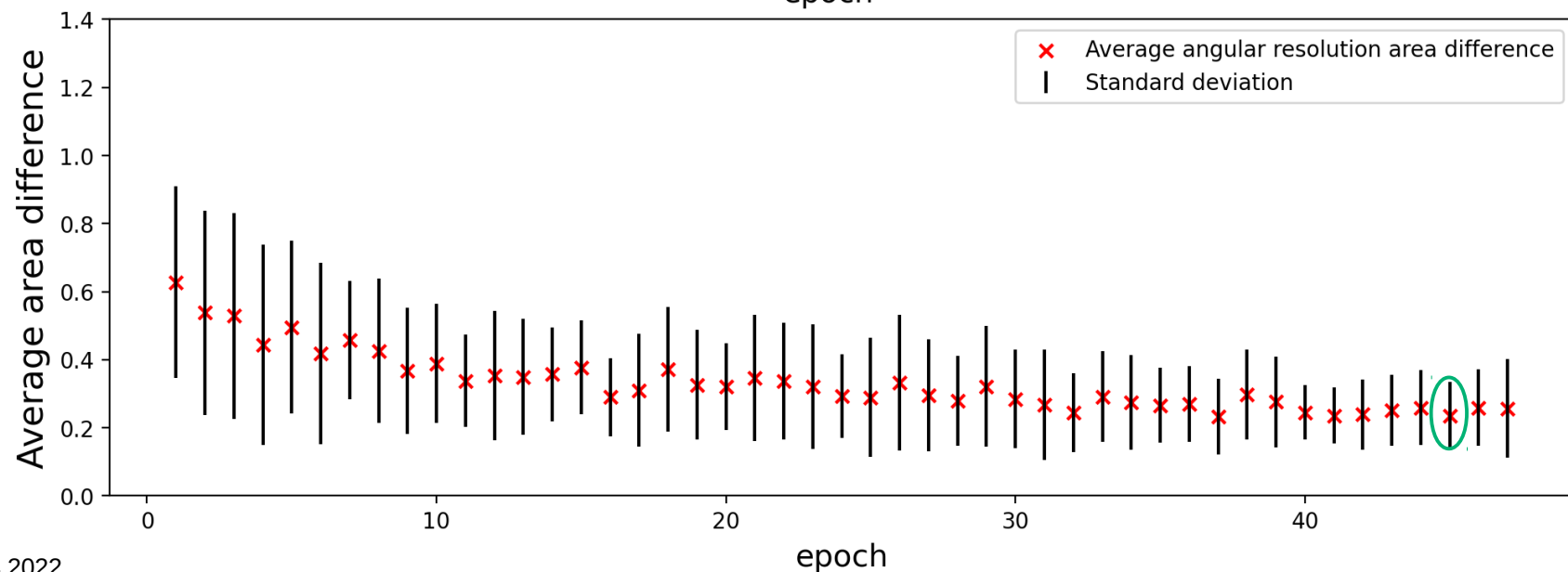   - E + A + Esum conditioning

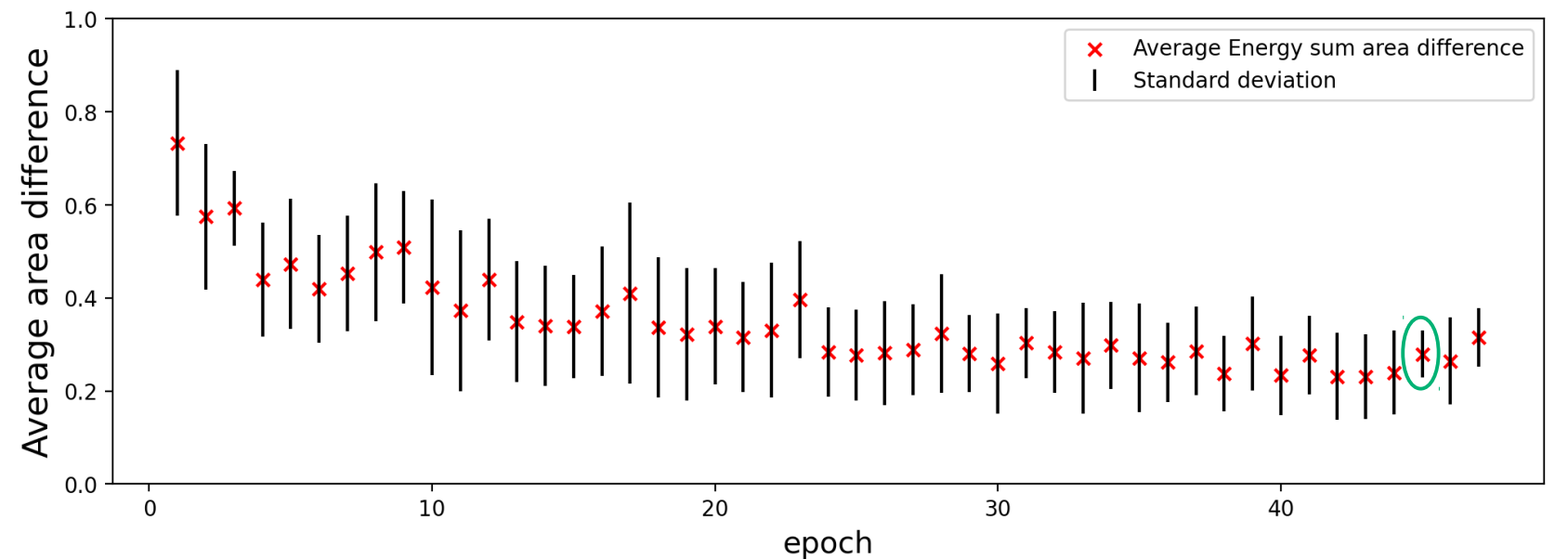   - E + A + Esum + Nhits conditioning

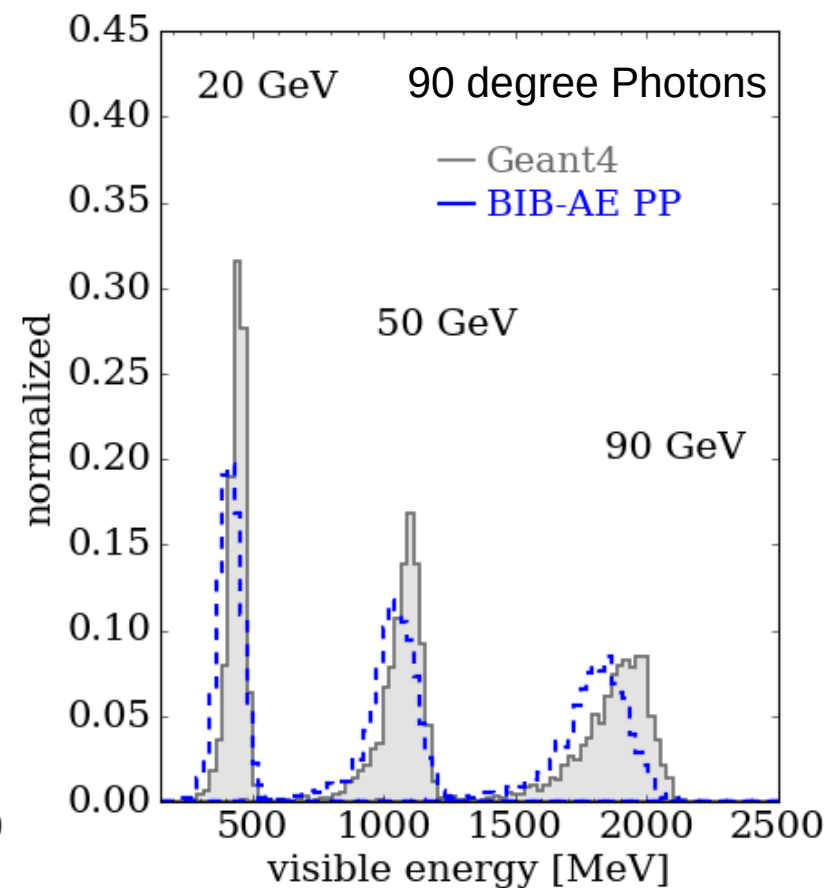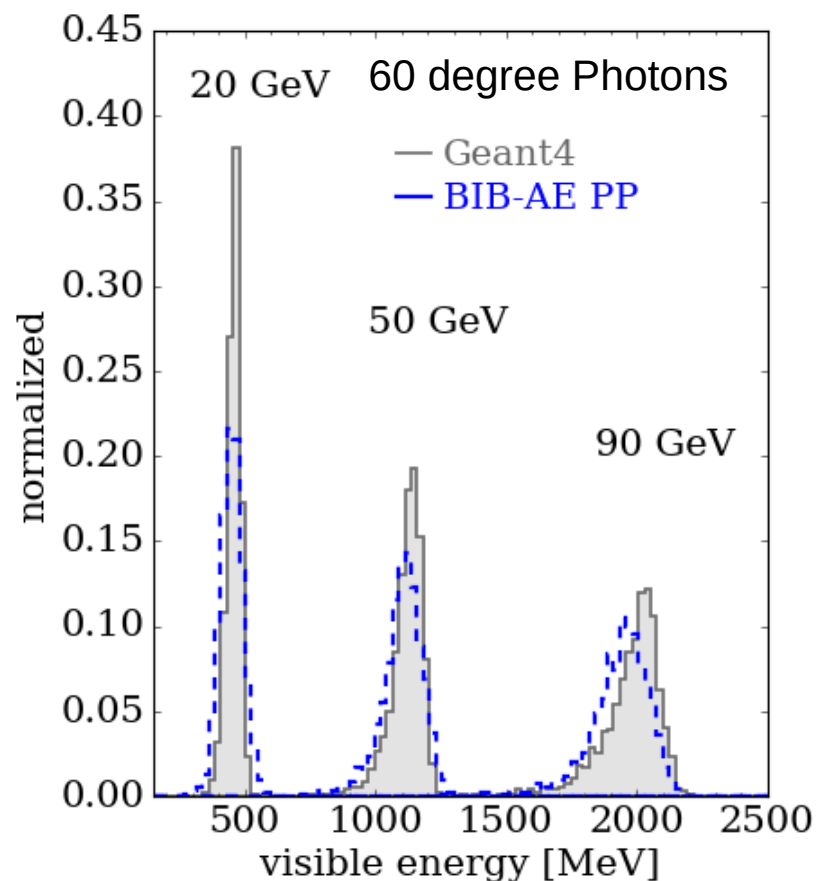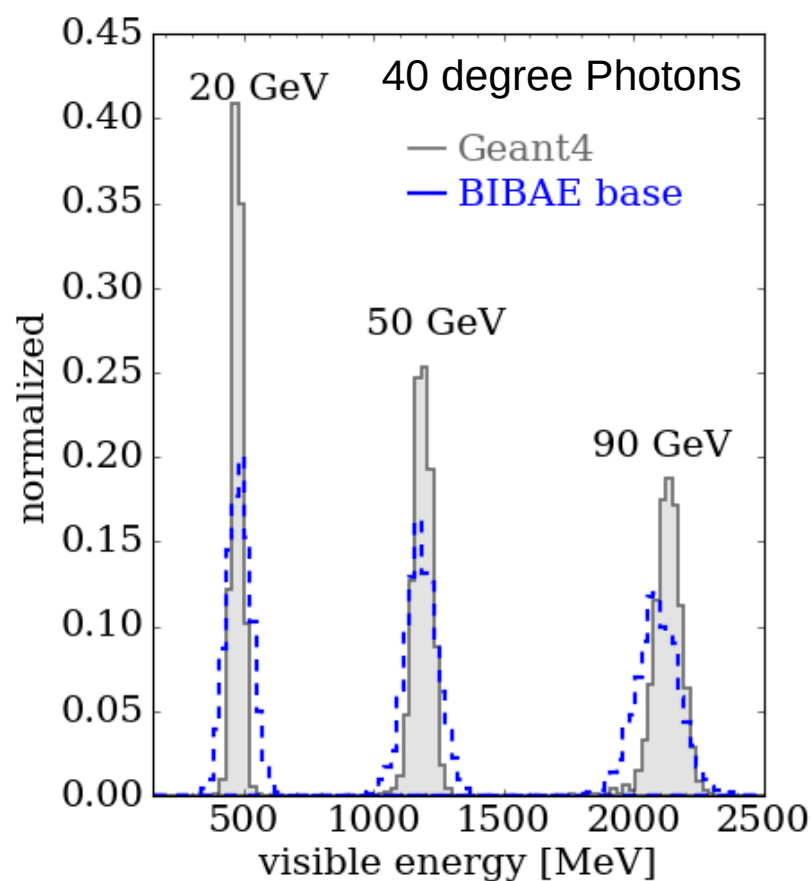# E+A labels Normalised Fidelity sweep: energy sum + angular distribution
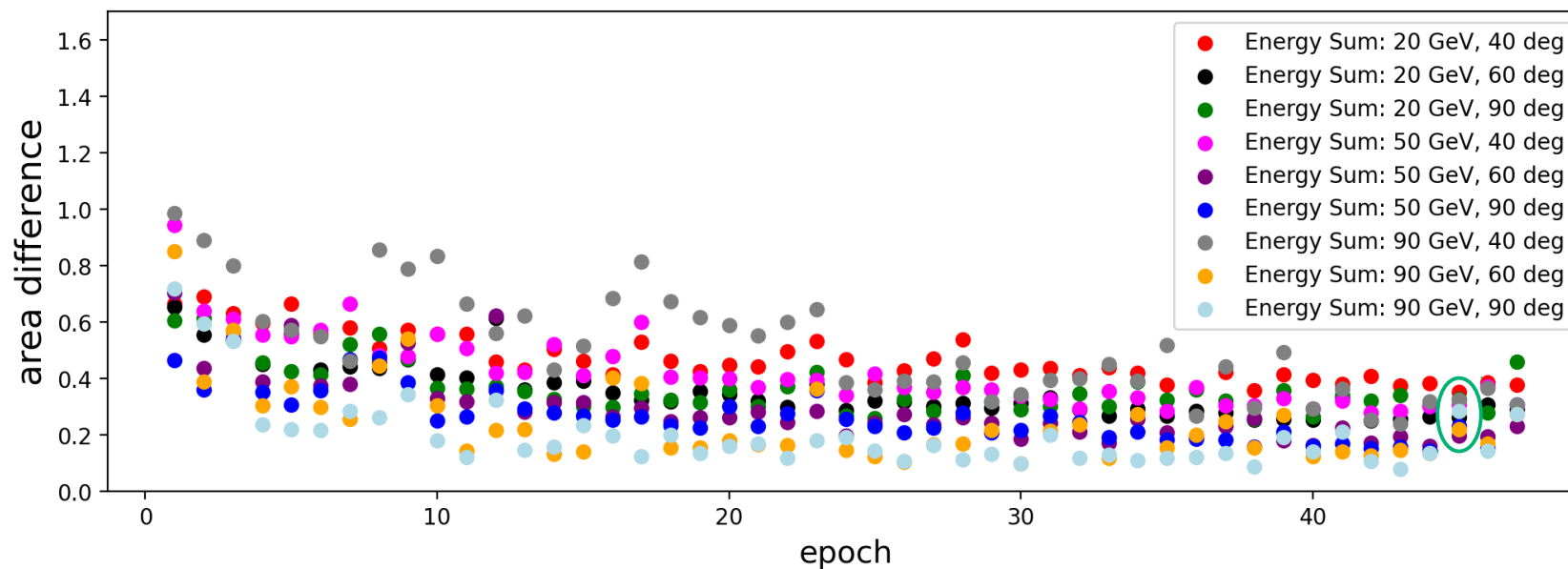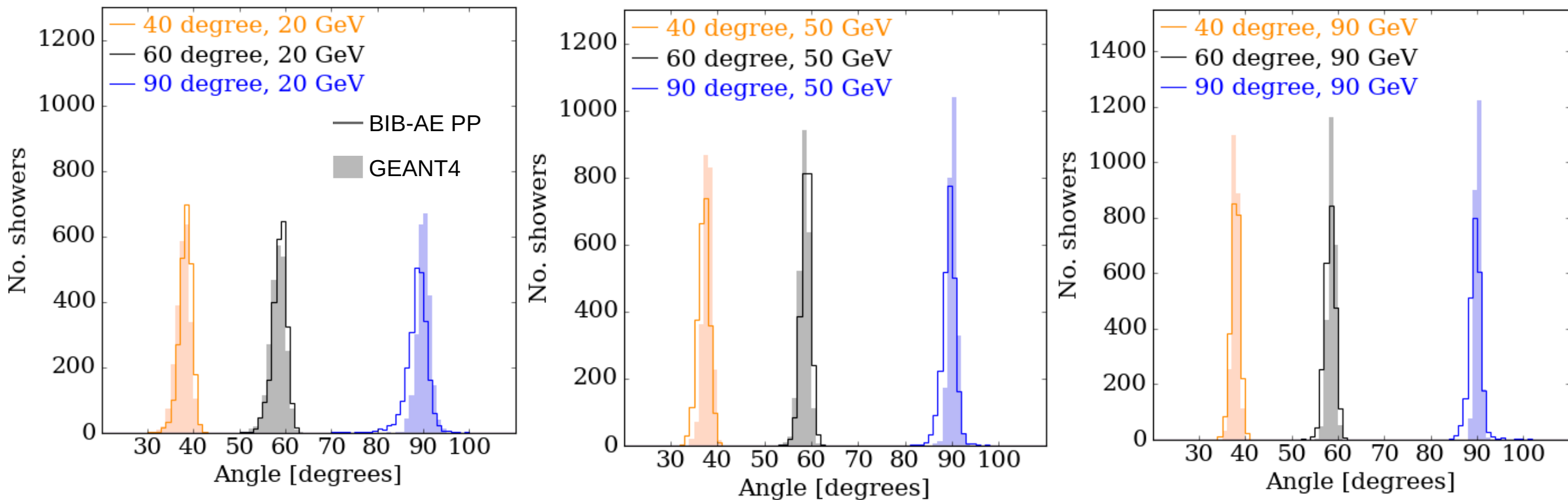

Clear band for 90 degree showers
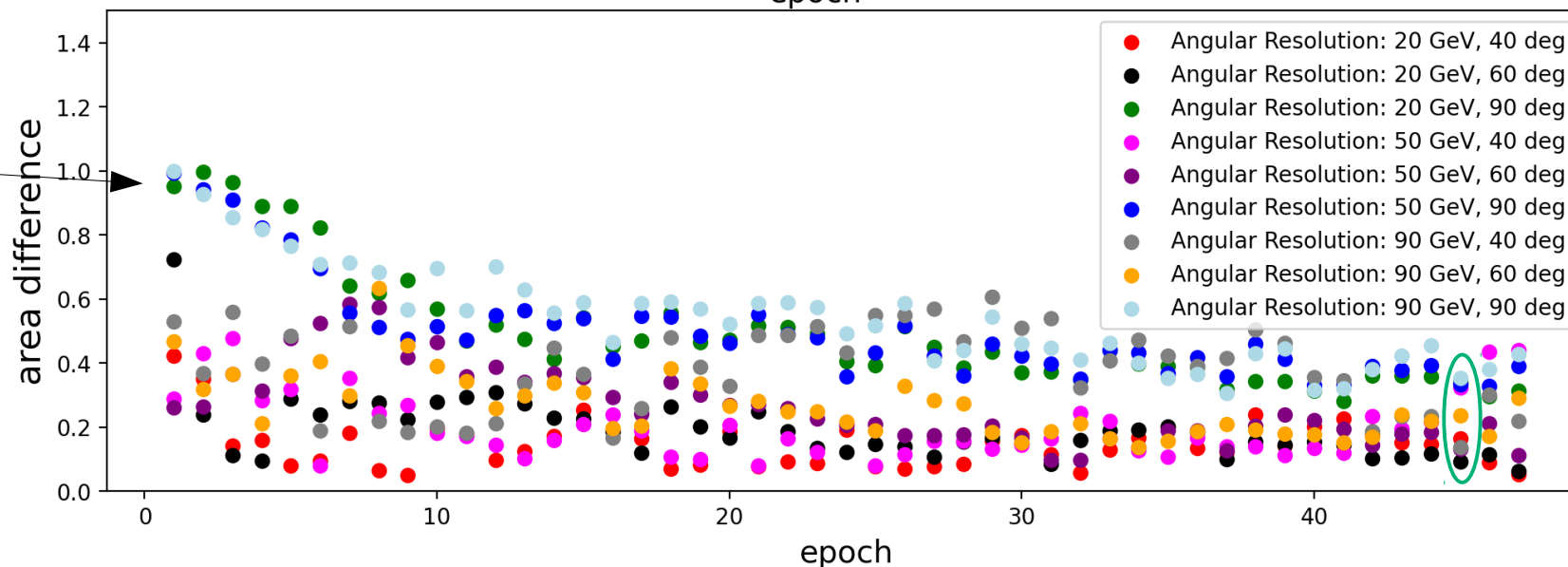
E+A labels Normalised Fidelity sweep: energy sum + angular distribution
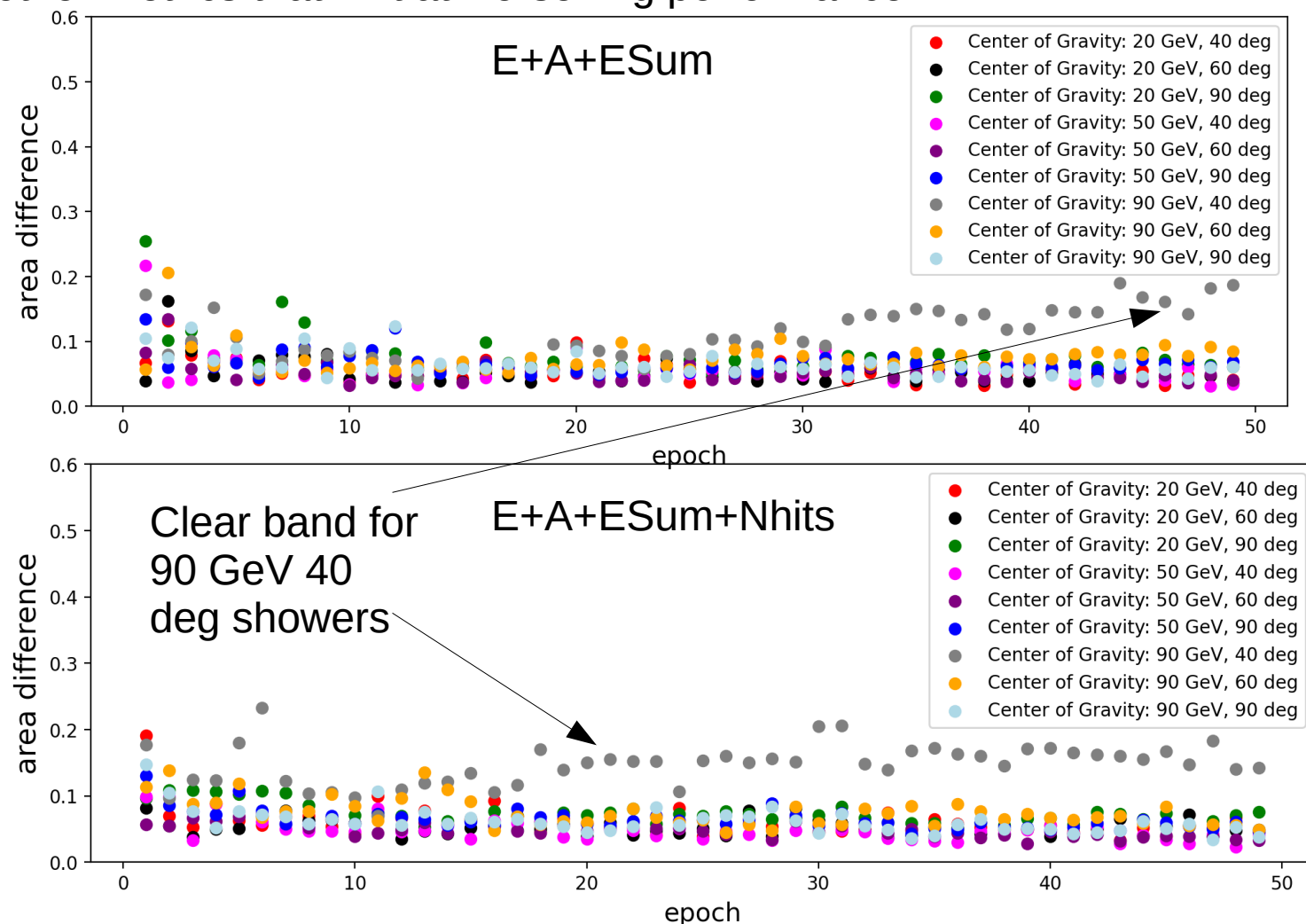
Results: Visible Energy Sum

Results: Angular Reconstruction Distributions

BIBAE E and A cond.: Other trainings

- E + A + Esum conditioning and E + A + Esum + Nhits conditioning trainings so far have not made significant difference to energy sum

- Noticeable trends in some other metrics that hint at worsening performance

Take aways and next steps

- Main difficulties with the angle and energy work currently is trying to optimise observables over the whole parameter space

- Running post processing on base will definitely affect distributions (most importantly energy sum)- so take plots with a (very big) pinch of salt!

- Next steps:

- PP- need to also try to optimise this a bit if possible: fortunately much quicker than base training

- After PP settled: will check correlations, computing performance etc.

- Will also keep training- check again after ~100 epochs

- Question: How much further do we want to try to push this?

- Obtaining further quality would likely involve full-blown hyperparameter sweep- would probably be very time consuming given computing time and hardware constraints....
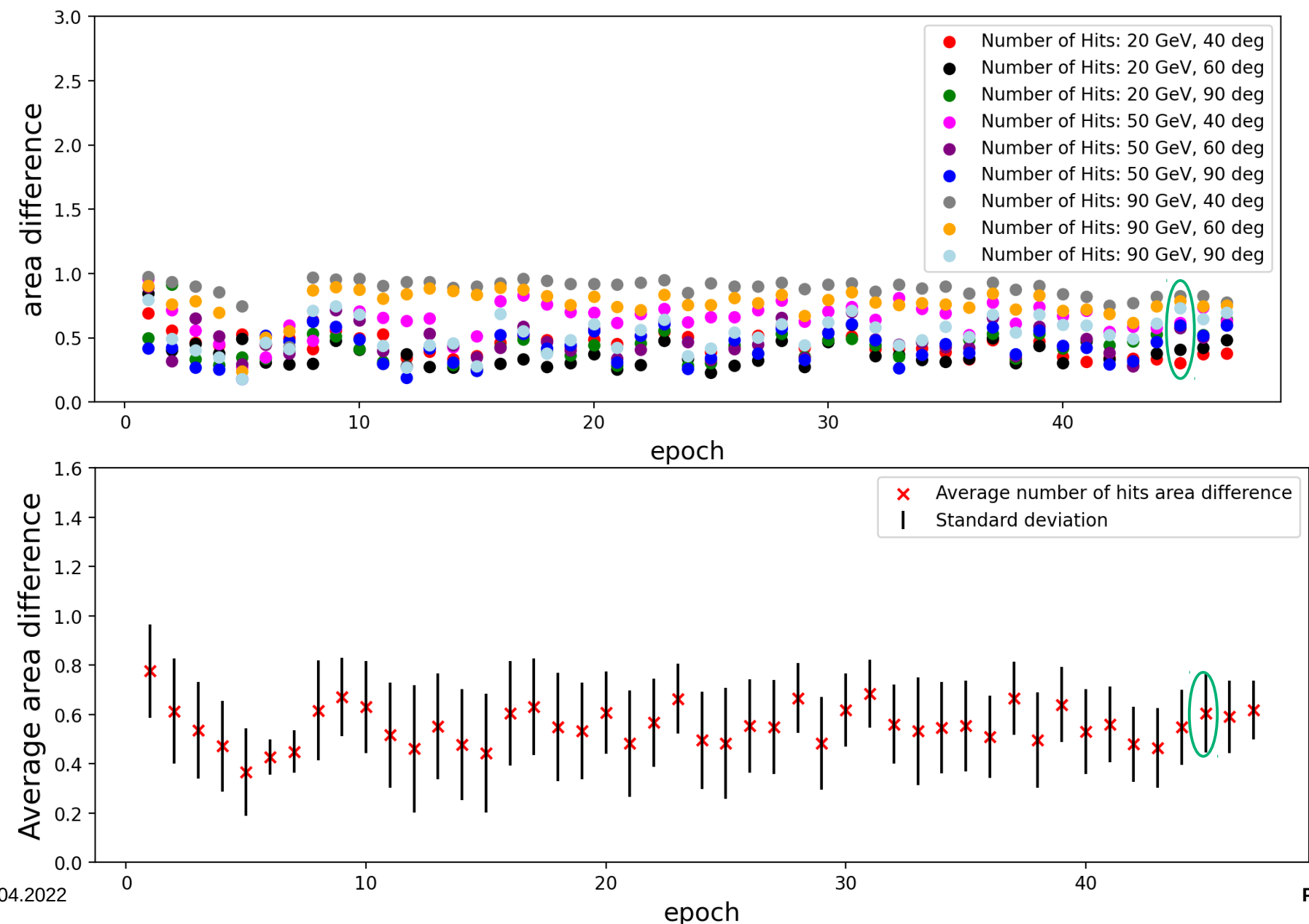
Back up

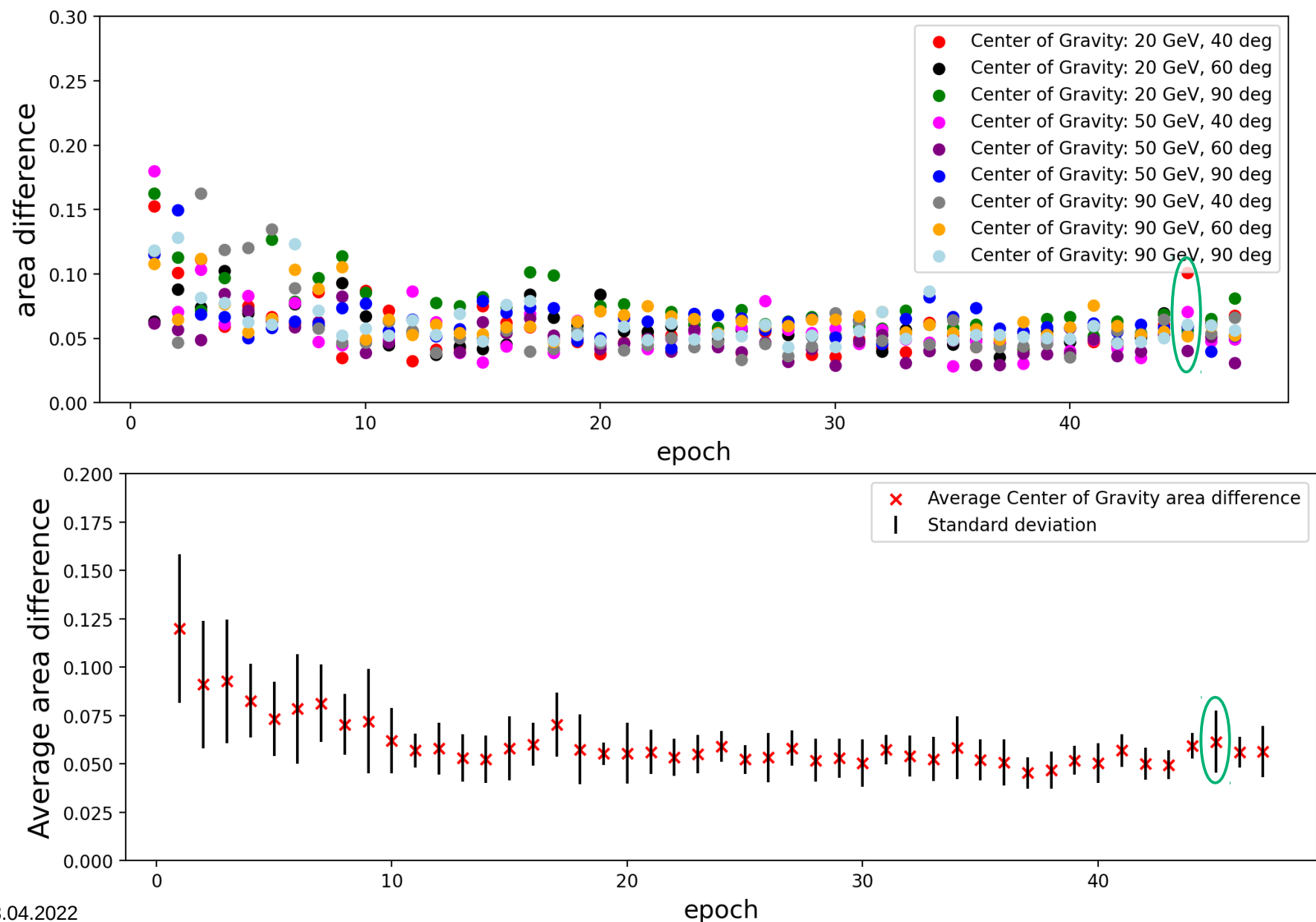# E+A labels Normalised Fidelity sweep: Cell Energy
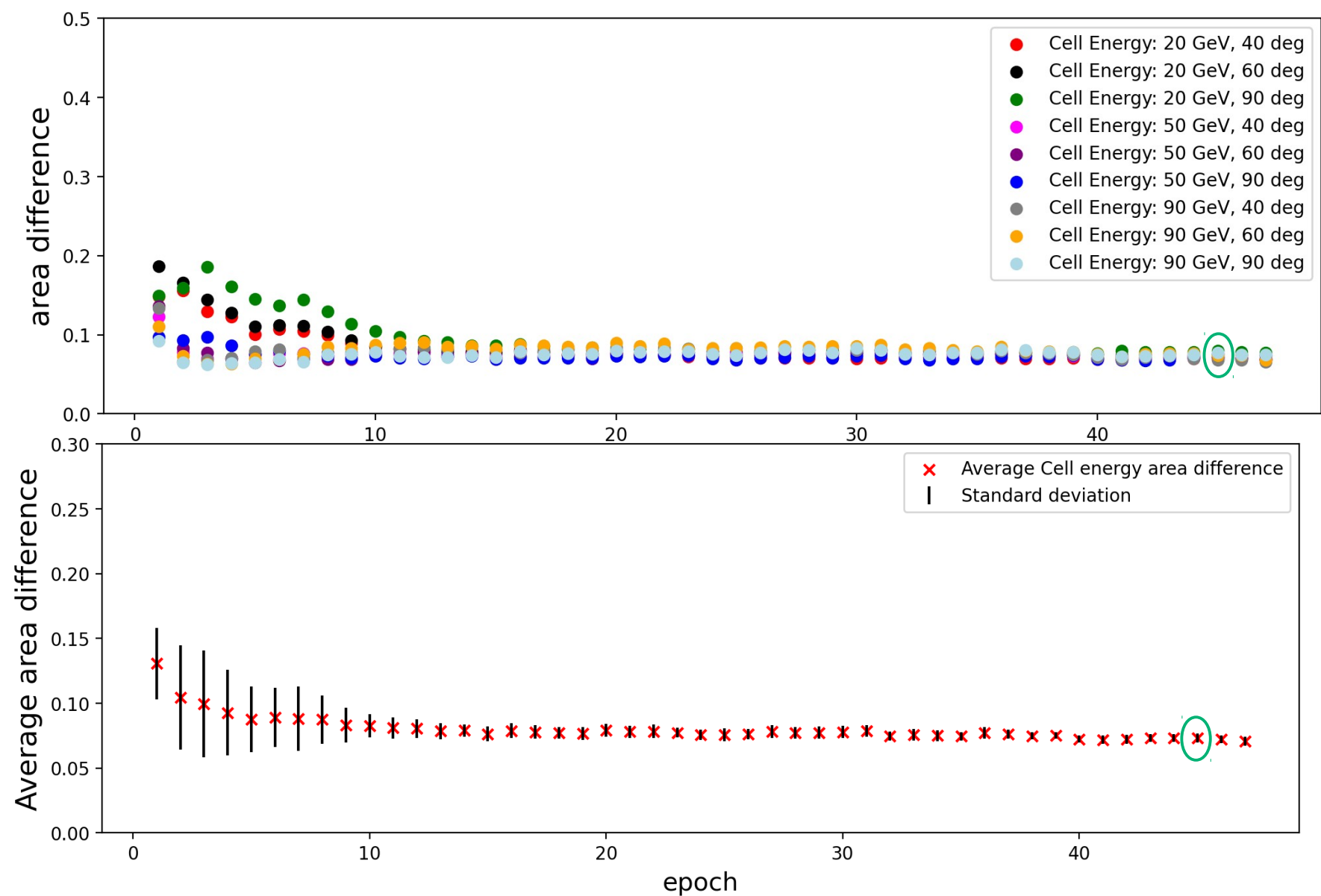
E+A labels Normalised Fidelity sweep: energy sum + angular distribution
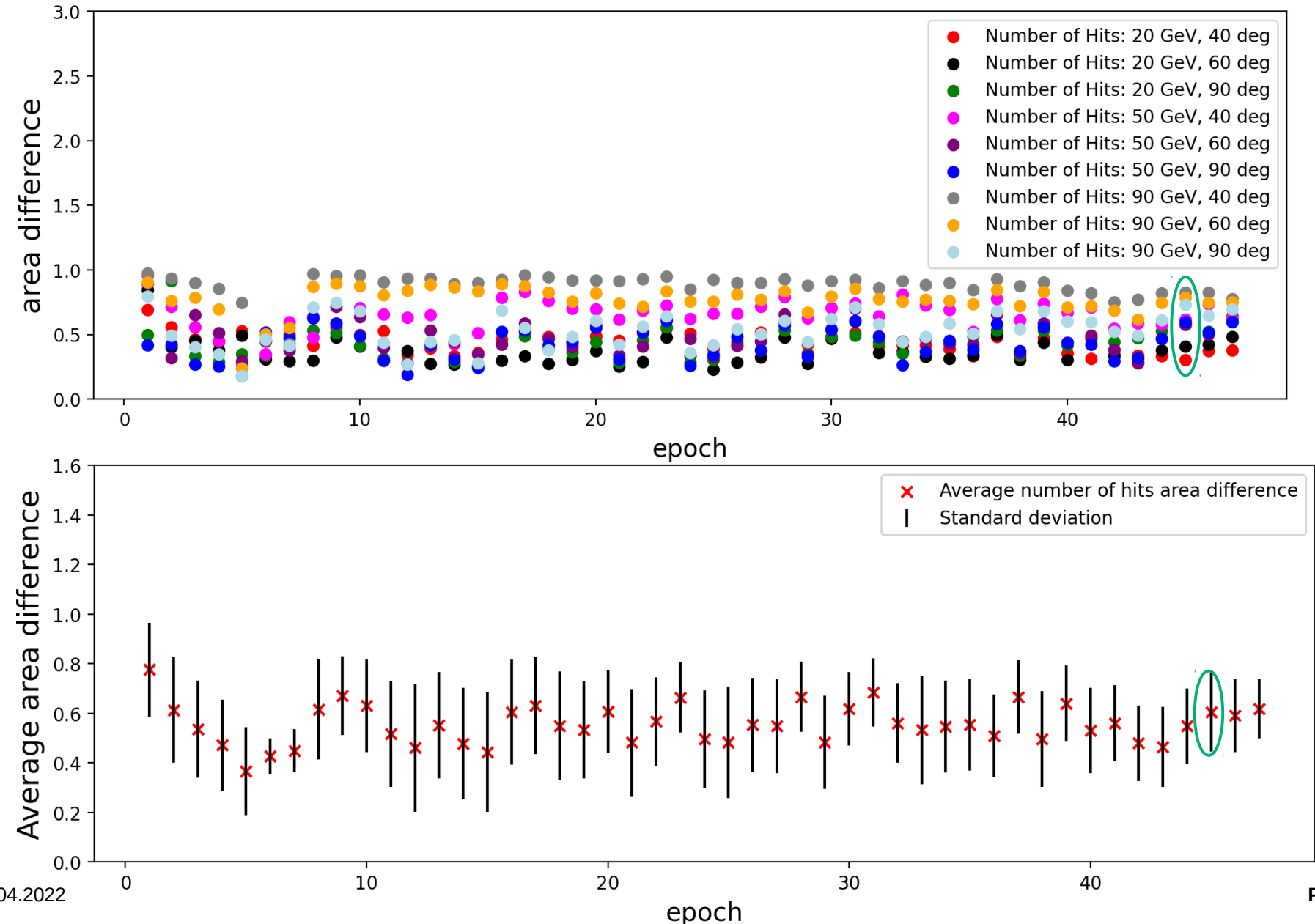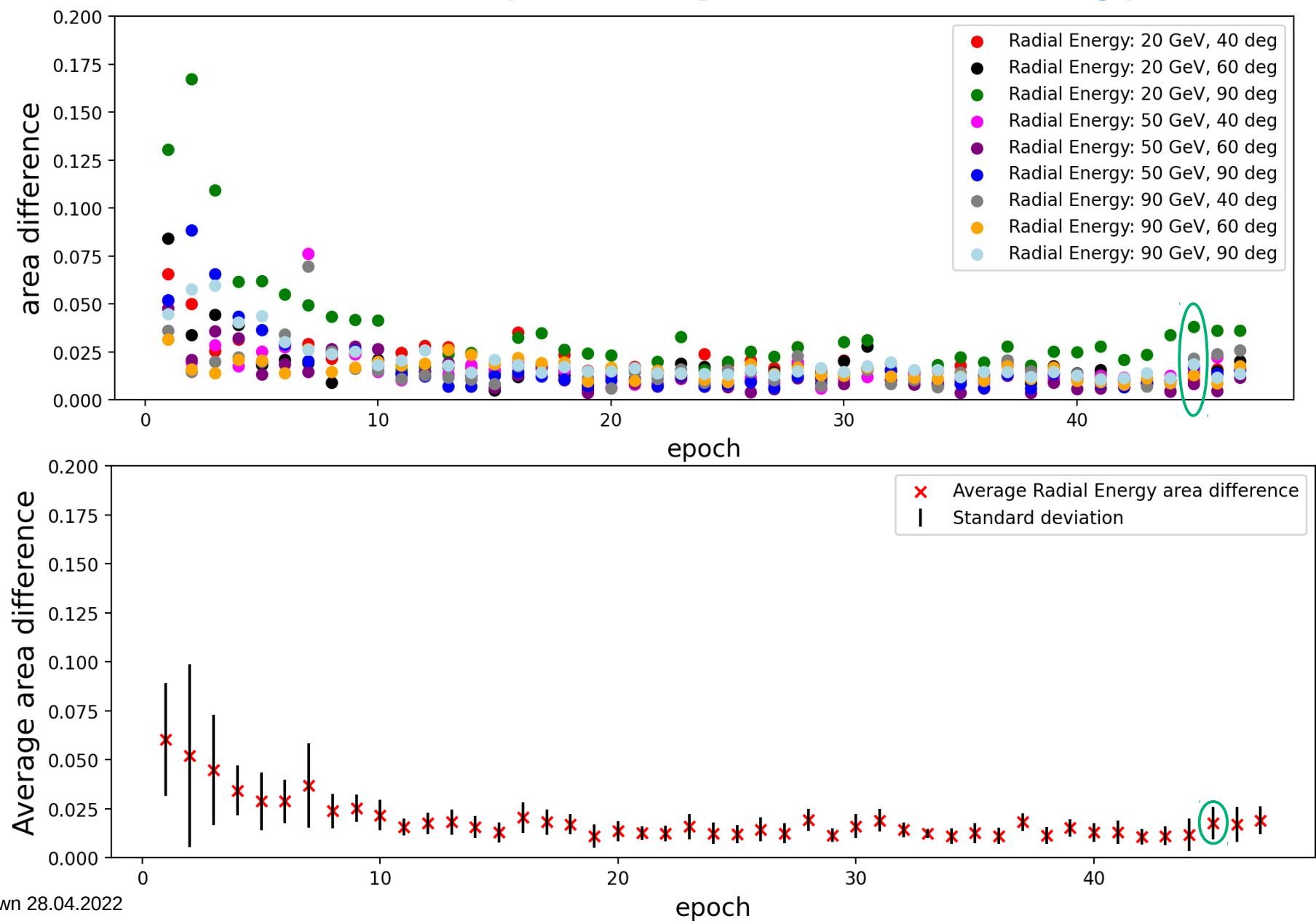
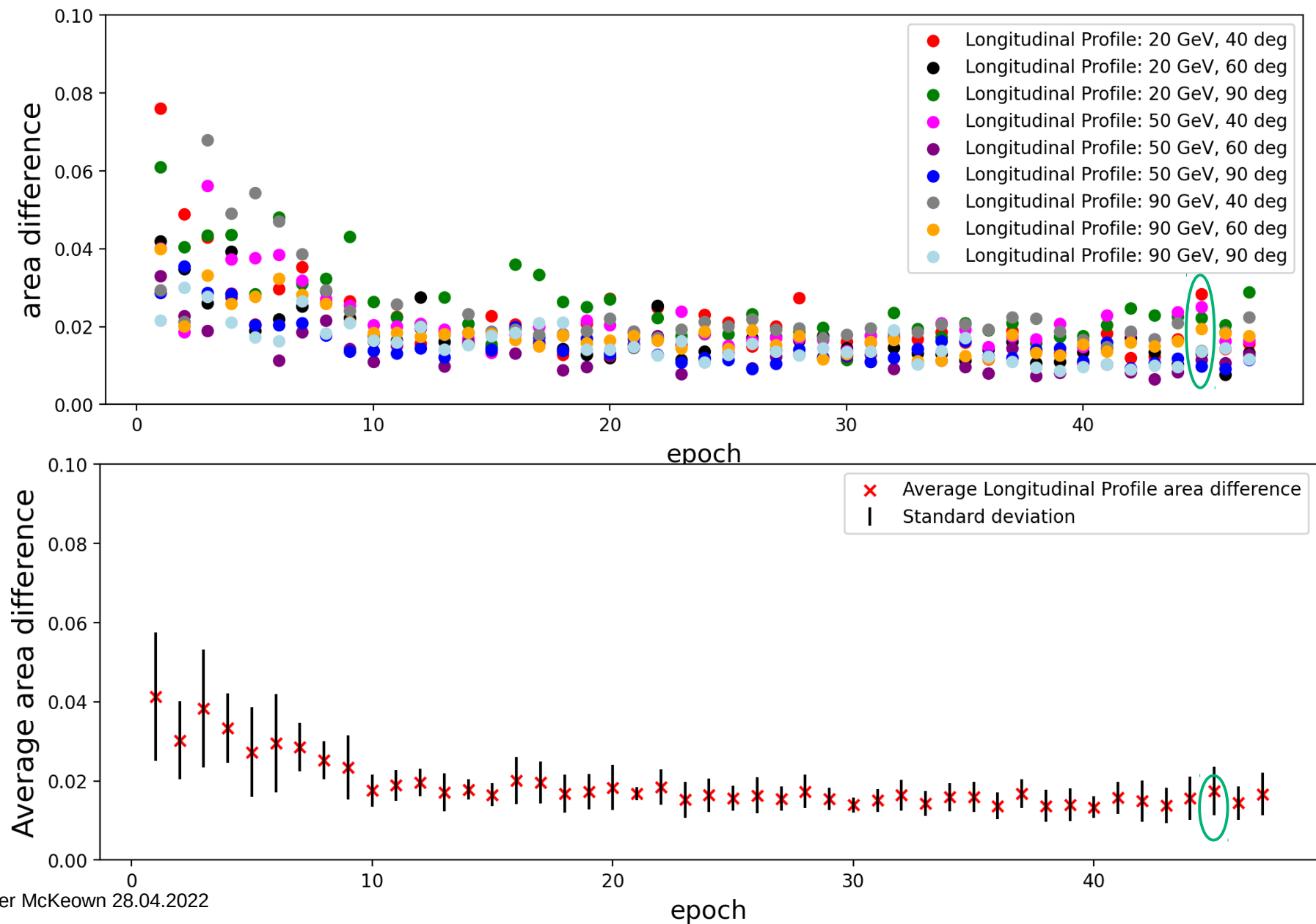# E+A labels Normalised Fidelity sweep: Number of Hits
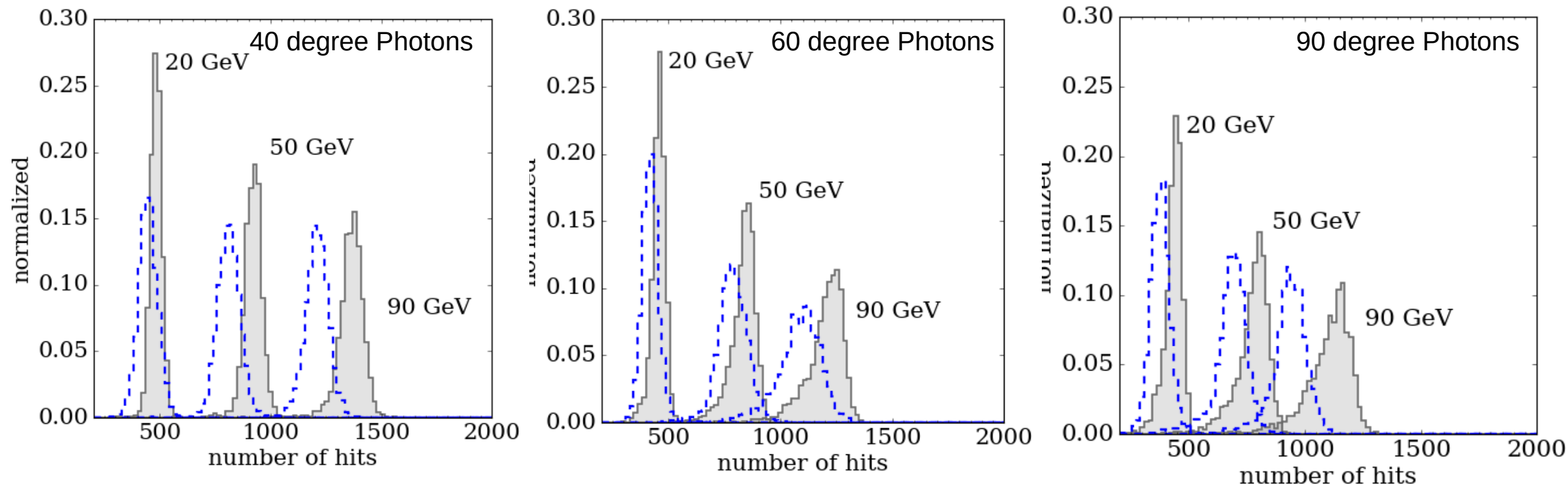
E+A labels Normalised Fidelity sweep: Center of Gravity

E+A labels Normalised Fidelity sweep: Radial Energy
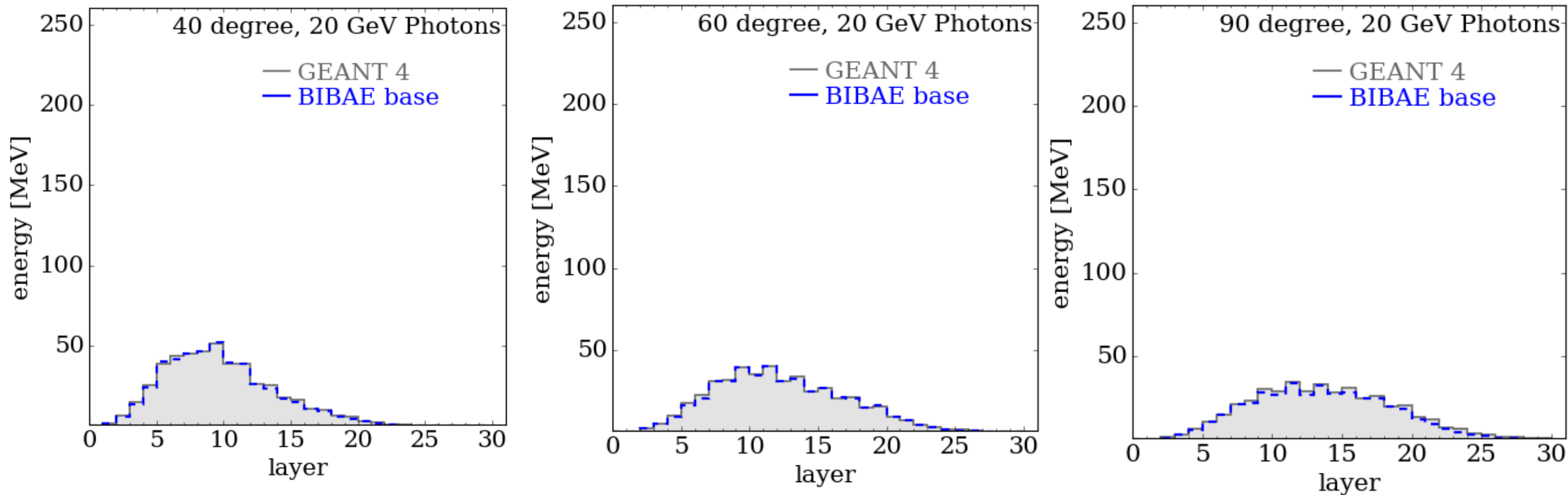
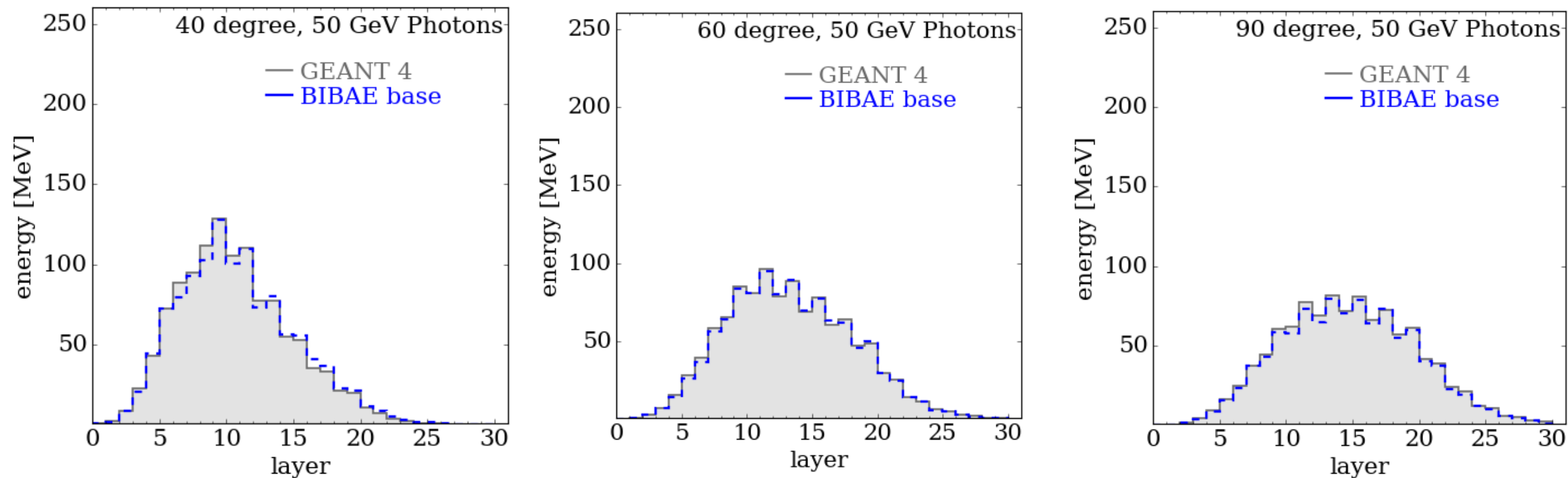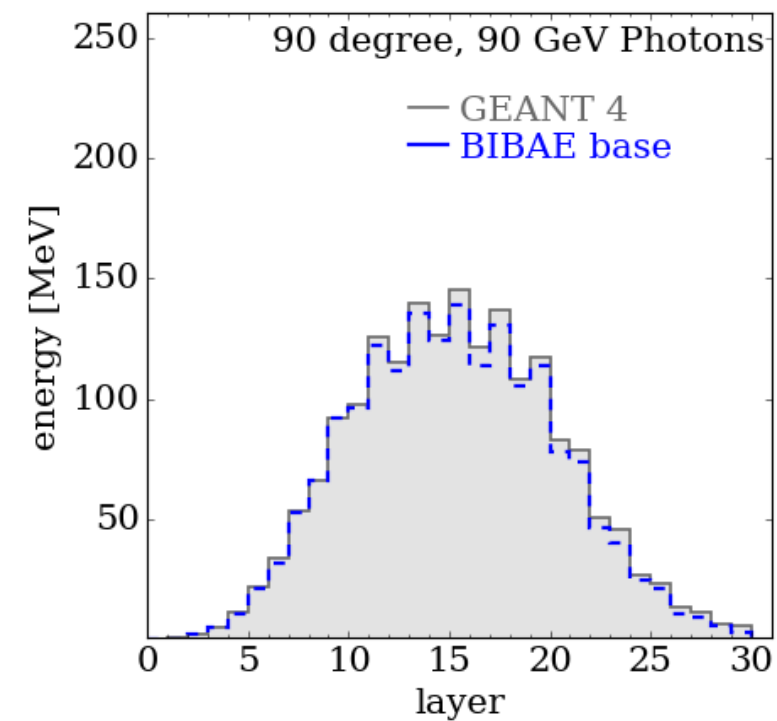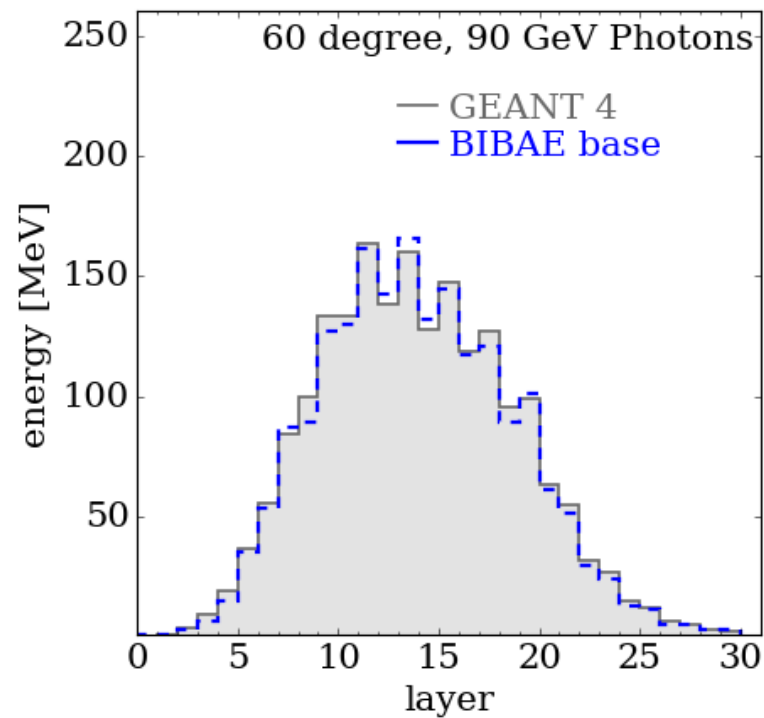# E+A labels Normalised Fidelity sweep: Longitudinal Profile
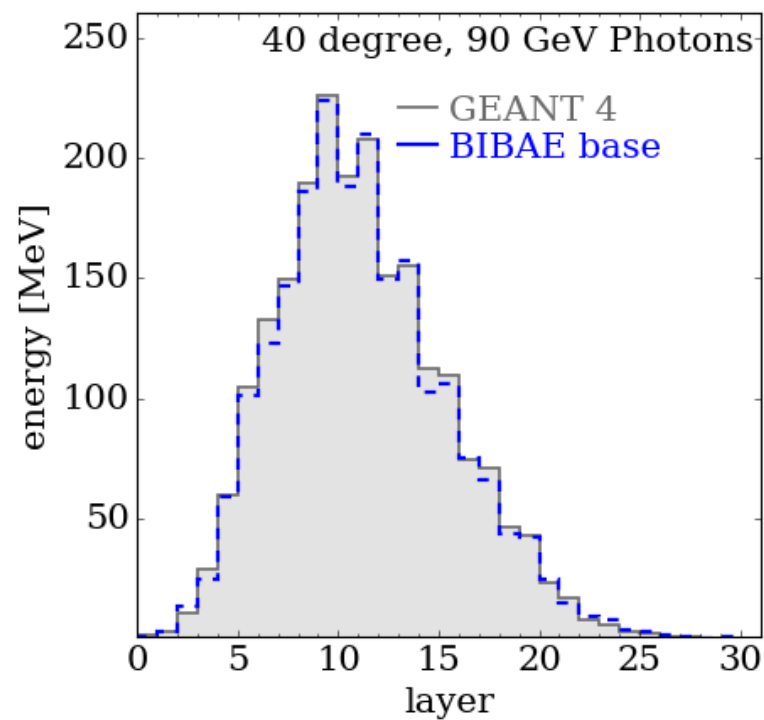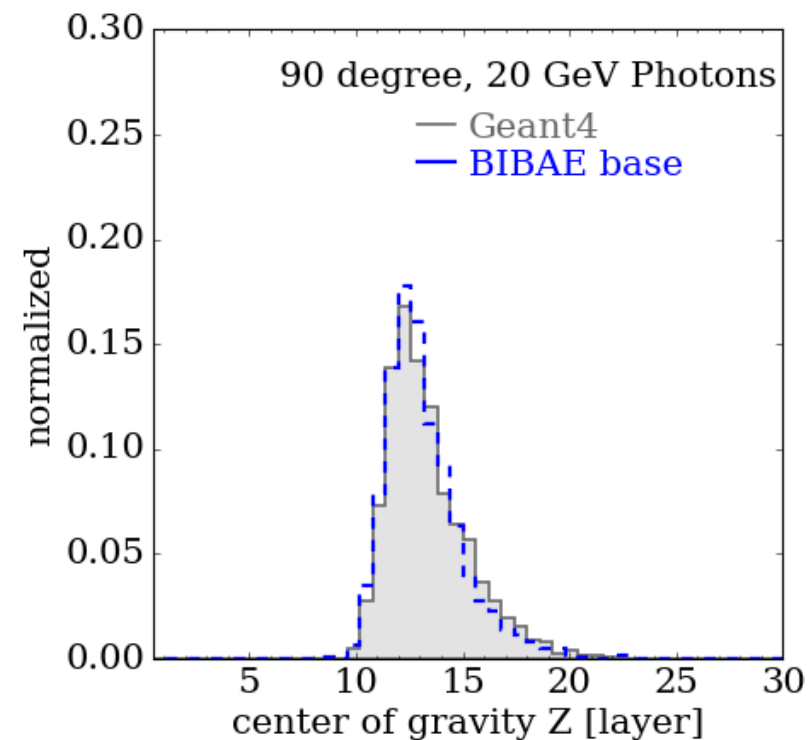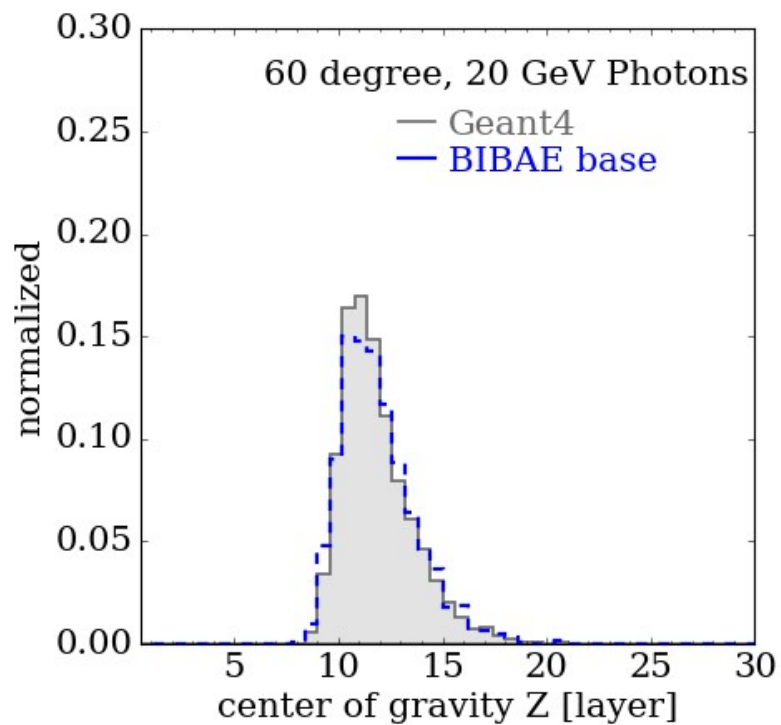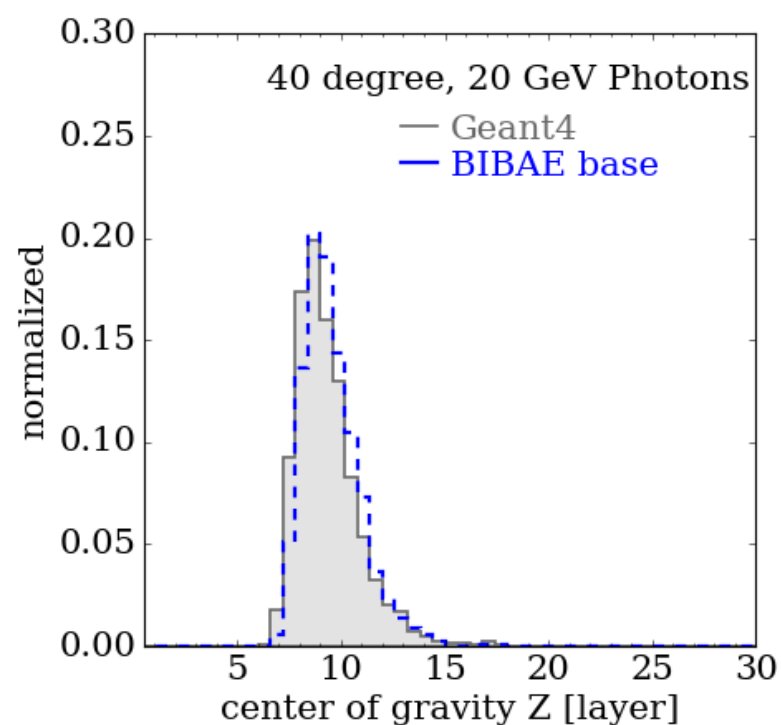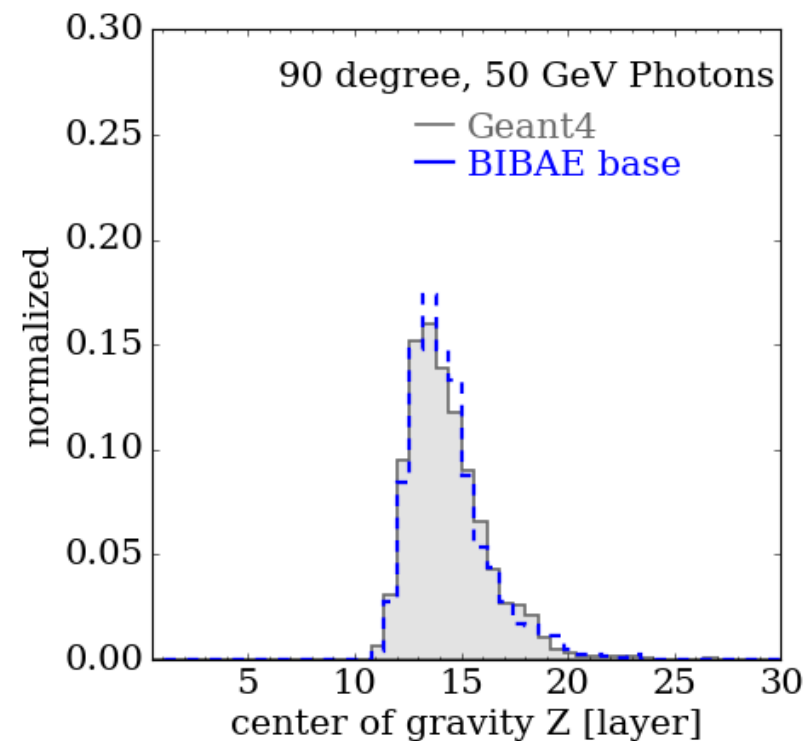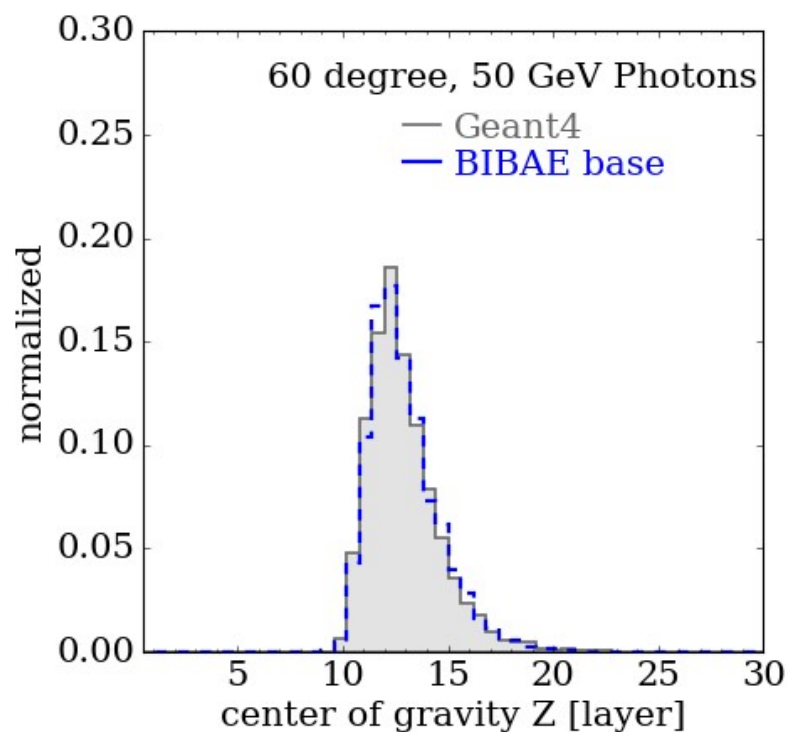
Results: Number of Hits
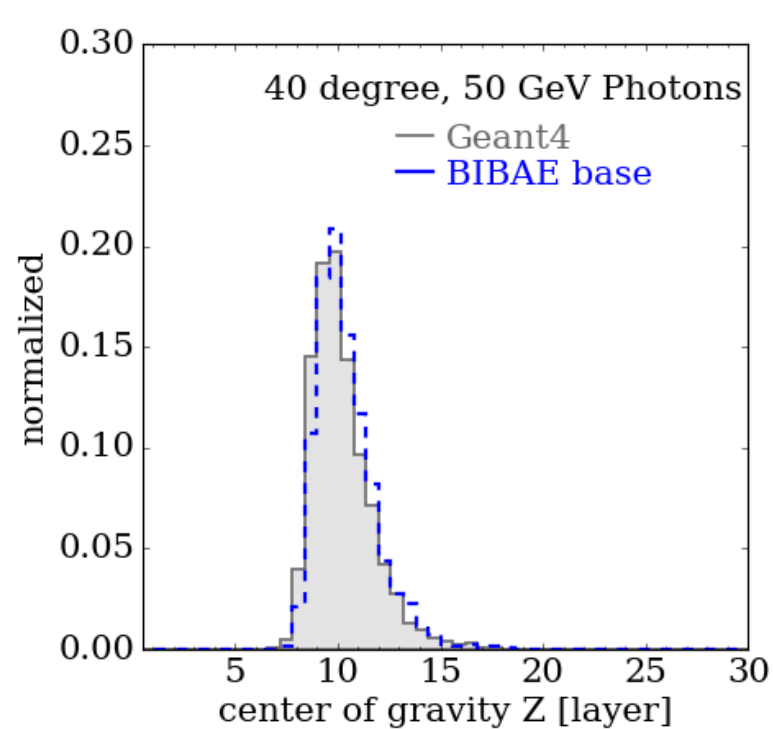
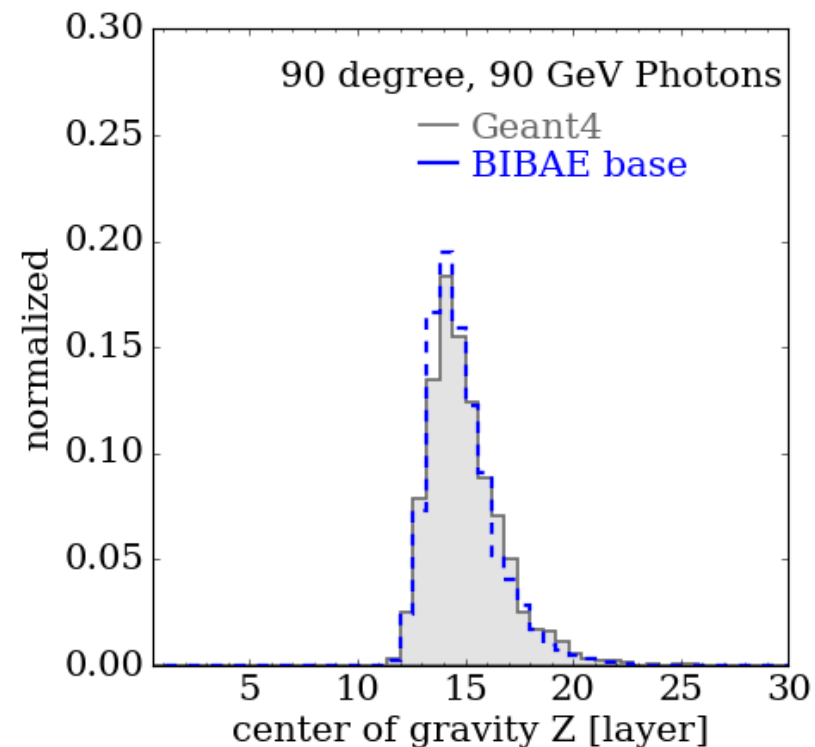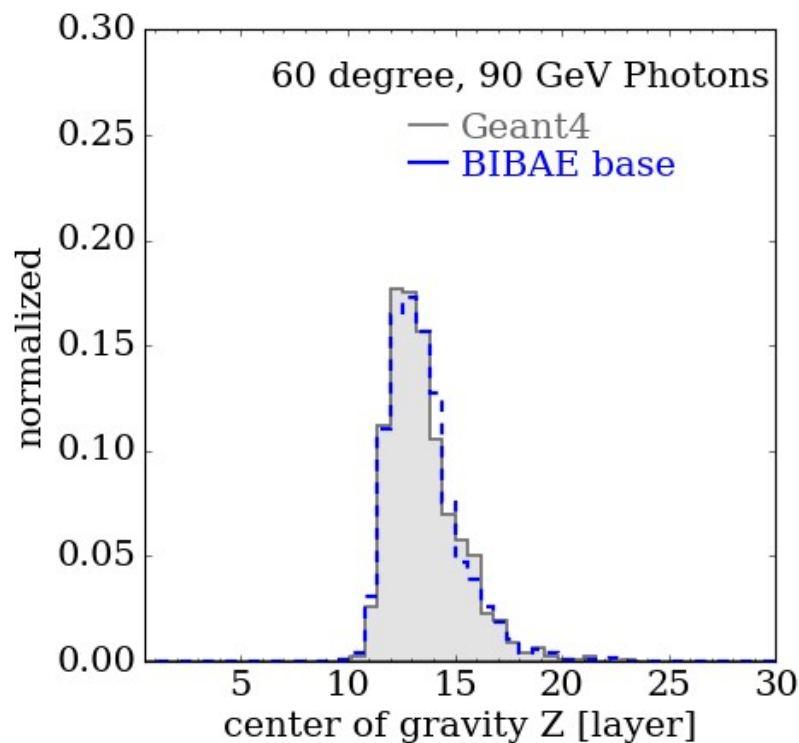# Results: Longitudinal Profile
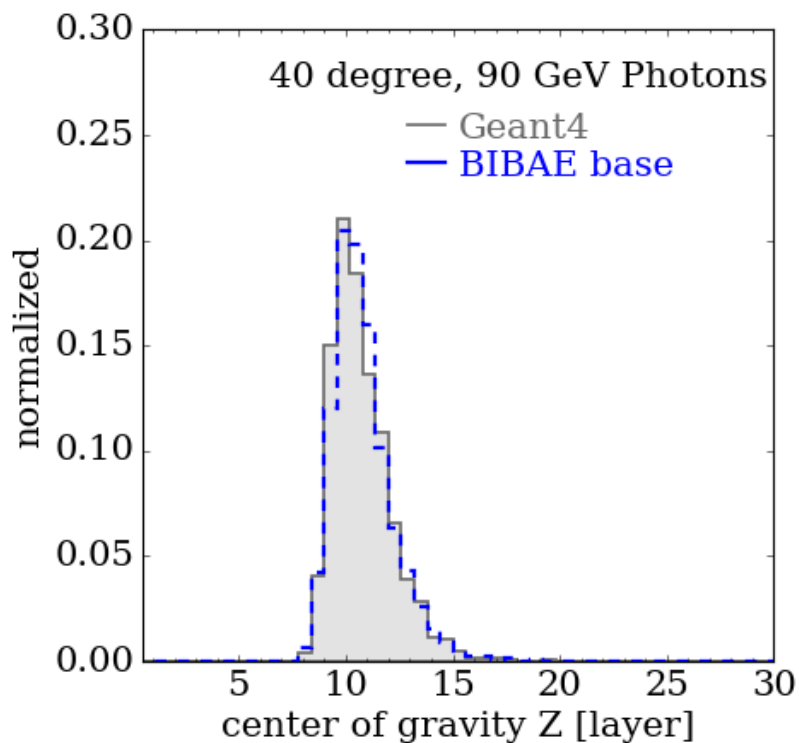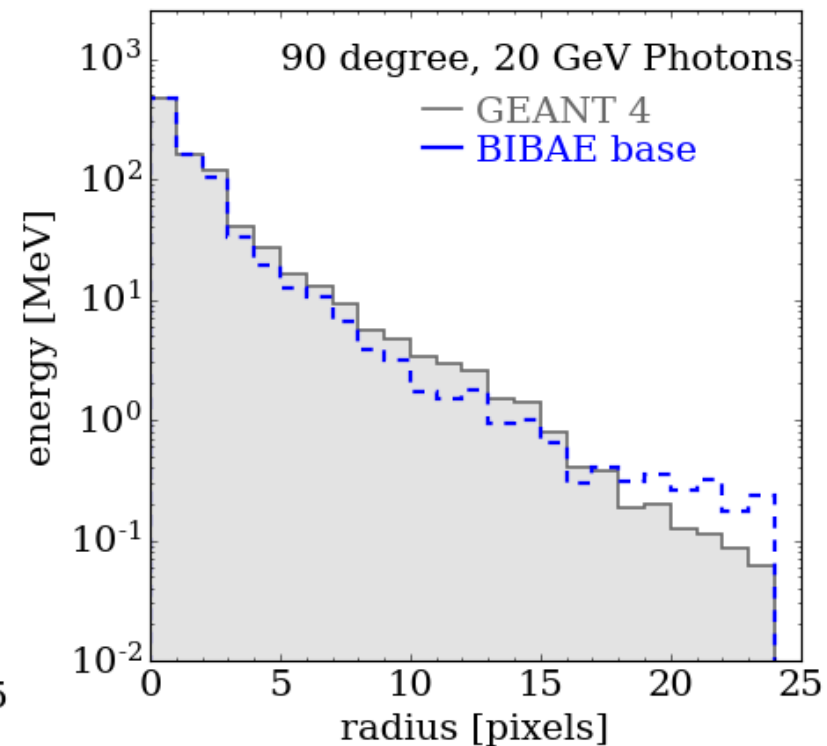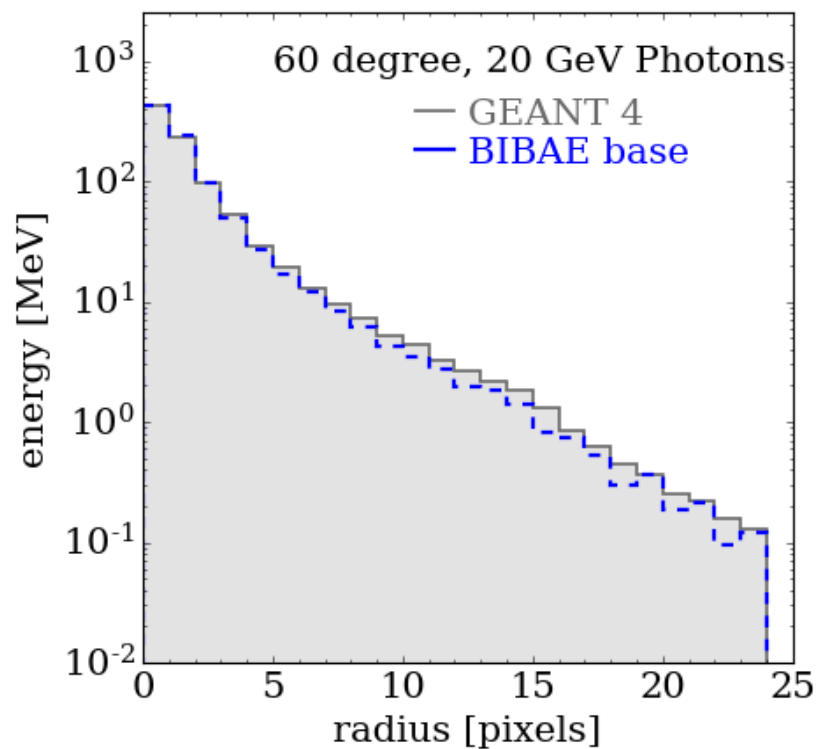
Results: Longitudinal Profile

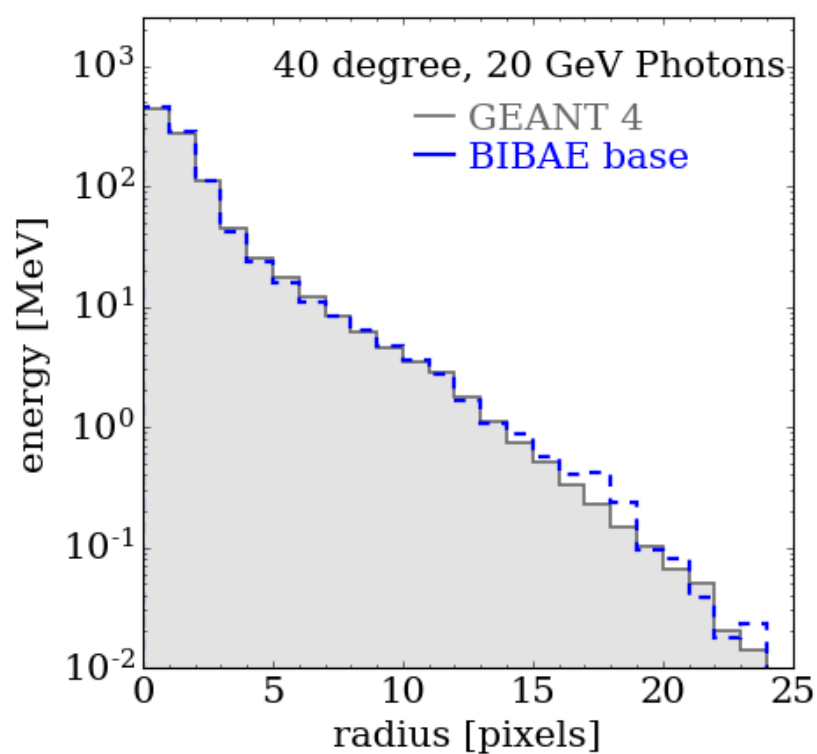# Results: Longitudinal Profile

Results: Center of Gravity
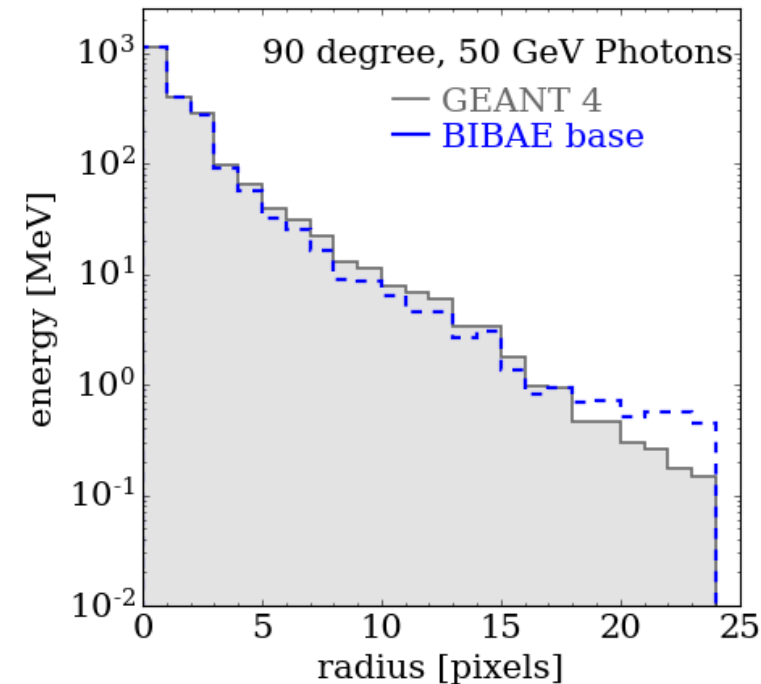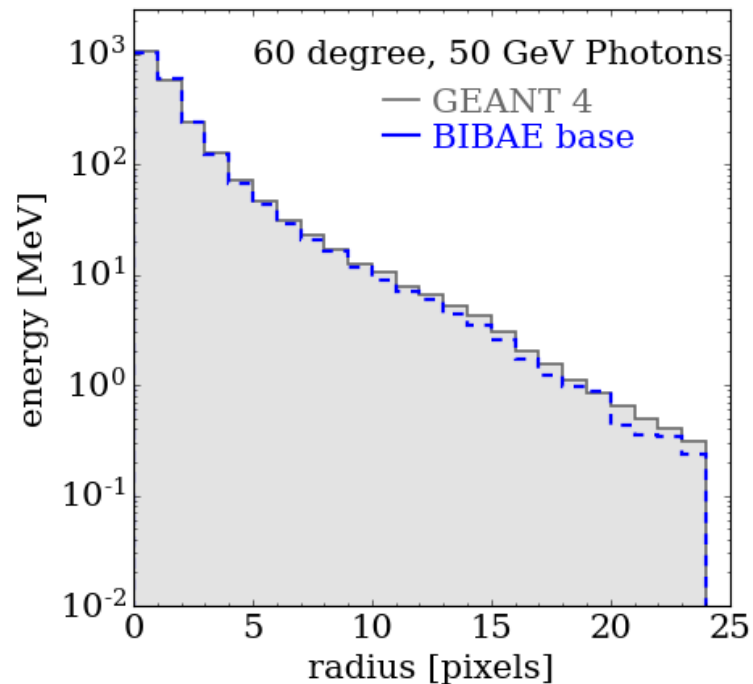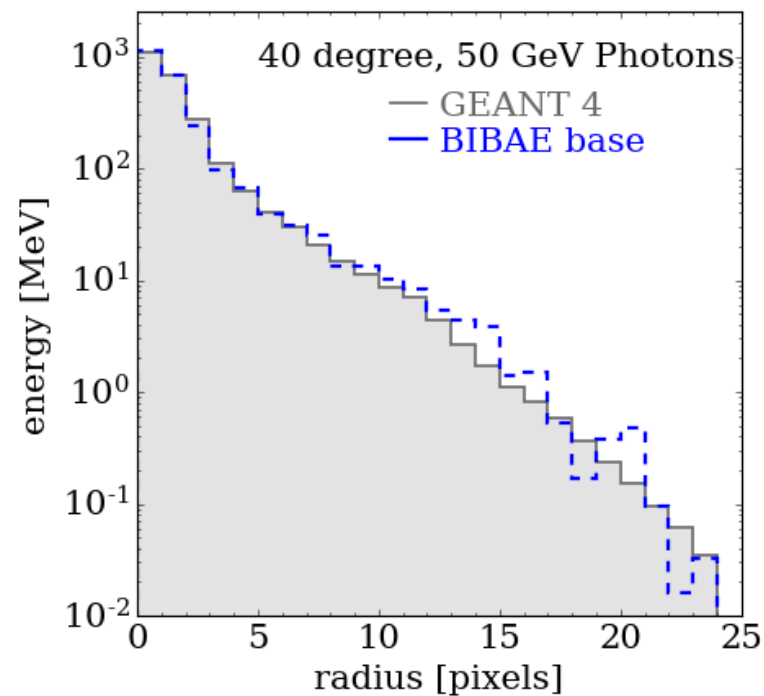
Results: Center of Gravity

Results: Center of Gravity

Results: Radial Profile

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