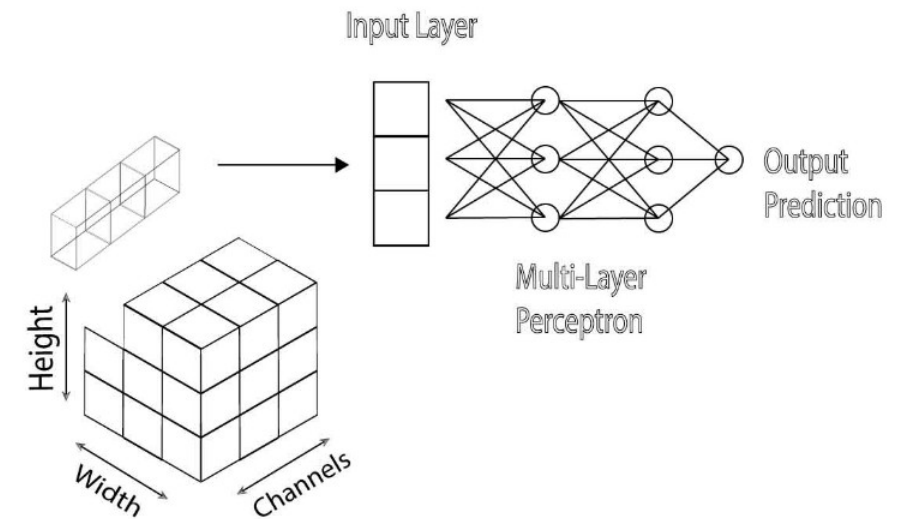
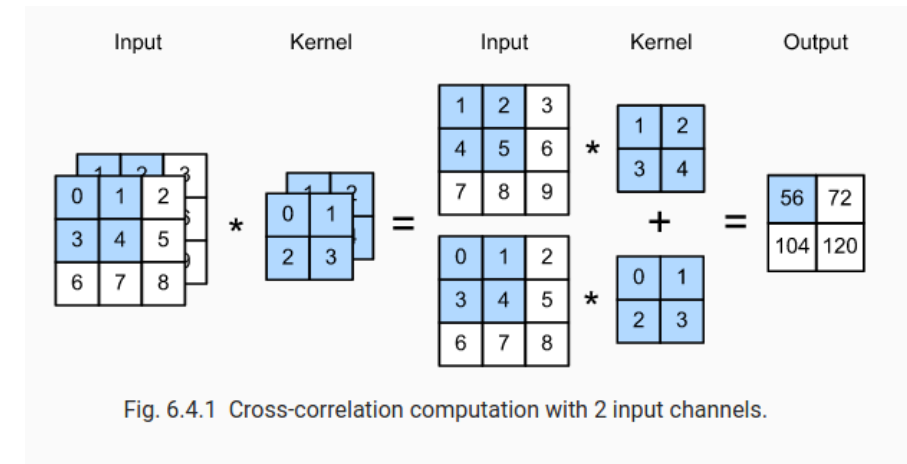


Angular and Energy conditioning

5.11.2021

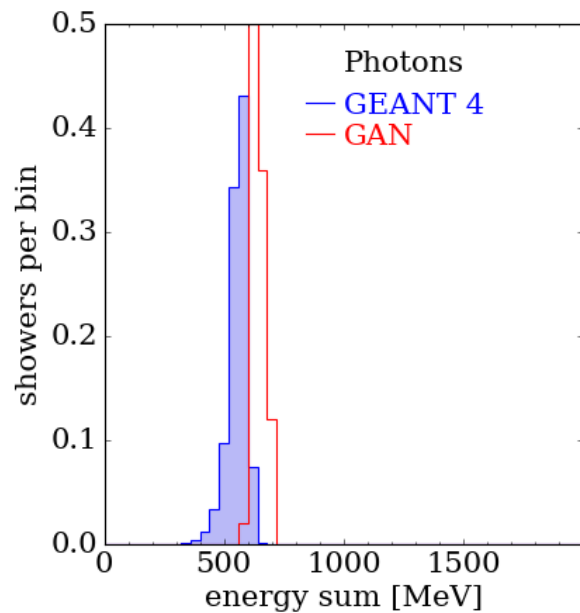
The problem with conditioning

- Have been investigating the problems with getting reasonable distributions from seemingly convergent trainings- Is the conditioning done incorrectly??
 - (noise*energy, noise*theta)
 - (50%noise*energy, 50%noise*theta)
 -
- Previously passing latent vector as channels to the convolutional layers
- Conv layers only behave like fully connected ones if you have a (1x1x1 kernel)
- Solution —► Switch to initial fully connected input

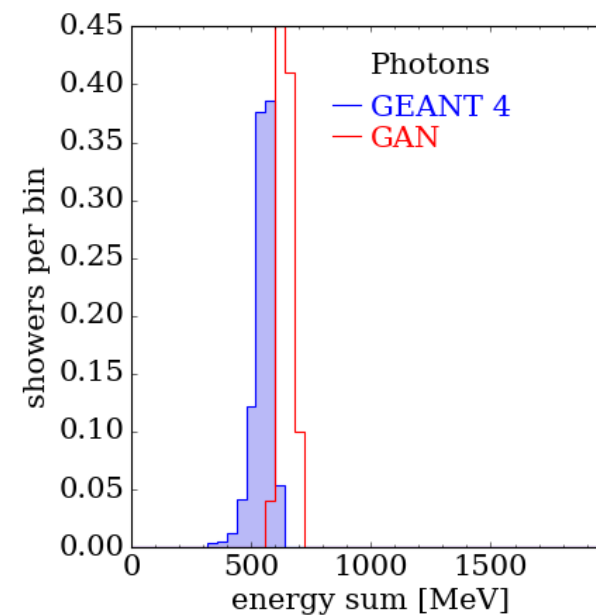


Energy sum

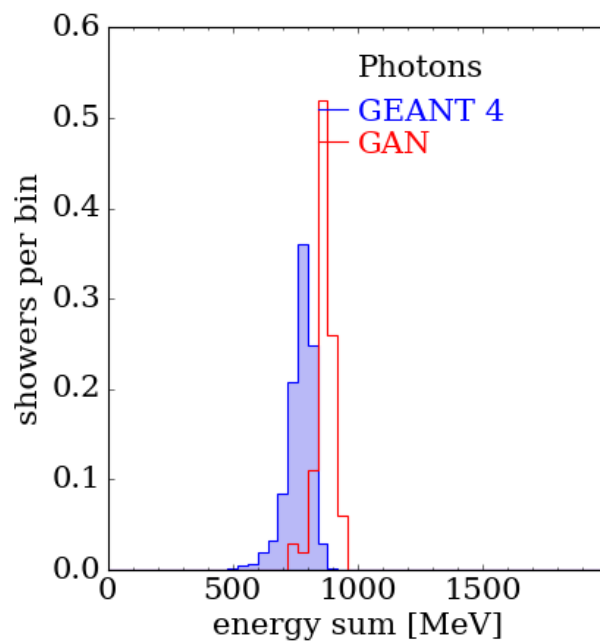
E25 GeV,
A75 deg



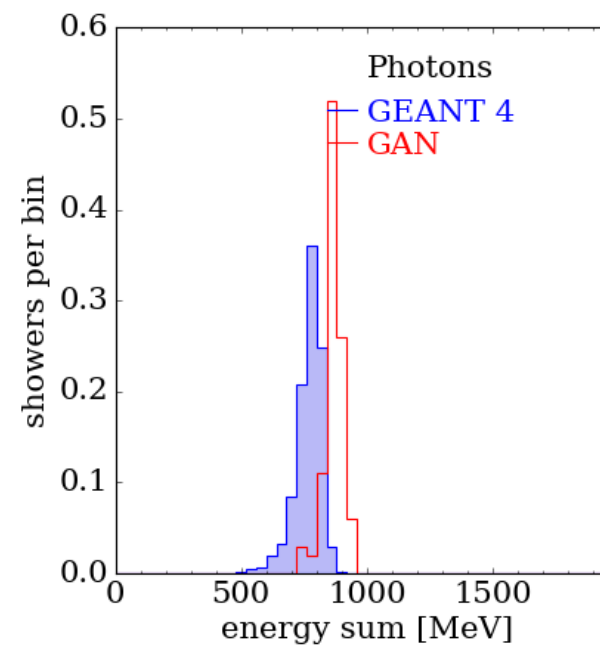
E25 GeV,
A85 deg



E35 GeV,
A75 deg

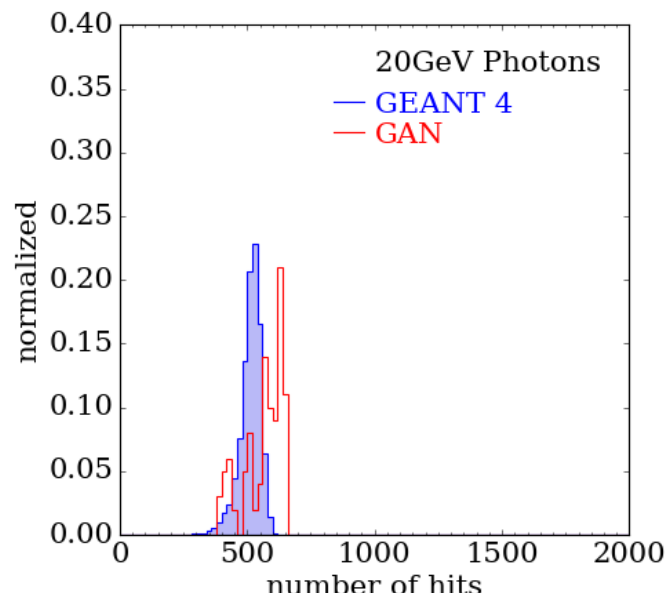


E35 GeV,
A85 deg

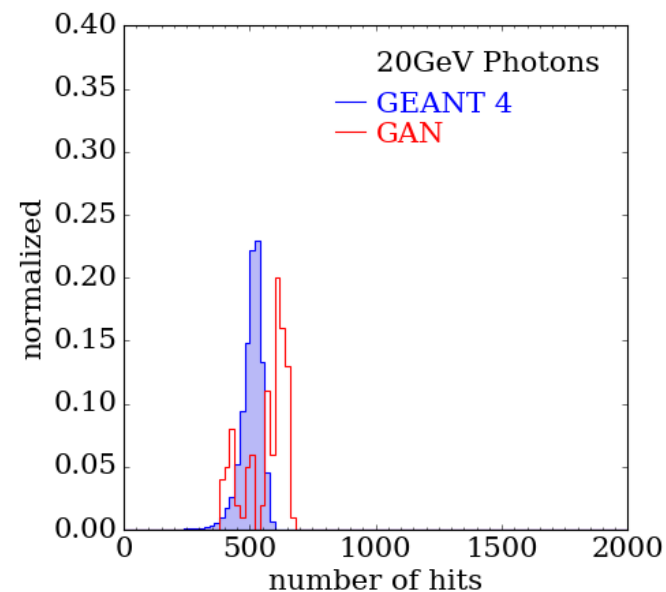


Number of hits

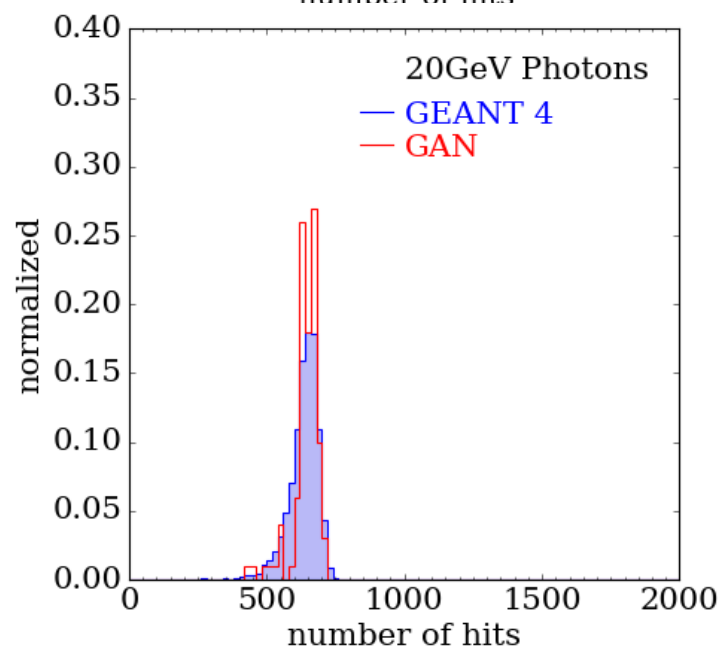
E25 GeV,
A75 deg



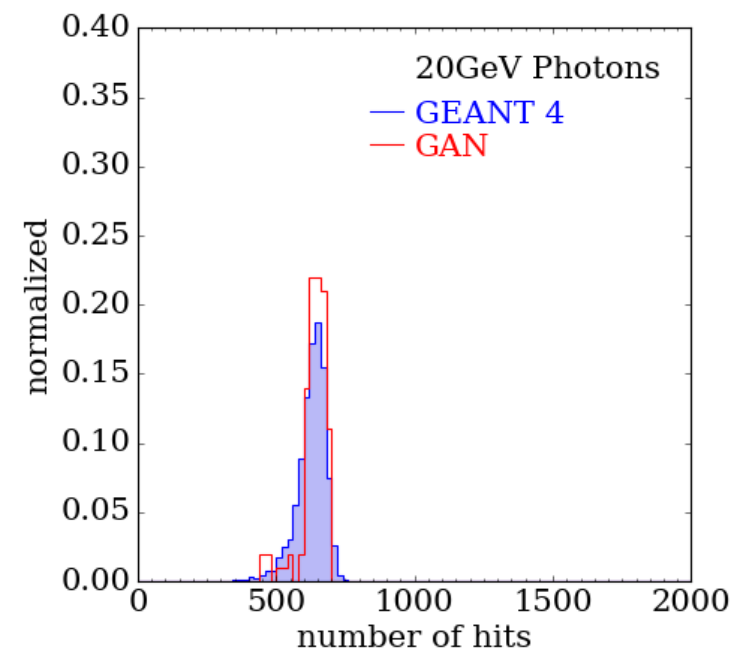
E25 GeV,
A85 deg



E35 GeV,
A75 deg

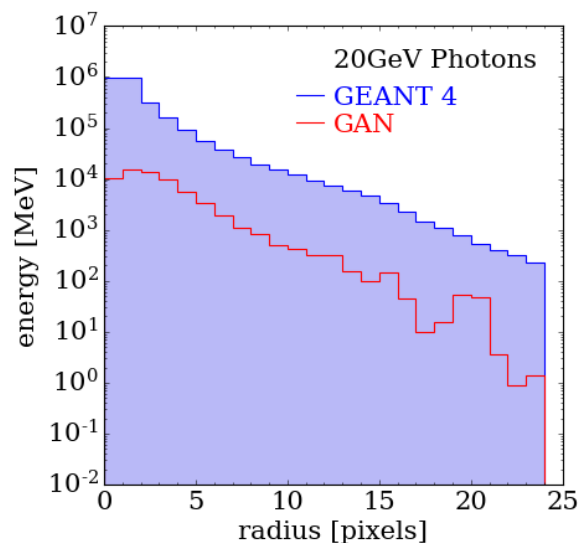


E35 GeV,
A85 deg

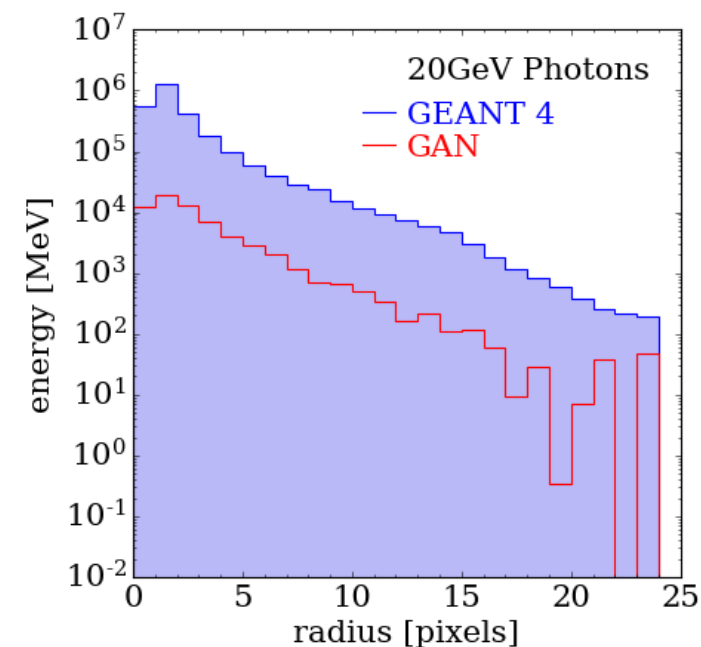


Radial profile- NOT YET VERIFIED!!!

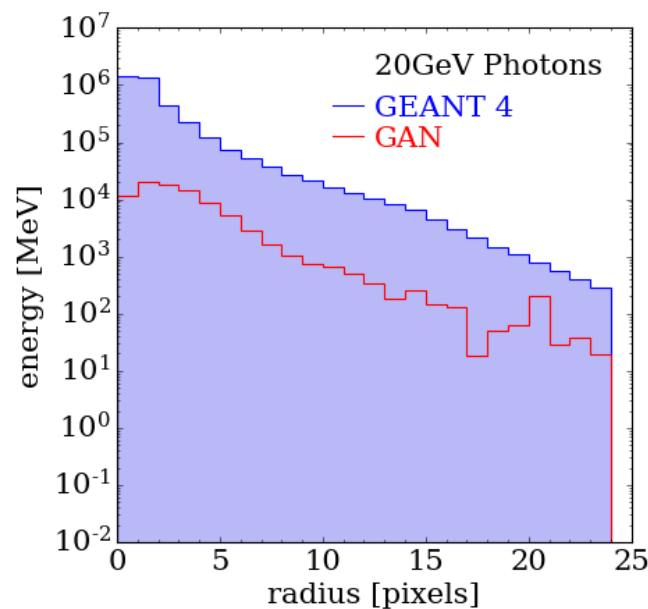
E25 GeV,
A75 deg



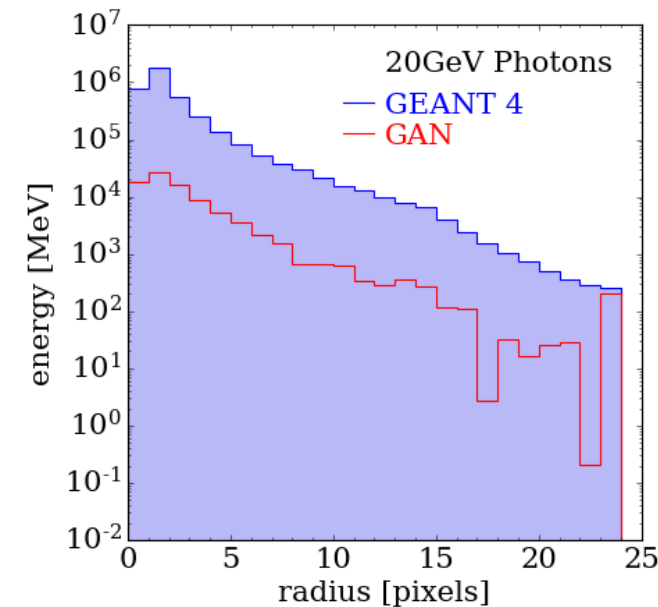
E25 GeV,
A85 deg



E35 GeV,
A75 deg

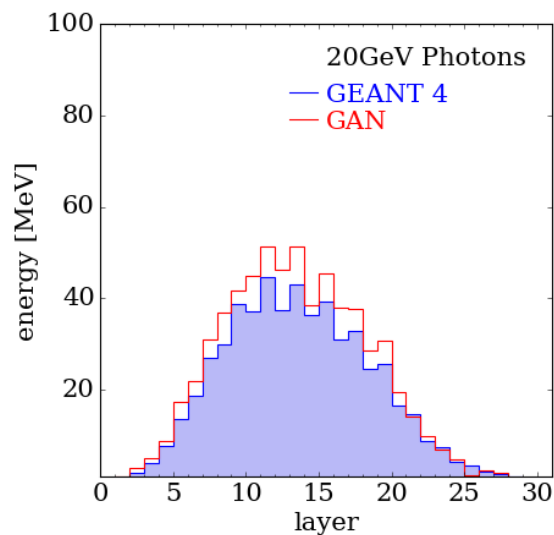


E35 GeV,
A85 deg

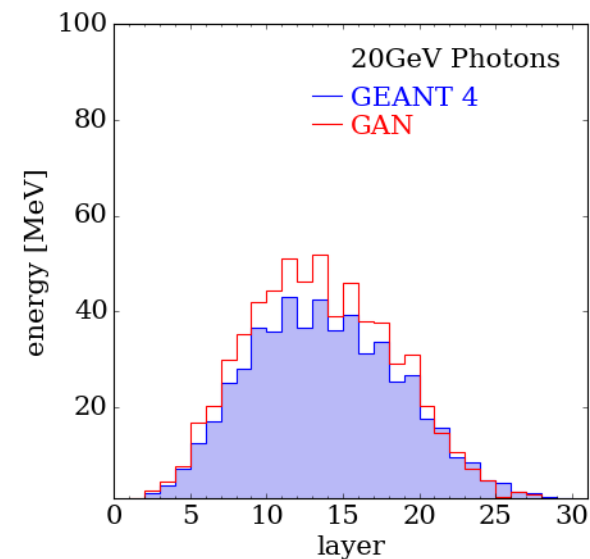


Longitudinal profile

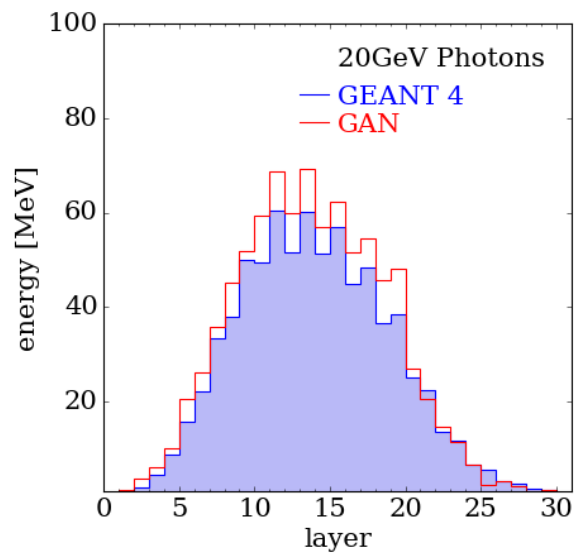
E25 GeV,
A75 deg



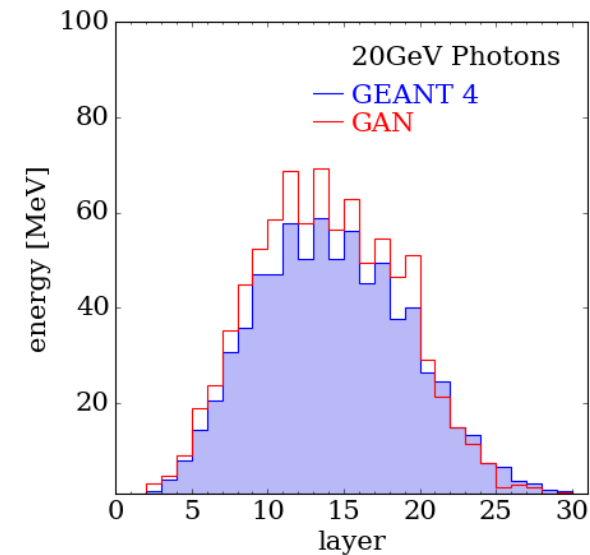
E25 GeV,
A85 deg



E35 GeV,
A75 deg

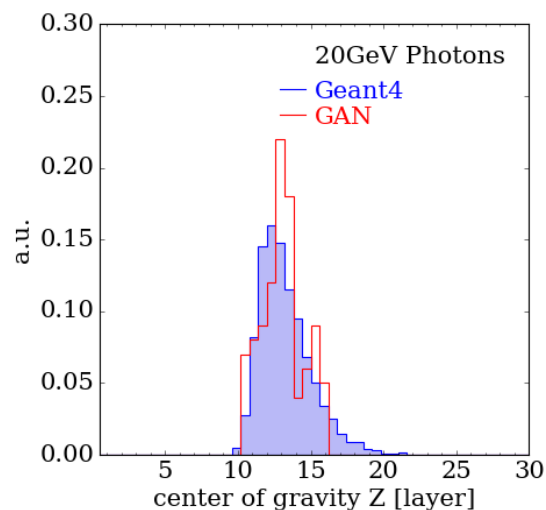


E35 GeV,
A85 deg

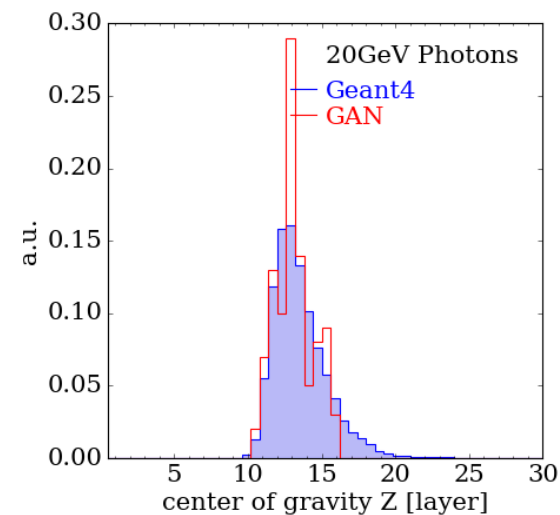


Center of gravity

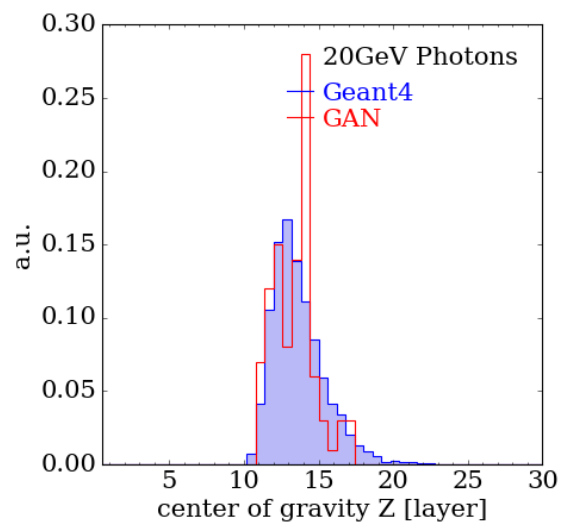
E25 GeV,
A75 deg



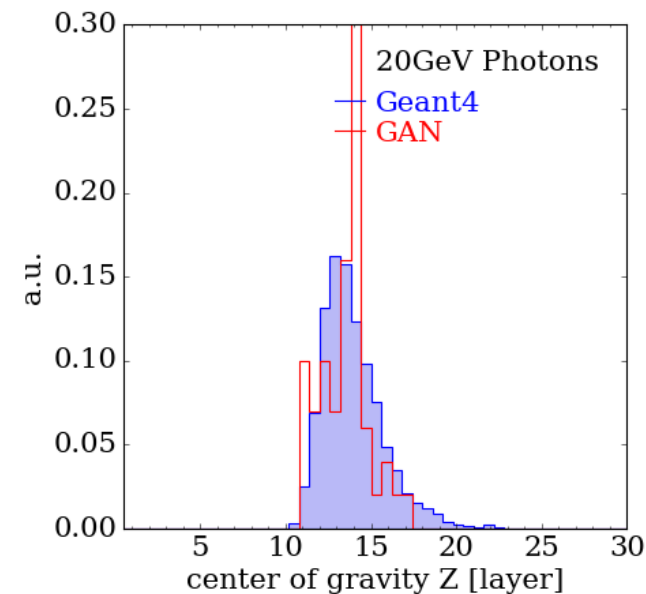
E25 GeV,
A85 deg



E35 GeV,
A75 deg

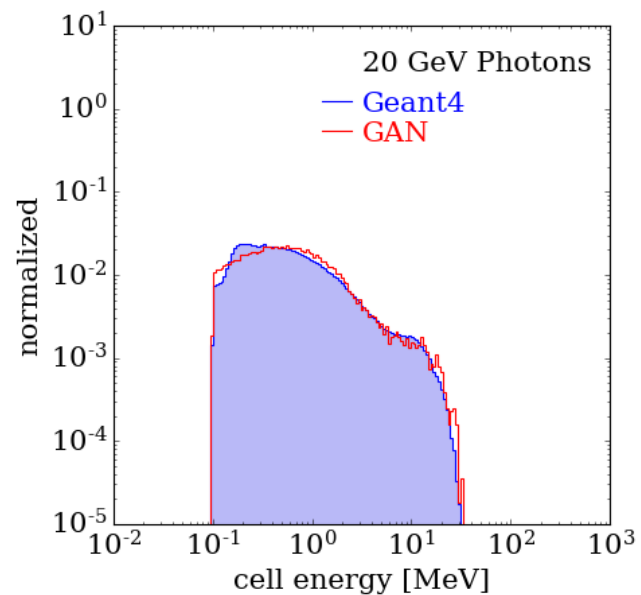


E35 GeV,
A85 deg

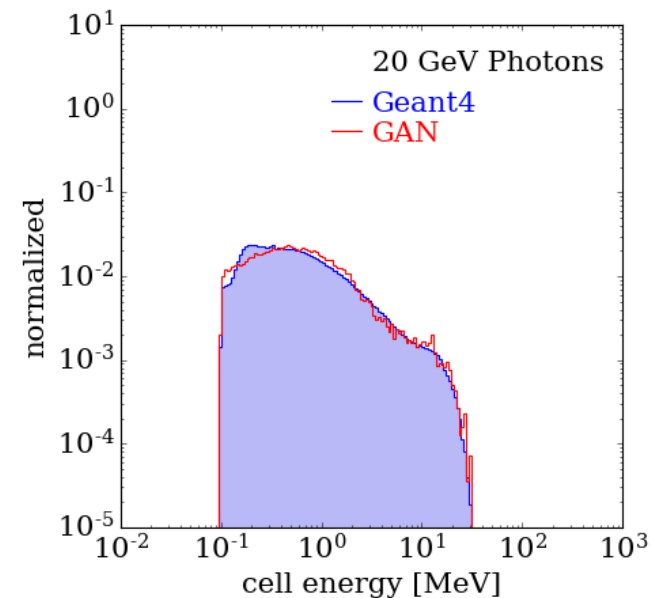


Cell energy

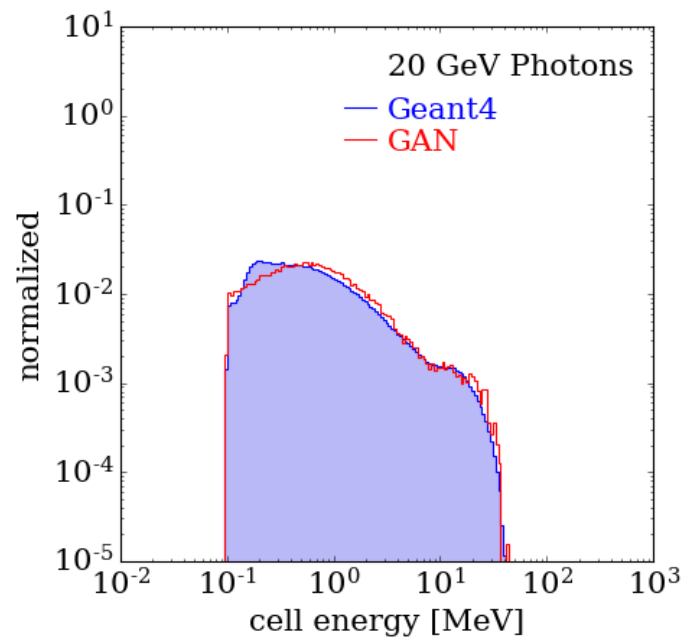
E25 GeV,
A75 deg



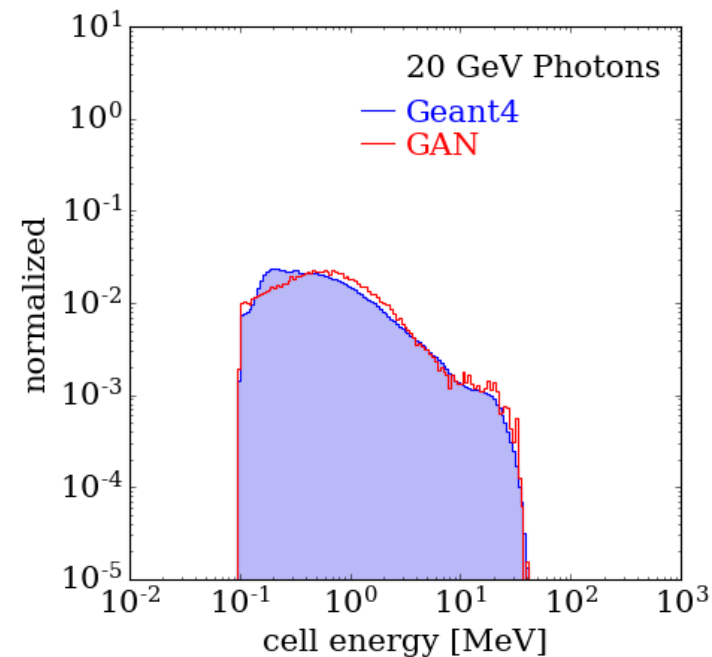
E25 GeV,
A85 deg



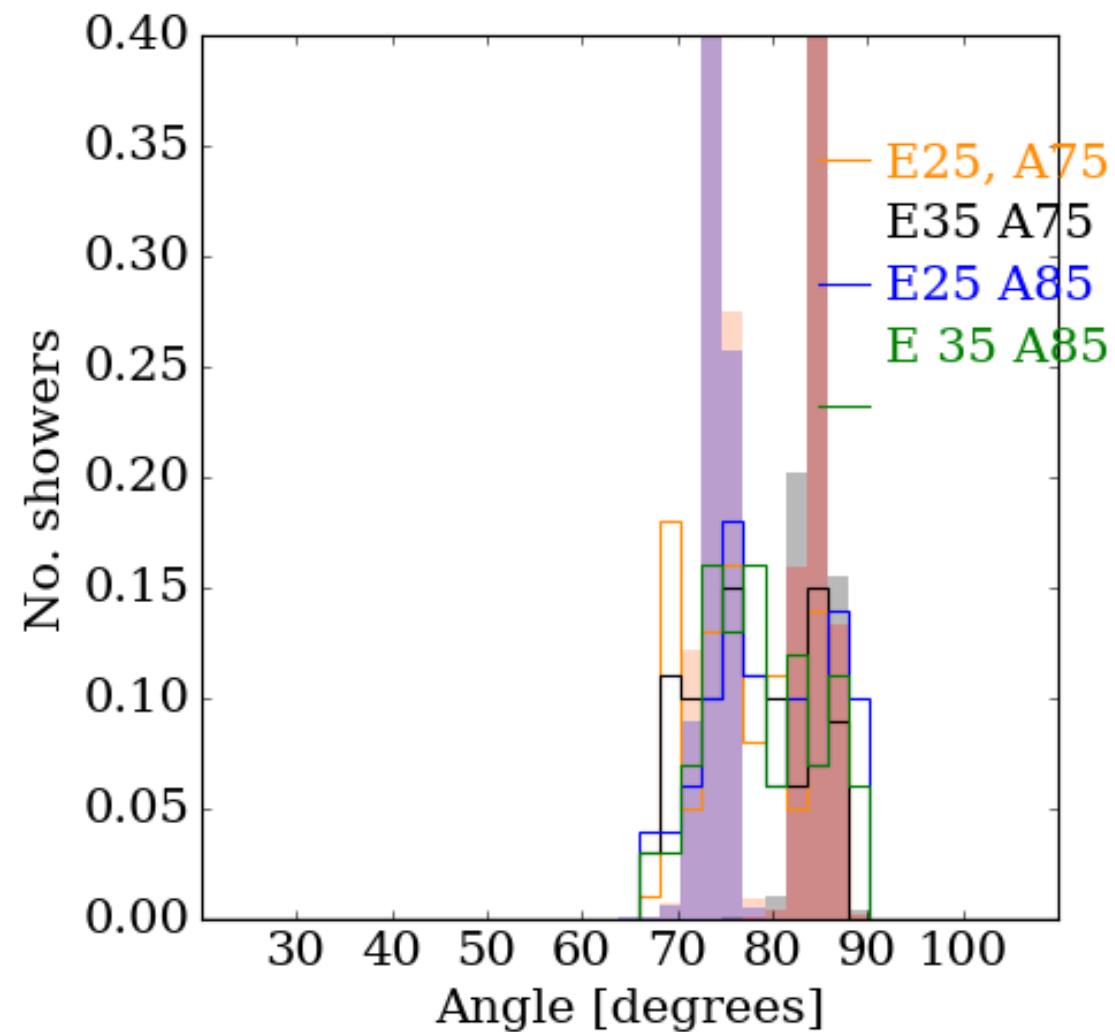
E35 GeV,
A75 deg



E35 GeV,
A85 deg



Angular distribution



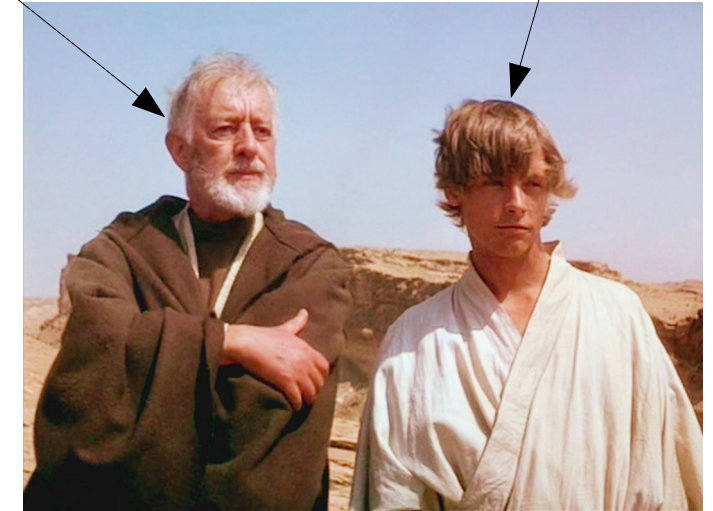
Adding constrainers

A New Hope?

- What if we try and add constrainers?
- Add constrainer loss after 5 epochs- have also tried a couple of variations of this..
- Tried several different loss weightings, e.g from Vallercosa et. al.
 - $\text{Kappa}_A = 25$
 - $\text{Kappa}_E = 0.1$
 - $\text{Kappa}_{adv} = 3$
- Epoch scan currently ongoing...
- Have chosen epoch 50 as an example, no reasoning behind that choice at this stage

Energy constrainer

Angular constrainer

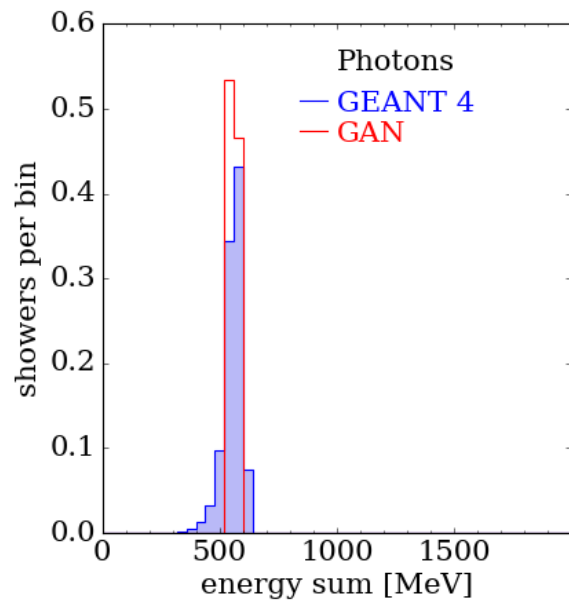


Mode collapse

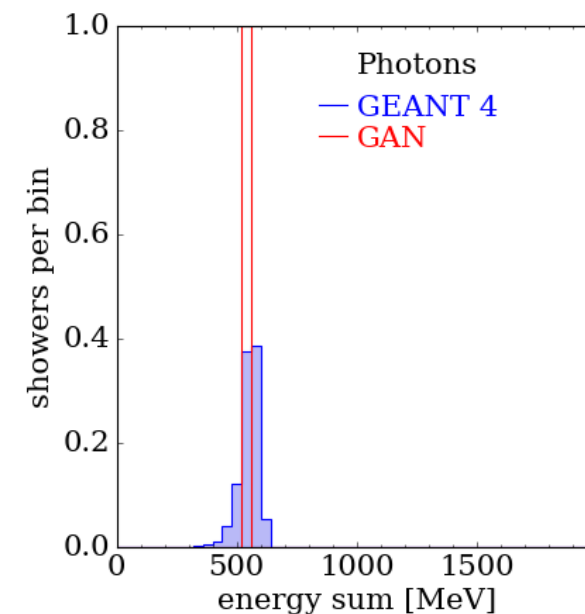


Energy sum

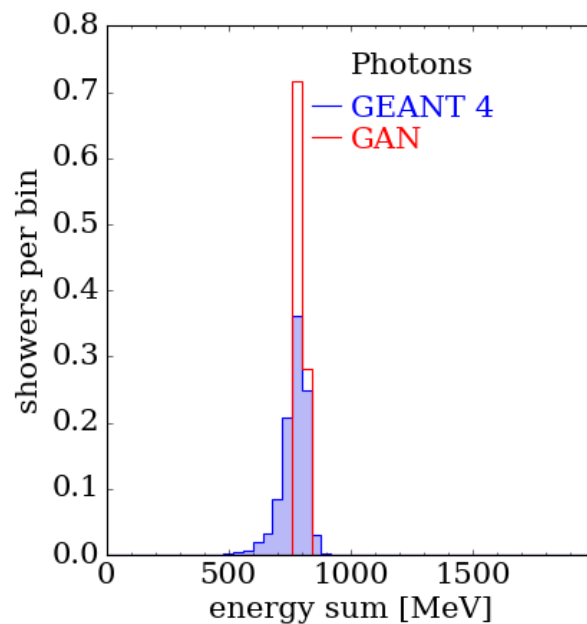
E25 GeV,
A75 deg



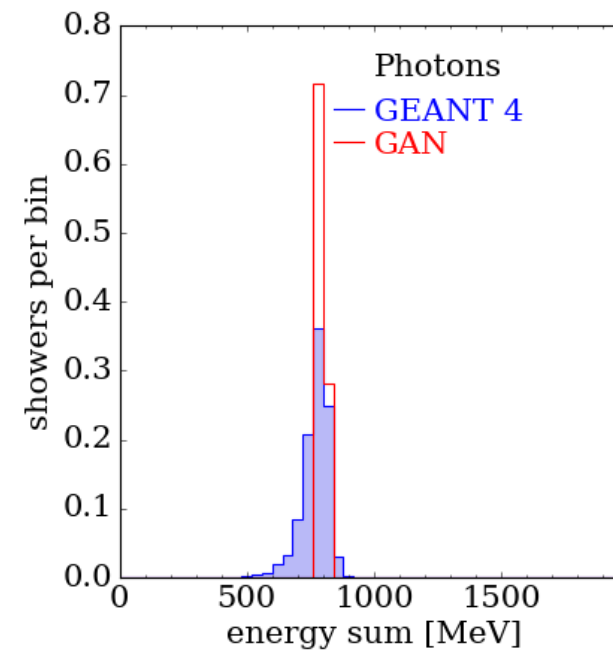
E25 GeV,
A85 deg



E35 GeV,
A75 deg

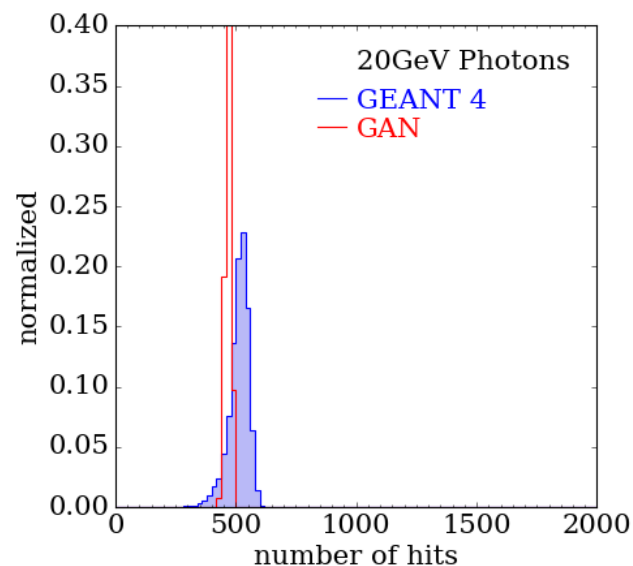


E35 GeV,
A85 deg

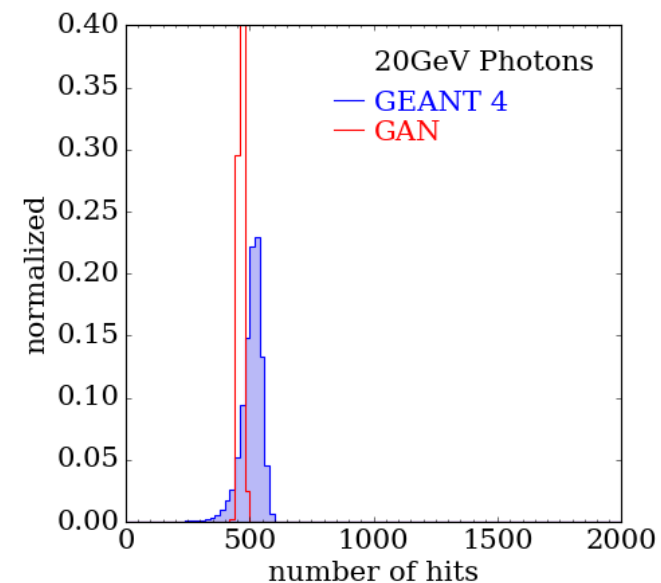


Number of hits

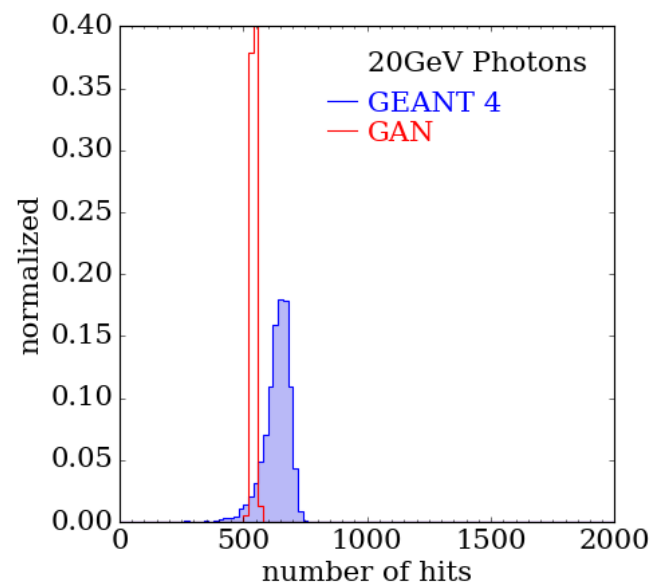
E25 GeV,
A75 deg



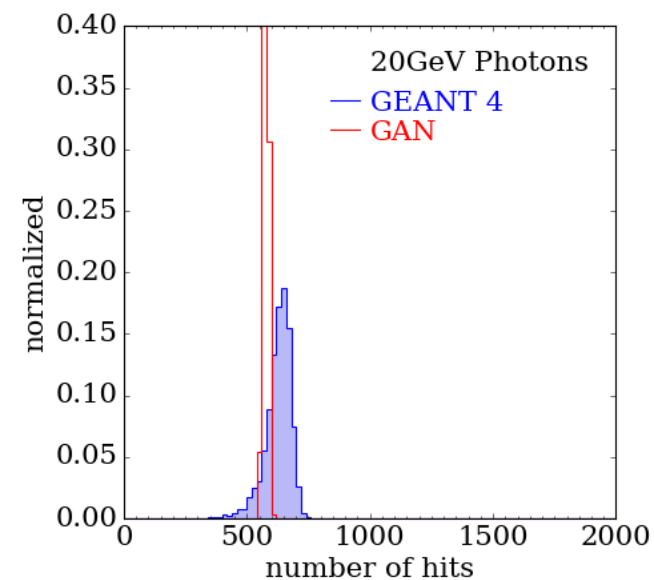
E25 GeV,
A85 deg



E35 GeV,
A75 deg

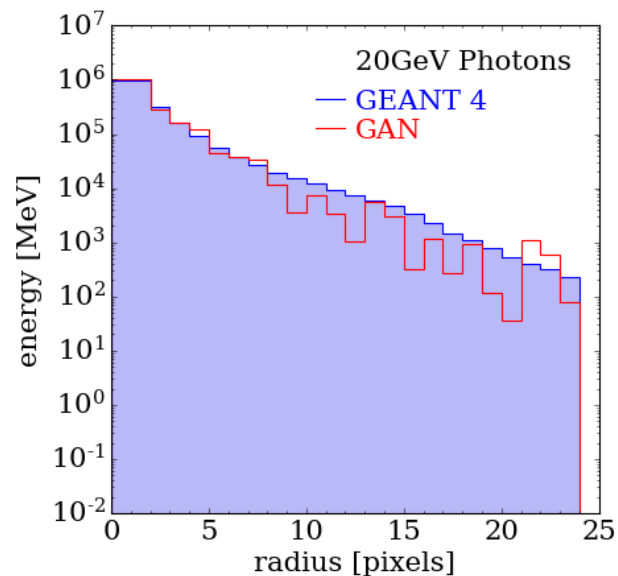


E35 GeV,
A85 deg

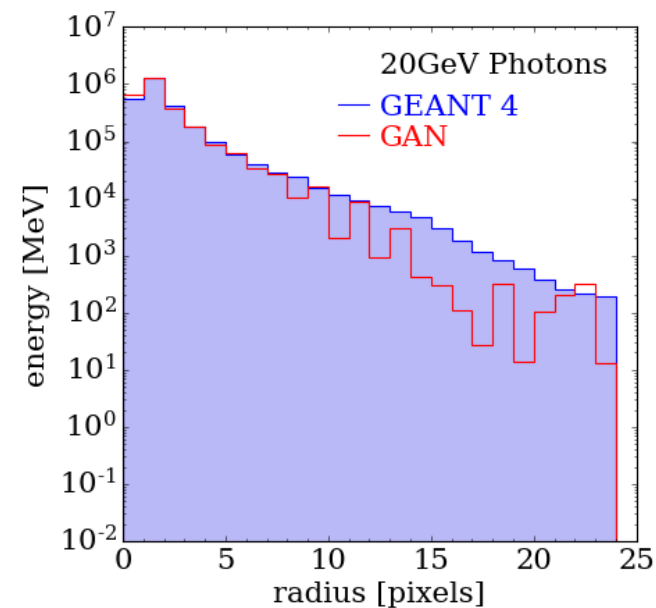


Radial profile- NOT YET VERIFIED!!!

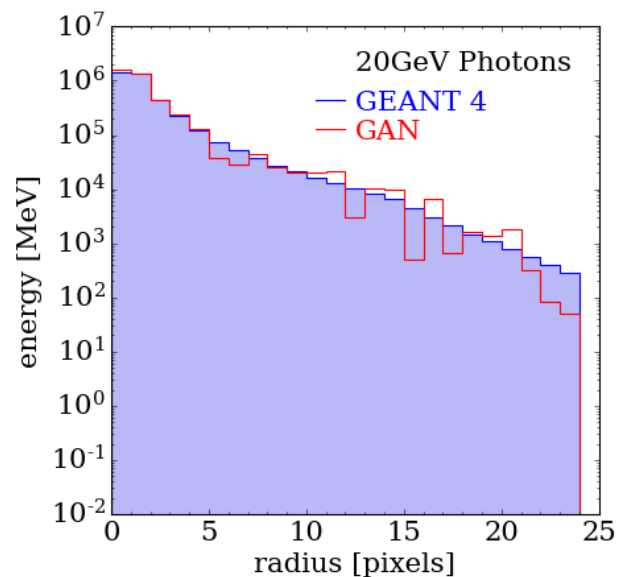
E25 GeV,
A75 deg



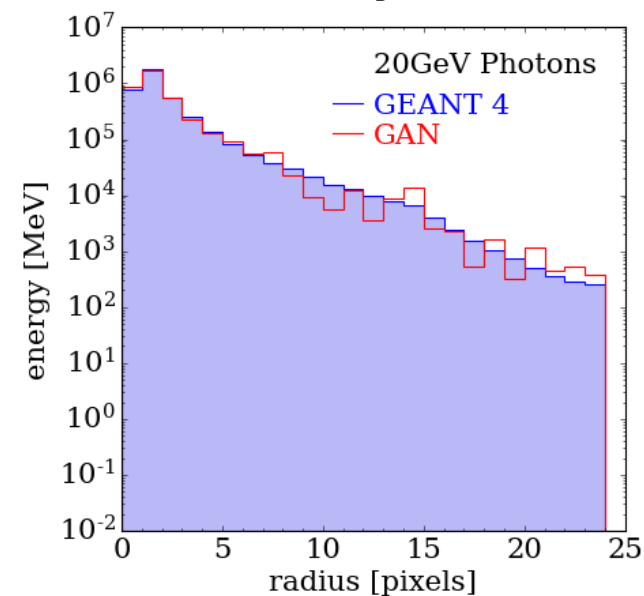
E25 GeV,
A85 deg



E35 GeV,
A75 deg

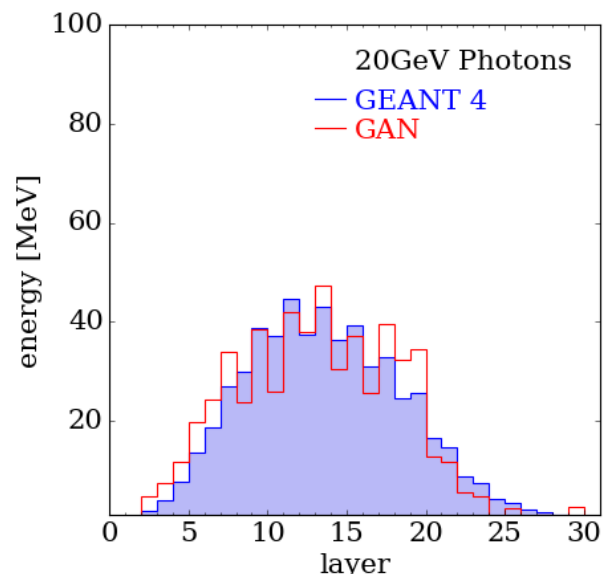


E35 GeV,
A85 deg

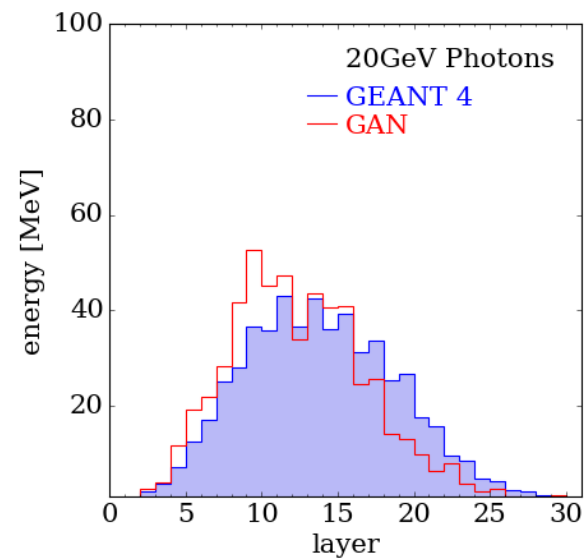


Longitudinal profile

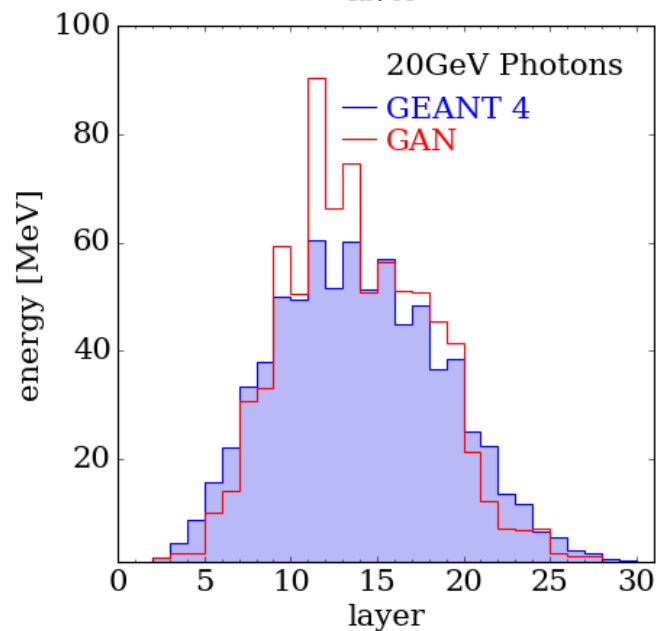
E25 GeV,
A75 deg



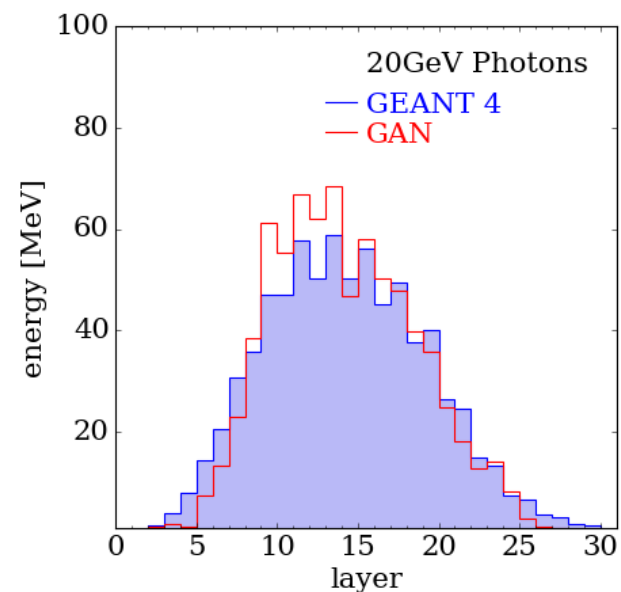
E25 GeV,
A85 deg



E35 GeV,
A75 deg

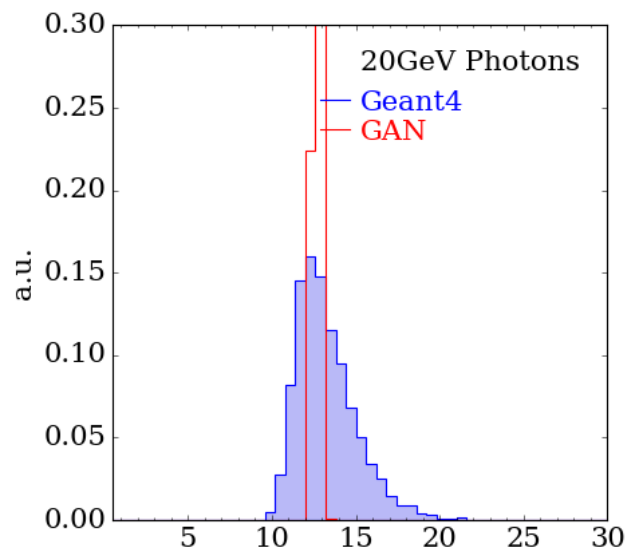


E35 GeV,
A85 deg

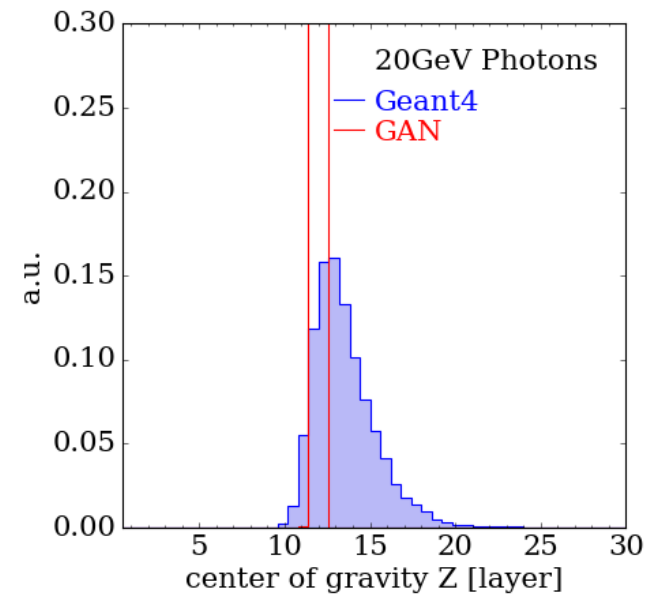


Center of gravity

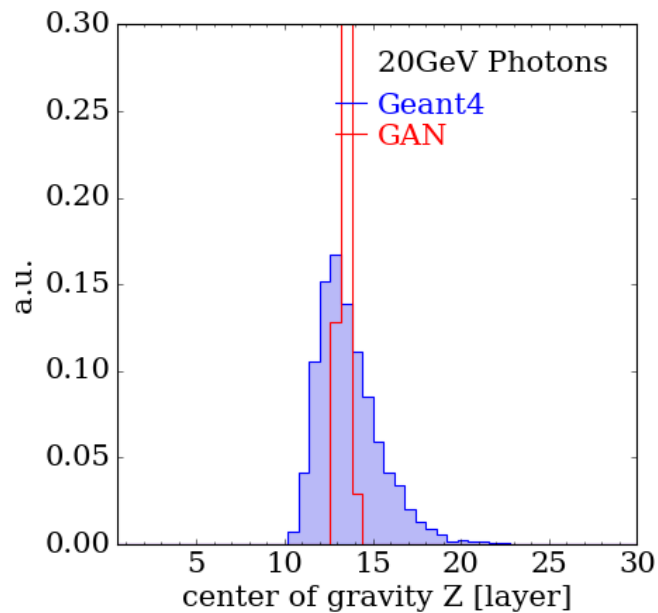
E25 GeV,
A75 deg



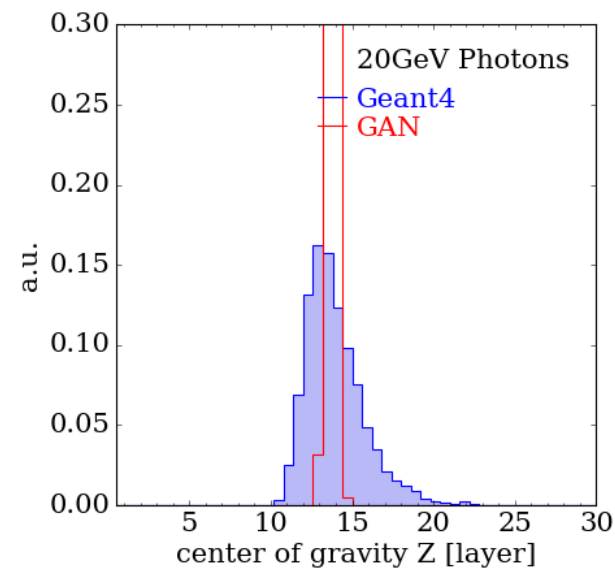
E25 GeV,
A85 deg



E35 GeV,
A75 deg

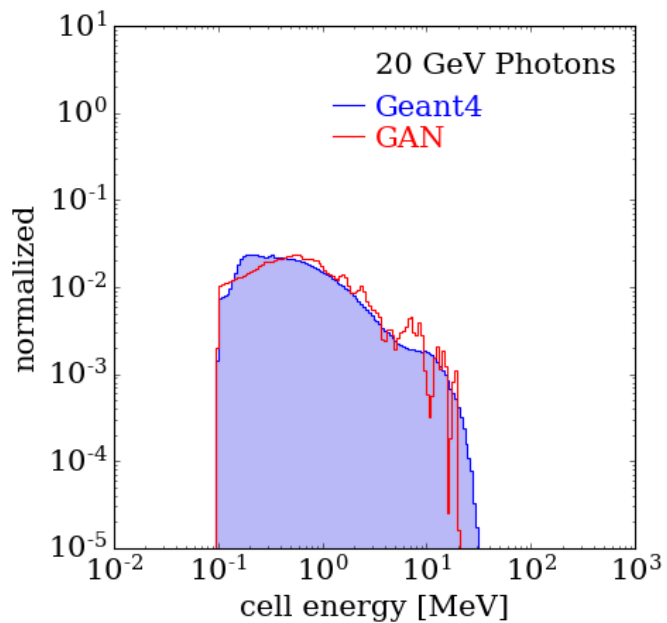


E35 GeV,
A85 deg

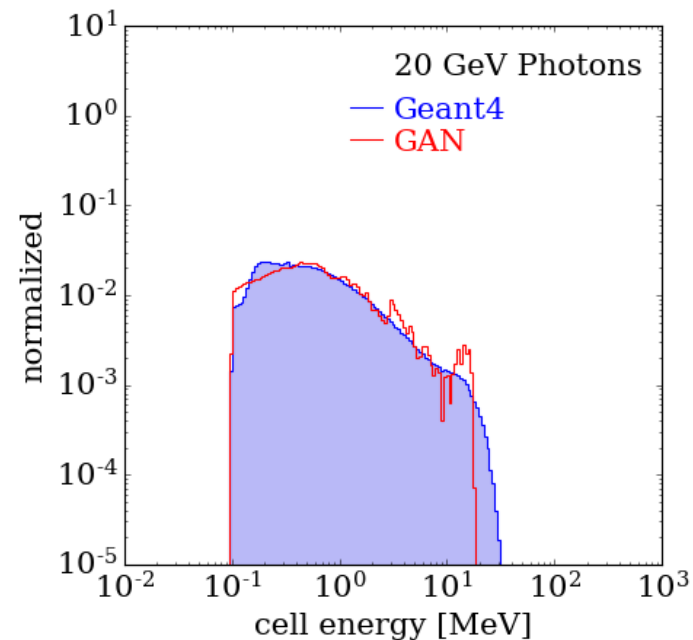


Cell energy

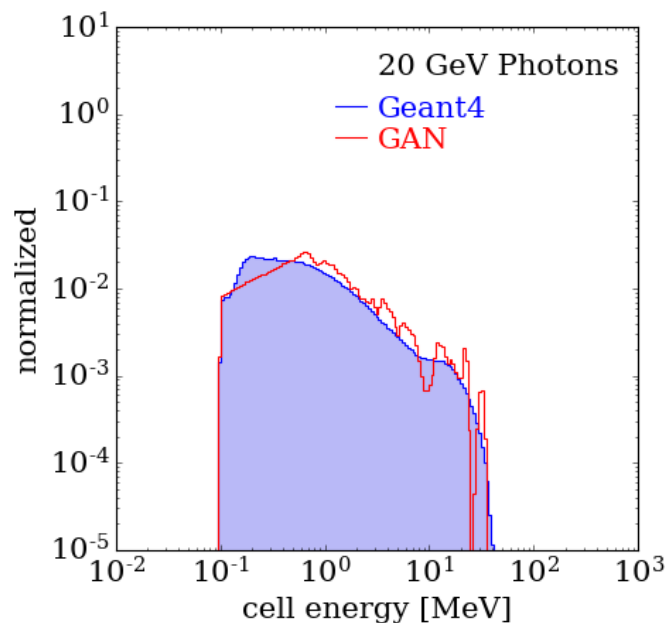
E25 GeV,
A75 deg



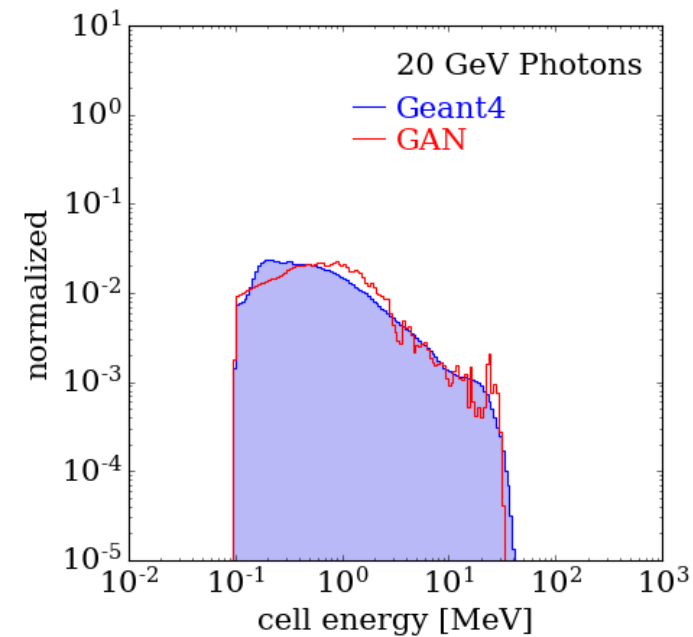
E25 GeV,
A85 deg



E35 GeV,
A75 deg

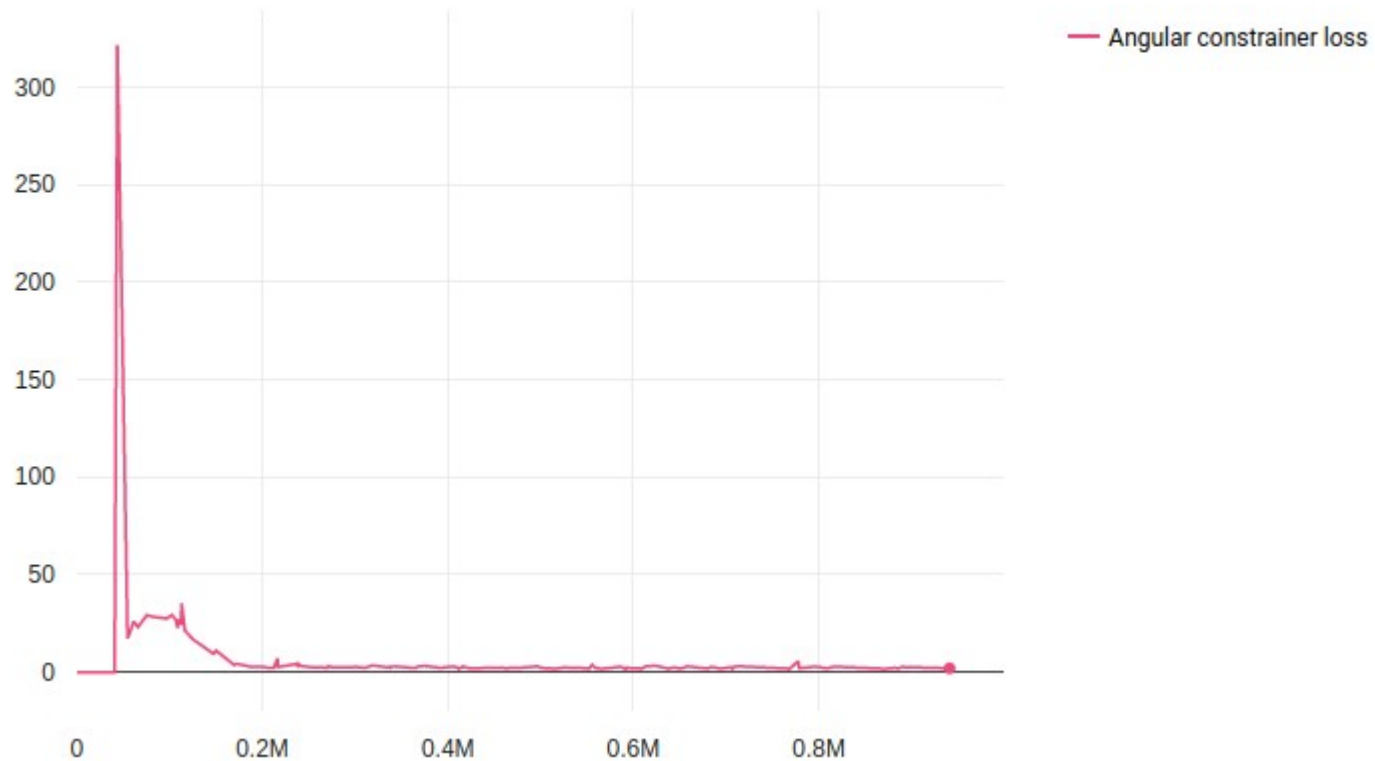


E35 GeV,
A85 deg

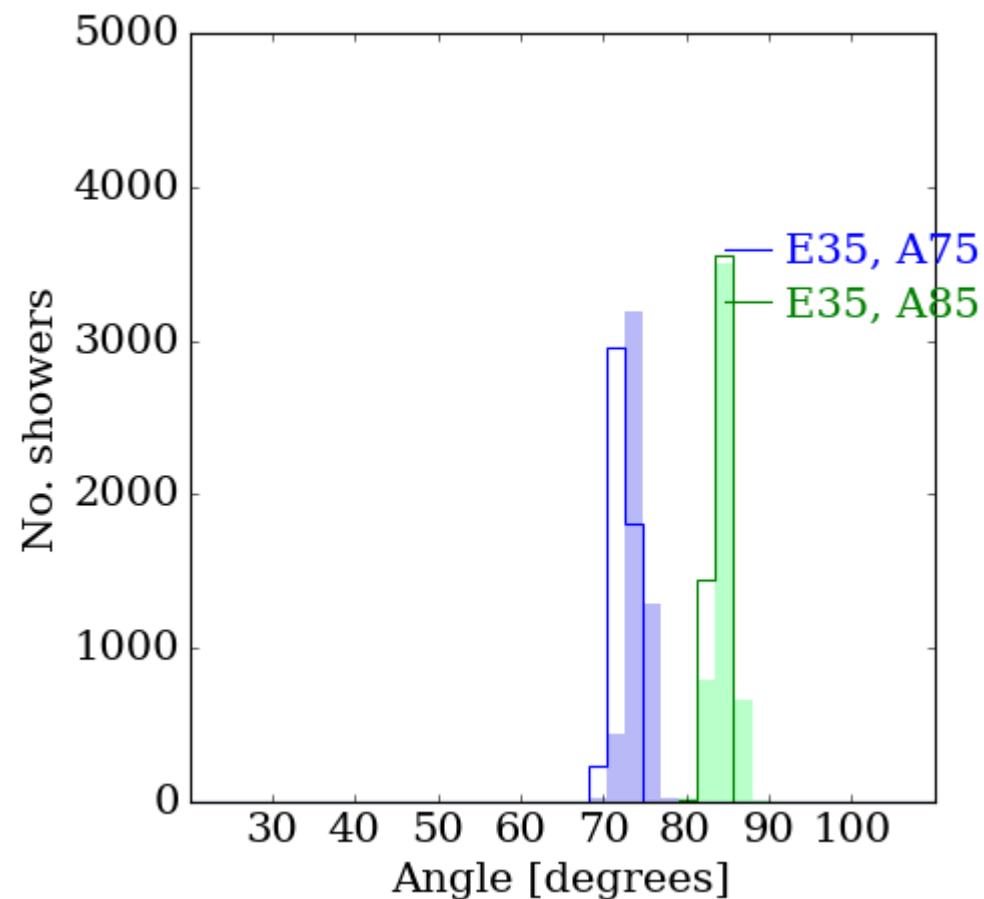
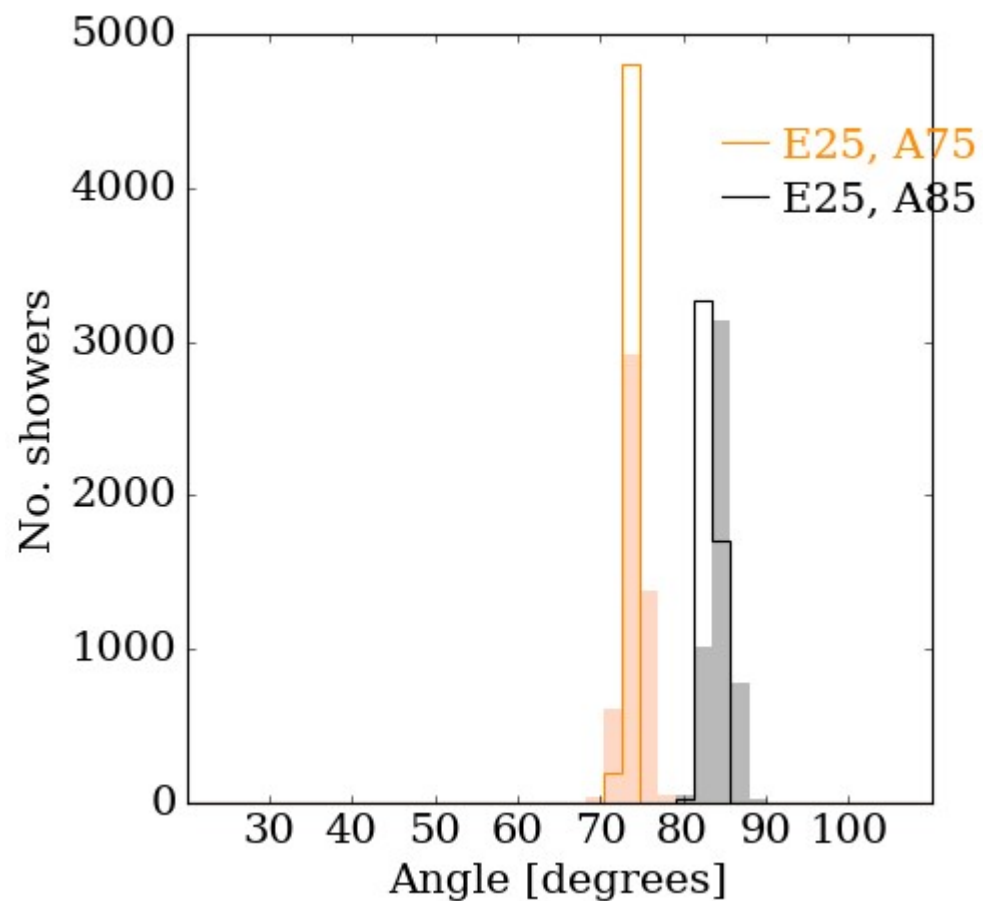


Adding constrainers

A New Hope?



Adding constrainers



Conclusions

- Angular conditioning is working!
- Mode collapse in most other distributions- makes sense since adversarial loss is a lot lower weighted- will try increasing this weighting
- Still waiting for epoch scans- perhaps this was just an unlucky choice
- If it is real, perhaps vallercosa et al don't suffer from mode collapse because they are constraining on additional distributions...
- Take away- constrainers are even more important for angle and energy