Constrained GAN

- Pre-train constrainer network to perform regression on anglula label (analogously to what was done for energy e.g in WGAN)
- Modify GAN loss to penalize network for showers that perform poorly in the constrainer
- $L = L_{adv} + \lambda L_{constrainer}$
- Only modify Generator loss:
- Train Generator 5 times more than discriminator
- Set λ =0 for 1 epoch; then set λ =0.1





What do the showers look like?



Physics distributions- 60 degree showers



DESY. | SFT Meeting | Peter McKeown 02.06.2021

What about the money plot?

Before angular constrainer



What about the money plot?

After angular constrainer



Bonus slide: constrainer vs PCA on GEANT4 showers

- How does angular constrainer perform on 'reconstructing' fixed angle showers vs traditional PCA?
 - Filled histograms- PCA labeling of G4 showers
 - Dashed lines- Constrainer labeling of G4 showers



Take aways and next steps

- Still not quite there- physics distributions are a bit off still
- Constrainer networks help a lot if you have labels
- Next steps:
- Decrease difference between amount of training of generator and discriminator