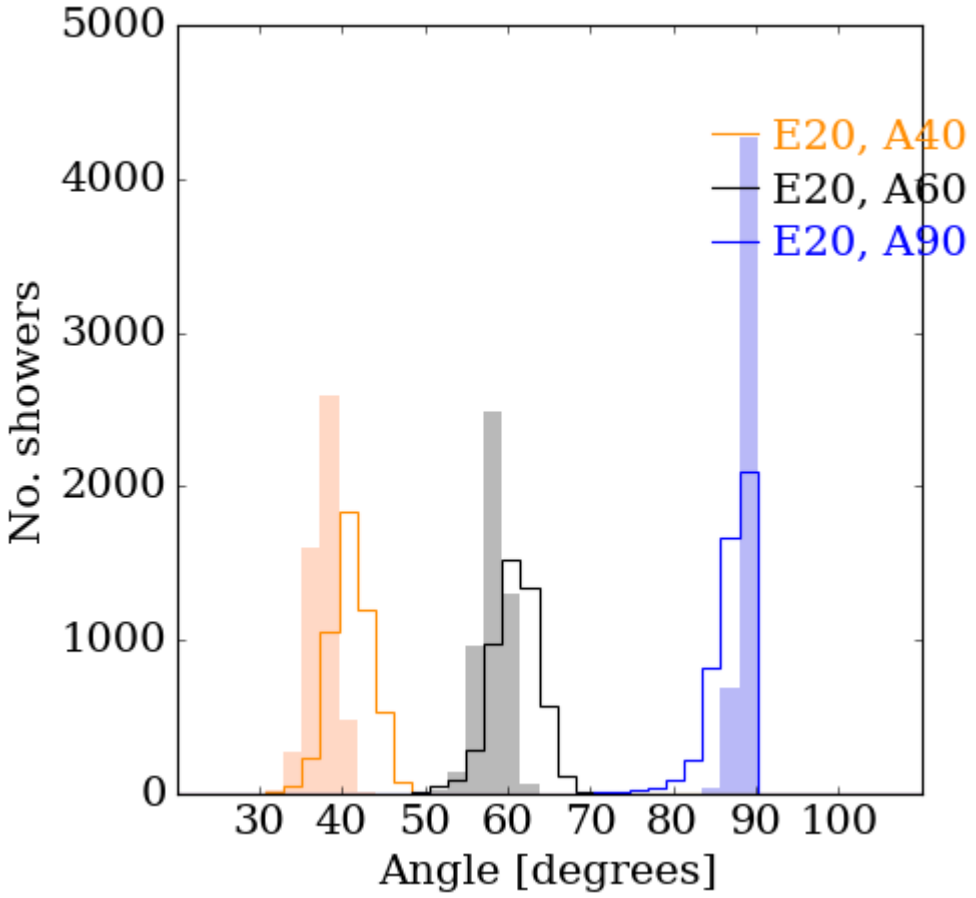
Systematic shift in angular reconstruction on validation data

17.02.2022

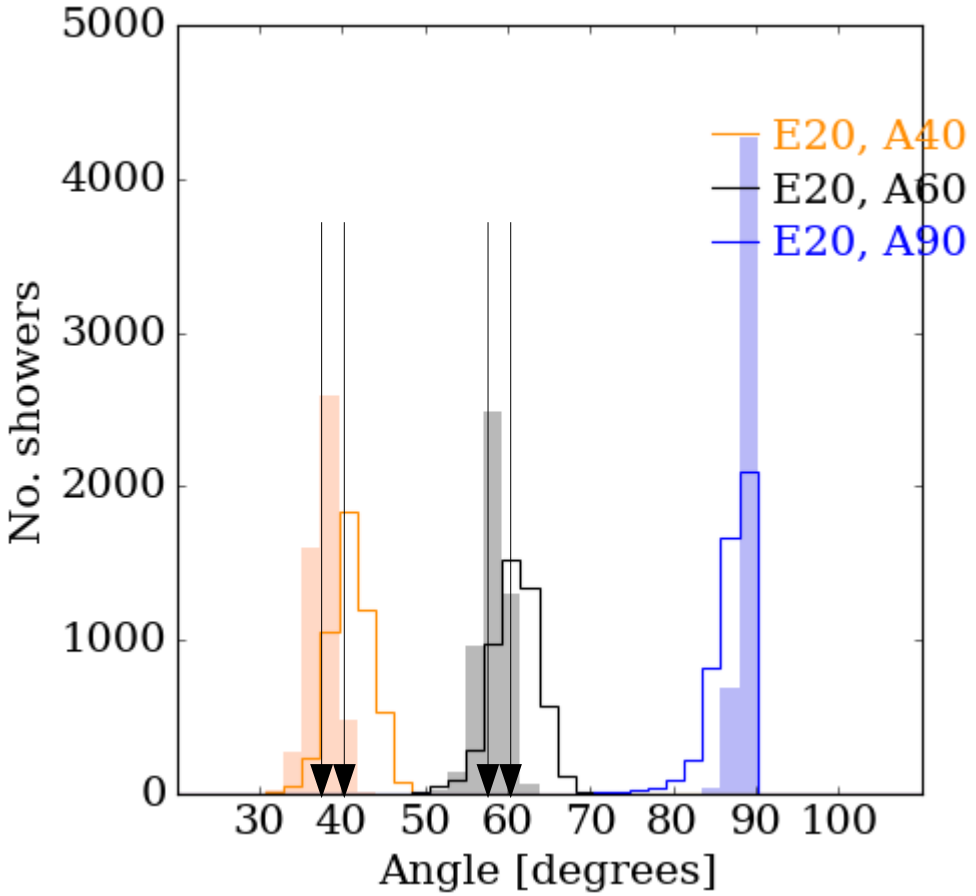
Odd behaviour for fixed showers

- BIBAE angles don’t align with geant4 data
- Looking closer: geant4 data appears to be recoed at angle with systematic bias to lower values

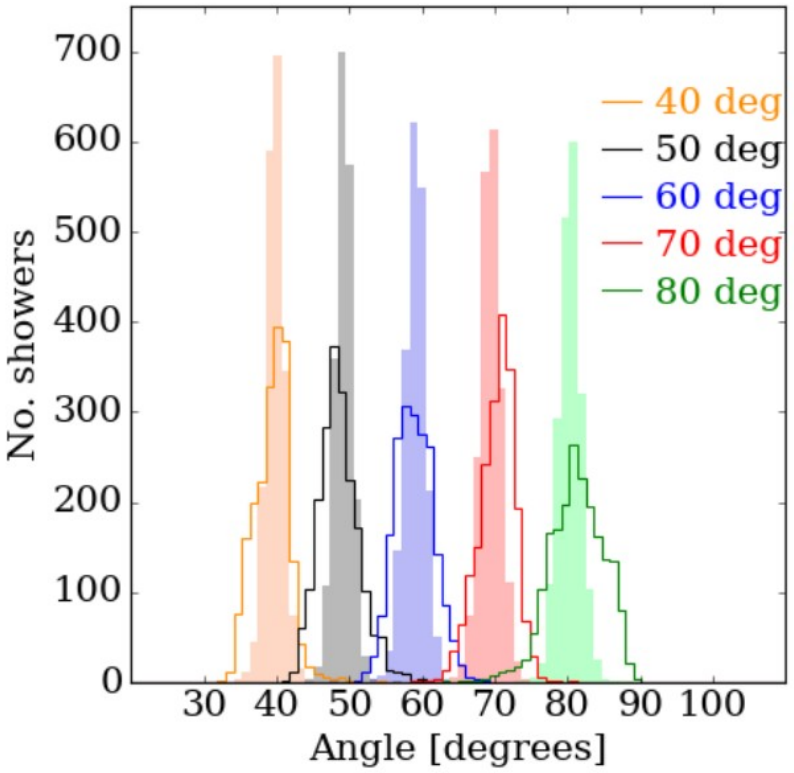


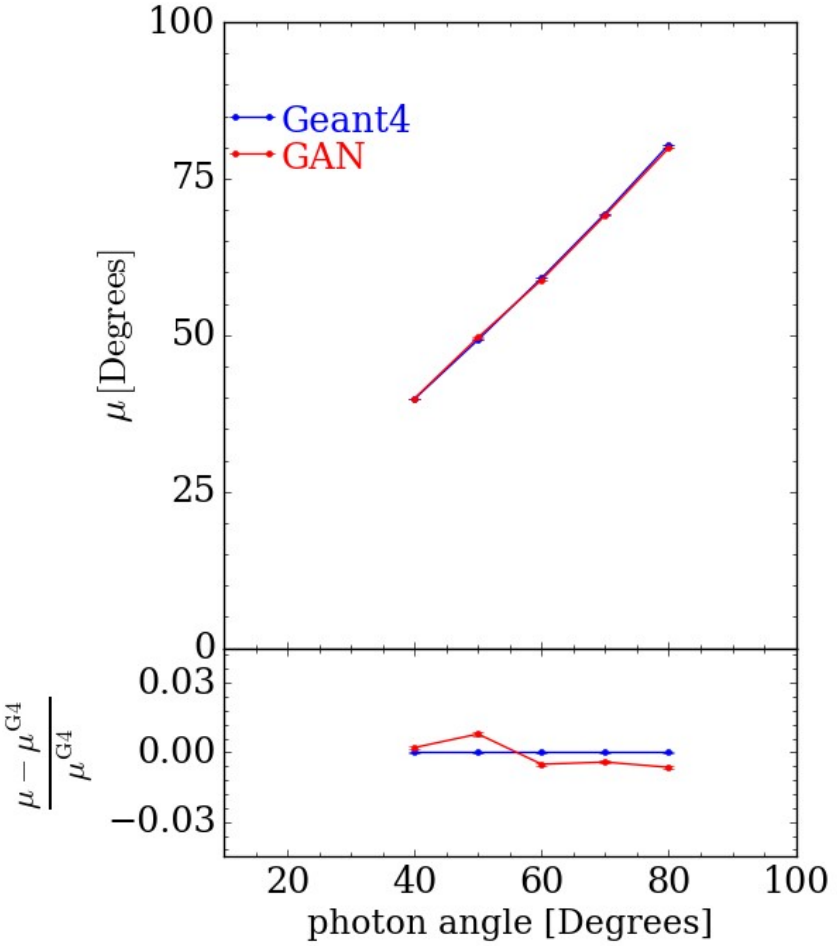
Odd behaviour for fixed showers

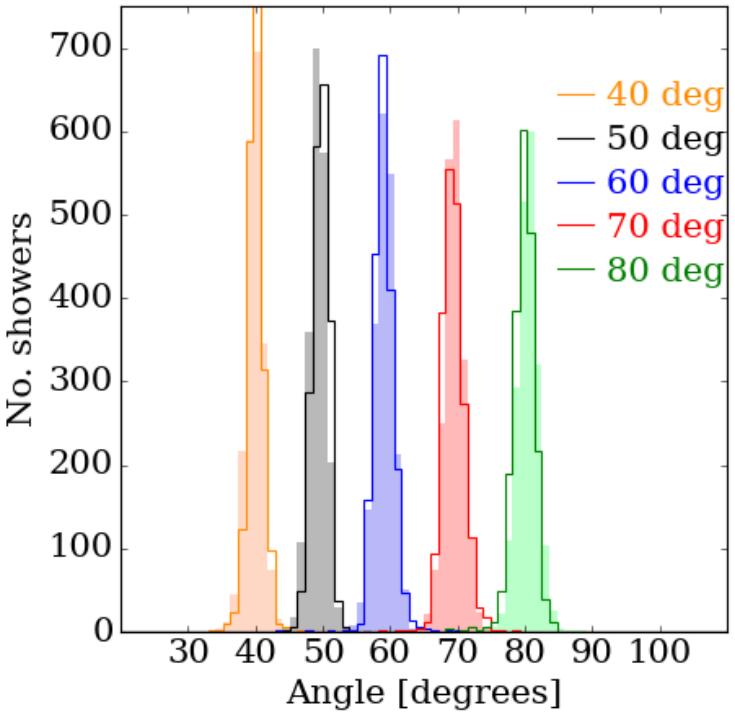
- BIBAE angles don’t align with geant4 data
- Looking closer: geant4 data appears to be recoed at angle with systematic bias to lower values
- What could be causing this systematic shift?
  - Either: pca has some problem for (30,30,60) data (recoing angles lower than it should) **and** BIBAE is learning a systematic shift in data to higher angles
  - Or: there is some difference between validation data and training data



Reminder: pca worked for angular study



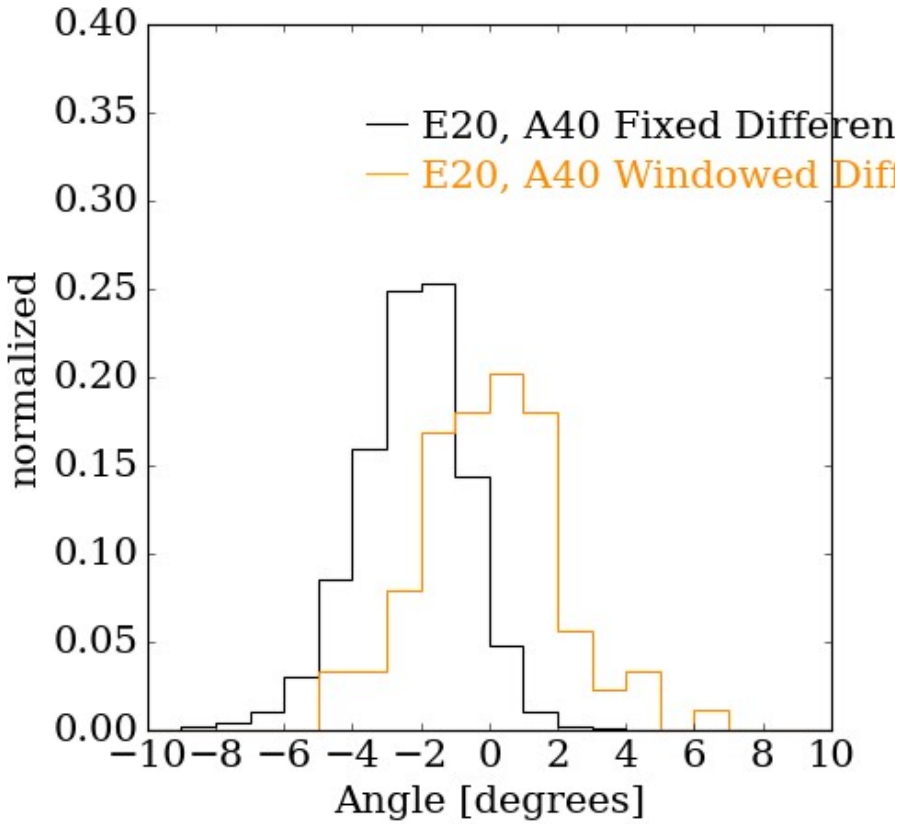


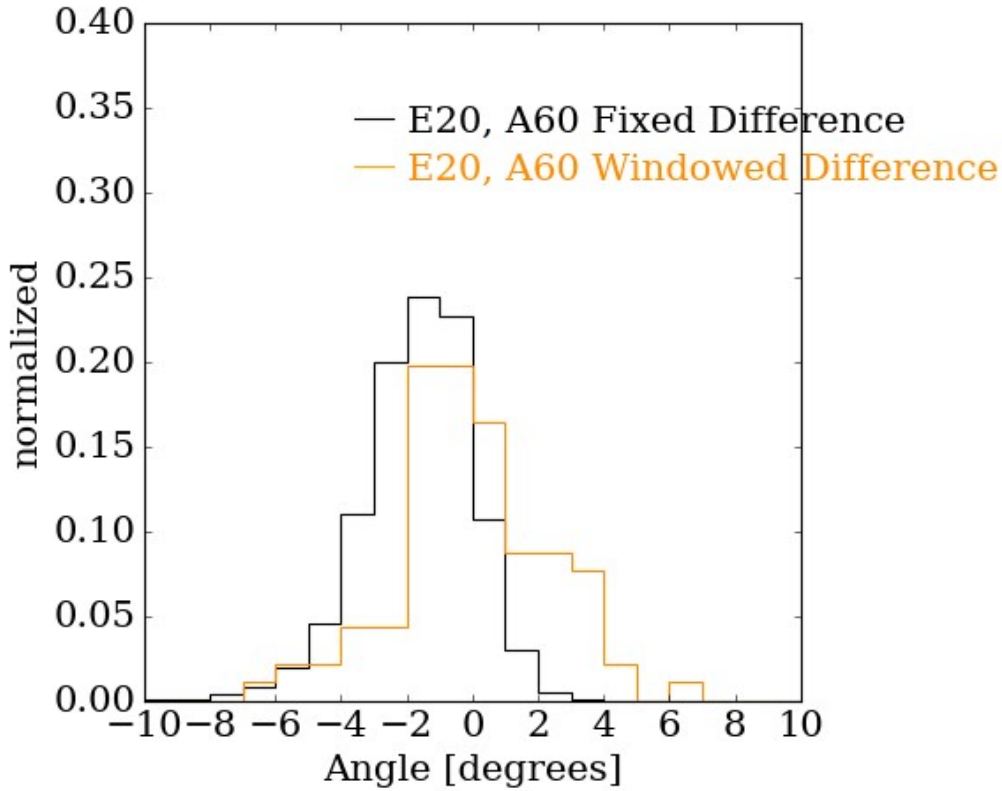


Investigation

- Want to compare training data to validation data as sanity check
- Take +/- 0.5 degrees and +/-0.5 GeV energy slices on training data slices
- Leaves ~ 90 samples per training data windows
- Use full sample for fixed (validation) data + normalise
- For both fixed (validation) and windowed (training) data, find difference between angular reco and true label for that shower

E=20 GeV

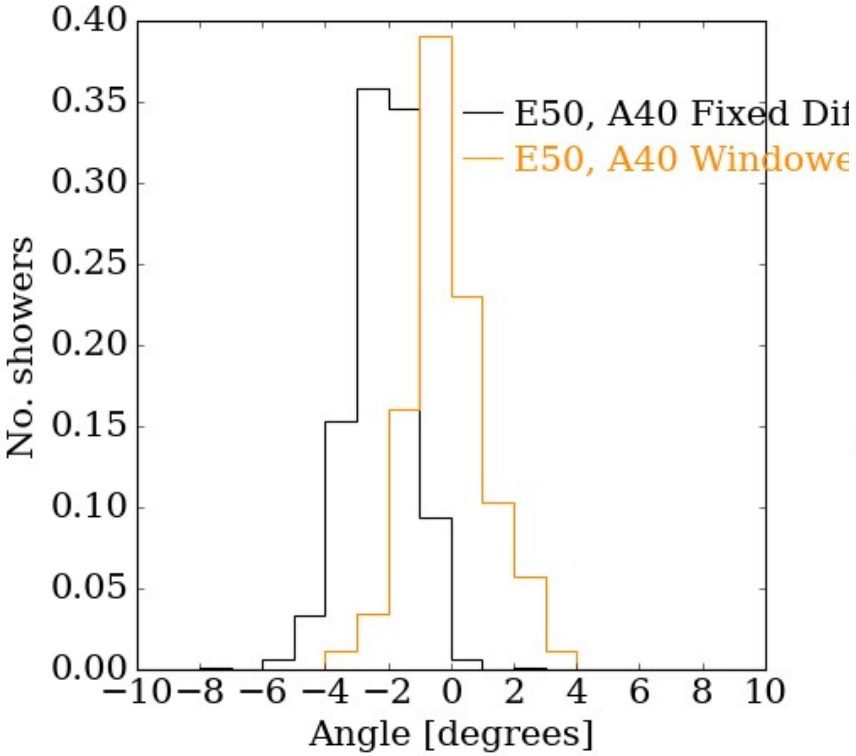


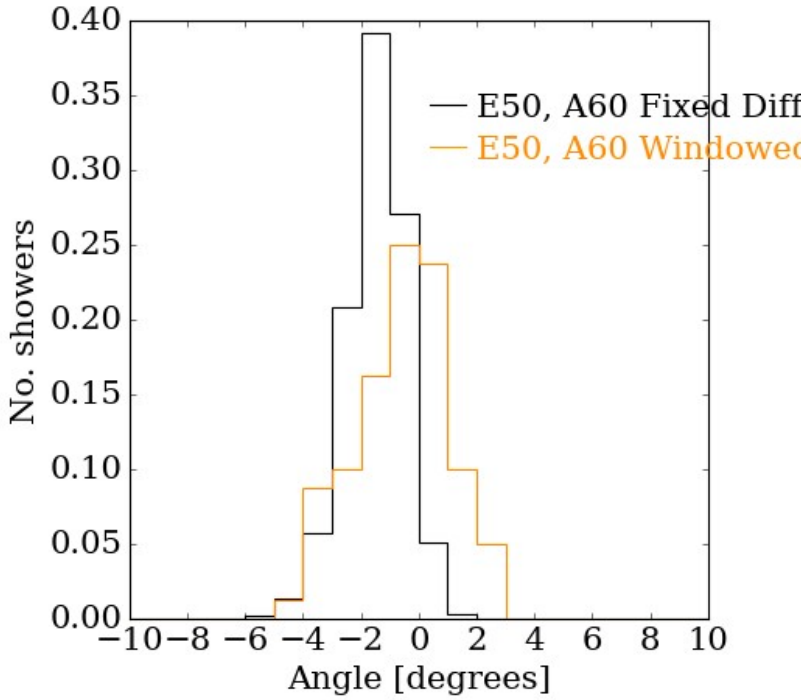


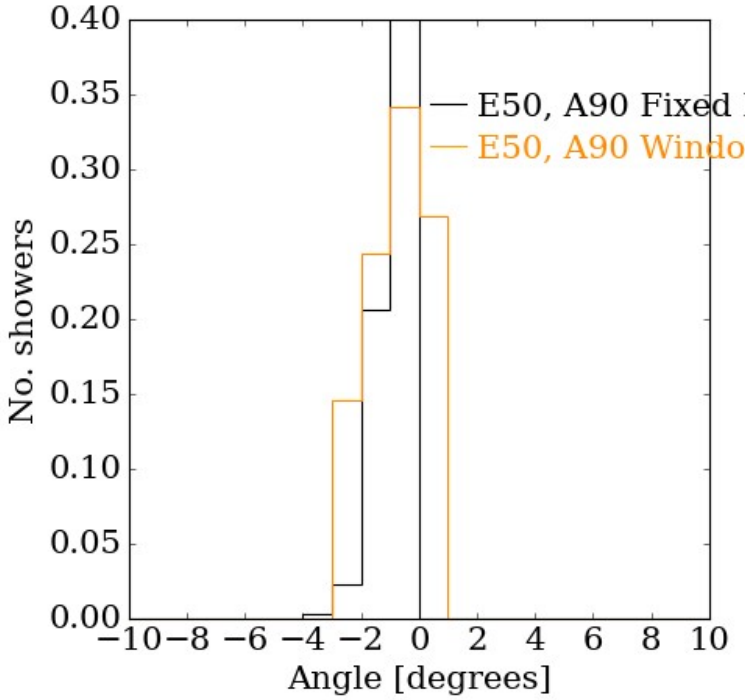
- mu_windowed = 0.0 +/- 0.1,
- sigma_windowed = 1.90 +/-0.08
- mu_fixed = -2.11 +/- 0.03
- sigma_fixed = 1.51 +/- 0.03

- mu_windowed = -0.2 +/- 0.2,
- sigma_windowed = 2.1 +/-0.2
- mu_fixed = -1.45 +/- 0.04
- sigma_fixed = 1.59 +/- 0.03

E=50 GeV





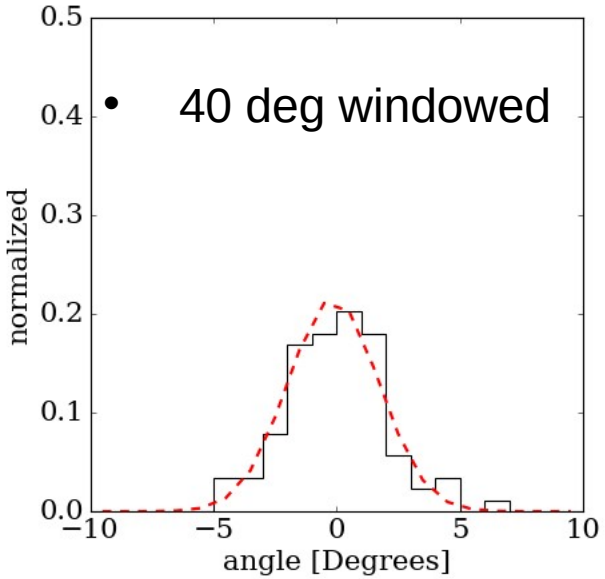


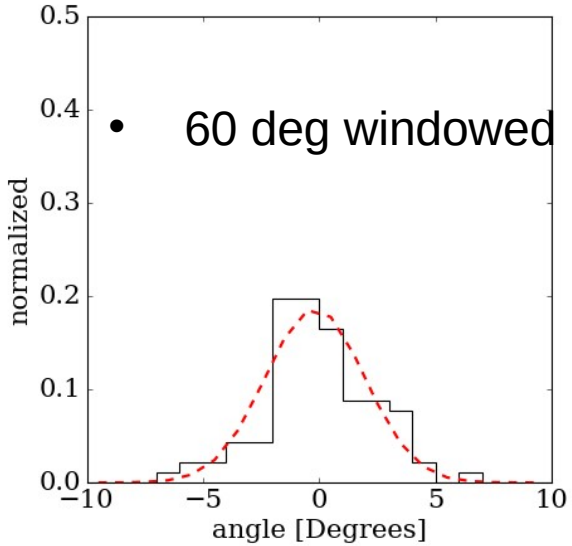
- mu_windowed = -0.3 +/- 0.1,
- sigma_windowed = 1.07 +/-0.05
- mu_fixed = -2.10 +/- 0.02
- sigma_fixed = 0.99 +/- 0.01

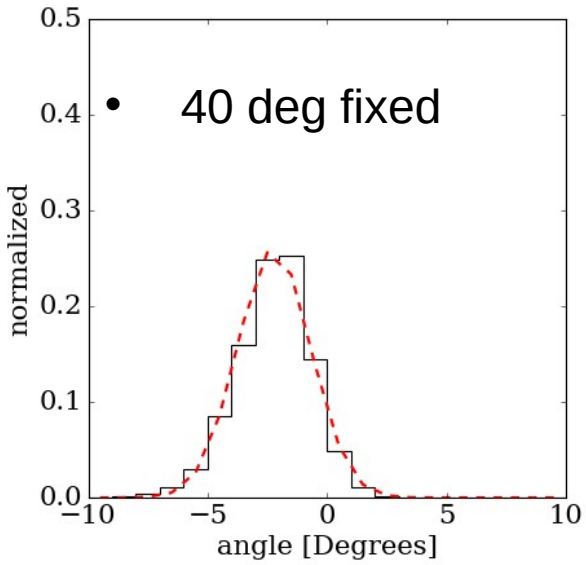
- mu_windowed = -0.4 +/- 0.1,
- sigma_windowed = 1.67 +/-0.08
- mu_fixed = -1.40 +/- 0.02
- sigma_fixed = 1.01 +/- 0.01

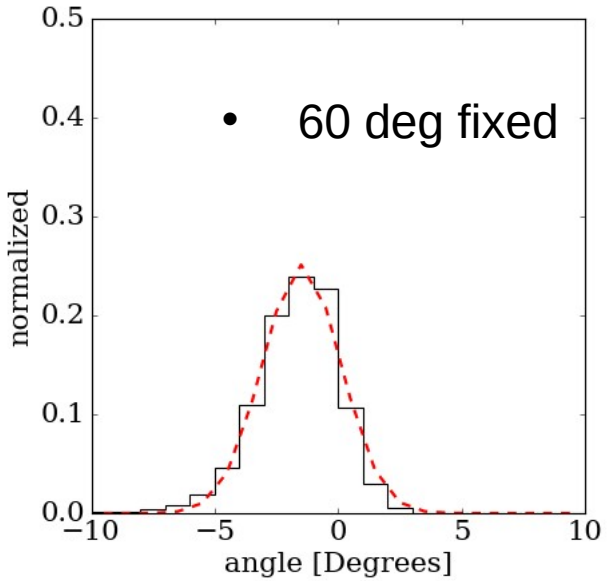
Backup

E=20 GeV


• 40 deg windowed
normalized
angle [Degrees]

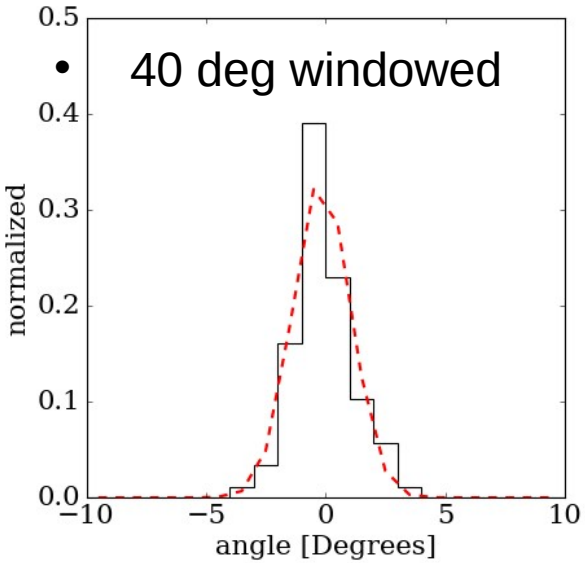

• 60 deg windowed
normalized
angle [Degrees]


• 40 deg fixed
normalized
angle [Degrees]

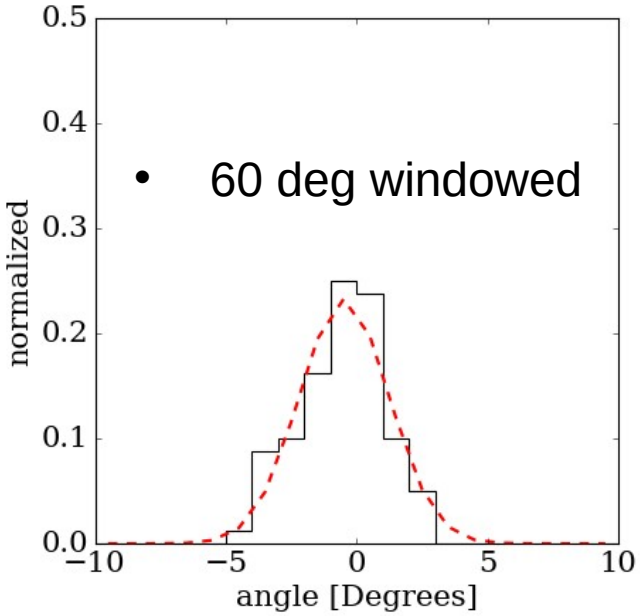

• 60 deg fixed
normalized
angle [Degrees]

E=50 GeV

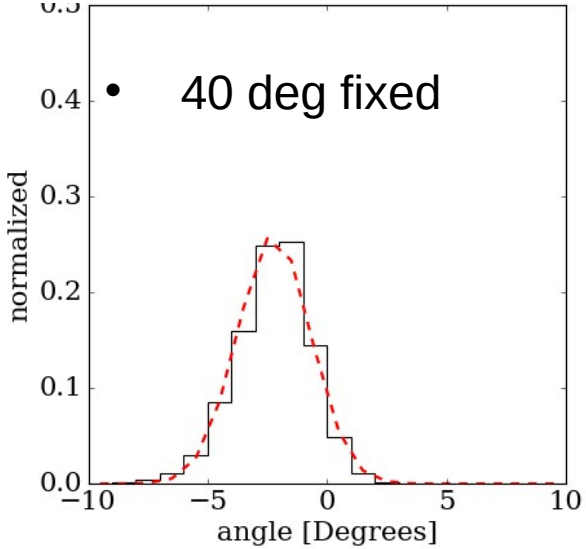
- 40 deg windowed



- 60 deg windowed



- 40 deg fixed



- 60 deg fixed