

Direct Reco Upgrade Progress – Binning study

Friday meeting 23-04-2021

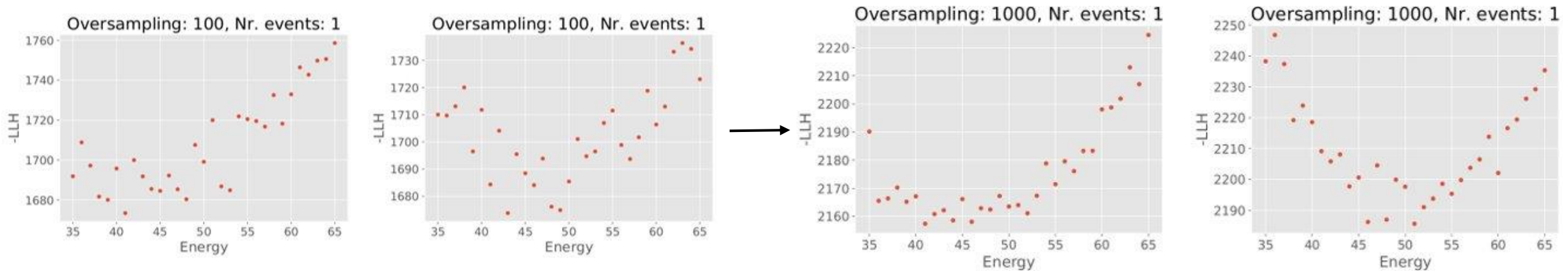
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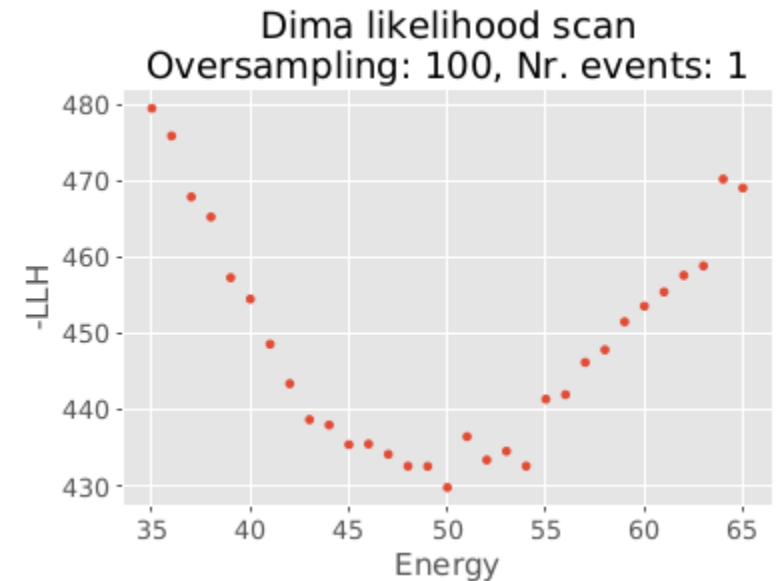
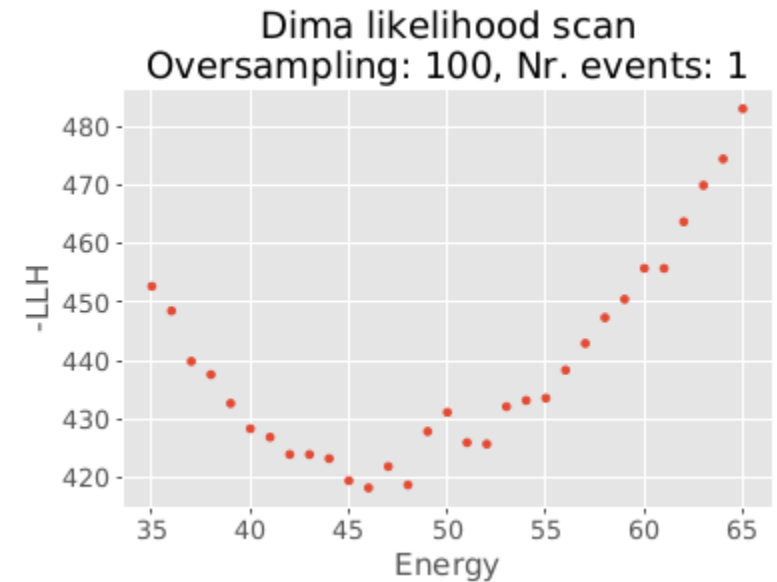
Recap

- Last time showed that large oversampling showed much improvement in likelihood stability and reconstruction ability
- Large oversampling takes a long time though :(



Only 1 bin

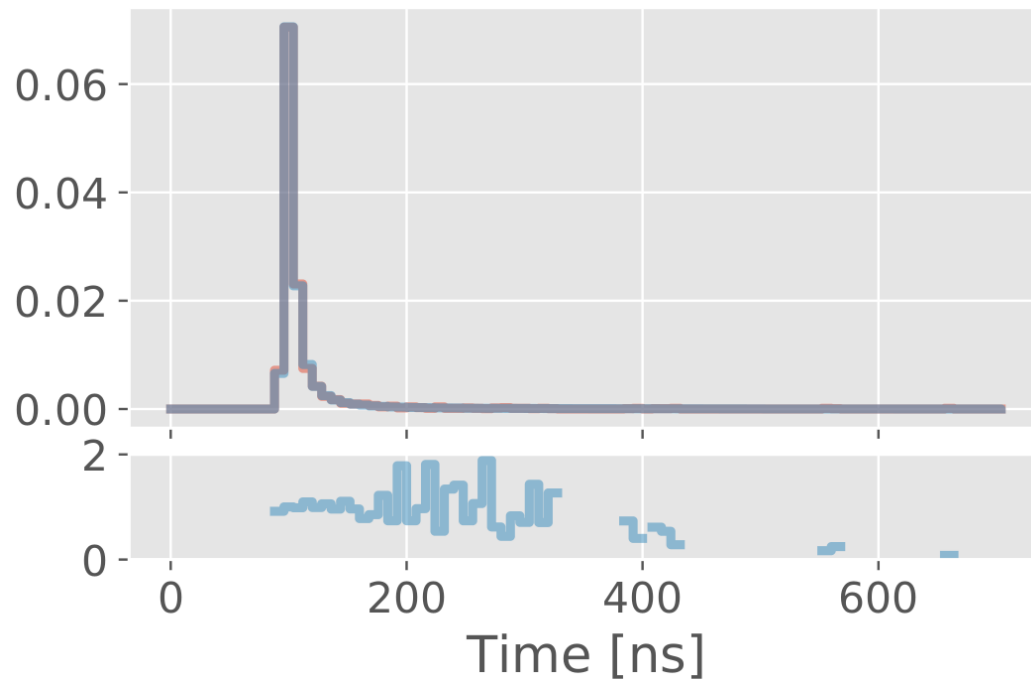
- A single bin showed stable likelihood space for energy with low oversampling!
- With 1 bin, we loose time information
 - -> worse directional reconstruction
- Try logarithmic binning
 - Small bins at small time, and large bin at large time



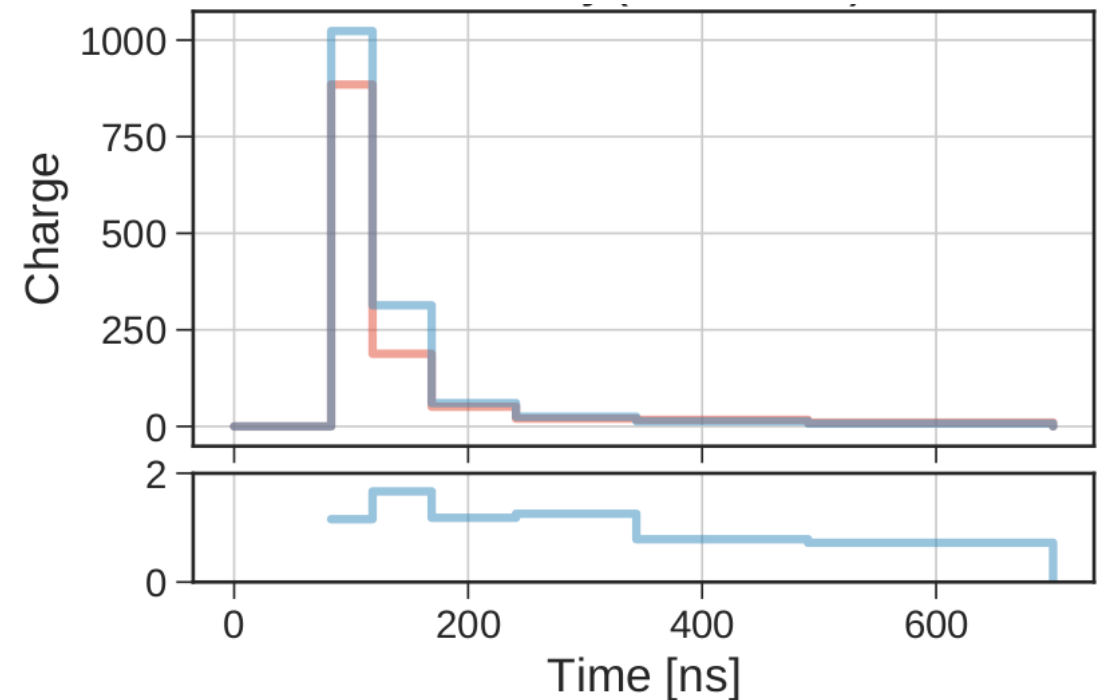
Logarithmic binning example

- Shows the uniform binning and the logarithmic binning
- This is only meant to show the bin widths, do not compare the actual charge vs. time, they are not the same events

Normal uniform binning (87 bins)

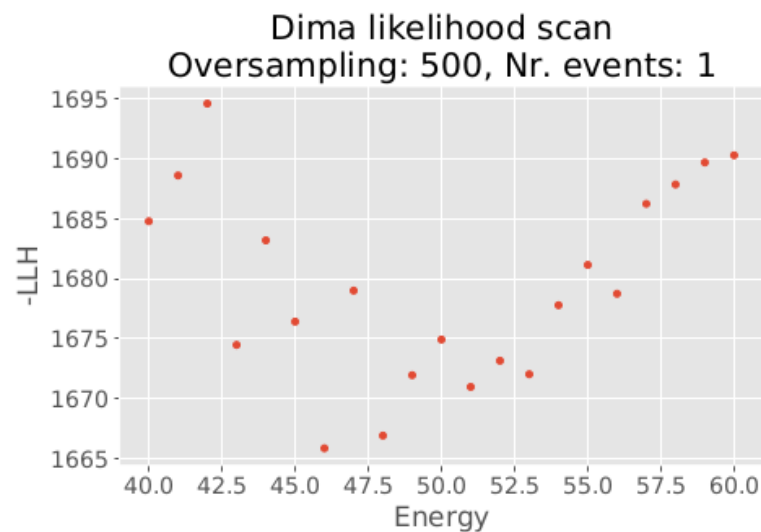
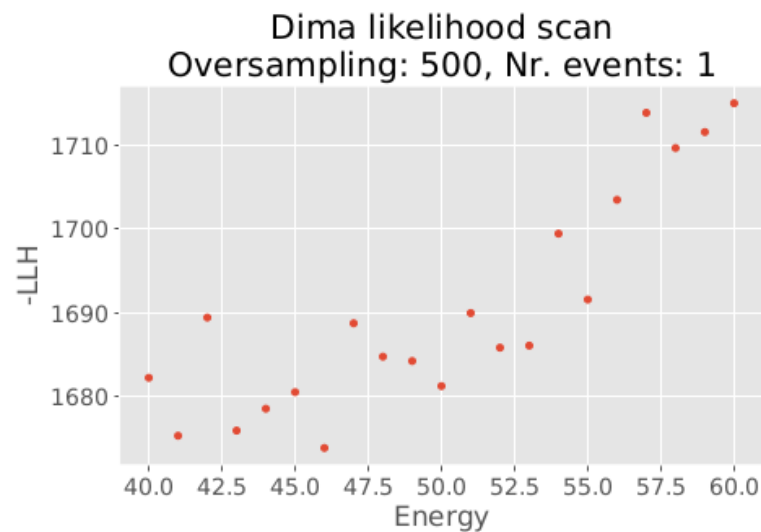


Logarithmic (10 bins)

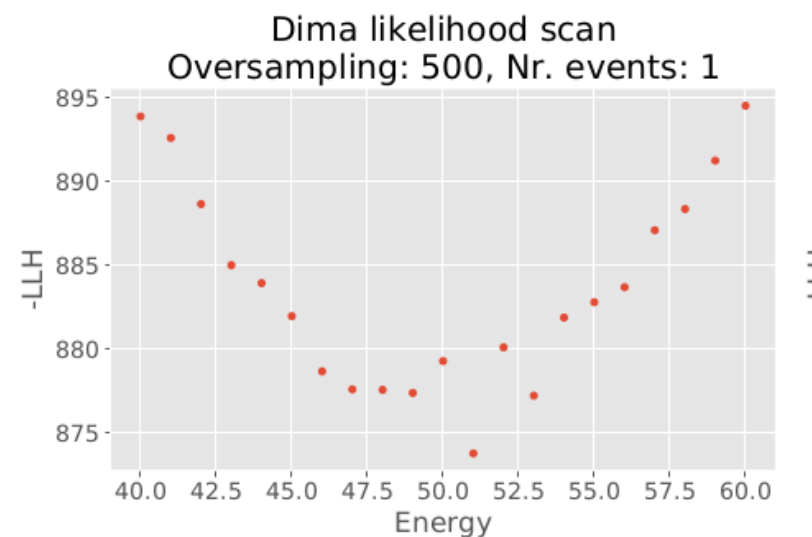
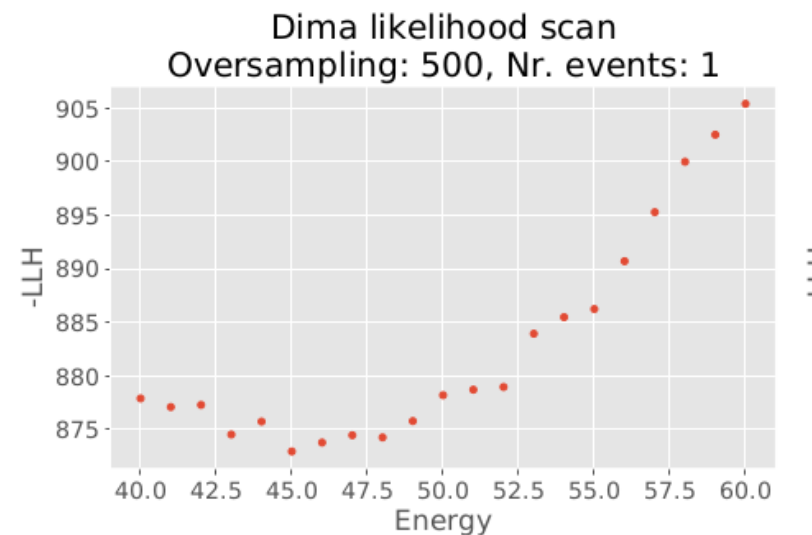


Logarithmic binning test : energy

Normal uniform binning

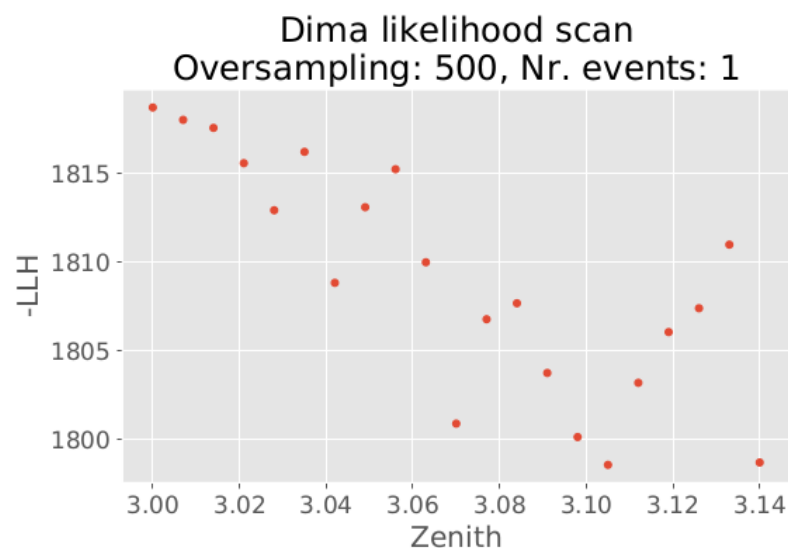
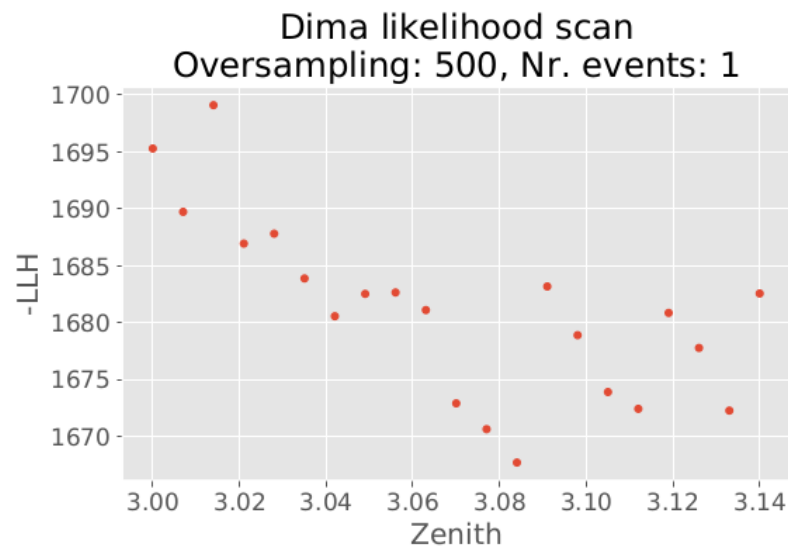


Logarithmic

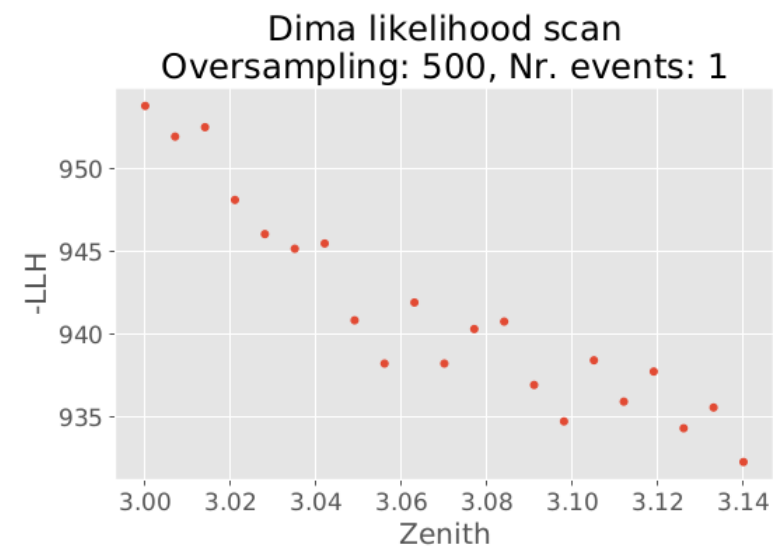
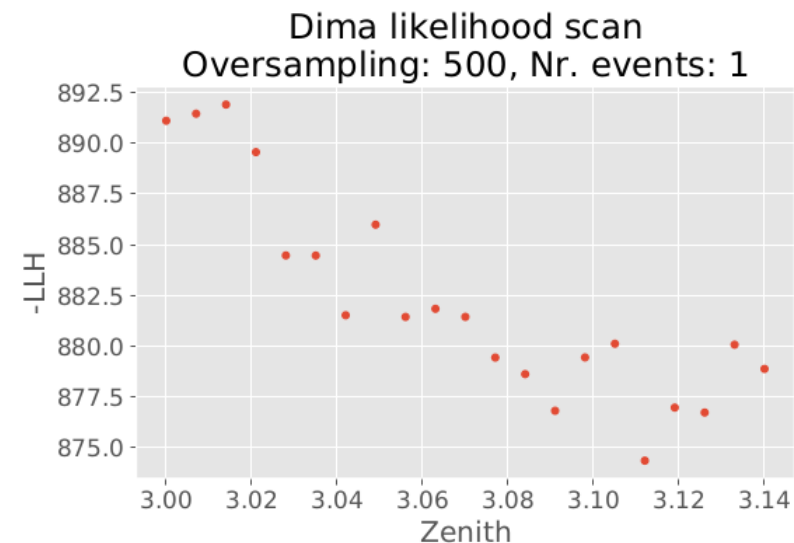


Logarithmic binning test : zenith

Normal uniform binning

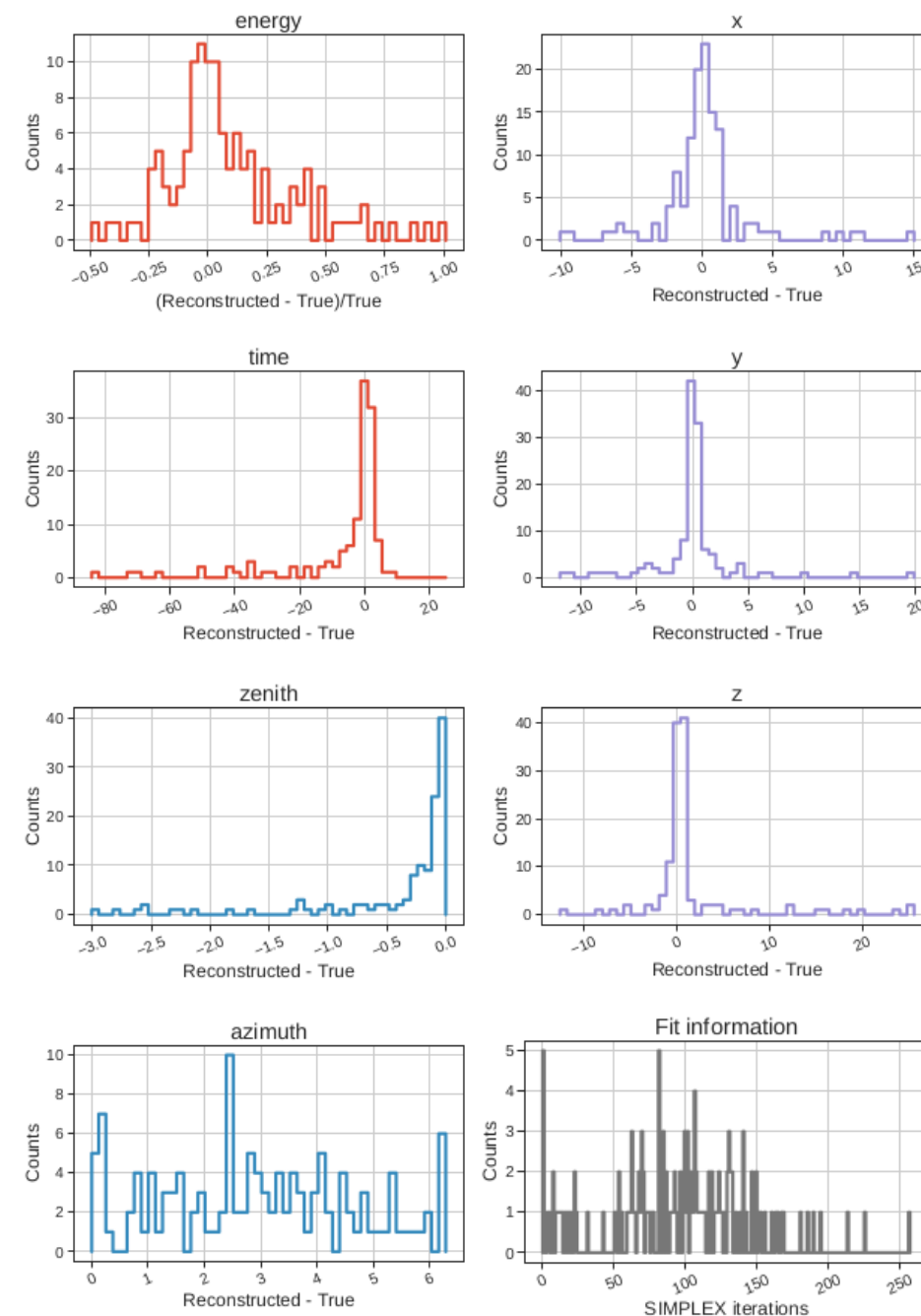


Logarithmic



Logarithmic binning reconstruction

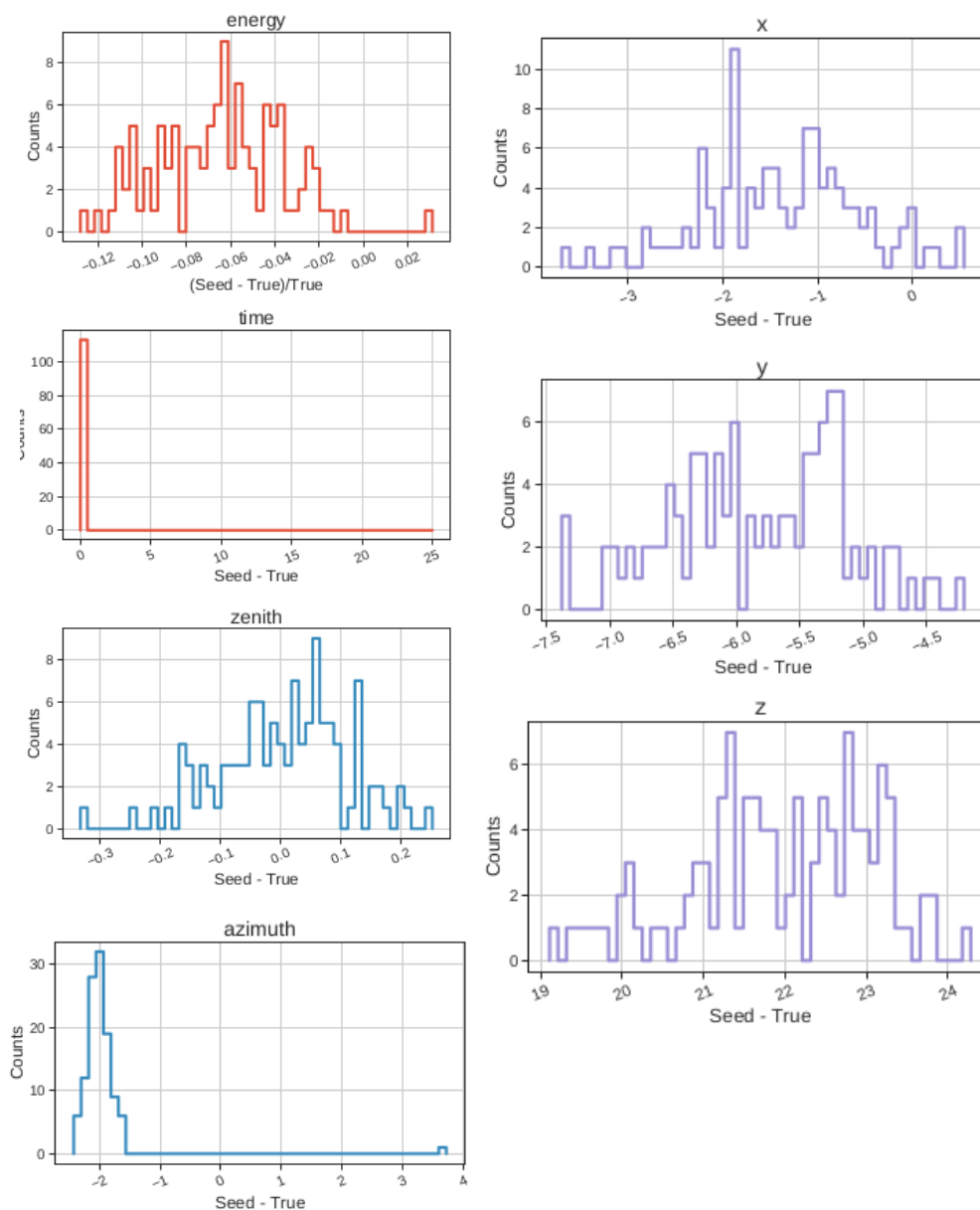
- Oversampling 500
- Seeding is uniformly sampled around truth
- Shows really good results



New MC and new seeding

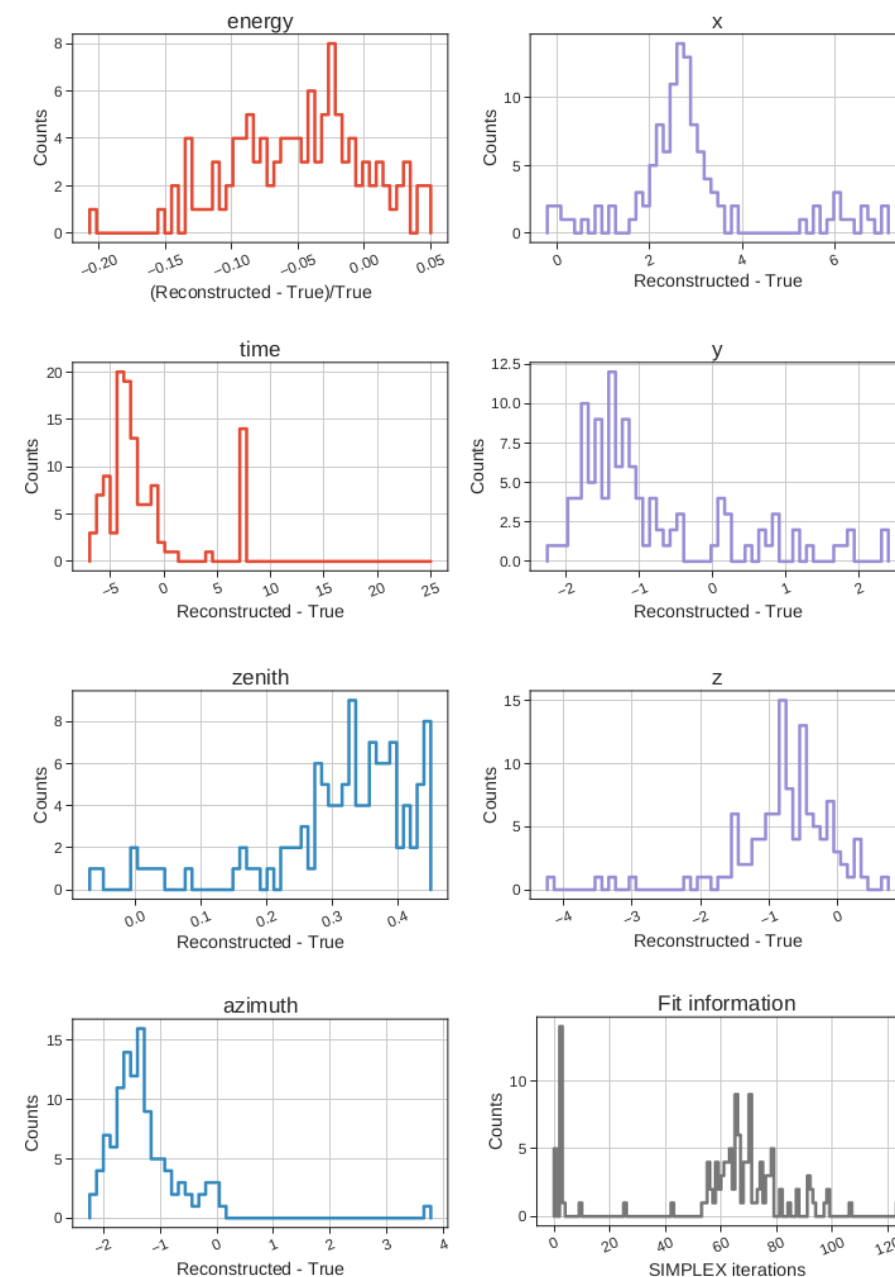
- Previously I had simulated a directly upwards going electron
 - -> Azimuth does not have any influence
 - -> Simulate with $\cos(\text{zenith}) = -0.9$, $\text{azimuth} = 0.8 \cdot \pi$
- Realistic seeding
 - For seeding x, y, z -> COG is used
 - For seeding zenith, azimuth -> linefit is used (SPE fit should be used)
 - Time -> set to 0
 - Energy -> energy appr. scales with total charge, find factor which relates total charge with energy and seed by multiplying this factor with the total charge

Reconstruction results



Oversampling: 1000
Events: 117

<-Seed
Reco ->



Reconstruction results – seed correlation

Oversampling: 1000

Events: 117

