Head-Tail and directionality: Preliminary analysis on MonteCarlo

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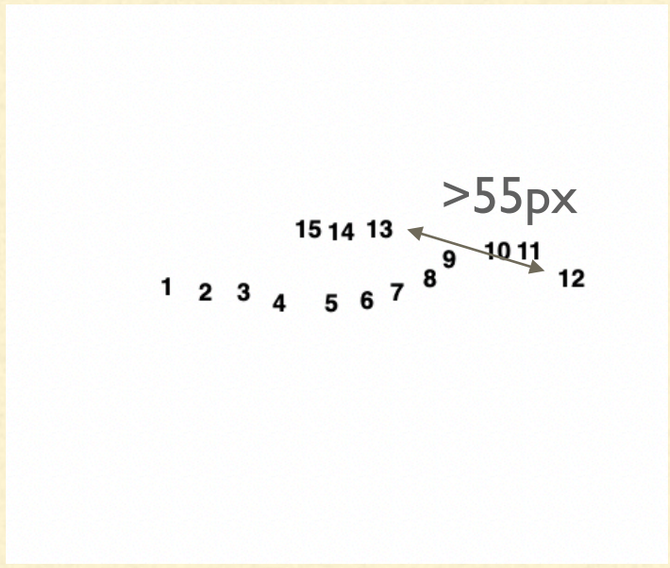
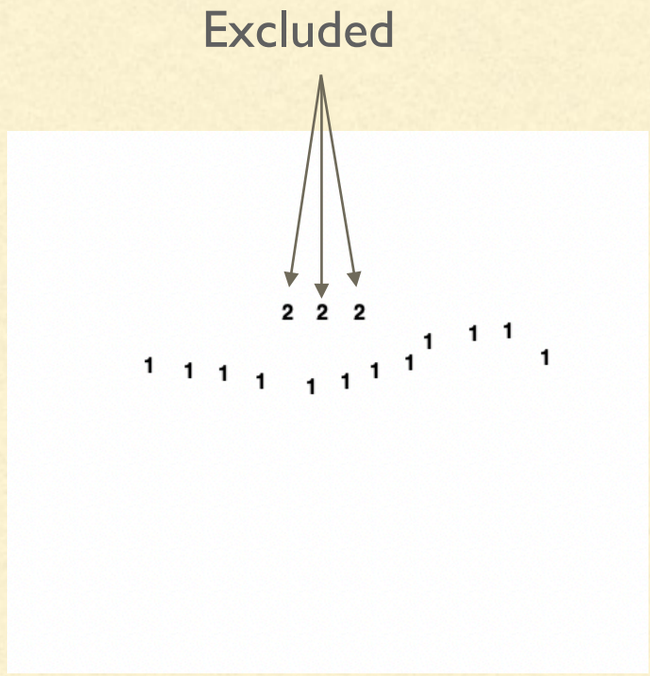
Isolation of main track

- After sorting, if there is a slices out of a radius of 55px from previus slices each next is excluded
- Excluded points are labeled with 2

Original Track



Sorted Track



"OnTrack" info

- Analysis are done only on slices "OnTrack"

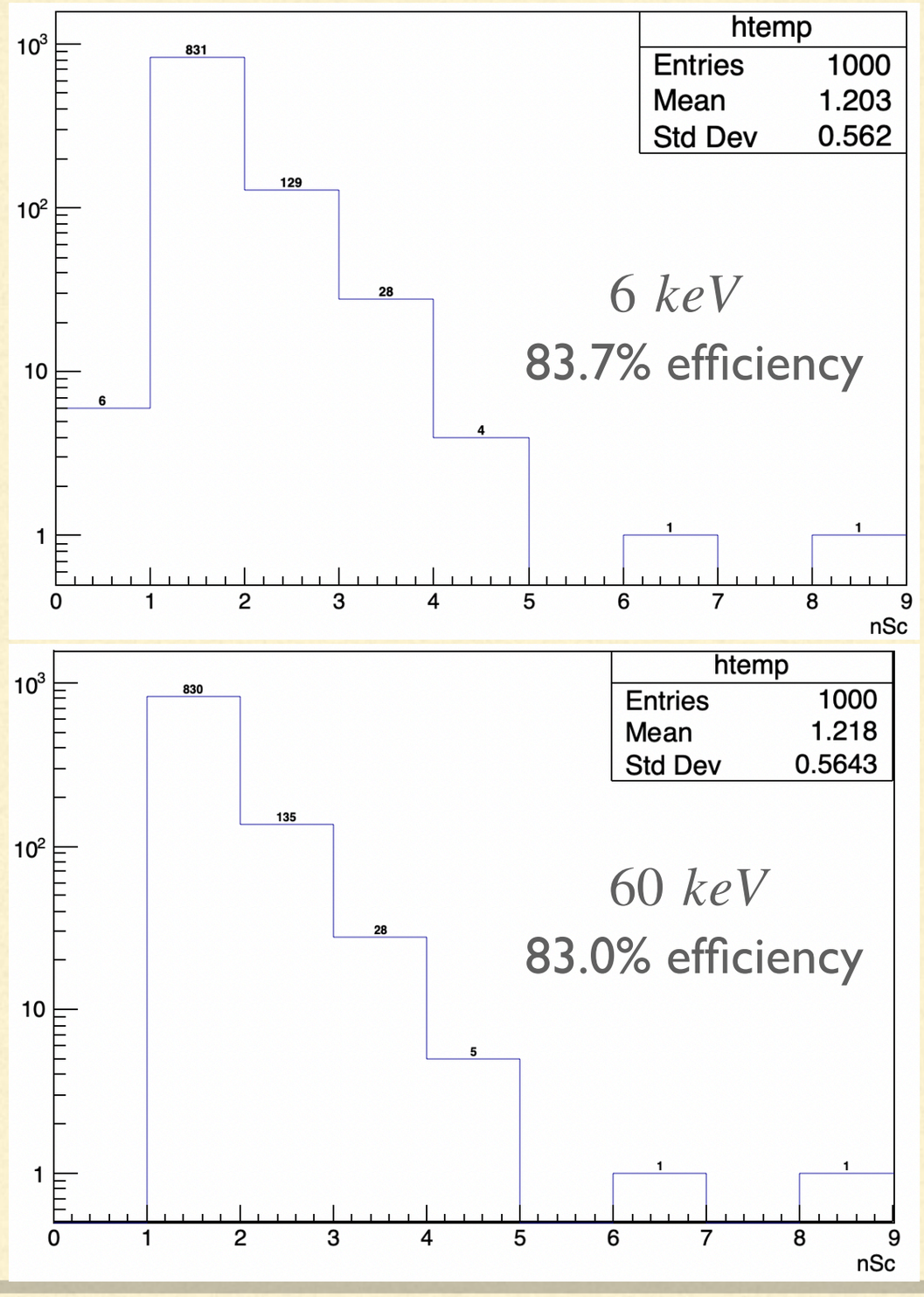
Dataset studied

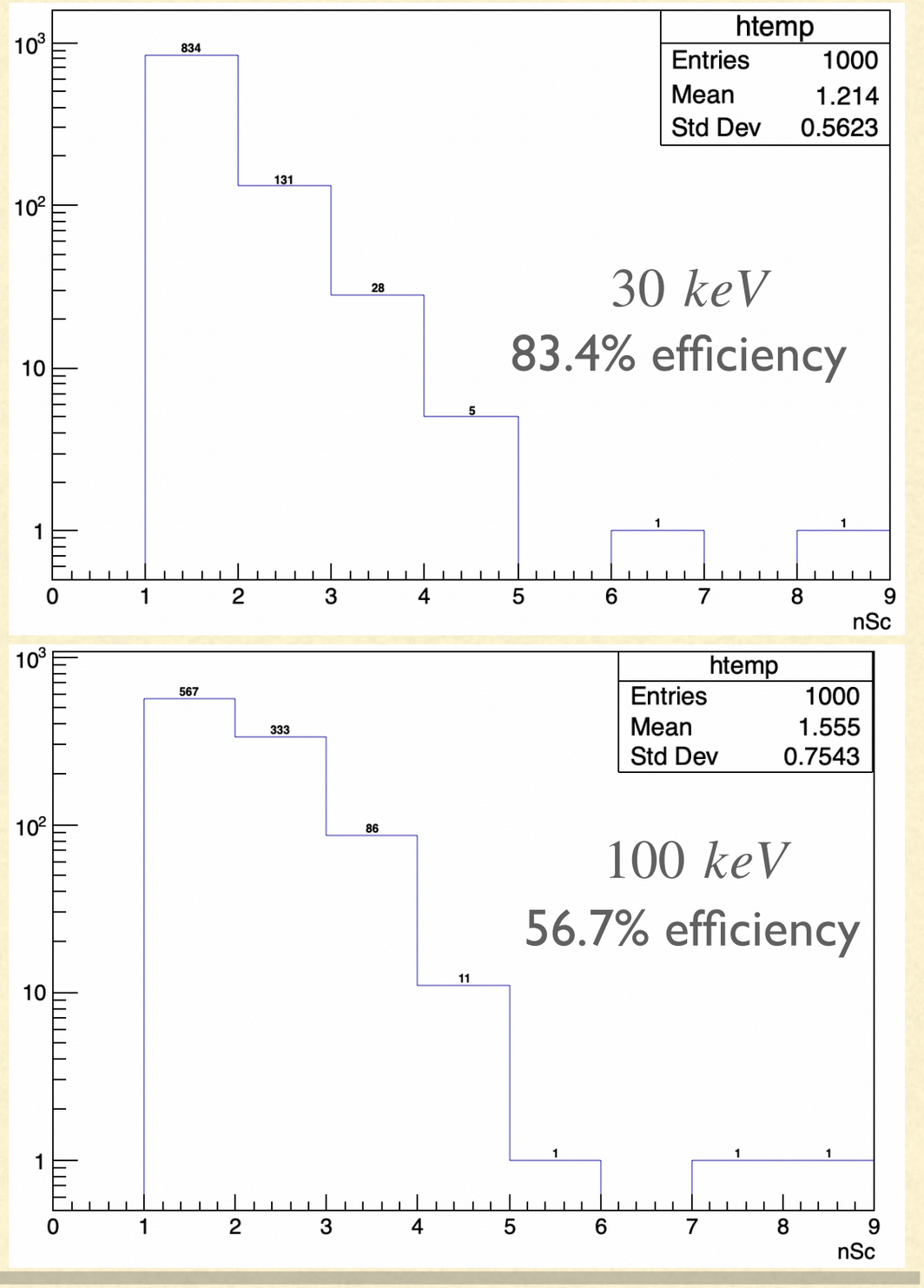
Directionality studied on electrons from MC by Giulia and Atul:

- Energy of 6 keV, 30 keV, 60 keV, and 100 keV
- Electron generated at the center of the image
- Distance from the GEM of 25cm to simulate diffusion
- Electron shot along the x-axis
- 1 Track per event

Supercluster reconstruction efficiency

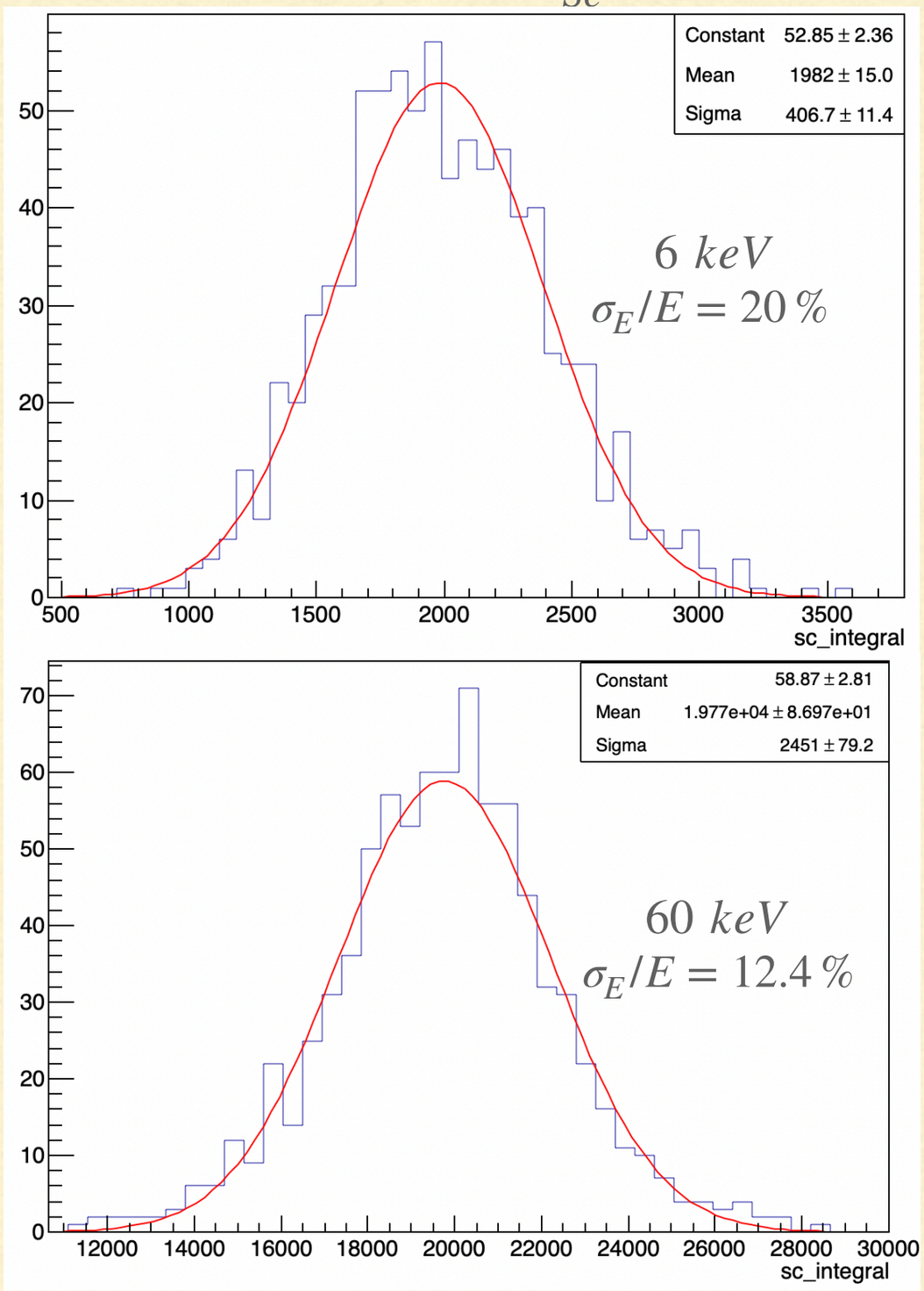
- 1 electron per event → 1 supercluster per event expected

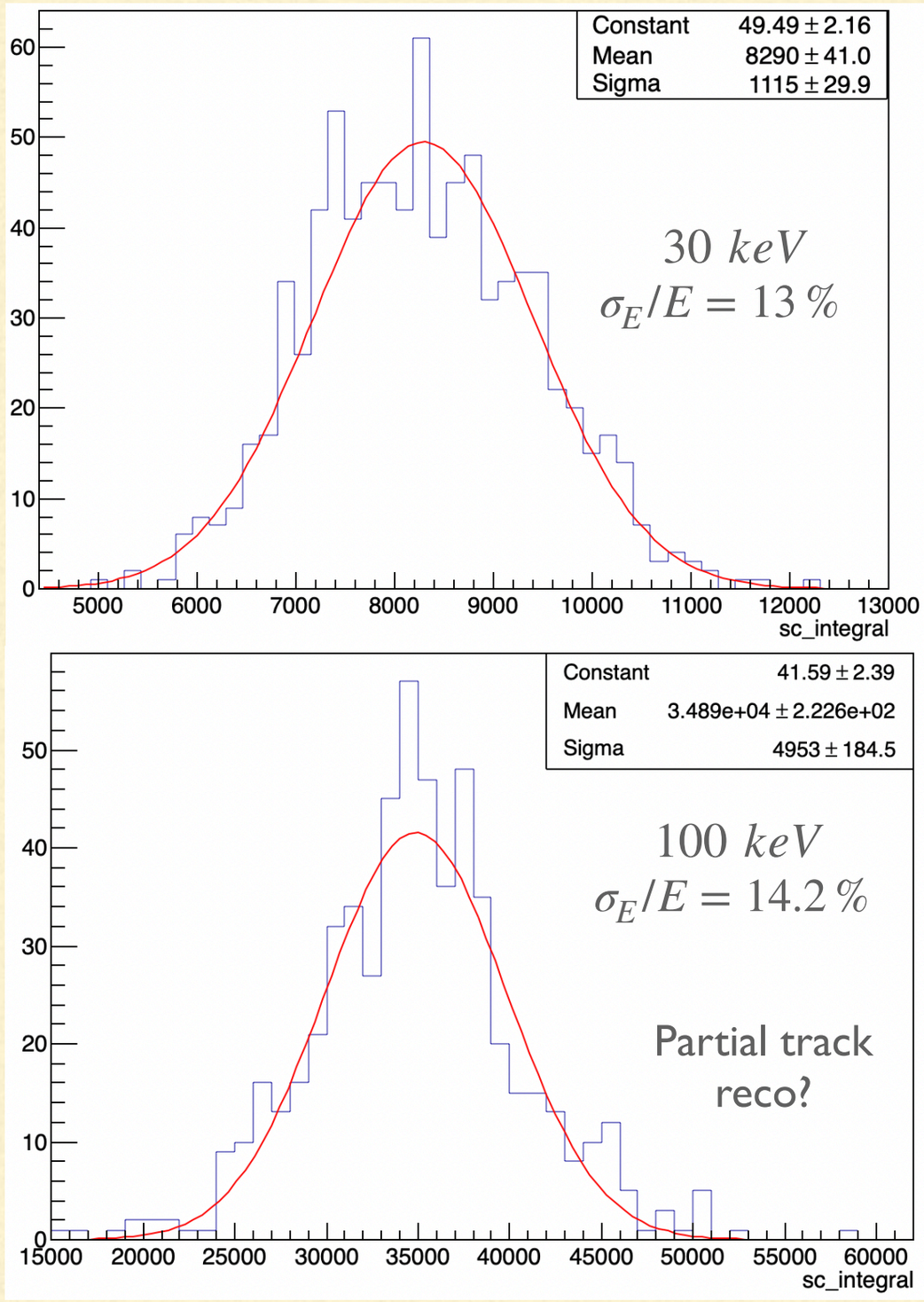




Energy resolution

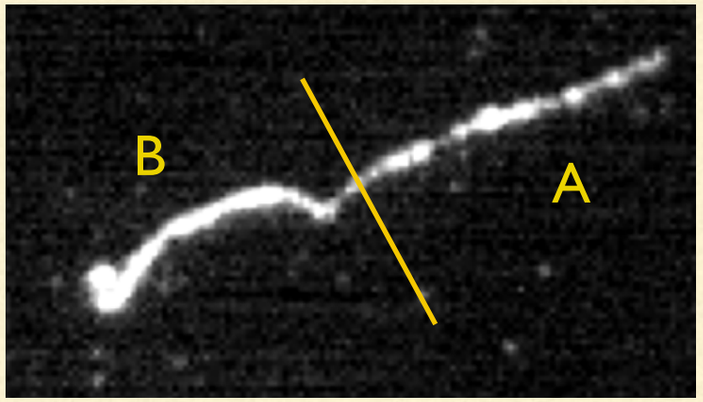
- Events selection with $N_{Sc} = 1$

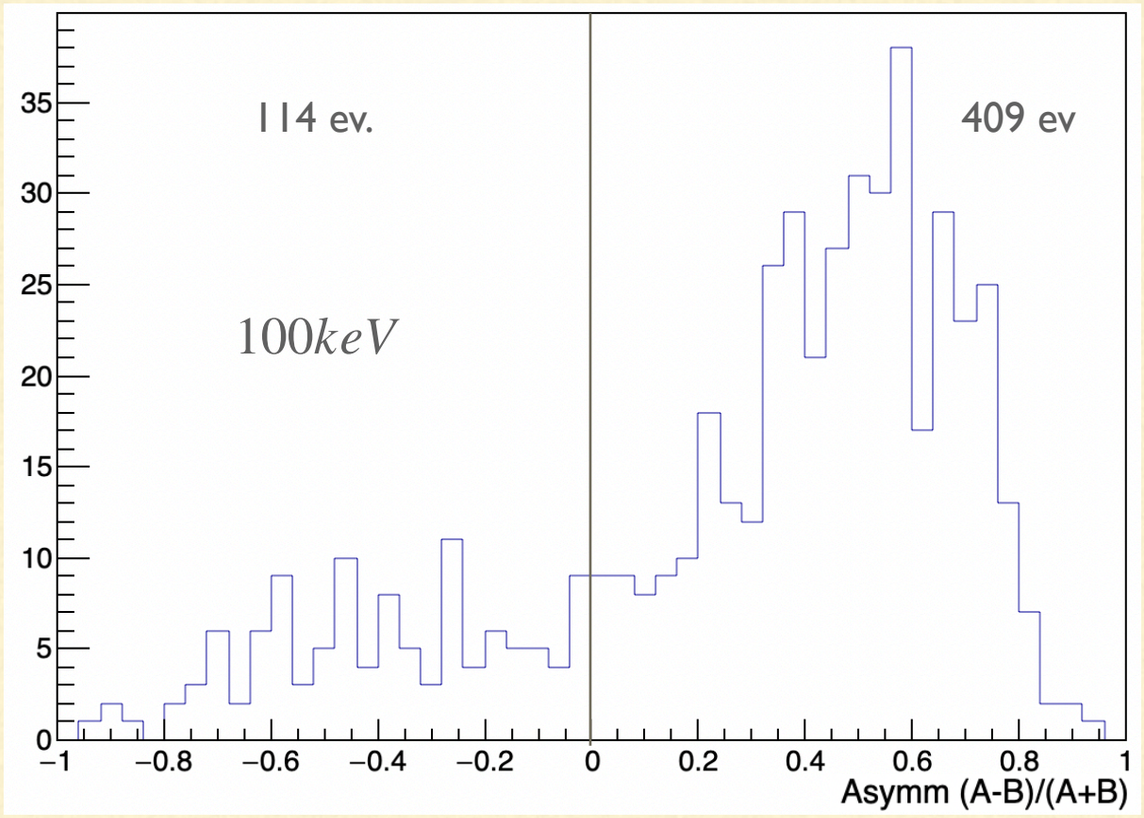




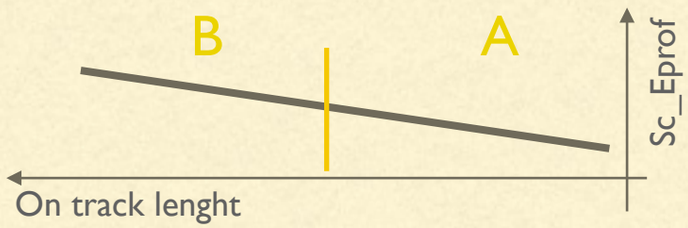
Track Asymmetry

- Cut the track into two pieces with same number of Slices
- Compute the integrals A and B.
- Define the Asymmetry as (A-B)/(A+B)
- Asymmetry multiplied times -1 if A is on the left
  (^{133}Ba source was on the right, can be easily changed)

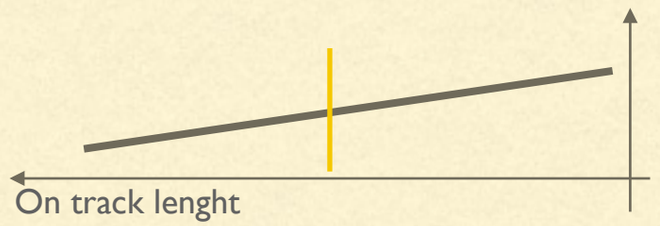




Asimm<0
(Like above track)



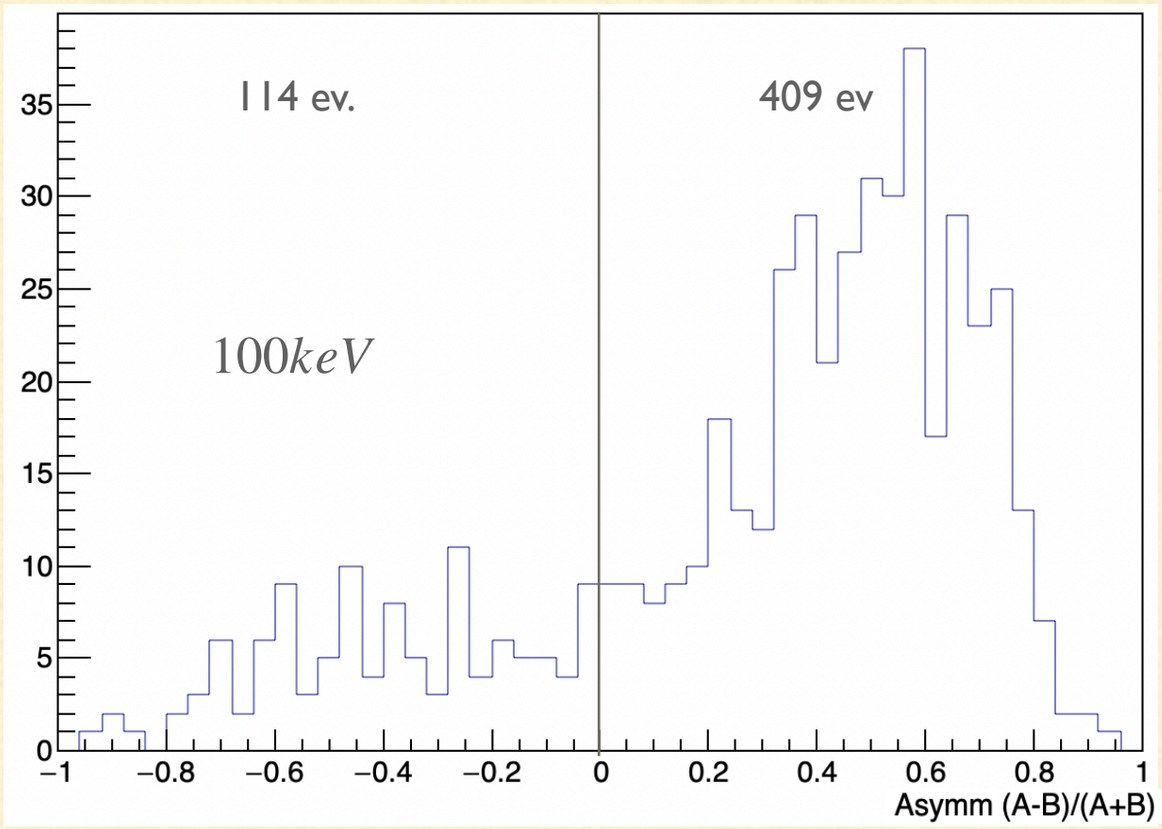
Asimm>0

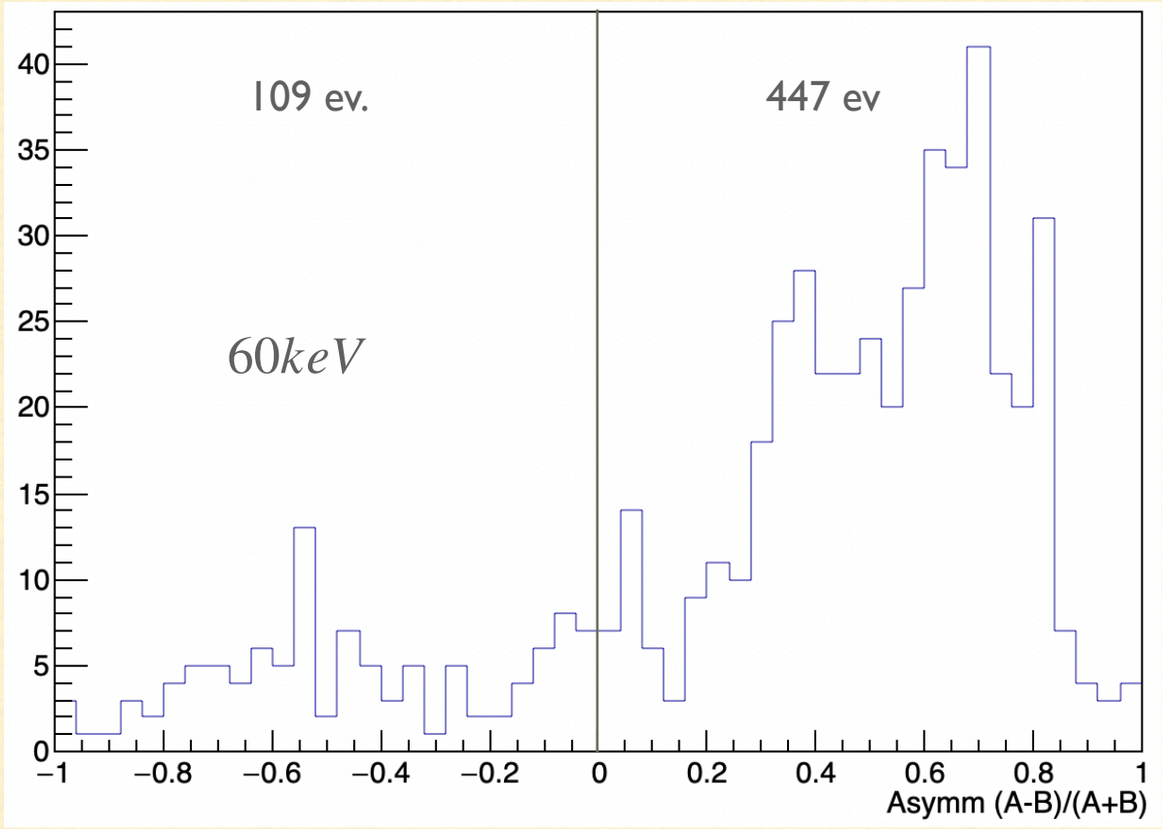


Events with negative asymmetry need some investigation

Track Asymmetry comparison

- Events selected with nSc $==1$ and Sc_nSlices >4

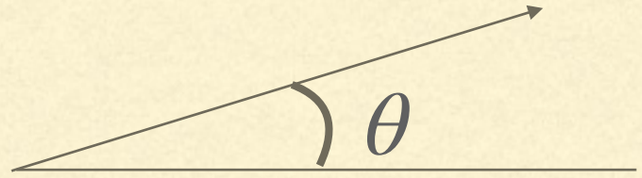


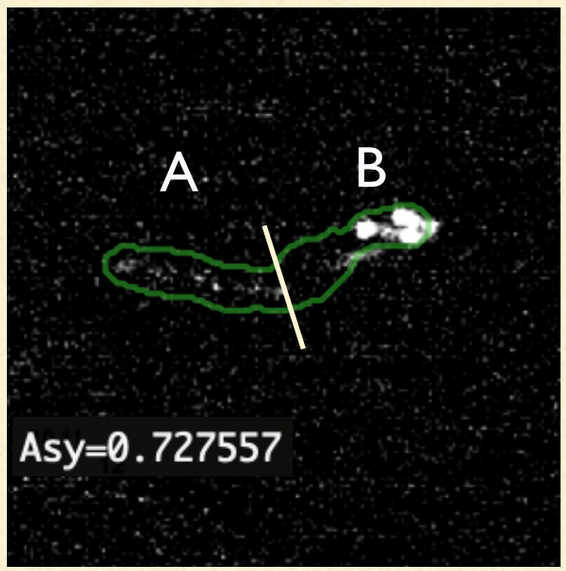


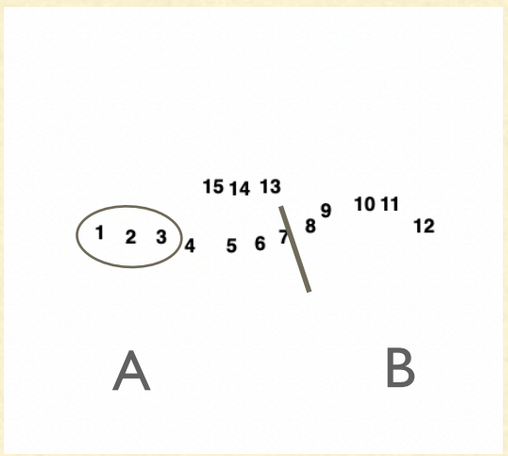
- Dataset at 6 keV and 30 keV not analysed due to the number of slices too low
- Data with slices of 15px of radius ready

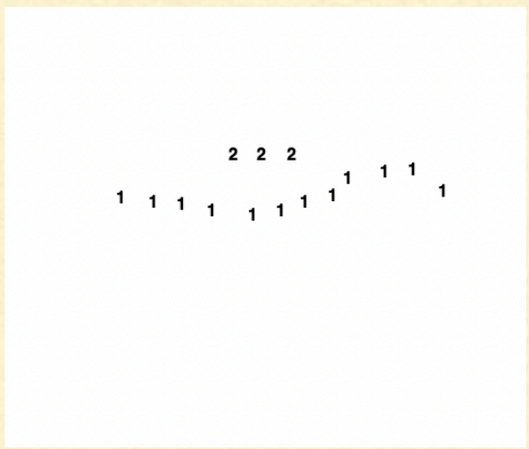
Directionality: strategy

- Consider the asymmetry to find the real beginning of the track
- Get the first N slices and fit it with a line(Seems to be optimal for N=3)
- Reconstruct the slope and so the angle of the track considering the order of the N points

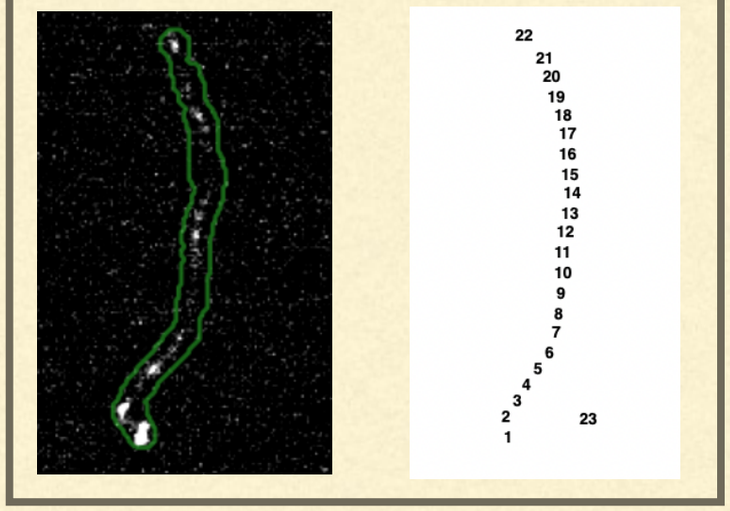


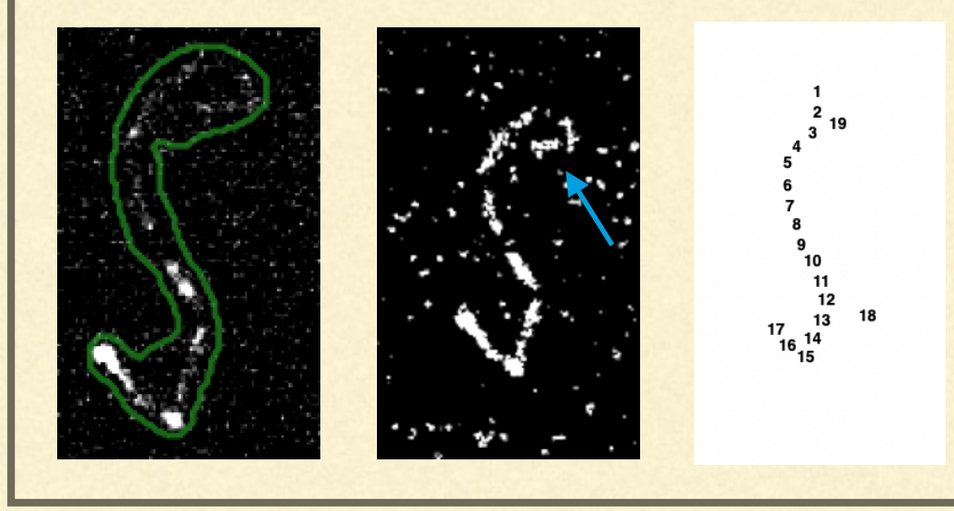


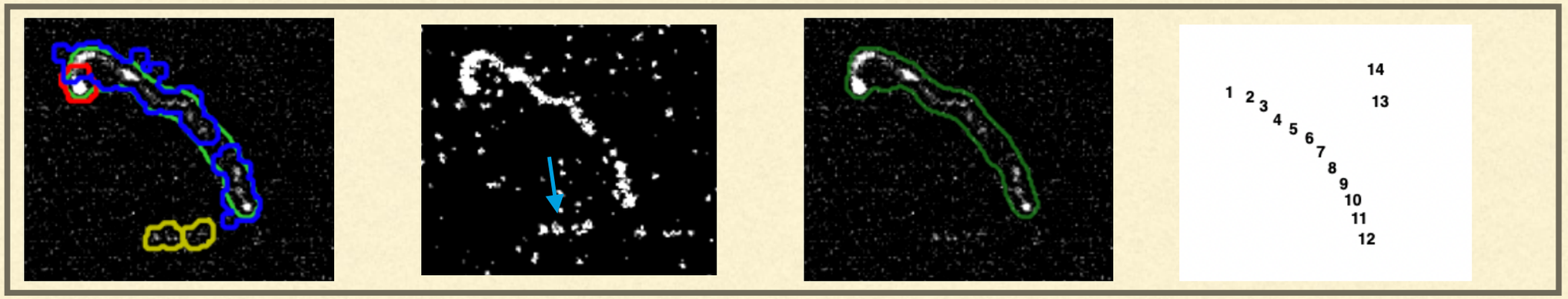




Issues in reconstruction

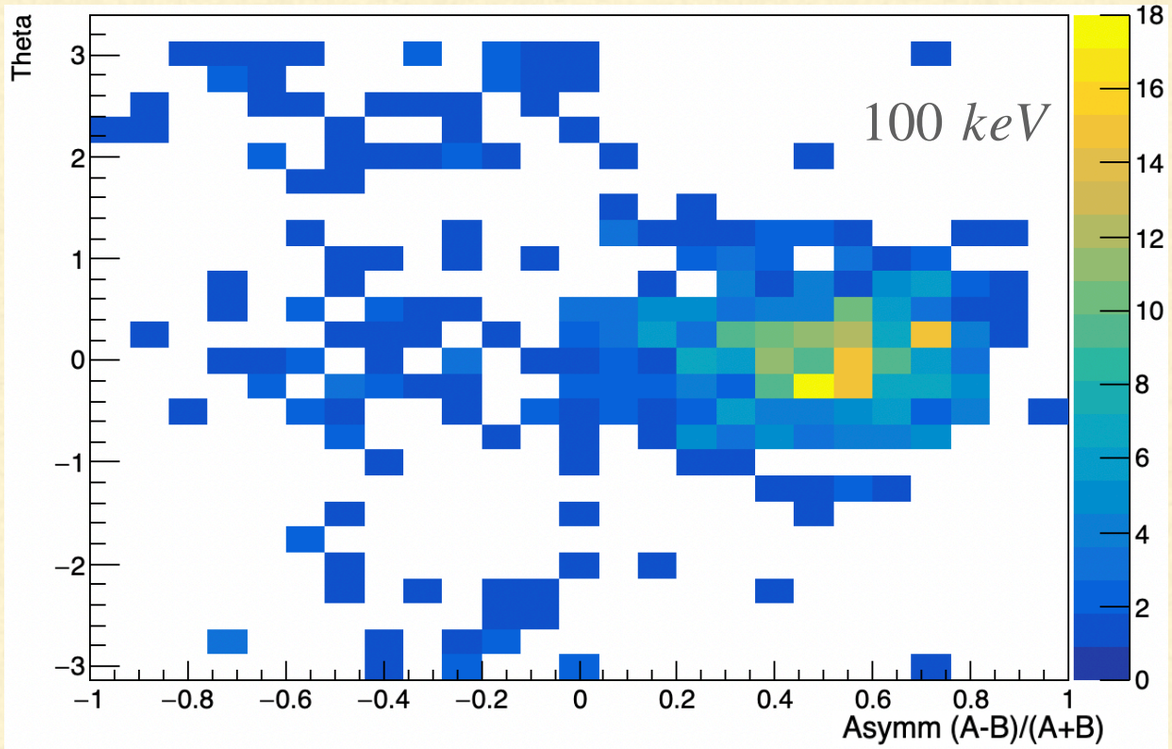


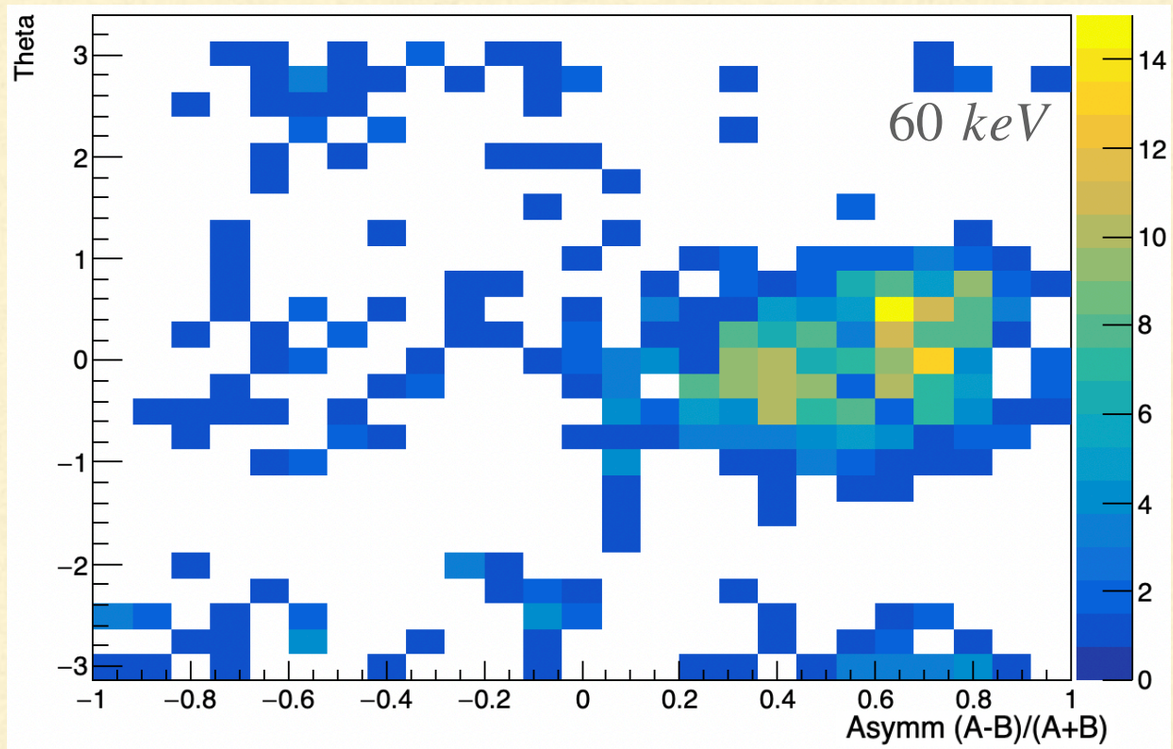




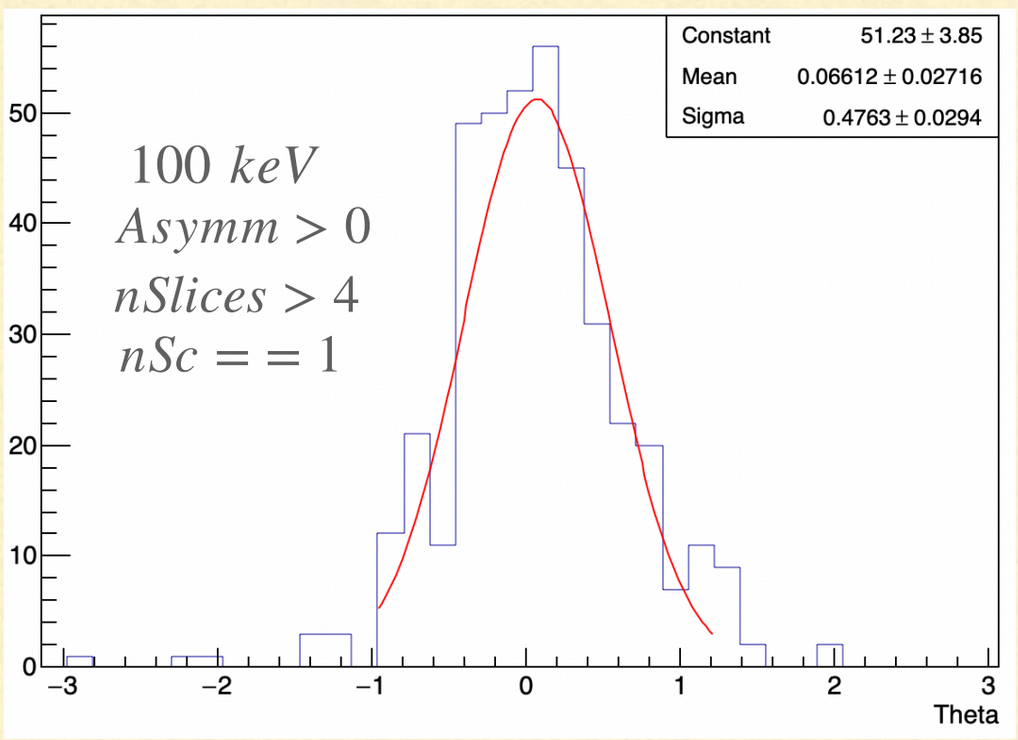
Data @ 100keV. Reconstruction is optimized for higher energy?

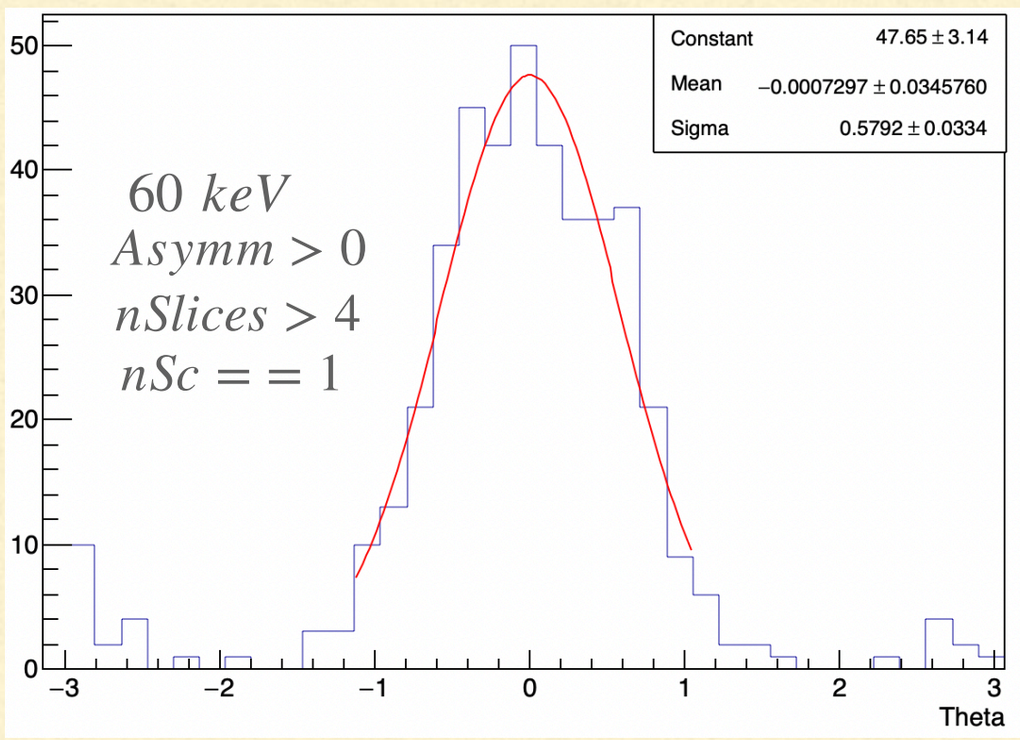
Directionality: analysis





Events with negative asymmetry dominate for larger values of theta

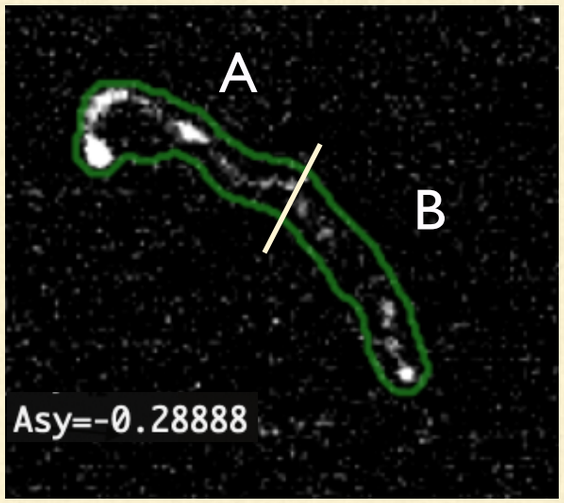


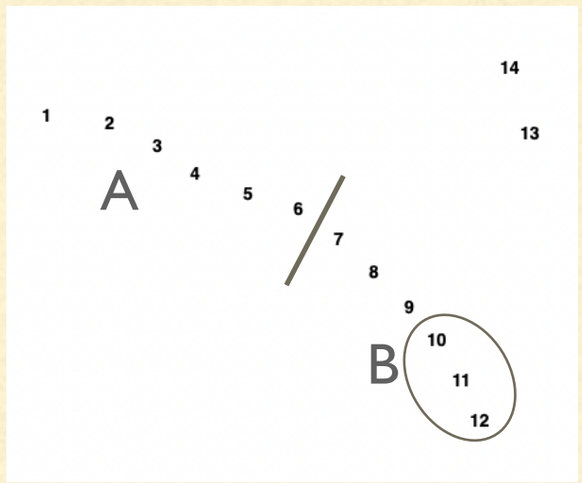


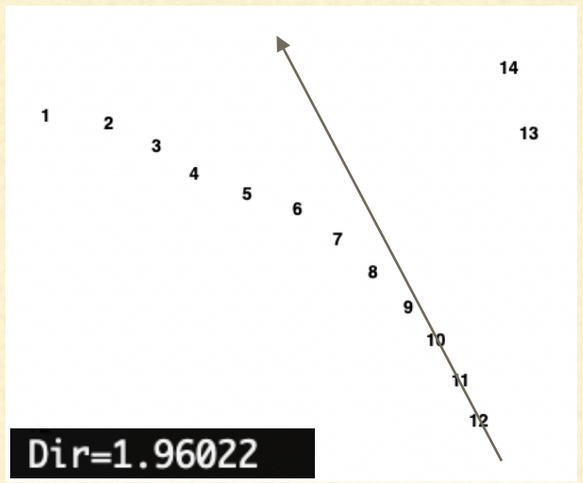
Conclusions

- The sorting tracks agorithm starts to works well
- Events asymmetry must be investigated more in deep (MC truth compar.)
- A preliminary algorithm for directionality with HT-recognition is ready
- The agorithm anyway is not giving the desired results
- Some issues in the reconstructing algorithm worse the angular resolution
- Needed to increase the number of slices at lower energies

Backup


A
B
Asy=-0.28888


A
B
1
2
3
4
5
6
7
8
9
10
11
12
13
14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1
2
3
4
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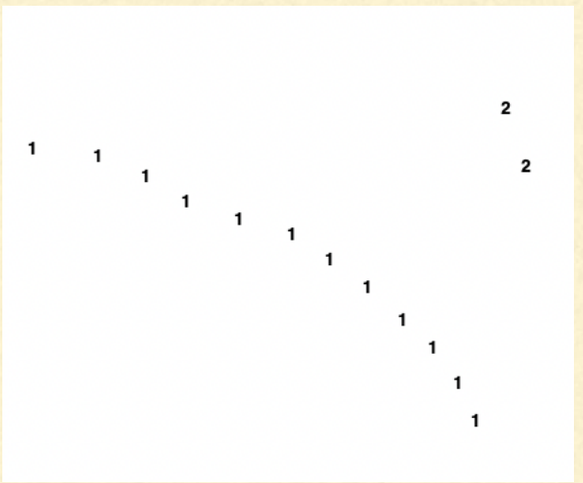
6
7
8
9
10
11
12
13
14


1
1
1
1
1
1
1
1
1
1
2
2