Bi-Weekly Meeting

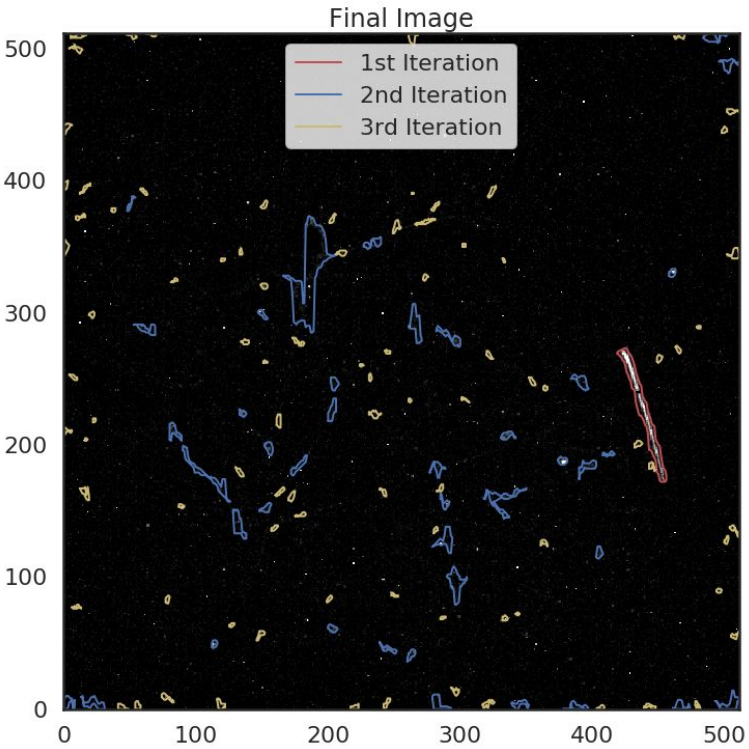
October 18, 2019

Current status

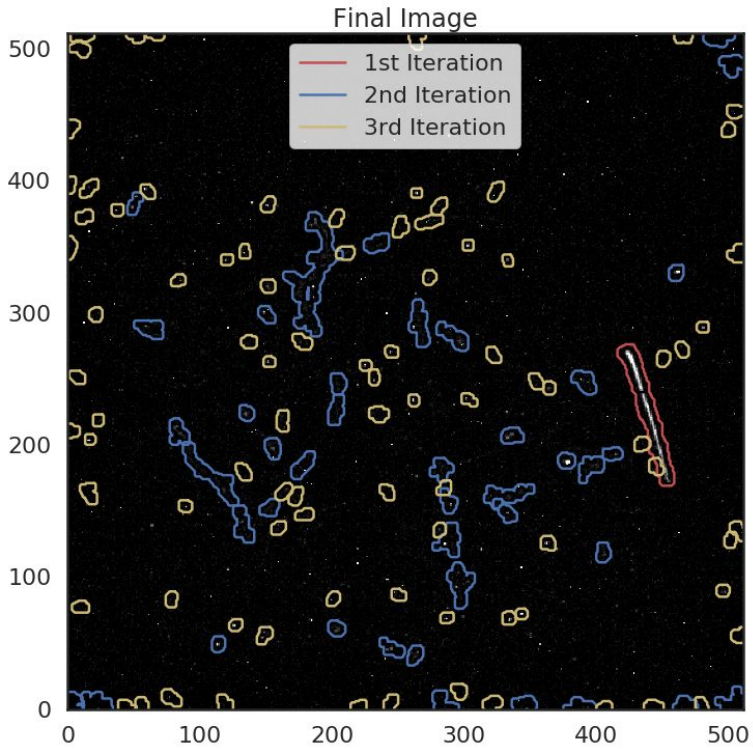
- The way to show the contours of the found clusters has been improved.
- The debug_code of the algorithm has been improved.
- Since we are have been problem with the noise two pre-processing algorithm was implemented:
  - After the pedestal subtraction and the zero-suppression an algorithm that try to find and remove hot spots was added;
  - After this a step of filtering was implemented, by now we are using the Median Filter.
- This new features seems to improve the clustering algorithm.

New way to show the contours

Old

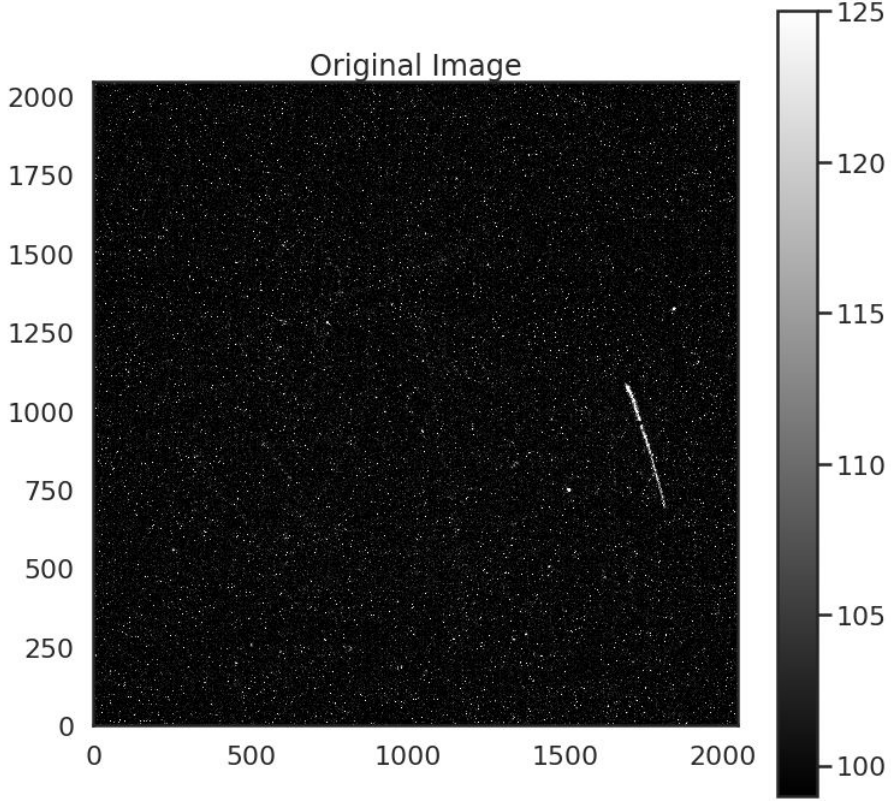


New

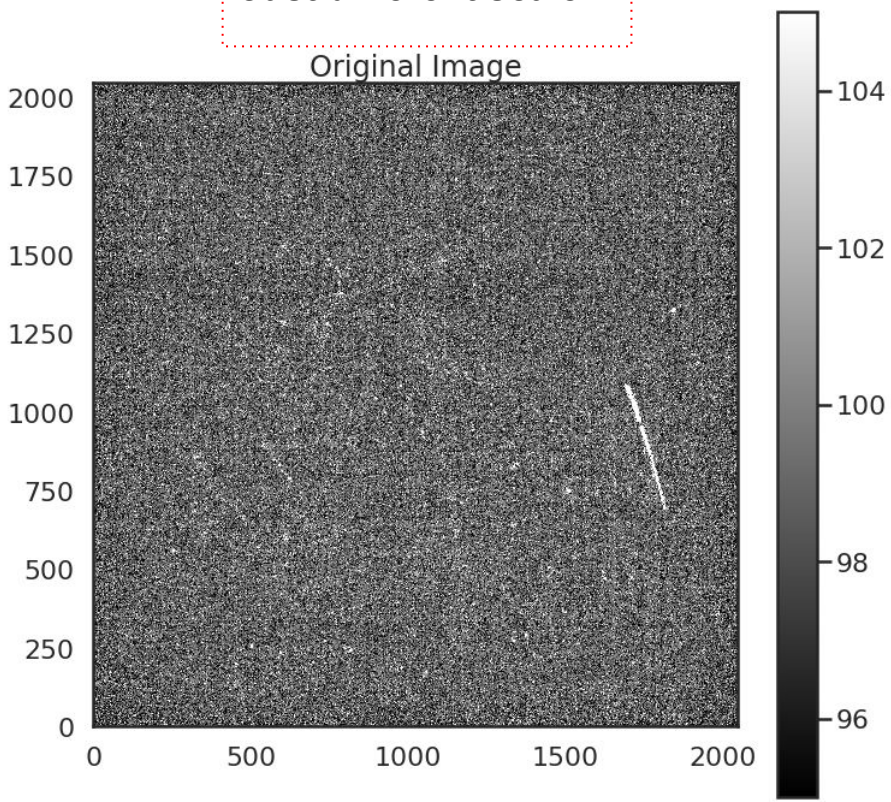


Example of how the preprocessing is working

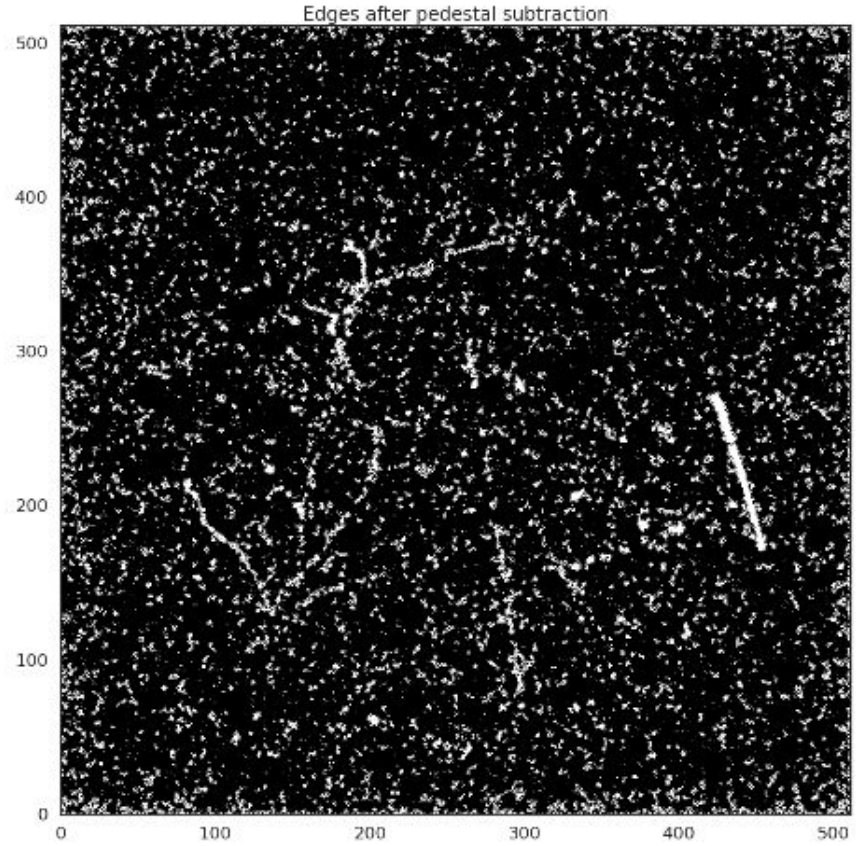
LEMOn data - 723 image 04 - NO SOURCE

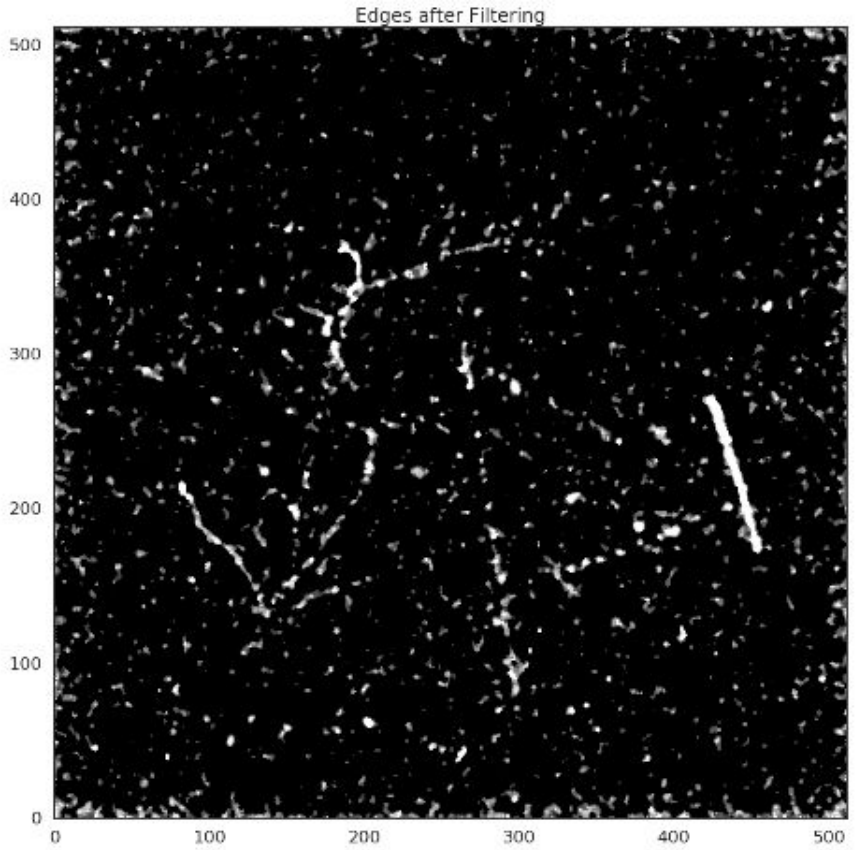


Just different scale

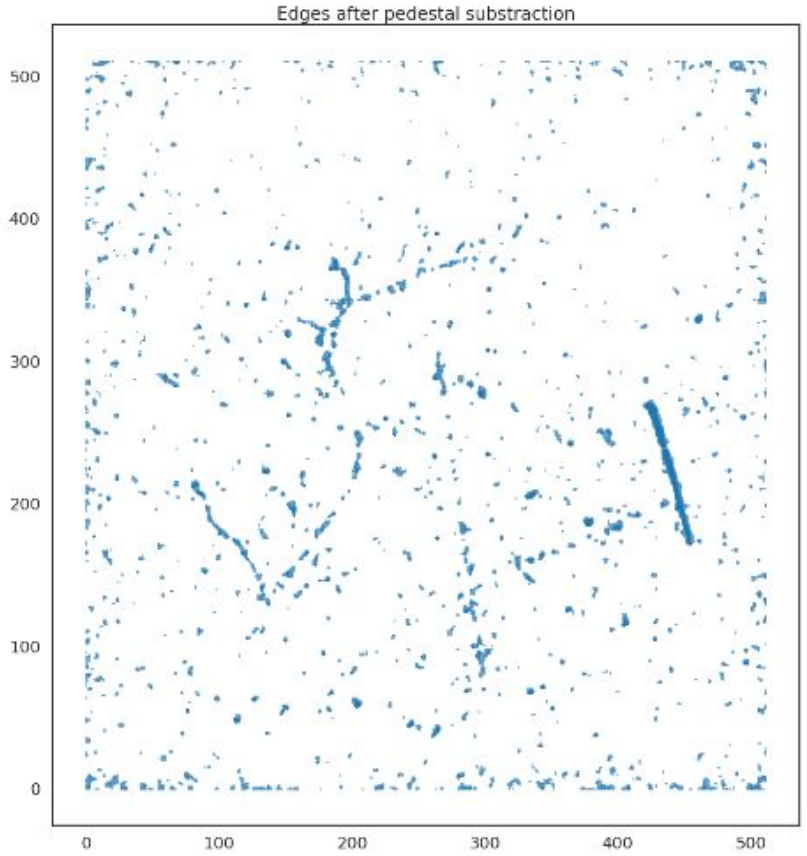


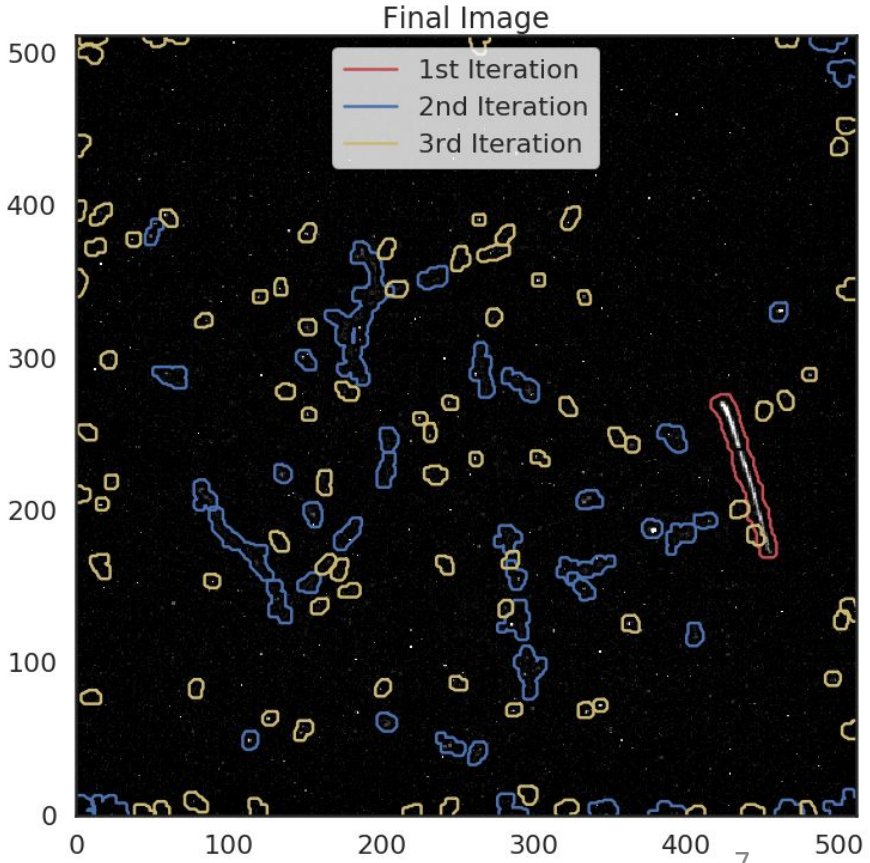
LEMOn data - 723 image 04 - NO SOURCE





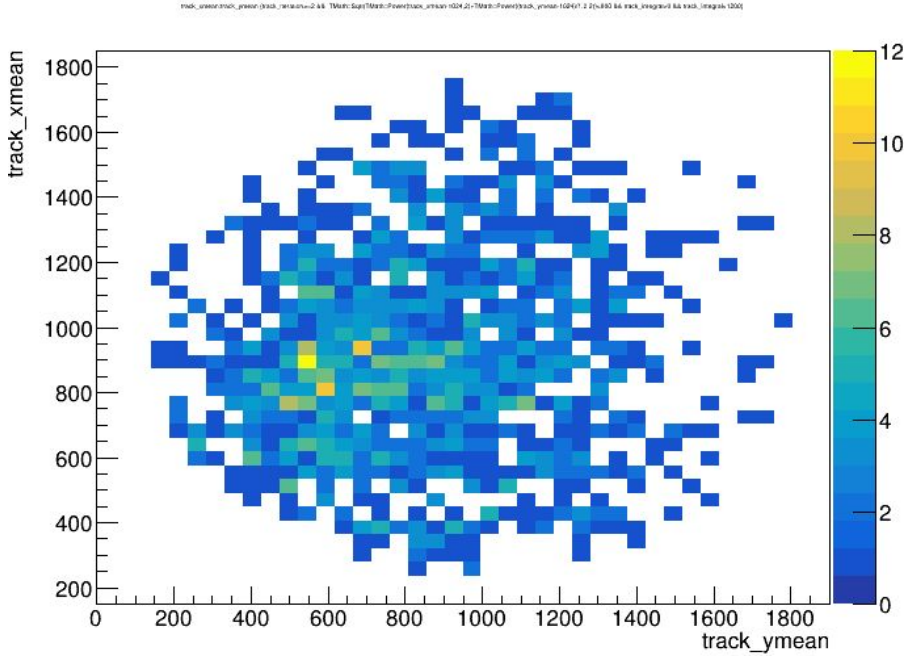
LEMOn data - 723 image 04 - NO SOURCE

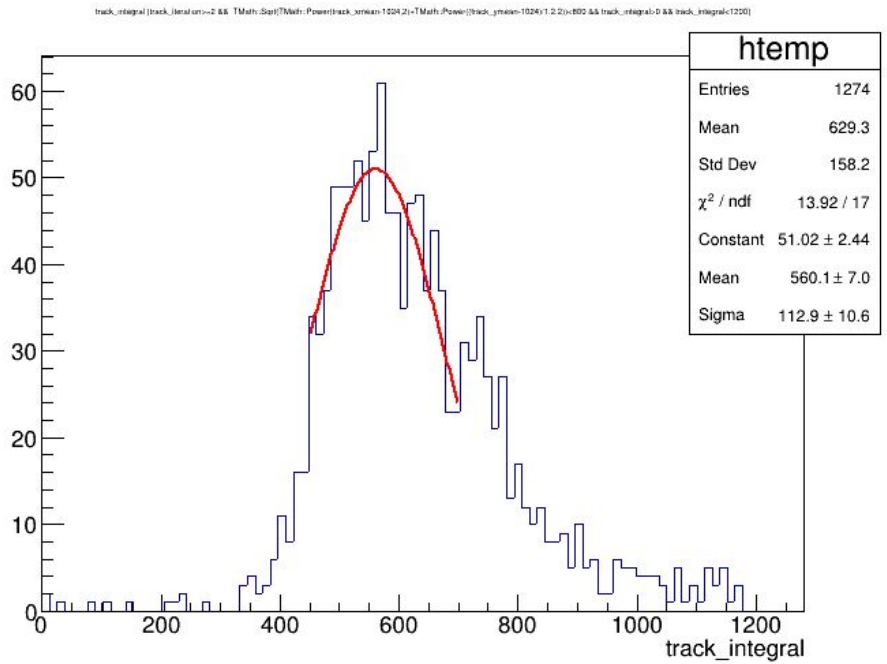




Fe55 - 440V

LEMOn Fe55 data - cutting in radius of 800px

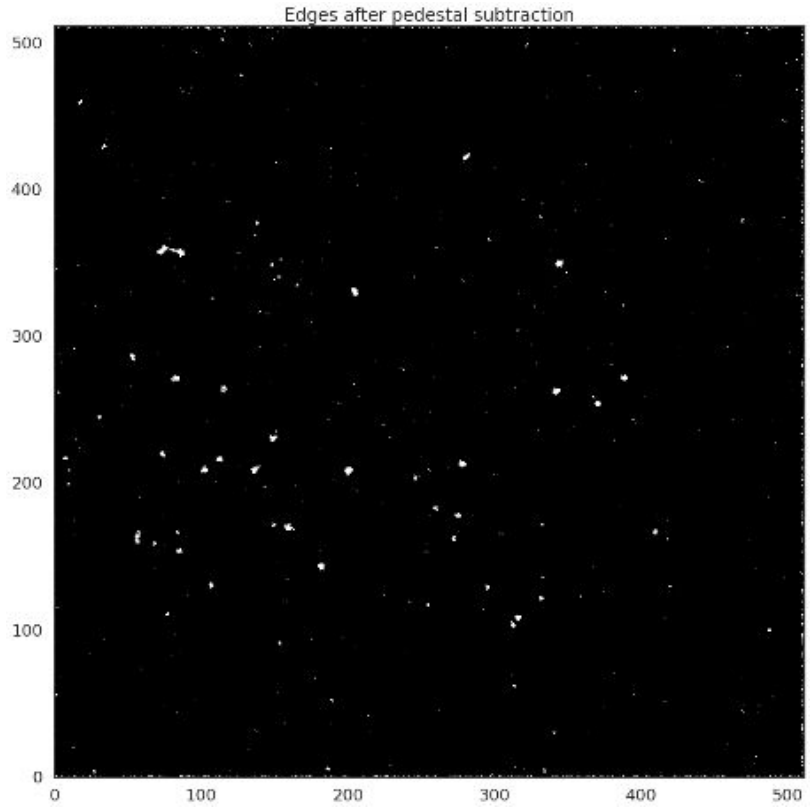


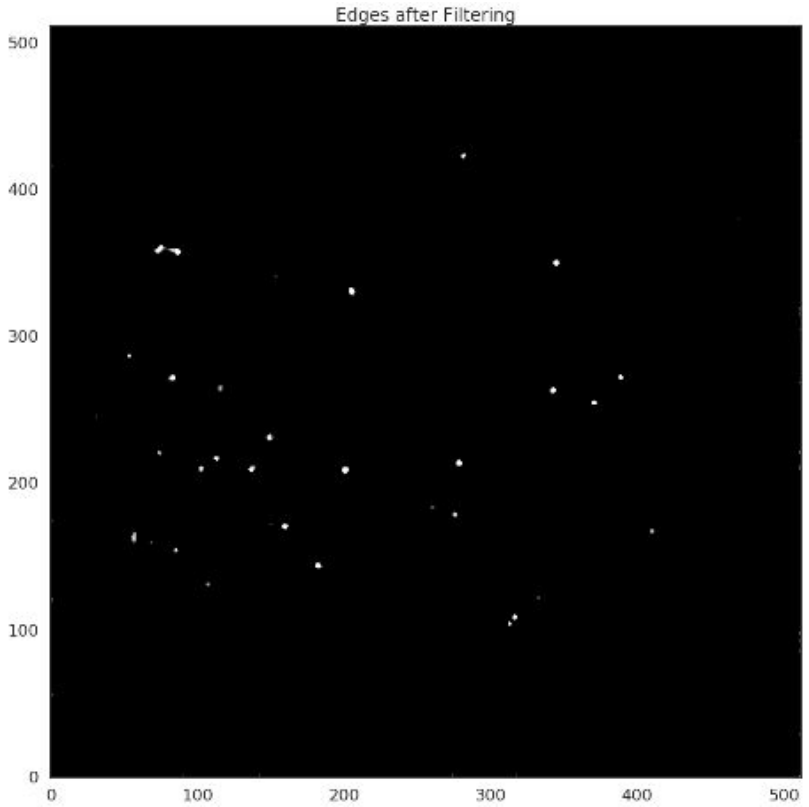


track_integral {track_iteration>=2 && TMath::Sqrt(TMath::Power(track_xmean-1024,2)+TMath::Power((track_ymean-1024)/1.2,2))<800 && track_integral>0 && track_integral<1200}

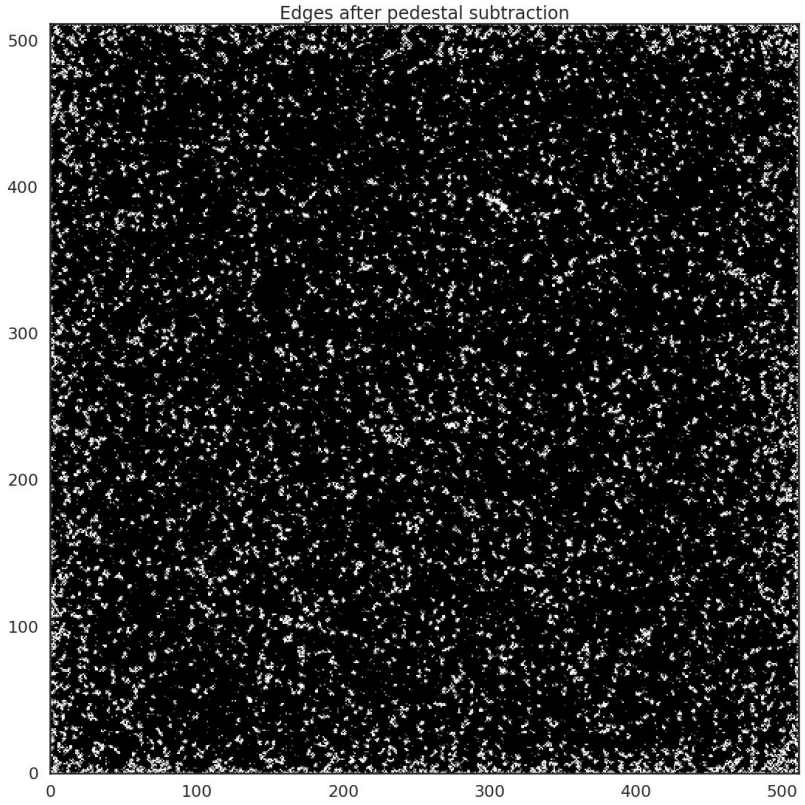
Examples of different runs

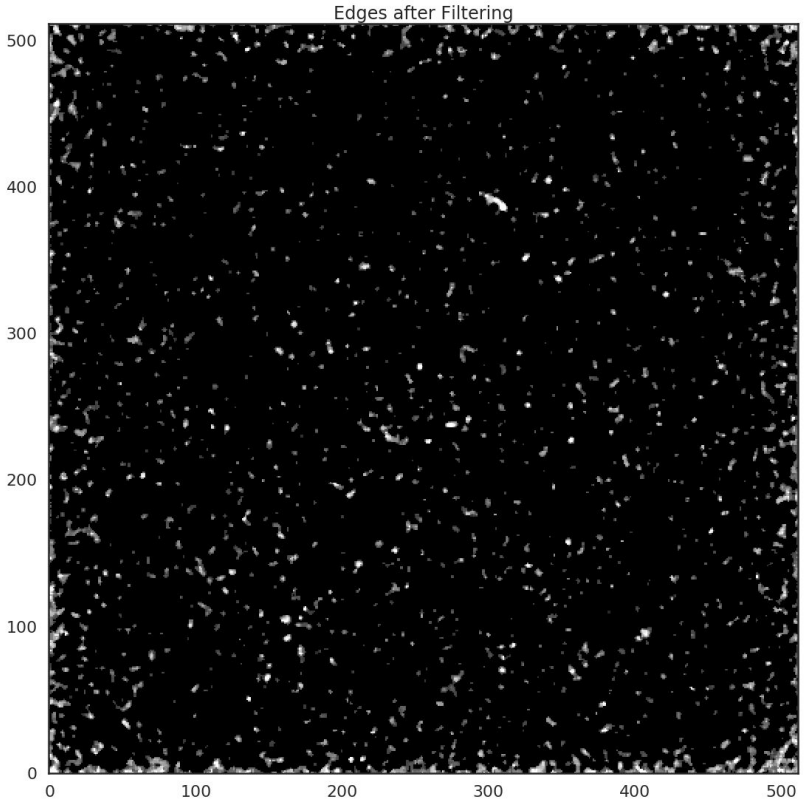
LEMOn only Fe55 data - Run 831 - October 4th / 2018



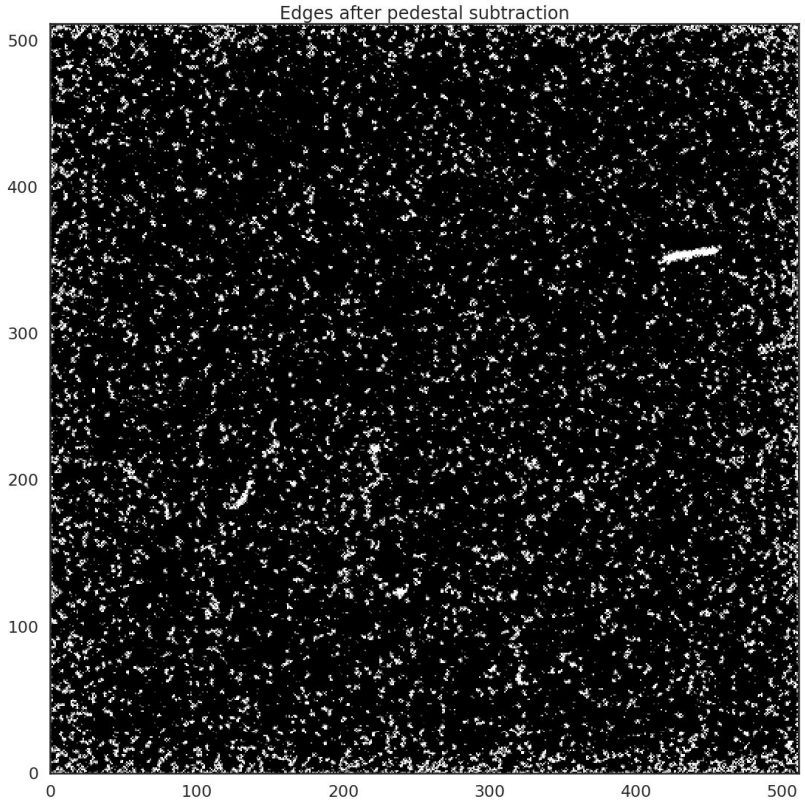


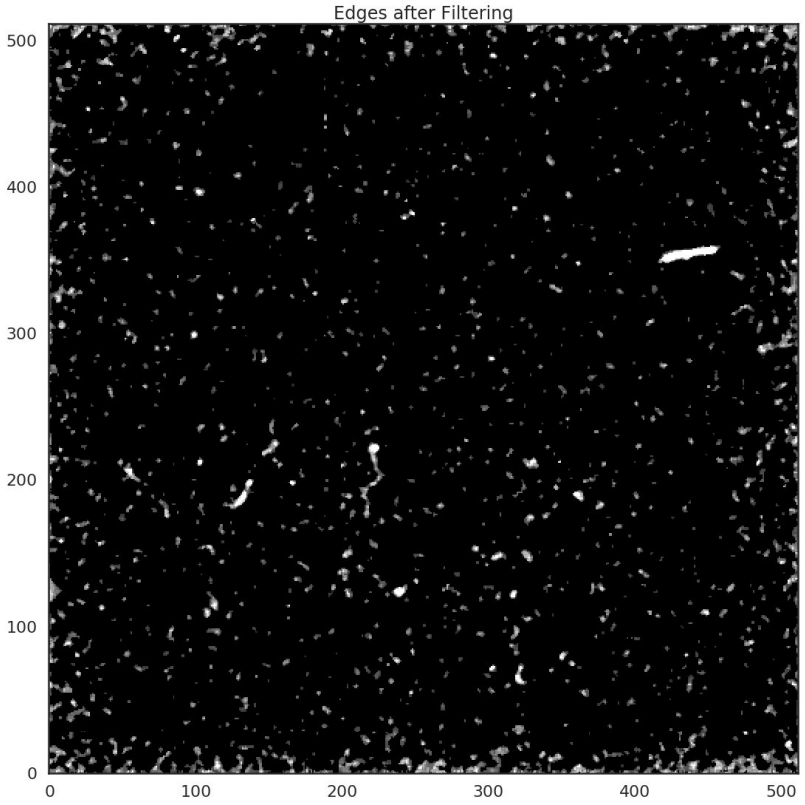
LEMOn only Fe55 data - Run 726 - May 21st / 2018



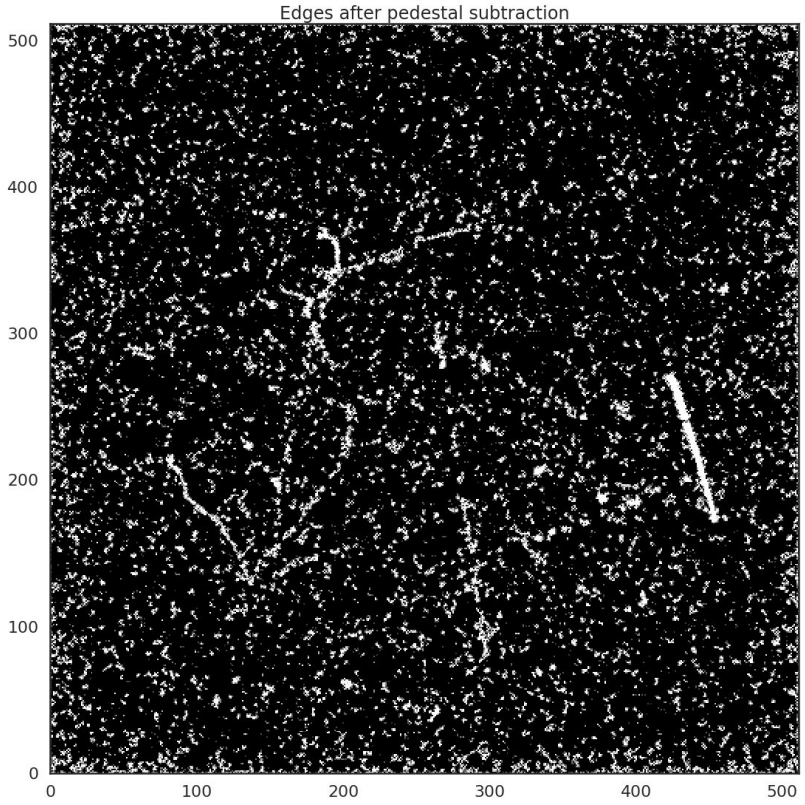


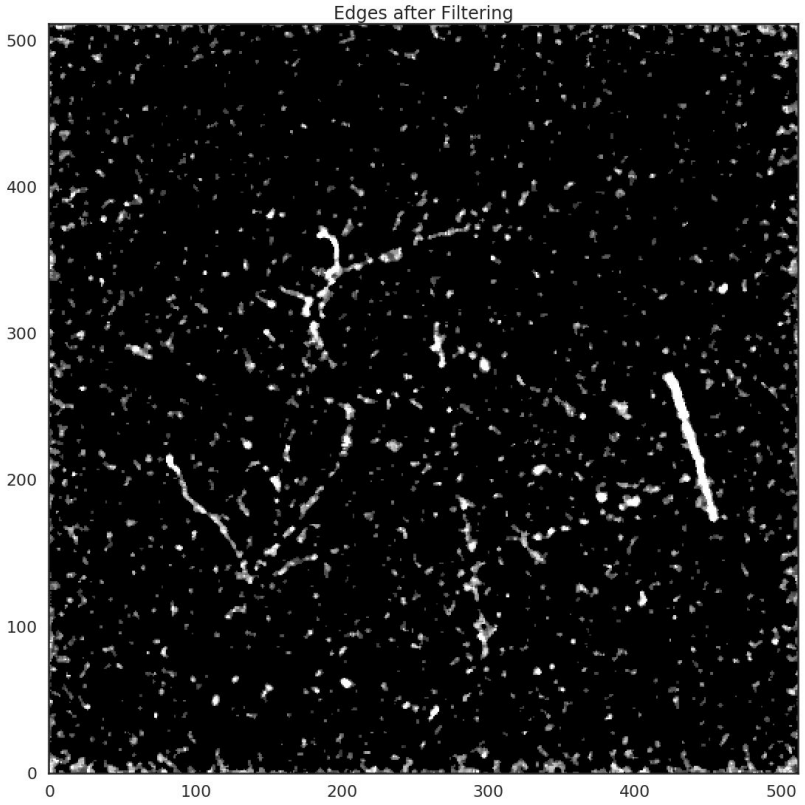
LEMOn AmBe + Fe55 - Run 738 - May 22nd



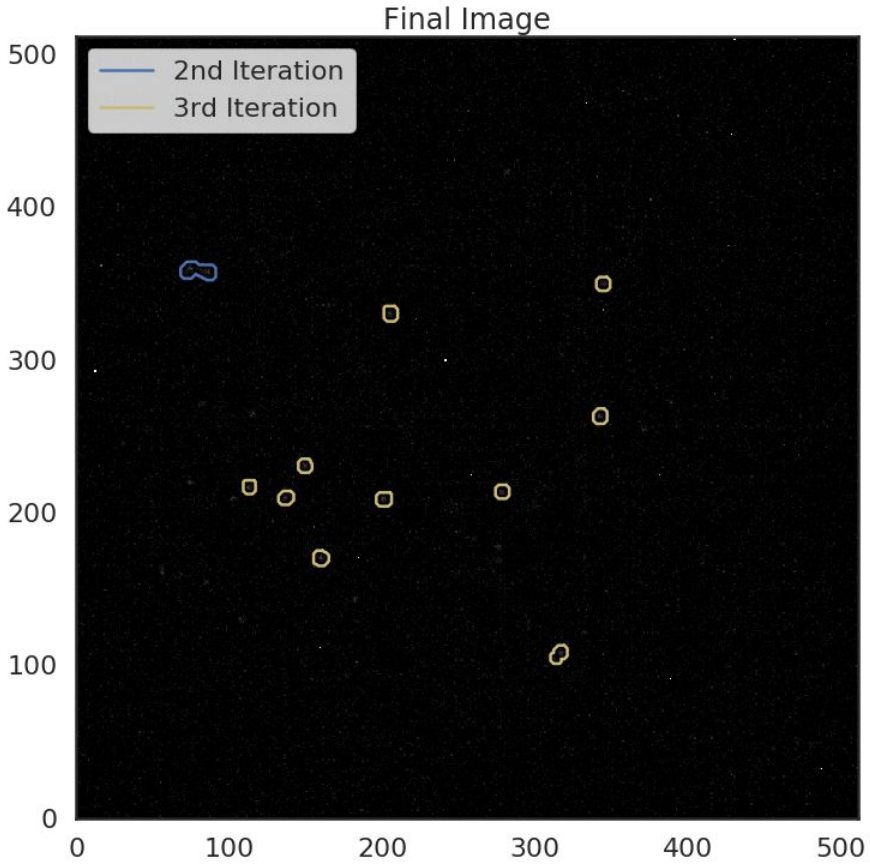


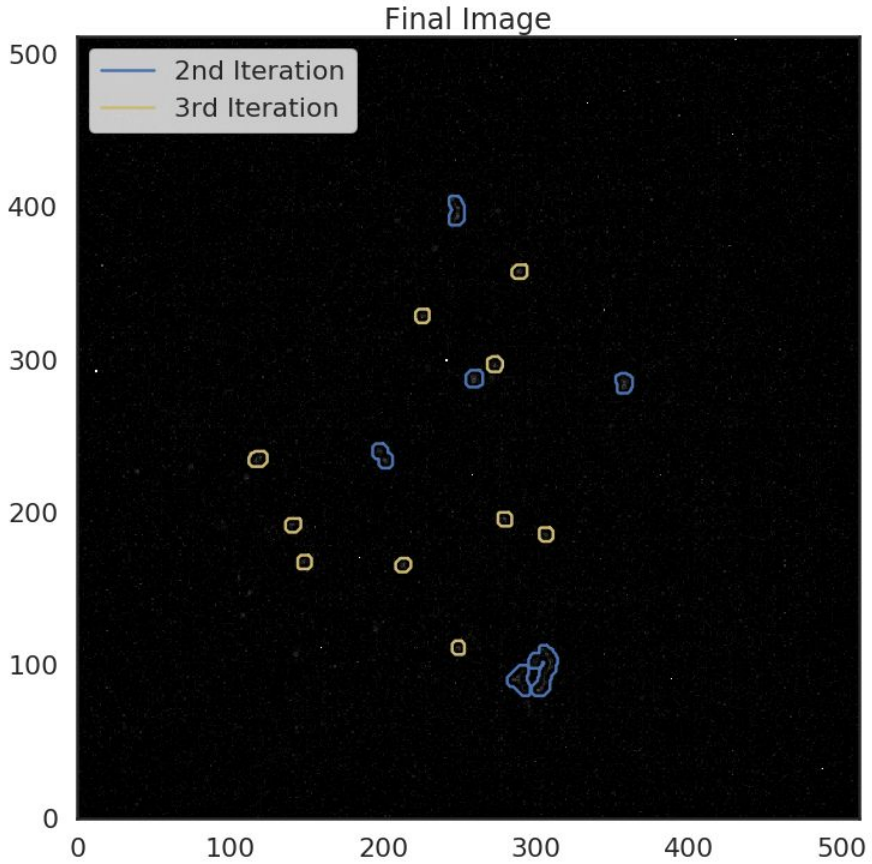
LEMOn No Source - Run 723 - May 18th





LEMOn Fe55 data - cutting in radius of 700px





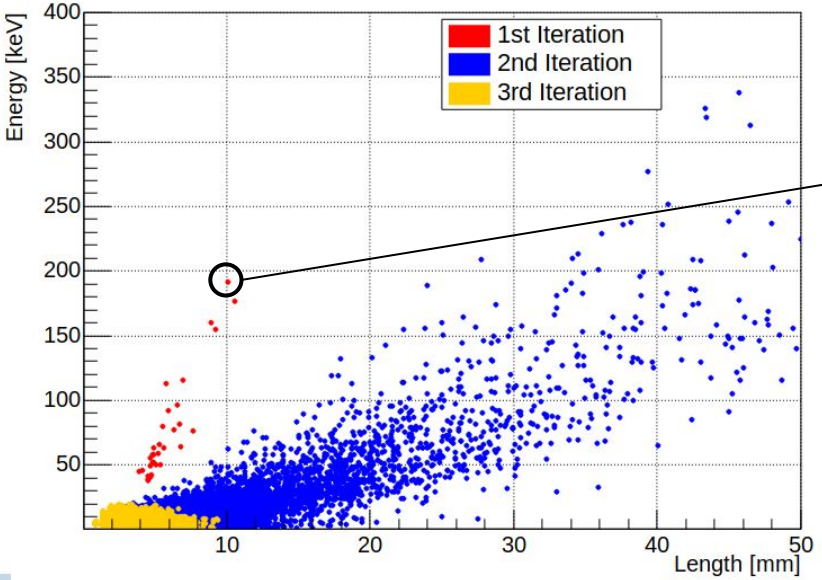
Backup

CO60 - Run 722

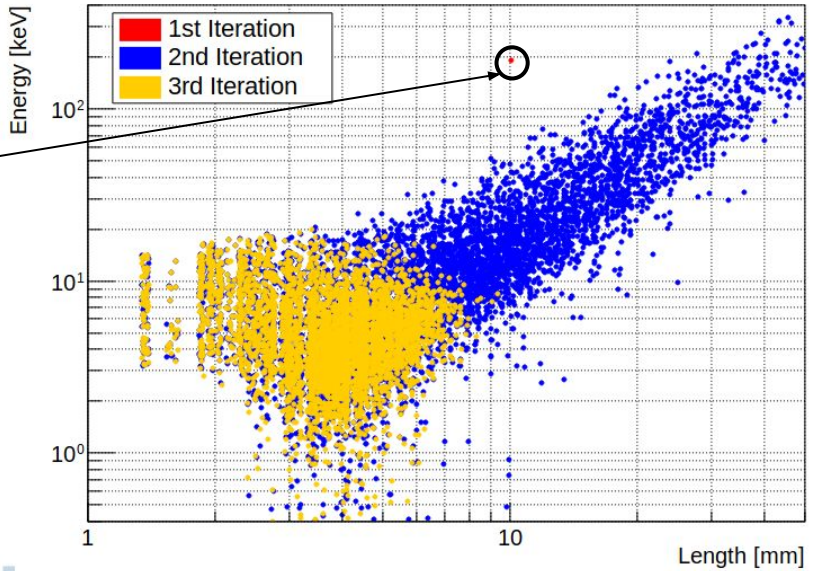
Looking at all images on CO60 run I have found just one possible nuclear recoil in the image 7

LEMOn CO60 data

The red dots found in the left image was all (except one) hot spots.

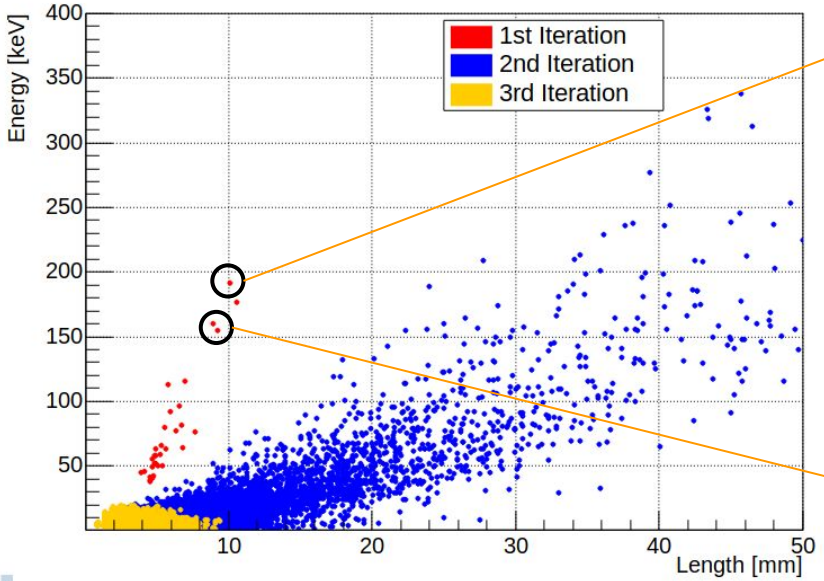


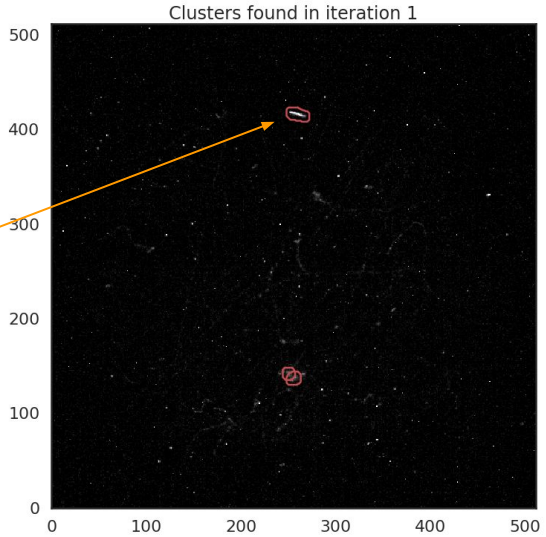
And applying a simple cut on the ratio between lonrms and latrms it was possible to remove all the hotspots.

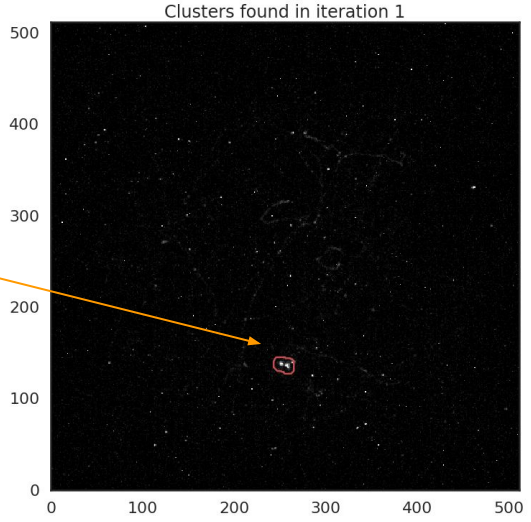


5.9keV/570px

LEMOn CO60 data







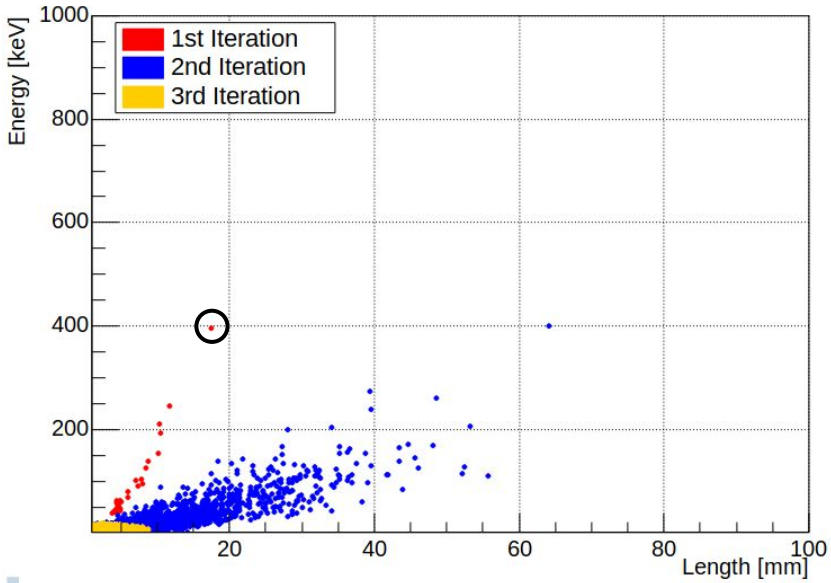
5.9keV/570px

No Source - Run 723

Looking at all images on CO60 run I have found just two possible nuclear recoil in the images 4 and 35

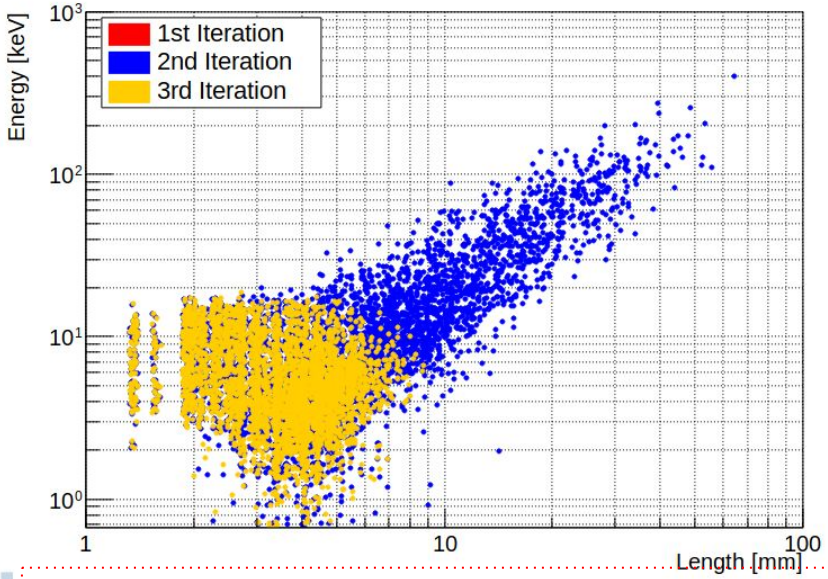
LEMOn No Source data

The red dots found in the left image was all (except one) hot spots.



5.9keV/570px

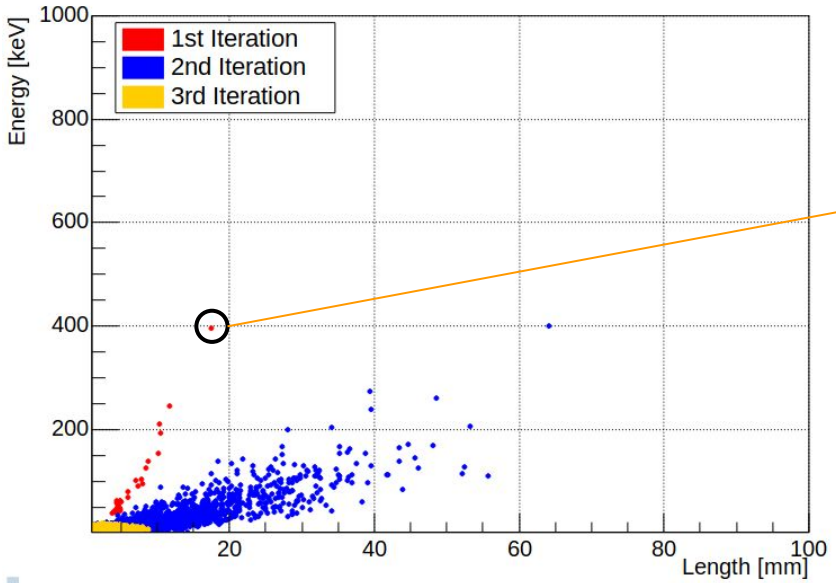
And applying a simple cut on the ratio between lonrms and latrms it was possible to remove all the hotspots.

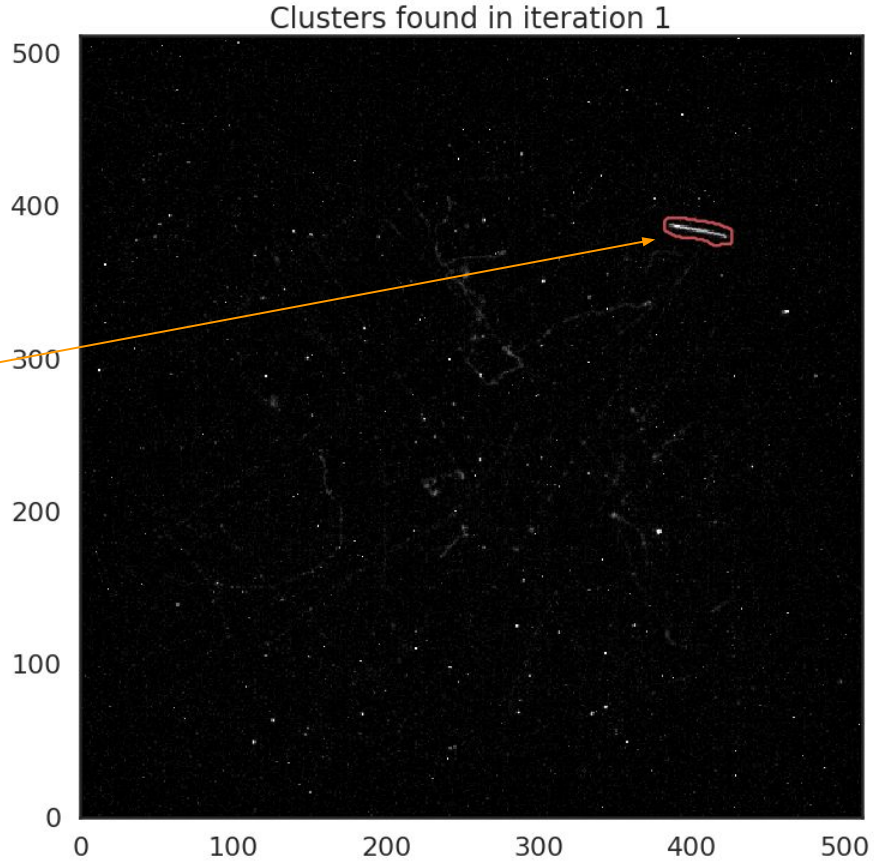


And with the cut on the fiducial volume it is possible to remove the protons

LEMOn No Source data

The red dots found in the left image was all (except one) hot spots.





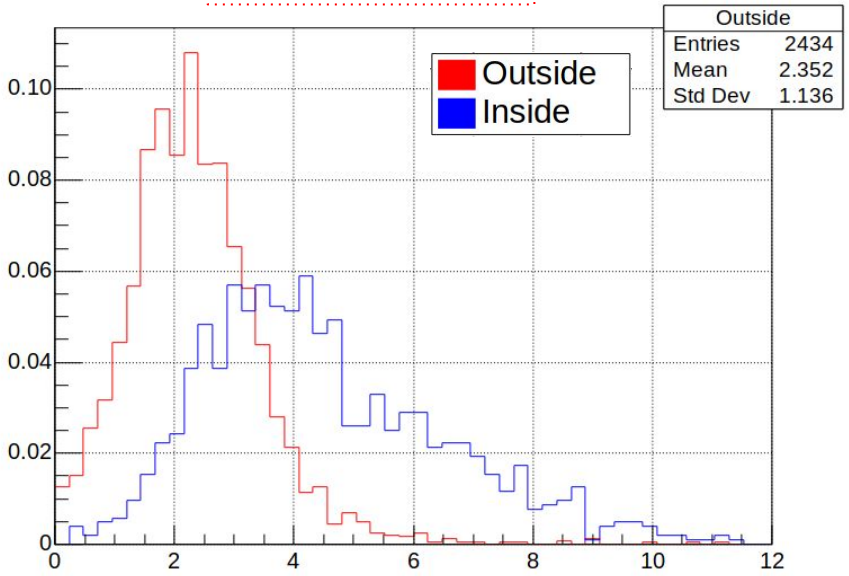
5.9keV/570px

AmBe - Run 738

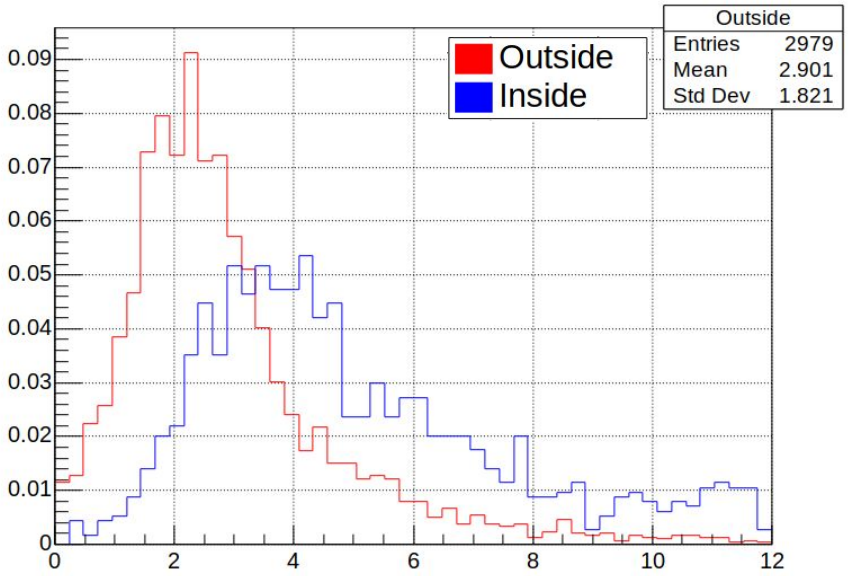
Looking at all images on AmBe run I

AmBe + Fe55 - Analysing the Fe55 peak

Just iteration 3

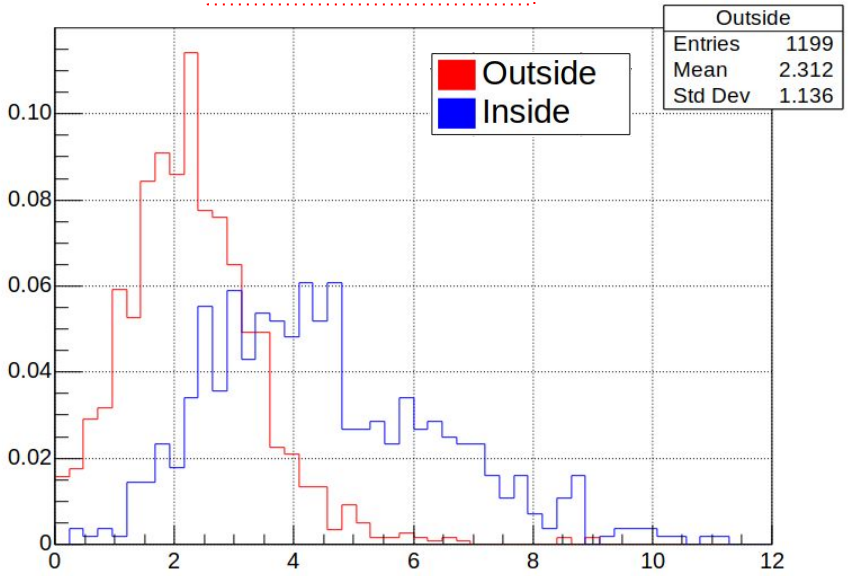


iteration 2 and 3

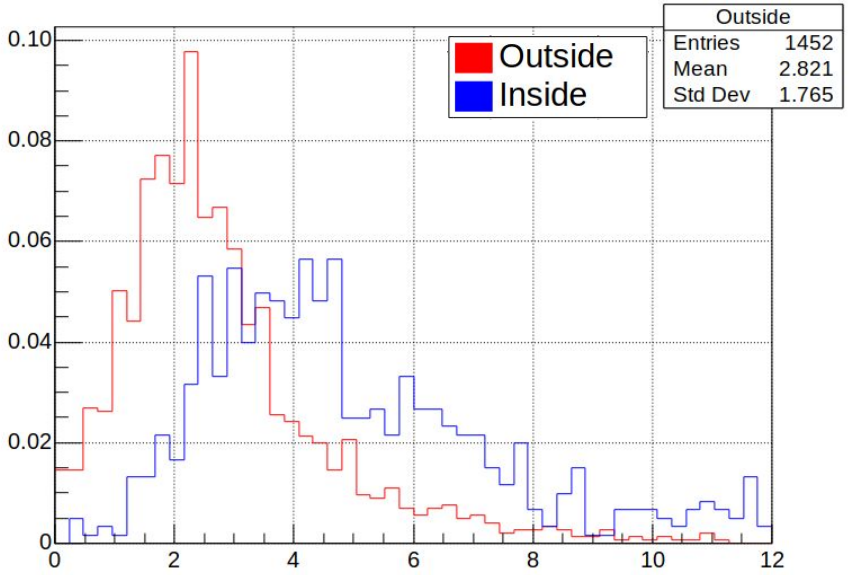


AmBe + Fe55 - Analysing the Fe55 peak

Just iteration 3



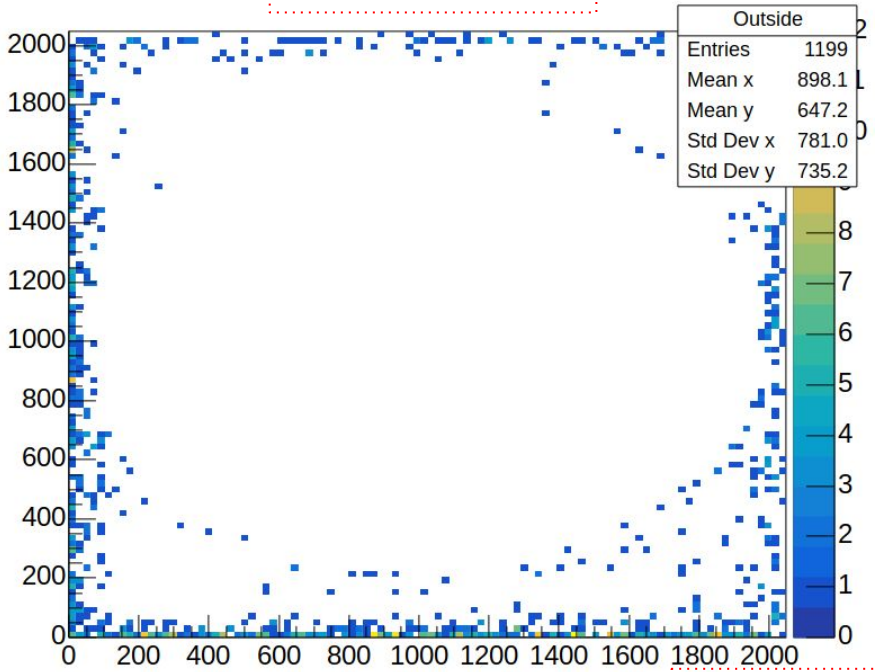
iteration 2 and 3



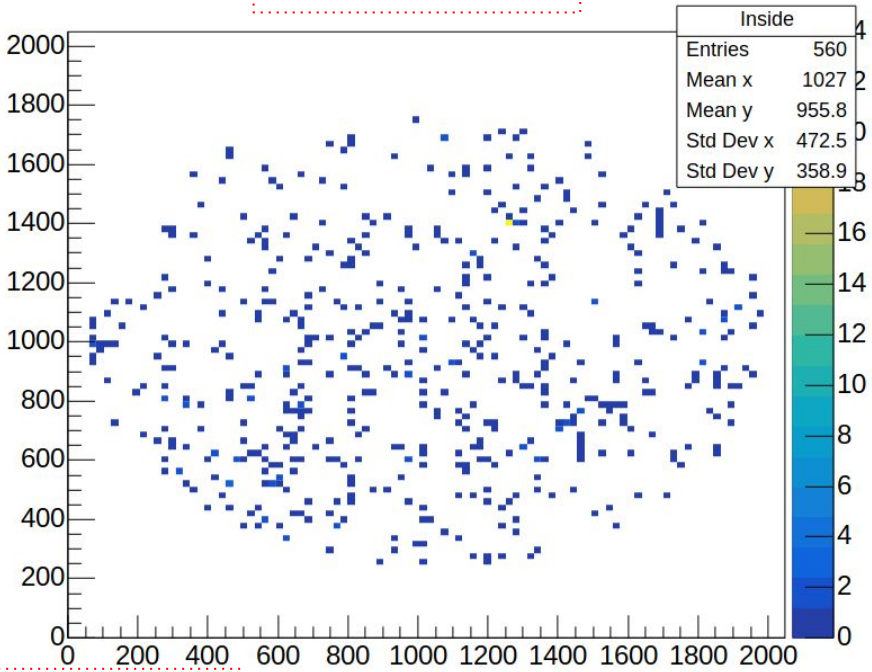
Both with a cut on the ‘roundness’ of the cluster

AmBe + Fe55 - Analysing the Fe55 peak

Just iteration 3



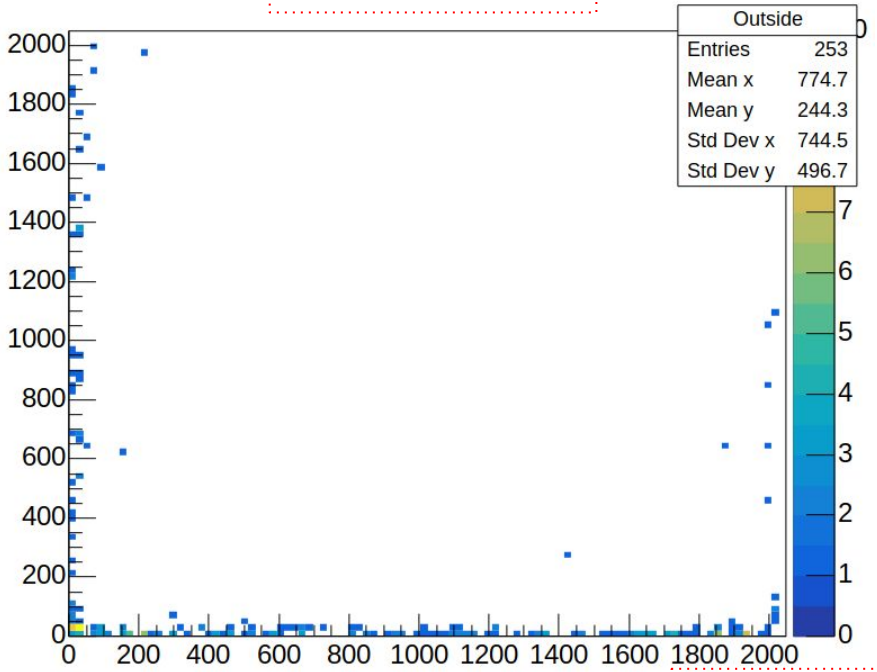
Just iteration 3



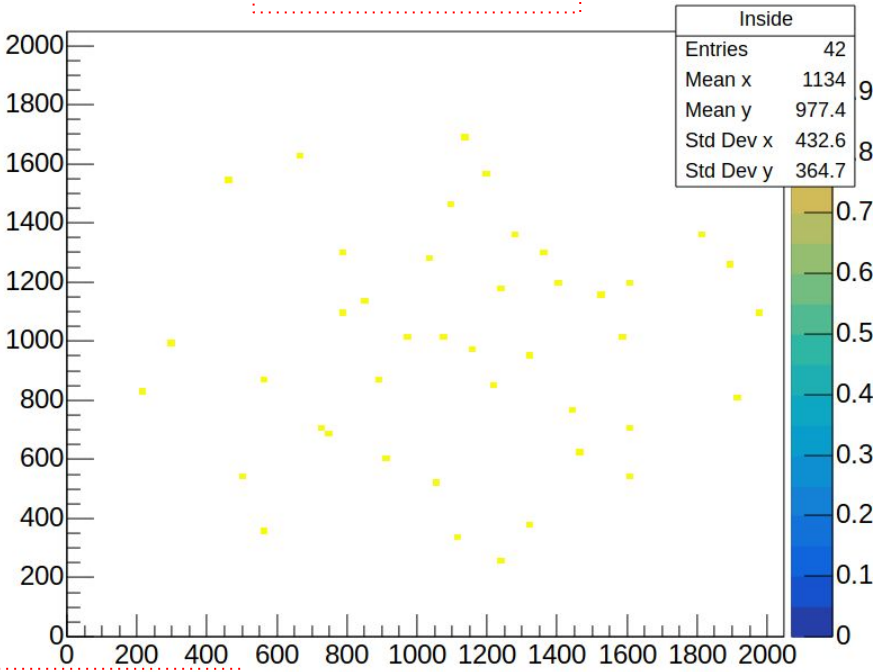
Both with a cut on the ‘roundness’ of the cluster

AmBe + Fe55 - Analysing the Fe55 peak

Just iteration 2



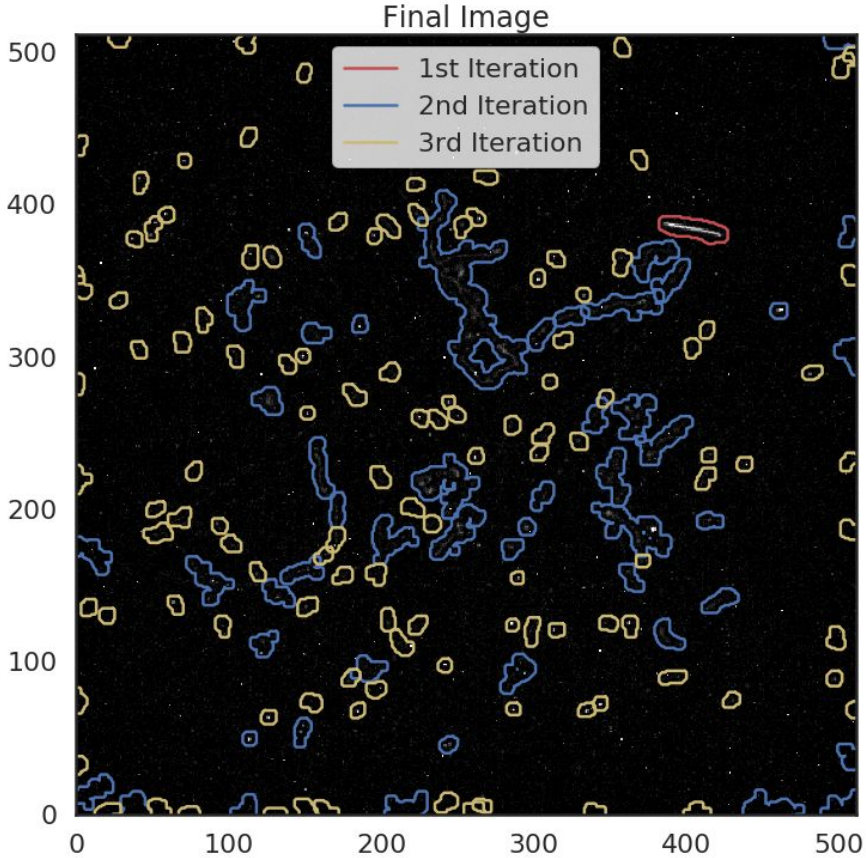
Just iteration 2



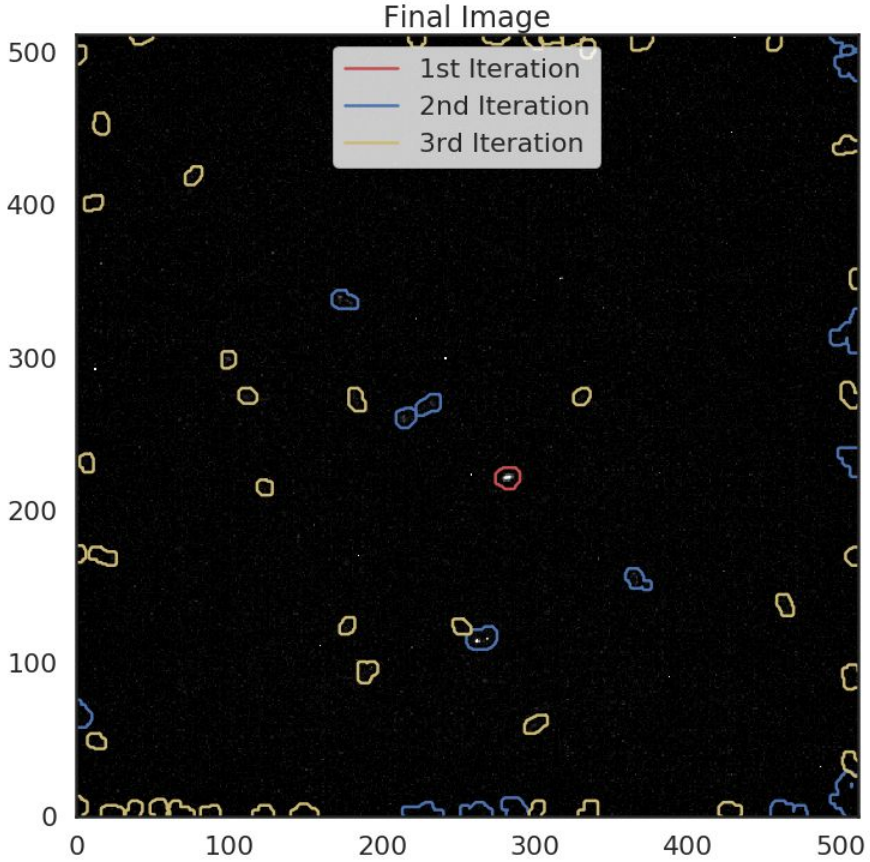
Both with a cut on the ‘roundness’ of the cluster

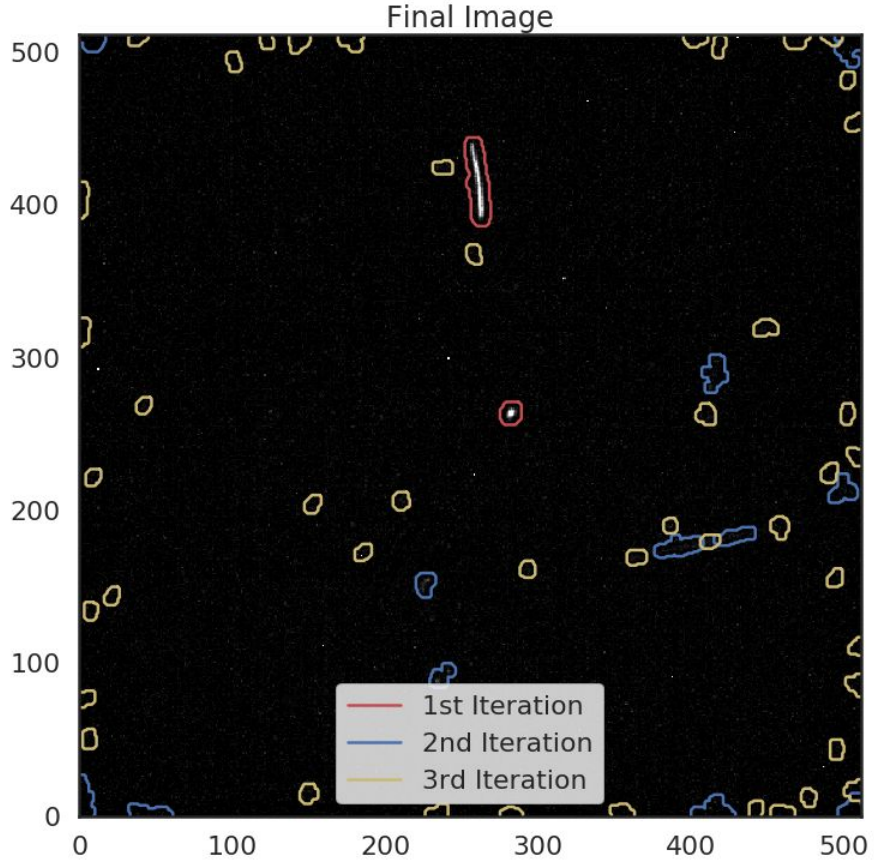
Iteration 1 AmBe

723 - image 35

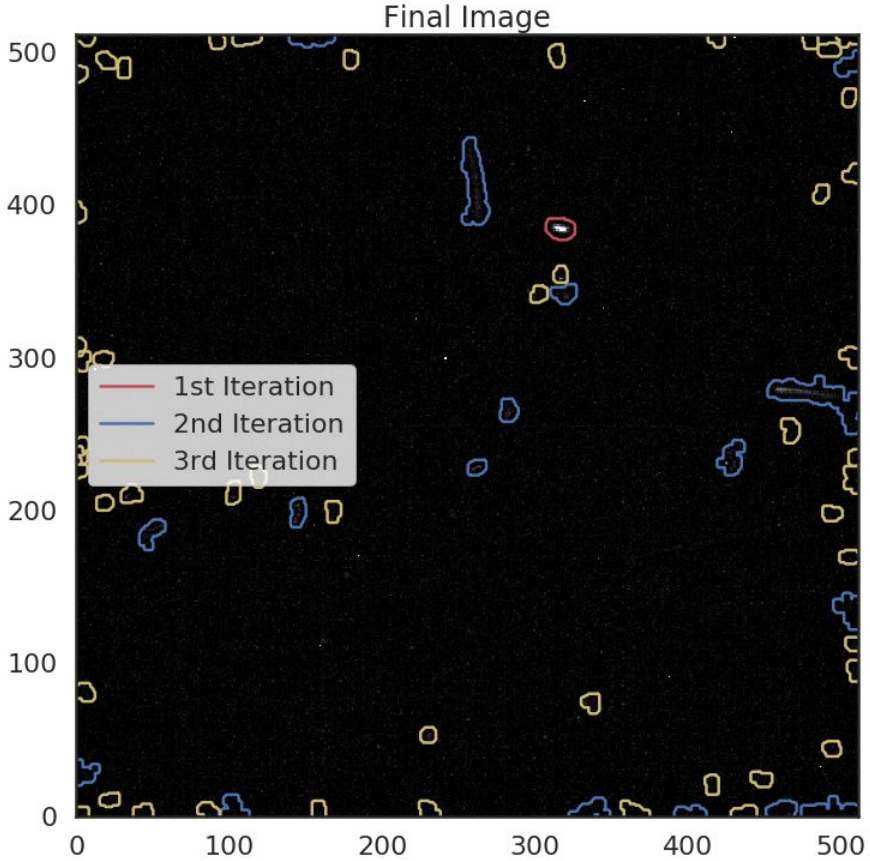

Final Image
1st Iteration
2nd Iteration
3rd Iteration
500
400
300
200
100
0
0
100
200
300
400
500

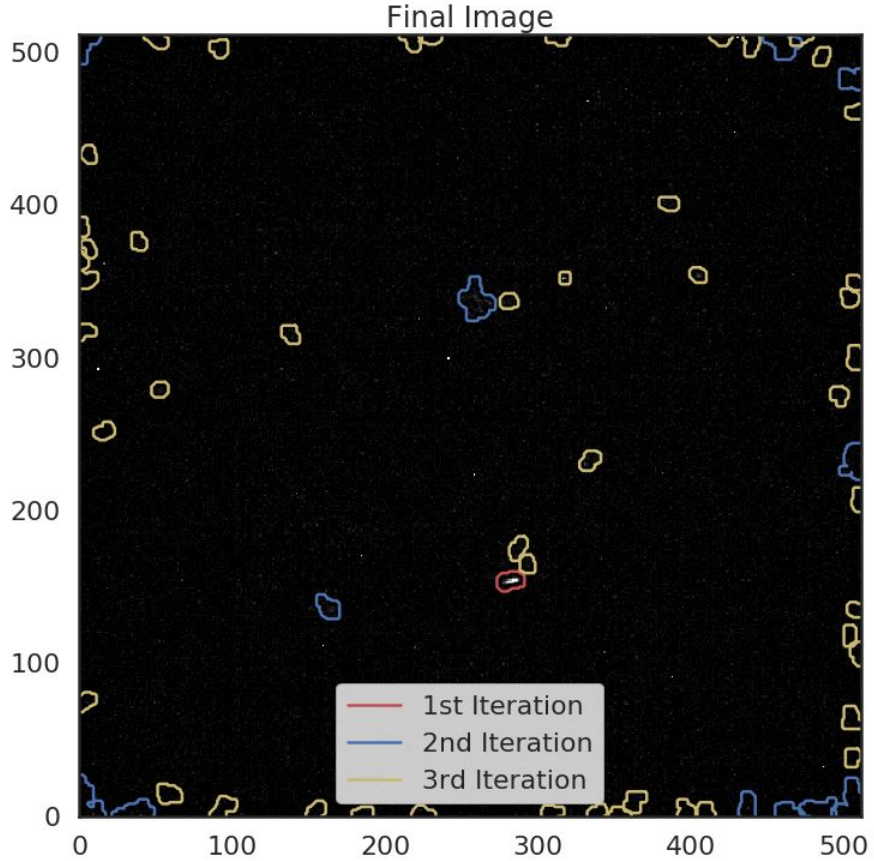
LEMOn data - Ambe 738 - image 7 and image 13



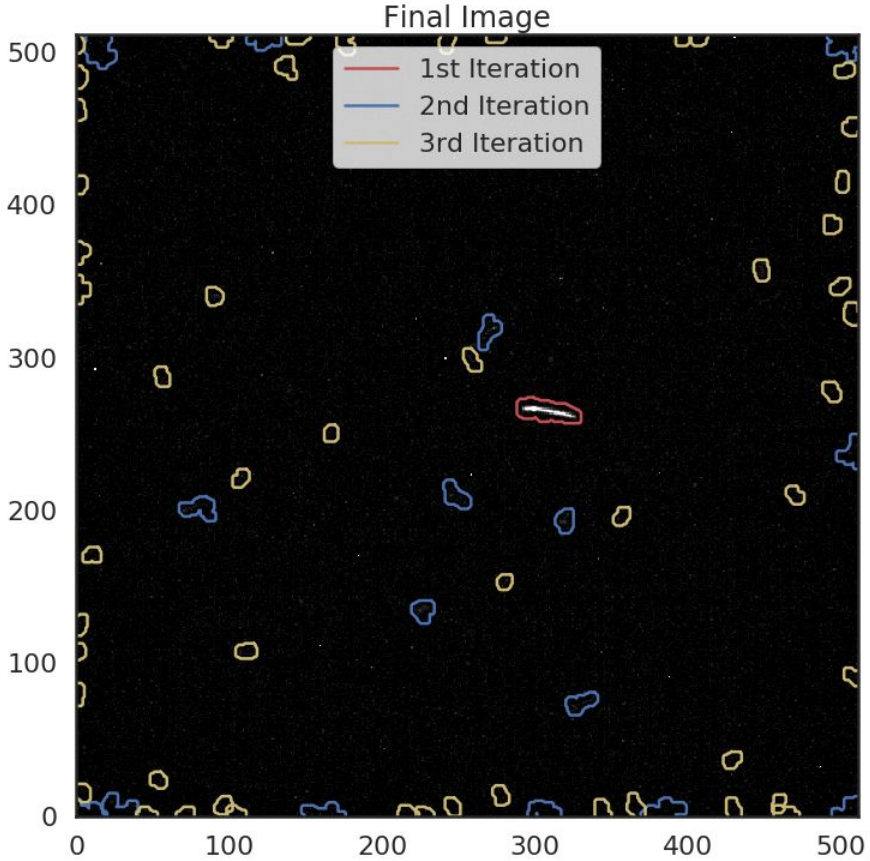


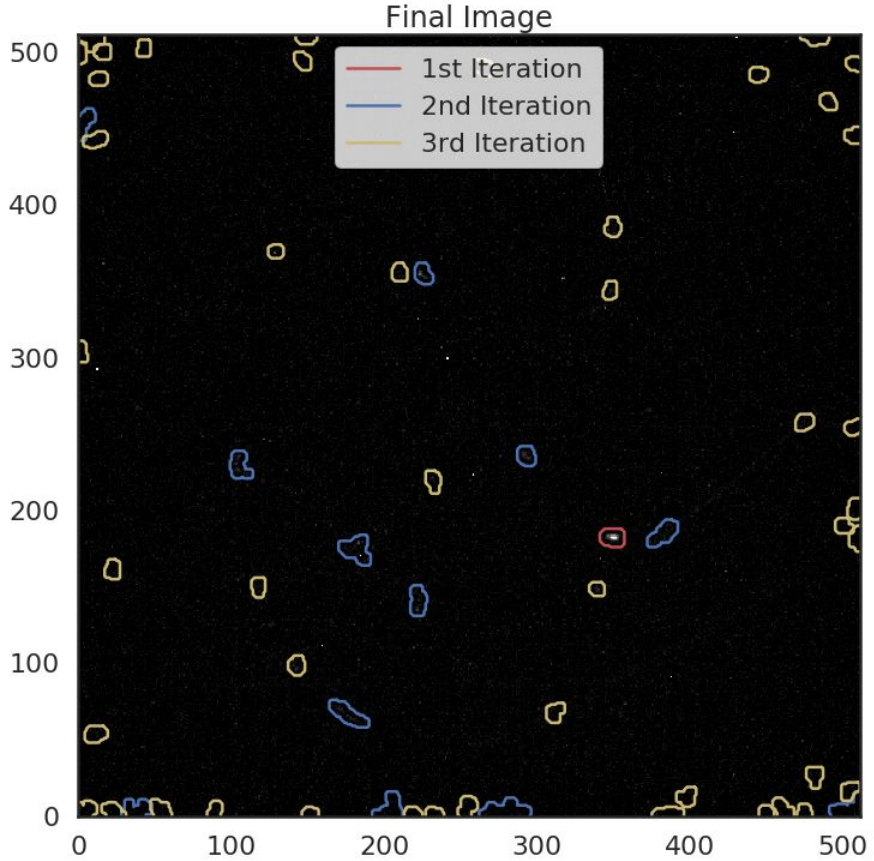
LEMOn data - Ambe 738 - image 14 and image 20



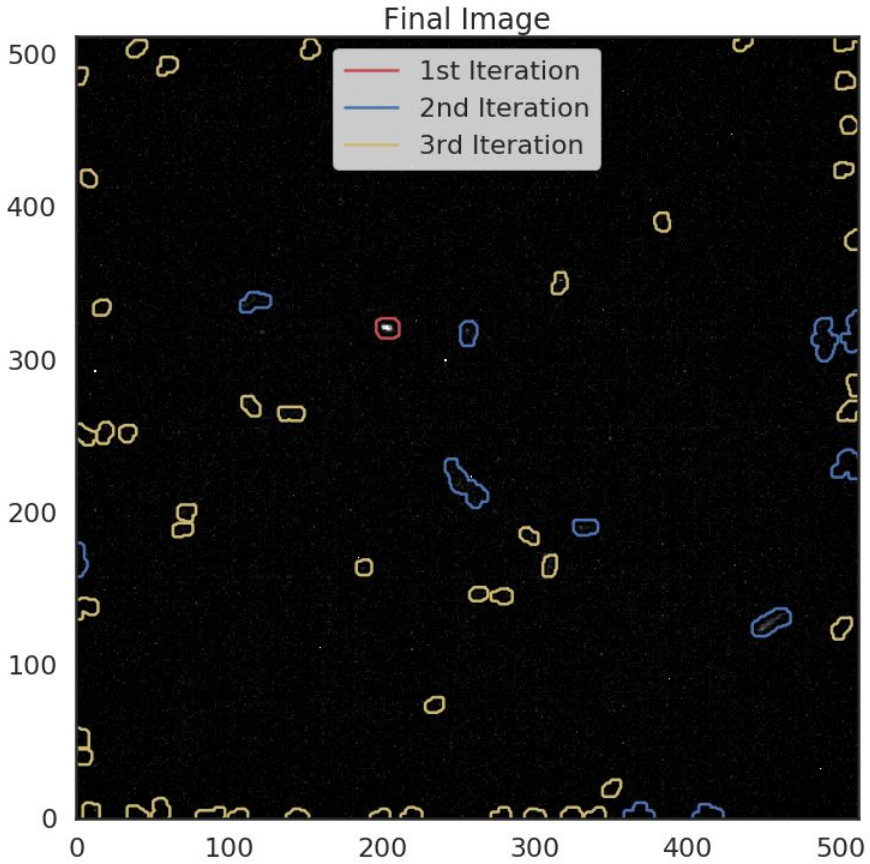


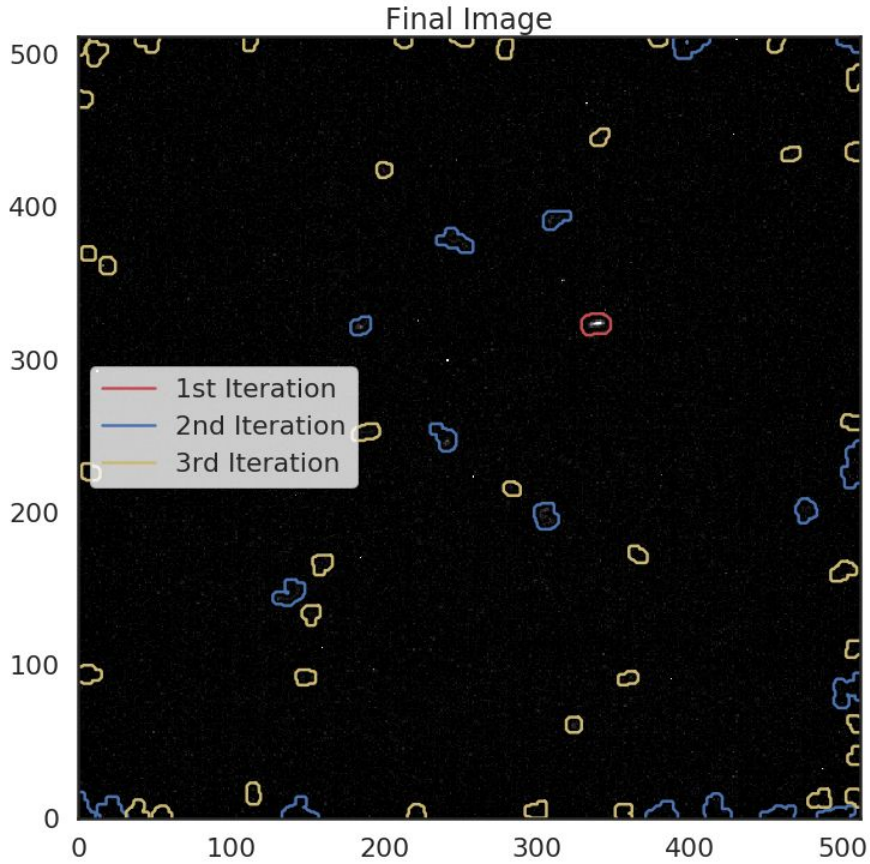
LEMOn data - Ambe 738 - image 22 and image 25



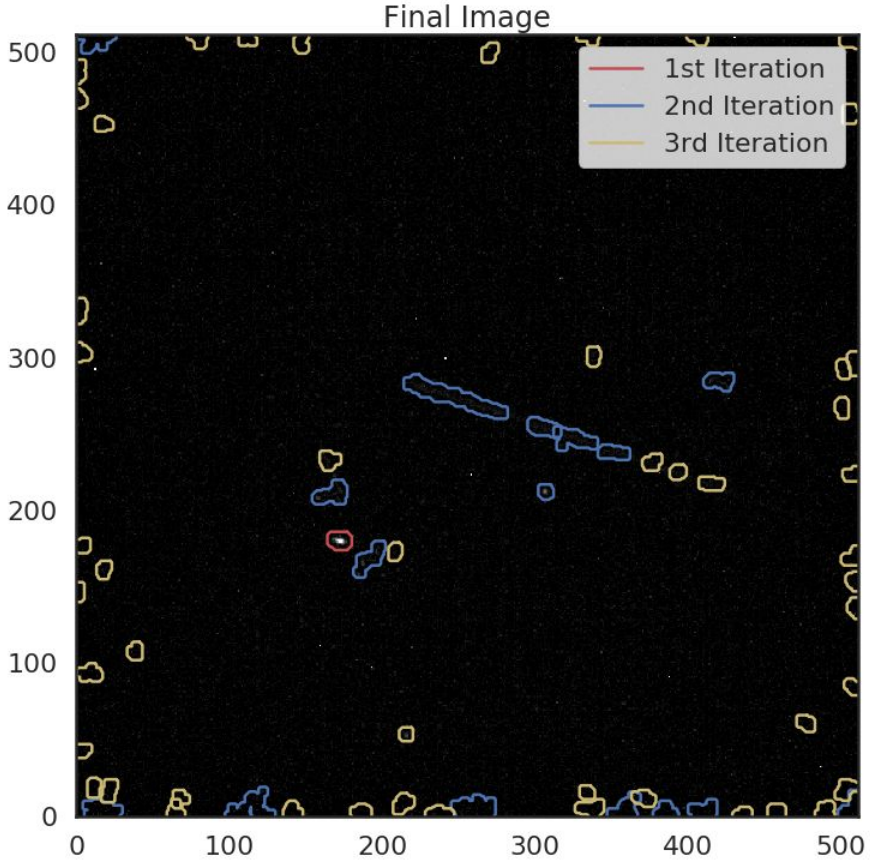


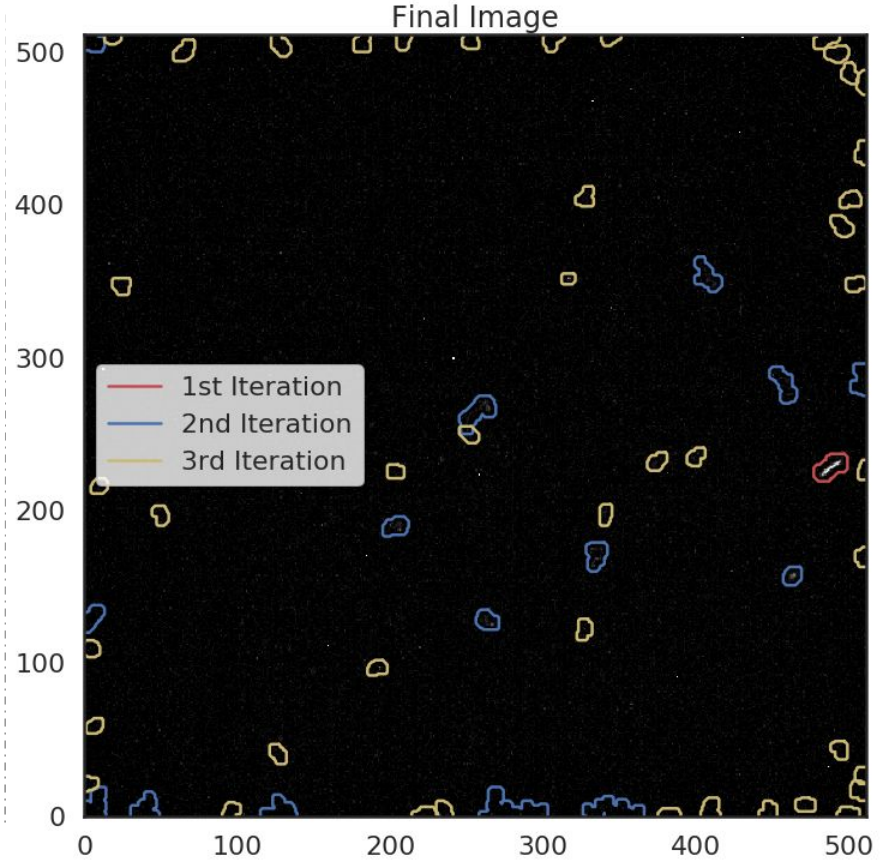
LEMOn data - Ambe 738 - image 29 and image 37



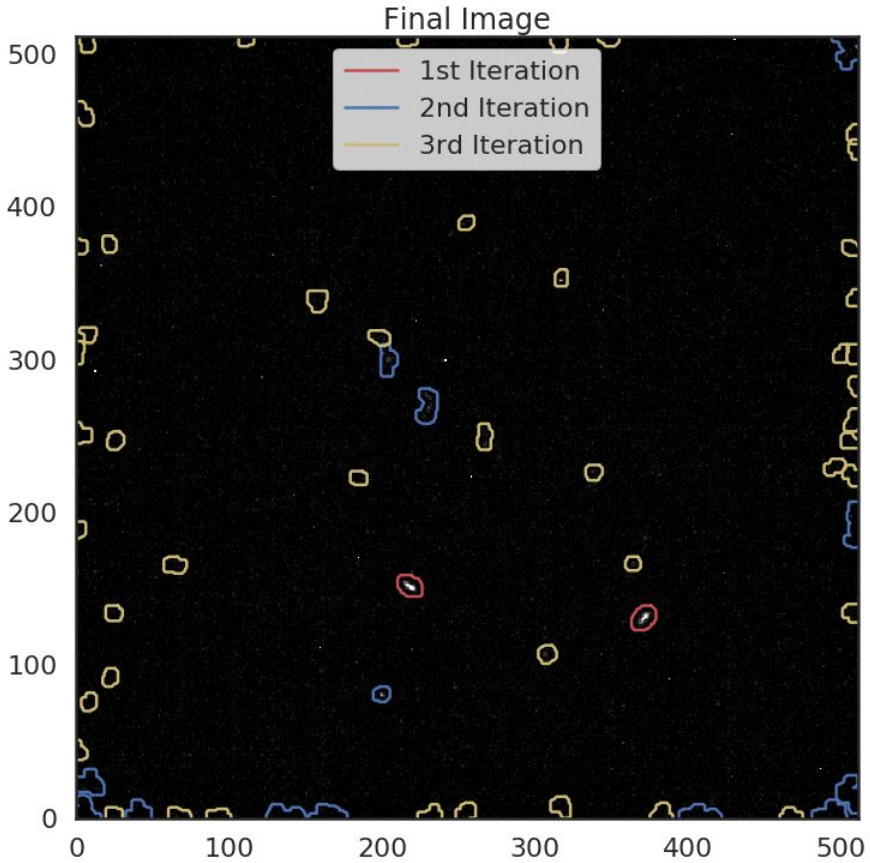


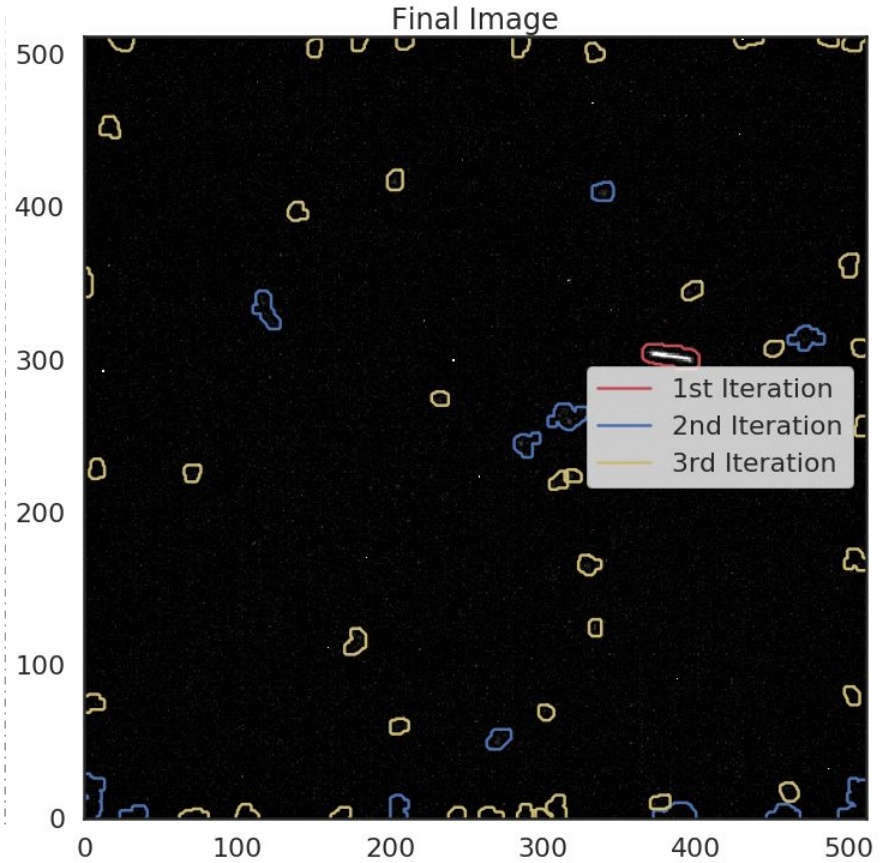
LEMOn data - Ambe 738 - image 52 and image 60



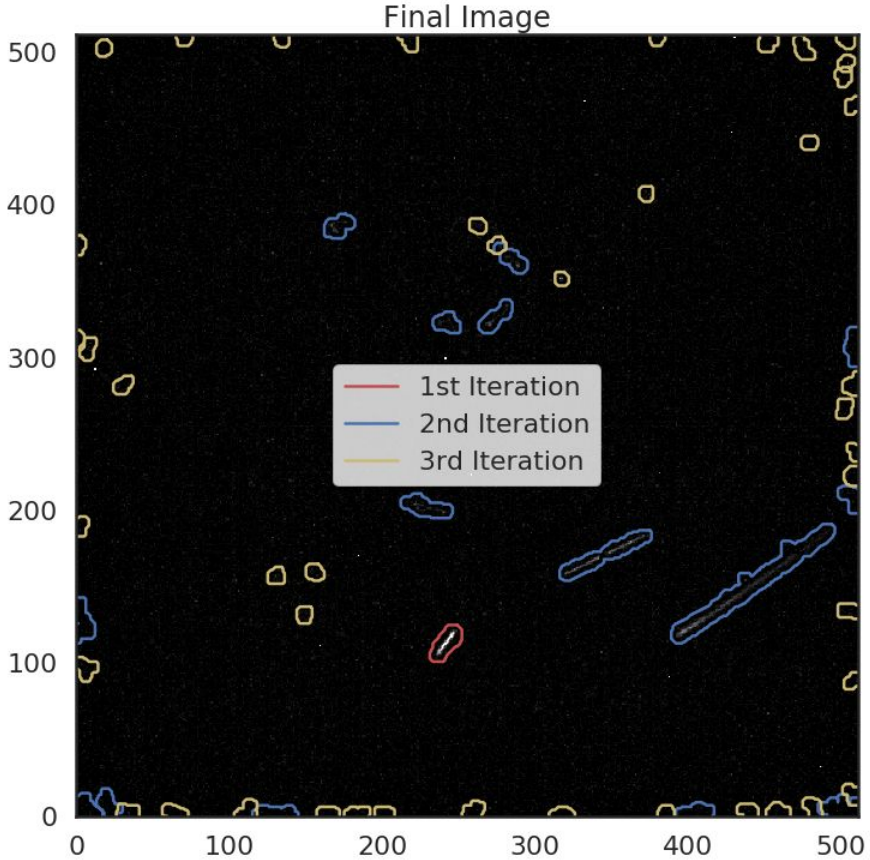


LEMOn data - Ambe 738 - image 69 and image 75





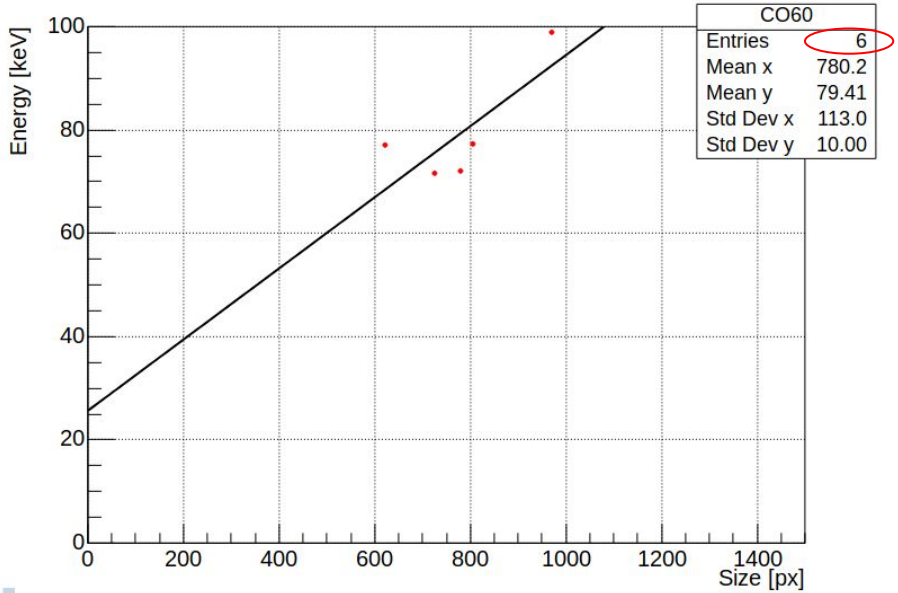
LEMOn data - Ambe 738 - image 88



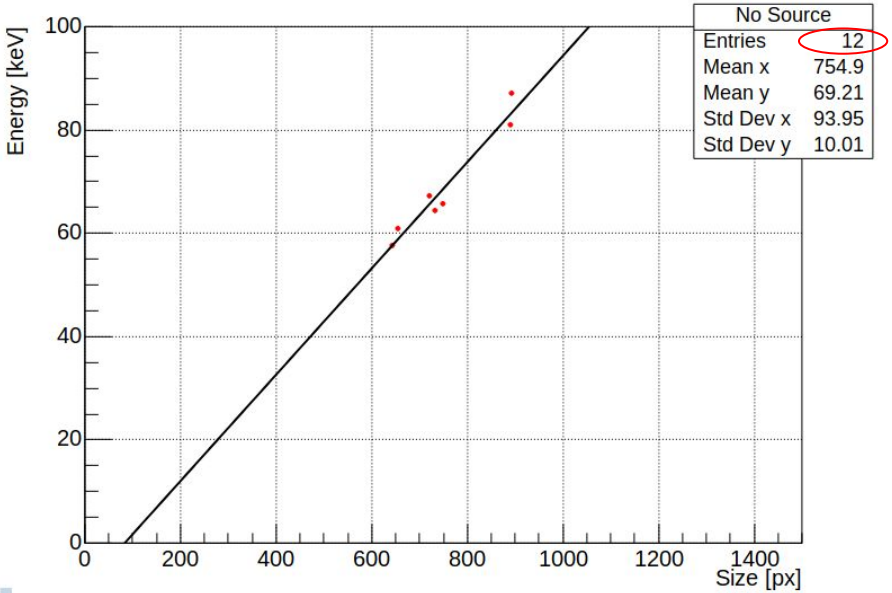
Iteration 1 No Source

Energy vs Size plot for iteration 1

Source

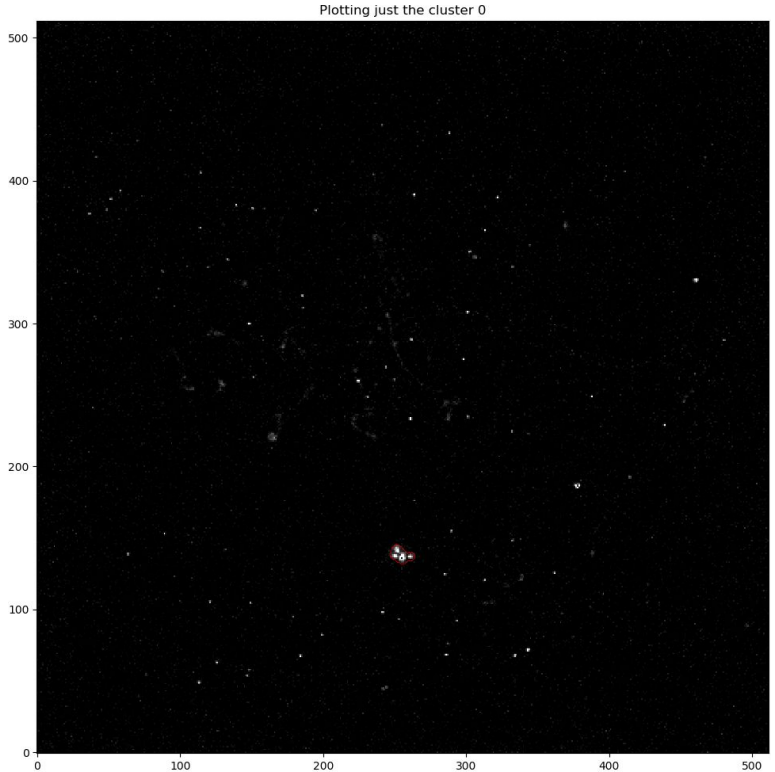


No Source

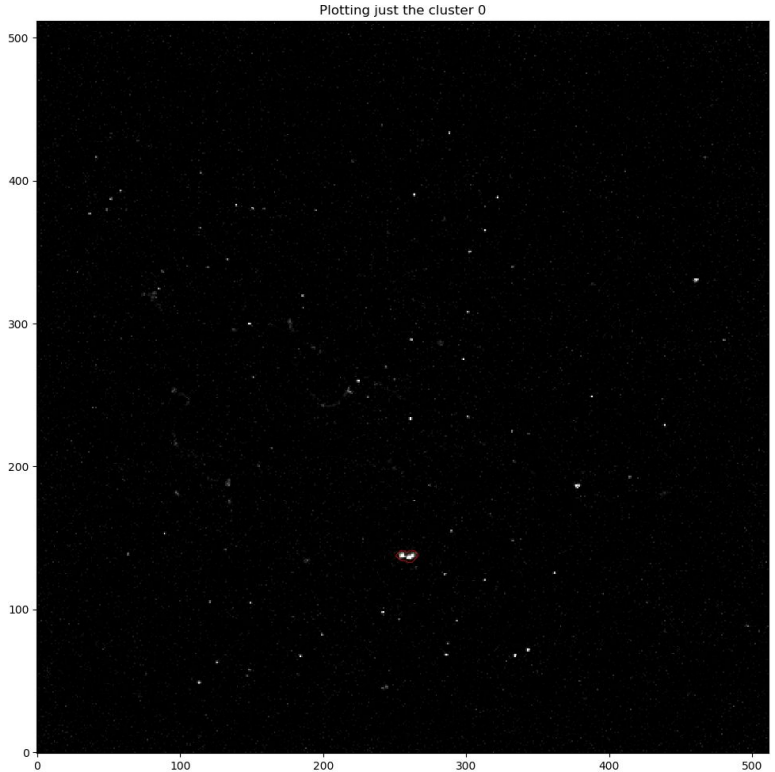


Examples of tracks from iteration 1

No Source

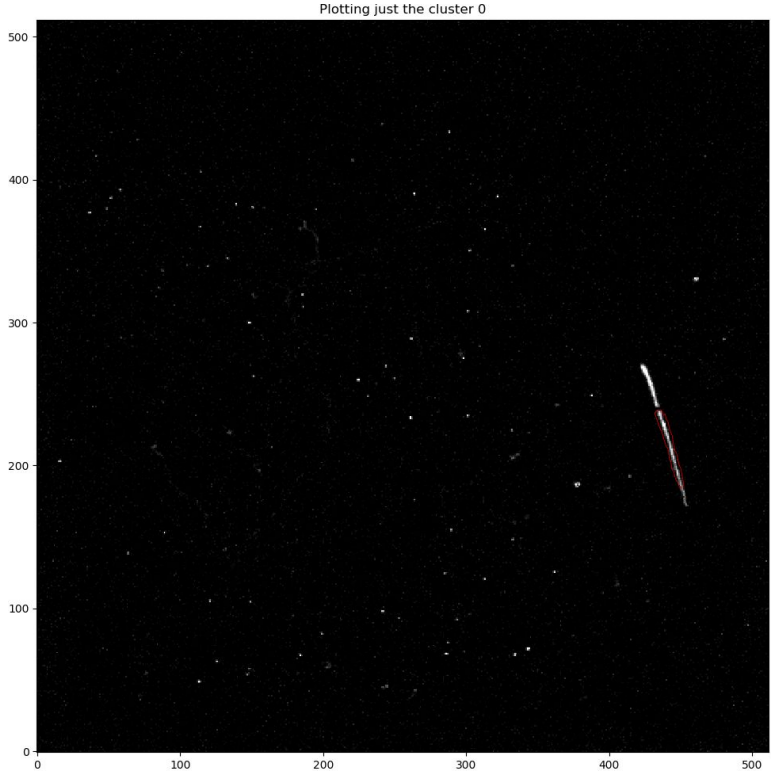


No Source



Examples of tracks from iteration 1

No Source



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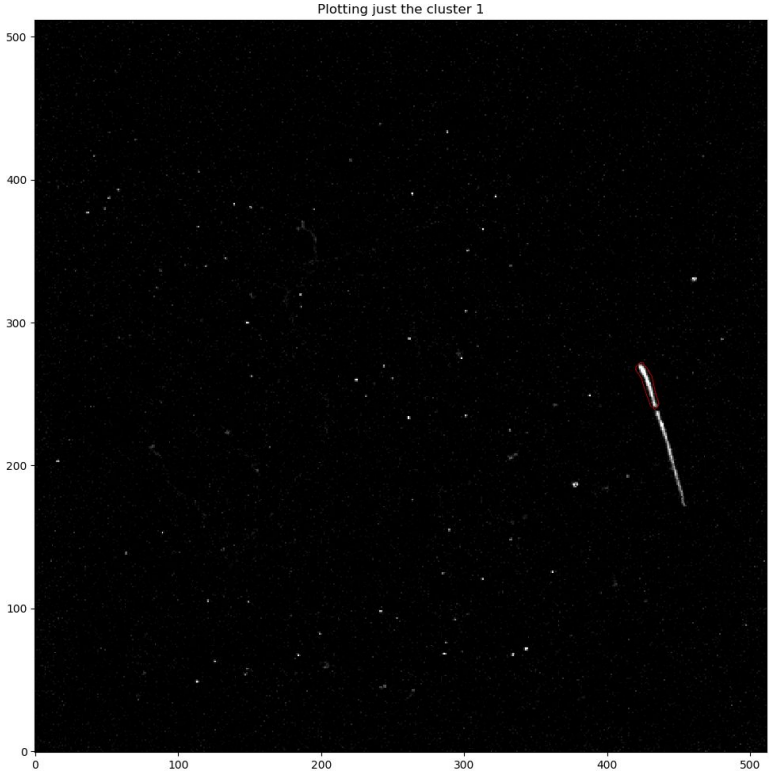

Examples of tracks from iteration 1

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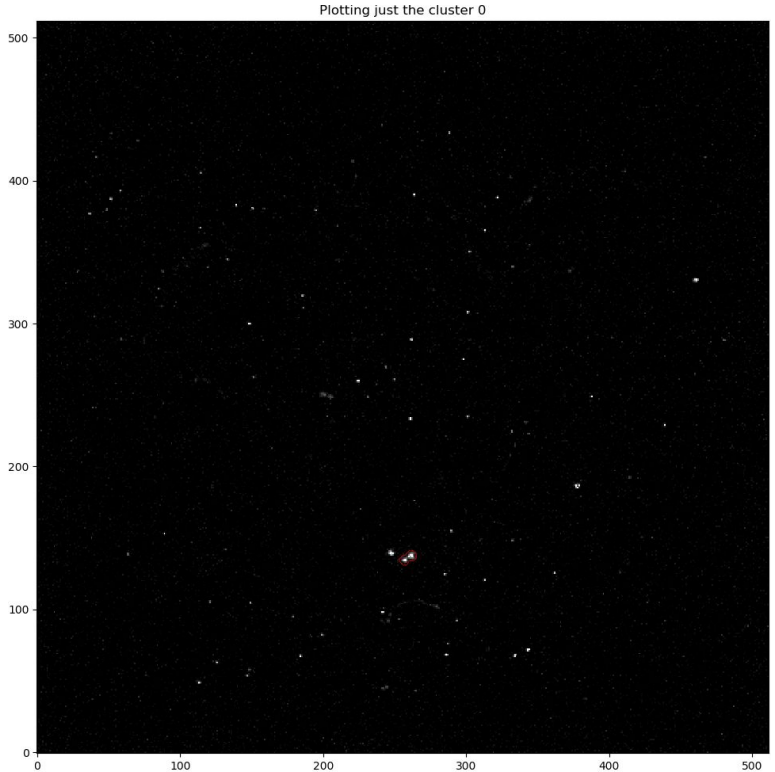

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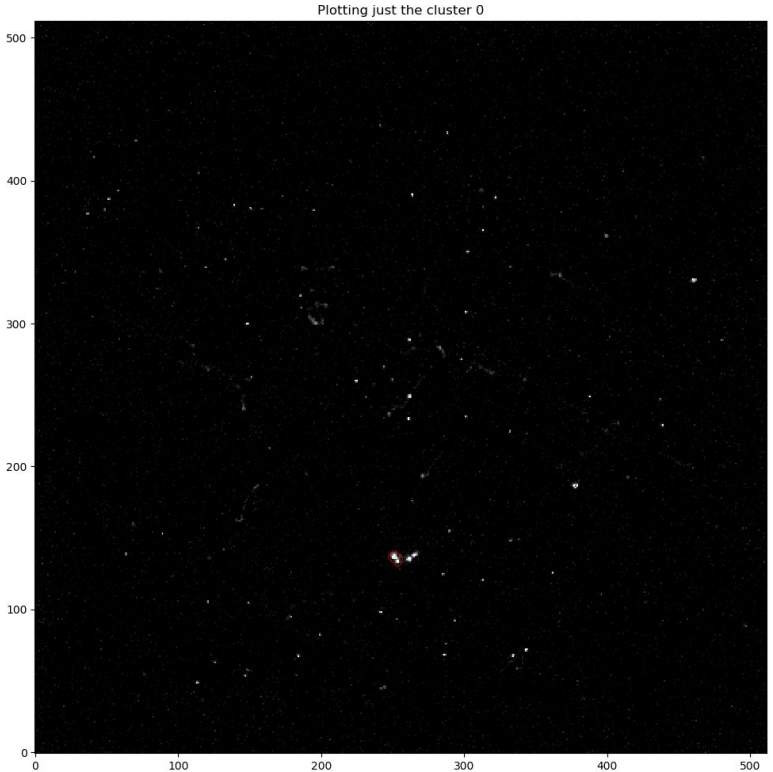

Examples of tracks from iteration 1

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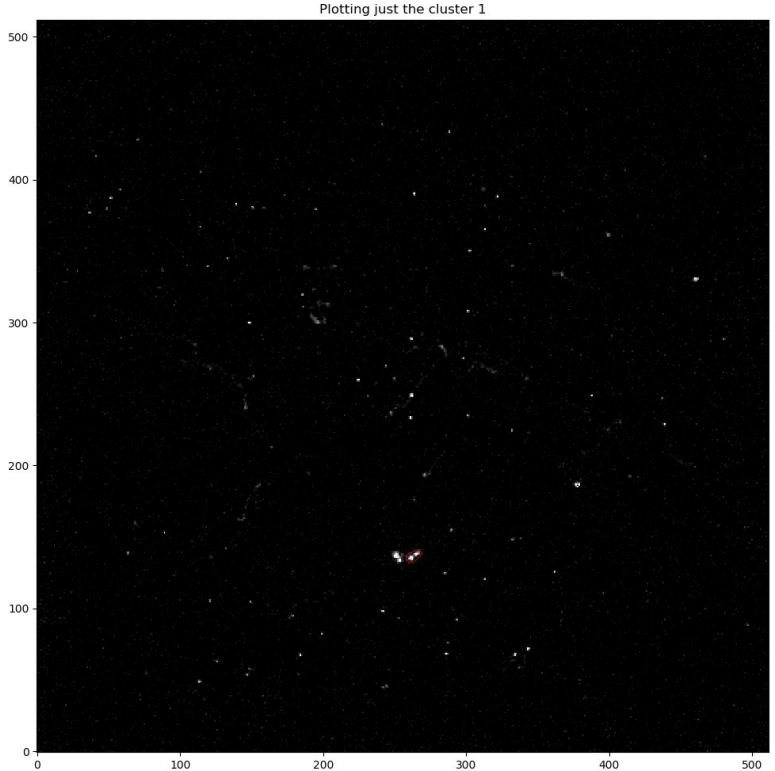

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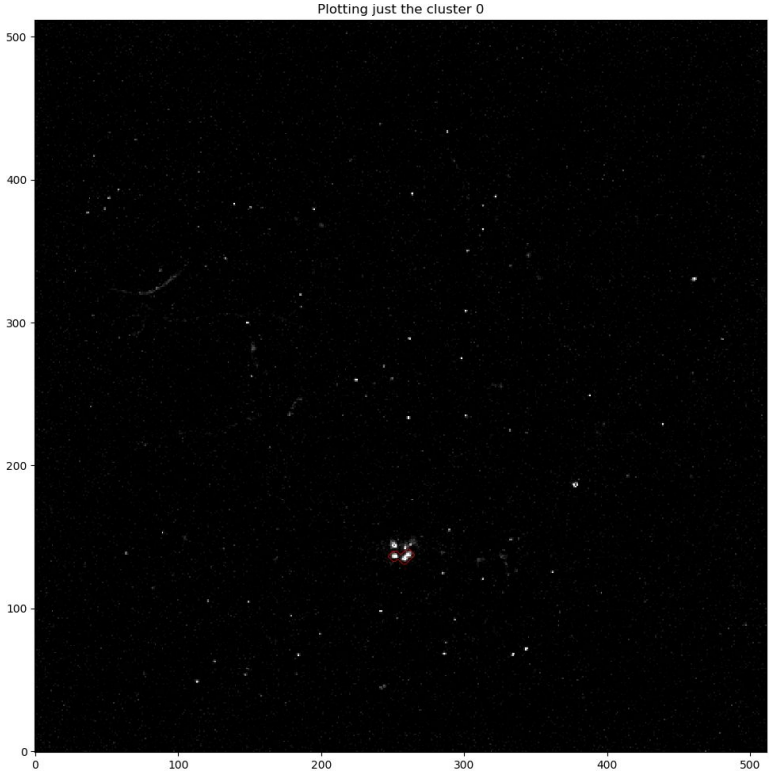

Examples of tracks from iteration 1

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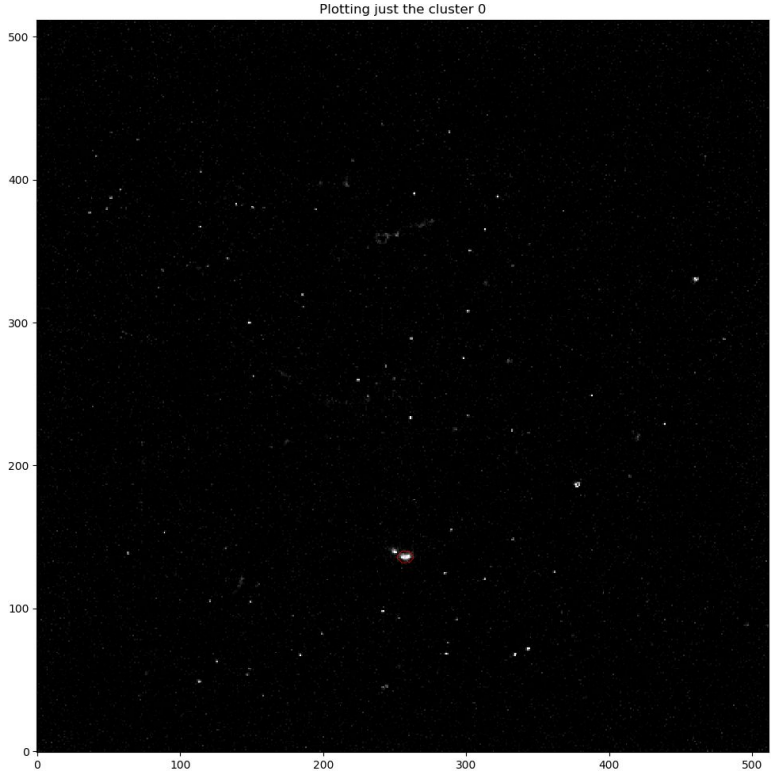

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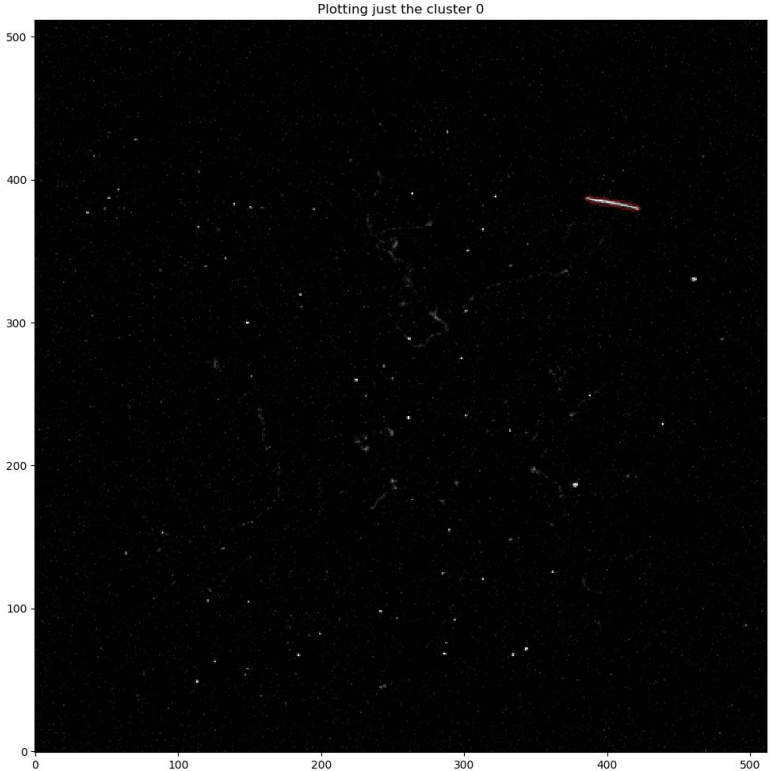

Examples of tracks from iteration 1

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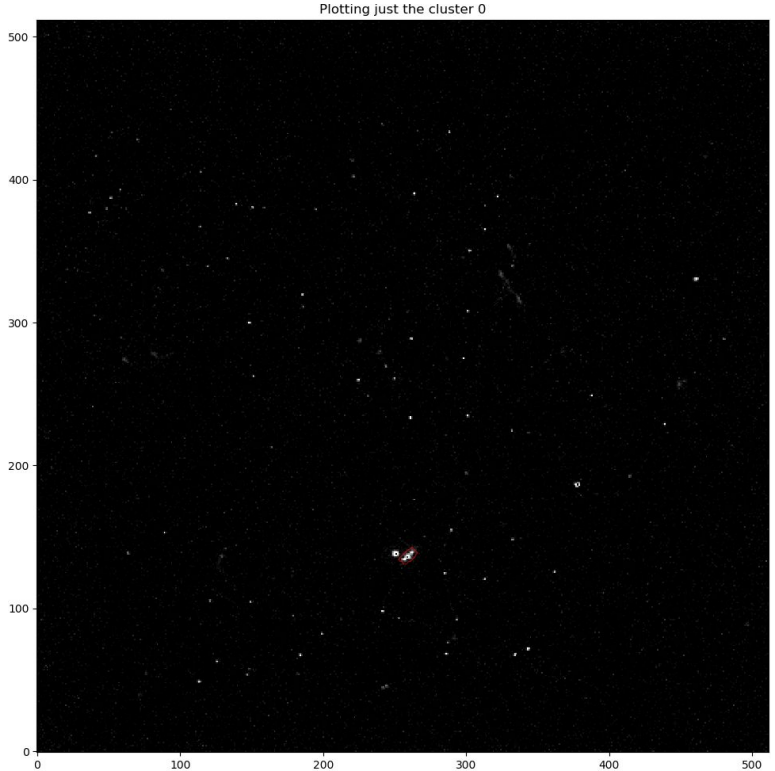

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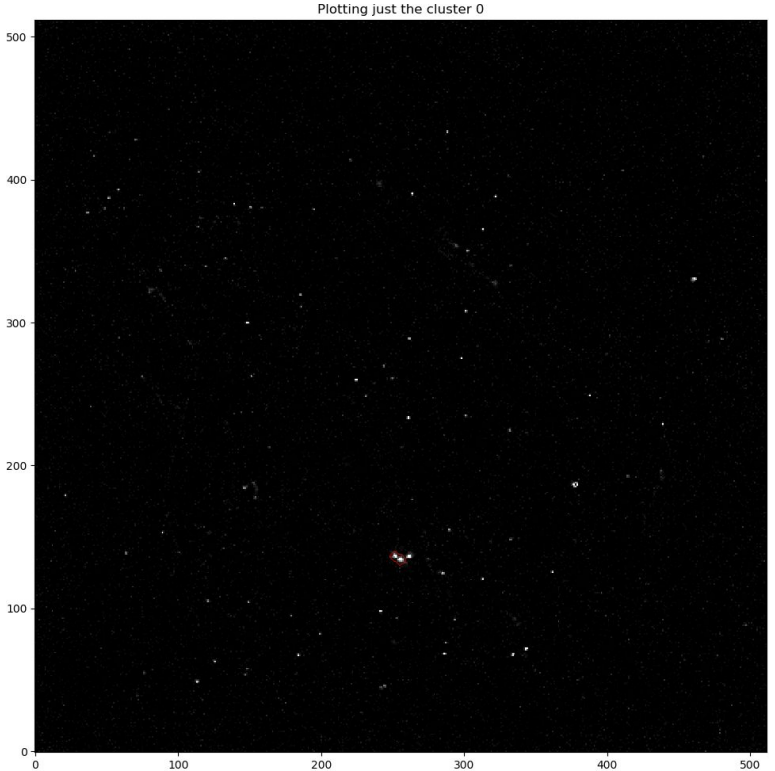
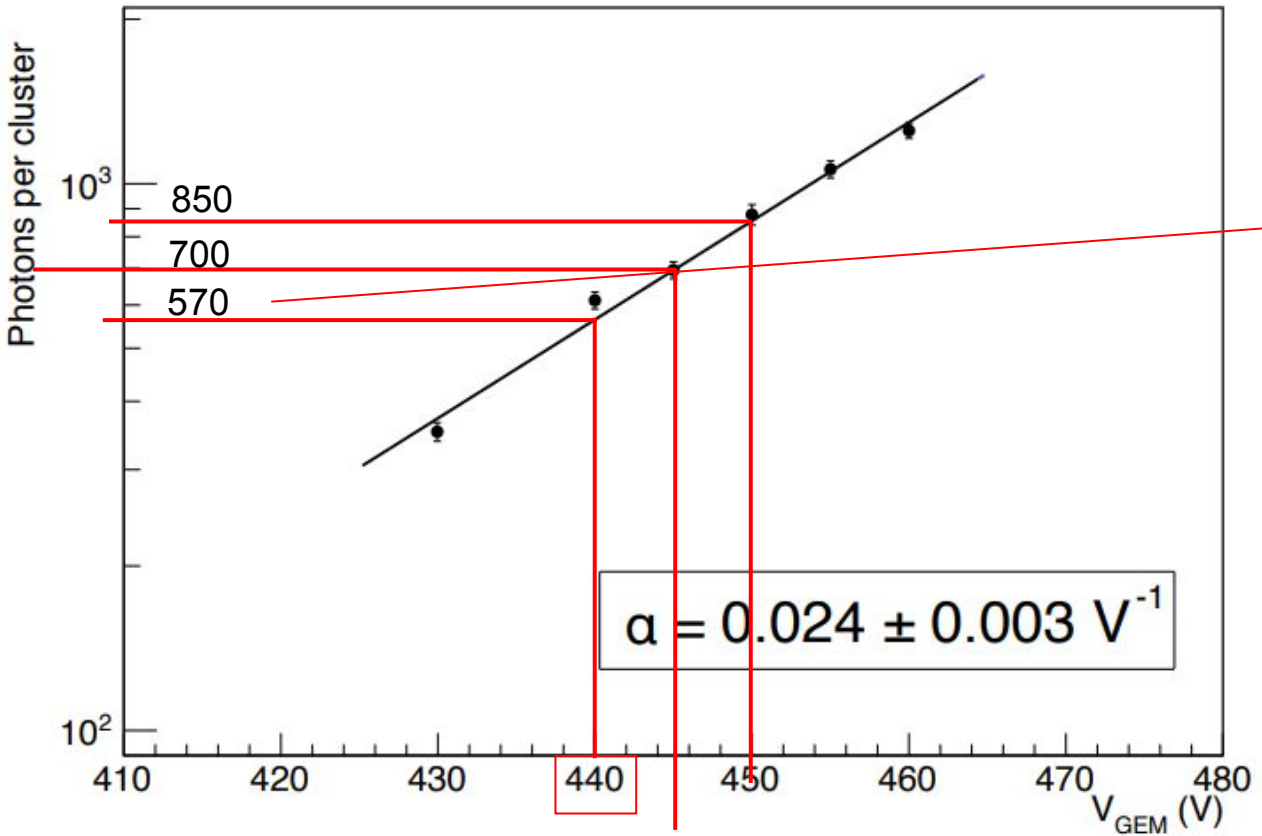
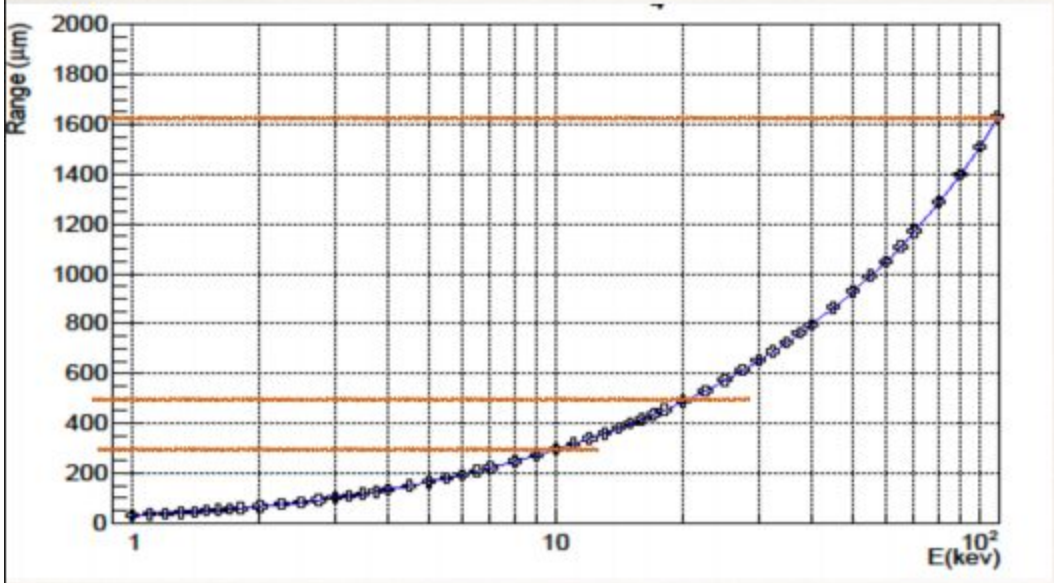


Calibration using the Fe55 paper



5.9keV/570 photons

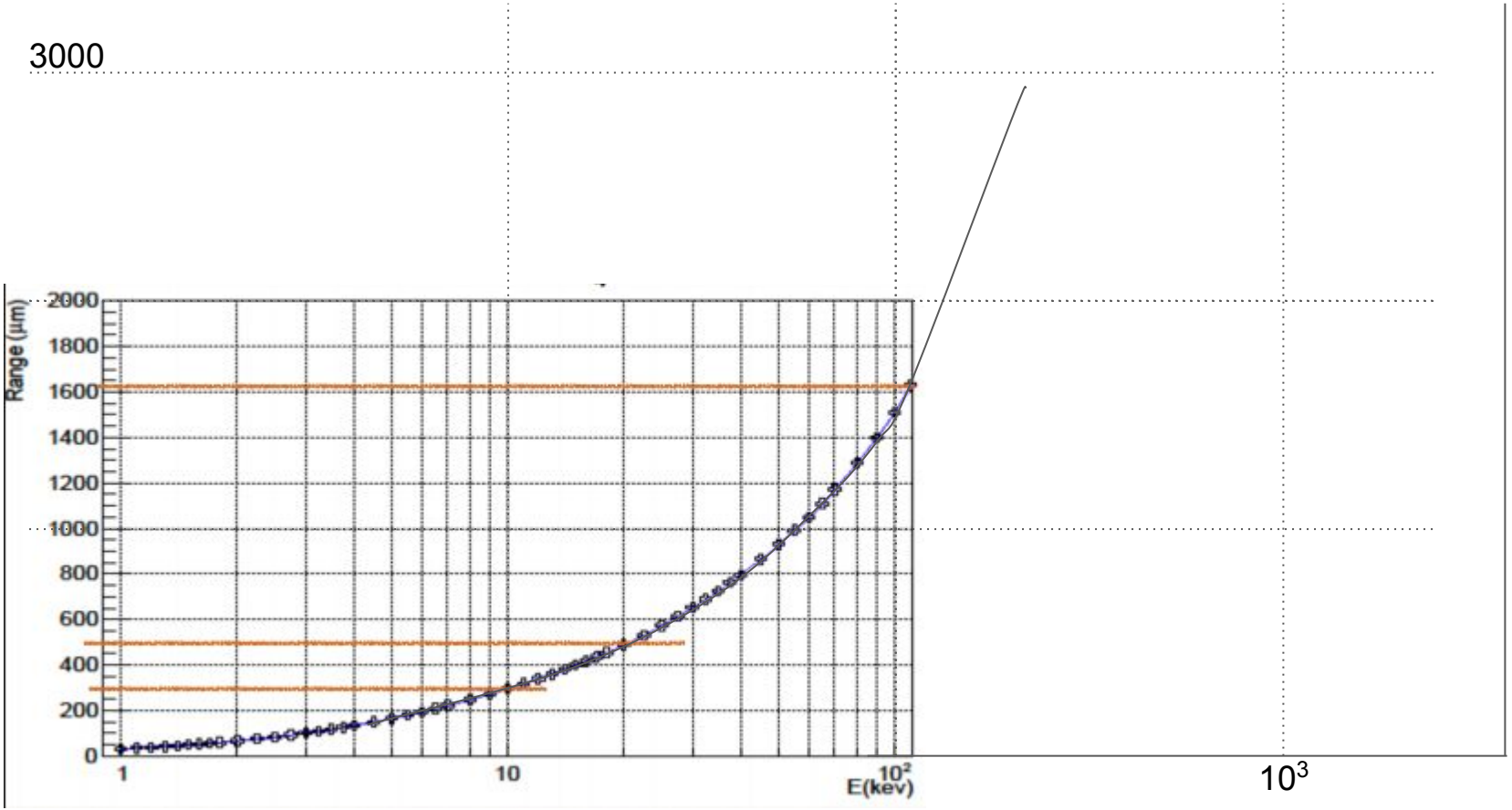
Range of protons in 60/40



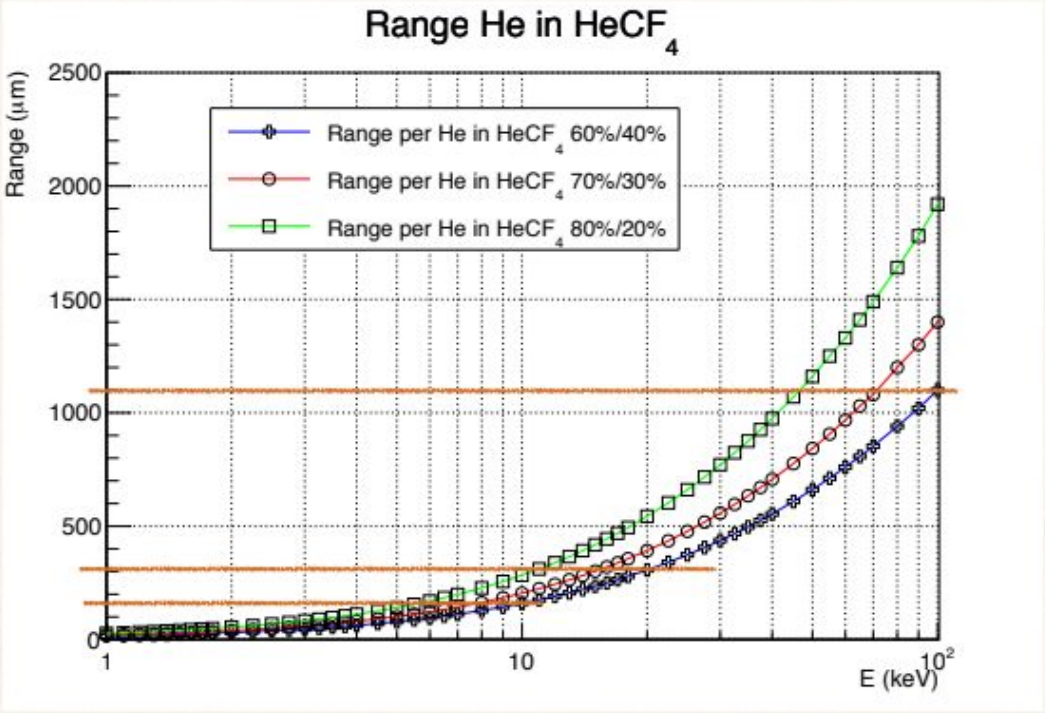
DISCLAIM: protons are not relevant for our Physics case, but we discovered a lot of proton tracks in FNG data.

This plot can be used to check if the experimental "Energy vs Length (Ev[i]L)" plot behaves as expected;

10 keV, 20 keV and 100 keV protons have a range of 300 µm, 500 µm and 1.6 mm;


3000
Range (µm)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1
10
10^2
E(kev)
10^3

Range of Helium nuclei



In particular, 10 keV, 20 keV and 100 keV He nuclei have a range of 170 μm, 300 μm and 1.1 mm in 60/40 (almost the double in 80/20).