

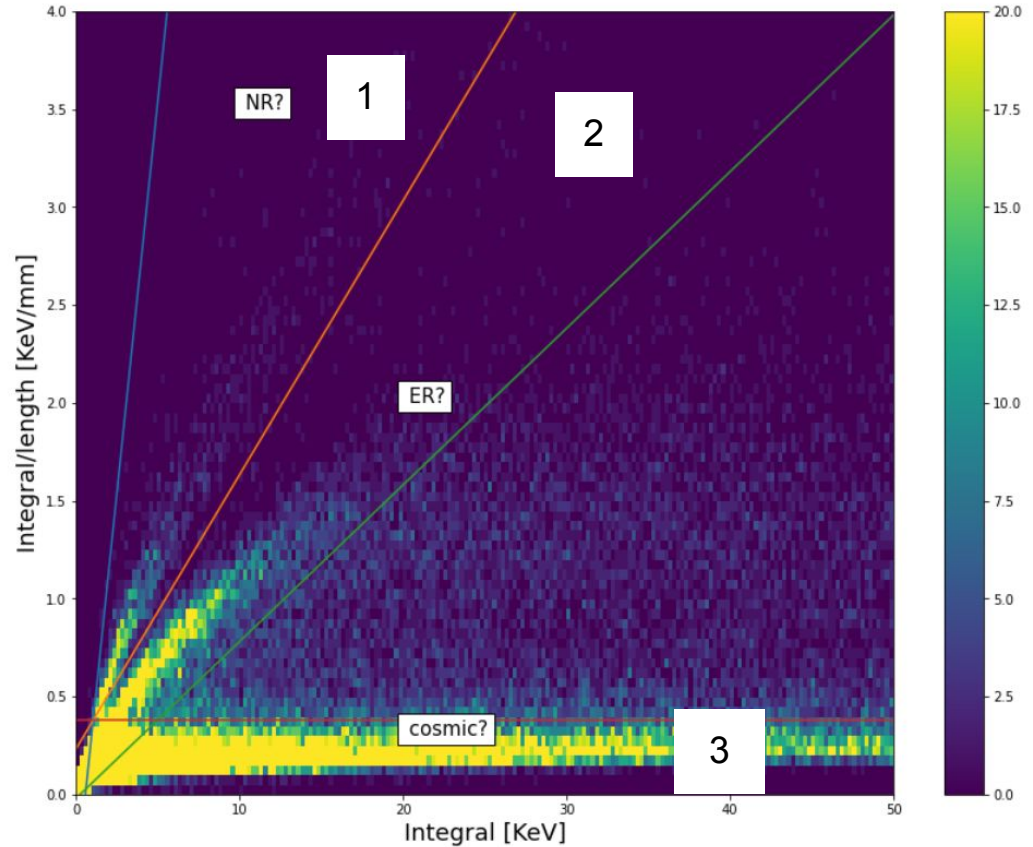
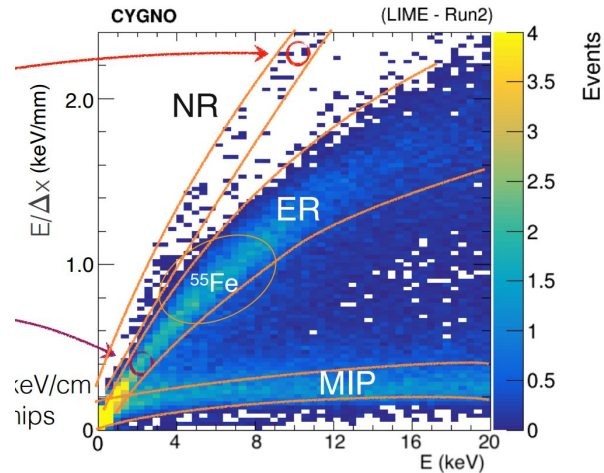
A look to the energy - density diagram

Key Idea

Plotting 1'hist2d of the energy of the clusters vs the energy density (integral over length) we see 3 families:

it's this the way for a NR - ER discrimination?

Let's see the face of this regions



Notes and conventions

Note: Golden background runs: 11590 -> 11951

Strategy: Build a dataframe of events with only one cluster and only one waveform of each family. This allows one to one correlation

Conventions

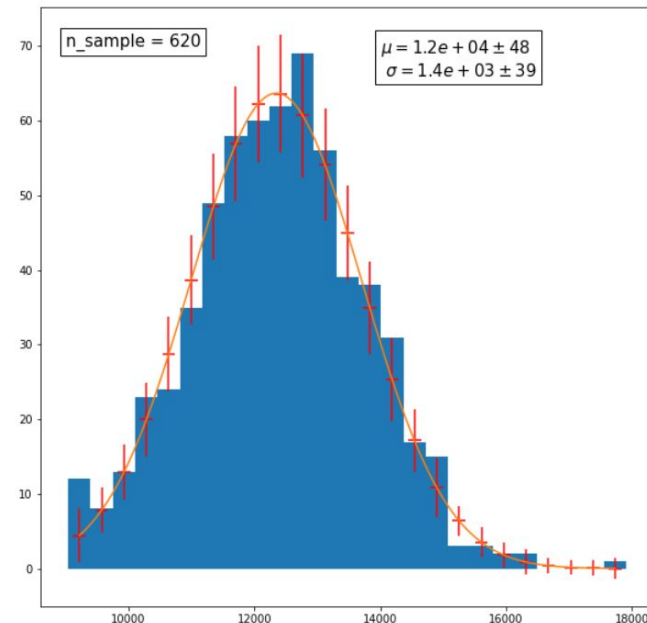
Conversion from px to mm: 330 mm = 1970 pxs

Conversion to KeV: used the calibration run of 8

March, selected the iron peak as 5.9 keV (without z regression)

Dati:

- image_df.txt dataframe con tutti i cluster
- single_cluster.txt dataframe con soli eventi a singoloccluster

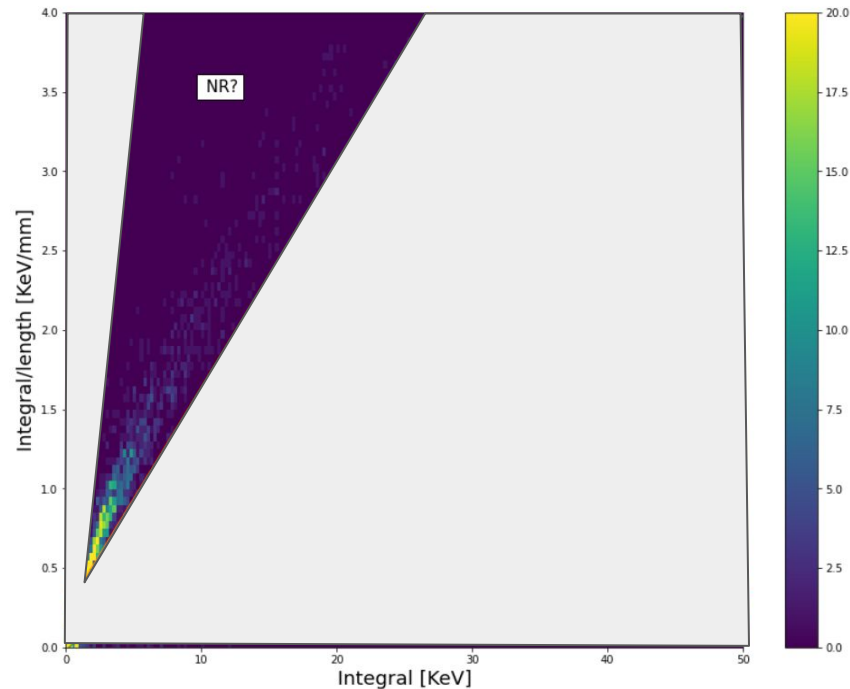


Zone 1

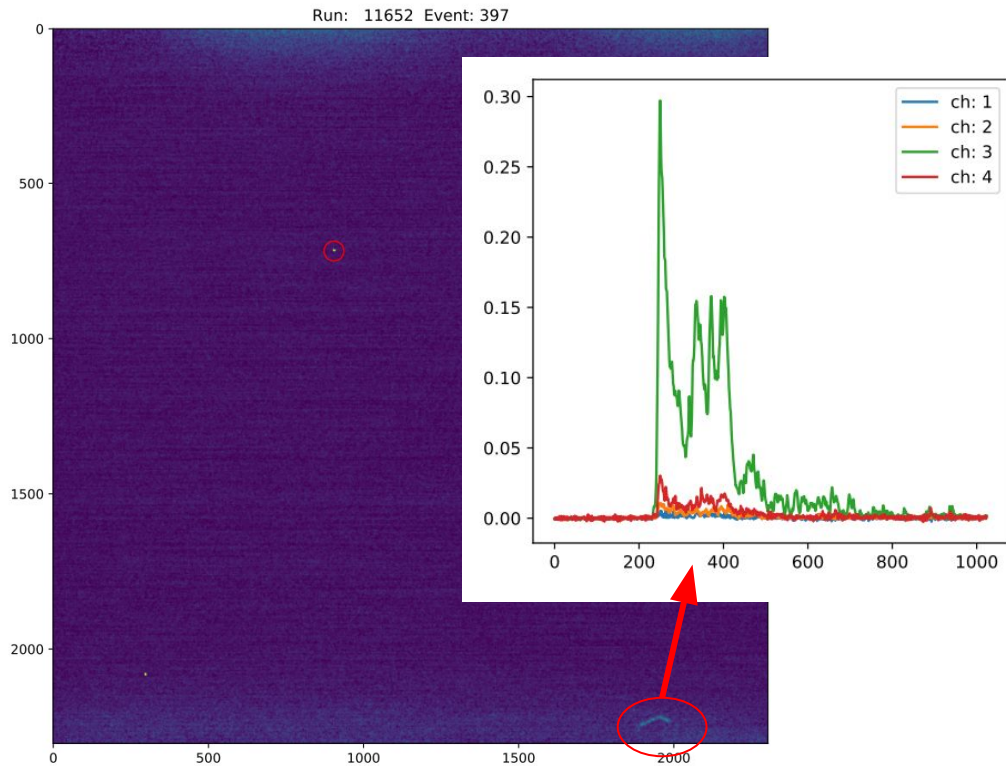
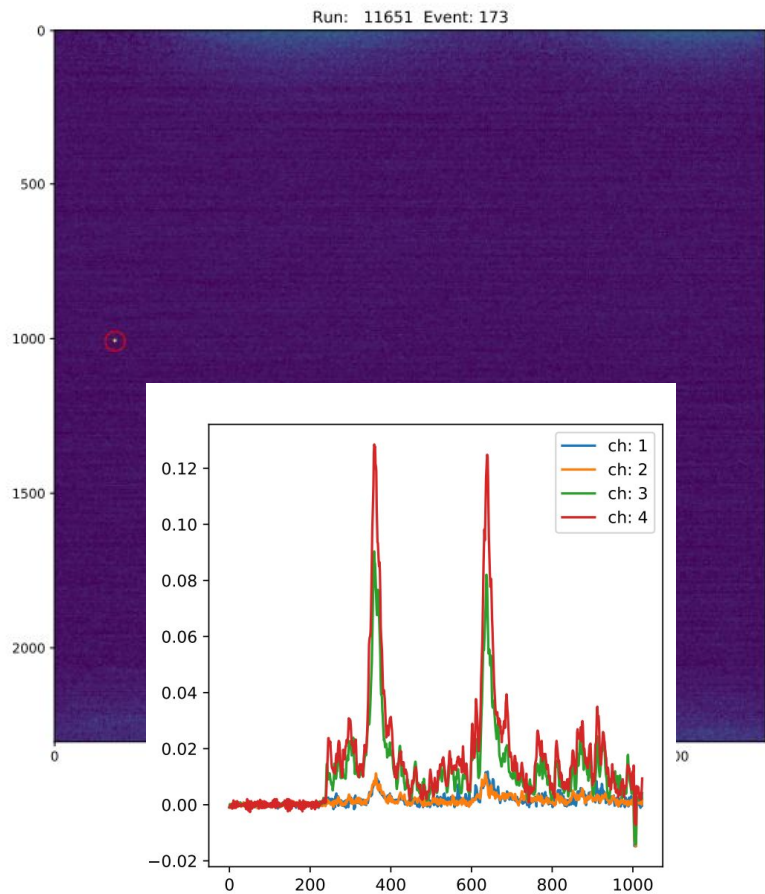
Impression: They are just fake spots that appears only in the camera and that doesn't have a relative waveform in the PMT's

Datas:

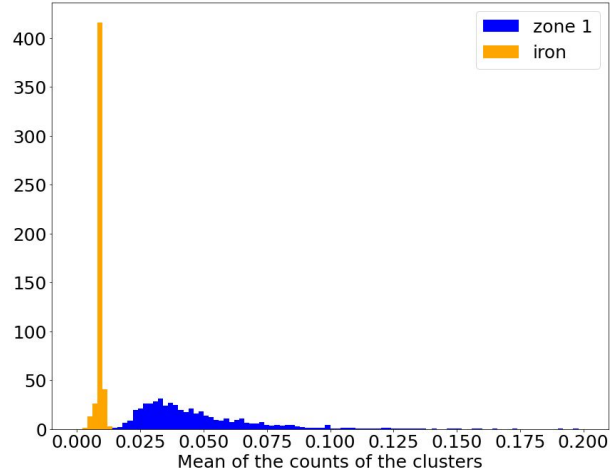
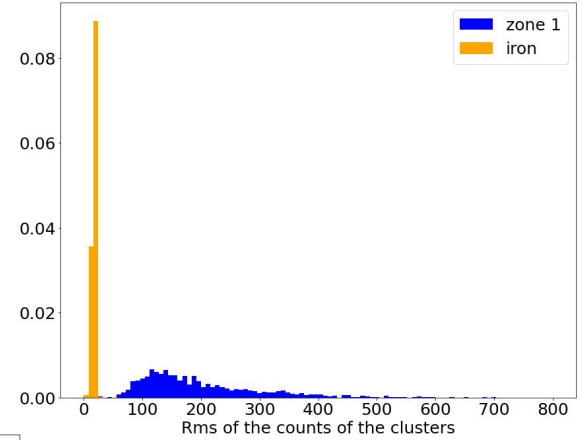
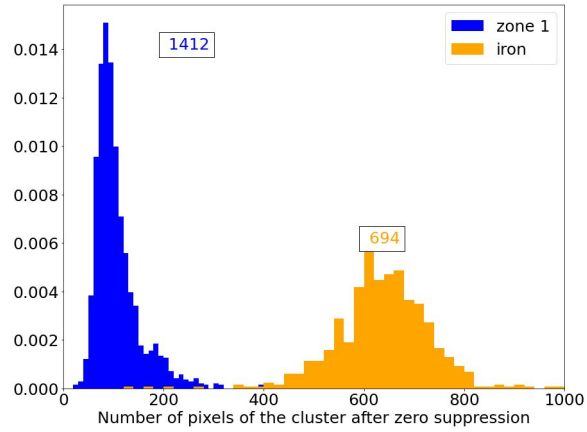
- single_waveform_nr.txt file con dati a singole waveform (ma non necessariamente a singolo cluster, si in questo caso possono esserci due cluster e una waveform perchè appunto sono fake cluster)
- single_cl_wf_nr.txt dataframe 1 a 1 risultante
- nuclear_recoil2.pdf pdf con immagini e waveform (da selezionare con il file subito prima)



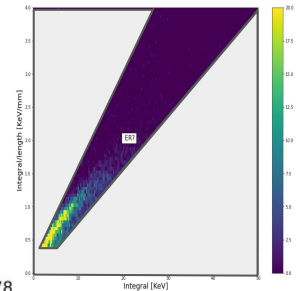
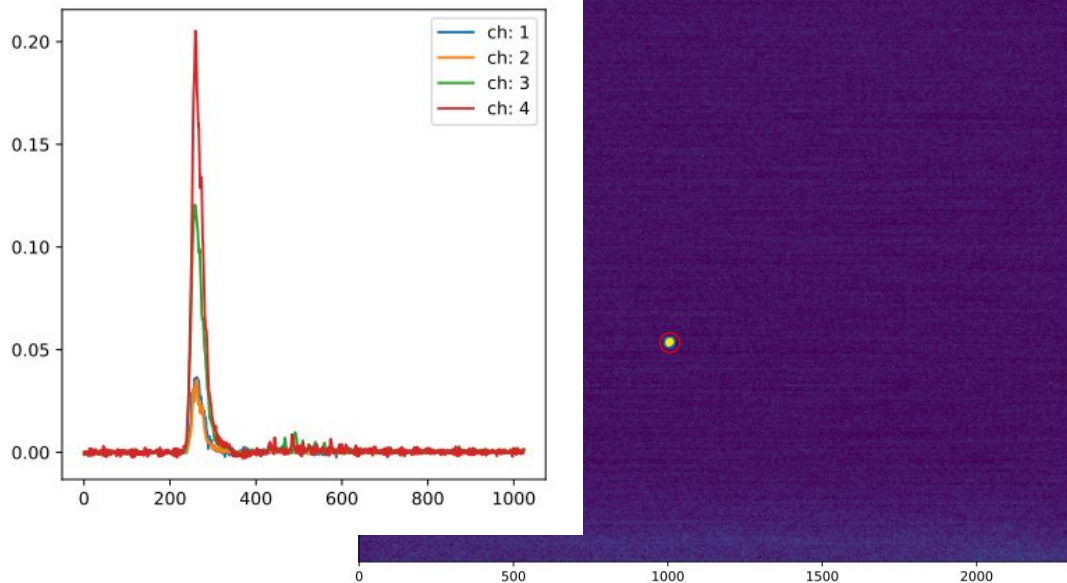
Zone 1- direct examples



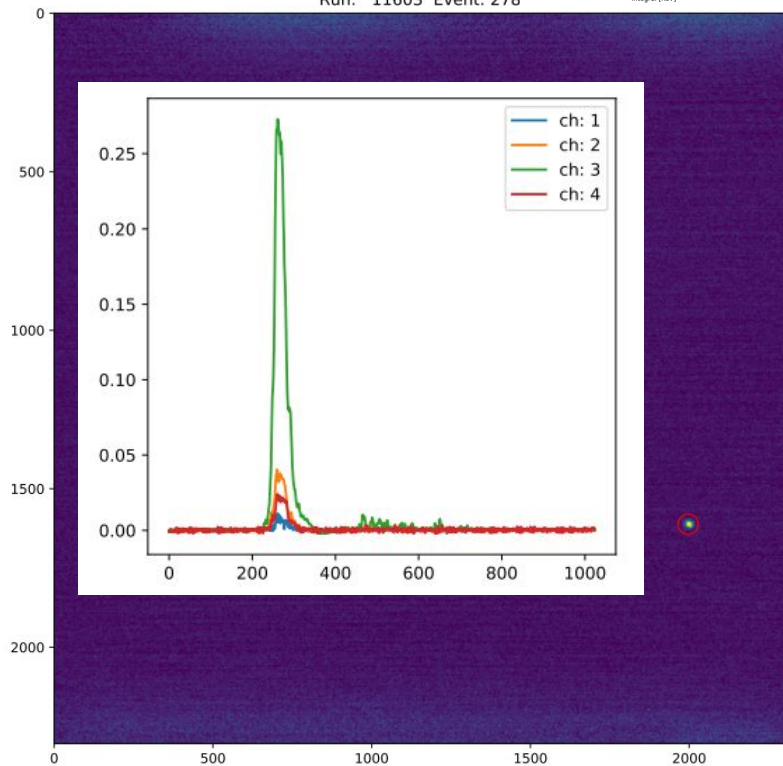
Zone 1 - Comparison with Fe spots



Zone 2



Run: 11603 Event: 278



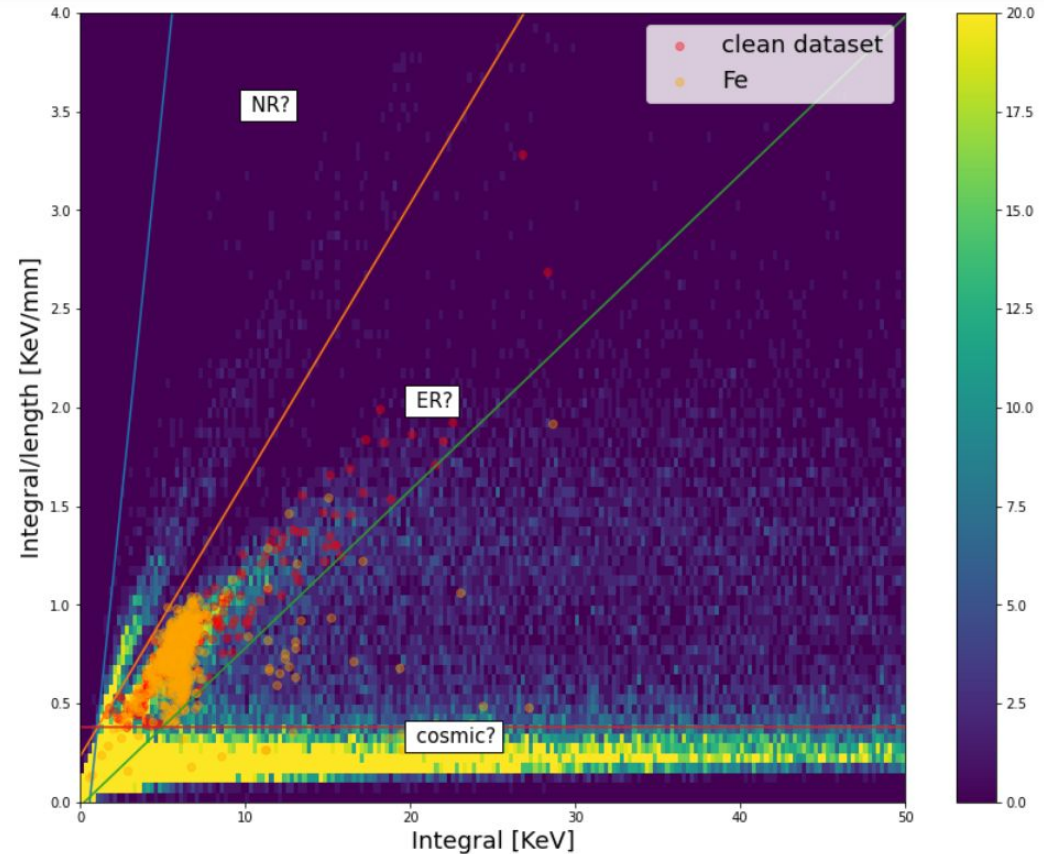
Datas:

- single_waveform_er.txt file con dati a singole waveform
- nuclear_recoil3.pdf pdf con immagini e waveform

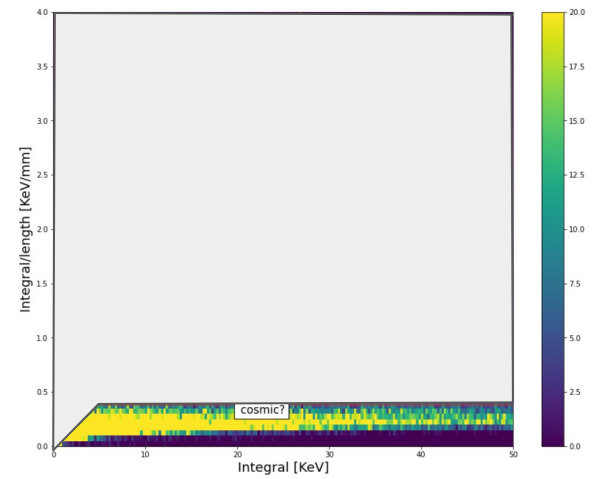
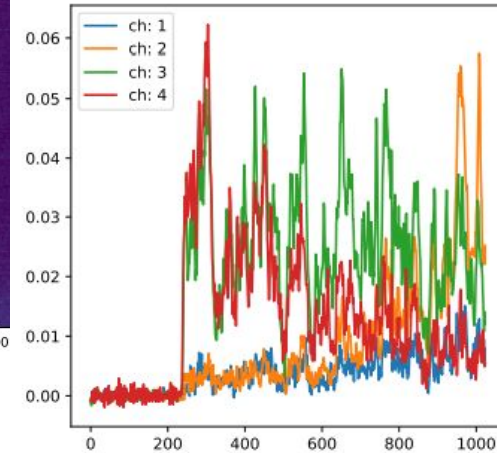
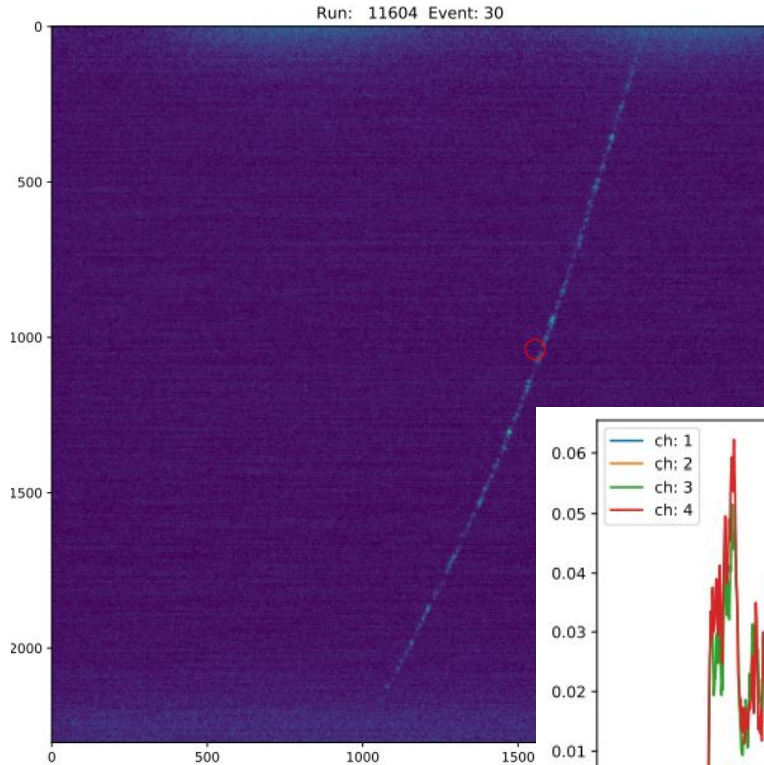
Also Fe belongs to that region

Are they nuclear or electron recoil?

Also iron belongs to that region so there is not a trivial answer



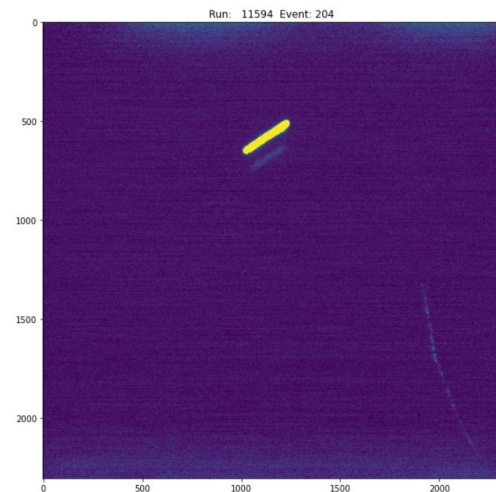
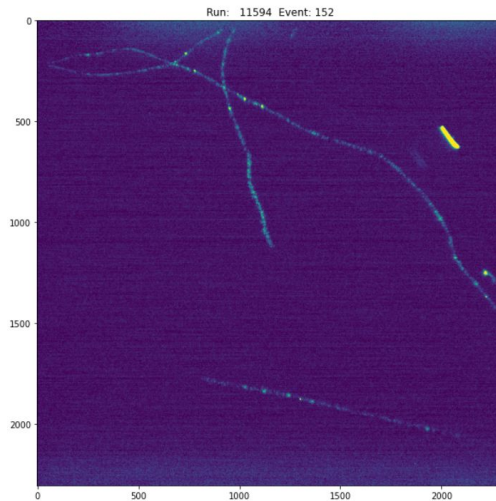
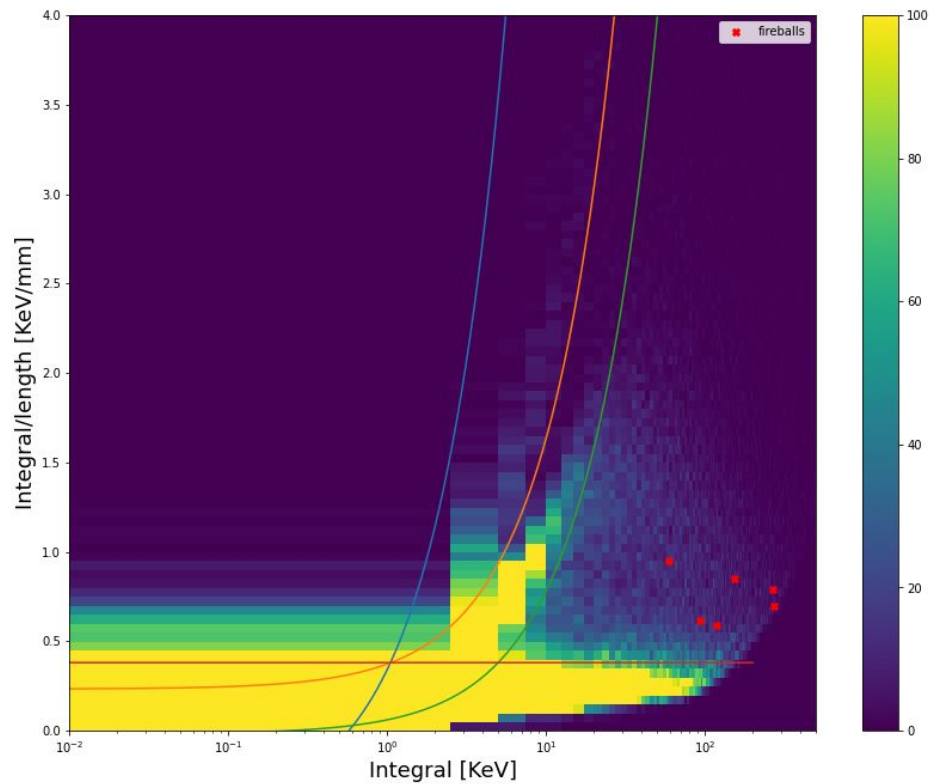
Zone 3



Conclusion: The last zone is populated by long tracks.

They are constant in density even though they can have different lengths.

What are these fireballs?



Next steps

- Look at the rate of fake clusters of region 1: maybe NR are there but hided
- Do we have an hint from simulations of how a NR should look like?
- Pass from a mean density to a local density knowing the pixels of the clusters
- Analysis with the PMT variables of zone 2