

Status of the analysis of MC tracks

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Goal, Inputs & Tools

Goal is to use simulated tracks to:

1. find a procedure for particle ID (simple cuts to start with, then...);
2. estimate particle ID efficiency;
3. then move to "directionality" (particle direction reconstruction).

Inputs:

- G4 simulated tracks (relying on simulated events generated by Flavio);
- Only electrons @ different energies available so far;
- Other particles are needed for this study... and nuclear recoils... use different generators ??

SW tools

- Digitization (produce images starting from MC tracks, adding diffusion, background,... (Flavio))
- Analysis code from Igor&Emanuele
- Full chain running on the Roma Tre Cluster (where MC tracks data are produced as well)

Digitization parameters

- 'diff_param' : 0.8, #diffusion parameter [mm]
- 'Conversion_Factor' : 2000/10, #Number of photoelectrons emitted per keV (iron calibration)
- 'noise_mean' : 99, #Electronic noise mean value per pixel
- 'noise_sigma' : 2, #Electronic noise sigma
- 'z_dim' : 350, #first dimension of the detector
- 'y_dim' : 350, #second dimension of the detector
- 'z_pix' : 2048, #number of pixels in the first dimension
- 'y_pix' : 2048, #number of pixels in the second dimension

Data size & processing time

Digitization:

Data size: ~**13MB/image** (from MC files of ~50kB/track)

→ Should find a reasonable data compression/zero suppression

Processing time:

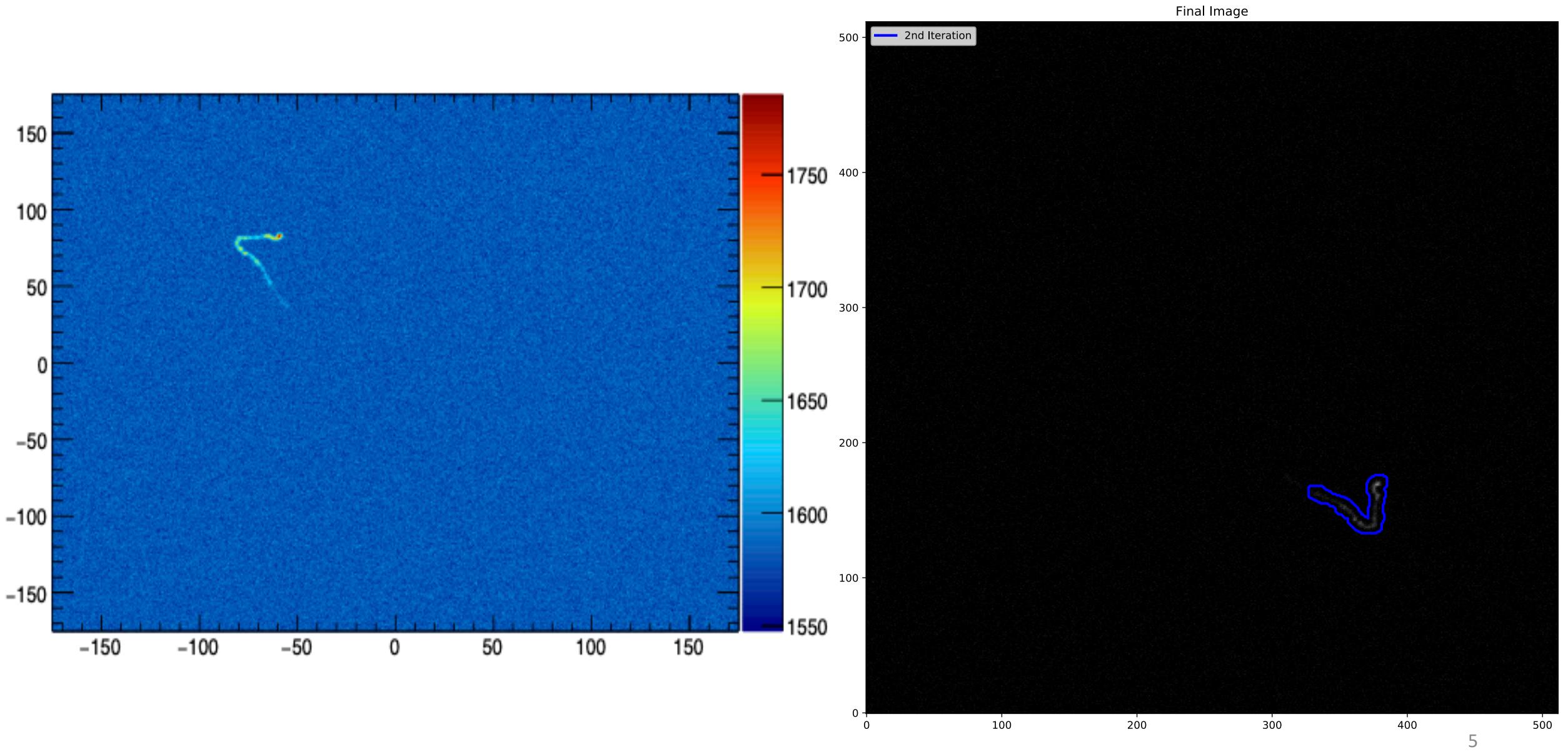
~50 s/image (digitization)

~15 s/image (Reconstruction/analysis)

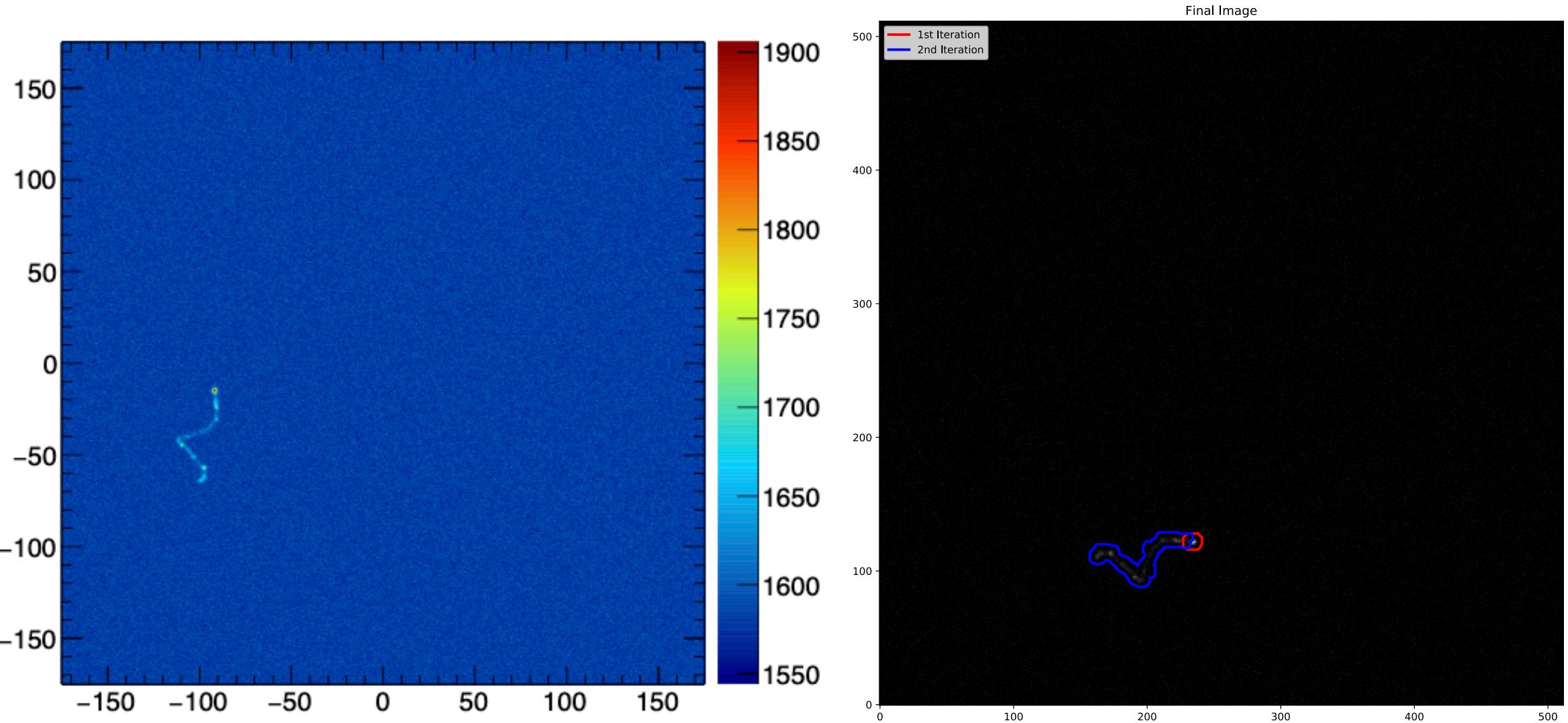
→ Increase job splitting...

However, ~100k events processed in a couple of days on the cluster

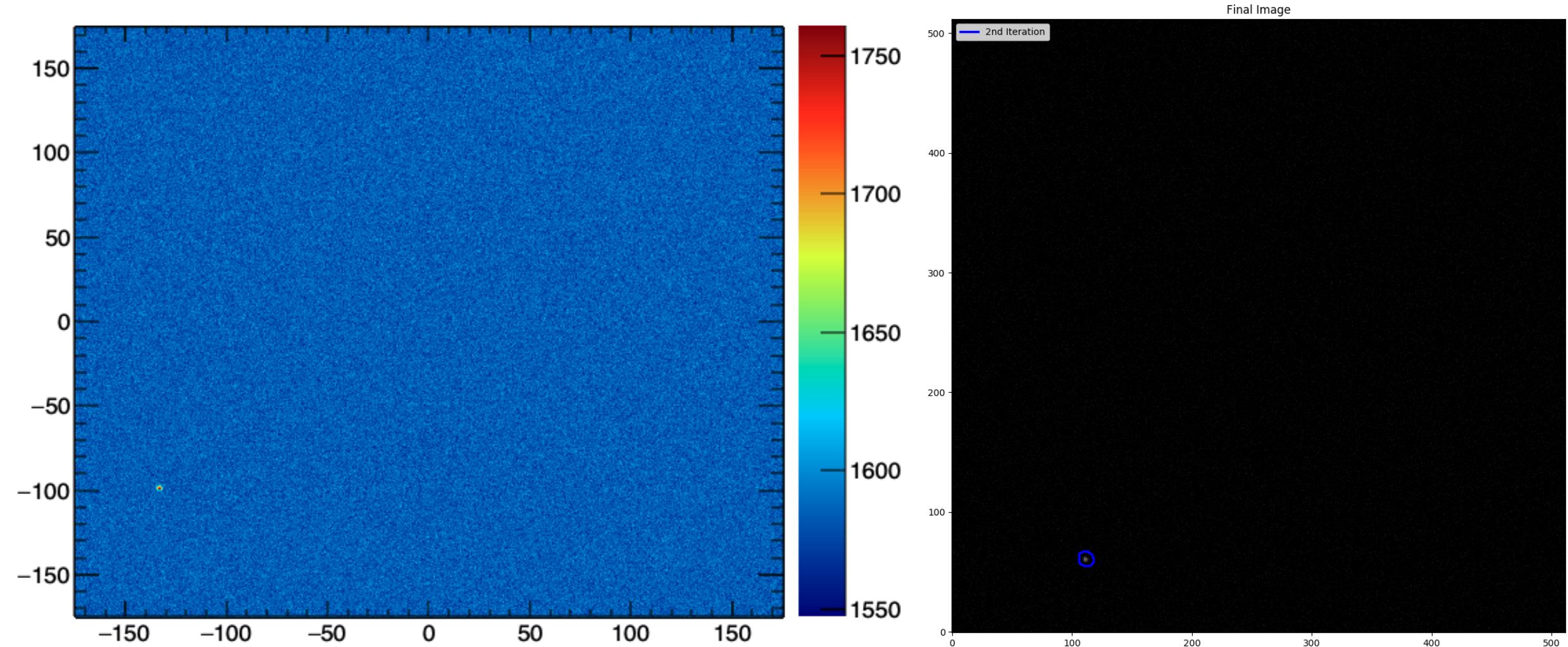
100 keV image



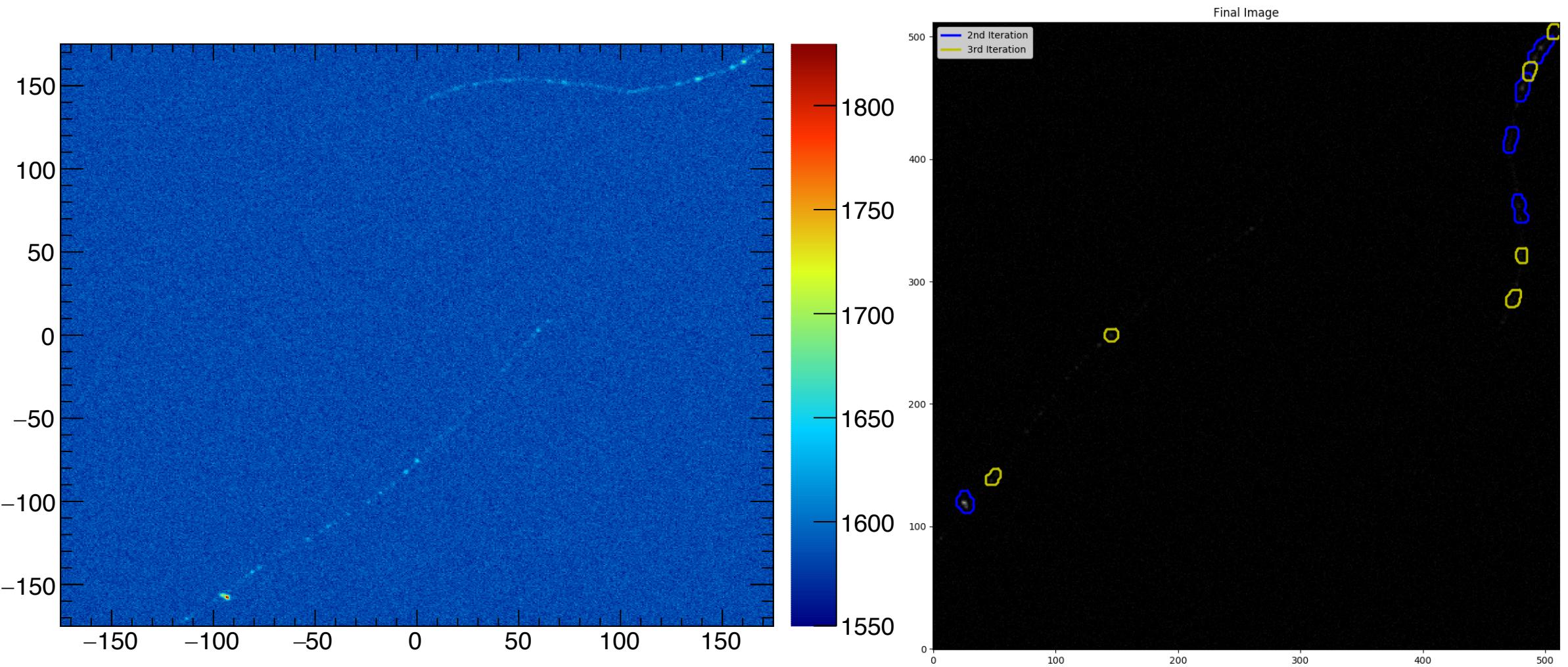
100 keV image



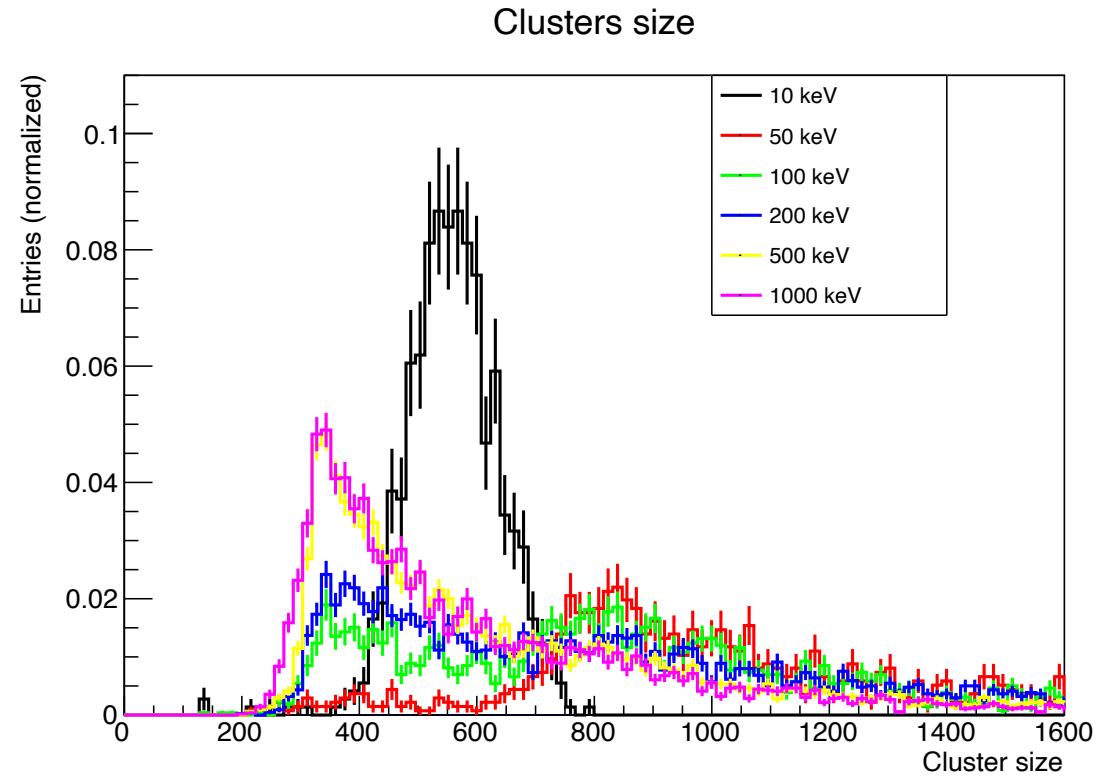
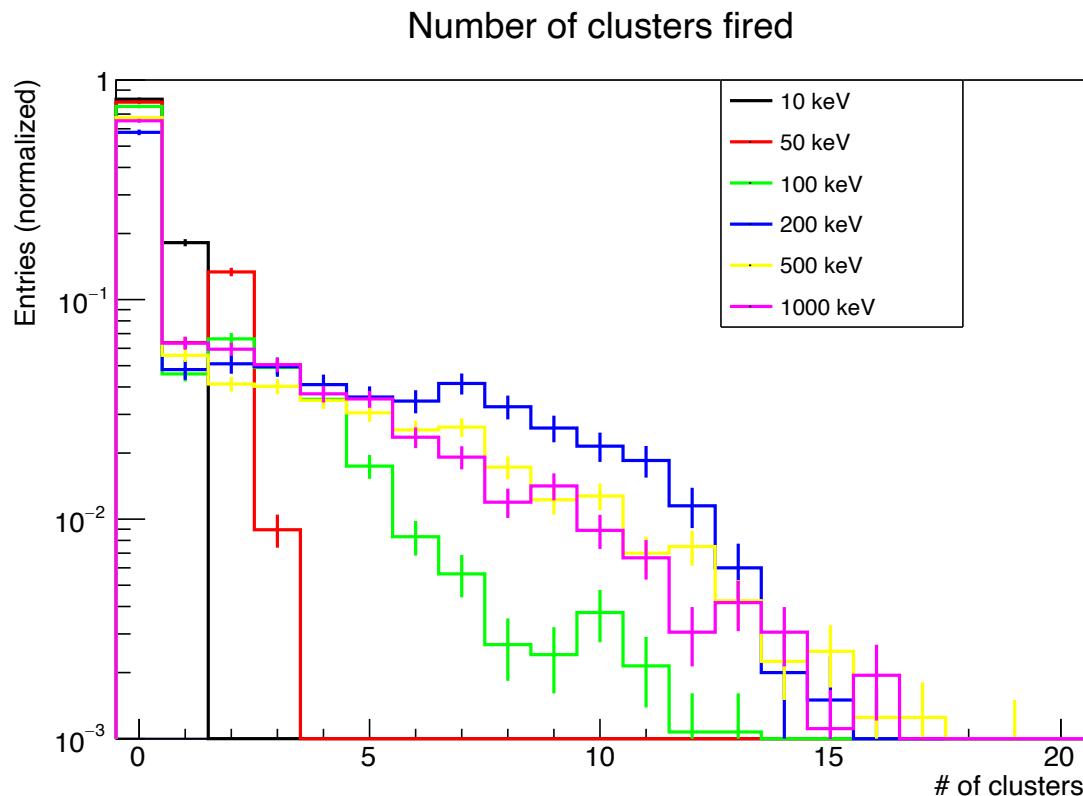
10 keV image



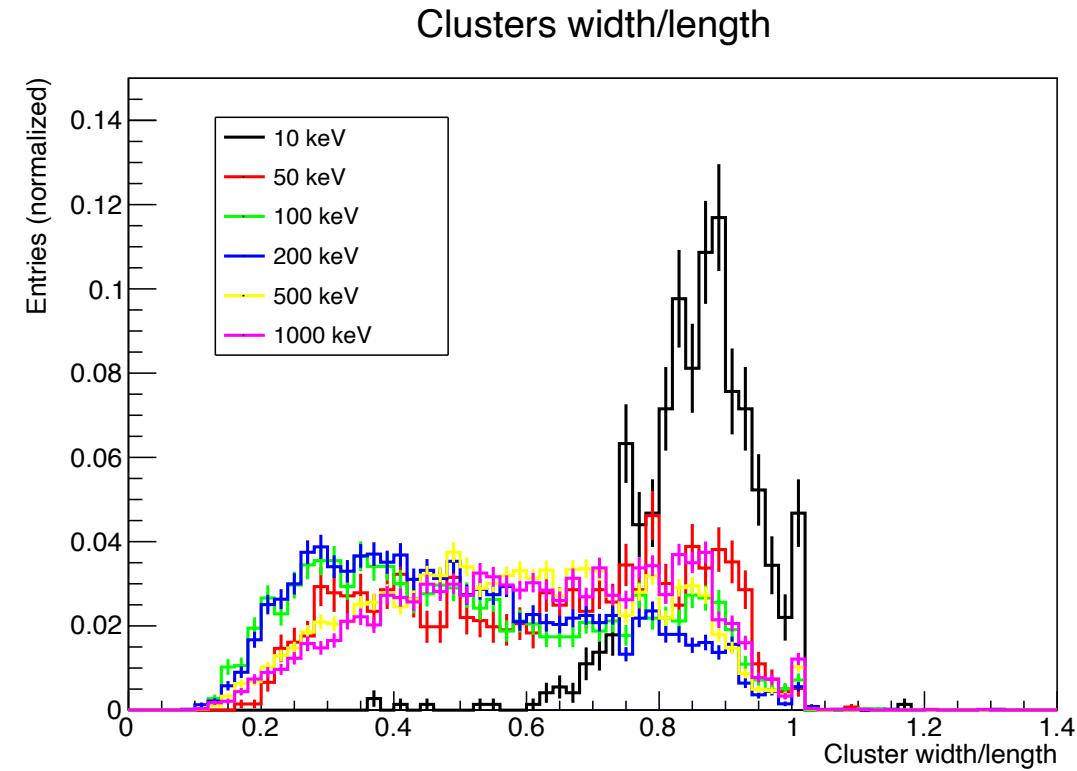
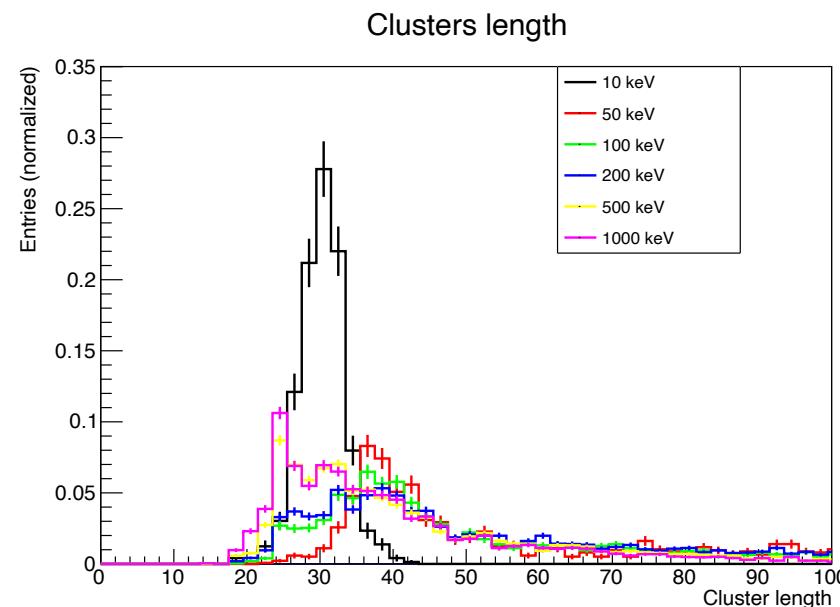
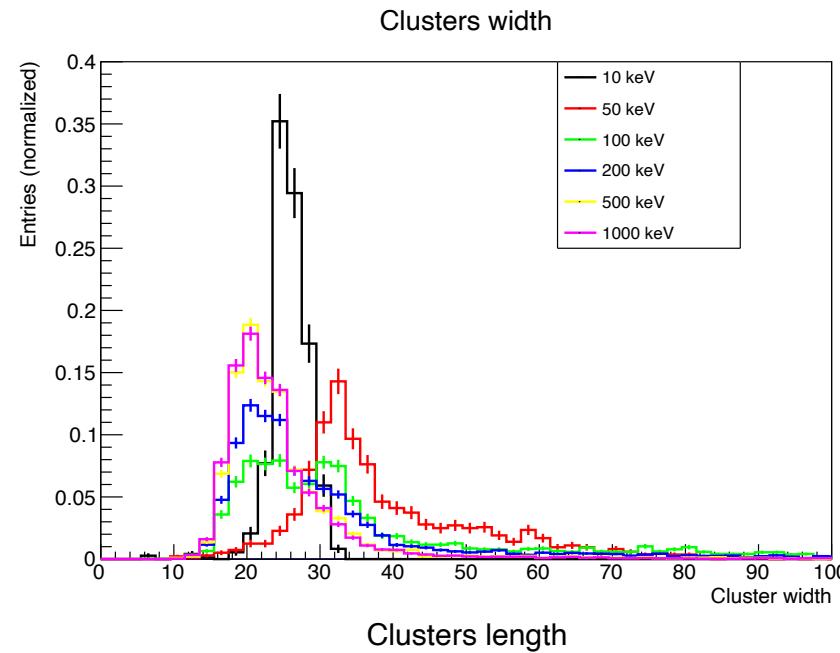
100 keV image



Clusters



Clusters characterization



Outlook

- The machinery is in place;
- Input events are needed (most urgent point!);
- Need to check/optimize the parameters of the clusterization algorithm (not sure the same parameters are ok to properly combine clusters on the different types/energy of tracks);

Cluster's iteration number

