Directional-iDBSCAN

first look at LIME data

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Last presentation

- A preliminary analysis of the LIME data was done with Ambe runs.
  - [3737-3791]: Ambe runs (focus on 3790).
  - [3792-3794]: Cosmics runs soon after source off (focus on 3793).

- It was agreed that the ideal would be to make an analysis with ^{55}Fe runs.
  - Run 4433: Cosmic run.
  - Run 4455: ^{55}Fe run.
  - Both 200 ms of exposure time.

iDDBSCAN optimizations

- The DBSCAN seeding improvement discussed in the last meeting was tested and implemented.

- Isolation seeding condition was moved out of the last clusterization loop.
 - The old version was too slow with these new data.

Parameters validation

- An attempt to validate the iDDBSCAN parameters was done, inspired by the iDBSCAN article.
    - Scan with the parameters aiming the maximum of: $ER_{dataset}$ - $NRAD_{dataset}$.
    - It was done initially varying the eps and min_samples.

- Since the currently metric distance used is the cityblock (manhattan distance), only integer values of eps will change the results.
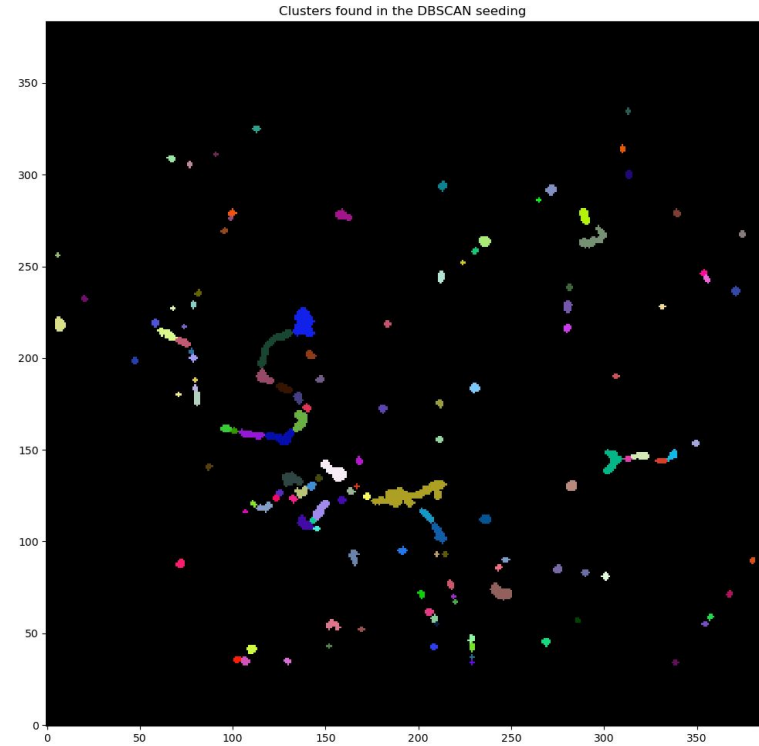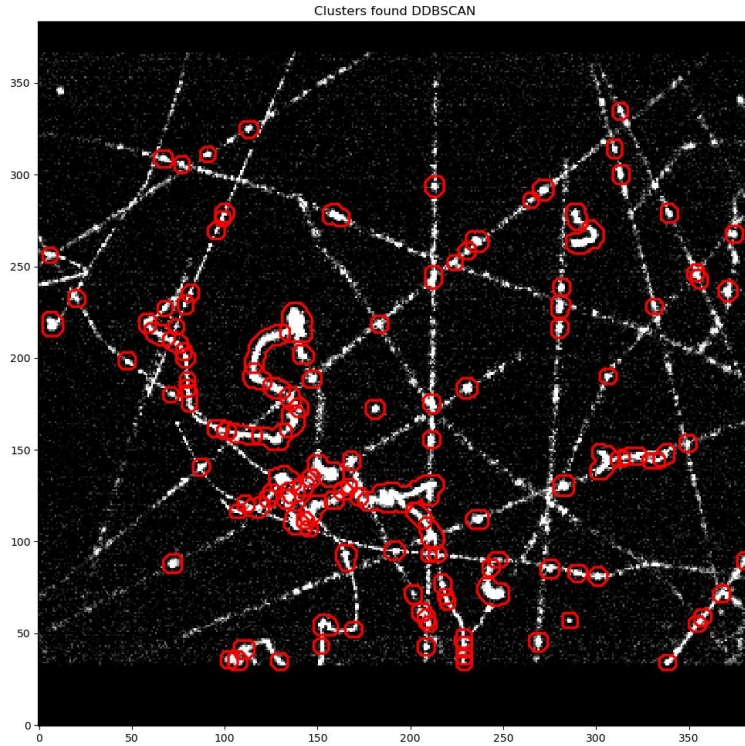
$$\sum_i |u_i - v_i|.$$

Parameters validation

Difference between total number of clusters found in ER and NRAD
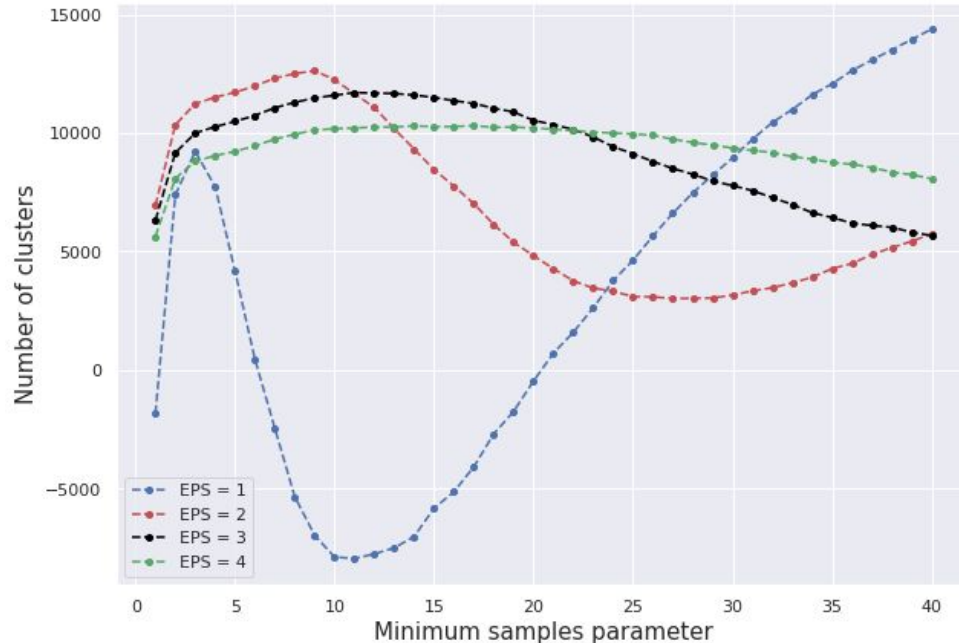
- Maximum at (eps, min_pts) = (2, 9).
- The second peak of EPS equal to 1 was discarded due to inconsistencies. (cosmic tracks are splitted into circular clusters)
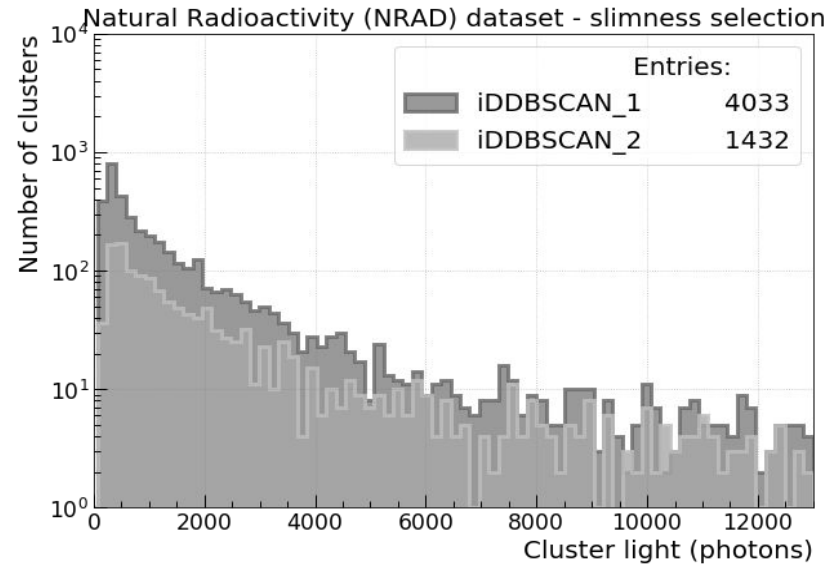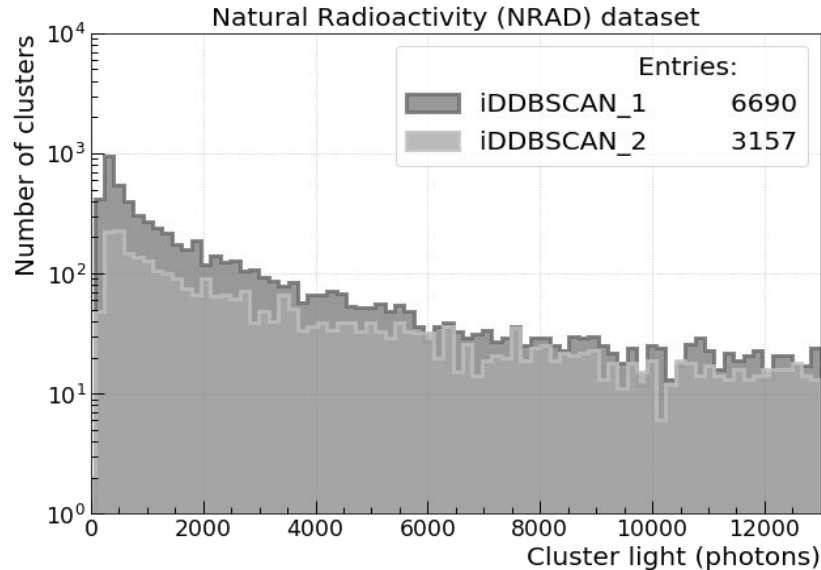
Run 4433 - Event 50

Clusterization with (eps, min_pts) = (1, 40)

Parameters validation

- A quantitative analysis was done to compare the results of the iDDBSCAN by using the (eps, min_pts) currently used and the one found in the previous analysis.
  - iDDBSCAN_1: (eps, min_pts) = (1, 5).
  - iDDBSCAN_2: (eps, min_pts) = (2, 9).
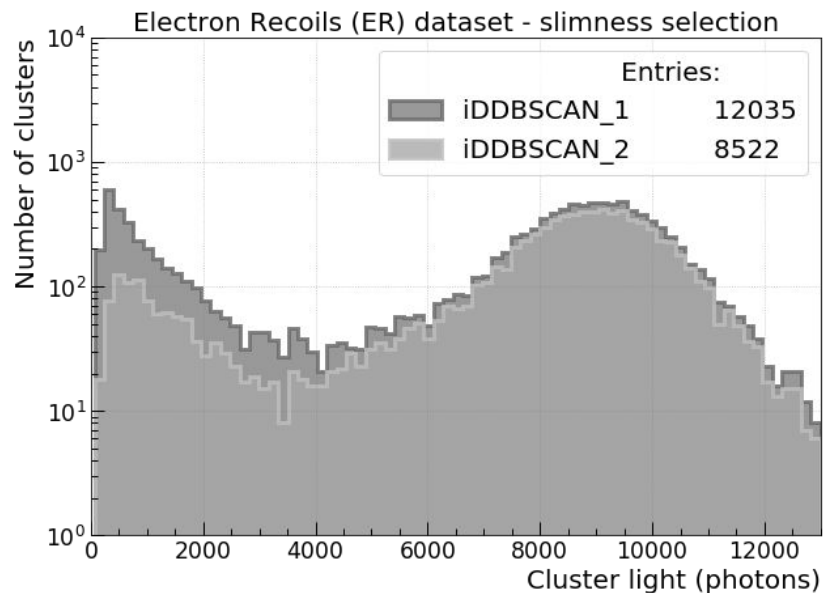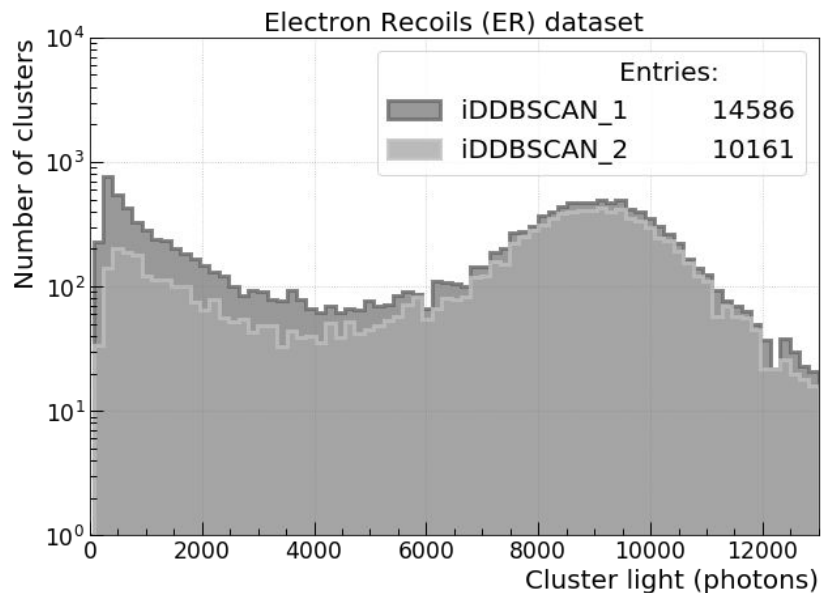 - The other parameters remained the same.

Low energy analysis

Run 4433 - Clusters found by the iDDBSCAN with different parameters and slimness selection disabled (left) and enabled (right).
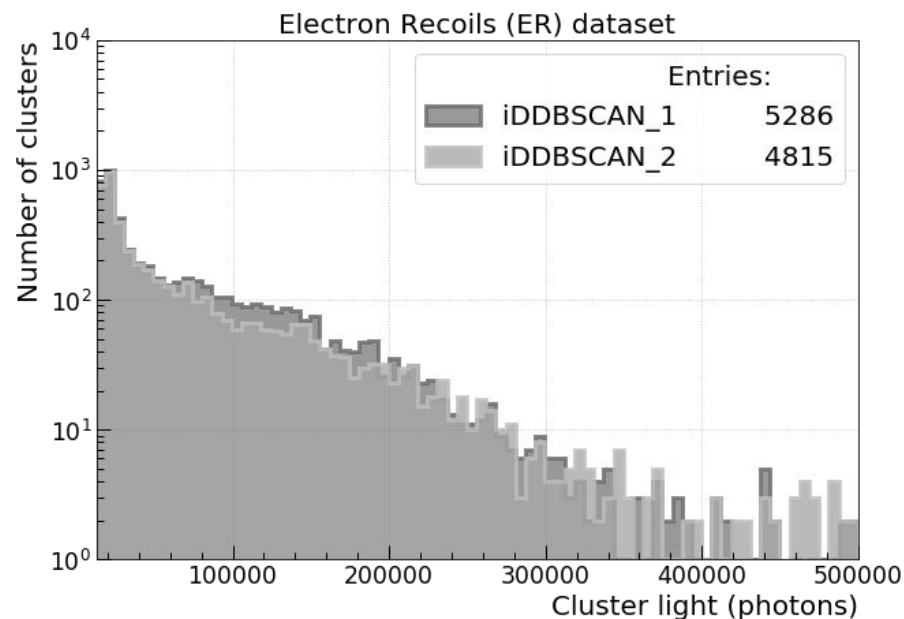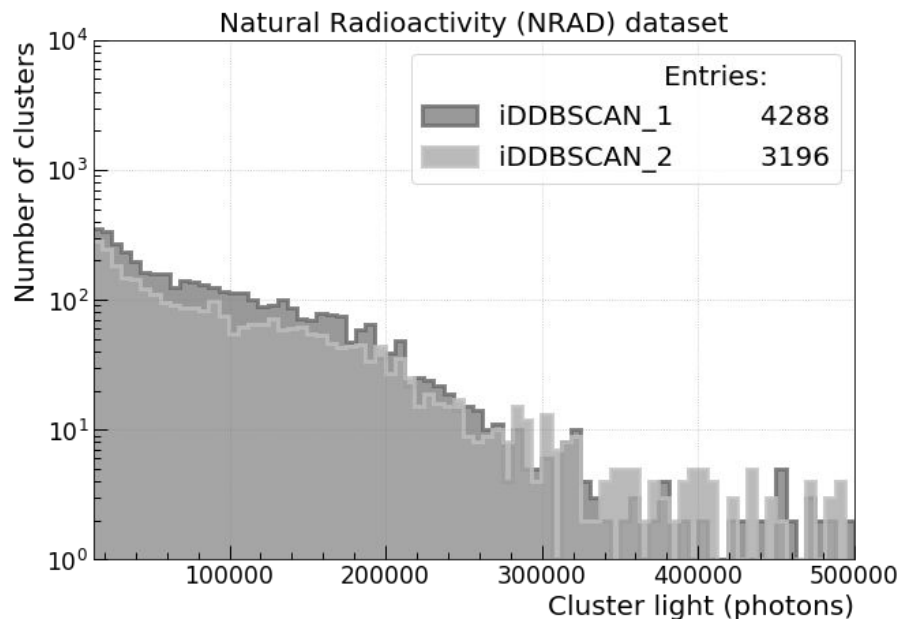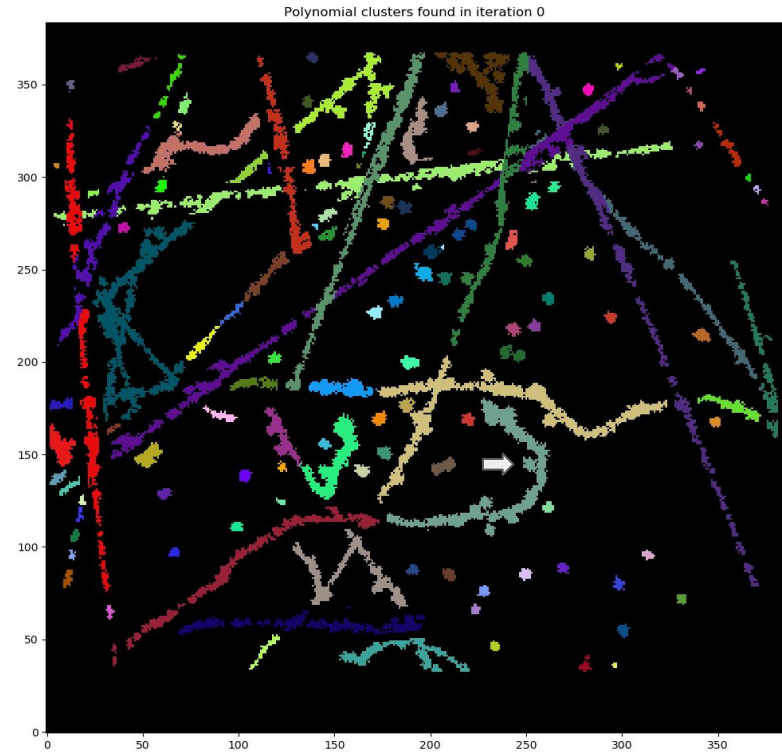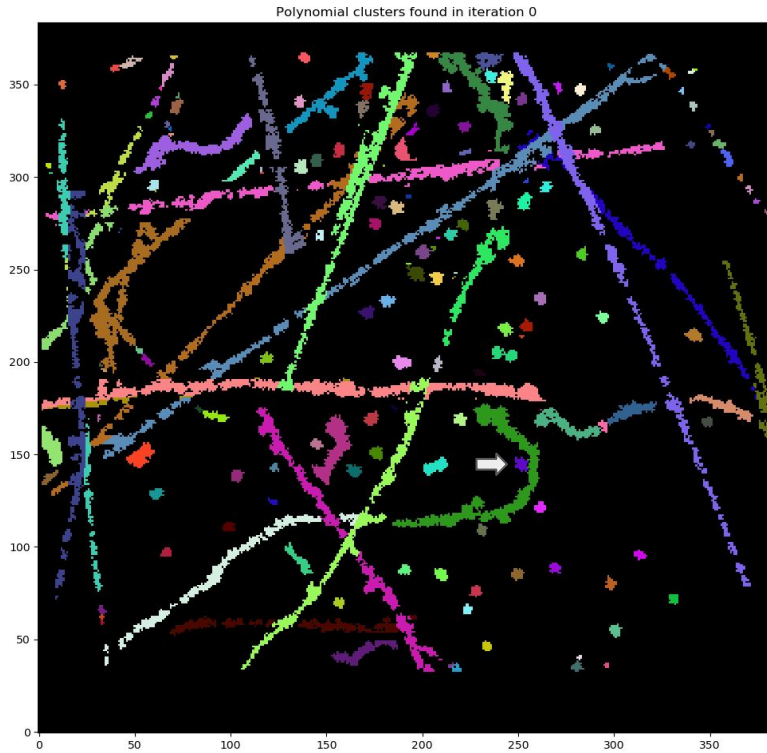
Low energy analysis

Run 4455 - Clusters found by the iDDBSCAN with different parameters and slimness selection disabled (left) and enabled (right).
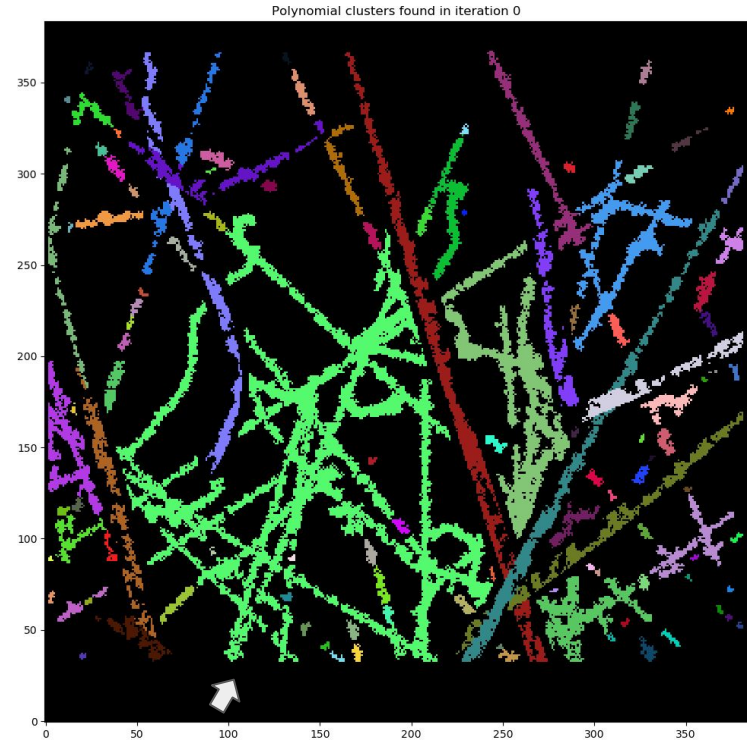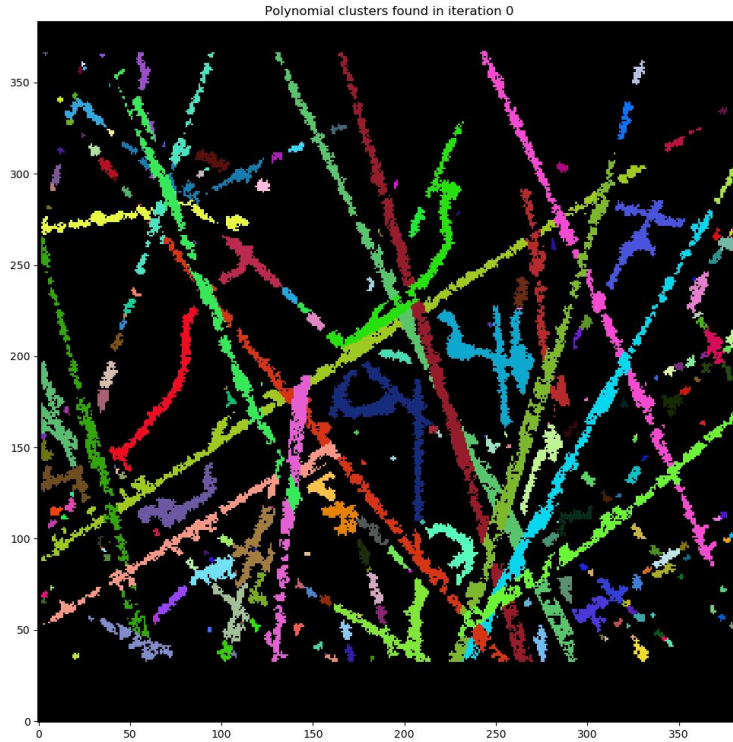
High energy analysis

Clusters found by the iDDBSCAN with different parameters in Run 4433 (left) and 4455 (right).

Run 4455 - Event 13

iDDBSCAN output with (eps, min_pts) = (1, 5) - left; (2, 9) - right.

Run 4433 - Event 13

iDDBSCAN output with (eps, min_pts) = (1, 5) - left; (2, 9) - right.

Conclusions

- Although the histograms show a great improvement in the low energy region, this does not mean that the cosmic tracks are being reconstructed correctly.

- Not sure if this is the best approach considering this high occupancy data.

- Any other ideas to validate these parameters?