Analysis Task

02-08-2019

Status Report

- Developed the algorithm to:
  - Run iDBSCAN over the images (one or more runs);
  - Create a table with the necessary information.
  - The algorithm is taking 8 minutes to run over 300 images and save the table
- We chose to not generate all the variables in the same time that we are doing the clusterization
- But the ‘table’ has all the information needed to create the variables.
  - For now, it is better to have ‘checkpoints’ in this stage of developing the framework;

File name	Tens GEM (V)	He:CF4	T2 (kV/cm)	Drift field	esposizione (s)	Commenti
run494	440	60/40	2	1	2	neutroni from AmBe + CMOS + 1 panetto di Pb+piu' vicini (300 eventi)

- **On Going:**
  - We are using ‘Pandas’ to be able to analyze the clusterization output;
  - In this way, we are capable of create any variable easily.

Output table of iDBSCAN

Tag of each cluster
(Long, Medium or Small)

Coordinates of each pixel

Light of each pixel

Pedestal of each pixel

Index of each cluster

	Run	Image	Tag	X	Y	Light	Pedestal
0	494	0	m	[10, 10, 10, 10, 10, 11, 11, 11, 12, 12, 12, 1...	[202, 203, 204, 205, 206, 201, 202, 203, 200, ...	[103, 96, 98, 103, 97, 129, 99, 120, 100, 98, ...	[100, 98, 99, 99, 98, 101, 99, 98, 101, 100, 9...
1	494	0	m	[28, 28, 28, 28, 28, 29, 29, 29, 29, 30, 3...	[163, 164, 165, 166, 167, 163, 164, 165, 166, ...	[98, 102, 99, 104, 103, 102, 101, 98, 103, 99,...	[97, 99, 99, 99, 100, 99, 98, 99, 100, 98, 98,...
2	494	0	m	[40, 41, 41, 41, 41, 41, 41, 41, 41, 42, 42, 4...	[101, 100, 101, 102, 105, 107, 108, 109, 110, ...	[96, 101, 102, 103, 100, 100, 100, 98, 104, 10...	[94, 99, 100, 99, 96, 100, 100, 97, 99, 100, 9...
3	494	0	m	[122, 123, 123, 123, 123, 123, 124, 124, 124, ...	[318, 316, 317, 318, 319, 320, 314, 315, 316, ...	[103, 96, 100, 103, 100, 105, 100, 100, 103, 1...	[100, 100, 100, 98, 100, 100, 99, 98, 99, 101,...
4	494	0	m	[181, 181, 181, 181, 181, 182, 182, 182, 182, ...	[302, 303, 304, 305, 306, 302, 303, 304, 305, ...	[99, 108, 106, 102, 102, 106, 111, 100, 101, 1...	[100, 100, 100, 100, 100, 100, 99, 99, 99, 100...
5	494	0	m	[195, 195, 195, 195, 196, 196, 196, 196, 196, ...	[379, 380, 381, 382, 378, 379, 380, 381, 382, ...	[103, 108, 116, 100, 113, 111, 111, 110, 109, ...	[98, 98, 99, 99, 101, 100, 99, 100, 100, 100, ...
6	494	0	m	[214, 215, 215, 215, 215, 215, 216, 216, 216, ...	[371, 368, 369, 370, 371, 373, 363, 364, 365, ...	[109, 100, 103, 98, 104, 101, 101, 110, 114, 1...	[100, 100, 99, 100, 100, 100, 100, 100, 100, 1...
7	494	0	m	[249, 249, 249, 249, 250, 250, 250, 250, 250, ...	[175, 176, 177, 179, 171, 172, 173, 174, 175, ...	[133, 106, 106, 101, 100, 120, 113, 103, 103, ...	[127, 100, 99, 99, 100, 102, 101, 99, 100, 100...
8	494	0	m	[265, 266, 266, 266, 266, 266, 266, 266, 267, ...	[129, 127, 128, 129, 131, 132, 145, 146, 127, ...	[100, 103, 102, 111, 103, 98, 99, 101, 100, 11...	[98, 98, 100, 99, 100, 99, 96, 100, 99, 99, 10...
9	494	0	m	[310, 311, 311, 312, 312, 313, 314, 314, 315, ...	[201, 200, 201, 200, 201, 201, 199, 200, 198, ...	[107, 102, 102, 104, 109, 109, 114, 107, 111, ...	[97, 101, 100, 100, 100, 100, 99, 98, 99, 100,...

New table with a few variables

Using this ‘Pandas’ tools is very simple to managed the information:

- ❑ Insert or remove variables;
- ❑ Filter by any feature.

	Run	Image	Tag	SumLight	SumPedestal	SumPixels	PhotonPPixels	XYCorrelation	lenX	lenY	XYlenR
0	494	0	m	639904.0	583755.0	5888.0	9.536175	0.681247	38.736842	26.285714	1.473684
1	494	0	m	276976.0	252262.0	2544.0	9.714623	0.694916	21.931034	33.473684	1.526316
2	494	0	m	283543.0	261904.0	2640.0	8.196591	0.717225	25.384615	27.500000	1.083333
3	494	0	m	223004.0	200517.0	2016.0	11.154266	0.236585	42.000000	26.526316	1.583333
4	494	0	m	933856.0	850428.0	8544.0	9.764513	0.877035	52.097561	28.105263	1.853659
5	494	0	m	152000.0	137146.0	1376.0	10.795058	0.829626	17.200000	24.571429	1.428571
6	494	0	m	441261.0	395988.0	3968.0	11.409526	0.454539	33.066667	62.000000	1.875000
7	494	0	m	180194.0	160986.0	1616.0	11.886139	0.670933	21.263158	40.400000	1.900000
8	494	0	m	241204.0	219535.0	2208.0	9.813859	0.115975	24.000000	42.461538	1.769231
9	494	0	m	153964.0	144778.0	1456.0	6.309066	0.285927	52.000000	11.030303	4.714286

Simple Example

If we want to check the clusters that have:

- ❏ Tag = ‘L’
- ❏ Photon/Pixel < 10

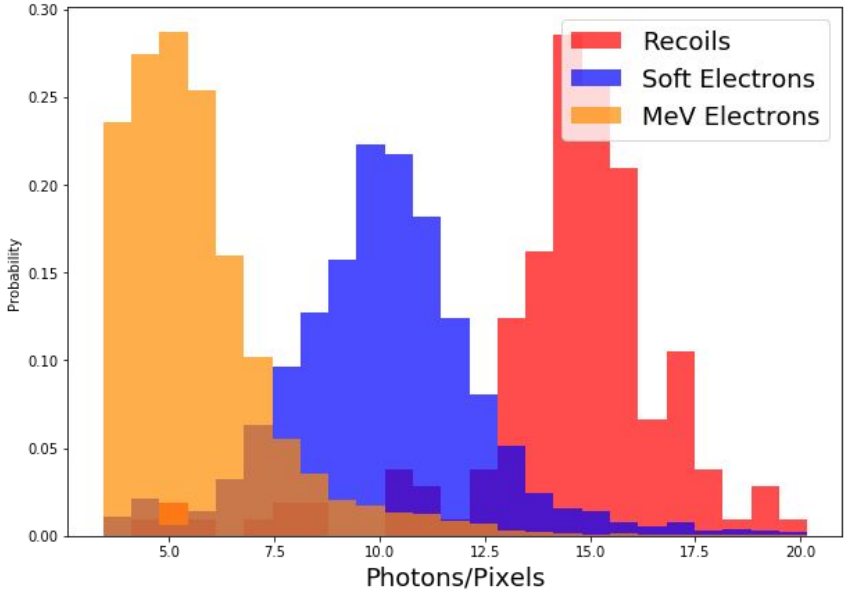
So, will be easy to plot the cluster and debug if it is necessary

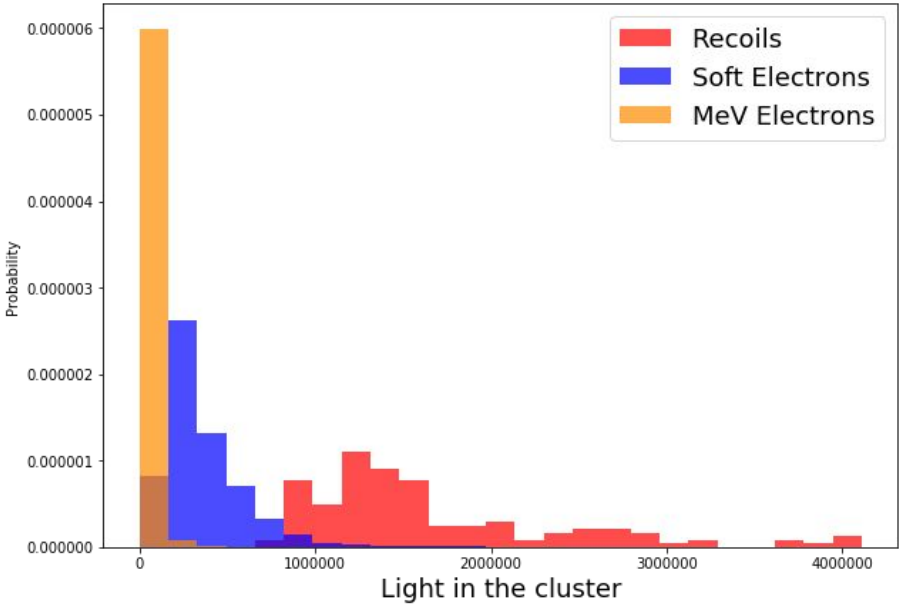
```
In [17]: variables[(variables.Tag == 'l') & (variables.PhotonPPixels < 10)]
```

Out[17]:

	Run	Image	Tag	SumLight	SumPedestal	SumPixels	PhotonPPixels	XYCorrelation	lenX	lenY	XYlenR
6930	494	82	l	3926679.0	3642002.0	36592.0	7.779761	0.819349	83.926606	98.365591	1.172043
7159	494	83	l	4066372.0	3858063.0	38944.0	5.348937	0.336262	135.222222	139.085714	1.028571
7160	494	83	l	1239130.0	1157115.0	11680.0	7.021832	0.242493	63.478261	74.871795	1.179487
8162	494	93	l	5170105.0	4771233.0	47984.0	8.312604	0.098008	133.288889	171.371429	1.285714
18309	494	209	l	13862470.0	13130051.0	132880.0	5.511883	0.798510	182.527473	180.543478	1.010989
18310	494	209	l	1765949.0	1690778.0	17104.0	4.394937	0.573358	73.724138	77.745455	1.054545
18311	494	209	l	8106981.0	7509328.0	75600.0	7.905463	0.049168	157.500000	185.294118	1.176471
18312	494	209	l	965660.0	916677.0	9280.0	5.278341	0.268274	122.105263	38.666667	3.157895
25890	494	271	l	7176089.0	6628847.0	66688.0	8.206004	0.233829	205.827160	171.876289	1.197531

Preliminary Results - Variables

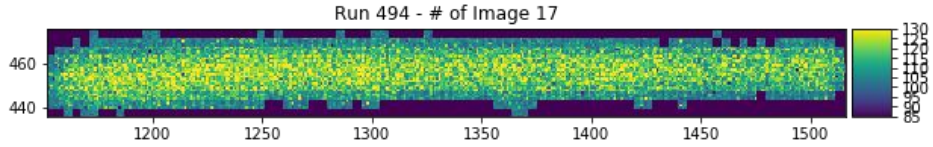




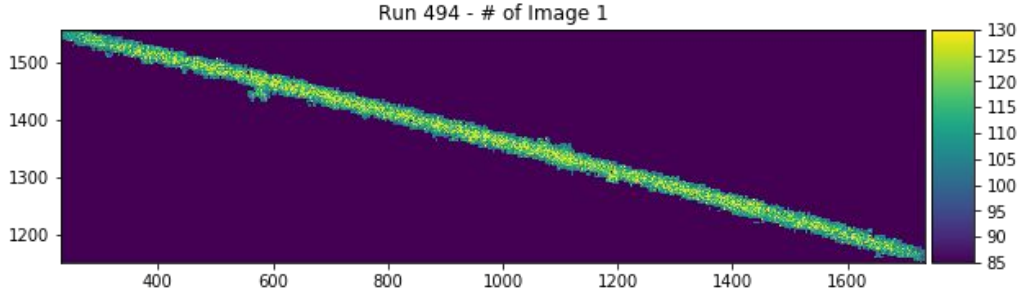
Backup

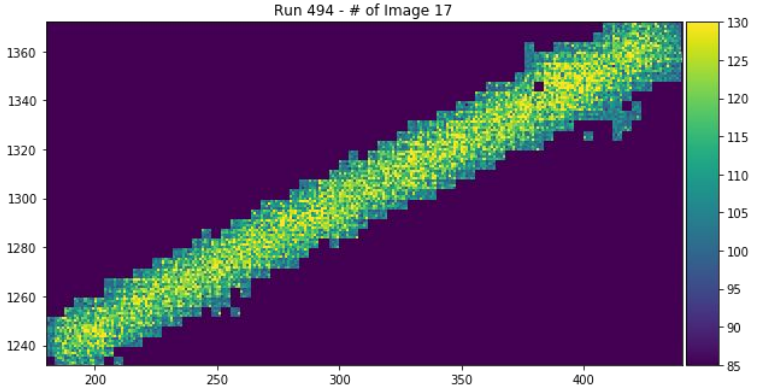
Characterize the ‘long’ tracks

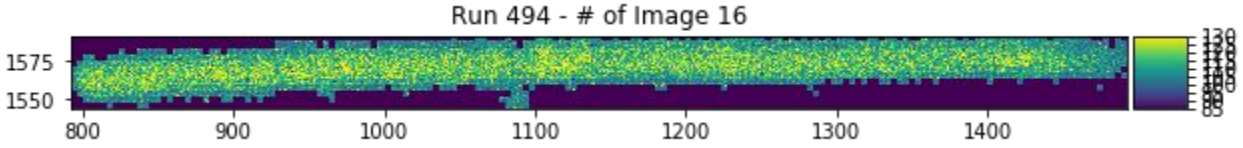
- The idea is:
  - Do a Fit on the the coordinates;
  - Use this Fit to get the angle;
  - Use the angle to calculate the Transformation matrix;
  - And then slice the cluster and calculate the intensity of light of each slice.

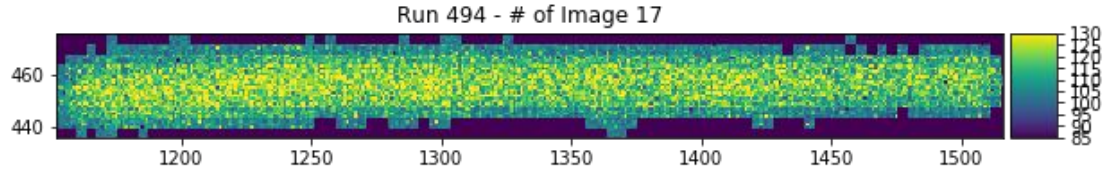


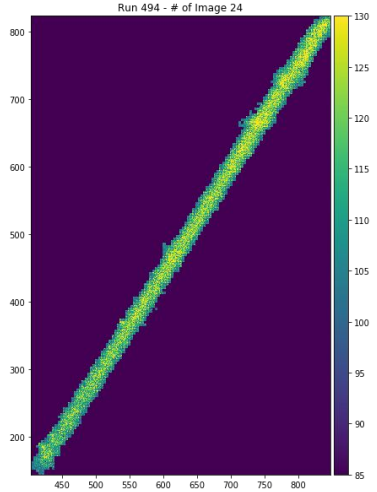
Examples of ‘L’ Clusters - 160 found on Run 494



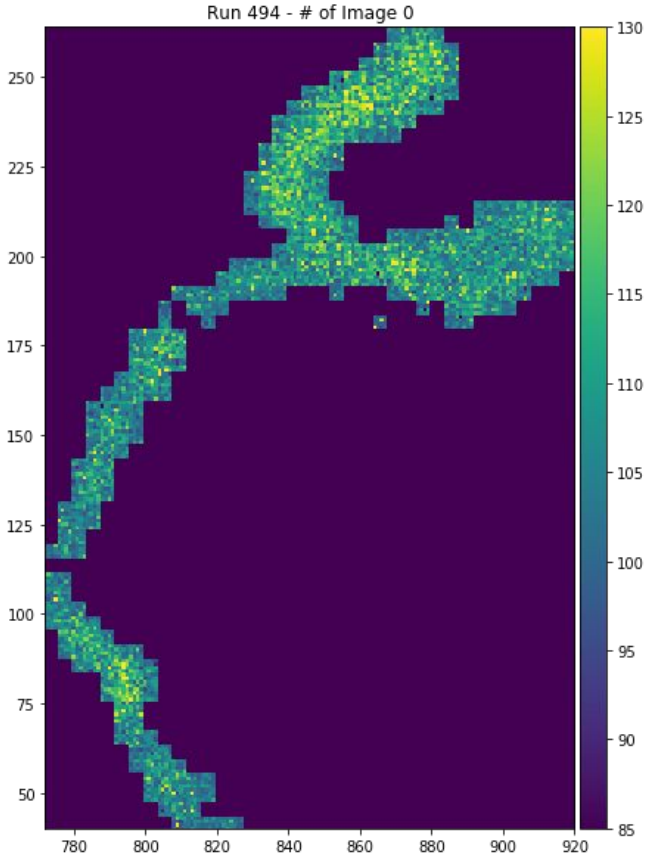


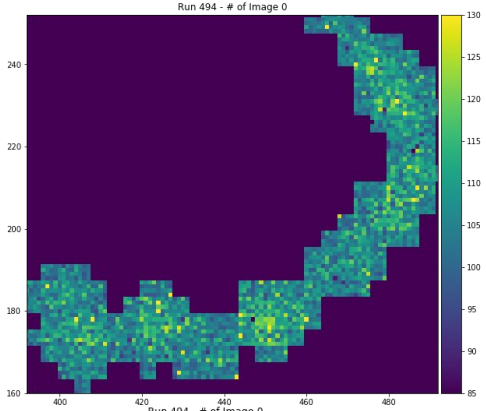


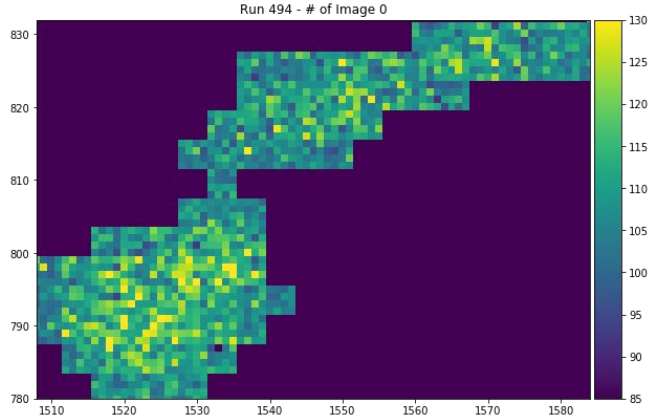


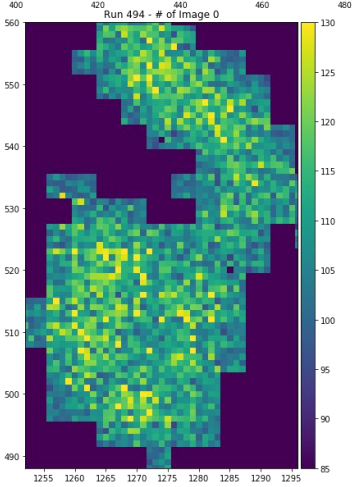


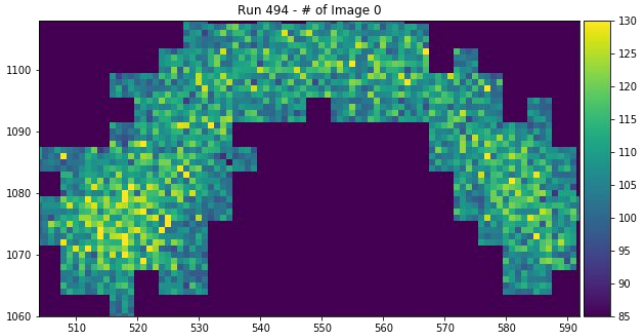
Examples of ‘M’ Clusters - 3328 found on Run 494











Examples of ‘S’ Clusters - 24964 found on Run 494