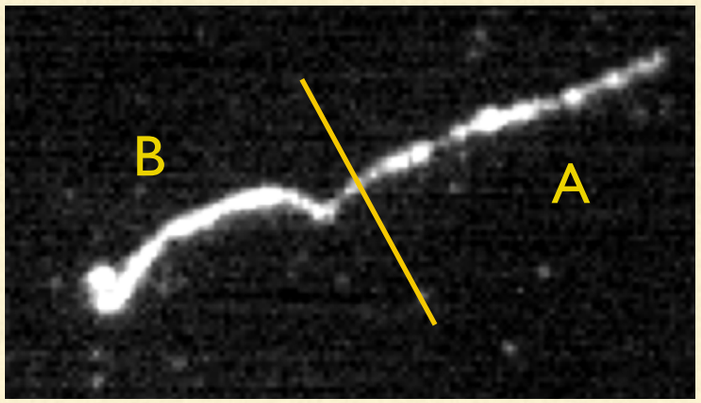
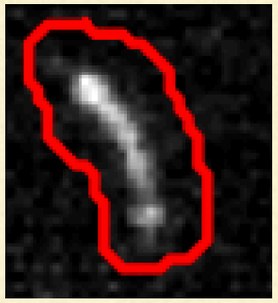
Head-Tail and directionality: Slice sorting

Samuele Torelli

Asymmetry as Head-tail measurement

- Cut the track into two pieces with same number of Slices
- Compute the integrals A and B.
- Define the Asymmetry as (A-B)/(A+B)
- Asymmetry multiplied times -1 if A is on the left (Sc_xmin+Sc_xprof)



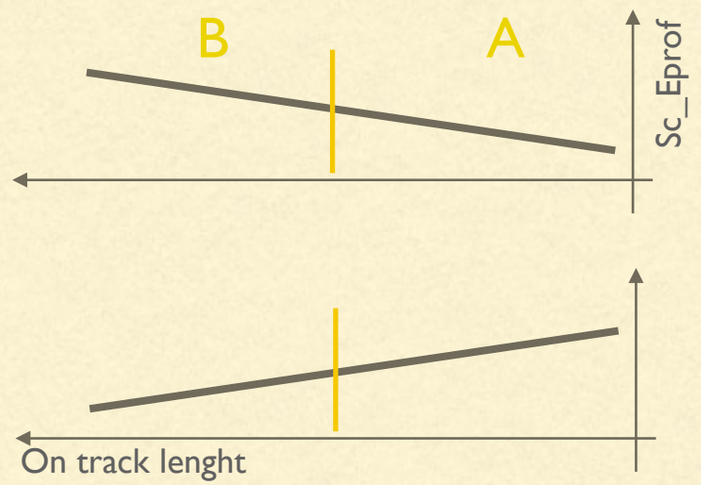


3 slices Asimm>0.9

5 slices -0.2<Asimm<0.2

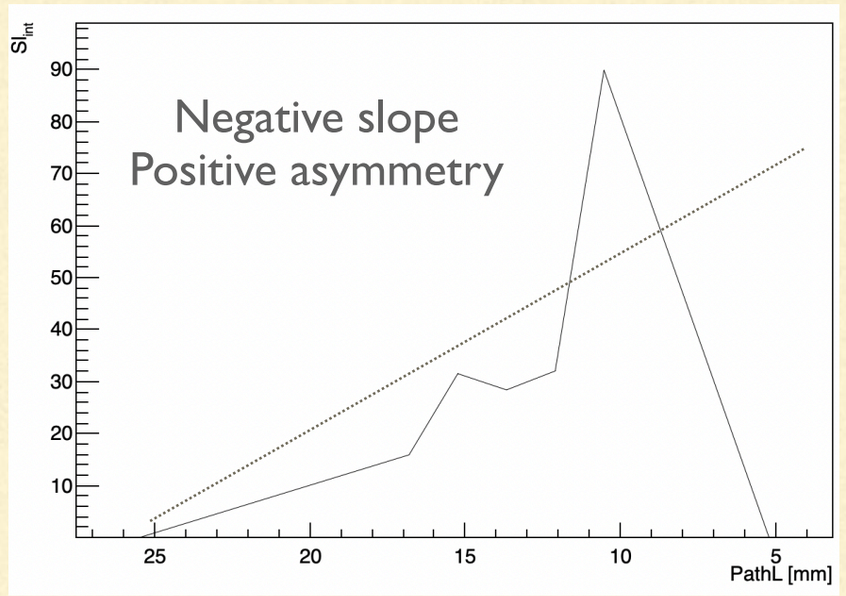
Asimm<0

Asimm>0
(Like above track)



Asymmetry method 2

- Fit the track profile with a line
- Slope of the track as head-tail measurement
- Multiplied times -1 if start to compute the profile from the left



Asymmetry method 3

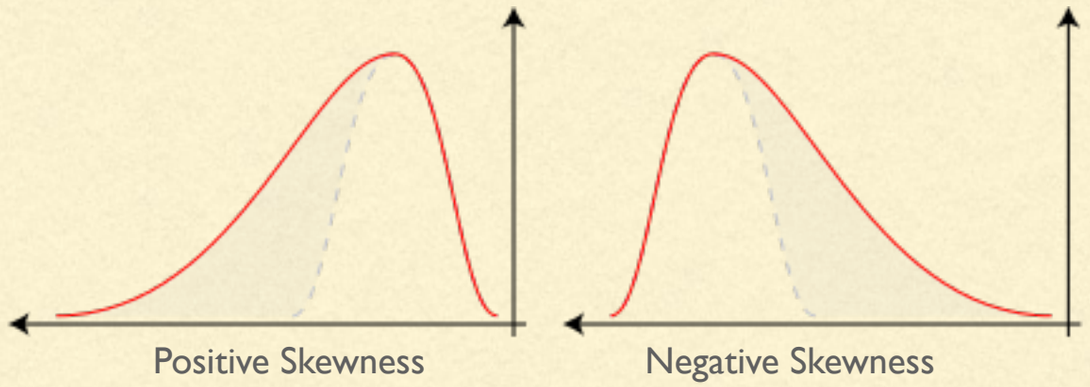
Skewness of a distribution defined as:

$$s = \frac{\sum_{i=1}^{N} (x_i - \bar{x})^3}{N\sigma^3}$$

Mean

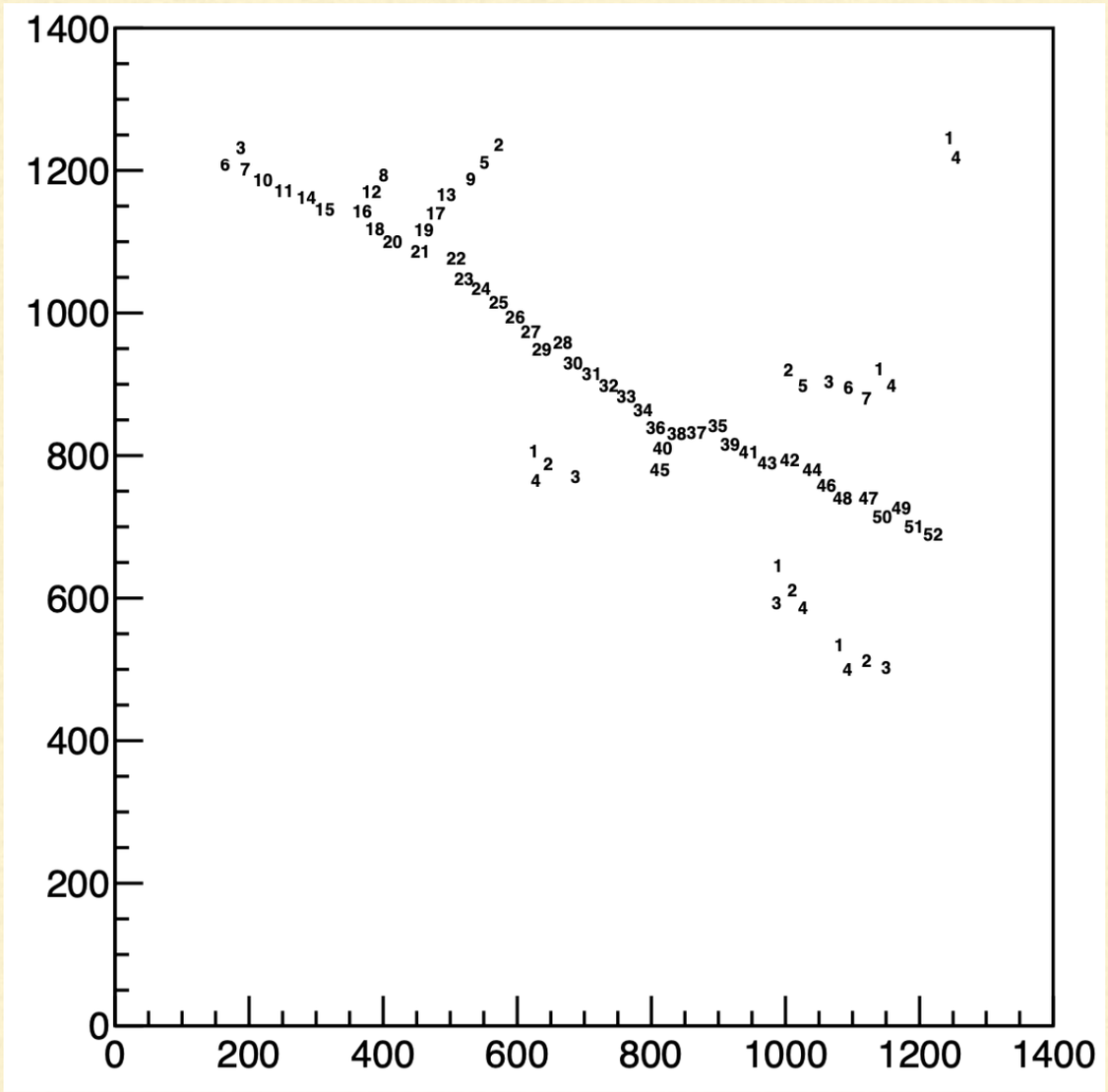
Ndata

StDev

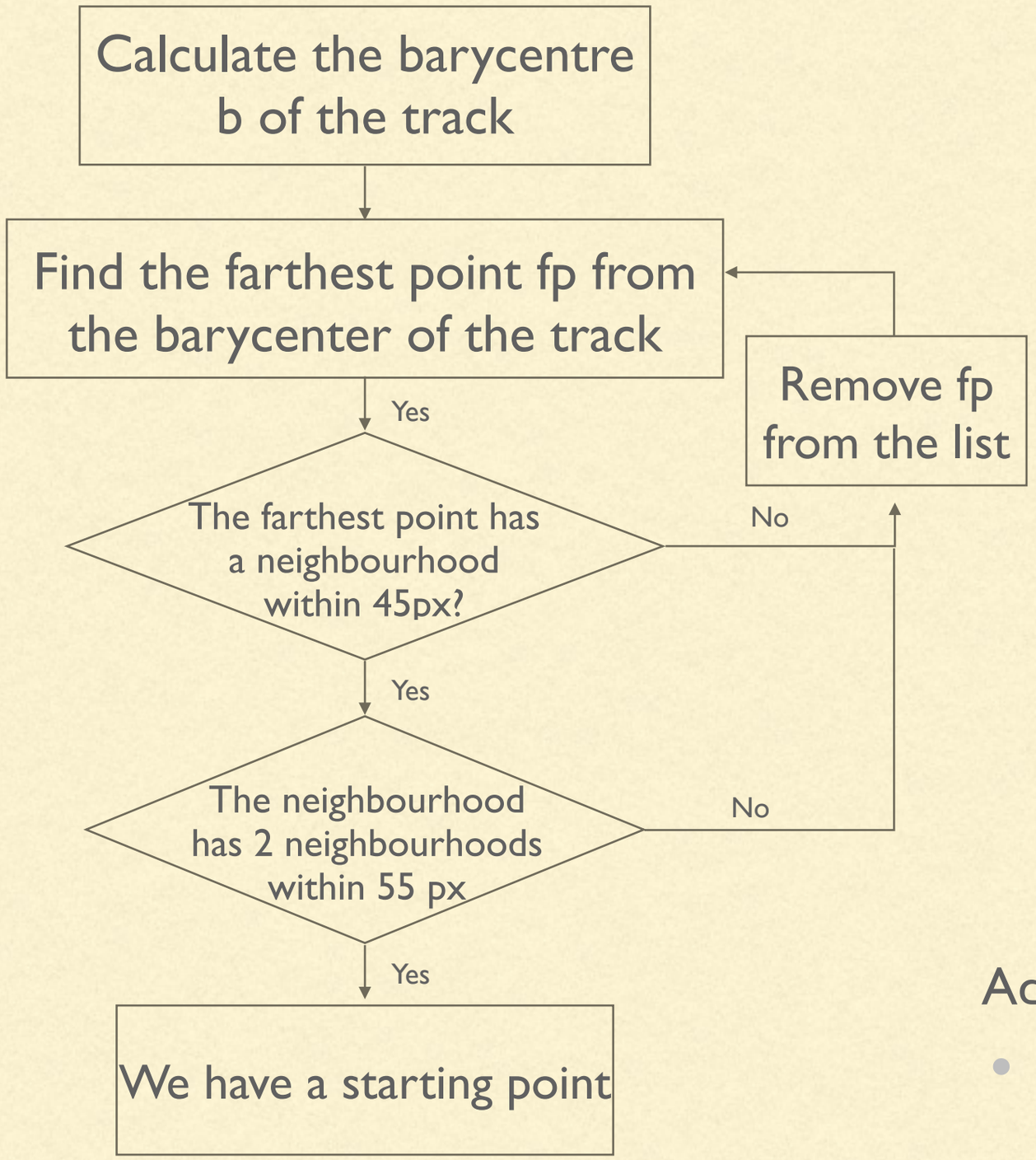


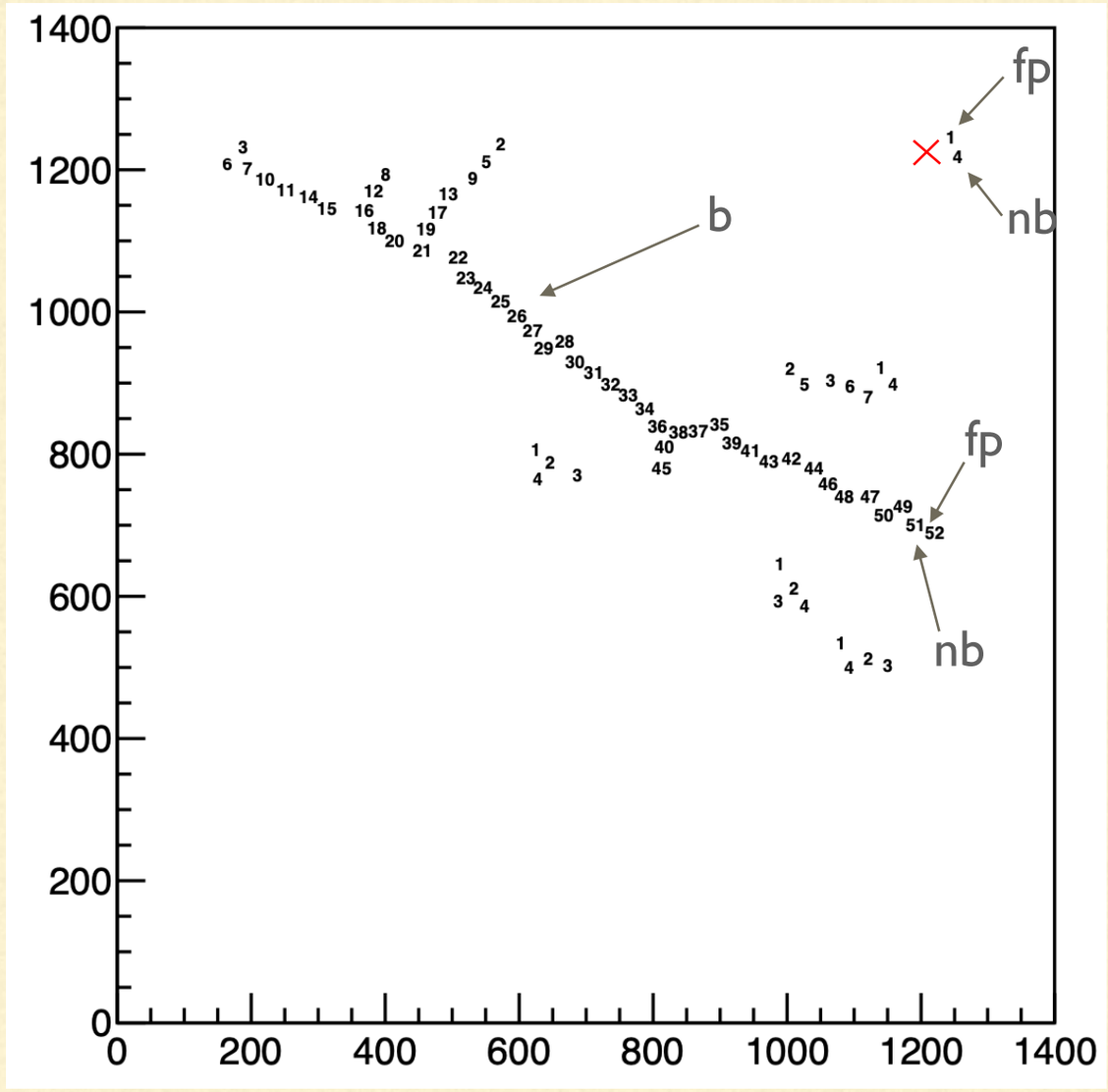
Problem in slice sorting

- Slices are sorted from top to bottom
- Asymmetries and profiles wrong



Algorithm for slice sorting: starting point





Additional advantage of fp from barycentre:

- In case of a blob (e^- head) or delta rays we'll start from the opposite side

Algorithm for slice sorting: follow the track

Start from the starting point sp

Search for nearest neighbour as next point

Search for number of neighbour of last point within 45px

$nNeigh \leq 1$

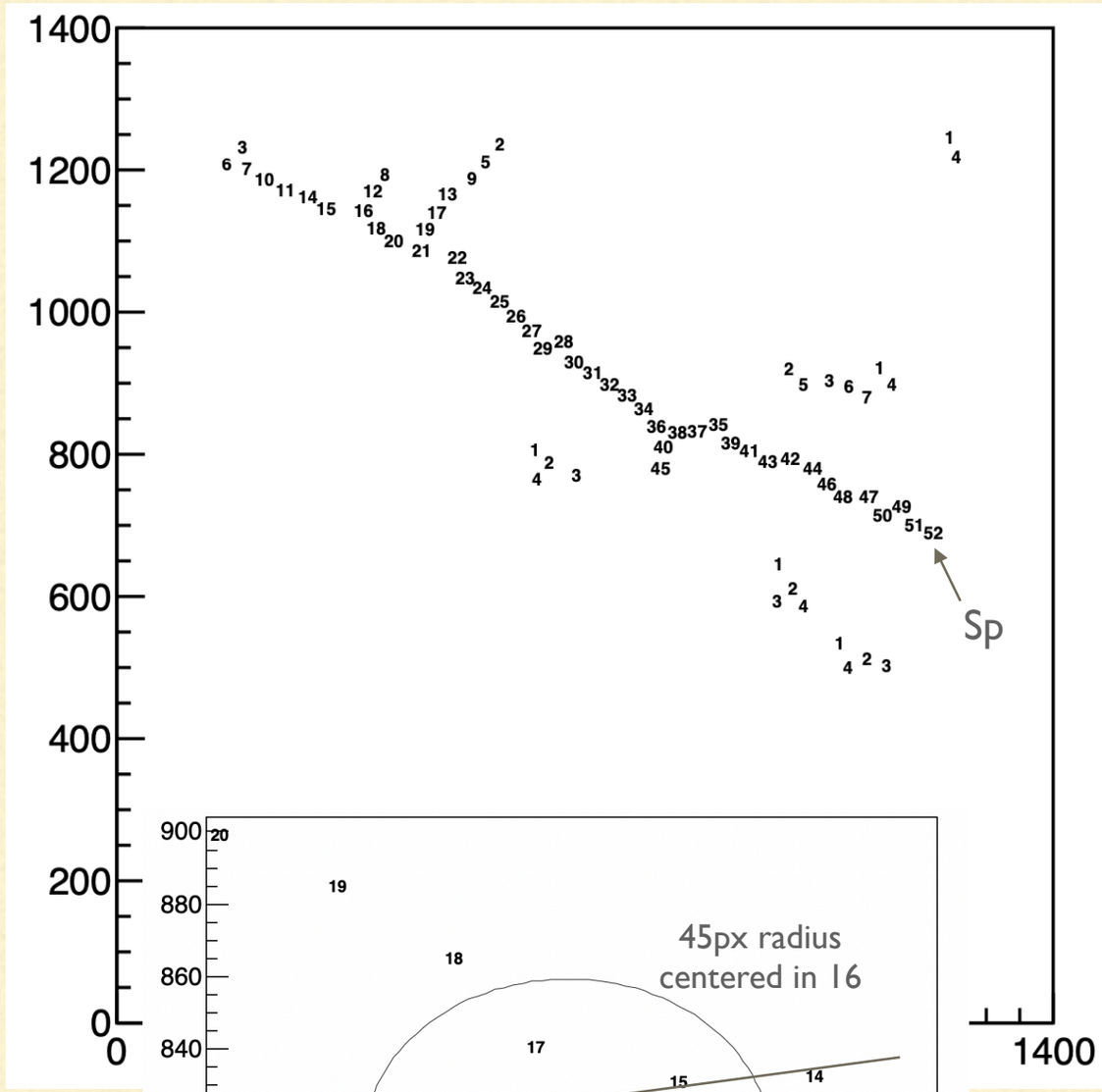
Select the nearest point as next

$nNeigh > 1$

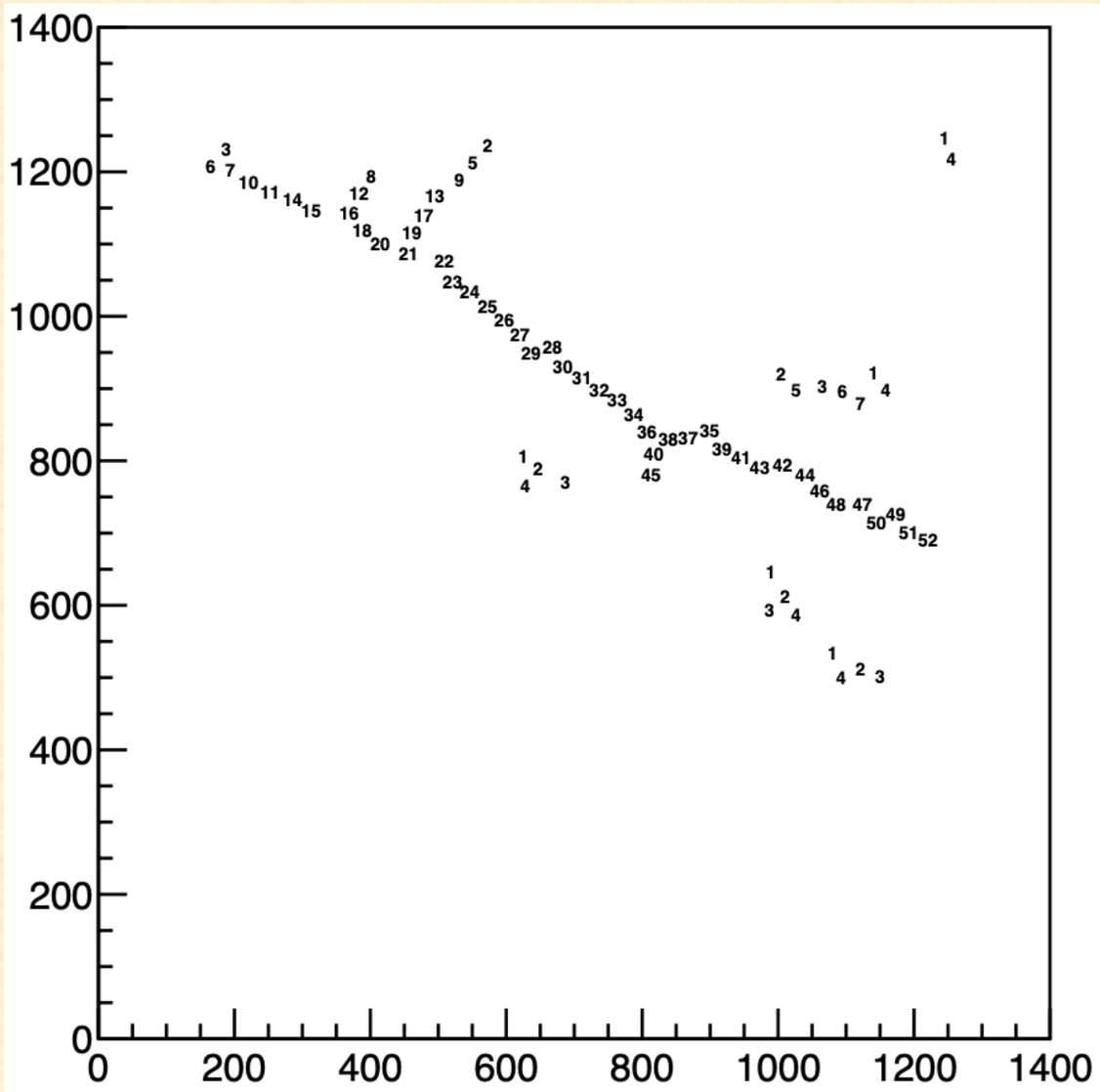
Find the which points are within 45

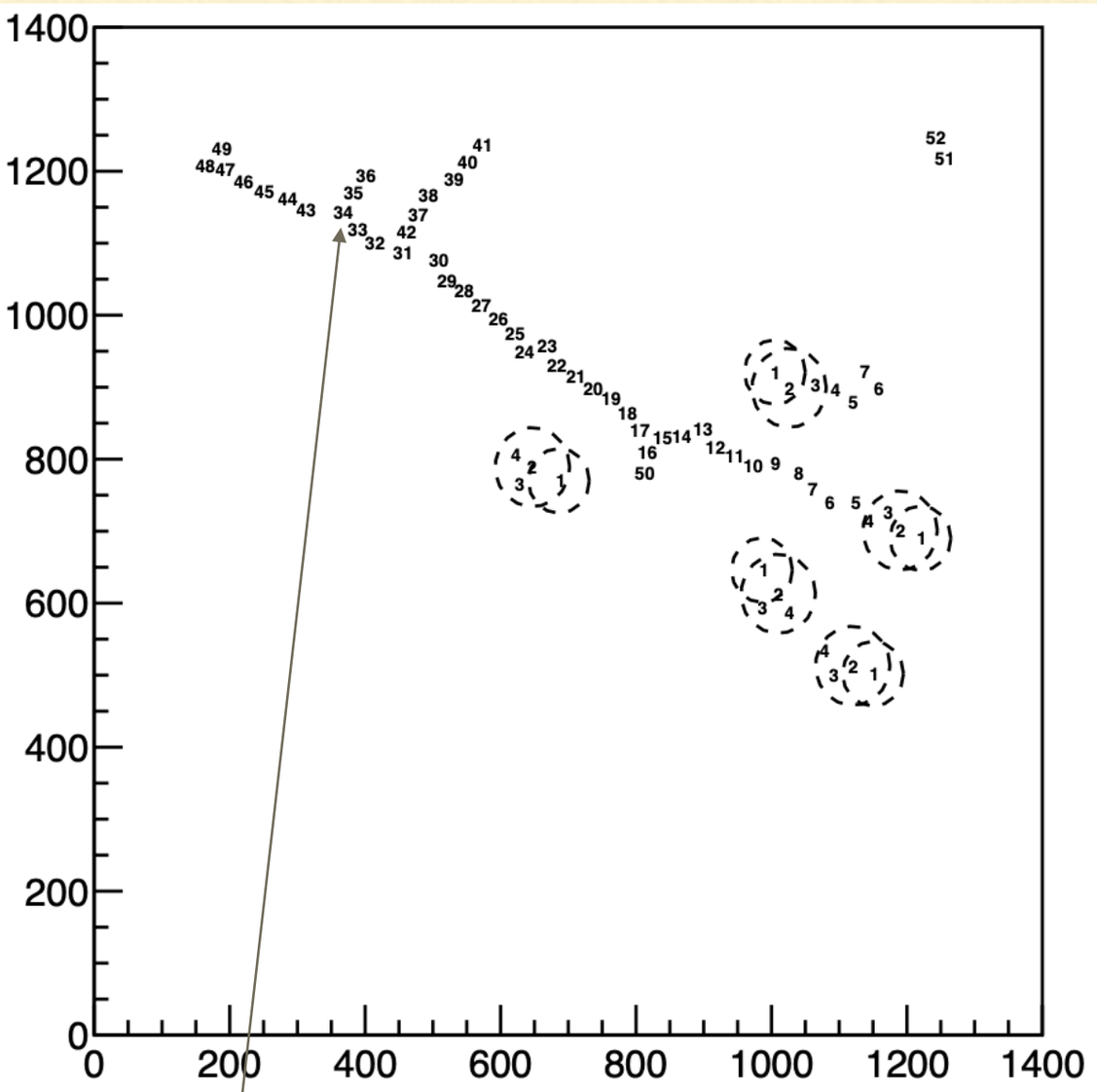
Fit the last point, the previus and the one before the previus, and one of the point within 45px from last with a line

Select the next point as the one with minor χ^2



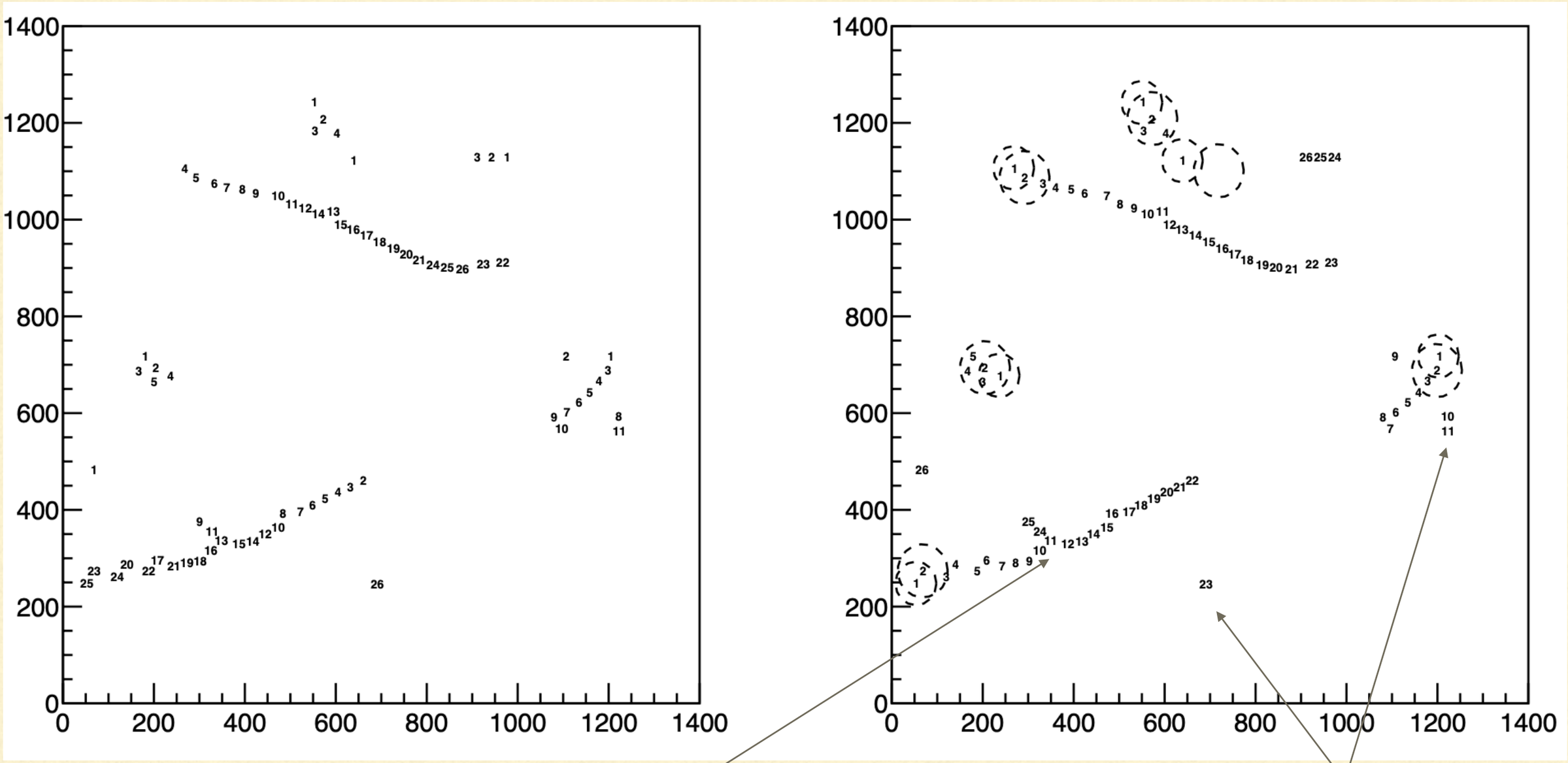
Algorithm for slice sorting: Final track sorted





Some optimization needed to skip delta-ray and follow the main track

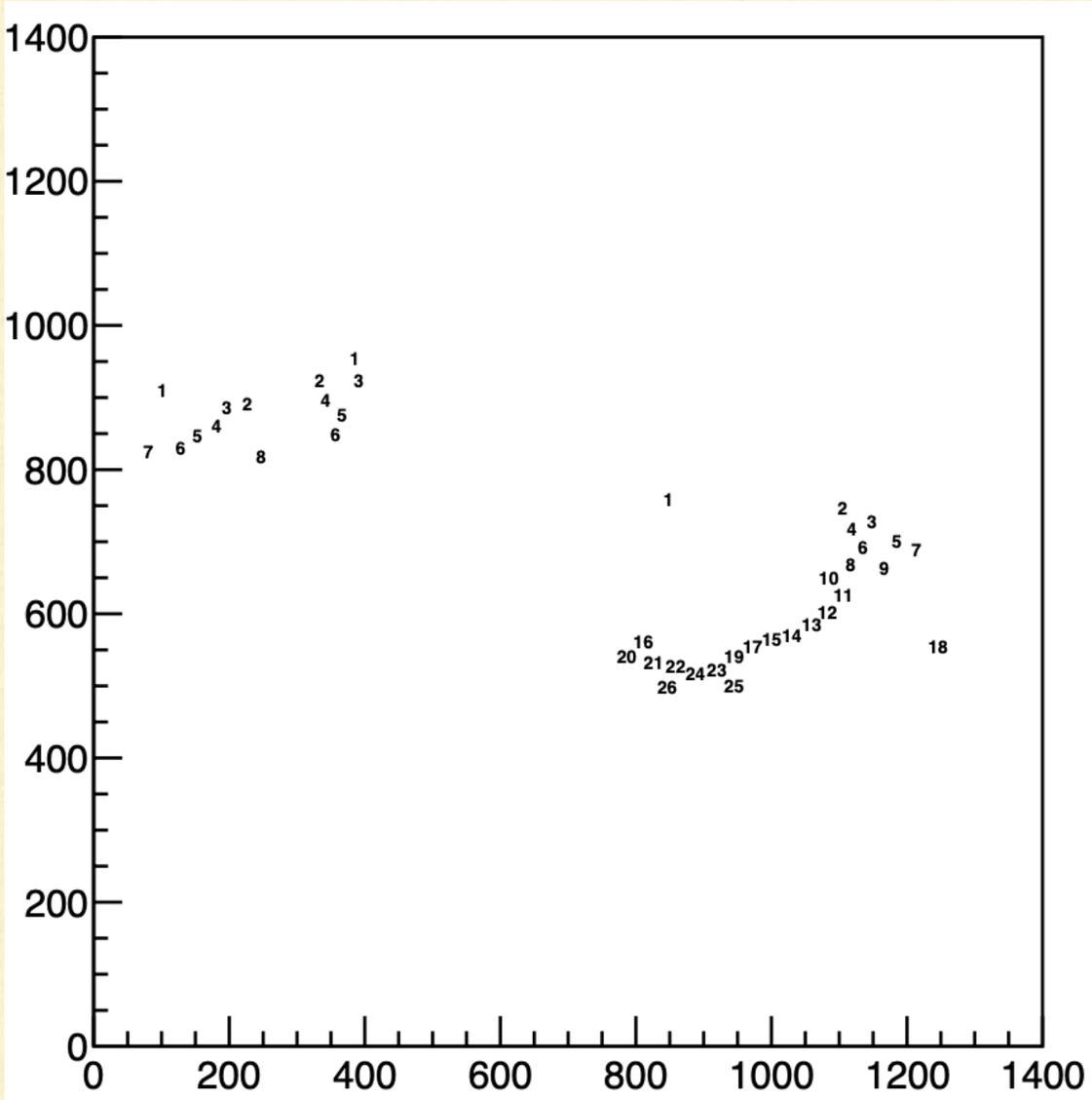
Some results (and problems)

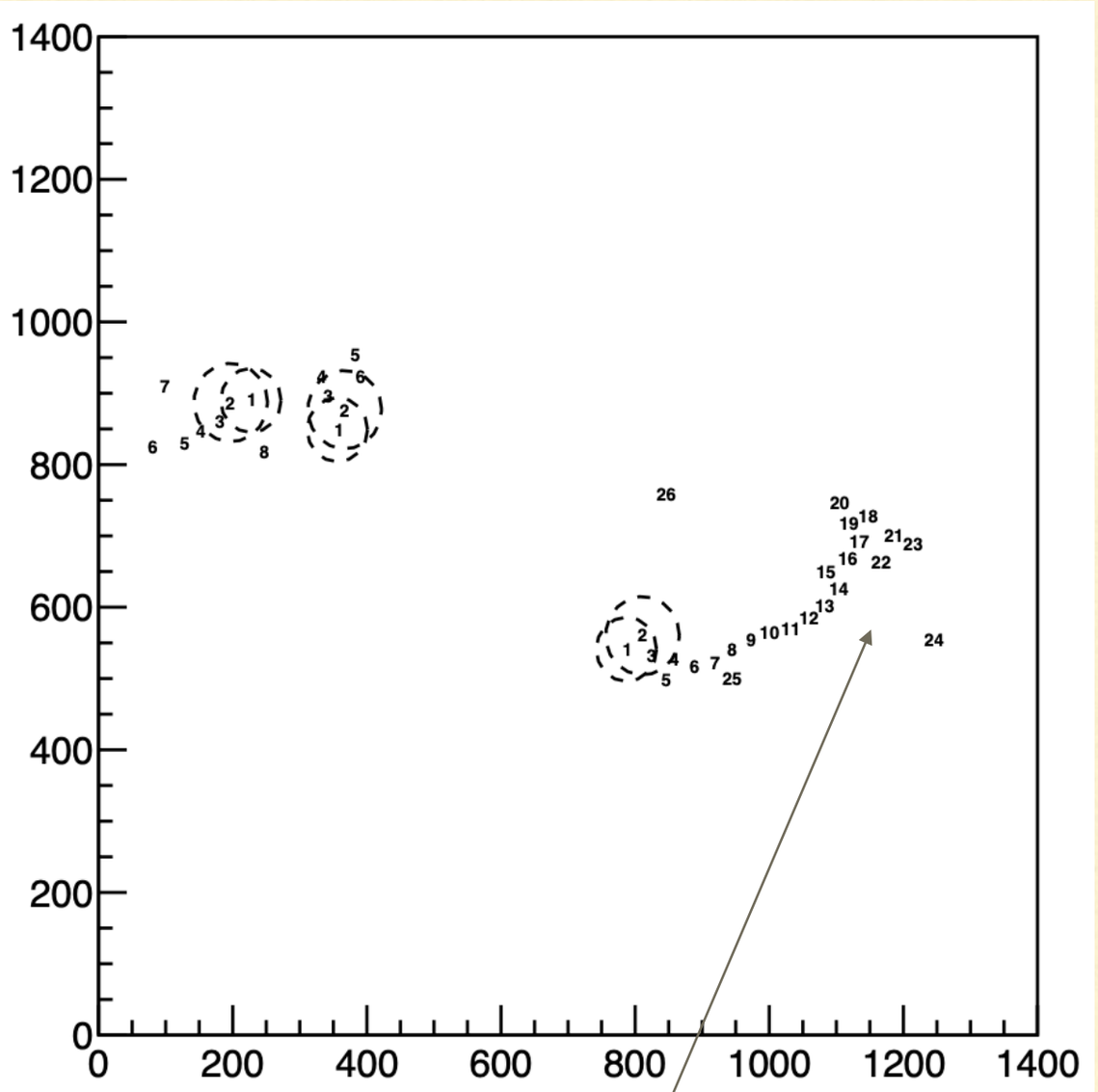


Store the information of 24-25 as delta-ray separated from the main track (useful even for curliness)

Remove outlines?
Problems in curlyness, track lenght and profile

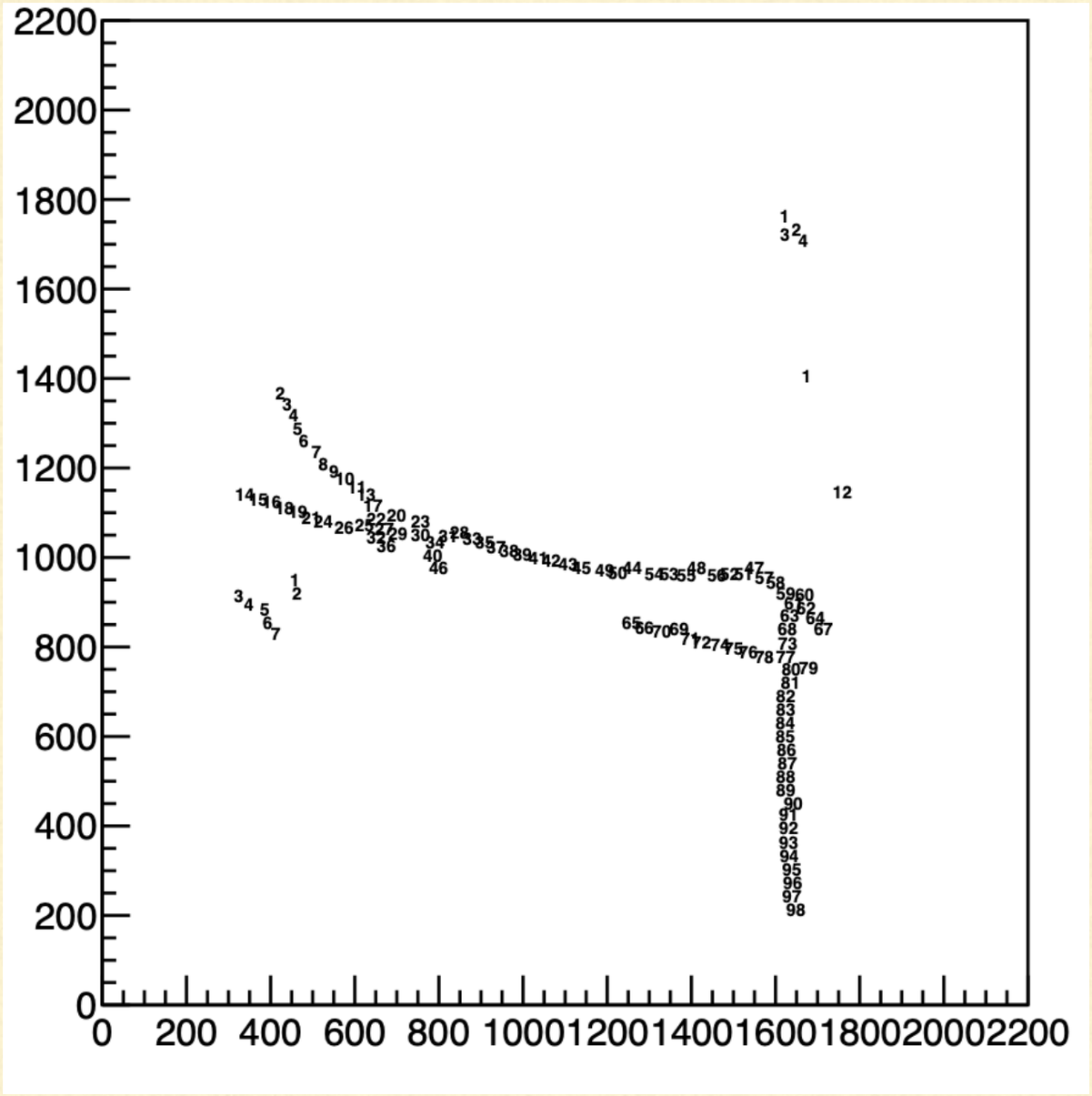
Some results (and problems)





What to do with blobs? Just store the information and use it in head-tail?

On LEMON



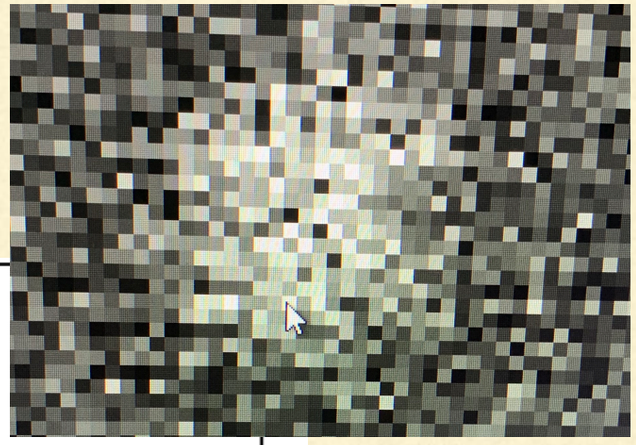
Sorting follows the main track

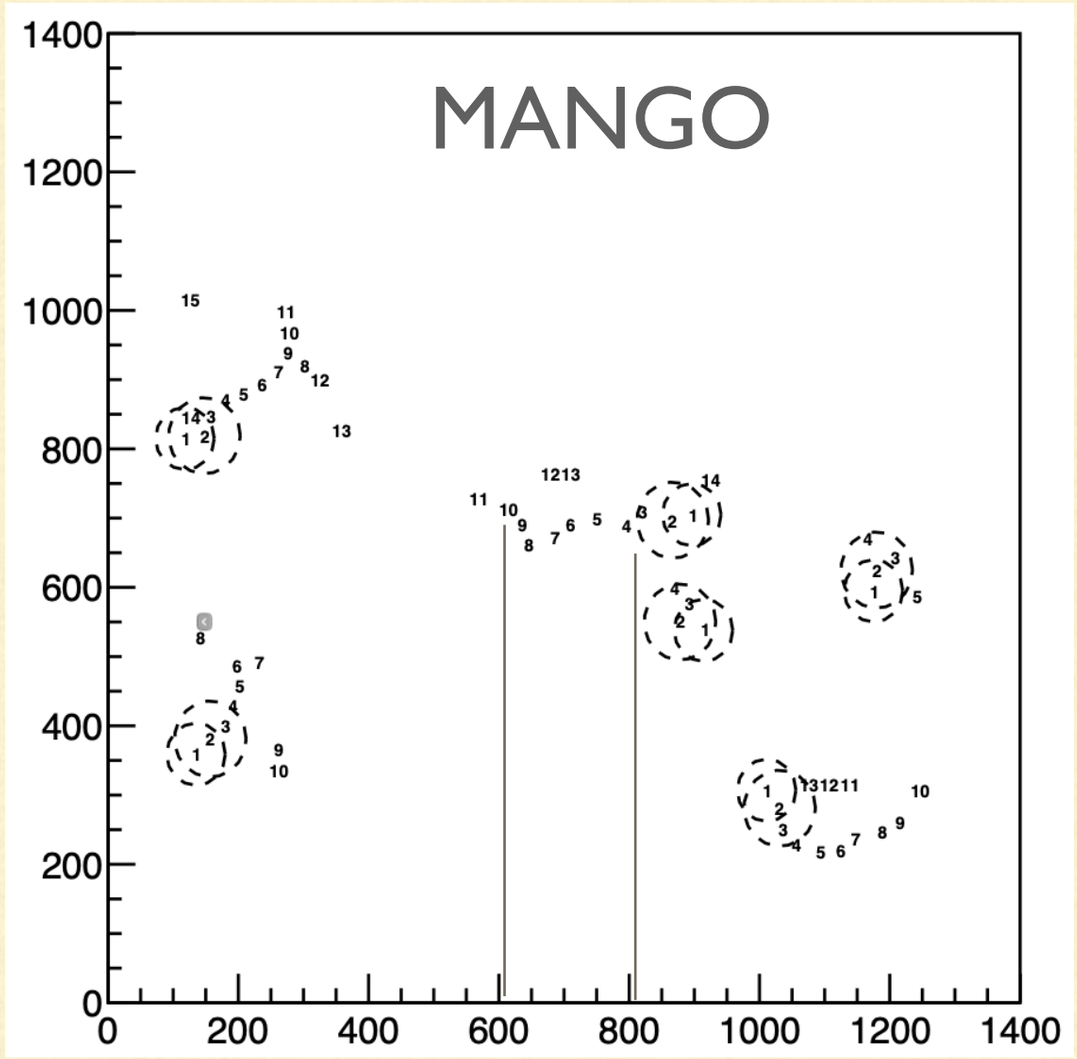
Clearer tracks: here the algorithm follows the main track

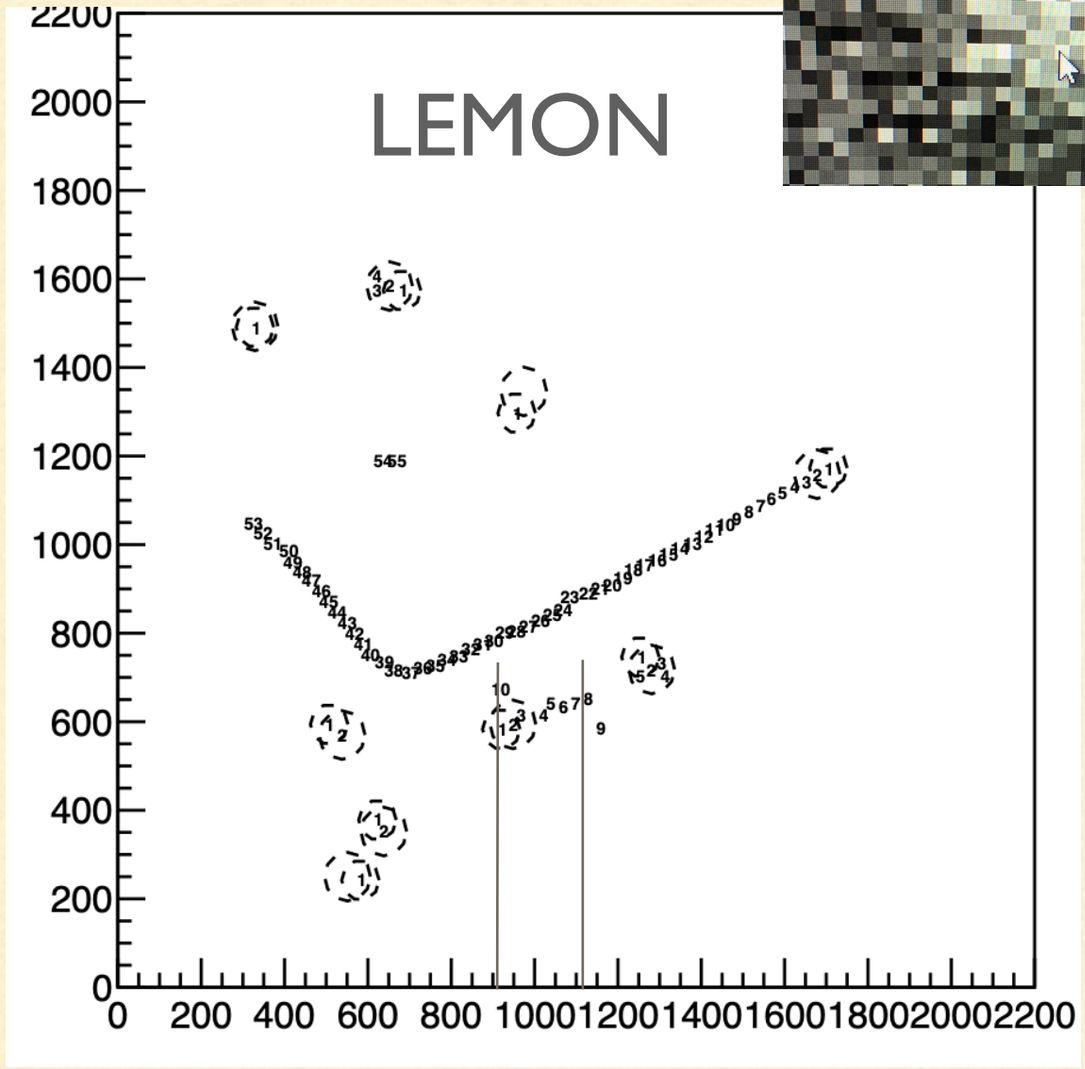
Slices in MANGO Vs LEMON

- Slices radius of 30 pixel for calibration purpose with ^{55}Fe with ~$125\ \mu m/px$ (defined in LEMON)
- In MANGO we have ~$50\ \mu m/px$, iron spot should be 70 pixels?

Should we increase the radius of the slices?







Conclusions:

- The head tail identification needs ordered slices to work
- A first algorithm of slice sorting seems to give promising results
- The algorithm can be optimised to separate delta rays from the main track and two overlapping track

Future work:

- Future work on main track isolation and algorithm optimisation
- Solved this point the directionality can start