Preliminary studies on the test-data from the IFR prototype
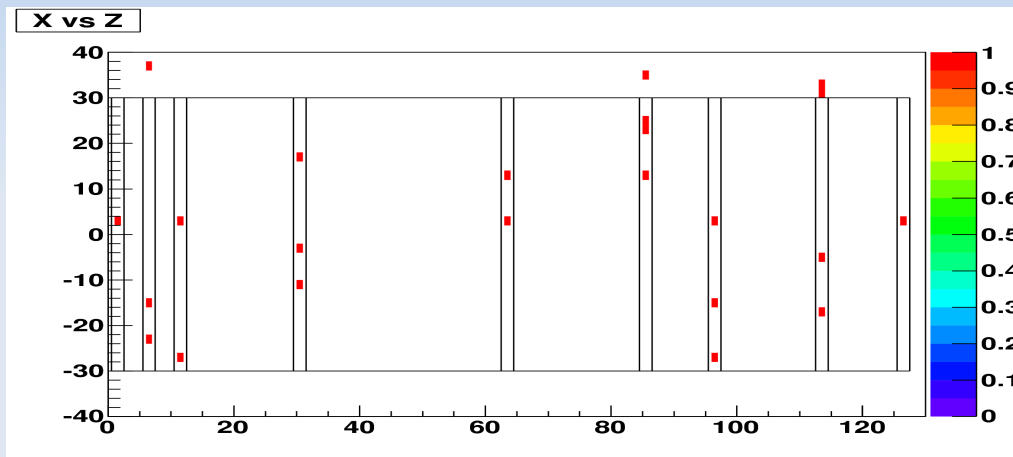
JAROSŁAW WIECHCZYŃSKI

13.09.2011

Data Set

- Test beam data – December 2010:
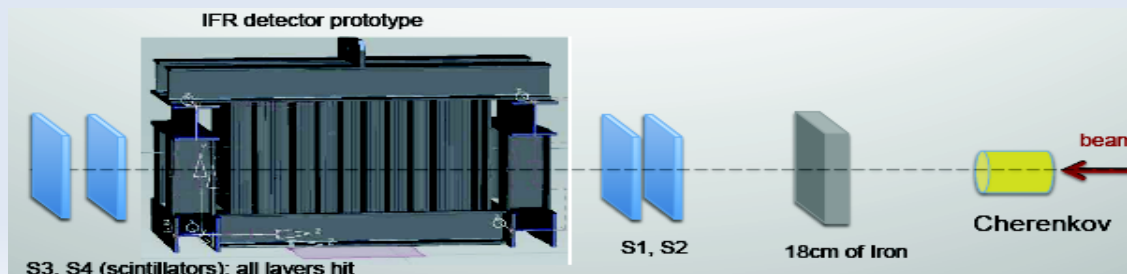
  file: Er_PreprocessedEvents_160_6-12-2010_13-50-54.root

9818 events in total

- Selection of the muon-like tracks:

  Tr_mu_Tight>0 && Tr_s3s4_Tight>0

3175 events chosen

Data selection & errors

First selection of the readout information:

- **Odd layers:**

   all BiRO information for **X**,**Y** coordinates

- **Even layers:**

   X – position calculated from the time propagation measurement, read from both ends of the stripes (2 independent values)
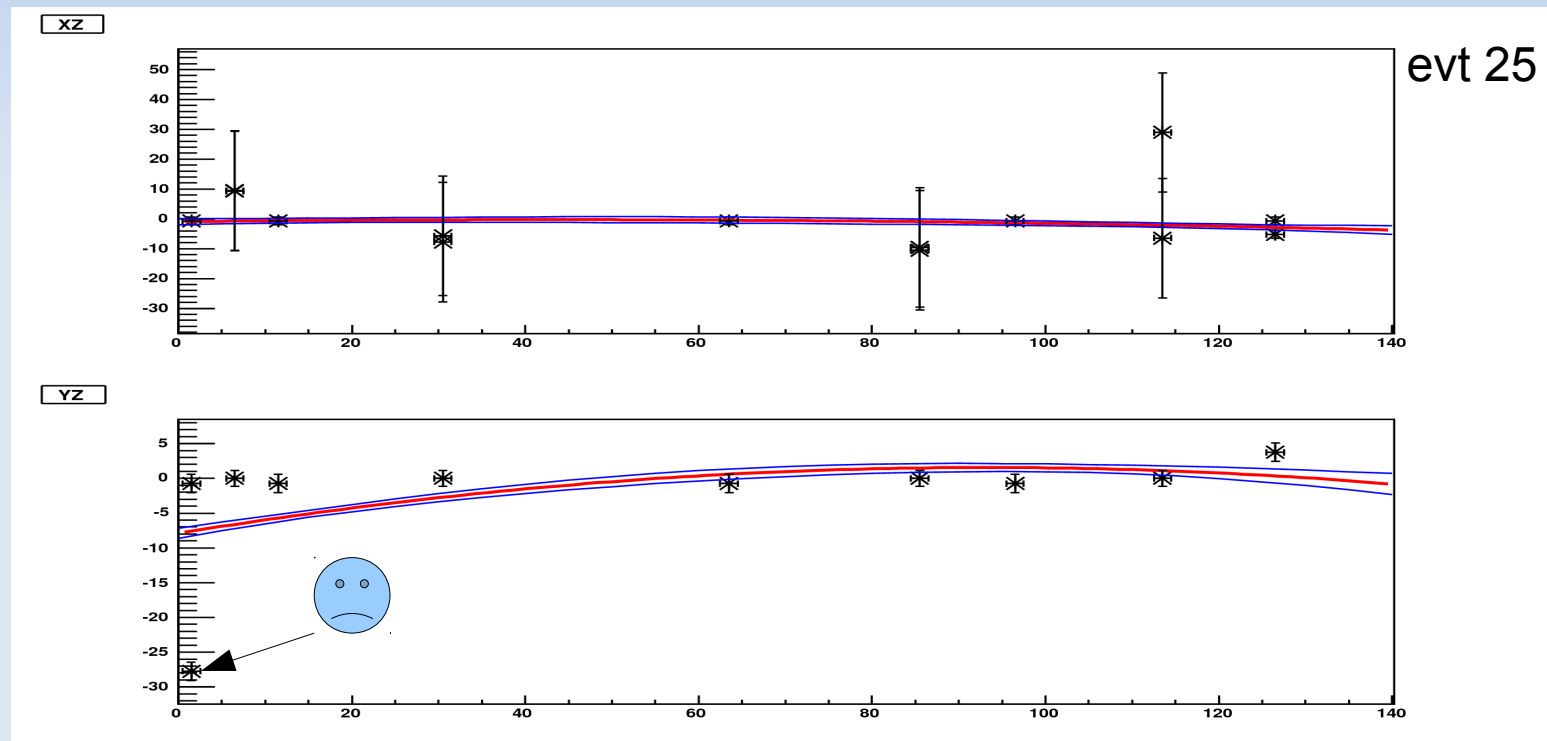
   Y – BiRO information from only one side of the strip

Errors assignment:

- BiRO: $\Delta X, \Delta Y = \dfrac{d_{strip}}{\sqrt{12}}$, $\Delta Z = 1cm$

   TDC-RO : $\Delta X = 20$ cm

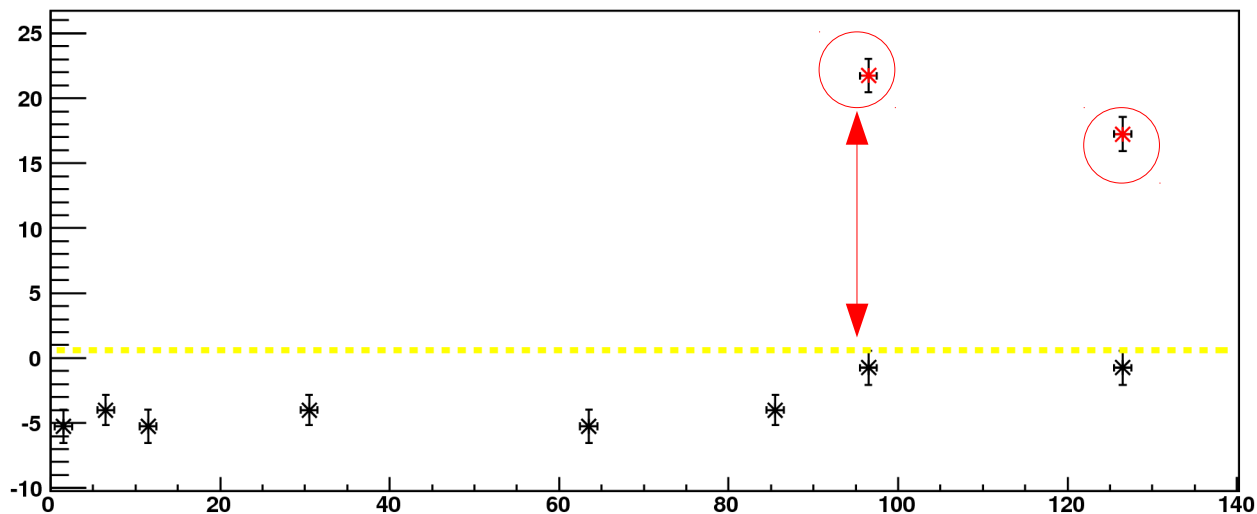# Attempt to fit...

- Fit - 2nd order Polynomial function

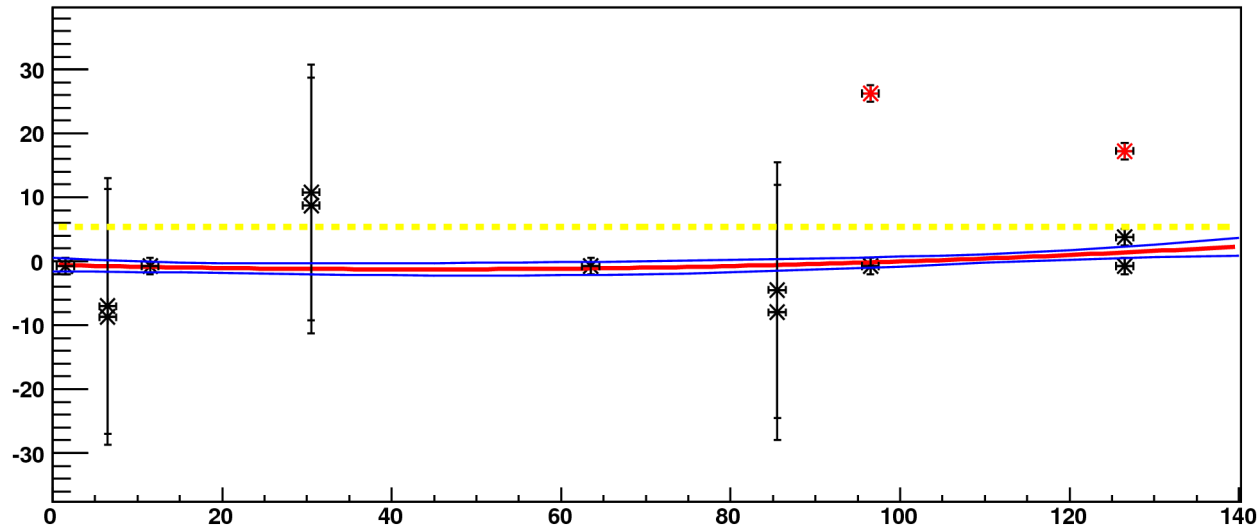- Some background points disturbing the fit to the straight muon track

Noise Hits
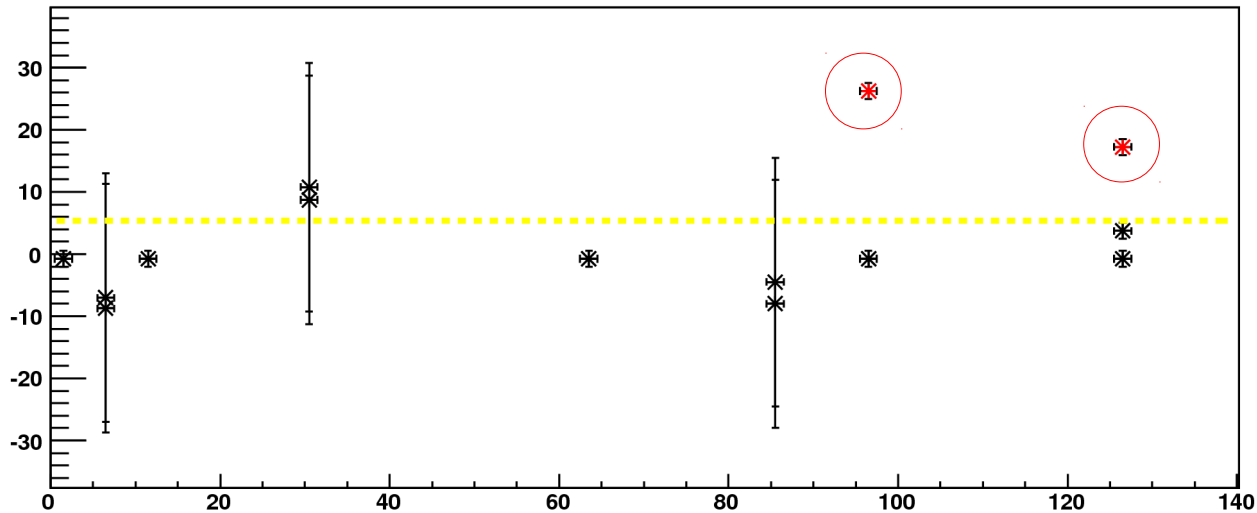
First idea:

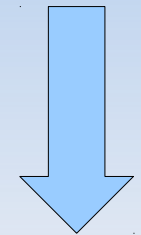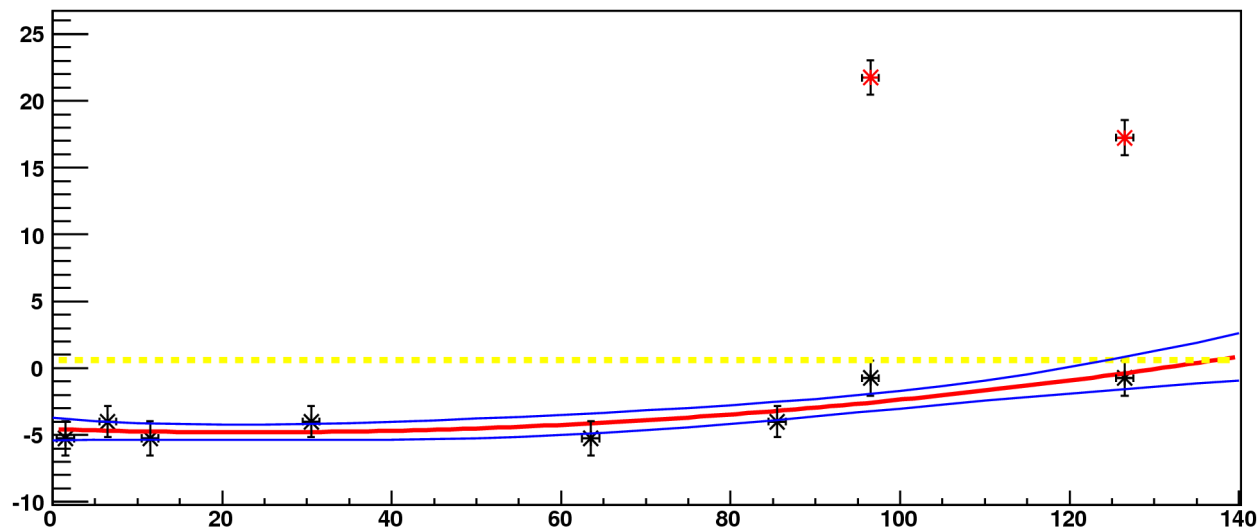rejecting background points by their distance from the weighted average

$$Av = \frac{\sum w_i X_i}{\sum w_i}, \quad w_i = \frac{1}{\Delta X_i^2}$$

Noise Hits - rejected

FIT

But...
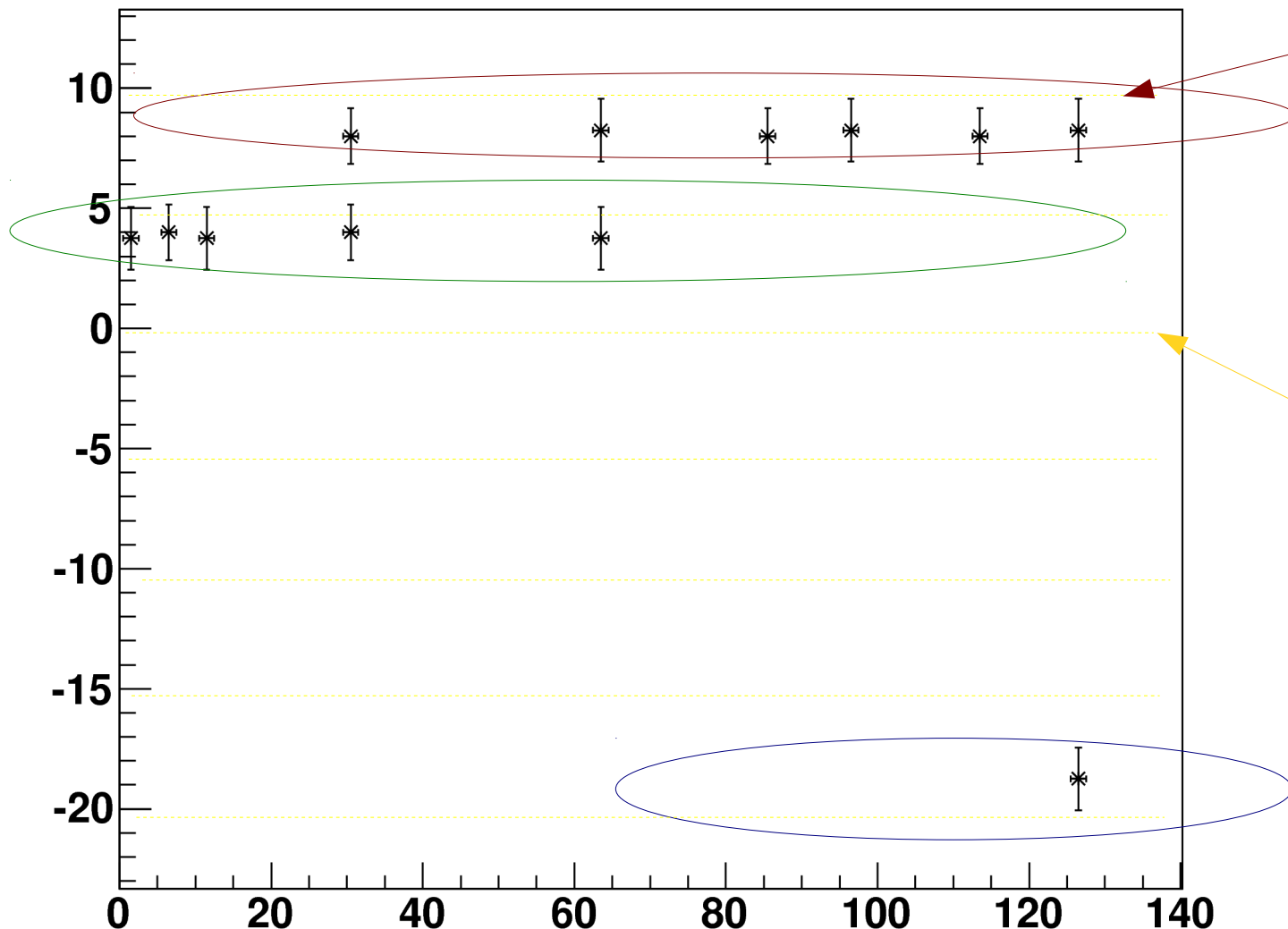Sometimes not ideal solution!

Clustering algorithm YZ (1)
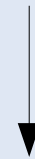
Clustering algorithm YZ (2)

Clustering algorithm YZ (3)

Clustering algorithm XZ (1)

1st step:

Rejecting only BiRO bckg points

Choosing the reliable BiRO track

Clustering algorithm XZ (2)

9: XZ
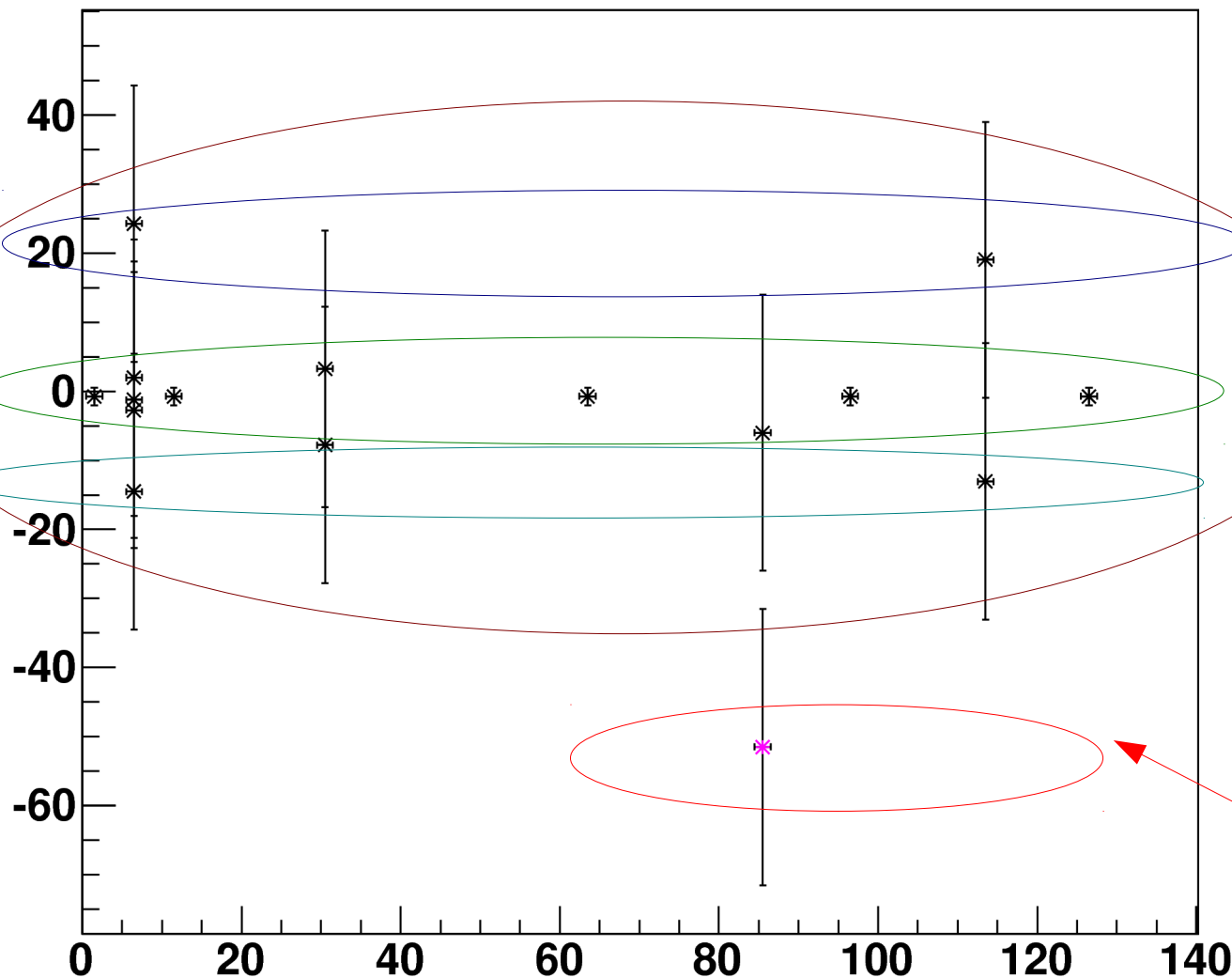
2nd step:

Including TDC hits
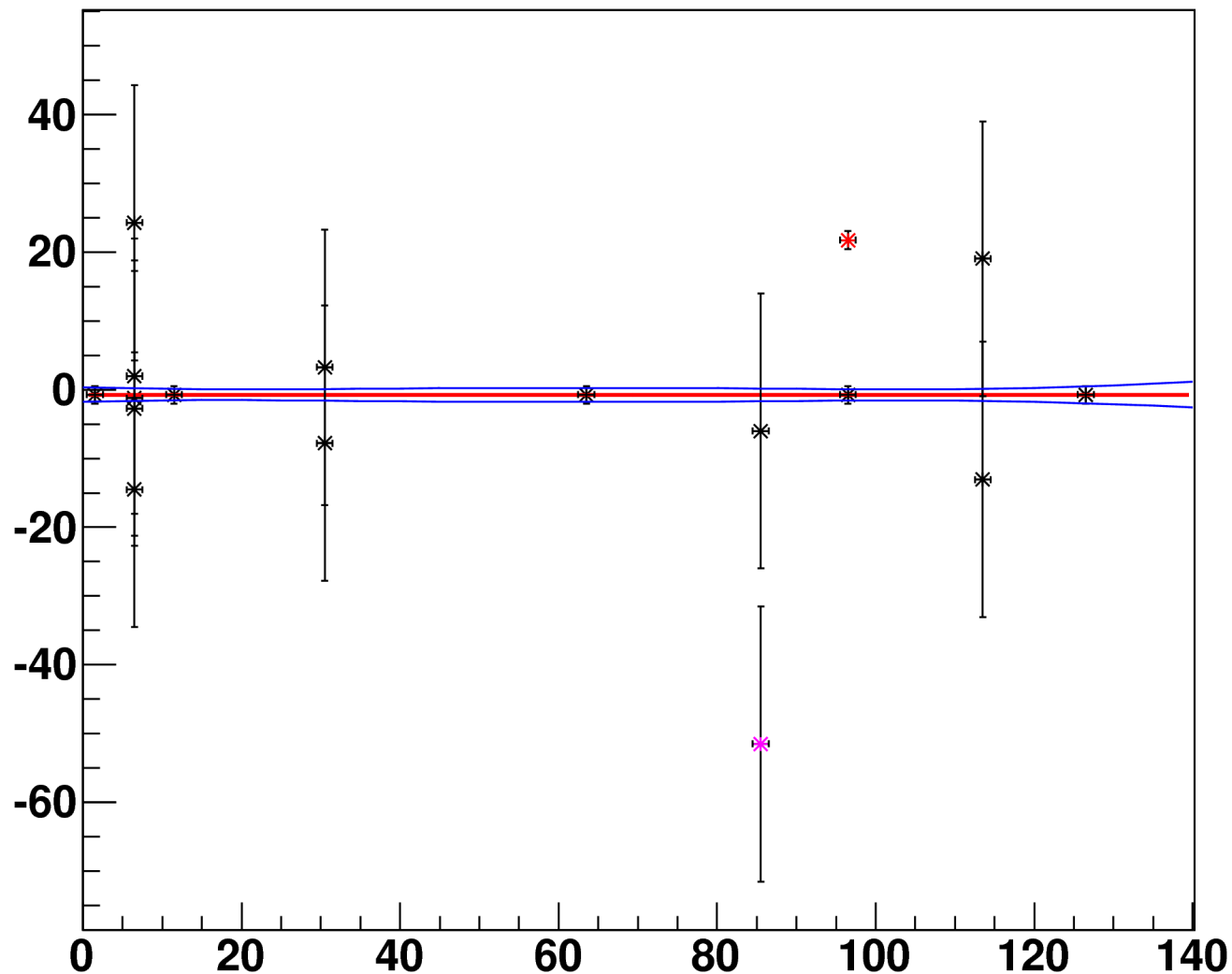
adjacent clusters:
d < 35 cm
→ **merged**

Initial centroids –
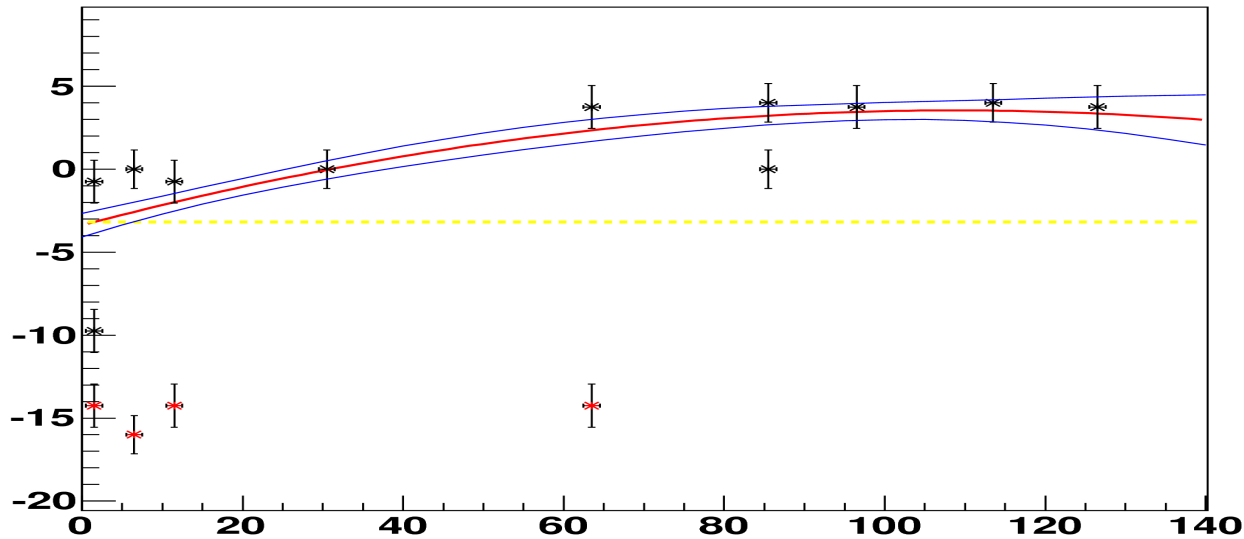every 20 cm

REJECTED

Clustering algorithm XZ (3)

Weighted average VS Clustering

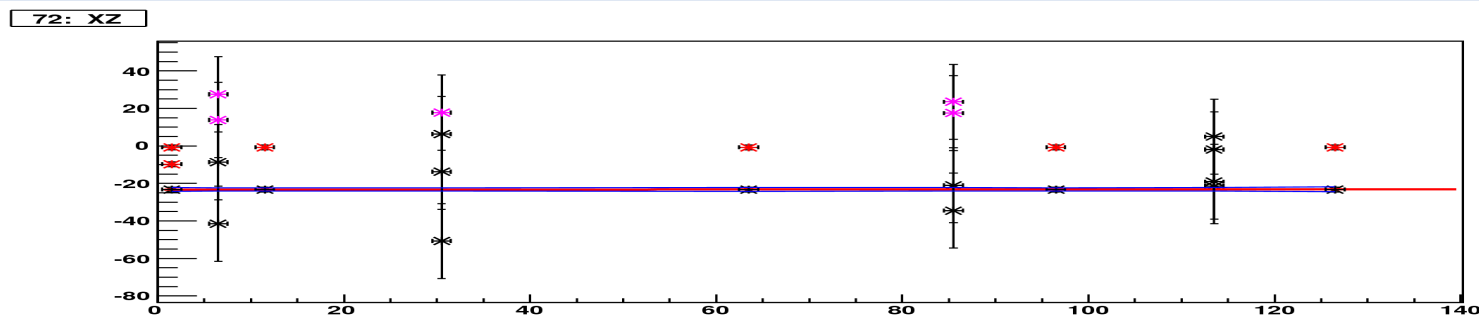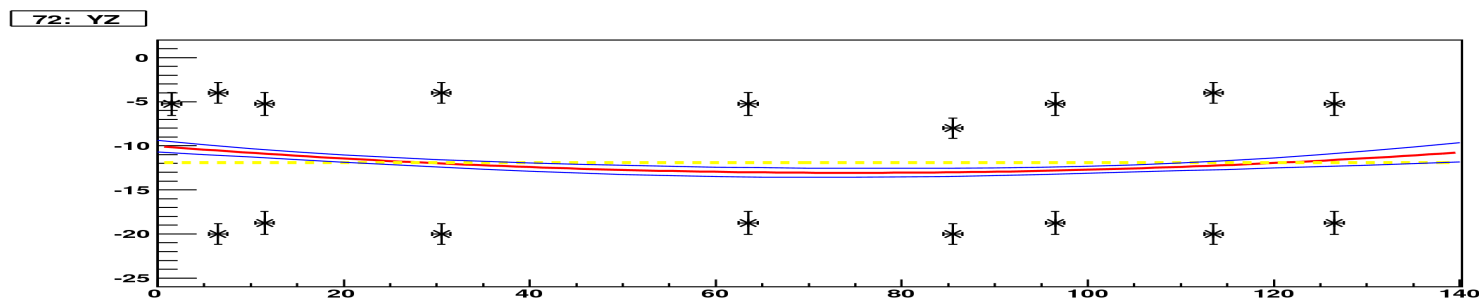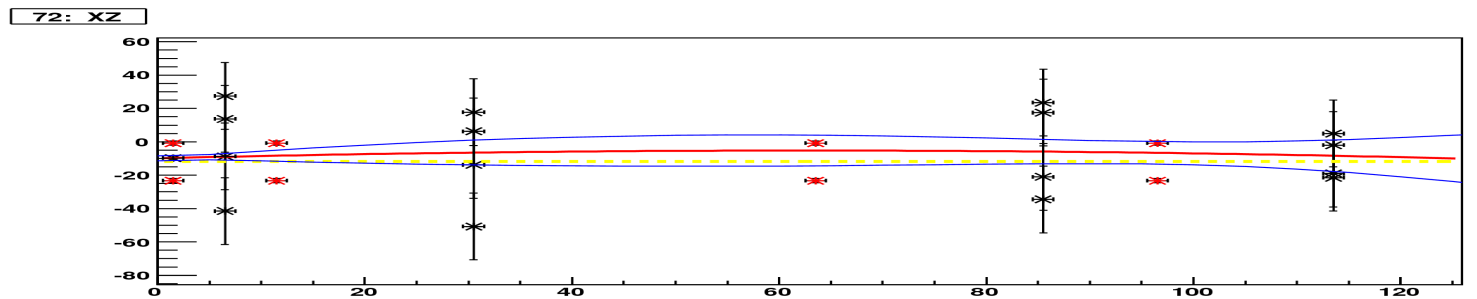The average is pulled down due to "low Y" noisy points →
one of them is accepted
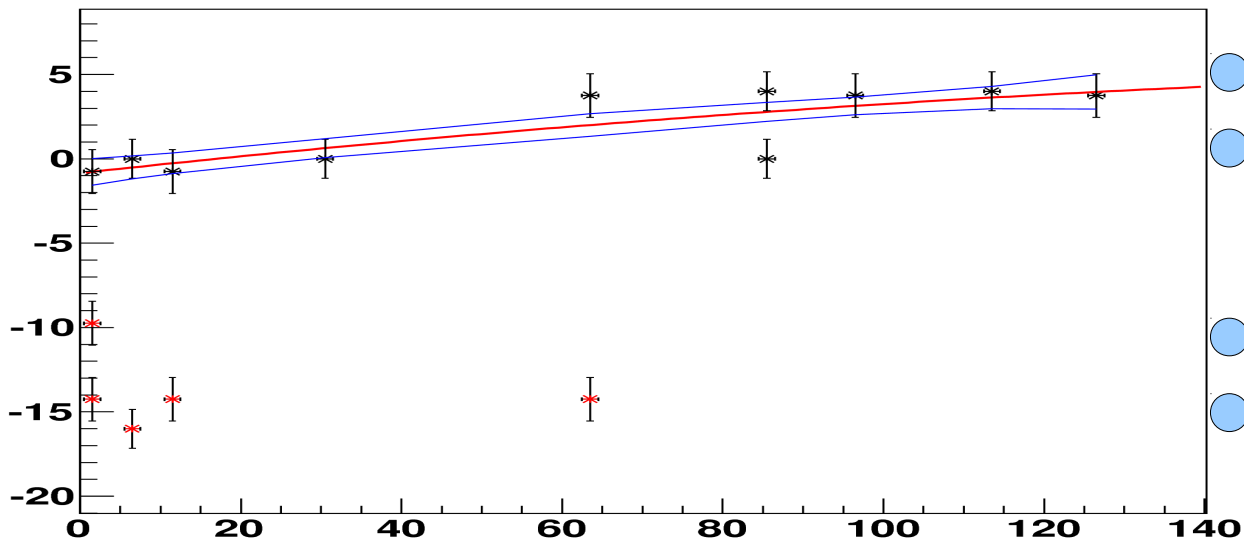
Separate, distant clusters → better

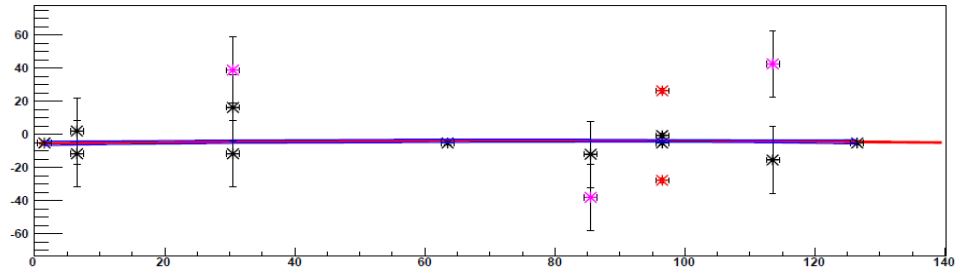**2530 muon-like events processed with this method (5060 fits!)**
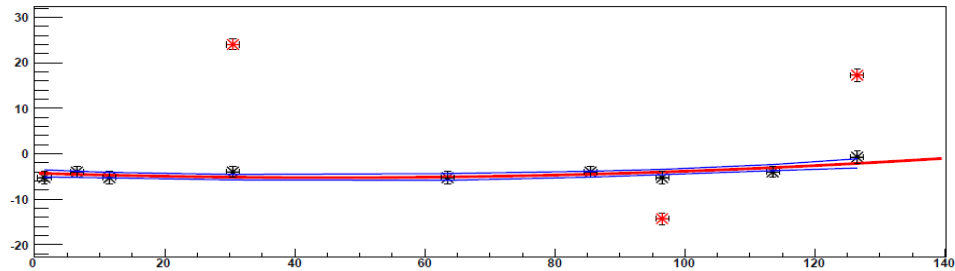
Two-muons events
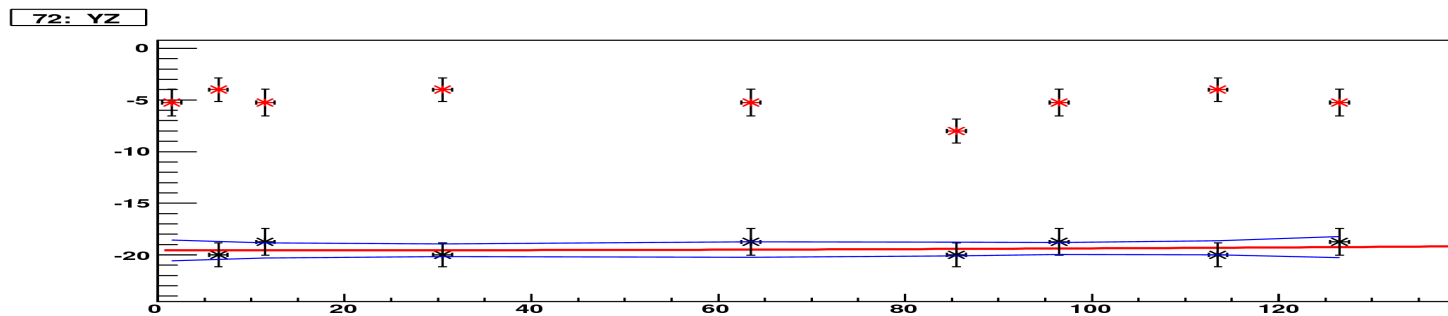
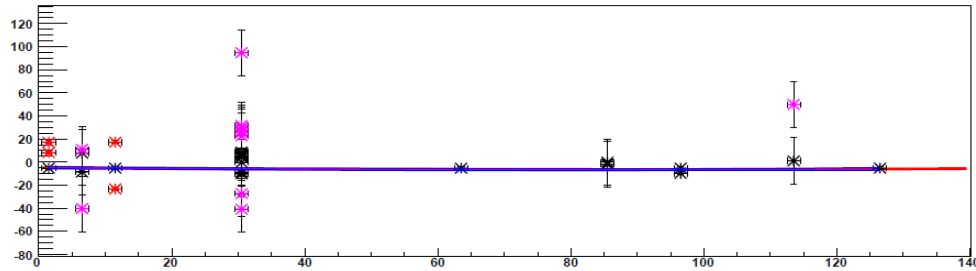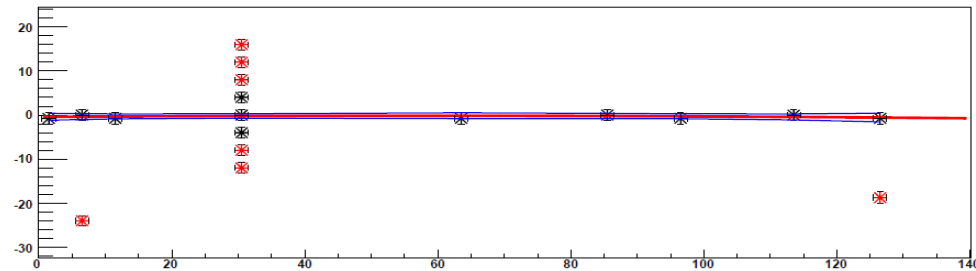Weighted Average

Clustering

some examples
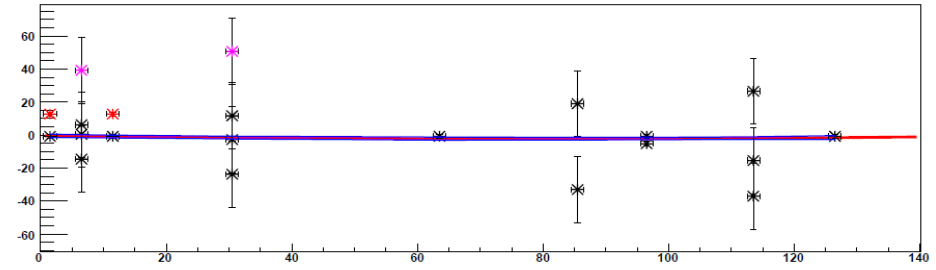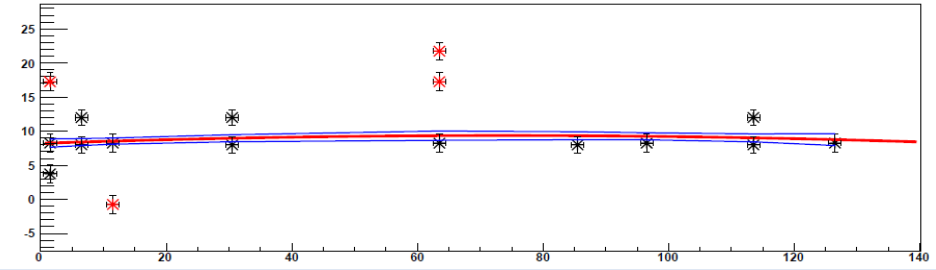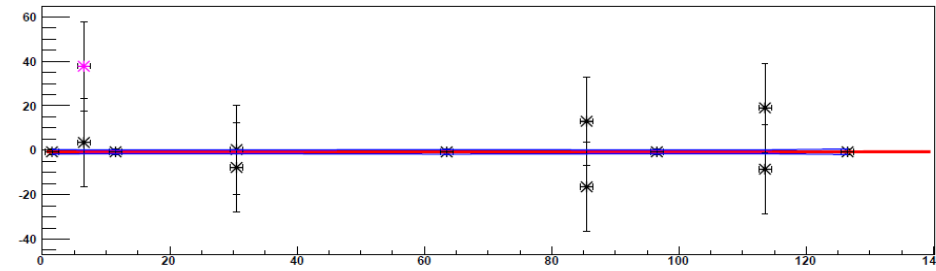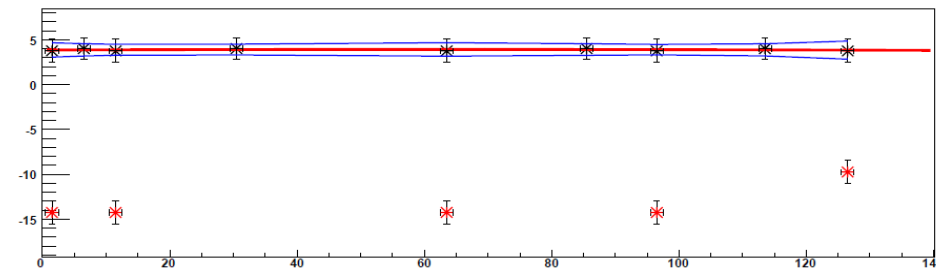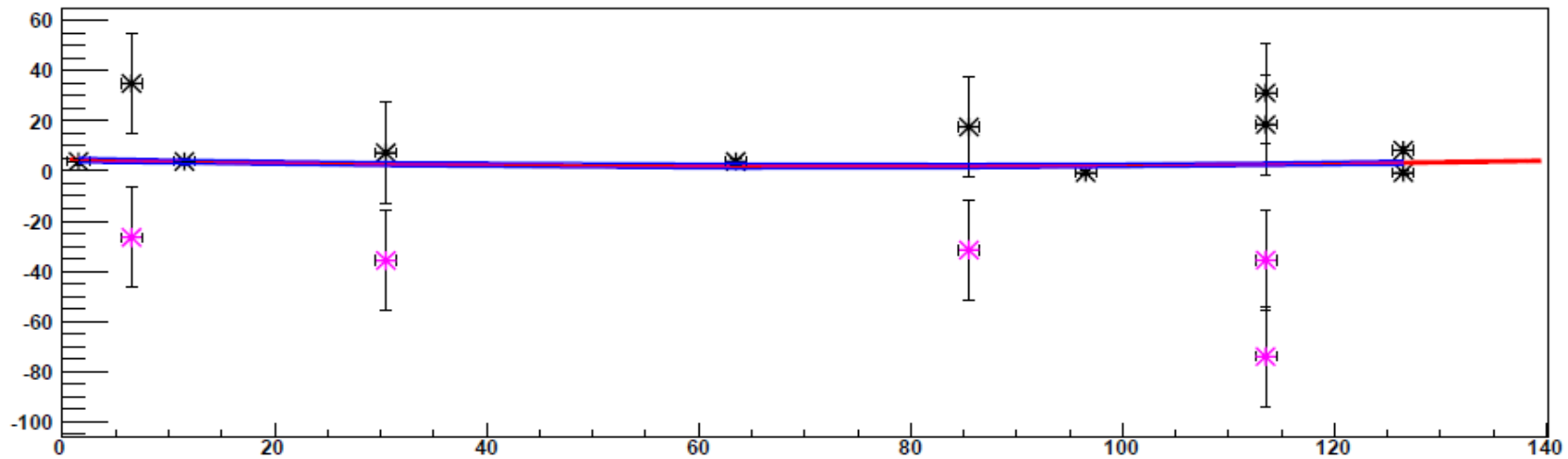
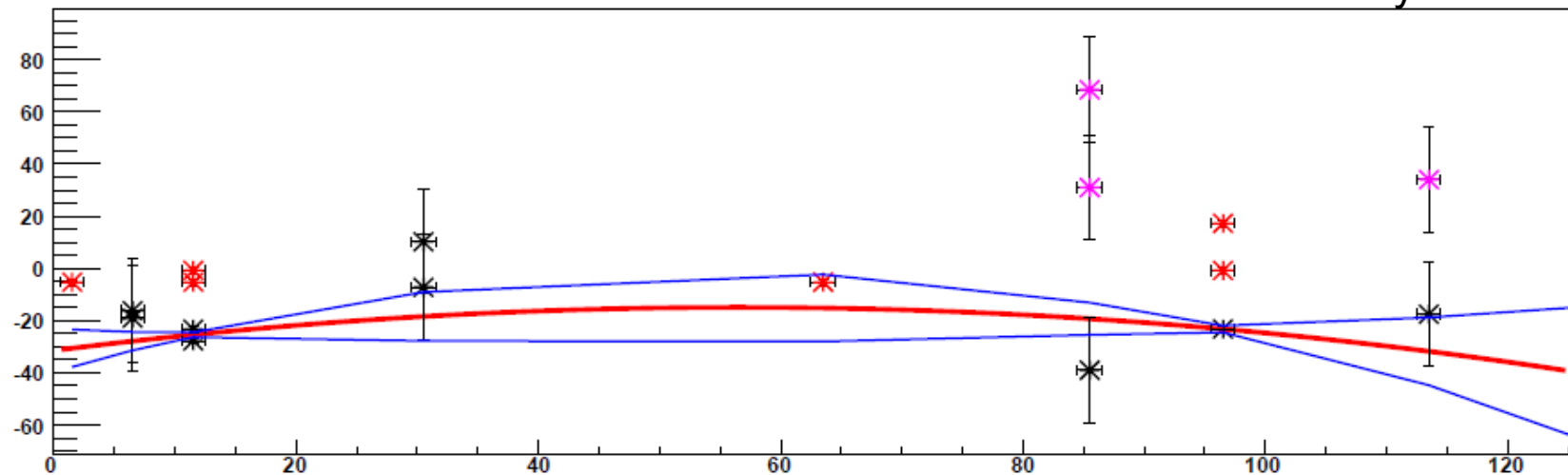# But sometimes...

351: XZ

3282: XZ

extremely rare

Preliminary efficiency calculations
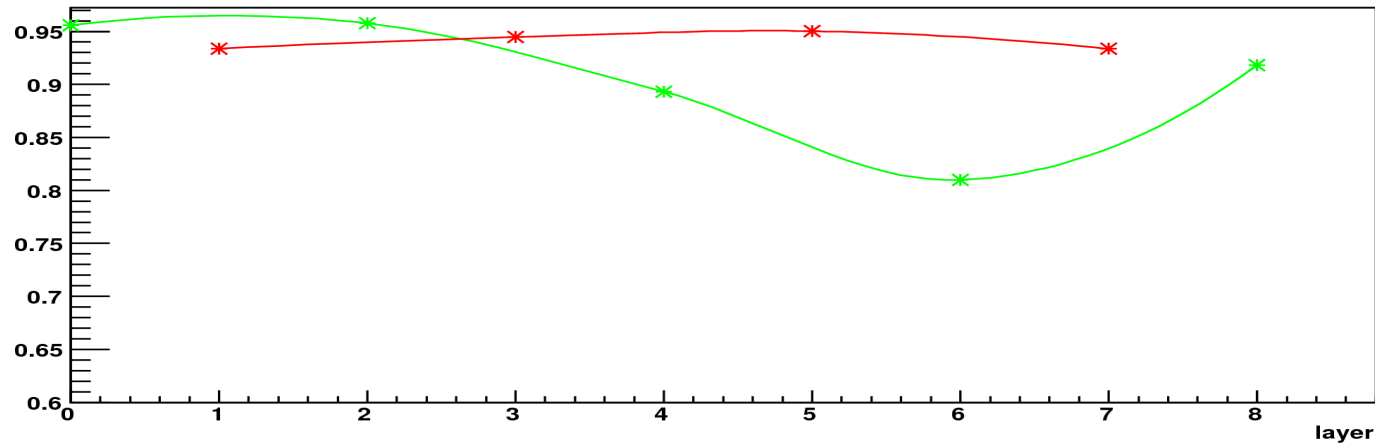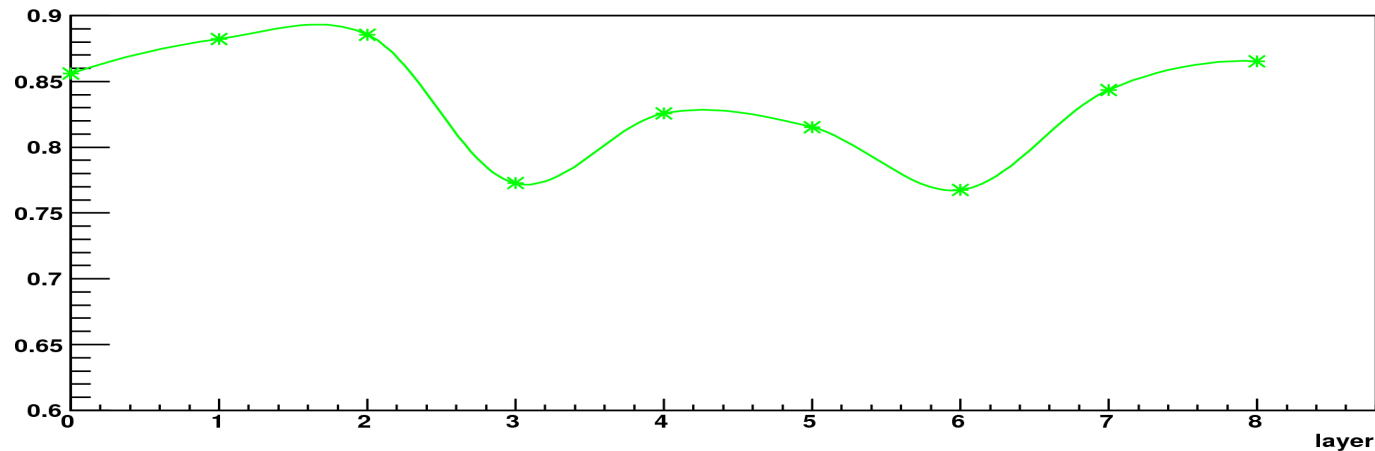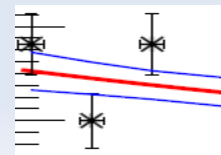
χ² /ndof
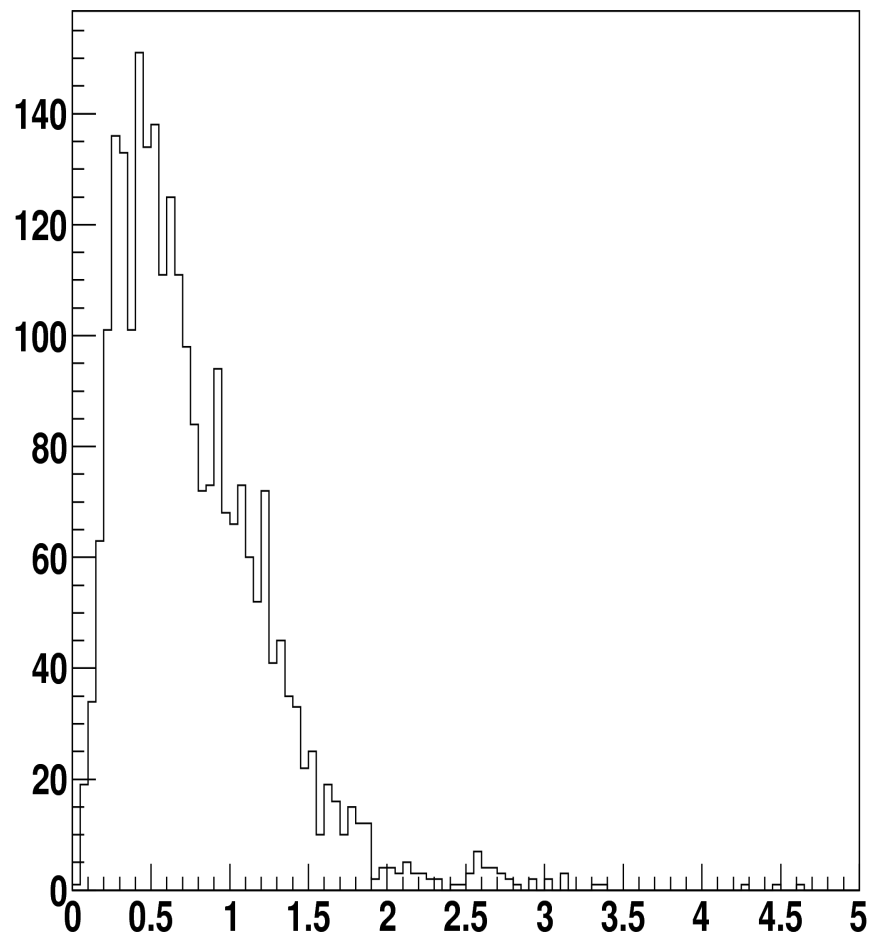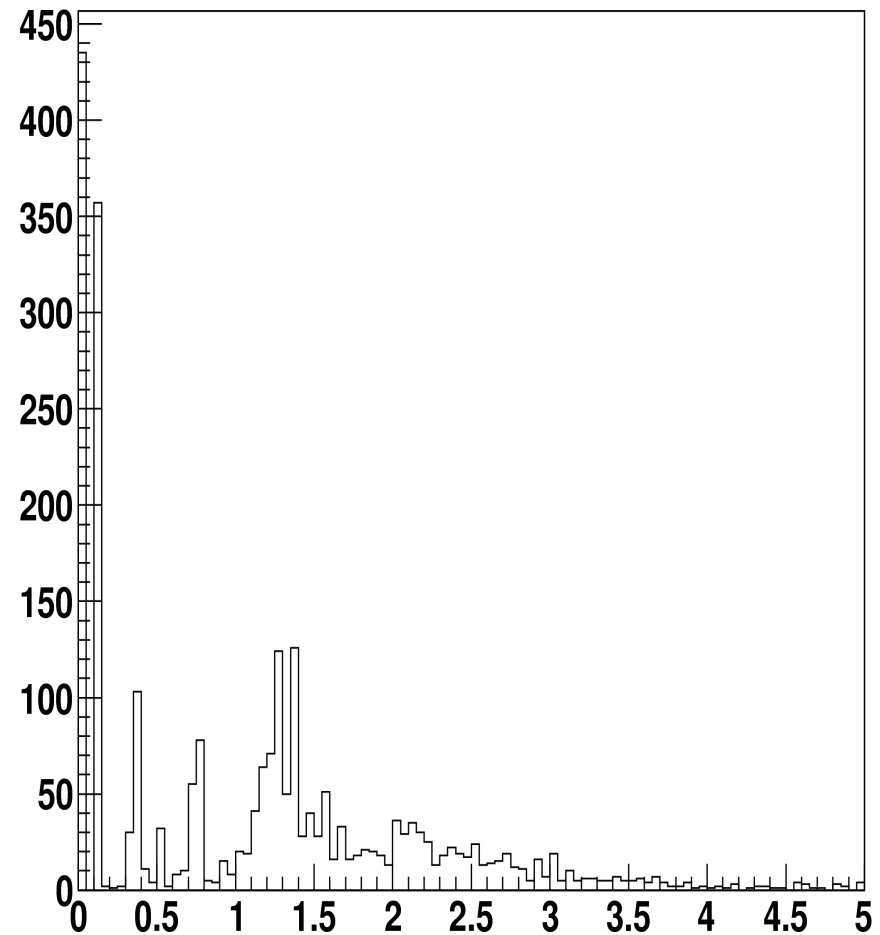
Next steps

- Possible corrections to the current procedure...

- Alignment study – residual distribution of the hits

- Looking at new test data