

Ongoing activities on fit with $\log\left(\frac{Q_1}{Q_0}\right)$ and $\log\left(\frac{Q_2}{Q_1}\right)$

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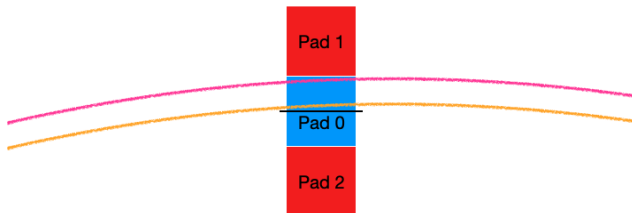
LPNHE-T2K group

Introduction

- The PRF's parameters used to fit the data depend on the parameters (orientation, RC, drift...) of the track
- Therefore the idea is to use other formulas and to see if they are less depending on these parameters
- To do this I used DESY test beam data generated by U.Yevarouskaya and study the $\log\left(\frac{Q_1}{Q_0}\right)$ and $\log\left(\frac{Q_2}{Q_1}\right)$ as suggested by P.Billoir, for different drift distances

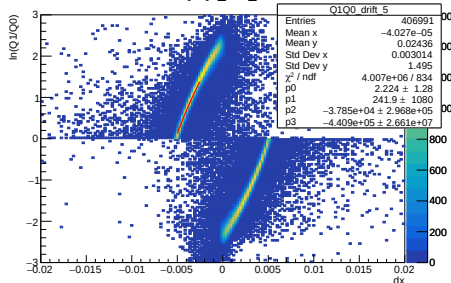
The Method

- The charge collected in the pad 1 (pad 2) decreases (increases) when the track gets close to the center of the pad 0
- We hence have a better accuracy with $\log\left(\frac{Q_1}{Q_0}\right)$ ($\log\left(\frac{Q_2}{Q_1}\right)$) when the track is at the **frontier** (**center**) of the pad 0.

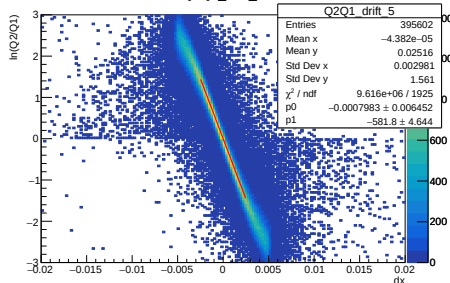


Preliminary results

Q1Q0_drift_5

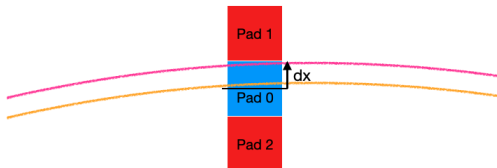


Q2Q1_drift_5

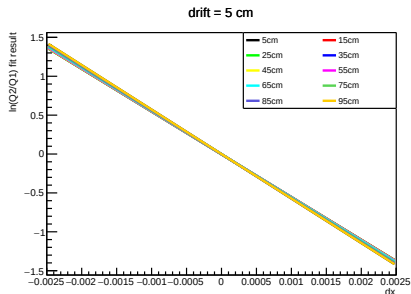
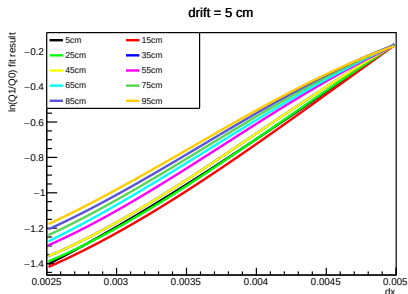


$$\ln \left(\frac{Q_1}{Q_0} \right) \times (y_0 - y_1) = p_3 x^3 + p_2 x^2 + p_1 x + p_0$$

$$\ln \left(\frac{Q_2}{Q_1} \right) \times (y_0 - y_1) = p_1 x + p_0$$



Global results

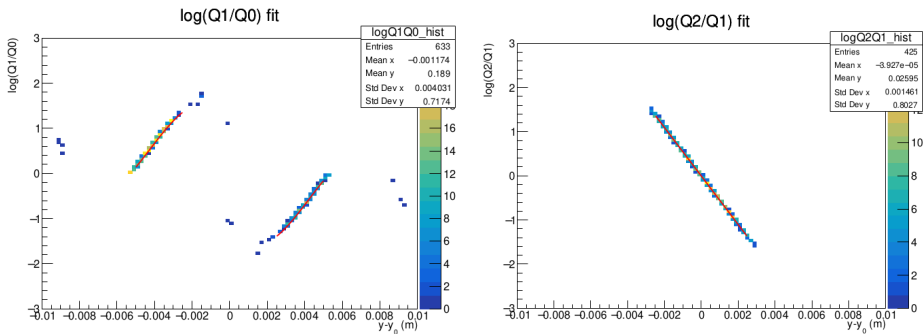


- By hand I've calculated a bias of $\approx 6 \mu\text{m}$ ($\approx 2 \mu\text{m}$) between the 2 extreme cases of $\ln(Q1/Q0)$ ($\ln(Q2/Q1)$).

Implementation in hatRecon

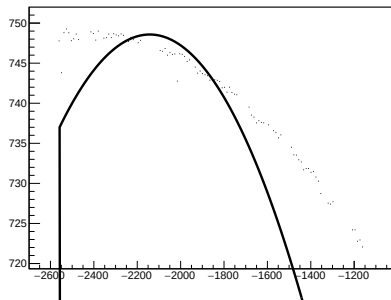
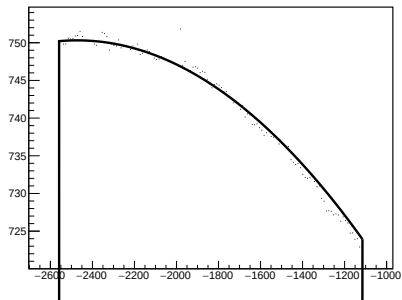
- In order to check the spatial resolution we can obtain, I implemented this fit technics in the HA-TPC Reconstruction software of ND280 (hatRecon)
- I did a first test with 10 muon horizontal tracks at 2 GeV

Results obtained with hatRecon



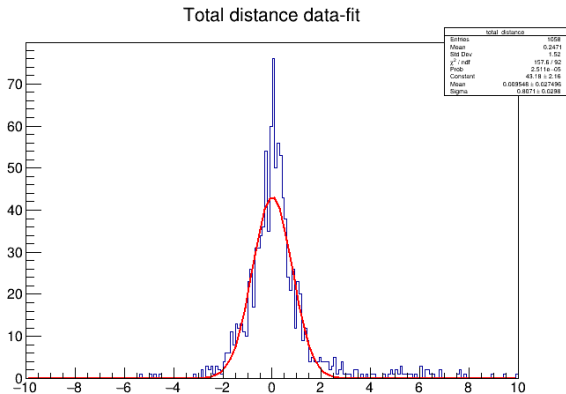
- Some bugs with $\ln\left(\frac{Q_1}{Q_0}\right)$ but results still promising

Results obtained with hatRecon



- When it works and when it doesn't work

Spatial resolution obtained



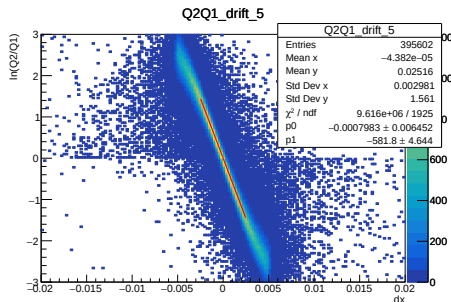
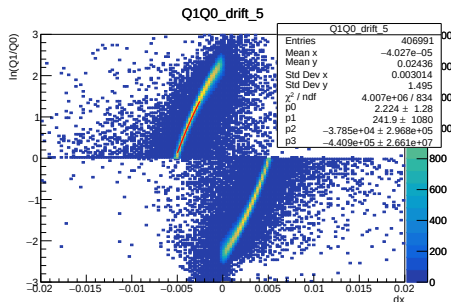
- Spatial resolution around 807 μm , but this can still be improved by fixing fit issues

- Fix fit issues: parabola $\rightarrow$ circle
- Try other types of tracks...

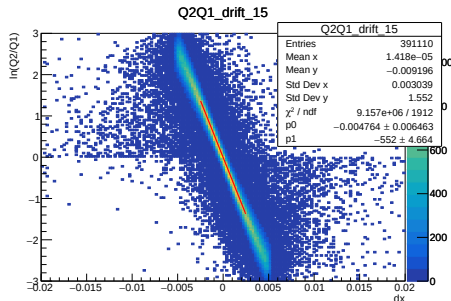
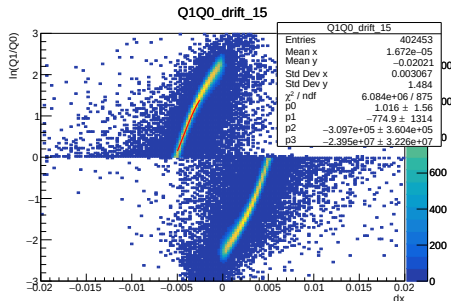
– Thank you ! –

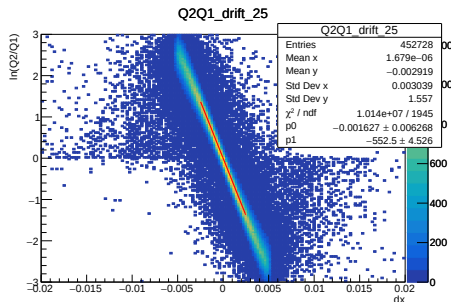
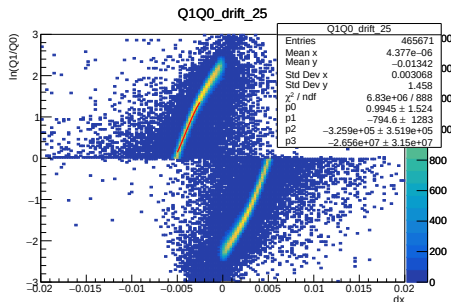
– Backup –

5 cm

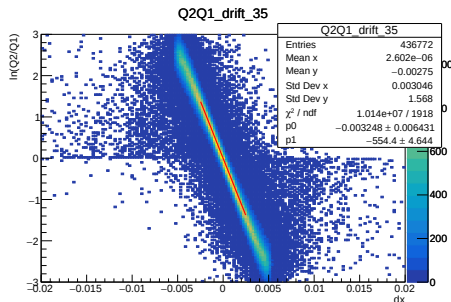
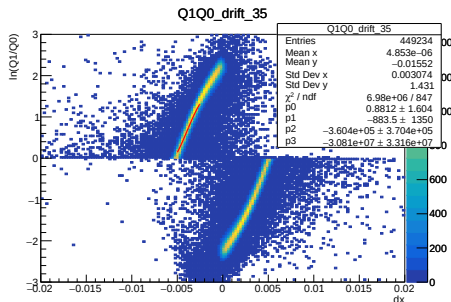


15 cm

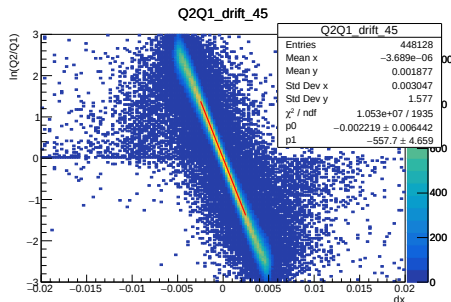
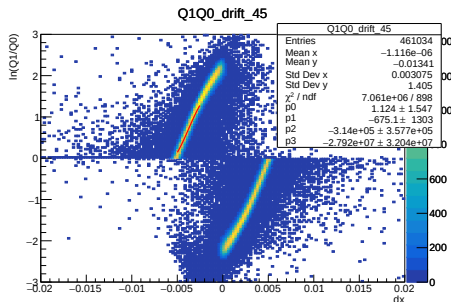




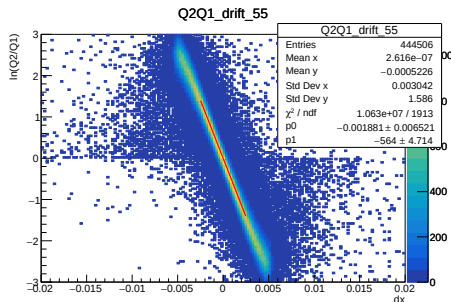
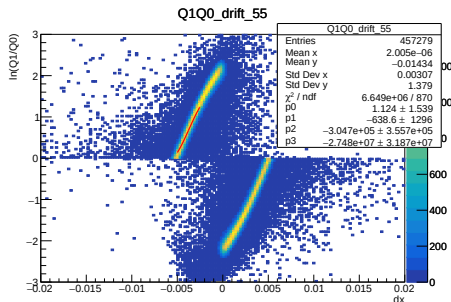
35 cm



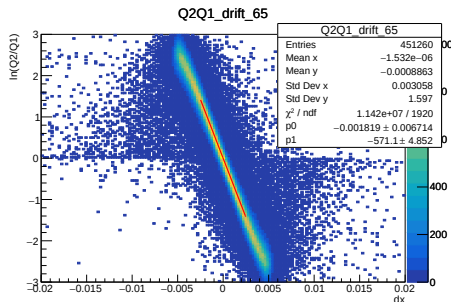
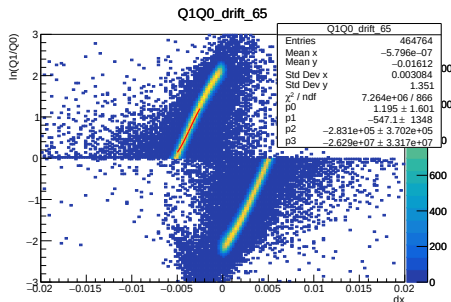
45 cm



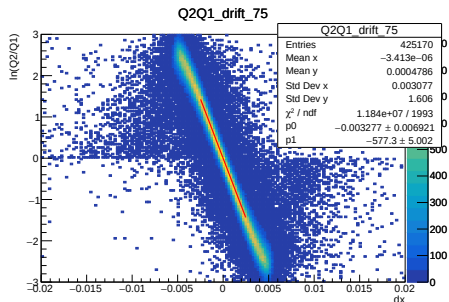
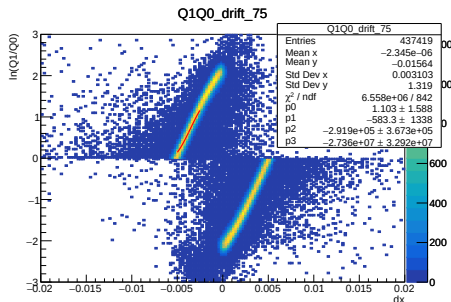
55 cm



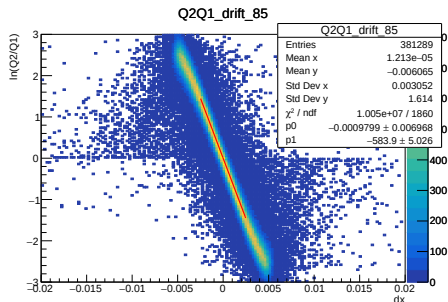
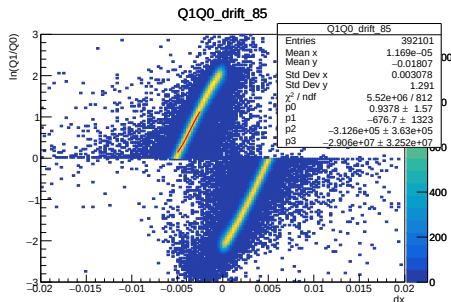
65 cm



75 cm



85 cm



95 cm

