# Drift Velocity and Time Zero Determination for 2013 Beam Test

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Introduction

* Determination of Time Zero for 2013 Beam test.

* Drift velocity calculated for data quality check

* Used 4 scans of TPC at different field settings (100 [ns] peaking time data)
    * B = 1 [T] / E = 230 [V/cm]
    * B = 1 [T] / E = 140 [V/cm]
    * B = 0 [T] / E = 230 [V/cm]
    * B = 0 [T] / E = 140 [V/cm]

* Plotted drift time verses table position
    * Slope = V_{drift}
    * Curve intercepts = Time Zero

Module Selection
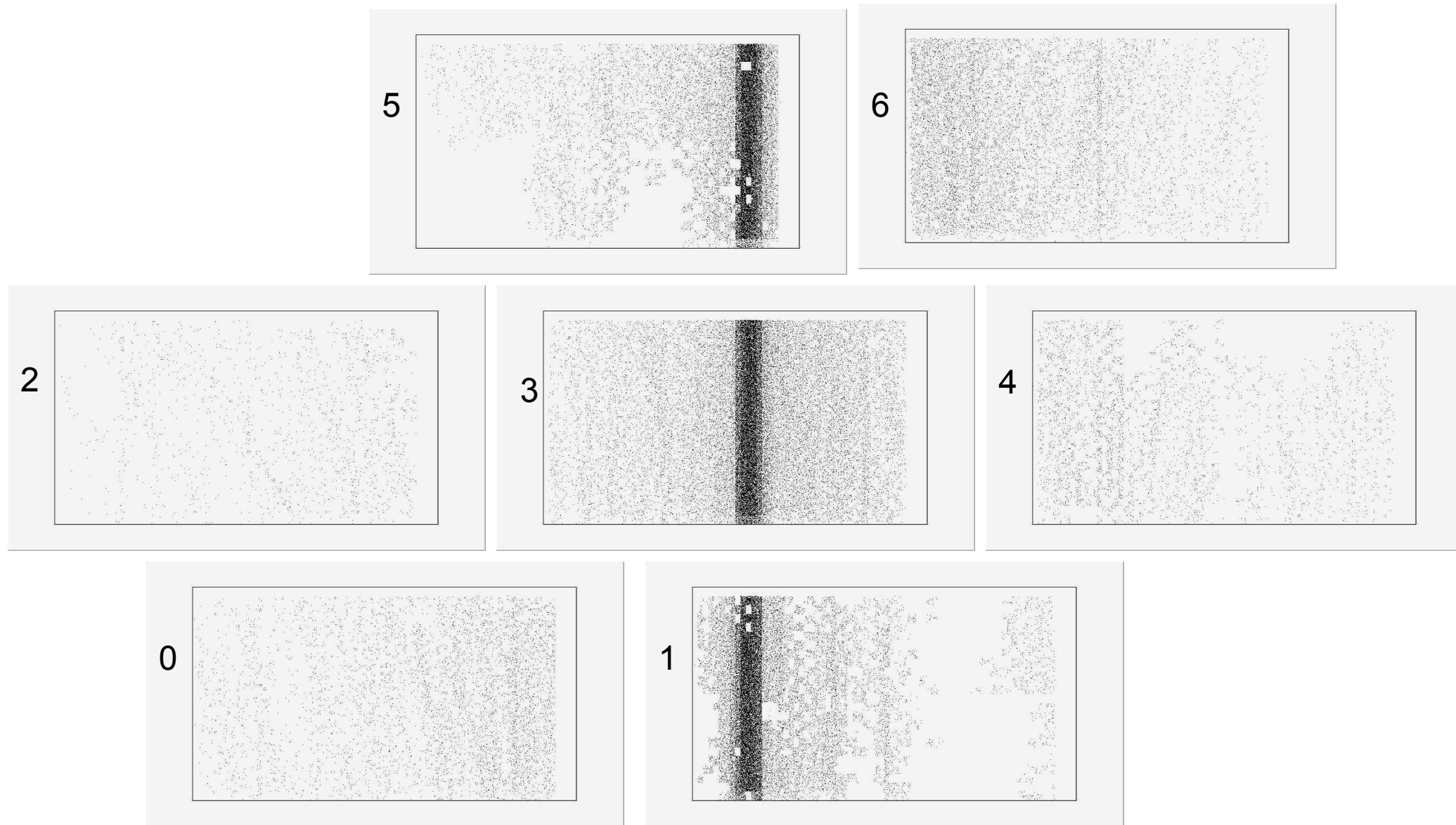
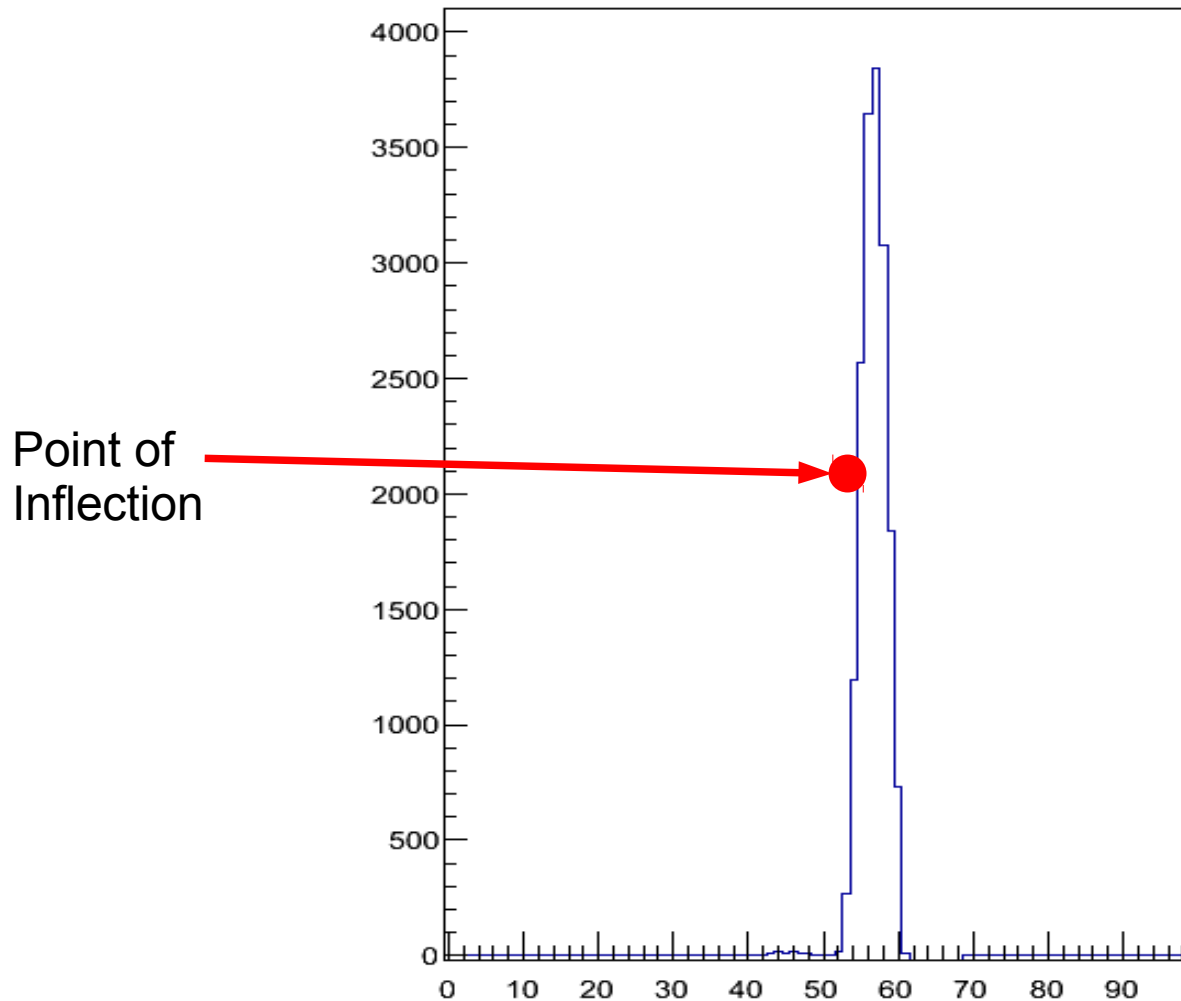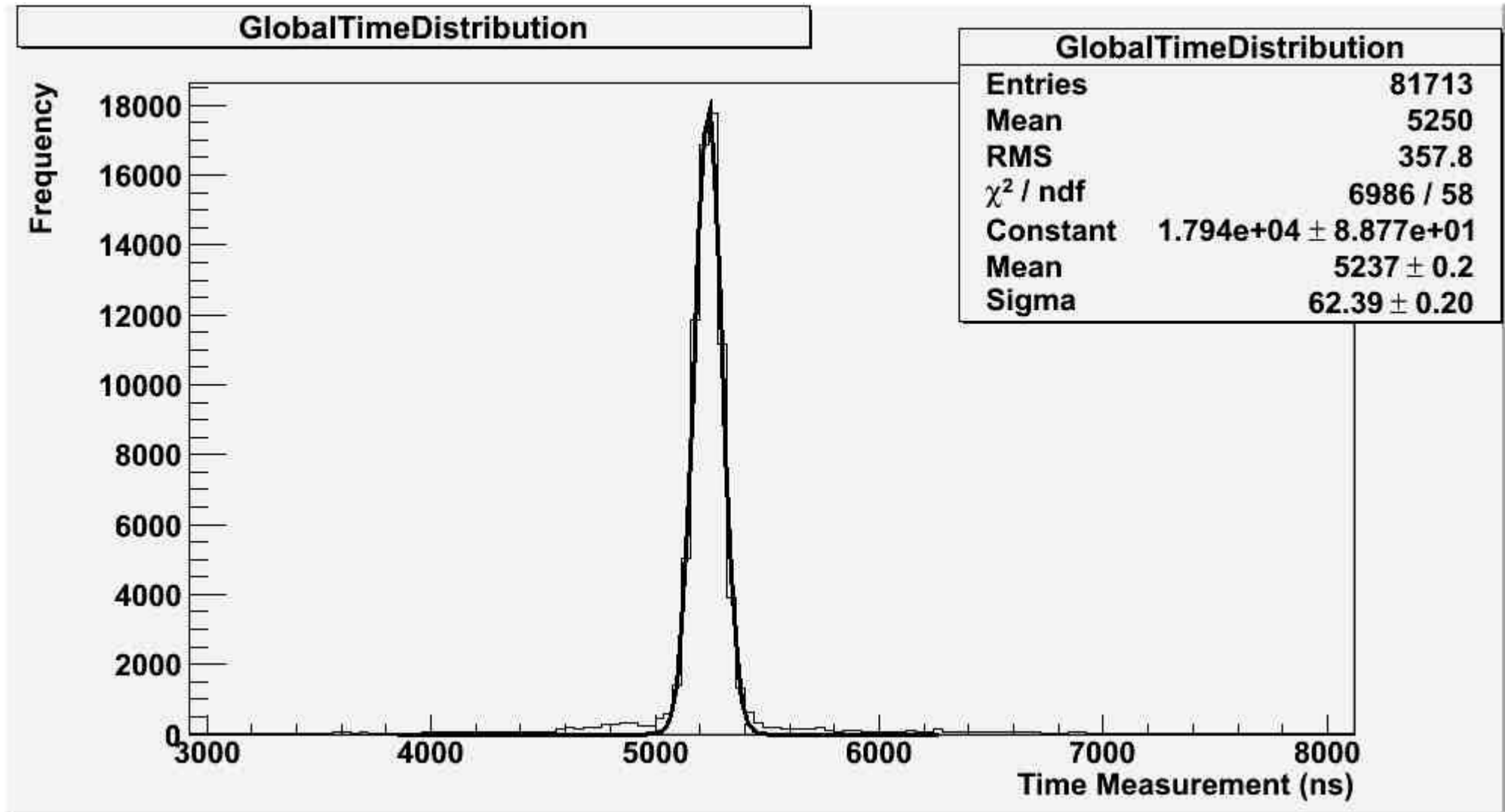Module # taken form Marlin GEAR files.

Measurement of Hit Time

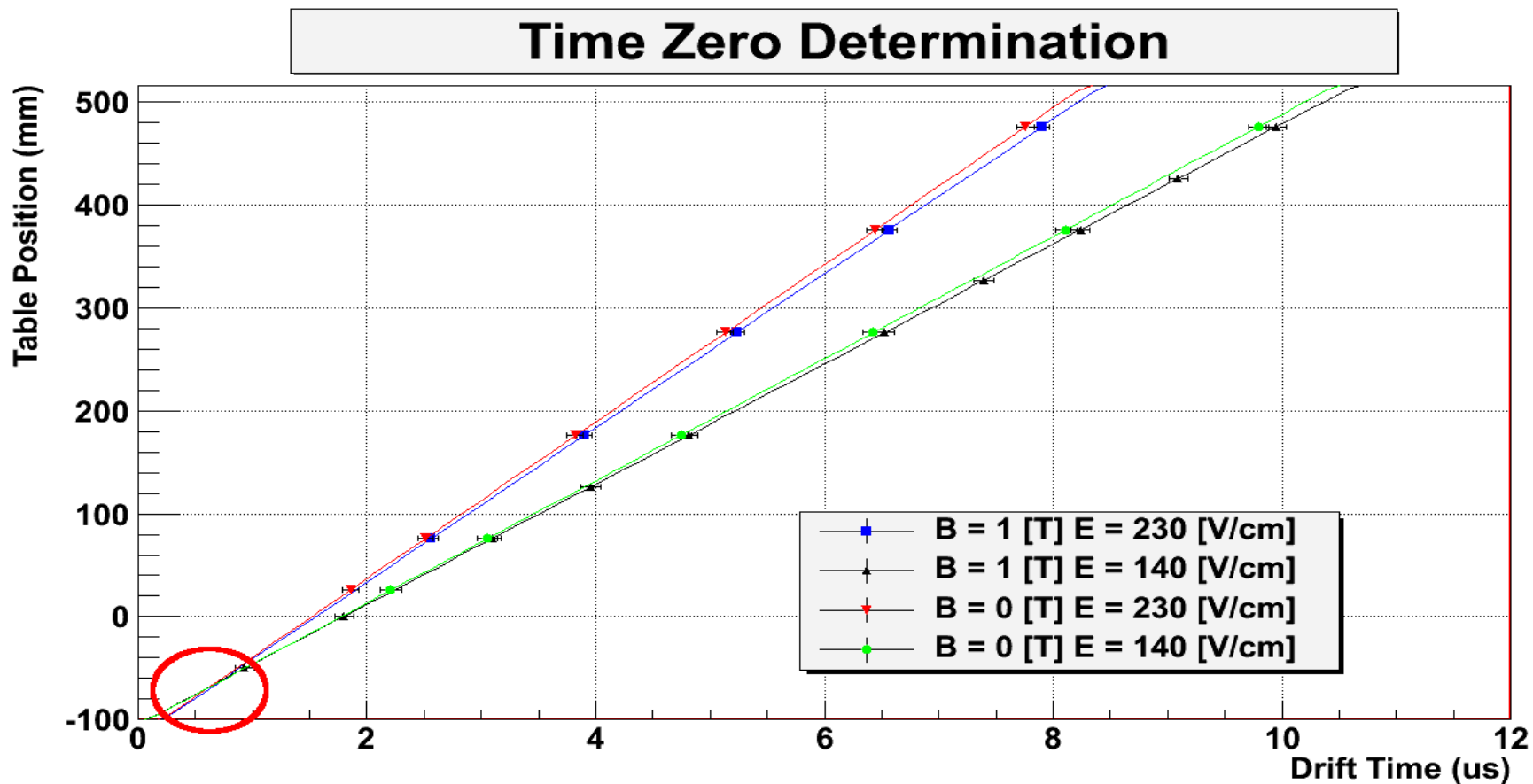Time Measurement of hit determined from point of inflection of main pulse.

hADC_3_652

Point of Inflection

Determination of Drift Time
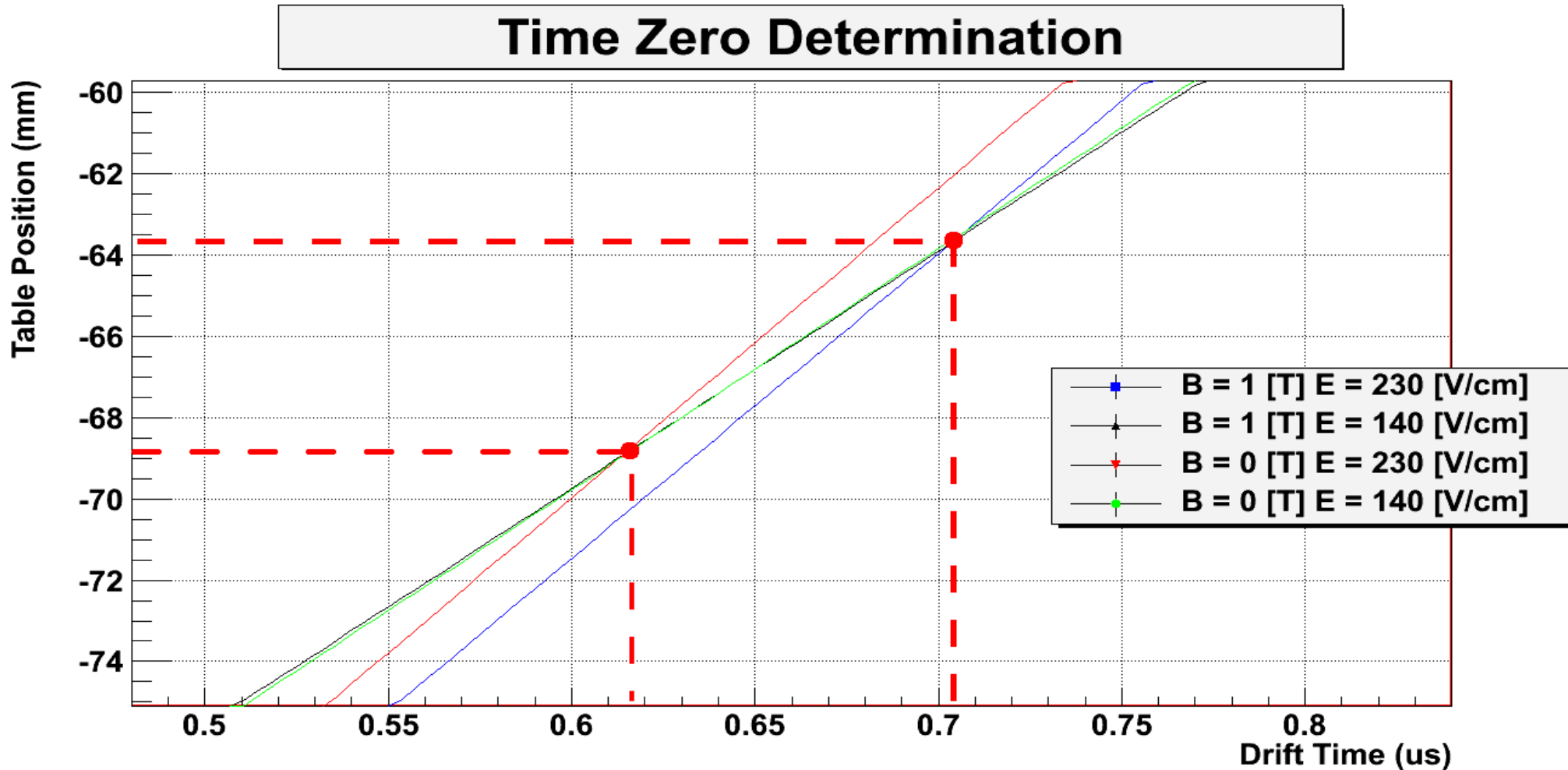

Sample drift time measurement. This is for run 3047.
(B = 1 [T], E = 230 [V/cm], table position 276 [mm])

Time Zero and Drift Velocity

Time Zero Determination

Scan Name	Chi-Square/ ndf	Measured V_{drift} [cm/us]	Calculated V_{drift} [cm/us]	Colour
B = 1 / E = 230	0.229/3	7.497 +/- 0.07	7.6	Blue
B = 1 / E = 140	0.513/8	5.834 +/- 0.03	5.61	Black
B = 0 / E = 230	0.2/4	7.629 +/- 0.04	7.6	Red
B = 0 / E = 140	0.349/4	5.935 +/- 0.04	5.61	Green

Zoomed in Time 0 Determination

Time Zero Determination

Legend:
- B = 1 [T] E = 230 [V/cm]
- B = 1 [T] E = 140 [V/cm]
- B = 0 [T] E = 230 [V/cm]
- B = 0 [T] E = 140 [V/cm]

Curve Intercept	Time Zero [ns]
Blue X Green	700
Blue X Black	710
Red X Green	620
Red X Black	620

Conclusion

✔ Drift velocities for both high (230 V/cm) and low field (140 V/cm) in close agree with calculated values. (Differences maybe due to change of gas composition between measurements)

✔ Time zero measurement found to be 660 +/- 40 [ns]