

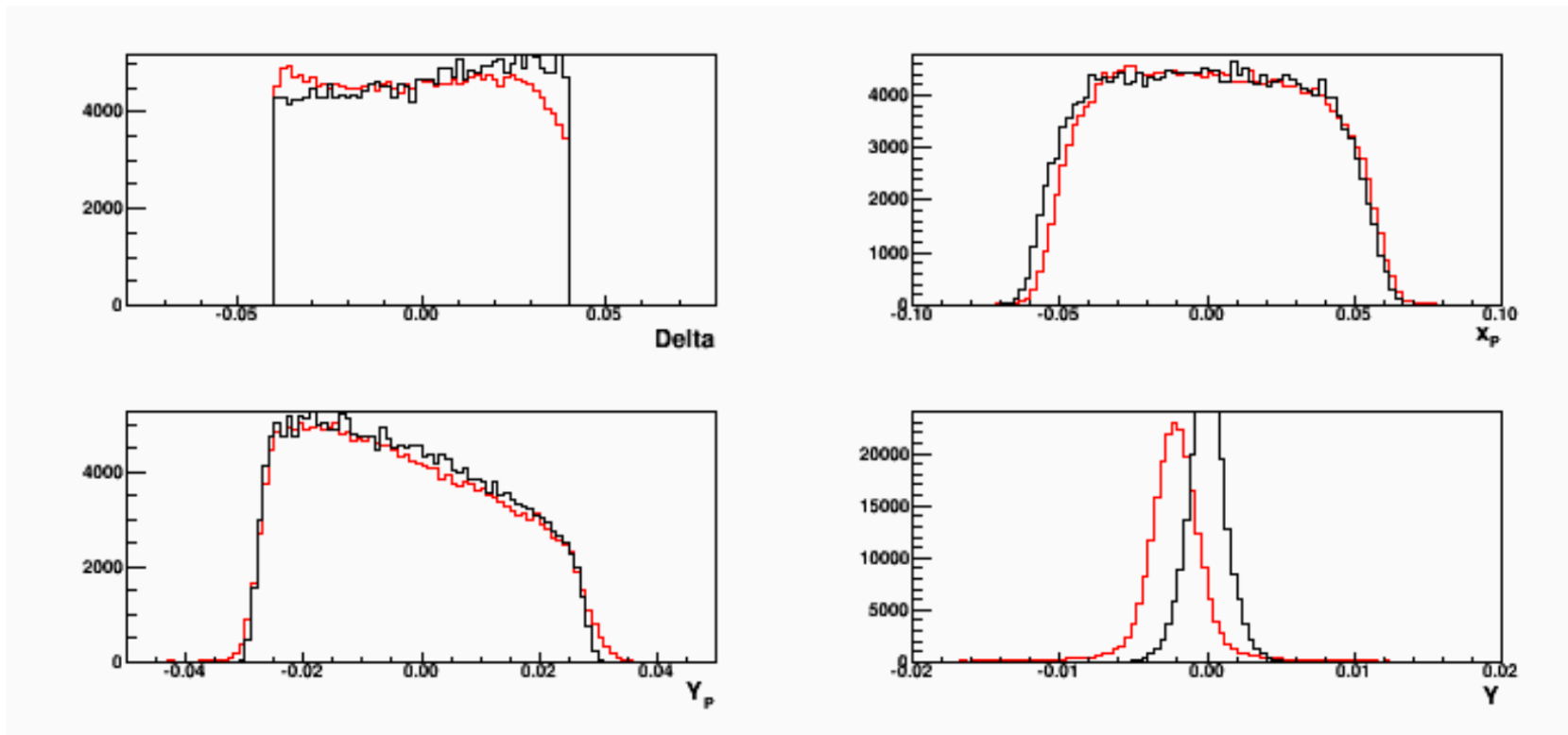
VDC Resolution Check

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with Longwu, Yang, Barak
March, 2017

- Motivation:

In delta scan comparison, we saw different ytar resolution in data and simulation. (pics from Dien)



- Motivation:

In delta scan comparison, we saw different ytar resolution in data and simulation.

Things to check in simulation code:

1. multiple scattering
2. energy loss
3. VDC resolution

Vertical drift chambers for the Hall A high-resolution spectrometers at Jefferson Lab

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E.A.J.M. Offermann^{b,5}, J. Segal^b, J.A. Templon^{a,6}, R. Wechsler^{a,7},
B. Wojtsekhowski^b, J. Zhao^{a,8}

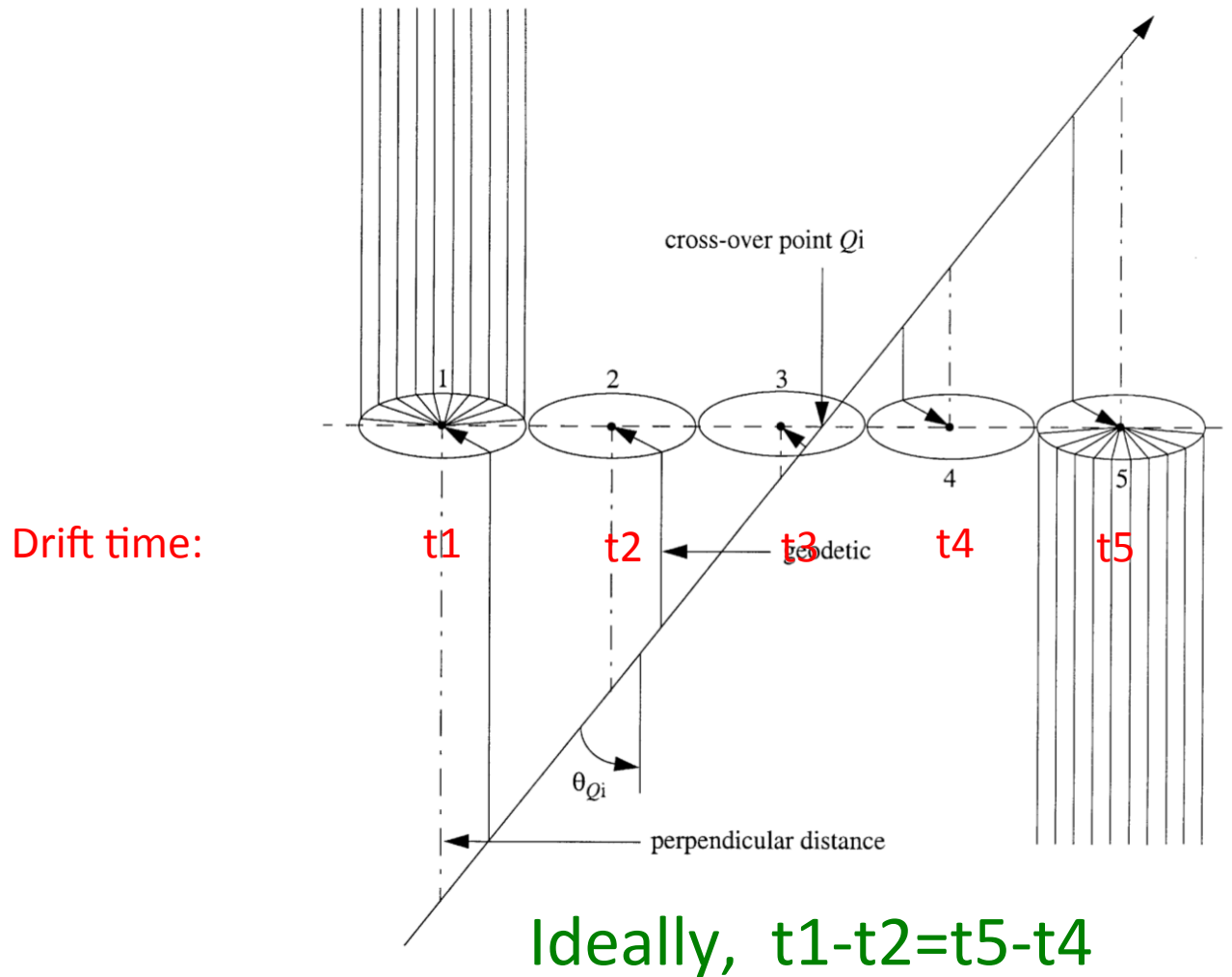
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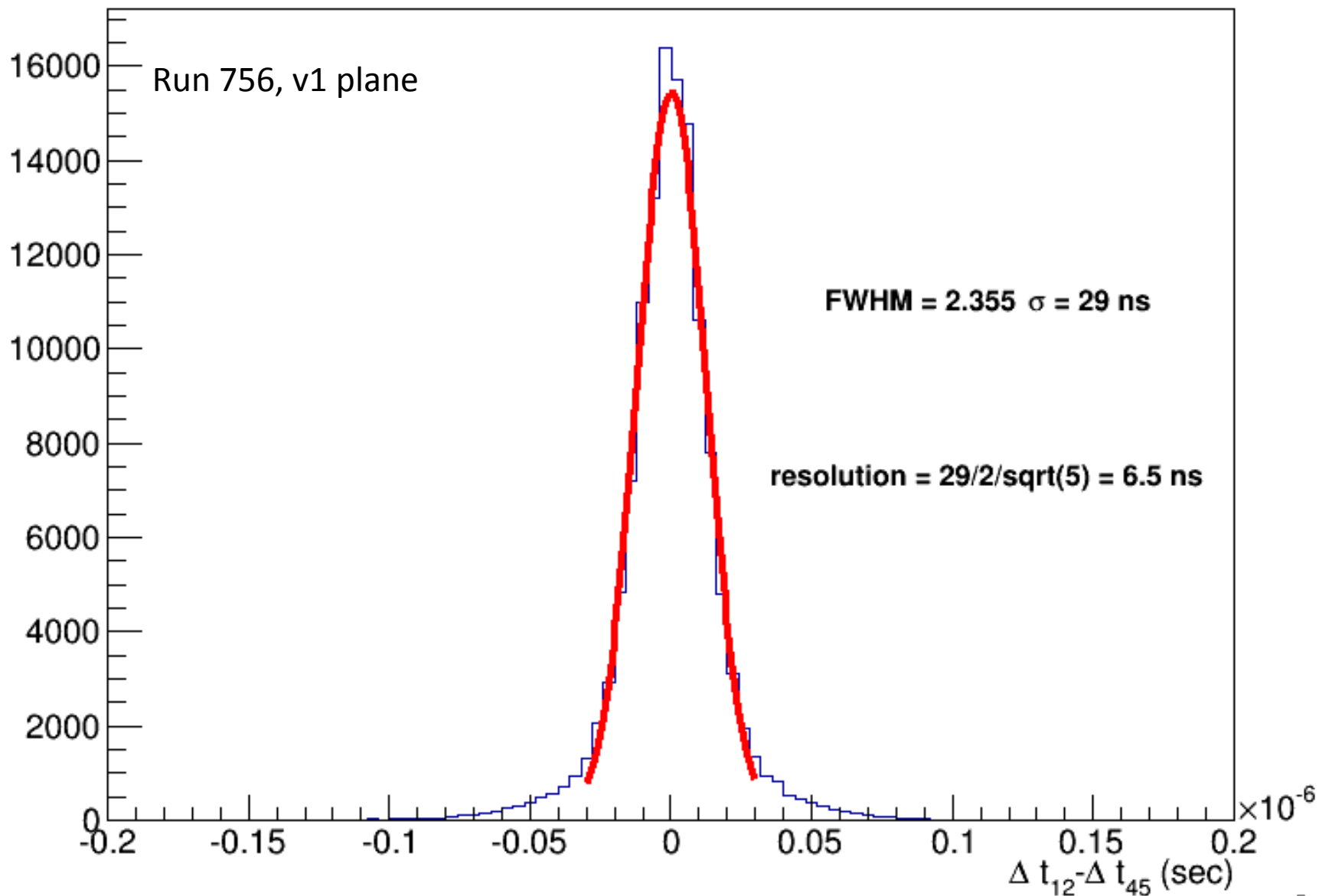
Received 13 October 2000; accepted 13 February 2001

VDC time resolution

K.G. Fissum et al. / Nuclear Instruments and Methods in Physics Research A 474 (2001) 108–131



L.vdc.v1.time[0]-L.vdc.v1.time[1]+L.vdc.v1.time[3]-L.vdc.v1.time[4] {Ndata.L.vdc.v1.time==5}



VDC time resolution was 4.5 ns on NIM paper

Gmp got 6.5 ns

Ar run 756 got 6.5 ns

What changed:

- New readout card
- high voltage from -4kV to -3.3 kV

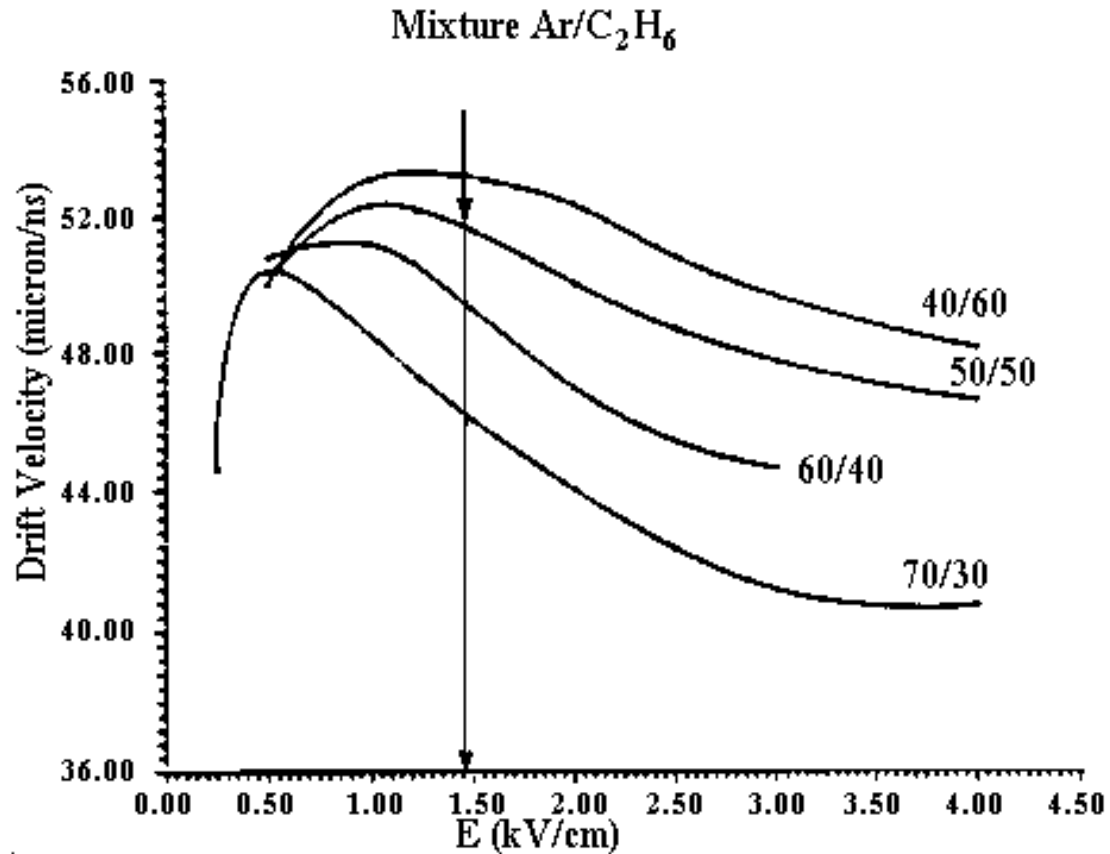
VDC position resolution = time resolution x drift velocity

VDC Drift Velocity

Electron drift velocity in 50/50 Ar/Ethane gas is:

~ 48.5 $\mu\text{m/ns}$ @ 3.3 kV

~ 48 $\mu\text{m/ns}$ @ 4.0 kV

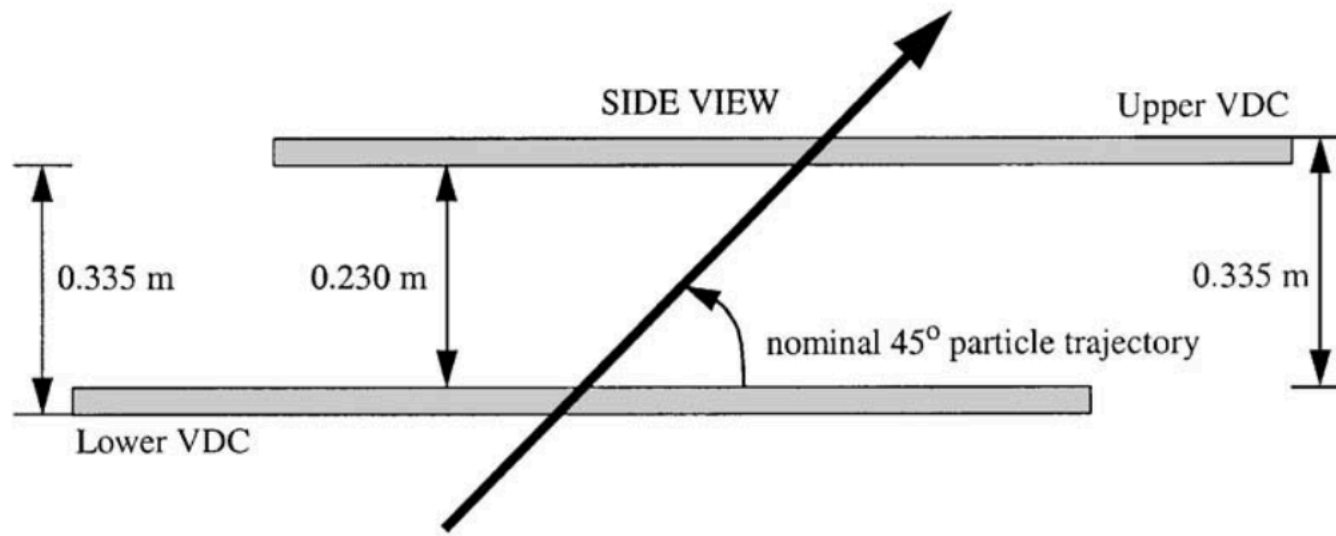


- Drift velocity from database:
49710 m/s = 49.7 um/ns for V1

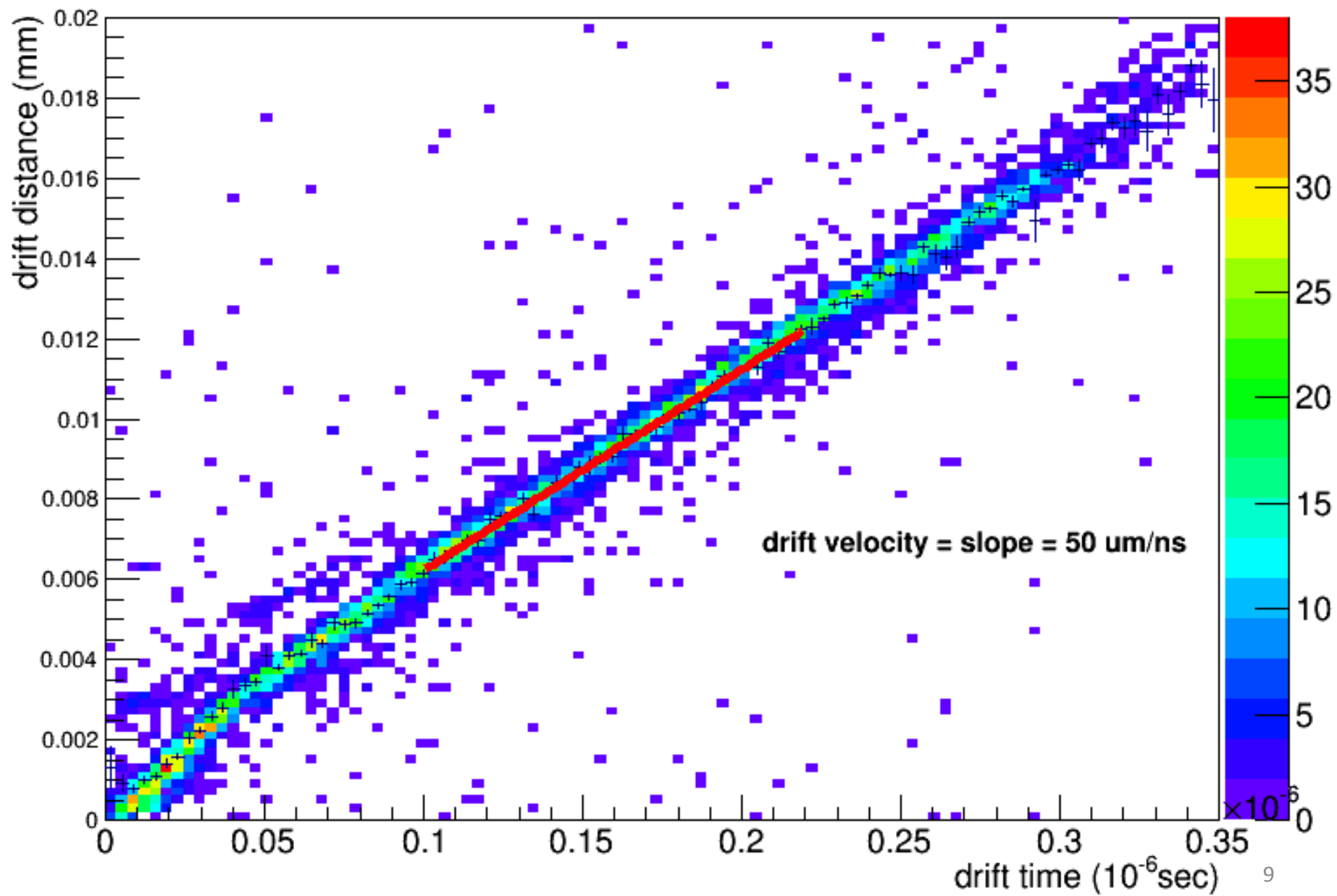
- Drift velocity from data:
Velocity = drift distance / drift time

~~L.vdc.v1.dist: drift time x velocity from database~~

L.vdc.v1.trdist: distance from wire to reconstructed track



L.vdc.v1.trdist:L.vdc.v1.time {Ndata.L.vdc.v1.time>=5&&L.tr.n==1&&L.vdc.v1.wire[2]==111}



VDC Position Resolution

- From NIM paper: $4.5\text{ns} \times 50\text{ um/ns} = 225\text{ um}$
- From this study: $6.5\text{ns} \times 50\text{ um/ns} = 325\text{ um}$

Ar run 756 w/ 0.075cm carbon foil

