

# TRIGGER-DEPENDENT VDC TIME OFFSET

---

Shujie Li  
with Florian, Hanjie, Ole

May 29<sup>th</sup>, 2018

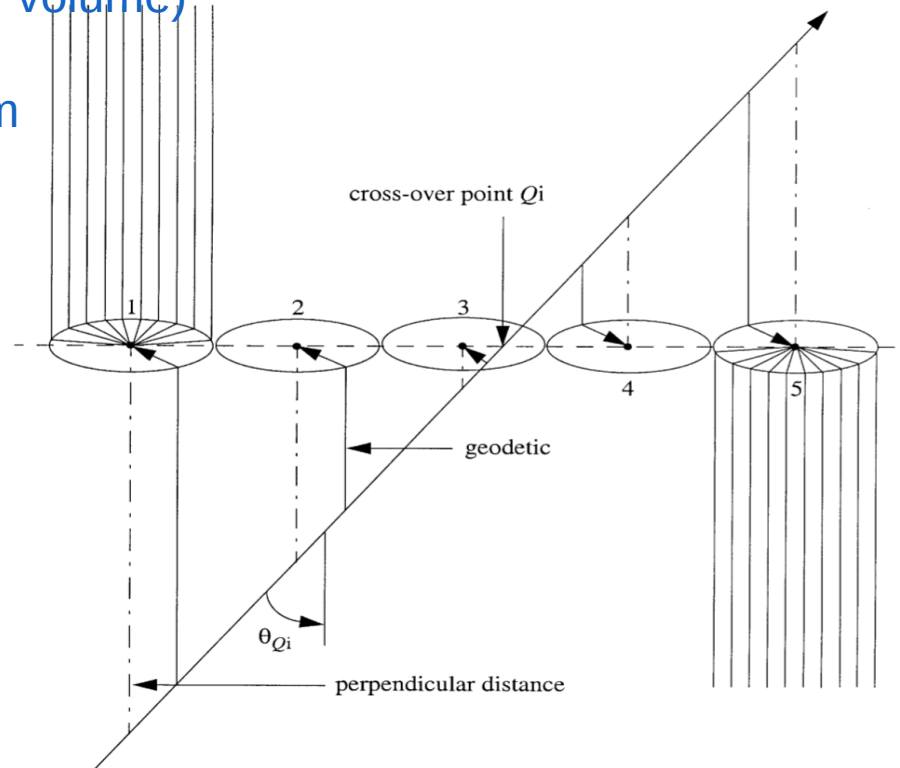
# Hall A VDC single plane

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

VDC gas: 50-50 Argon-Ethane (by volume)

VDC HV: -3.5 kV

VDC single plane thickness: 26mm



- 3 – 7 wires are fired
- TDC records hit time → subtract  $t_0$  to get drift time
- Convert drift time to drift distance (provided drift velocity)
- Fit drift distance to find intercepts

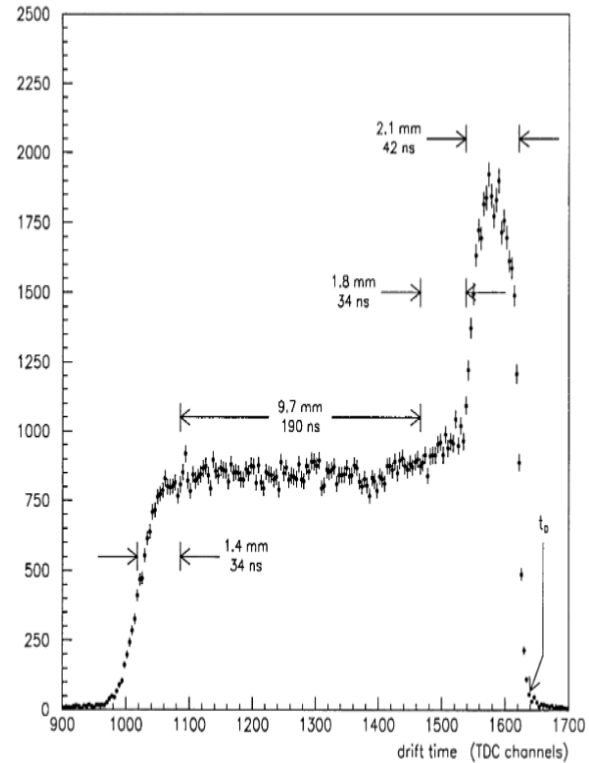
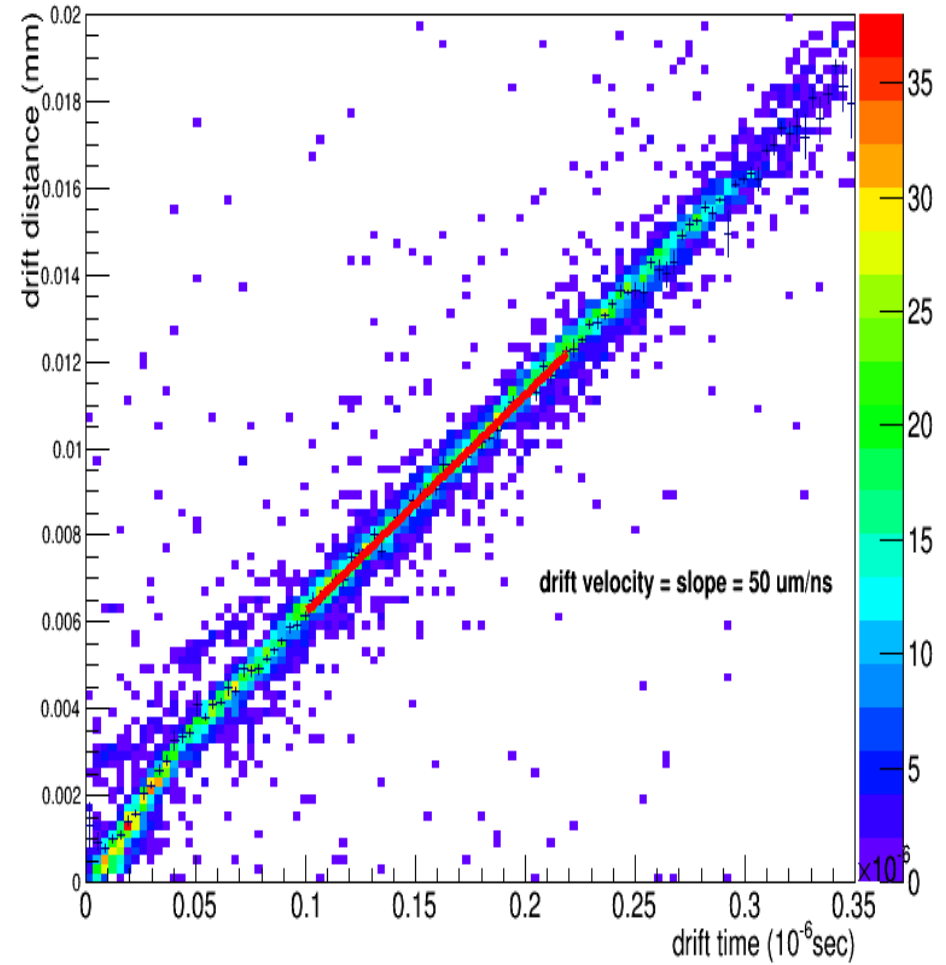


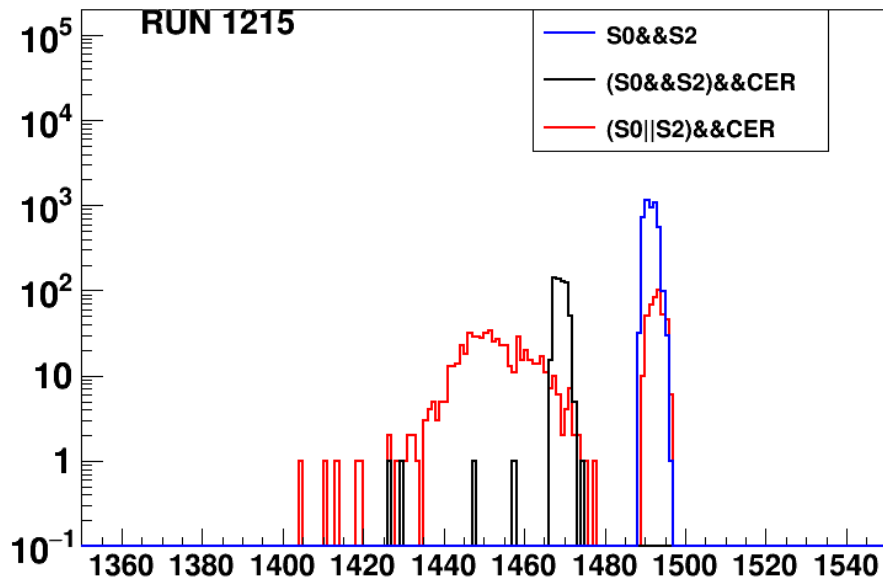
Fig. 17. A single-wire drift-time spectrum. The TDC is operated in common-stop mode, so that short drift times occur at large TDC values. A single time bin is 2.0 ns. The timing reference point  $t_0$  is located at channel 1640.



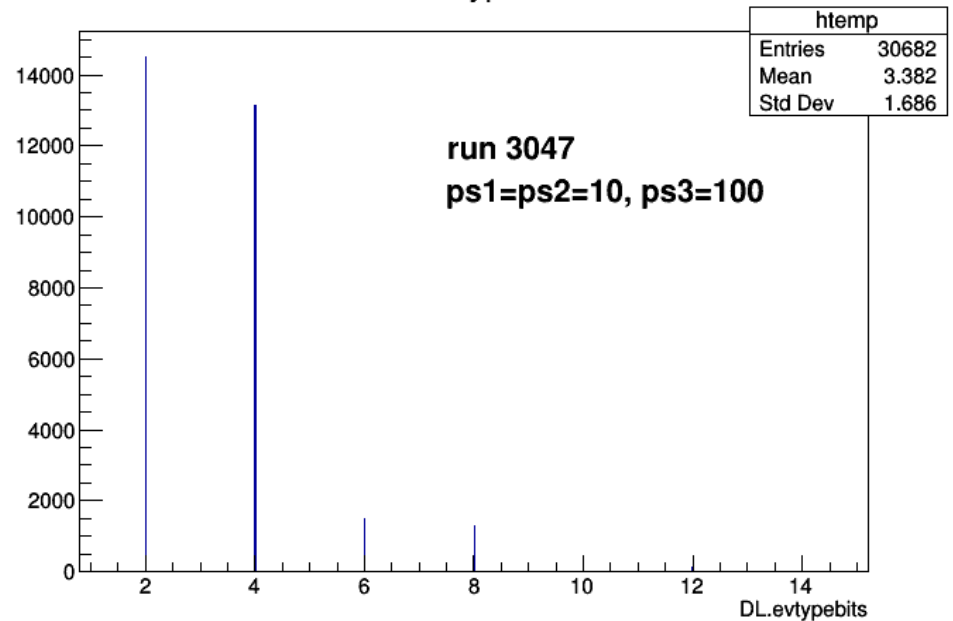
The  $t_0$  is fixed for a given wire. But the raw vdc time spectrum will have:

1.  $\pm 5$ ns jiggling due to the cable length to different s2 paddles
2. When triggers are prescaled, a time shift due to trigger type ( 10 ns b/w T1 and T2)

Raw TDC Spectrum of Triggers

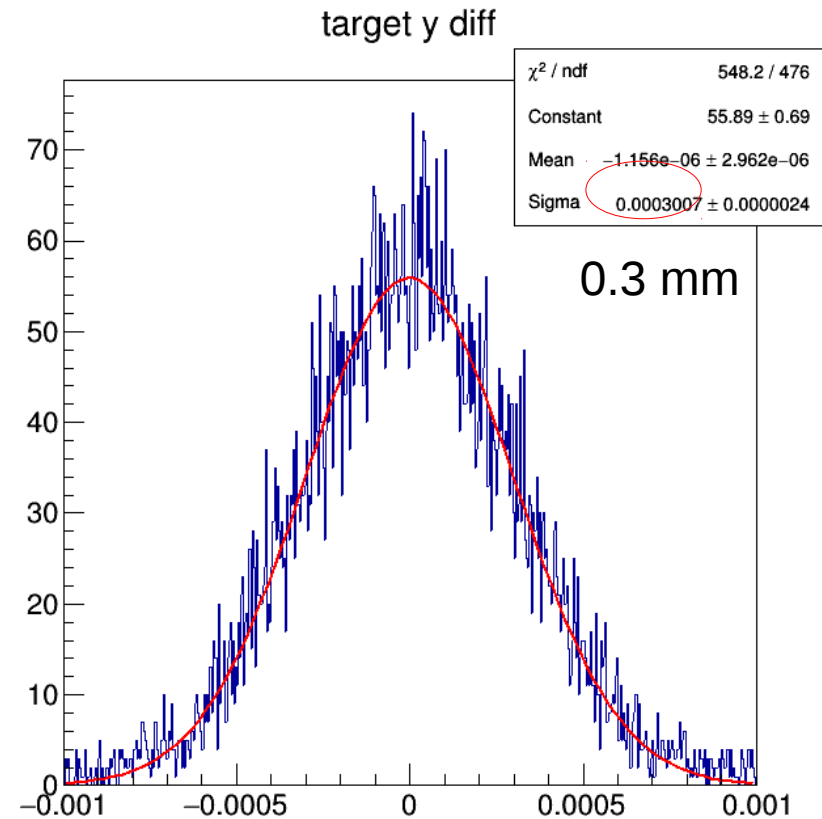
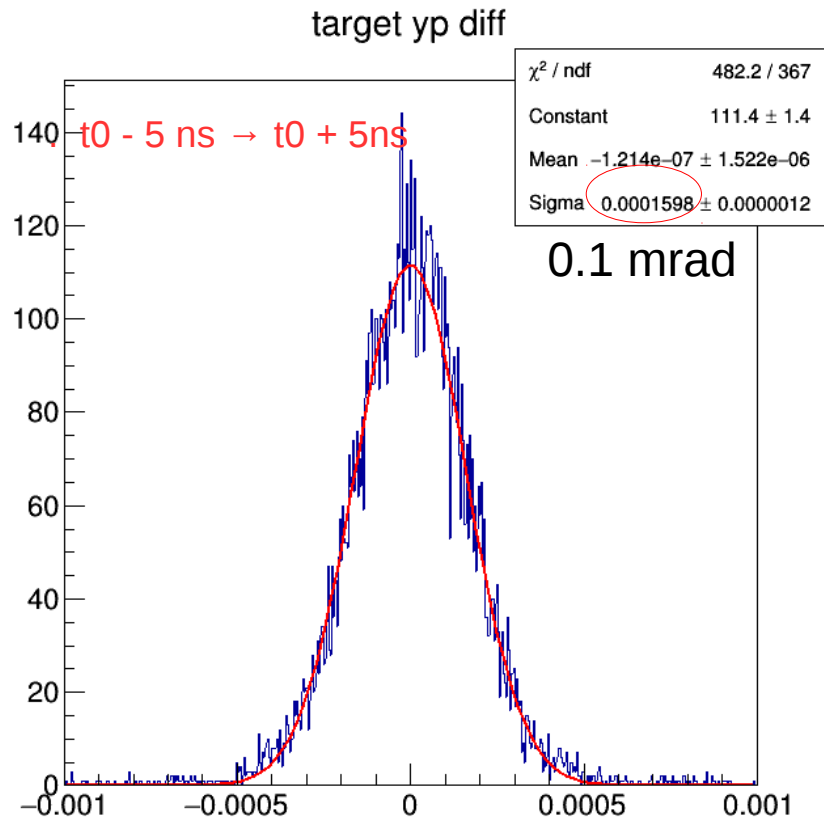


DL.evtypebits



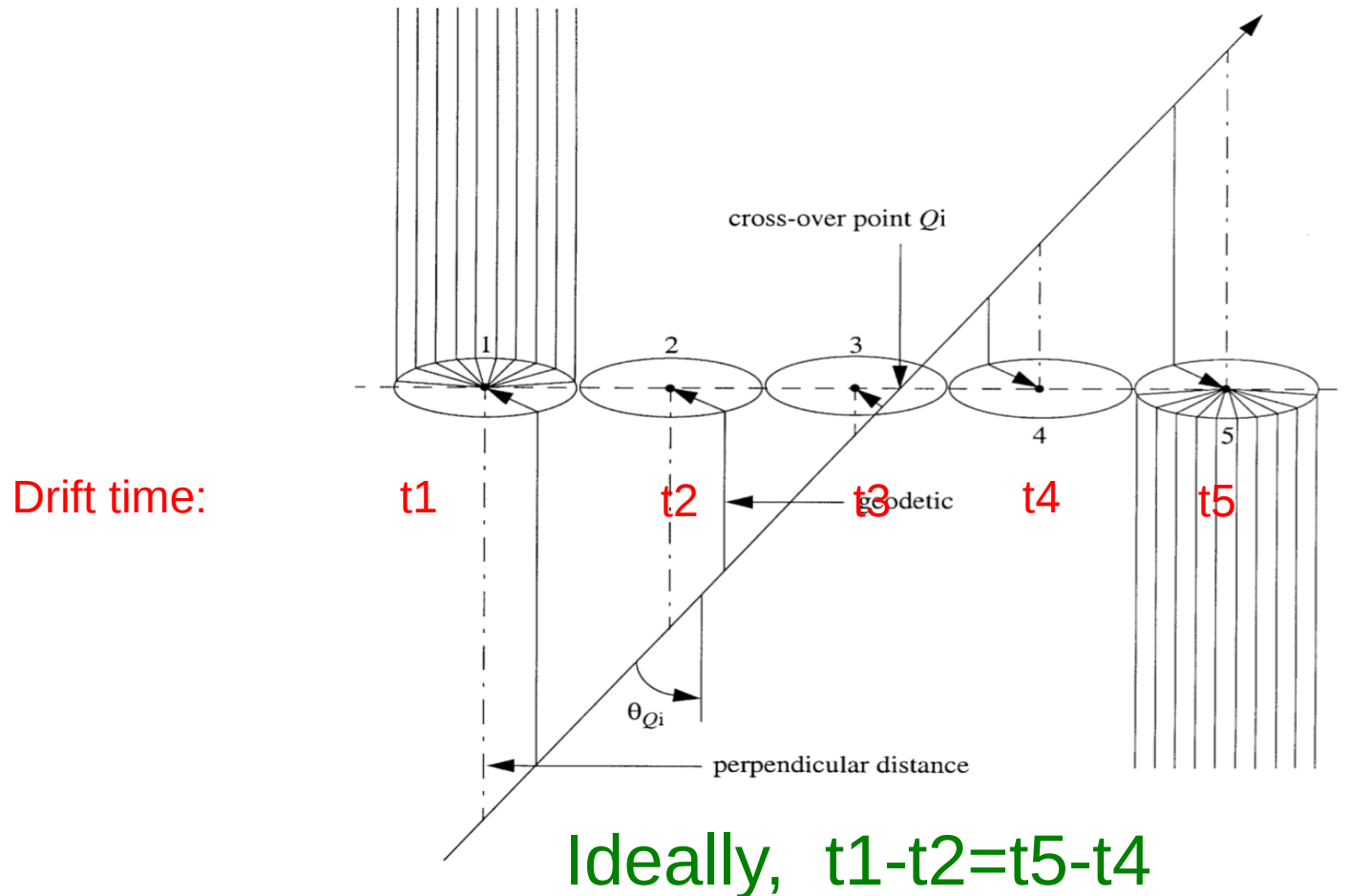
# Q: Will the trigger time change affect VDC tracking?

– No obvious change in reconstructed target variables



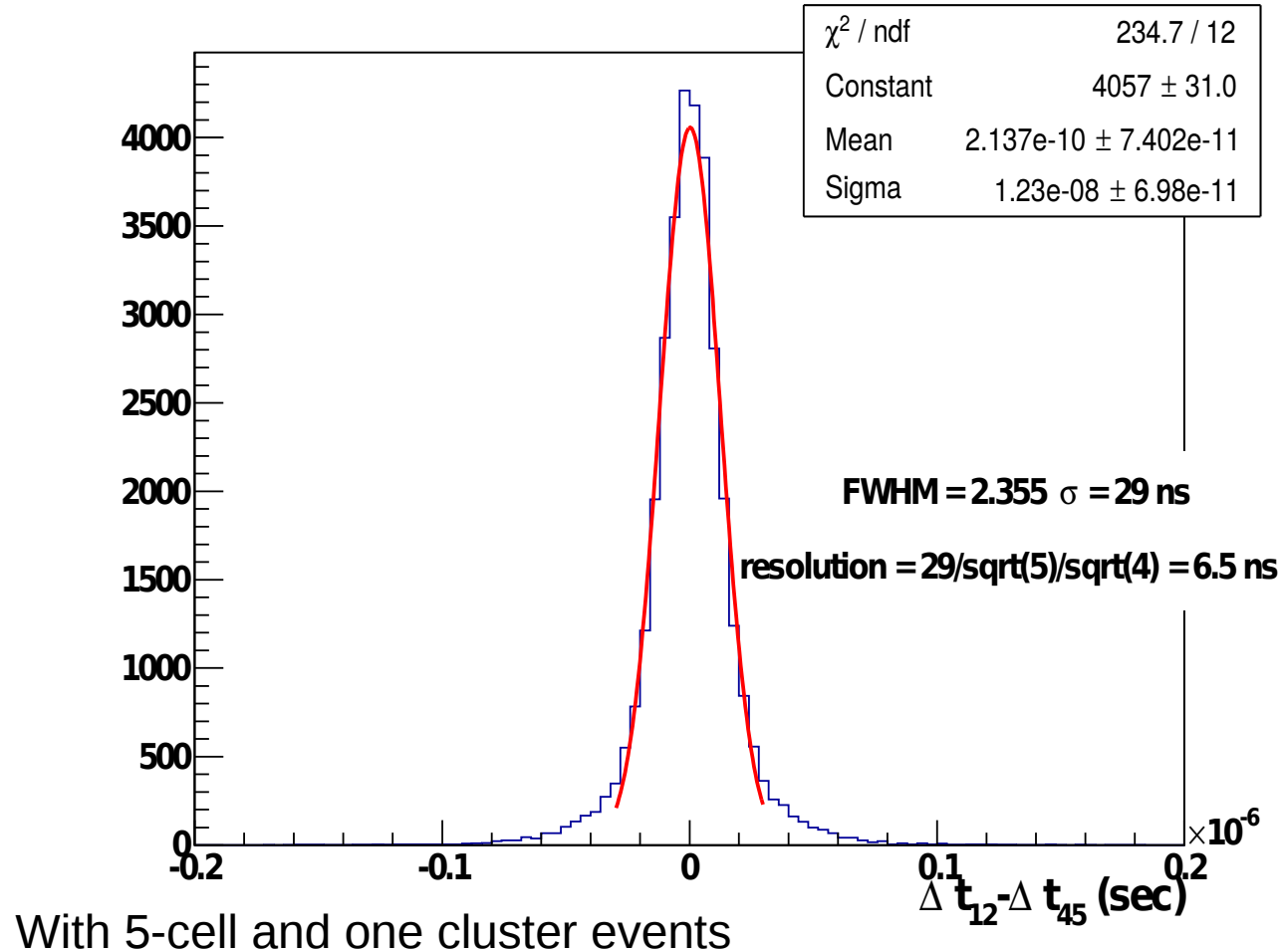
# Q: Will the trigger time change affect VDC tracking?

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



# Q: Will the trigger time change affect VDC tracking?

– 10 ns change is the same order as VDC time resolution



Just to be more careful... Work with ThaTriggerTime.h

$$\text{Drift time} = (\text{rawtime} - t_{\text{o}}) * \text{TDCresolution} - \text{triger\_shift}$$

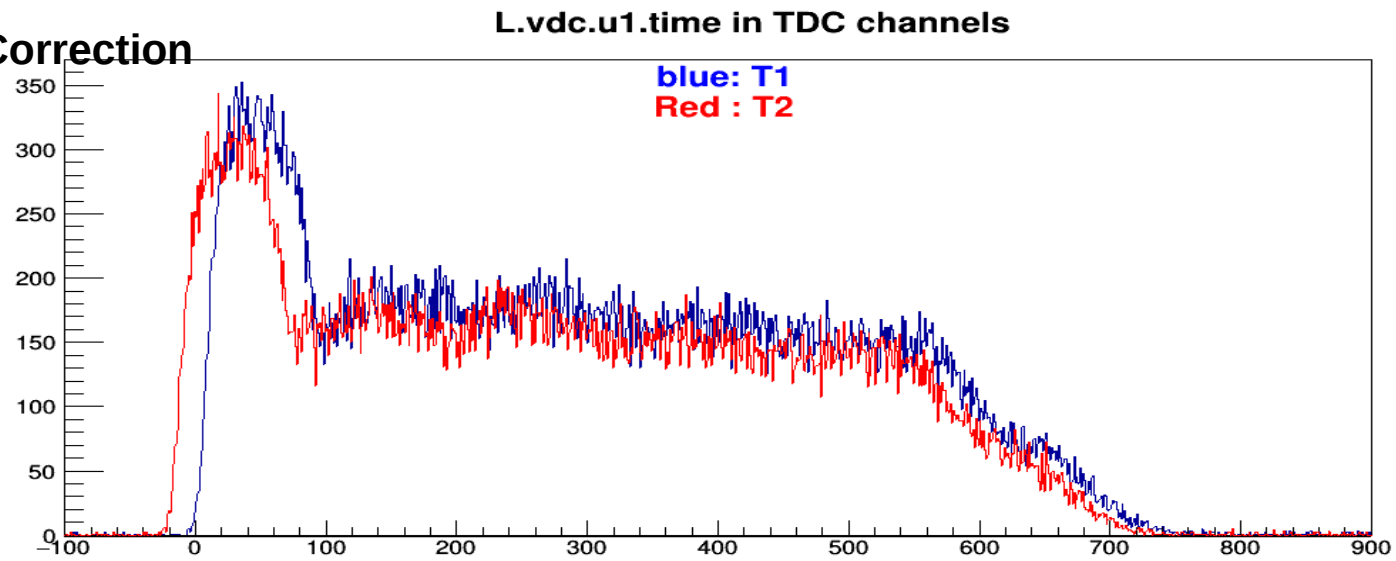
```
db_L.trg.dat:
# TDC resolution (s/channel)
L.trg.tdc_res = 0.5e9
L.trg.common_stop = 1

# Global offset (s), shared by all triggers (optional, zero if not given)
L.trg.glob_off = 0

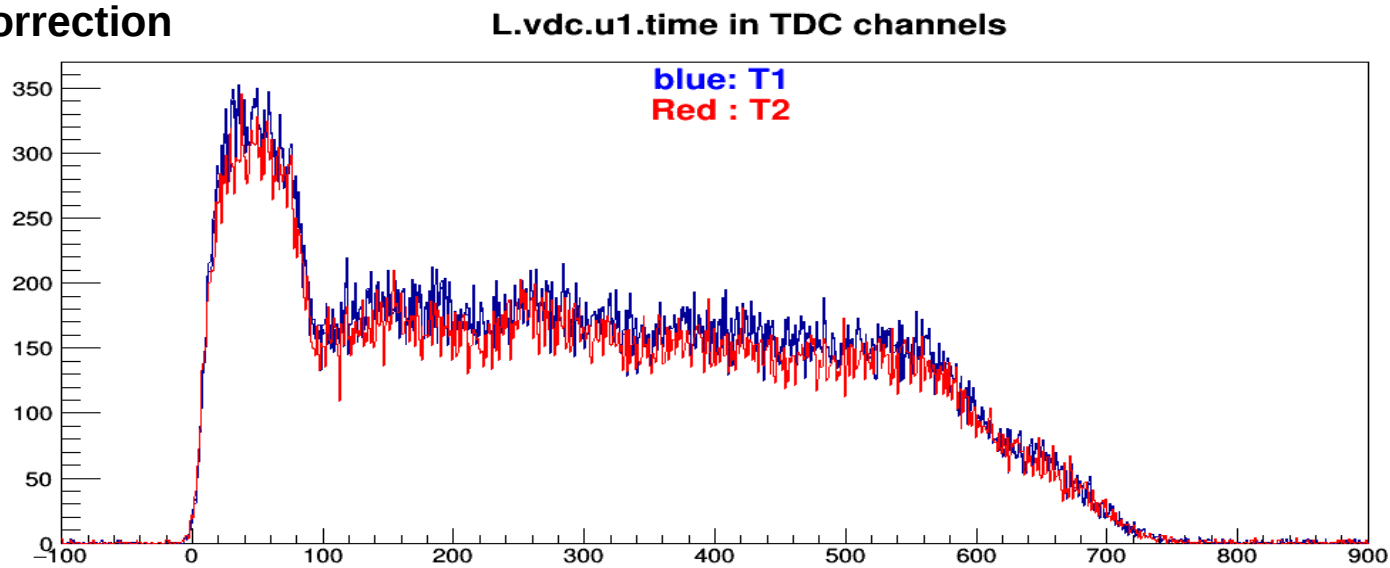
# 5-tuples of trigger numbers, time offsets, TDC channels.
# Trigger numbers not specified are assumed to have offsets of zero.
# trigger number, offset (s), crate, slot, chan
L.trg.trigdef =
  1  0e-9      5      16      0
  2 -10e-9     5      16      1
  3  0e-9      5      16      2
```



## Before Trigger Correction



## After Trigger Correction



TO DO:

1. Better tracking algorithm and event-by-event  $t_0$  offset?
2. how to deal with trigger 3 time jiggling?