

d_2^n BB Analysis

Matthew Posik¹

¹Temple University, Philadelphia, PA

1 **T2 Trigger**

2 **Missing Tracks**

T2 Trigger

- T2 trigger is formed between Shower and Čerenkov geometrical overlaps

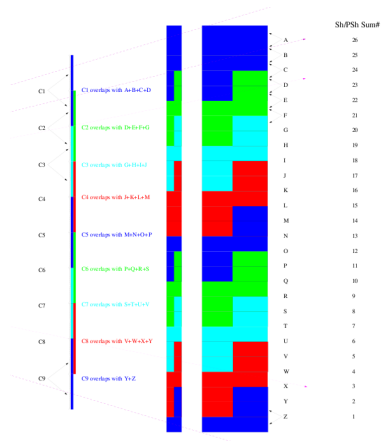


Figure 1: Geometrical Overlap for T2 trigger

T2 Trigger Cont.

- A hit in the TDC is the time difference between the trigger and hit going into the TDC
- For T2

$$dt = T_{hit} - T2$$

- But there is also some events with T2 and T6 with the T6 carrying the timing. For these we have:

$$dt = T_{hit} - T6$$

- To have the time difference be between the hit and T2

$$dt = T_{hit} - T6 - (T2 - T6) + const = T_{hit} - T6 - DBB.t2 + const$$

T2 Trigger Cont.

- T6 timed L1A could lead to a T2 walk in certain components vs the T6 timed L1A
- This is seen in the Big Bite TDCs

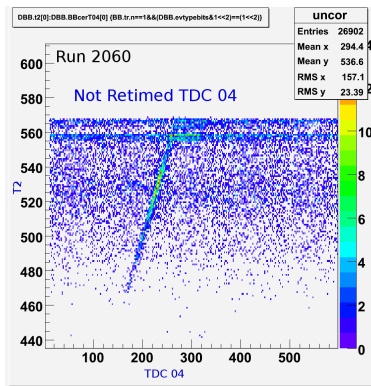


Figure 2: T2 trigger vs T6 Timed L1A for BB TDC 04

T2 Re-Timed TDC

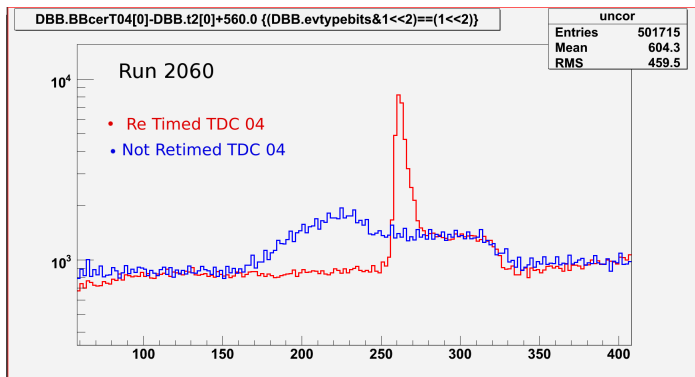


Figure 3: Blue T6 timed TDC 04. Red T2 re-timed TDC 04. Both from run 2060

Why the shoulder on the TDC?

T2 Re-Timed T2 vs TDC

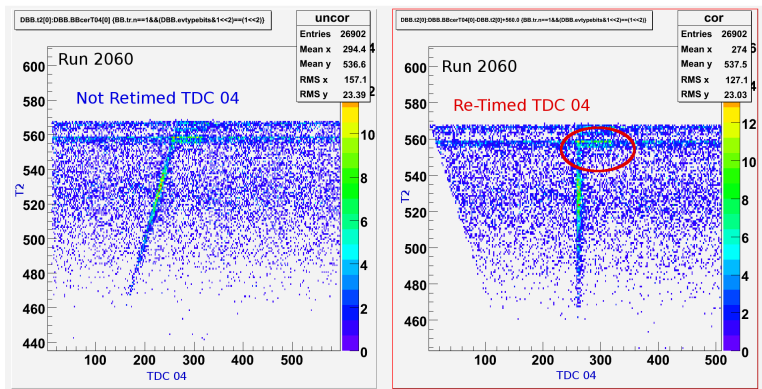


Figure 4: (Left) T6 timed TDC 04. (Right) T2 re-timed TDC 04 from run 2060

T2 Re-Timed TDC w/T2 Cuts

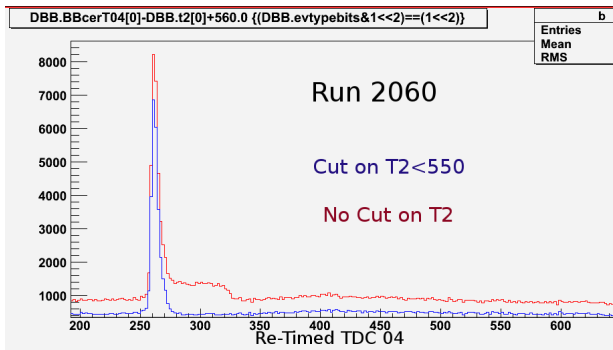


Figure 5: (Red) No T2 cut. (Blue) T2 cut

T1 vs TDC

- Maybe T1 is causing the shoulder?

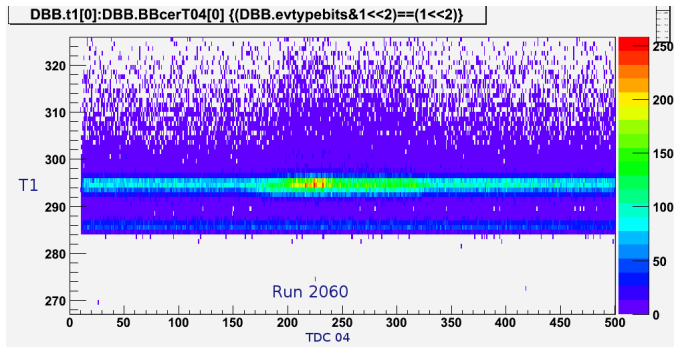


Figure 6: (left) T1 vs TDC 04. Both run 2060

T1,T6 vs T2

Not much from T1 vs TDC, look at T1,T6 vs T2...

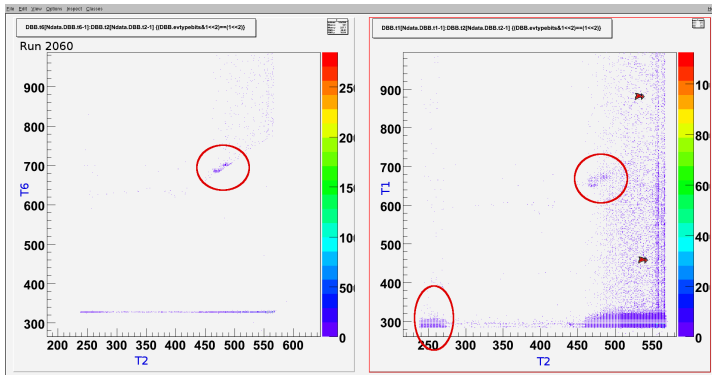


Figure 7: (left) T6 vs T2 (Right) T1 vs T2. Both run 2060

T2 Structure

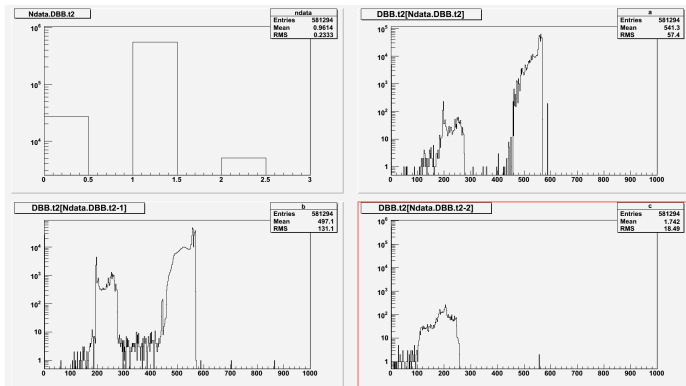


Figure 8: (Upper left) T2 hits, (upper right) T2[Ndata], (lower left) T2[Ndata-1], (lower right)[Ndata-2]

T2 Trigger

- Need more time to understand T2 structure
- Currently looking at the trigger diagrams to unravel T2 Structure

Missing Tracks

- When looking over my Čerenkov cuts from last week I noticed that the tracking cut through out a large number of events $\sim 95\%$
- looked at run 2060 4pass 3He run:
 - Replayed 581,294 events
 - Applied $BB.tr.n == 1$ cut and had 30,667 events left
 - Only $\sim 5\%$ one track events
- Had this problem before with 1pass H2 run.
- Thought it was fixed with updated Optics (more one track events)

Is it rate related?...

1-Pass H2 Tracks

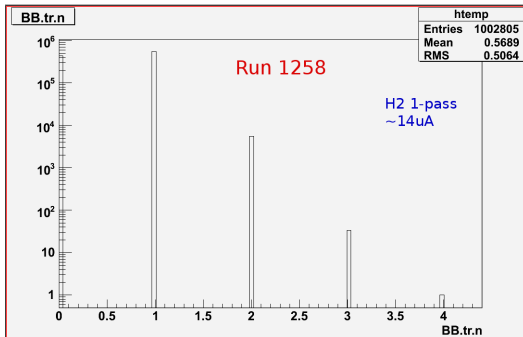


Figure 9: 1pass H2 Tracks from run 1258

5-Pass N2 Tracks ($\sim 5\mu A$)

Looked at runs of different Energy and Current...

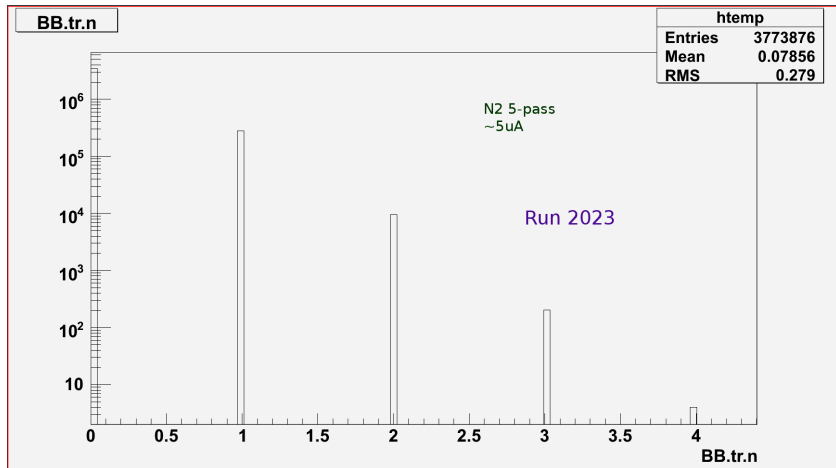


Figure 10: 5pass N2 Tracks from run 2023

4-Pass 3He Tracks ($\sim 14\mu\text{A}$)

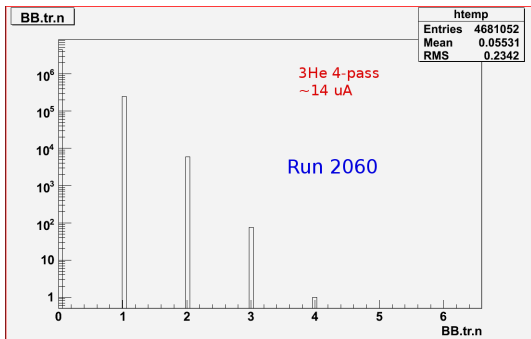


Figure 11: 4pass 3He Tracks from run 2060

Missing Tracks

- Does not appear to be rate related.
- Brad suggested checking the time-zeros (t_0) of the MWDCs
- t_0 offsets would change from transversity to d_2 because different trigger
- Began reading Seamus's thesis section of MWDC..

t_0 Offsets

- Each wire of each drift chamber is connected to a TDC whose read out is controlled by the BigBite trigger
- Read out time for wire i is

$$t_{TDC} = t_{drift} + t_{0,i}$$

- Where $t_{0,i}$ includes propagation time of signal to TDC, time electron takes to propagate to the trigger detectors and time it takes for trigger to occur and be sent
- d2 MWDC set up
 - 3 Drift chamber
 - 6 planes per chamber (18 total)
 - 3 orientations (2 planes same orientation separated by 0.5cm)
- Posted a talk by Xin discussing the MWDC on d2 Wiki:

https://hallaweb.jlab.org/wiki/images/6/6d/Xin_BB_mwdc.pdf

To-Do

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- Finish understanding T2 trigger structure
- Look into missing tracks
 - Find out how to check t_0 offset
- Get rough π rejection of Čerenkov using no tracking?