

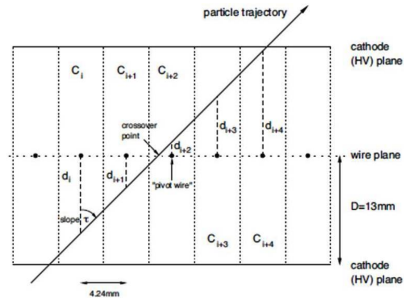
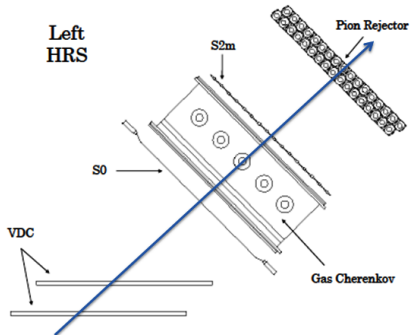
2nd Update on VDC studies

Vlassis Petousis

January 14, 2015

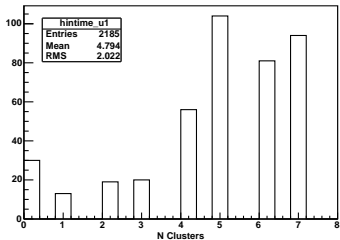
- L - VDC: a quick overview.
- The VDC's "V shape" clusters in time algorithm.
- "V shape " Linear Fitting.
- Finding the Centroid and the Angle.
- Event Display (single or multi cluster events)
- To Do List...

L - VDC overview

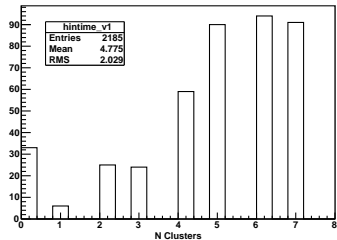


L - VDC overview

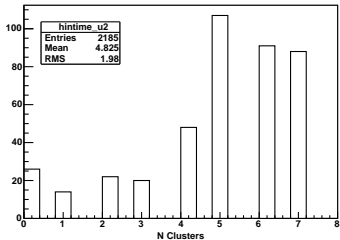
u1 - wires in 300 ns



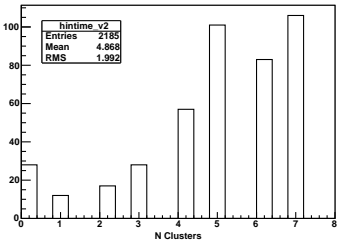
v1 - wires in 300 ns



u2 - wires in 300 ns

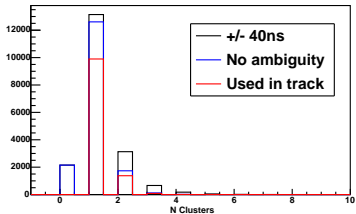


v2 - wires in 300 ns

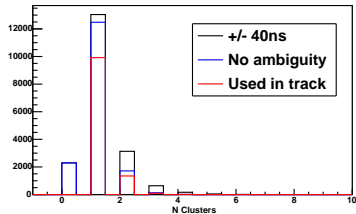


L - VDC overview

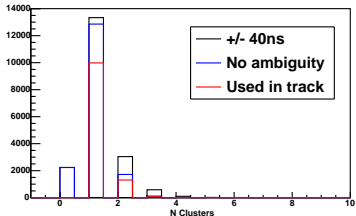
u1 - Clusters in 40 ns - apex_2080.dat.0



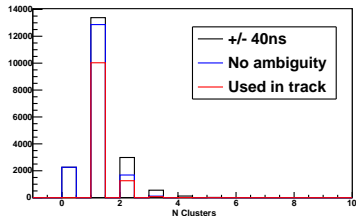
v1 - Clusters in 40 ns - apex_2080.dat.0



u2 - Clusters in 40 ns - apex_2080.dat.0

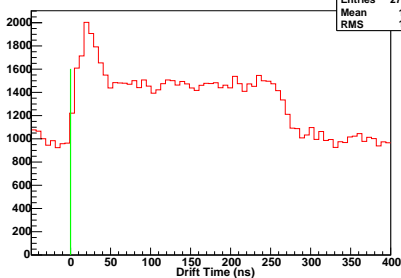


v2 - Clusters in 40 ns - apex_2080.dat.0

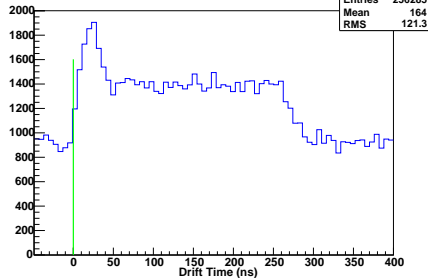


- The Drift Time Spectrum for the U1 and U2 plane.

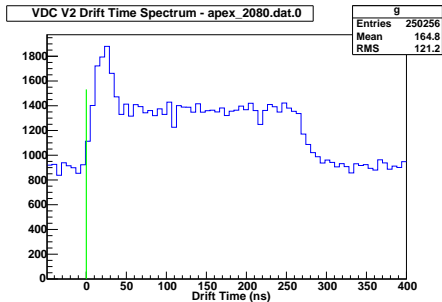
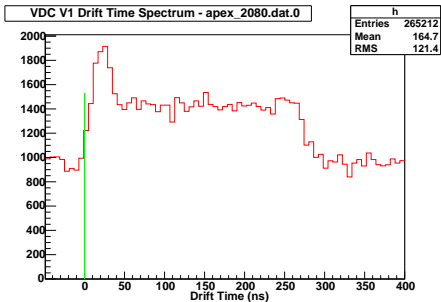
VDC U1 Drift Time Spectrum - apex_2080.dat.0



VDC U2 Drift Time Spectrum - apex_2080.dat.0

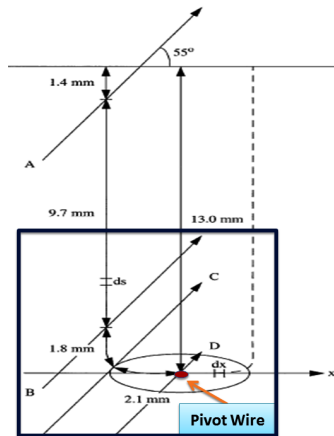
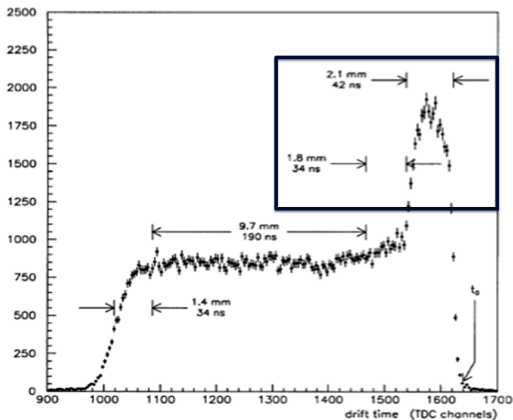


- The Drift Time Spectrum for the V1 and V2 plane.



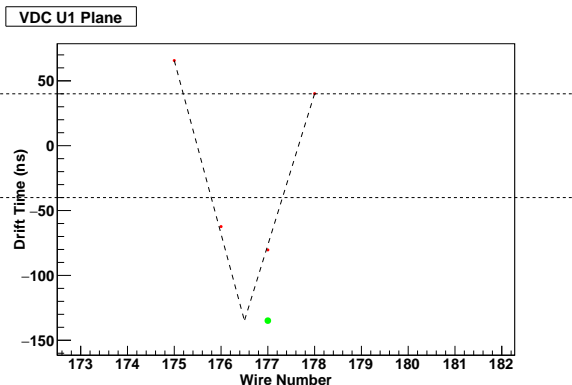
The VDC's "V shape" clusters in time algorithm

- Tracks enter nominally 45° producing signals in 3 to 7 wires.
- The drift time close to pivot wire and the next to it, varies between 42 ns and 76 ns respectively. [NIM A 474 (2001) 108-131]



The VDC's "V shape" clusters in time algorithm

- The existing Tracking Algorithm scan's for "V shape" clusters in time. Fired wires: $3 \leq \text{wires in cluster} \leq 7$
- " $L.vdc.u1.t0 * 1e9$ " (*pvertime*) : " $L.vdc.u1.clpivot$ " (*pvwire*)



"V shape" Linear Fitting

- I modified and developed several macros which they depict and fit the "V shapes" for both planes U1-U2 and V1-V2.

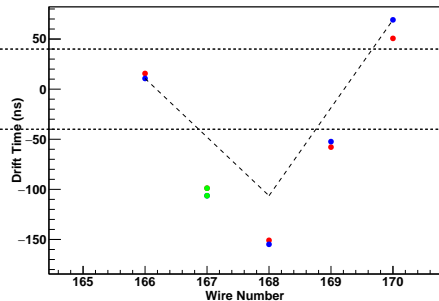
```
*****
*
*           W E L C O M E to the           *
*       H A L L A  C++  A N A L Y Z E R     *
*
*           Release      1.5.25           Dec  5 2014 *
* Based on ROOT 5.34/19           Jul  9 2014 *
*
*           For information visit           *
*           http://hallweb.jlab.org/root/   *
*
*****
```

```
CINT/ROOT C/C++ Interpreter version 5.18.00, July 2, 2010
Type ? for help. Commands must be C++ statements.
Enclose multiple statements between { }.
analyzer [0] .L uplanes.C
analyzer [1] data()
*****
Please set the number of Entries (integer value): 100
           Number of Entries: 100
           The VDC Planes which will be created are U1 and U2
           Please run: uplanes()
*****
analyzer [2] uplanes()
wire = 219 -> 223, time = 259.650024 -> 177.650024
wire = 224 -> 228, time = 216.150024 -> 219.150024
```

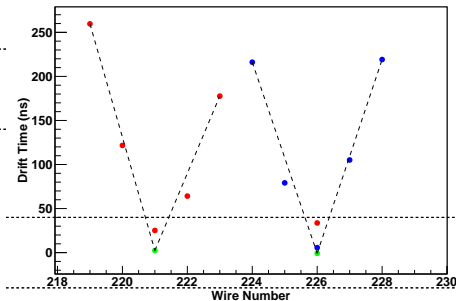
"V shape" Linear Fitting

- The code finds, depicts and makes a linear fit of the "V shapes".

VDC U1(RED)-U2(BLUE) Planes



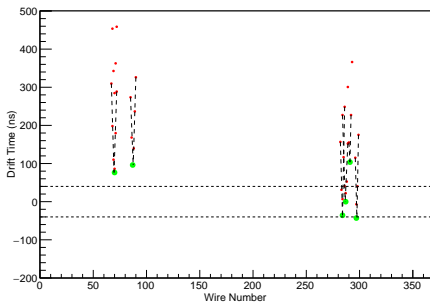
VDC U1(RED)-U2(BLUE) Planes



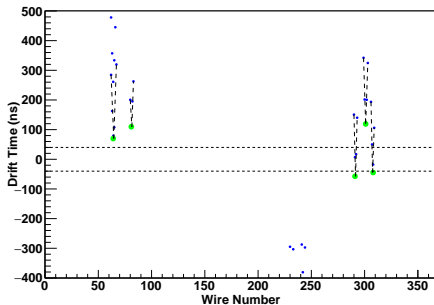
"V shape" Linear Fitting

- The code finds, depicts and makes a linear fit of the "V shapes" even they are very close together.

VDC U1 Plane

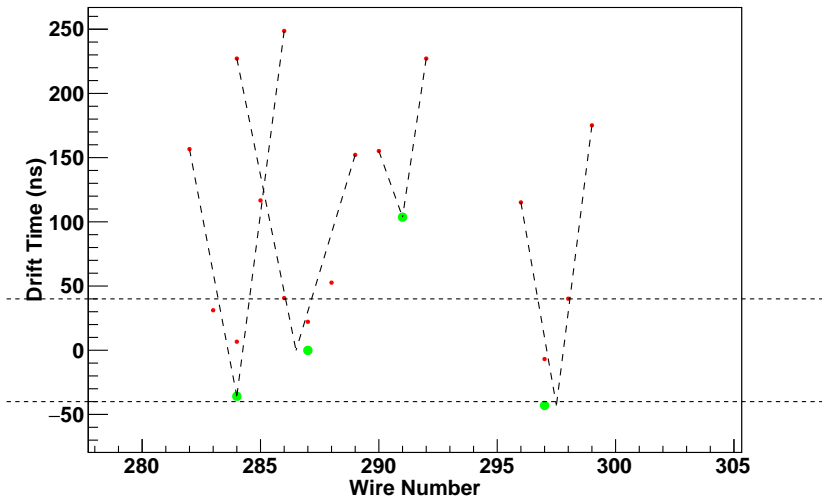


VDC U2 Plane



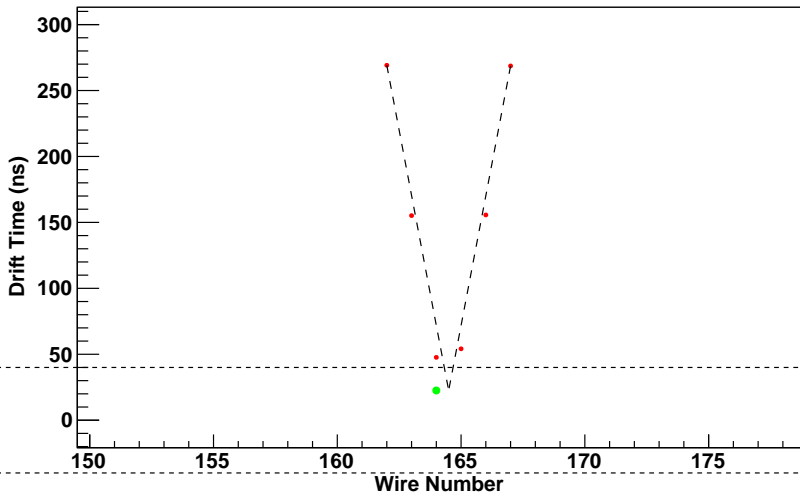
"V shape" Linear Fitting

VDC U1 Plane



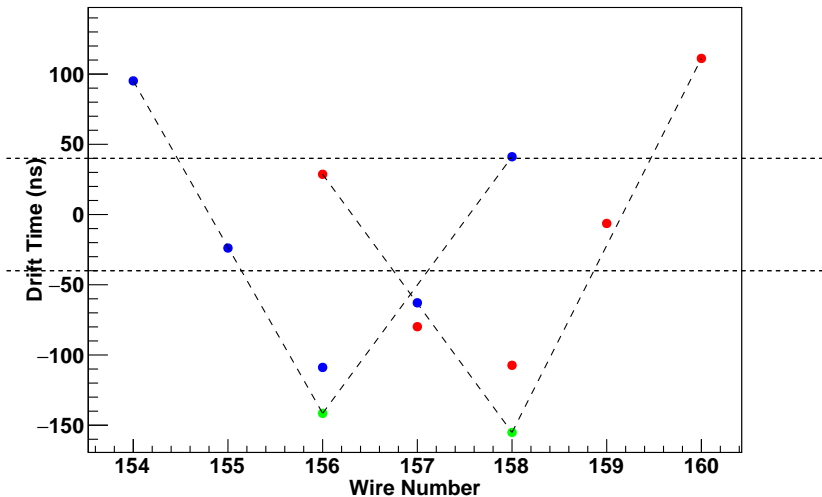
"V shape" Linear Fitting

VDC U1 Plane



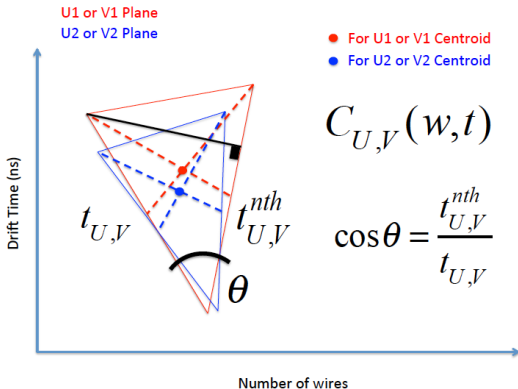
"V shape" Linear Fitting

VDC U1(RED)-U2(BLUE) Planes



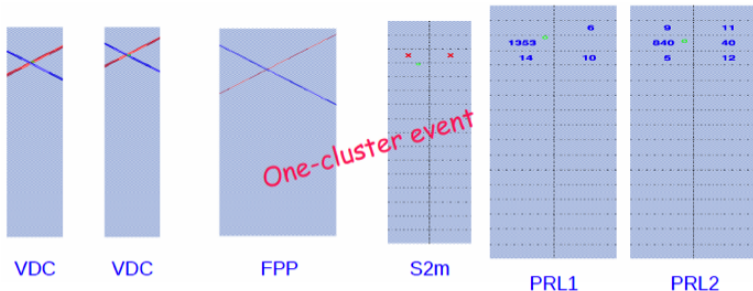
Finding the Centroid and the Angle

- From the centroid's "C" position and the angle θ , we will be able to detect changes (or not) among same planes.
- It will help us to configure more concretely (in addition to the the total drift time and using specific cuts also) each track in each plane.



Event Display - One Cluster Event

- It will be very useful to use an Event Display (especially for multi cluster events) and its correlation with S0 and S2m (the picture has been taken from Longwu Ou - HallA Collaboration Meeting 12/08/2014).



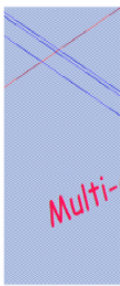
Event Display - Multi Cluster Events



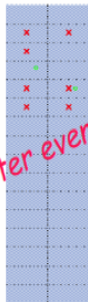
VDC



VDC



FPP

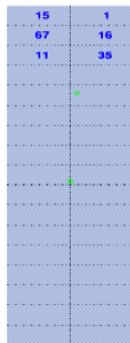


S2m

Multi-cluster event



PRL1



PRL2

- To improve the accuracy of the Linear Fitting on "V shapes".
- Calculation of the Centroid's and Angle in each U-V plane.
- Event Display for VDC's in correlation with S0 and S2m detectors (Future Plan).

Other suggestions or ideas are more than welcome.

THANK YOU FOR YOUR ATTENTION