

CHAMBER TESTING

A. Bujak

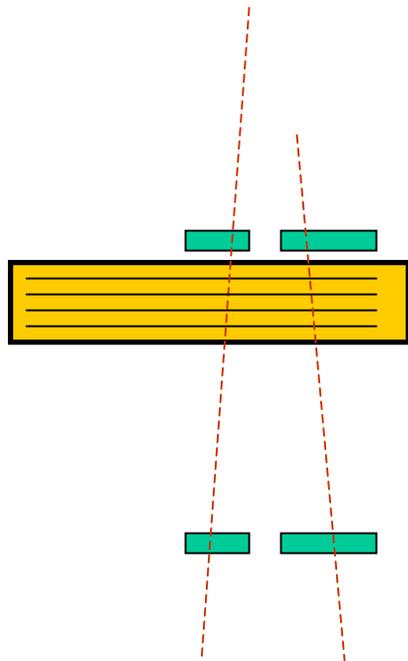
FNAL, August 10, 2002

Cosmic Test Setup

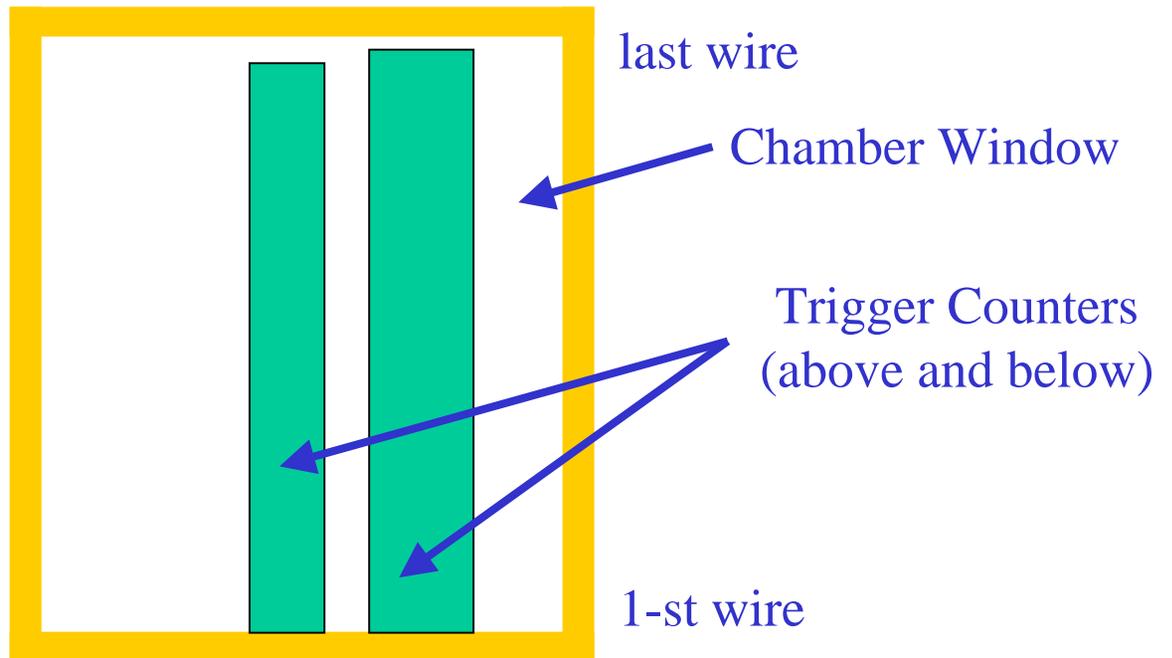


Trigger Counters

Side View



Top View

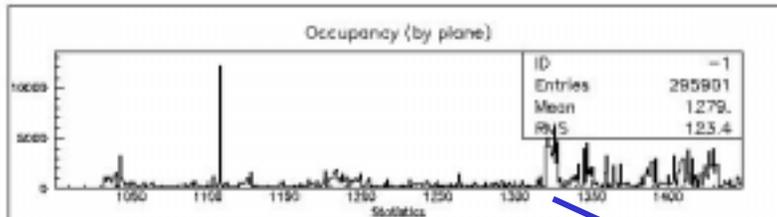


Chamber No.1 Before Ground Fix

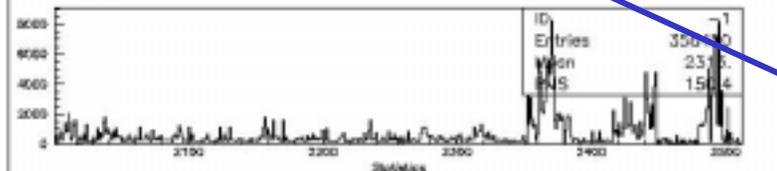
(Cosmic Trigger, HV=1900V, Threshold = max =5V)

Number of Hits per Wire

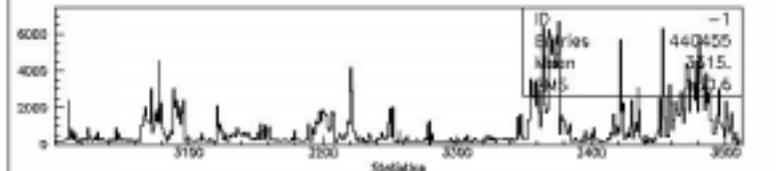
Pl.1



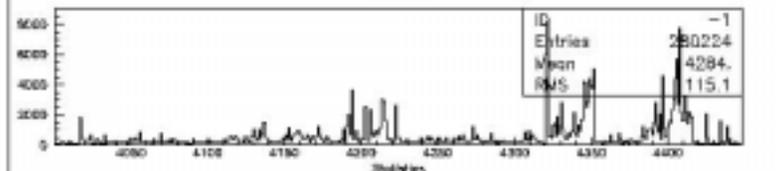
Pl.2



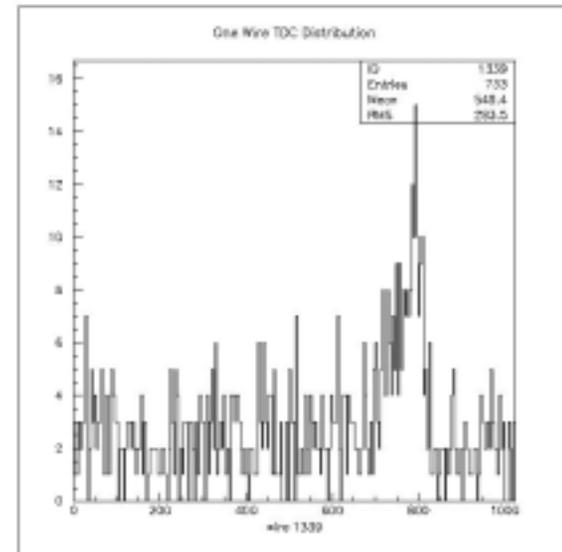
Pl.3



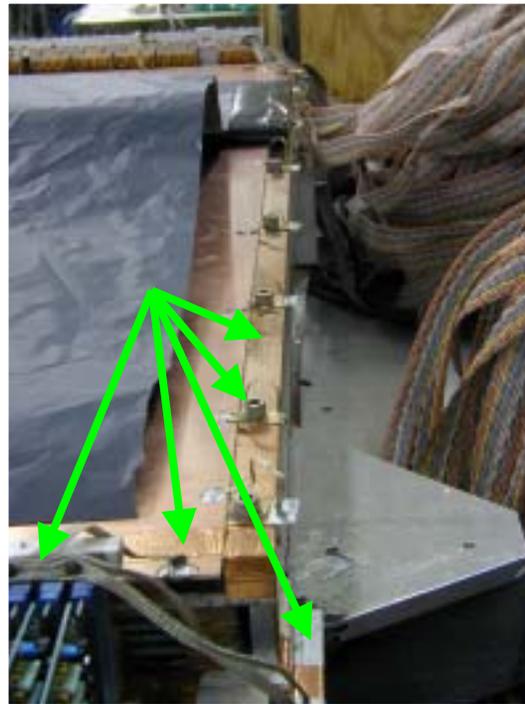
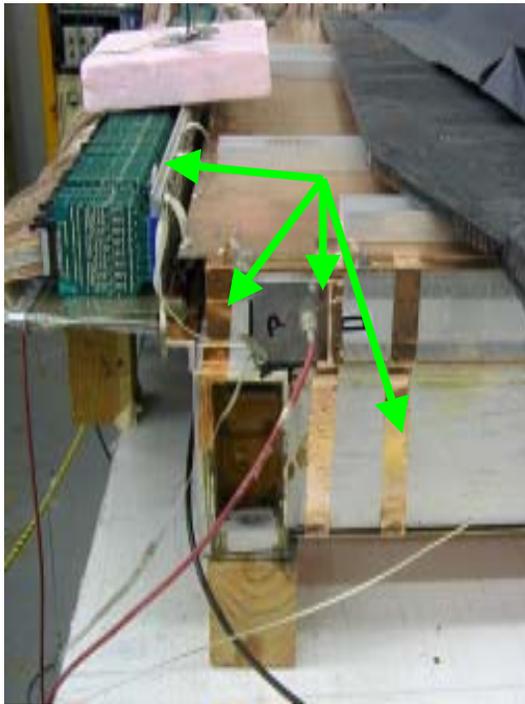
Pl.4



Single Wire TDC Distribution



Grounding

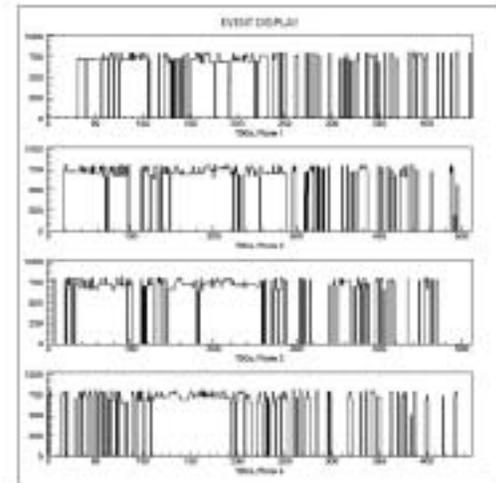
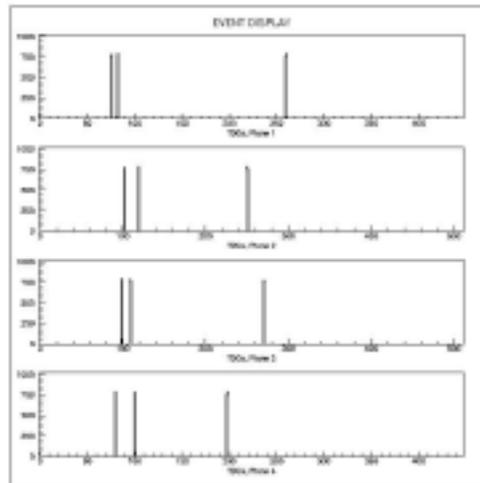
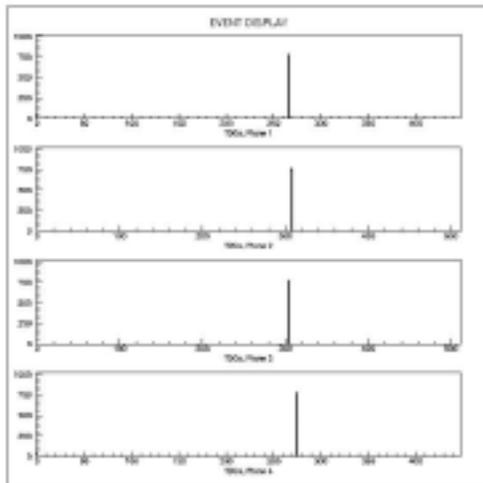


Event Examples

(on-line display)

Typical at HV < 1950V

Observed at
HV > 1950V



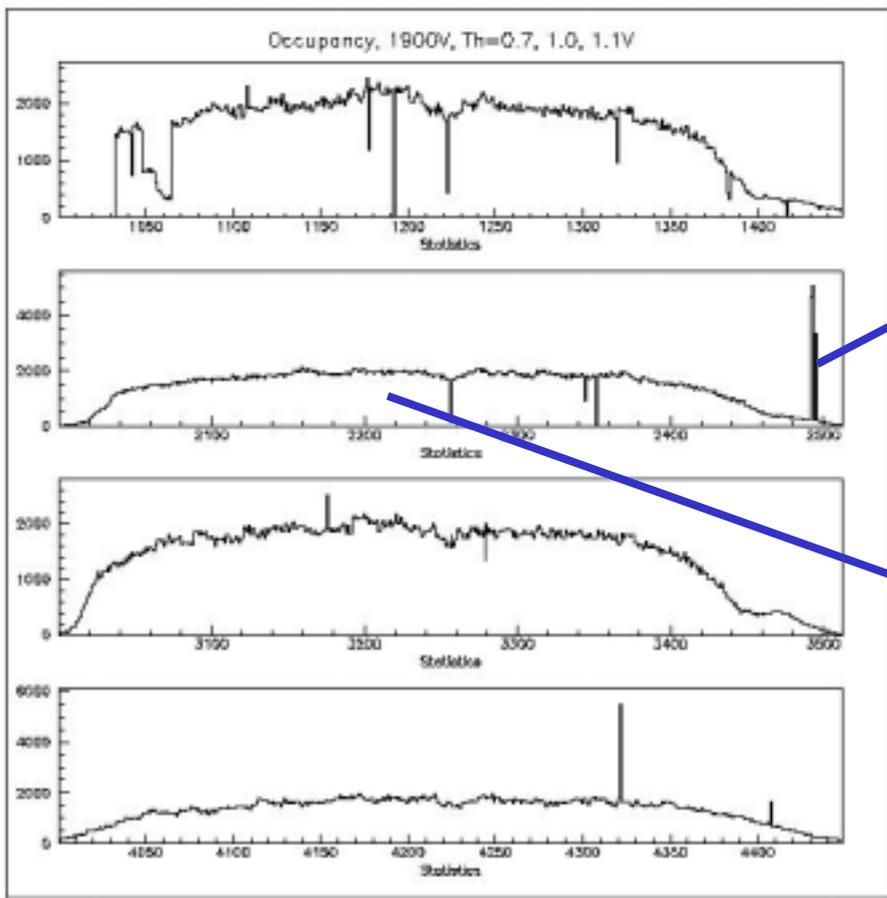
TDC Channel 
Wire Number 

Notice timing (cross-talk !)

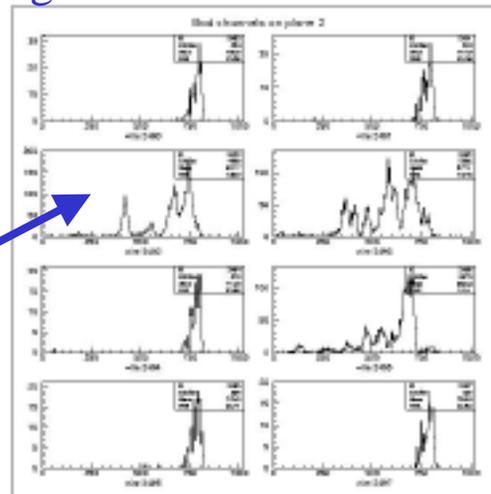
Chamber No.1 After Ground Fix

(Cosmic Trigger, HV=1900V, Threshold ~1V)

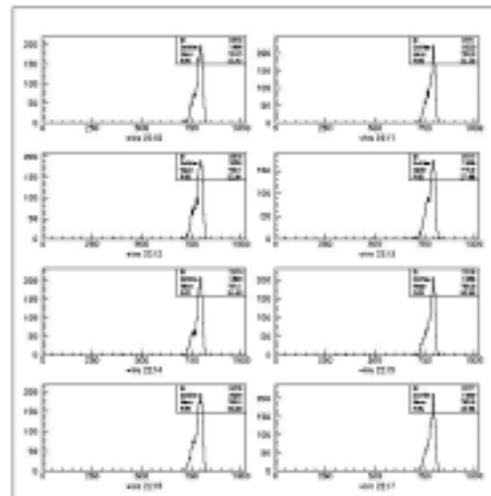
Number of Hits per Wire (Planes 1 – 4)



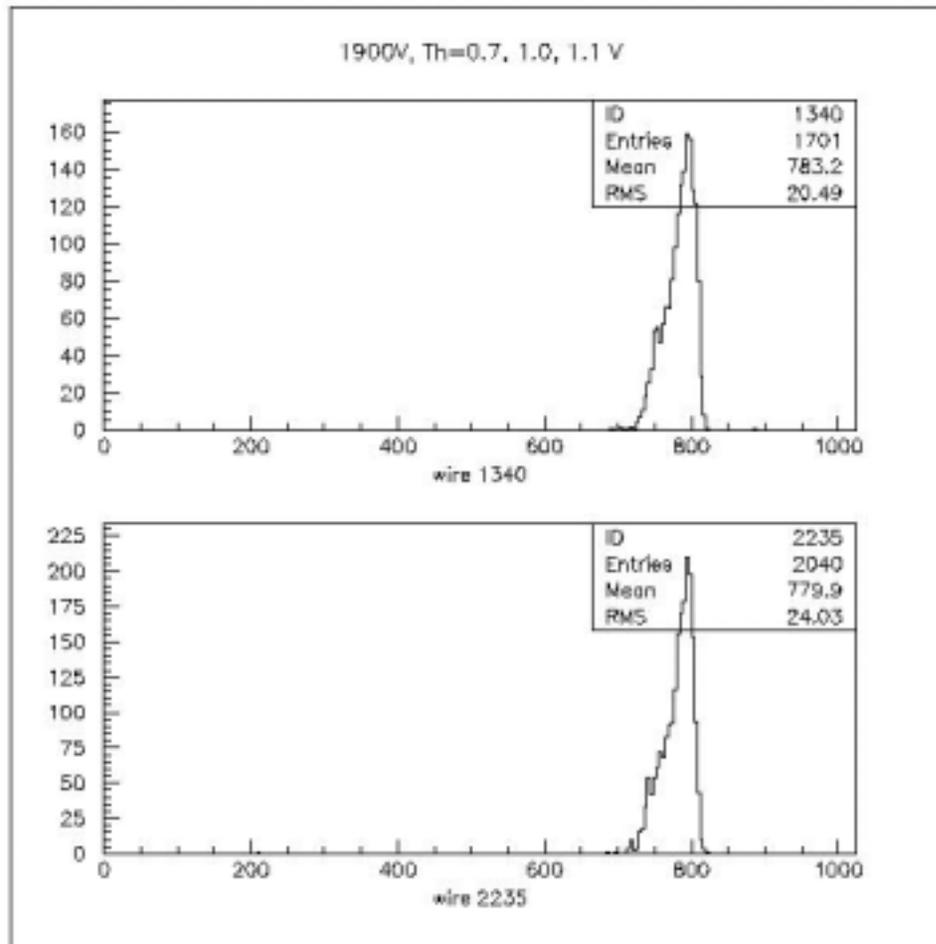
Single Wire TDC Distributions



Cross-talk
in
electronics



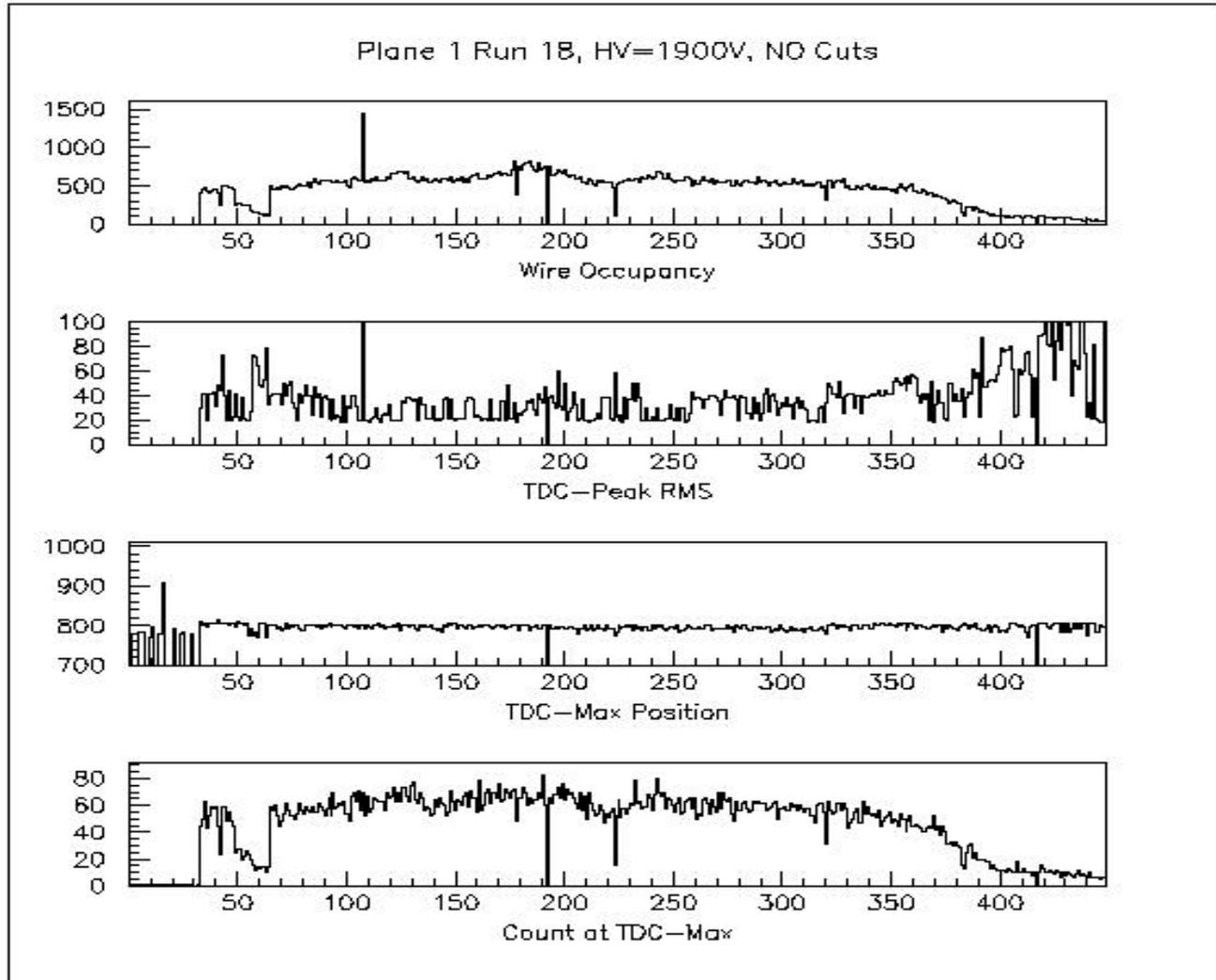
Typical TDC (Time) Distributions



1 channel => 0.5 ns

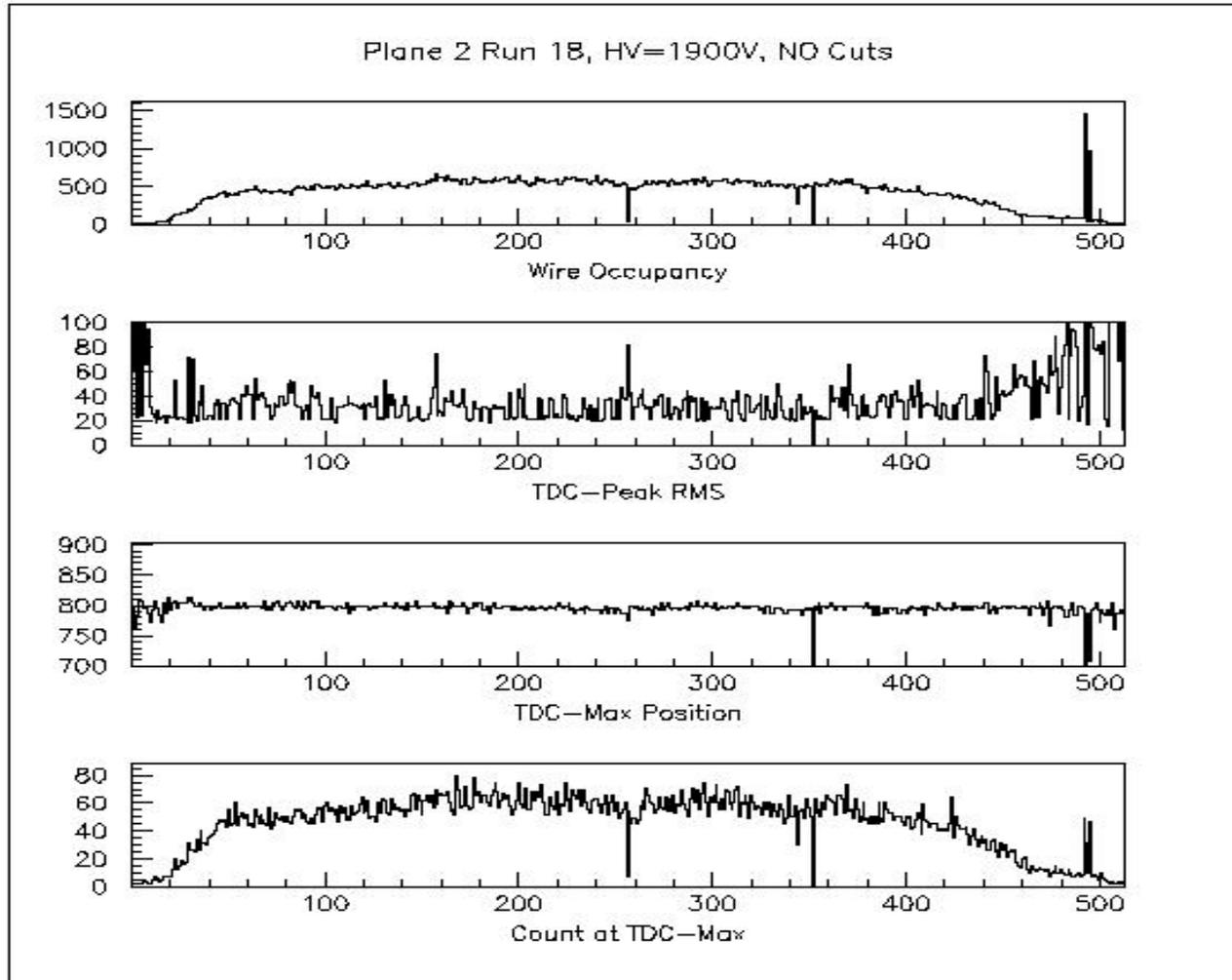
Summary - Plane 1

(Large Scintillators, HV=1900V, TH~1V, No Cuts)



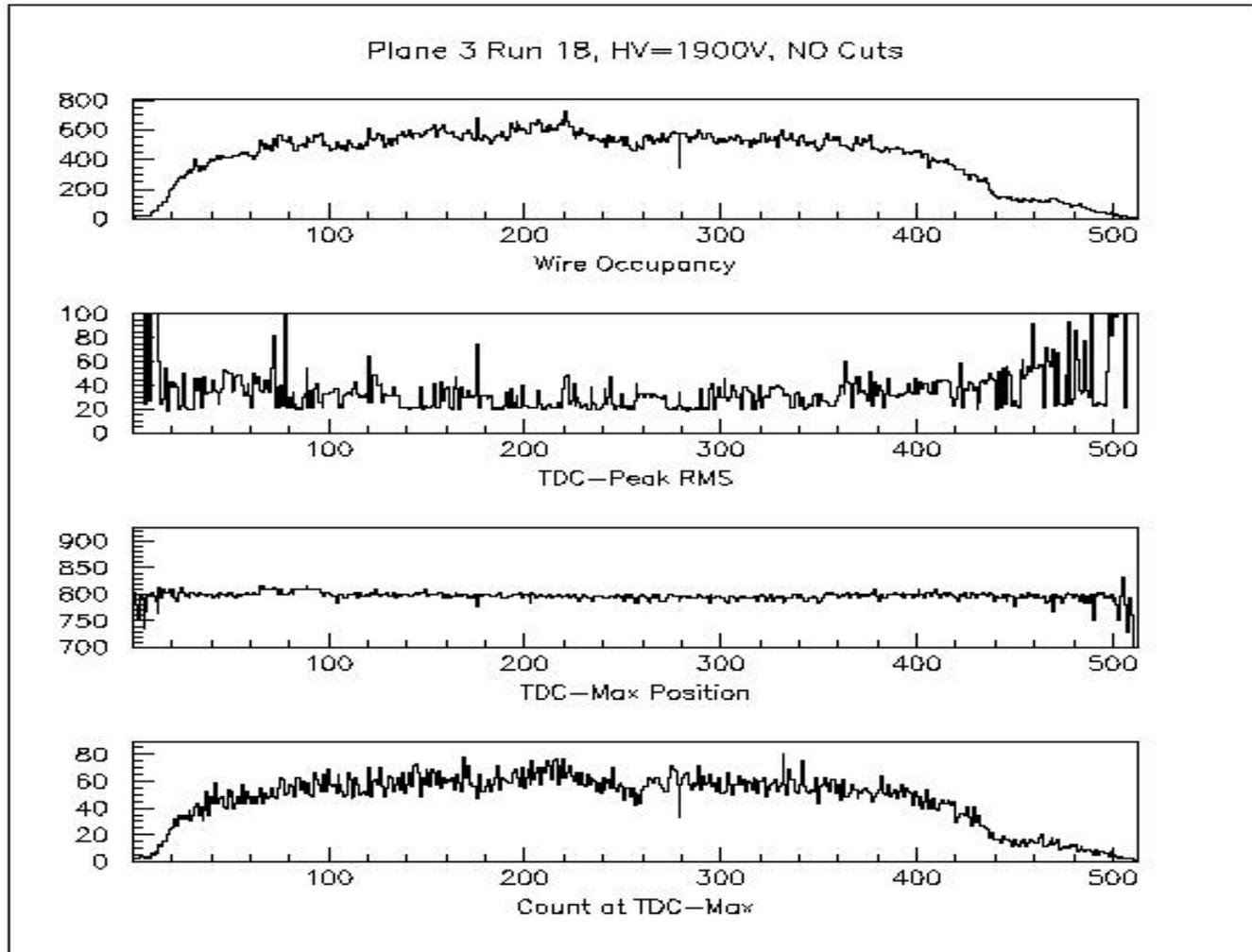
Summary - Plane 2

(Large Scintillators, HV=1900V, TH~1V, No Cuts)



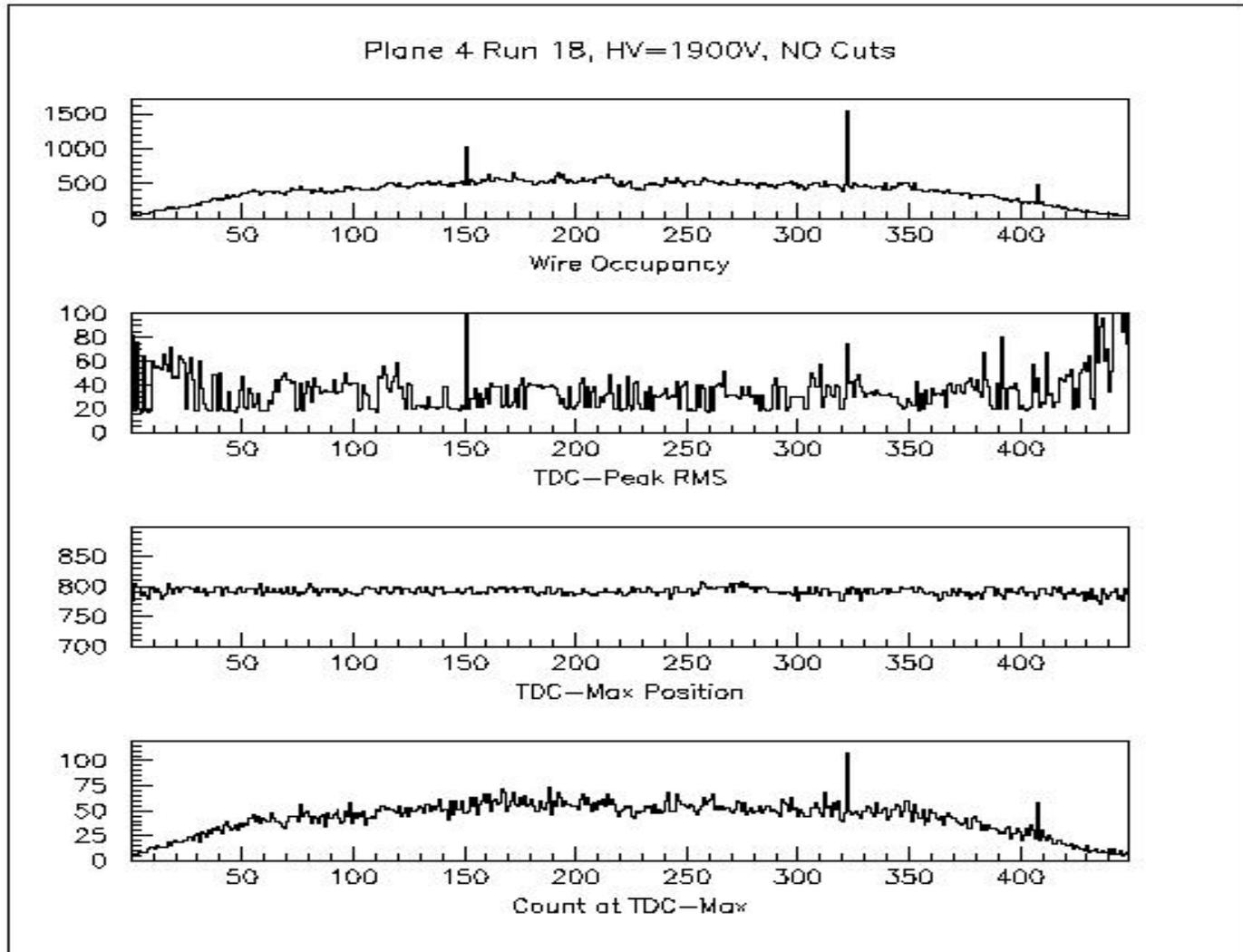
Summary - Plane 3

(Large Scintillators, HV=1900V, TH~1V, No Cuts)



Summary - Plane 4

(Large Scintillators, HV=1900V, TH~1V, No Cuts)



Simple Analysis

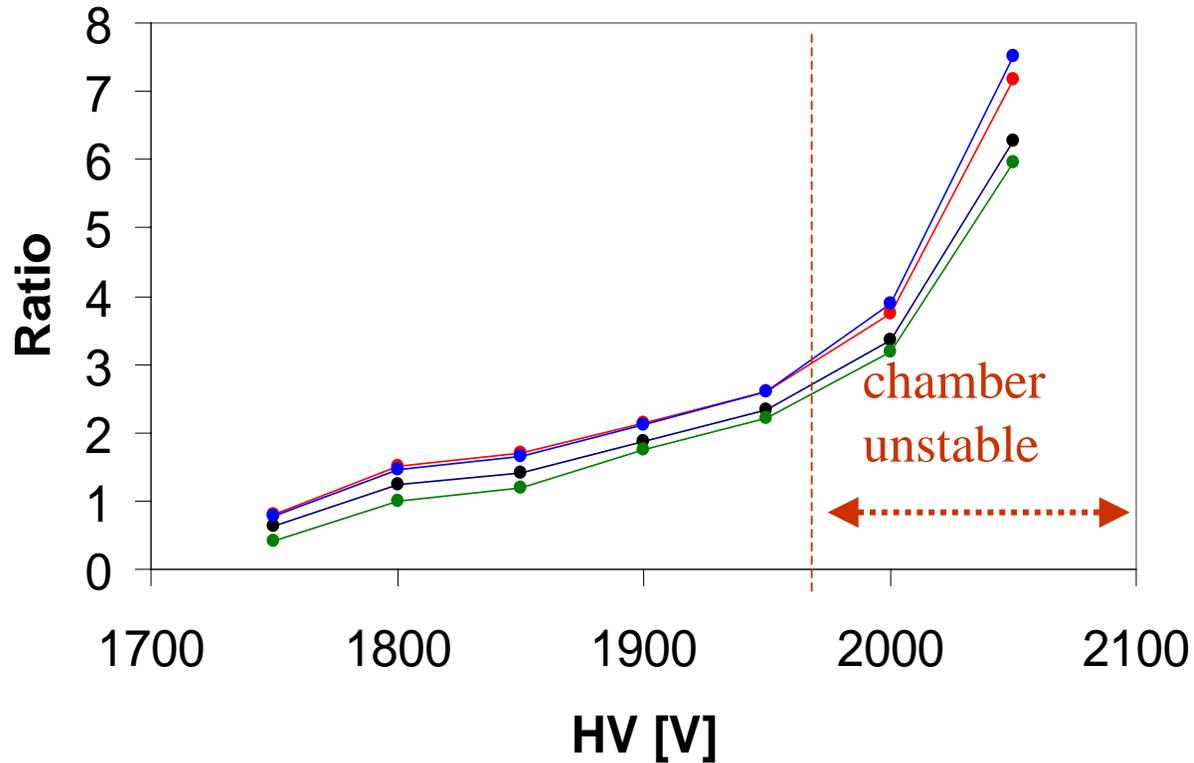
Definition

Single Track:

(1) Cosmic Trigger, and

(2) 0, 1 or 2 (neighboring) hits in each plane

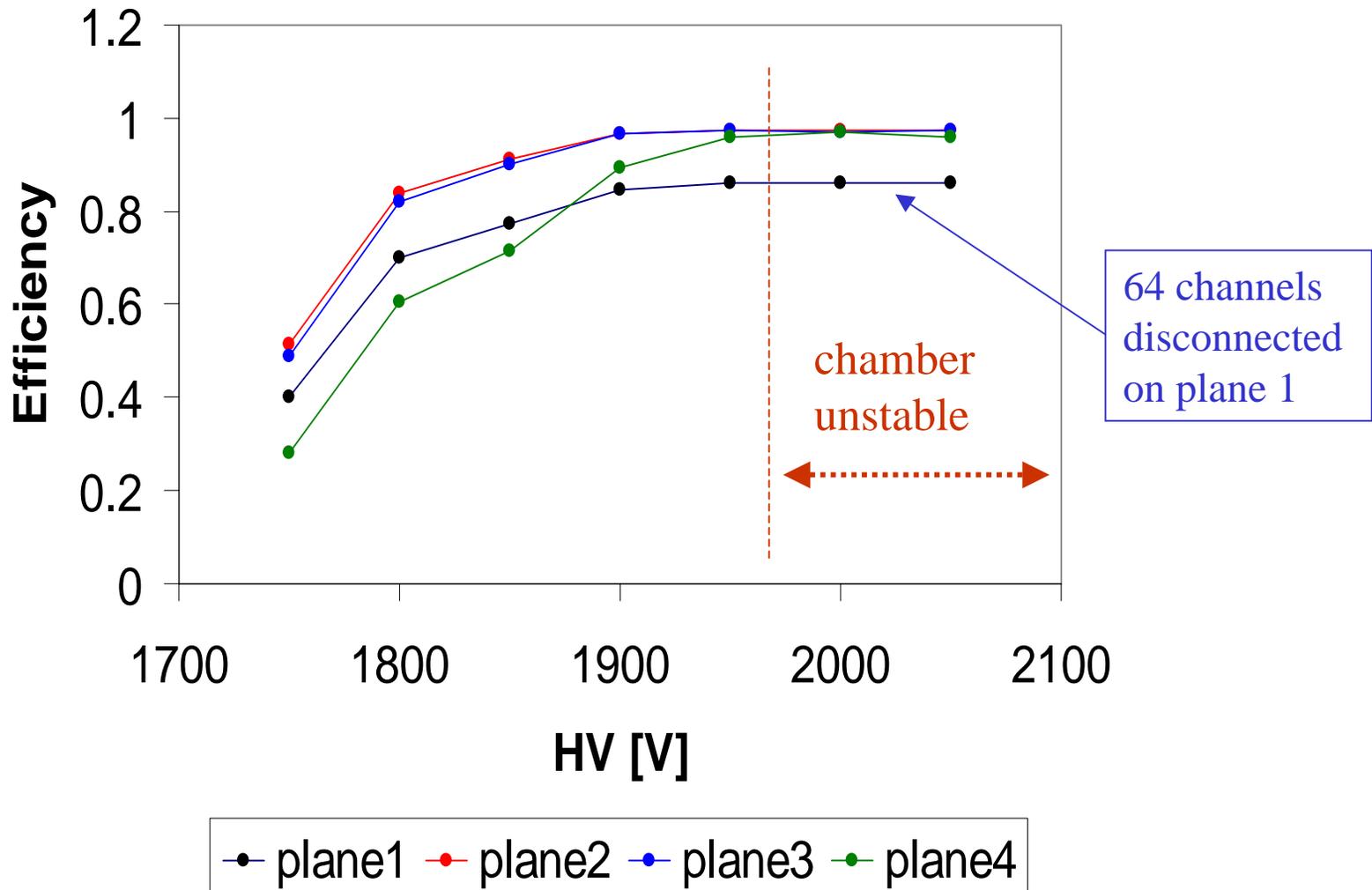
Average Number of Hits per Trigger



● plane1 ● plane2 ● plane3 ● plane4

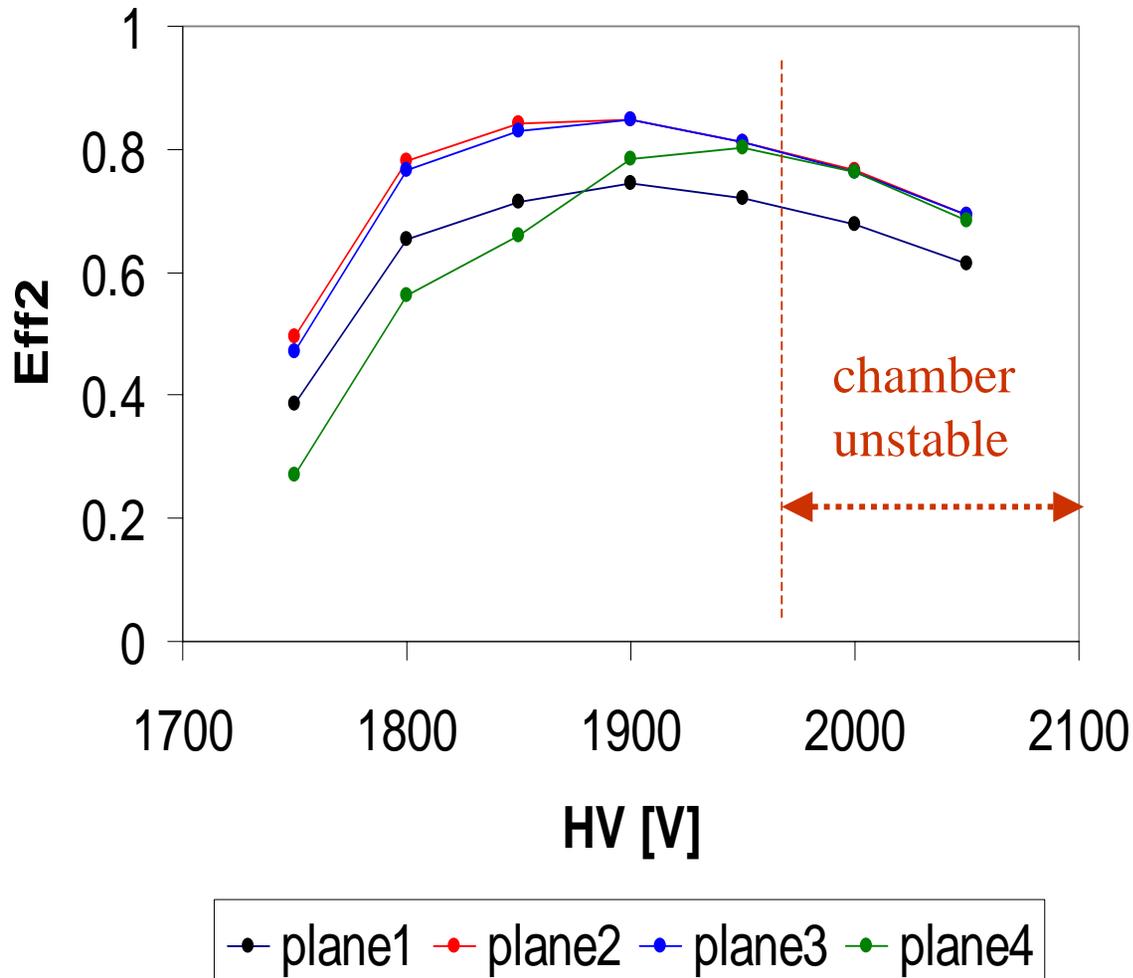
Efficiency Estimate (upper limit)

$$Eff1 = \frac{\text{Number_of_Single_Tracks_in_Plane}}{\text{Total_Number_of_Single_Tracks}}$$



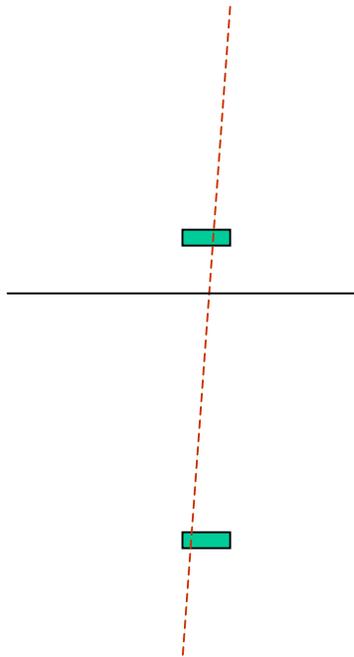
Efficiency Estimate (lower limit)

$$Eff\ 2 = \frac{\text{Number_of_Single_tracks_in_Plane}}{\text{Number_of_Triggers}}$$

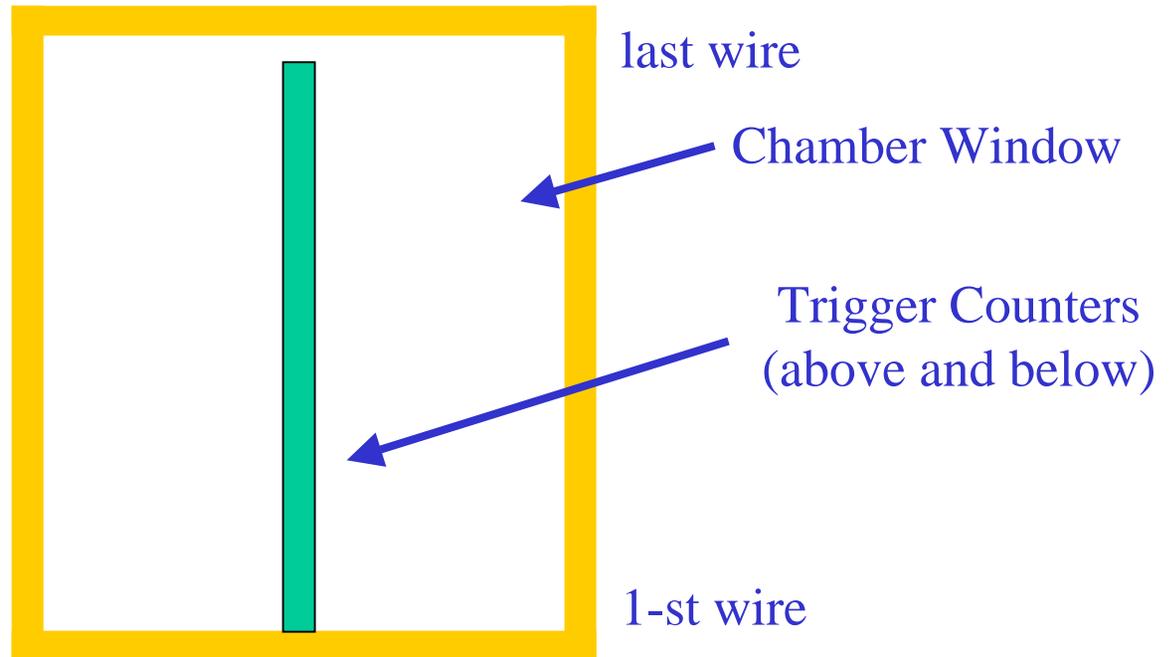


Trigger Counters – Center of Wires

Side View



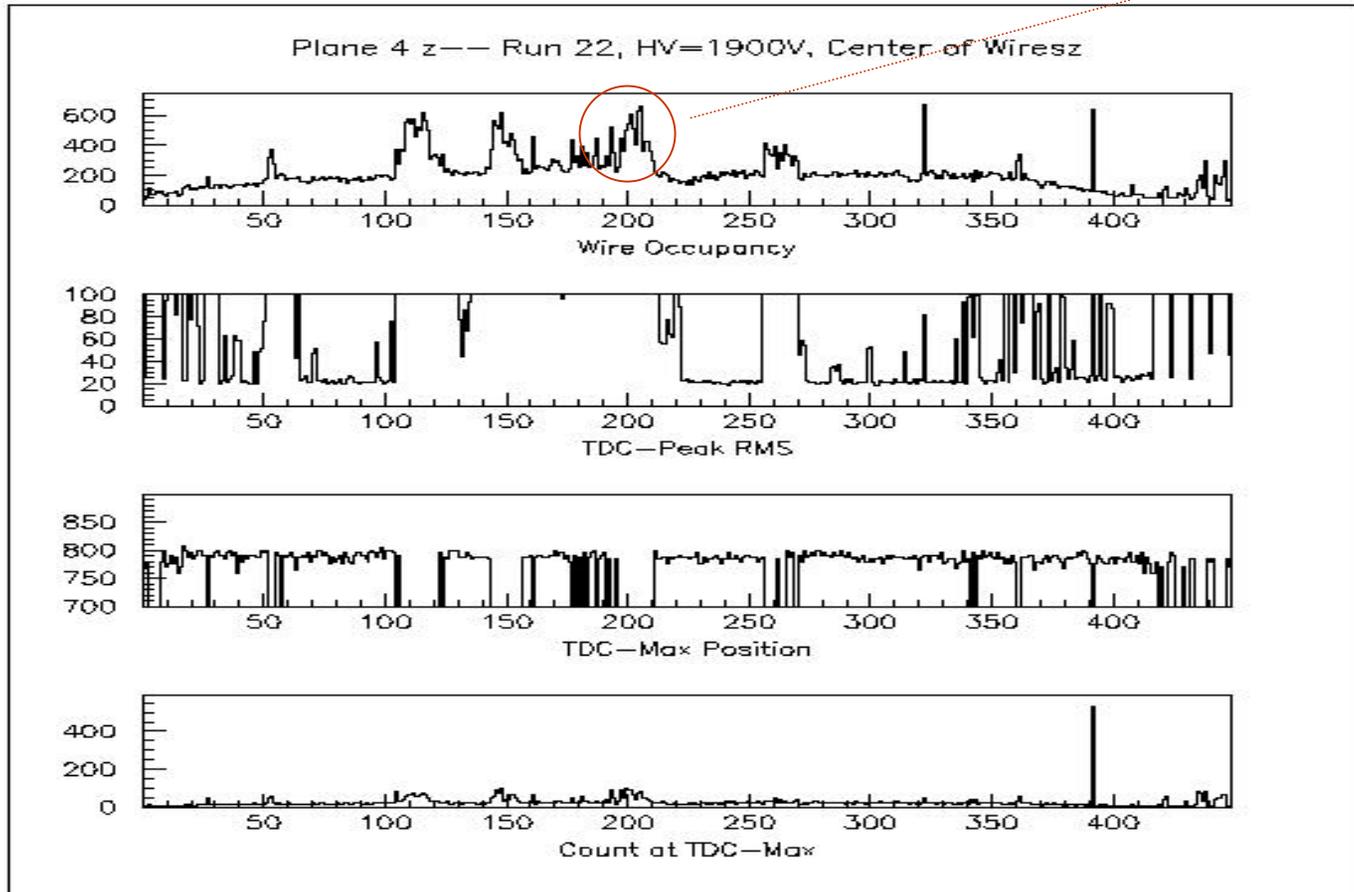
Top View



Plane 4, Center of Wires

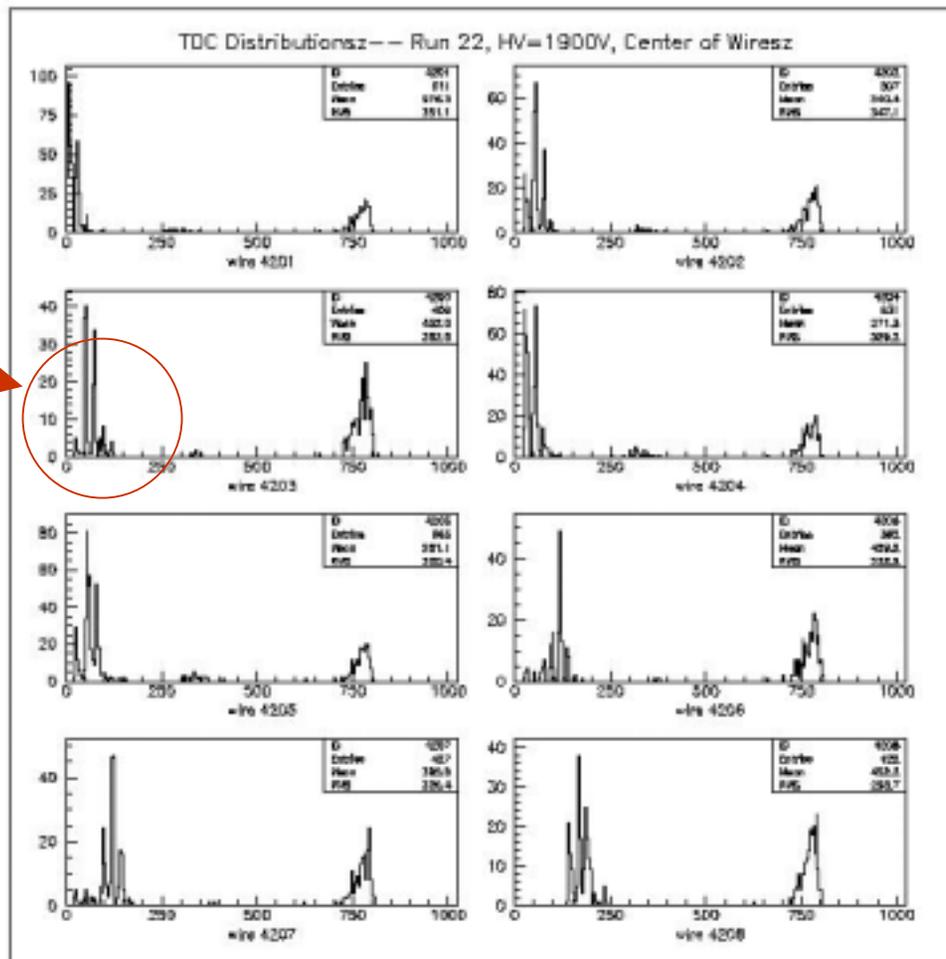
(HV=1900V, TH~1.5V, No Cuts)

See
next
page



Plane 4, Center of Wires

(HV=1900V, TH~1.5V, No Cuts)



Test Summary

- Chamber works as a whole, but “strange” localized effects are observed
- All wires alive (noisy or dead channels - due to electronics problems)
- Chamber common ground problem must be addressed during fixing/reassembly – have recommendations
- Rather short working range: ~ 1850 – 1950V
- Time Resolution: 10-20ns RMS, <50ns at base

Related Issues

- **David is working on preamp supports**
- **Discriminator-to-TDC cable adapters are ready**
- **Who is responsible for fixing the chambers - when?**
- **Need to place request for TDCs at PREP ASAP**
- **All preamplifiers, discriminators and TDCs from PREP MUST be tested before installation**
- **Info from chamber experts:**
 - **The loss of tension for aluminum wires has been determined to be 3-5% / year.**