# Preliminary Analysis of the New Focusing DIRC Prototype Beam Data

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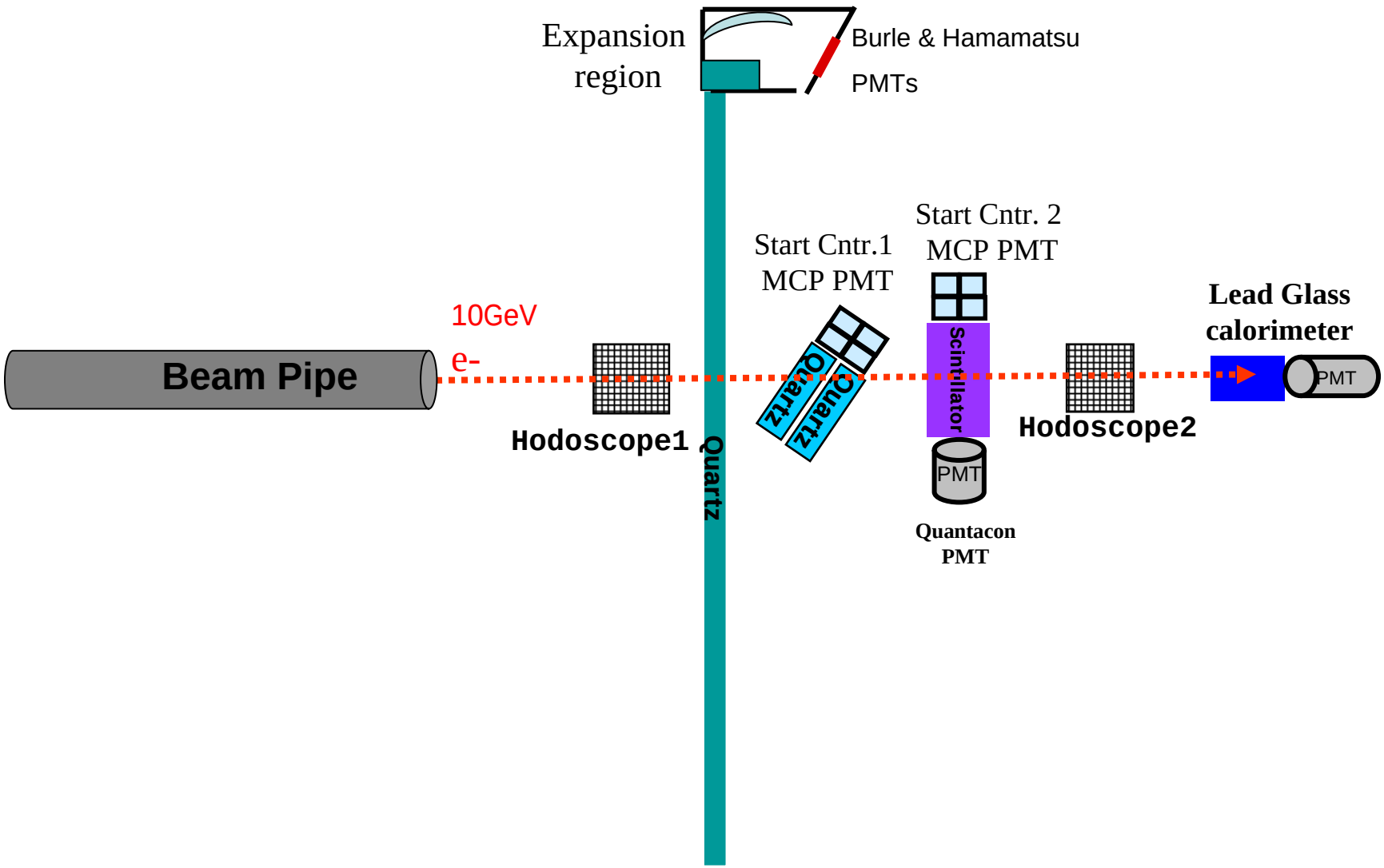
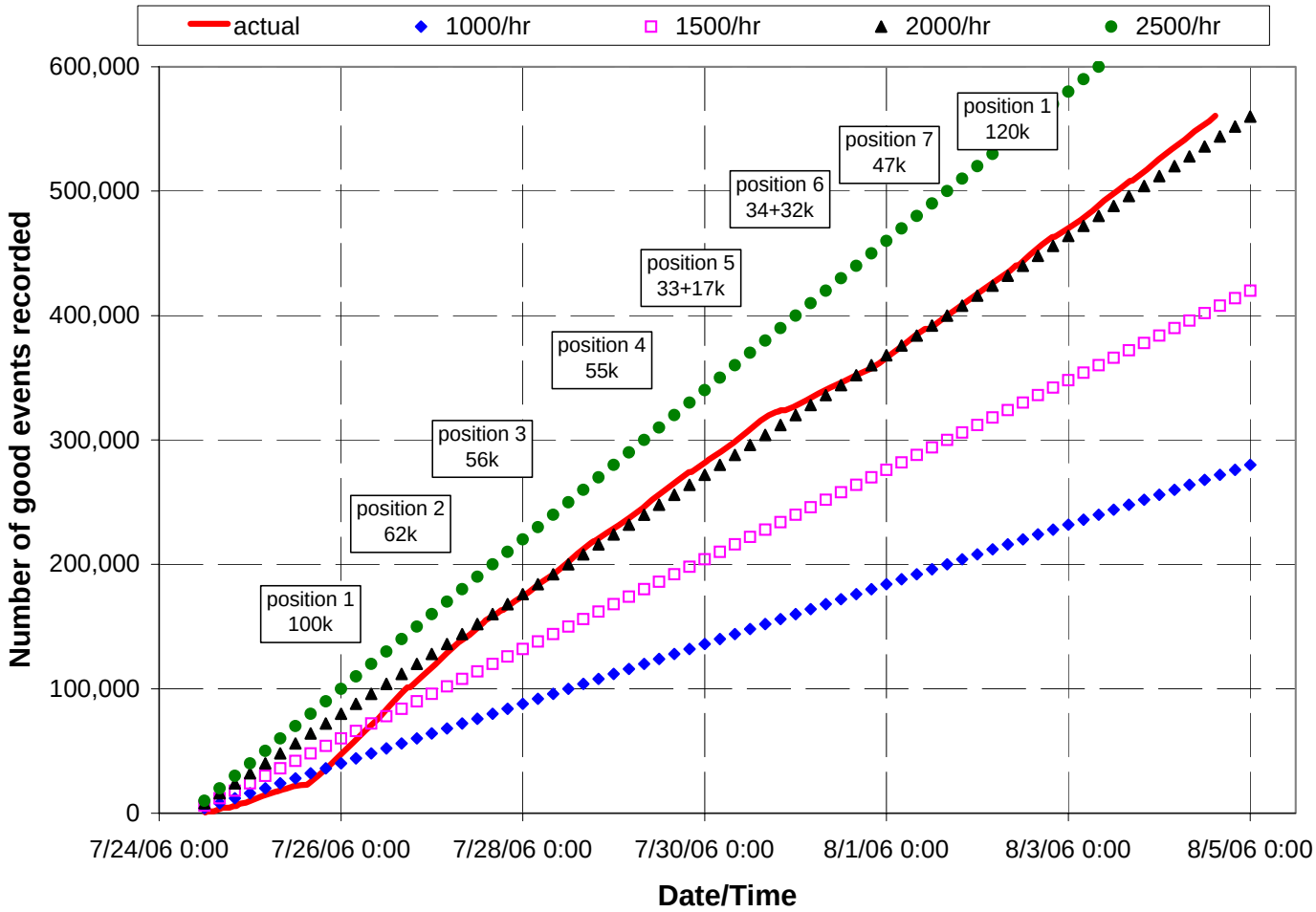
8/24/2006

# Test Beam Setup

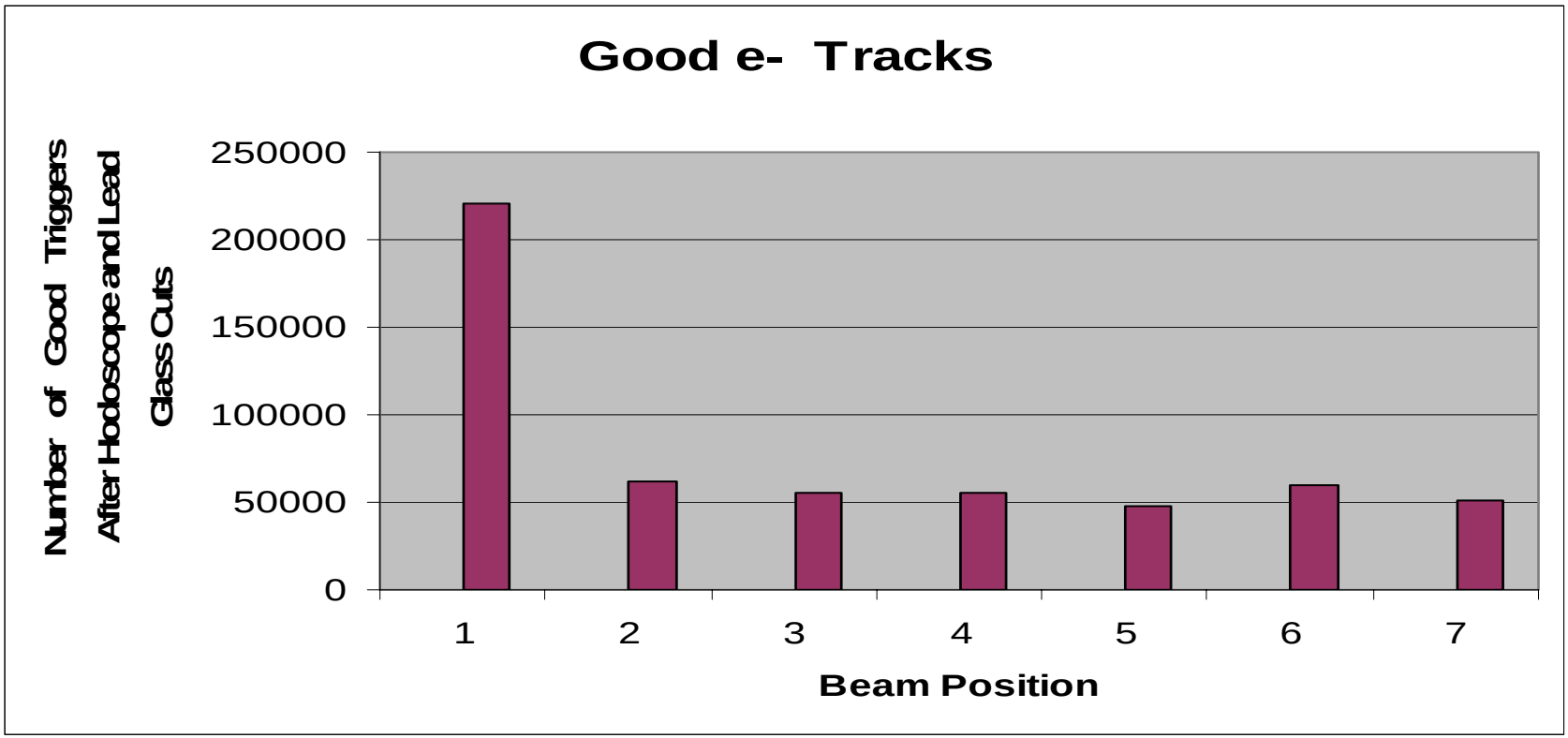


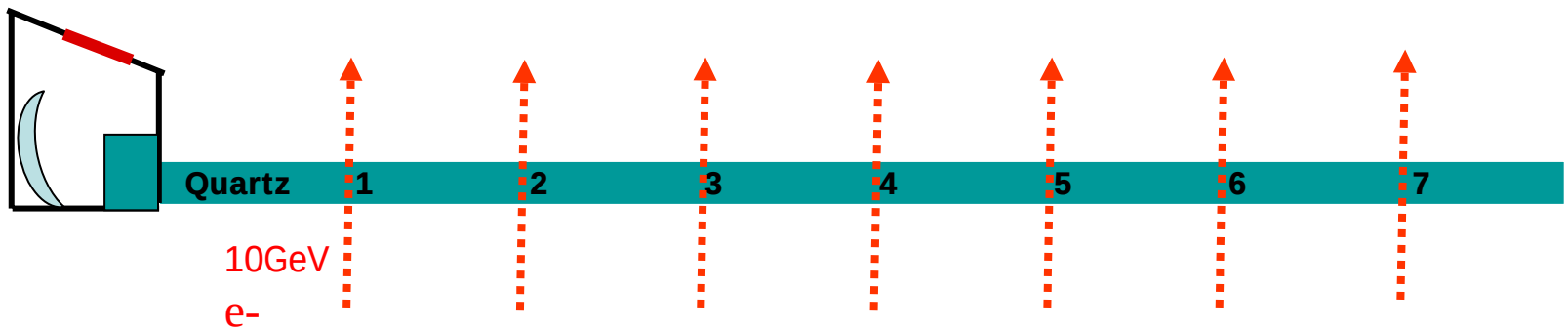
# Accumulation of Beam Data: July 24 to August 4, 2006




Plots From Joe

# Statistics

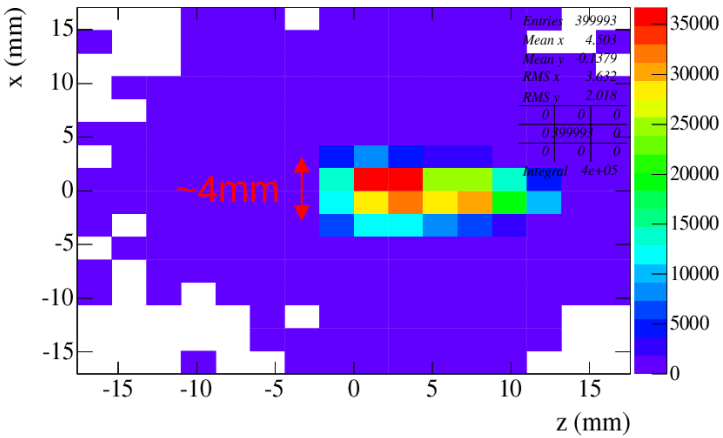

Good e- Tracks
Number of Good Triggers After Hodoscope and Lead Glass Cuts
250000
200000
150000
100000
50000
0
1
2
3
4
5
6
7
Beam Position


Quartz
1
2
3
4
5
6
7
10GeV
e-

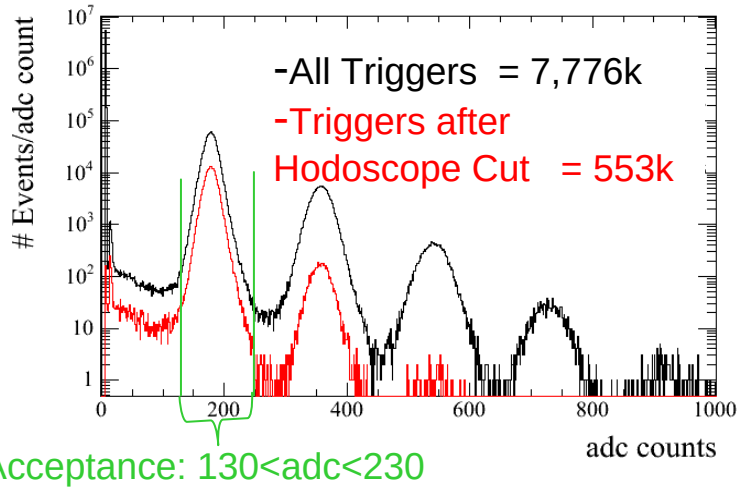
# Tracking and Calorimetry

Only data from Runs 16→22

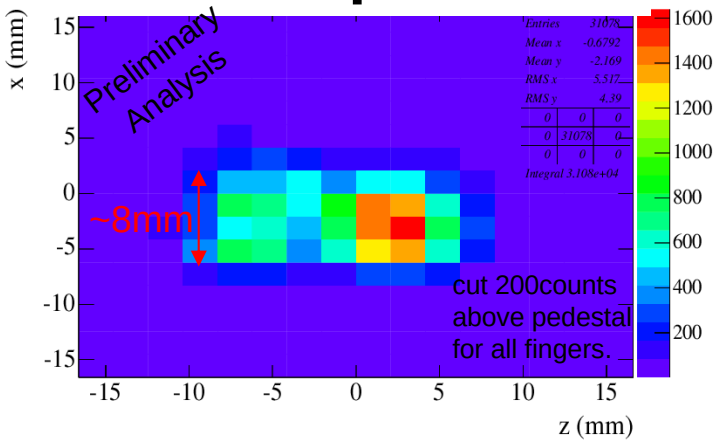
## Hodoscope 1




## Lead Glass Adc

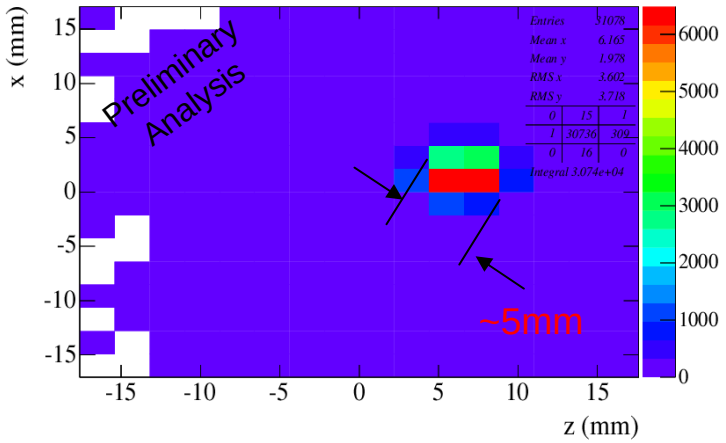



## Hodoscope 2




## Correlation of Hodoscopes:

## Difference Beam in Positions




~2.12m distance between hodoscopes and this correlation (<5mm change)

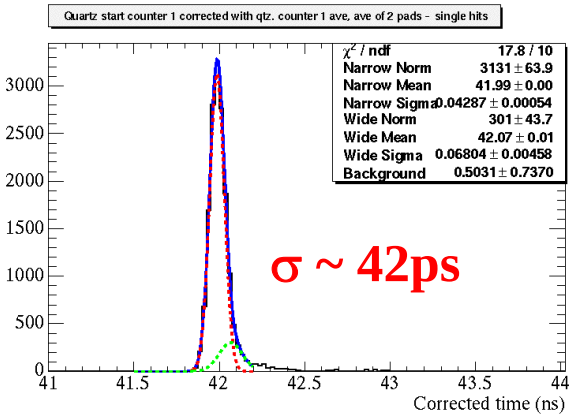
give a track angle resolution of

**$\sigma_\theta$< 1.5mm/2m ~.8mrad**

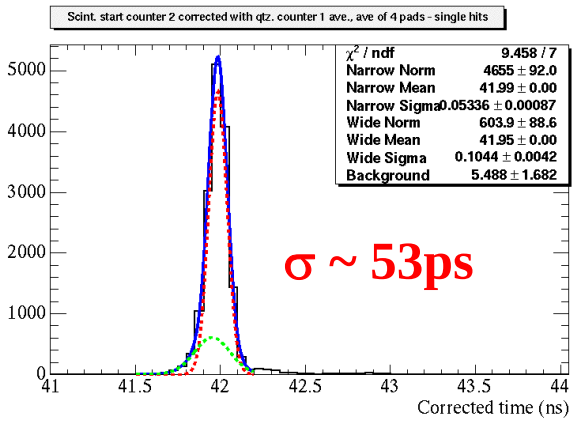
# Event Time: Local start counters

## 1) Run 12b:

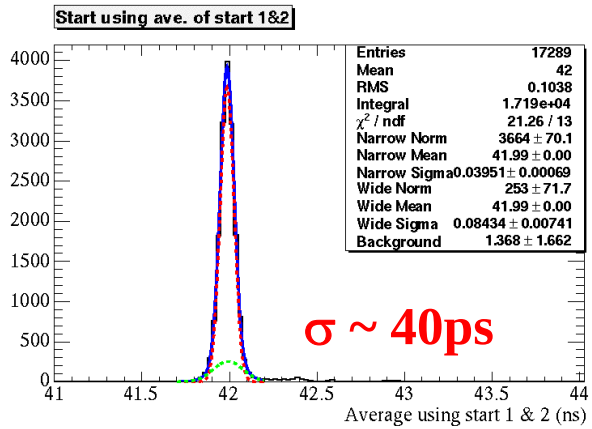
### Start counter 1:



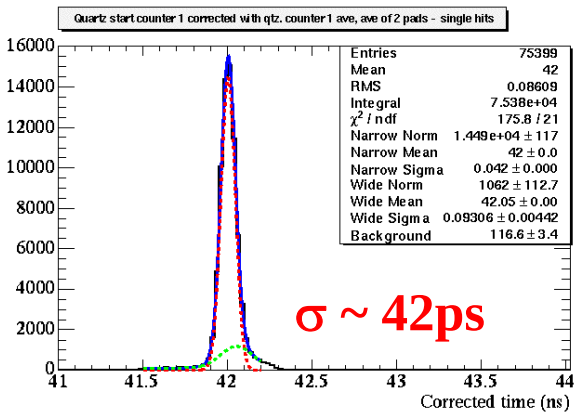

### Start counter 2:

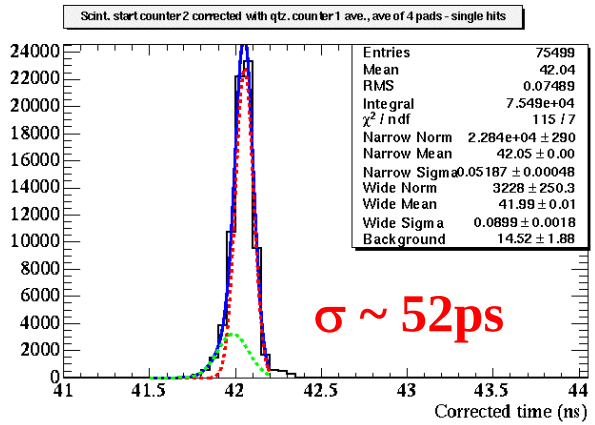


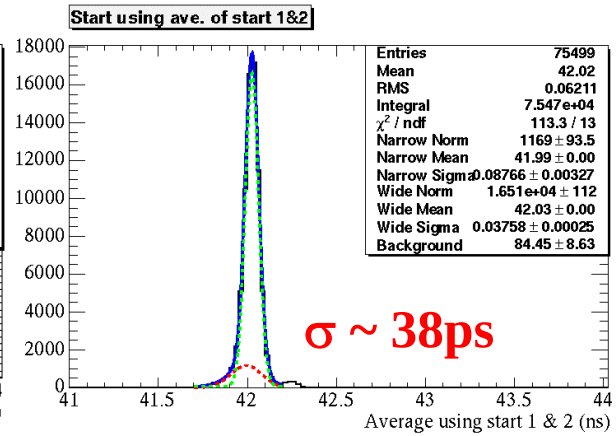

### Average of Start 1 & 2:




## 2) Run 22:



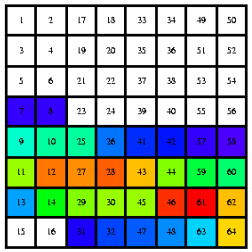




- **Use the last run correction constants (no new tuning).**

Plots From Jerry

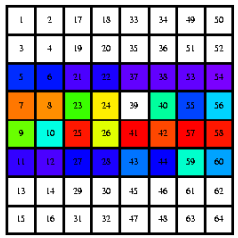
# Cherenkov Ring Occupancy

run 22 data



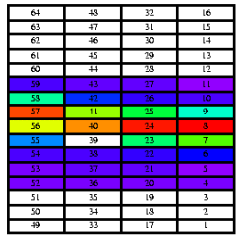
Slot 1

Burle 5



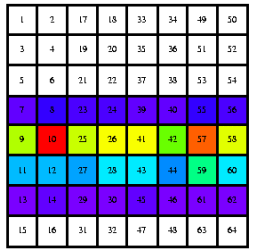
Slot 2

Hamamatsu 4



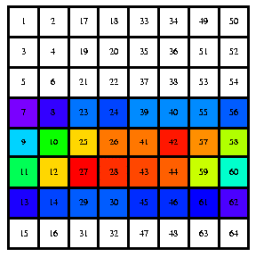
Slot 3

Hamamatsu 2



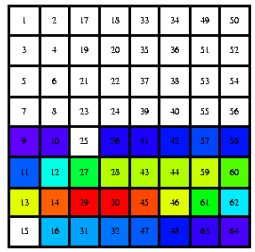
Slot 4

Burle 4



Slot 5

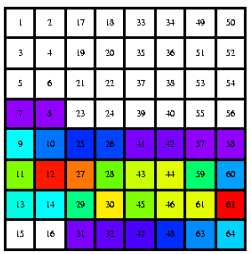
Burle 15



Slot 6

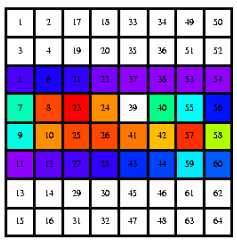
Burle 14

Geant4



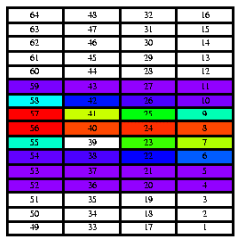
Slot 1

Burle 5



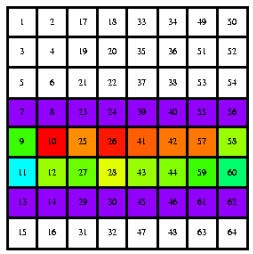
Slot 2

Hamamatsu 4



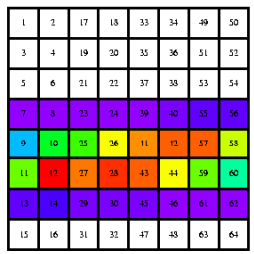
Slot 3

Hamamatsu 2



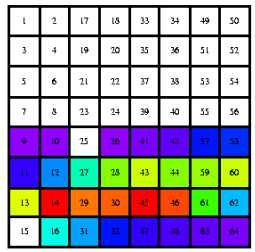
Slot 4

Burle 4



Slot 5

Burle 15



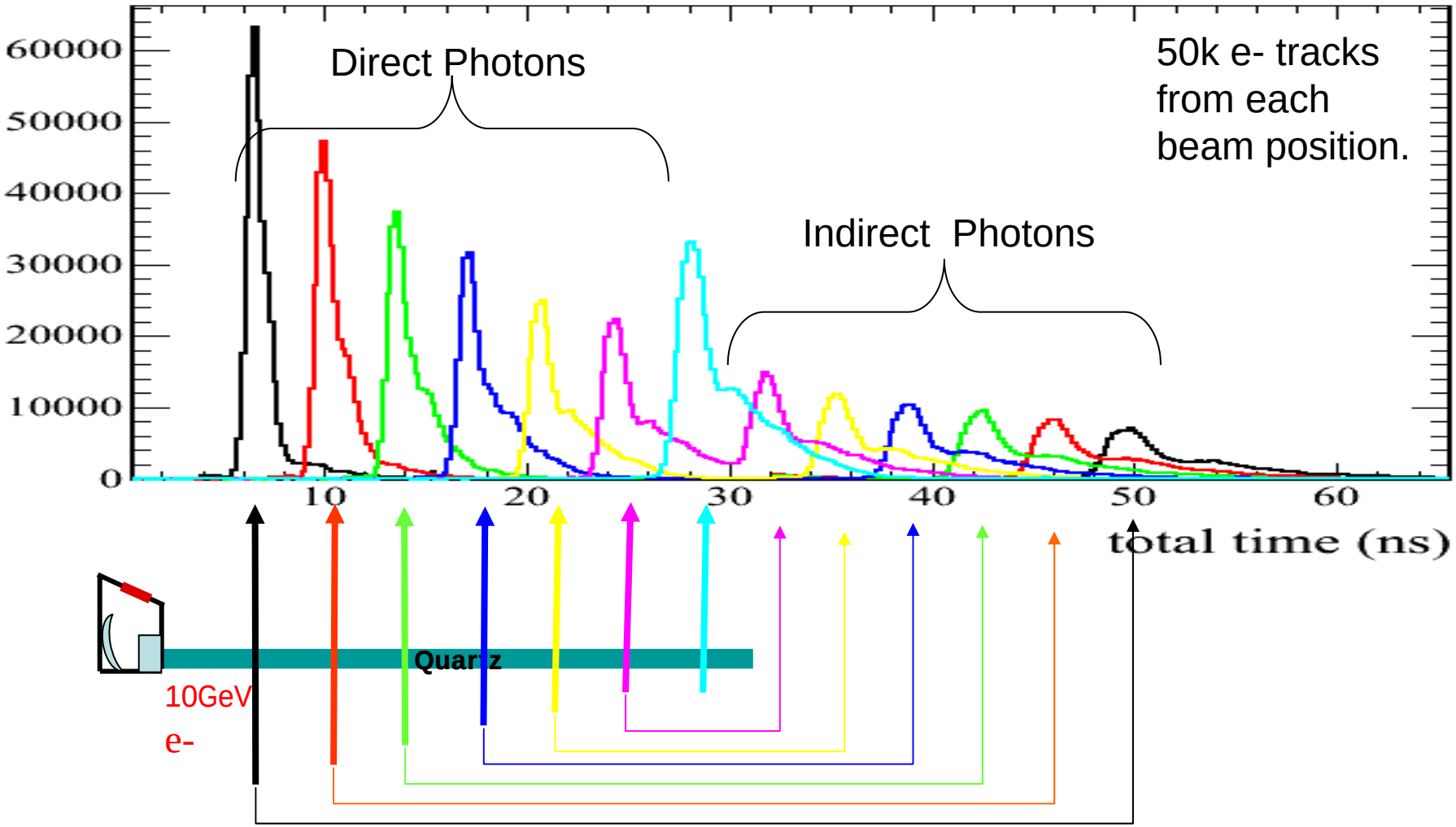
Slot 6

Burle 14

Plots From Joe

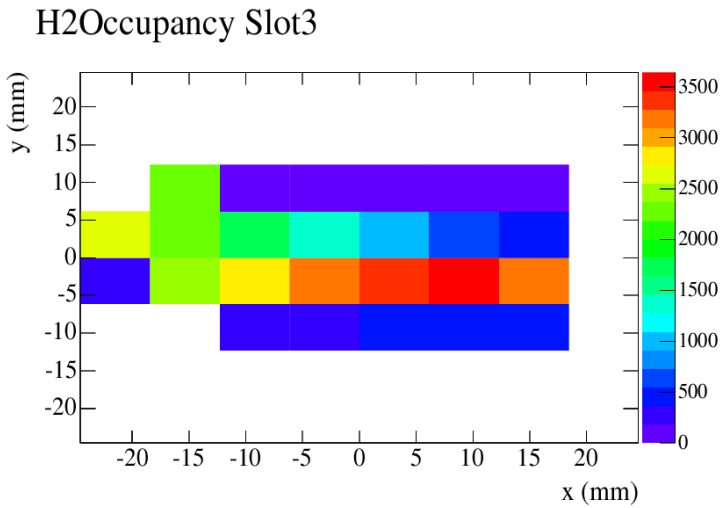
# Separation of Direct and Indirect Photons by Timing

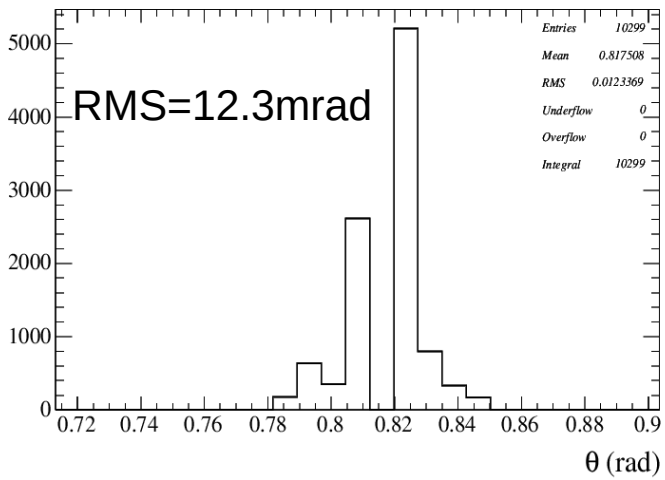
Time Of Propagation for all Detected Photons



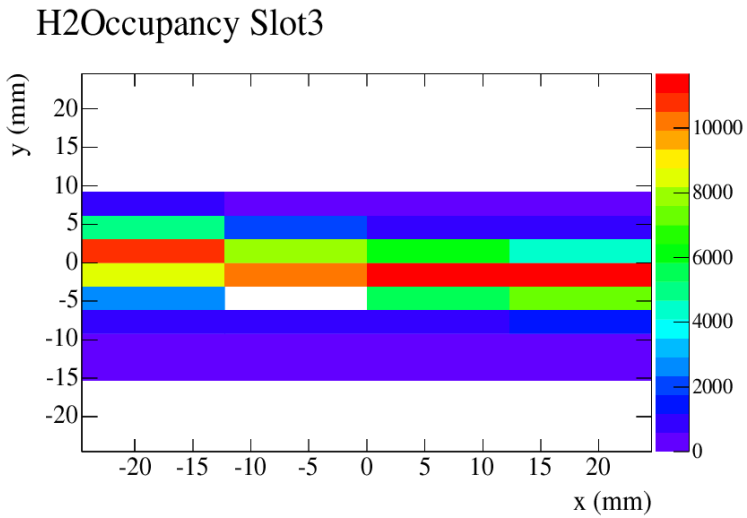
# New Slot3 Pixels

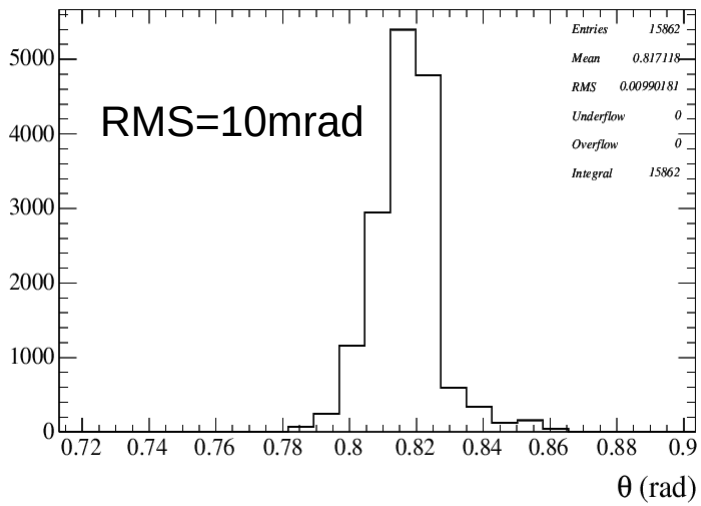
## old 6x6mm pixels




## new 3x12mm pixels

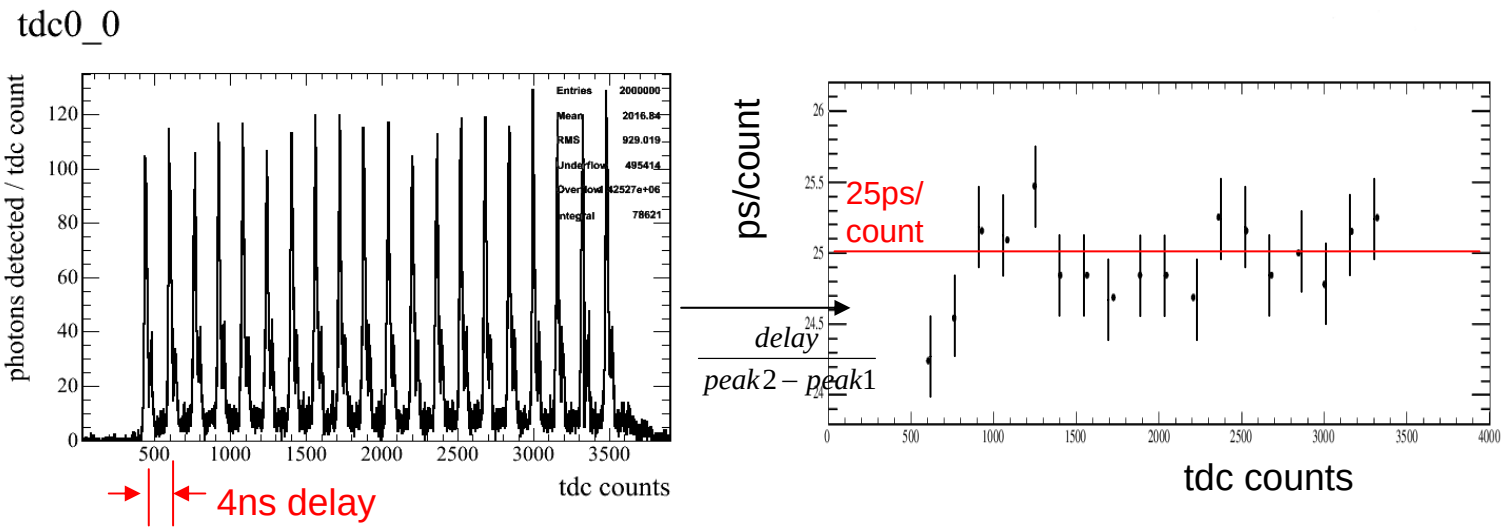


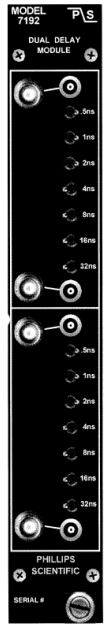



# New TDC and SLAC ADC Calibration Using PILAS Laser

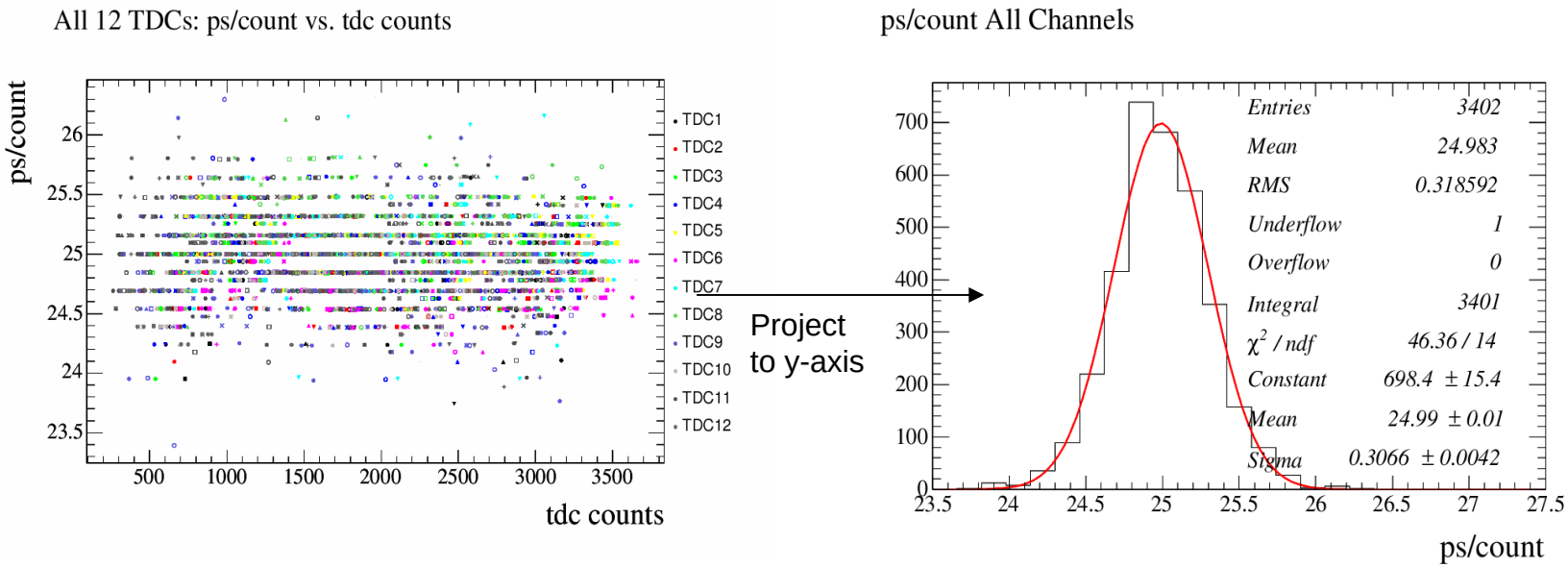
# Phillips TDC Calibration: June 30,2006

One Channel

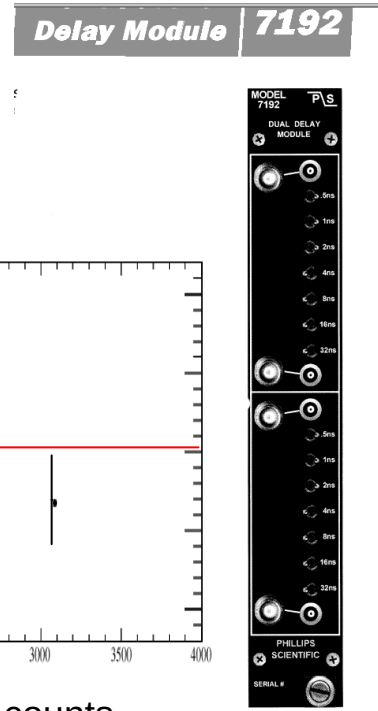


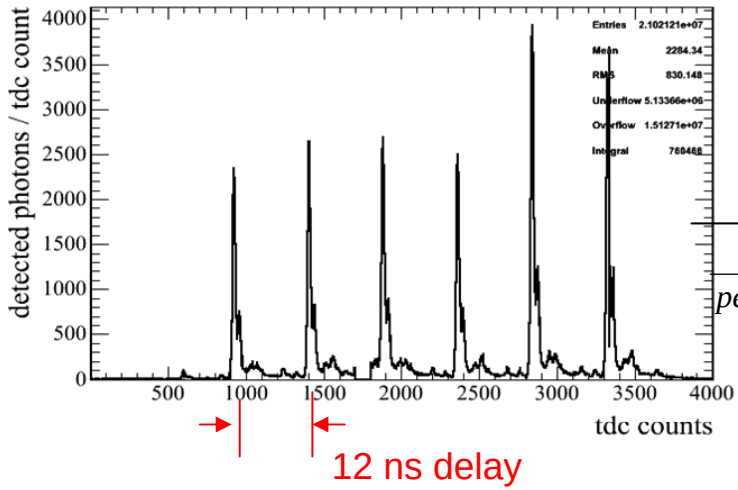

All Channels

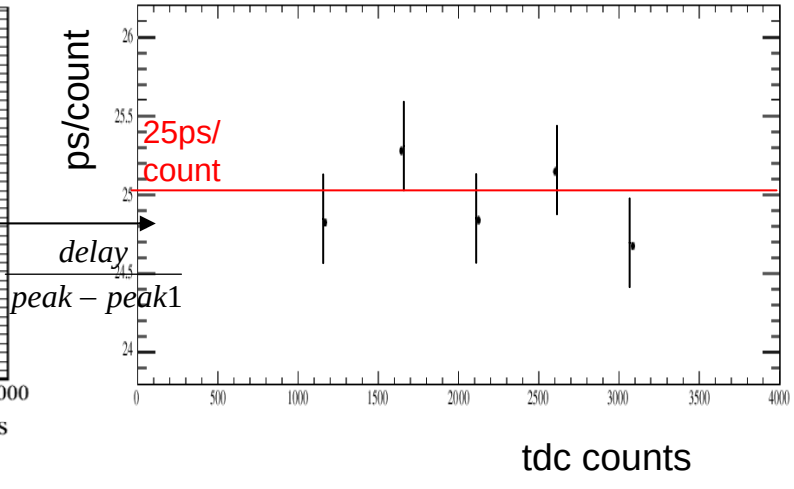


# Phillips TDC Calibration (Coarse/High Statistics): July 1-4,2006

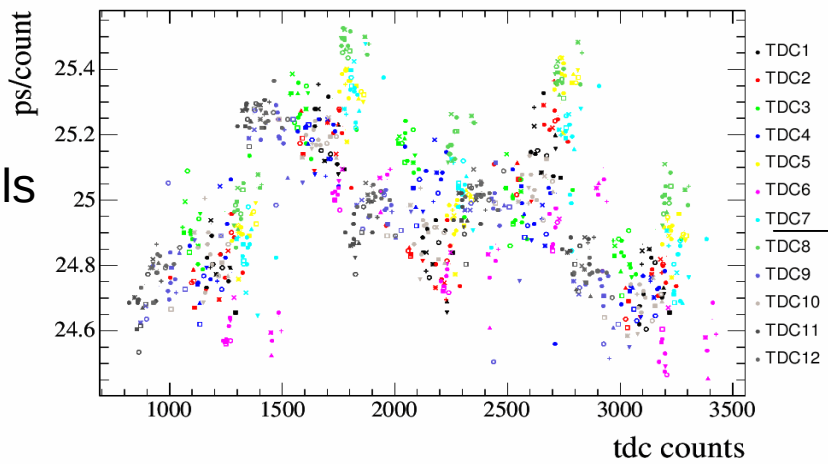



One Channel

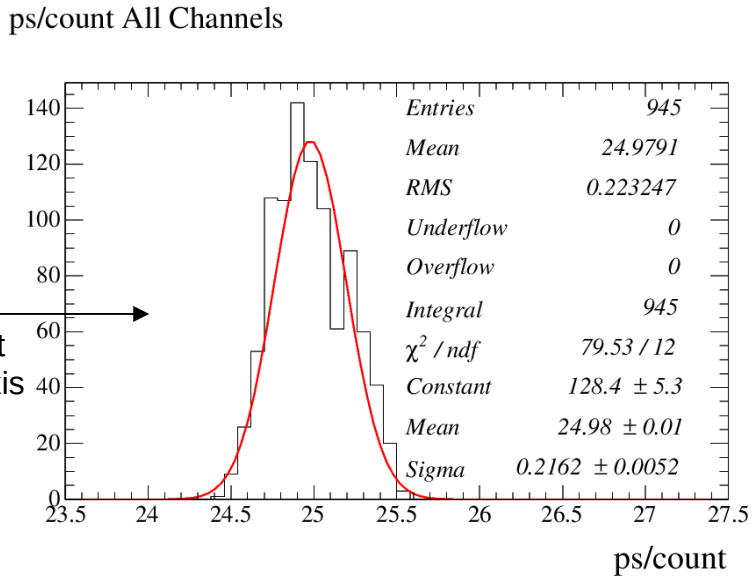



All Channels




Project to y-axis

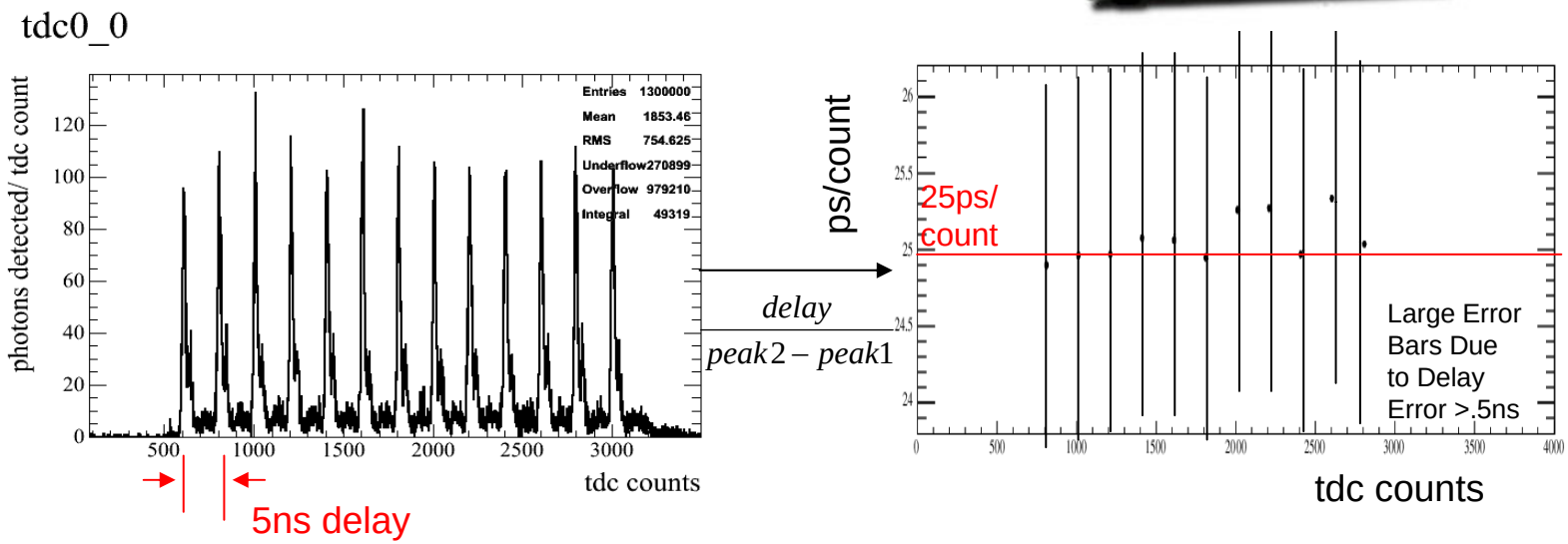


# Phillips TDC Calibration: August 9,2006

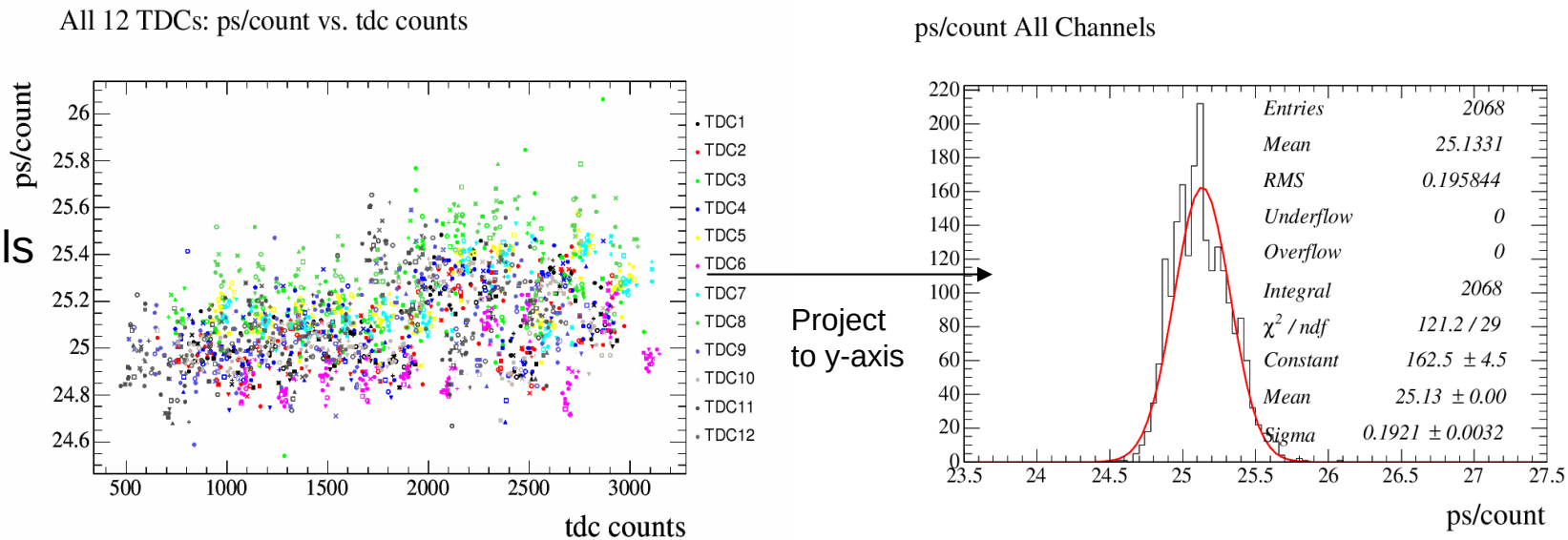
**Delay Module**

**DG535**

One Channel




All Channels

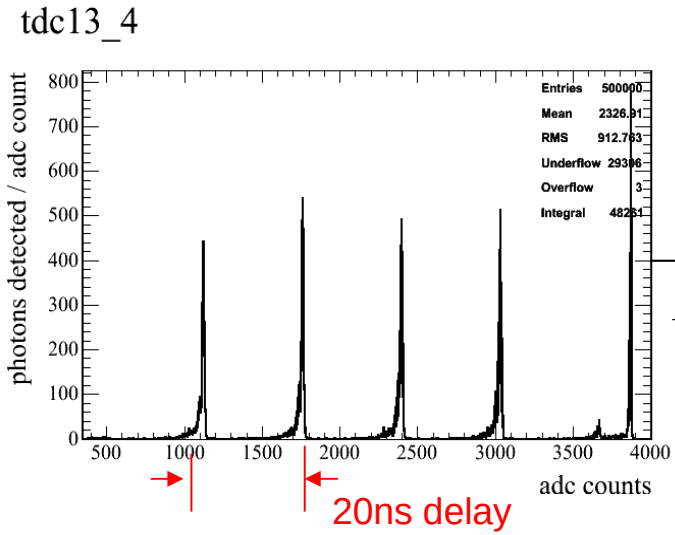


# SLAC ADC Calibration: August 6, 2006

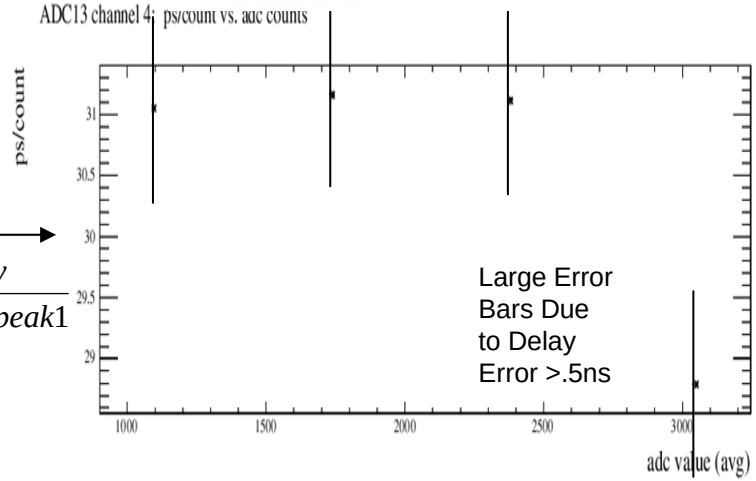
**Delay Module**

**DG535**

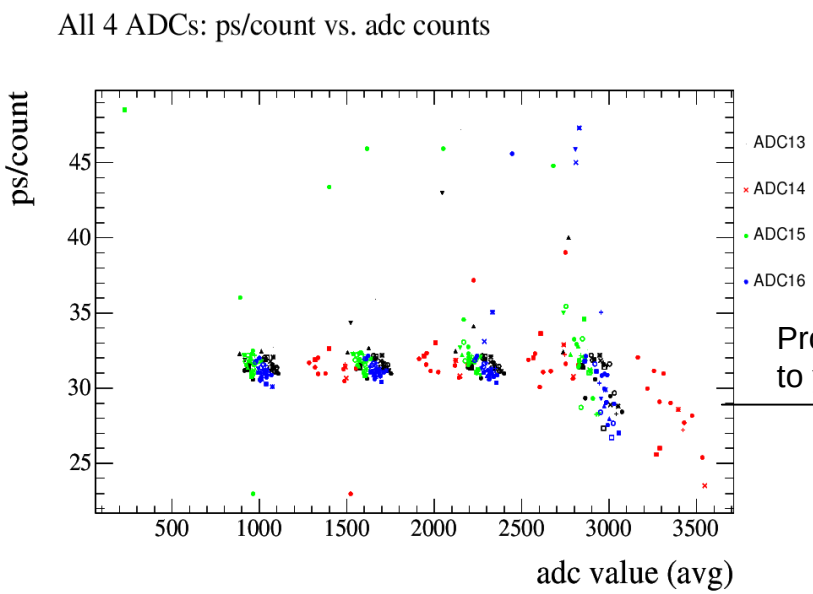
One Channel



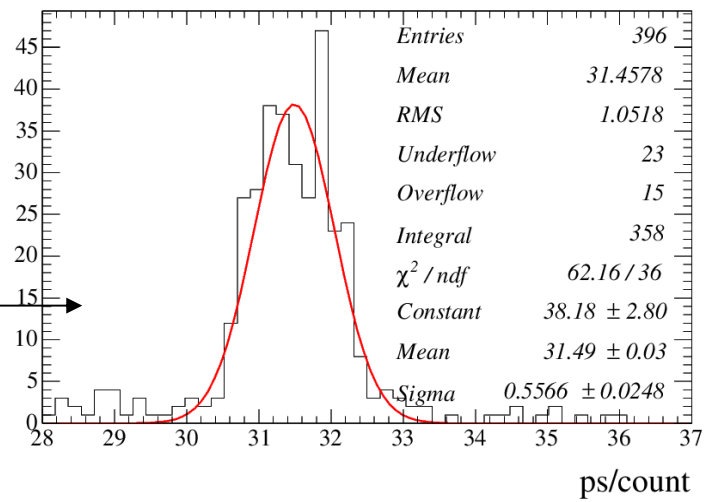

$$\frac{delay}{peak2 - peak1}$$




All Channels




Project to y-axis



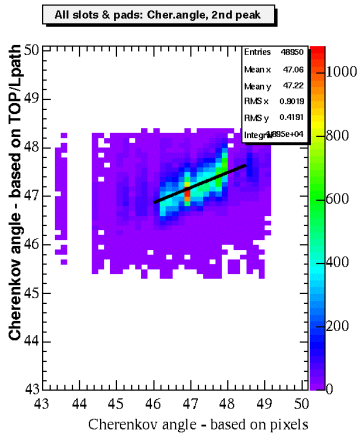
# ThetaC Resolutions:
## Preliminary Analysis by Jerry

# Cherenkov angle resolution based on TOP

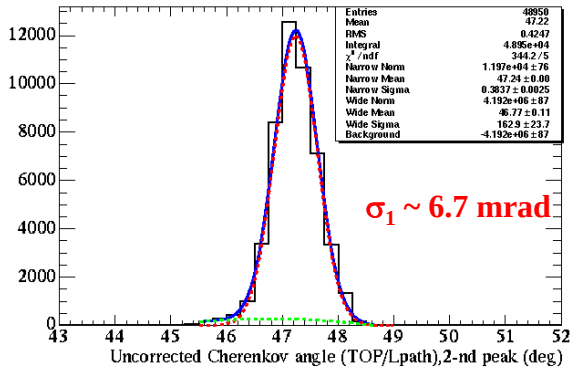
## 1) Run 12b, pos. 1, analysis of the 2-nd peak (Ivan's constants):

**Assume: $\beta = 1$**

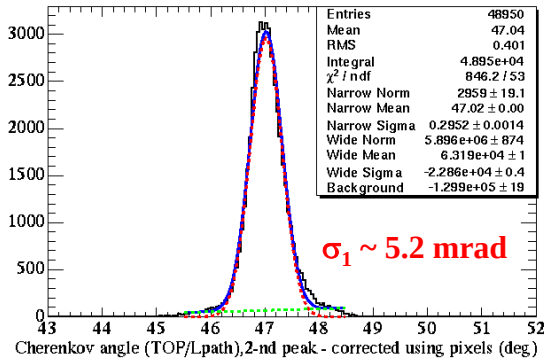
### Use epsilon time offsets:




### Raw

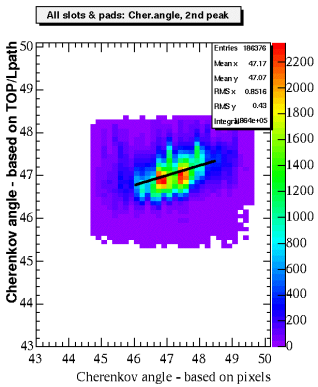


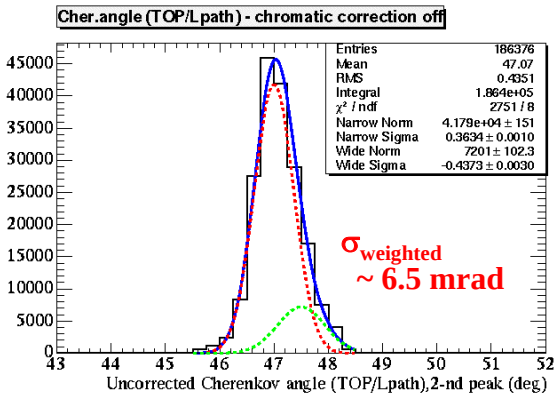

### Chromatic correction using pixels (actual fit to data)

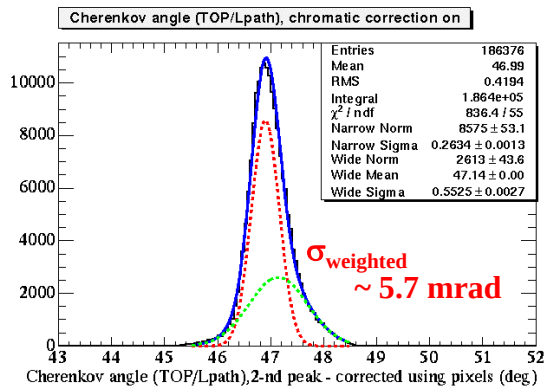



## 2) Run 22, pos. 1, analysis of the 2-nd peak (Jose's constants):

### No epsilon time offsets yet:




- **Chromatic correction using the empirical correlation (Data-driven shape).**

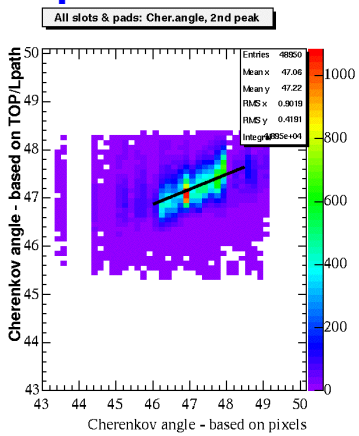
Plots From Jerry

# Cherenkov angle resolution based on pixels

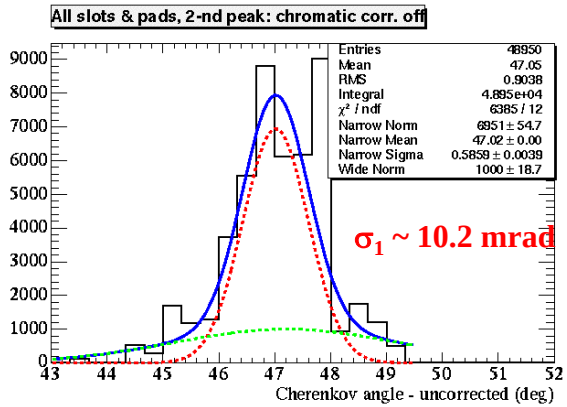
## 1) Run 12b, pos. 1, analysis of the 2-nd peak (Ivan's constants):

**Assume: β = 1 (in TOP analysis)**

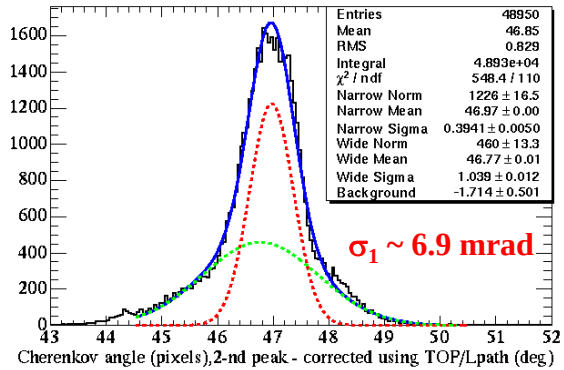
**Use epsilon time offsets:**




**Raw**

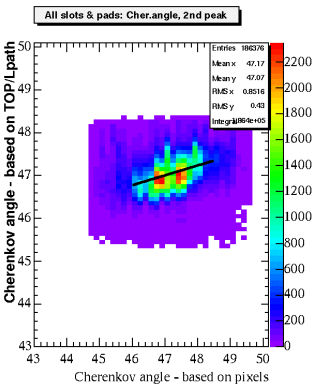


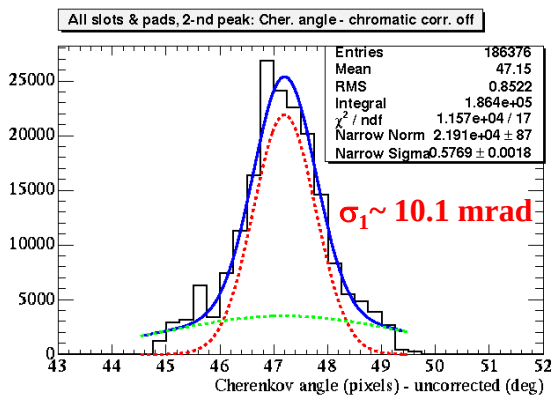

**Chromatic correction using TOP**

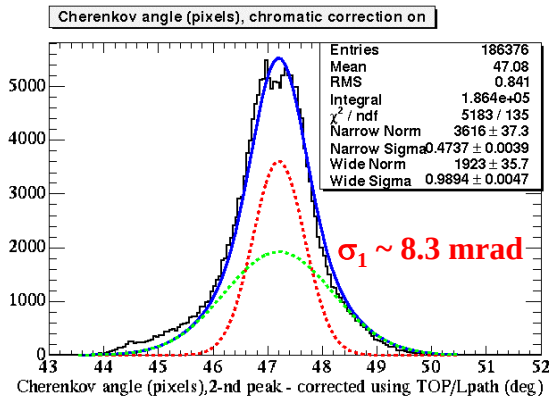



## 2) Run 22, pos. 1, analysis of the 2-nd peak (Jose's constants):

**No epsilon time offsets yet:**



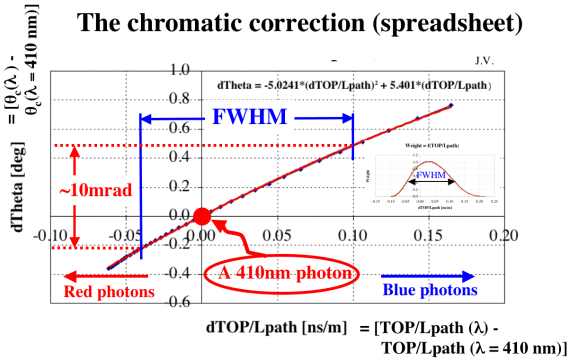

- **Chromatic correction using the theoretical correlation (45° angle).**

Plots From Jerry

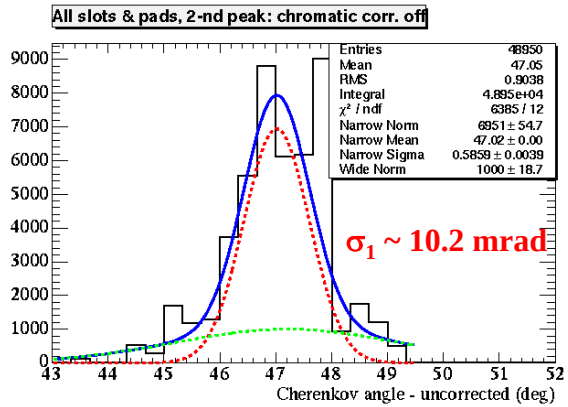
# Cherenkov angle resolution based on pixels

## 1) Run 12b, pos. 1, analysis of the 2-nd peak (Ivan's constants):

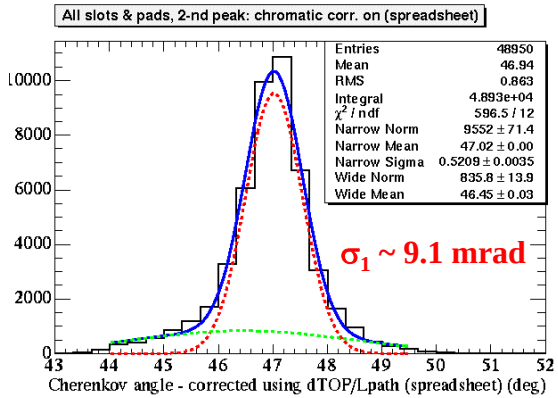
**Fit a quadratic curve over an entire region of the efficiency profile:**




**Raw**

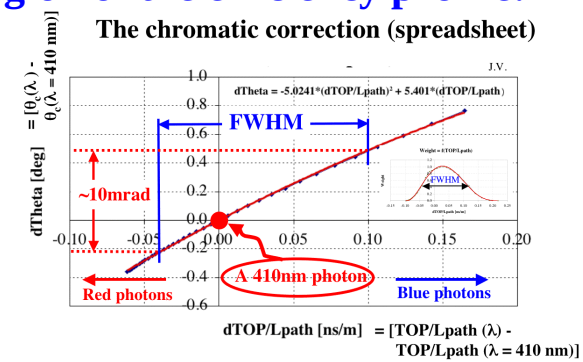



**Chromatic correction using TOP/Lpath (Spreadsheet)**

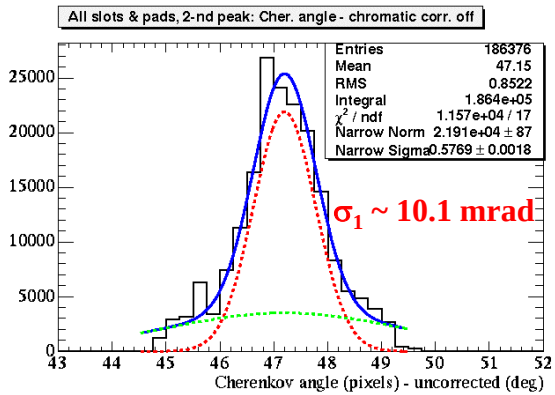


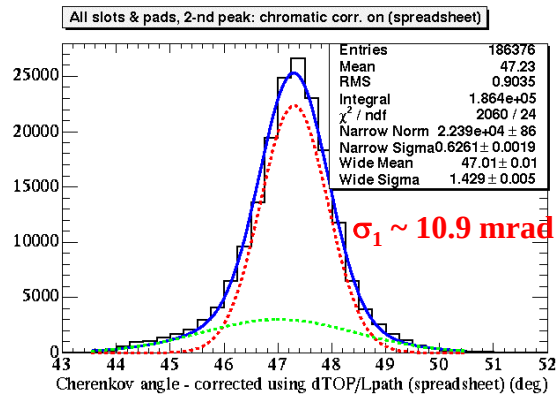

## 2) Run 22, pos. 1, analysis of the 2-nd peak (Jose's constants):

**Fit a quadratic curve over an entire region of the efficiency profile:**




**No epsilon time offsets yet:**



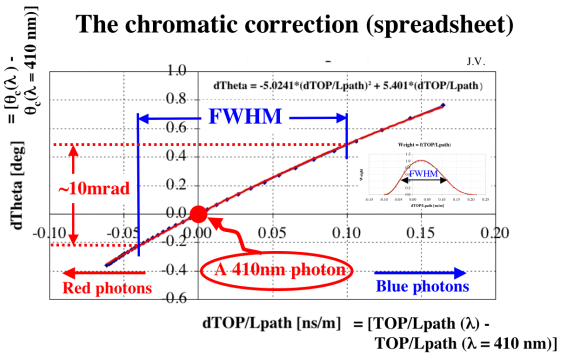

- **Chromatic correction using the theoretical correlation (Refraction index-driven).**

Plots From Jerry

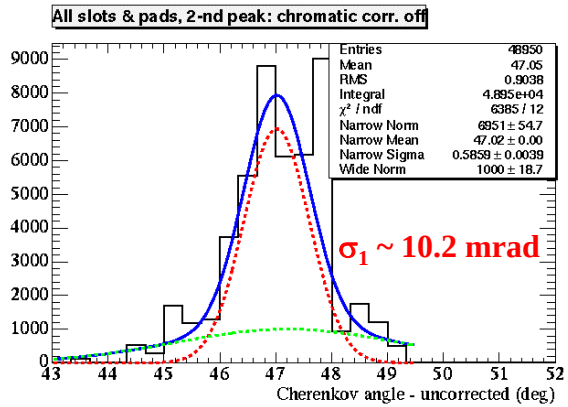
# Cherenkov angle resolution based on pixels

## 1) Run 12b, pos. 1, analysis of the 2-nd peak (Ivan's constants):

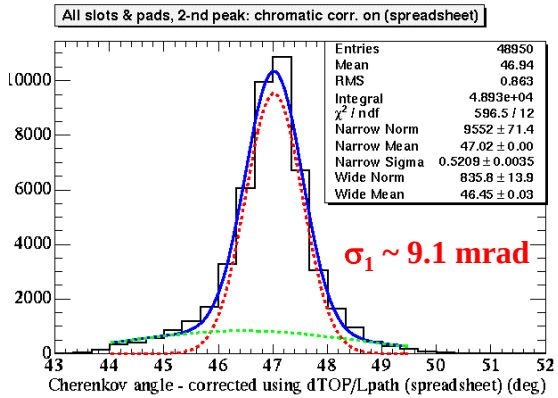
**Fit a quadratic curve over an entire region of the efficiency profile:**




**Raw**

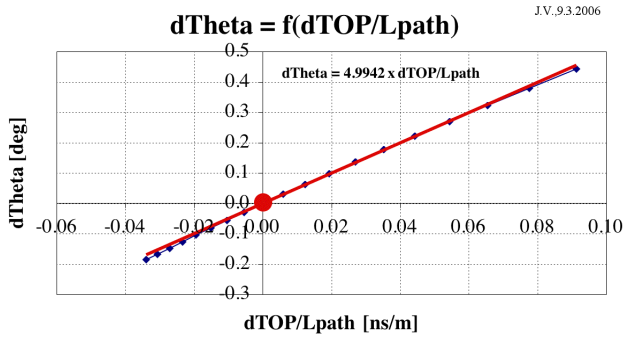



**Chromatic correction using TOP/Lpath (Spreadsheet)**

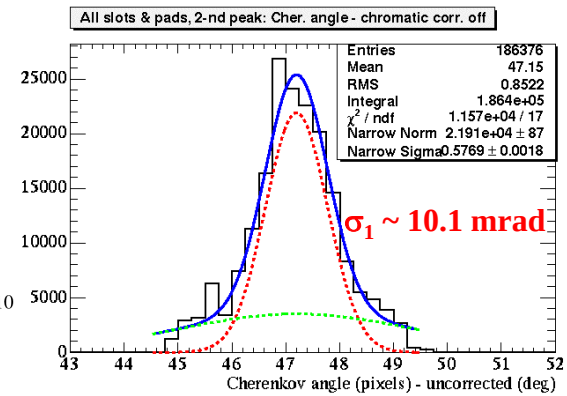


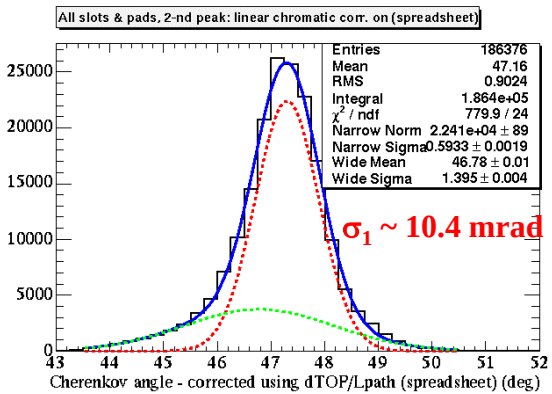

## 2) Run 22, pos. 1, analysis of the 2-nd peak (Jose's constants):

**Fit a linear curve over a FWHM region of the efficiency profile:**




**No epsilon time offsets yet:**



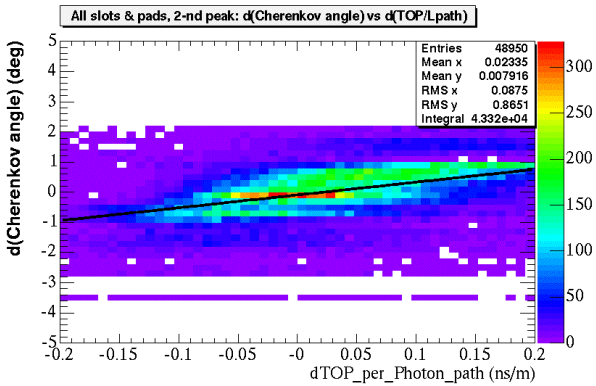

- **Chromatic correction using the theoretical correlation (Refraction index-driven).**

Plots From Jerry

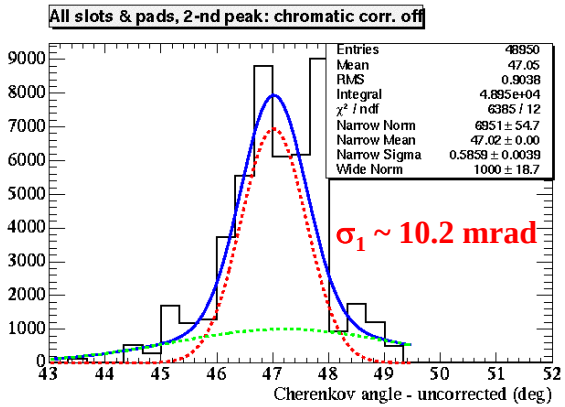
# Cherenkov angle resolution based on pixels

## 1) Run 12b, pos. 1, analysis of the 2-nd peak (Ivan's constants):

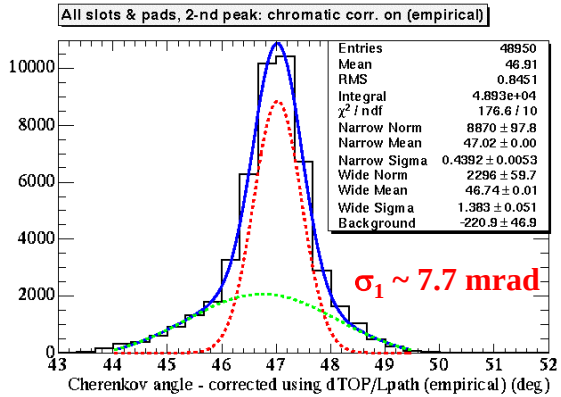
### Use epsilon time offsets:




### Raw

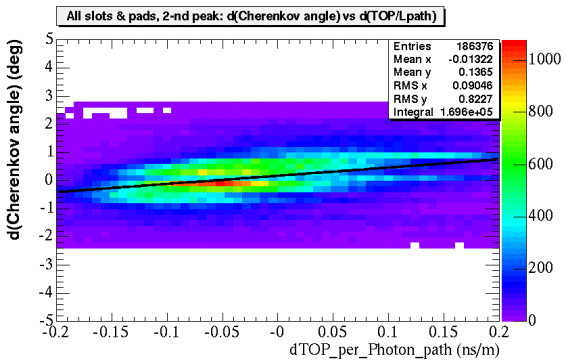


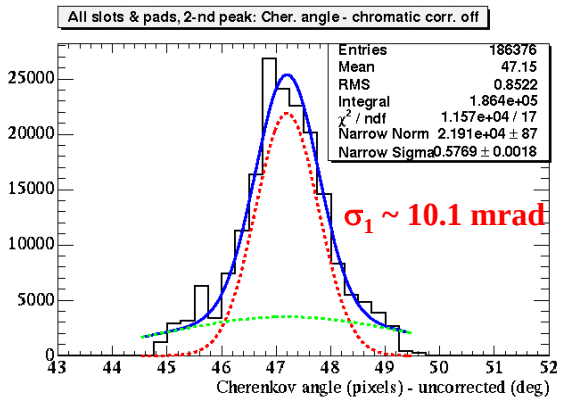

### Chromatic correction TOP/Lpath (Empirical)

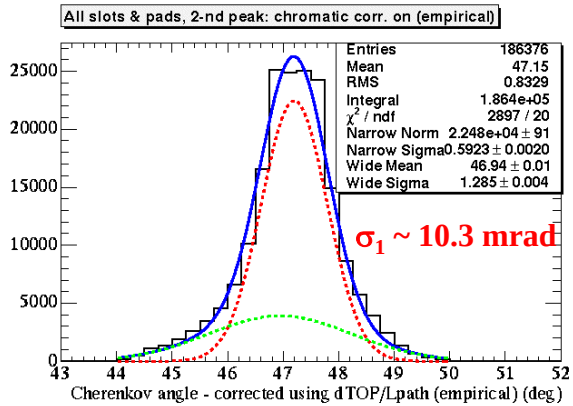



## 2) Run 22, pos. 1, analysis of the 2-nd peak (Jose's constants):

### No epsilon time offsets yet:



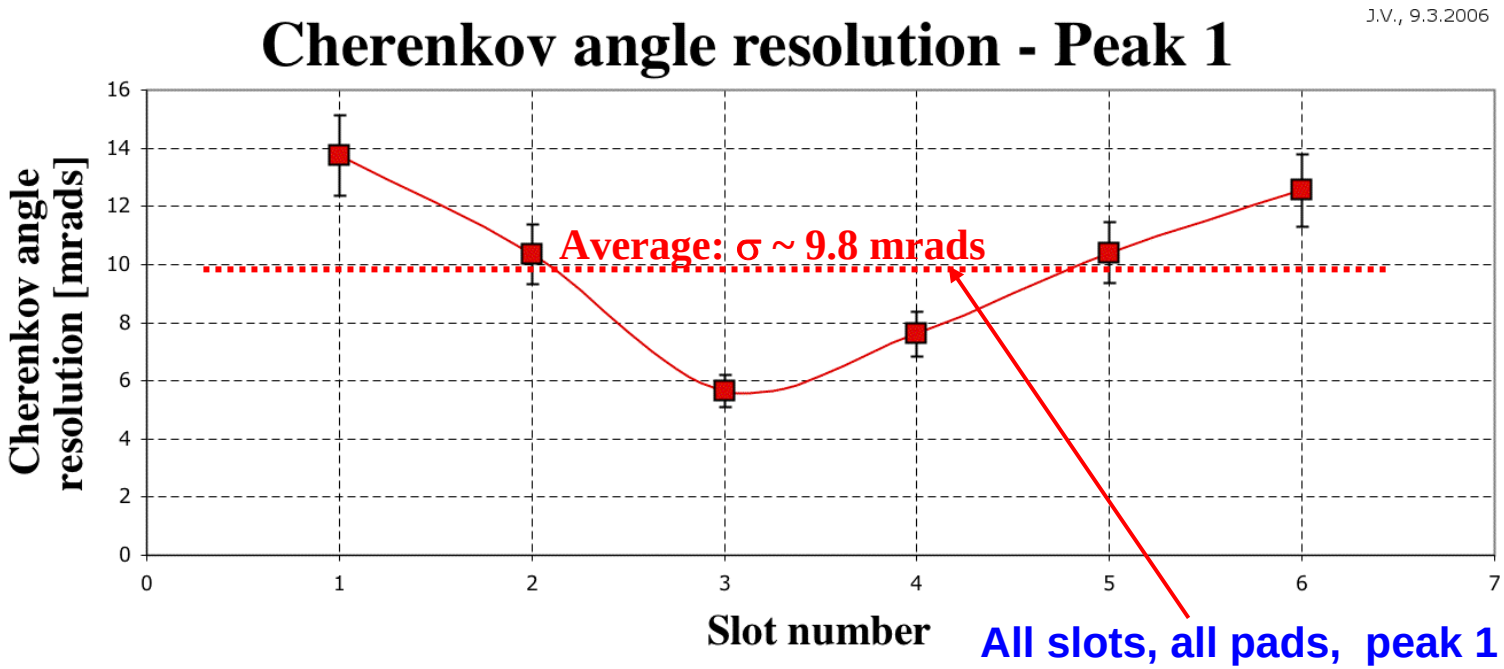




- **Chromatic correction using the empirical correlation (Data-driven shape).**

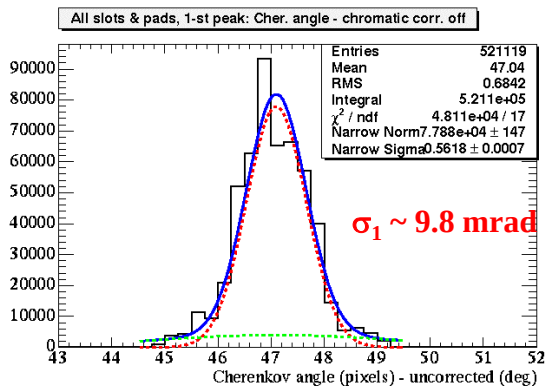
Plots From Jerry

# Do we benefit from the wing slots ?

**Run 22, pos. 1, Forward pfotons only (Jose's constants):**



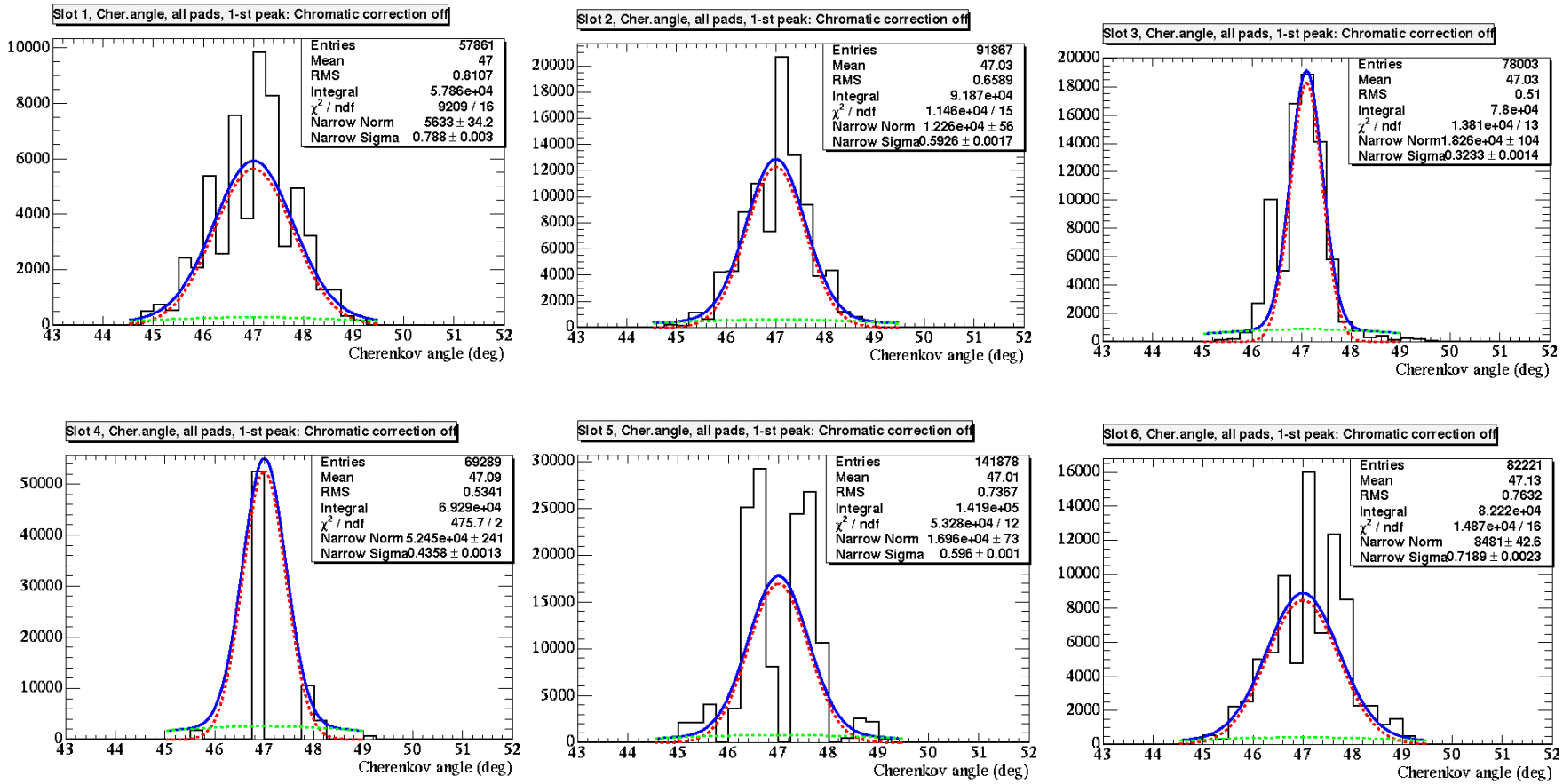

- **Chromatic correction off.**
- See all fits on the next page.




Plots From Jerry

# Fits used in the previous plot

**Run 22, pos. 1, Forward pfotons only (Jose's constants):**




- **Fix the "background" amplitude to 5% of the main Cherenkov peak amplitude.**
- **"Background photons" = Cherenkov photons which scattered away from the main peak.**

Plots From Jerry

# Summary/Outlook

• Preliminary analysis of the hodoscopes gives good track angle resolution.

•Lead Glass shows good separation of multi-particle pulses.

•Start counters give good timing resolutions as before so beam trigger is stable.

•We obtained about 2x the statistics as we had before for each beam position.

•Cherenkov ring coverage is almost complete; added new slot1 and covered some holes.

•New MCP in slot3 has smaller pixel size giving better theta resolution.

•Waiting for new Cherenkov angle assignments obtained from Geant Simulation.

•Timing needs to be looked at on a finer scale.

•ThetaC resolution from time and chromatic correction need to be looked at more closely.

•New method of analysis for chromatic correction is coming.