

# Coordinate Detector Status Update

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Christopher Newport University

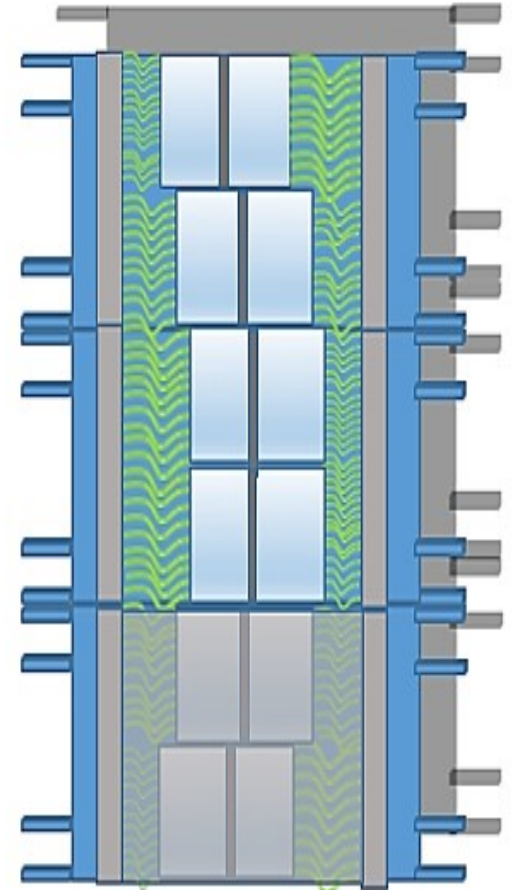
SBS Collaboration Meeting  
14<sup>th</sup> July 2017

# Acknowledgements

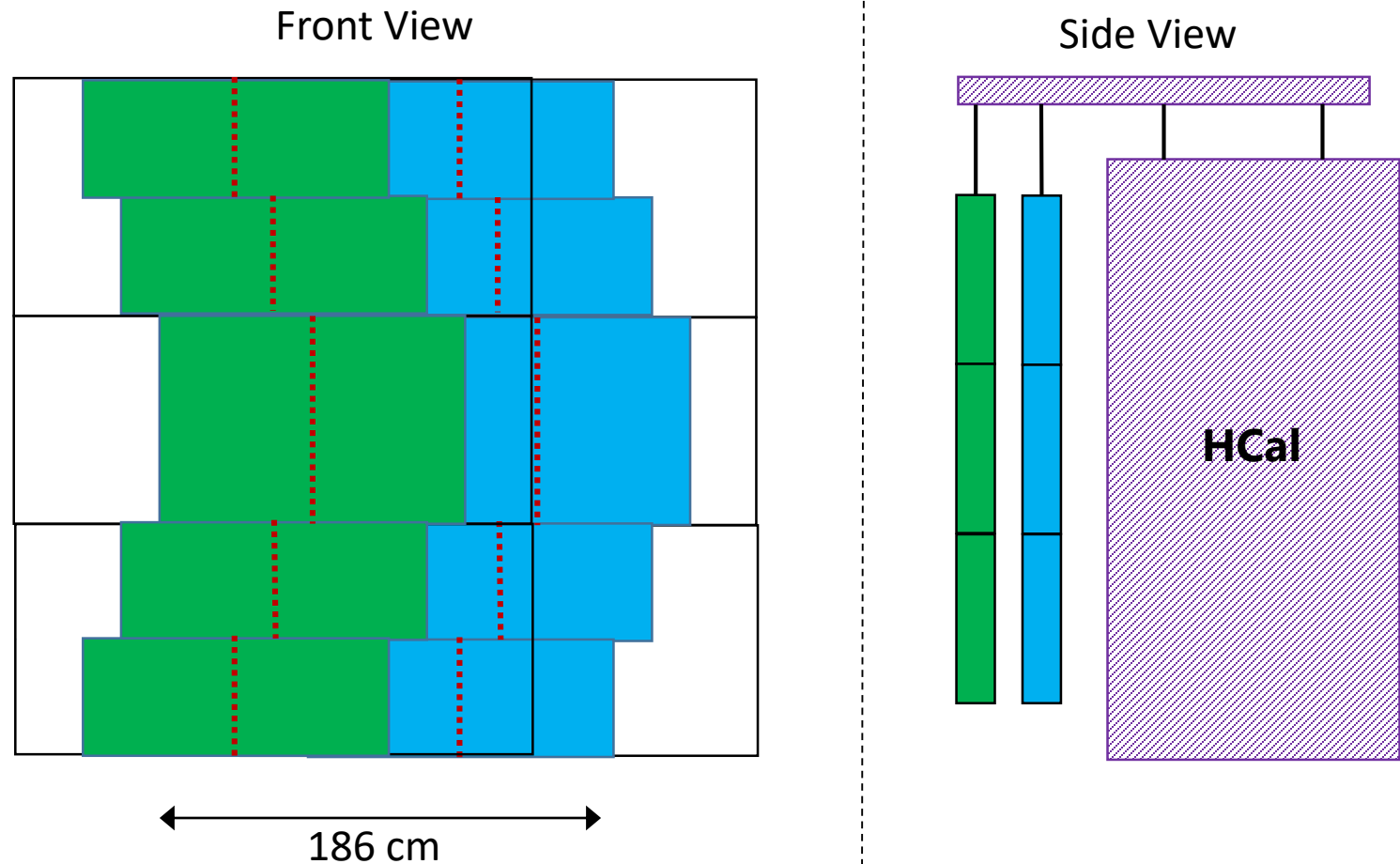
- Contributions from many people!
- CNU: Peter Monaghan, Ed Brash, [Ralph Marinaro](#), [Katie Whitcomb](#)
- St. Mary's: Adam Sarty, [Parker Reid](#)

# Coordinate Detector Configuration

- Detector has two planes each with an active area of  $(102 \times 294) \text{ cm}^2$
- 6 modules; 3 per plane; 28 scintillator **groups** in each module.
- Each group consists of 14 scintillator **paddles**.
- Total of 2352 channels.
- Each paddle has a **wavelength shifting fiber** (WLS) along its center for light collection.
- Each group of WLS connected to 16-channel **maPMT**



# Acceptance Coverage for $Gm_n$



- Offset planes to cover HCal acceptance

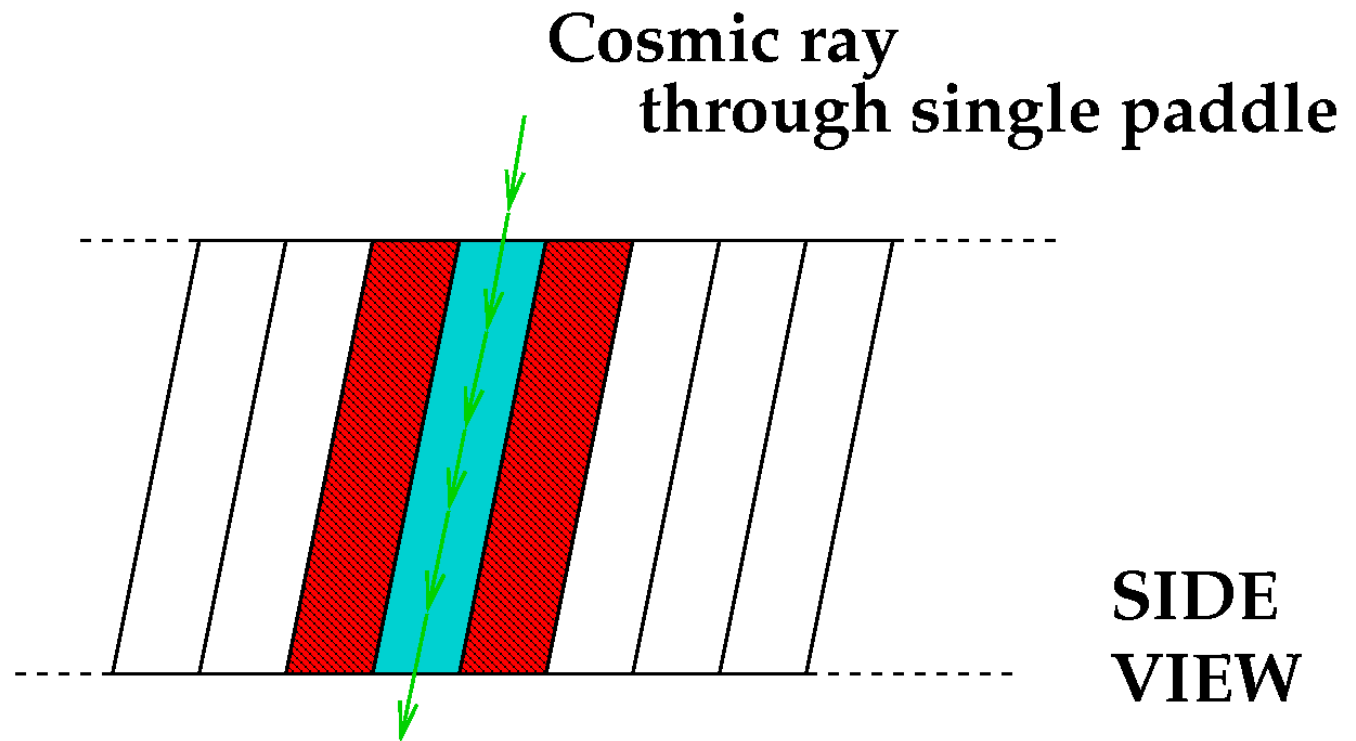
# Module Assembly Completed!

- All six modules assembled; awaiting testing.



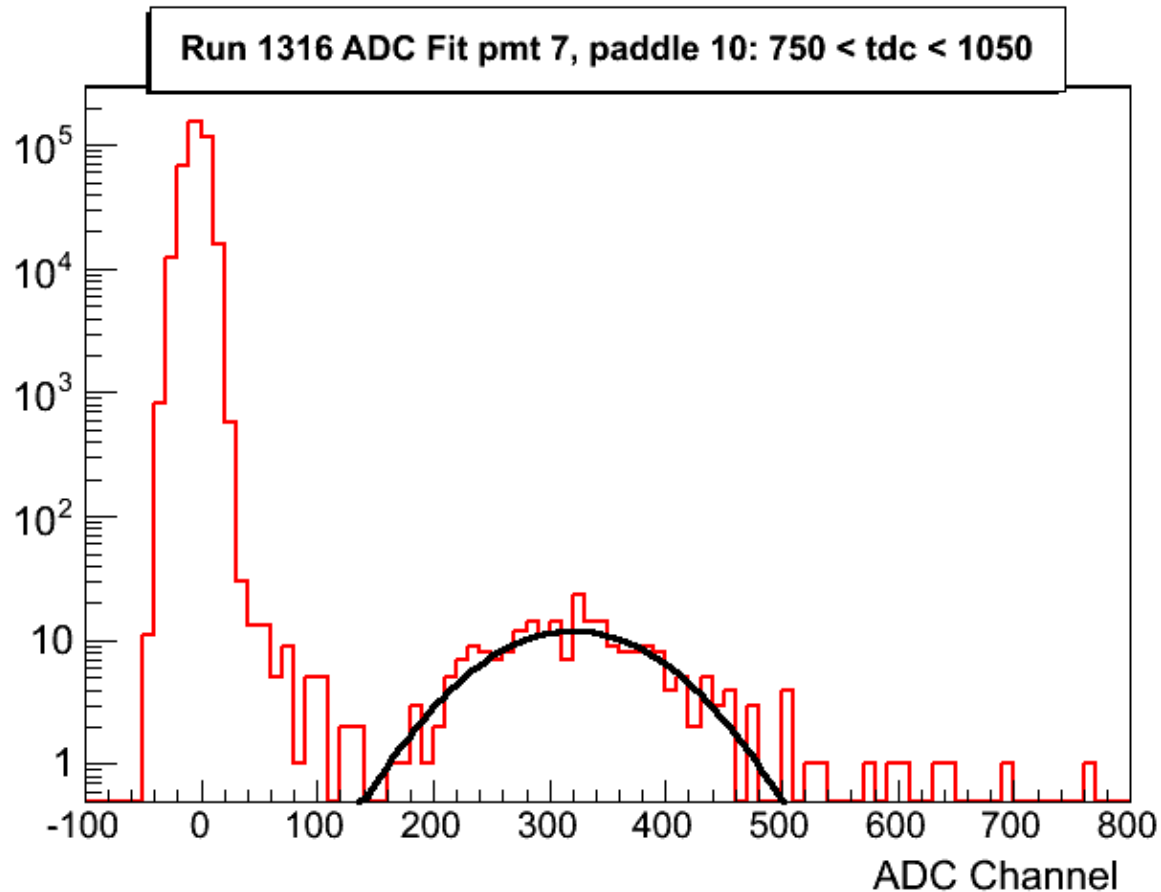
# Selecting Tracks

- Apply cuts on ADC of middle paddle and two adjacent paddles



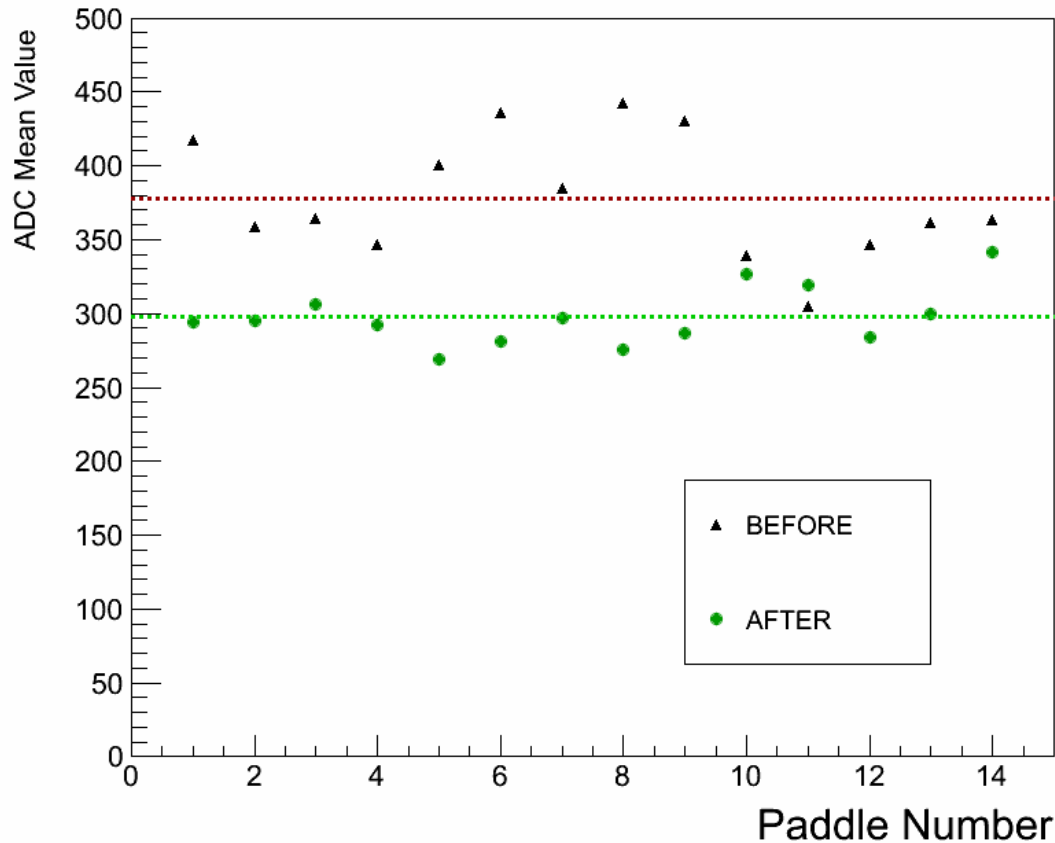
# Single Track ADC Amplitude

- Separate signal from remnant of pedestal



# Charge Equalisation

Comparison of Mean ADCs - PMT 7

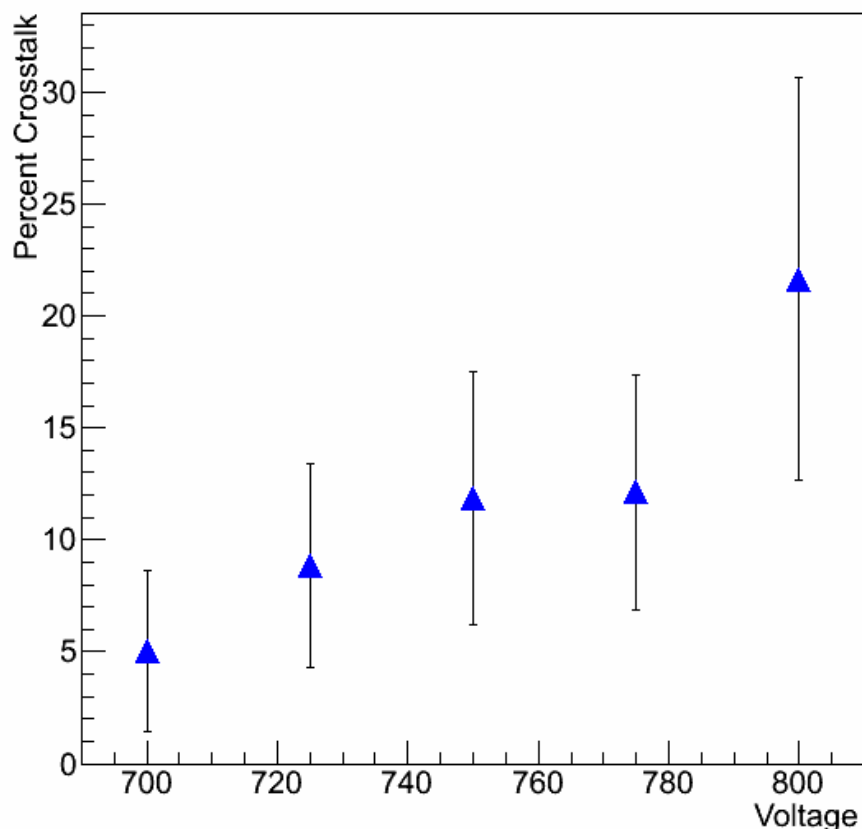


- Mean ADC for single paddle cosmic events.



# Capacitive Crosstalk

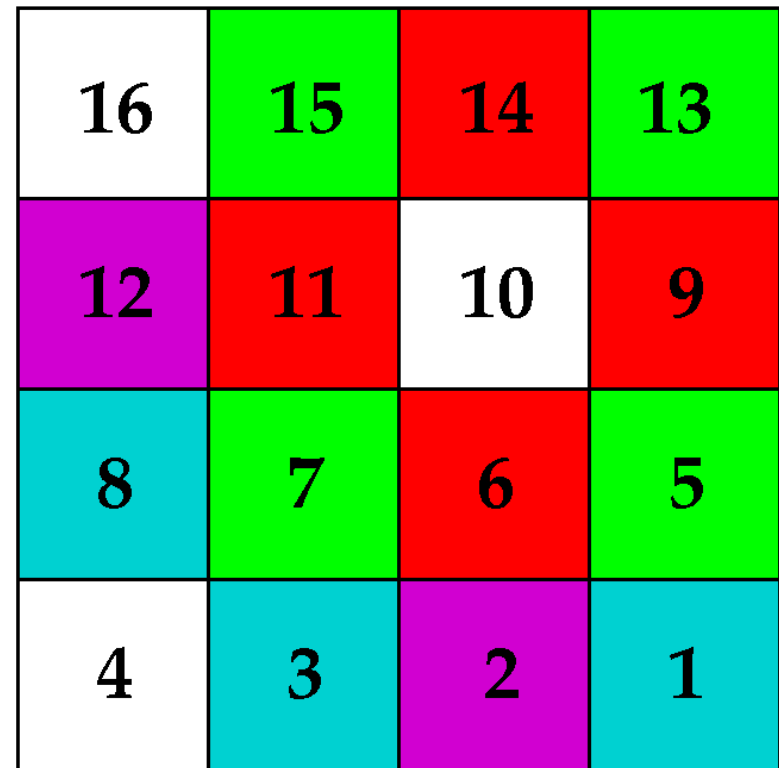
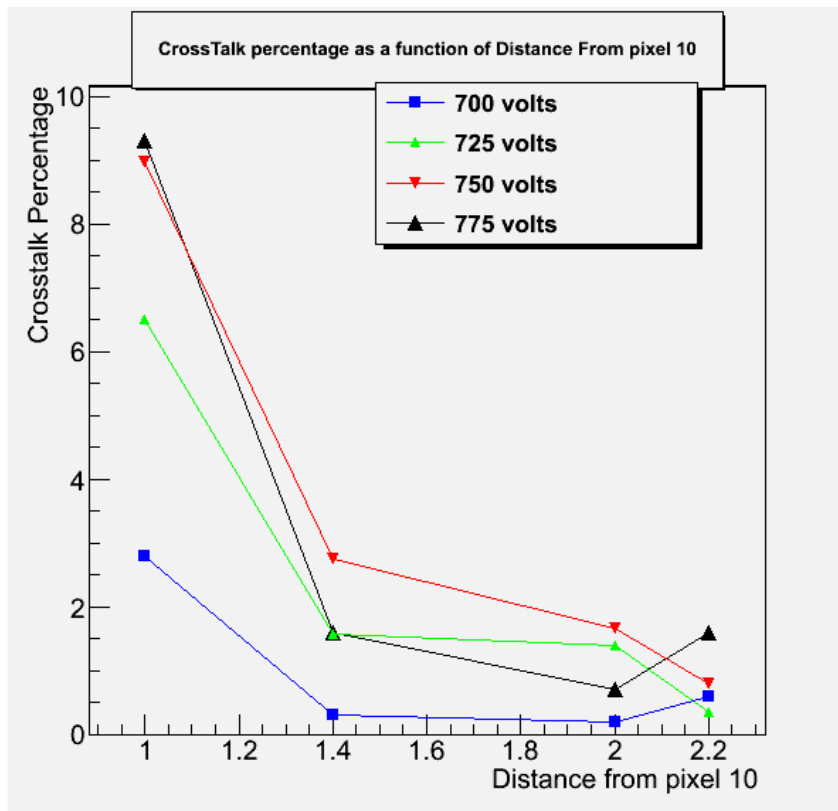
Percent CrossTalk vs Voltage



- Consider single track in middle paddle.
- Define crosstalk as percentage of events where TDC fired in either of the two adjacent paddles.
- Dependent on PMT voltage

# Crosstalk Geometry Dependence

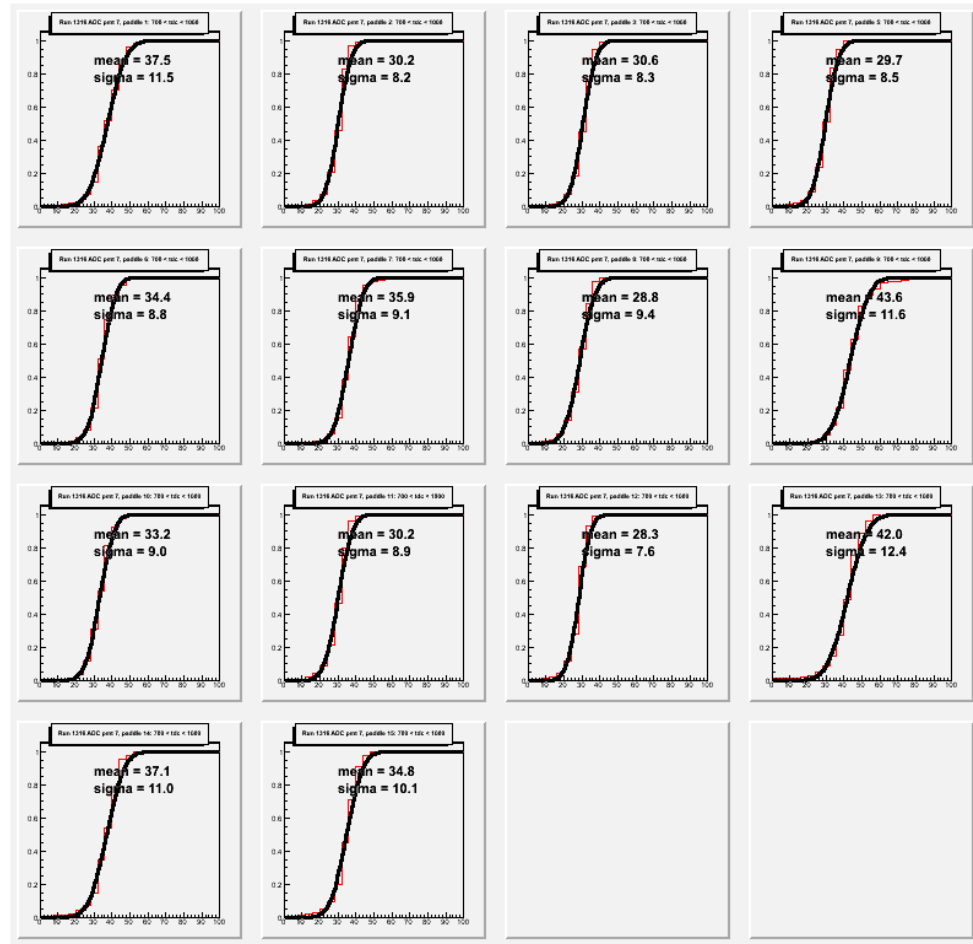
- Larger crosstalk in pixels immediately adjacent
- Significantly reduce crosstalk with HV



# Efficiency Ratio

$$\eta = \frac{ADC (TDC \text{ cut})}{raw \text{ ADC}}$$

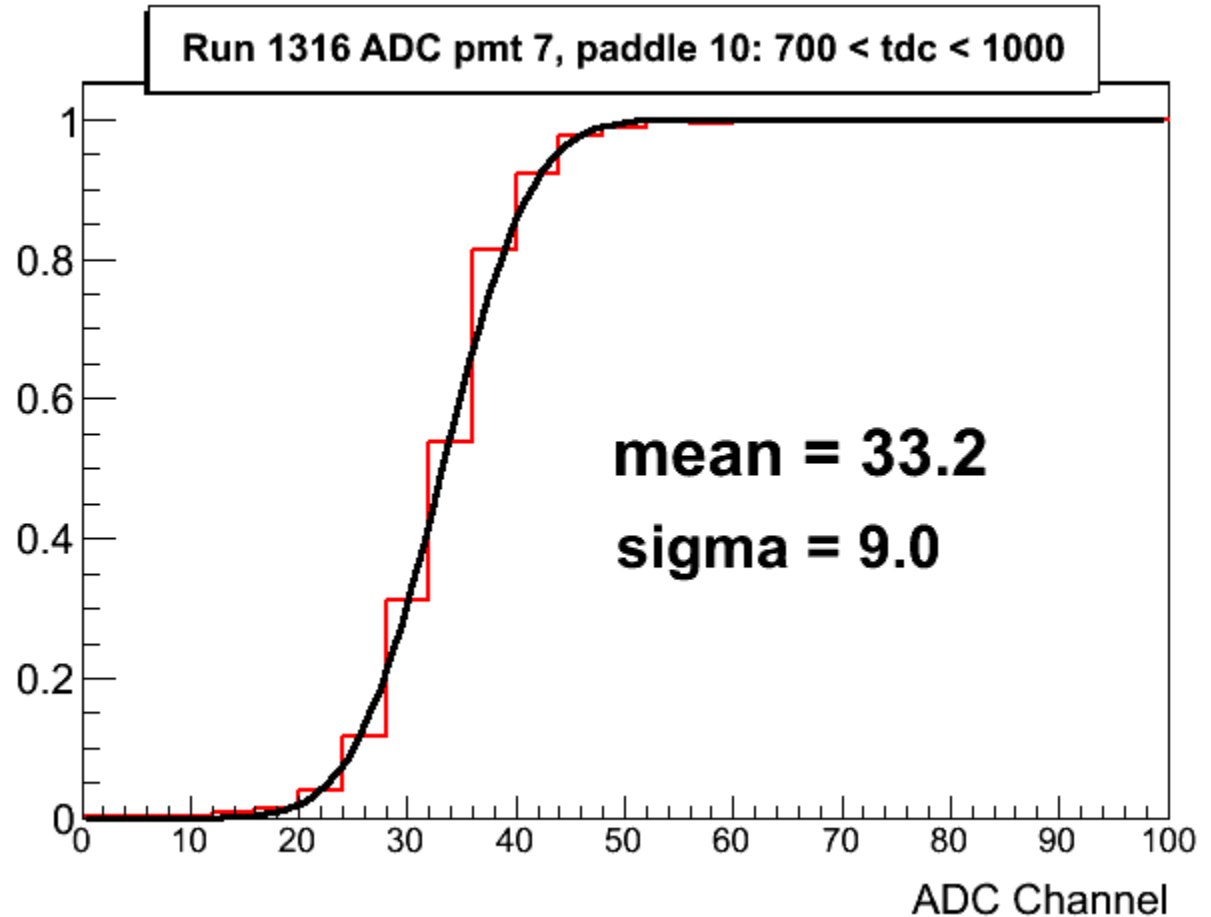
- Set 50% ratio as threshold for detector
- Mean values consistent across all 14 pixels.



# Single Pixel Efficiency Ratio

$$\eta = \frac{ADC (TDC \text{ cut})}{raw ADC}$$

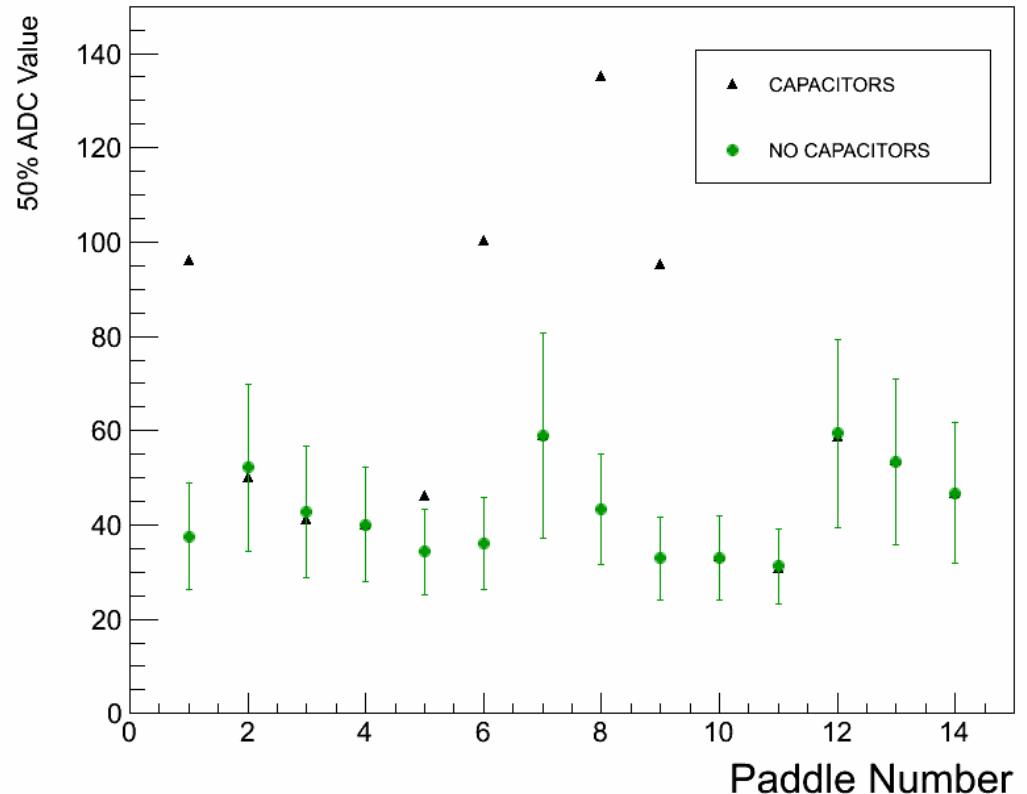
- Set 50% ratio as threshold for detector
- Determine threshold to set for each bar.



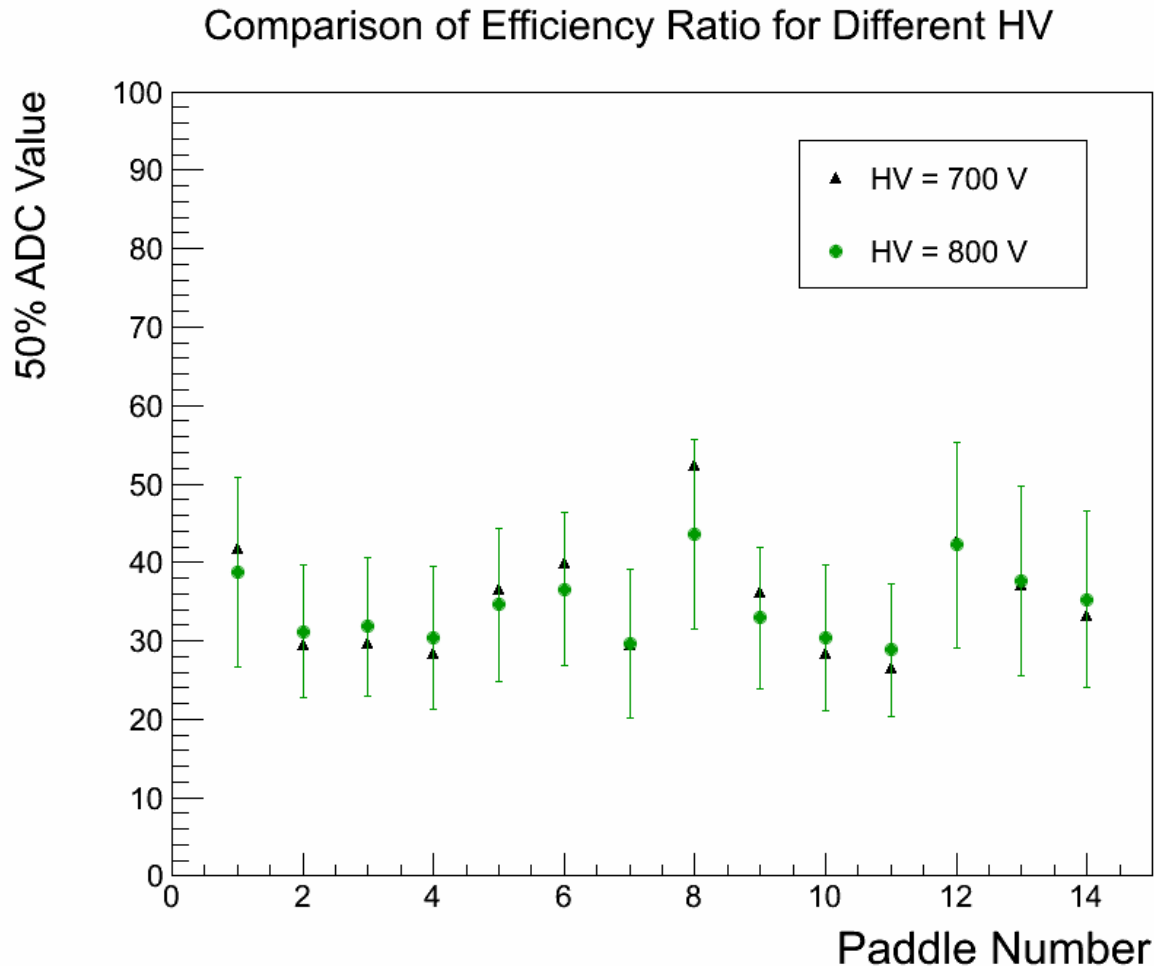
# Efficiency with/without Capacitors

- Removed capacitors from connectors between PMT and NINO
- Resistors still in place.
- Efficiency ratio now more consistent between all paddles

Comparison of Efficiency Ratio - PMT 7



# Compare Efficiency with Voltage



- Efficiency independent of PMT voltage

# Wiki Pages for CDet

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- Information posted on SBS Wiki
  - [CDet pages here](#)
- Very much a work in progress.
- Please give us feedback for improvements!

# Manpower Commitment

- Two CNU faculty: Monaghan & Brash
- Two CNU undergraduate students: Katie Whitcomb & Ralph Marinaro
- **Funding dependent!**



# Summary

- Commissioning in progress.
- Software databases, tools, analysis scripts being updated and developed.
- Working to determine the required resistances for charge-equalization of each pixel/fiber.
- Determine threshold setting for each PMT
- Lessons learned will help in testing of the rest of the six modules.