

# Pulsed LED Calibration of Multi-anode Photomultiplier Tubes

Paul Karchin, Alfredo Gutierrez, Brian Jankowski, Sean Thomas  
Wayne State University

ALCPG Workshop  
Fermilab  
4/9/07

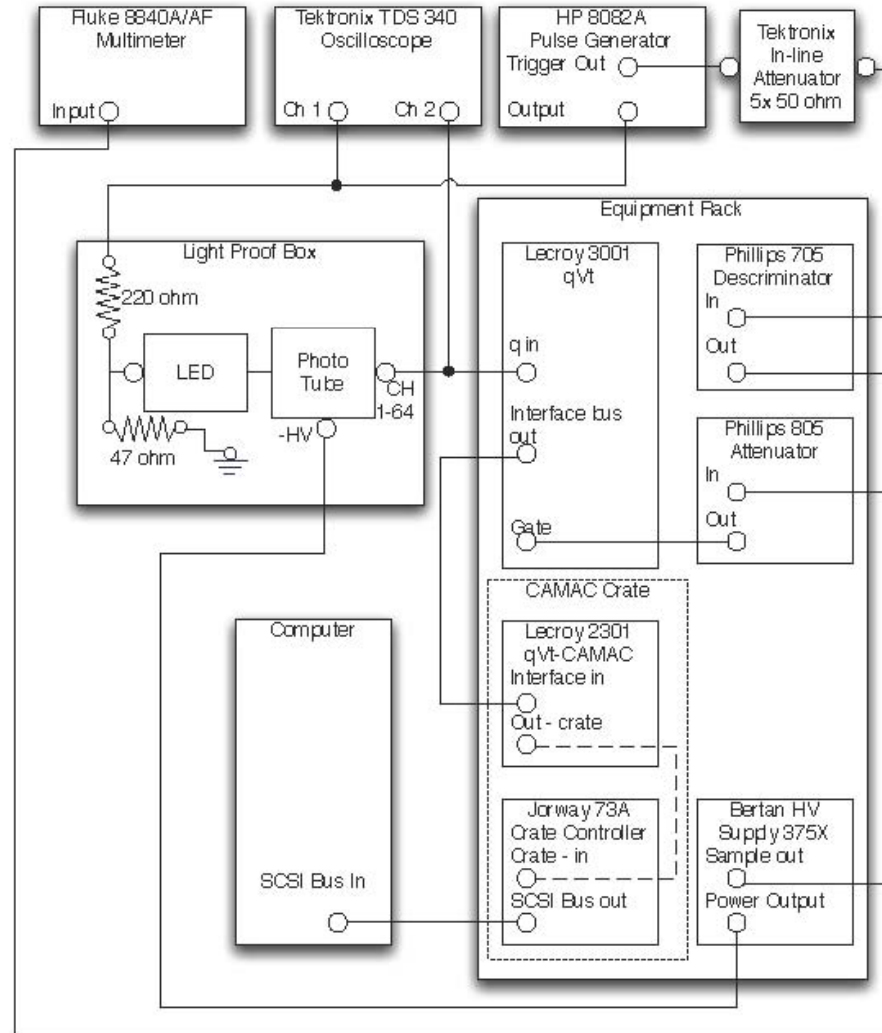
# Goals

- Hamamatsu MAPMT as baseline readout
- Calibrate gain of each channel
- Absolute and relative gain

# Method

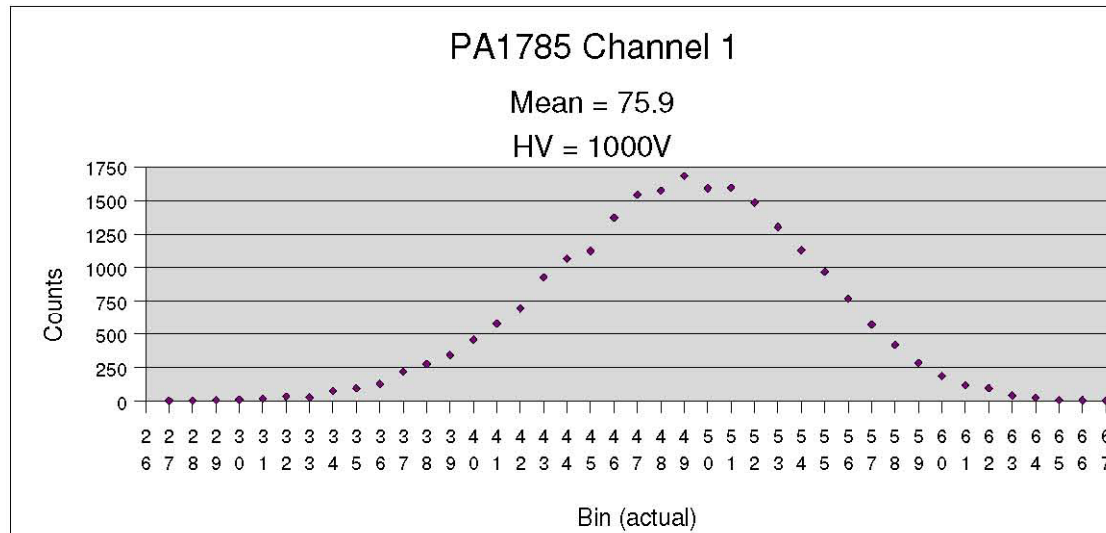
- Fast (10ns) light pulse from LED
- record pulse charge distribution with LeCroy QVT
- extract PMT gain and mean # pe (npe) assuming Poisson statistics

# Calibration Instrumentation

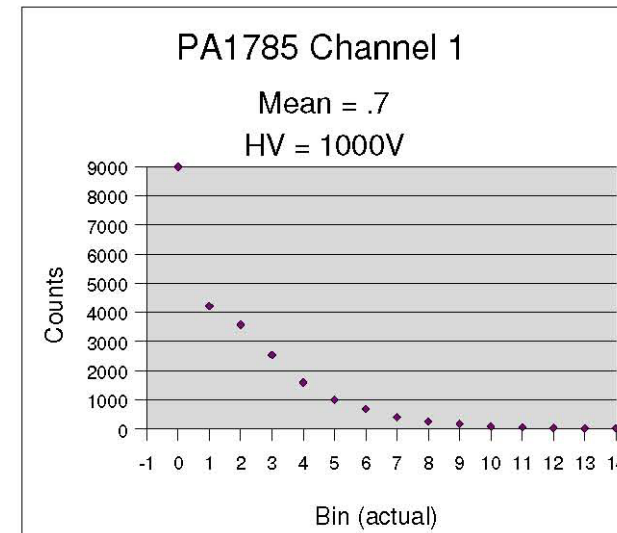


# MAPMT Charge Distributions

High Mean



Low Mean

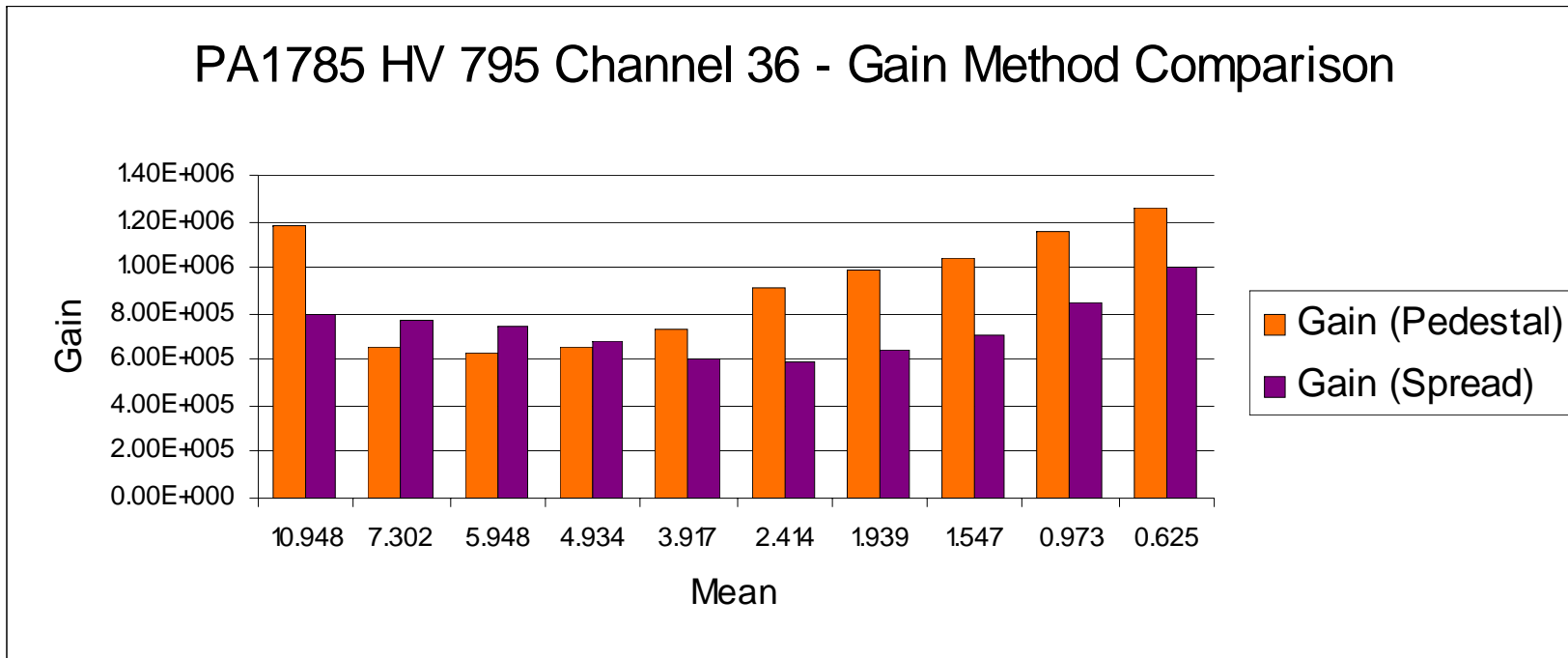


Gain and npe determined assuming Poisson statistics

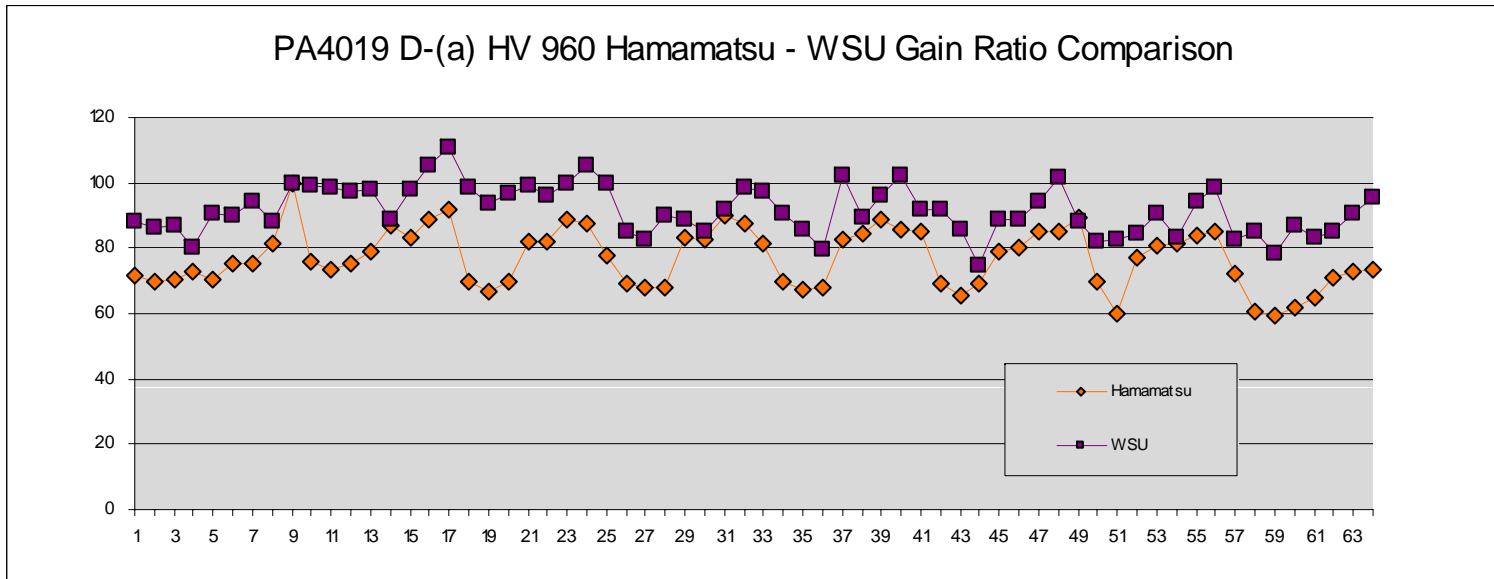
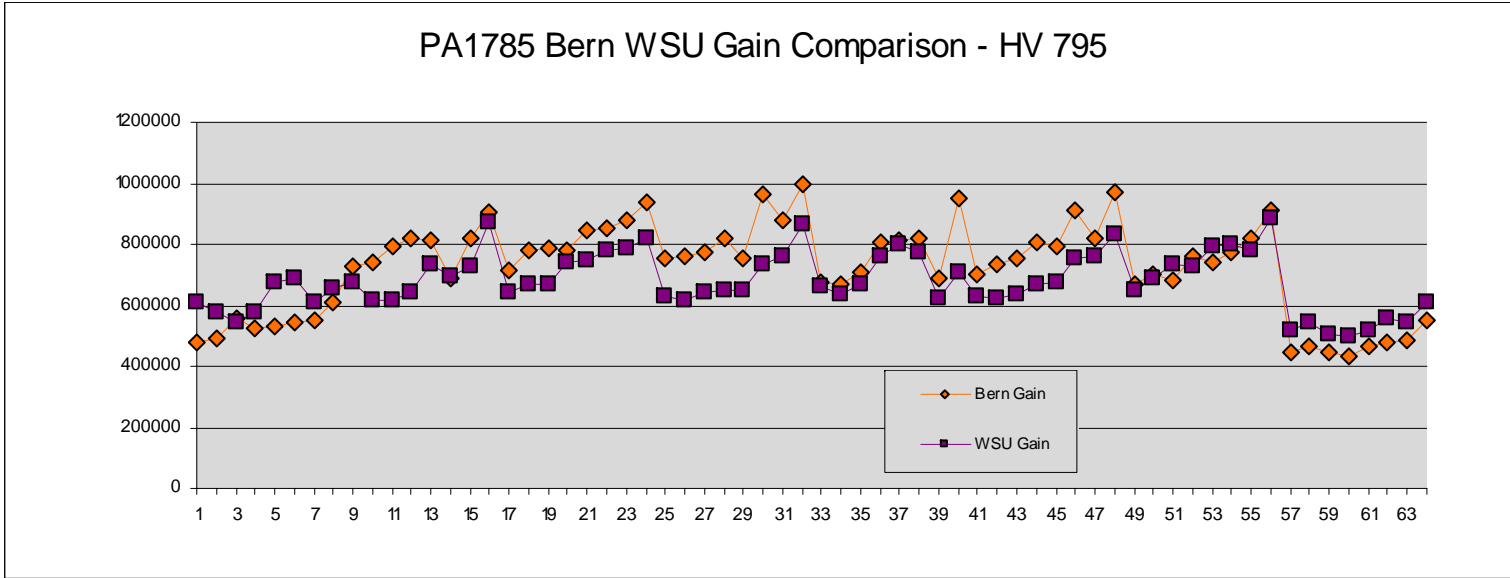
Two Methods:

- charge mean and variance (width method)
- pedestal to total charge ratio (pedestal method)

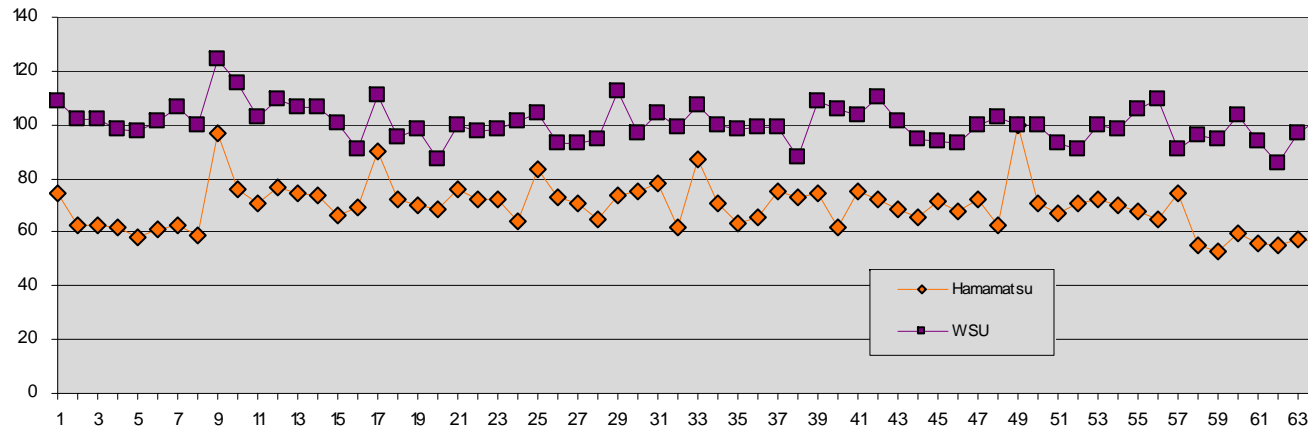
## PA1785 HV 795 Channel 36 - Gain Method Comparison



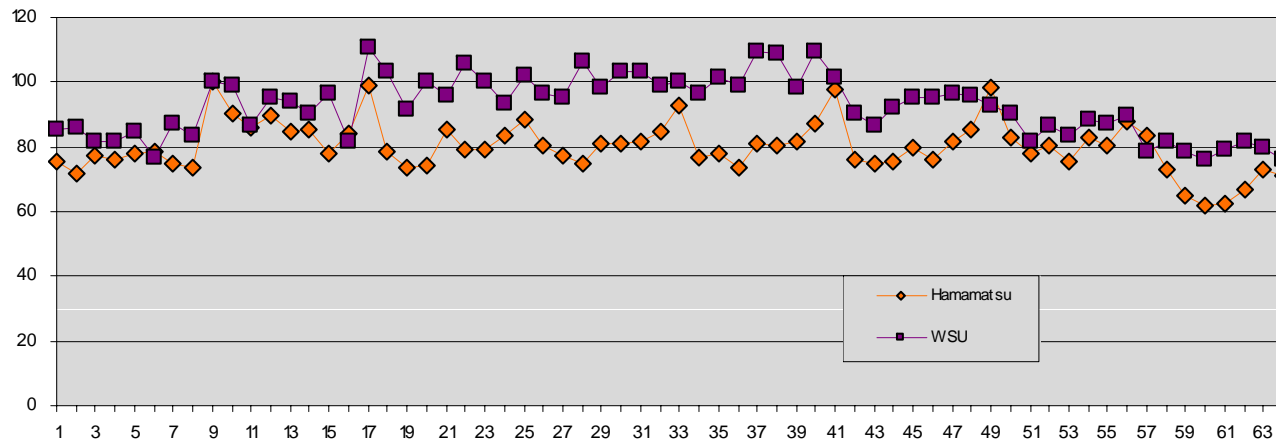
Bern Gain 8.07 E+005



PA4015 D-(b) HV 960 Hamamatsu - WSU Gain Ratio Comparison



PA4020 S- HV 960 Hamamatsu - WSU Gain Ratio Comparison



# Conclusions & Outlook

- LED pulse calibration setup and DAQ established
- Poisson analysis gives reasonable npe and gain values
- Cross check with Univ. Bern calibration and Hamamatsu calibration is reasonable
- Absolute and relative gain for large number of channels is available for tubes used in Fermilab beam test of scintillator muon prototypes