

# HGC Update – Dec/18

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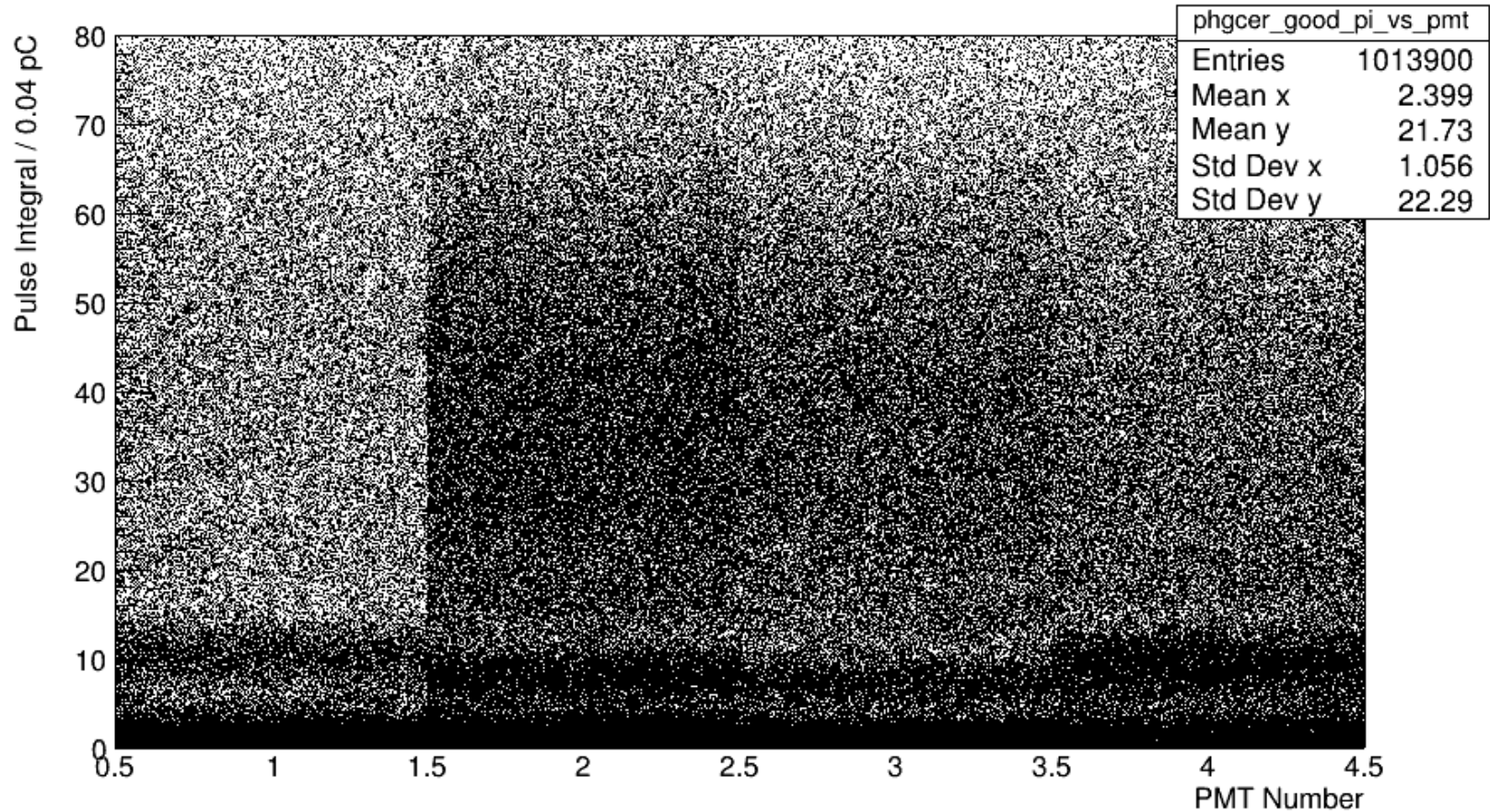
University  
of Regina

# Improved Gain Matching

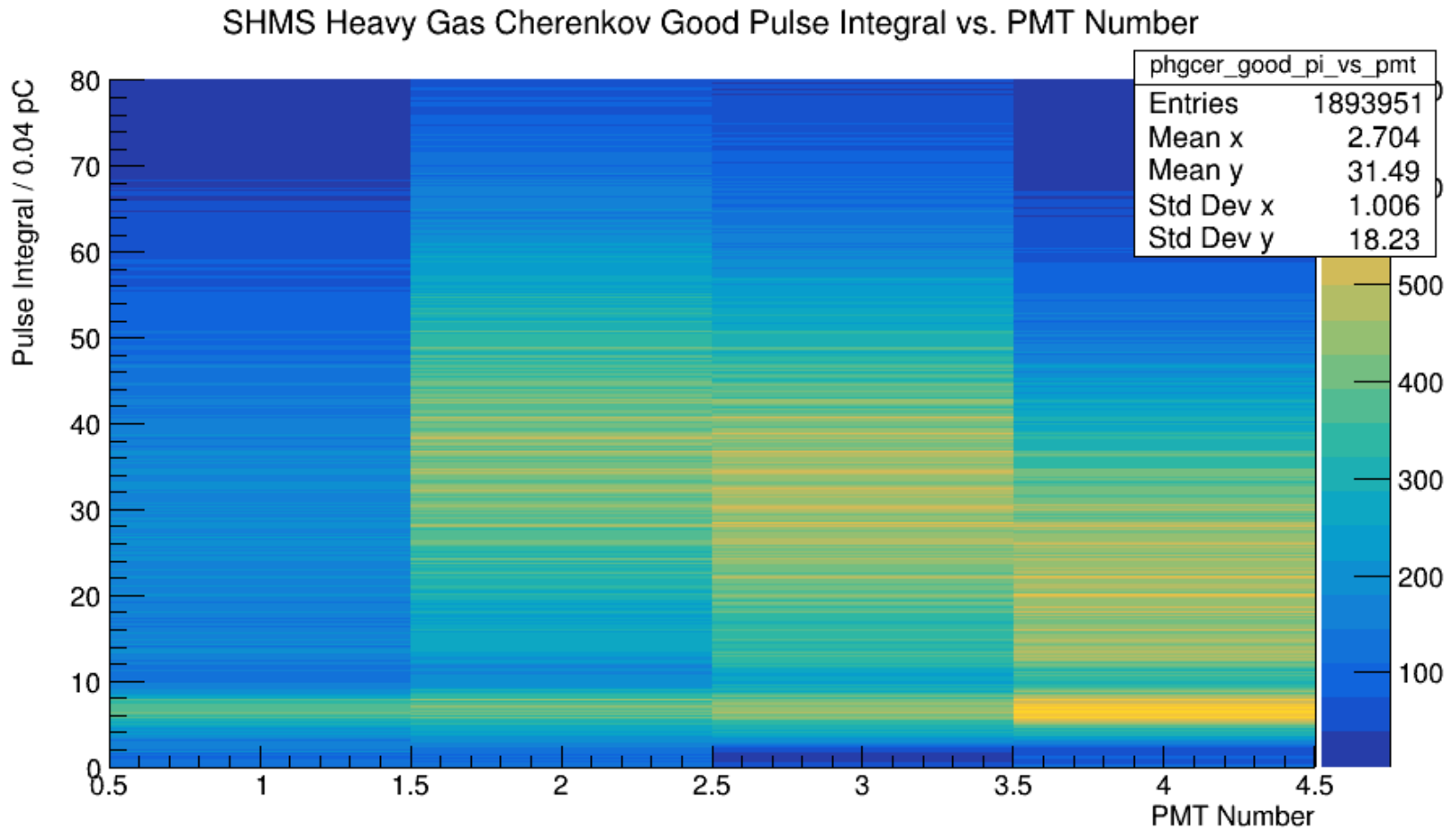
PMT	KPP	New
1 (LL)	2347	2251
2 (LR)	2087	2051
3 (UL)	2015	2001
4 (UR)	2158	2086

# Good Pulse Int vs PMT Run 488

SHMS Heavy Gas Cherenkov Good Pulse Integral vs. PMT Number

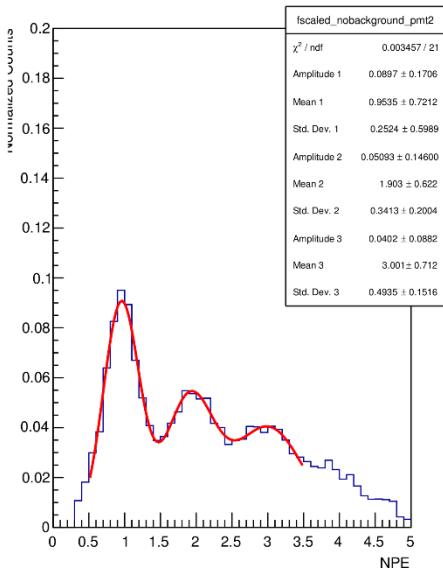


# Good Pulse Int vs PMT Run 1583



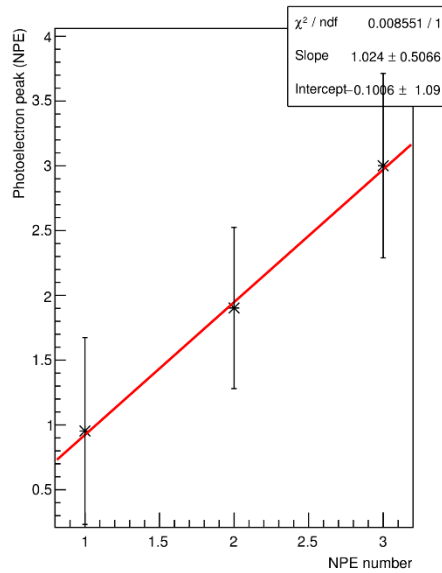
# New Calibrations Posted

NPE spectra background removed for PMT2

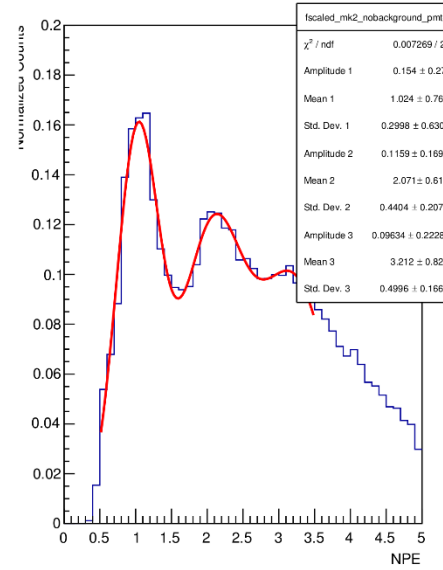


Lower Right PMT

Linear Spacing of PE for PMT2

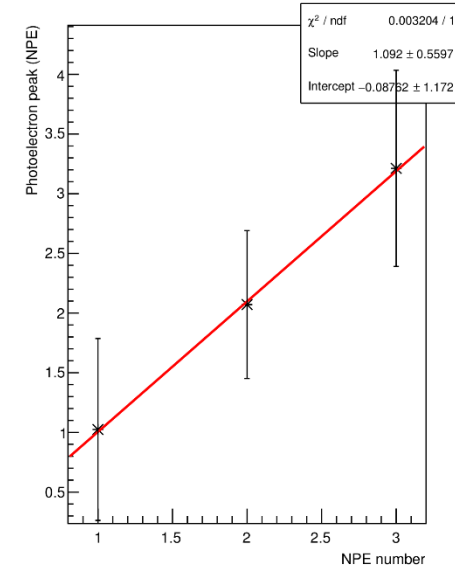


NPE spectra background removed for PMT4

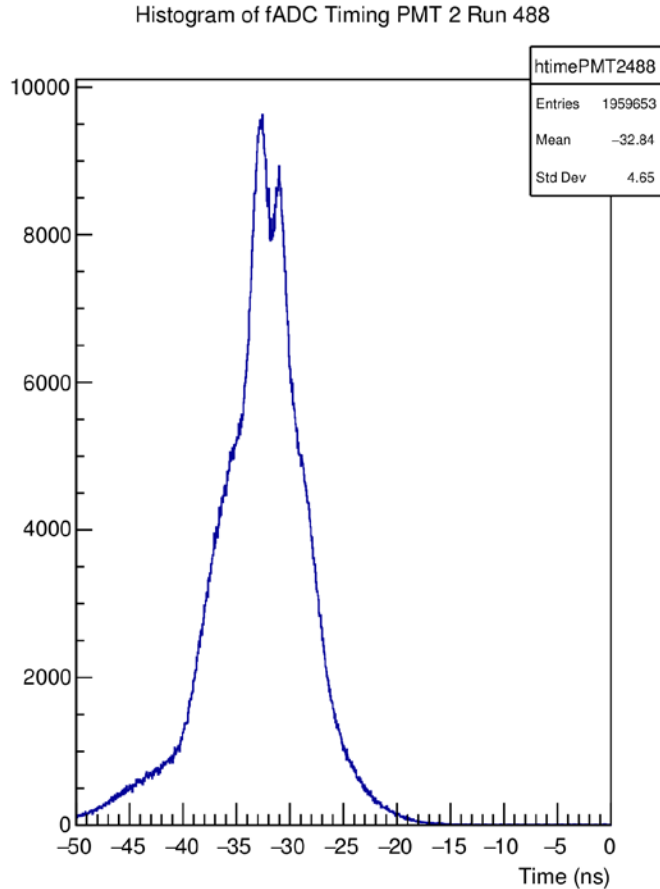


Upper Right PMT

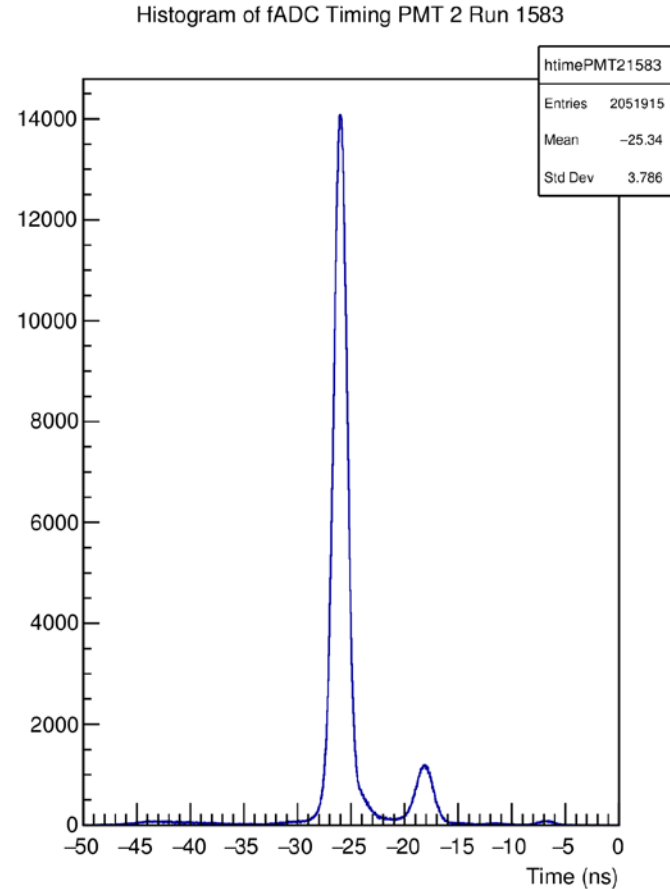
Graph



# PMT timing peaks much improved



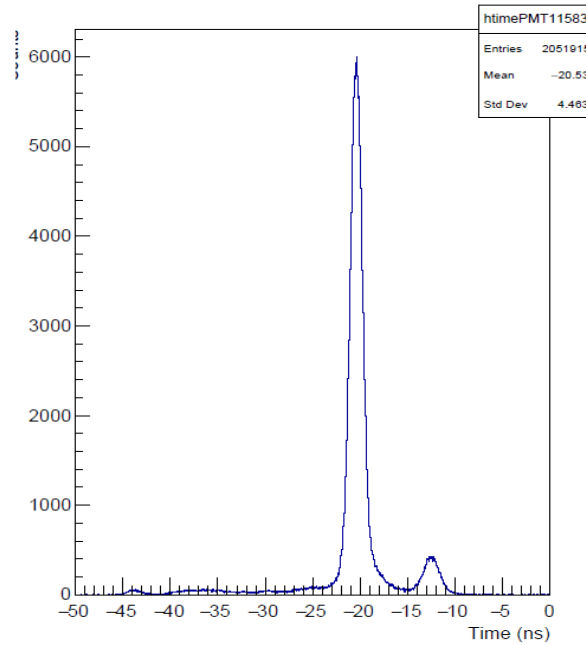
KPP



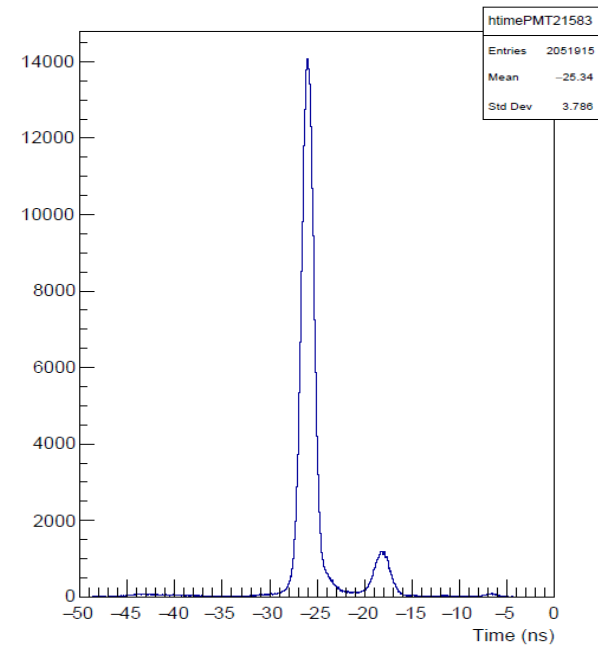
Still need to understand 2<sup>nd</sup> peak  
...different trigger?

- Double peak most pronounced in PMT 1 & 2
- Correlated with grease removal?

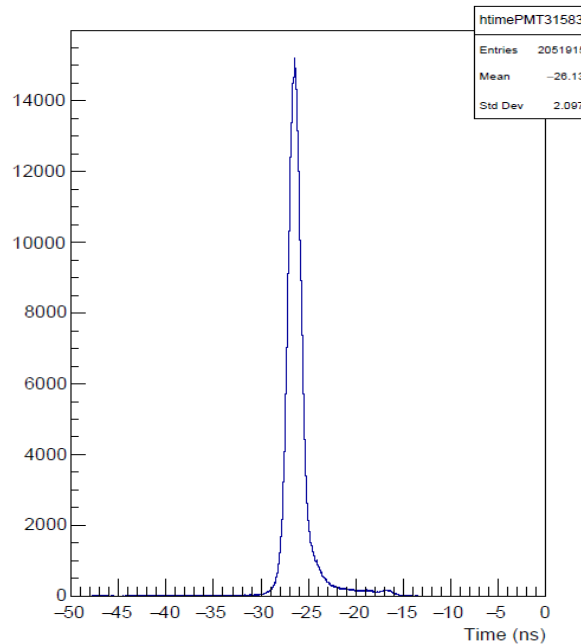
Histogram of fADC Timing PMT 1 Run 1583



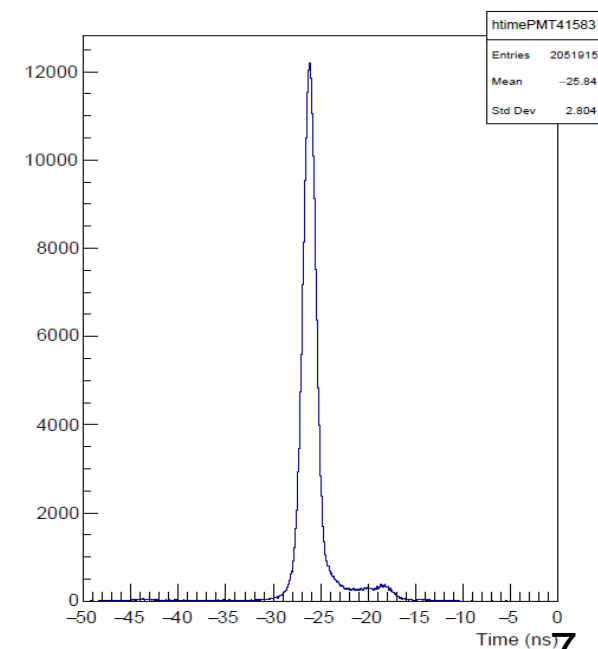
Histogram of fADC Timing PMT 2 Run 1583



Histogram of fADC Timing PMT 3 Run 1583



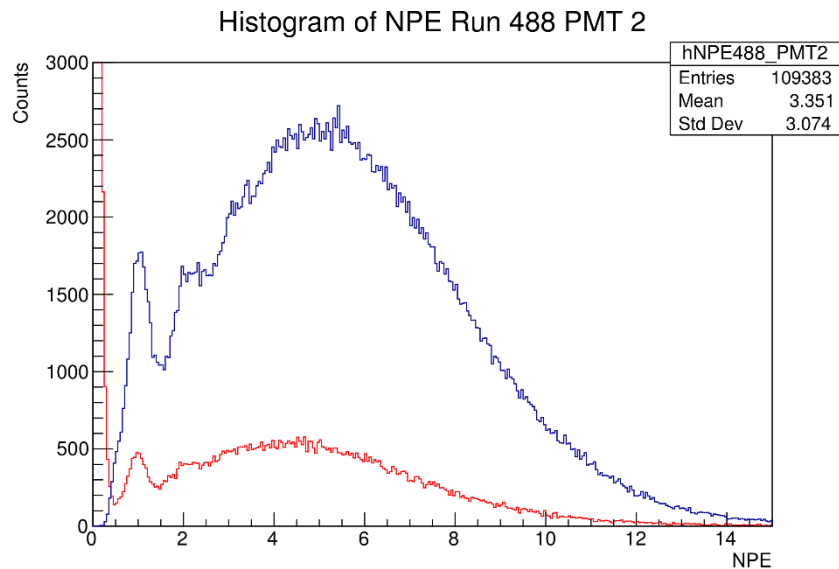
Histogram of fADC Timing PMT 4 Run 1583



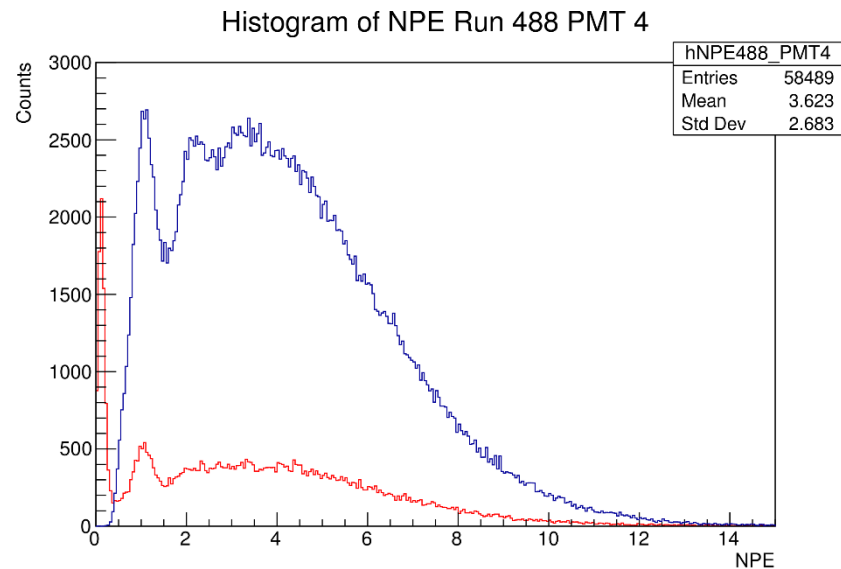
# Preliminary Comparison of NPE spectra

Red=KPP 488

Blue=Run 1583



Lower Right PMT  
Optical Grease Removed



Upper Right PMT  
Optical Grease not Removed

Due to mirror interleaving, there is a significant shadowing effect on some PMTs that needs to be taken into account before the detailed comparison is completed.



# HGC Electron Efficiencies

npe Cut	KPP 488	Run 1583
>2.0	89.72%	91.52%
>1.5	94.09%	94.95%
>1.0	97.41%	98.10%
<b>&gt;0.5</b>	<b>99.60%</b>	<b>99.95%</b>

- Encouraging improvement. Detailed analysis to understand the effect of the optical grease removal on PMTs 1,2 still in progress.
- Removal of grease on PMTs 3,4 is more complicated, will happen next summer. Ideas for other improvements are under consideration.

# HGC Electron Efficiency per PMT

npe Cut @ 2.0	KPP 488	Run 1583
PMT 1	85.90%	86.78%
PMT 2	91.95%	94.49%
PMT 3	90.87%	90.63%
PMT 4	88.18%	88.20%

**PMT 1 & PMT 2 have optical grease removed**

# HGC Electron Efficiency per PMT

npe Cut @ 0.5	KPP 488	Run 1583
PMT 1	98.41%	99.93%
PMT 2	99.94%	99.97%
PMT 3	99.71%	99.92%
PMT 4	99.94%	99.99%

**PMT 1 & PMT 2 have optical grease removed**

# Future Work

- Better understand effect of optical grease removal
  - Detailed comparison between KPP and commissioning data
- Further optimization of HGC performance
  - Simulate a variety of optical configurations