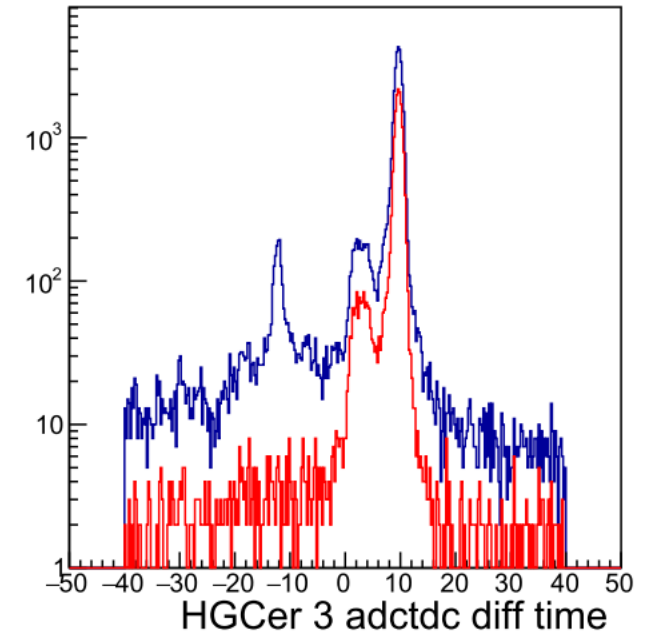
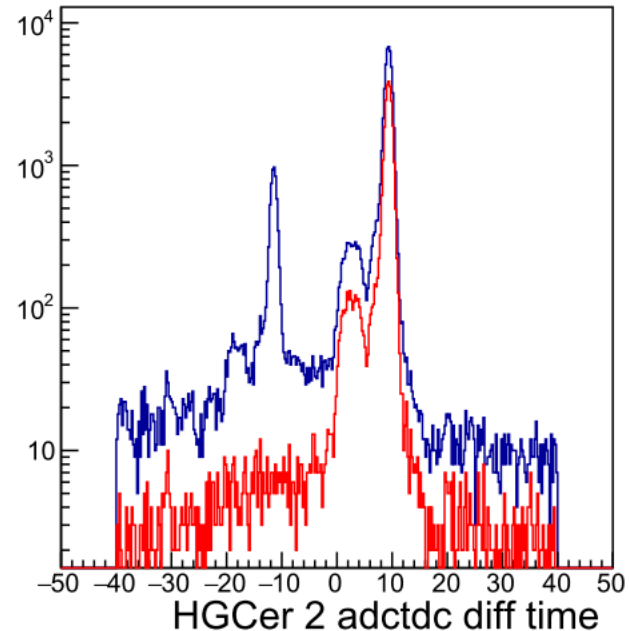
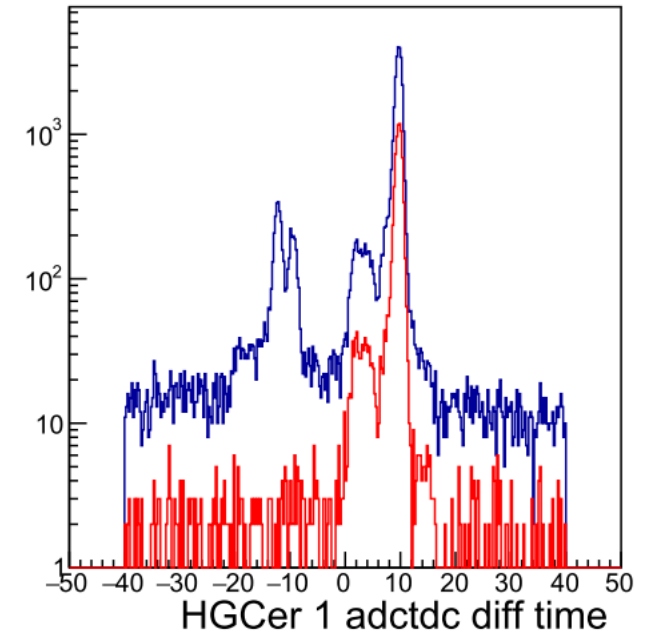
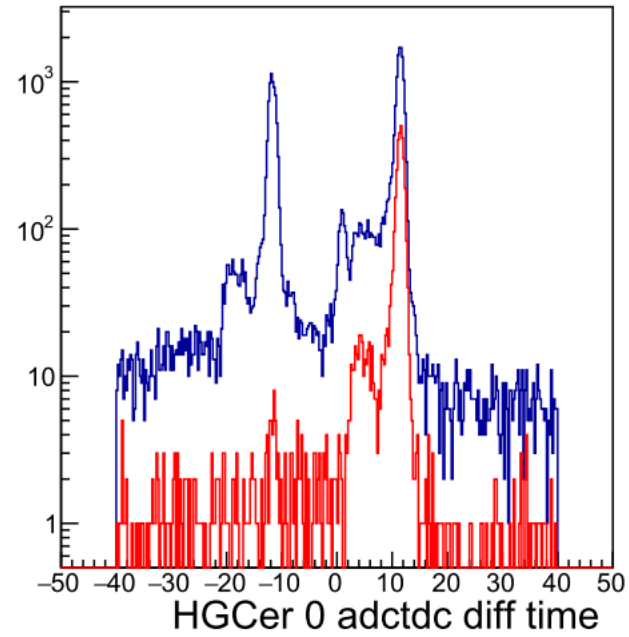


SHMS HG Cerenkov

- Looking at run 5371 taken in the Fall 18 as part of SIDIS.
- SHMS in negative polarity.
- SHMS $\frac{3}{4}$ rate is 600kHz.

SHMS HG

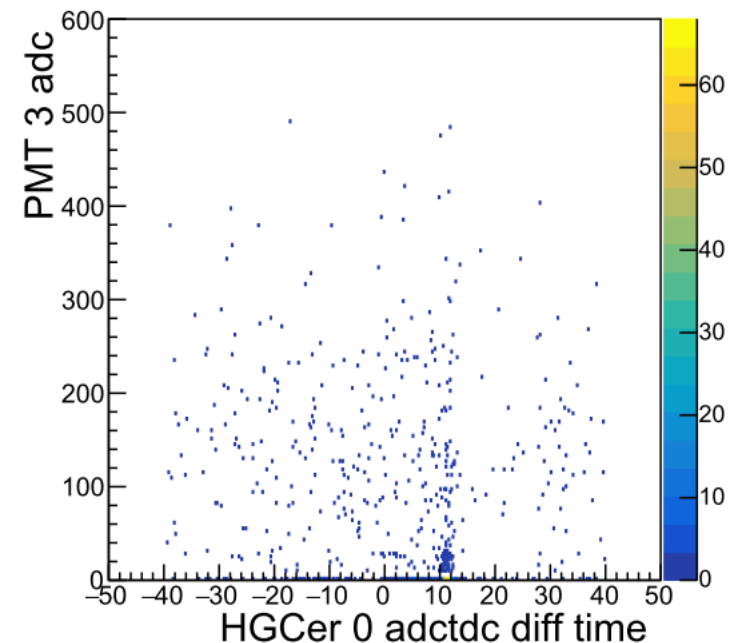
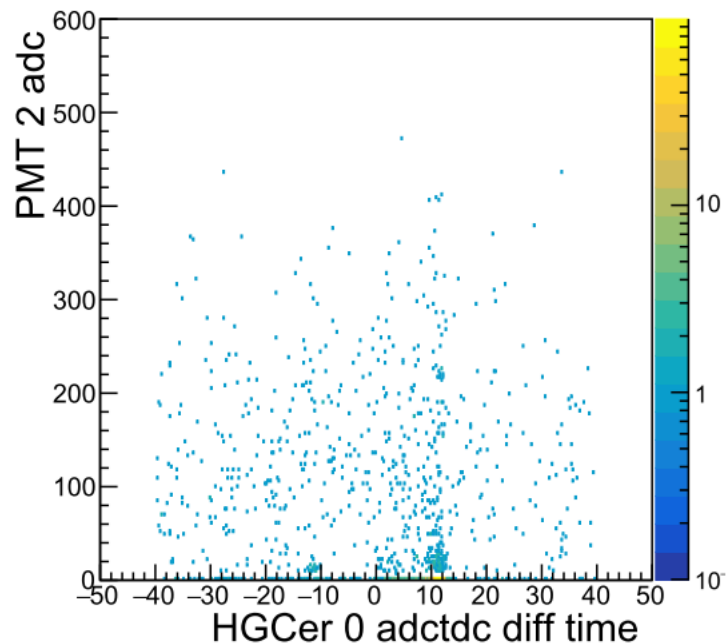
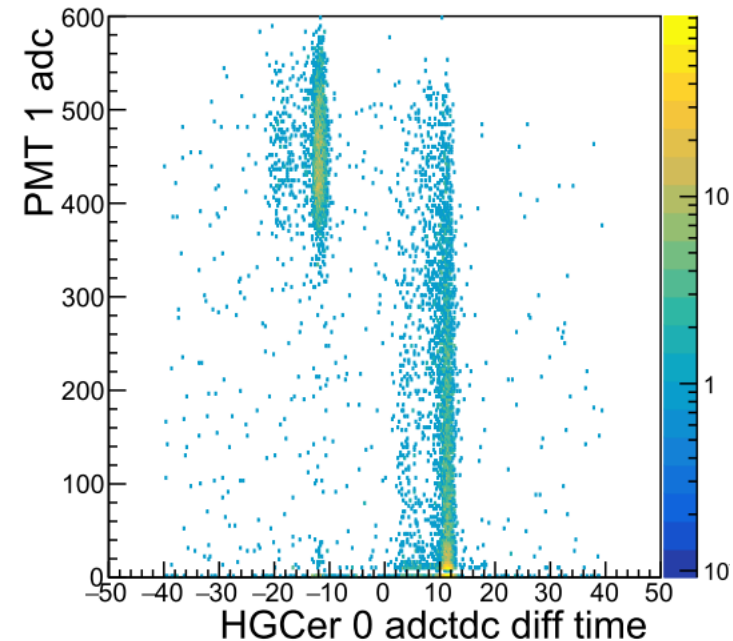
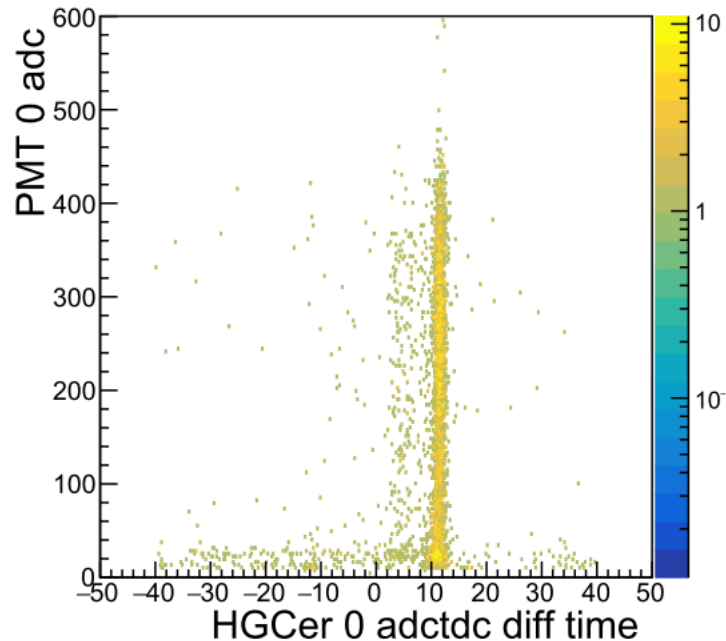
- “adctdc diff time” = ADC time – Hodoscope Starttime.
- If multiple hits in PMT, selects hit with largest ADC in the ADC-Hodo time difference time.
- Use window of ± 40 ns.
- Plot for each PMT
- Blue line is for all hits in PMT.
- Red line has hit in PMT with no hits in any other of the PMTs.
- Most of the peaks disappear when no hits in other PMTs.



Look at PMT 0

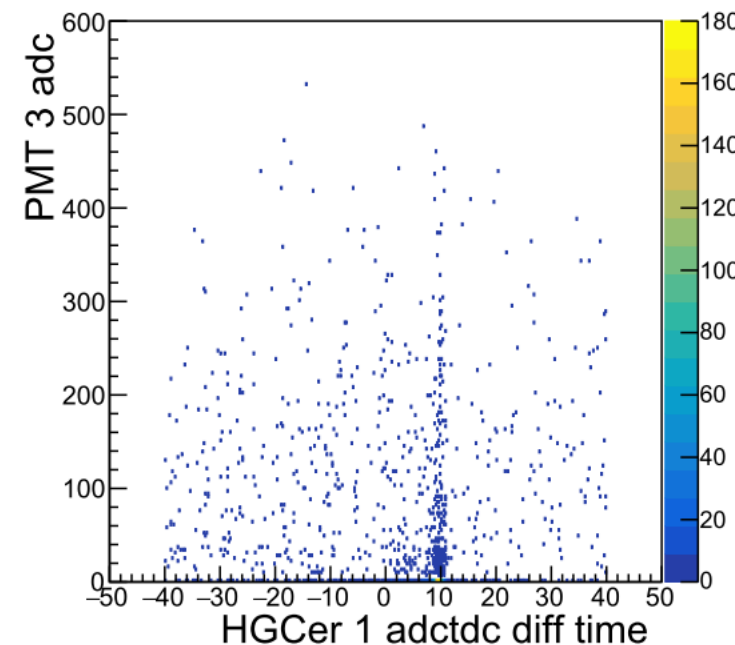
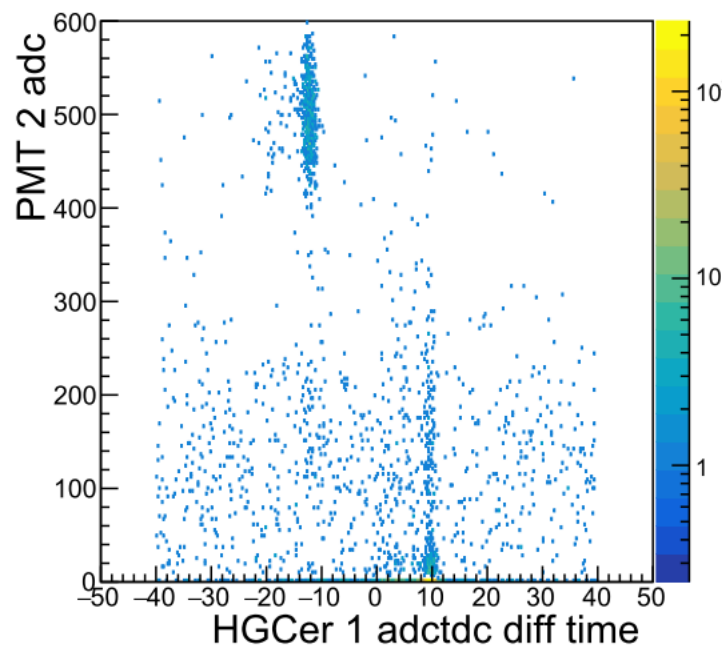
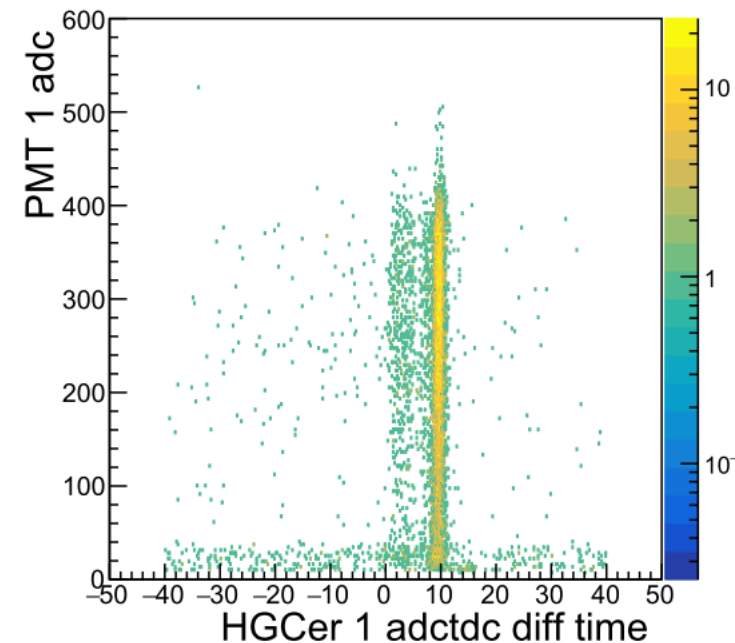
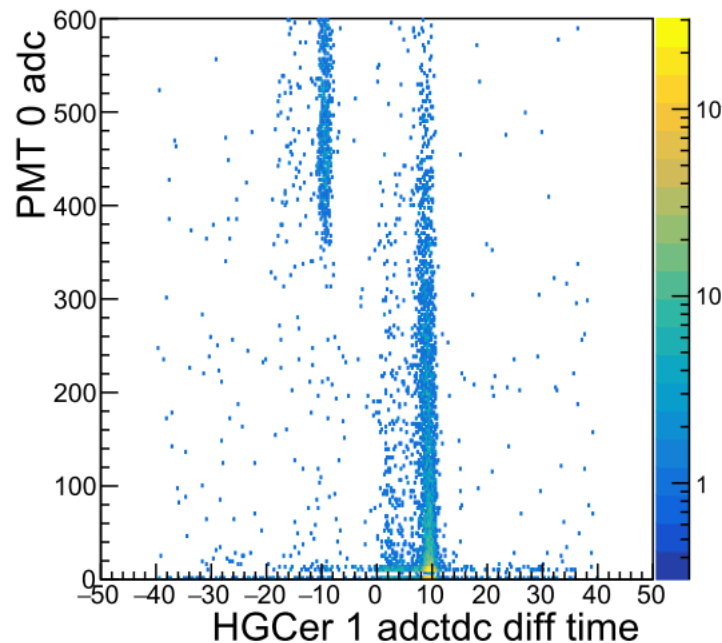
- Upper left plot is PMT0 ADC amplitude versus PMT0 ADC-HODO time difference with no hits in any other PMT.
- Upper right plot is PMT1 ADC amplitude versus PMT0 ADC-HODO time difference with no hits in other two PMT.
- Lower left plot is PMT2 ADC amplitude versus PMT0 ADC-HODO time difference with no hits in other two PMT.
- Lower right plot is PMT3 ADC amplitude versus PMT0 ADC-HODO time difference with no hits in other two PMT.

Looks like cross talk with PMT1. Maybe in the linear FI/FO.



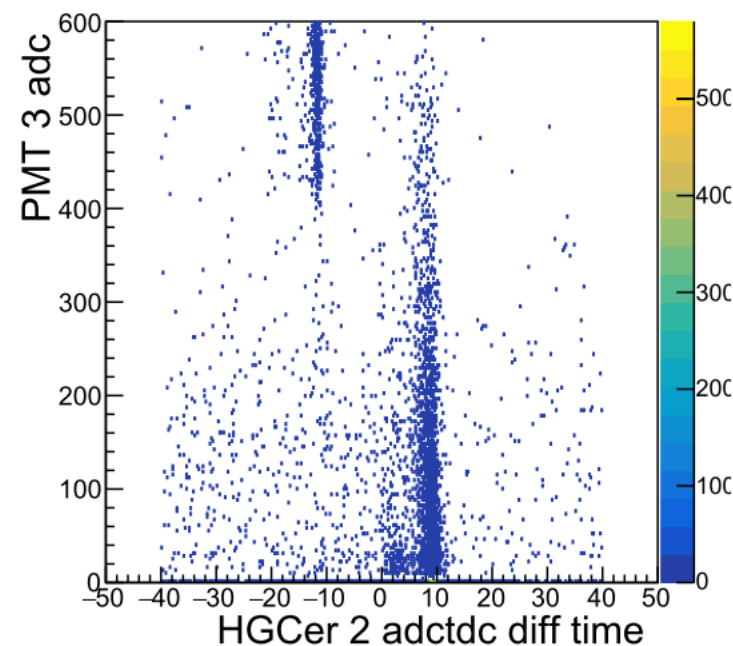
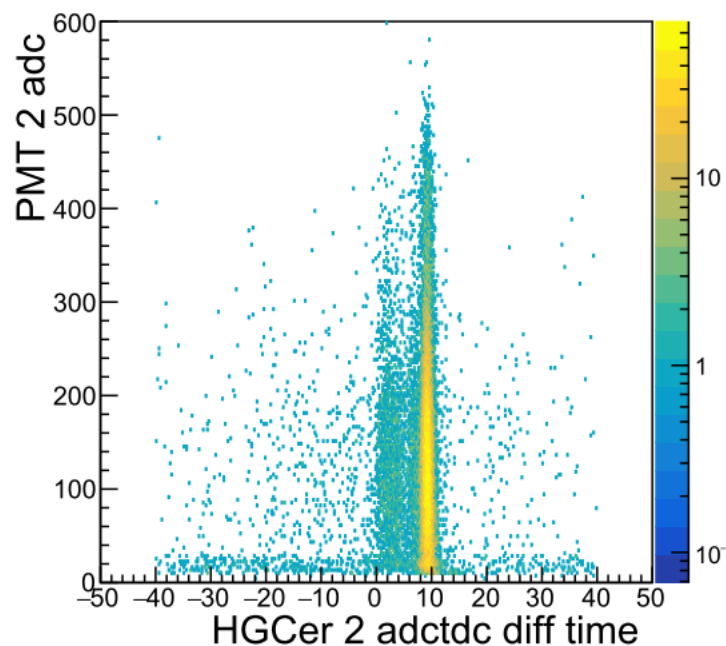
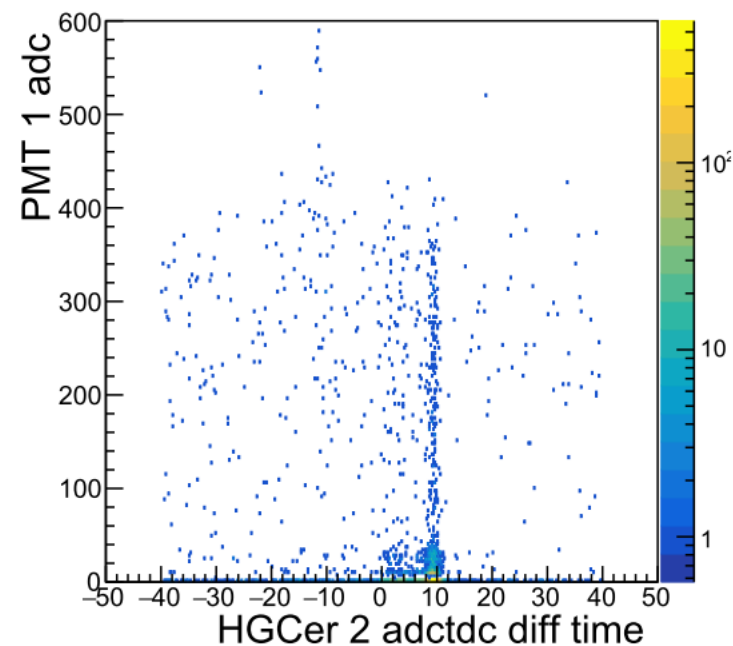
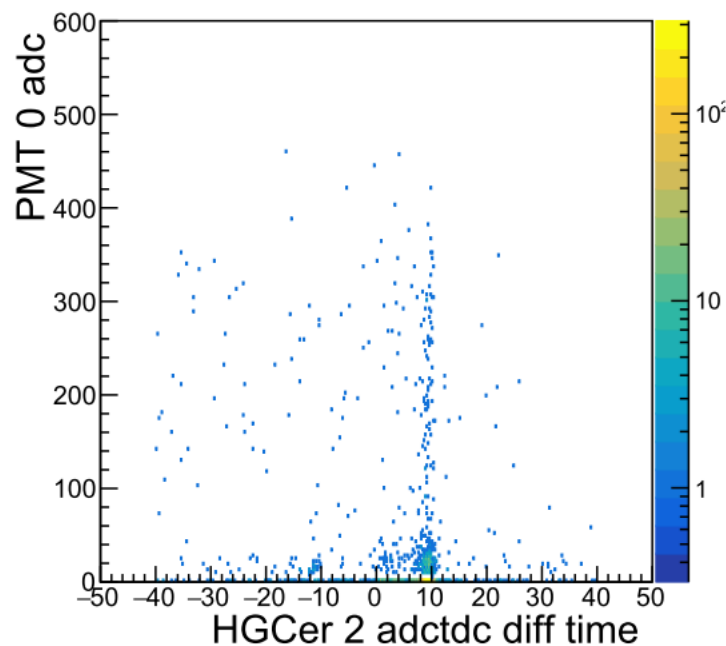
Look at PMT 1

- Upper left plot is PMT0 ADC amplitude versus PMT1 ADC-HODO time difference with no hits in any other two PMT.
- Upper right plot is PMT1 ADC amplitude versus PMT1 ADC-HODO time difference with no hits in other PMTs.
- Lower left plot is PMT2 ADC amplitude versus PMT1 ADC-HODO time difference with no hits in other two PMT.
- Lower right plot is PMT3 ADC amplitude versus PMT1 ADC-HODO time difference with no hits in other two PMT.



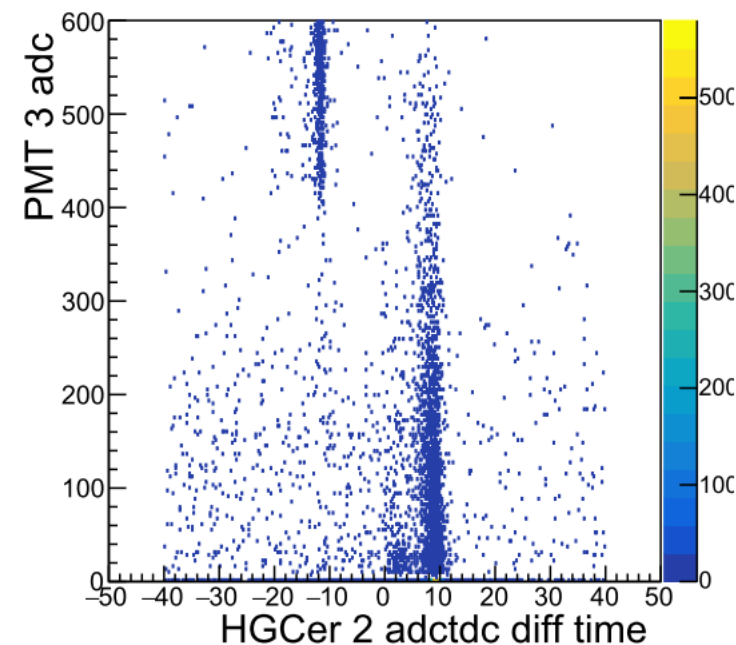
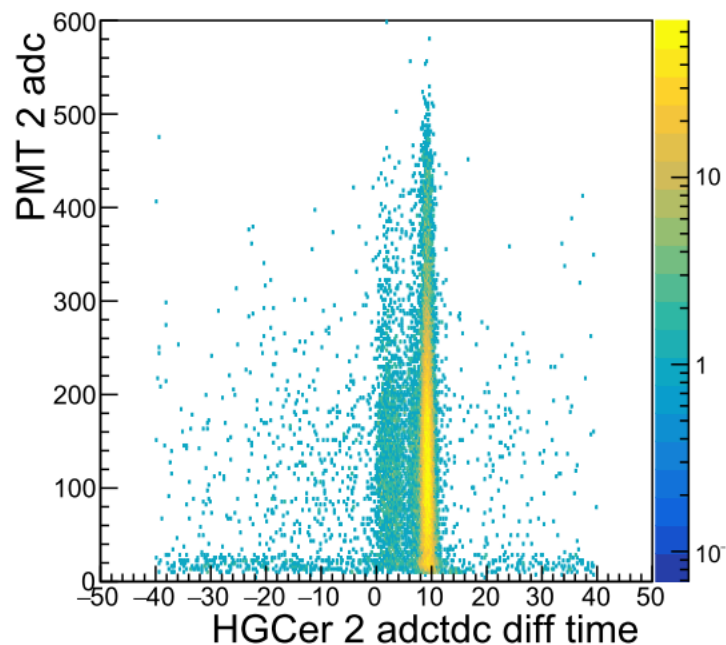
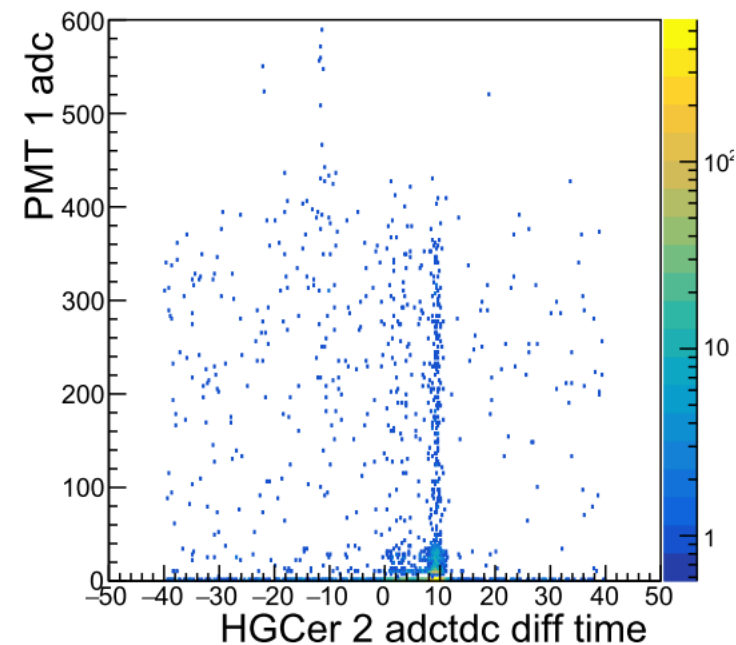
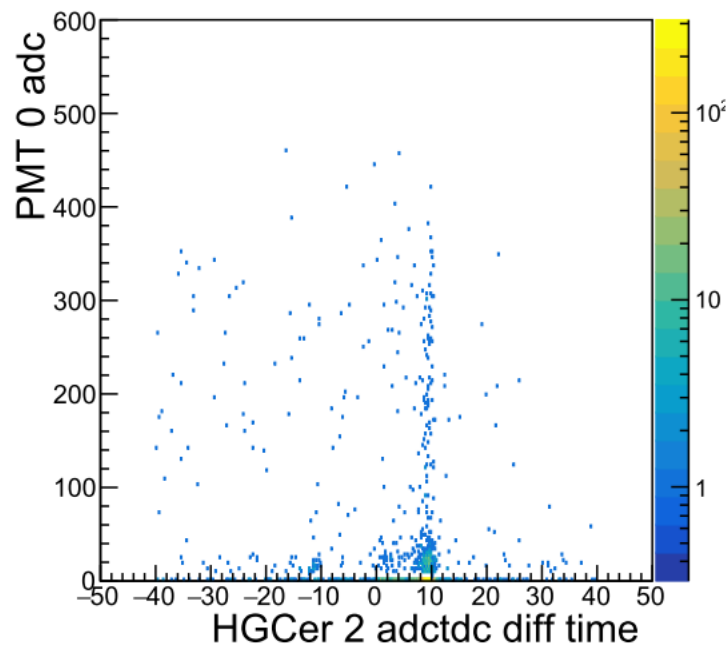
Look at PMT 2

- Upper left plot is PMT0 ADC amplitude versus PMT2 ADC-HODO time difference with no hits in any other two PMTs.
- Upper right plot is PMT1 ADC amplitude versus PMT2 ADC-HODO time difference with no hits in other PMTs.
- Lower left plot is PMT2 ADC amplitude versus PMT2 ADC-HODO time difference with no hits in other three PMT.
- Lower right plot is PMT3 ADC amplitude versus PMT2 ADC-HODO time difference with no hits in other two PMT.

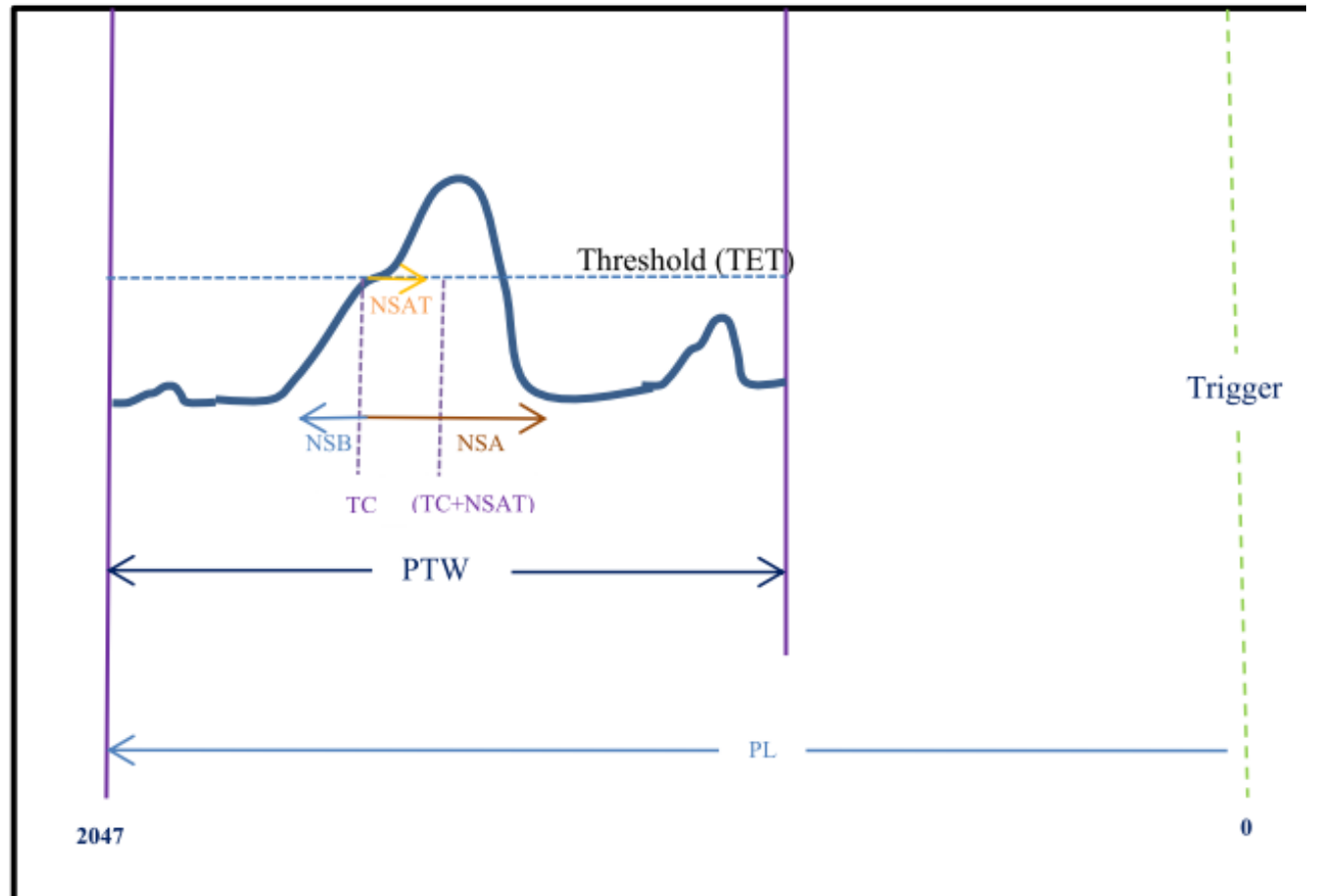


Look at PMT 3

- Upper left plot is PMT0 ADC amplitude versus PMT3 ADC-HODO time difference with no hits in any other two PMTs.
- Upper right plot is PMT1 ADC amplitude versus PMT3 ADC-HODO time difference with no hits in other two PMTs.
- Lower left plot is PMT2 ADC amplitude versus PMT3 ADC-HODO time difference with no hits in other two PMTs.
- Lower right plot is PMT3 ADC amplitude versus PMT2 ADC-HODO time difference with no hits in other three PMTs.



- Fall 18, ADC Reference Time signal is the $\frac{3}{4}$ signal and the EL-REAL delayed by about 130ns.
- FADC defines pulse if finds NSAT consecutive bins above threshold.
- Define TC as the time of the first bin in the NSAT group of bins.

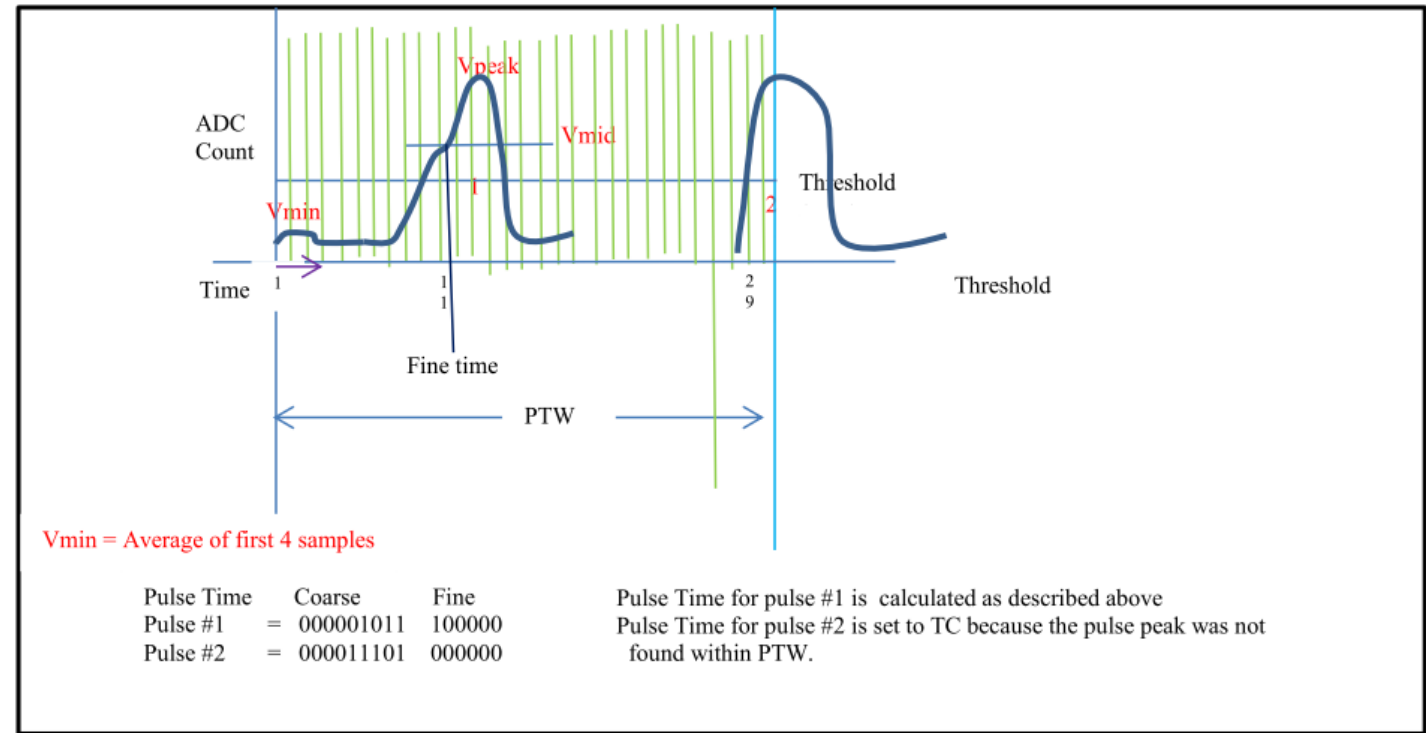


- Determine Vpeak is time bin when ADC counts first decreases. Will search beyond TC+NSA.
- Determines Vmin as average ADC count of first four time bins in PTW.
- $V_{Mid} = (V_{peak} - V_{min}) / 2$ and determine time bin N1 which has VMid. The Time Fine :

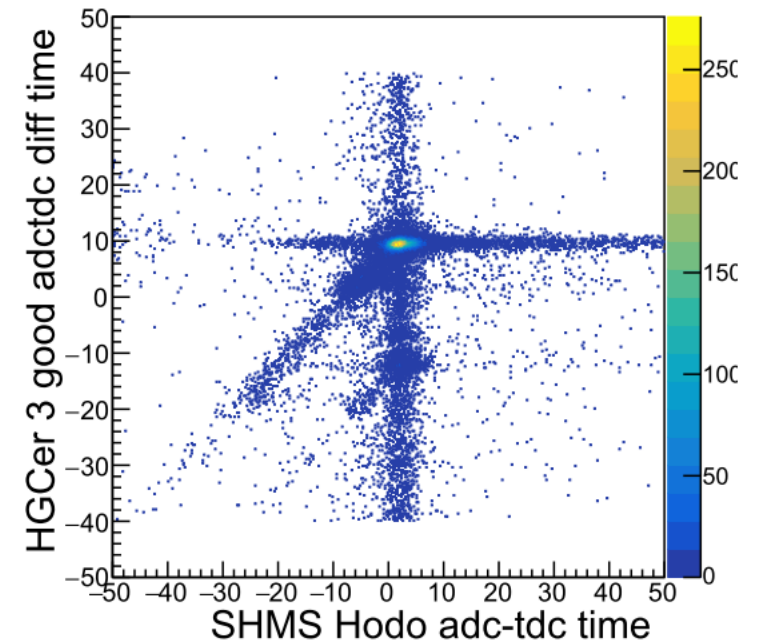
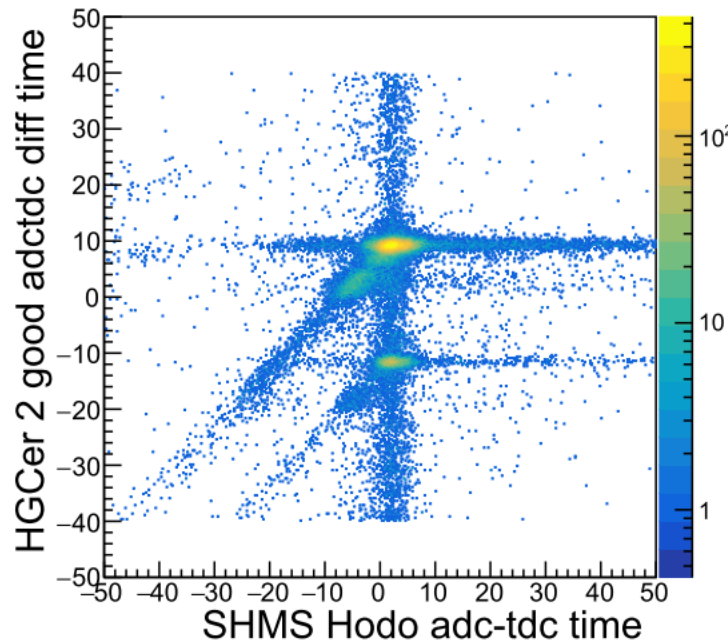
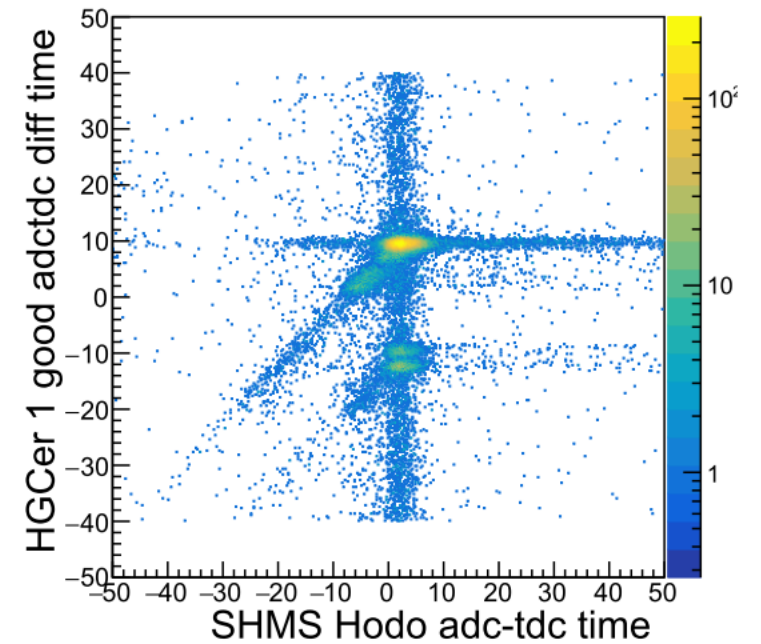
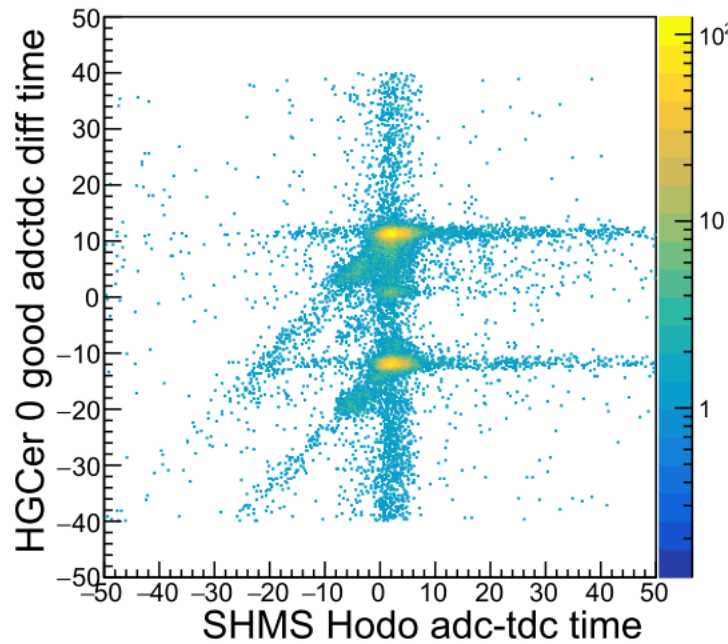
$$TF = 64 * (V_{Mid} - V(N1)) / (V(N1+1) - V(N1)).$$

If ADC count larger than threshold in first four time bins then:

- Time is set to TC
- Amp is set to zero for any hit in the event.



- Upper left plot is PMT0 ADC-HODO time difference versus SHMS HODO adc-tdc time. No cut on other PMTs.
- Upper right plot is PMT1 ADC-HODO time difference versus SHMS HODO adc-tdc time. No cut on other PMTs.
- Lower left plot is PMT2 ADC-HODO time difference versus SHMS HODO adc-tdc time. No cut on other PMTs.
- Lower right plot is PMT3 ADC-HODO time difference versus SHMS HODO adc-tdc time. No cut on other PMTs.



Put a cut that the ADC
Reference time amplitude is
zero.

- Upper left plot is PMT0 ADC-
HODO time difference versus
SHMS HODO adc-tdc time.
No cut on other PMTs.
- Upper right plot is PMT1
ADC-HODO time difference
versus SHMS HODO adc-tdc
time. No cut on other PMTs.
- Lower left plot is PMT2 ADC-
HODO time difference versus
SHMS HODO adc-tdc time.
No cut on other PMTs.
- Lower right plot is PMT3
ADC-HODO time difference
versus SHMS HODO adc-tdc
time. No cut on other PMTs.

