



SHMS Detector Timing

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Introduction

- Produced a script to set detector timing windows for Kaon/PionLT analysis
- HMS detectors largely problem free, time windows easy to set
- Issues with several SHMS detectors, multiple peaks in some timing spectra
- Script checks “GoodADCTDCTimeDiff” PMT by PMT, explicitly for `multiplicity == 1` events in each detector

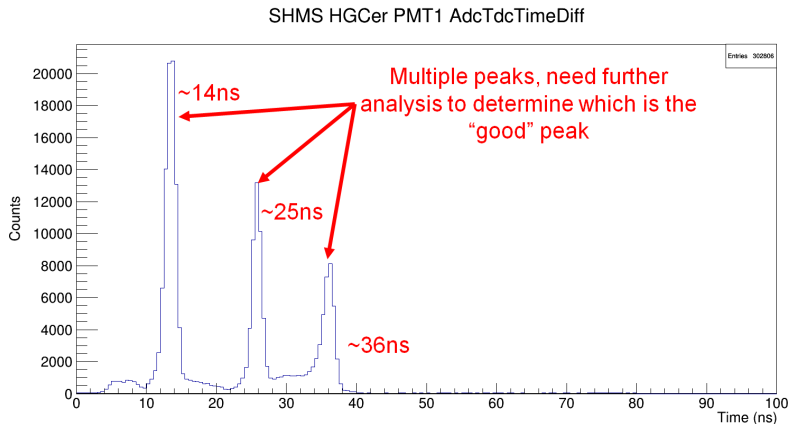
Run Conditions

- Checking a carbon inelastics run from Winter 2018 period, **run 6619**
- Ran with **COIN DAQ** but only selected singles events, i.e. **no coincidence triggers**
- $E_{Beam} = 3.835 \text{ GeV}$, $I_{Beam} = 20 \mu A$

Table: Spectrometer angles and central momenta for run 6619.

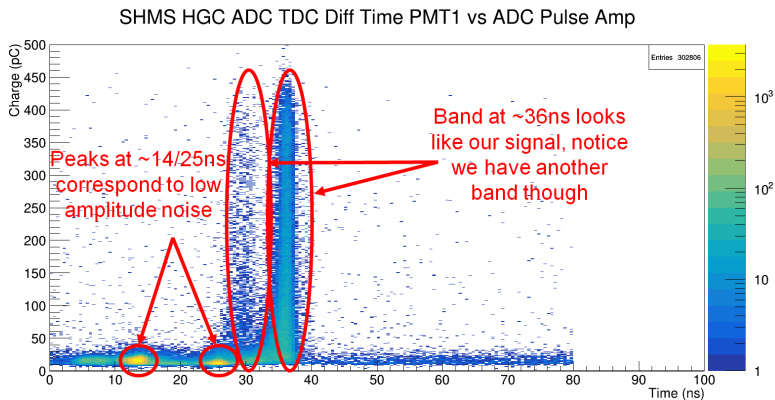
	HMS	SHMS
$P_{cent}/\text{GeV}c^{-1}$	-2.026	-3.007
θ/deg	30.00	9.50

SHMS HGC Timing Example 1/3



SHMS HGC PMT1 ADCTDC Time Difference spectrum.

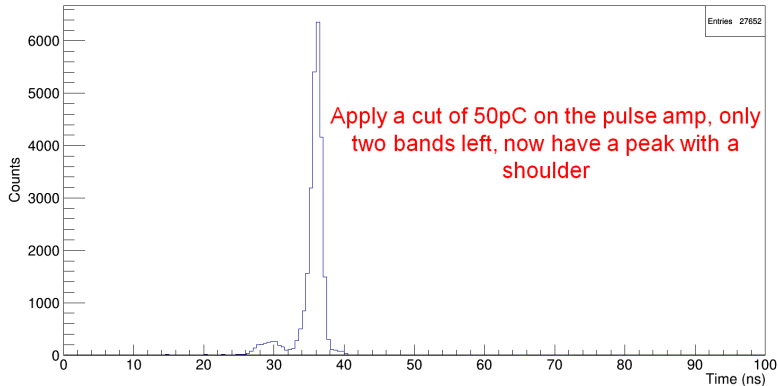
SHMS HGC Timing Example 2/3



SHMS HGC PMT1 ADCTDC Time Difference vs ADC Pulse Amp spectrum.

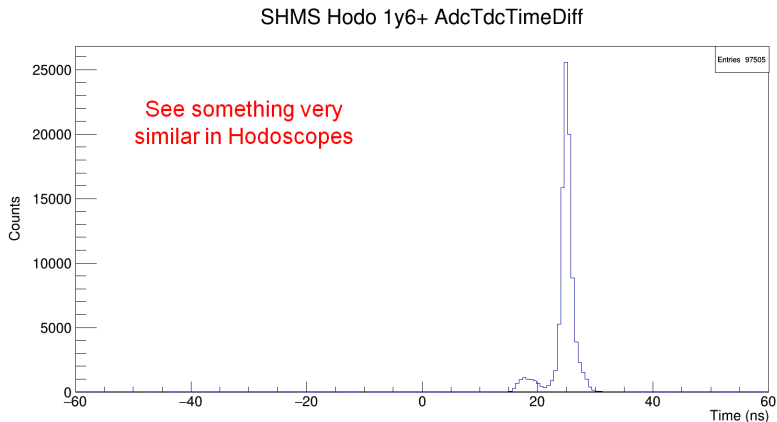
SHMS HGC Timing Example 3/3

SHMS HGCer PMT1 AdcTdcTimeDiff, ADC Pulse Amp Cut



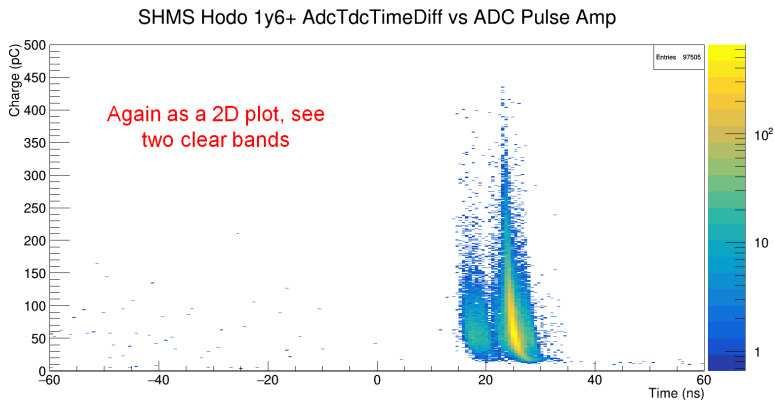
SHMS HGC PMT1 ADCTDC Time Difference spectrum after applying a pulse amp > 50 cut. Note this cut is only applied to select the time window.

SHMS Hodoscope Timing Example 1/2



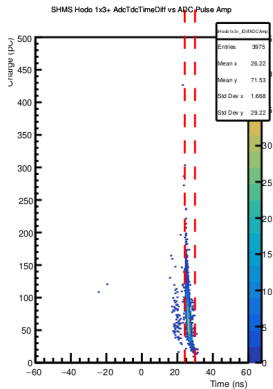
SHMS Hodoscope 1y6+ PMT ADCTDC Time Difference spectrum.

SHMS Hodoscope Timing Example 2/2



SHMS Hodoscope 1y6+ PMT ADCTDC Time Difference vs ADC Pulse Amp spectrum.

Physics Data



SHMS Hodoscope 1y6+ PMT ADCTDC Time Difference vs ADC Pulse Amp spectrum for a physics run (6749), a second band is still present.

Summary

- Strange double peak behaviour seen in several SHMS detectors
- Present in Carbon runs and physics runs
- Cut on pulse amp to select timing windows helps in some cases