

Timing Window for HMS and SHMS Detectors

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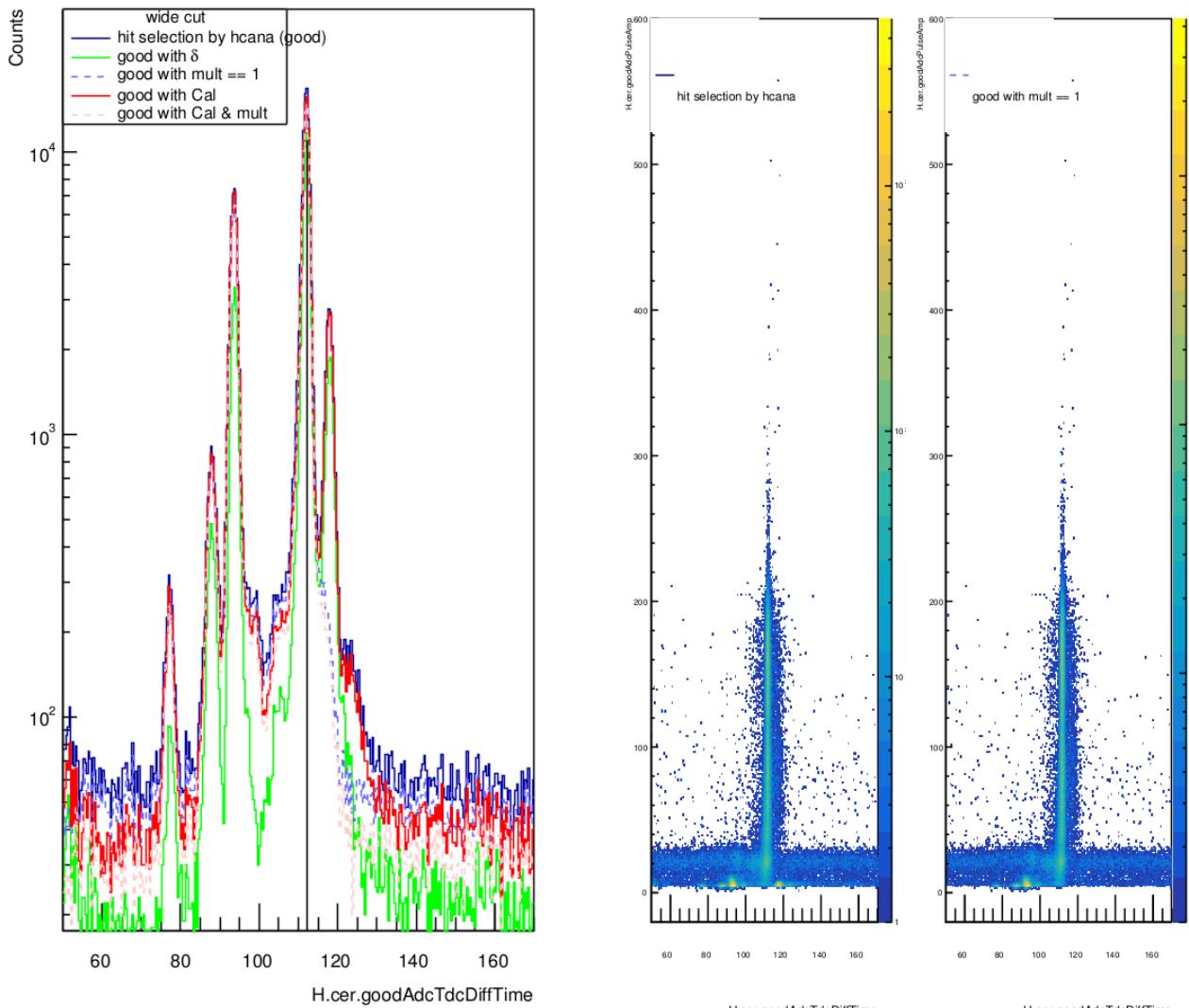
Variable we Look at :

Detector HMS	Plane	Pmts	Variable	Detector SHMS	Plane	Pmts	Variable
HCER		2	H.cer.goodAdcTdcDiffTime	HGCER		4	P.hgcer.goodAdcTdcDiffTime
HCAL	1pr_pos	13	H.cal.1pr.goodPosAdcDiffTime	NGCER		4	P.ngcer.goodAdcTdcDiffTime
HCAL	1pr_neg	13	H.cal.1pr.goodNegAdcTdcDiffTime	AEROGEL	aero_pos	7	P.aero.goodPosAdcTdcDiffTime
HCAL	2ta_pos	13	H.cal.2ta.goodPosAdcTdcDiffTime	AEROGEL	aero_neg	7	P.aro.goodNegAdcTdcDiffTime
HCAL	2ta_neg	13	H.cal.2ta.goodNegAdcTdcDiffTime	PCAL	presh_pos	14	P.cal.pr.goodPosAdcTdcDiffTime
HCAL	3ta_pos	13	H.cal.3ta.goodPosAdcTdcDiffTime	PCAL	presh_neg	14	P.cal.pr.goodNegAdcTdcDiffTime
HCAL	4ta_pos	13	H.cal.4ta.goodPosAdcTdcDiffTime	PCal	shower	224	P.cal.fly.goodAdcTdcDiffTime
HDC	12		H.dc.[plane].rawtdc	PDC	12		P.dc.[plane].rawtdc
HHODO	1x_pos	16	H.hod.1x.GoodPosAdcTdcDiffTime	PHODO	1x_pos	13	P.hod.1x.GoodPosAdcTdcDiffTime
HHODO	1x_neg	16	H.hod.1x.GoodNegAdcTdcDiffTime	PHODO	1x_neg	13	P.hod.1x.GoodNegAdcTdcDiffTime
HHODO	1y_pos	10	H.hod.1y.GoodPosAdcTdcDiffTime	PHODO	1y_pos	13	P.hod.1y.GoodPosAdcTdcDiffTime
HHODO	1y_neg	10	H.hod.1y.GoodNegAdcTdcDiffTime	PHODO	1y_neg	13	P.hod.1y.GoodNegAdcTdcDiffTime
HHODO	2x_pos	16	H.hod.2x.GoodPosAdcTdcDiffTime	PHODO	2x_pos	14	P.hod.2x.GoodPosAdcTdcDiffTime
HHODO	2x_neg	16	H.hod.2x.GoodNegAdcTdcDiffTime	PHODO	2x_neg	14	P.hod.2x.GoodNegAdcTdcDiffTime
HHODO	2y_pos	10	H.hod.2y.GoodPosAdcTdcDiffTime	PHODO	2y_pos	21	P.hod.2y.GoodPosAdcDiffTime
HHODO	2y_neg	10	H.hod.2y.GoodNegAdcTdcDiffTime	PHODO	2y_neg	21	P.hod.2y.GoodNegAdcTdcDiffTime

HMS GAS Cherenkov : Good ADC TDC Time Difference Hit Selection (CSV Run 6263)

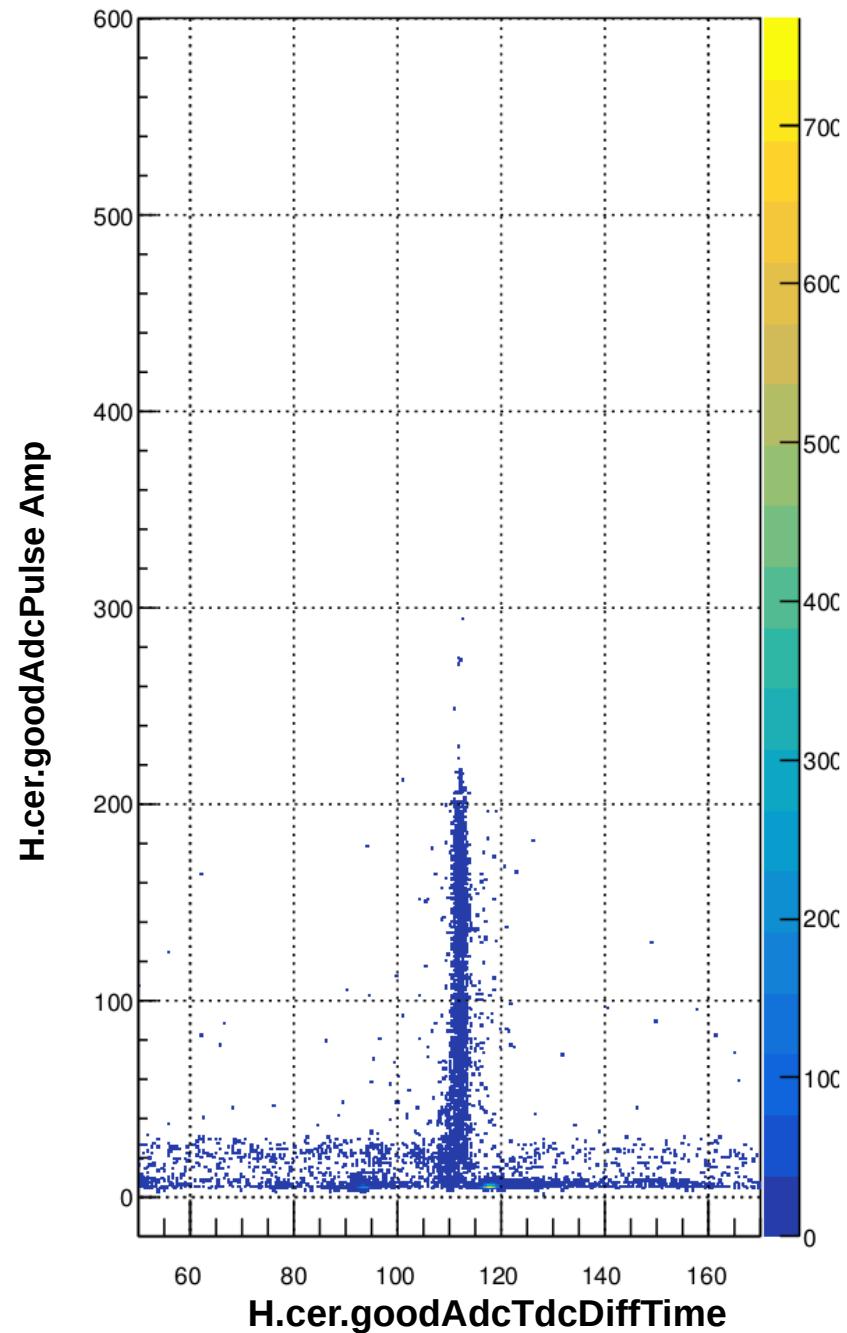
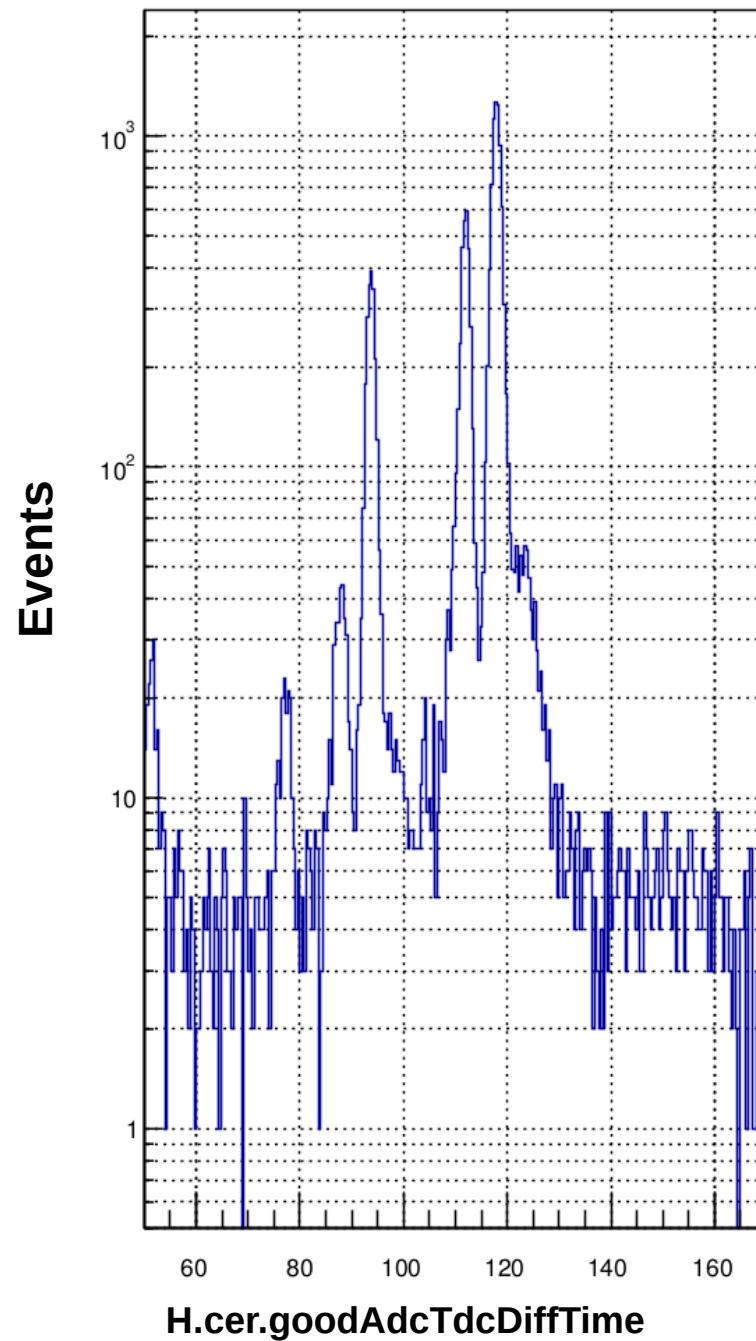
PMT 1 Old HCANA (from Abishek)

If we applied a multiplicity cut ==1 (Dotted Blue) if we are still seeing those little peaks, this means that the events in these peaks are not from multiple hits (i.e. events are from the same hit).

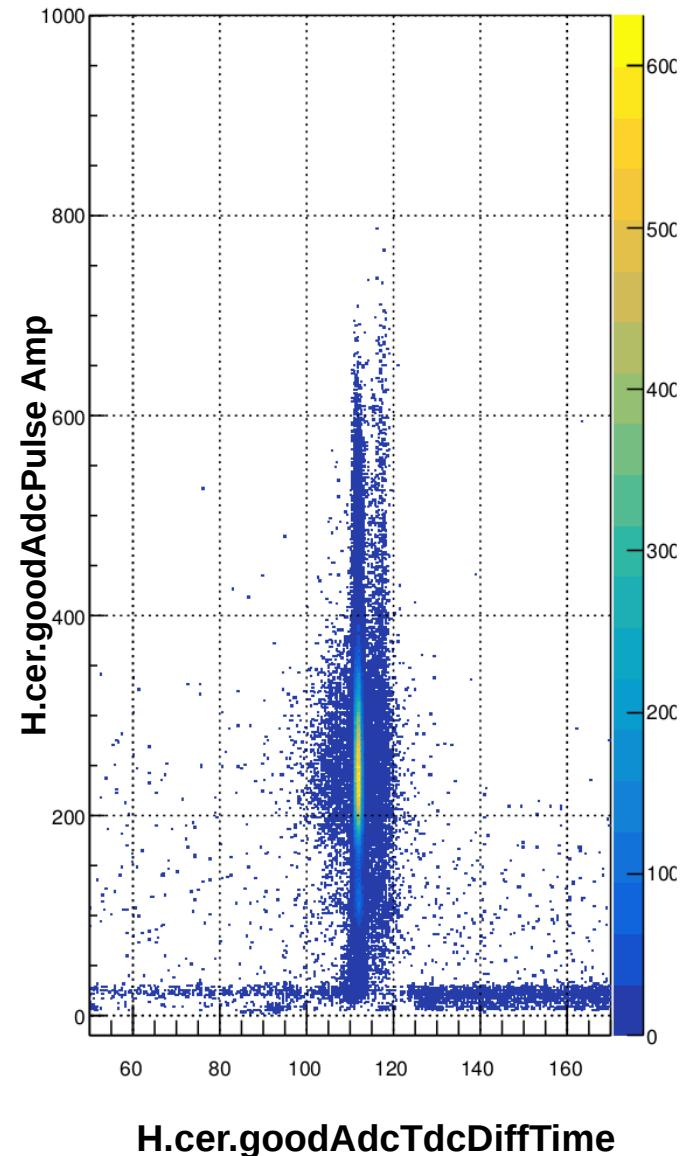
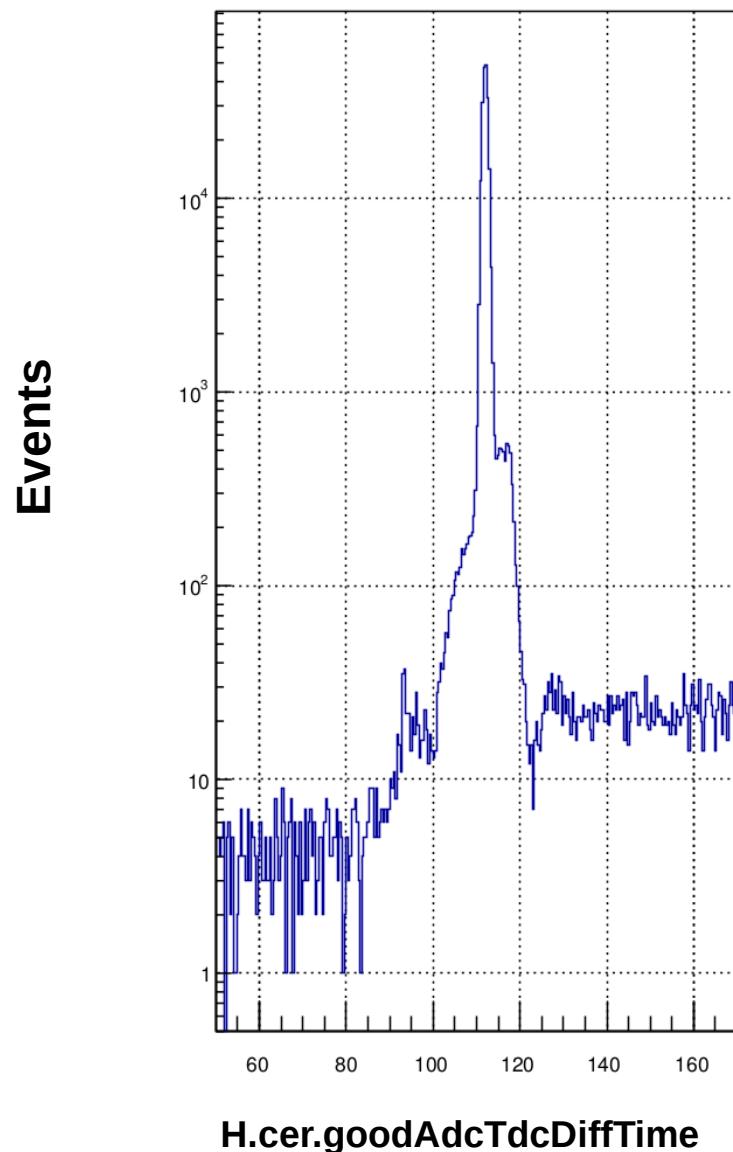


If multiplicity ==1 excluded this little peak, then the events in this peak are from multiple hits.

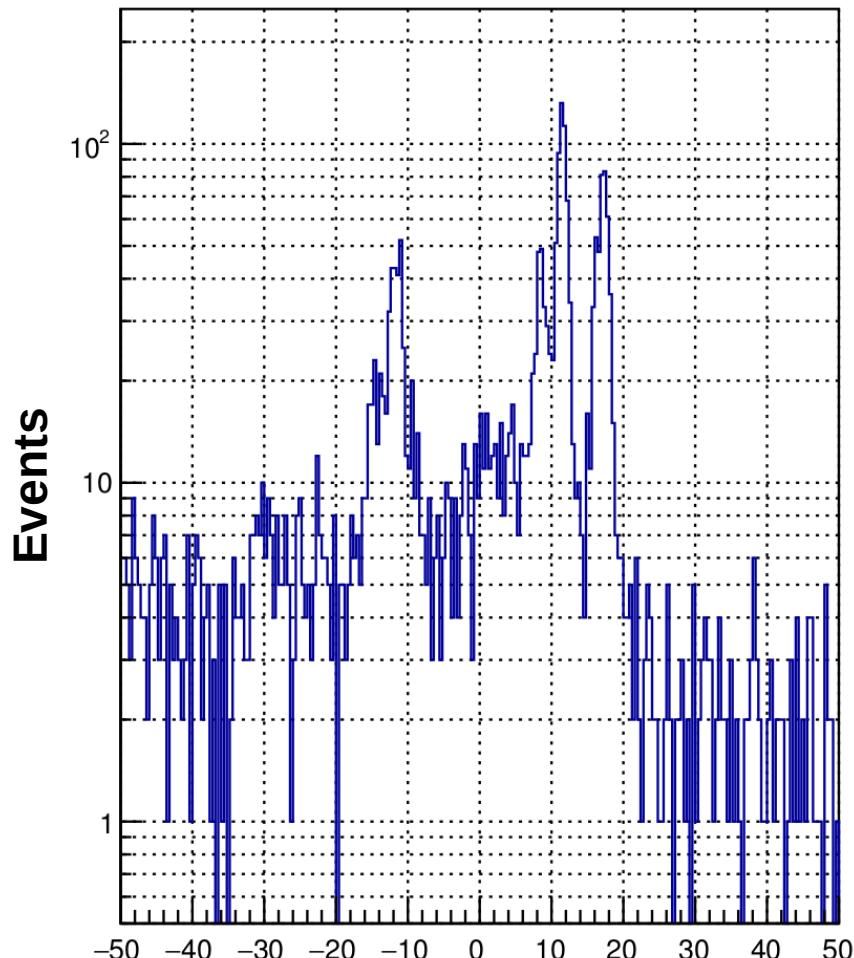
HMS CER PMT 1 Old HCANA with Multiplicity > =2



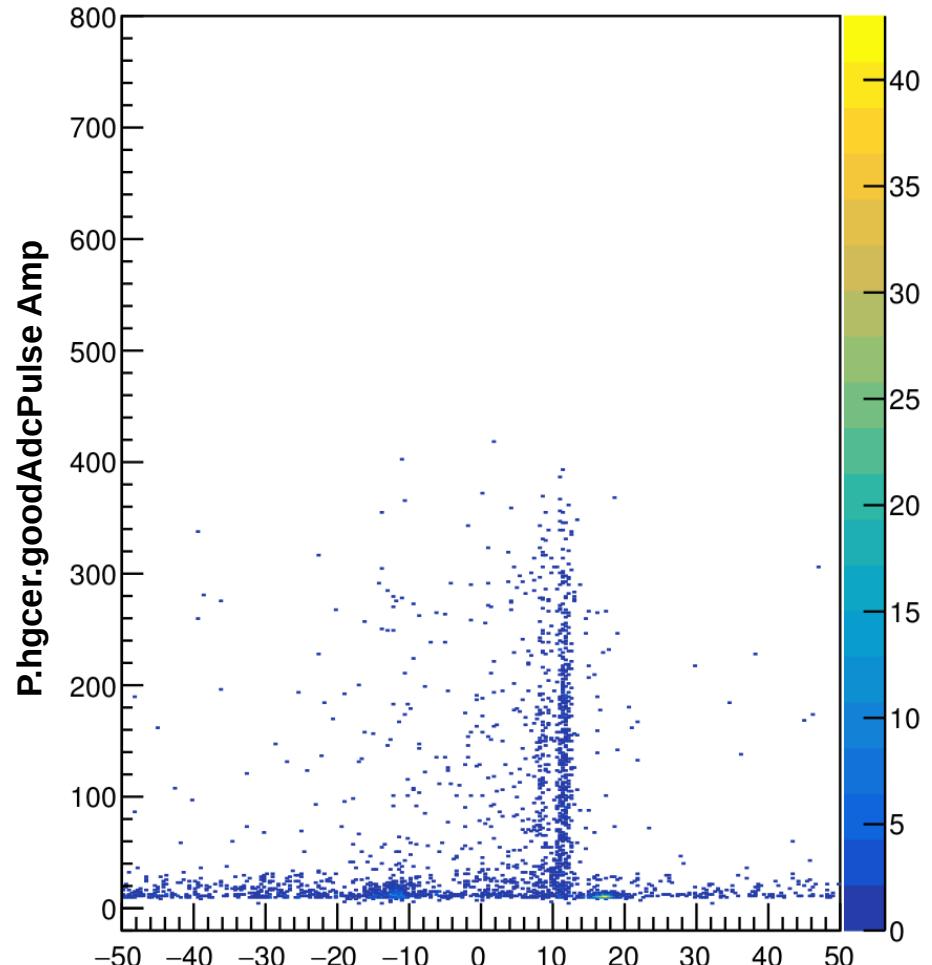
HMS CER PMT 1 New HCANA with Multiplicity > =2



HGCER PMT 1 Old HCANA, Multiplicity > =2



`P.hgcer.goodAdcTdcDiffTime`

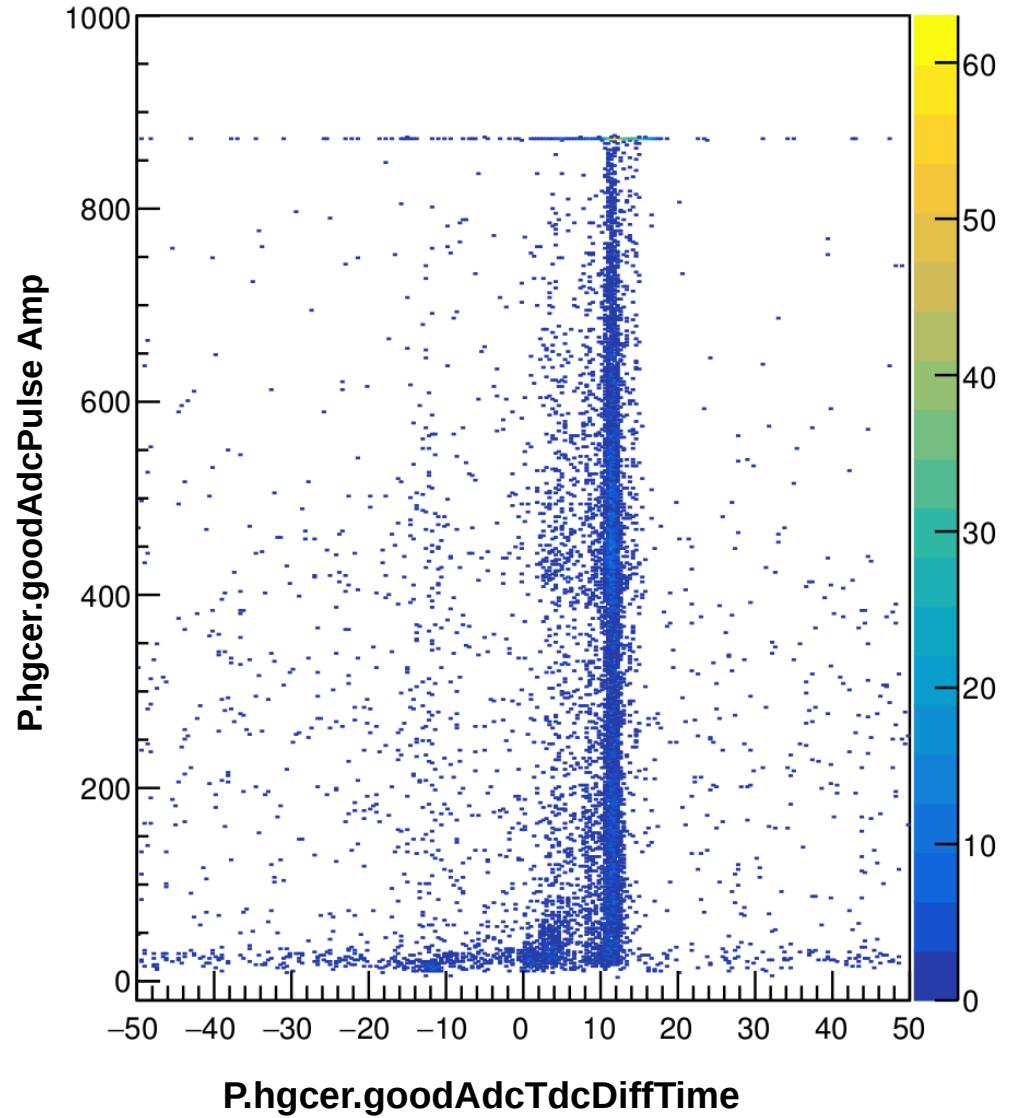
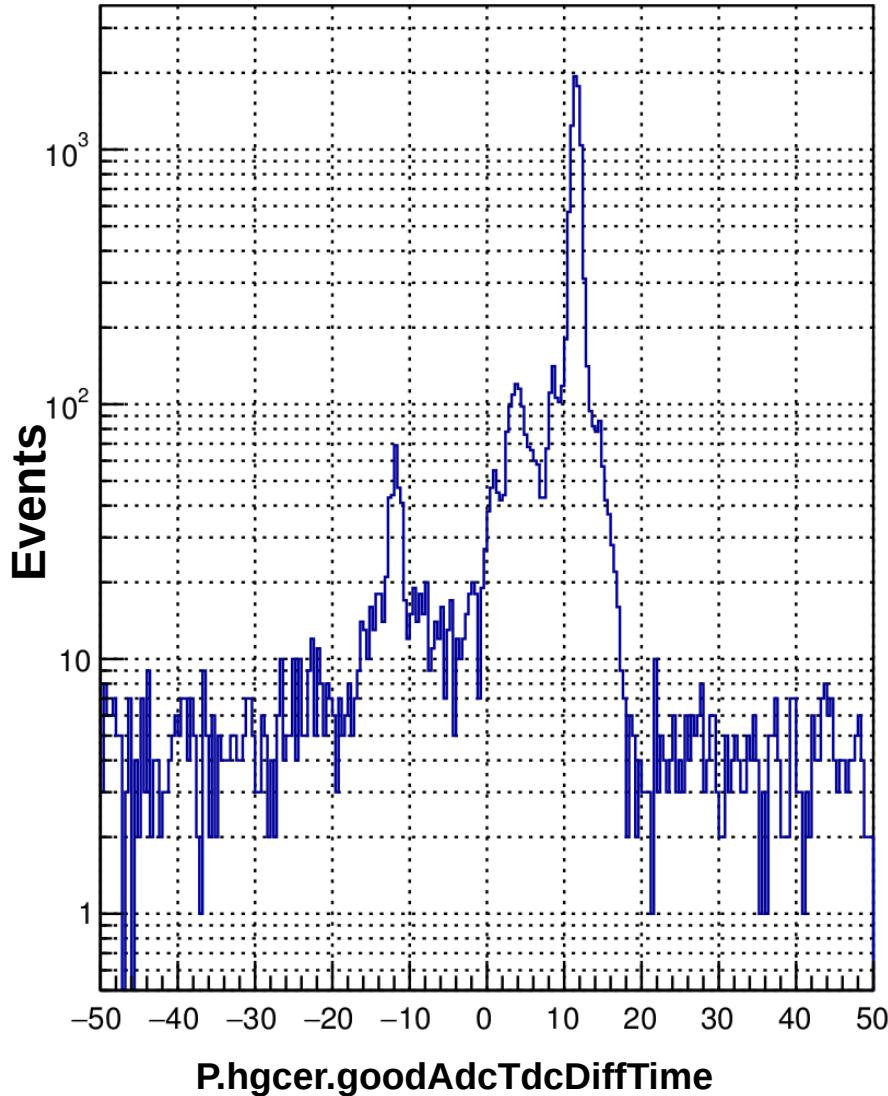


`P.hgcer.goodAdcTdcDiffTime`

For Example,

Event	Total hits	TDC1(ns)	TDC2(ns)	TDC3(ns)	OLD Hcana (ns)	NEW HCANA
1 amp	3	-10	11	15	15	11
		55	300	250		
2 amp	2	-20	-	11	11	11
		60	-	310		
3 amp	3	-15	11	17	17	11
		57	305	257		

HGCER PMT 1 NEW HCANA, Multiplicity > =2



Summary

- As we observed many satellite peaks on either side of a good adc tdc time difference within a specific time window, we tried to understand whether they are real signals. We plotted the pulse amplitude vs pulse time. It is observed that for most of those little peaks there is almost negligible amplitude.
- We applied the multiplicity cut ==1 to see if these multiple timing peak events are hits from same event or not.
- with multiplicity cut > =2, we saw multiple peaks, which suggests that these hits are coming from same event.
- Now, it is clear that we have events which has more than two hits, however the old version of HCANA used to pick the last hit within the time window.
- Now, Mark fixed the HCANA so that the hits which has maximum amplitude within the selected time window is picked.
- Mark is going to apply this method for other detectors as well.