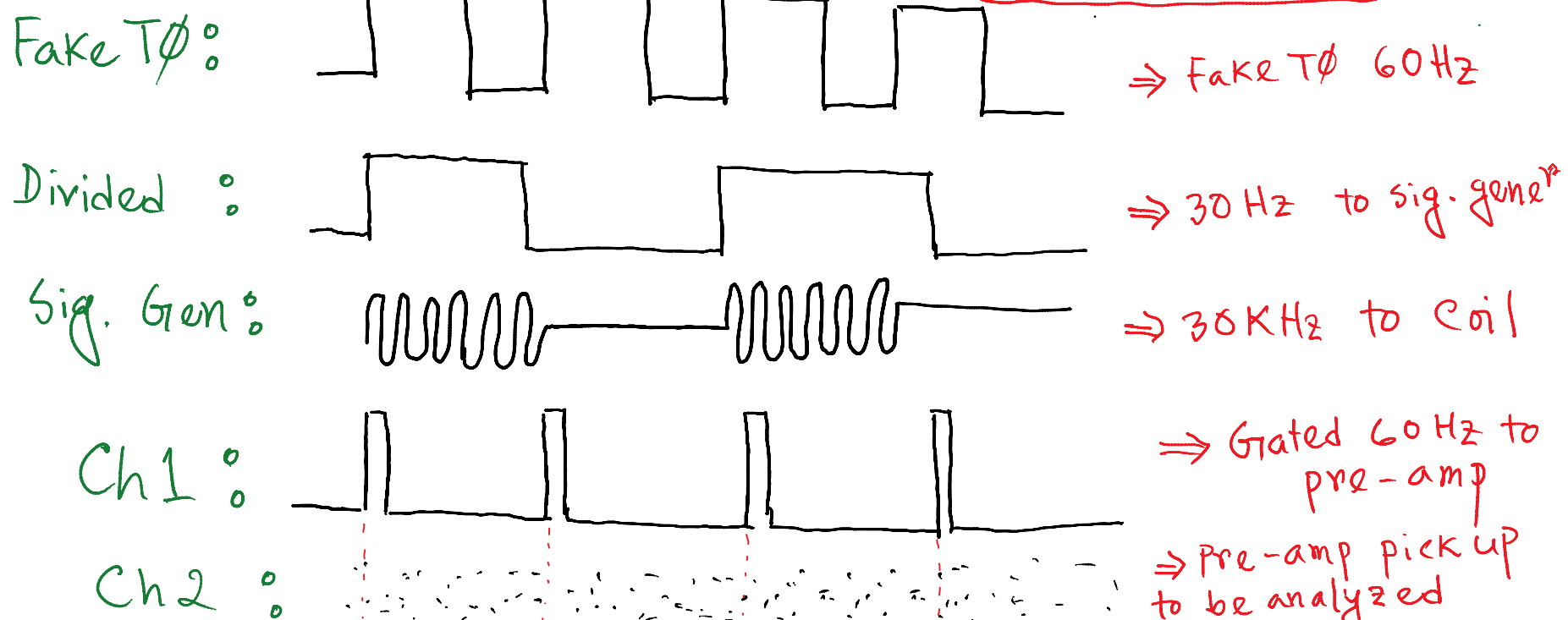
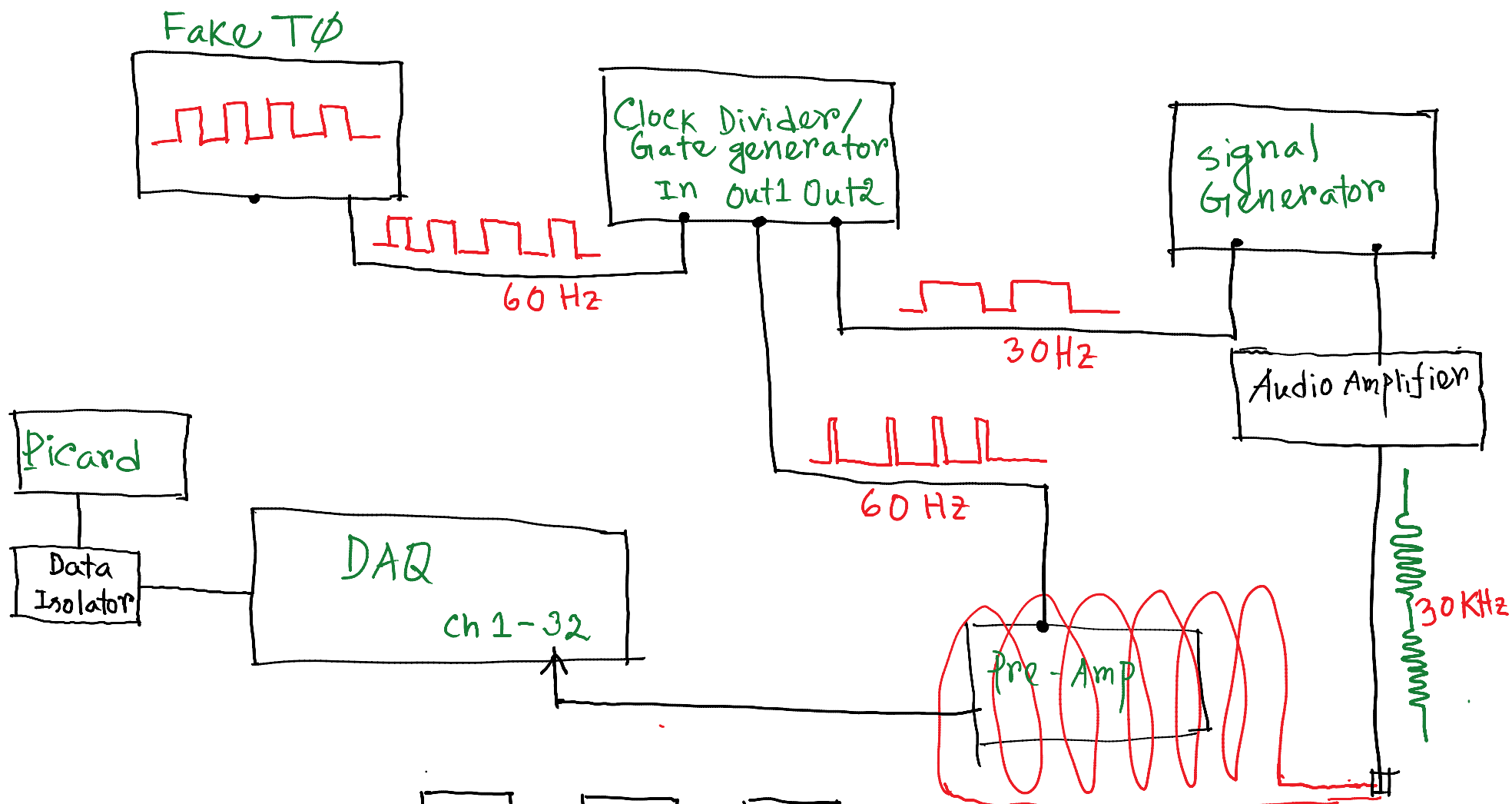
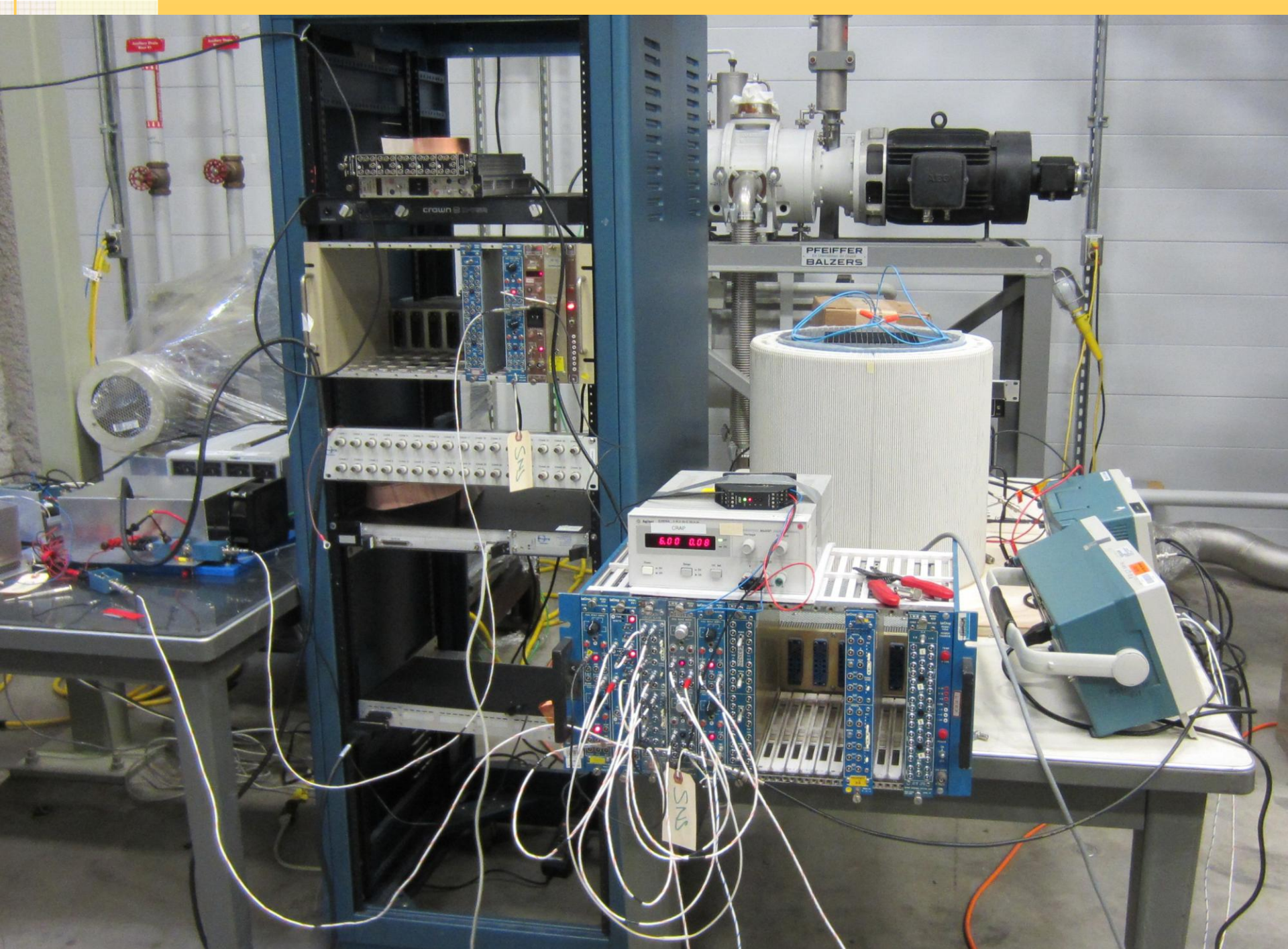


Status of False Asymmetry Measurement



1. The Set-Up





gated 60Hz to pre-amp

30Hz to sig generator



30KHz
To Coil

Tek Run

Trig'd

1

Δ : 4.26 V
@: -2.80 V

A Trigger
Source

Ch1

2

Ch2

Ch3

3

Ch4

-more-
1 of 2

Ch1 1.00 V
Ch3 1.00 V

Ch2 1.00 V

M4.00ms A Ch1 $\int$ -420mV

13.60 %

Type
Edge

Source
Ch1

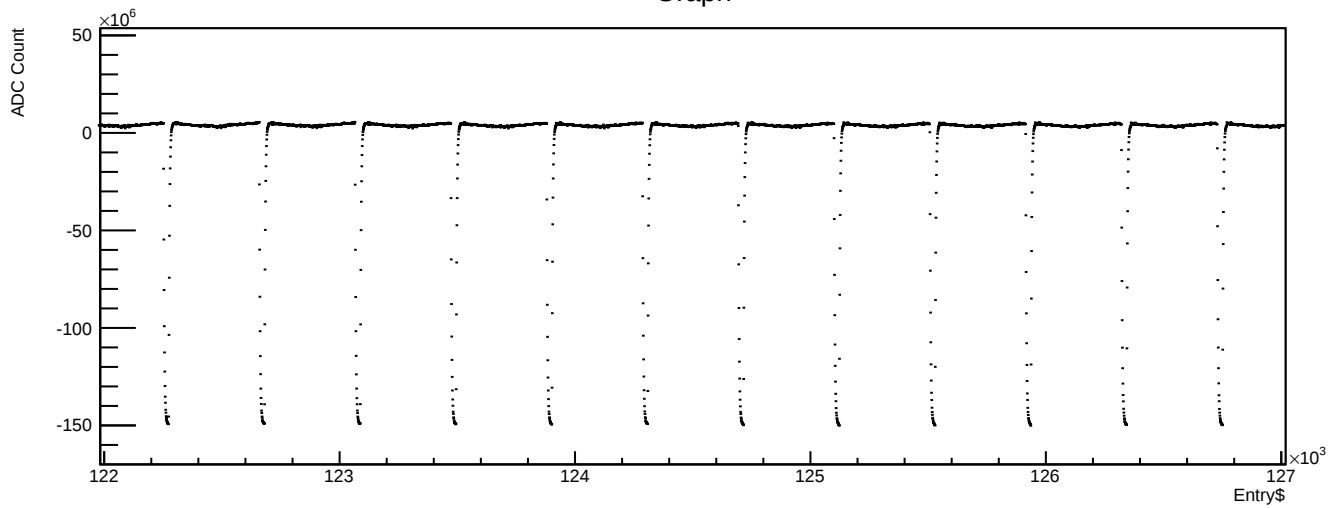
Coupling
DC

Slope
 $\int$

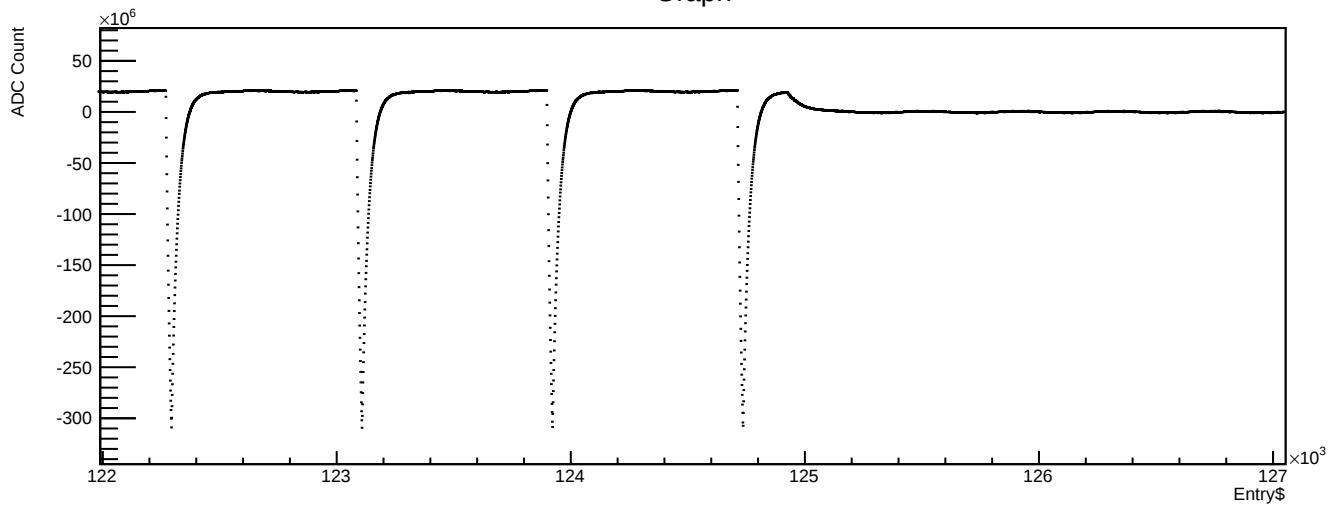
Level
-420mV

Mode
Auto
& Holdoff

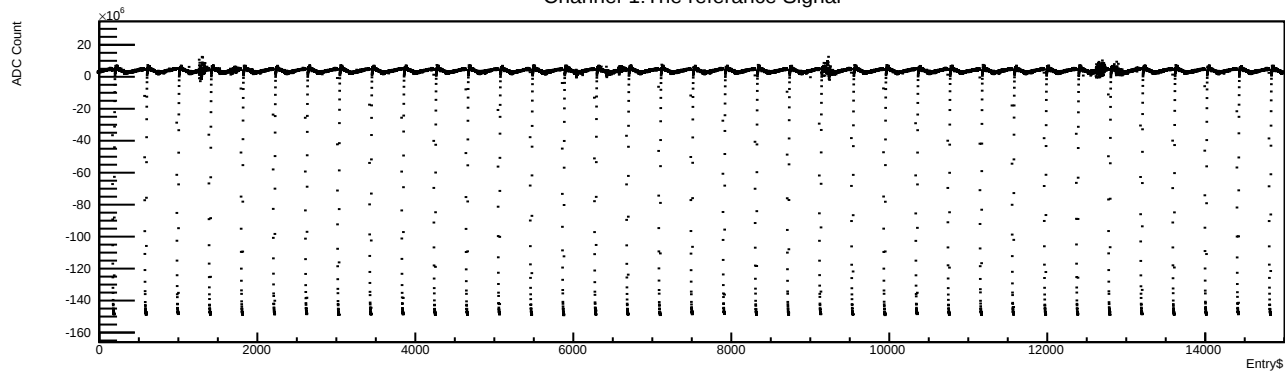
Graph



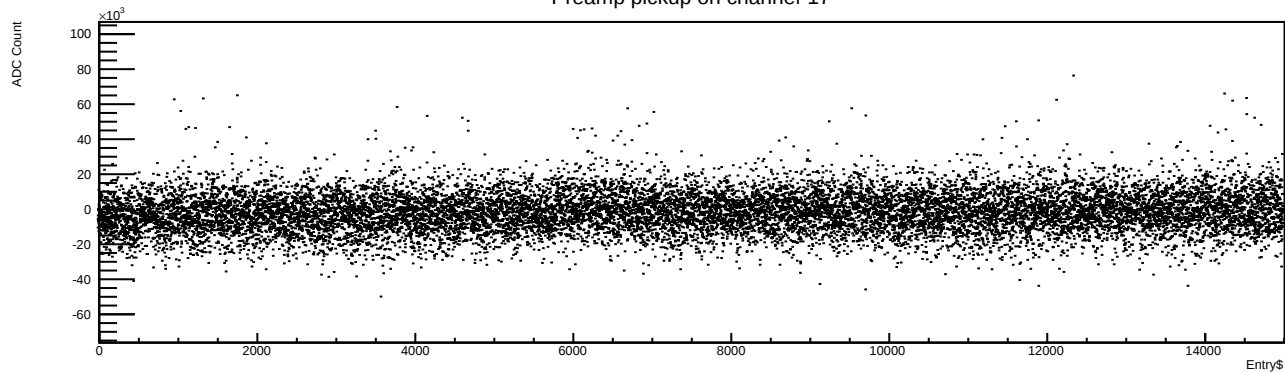
Graph



Channel-1: The reference Signal

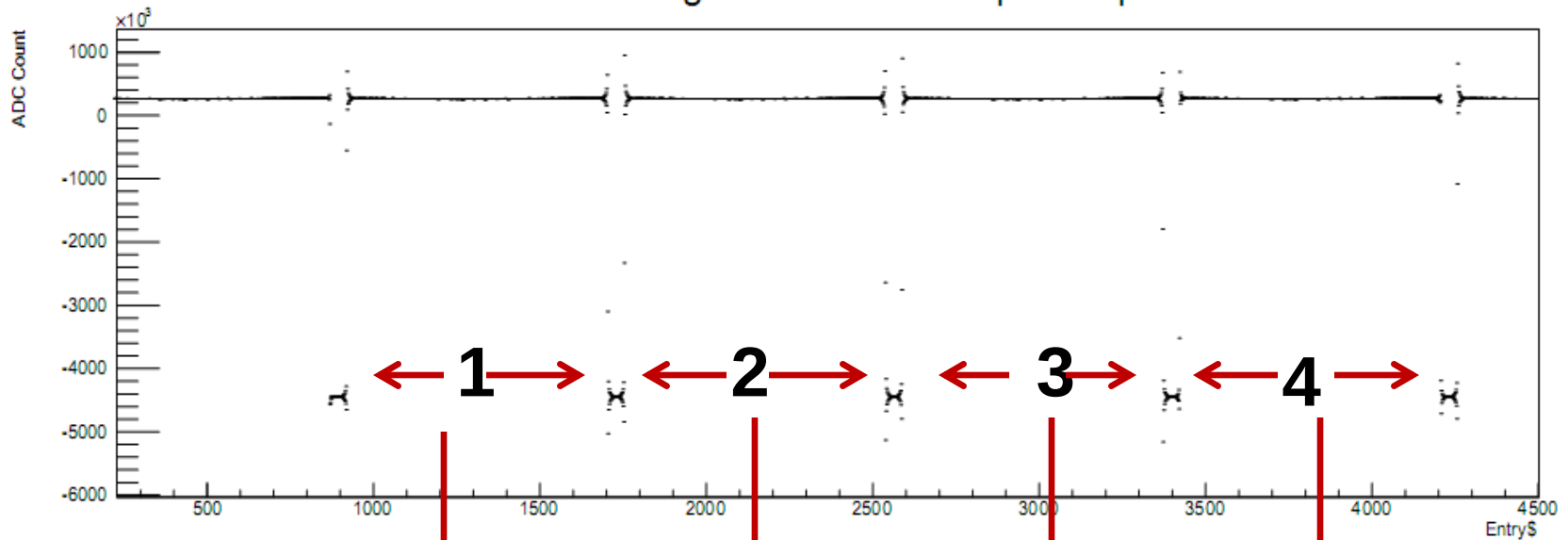


Preamp pickup on channel-17

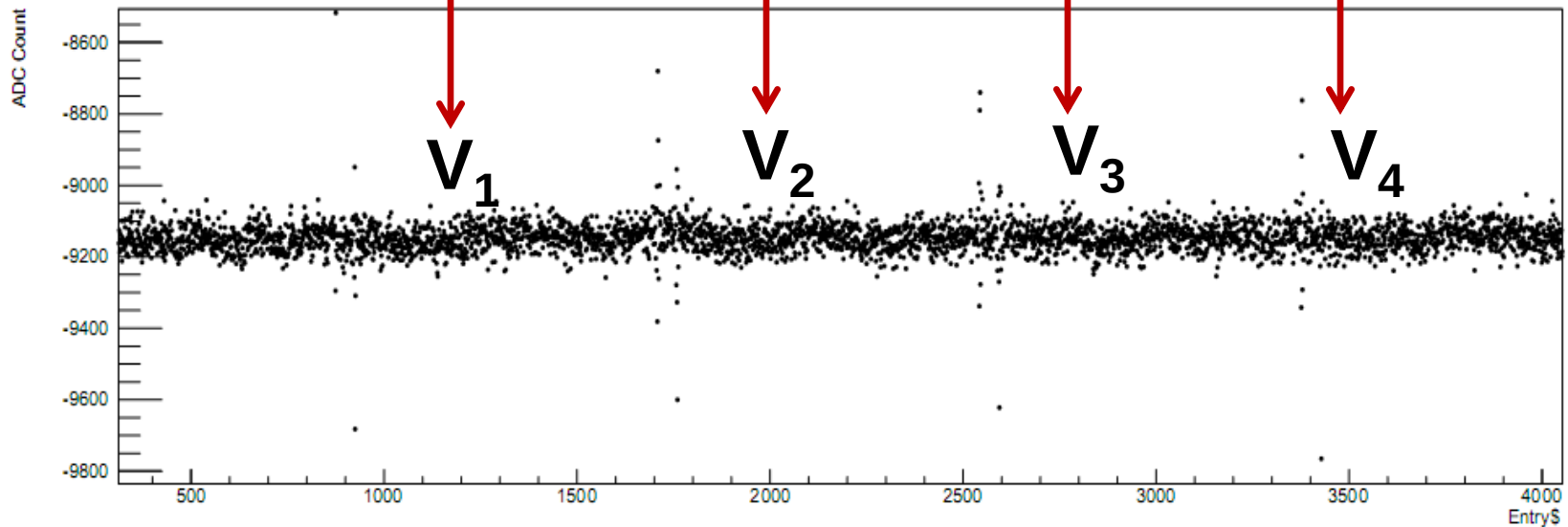


2.The Algorithm

60-80Hz Gated Signal connected to pre-amp ch-1



Asymmetry pick-up on pre-amp channel -4



- ❑ Take equal number of entries between two T_0 pulses.
- ❑ Skip few entries before and after any pulse.
- ❑ Subtract two adjacent pulses then, normalize by the full scale of the ADC(20 Volt).
- ❑ Skip the very last pulse(T_0).

$$A_1 = (V_1 - V_2) / 20$$

$$A_2 = (V_3 - V_4) / 20 \quad \dots \text{etc.}$$

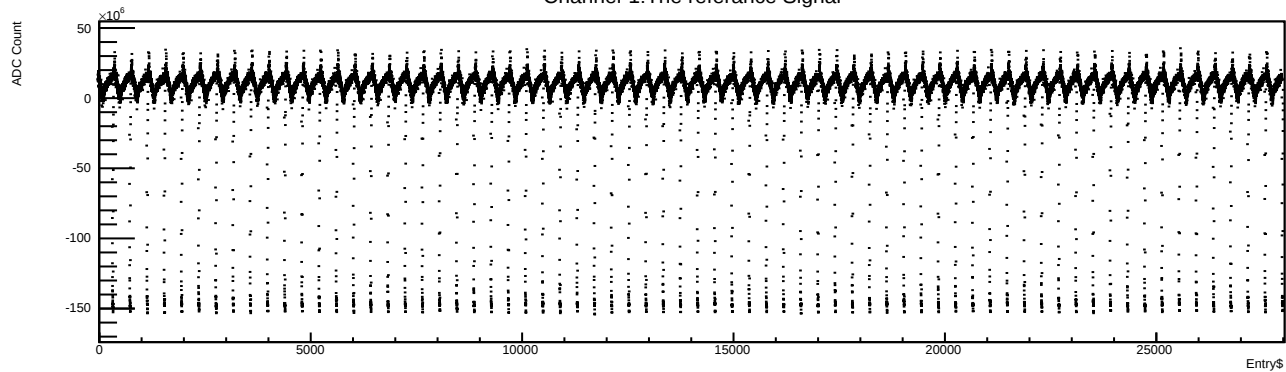
$$\text{Asymmetry, } A = (A_1 + A_2 + A_3 + \dots + A_N) / N$$

- ❑ To calculate uncertainty in false asymmetry, make a histogram for asymmetry of individual pair, A_k , $k=1, 2, \dots, N$
- ❑ Calculate width σ (sigma or RMS) of the histogram.

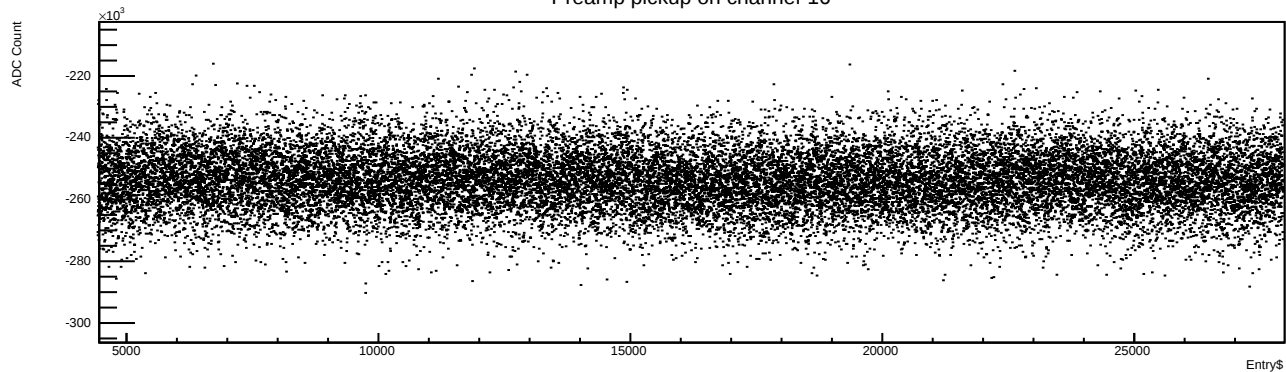
$$\Delta A = \sigma / \sqrt{N}$$

- ❑ Implement the above algorithm in the code/script, check the script with known signal for which the asymmetry is known. Also check changing the number of pairs considered.

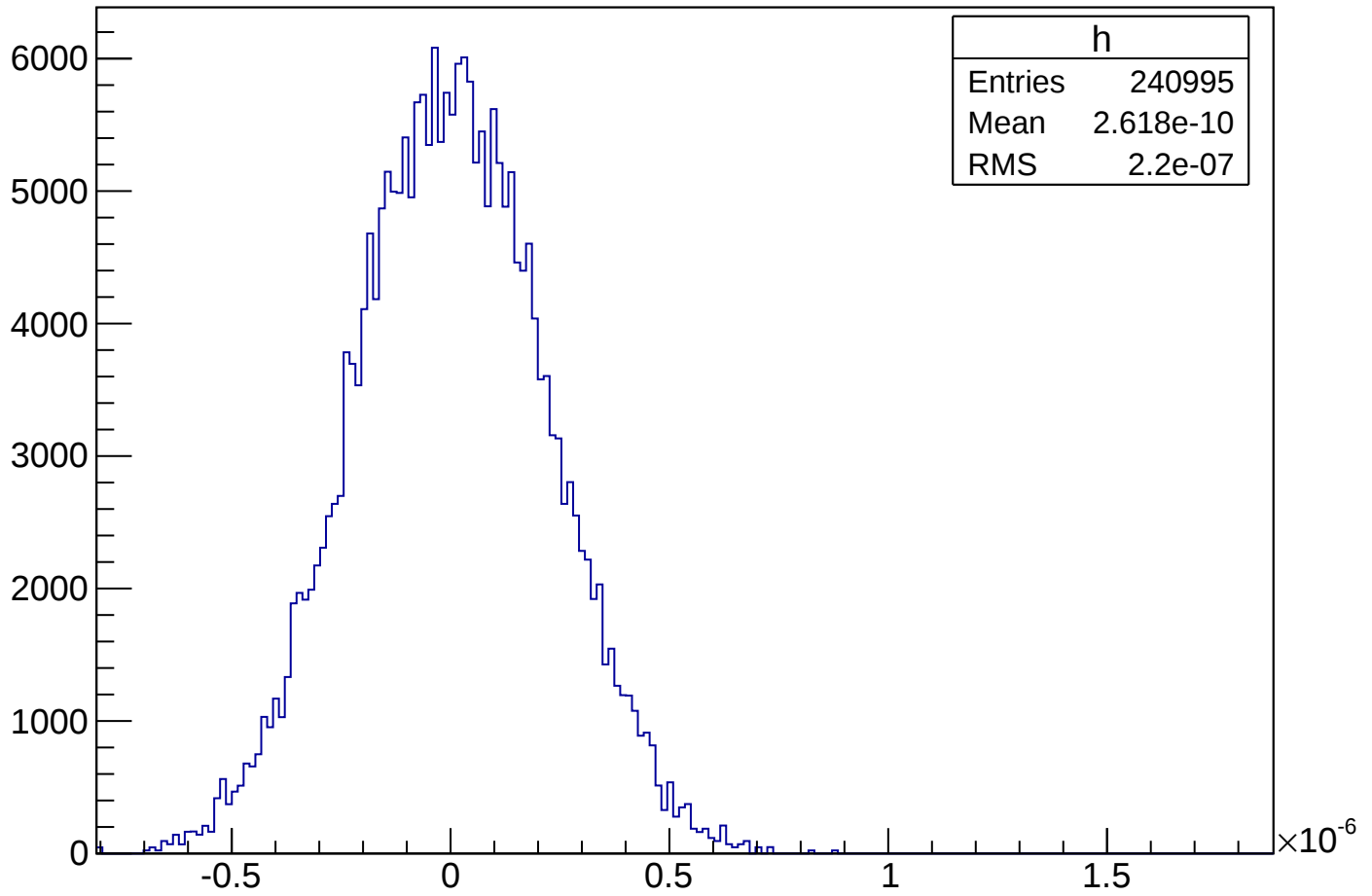
Channel-1:The reference Signal



Preamp pickup on channel-16



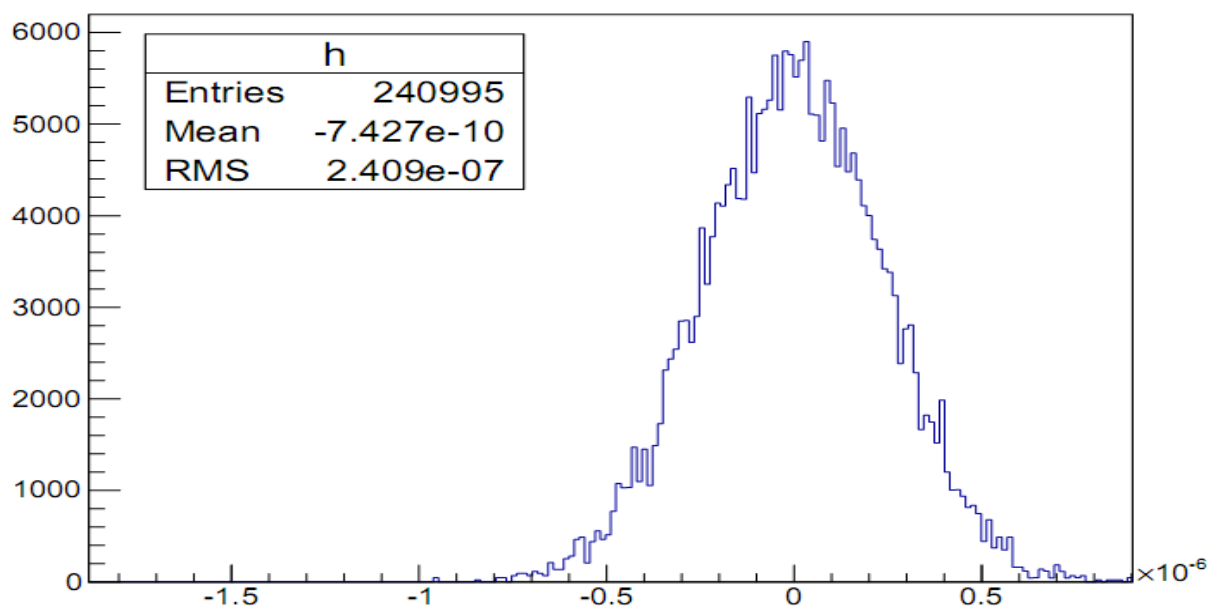
Histogram for individual Asymmetry



5 Hours run at 25KHz without spin flipper

Channel #	No. of entries considered	No. of T_0 considered	False Asymmetry	Uncertainty
3	120497500	481990	-1.27657e-08	5.07117e-10
4			-4.25047e-10	4.74584e-10
5			-2.05721e-08	5.53284e-10
6			4.75672e-09	4.57176e-10
7			-2.38102e-08	4.82394e-10
9			7.65207e-09	5.22495e-10
16			5.94231e-09	4.48224e-10
17			-1.01195e-09	5.12805e-10
18			1.30903e-08	4.86665e-10
19			-7.79798e-09	4.90793e-10
Ave= -3.4 E-9 ± 1.55E-10				

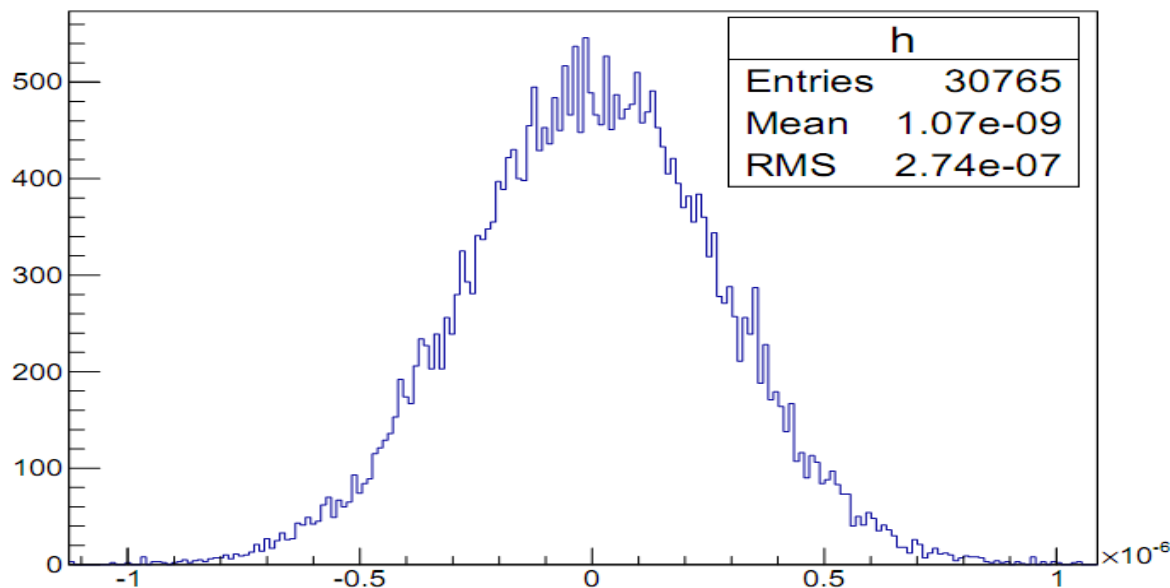
Histogram for individual Asymmetry for Channel-19



30min run at 25KHz with spin flipper

Channel #	No. of entries considered	No. of T_0 considered	False Asymmetry	Uncertainty
3	15382500	61530	-1.44775e-09	1.52597e-09
4			4.78159e-10	1.65144e-09
5			-4.18071e-10	1.59976e-09
6			-1.07053e-09	1.48955e-09
7			-7.54608e-10	1.45766e-09
9			-1.46496e-10	1.79211e-09
16			1.43426e-09	1.36481e-09
17			-2.73156e-10	1.5601e-09
18			1.10573e-09	1.56208e-09
19			-3.07611e-10	1.55395e-09
Ave=-1.4E-10 ± 4.9E-10				

Histogram for individual Asymmetry for channel-18



5 Hours run at 25KHz with spin flipper

Channel #	No. of entries considered	No. of T_0 considered	False Asymmetry	Uncertainty
3	139047000	556188	1.38253e-10	4.97903e-10
4			1.4626e-10	5.20801e-10
5			1.37455e-10	4.64901e-10
6			4.74385e-11	4.94075e-10
7			1.41347e-10	4.88807e-10
9			-2.13366e-10	6.17447e-10
16			2.15342e-10	4.50361e-10
17			1.61917e-10	5.24396e-10
18			3.06627e-10	5.21796e-10
19			6.60844e-12	5.17612e-10
Ave=1.1E-10 ± 1.6E-10				

Histogram for individual Asymmetry for Channel-18

