Compton electron detector

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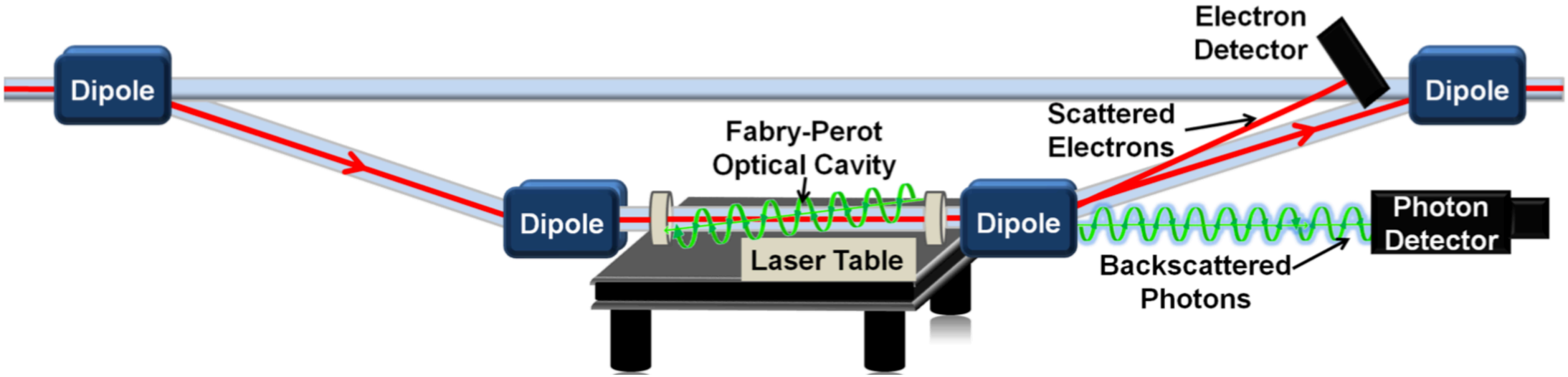
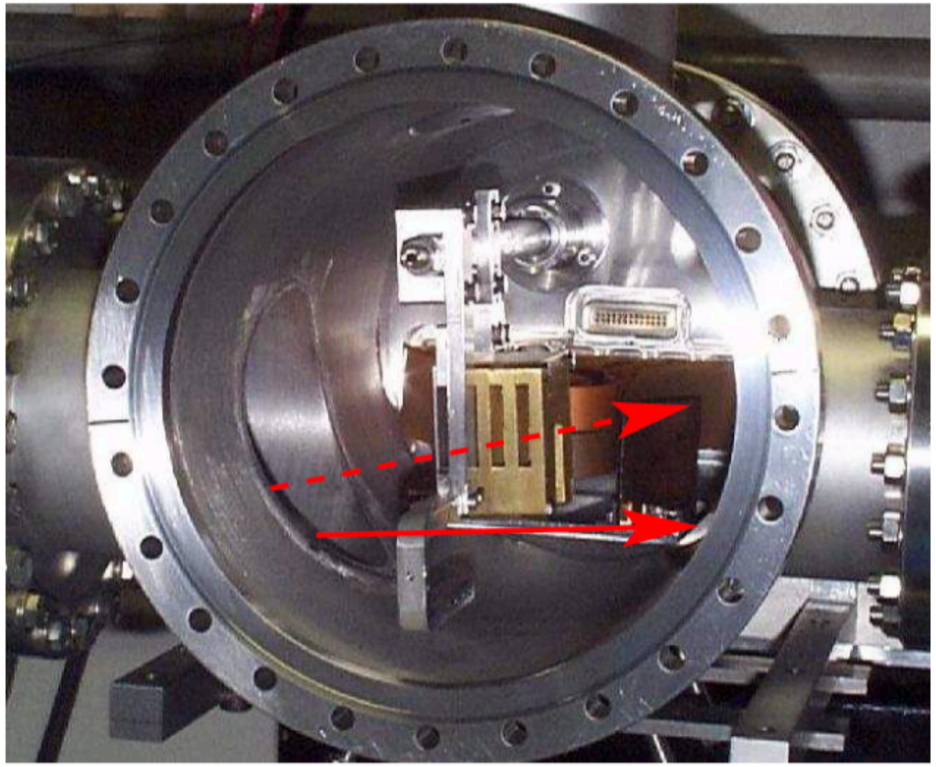
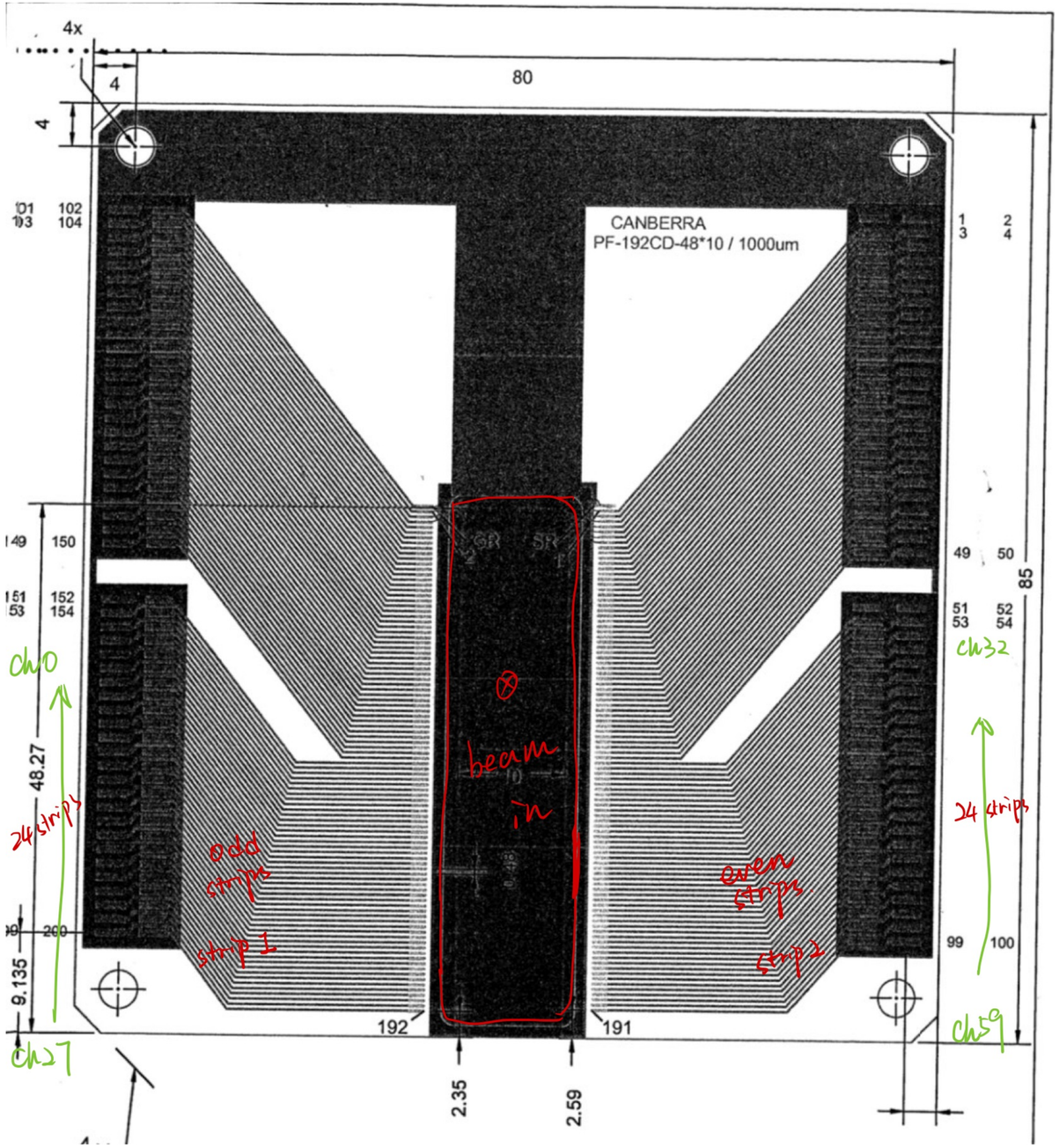
Compton polarimeter

$$A_{\text{exp}} = P_e P_\gamma A_{\text{QED}}$$



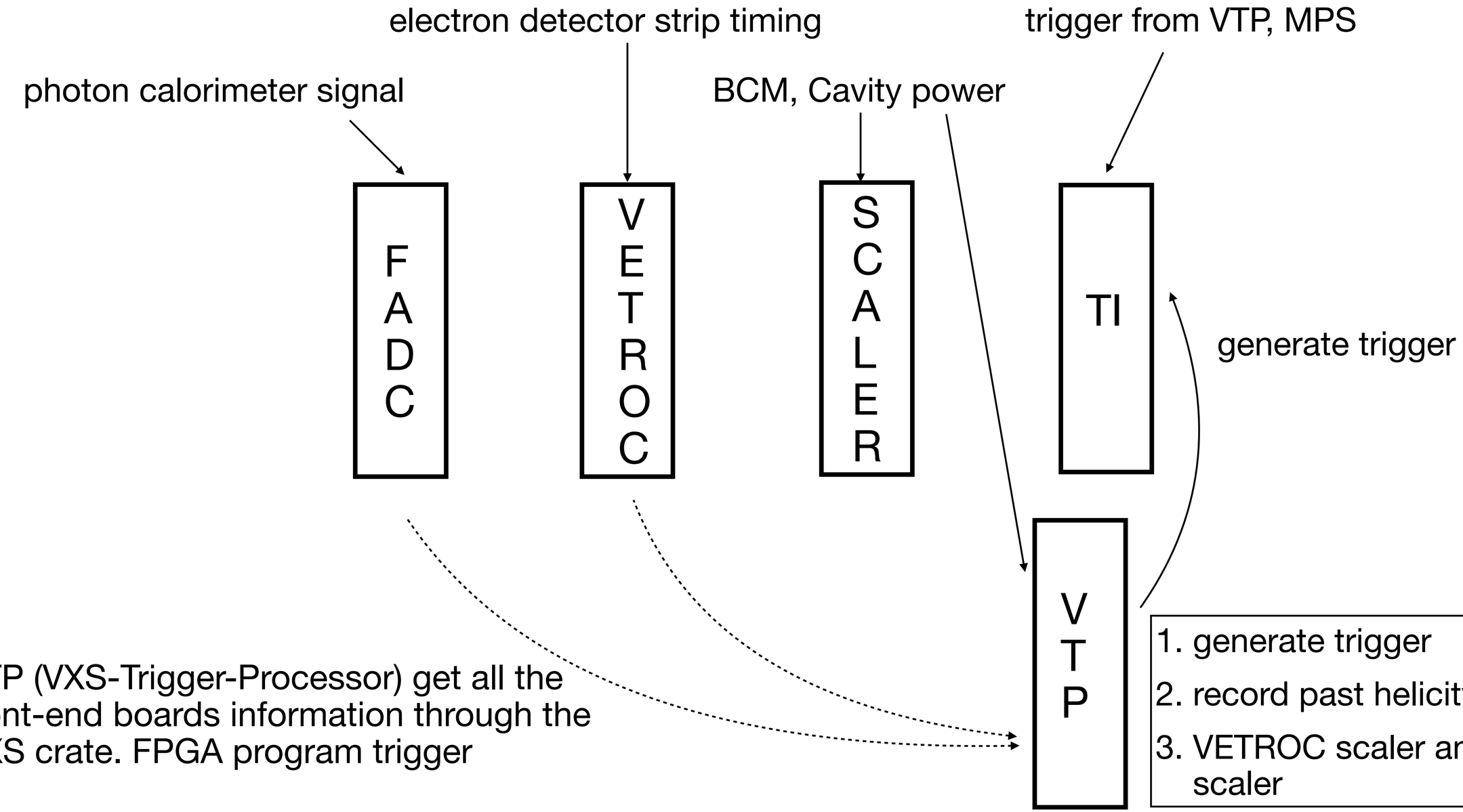
Electron detector





vetroc channel to strip map

Electron detector DAQ

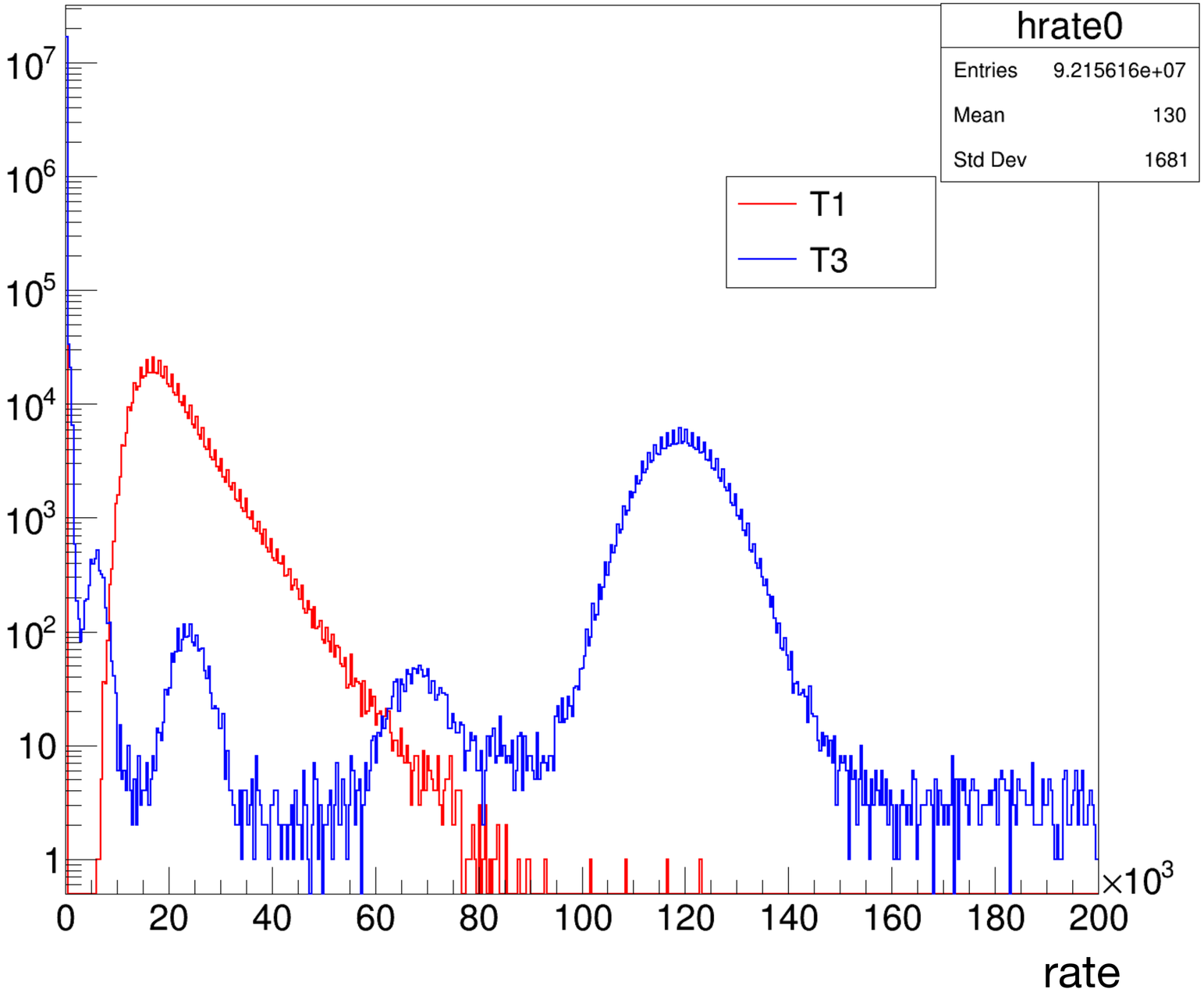


Trigger rate

T1: at least two e planes

T3: photon (prescale =1000)

block level=20



Trigger dead time

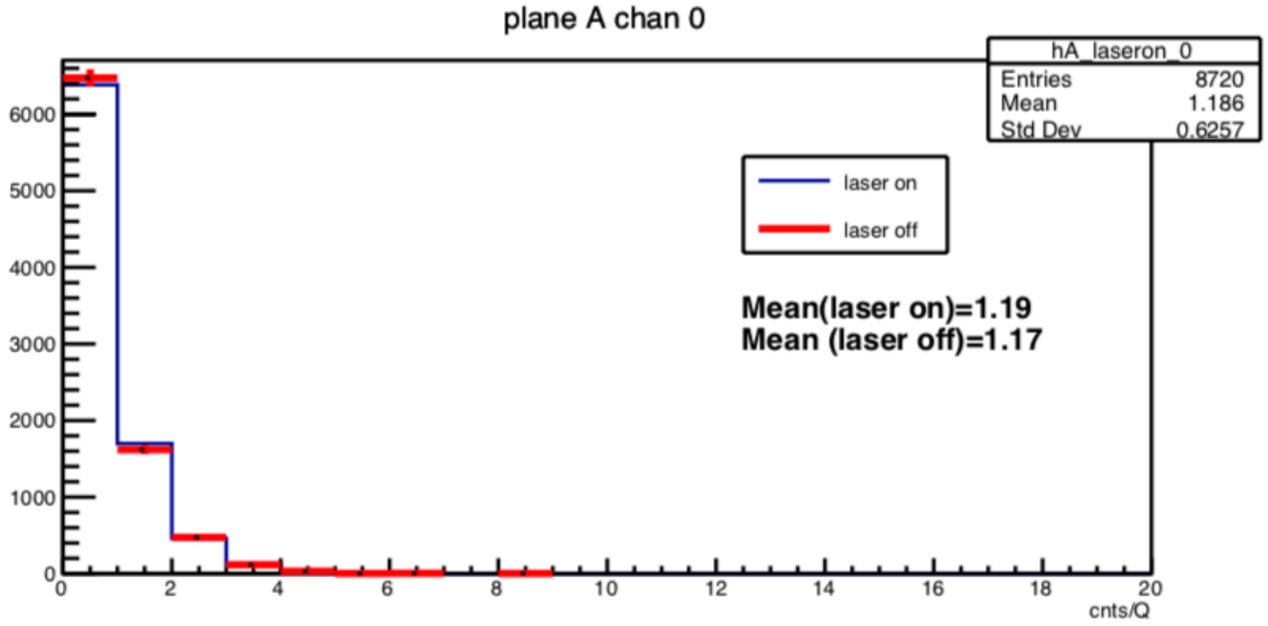
	T1 dead time	error	T3 dead time	error
laser on, beam>130 uA	9.49%	0.004%	38.2%	0.07%
laser off, beam>130 uA	9.06%	0.005%	35.1%	0.2%
beam off	8.77%	0.008%	17.2%	3.6%

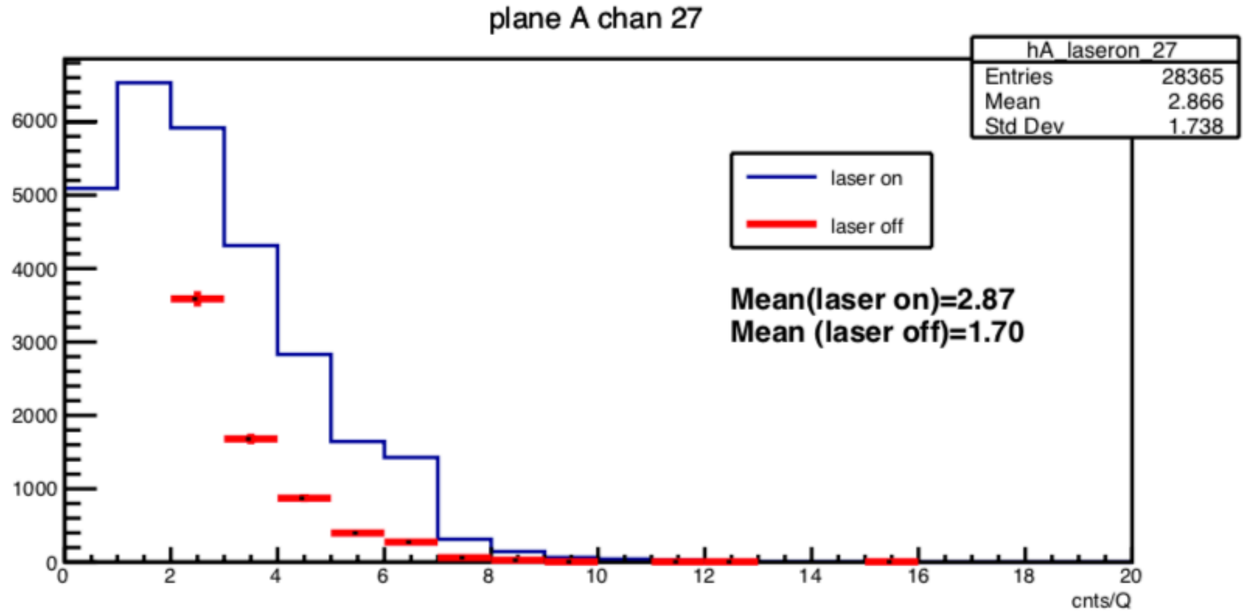
Strip rate/current

1. Use VTP scaler data, which record the hits for every VETROC channel and BCM counts for every helicity window.

2. The rate/current = the number of hits per helicity window/(beam current * 1/120);

3. The strip rate/current is calculated for beam on laser on, and beam on laser off;





From the comparison between the rate/current for laser on and off:

1. There are three strips on the left side and right side of Plane A and plane B seeing the compton events. (channel 25, 26, 27, 57, 58 ,59)

2. Three strips on the left side of plane C see the compton events. (channel 25, 26, 27). The right side of plane C is too noisy.

3. Probably none of the strips in plane D see the compton events. The right side of plane D is too noisy.

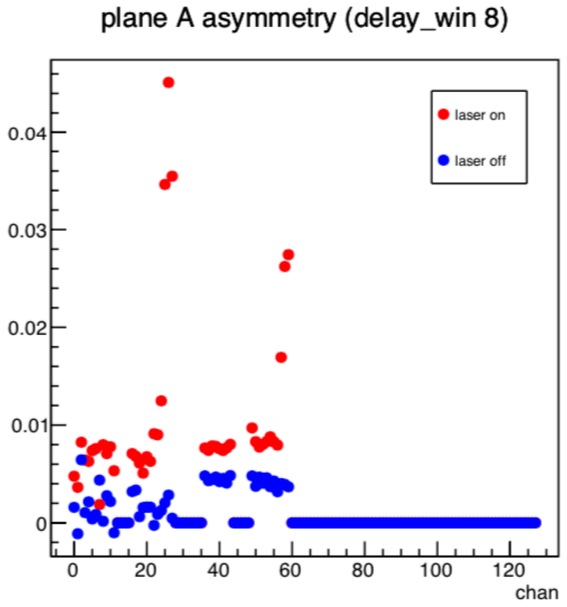
The asymmetry for each strip

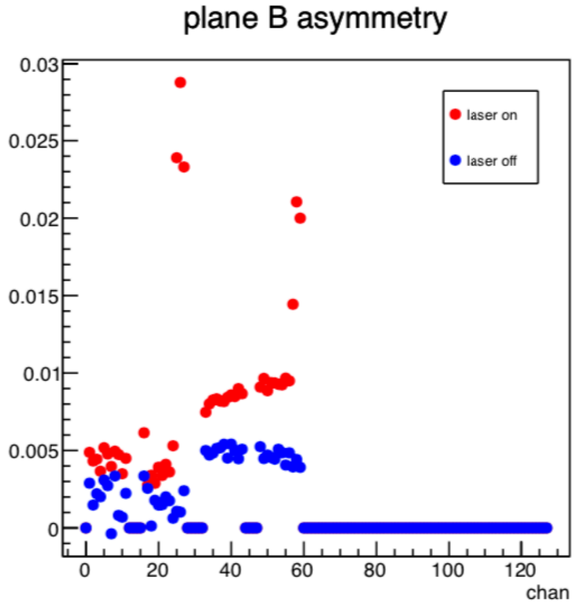
1. Remove the 8 helicity windows delay

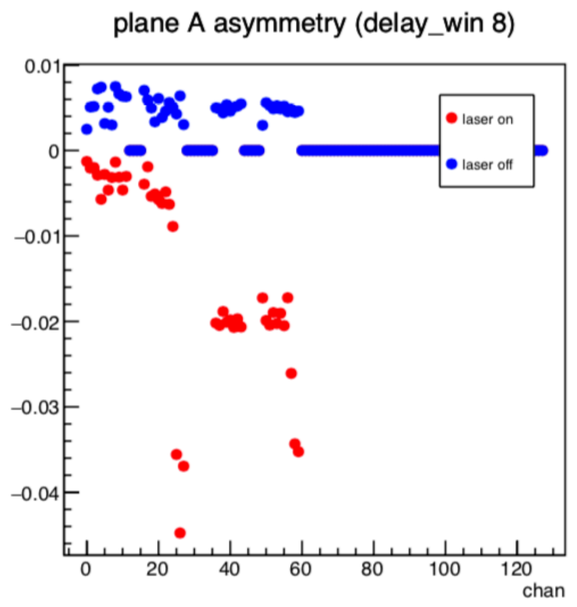
2. Get the total number of hits for helicity 1 (N1), the total number of incident charge for helicity 1 (Ne1), the total number of hits for helicity 0 (N0), the total number of incident charge for helicity 0 (Ne0),

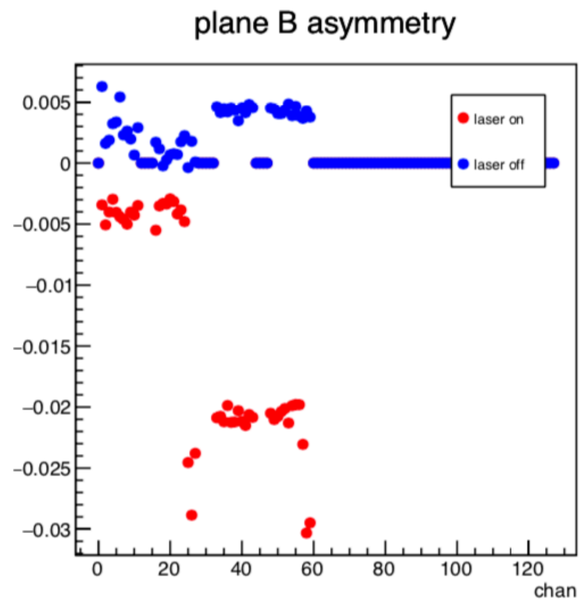
3. Asymmetry = (N1/Ne1-N0/Ne0)/(N1/Ne1+N0/Ne0)

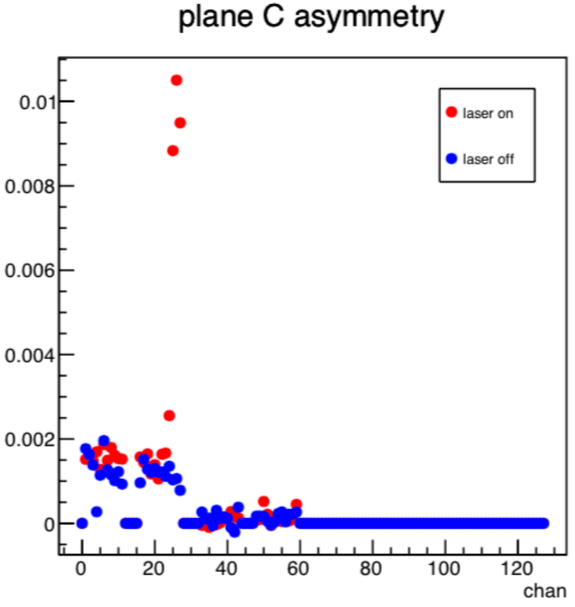
4. It’s calculated for beam on laser on, and beam on laser off; run 1067 (IHWP=IN) and run 1073 (IHWP=OUT)

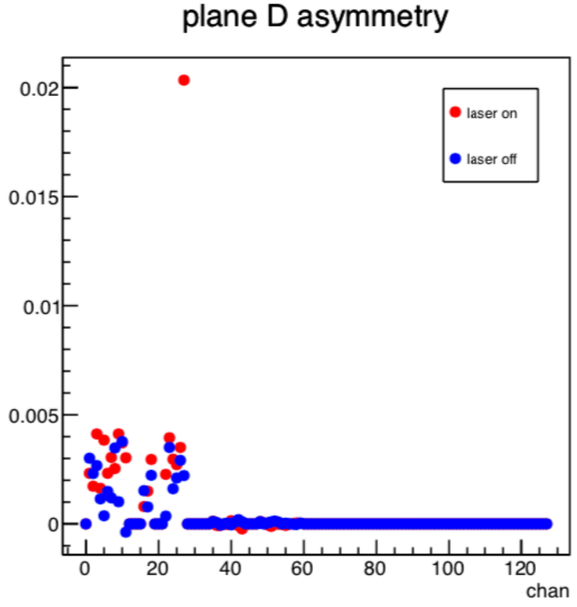


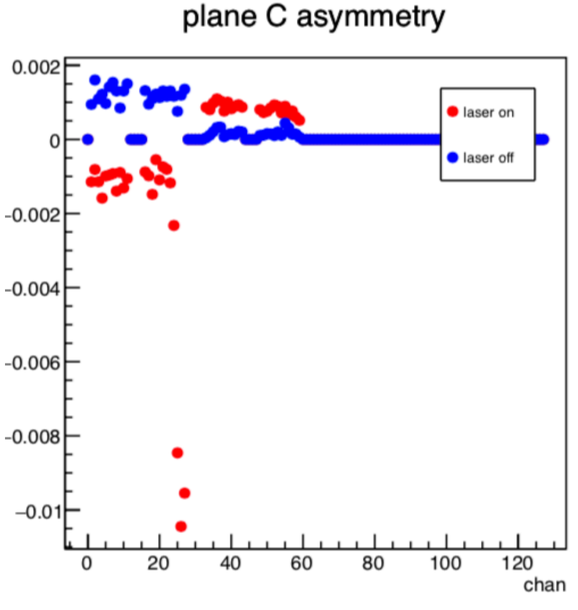


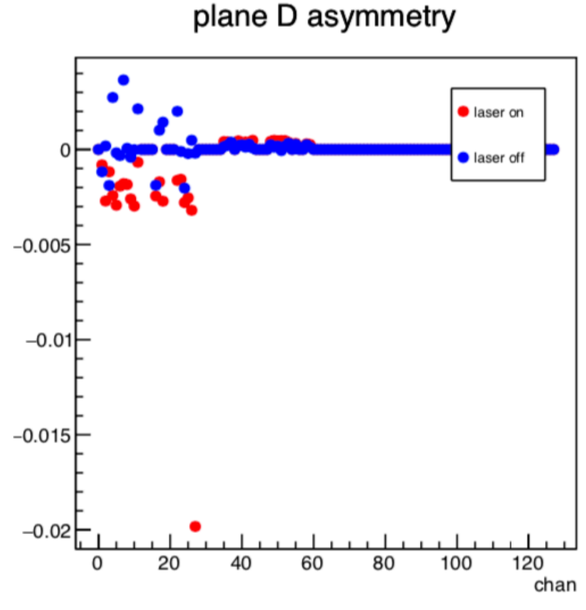








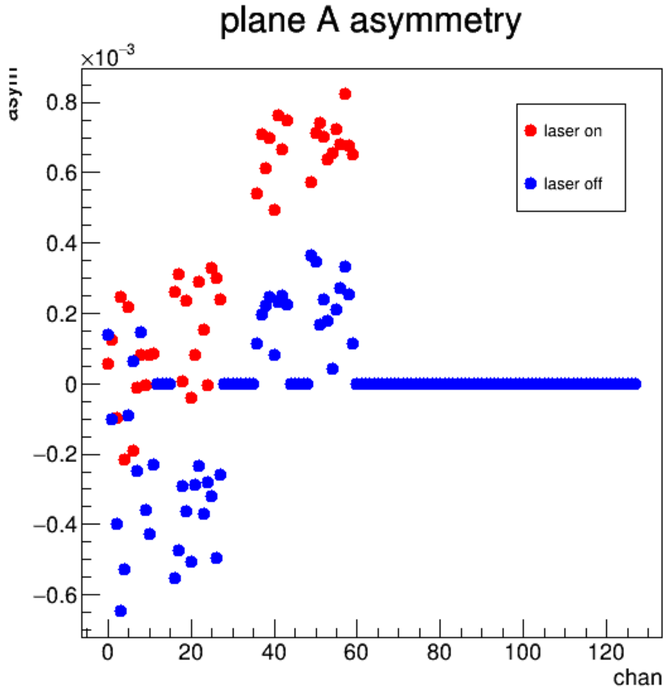


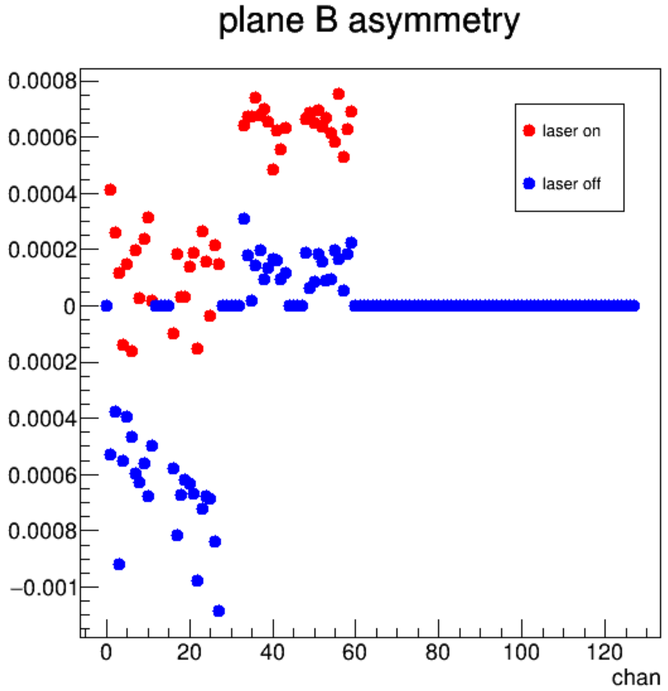


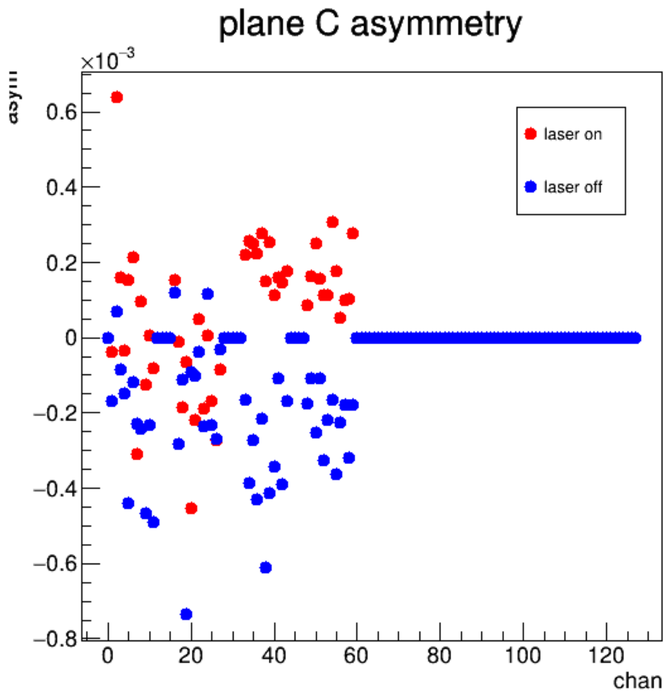
run 1067

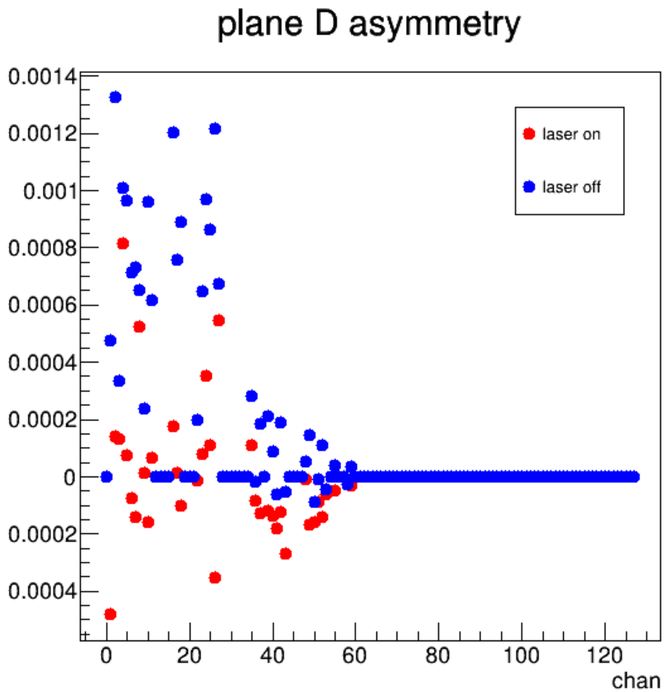
run 1073

beam off


plane A asymmetry
asym
×10⁻³
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
0
20
40
60
80
100
120
chan
laser on
laser off


plane B asymmetry
0.0008
0.0006
0.0004
0.0002
0
0.0002
0.0004
0.0006
0.0008
−0.001
0
20
40
60
80
100
120
chan
laser on
laser off


plane C asymmetry
asym
×10⁻³
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
0
20
40
60
80
100
120
chan
laser on
laser off


plane D asymmetry
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
0.0002
0.0004
0
20
40
60
80
100
120
chan
laser on
laser off

Conclusions:

1. The asymmetries for "laser off" remain the same sign for 1067 and 1073, and are less than 0.5%. The asymmetries for "laser on" change sign for run 1067 and 1073, and much bigger asymmetries (>2%) are observed on those channels seeing the compton events (close to channel 27, and channel 59).

2. More clean results can be gotten using VETROC data with time cut applied;