Possible Reasons

Possible reasons for the beam current dependence:

1. NPS calorimeter dead time (especially for high beam current)
2. Charge information:
   - which BCM calibration to use,
   - whether report file gives correct charge information?
3. Target boiling (about 3% in 60uA)
4. Track efficiency (already applied the track efficiency correction)

Slope Table

KinC_x	LH2 Yield vs Trigger1 rate Slope (10^{-5} %/kHz)	Maximum Trigger1 Rate (kHz)	Runs (More than 5)
36_3	0.79	800	20
36_5	-3.03	2200	13
50_4	-2.43	1800	25
50_4’	-3.30	2000	35
60_3	-3.32	1100	11
50_1	-2.79	1000	9
36_5’ (Calibrated)	-3.07	2200	8
60_4a (Calibrated)	-2.22	2200	14
60_4b	-2.13	1200	19

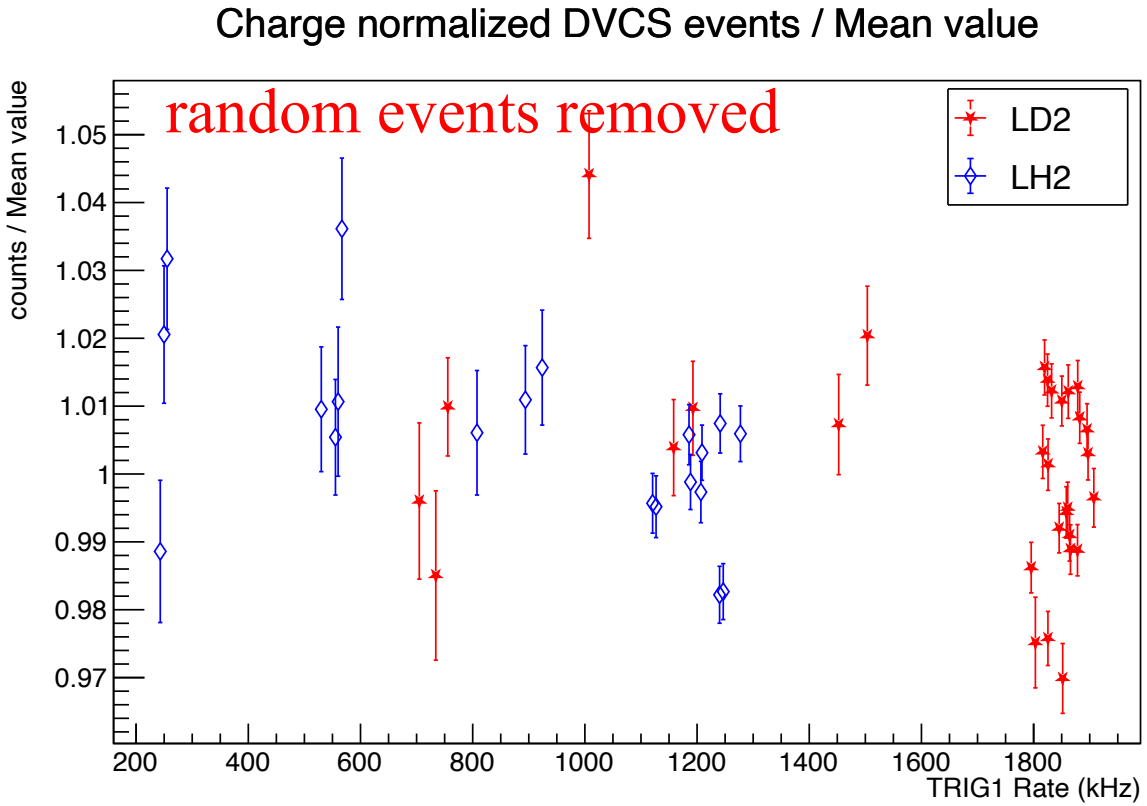
- For LD2, the slope varies a lot (can be positive and also negative)
- For LH2, if the maximum hTRIG1 rate is larger than 800 kHz, the slope is always negative [-2, -3]e-5

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

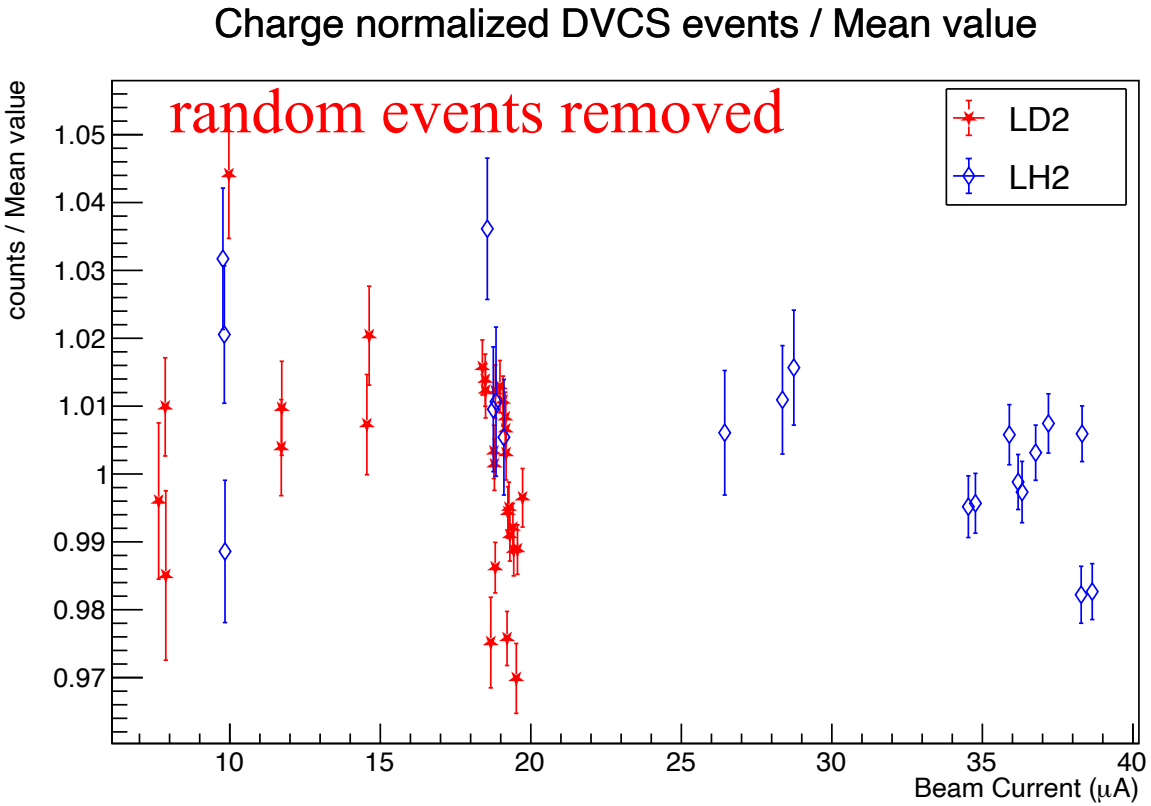
145 < *clus*T < 155

Include col 1-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

KinC_x60_4b

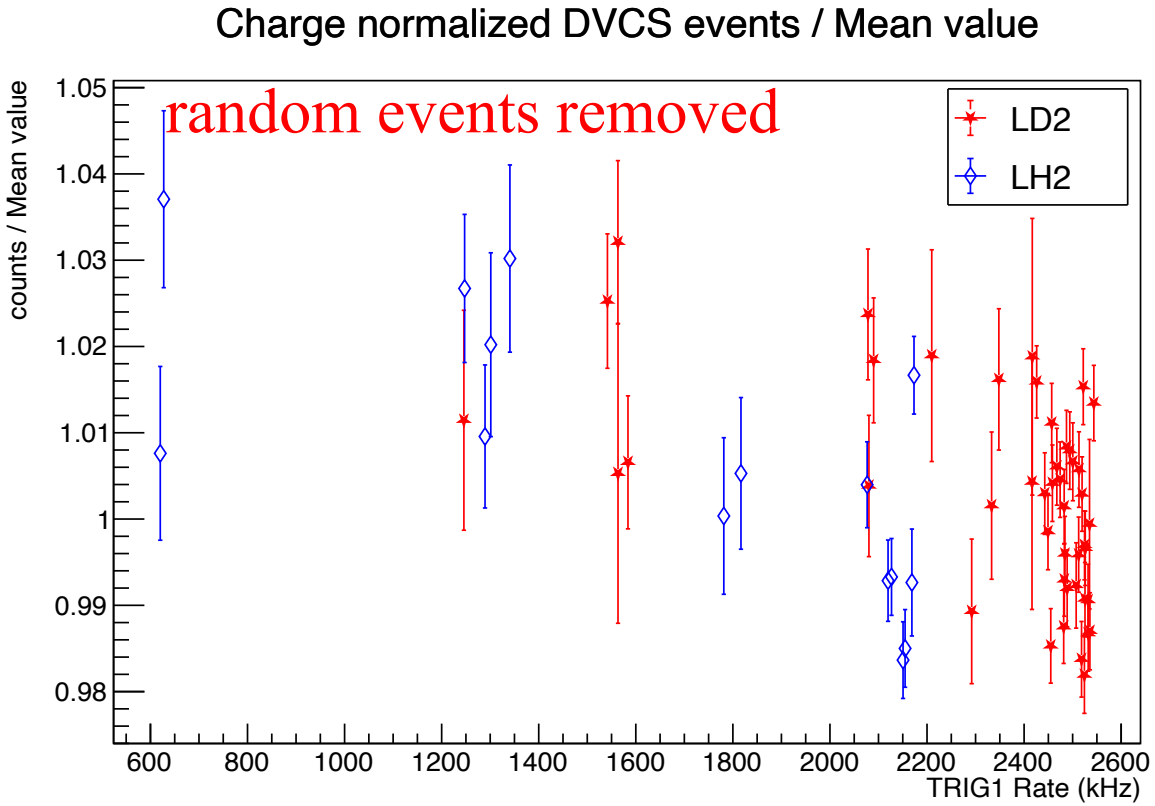
DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

145 < *clus*T < 155

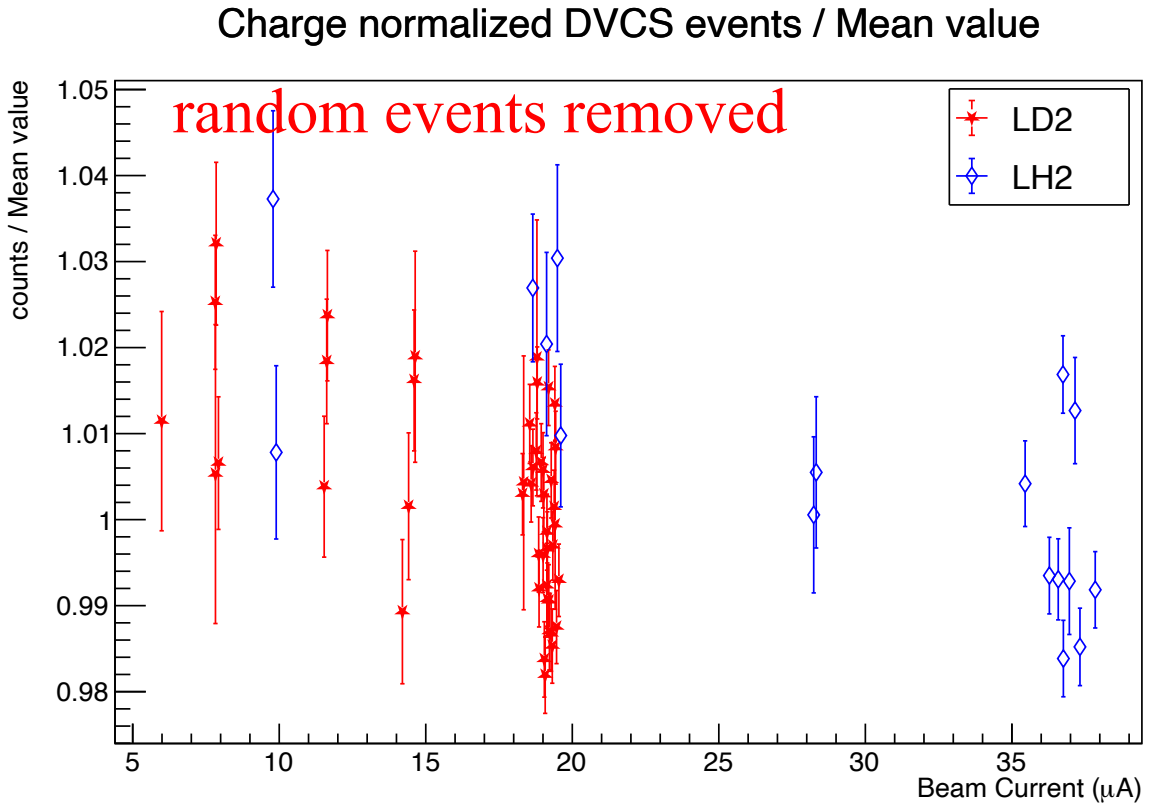
Include col 1-28

After Calibration



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

KinC_x60_4a

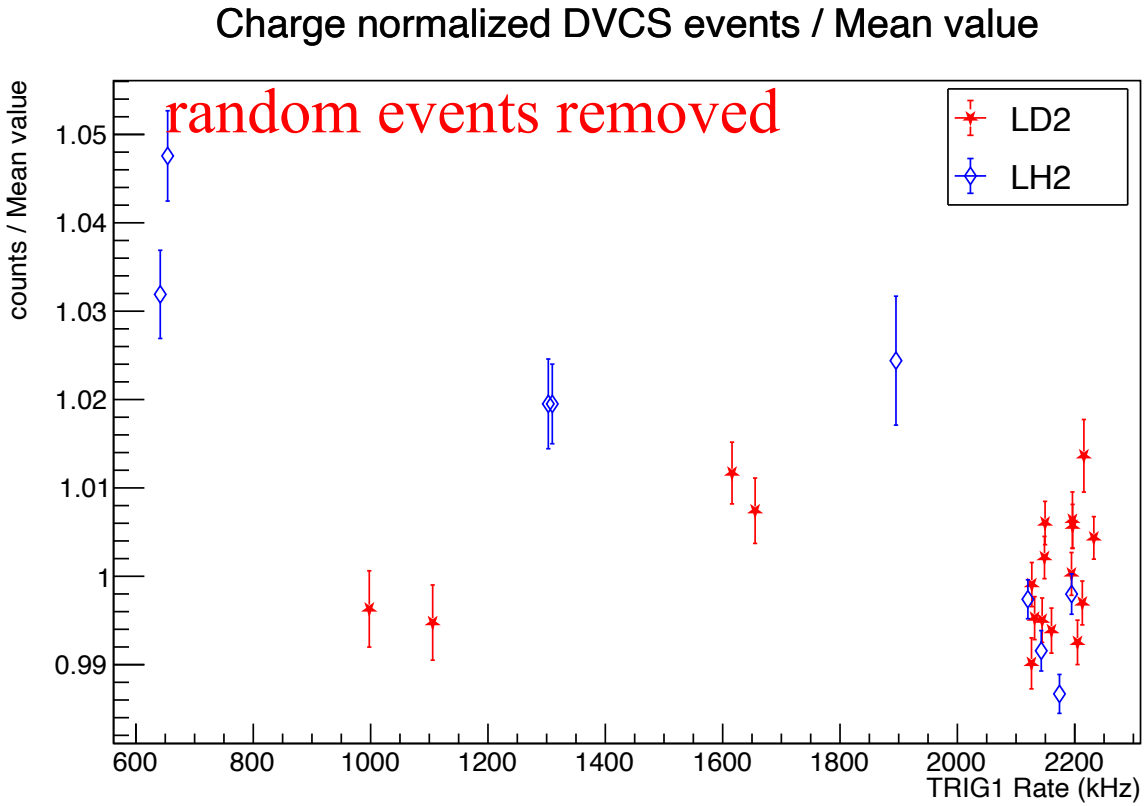
DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

145 < *clus*T < 155

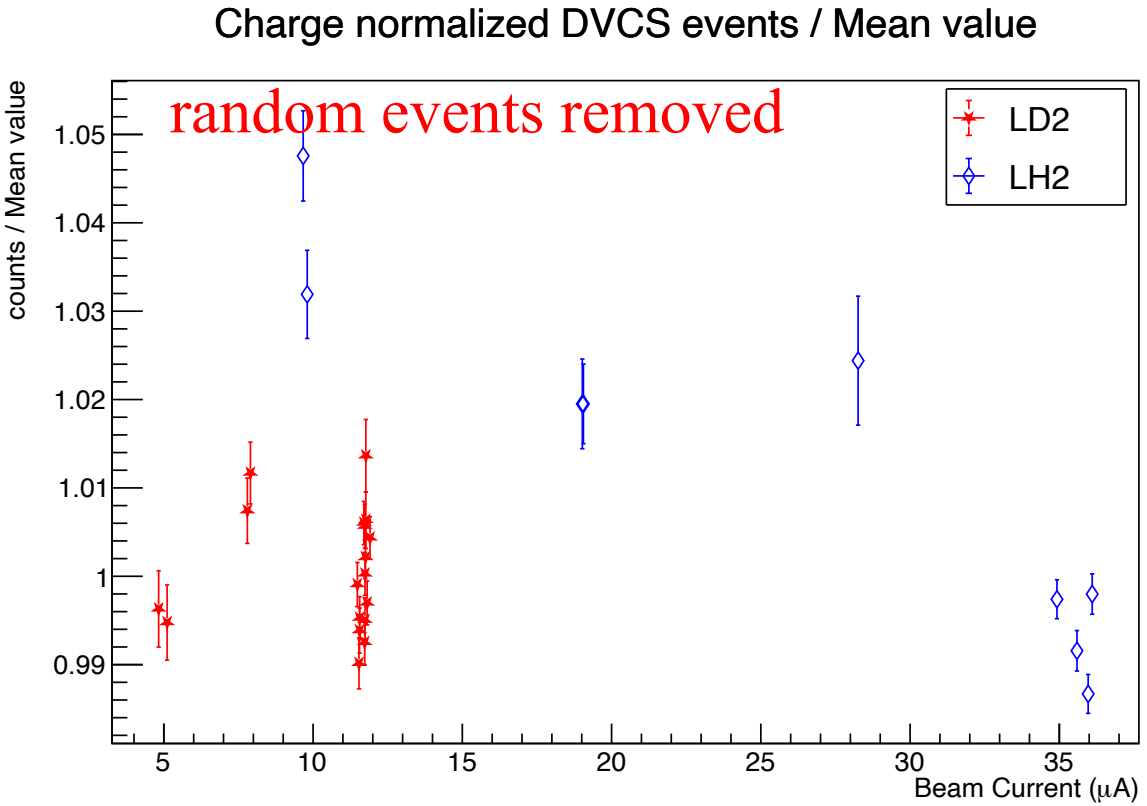
Include col 1-28

After Calibration



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

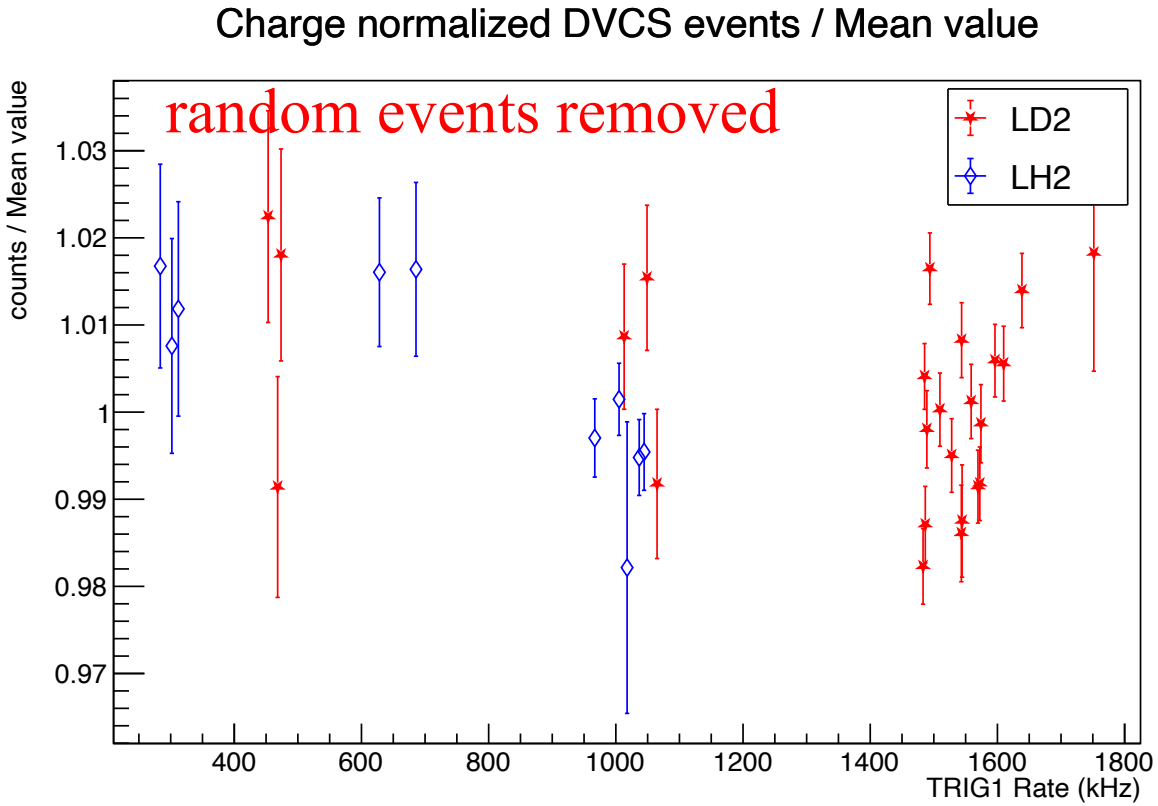
KinC_x36_5'(2024)

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

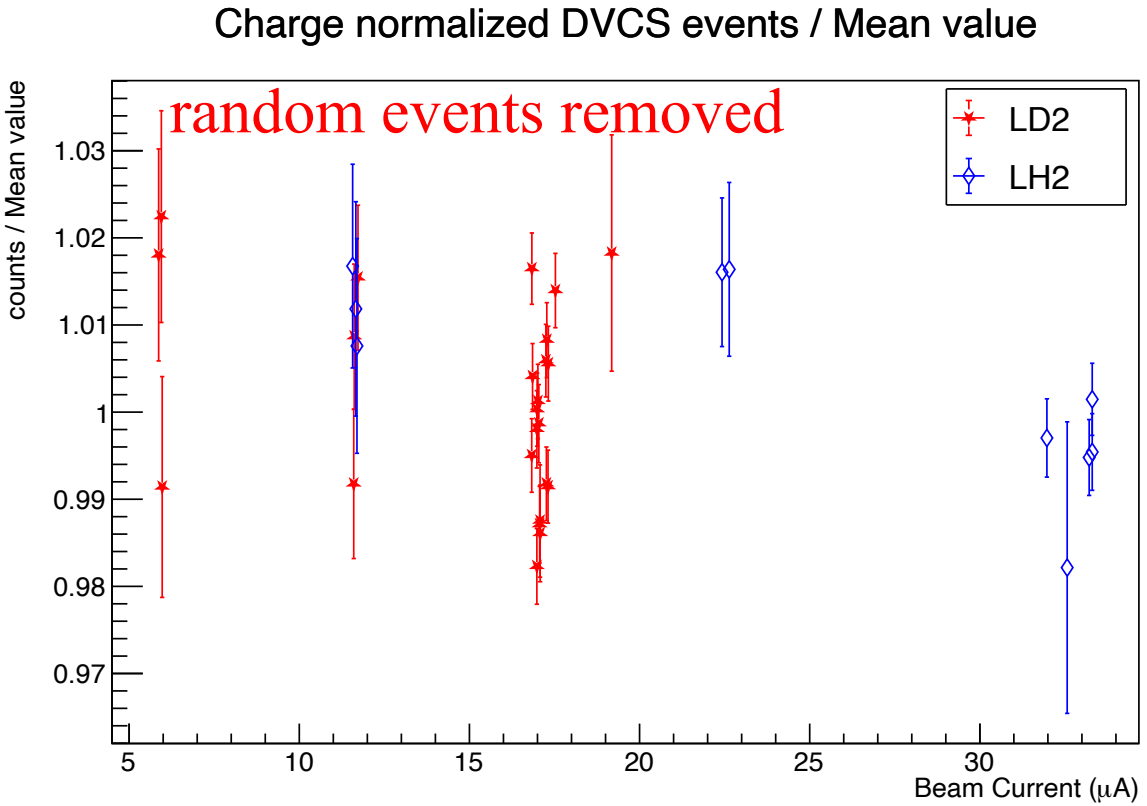
145 < *clus*T < 155

Include col 11-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

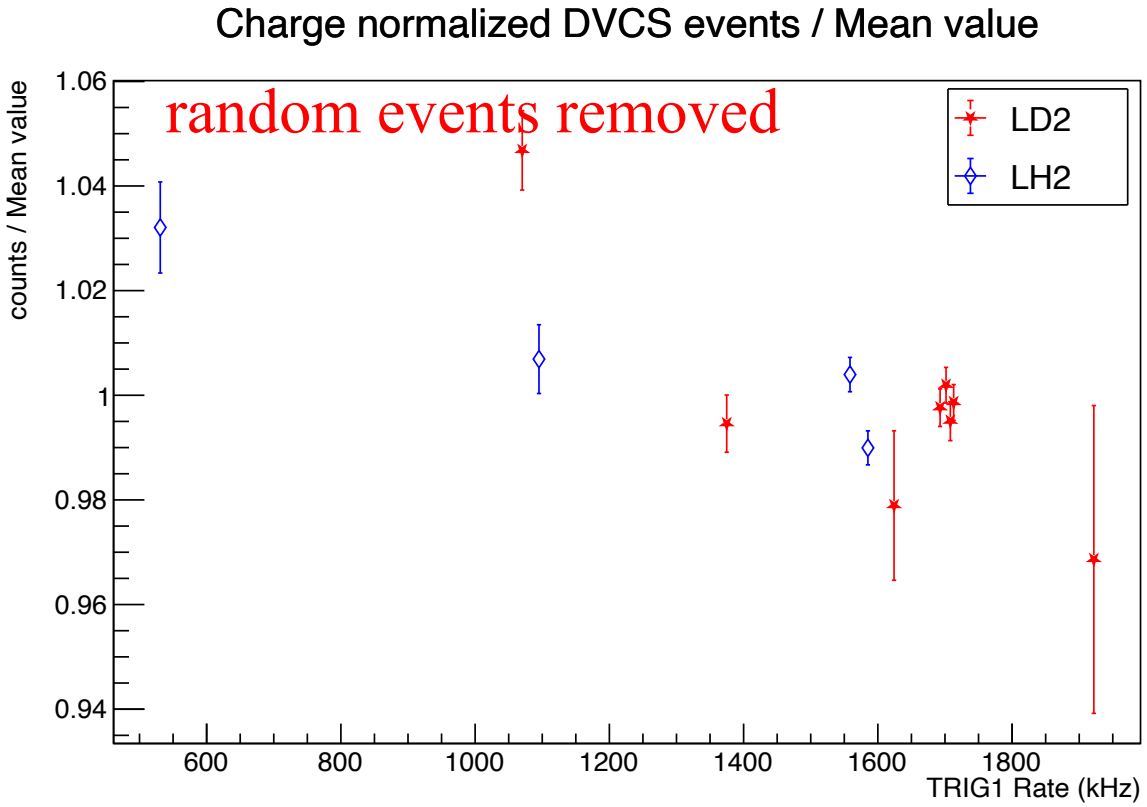
KinC_50_1

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

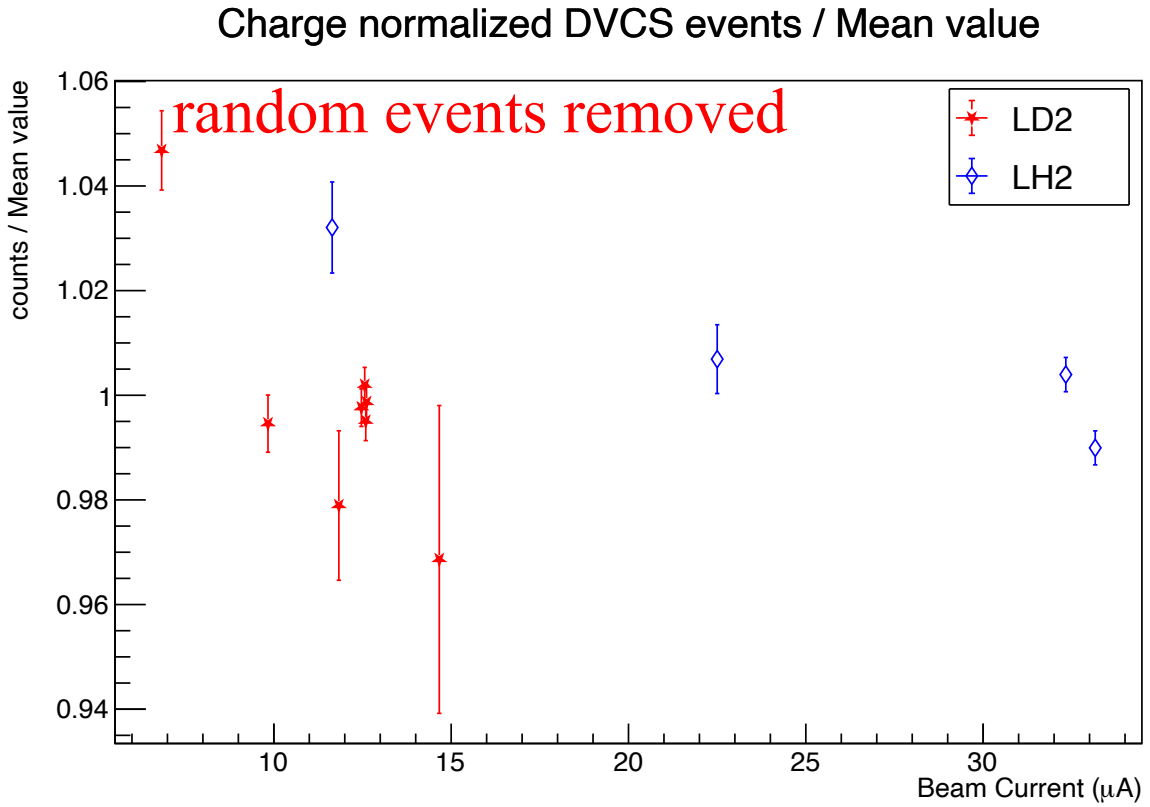
145 < *clus*T < 155

Include col 9-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

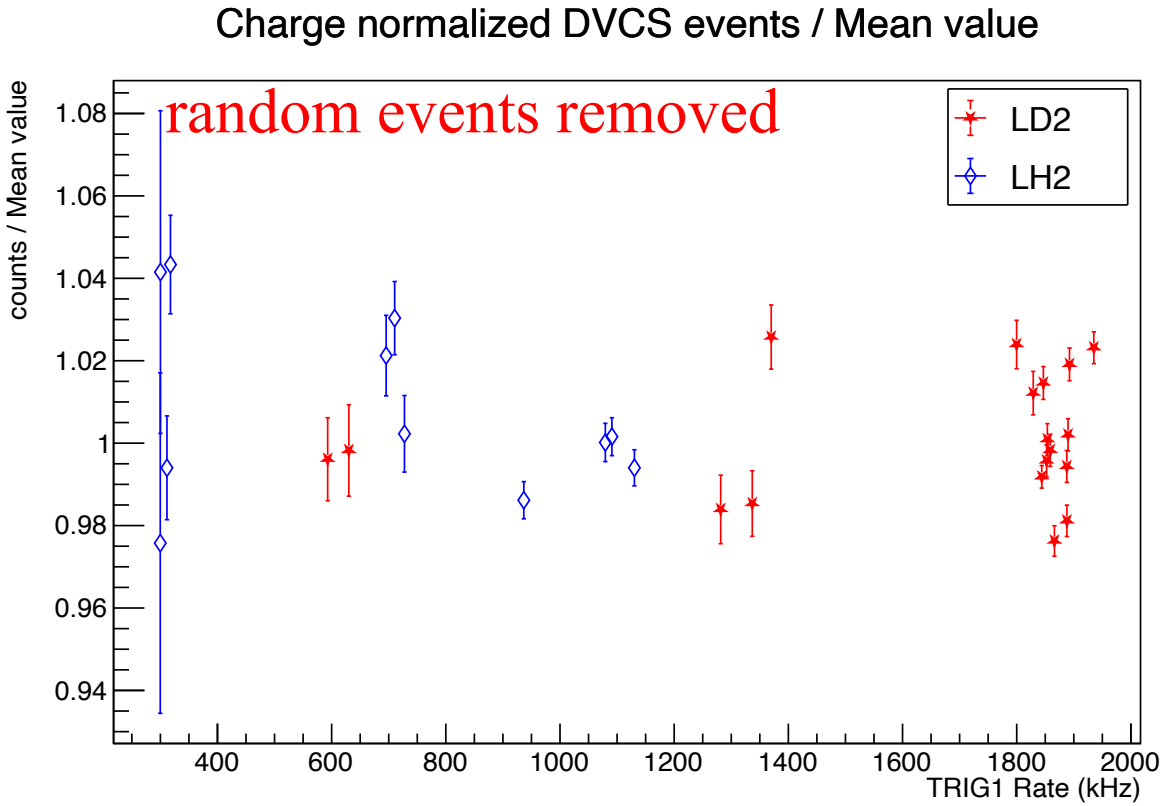
KinC_36_2”

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

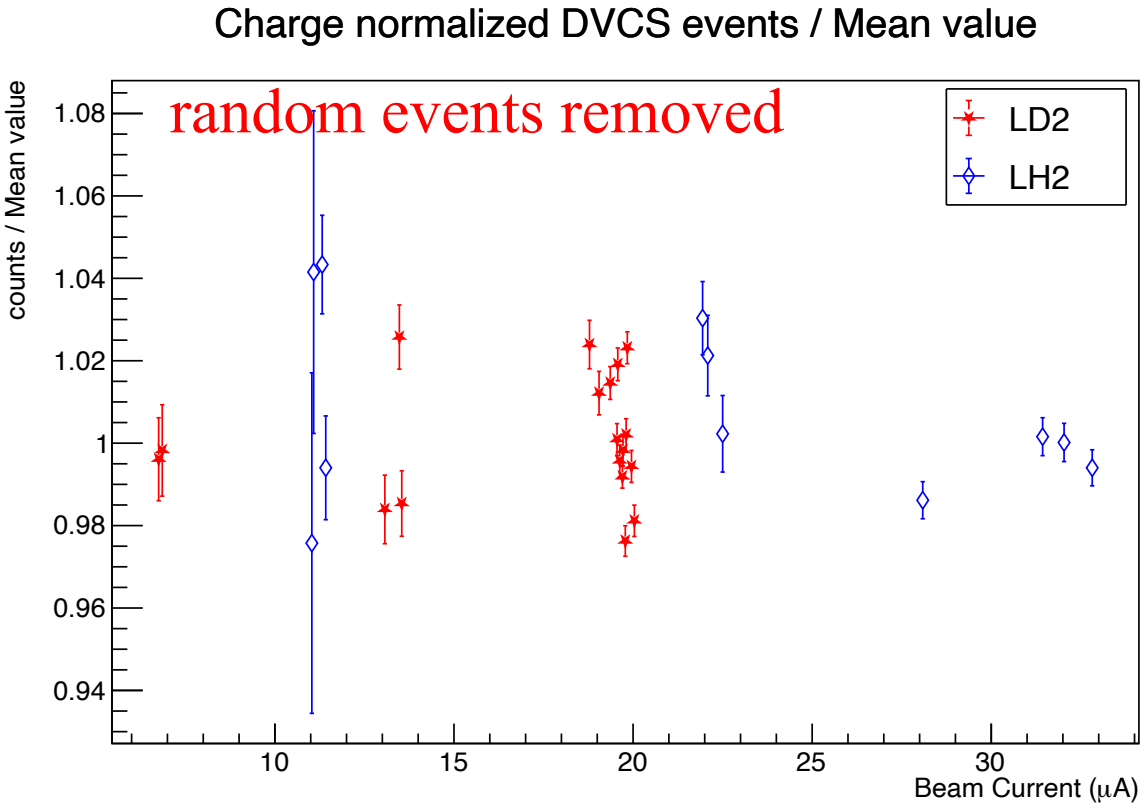
145 < *clus*T < 155

Include col 7-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

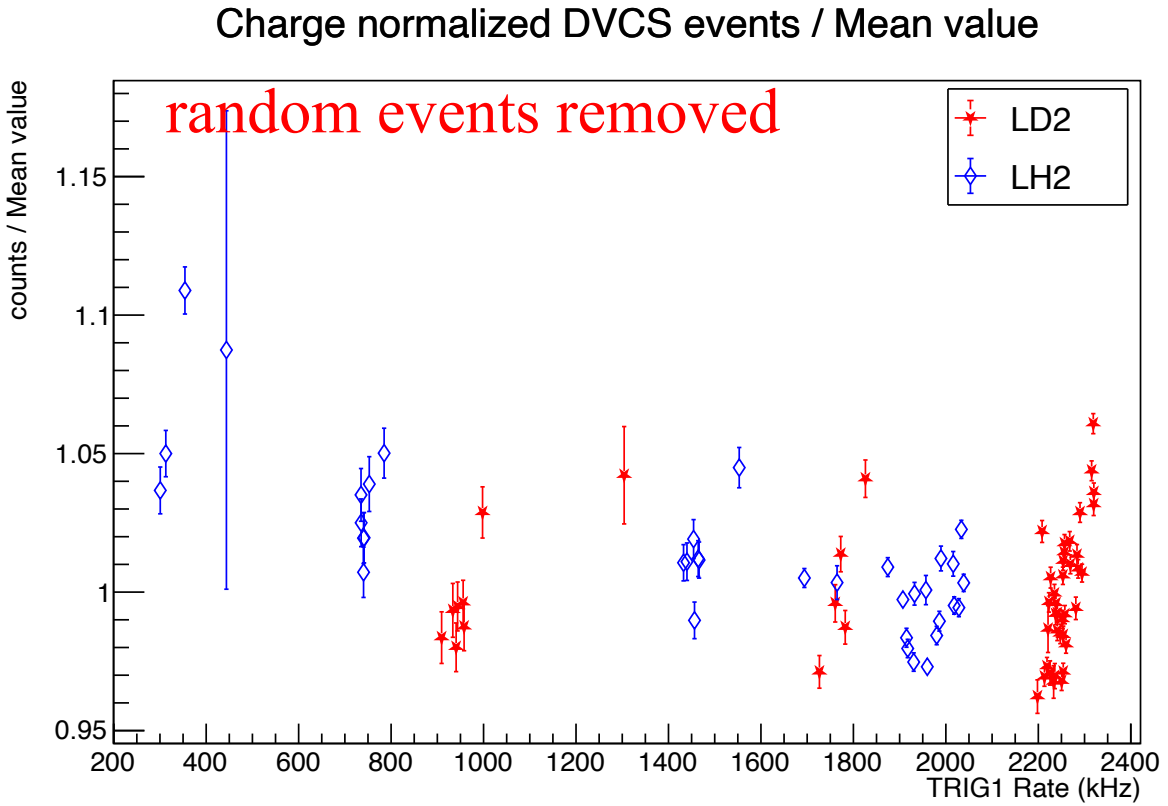
KinC_60_3’

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

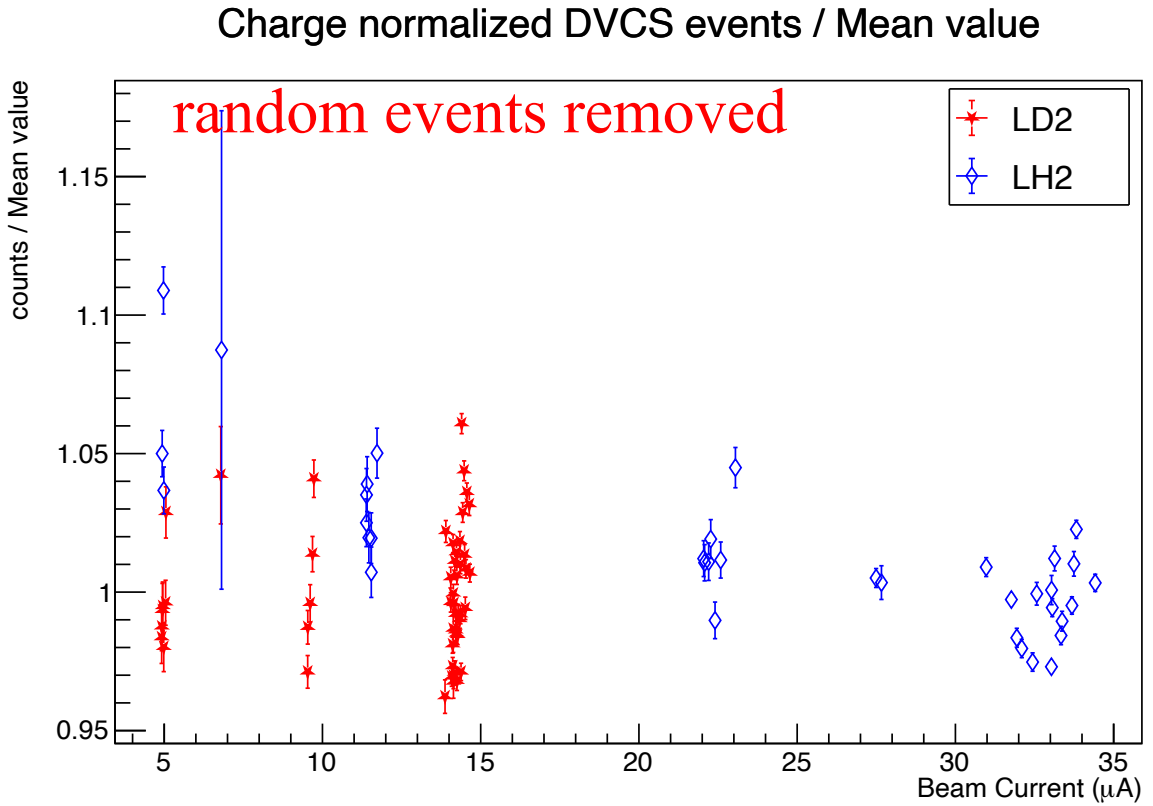
145 < *clus*T < 155

Include col 6-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

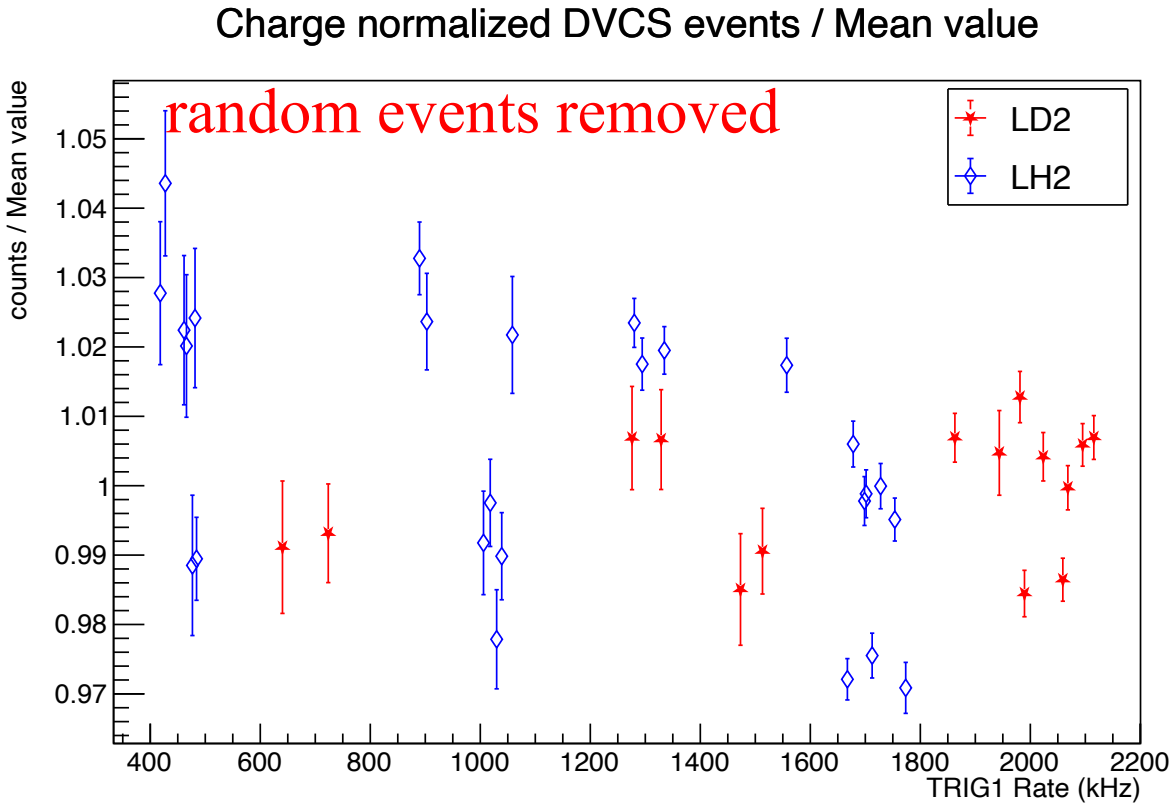
KinC_50_4’

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

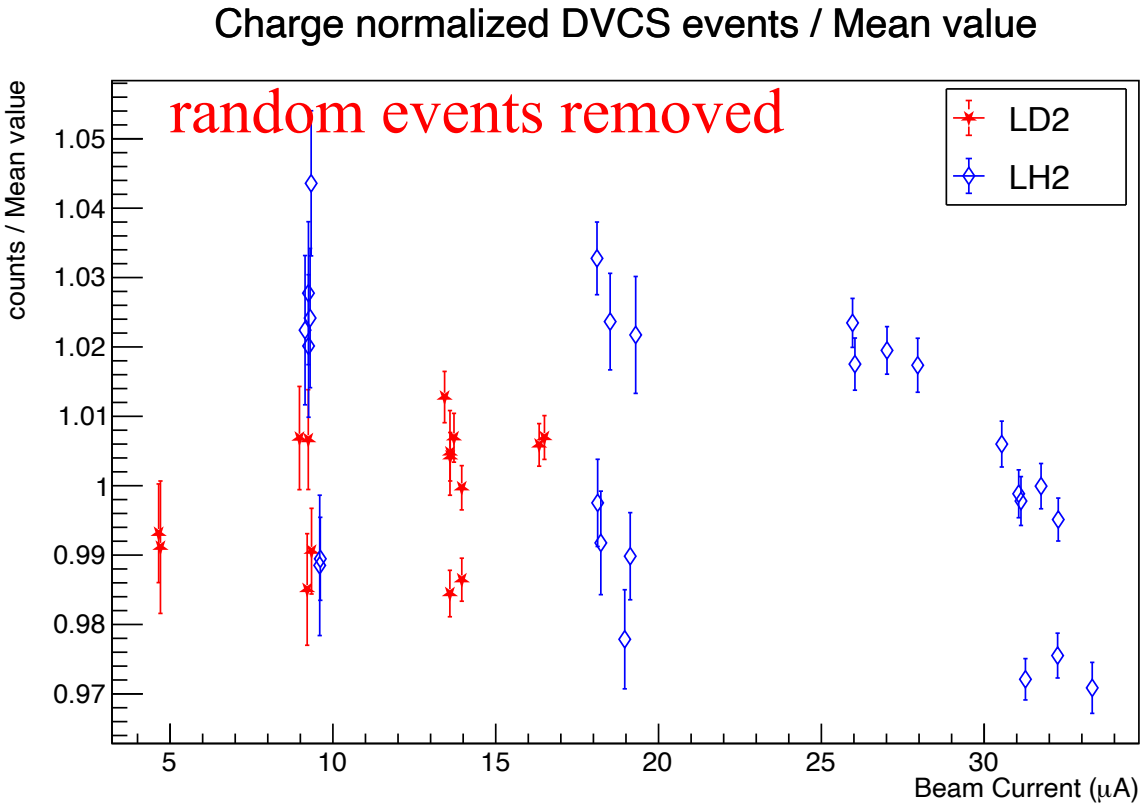
145 < *clus*T < 155

Include col 5-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

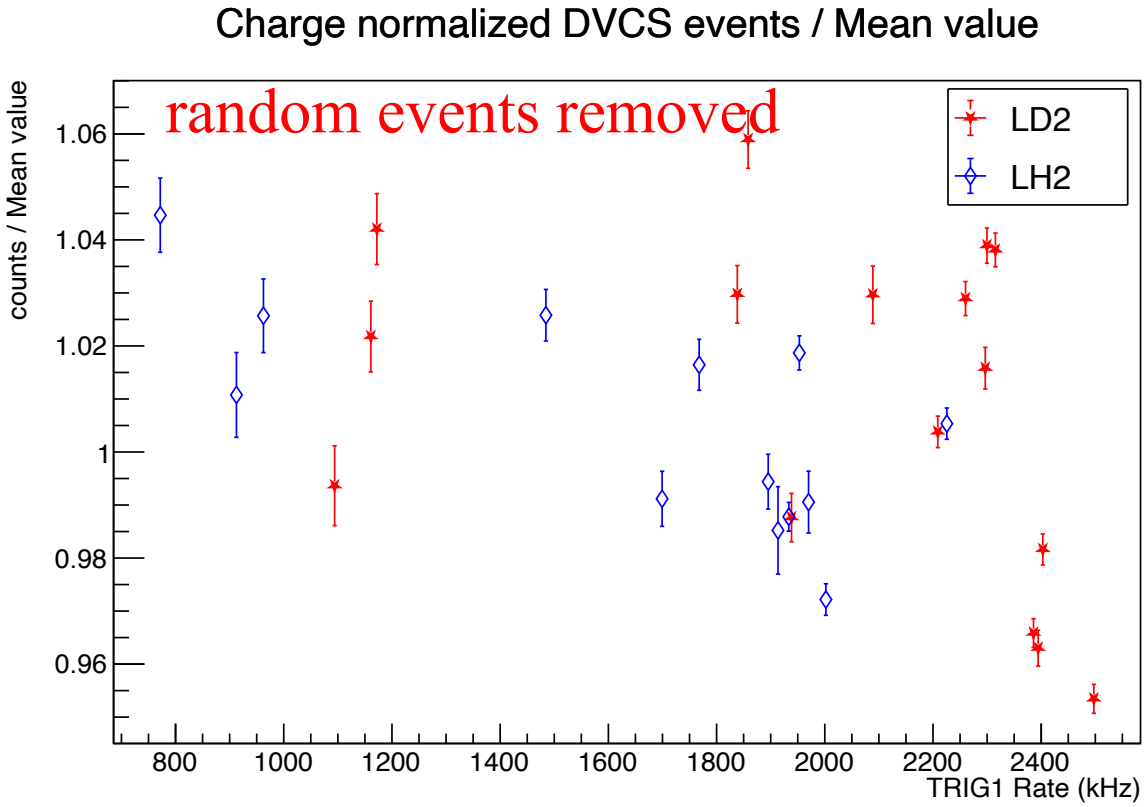
KinC_50_4

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

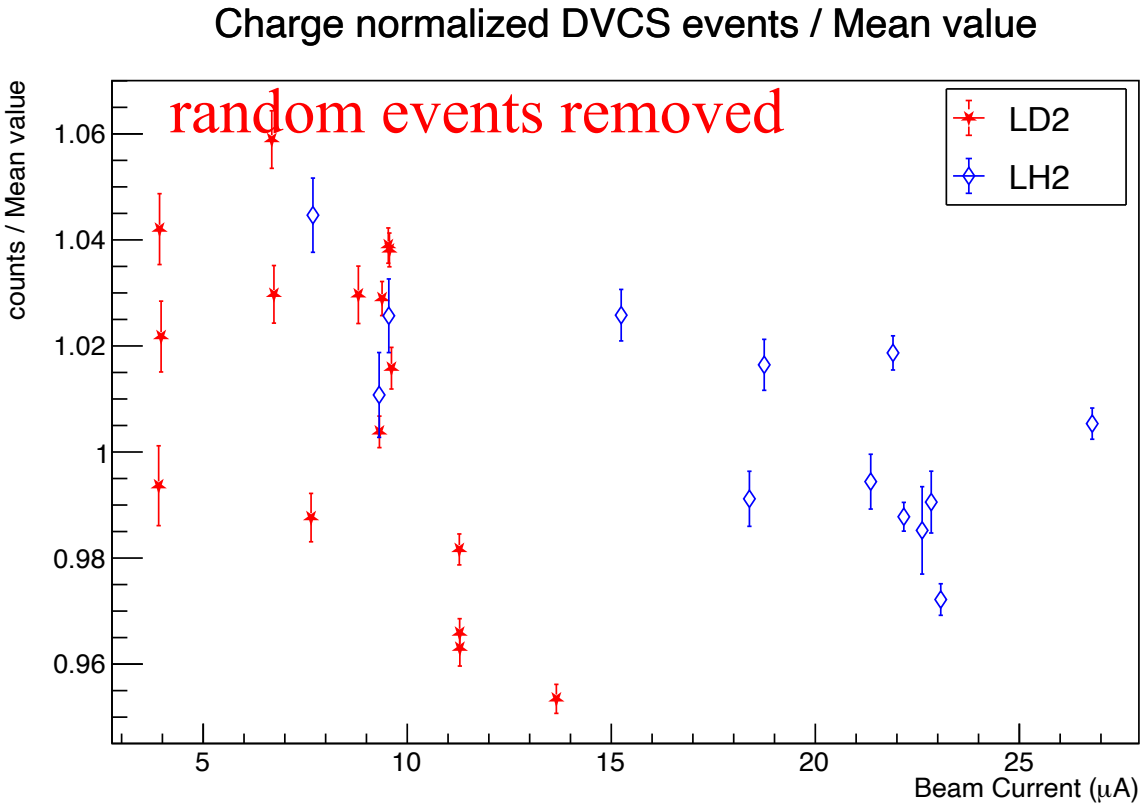
145 < *clus*T < 155

Include col 4-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

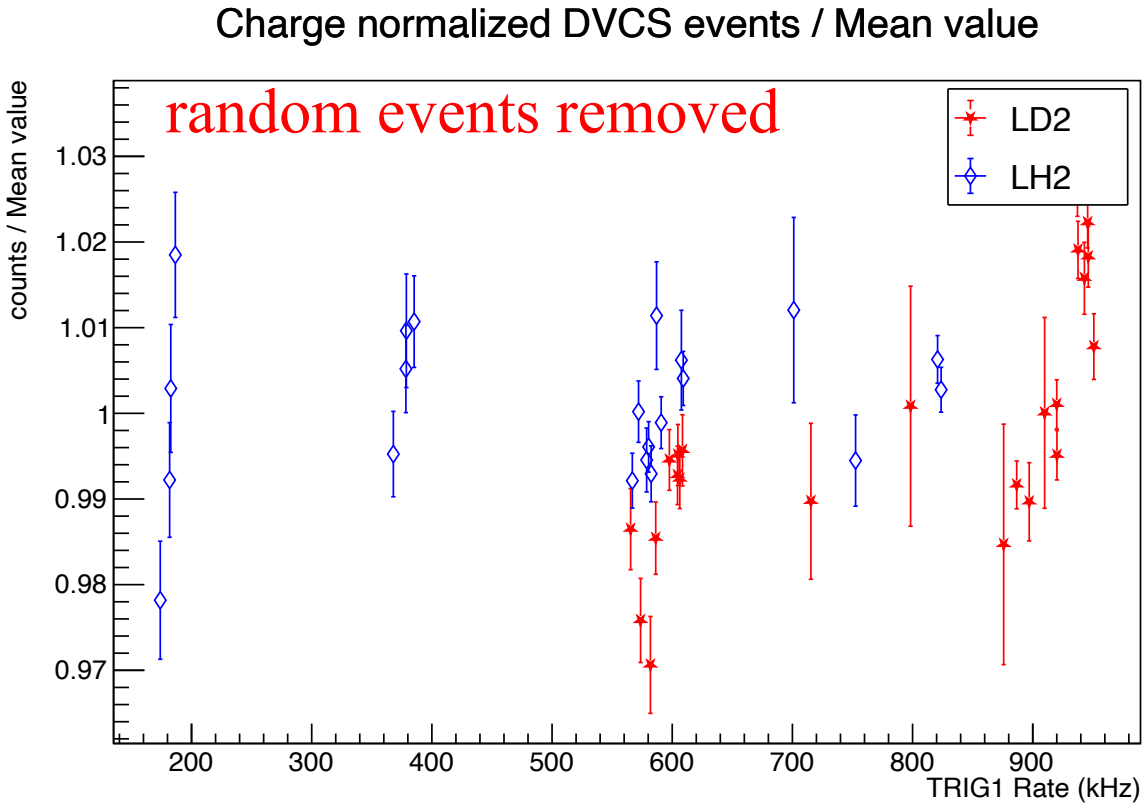
KinC_36_5

DVCS charge normalized yield

dvcs selection: Emax > 2 GeV

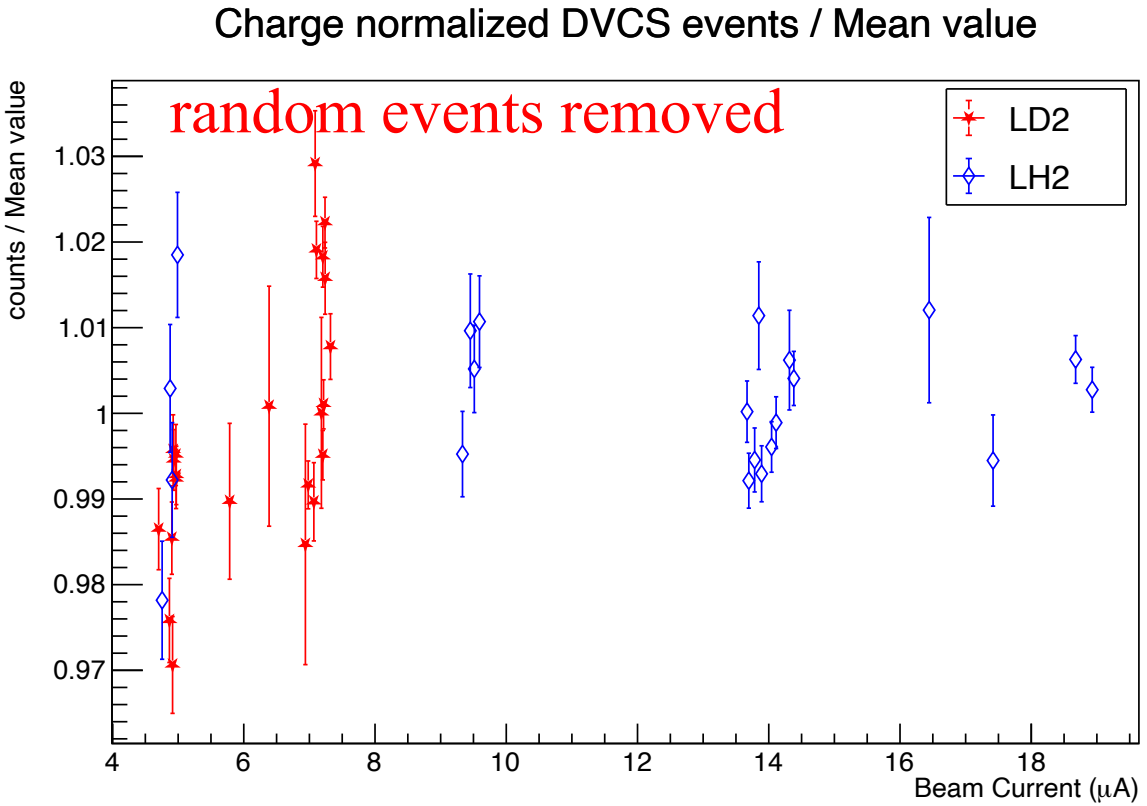
145 < *clus*T < 155

Include col 3-28



yield vs. trig1 rate

NPS Dead-time



yield vs. beam current

Boiling & BCM

KinC_36_3