

DVCS charge normalized yield

dvcs selection: $E_{\text{max}} > 2 \text{ GeV}$

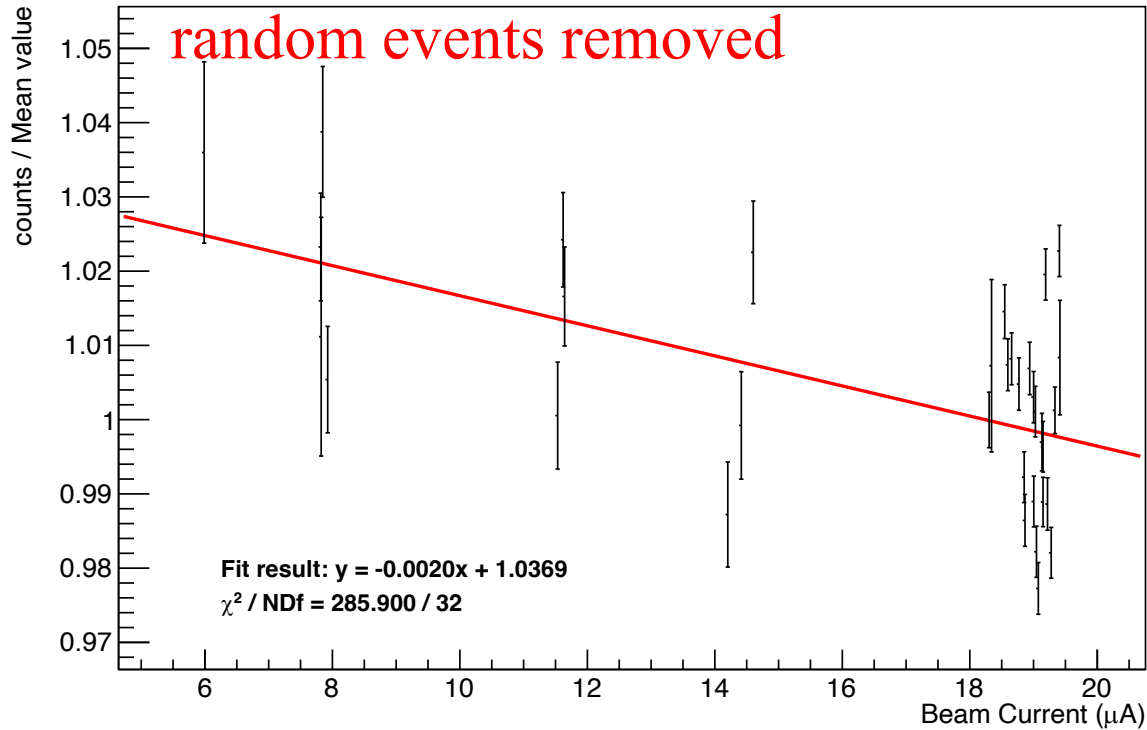
$145 < \text{clusT} < 155$

Before Calibration

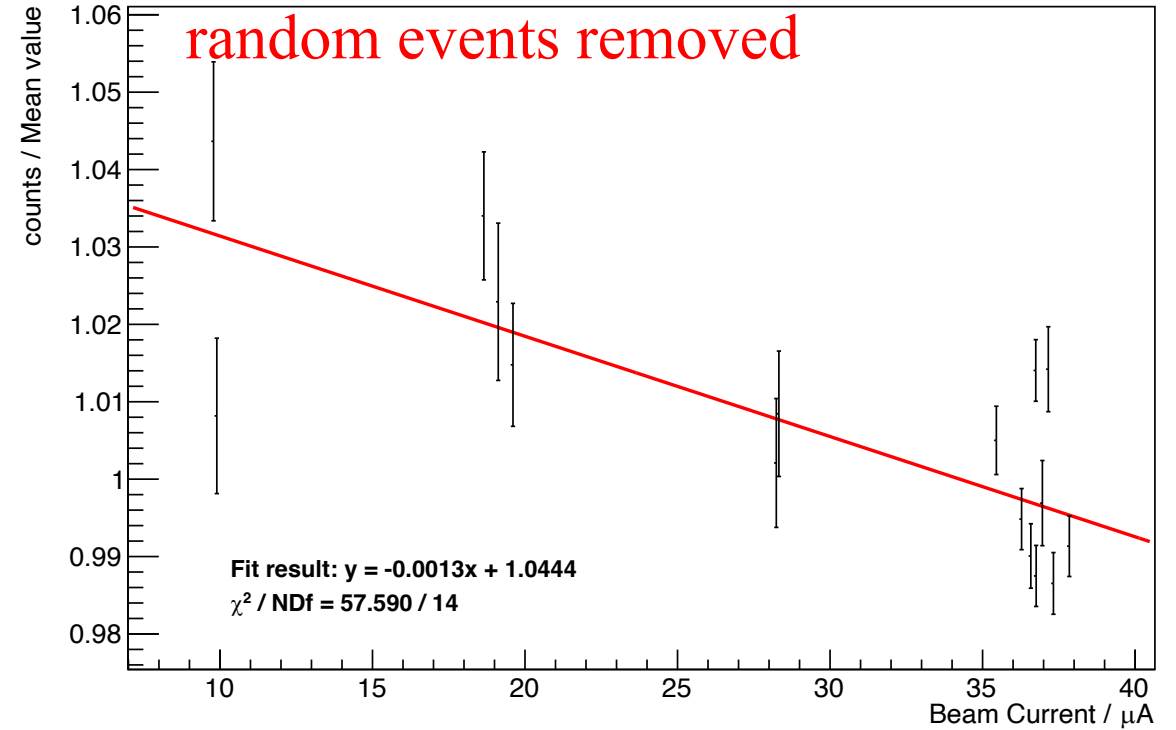
Include col 1-28

Charge normalized DVCS events(LD2) / Mean value

Charge normalized DVCS events(LH2) / Mean value



LD2



LH2

DVCS charge normalized yield

dvcs selection: $E_{\text{max}} > 2 \text{ GeV}$

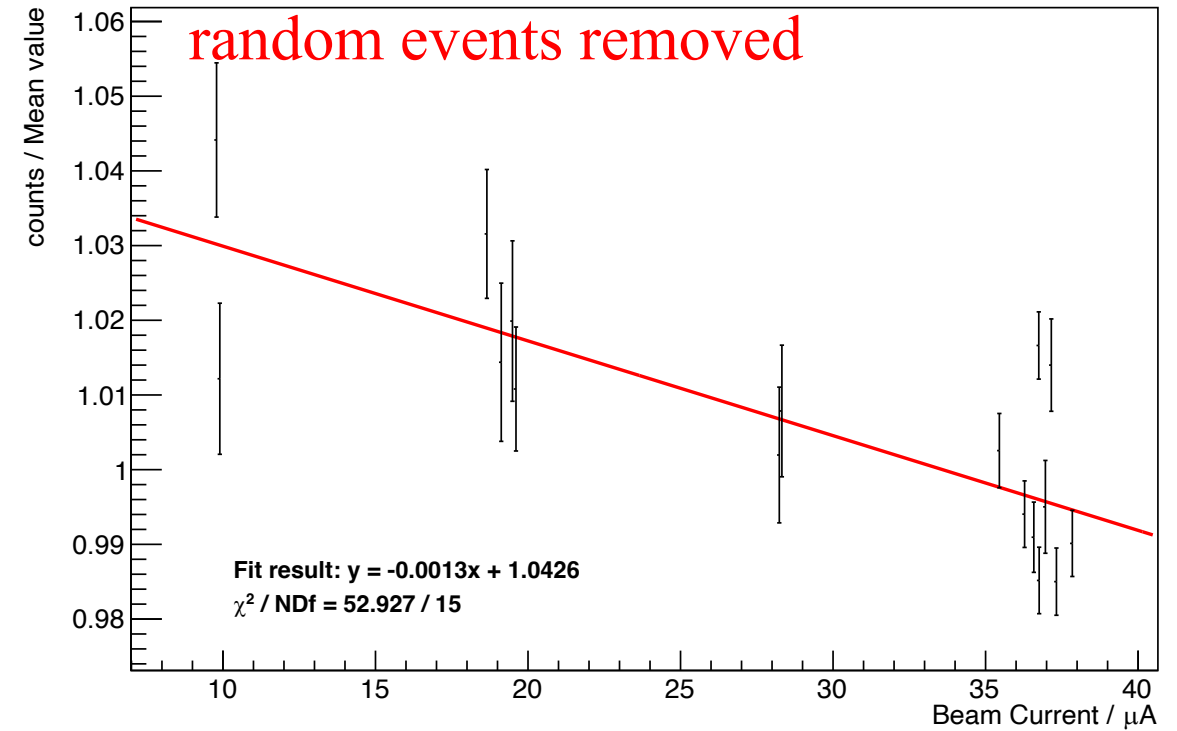
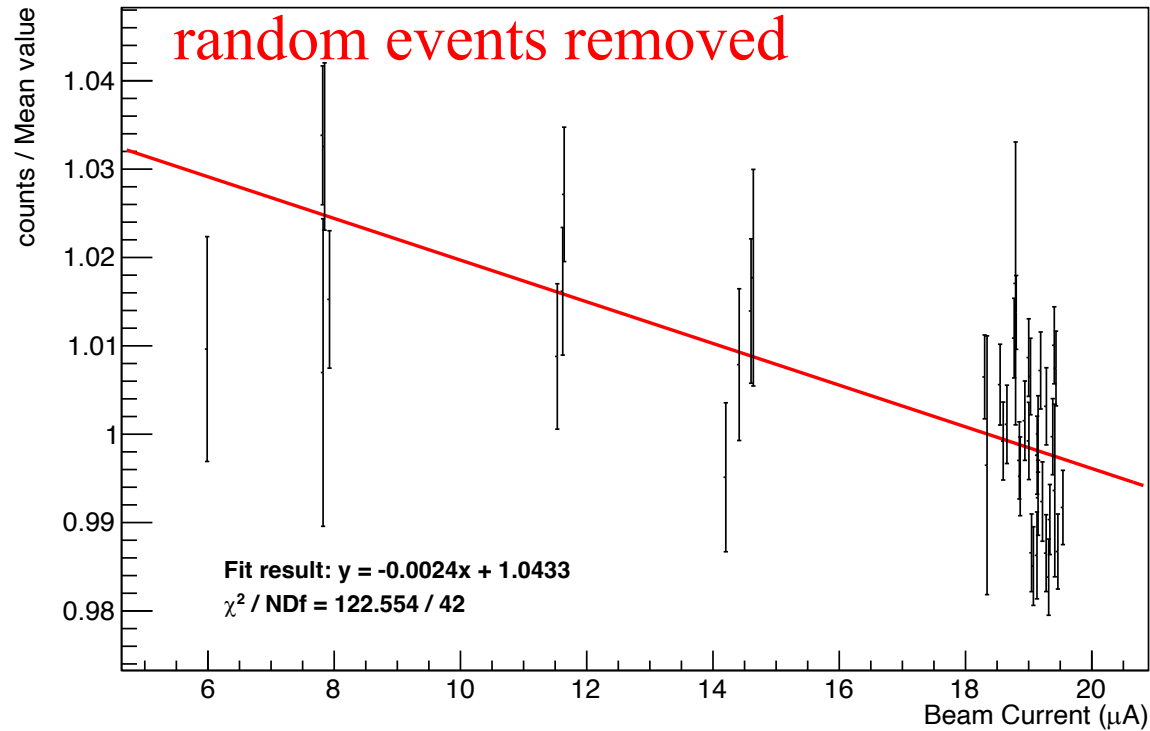
$145 < \text{clusT} < 155$

After Calibration

Include col 1-28

Charge normalized DVCS events(LD2) / Mean value

Charge normalized DVCS events(LH2) / Mean value



LD2

LH2

DVCS charge normalized yield

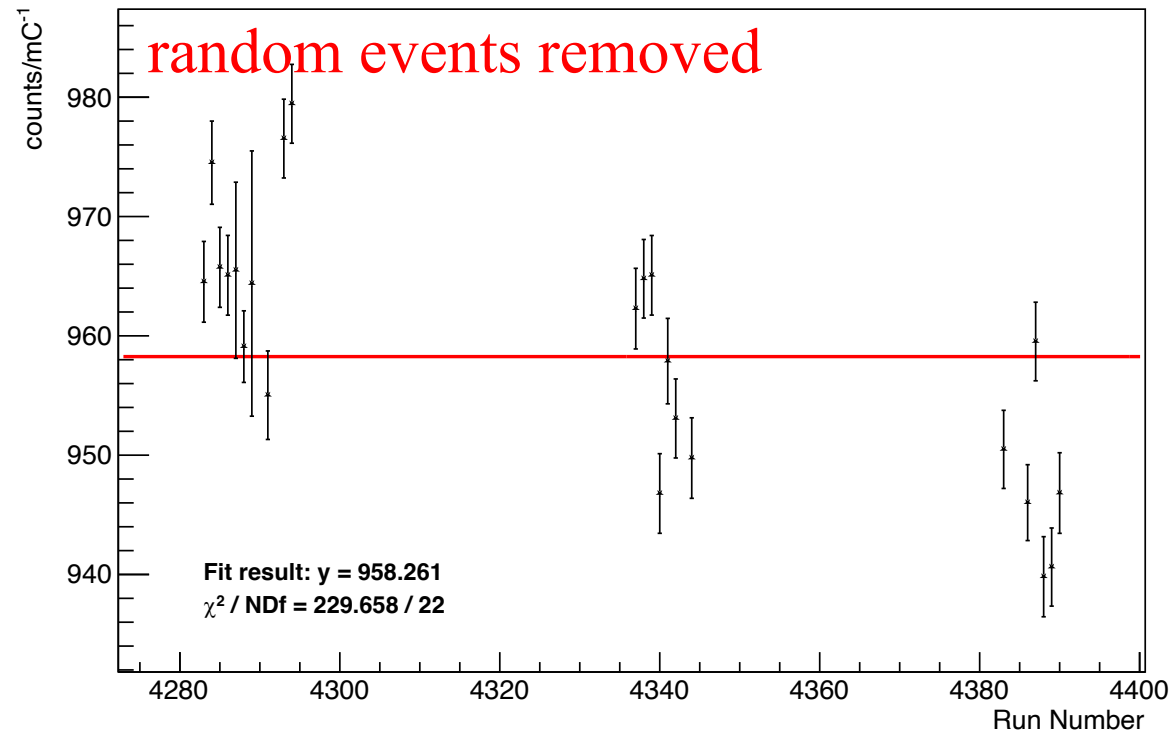
dvcs selection: $E_{\text{max}} > 2 \text{ GeV}$

$145 < \text{clusT} < 155$

Include col 1-28

Before Calibration

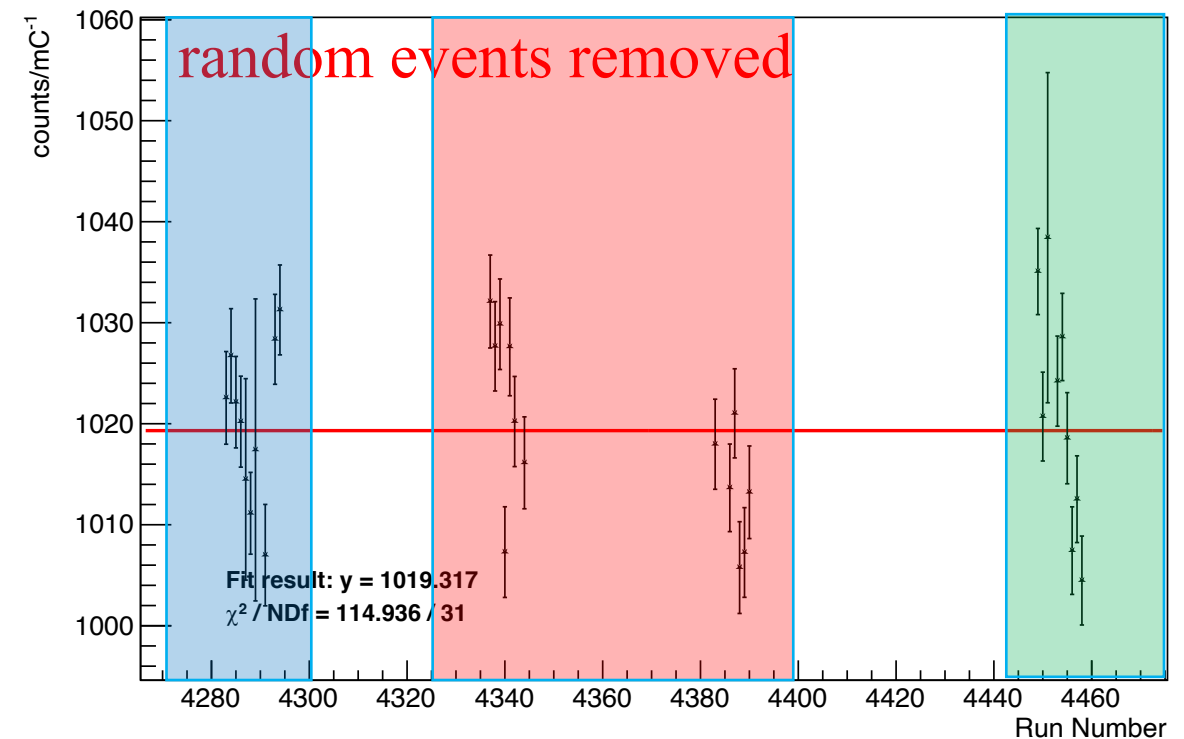
Charge normalized DVCS events(LD2)



20 uA runs

After Calibration

Charge normalized DVCS events(LD2)



20 uA runs

π^0 *clusT*₁ vs. *clusT*₂

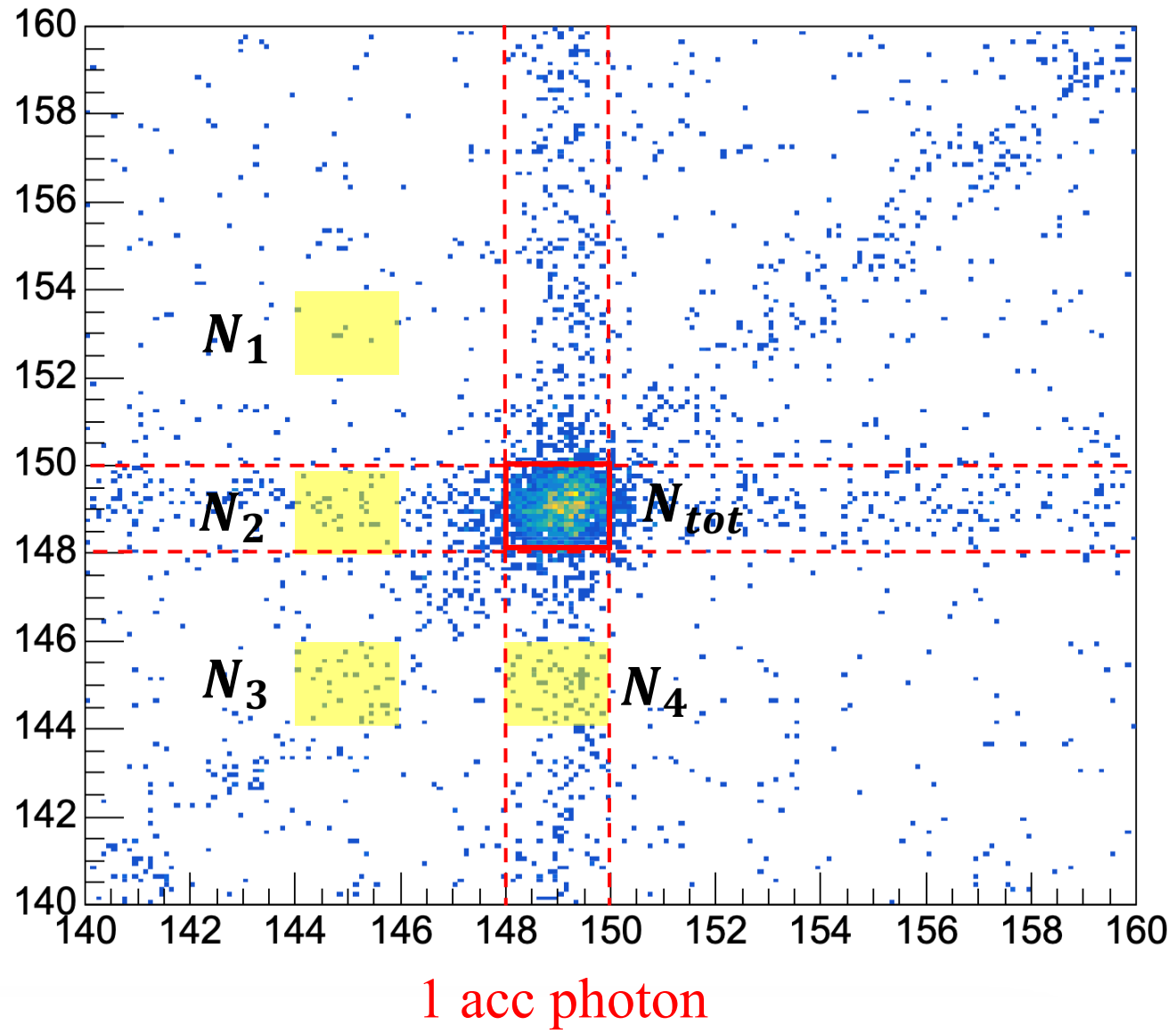
Photon Energy > 1GeV
Invmass ∈ [0.11,0.17]

clusT1 vs. clusT2 for run 4224

3 acc particles

1 acc photon

1 acc electron



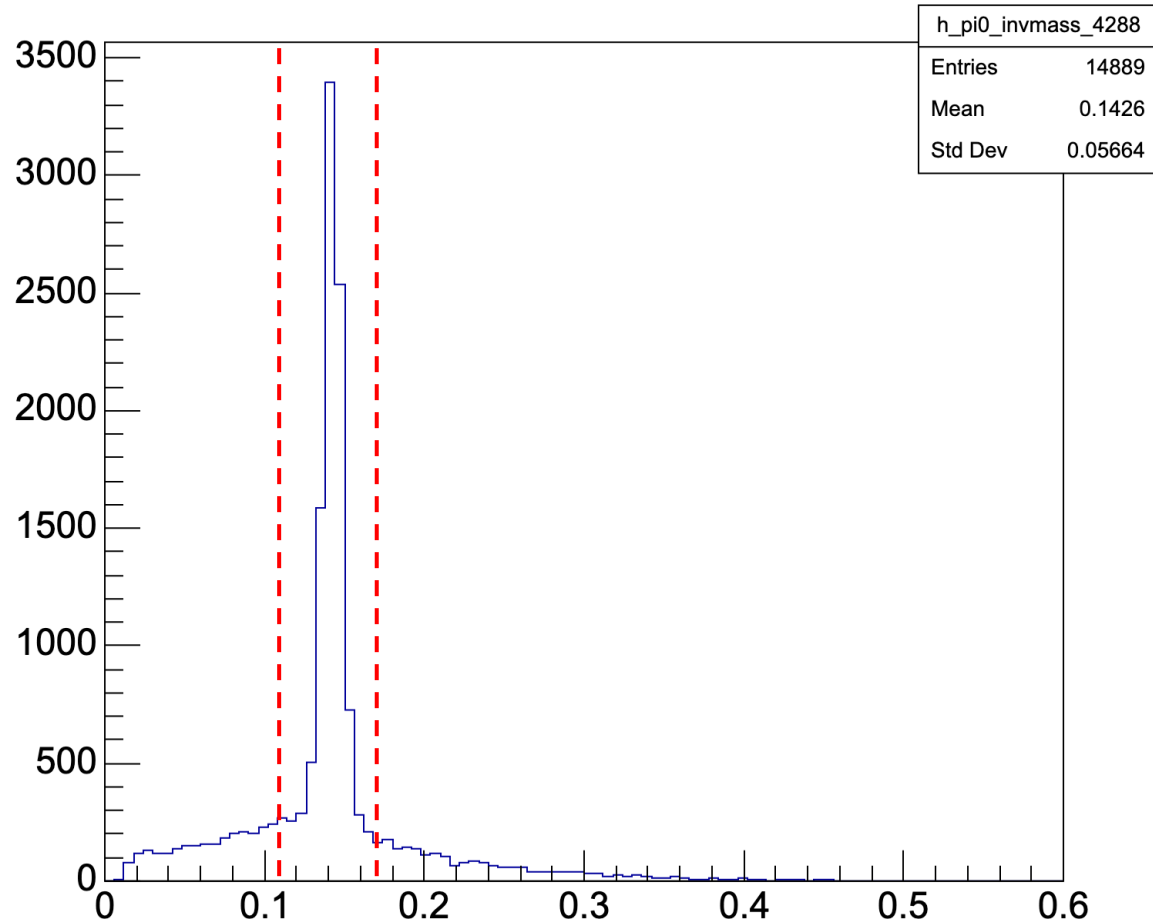
ClusT ∈ [148,150]

1 acc photon

π^0 Inv mass and Missing mass

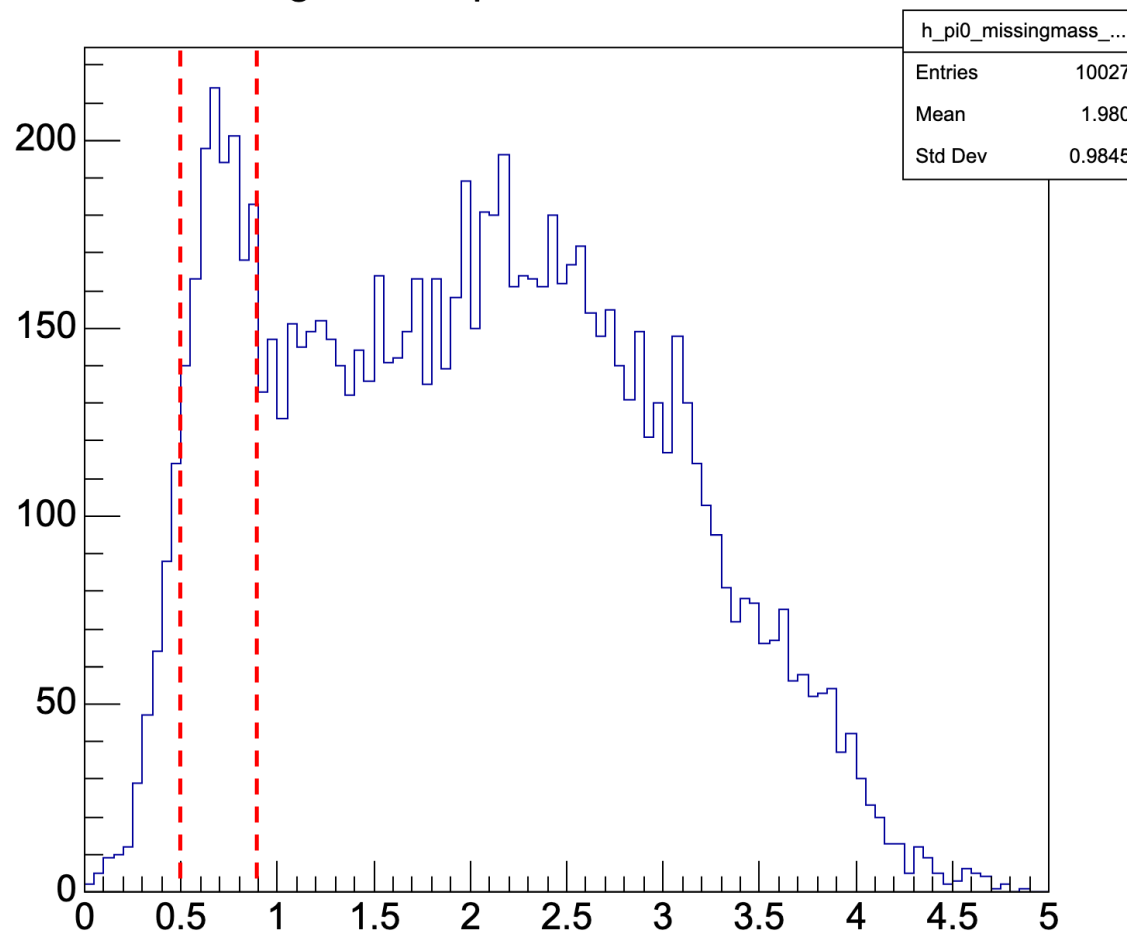
Photon Energy > 1 GeV

π^0 invariant mass distribution for run 4288



Invmass cut [0.11,0.17]

π^0 missing mass square distribution for run 4288



Missing mass² cut [0.5,0.9]

π^0 charge normalized yield

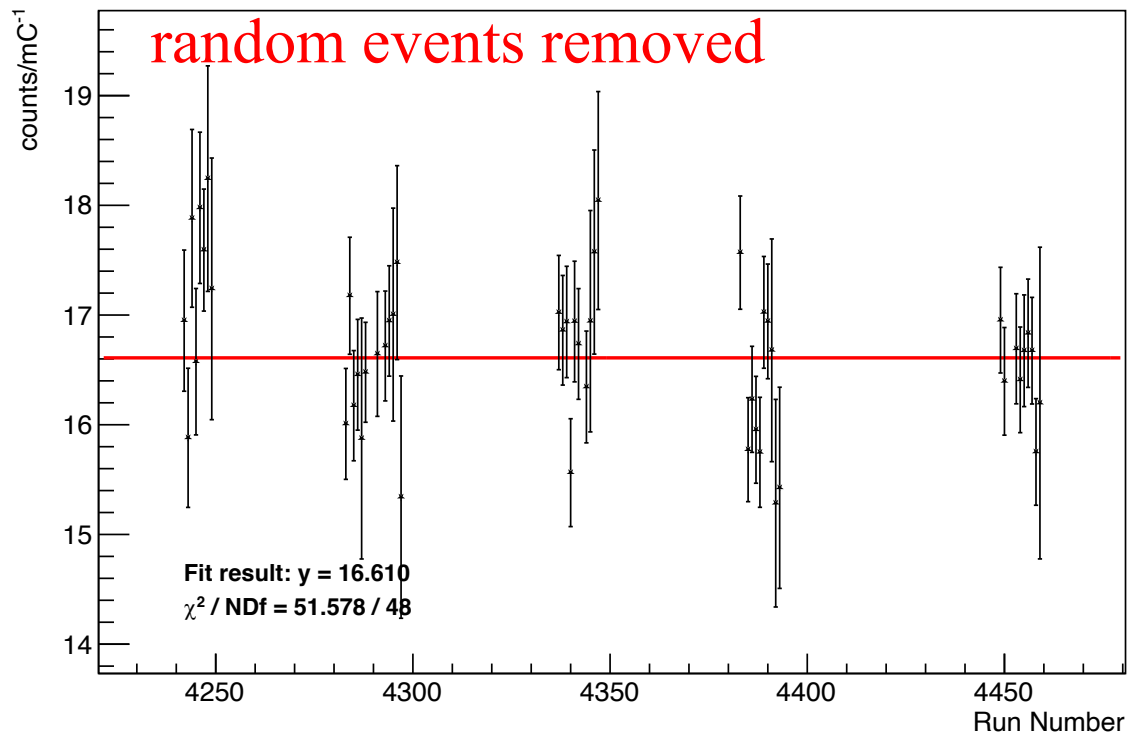
π^0 selection: Photon Energy > 1GeV

clusT cut [148,150] , Invmass cut [0.11,0.17]

Missing mass² cut [0.5,0.9]

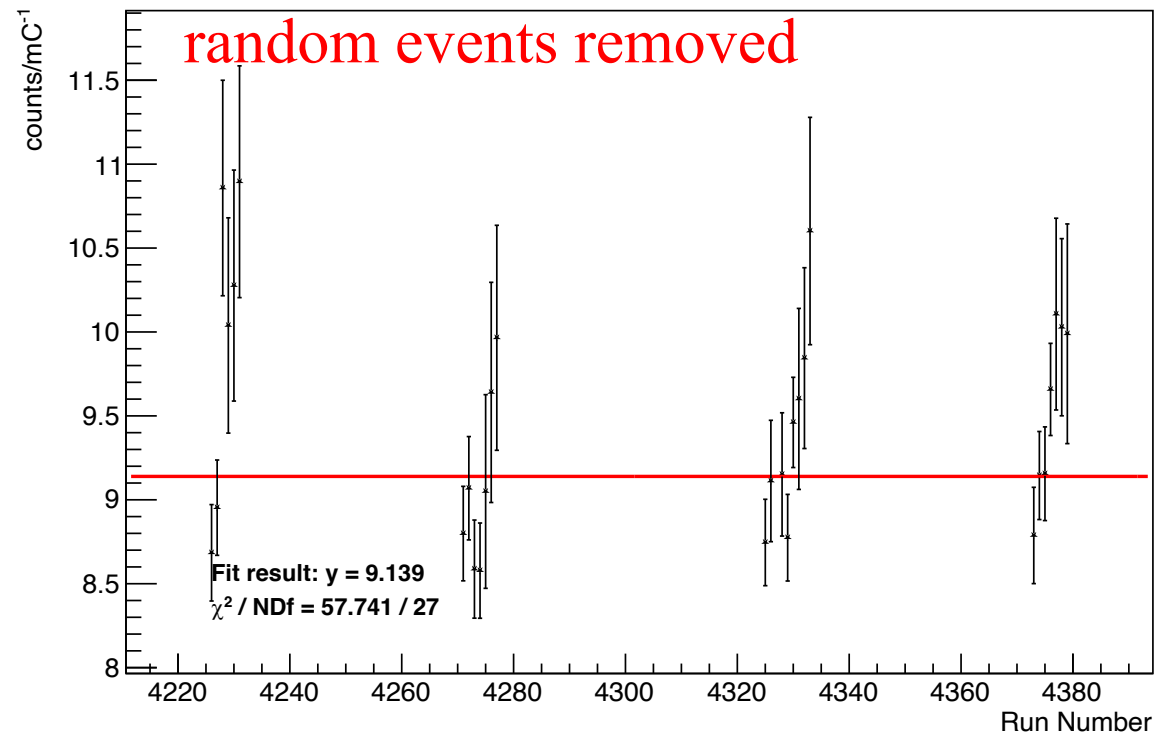
After Calibration

Charge normalized π_0 events(LD2)



LD2

Charge normalized π_0 events(LH2)



LH2

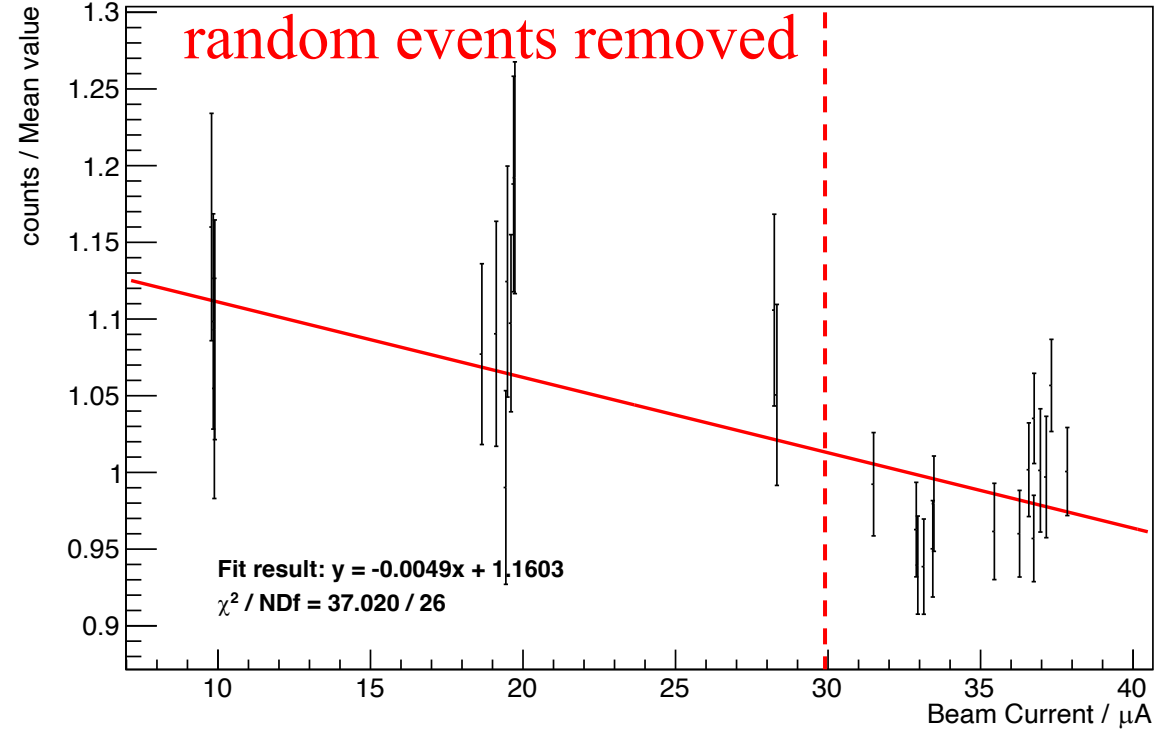
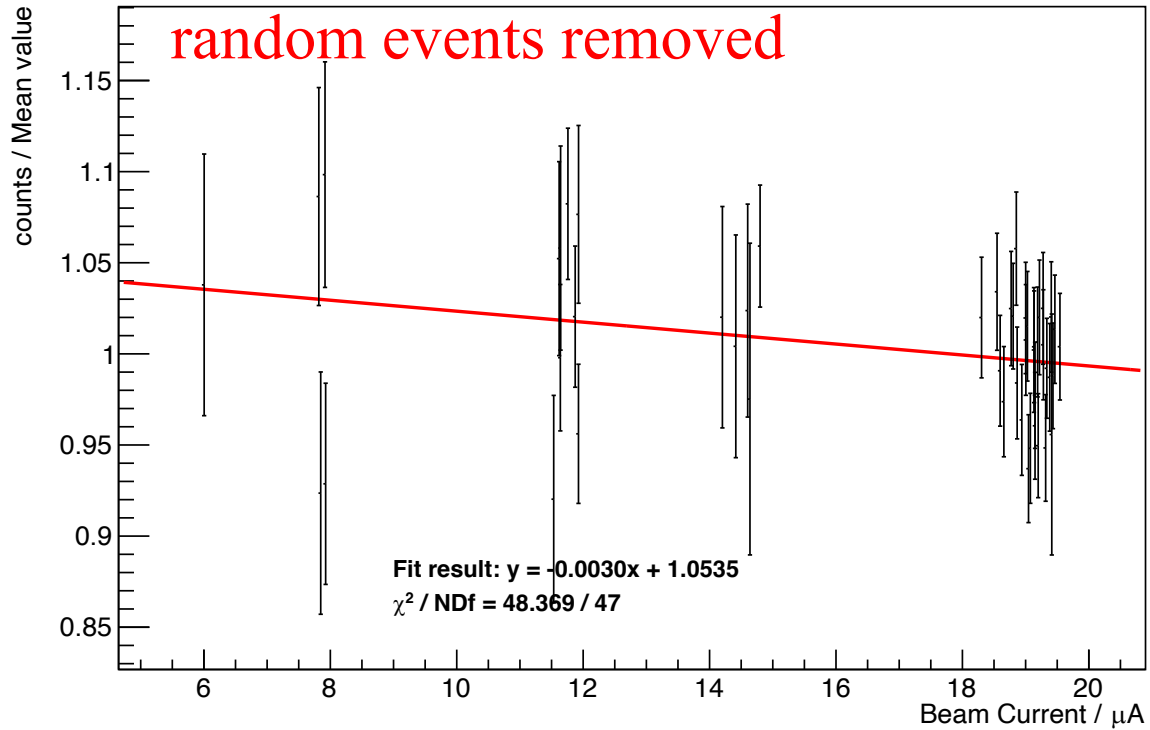
π^0 charge normalized yield

π^0 selection: Photon Energy $> 1\text{GeV}$
 $clusT$ cut $[148,150]$, $Invmass$ cut $[0.11,0.17]$
Missing mass² cut $[0.5,0.9]$

After Calibration

Charge normalized pi0 events(LD2) / Mean value

Charge normalized pi0 events(LH2) / Mean value



LD2

LH2

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)

So I want to check next:

1. NPS calorimeter dead time
 - Yield vs. hTRIG1 slope for all the kinematic settings should be similar (if NPS dead time dominates)
2. Charge information:
 - Use BCM1 (Not much difference)
 - Calculate the charge information myself and compare it with the report file

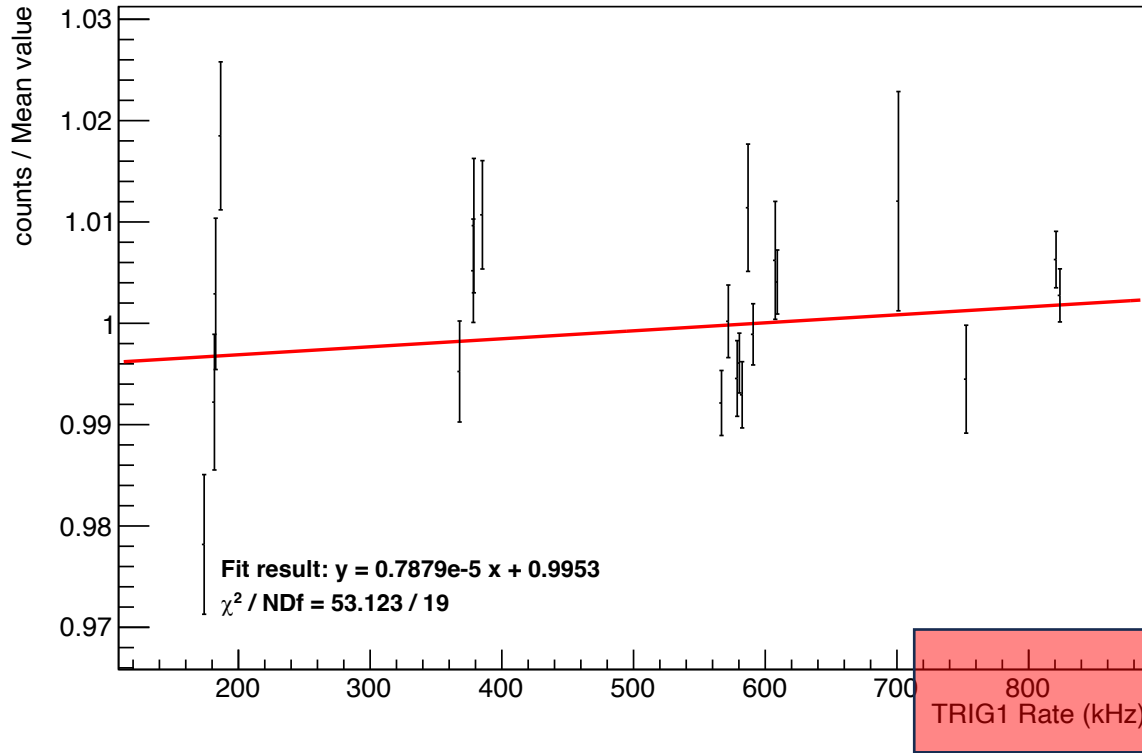
Slope Table

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 $[-2, -3]e-5$

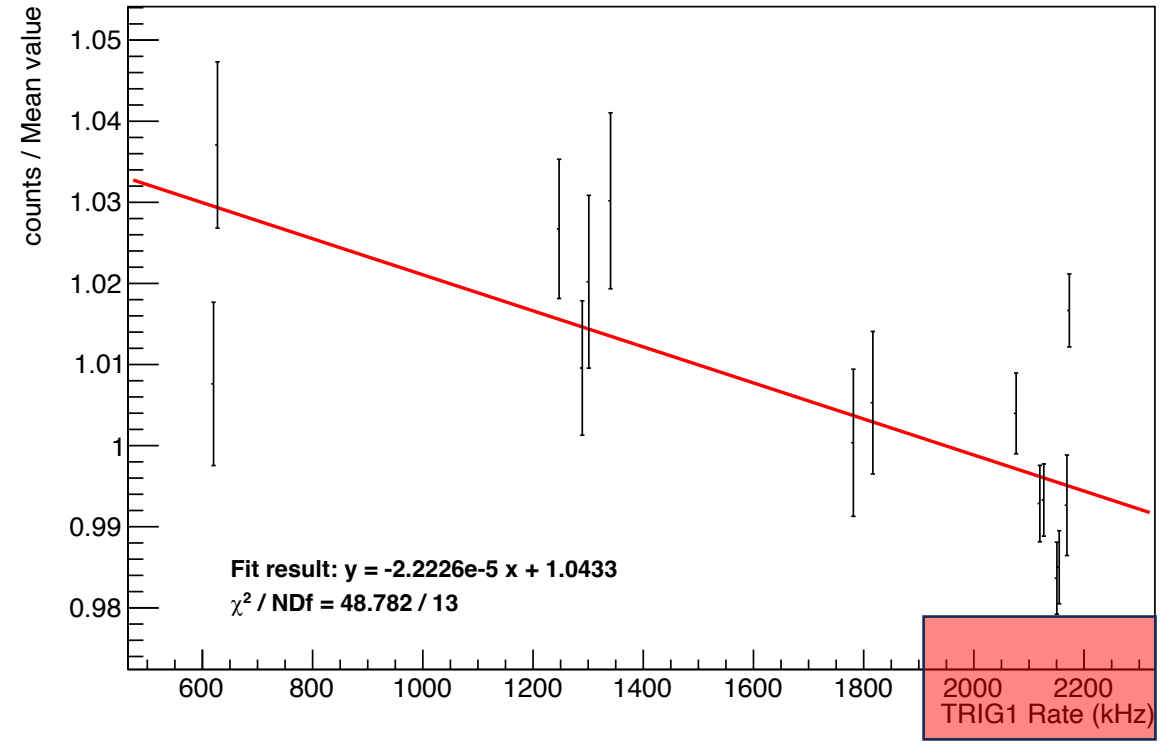
Yield vs hTRIG1 Rate

Charge normalized DVCS events(LH2) / Mean value



KinC_x36_3

Charge normalized DVCS events(LH2) / Mean value



KinC_x60_4a

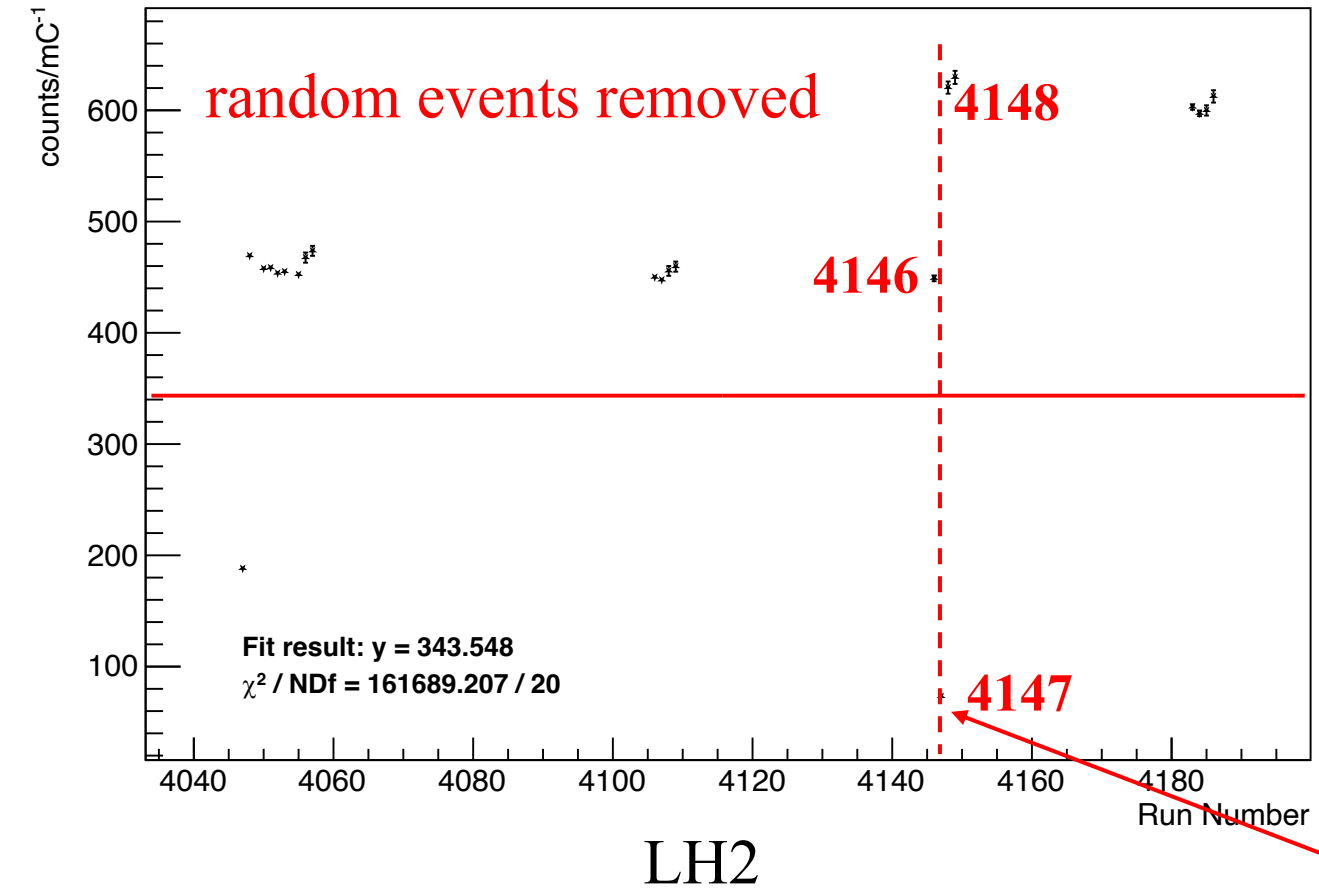
New Observed Issue

dvcs selection: $E_{max} > 2 \text{ GeV}$

$145 < clusT < 155$

Include col 1-28

Charge normalized DVCS events(LH2)



DAY Monday (05-Feb-2024)

Lognumber	Date	Author	Logbook(s)	Title
4248124	09:29	heinricn	HCLOG	RC Report - 2024-02-05
4248119	09:22	coda	HCLOG	COIN_NPS Start_Run_4149,Run_type=Production,target_type=LH2 2 10cm,coda_ps=ps6=0,comment_text=KinC_x60_3a 10uA,shms_theta=33.02,
4248116	09:21	coda	HCLOG	End_of_Run_4148
4248115	09:15	cdaq	HCLOG	50k replay plots for run 4148
4248110	09:01	coda	HCLOG	COIN_NPS Start_Run_4148,Run_type=Production,target_type=LH2 2 10cm,coda_ps=ps6=0,comment_text=KinC_x60_3a 20uA,shms_theta=33.02,
4248107	08:59	coda	HCLOG	End_of_Run_4147
4248106	08:57	R. Michaels	HCLOG	CODA snapshot.
4248102	08:34	wmhenry	HCLOG	Follow-up Re: Drift Ch. Gas ethanol temp out of range
4248094	08:13	cdaq	HCLOG	50k replay plots for run 4147
4248093	08:06	voutier	HCLOG	Day shifty summary
4248090	07:59	coda	HCLOG	COIN_NPS Start_Run_4147,Run_type=Production,target_type=LH2 2 10cm,coda_ps=ps6=0,comment_text=KinC_x60_3a 40uA,shms_theta=33.02,
4248079	07:25	coda	HCLOG	End_of_Run_4146
4248069	07:02	cdaq	HCLOG	50k replay plots for run 4145

What happed here?

New Observed Issue

dvcs selection: $E_{\text{max}} > 2 \text{ GeV}$

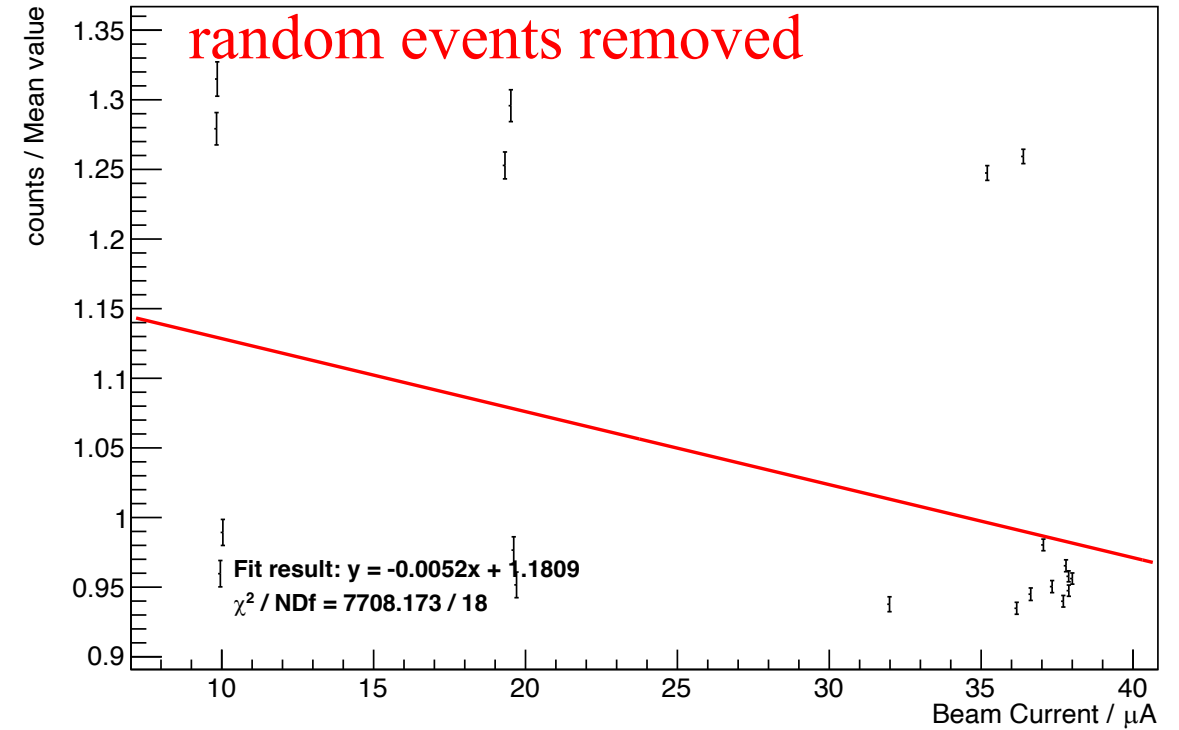
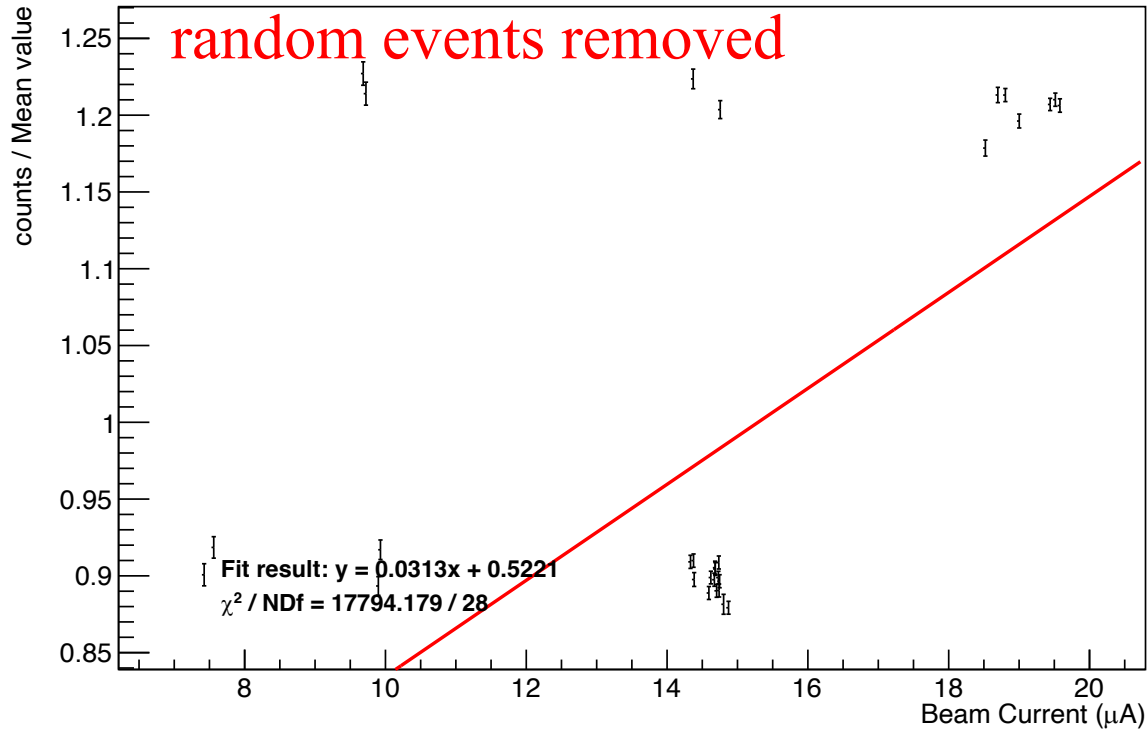
$145 < \text{clusT} < 155$

Without Calibration

Include col 1-28

Charge normalized DVCS events(LD2) / Mean value

Charge normalized DVCS events(LH2) / Mean value



LD2

LH2

New Observed Issue

dvcs selection: $E_{\text{max}} > 2 \text{ GeV}$

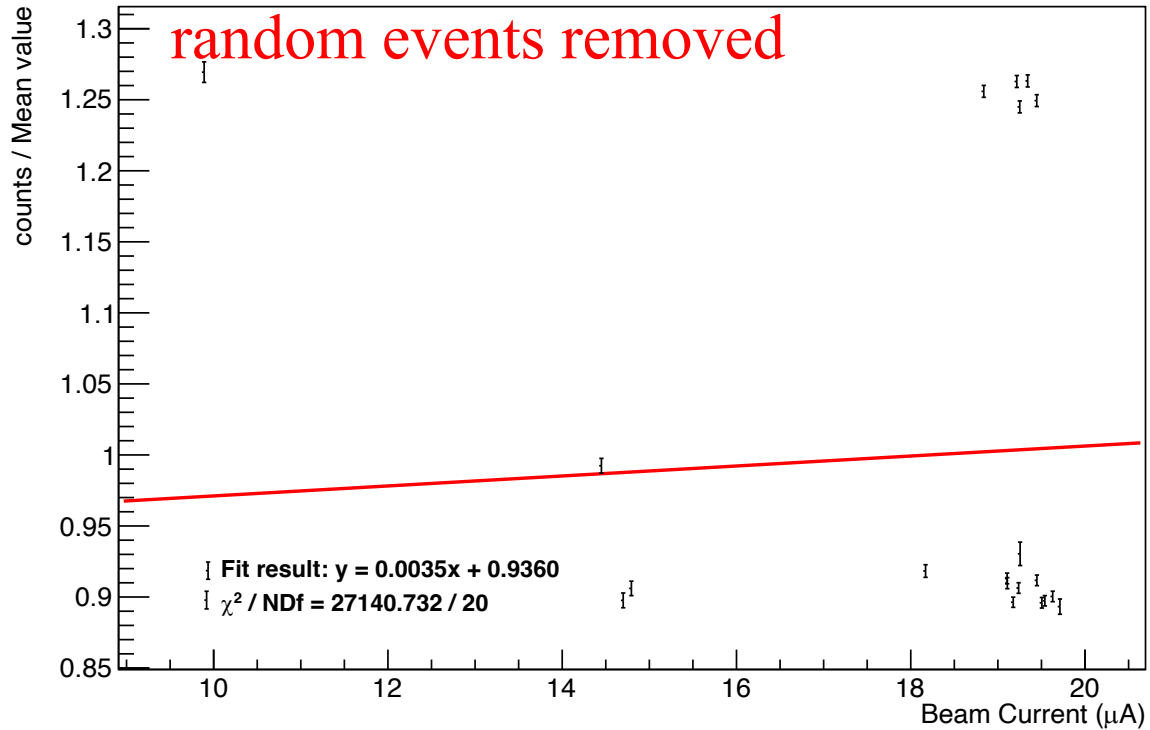
$145 < \text{clusT} < 155$

Without Calibration

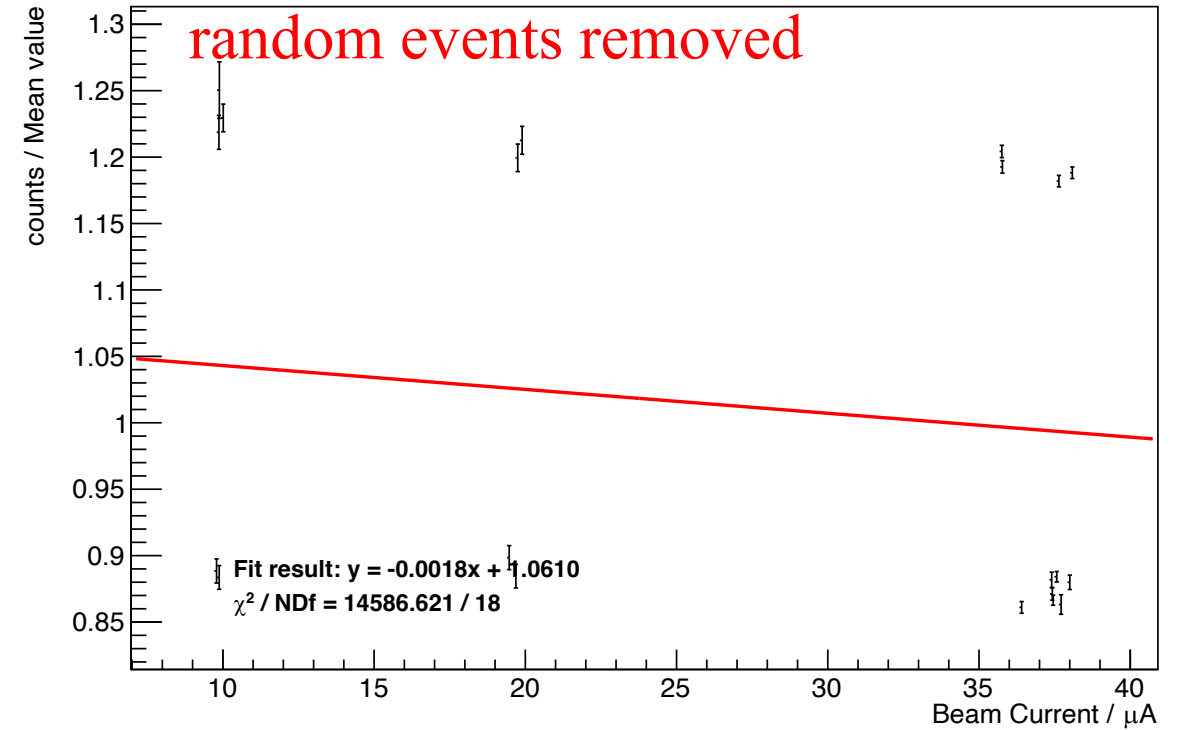
Include col 1-28

Charge normalized DVCS events(LD2) / Mean value

Charge normalized DVCS events(LH2) / Mean value



LD2



LH2