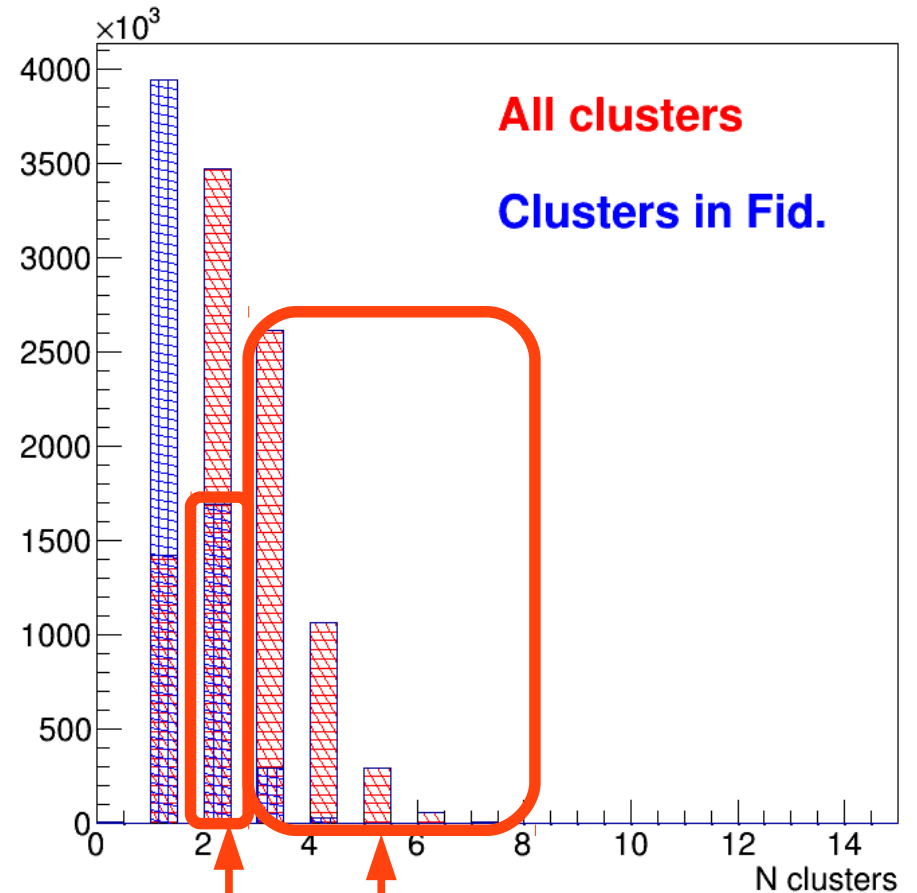
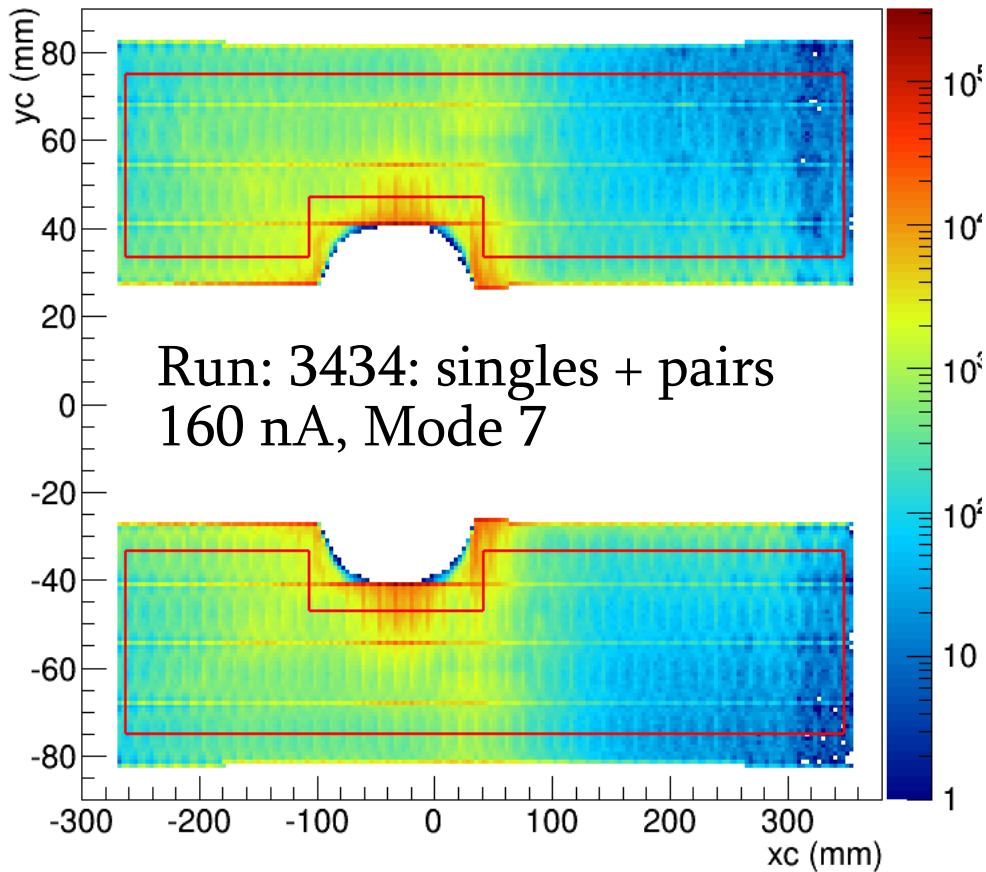


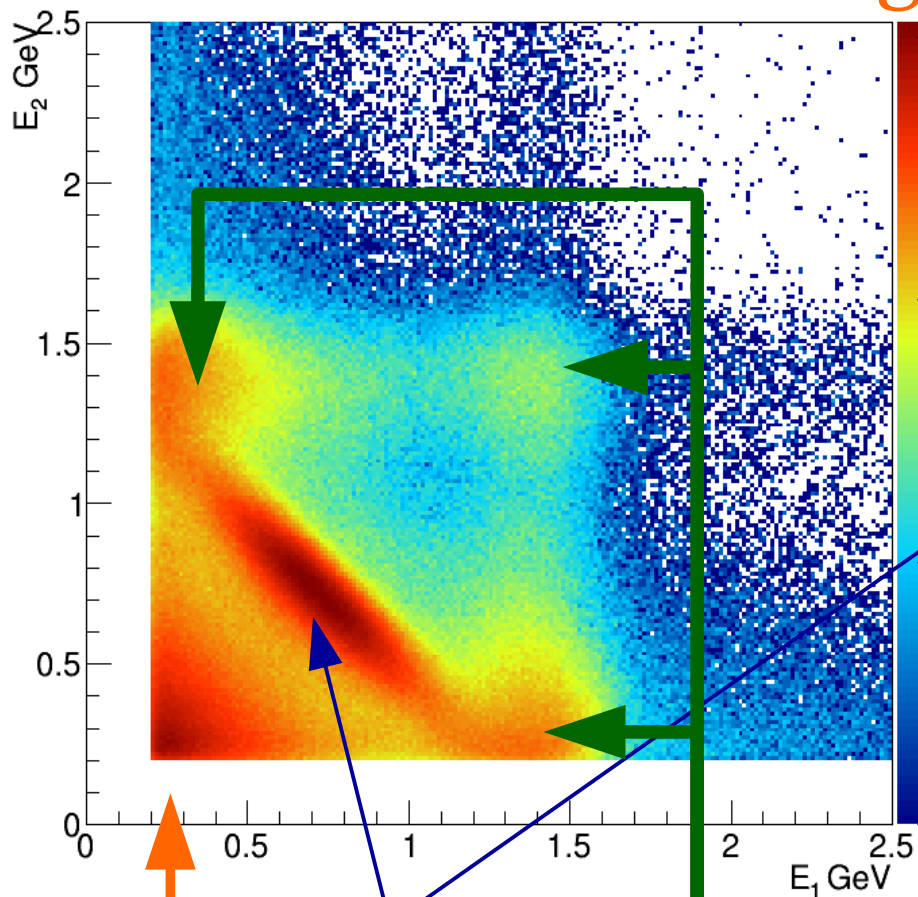
Fiducial cuts



Cut on the reconstructed cluster position. Events having cluster center within 13mm of the ECal border were cut out

2 and more than 2 cluster events further were studied separately

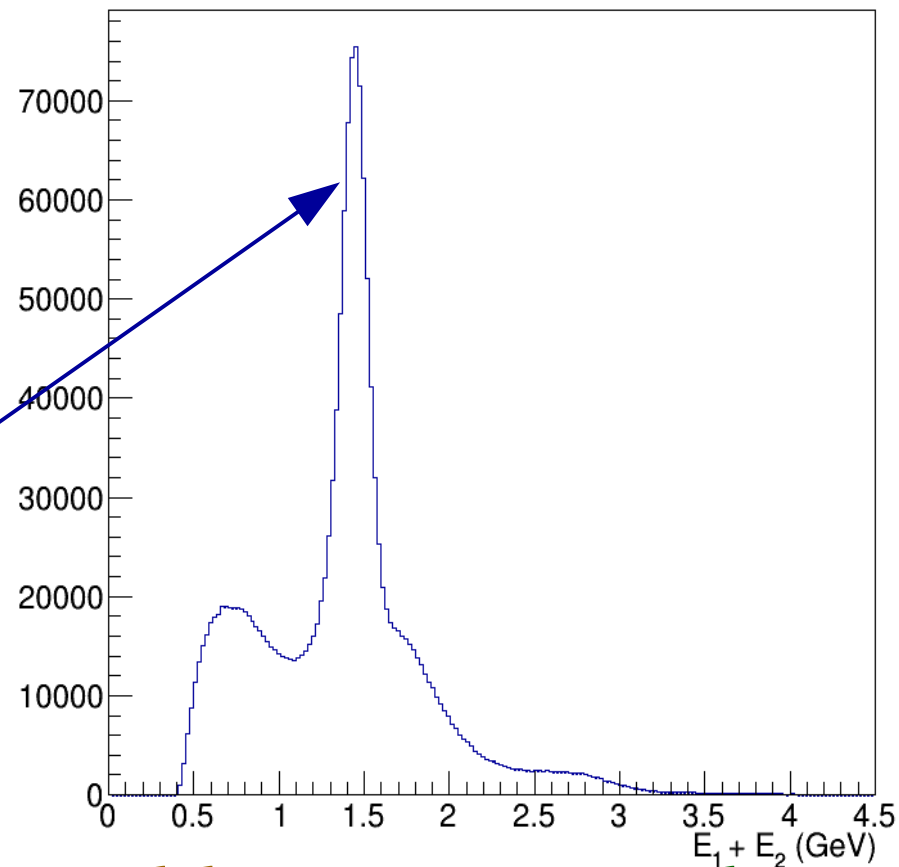
Energy distributions



Beam energy

Beam Electron

Less than beam energy



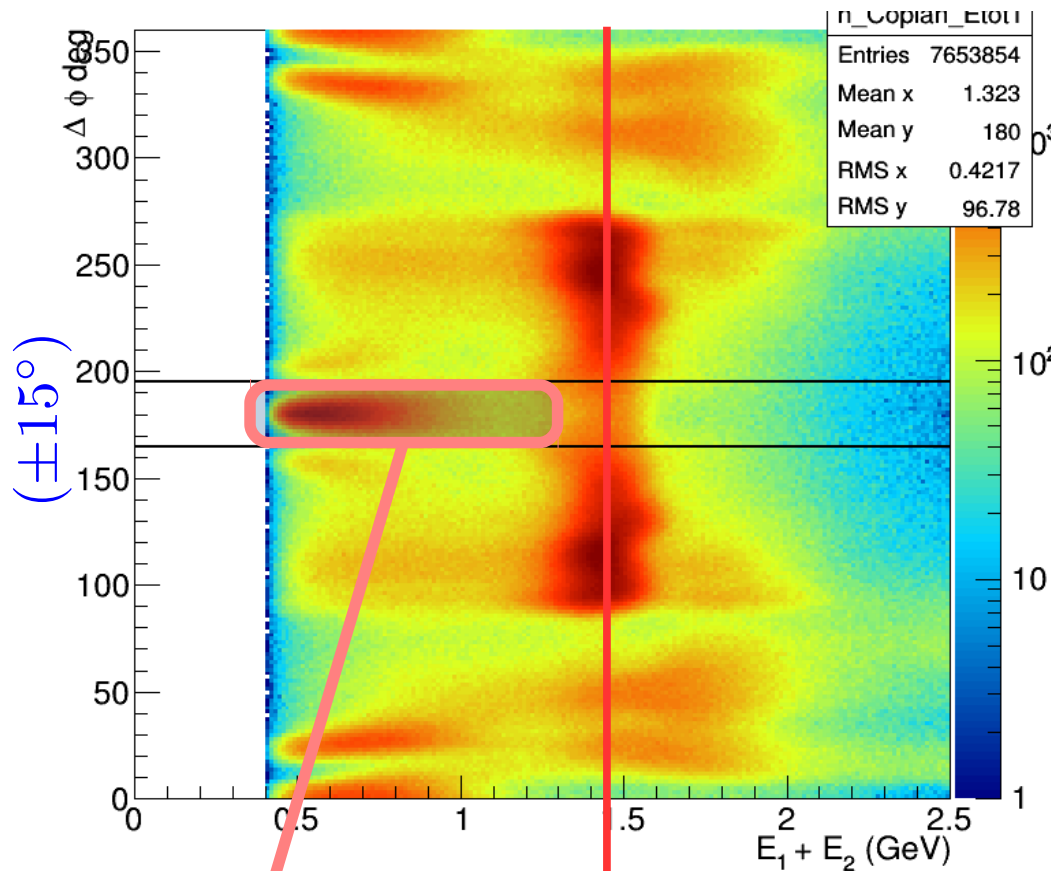
1 cluster with beam energy: Beam electron

2 clusters make beam energy

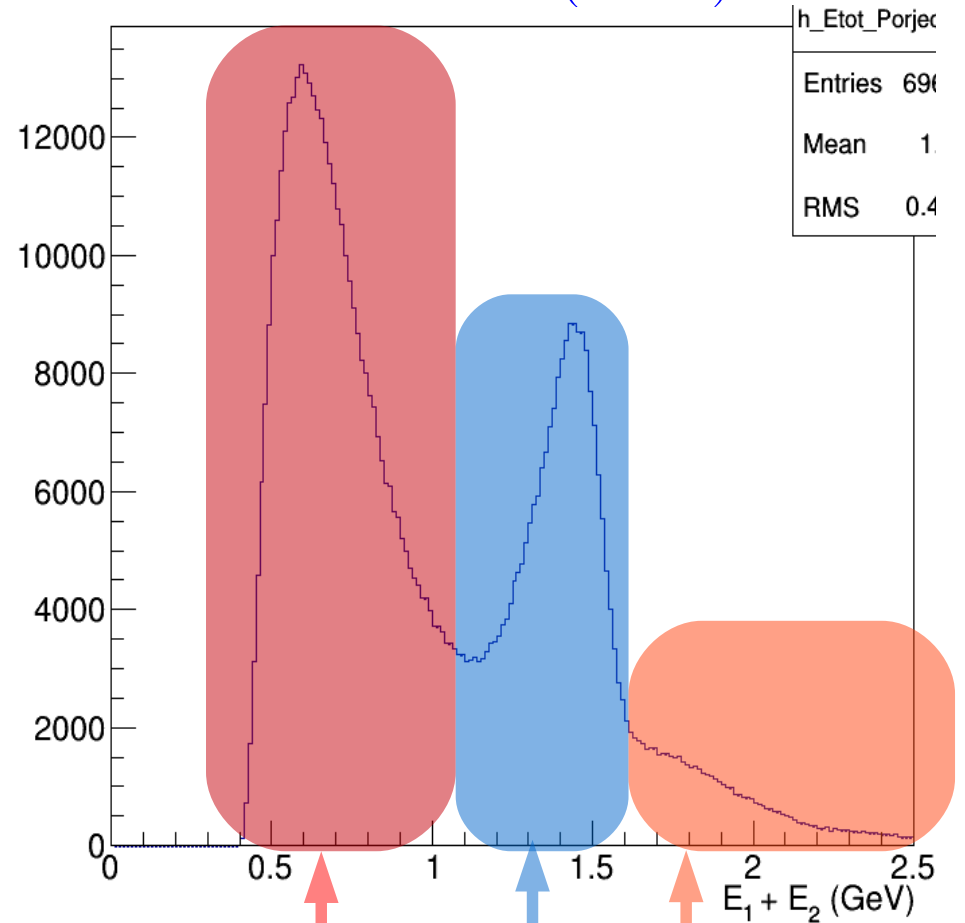
- e^-e^+ : pairs
- e^-e^- : Møller
- $e^-\gamma$: Large angle Bremsstrahlung

Coplanarity cut

Run 3434



$\Delta\Phi \in (\pm 15^\circ)$



e^-e^+ pairs

Beam Energy

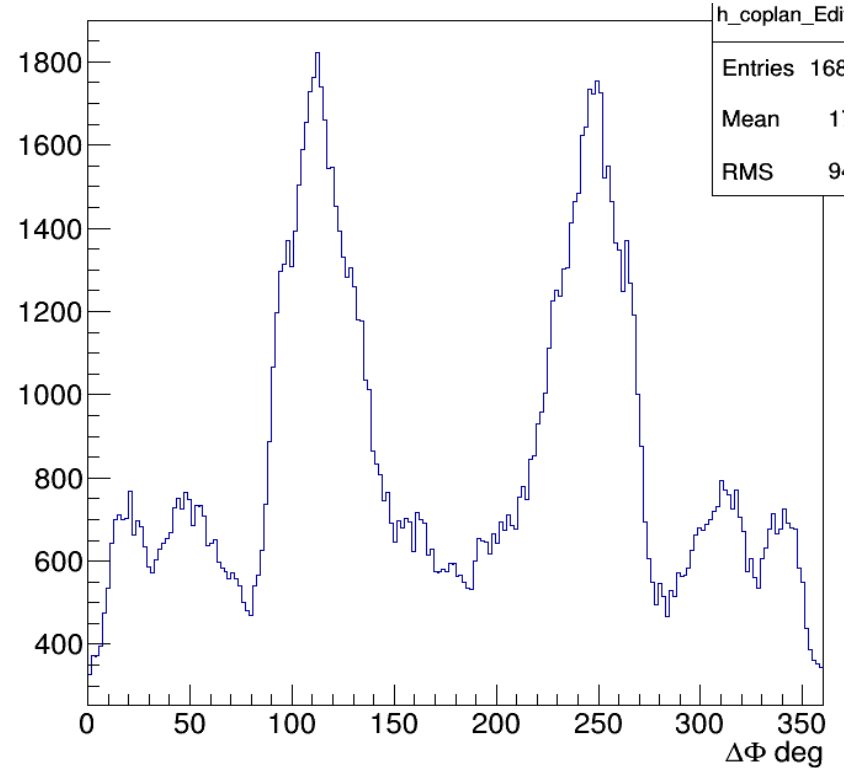
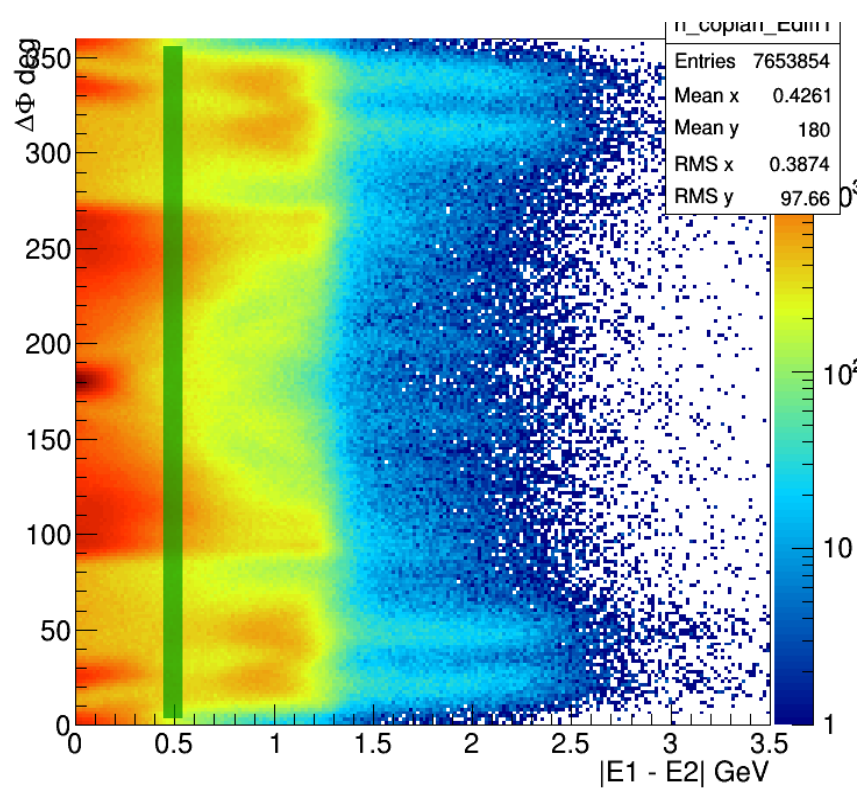
e^-e^+ pairs

Accidentals

e^-e^+ or leak from Møller, LAB

Cut on coplanarity

coplanarity at $E_{diff} \approx 0.5\text{GeV}$



Precise cut value on $|E1-E2|$ can be determined from proper simulations. Already at 0.5 GeV, within statistic uncertainty there seems no evidence of coplanar events

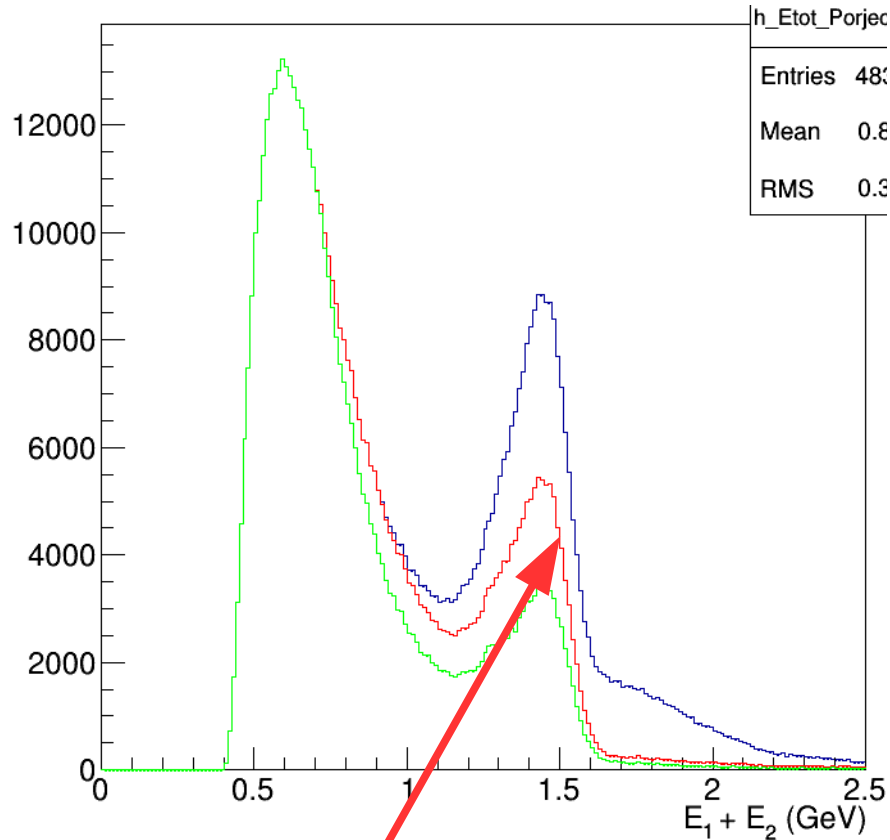
An additional cut is $|E1 - E2| < 0.5 \text{ GeV}$

Cut on Energy difference

No cut on $|E_1 - E_2|$

$|E_1 - E_2| < 0.5 \text{ GeV}$

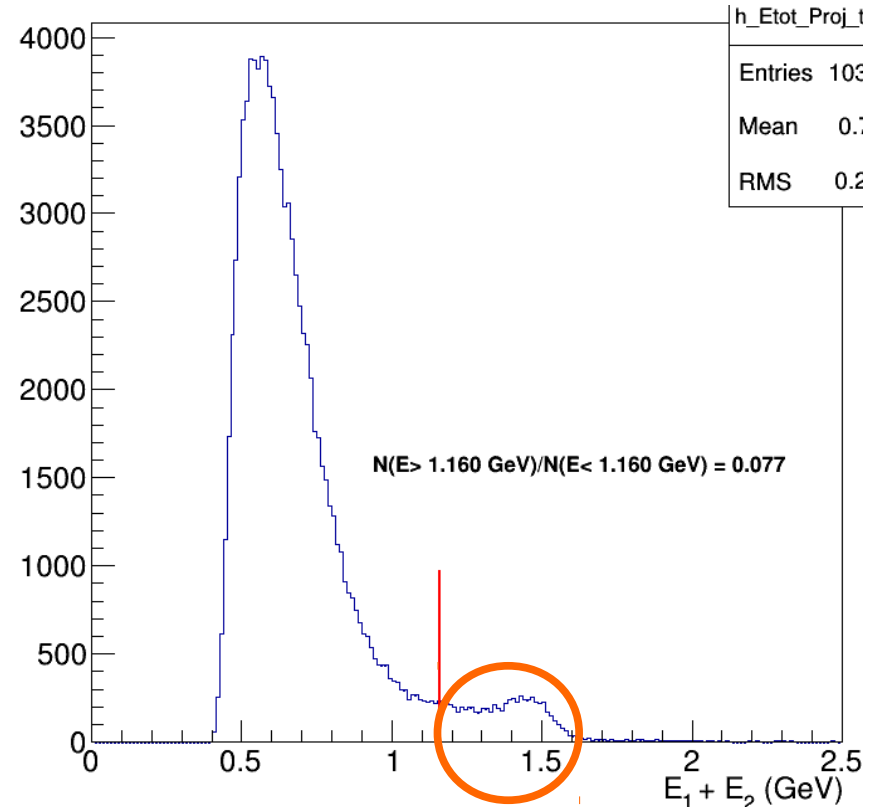
$|E_1 - E_2| < 0.3 \text{ GeV}$



1.25% of All triggered events

Let's call $N(E_{tot} > 0.8 E_b)$ good tridents

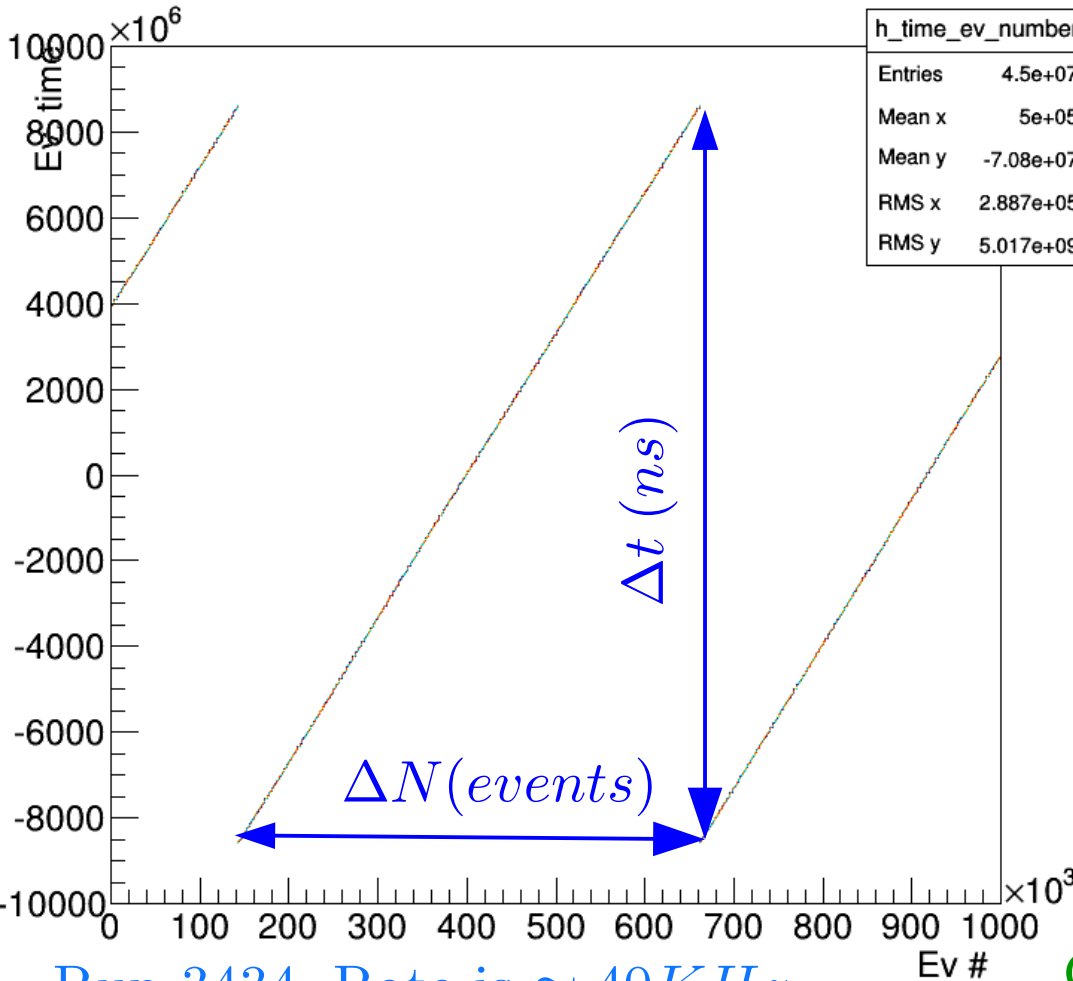
very tight cut ($\Delta\Phi < 2^\circ$) on coplanarity



A small bump, but again can be a leak from Møller and/or LAB

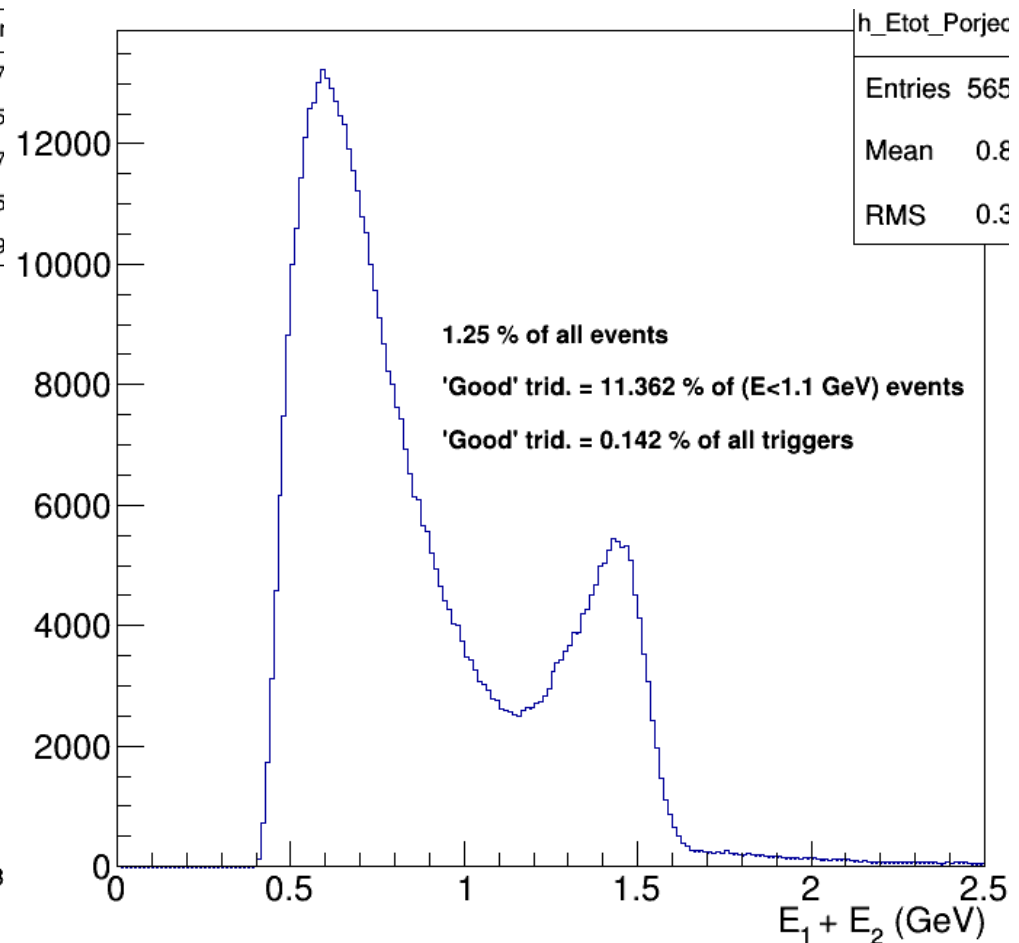
More or less realistic ratio between "good" tridents and all events can be obtained by tightening coplanarity as much as possible

Trigger rates



Run 3434, Rate is $\approx 40\text{KHz}$

'Good' Trident's rate $\approx 37\text{Hz}$

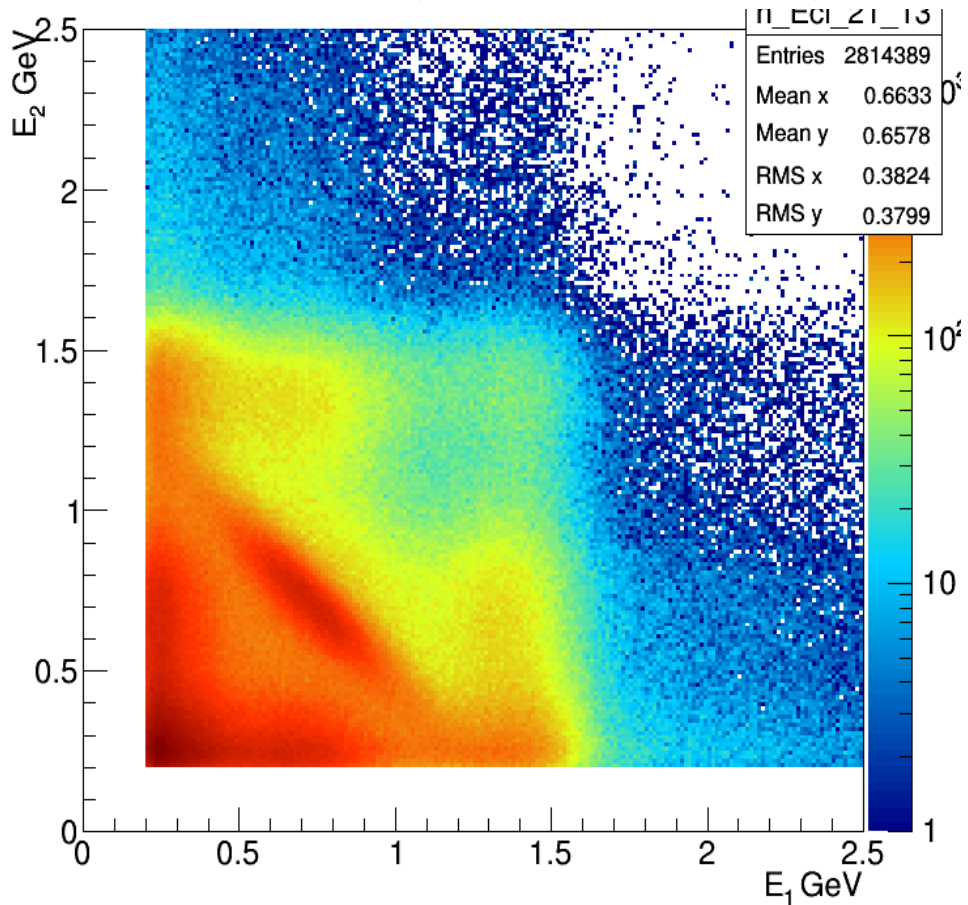


Cross section in the Acceptance region with 2.2 GeV beam energy is about $25\ \mu\text{b}$
This reflects into $\approx 800\ \text{Hz}$

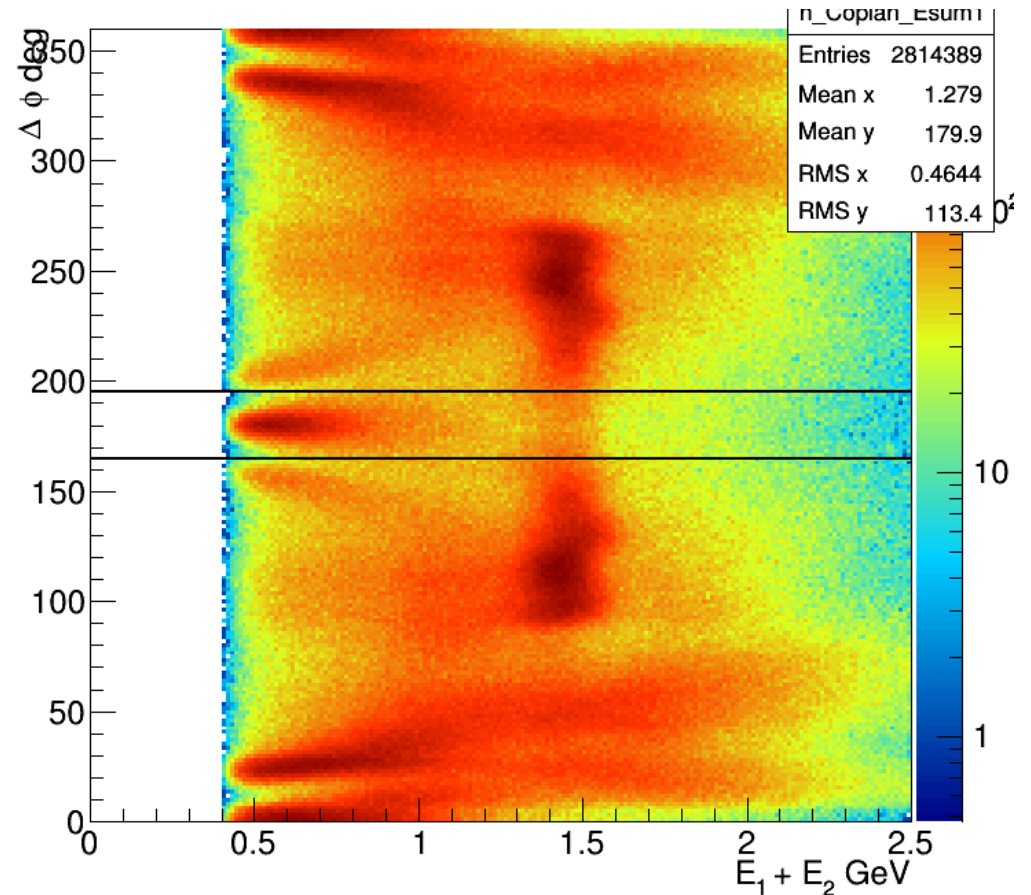
There is an 1 order of magnitude difference!, but this analysis method is not precise, based on assumptions, no proper PID, only accounts the events in a fiducial region, and theoretical rate is estimated in a different energy.

More than two cluster events

All possible i, j combinations ($j > i$)



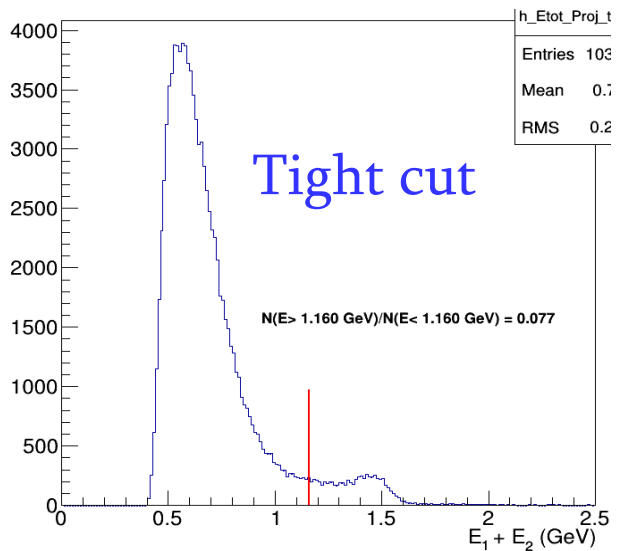
Clear indication of coplanar events



Has similar signature as 2 cluster events, with higher overall background

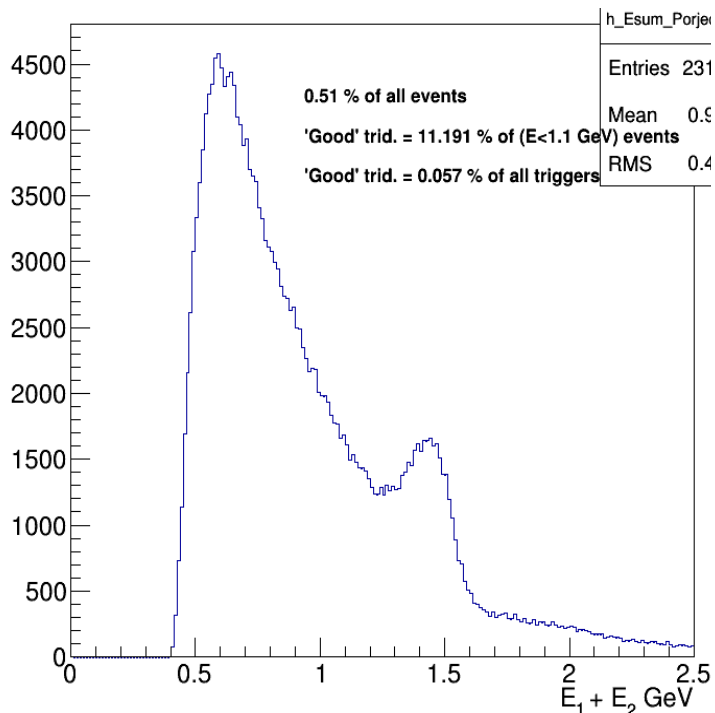
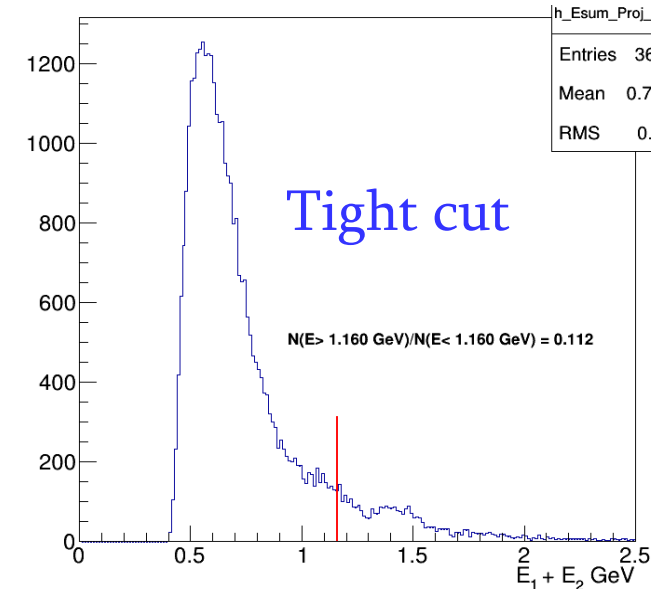
Comparison of 2 and more than 2 cluster events

2 cluster events



$$(\Delta\phi \pm 15^\circ)$$

More than 2 cluster events



Accidentals in >2 cluster events are more, and they can cause the ratio to be bigger for these events.

It is hard to eliminate/estimate background without SVT

0.057% translates into about 22 Hz, but here there is a significant background, so actual rates should be less than the estimated value.

Rates table

Mode 1, Maybe DAQ saturated?, or Spreadsheet value is incorrect

	A' trigger				Pairs trigger	
Run	3419	3420	3421	3422	3434	3436
Current (nA)	50	100	150	200	160	130
Trigger Rate (Khz)	2.27	5.34	7.54	7.64	38.7	33.1
2 cluster Good Tridents (Hz)	15.3	27	31.18	26.4	37.1	31.7
>2 cluster Good Tridents (Hz)	3.77	12.5	21.7	25.05	22.1	17.2
Total Tridents (Hz)	19.07	39.5	52.88	51.45	59.2	48.9
Theoretical prediction (Hz)	258	516	775	1033	827	671.5

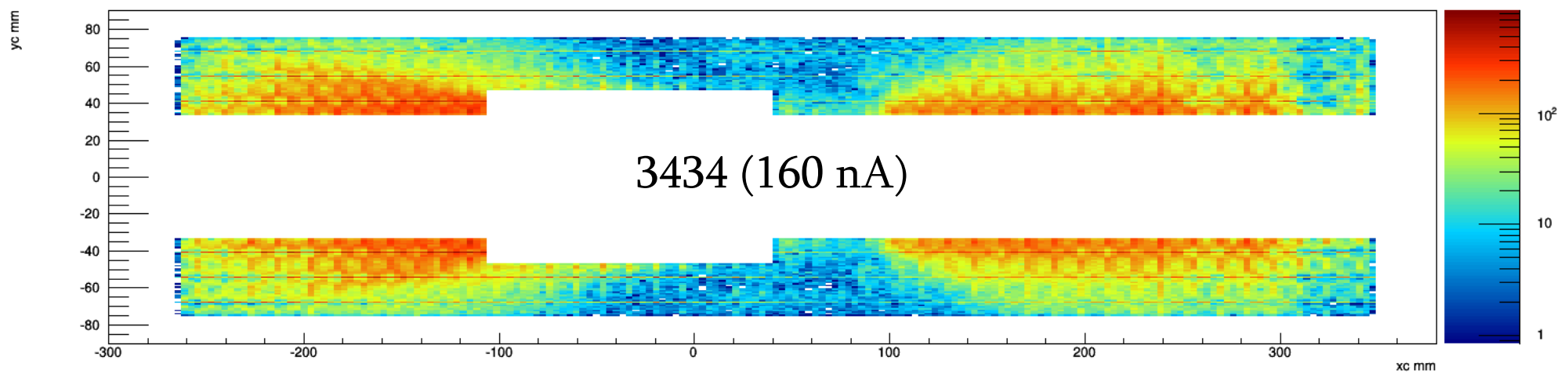
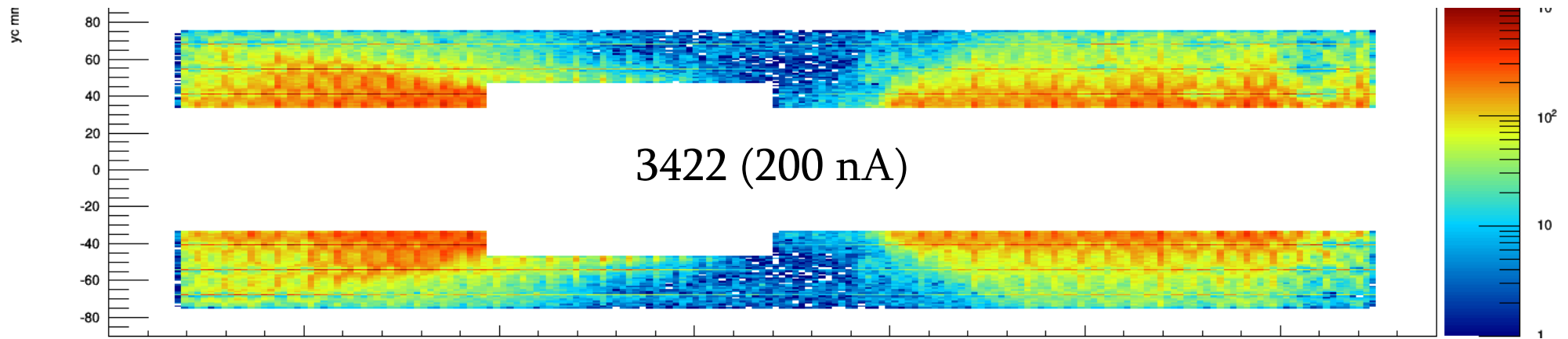
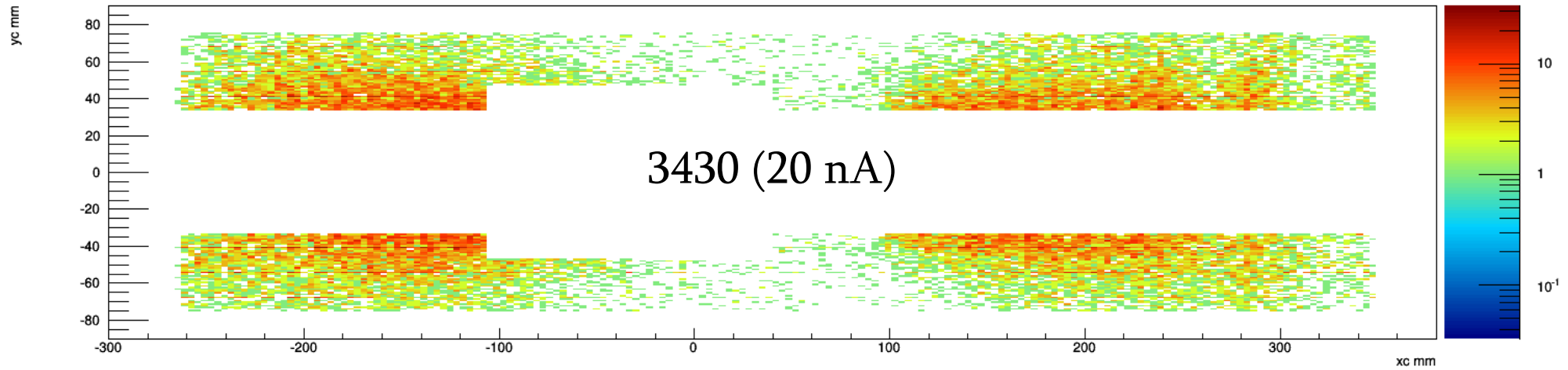
In general “current/tr.-rate/total-tridents” proportion looks consistent

Close current runs (3421 and 3434) show similar expected rates for tridents. This probably good sign for a trigger.

Contribution from >2 cluster events becomes significant for high current runs

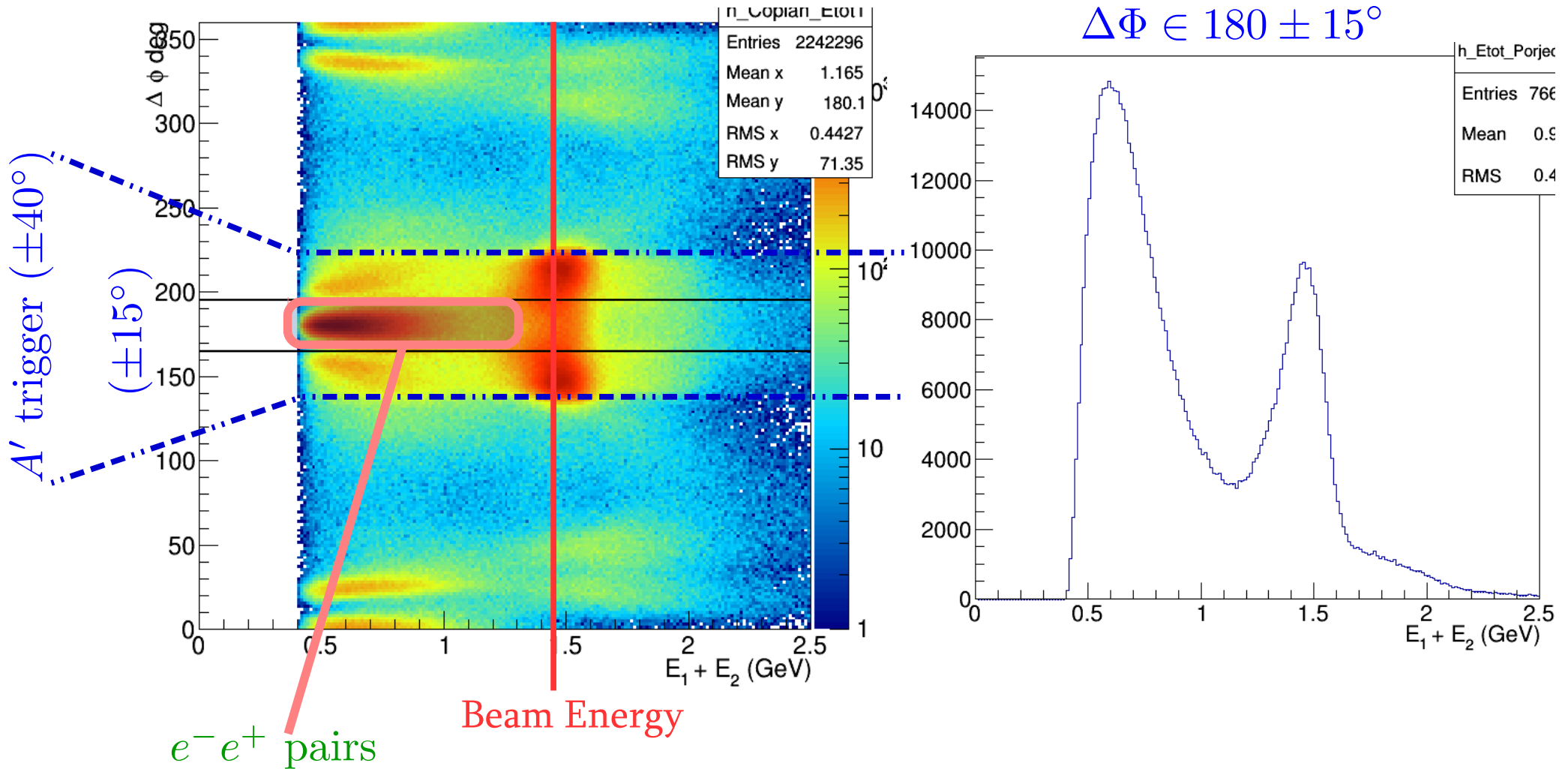
Estimated rates are more than 1 order of magnitude lower than theoretical, But there are many reasons for that (mentioned in previous slides)

ECal Surface distribution



2 Cluster Events

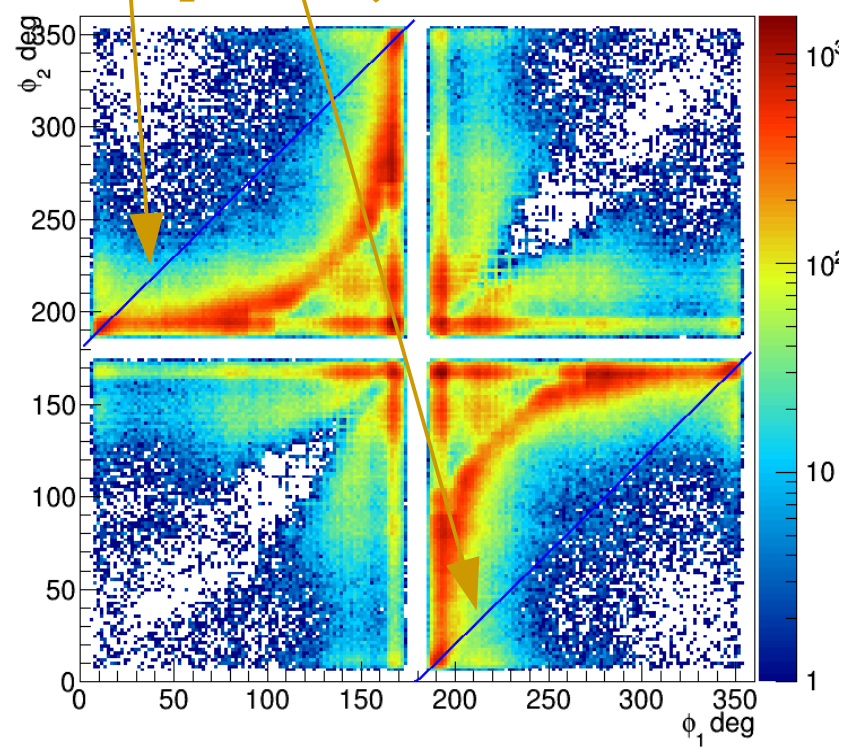
Run 3420



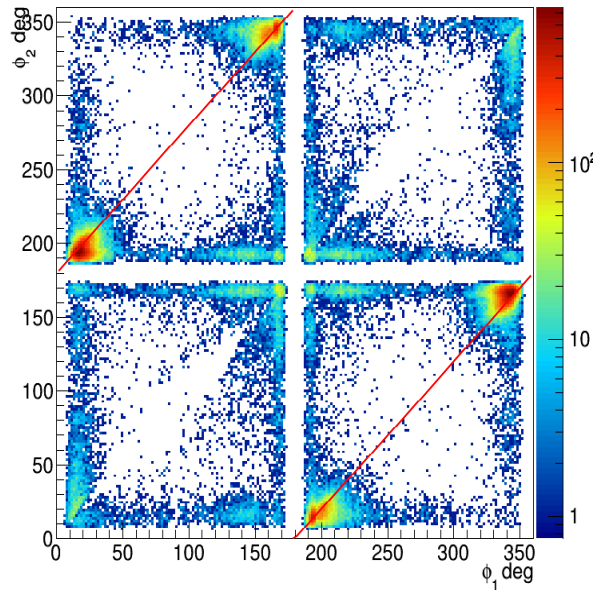
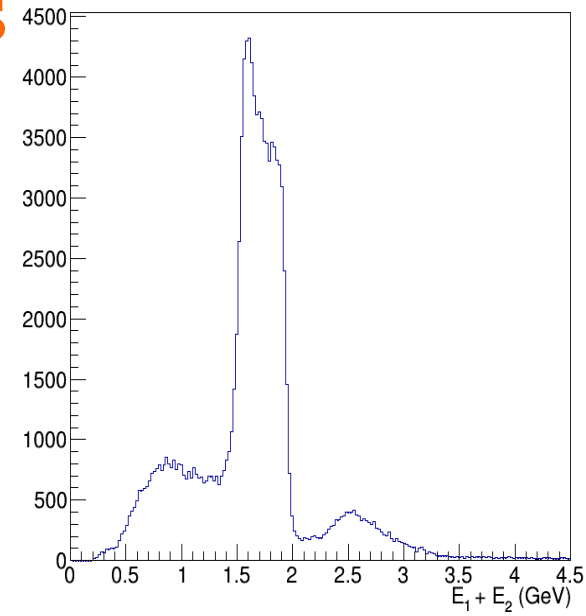
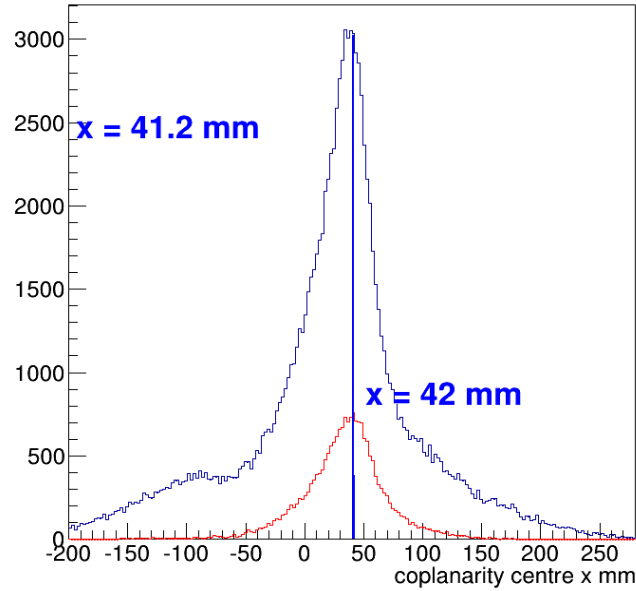
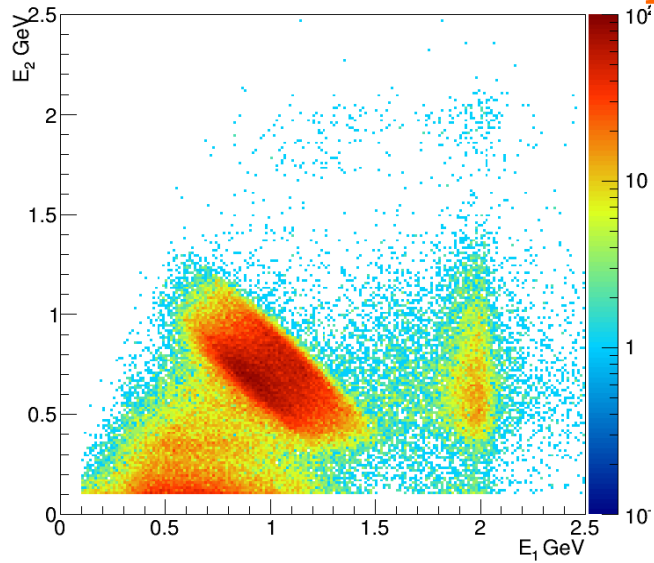
Probably coplanarity cut can be shrank to 20 deg, and it can reduce rates a lot.
This can be studied more precisely with SVT

Additional slides

Coplanarity line



Tridents: simulations



- ★ Tridents are coplanar
- ★ Coplanarity center is at Right place
- ★ Energy and Ecall coordinate distributions look different from data

