

FoCal Trigger simulation

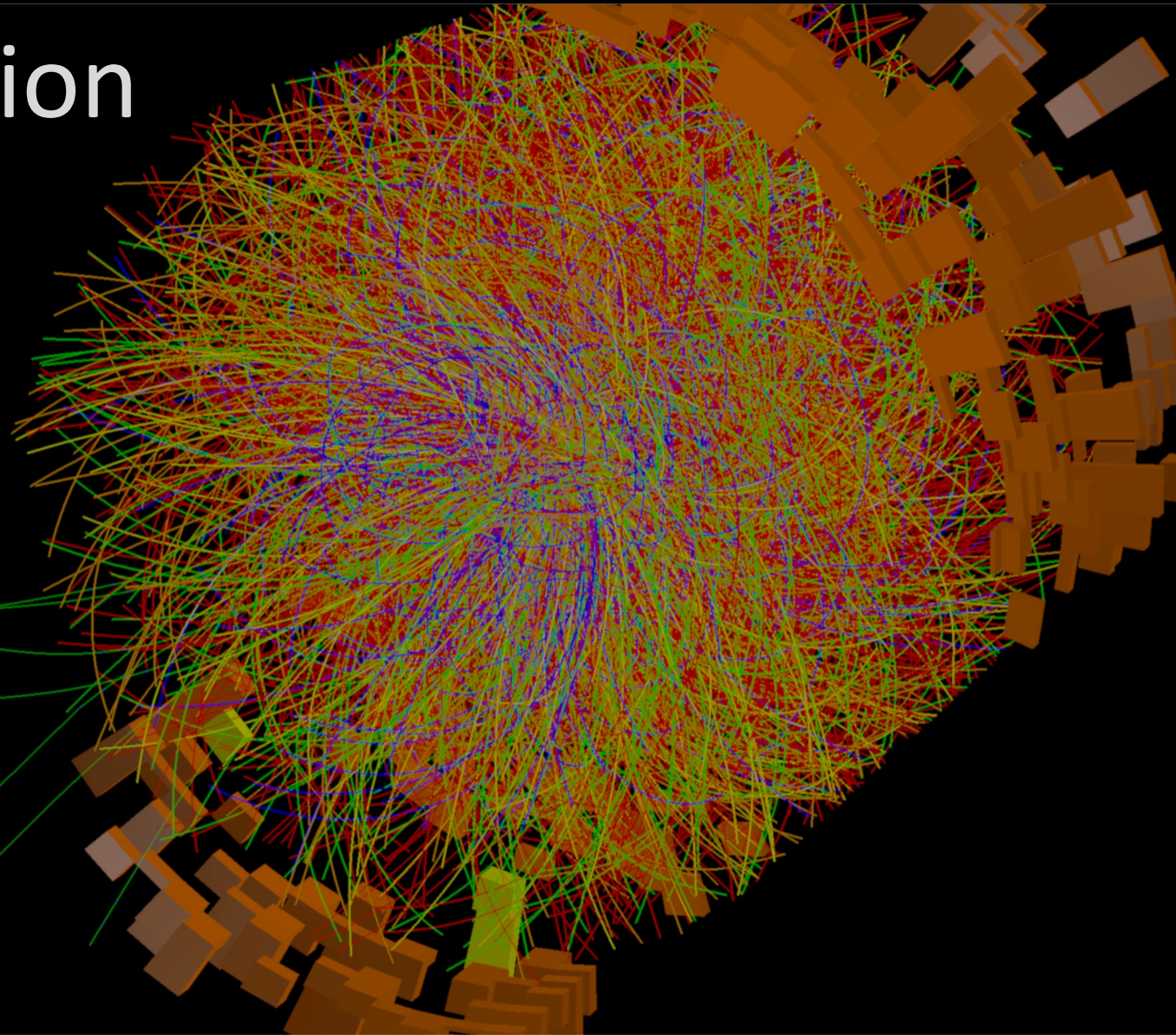


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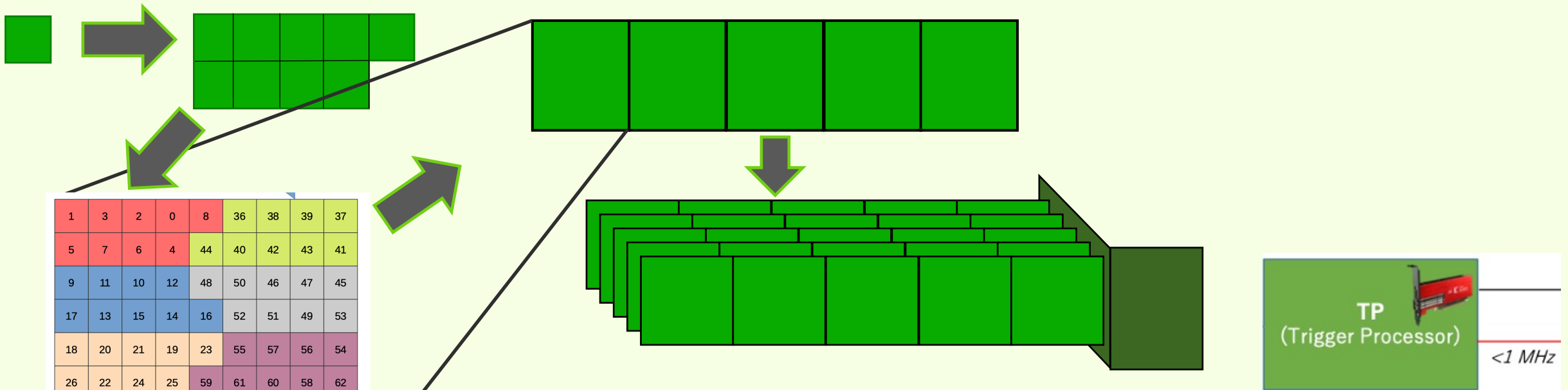
Update

1. Used increased events root file (2500 -> 10000)
2. Identify π^0



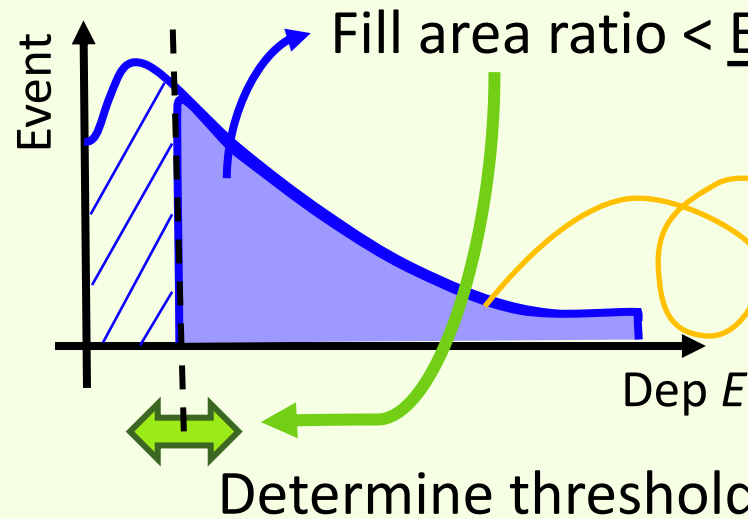
1. Determine the threshold line
2. Estimate remain π^0
3. Measured π^0 gamma opening angle

Trigger channel evaluation



| | | | | | | | | |
|----|----|----|----|----|----|----|----|----|
| 1 | 3 | 2 | 0 | 8 | 36 | 38 | 39 | 37 |
| 5 | 7 | 6 | 4 | 44 | 40 | 42 | 43 | 41 |
| 9 | 11 | 10 | 12 | 48 | 50 | 46 | 47 | 45 |
| 17 | 13 | 15 | 14 | 16 | 52 | 51 | 49 | 53 |
| 18 | 20 | 21 | 19 | 23 | 55 | 57 | 56 | 54 |
| 26 | 22 | 24 | 25 | 59 | 61 | 60 | 58 | 62 |
| 30 | 28 | 29 | 27 | 67 | 63 | 65 | 64 | 66 |
| 34 | 32 | 33 | 31 | 35 | 71 | 69 | 68 | 70 |

Determine the appropriate threshold for each trigger logic, respectively.
 → Estimate the rate of the pi0 /direct photons .



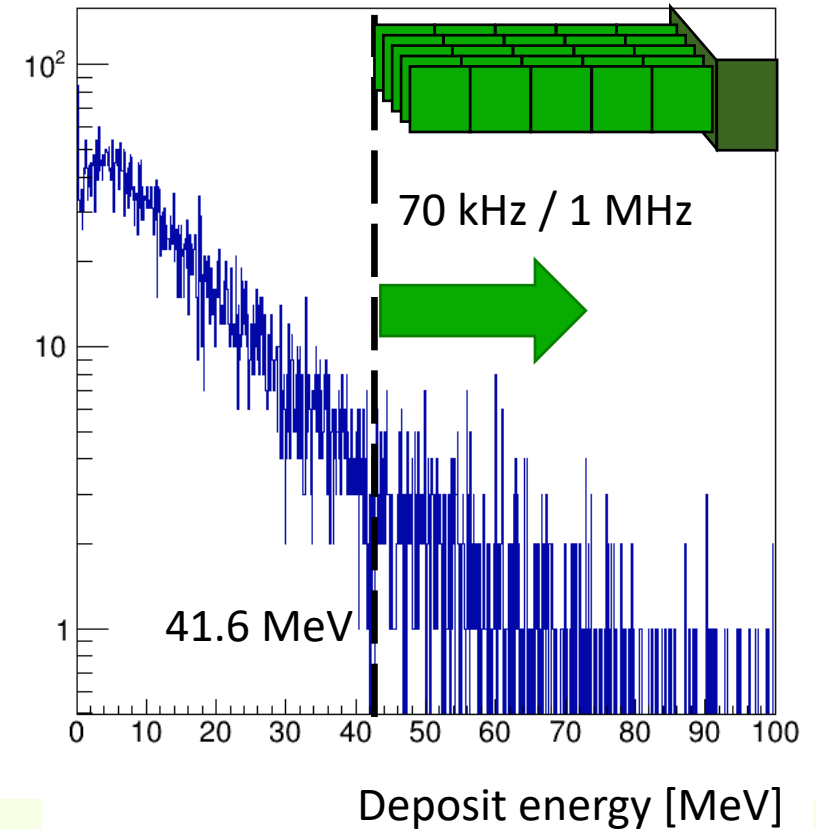
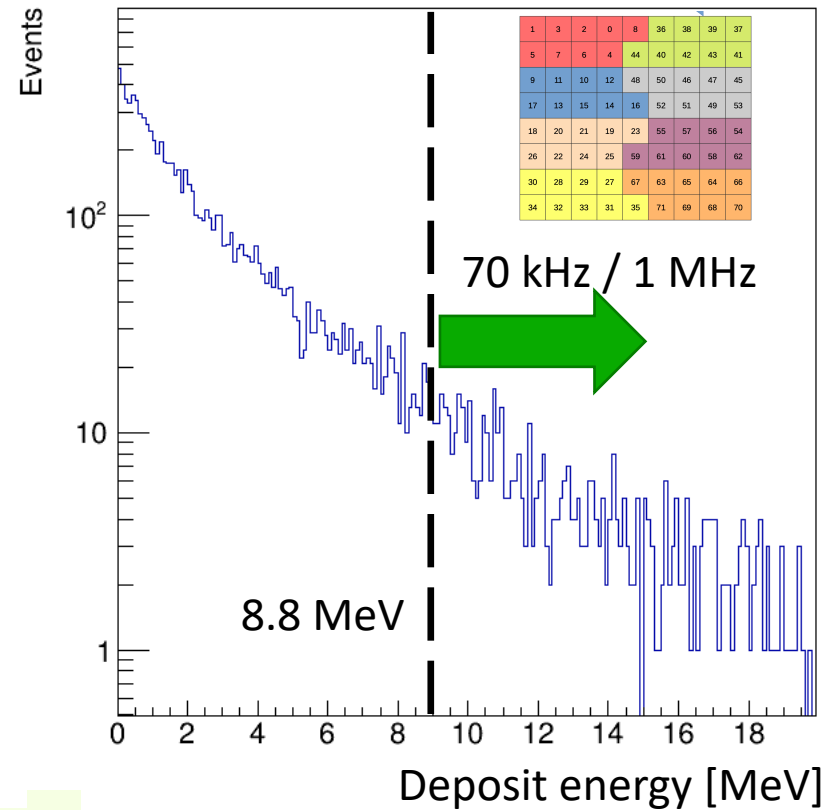
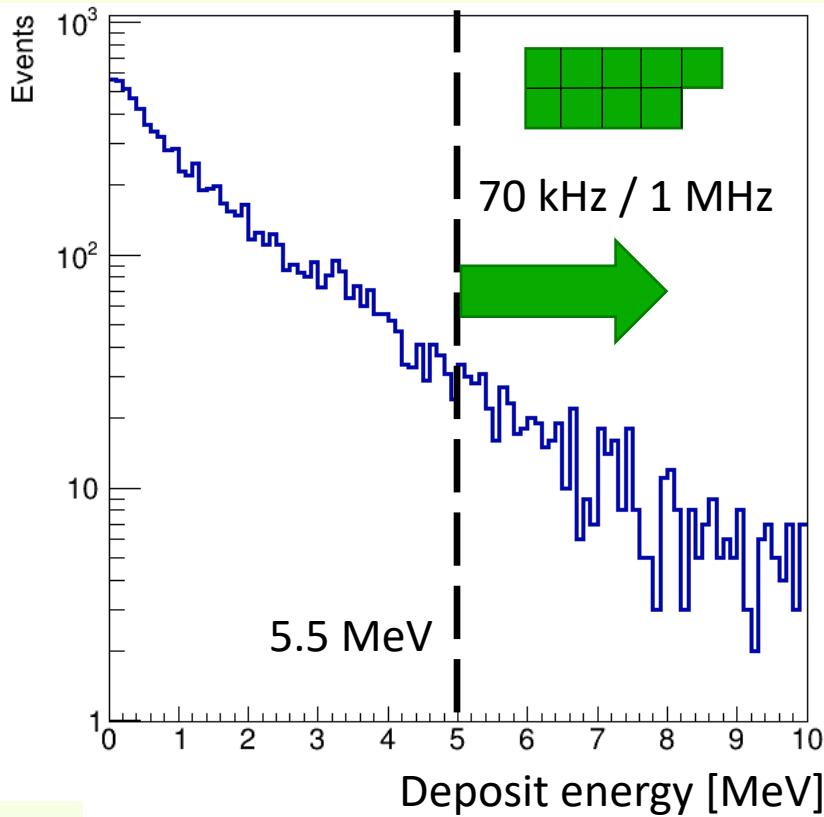
direct/pi0 photon rate

$$\frac{\pi_0}{\gamma} \ll 1$$

These energy distribution

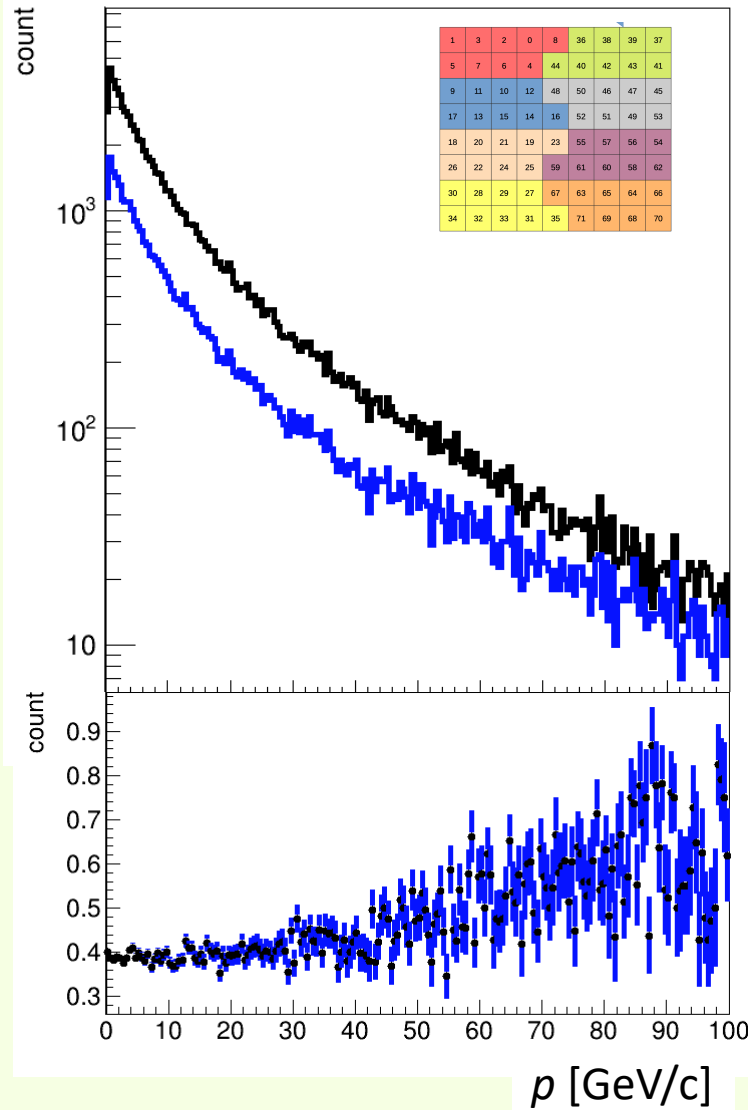
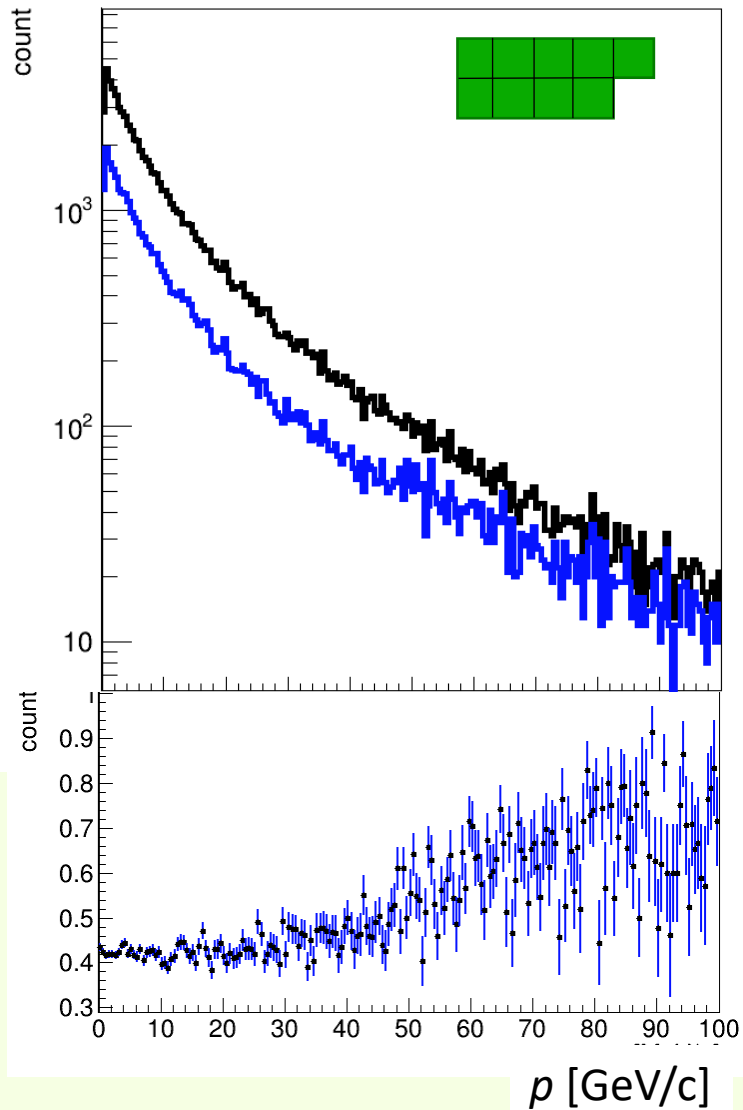
Determine the threshold

Plot the highest energy in an Event for each sum up channel

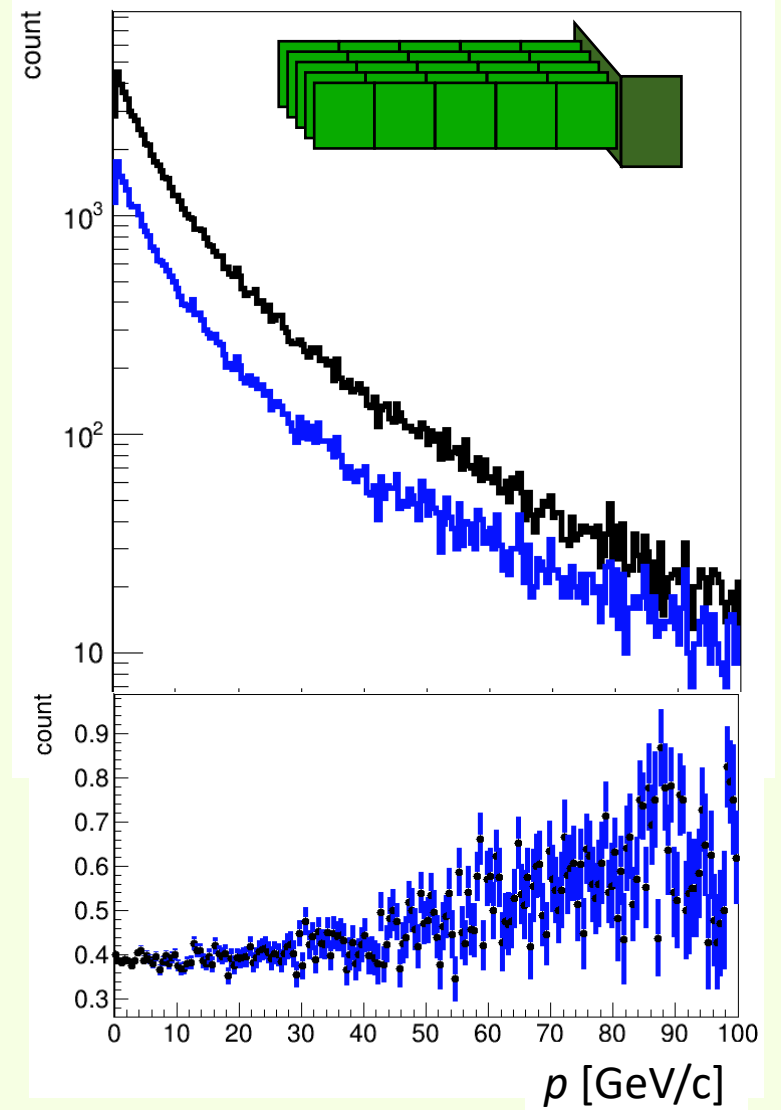


- 1 HGCROC: 32bit x 72 ch = 2304 bit
- Read 1 HGCROC by GBT (3.2 Gbps)
- 1 aggregator board has 20 HGCROC
- > $3.2 \times 10^9 / 20 / 2304 = 70 \text{ kHz}$

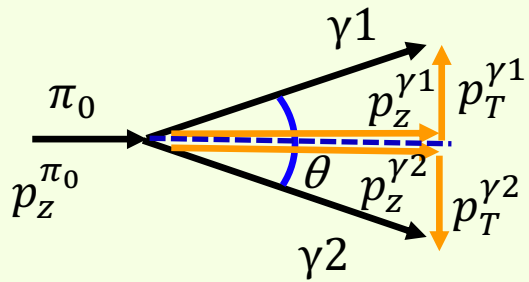
Reduction of pi0 by trigger



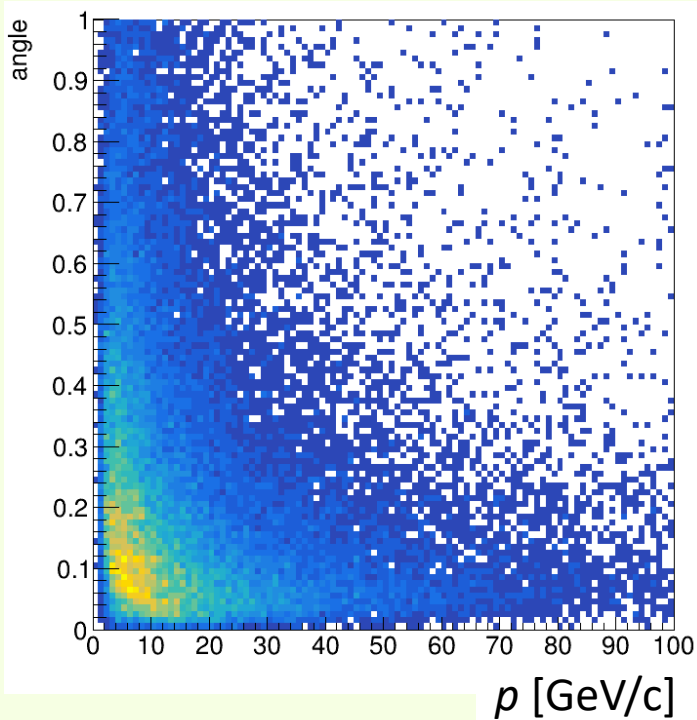
Small pT pi0 reduced by trigger



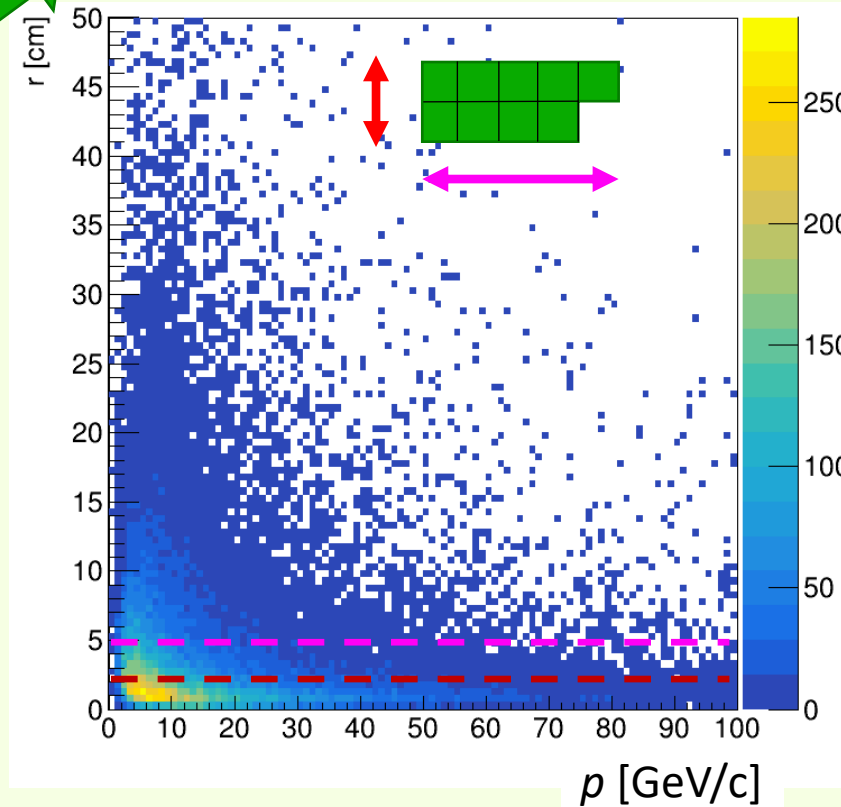
Pi0 gamma opening angle



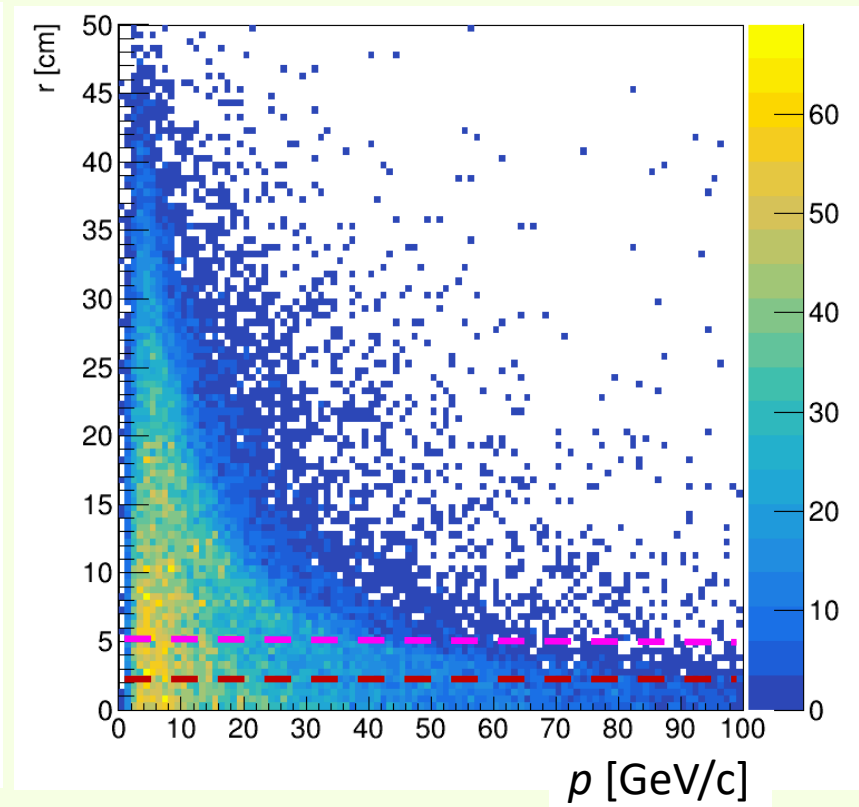
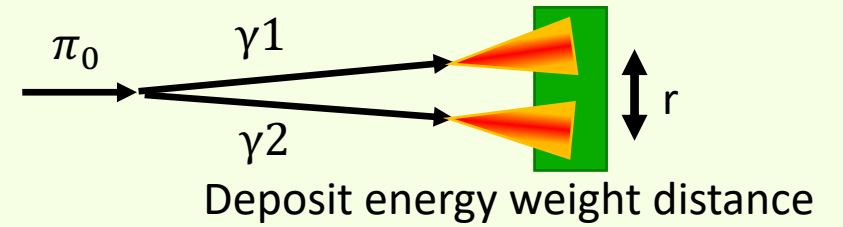
$$\theta = \arctan\left(\frac{p_T^{\gamma 1}}{p_z^{\gamma 1}}\right) + \arctan\left(\frac{p_T^{\gamma 2}}{p_z^{\gamma 2}}\right)$$



$$r = 700 \text{ [cm]} \times \tan\theta$$



→ 2 sum cell can separate gammas from pi0 having smaller than 20 GeV/c



→ 2 sum cell can separate gammas from pi0 having smaller than 50 GeV/c

Next step

- Make the trigger use longitudinal information (layer combination)