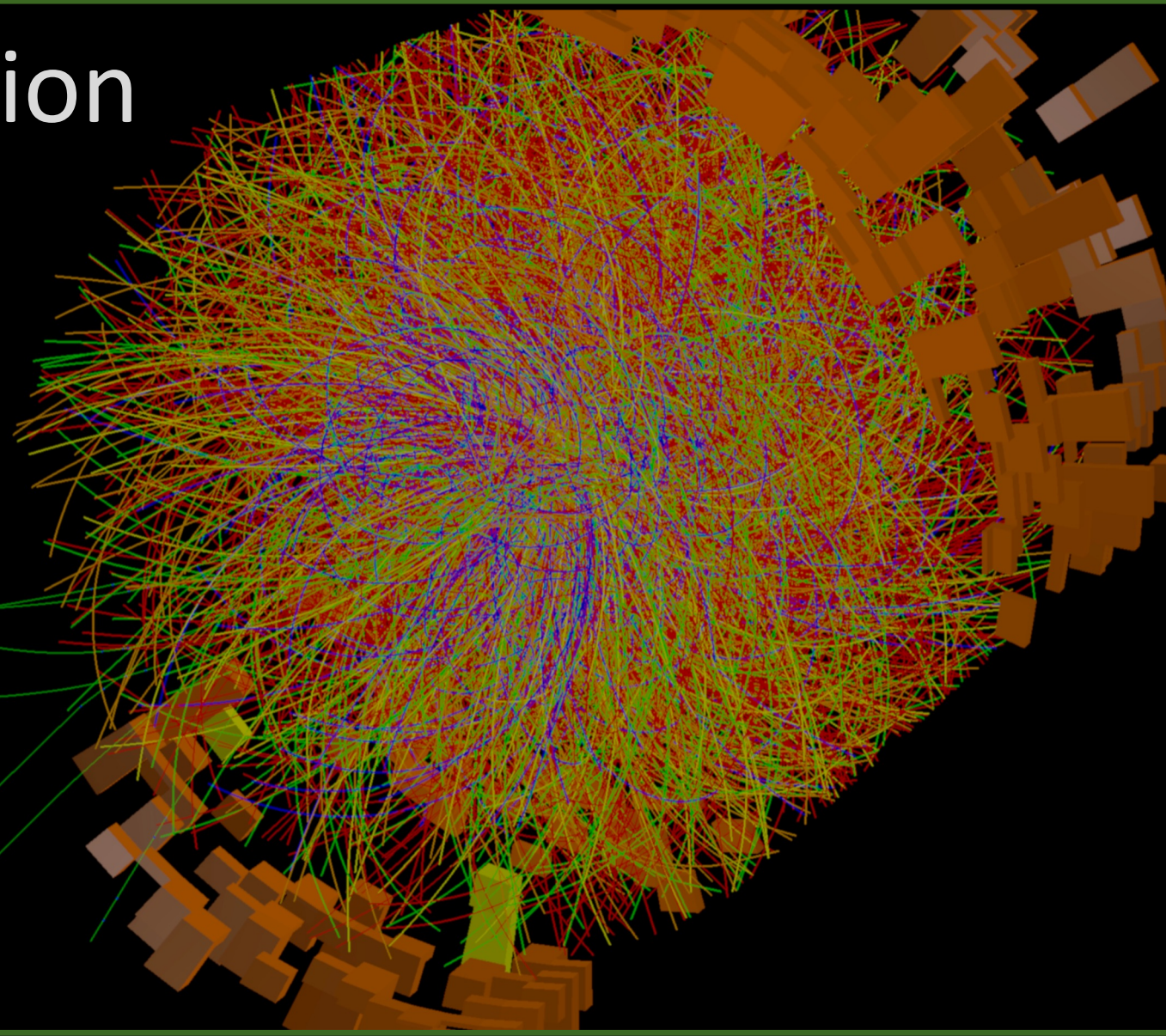
FoCal Trigger simulation



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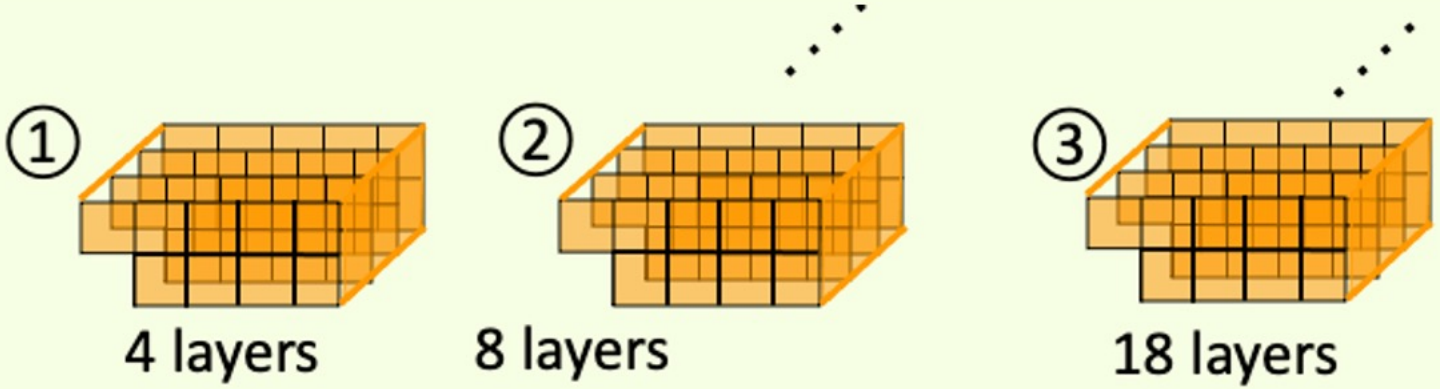
Pi0/Gamma trigger

New Progress

- Test z direction sum (tower)
- Single photon / pi0 simulation



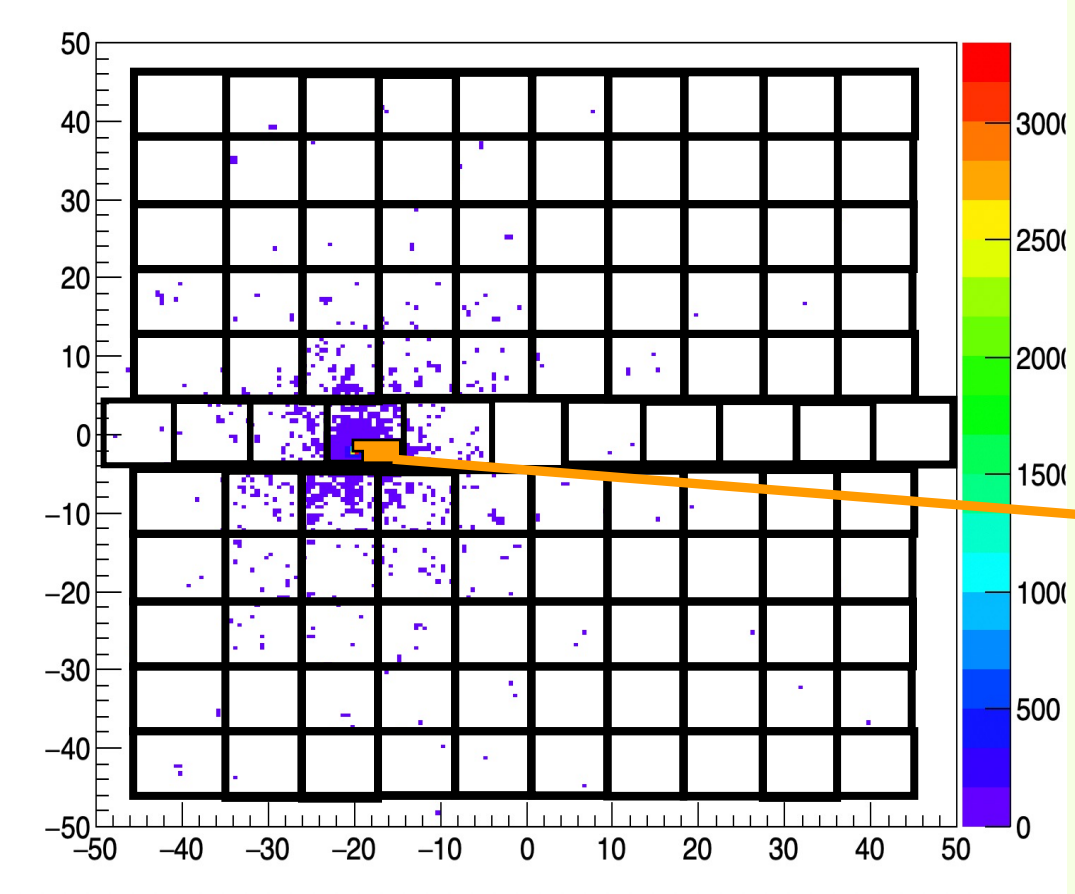
Single Events
pT flat: 0-20 GeV/c
$3.0 < \eta < 6.0$
(FoCal $3.4 < \eta < 5.8$)

Estimate appropriate thrshold for readout rate by using pp 14 TeV

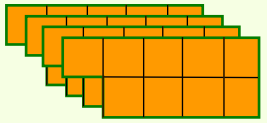
-> Estimate the efficiency of phons and pi0 using determined thershold

Trigger Decision

FoCal-E Pad



1 Pad



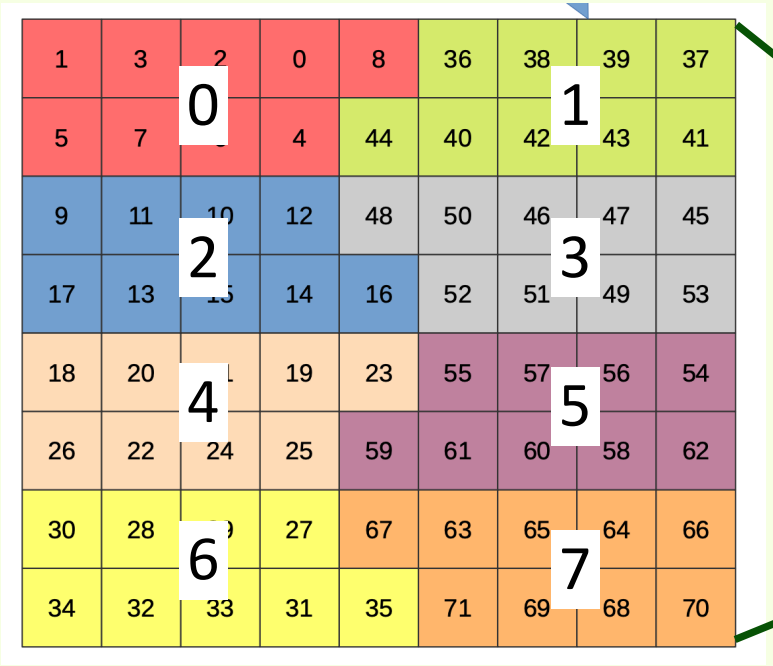
- Find a tower that has the highest deposit energy or pT. (pT = deposit energy * sinθ)
- Trigger events that there is a tower having deposit E/pT over **threshold.**

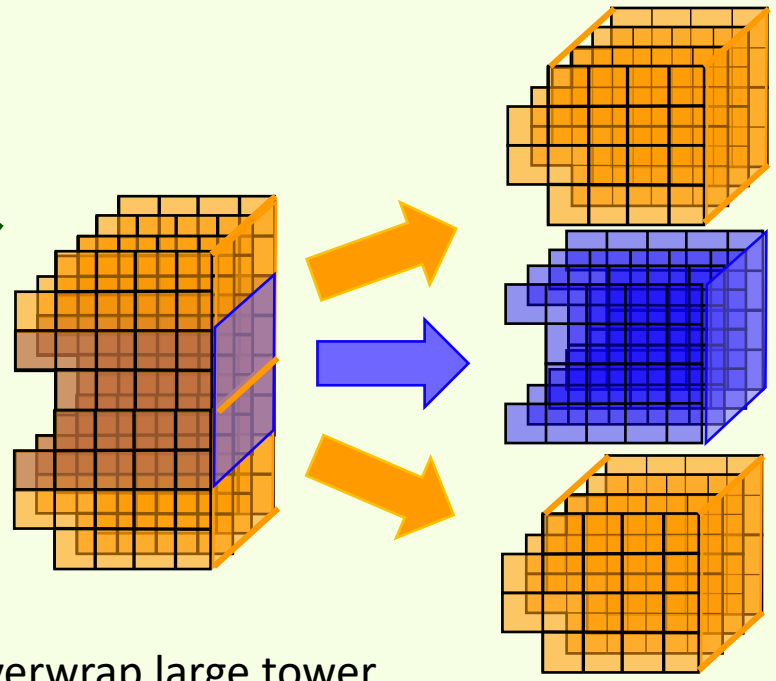
→ Determine the threshold value of deposit E/pT based on the data reading rate

Overwrap Tower

Overwrap Unit Tower

-> We expect to recover the particle that go through out the tower

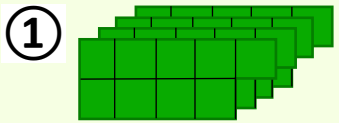




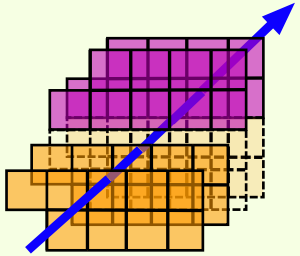
Overwrap large tower

Unit: Sum of cells on a layer

Tower: Sum of units for z direction

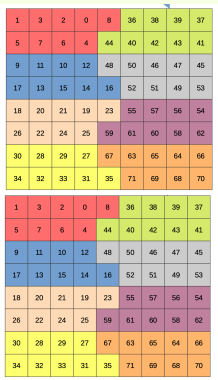


Tower combining 9 cells unit having highest energy



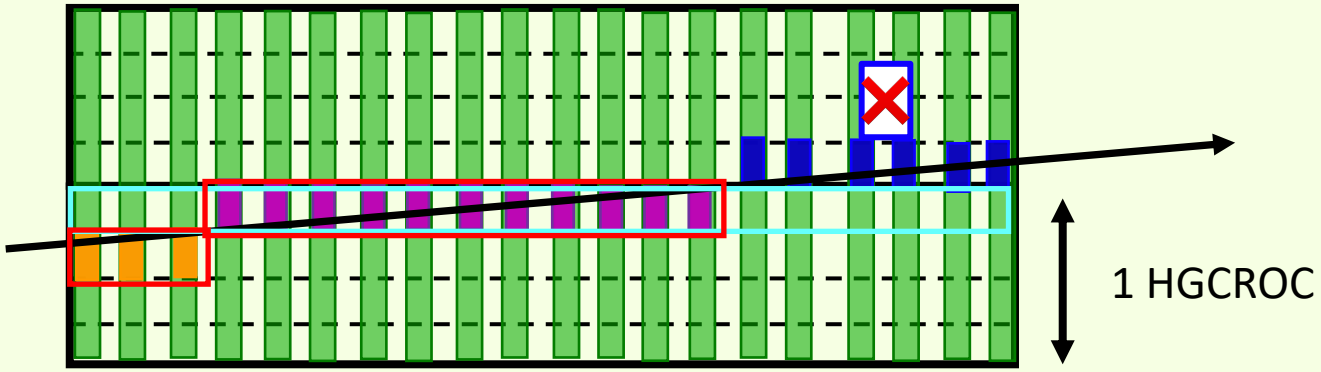
Felxible:

- Merge highest unit not fix x-y direction
- ✕ : not over 1 HGCROC



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

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

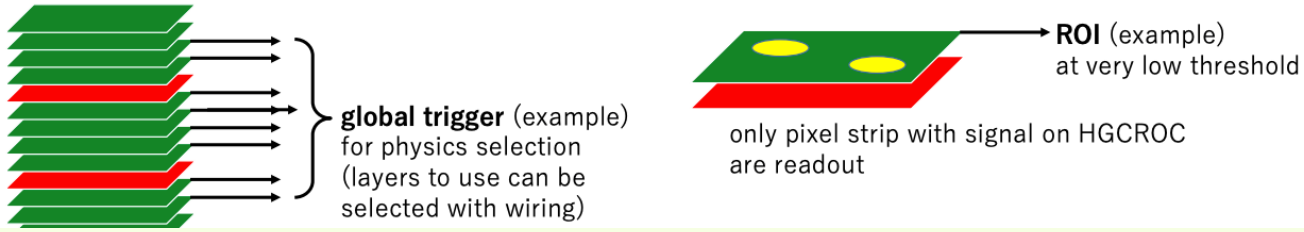


This tower helps the pixcel readout ROI?

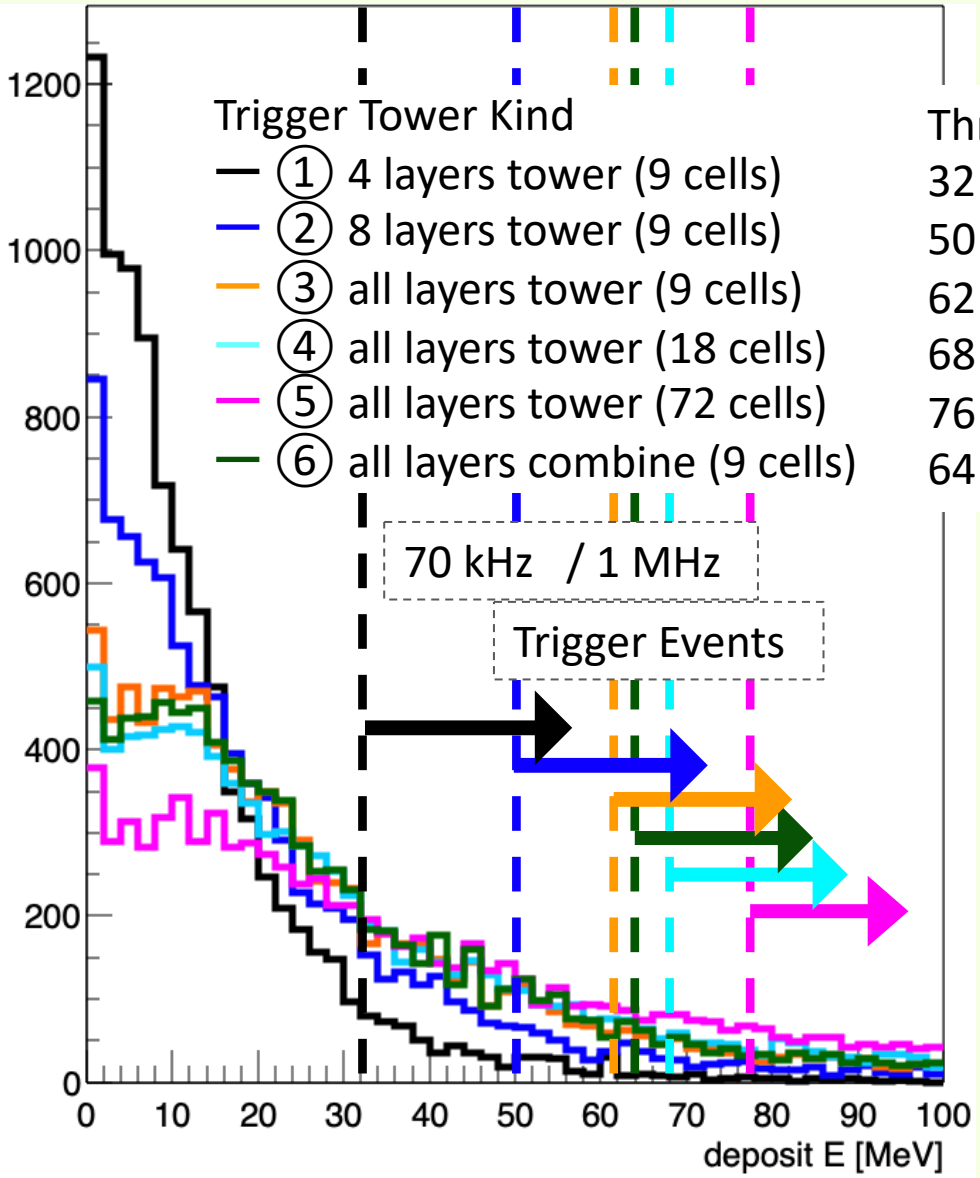
Ken Oyama
FoCal-J meeting in Tsukuba
Jul. 13, 2022

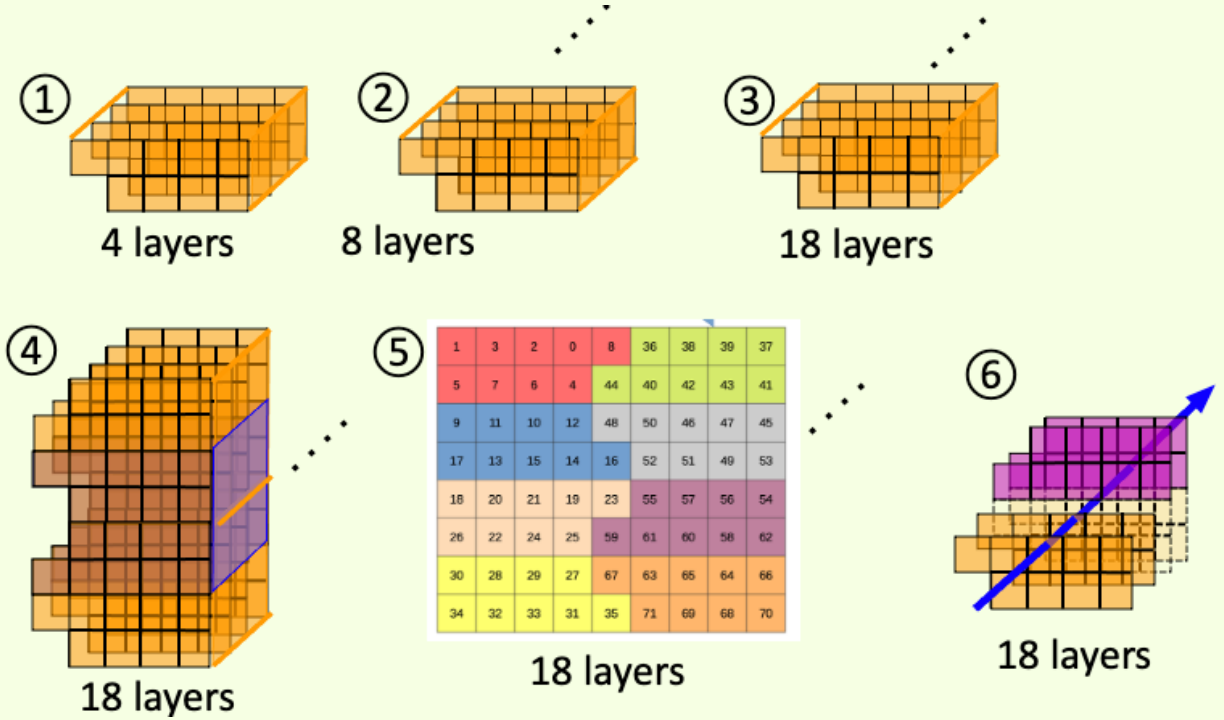
■ ROI mask for PIXEL

- Only strip with condition (GLOBAL && ROI) == 1 are read out (max rate: < 100 kHz)

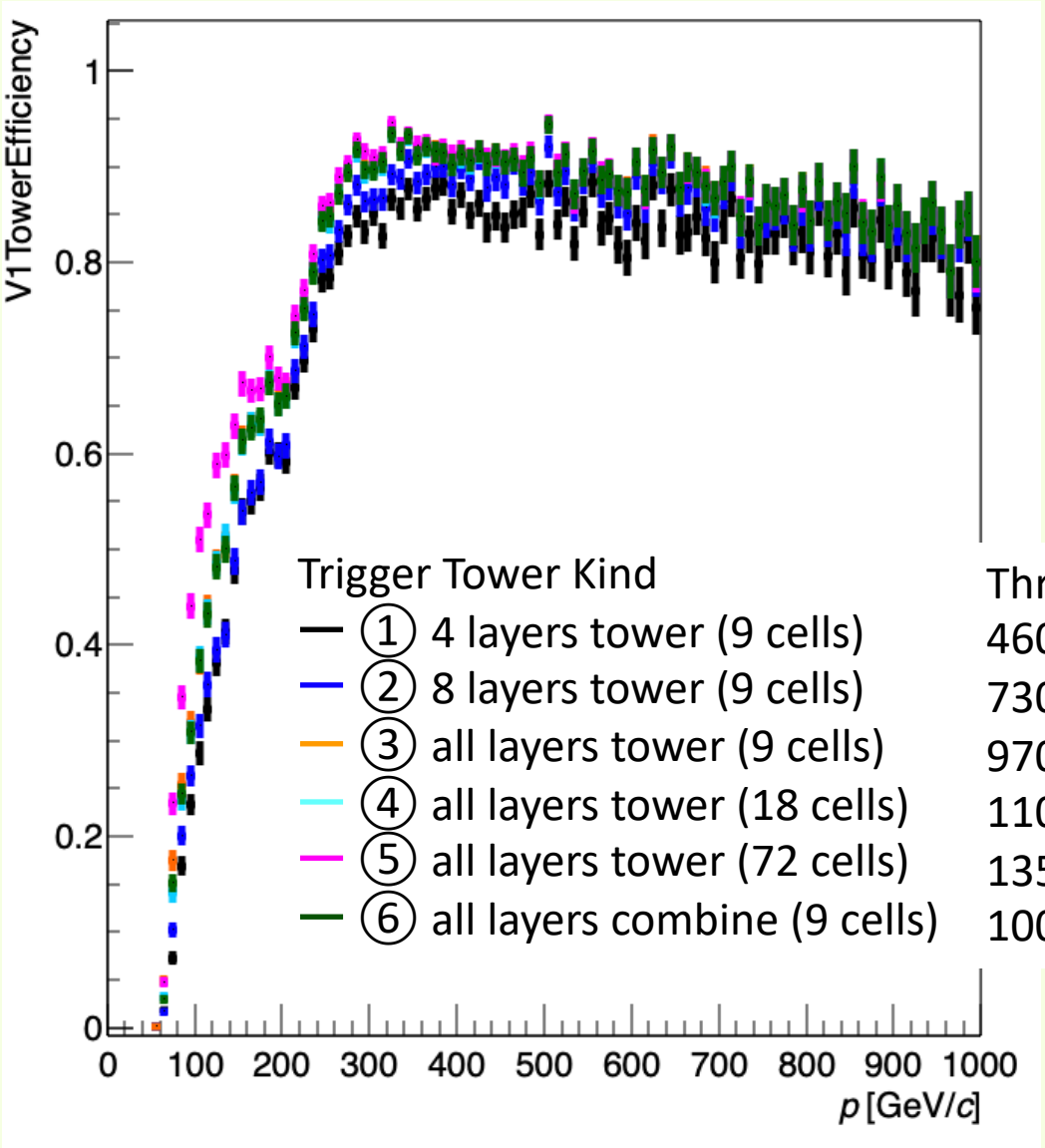


Tower Kinds pT Distribution

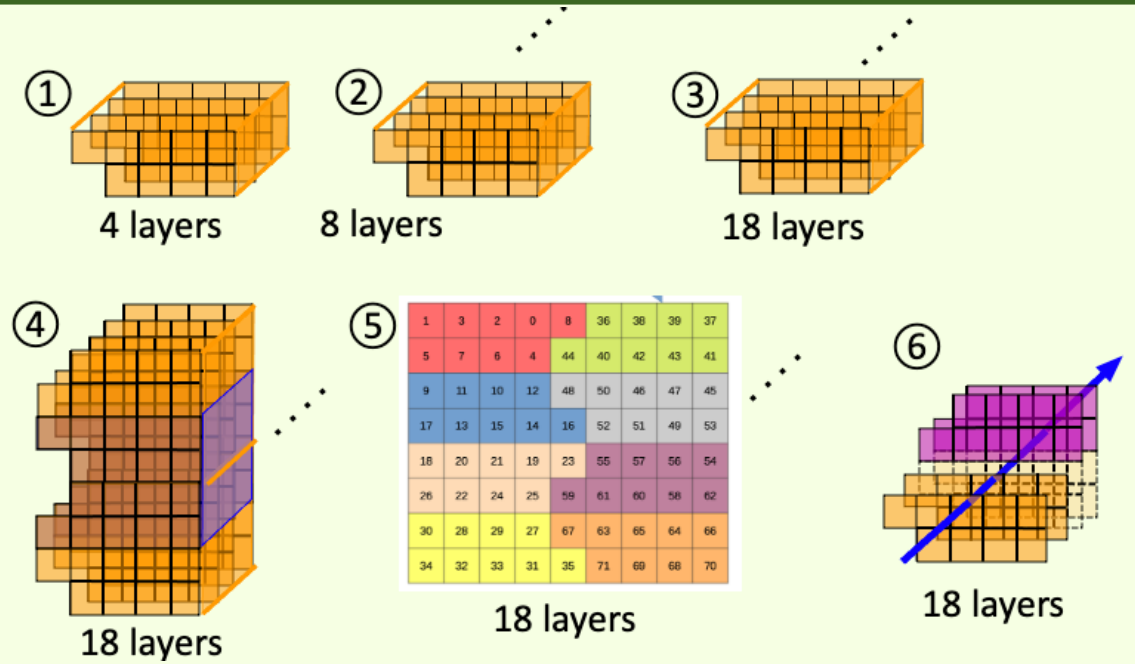




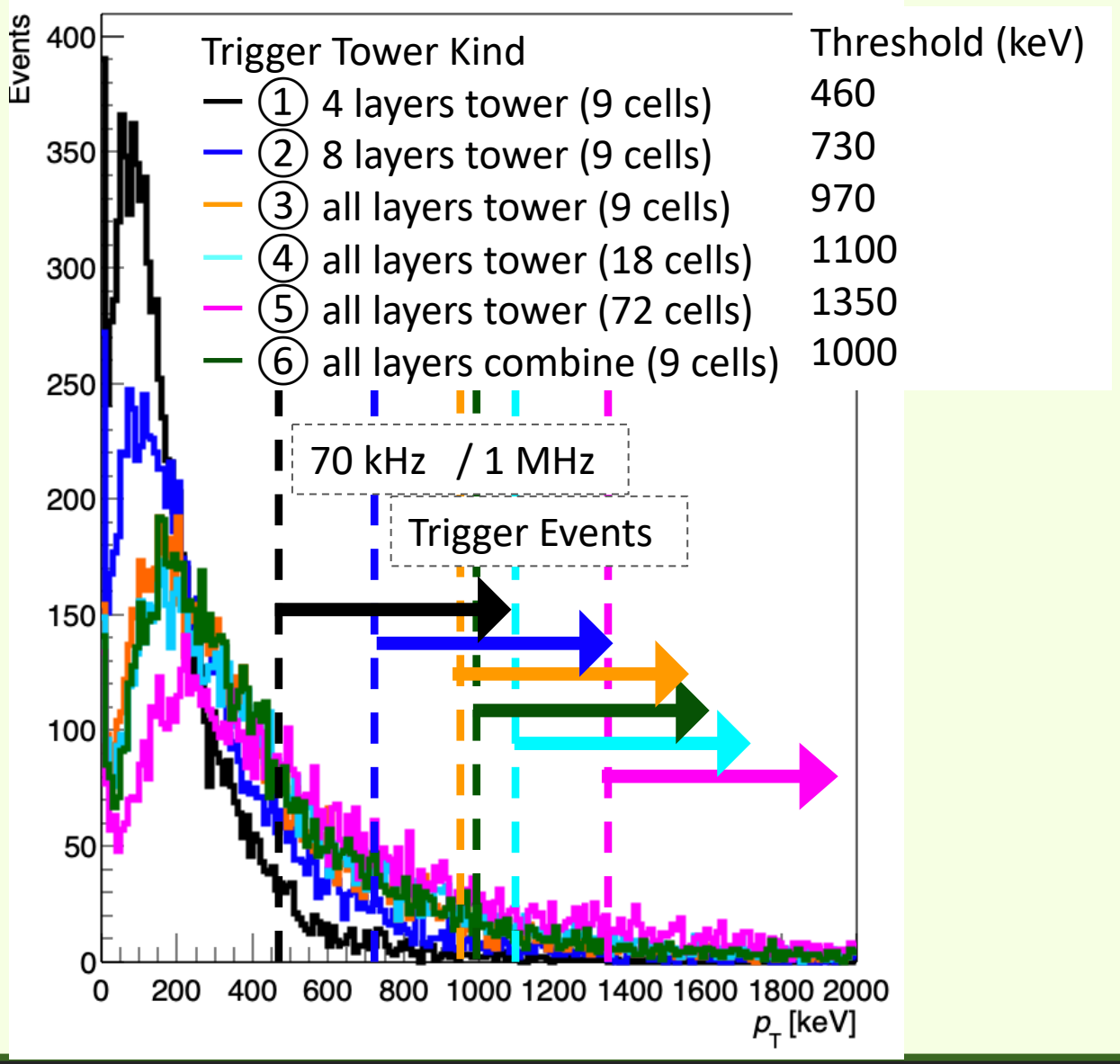
Deposit Energy Trigger Efficiency (Tower kind)



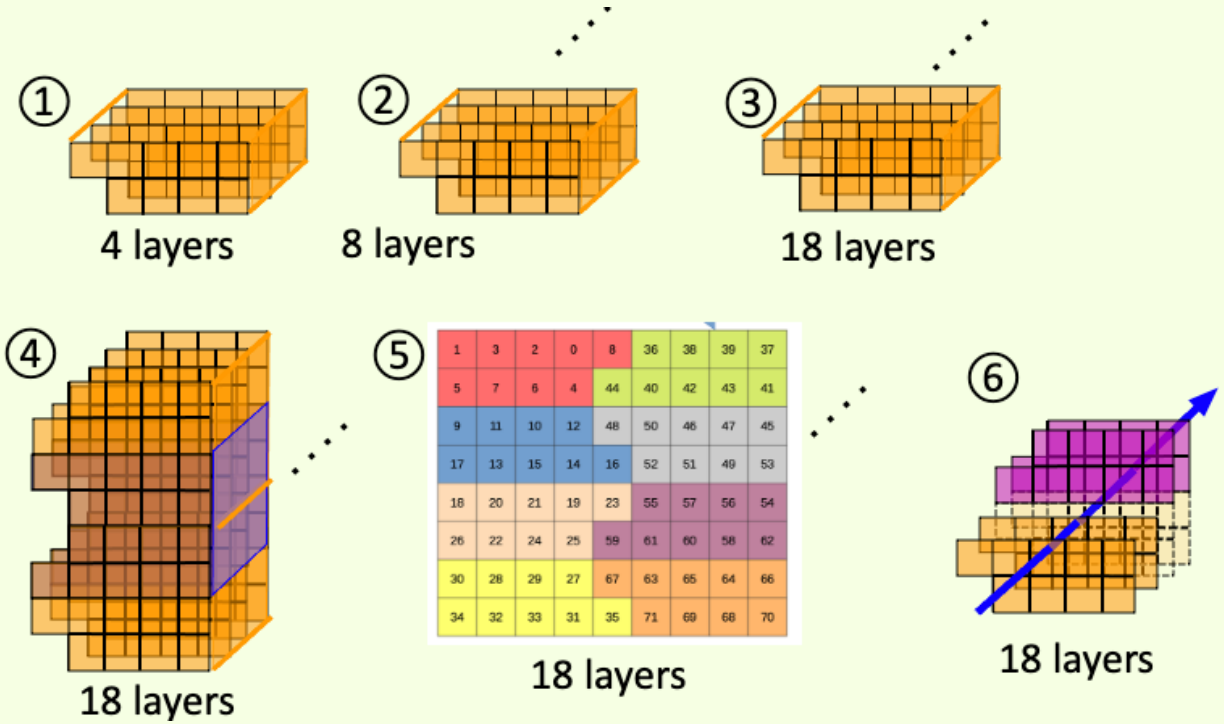
Threshold (keV)
460
730
970
1100
1350
1000



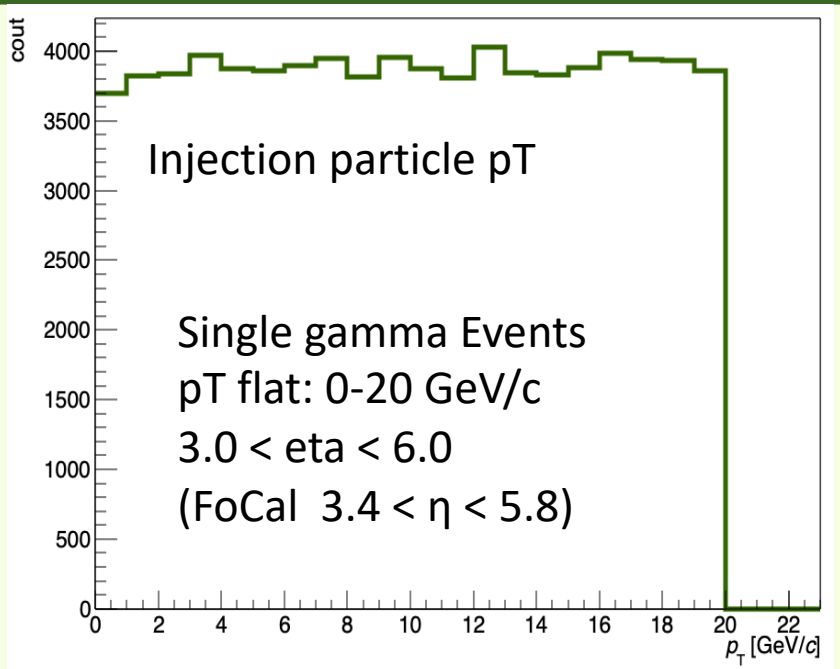
Tower Kinds Deposit Energy Distribution

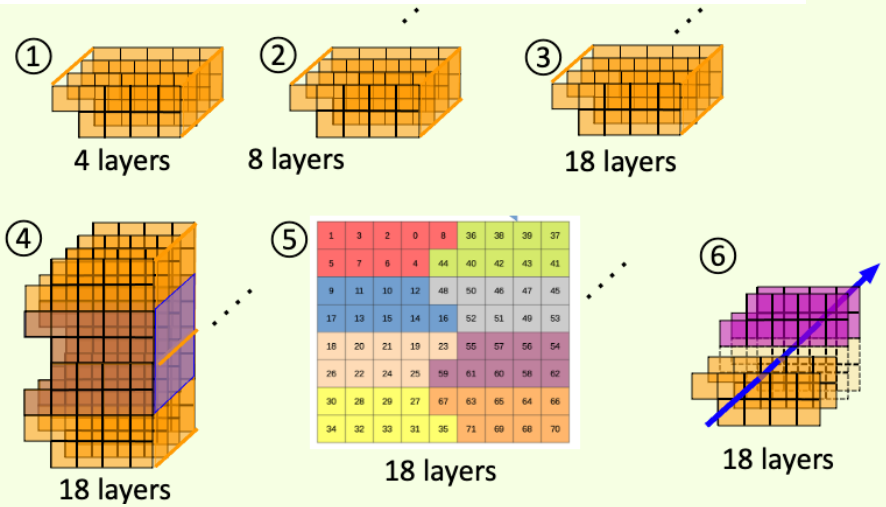


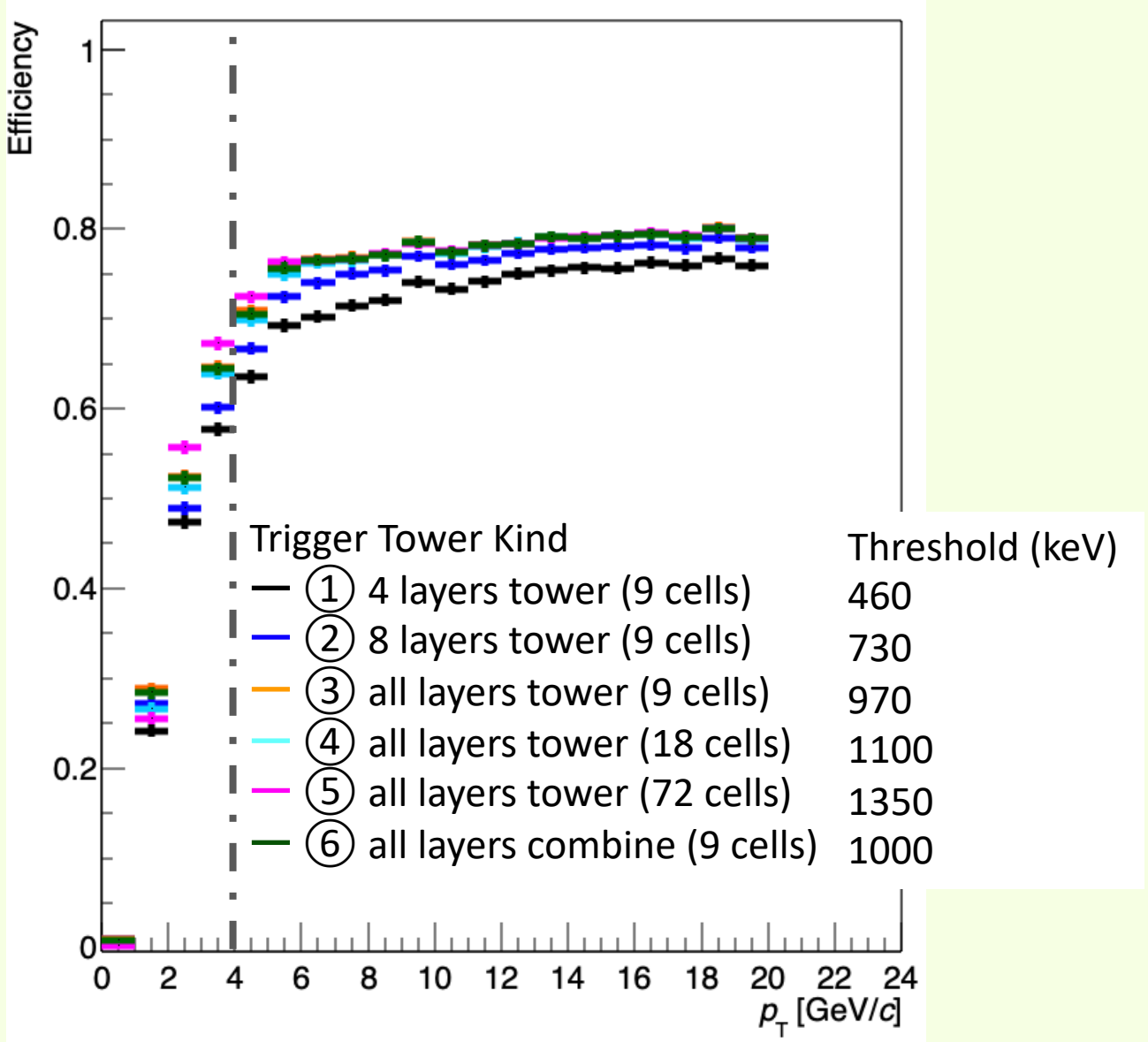
Fill the most highest pT from the pT the tower units have in an event.
(pT = towerDepE × sinθ)



pT Trigger Efficiency (Tower kind)



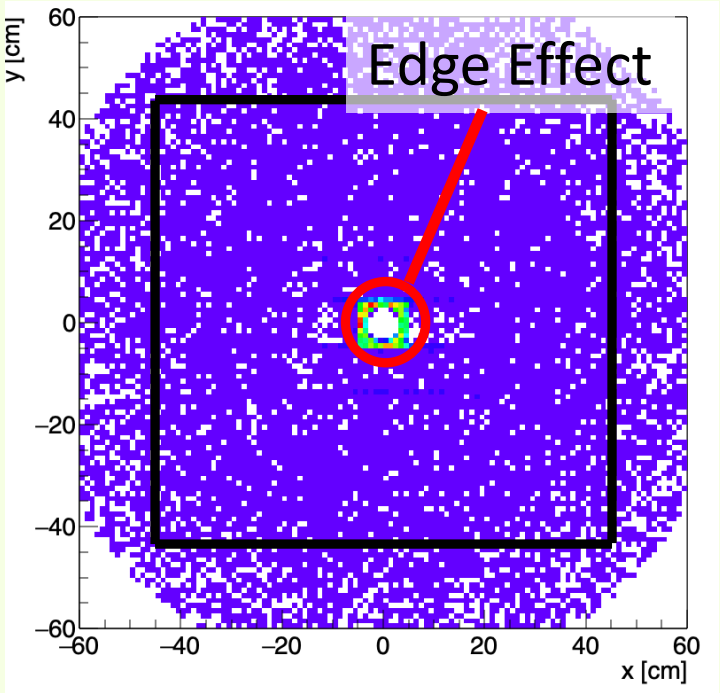


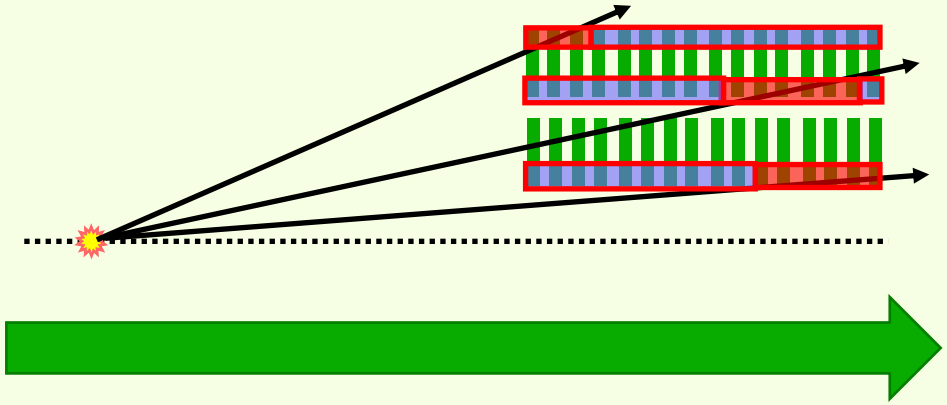


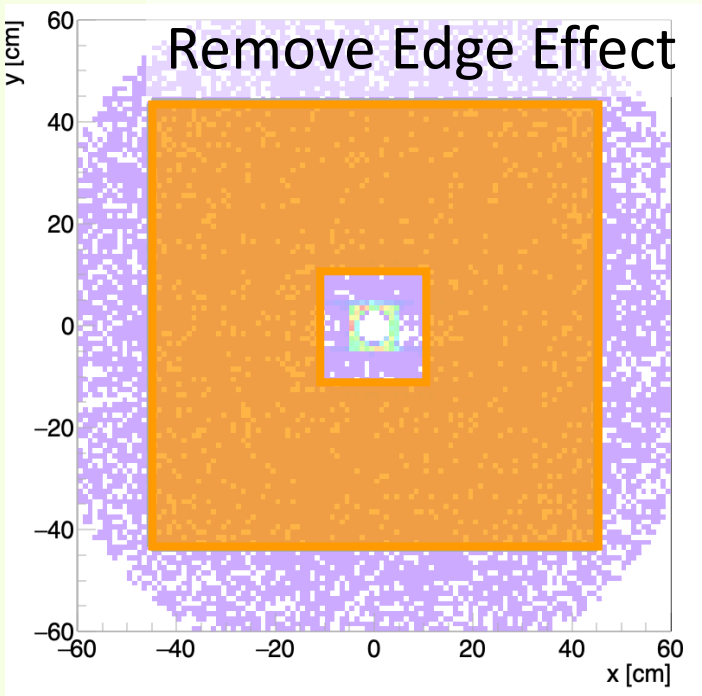
Check Miss Event Hit position

Fill a position gammas in miss event at 7000 mm
(x = 7000. * (px/pz), y = 7000. * (py/py))

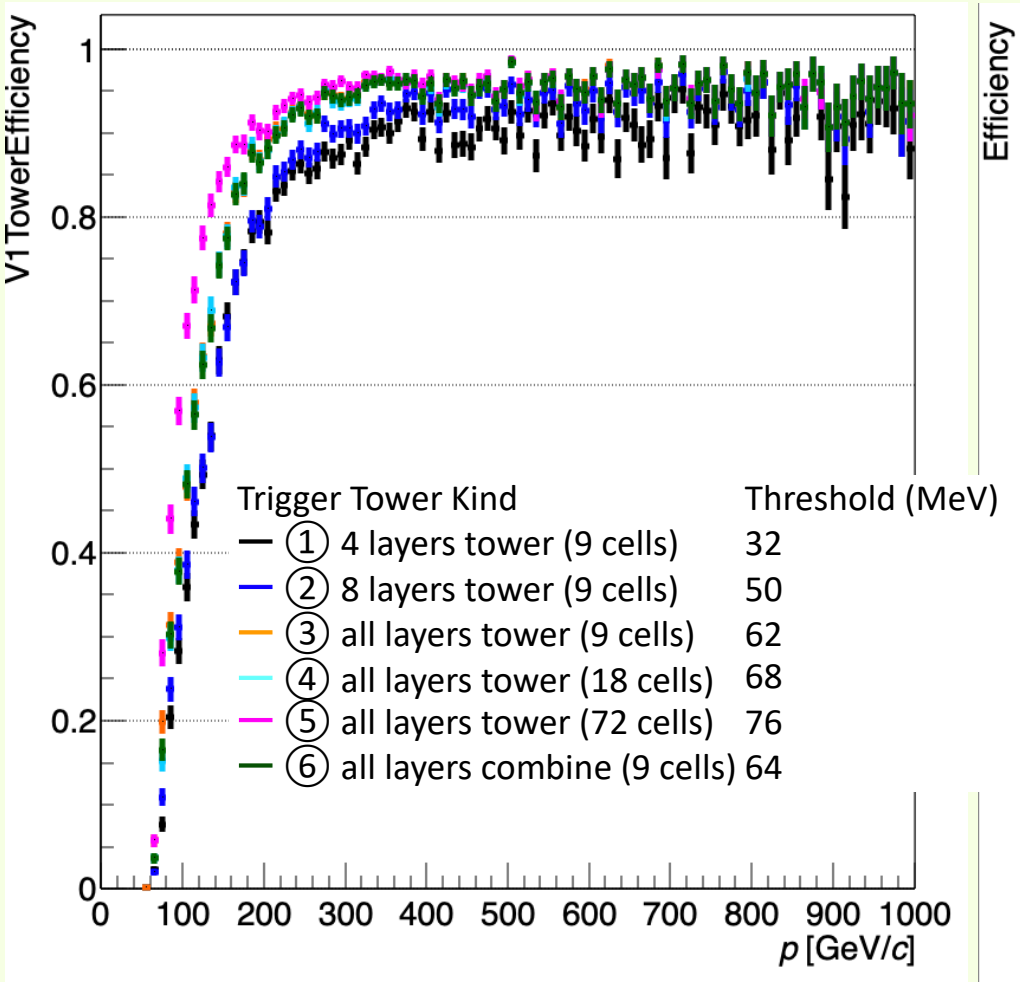
(Every event has a hit point on FoCal.
So even if the point is on the out of FoCal region at 7000 mm, the particle has hit inner or outer layer.)

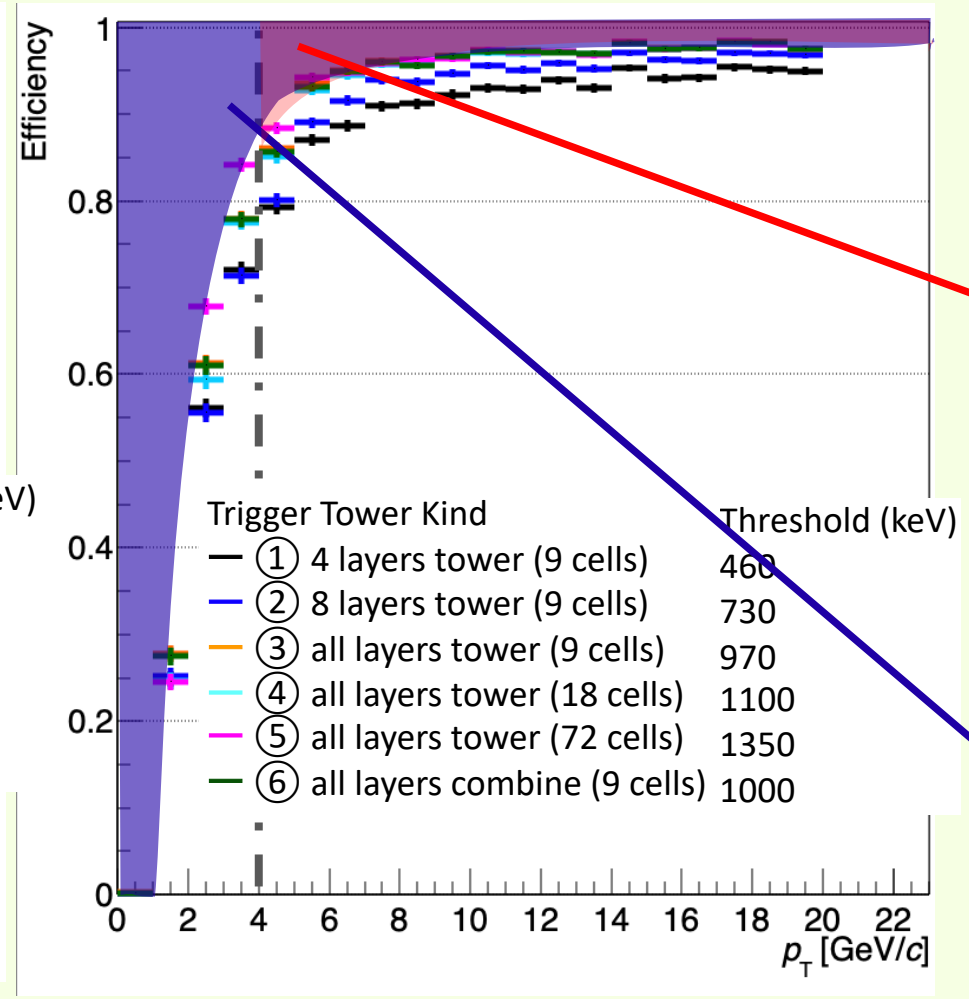


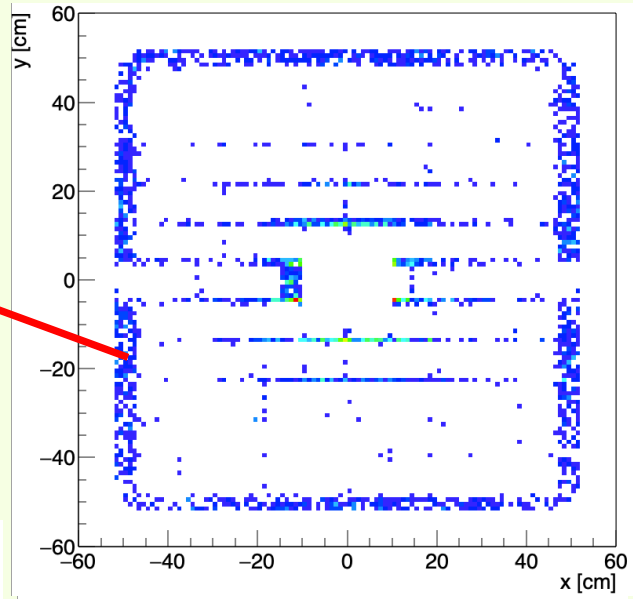


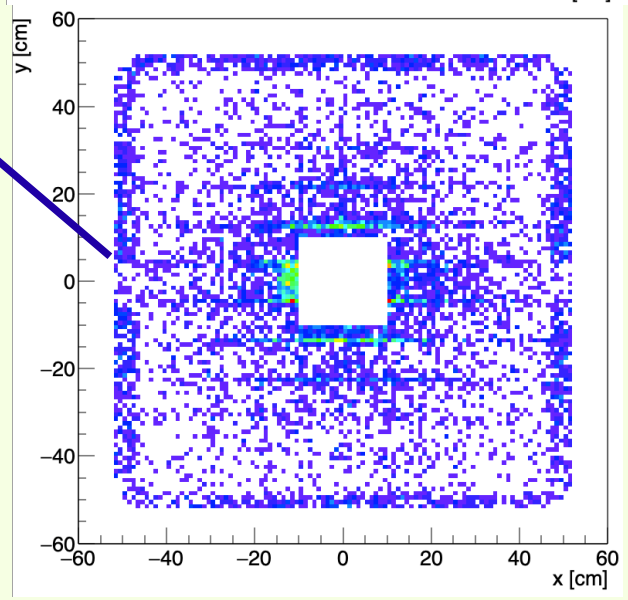


Remove edge Effect

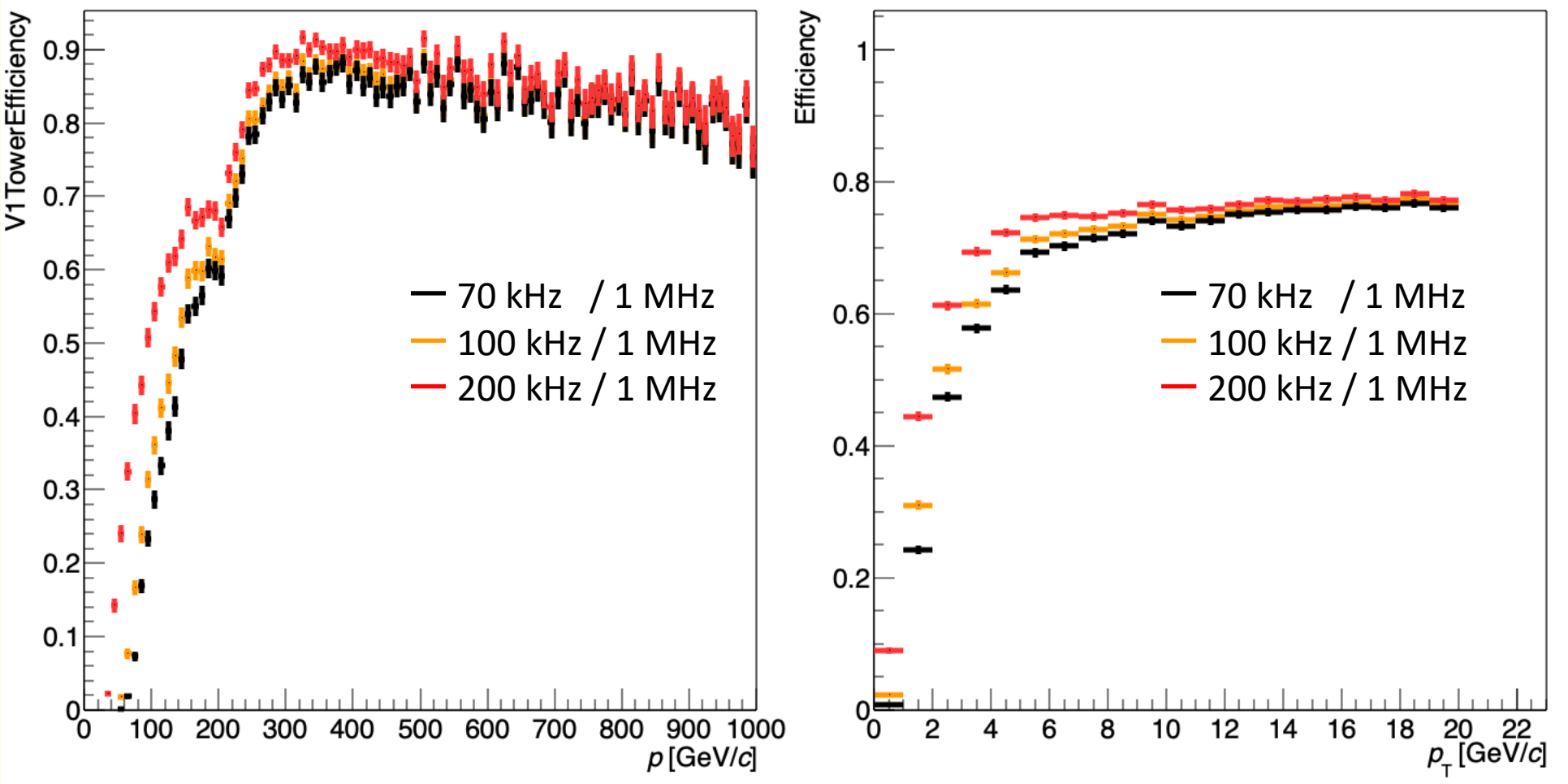




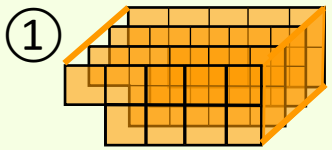




Change the limet of the read-out rate



Trigger tower



Event If we inclease the readout rate limit, the efficiency is not so inproved.