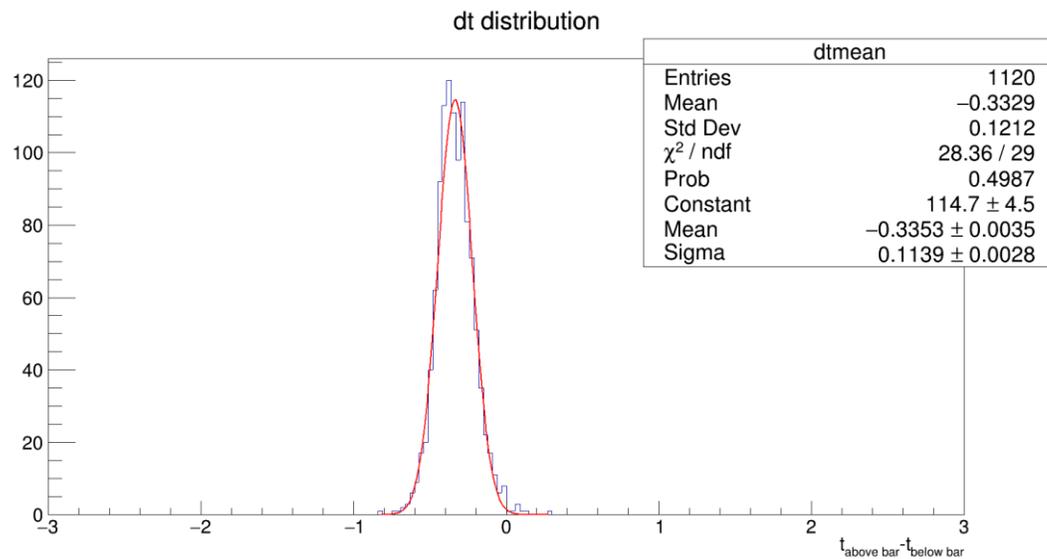
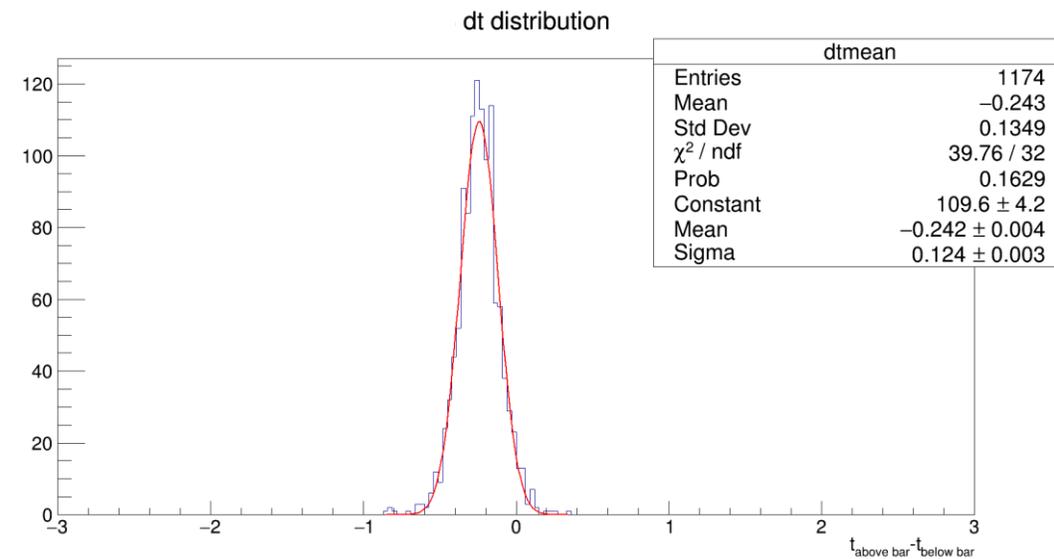


Time resolution

- Time difference between channels are adjusted.
- Time difference histogram binning problem



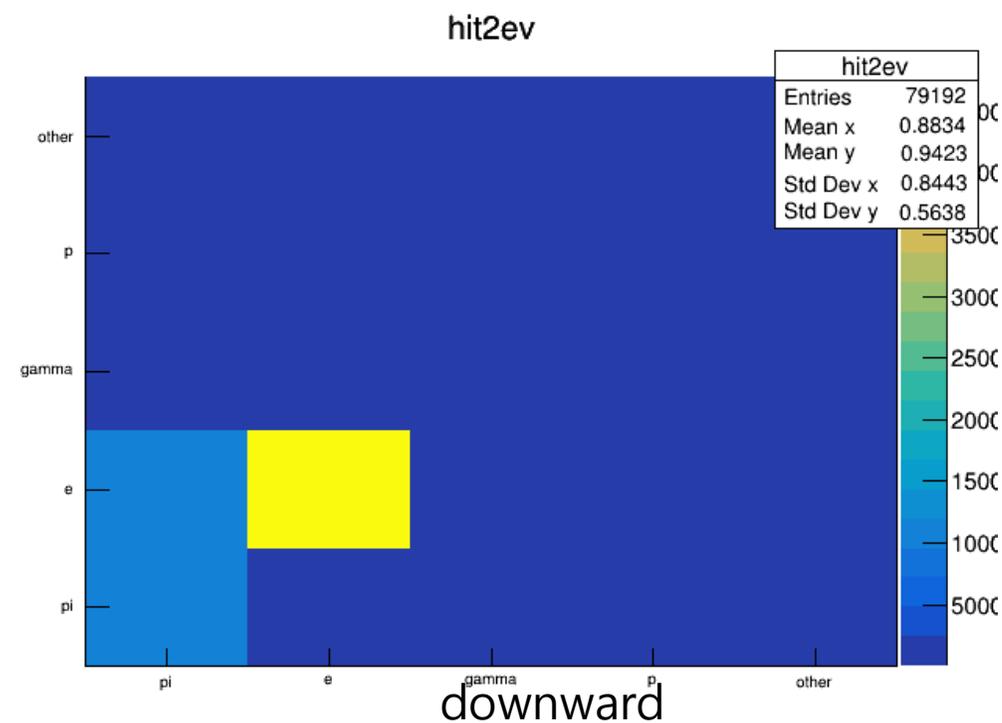
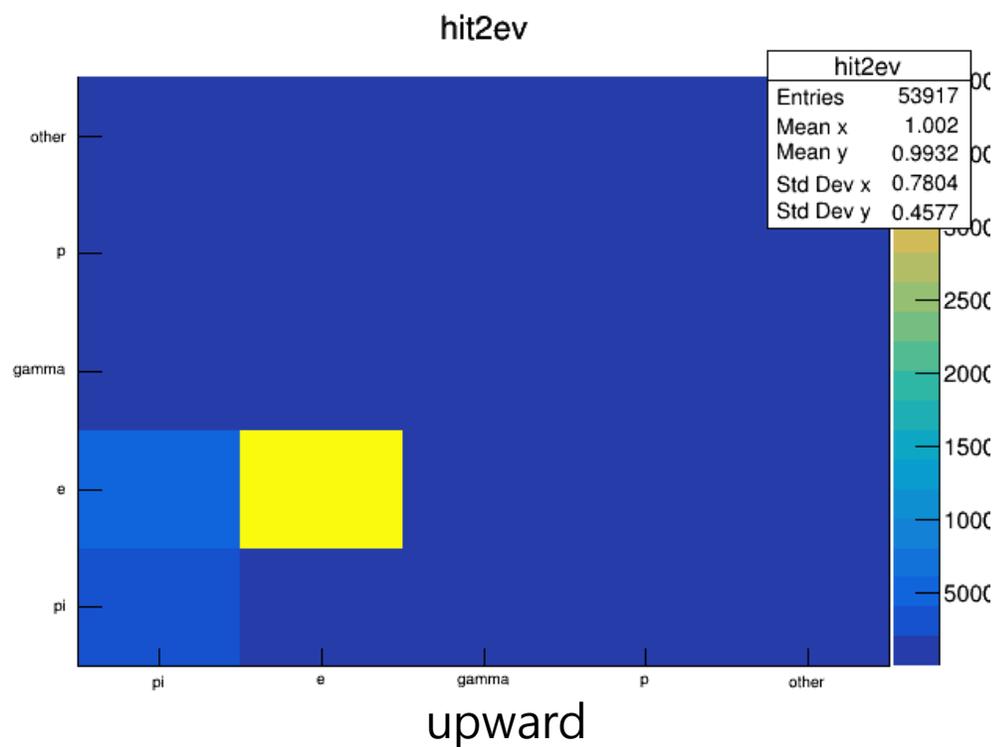
Bar AB



Bar CD

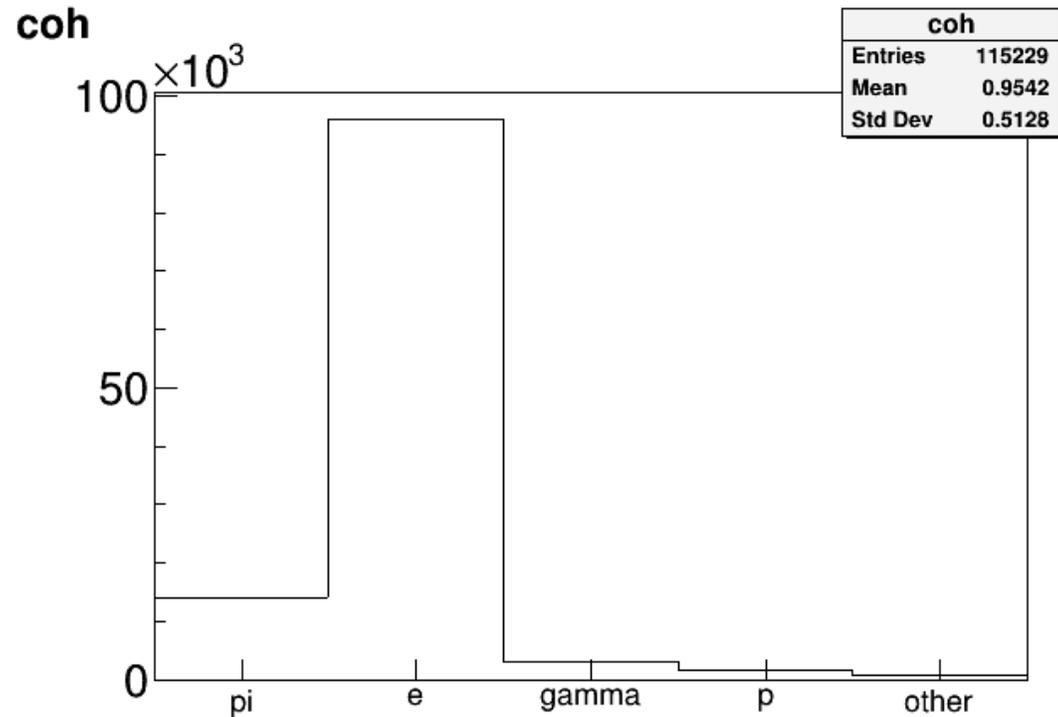
Coincidence hits

- Upward (left) , downward(right)
- If # of particles which hit the same bar within a trigger is two, such particle IDs is depicted in histogram.

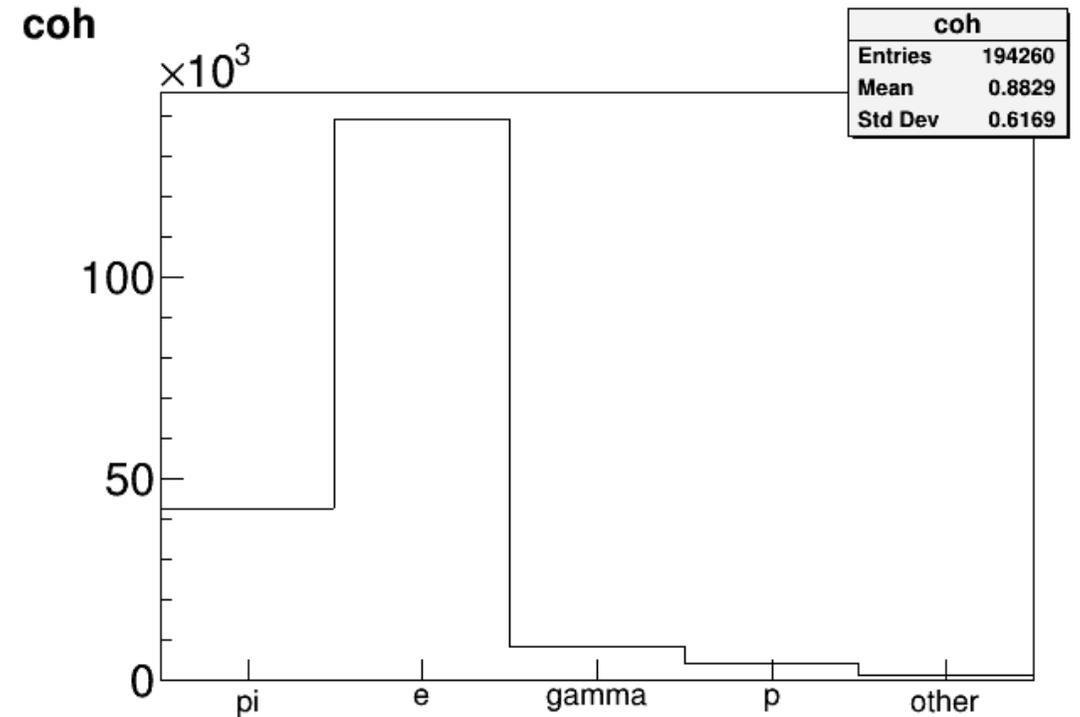


Coincidence hits

- All ID of particles which hit the same bar within a trigger



upward

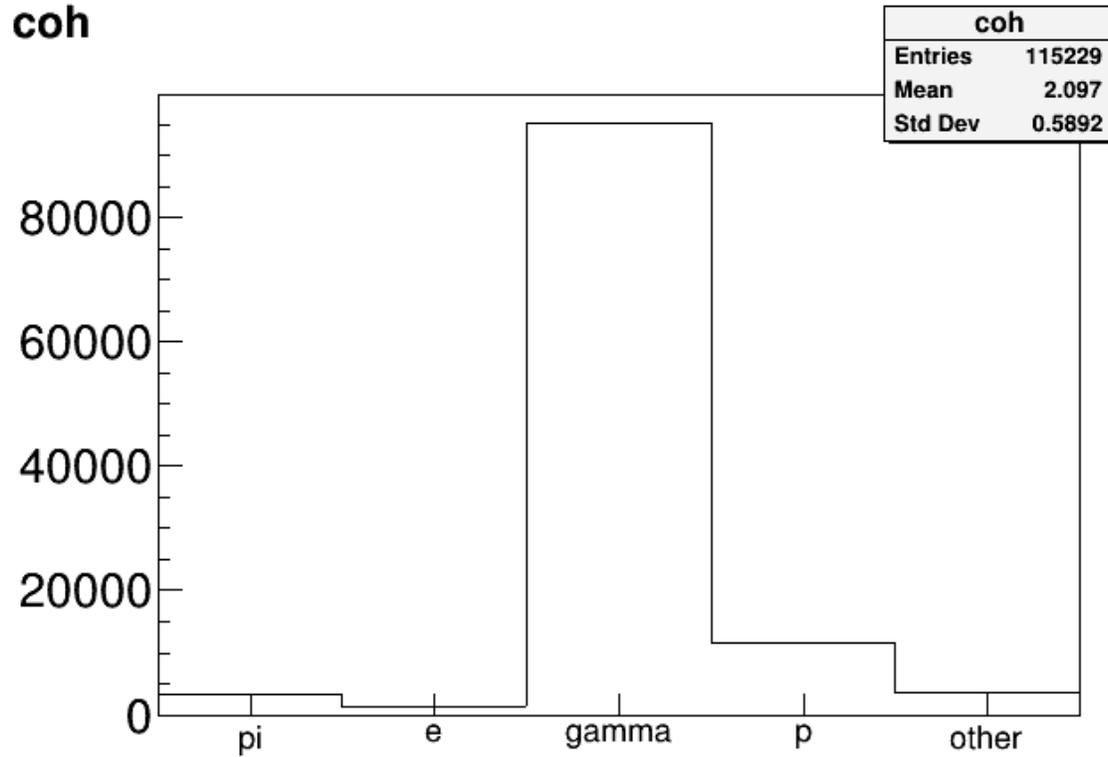


downward

Coincidence hits

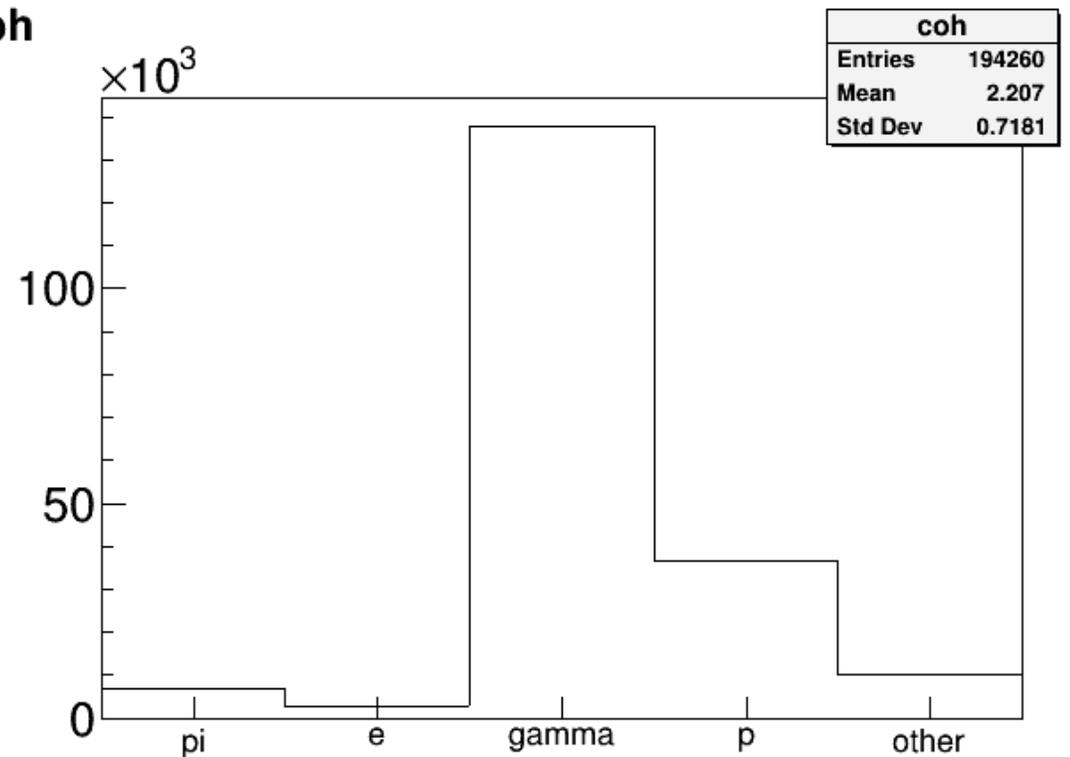
- And their mother particles

coh



upward

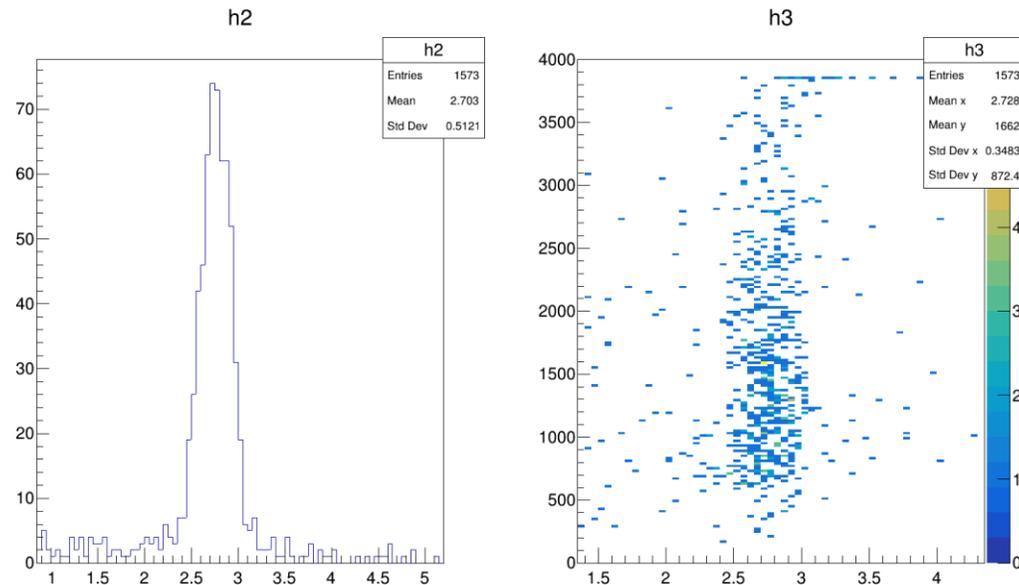
coh



downward

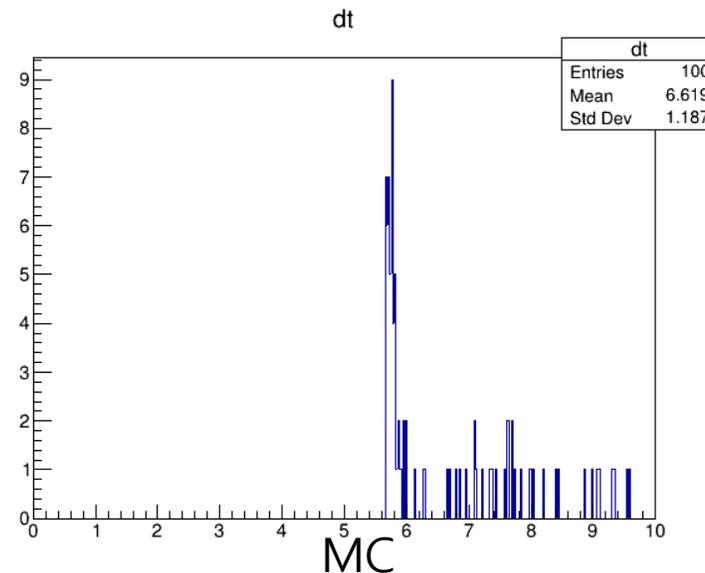
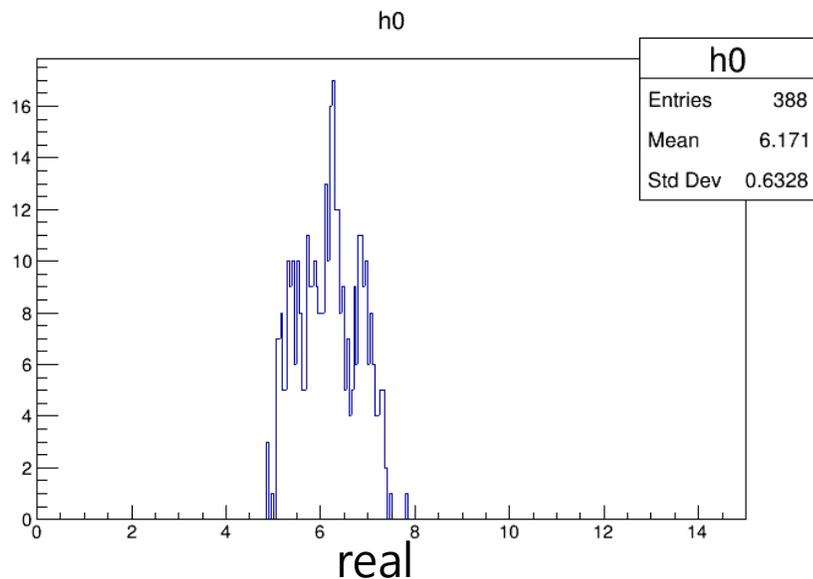
About pile-up

- Study the pileup events by simulating waveform.. (not precise)
- Fitting the real waveform with landau distribution.
- Landau distribution is described in ROOT as (MPV, sigma)
- Height of pulse and sigma do not shows specific correlation.



Pile-up

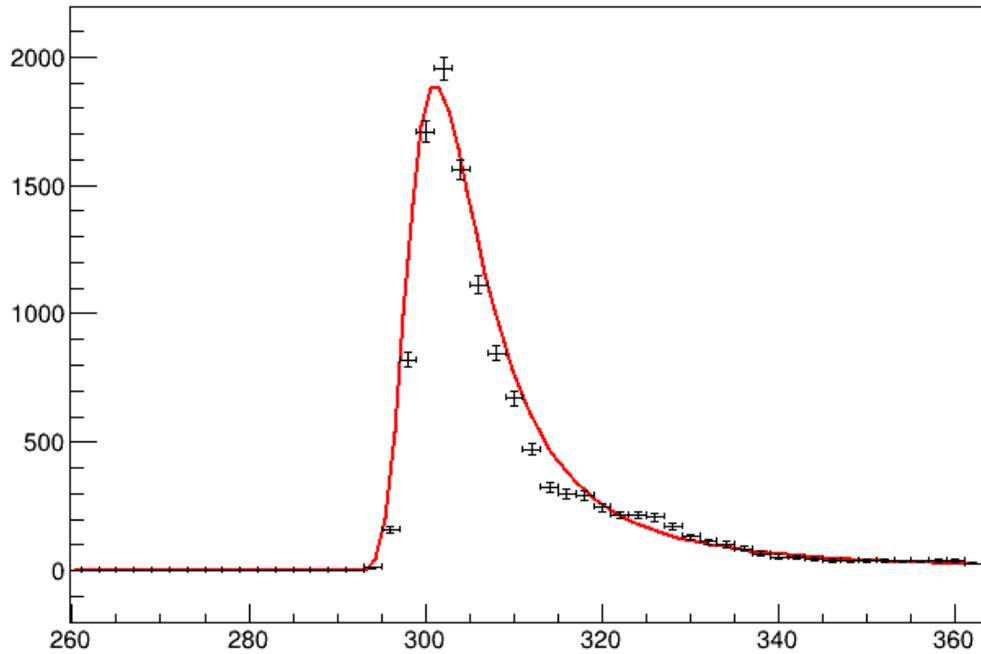
- In simulation, give a landau distribution for a single photon.
- And fit the total signal. Adjust the sigma of landau distribution of single photon so that the total landau fit sigma is same to mean of real signal sigma, empirically.
- But the rise time distribution is not fit with real data's.



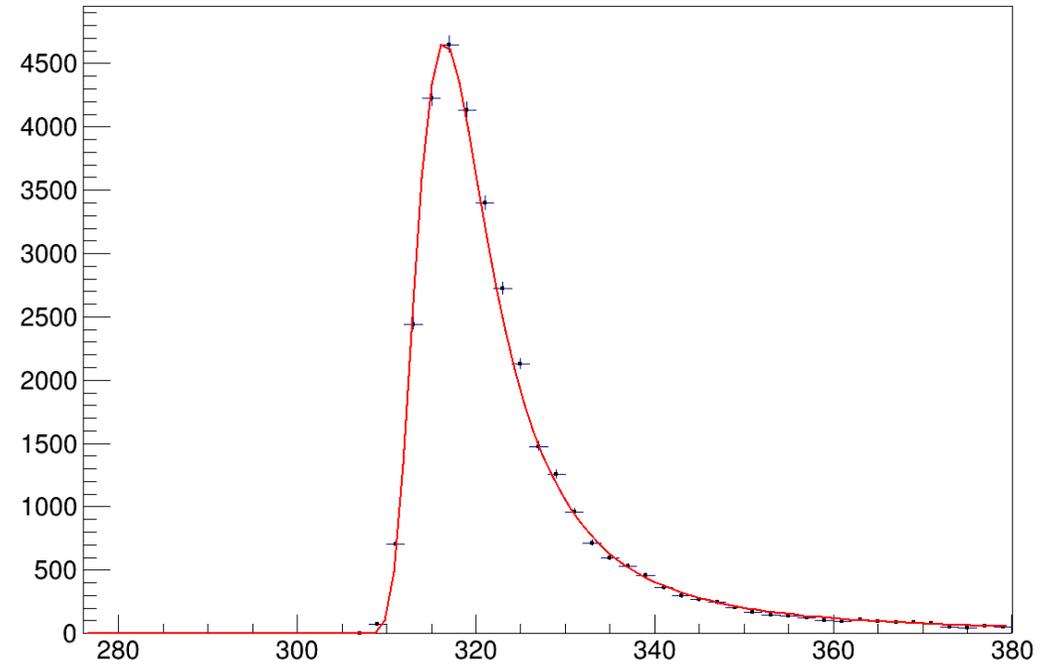
About pile-up

- Waveform of real data(left) and simulation(right)

Graph



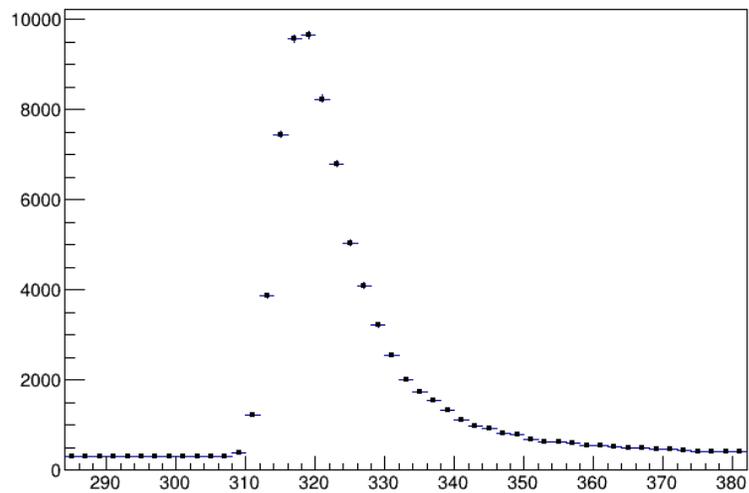
h



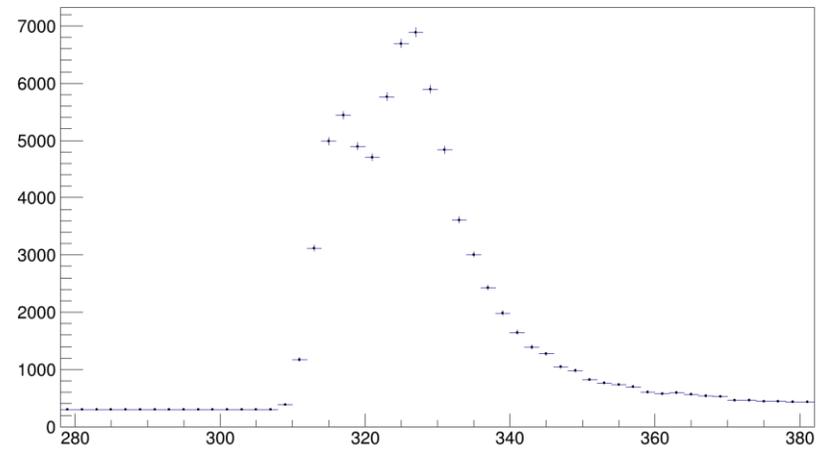
About pile-up

- 2ns , 10ns , 30ns pile up simulation (1GeV muon)

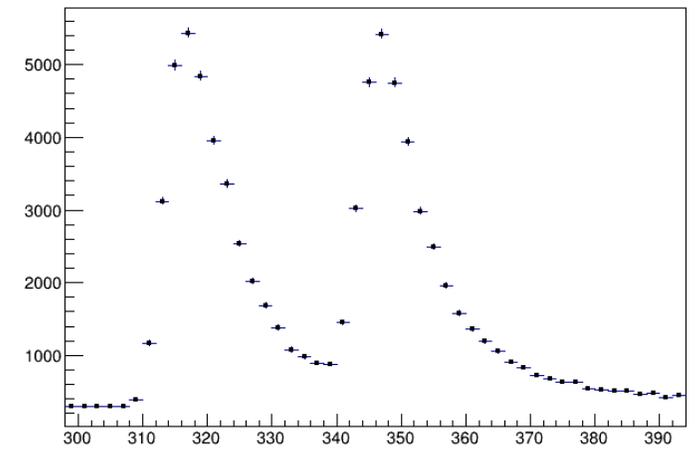
h



h

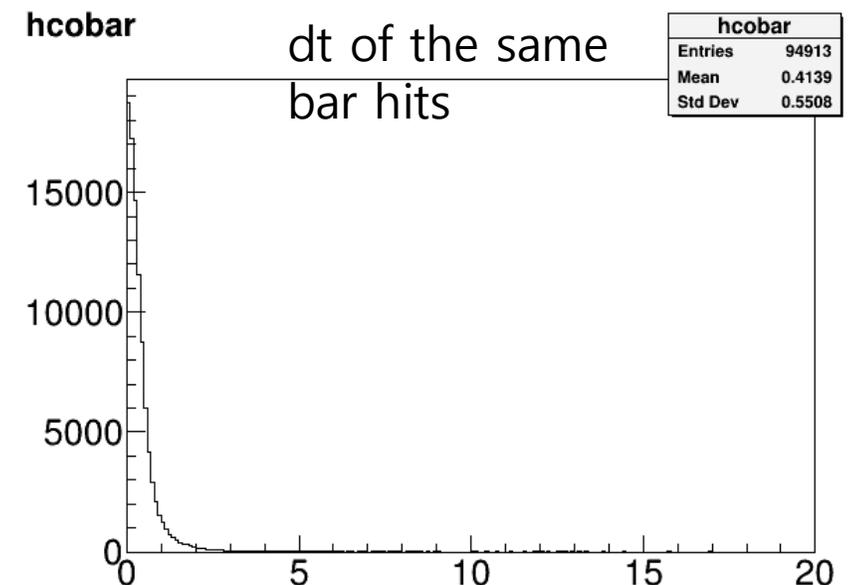


h



Pile-up treatment in simulation

- Assume that we cannot distinguish the same bar hits within a trigger.
- See only the first hit of the same bar hits and add the deposit energy of others to the first hit.
- Use cosmic ray rejection algorithm 3.
(trigger selection algorithm 3)



Cosmic ray rejection

- The word "event" means the annihilation of one antiproton event.
- If a hit occurs, a trigger is started.
- Selection efficiency =
 $(\# \text{ of event whose } \# \text{ of selected trigger is one}) / (\# \text{ of total event})$
- Background rate =
 $(\# \text{ of false trigger}) / (\# \text{ of event whose } \# \text{ of selected trigger is one})$

		S.E	B.R
No pile-up	Up	0.2432	0.0054
	Down	0.2480	0.0049
Pile-up	Up	0.2427	0.0056
	Down	0.2455	0.0051

Back up

- 1) First, we select the triggers having Top-Bottom combination with two or more hits, which have at least one hit at Top and Bottom, each. Then, by checking the time difference between the earliest top hit and earliest bottom hit, we reject the trigger with a condition of $\Delta t = T_{\text{bot}} - T_{\text{top}} > 2 \text{ ns}$ according to the distributions of cosmic-rays.
- 2) This algorithm is almost same as 1) but checking that the time differences of all possible combinations of a top hit and a bottom hit are less than 2 ns. If one of them, at least, is more than 2 ns, that trigger is rejected.
- 3) This algorithm is almost same as 2) but select the trigger with more than two hits at first.