BCM1F TDCs

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DESY

FCAL CMS Weekly Meeting
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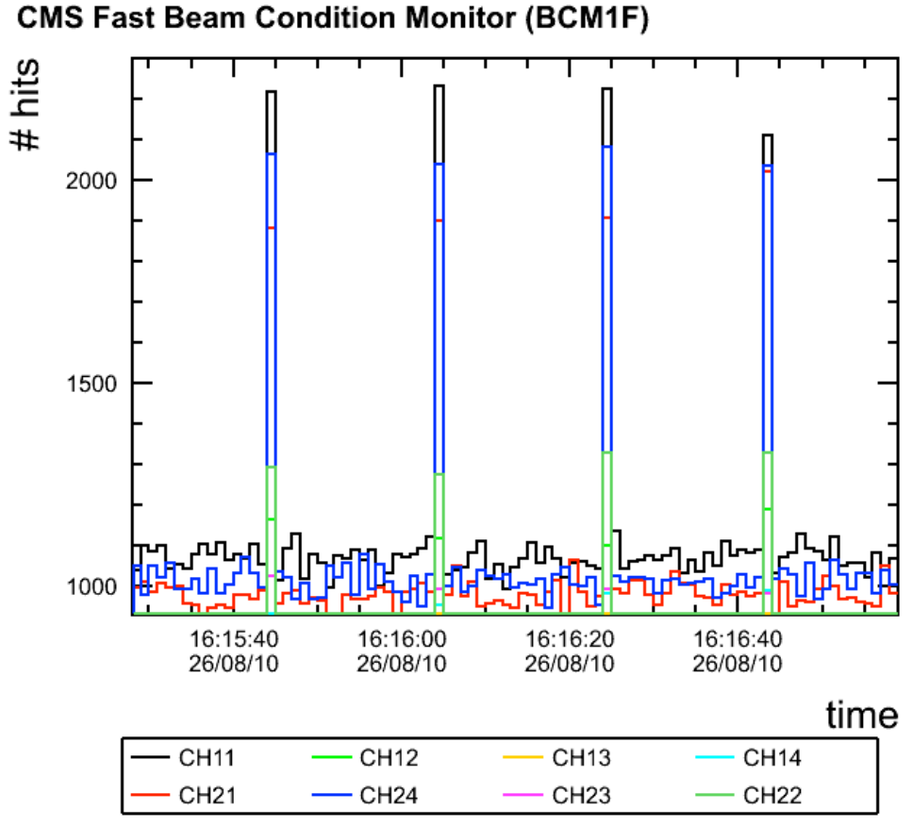
Bug fix in TDCs code

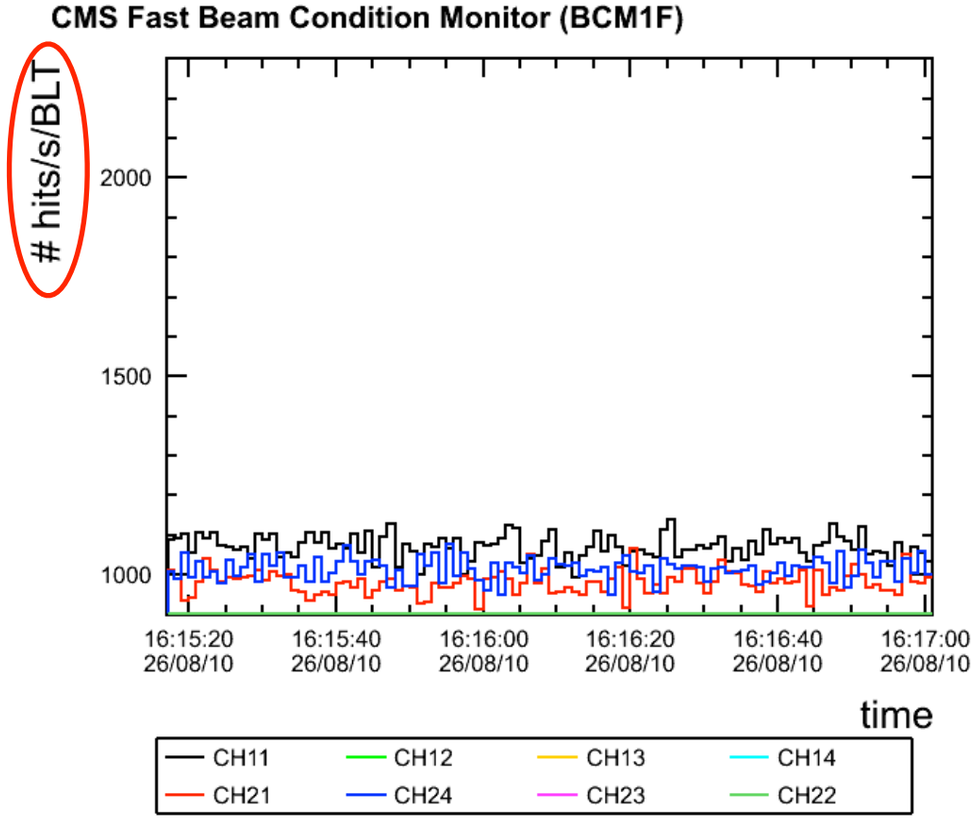
- Wednesday 1. September, Elena informed that the address used in the VETO function with the LUT, implemented in the TDC code, was wrong.
- On Thursday, the modifications were implemented and the TDCs restarted.
  - Many error messages: Is TDC in error?
  - TDCs crashing
  - After many attempts, the TDCs finally stayed up. But only after the scalers crashed/stopped(?)

Spikes on BCM1F TDCs

ok

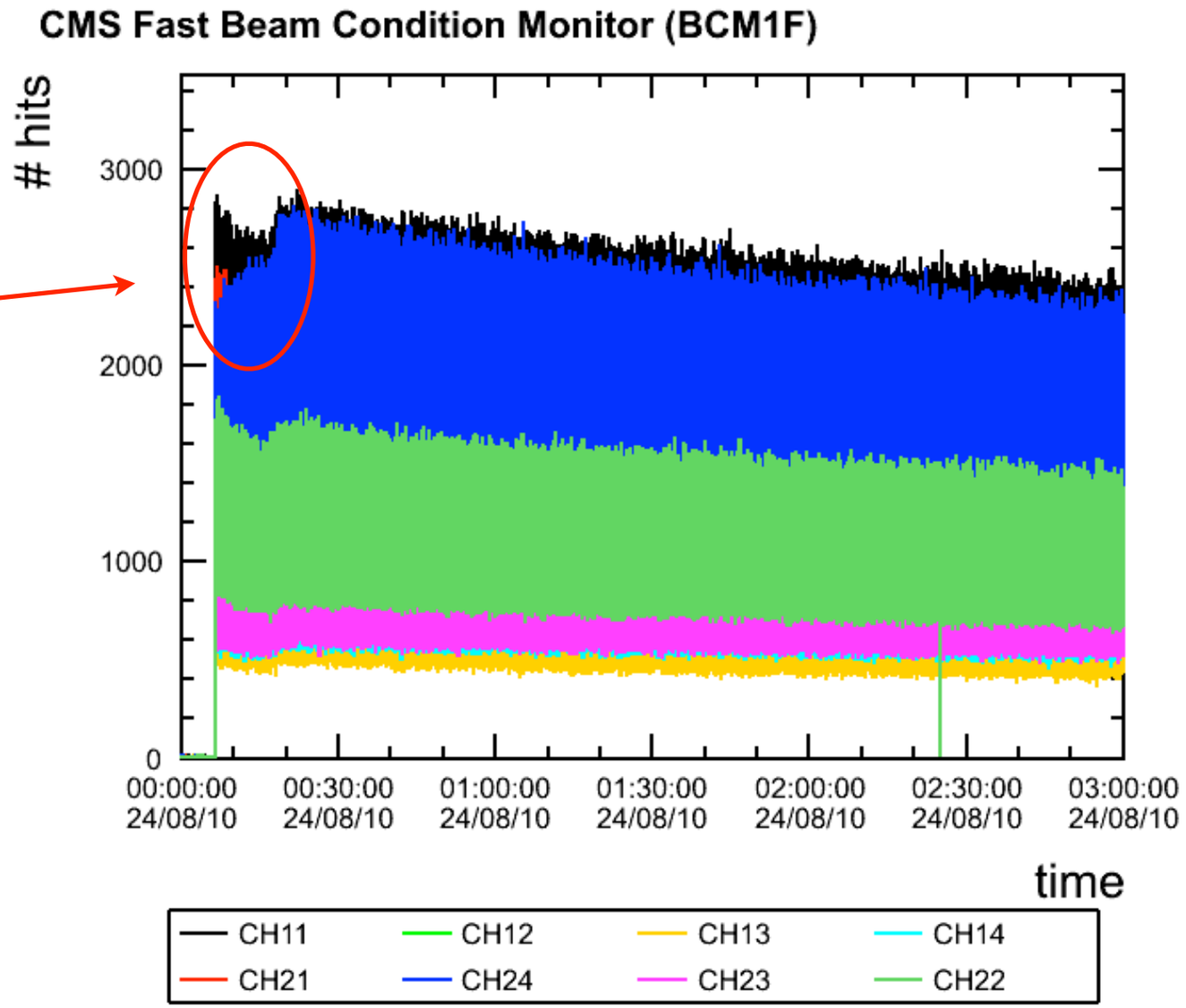
- Two weeks ago I showed spikes in TDC rates.
- Just a feature: rates were high and there were 2 BLTs in those particular seconds.
- Dividing the entries by the number of BLTs in all bins...





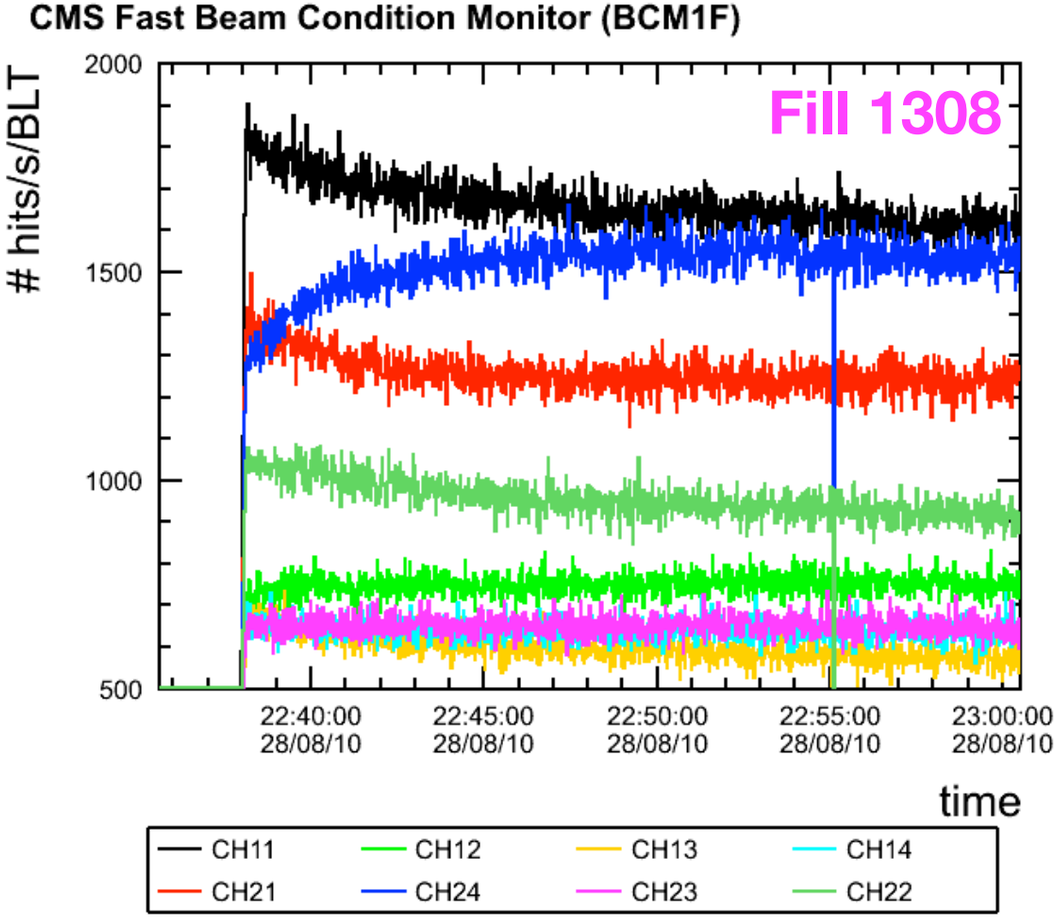
Channels with different behavior at the beginning of the fill

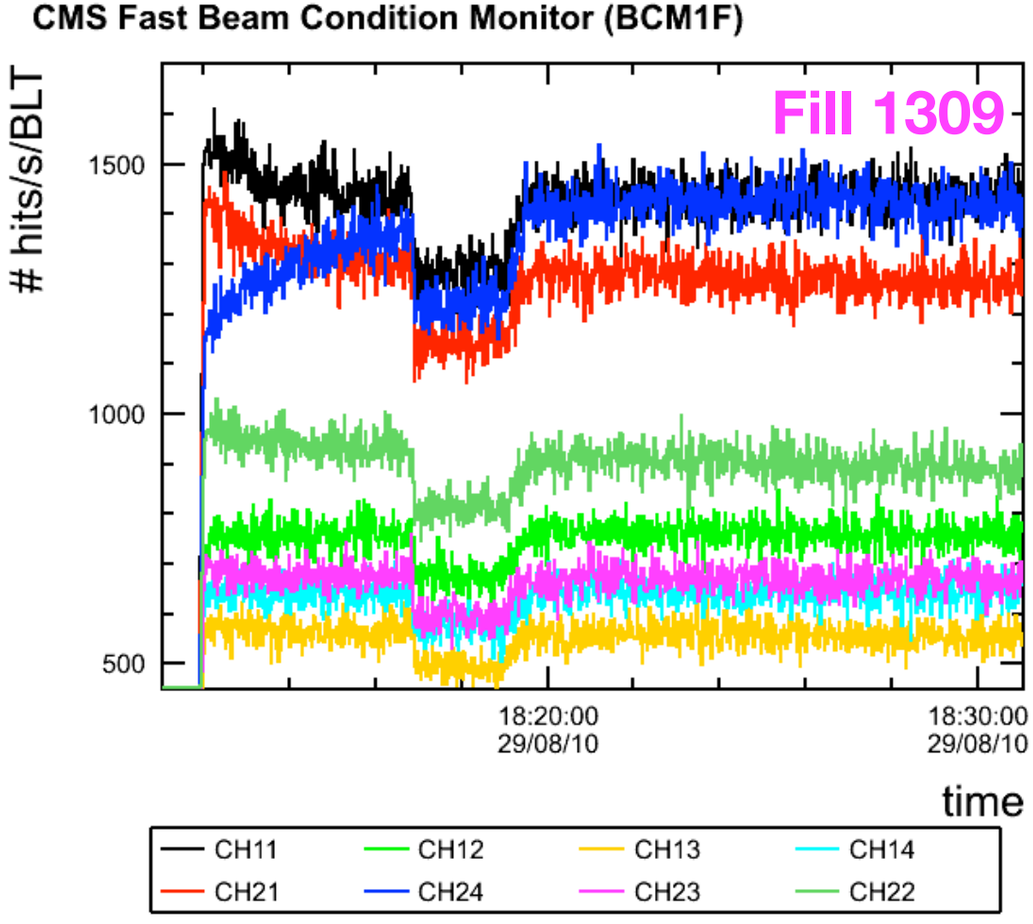
- Shown two weeks ago...
  - Notice channels with different behavior in the beginning of the fill, particularly CH24.



Channels with different behavior at the beginning of the fill

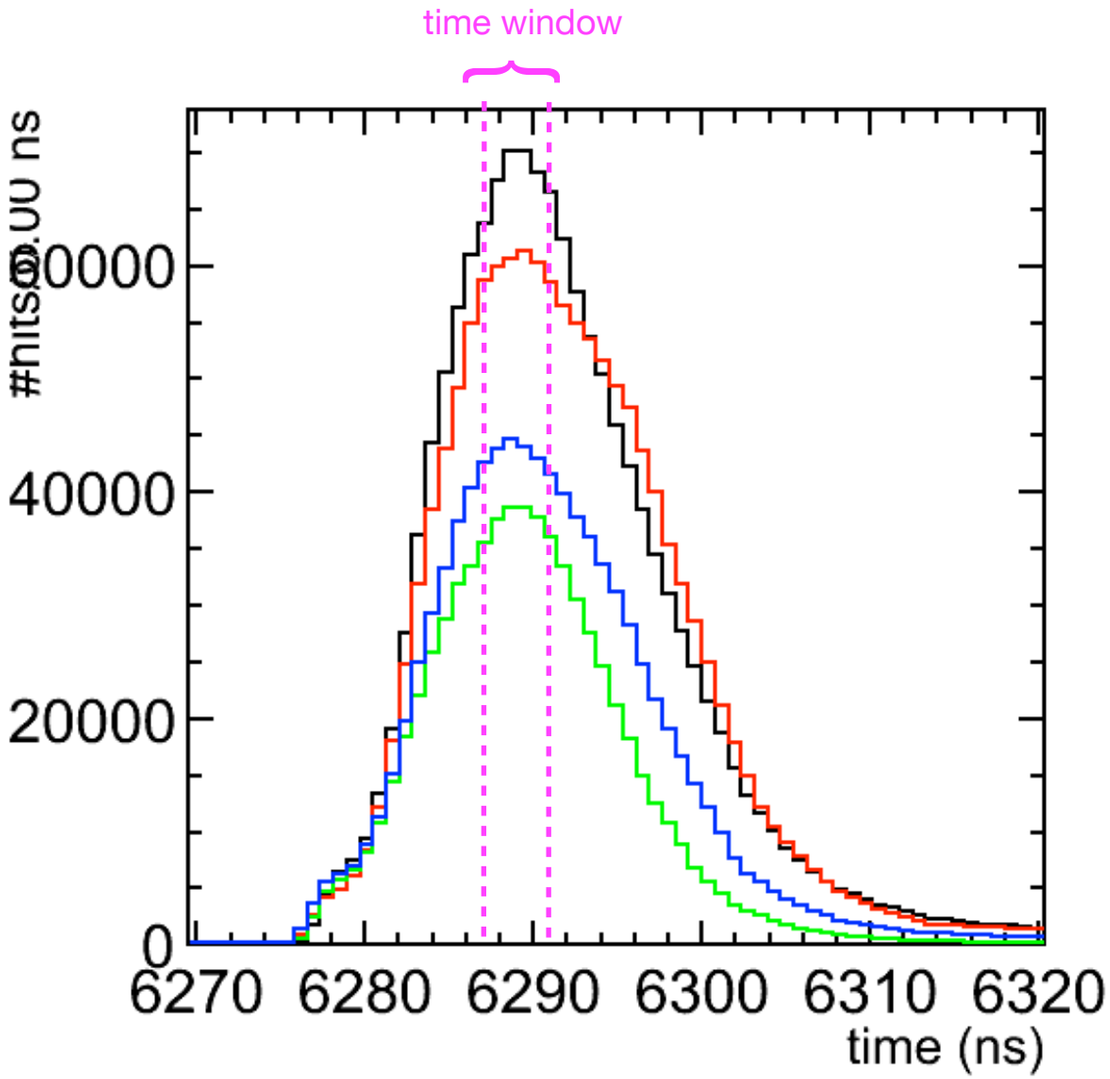
- David suggested comparing fills 1308 and 1309.
  - Still channels behave differently in the beginning of the fill. But in fill 1309 the discrepancy between channels is smaller.
  - Notice that rates in ch11 and ch21 (top) decrease at the same time the rates in ch24 and ch12 (out) increase.
  - Beam moving? Would HF be less sensitive? Lack of time to look the beam spot, vertex...





Coincidences from collisions

- Coincidences of back-to-back channels.
  - Coincident hits time difference, for pairs with the smallest time difference.
  - Define a time window close/ around the colliding peak.
  - To do: Define a small time window (~4ns) and scan the whole colliding distribution.



Coincidences from collisions

- Time resolution
- VERY PRELIMINARY!
- Time window of ±2 ns around de colliding peak.

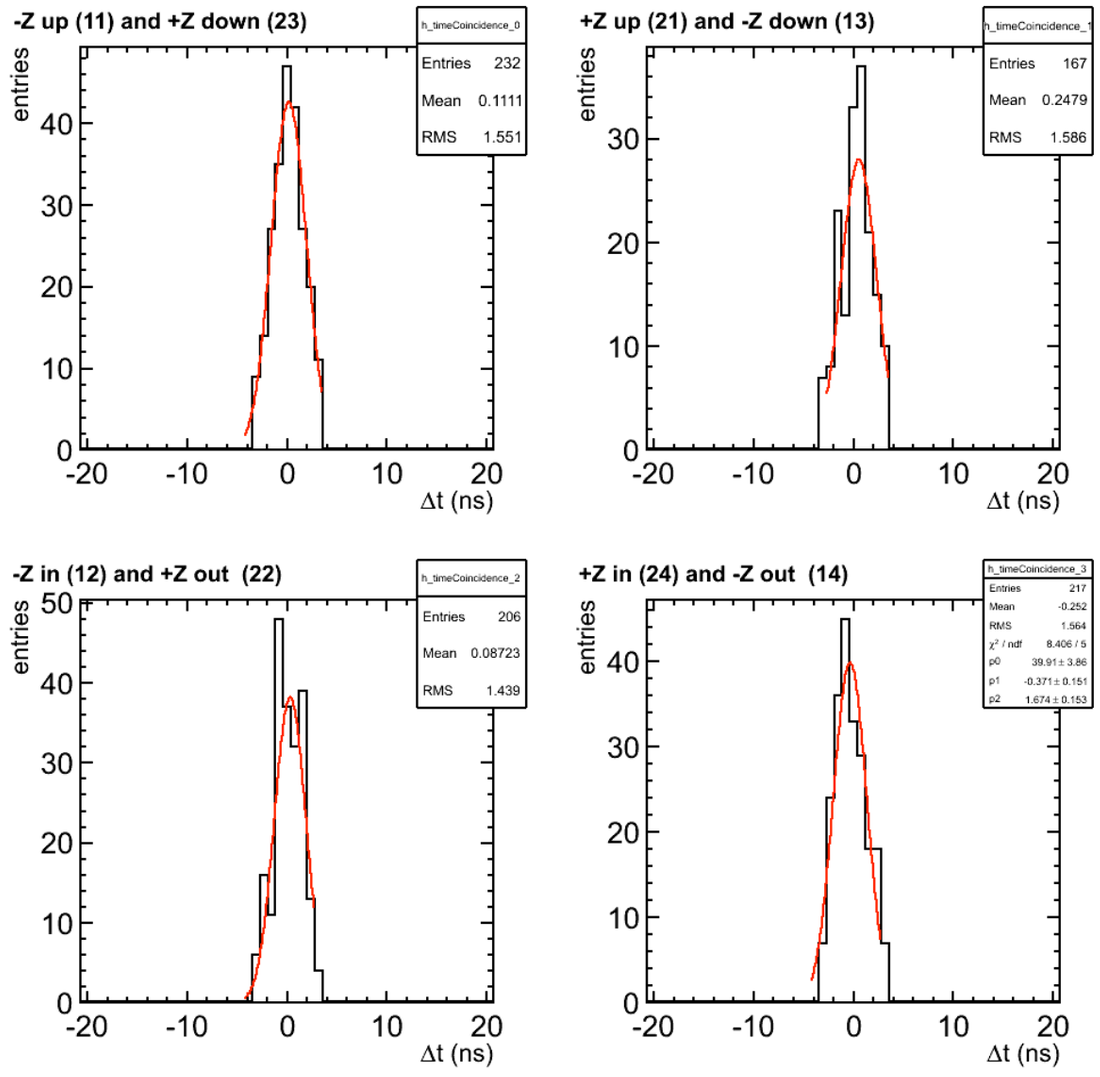
Gaussian fit (ns)

μ = 0.15±0.13 σ = 1.76±0.14	μ = 0.52±0.18 σ = 1.77±0.14
μ = 0.28±0.14 σ = 1.58±0.16	μ = -0.37±0.15 σ = 1.67±0.15

- Compatible with published value using the ADCs (1.8 ns)

bunch #1 – corrected

±2 ns around the peak

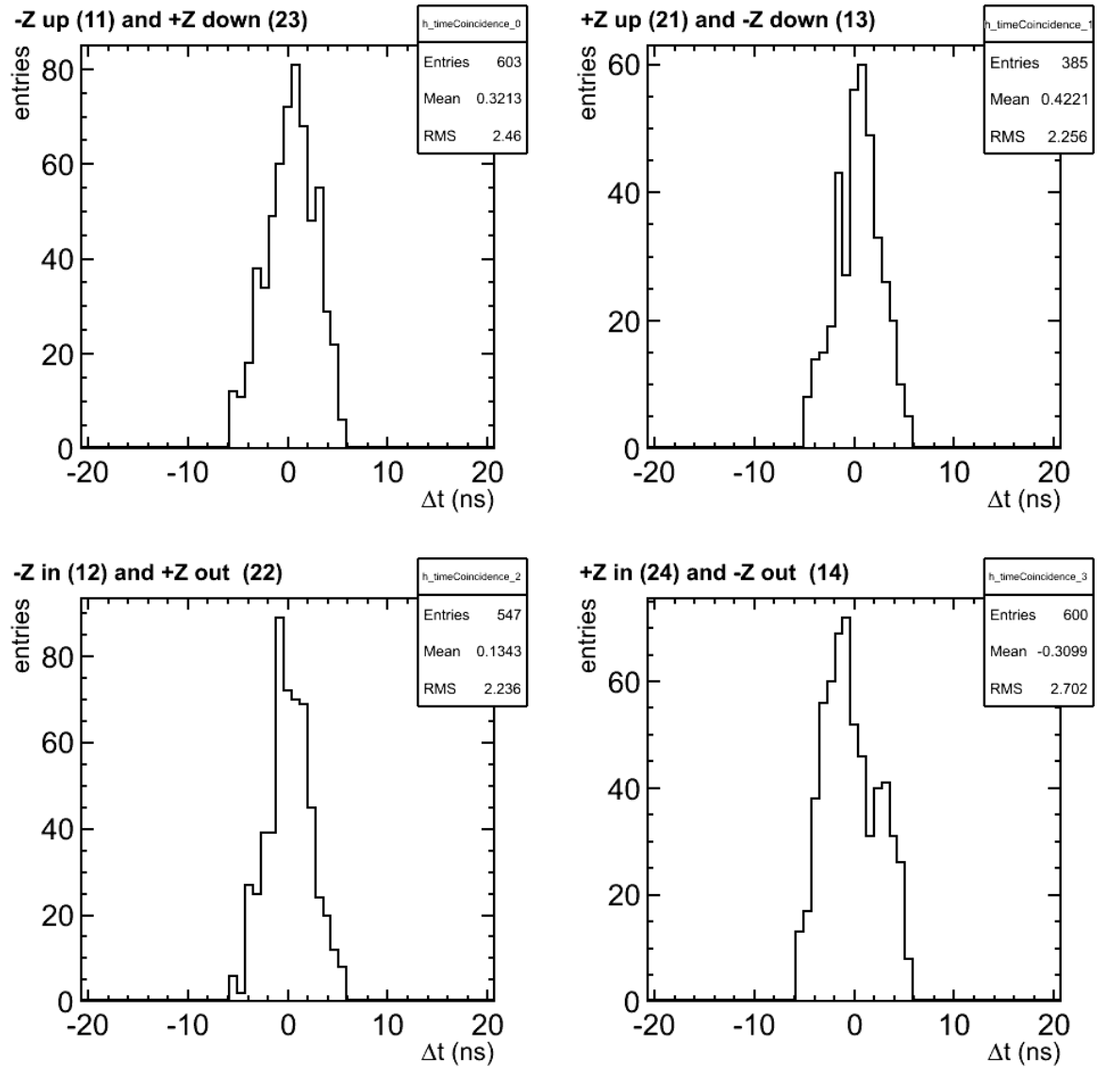


Coincidences from collisions

- Larger time window ±3 ns around the peak.
- Secondary peaks appearing(?)

bunch #1 – corrected

±3 ns around the peak

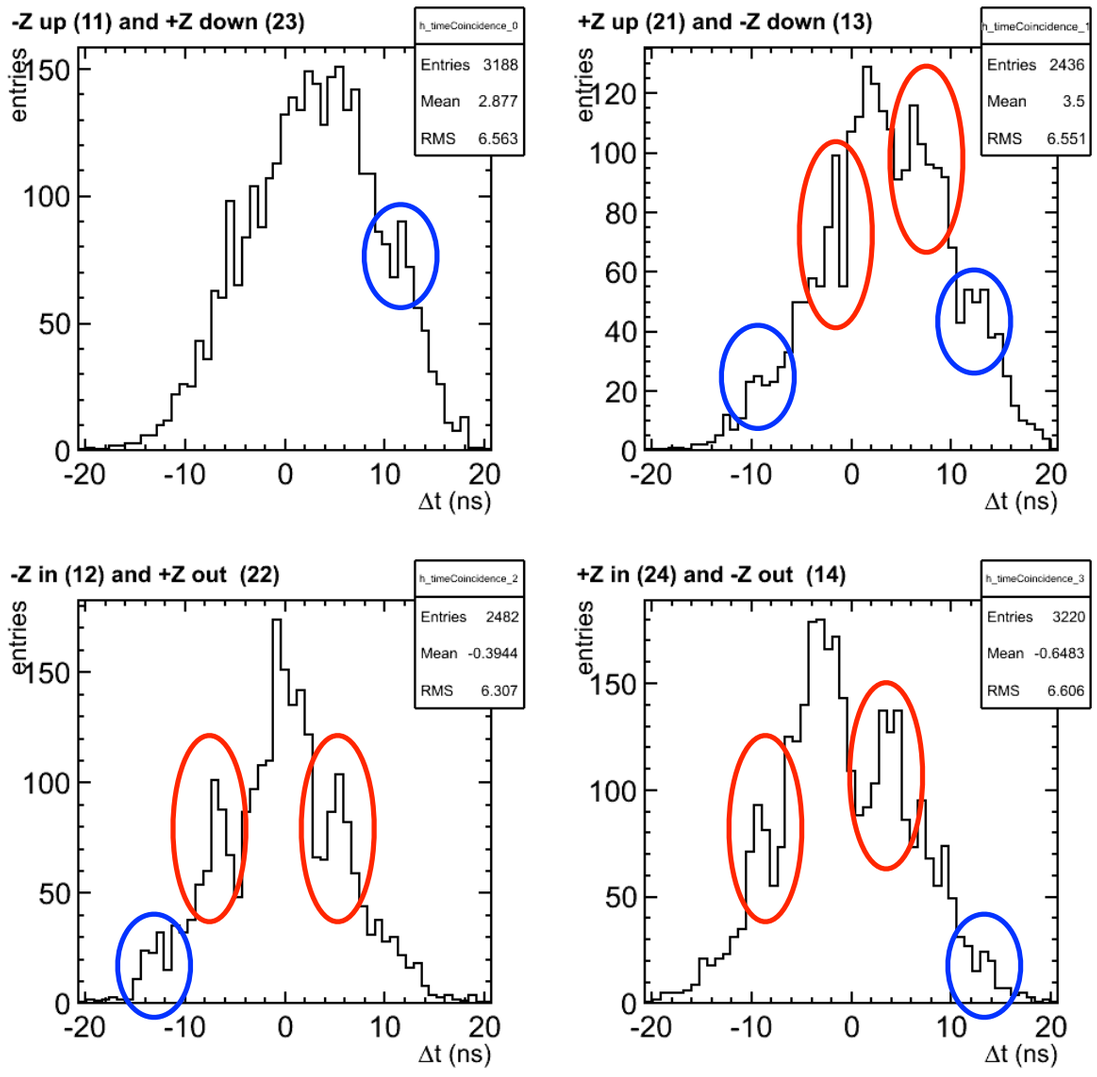


Coincidences from collisions

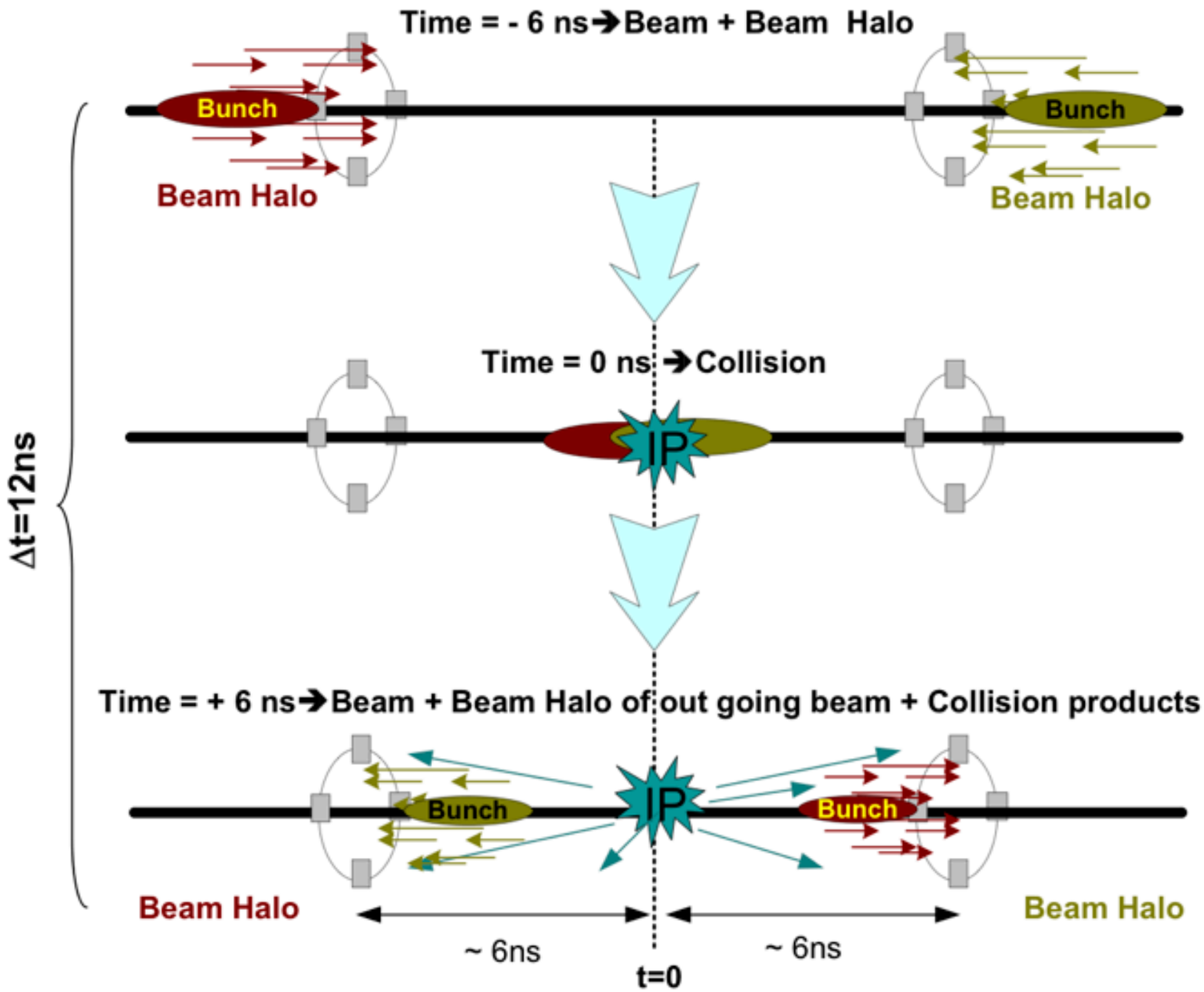
- Time window ±10 ns around peak: t = (6280,6300) ns
- Secondary peaks at ±6 ns!?
  - Extra bucket?
  - $e^{\pm}$ clusters predicted in simulation?
  - ???
- Secondary peaks at ±12 ns!?
  - Beam halo?
  - Beam halo + collision?
  - ???
- Need more investigation…

bunch #1 – corrected

±10 ns around the peak



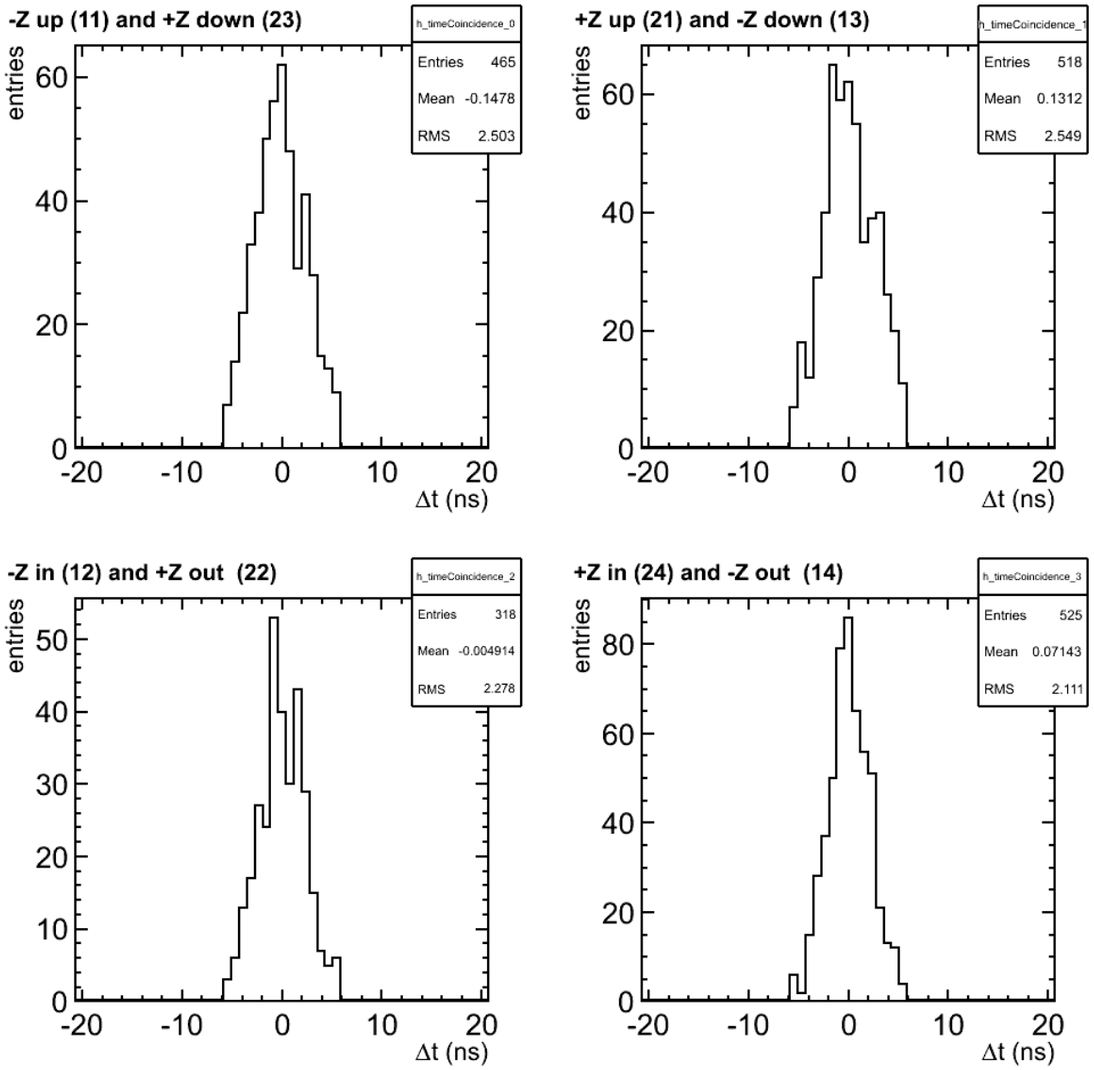
What BCM1F should see



Coincidences from collisions

bunch #1 – uncorrected

±3 ns around the peak

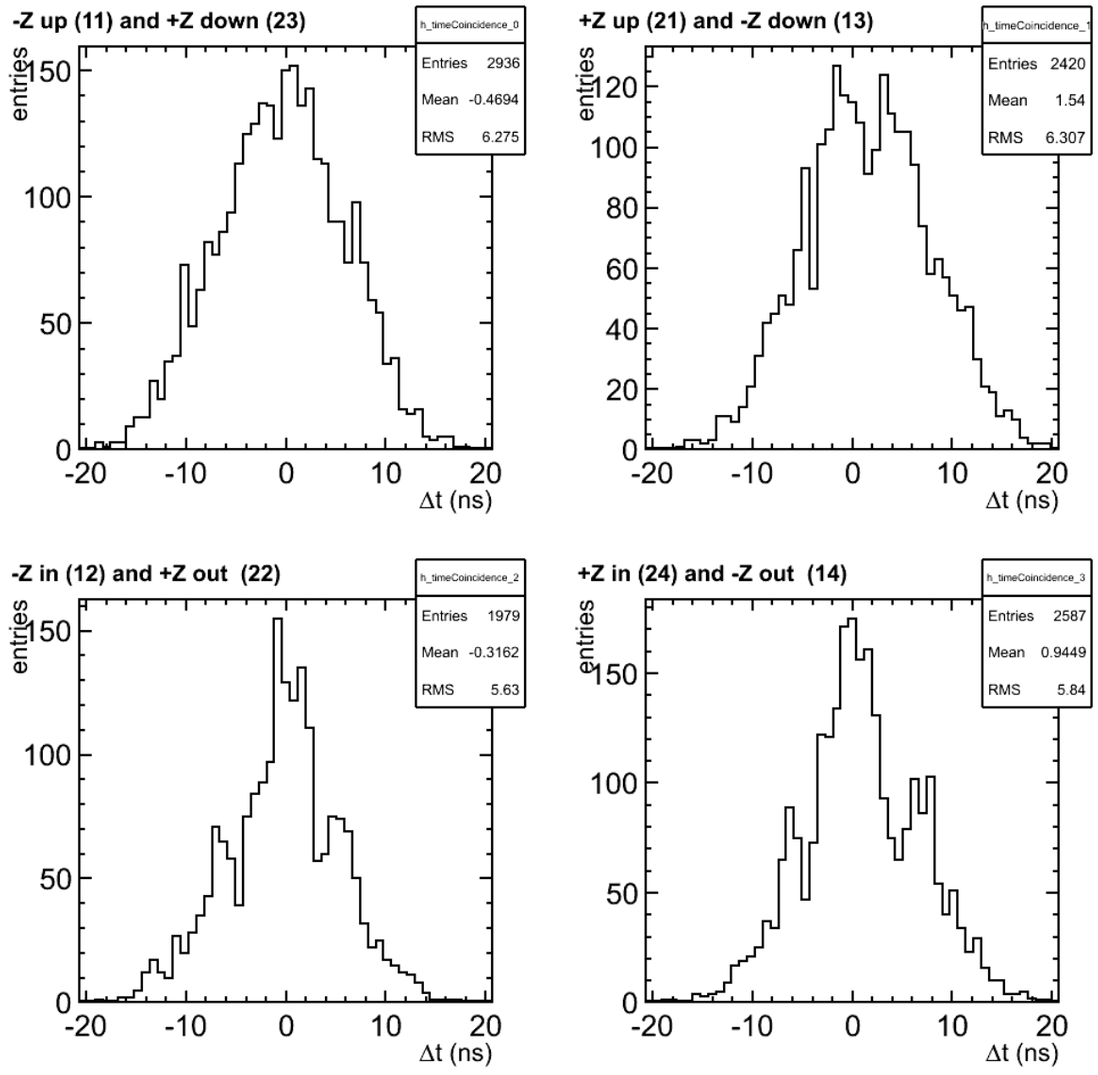


- Without corrections.
- Why peaks are more centered?
  - Calibration method not very good?
  - Or should it be like this?

Coincidences from collisions

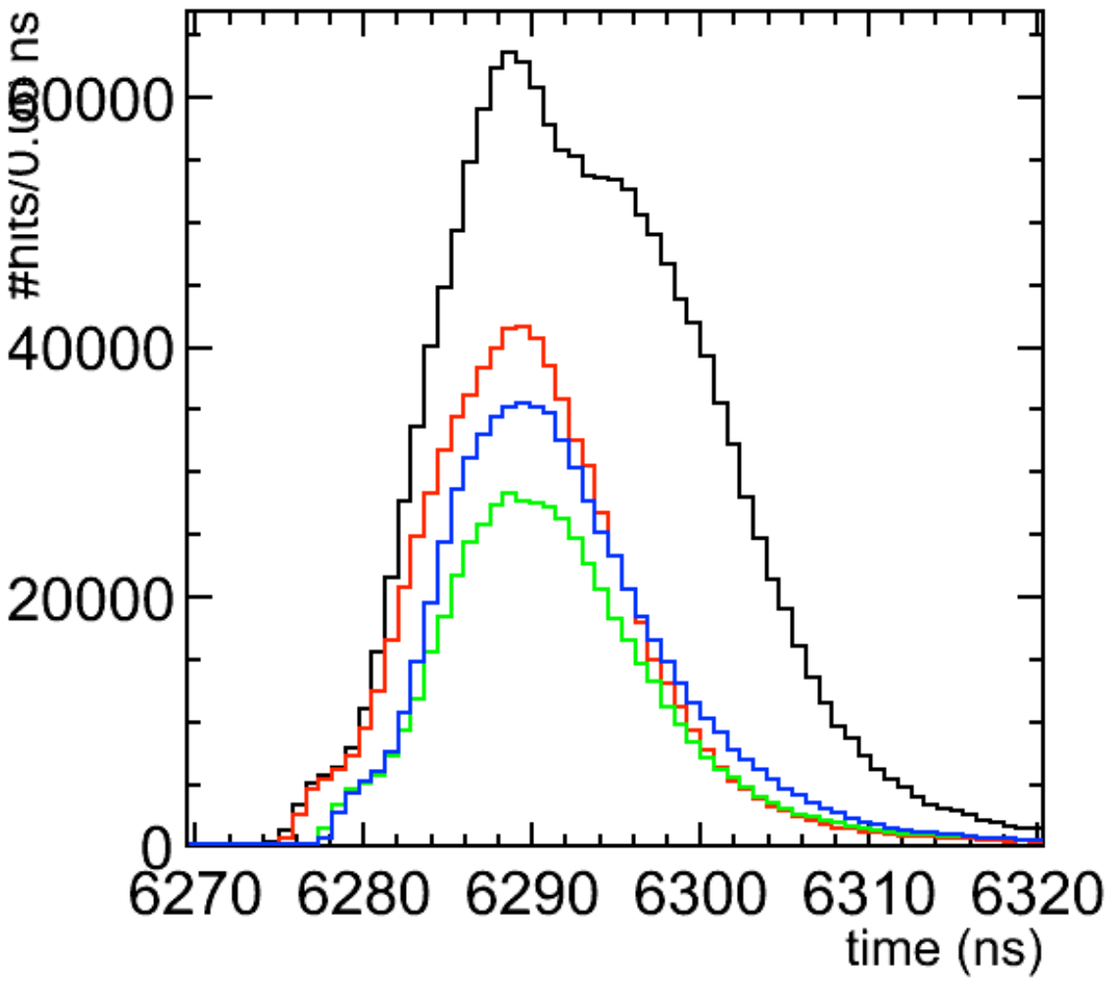
bunch #1 – uncorrected

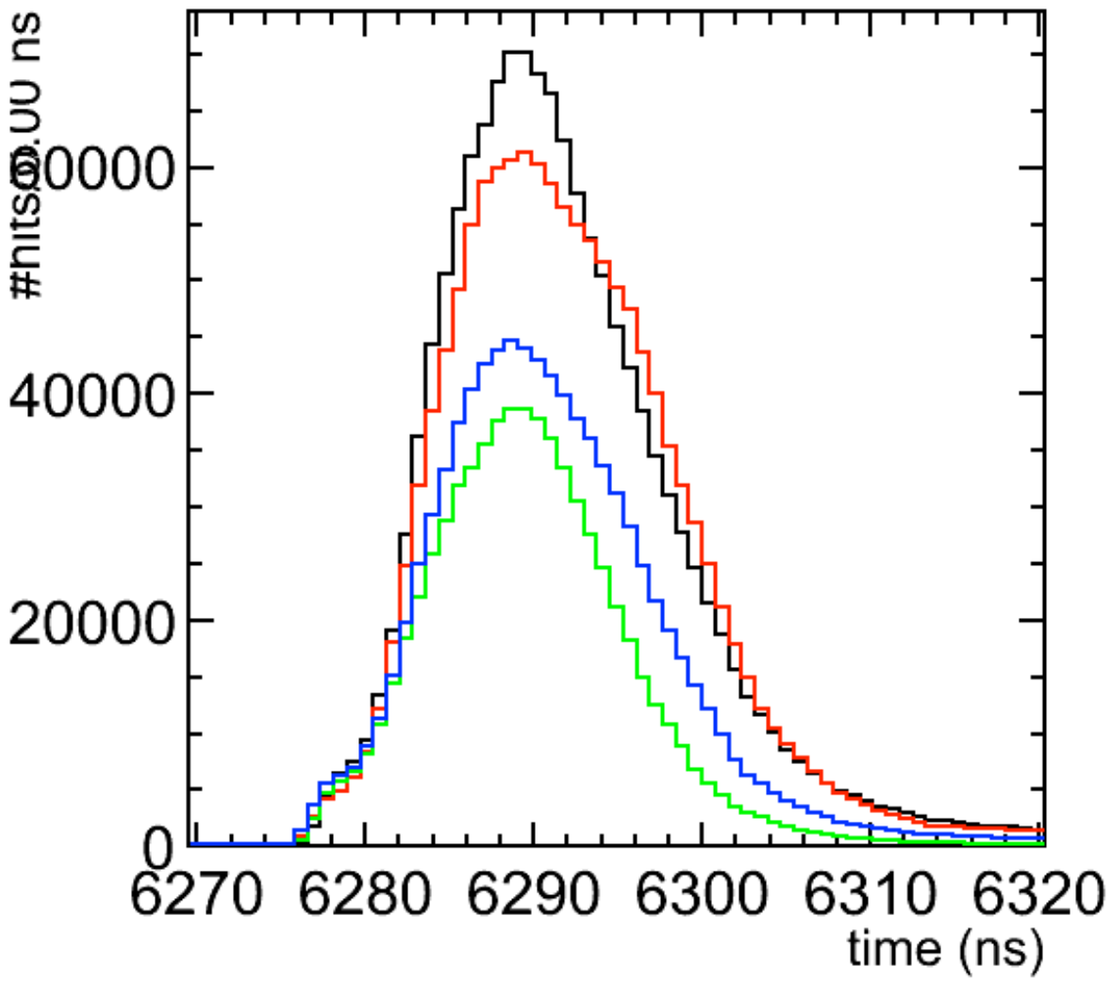
±10 ns around the peak



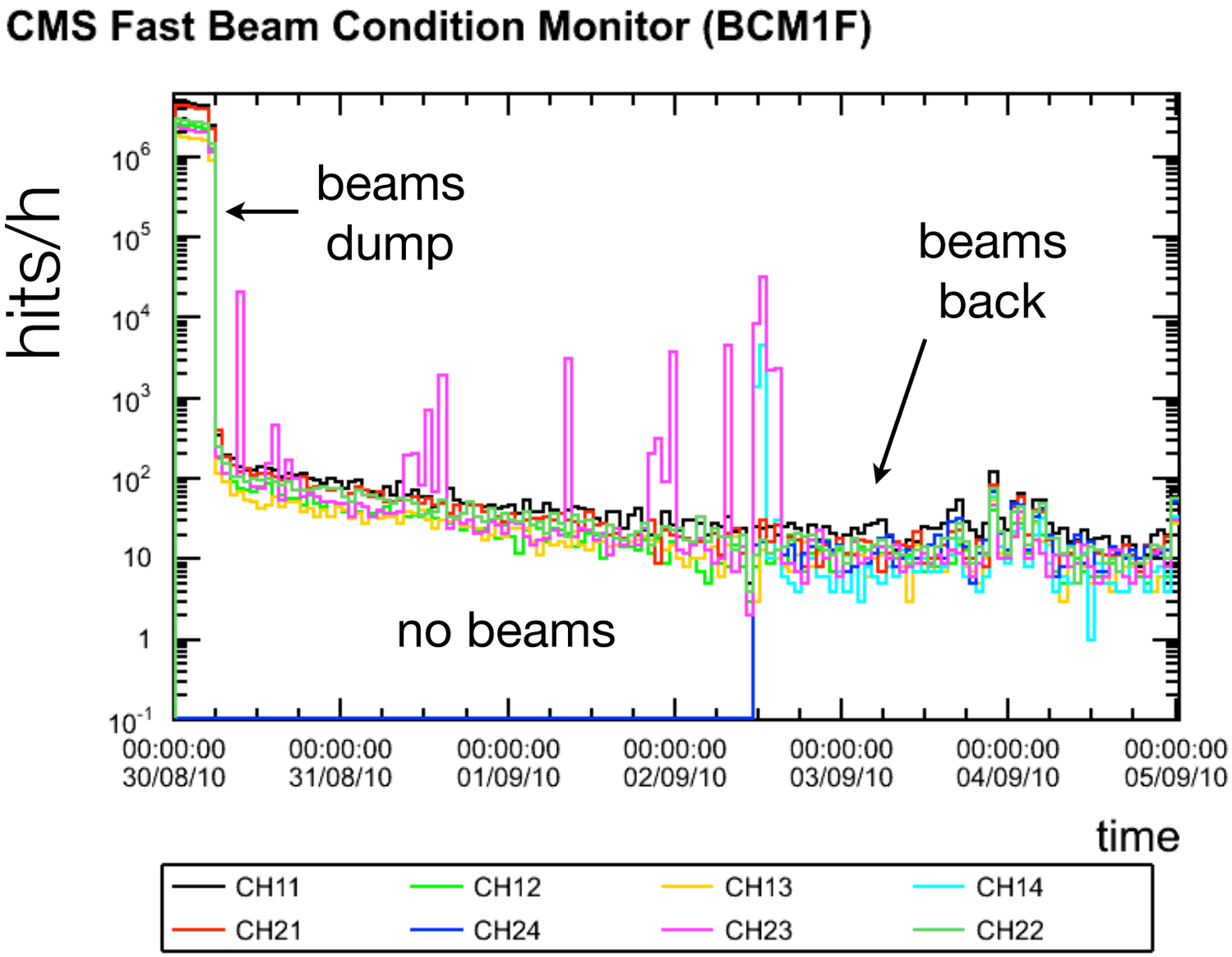
Coincidences from collisions

- Using Fill 1262
  - Bunch #1: calibration applied. Peaks are at the same position.





After-glow late effects



- Beginning of September no beams for few days.
- Observation of the detector material decaying with a long lifetime.
- This kind of plot can also be useful to evaluate different acceptance between channels independent on beam conditions. But would castor also have some influence?
- Noise in channels 23 and 14 appearing from time to time.