INGRID activity

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4/23/2010 Calibration & performance session
at T2K collaboration meeting

Run29, 30, 31 data taking

- Data taking of Run29,30,31
  - Total # of proton by CT5 : 3.4e18 protons.
  - Total # of good spill : 1.7e5 spills.
- There was no trouble, no miss spill during DAQ running.

- Detector setting
  - ΔV of MPPC = 1.1 V
  - Integration time = 500 nsec
  - TDC threshold is 2.5 p.e.

Flow chart of event selection

Make timing cluster(more than 4 hits within 100nsec)

# of active planes > 1 &&
p.e./active layer > 6.5

On time

Beam related event

↓

Report about this events

# of active planes > 2 &&
p.e./active layer > 6.5

Tracking

Track matching

On time

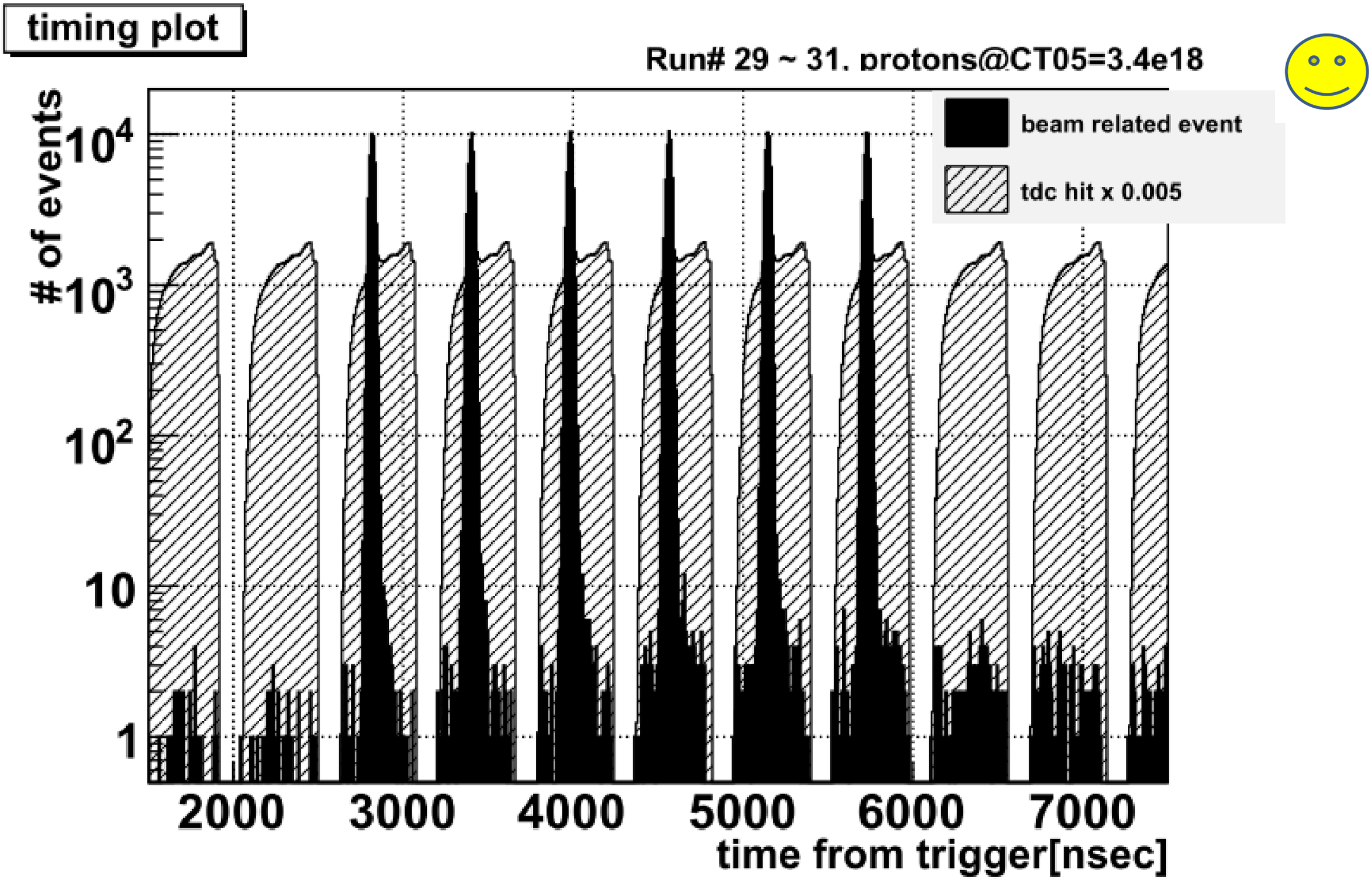
Upstream VETO

Fiducial volume

neutrino event

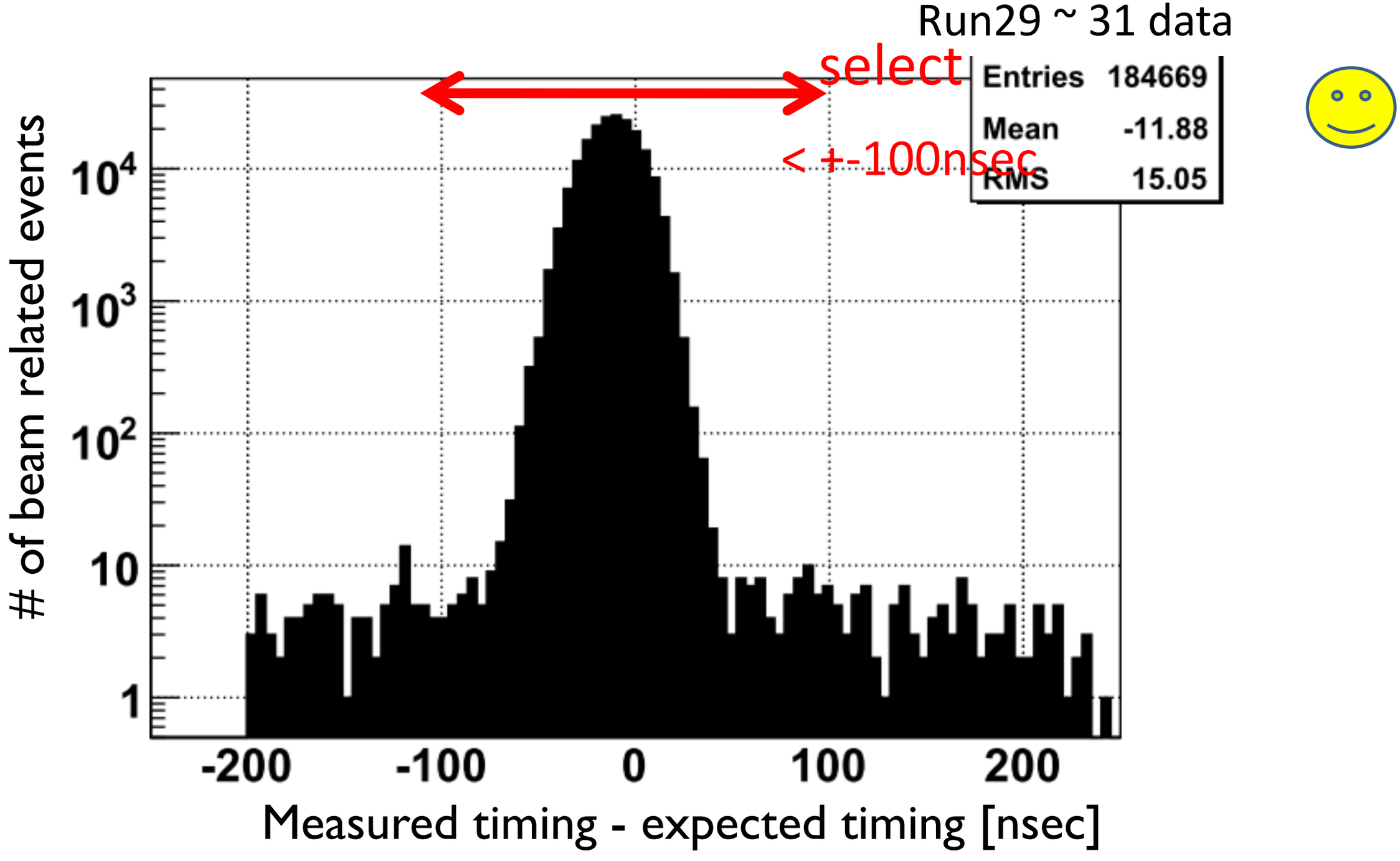
data set: Run29 ~ 31,
172818 spills, 3.4×10^{18}protons@CT05

Beam timing


timing plot
Run# 29 ~ 31, protons@CT05=3.4e18
beam related event
tdc hit x 0.005
# of events
10^4
10^3
10^2
10
1
2000
3000
4000
5000
6000
7000
time from trigger[nsec]

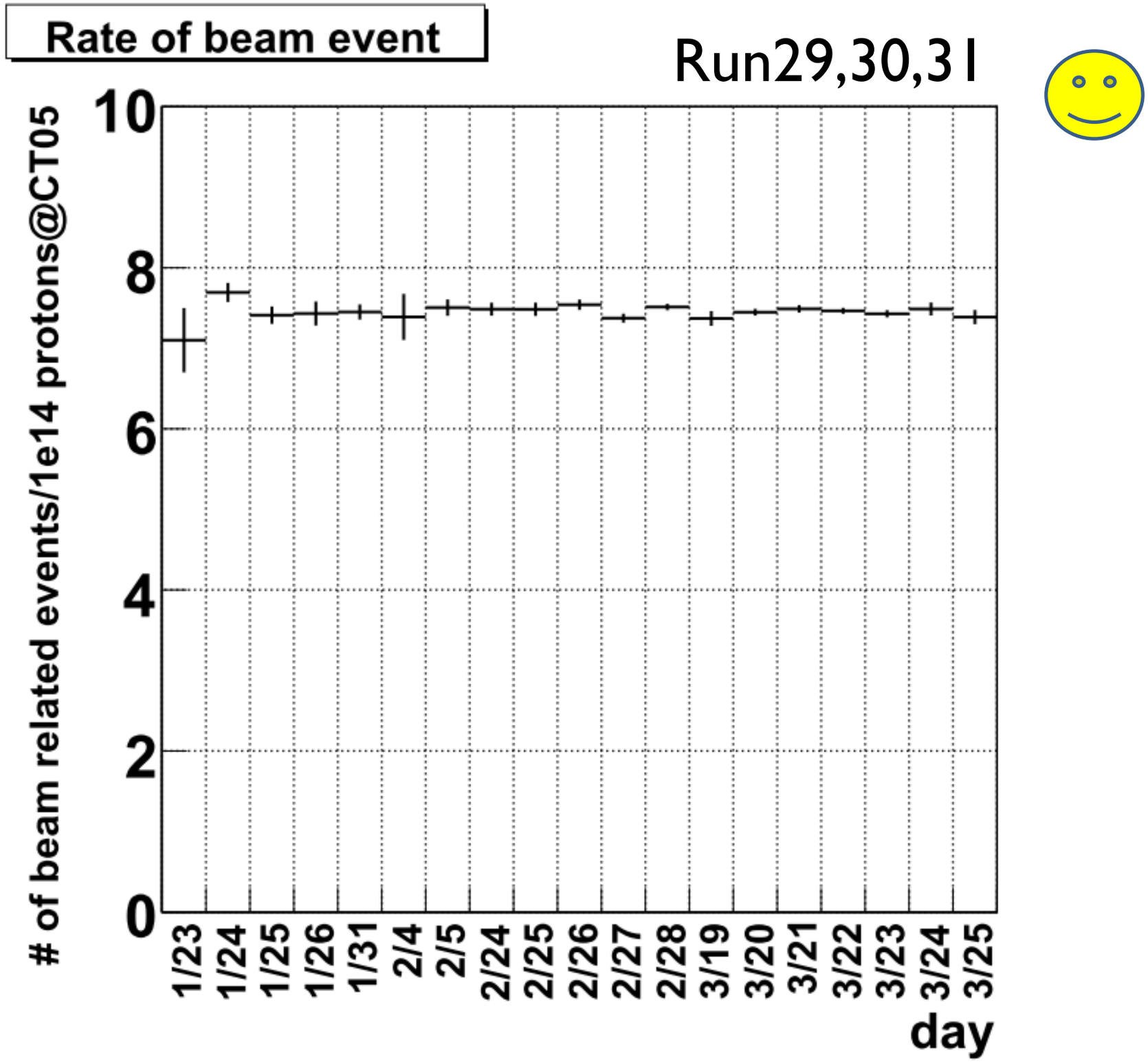
Beam timing from expectation

Events in 100 nsec difference from expected beam timing calculated from CT5 timing are "on time" events.



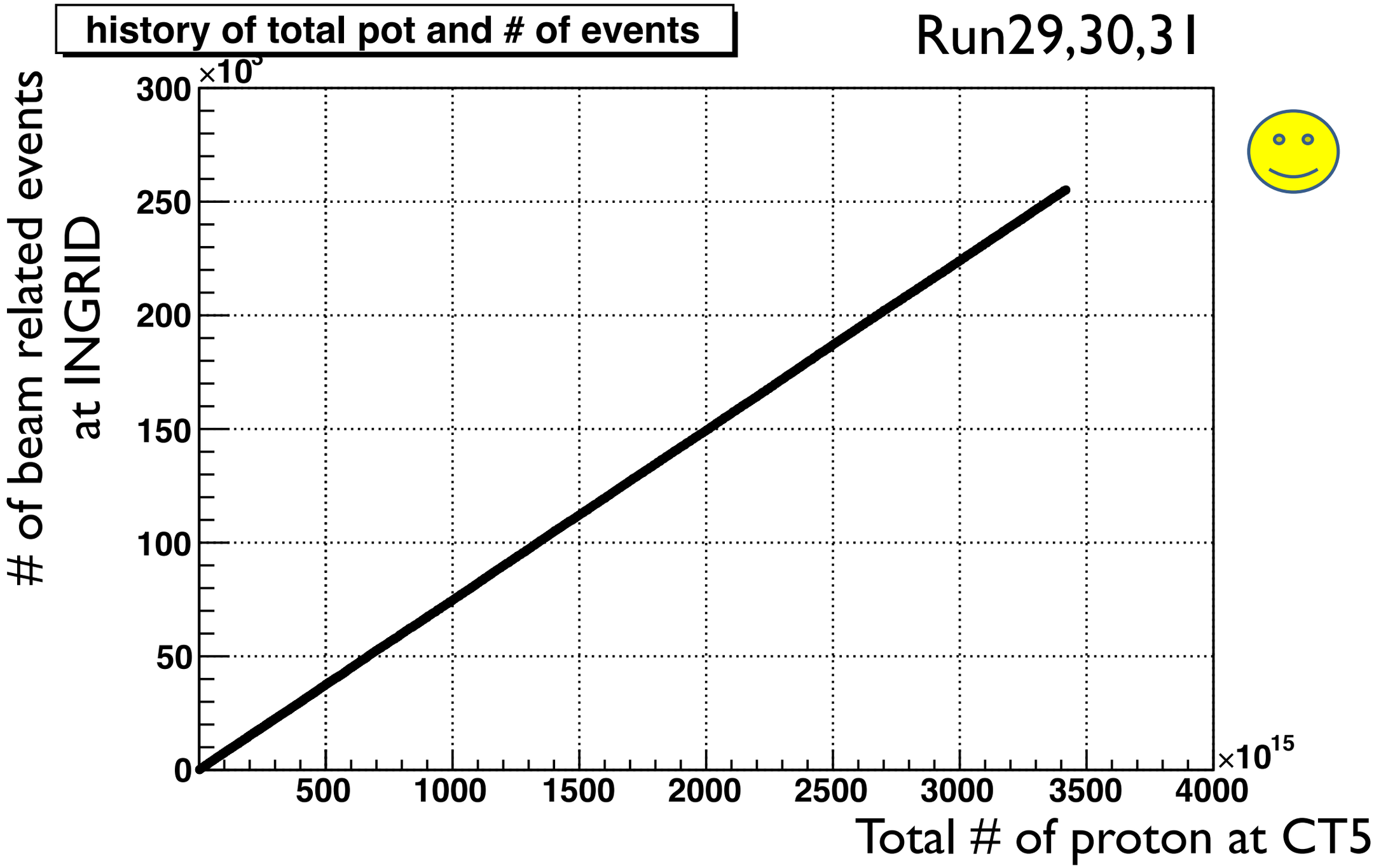
Stability of data taking

~ beam related events ~



Stability of data taking

~ beam related events ~

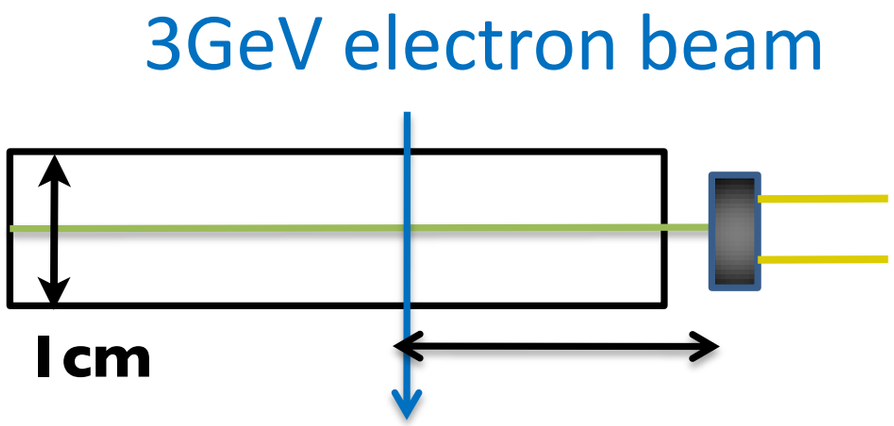


Data taking is stable.

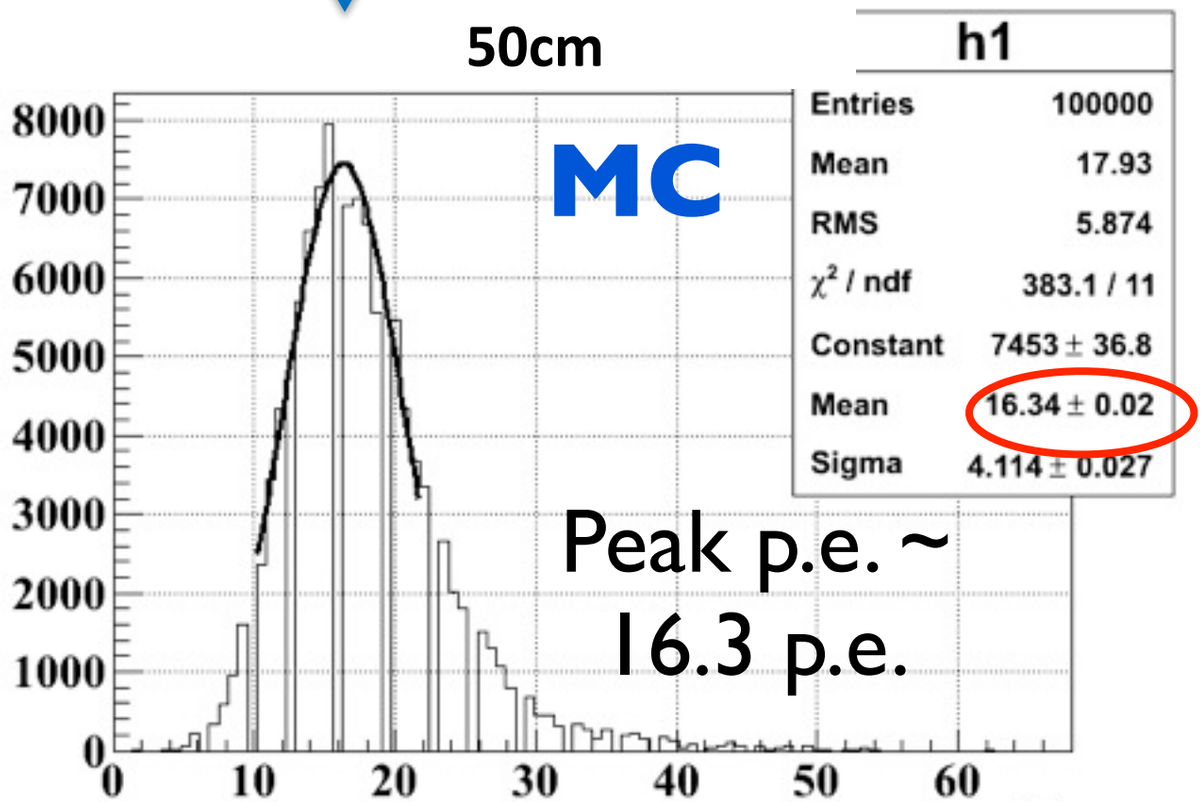
Status of INGRID Detector MC

- Progress in updating INGRID MC.
  - Add some detector responses.
  - There are other detector responses needed to add.
- Comparison between MC and real data (cosmic, beam).
  - Now progress one by one.

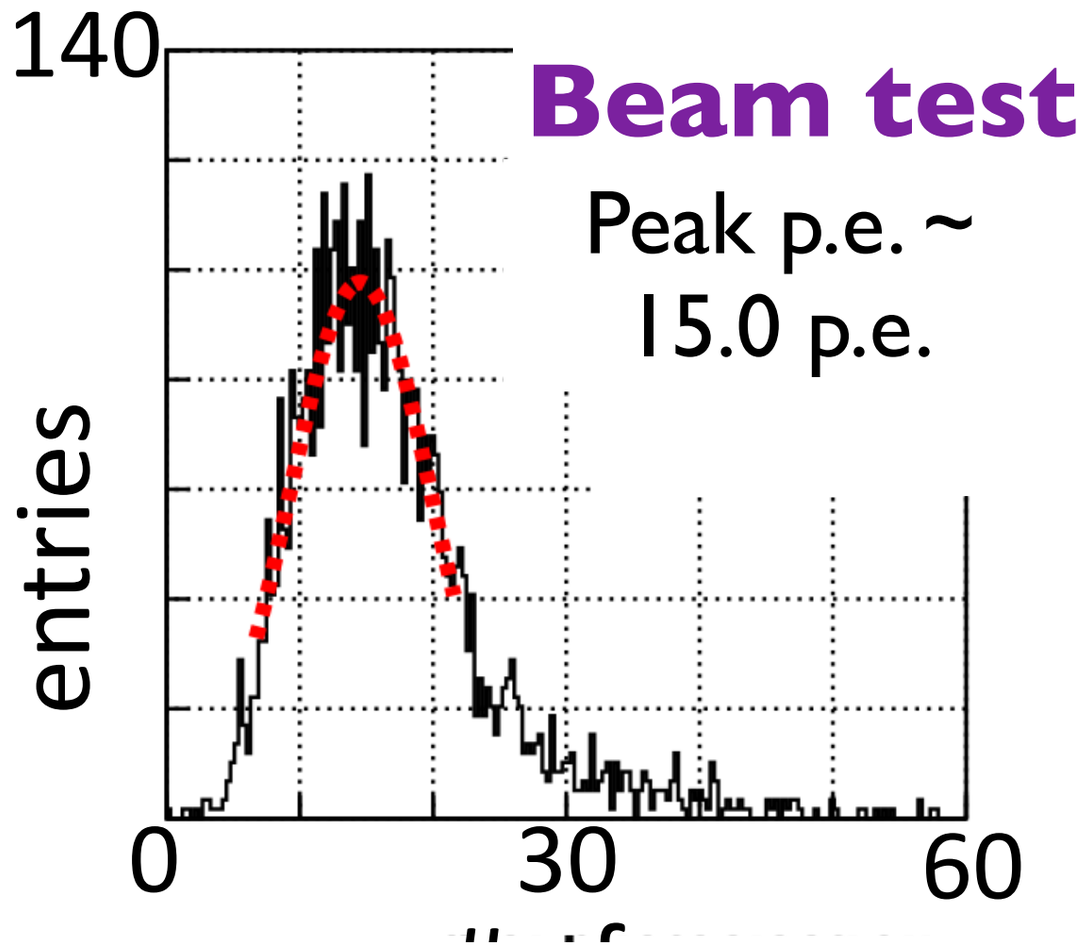
Comparison with beam test (1ch)



After add some detector responses, simulate beam test measurement.



Peak p.e. ~ 16.3 p.e.



Beam test

Peak p.e. ~ 15.0 p.e.

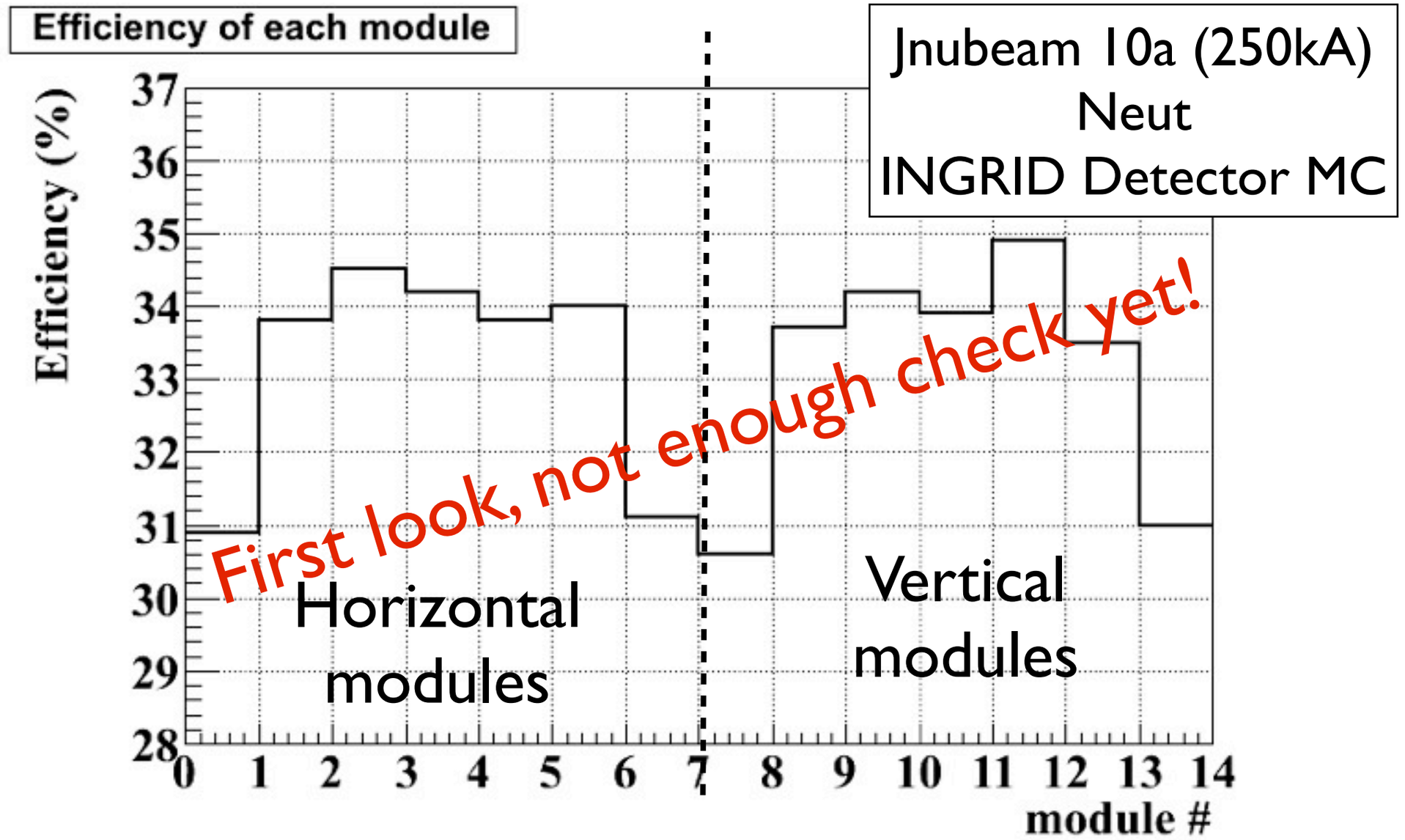
<u>Roughly 10% difference between MC and data.</u>

→More study is needed.

Efficiency of each module (MC)

Efficiency = (# of events after neutrino event selection) /
(# of neutrino interaction within modules)

Neutrino event selection will be reported by Otani-san in ND280-beam talk.



Checking & tuning MC is going on.

Summary

- Data taking of INGRID is stable.
  - No critical trouble and no miss spills during DAQ running.
- MC tuning & study is going on.
  - There are some effects needed to add more.
  - Comparison between MC and real data (beam, cosmic) is going on.
- MC will be used to estimate systematic errors.

Back up

MC tuning item

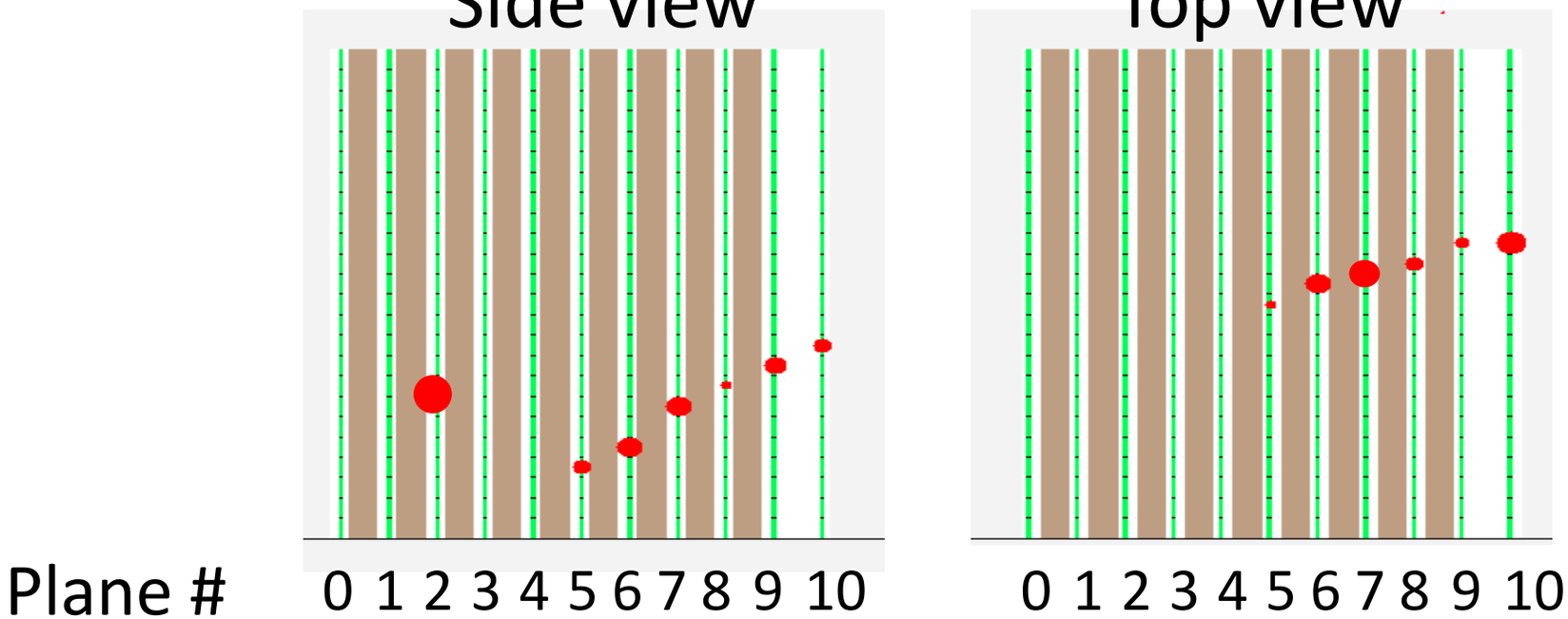
- Fiber attenuation → added to MC
- Scintillator quenching → added to MC
- MPPC response → added to MC
- MPPC dirk current noise → not yet
- MPPC - Fiber coupling constant → not yet
- Hit efficiency for each channel → not yet
- Hit time → not yet
- Electric response (p.e. > ADC, time > TDC, logical delay) → not yet

Many items are needed to consider.
But, not need for install all of these item soon.

Variables for selection of beam event

- Active plane(Plane#0 is not used. only plane#1 ~ 10)
  - Coincidence hit at side and top view(TDC threshold = 2.5p.e.)
- p.e. / active layer
  - (Total p.e. in active planes) / (# of active planes × 2)

example

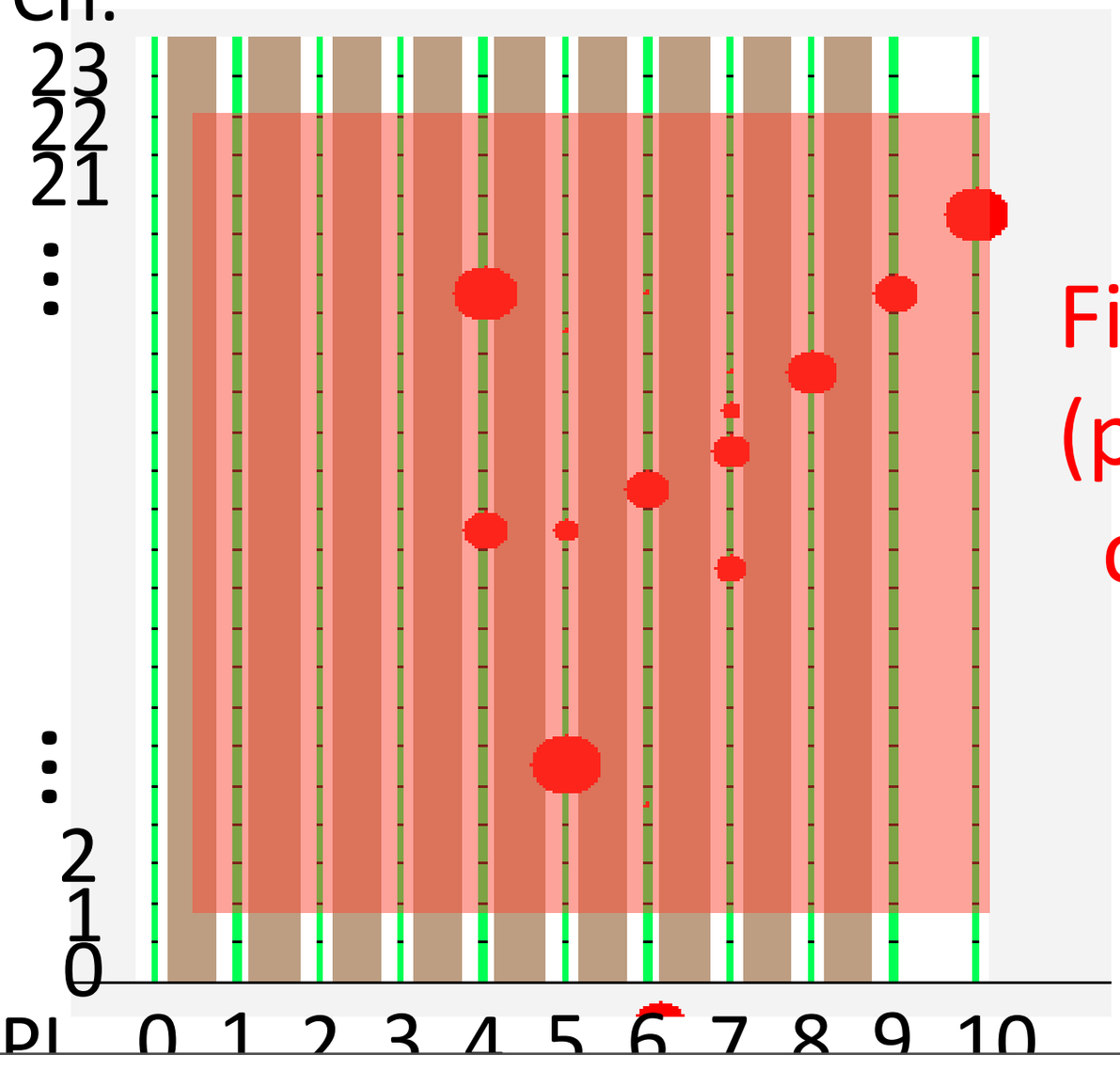


- # of active planes = 6(plane# 5 ~ 10)
- p.e. / active layer = total p.e. in plane# 5~10 / (6x2)

Fiducial volume cut

Because there is a gap(10~20cm) b/w tracking planes and VETO, particle from out side can not be rejected.

➡ We defined fiducial volume and selected the event whose vertex is within fiducial.



Fiducial volume (plane 1 ~ 10 ch.2 ~ 21)