Beam summary in MR Run41

A.Murakami for beam group

Data set

- Apply Good spill selection for the run# **410074(3/8)** ~ **410208(3/22)**
- Horn current settings in this period : **200kA**

Spill selection

Quick spill selection

1. Physics run
   - "run_type" is "physic run" and all Horn ON
   - exclude spills for beam tuning, beam study
2. TriggerFlag is "Beam Trigger" (beam during MR operation)
3. Good GPS status
4. CT05 # of protons per spill > 1e11 in order to exclude spills which no beam in MR (due to machine interlock etc...)

5. Normal condition cut
   - exclude unusable spills (e.g. PV2 magnet unstable etc...)

Good spill selection

6. Horn current cut
   - Nominal current ± 5 kA for all three horns
7. MUMON cut
   - beam angle within 1mrad (|Si fit X|<10cm & |Si fit Y|<10cm)
   - Si total Q / CT05 cut : mean of Q/CT05 ± 5%

Normal condition cut

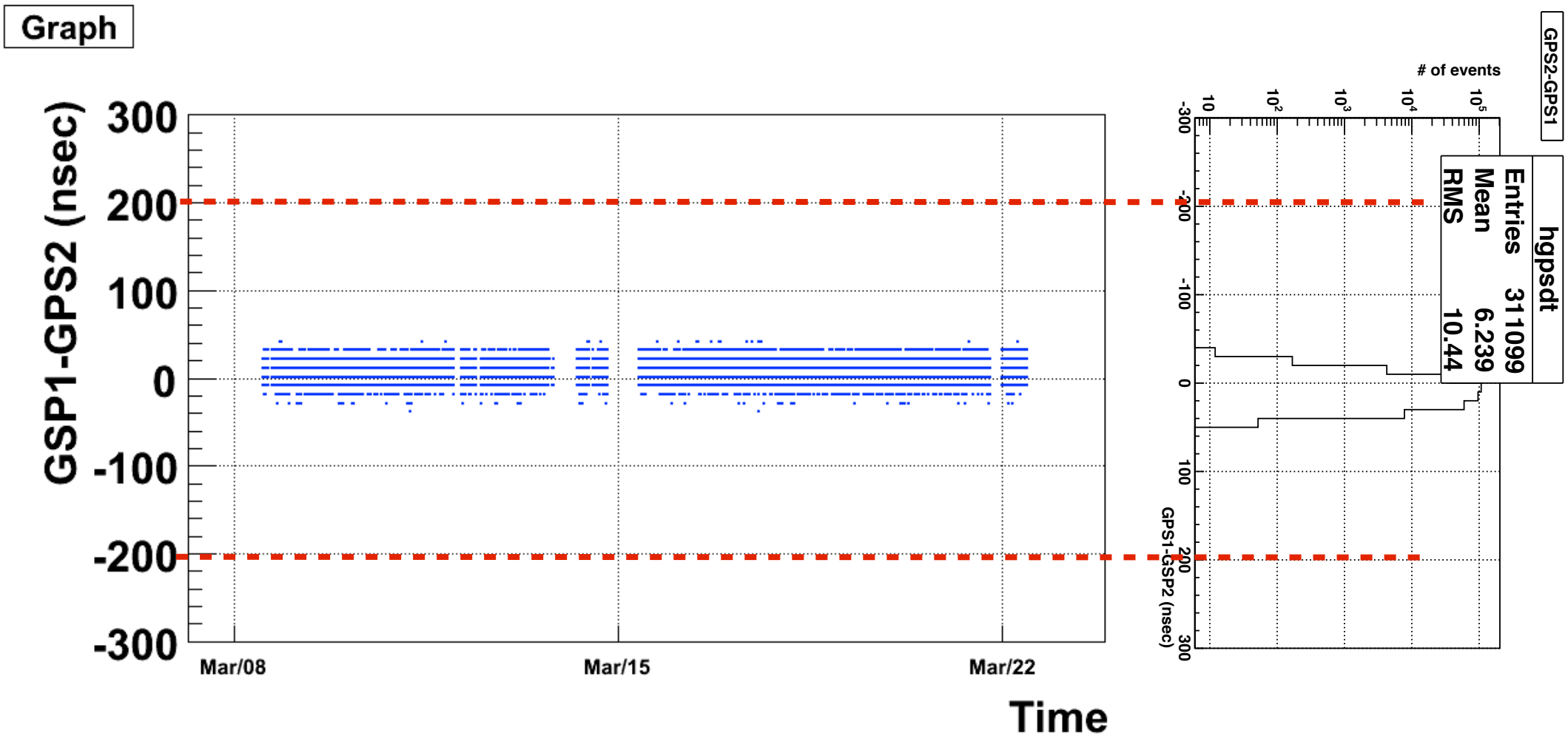
- Remove these spills in run# **410192** by normal condition cut
  - spill#=1919127 : Beam stop due to MPS of MR Beam loss monitor
  - spill#=1919128 : 1 shot after recover of above MPS.
  - spill#=1919129 : Check beam condition (2bunch beam) after setting magnets
  - spill#=1919130 : Check beam condition (8bunch)

Threshold of horn & mumon cut

- Horn current & MUMON Si Q /CT5 cut threshold are defined as the followings table.
  - Nominal Horn current = mean of three horns current in physics run.
  - Nominal MUMON SiQ / CT5 = mean of this value in physics run.

run#	Horn current setting	Horn current cut	MUMON SiQ/ CT5 cut
410052~410053	250kA	252.3 ± 5 kA	32.37 ± 5%
410065~410068	0kA	0kA	8.54 ± 5%
410074~410208	200kA	204.7 ± 5kA	21.65 ± 5%

GPS Status



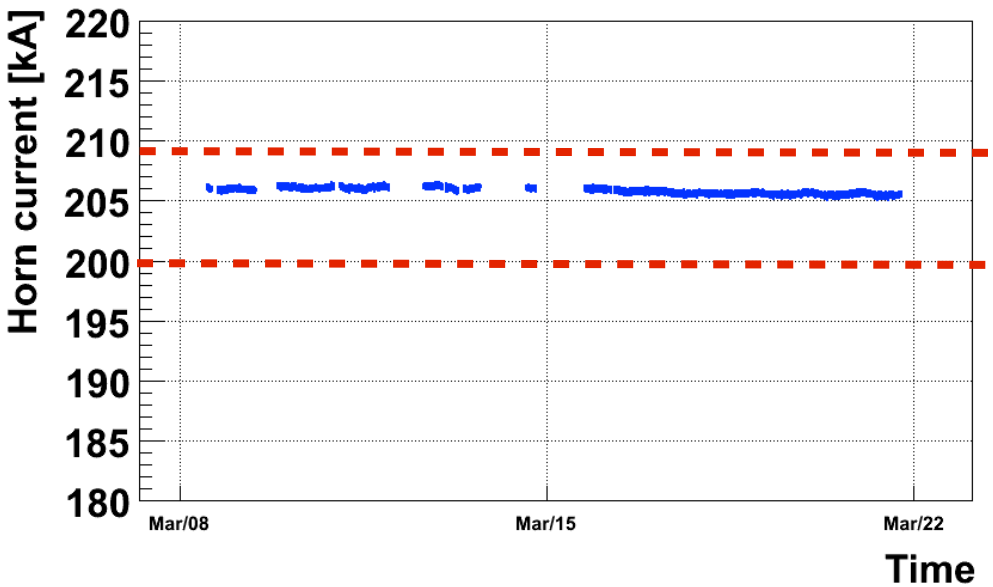
GPS1,2 status are good during this period

No Bad spill

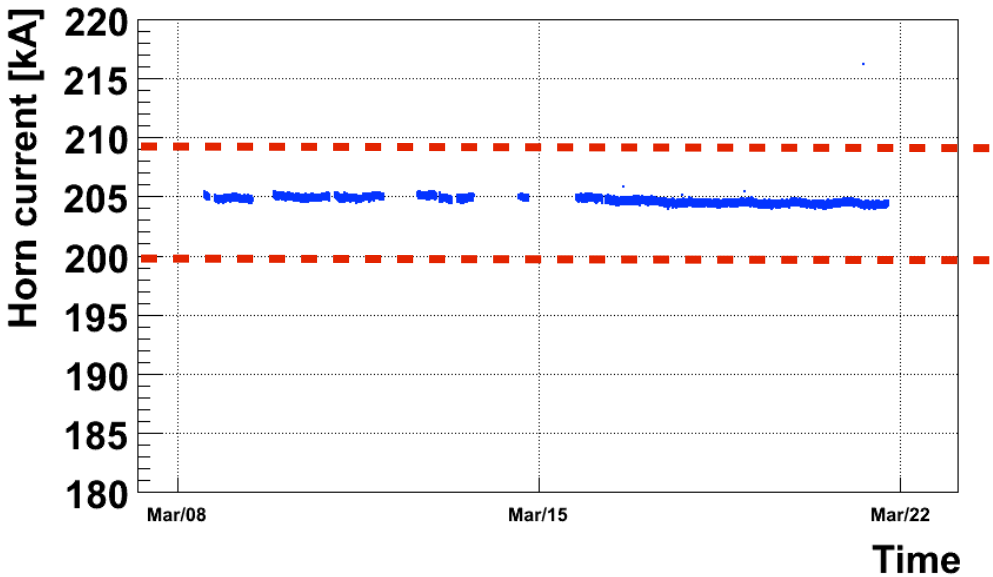
Horn current

204.7 ± 5kA

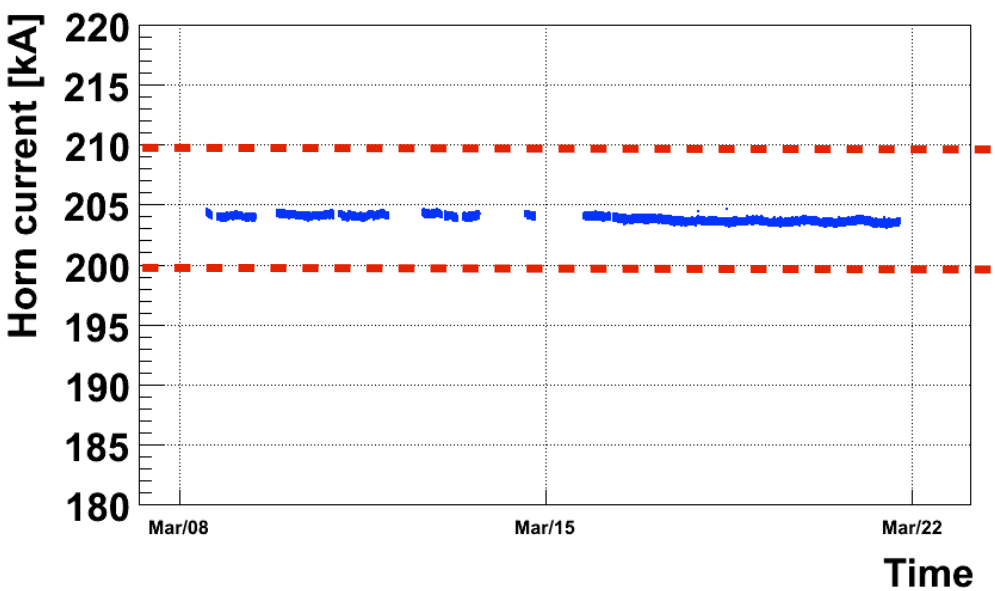
Horn1 current

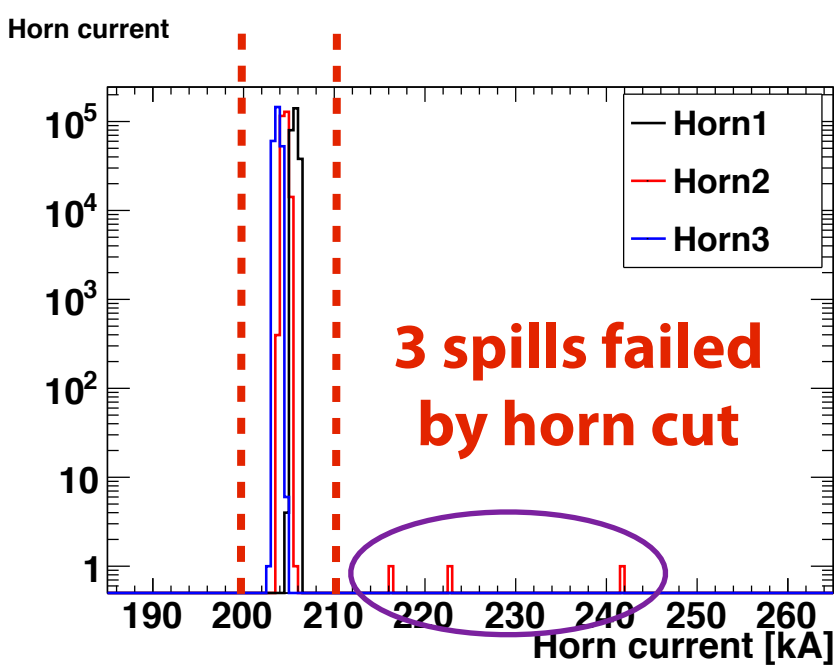


Horn2 current

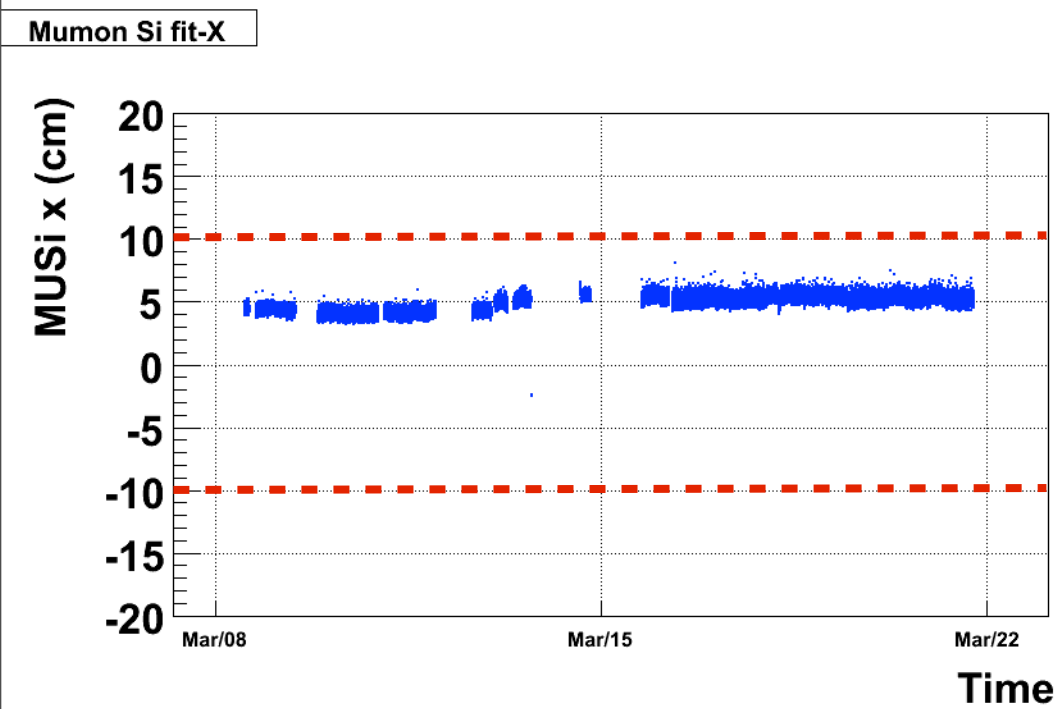


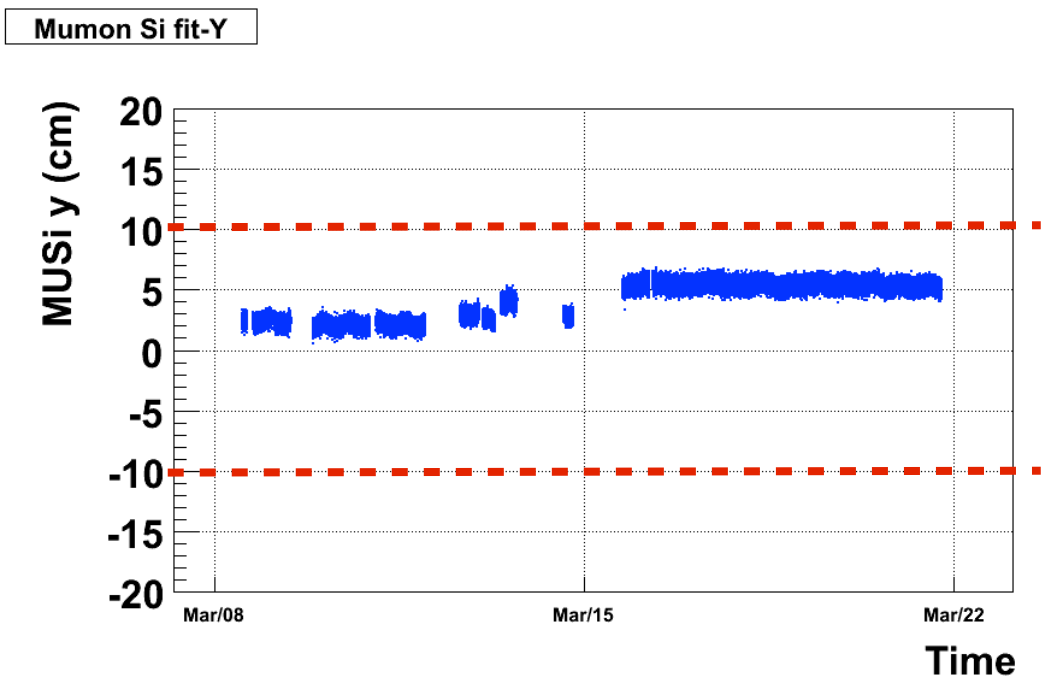
Horn3 current





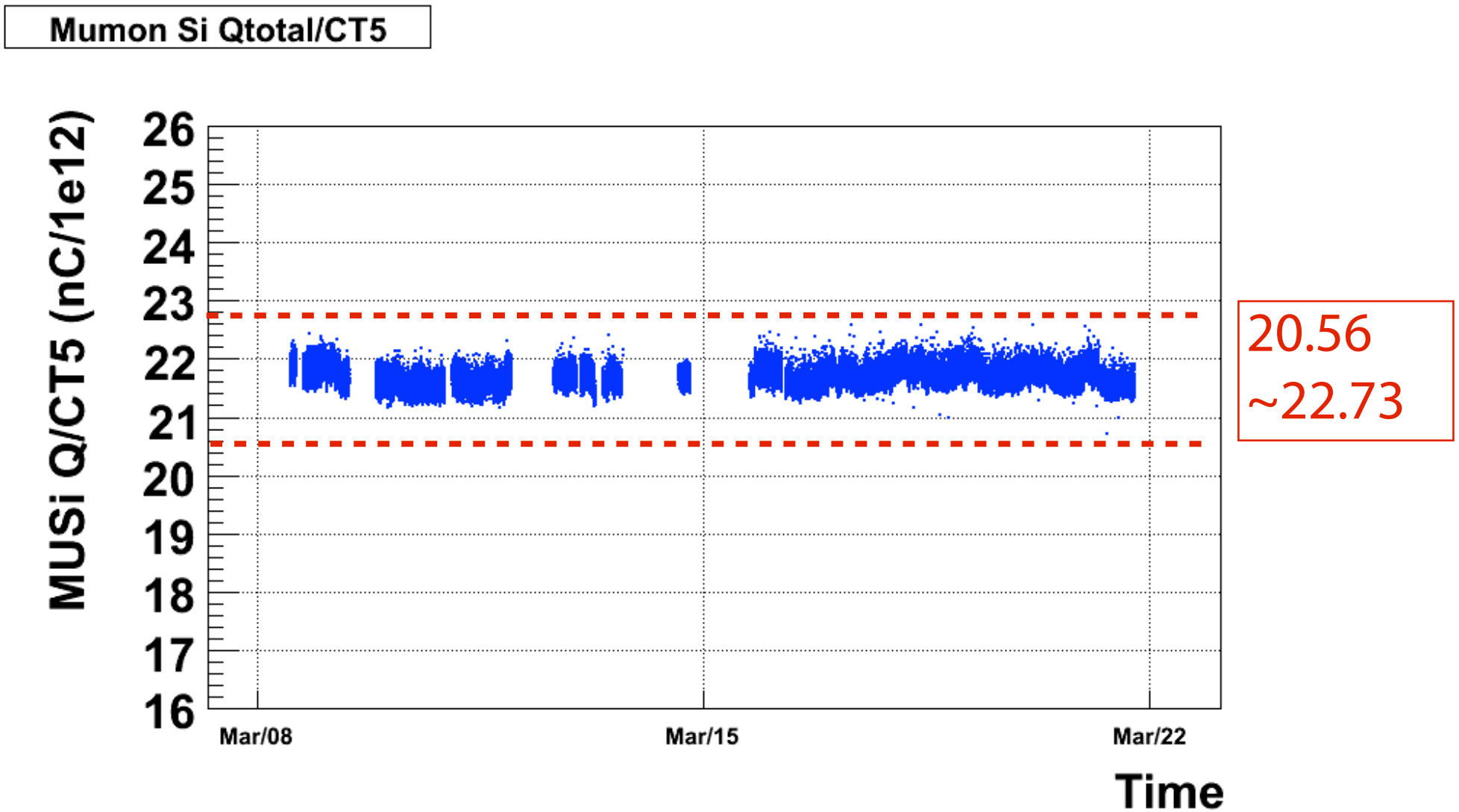
MUMON Si fit center





No Bad spill (not including horn bad spills)

MUMON Si Q / CT05



No Bad spill (not including horn bad spills)

Good spill for physics runs (run3b)

Run# 410074(3/8)~410208(3/22)

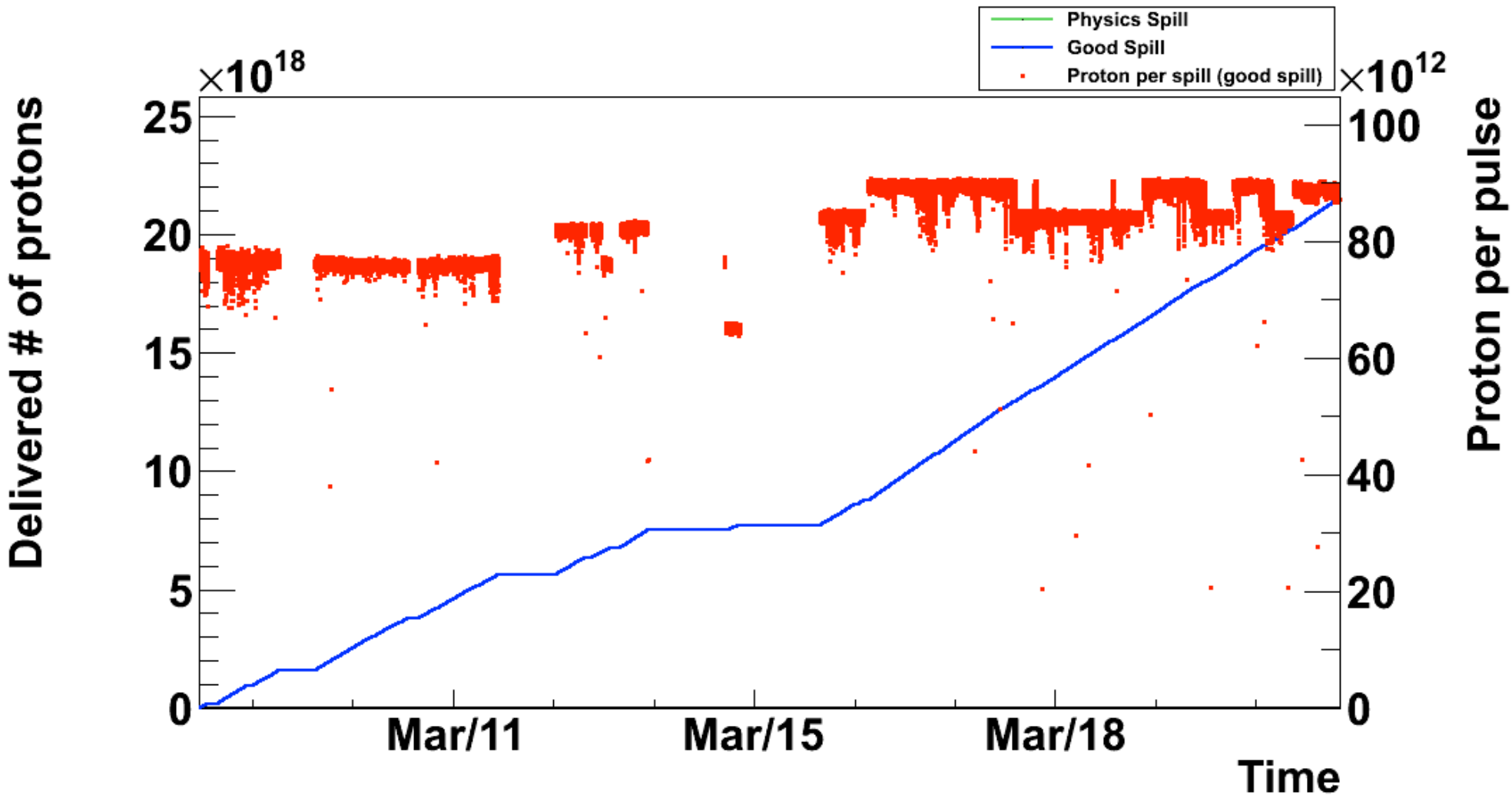
	# of spills	Ratio
Physics spills	259759	1
Beam trigger	258975	0.997
Good GPS	258975	0.997
ppp(CT5)>1e11	258802	0.996
Normal beam	258797	0.996
Horn cut	258794	0.996
MUMON cut	258794	0.996

# of delivered protons(CT5) after Good spill selection

Total POT : 2.151e19

Integrated POT (run3b)

Run# 410974(3/14)~410208(3/22)



Definition of Good spill flag

- In order to distinguish the Horn-off spill from the horn ON spill, the value of the good flag will be re-defined.
  - flag =0 : Not suitable data for physics analysis.
  - flag =1 : Good spill for Horn 250kA operation.
  - flag =100 : Good spill for Horn OFF.
  - flag = 2, 3 ... 99: Reserved for the other horn operation mode.
  - flag =-1,-2 ... -99: Reserved for the other horn operation mode with opposite polarity.

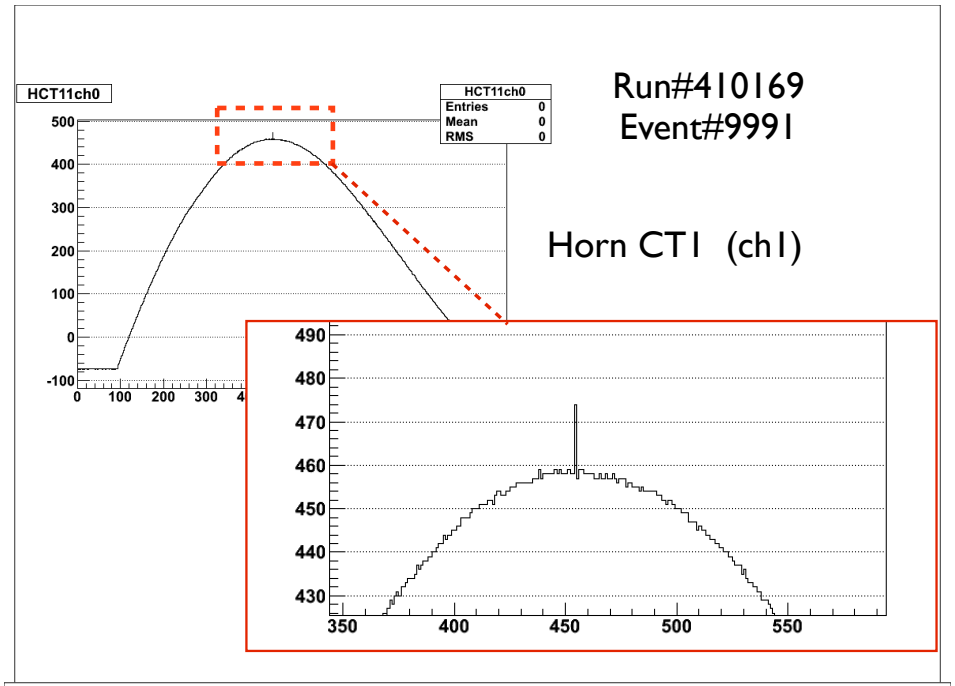
horn current	0 kA	200 kA	250 kA
good spill flag	100	2	1

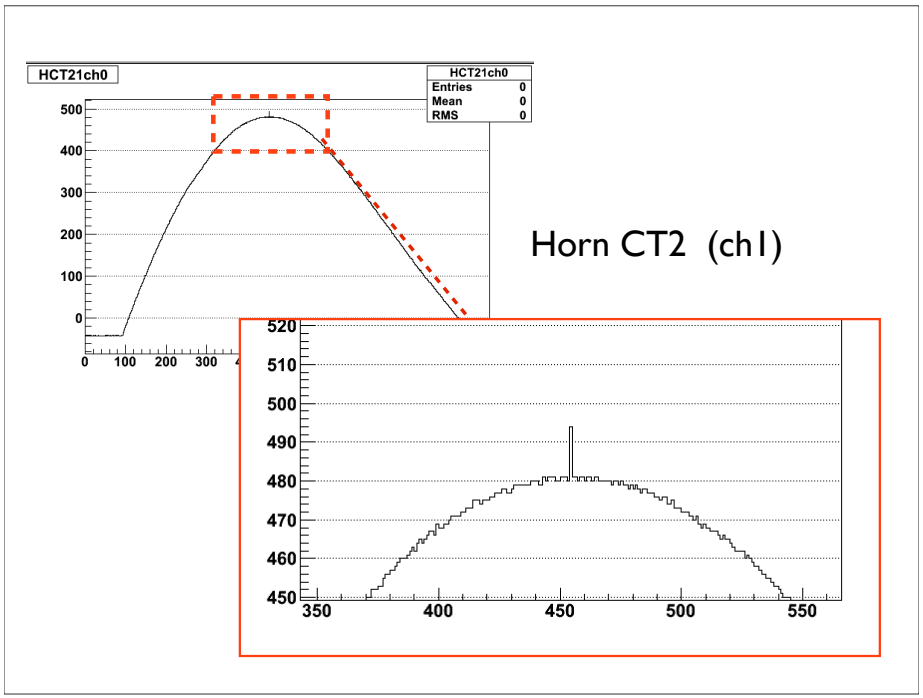
Summary

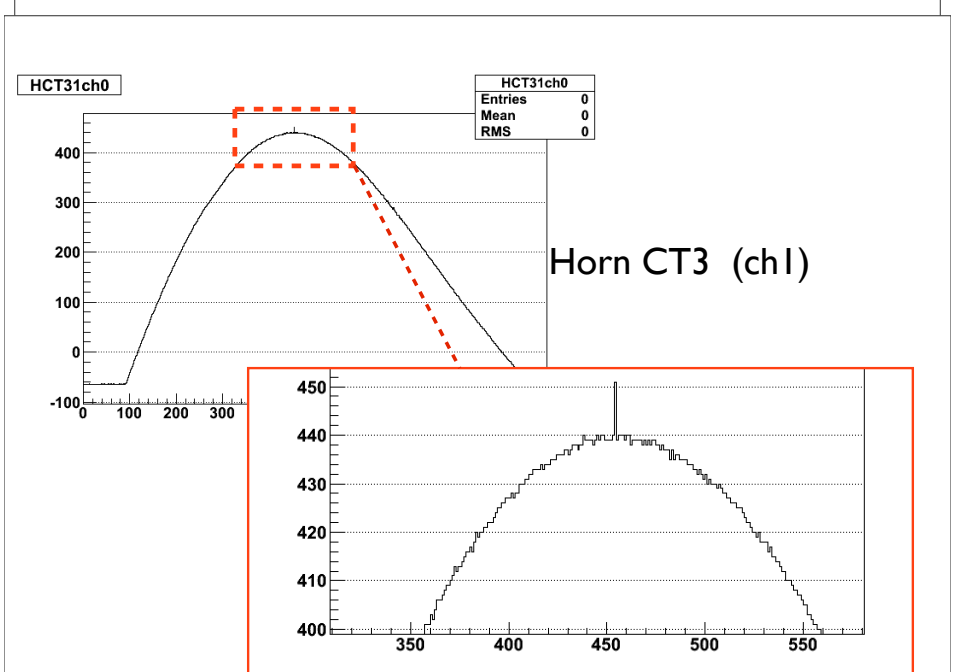
- Beam operation is stable in MR Run41 (at 200kA horn current setting)
- There are some bad spills as like the following:
  - There are 4 bad spills due to abnormal proton beam condition.
    - MR MPS issued at this spill.
  - There are 3 bad spills due to abnormal horn#2 current.
    - Now these spills are treated as “bad”. (Bad fitting for horn current shape cause these bad spills. Investigating this reason for detail → Back up)
- Integrated # of POT in run3b is **2.15e19**.

Back up

FADC of Horn current (one of bad spills)







There is a spike around peak current

→ Issue bad fitting & horn current estimated larger.