Beam summary in MR Run39-40

Beam operation in MR Run 39-40

- Neutrino beam operation in 2011.Dec (MR Run39) and 2012.Jan(MR Run40)
  - Monitor check, Beam tuning&study
  - Continuous beam operation → Possible to use for physics analysis
- In this period, no horn operation
- Check the beam quality in this physic run ("good spill")

In physics run	MR Run39	MR Run40
Period	12/24~27(12/26)	1/20~26 (1/23~26)
# of Spills	3740	20134
Max beam power	~30kW	~90kW

Good spill selection

1. Physics run
   1. "run_type" is "physics run" and all Horn ON
   2. exclude spills for beam tuning, beam study
2. Trigger Flag is "Beam Trigger" (it means that beam during MR operation)
3. Good GPS Status
4. CT05 # of protons/spill > 1e11 in order to exclude spills which no beam in MR(due to machine interlock, etc...)
5. Normal condition cut
   1. exclude unusable spill (e.g. PV2 unstable, etc...)

Apply only these cut →
"Quick beam summary"

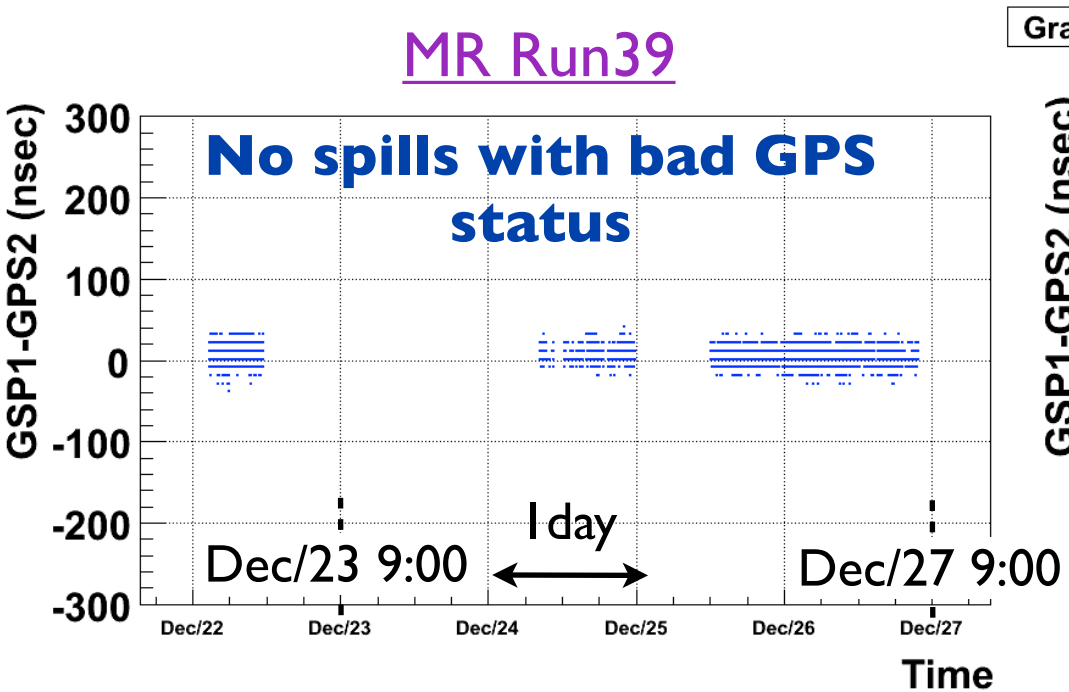
6. Horn cut
   1. nominal ± 5kA for all three Horns

Horn cut masked in MR Run39&40

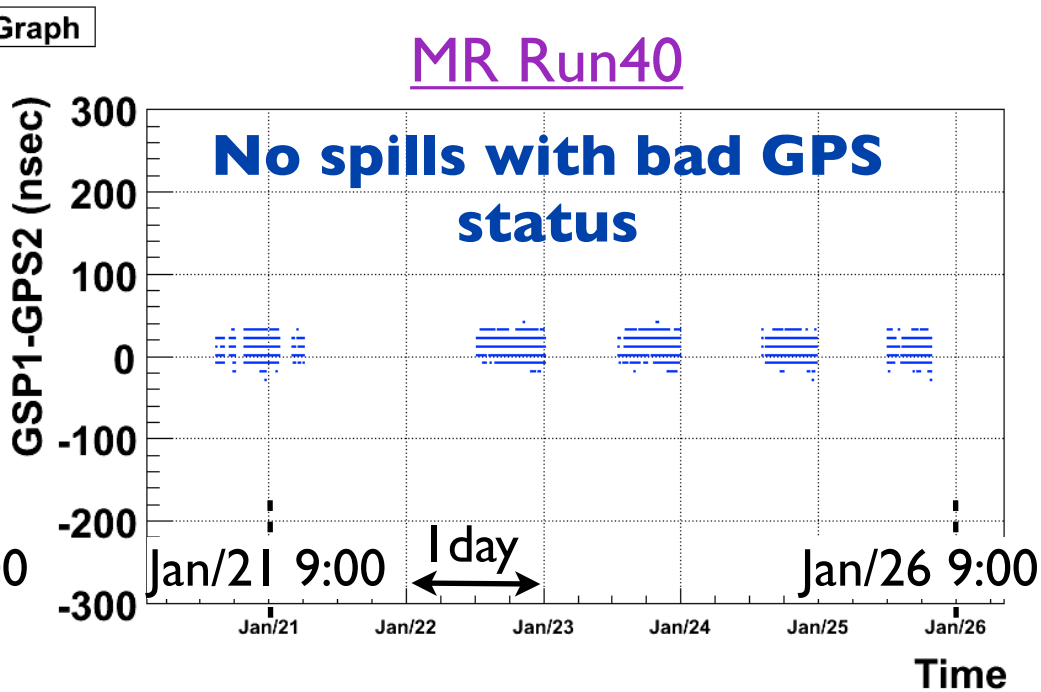
7. MUMON cut
   1. beam angle at MUMON within 1mrad (abs(Si fit x) < 10cm and abs(Si fit y) < 10cm)
   2. Si total Q / CT05 cut : nominal ± 5%

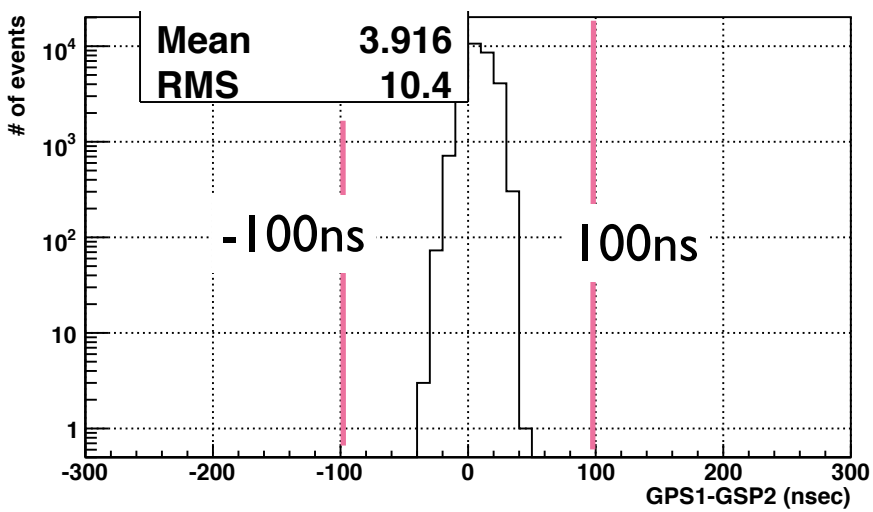
GPS2 - GPS1 (in whole beam operation)

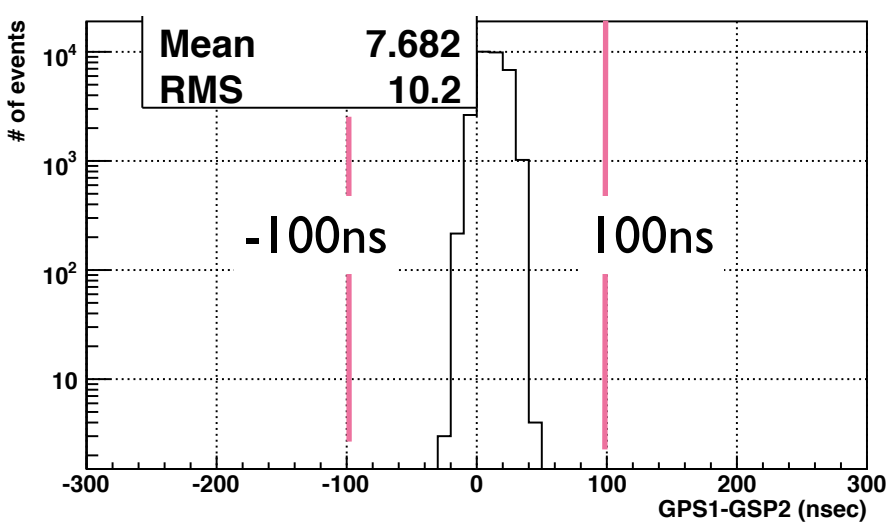
MR Run39



MR Run40

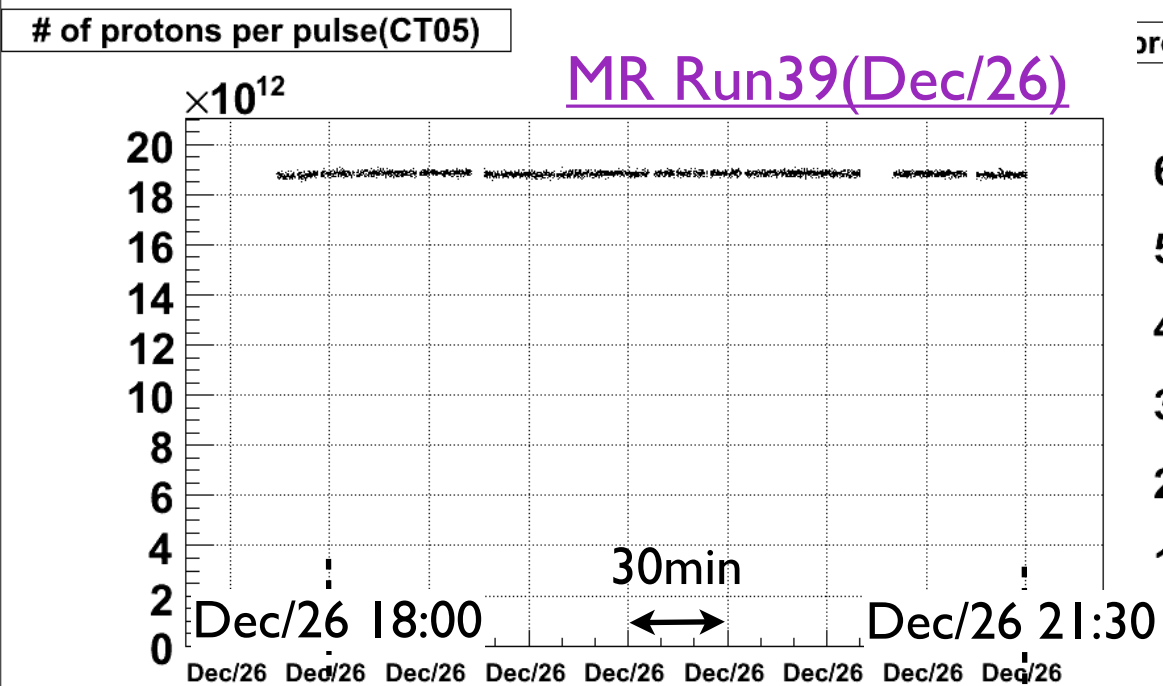


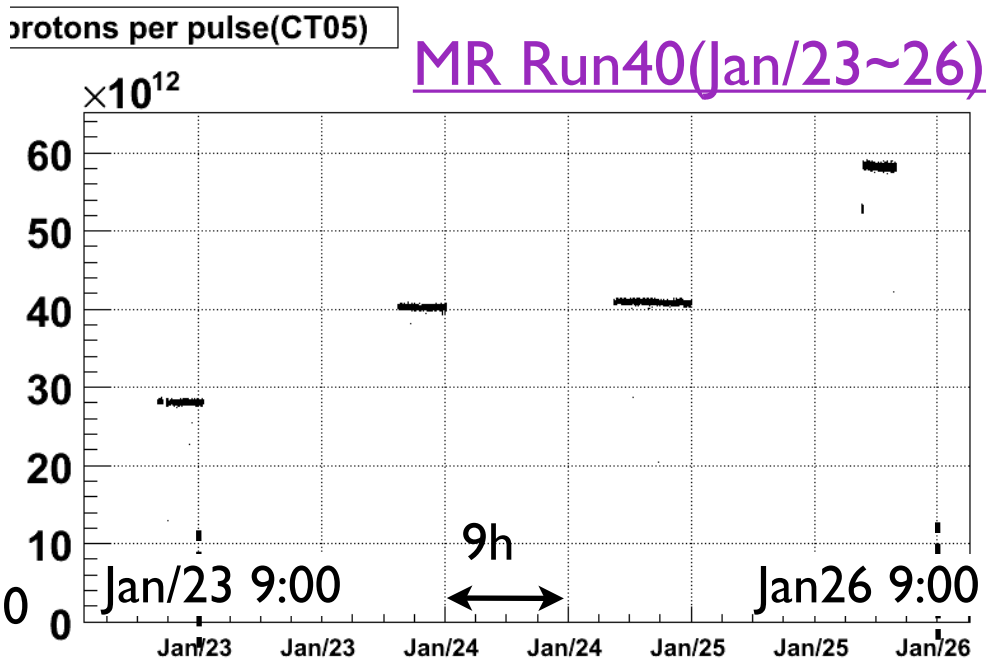




GPS stable in whole period → No spill failed by good GPS selection

Proton per pulse (CT05)



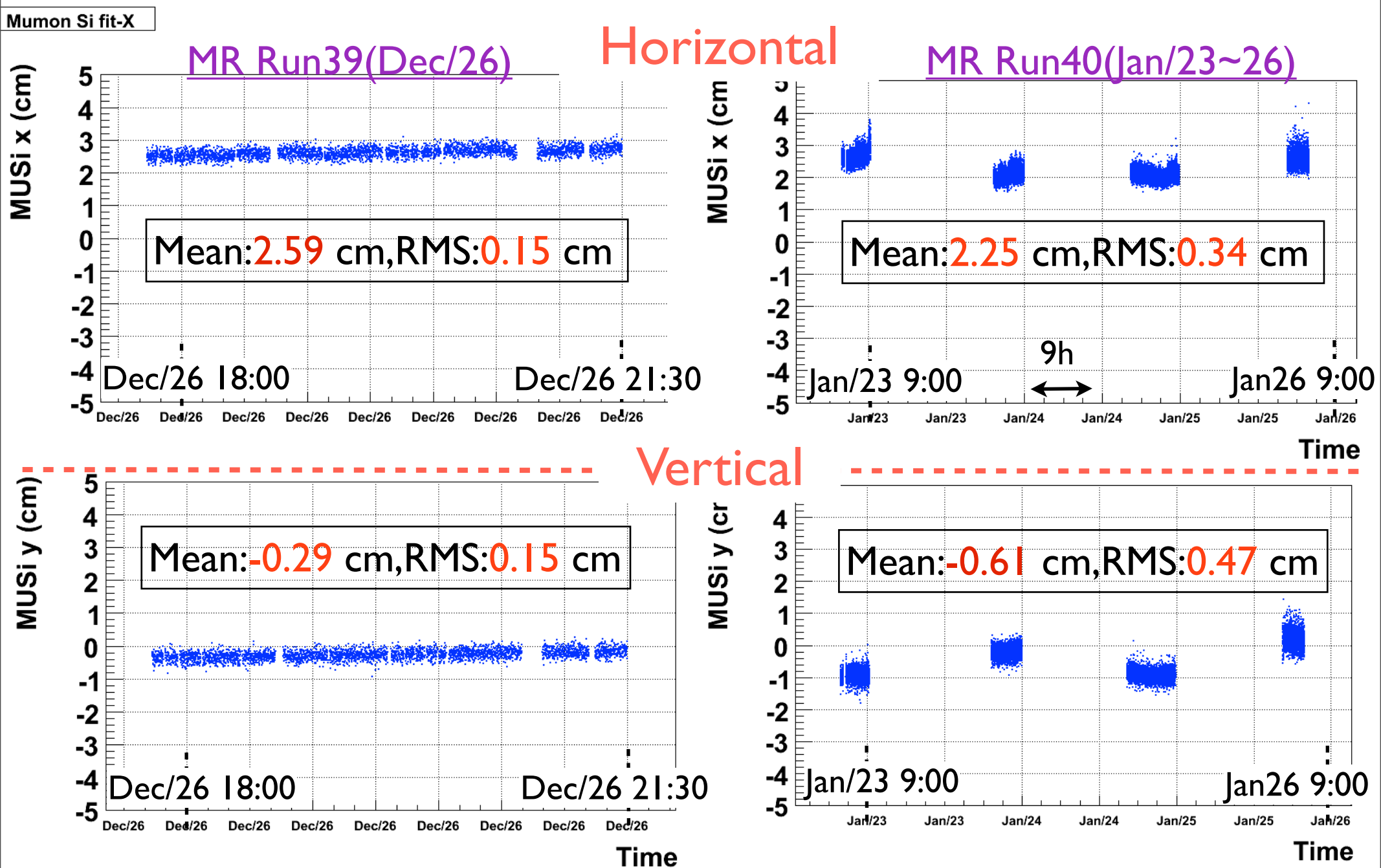


1.9e13 ppp (~30kW)

2.8e13 ~ 5.8e13 ppp
(43kW~90kW)

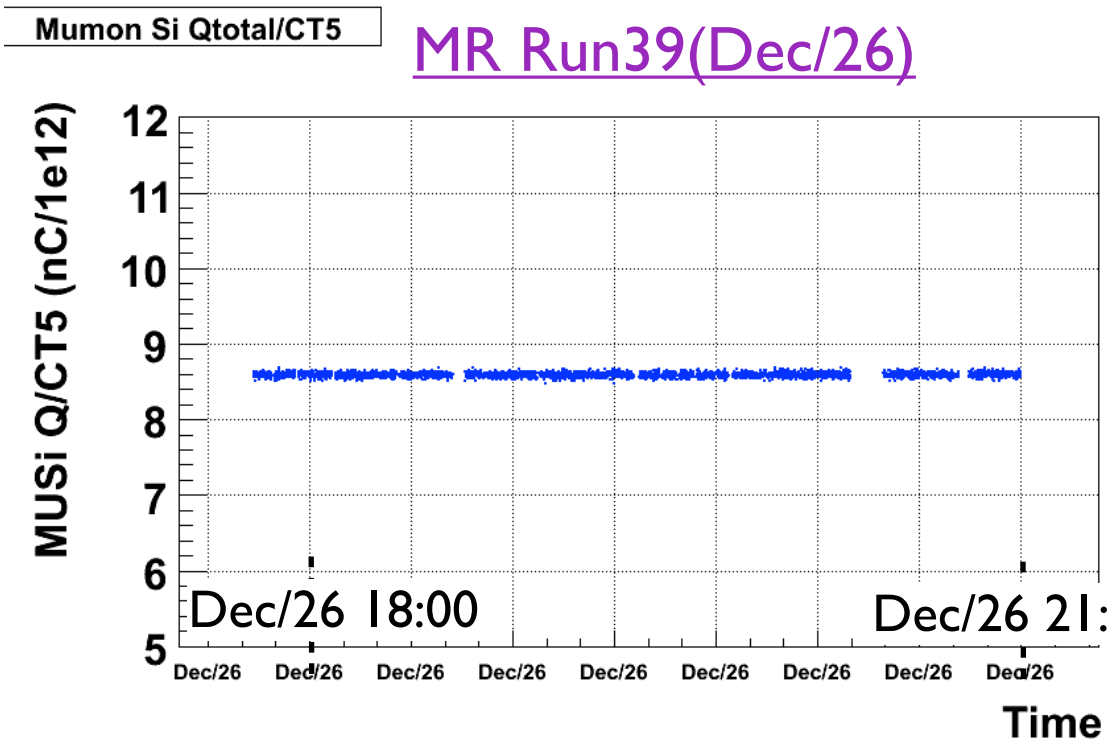
Beam power increase step-by-step

MUMON Si beam profile center



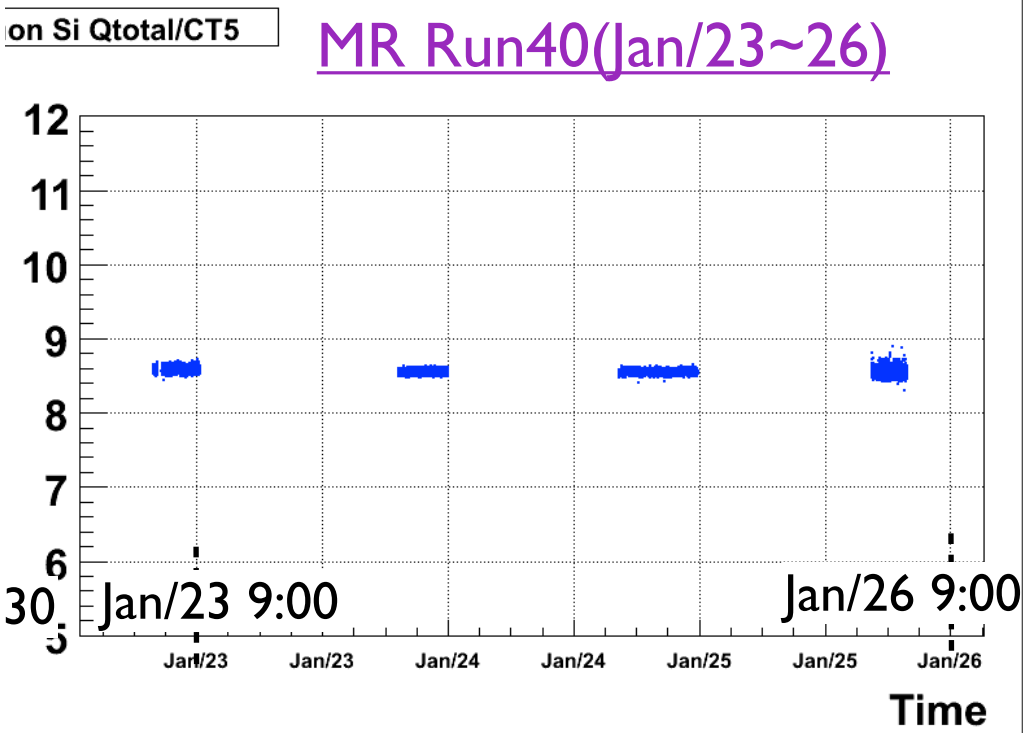
|MUMON Si center from beam axis| < 10cm → OK

MUMON Si total Q/CT5



MR Run39(Dec/26)

Mean=8.57, RMS=0.029(0.3%)



MR Run40(Jan/23~26)

Mean=8.54, RMS=0.030(0.4%)

Fluctuation of MUMON Si / CT5 << 5%

→No spill failed by MUMON Si/CT5 cut(nominal ± 5%)

Summary of continuous run

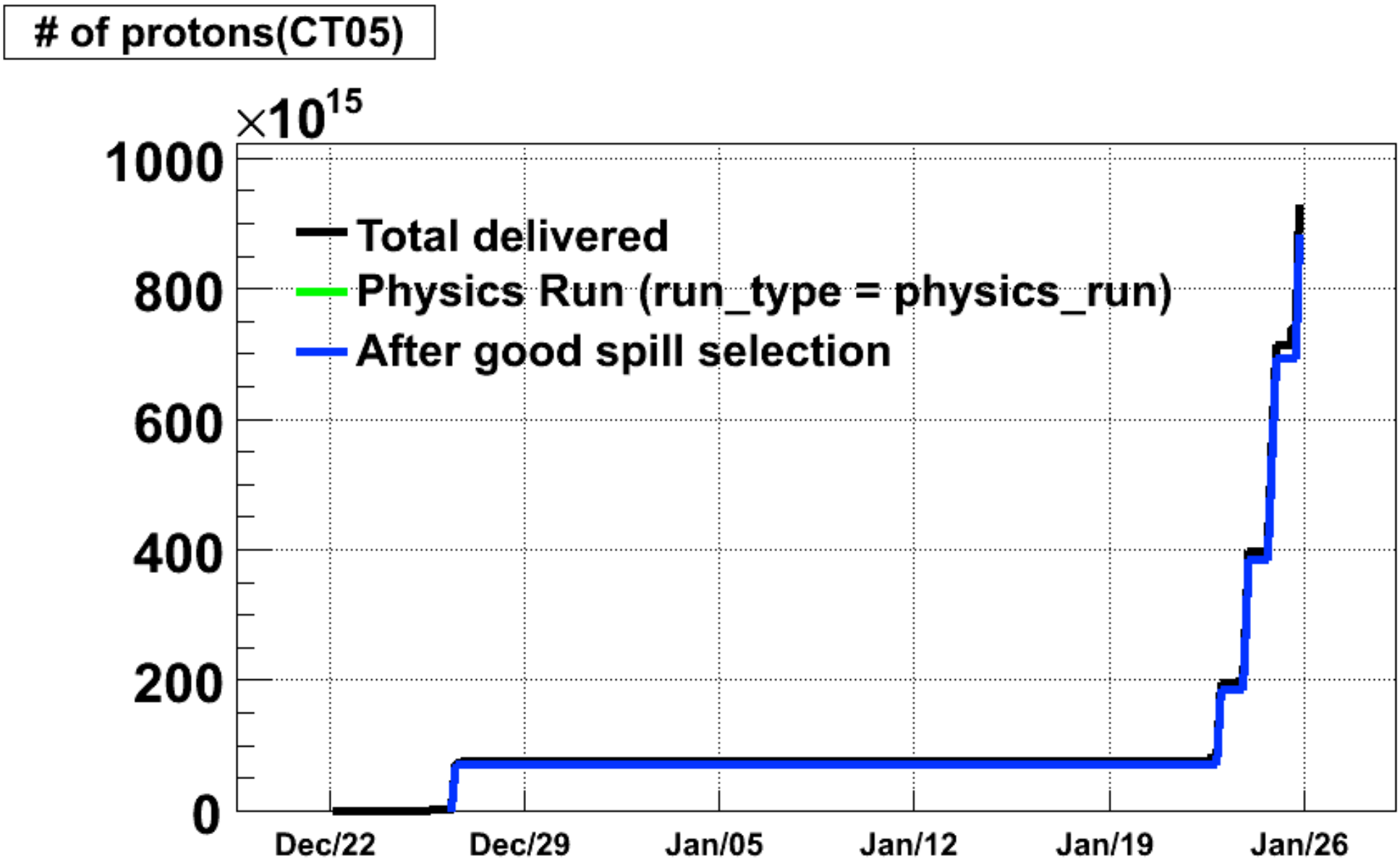
	MR Run39(Dec/26)		MR Run40(Jan/23~26)	
	# of spills	Ratio	# of spills	Ratio
Physics spills	3740	1	20134	1
Beam trigger	3730	0.997	19917	0.989
Good GPS	3730	0.997	19917	0.989
ppp(CT5)>1e11	3721	0.995	19856	0.986
Normal beam	3721	0.995	19856	0.986
MUMON cut	3721	0.995	19856	0.986

# of delivered protons(CT5) after Good spill selection

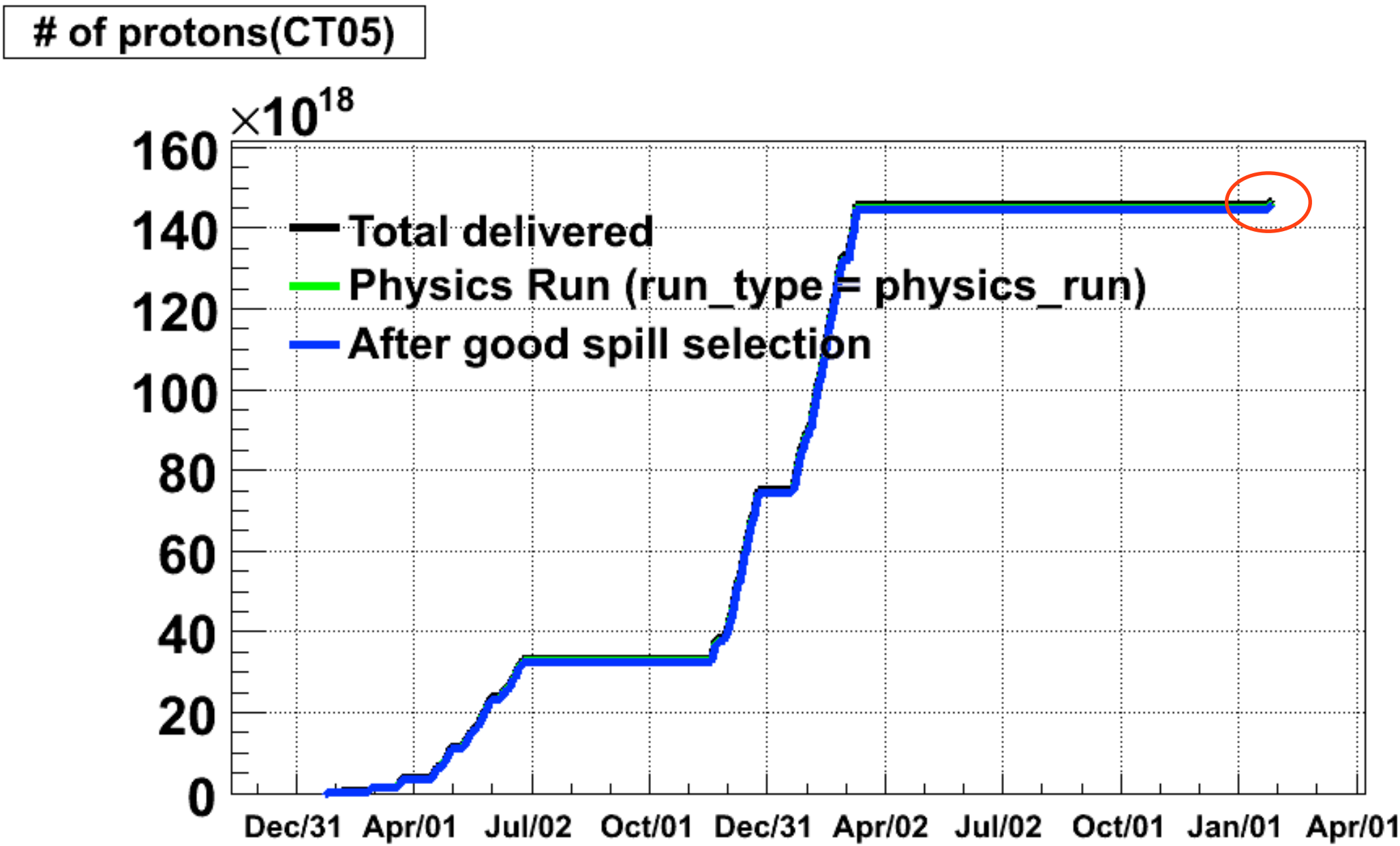
MR Run39: 7.01e16 pot MR Run40: 8.11e17 pot

Total POT : 8.81e17 pot

POT history in MR Run39-40



POT history in MR Run29-40



New definition of good spill flags

- MR Run 29~38
  - Good spill -> flag = 1
  - Not good spill -> flag = 0
- MR Run 39~
  - Good spill -> flag = (Setting horn current)
    - If no horn operation, flag = 100
  - Not good spill -> flag = 0

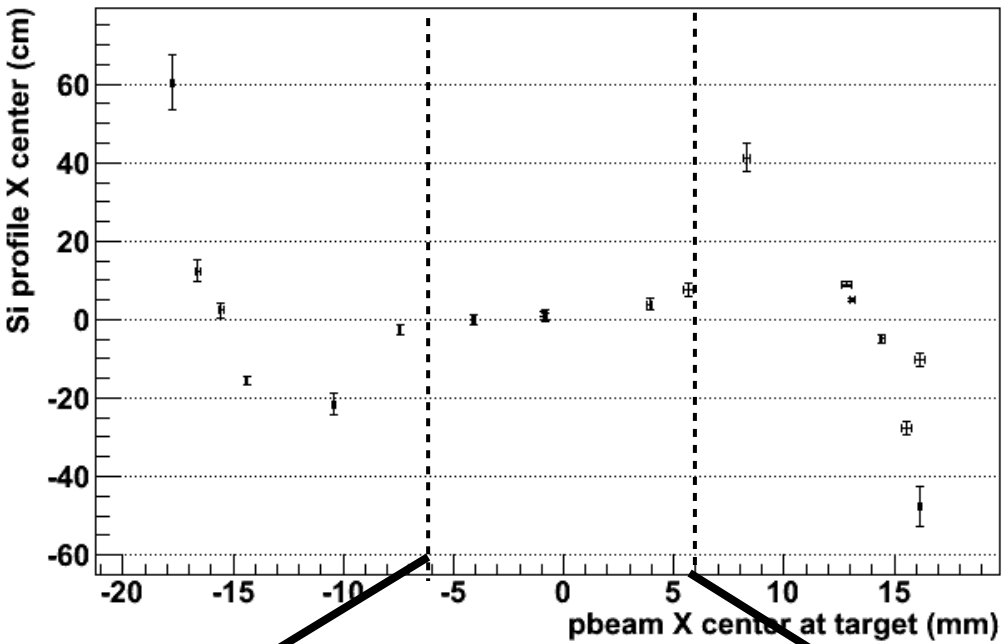
Reminder: release process

- Quick beam summary : include “spill flag”, not “good spill flag”
  - Process done every ~2 days (by manual)
  - Check minimum quality check (process done correctly?, file broken?, latest calib const?, etc) → Release for ND(Minamino-san) & SK(Nakayama-san)
    - If no problem, can release every 2~3 day
    - When need to update, release again and announce .
- Beam summary: include “good spill flag”
  - Apply good spill selection for quick beam summary
  - Discuss beam quality in weekly beam group meeting
    - After beam group approves, release beam summary data for ND&SK (announce for beam, ND, SK group)
- Run40 data check in this report is ok → Release beam summary soon after collabo.

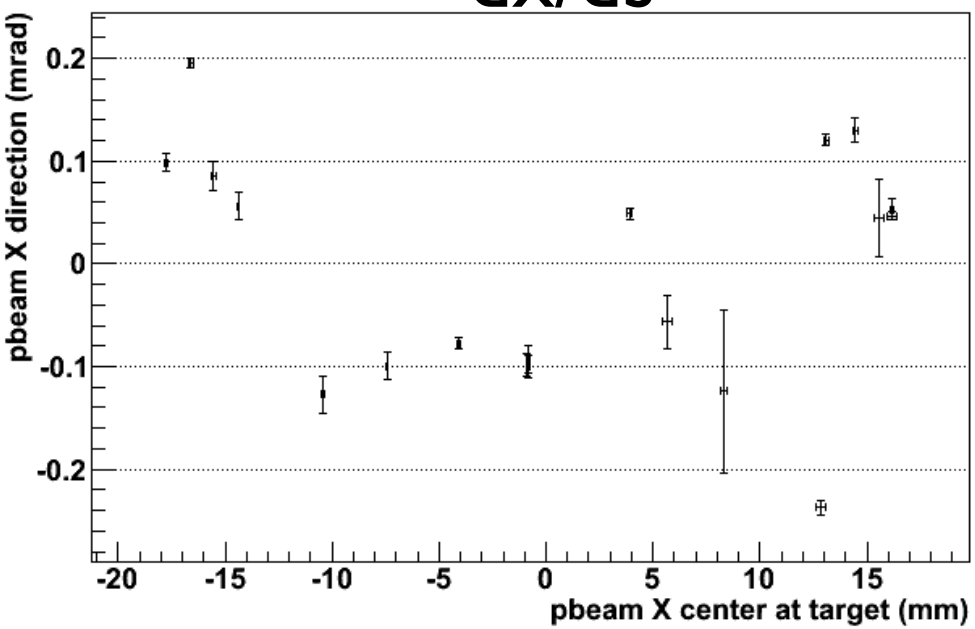
Back up

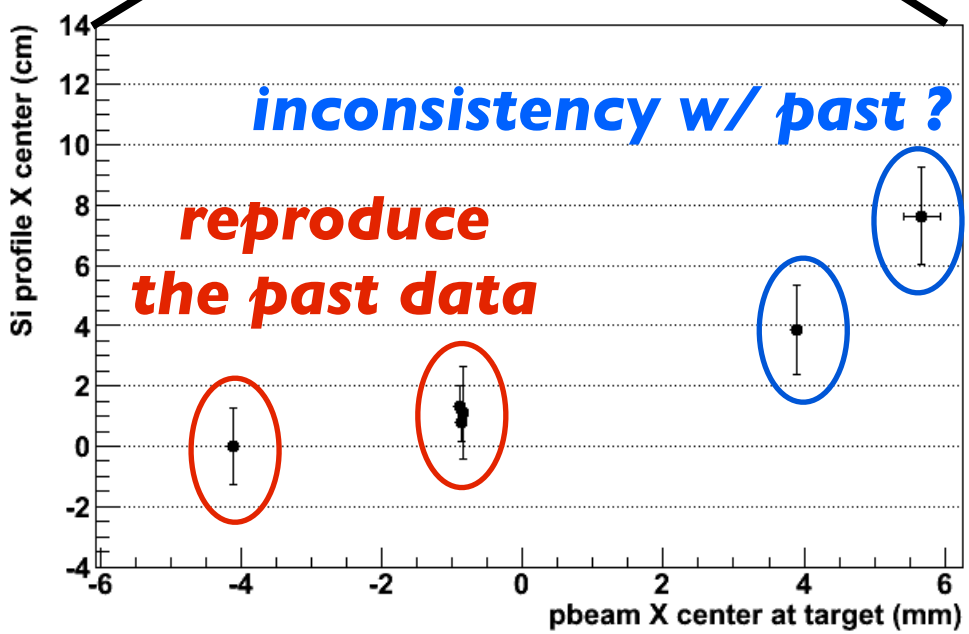
MR Run39 X-scan @ target

k.suzuki



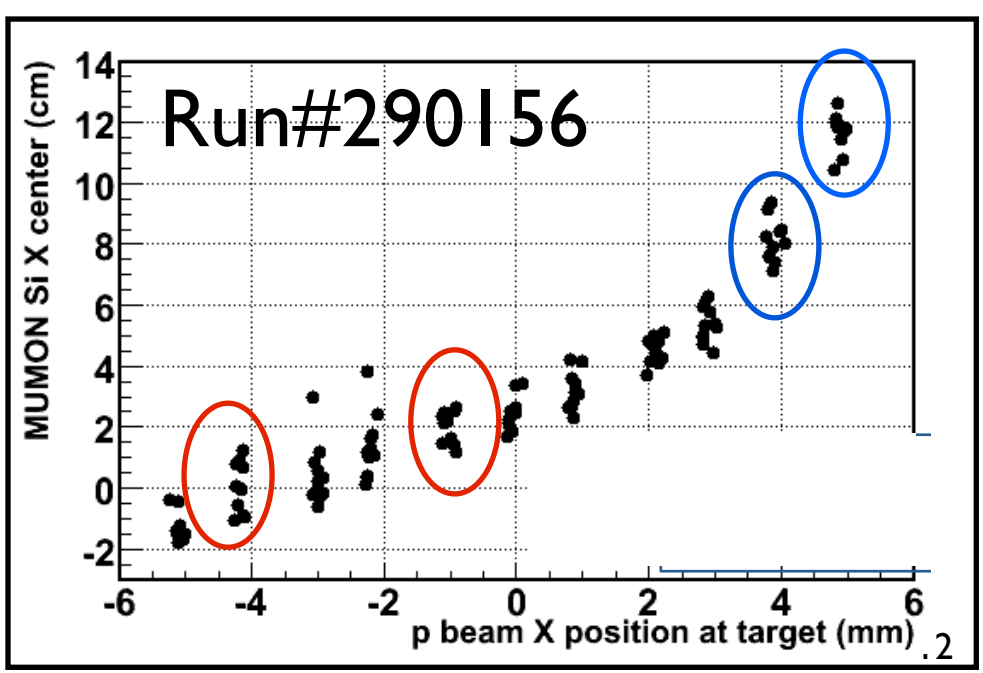
dx/ds





inconsistency w/ past ?

reproduce the past data



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