Run15pp200 Muon-Arm Data Quality Checks

Xiaodong Jiang 09/16/2015 updated

All files on webpage:

https://www.phenix.bnl.gov/phenix/WWW/publish/xjiang/Run2015/Run15pp200/

Generic runlist files, runnum vs luminosity files on webpage:

https://www.phenix.bnl.gov/phenix/WWW/publish/xjiang/Run2015/Run15pp200/runlist

From production pro104, which has a slightly improved tracking for MuTr, (compared to the online run15 production code)

Generated MuTr performance files run-by-run, for data-quality checks. MuTr performance plots at:

https://www.phenix.bnl.gov/phenix/WWW/publish/xjiang/Run2015/Run15pp200/muon_arm_qa/run15pp200_qaplots/

Following Sanghoon,
listed runs that got flagged from track-yield-per-bbc-scaled-trigger, for MUID1D trigger and for SG3_MUID1D1H trigger.
Checked runs with obvious problems, plots attached.

Run15pp200 Muon-Arm GoodRunList

Updated run15pp200 muon-arm “good-run-list”:

South-Arm:

698 runs goodrunlist_run15pp200_south_alllumi.txt

217 runs goodrunlist_run15pp200_south_lowlumi.txt
243 runs goodrunlist_run15pp200_south_midlumi.txt
238 runs goodrunlist_run15pp200_south_highlumi.txt

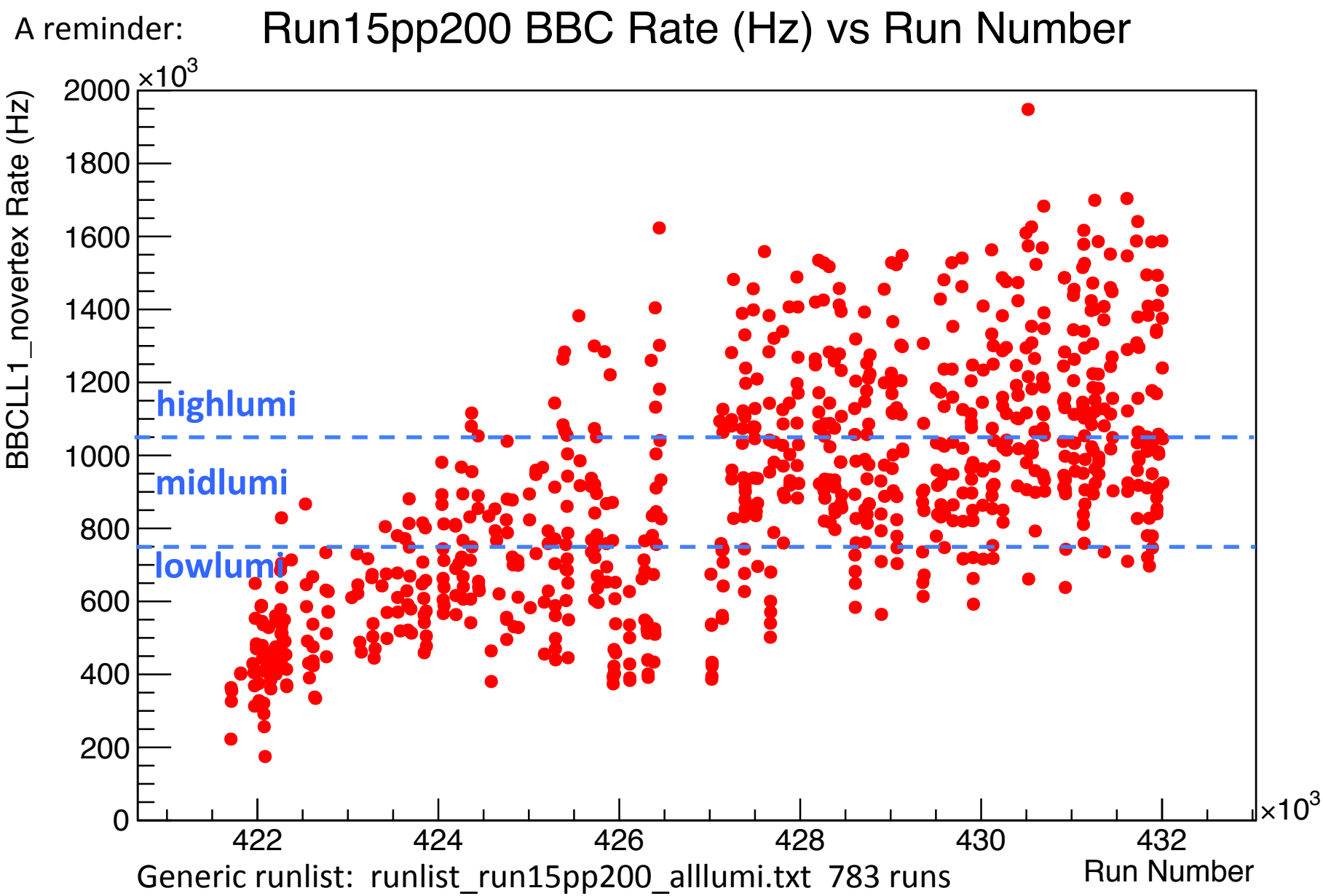
North-Arm:

672 runs goodrunlist_run15pp200_north_alllumi.txt

213 runs goodrunlist_run15pp200_north_lowlumi.txt
228 runs goodrunlist_run15pp200_north_midlumi.txt
231 runs goodrunlist_run15pp200_north_highlumi.txt

https://www.phenix.bnl.gov/phenix/WWW/publish/xjiang/Run2015/Run15pp200/runlist/MuTr_MUID_goodrunlist/

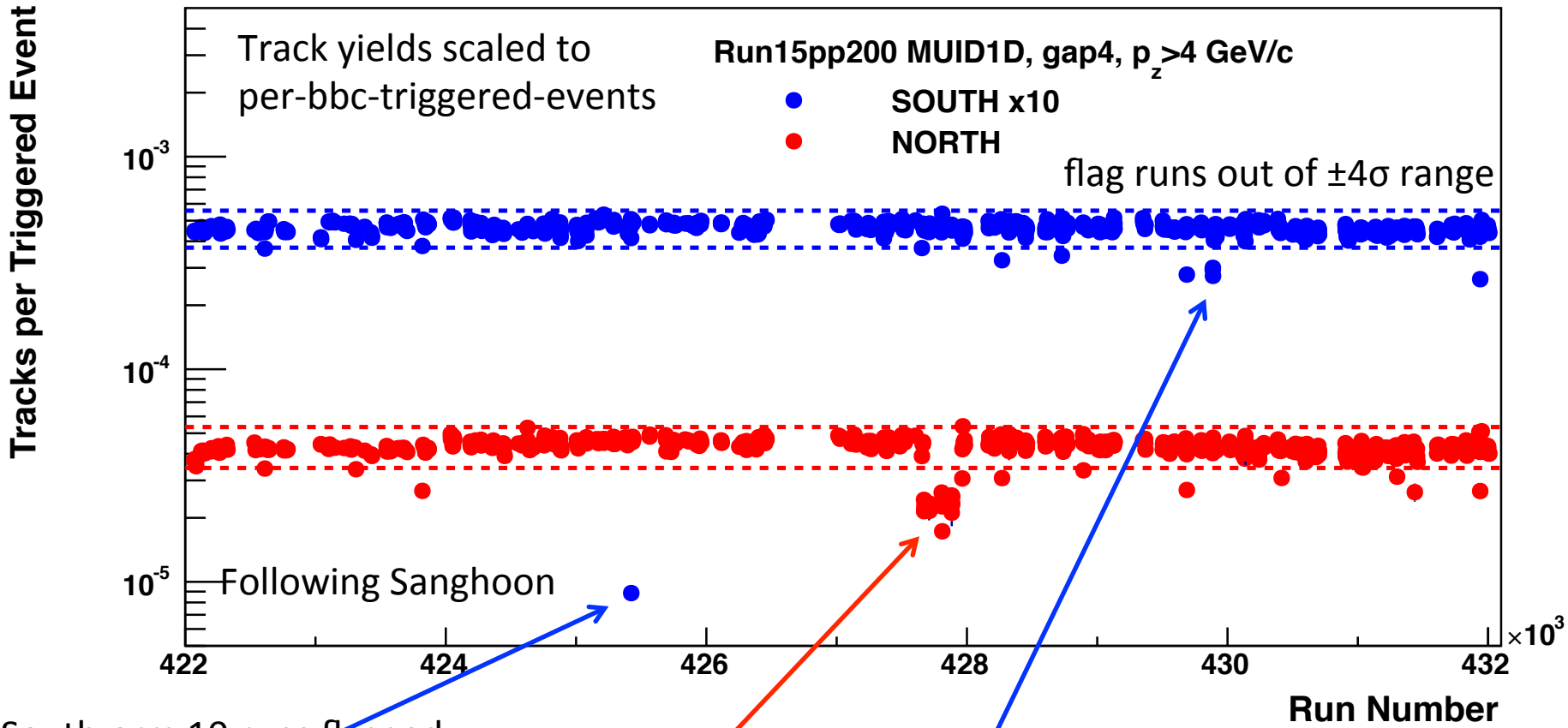
A reminder:



Generic runlist: runlist_run15pp200_alllumi.txt 783 runs

- **highlumi:** runlist_run15pp200_highlumi.txt 258 runs, BBCRate>1.05 MHz
- **midlumi:** runlist_run15pp200_midlumi.txt 264 runs, 0.75MHz<BBCRate<1.05 MHz
- **lowlumi:** runlist_run15pp200_lowlumi.txt 261 runs, BBCRate<0.75 MHz

Tracks-per-Triggered-Events: Trigger=MUID1D, lastgap=4



South-arm 10 runs flagged:
422611,**425423**,427654,428269,428728,429687,**429886,429887,429888**,431939.

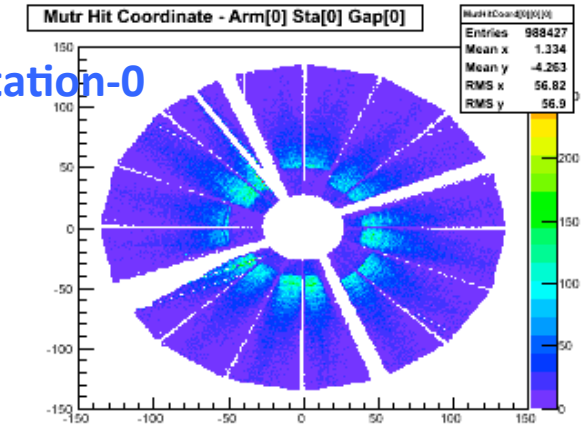
North-arm 40 runs flagged:
422611,423311,423820,**427670,427671,427672,427673,427674,427708,427709,427710,427711,427712,427713,427805,427806,427807,427810,427811,427813,427814,427815,427829,427878,427879,427881,427882,427883,427885,427886,427887,427964,427968,**428269,428894,429687,430415,431301,431437,431939.

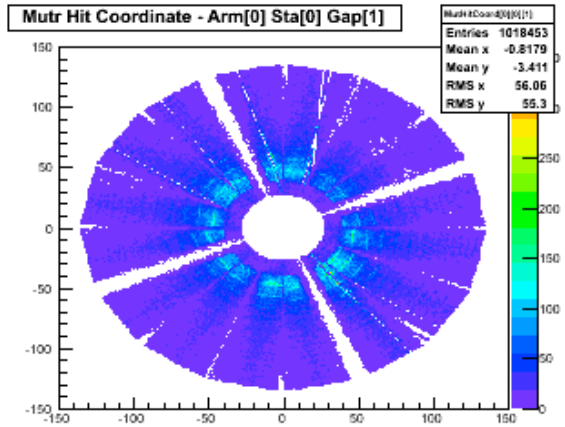
Tracks-per-BBC-triggered events

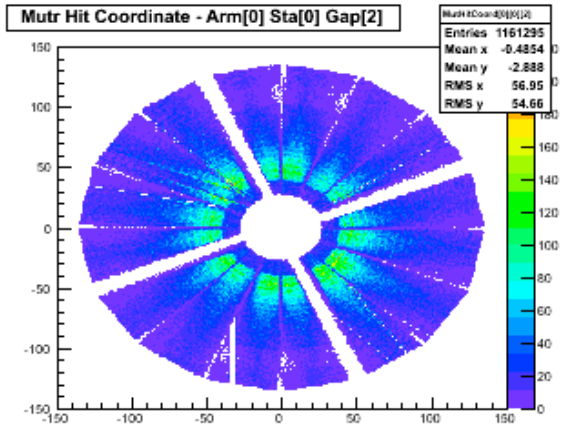
Sanghoon made, related to the cross section, for example in MUID1D trigger,

$$\text{Tracks-per-BBC-triggered-events} = \frac{(\text{\#-Tracks-in-MUID1D})*(\text{Scale-down-factor-MUID1D} + 1)}{(\text{BBC-novtx-scaled-counts})*(\text{Scale-down-factor-BBC-novtx} + 1)}$$

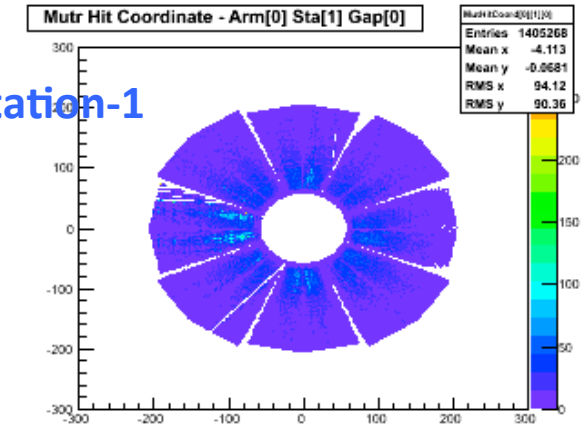
Station-0

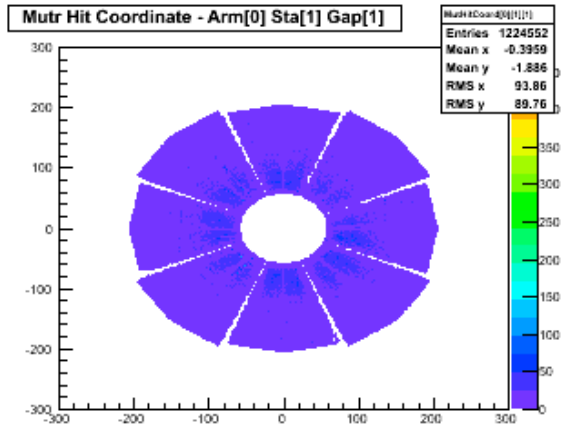


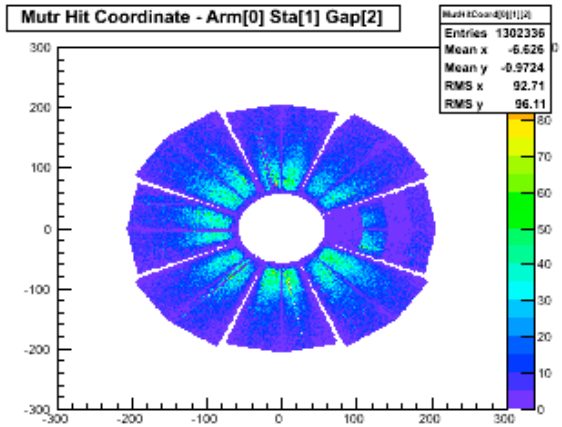




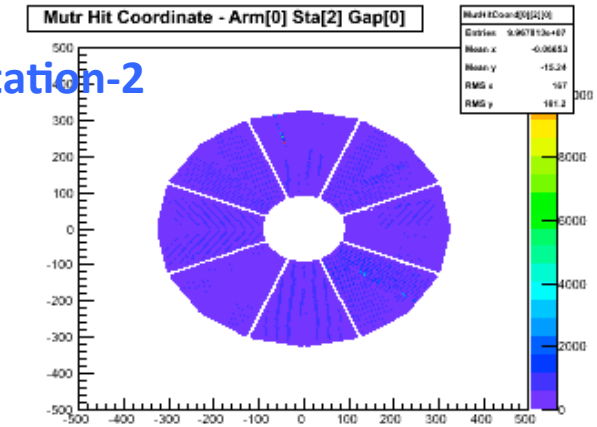
Station-1

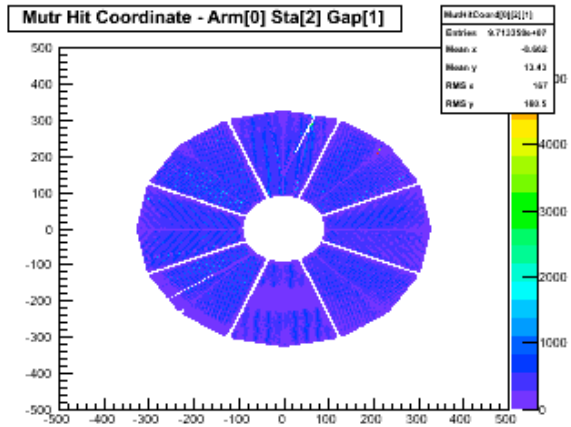






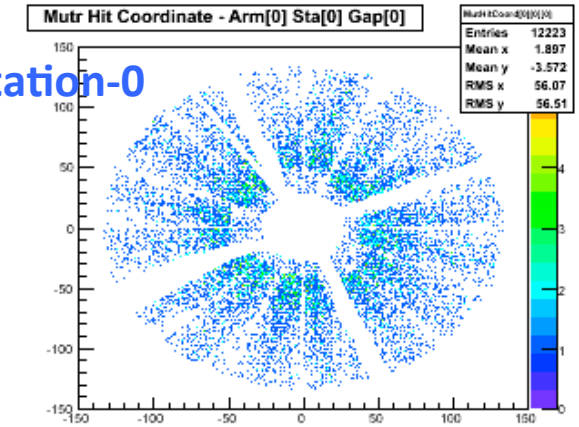
Station-2

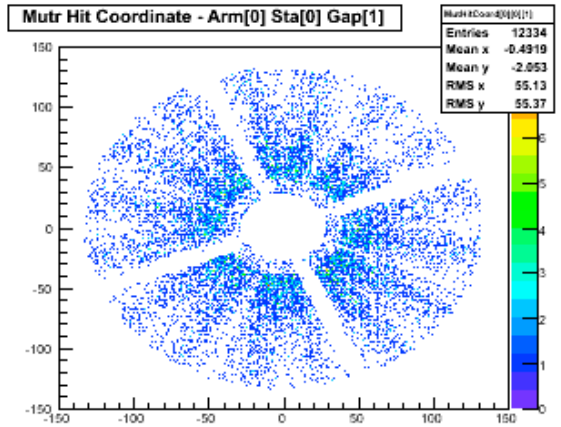


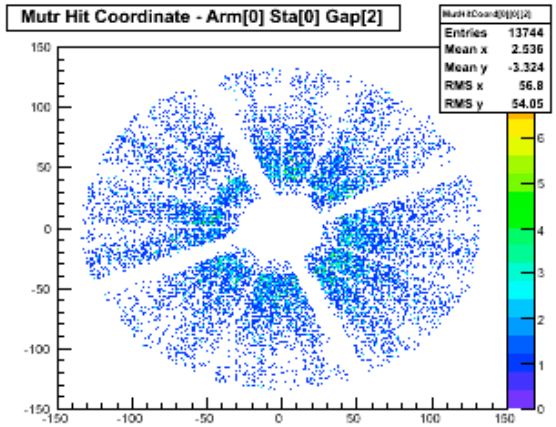


Run 425422. A Good run
South-arm MuTr

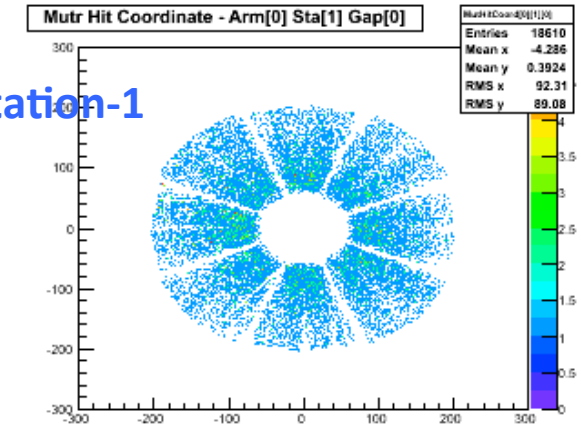
Station-0

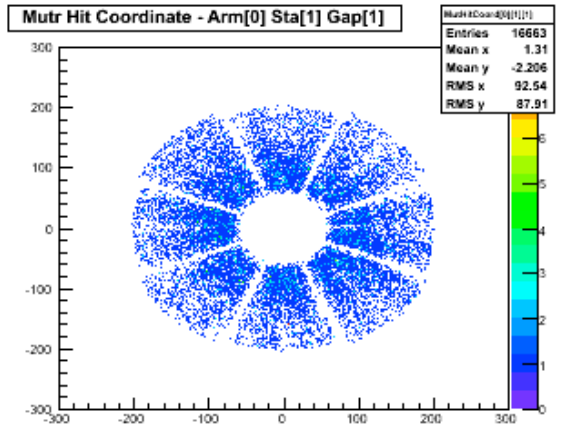


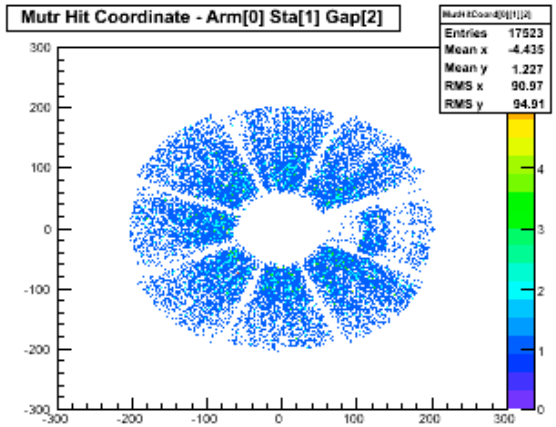




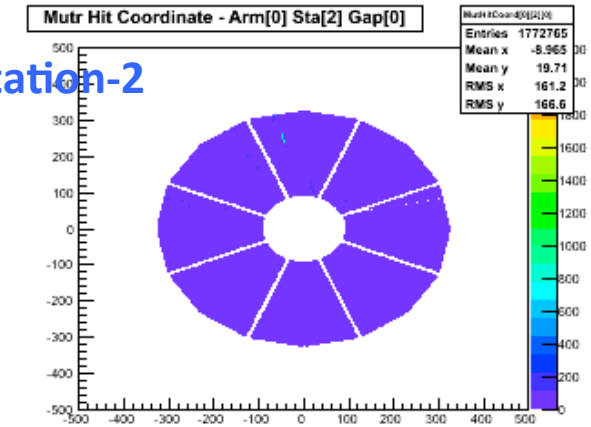
Station-1

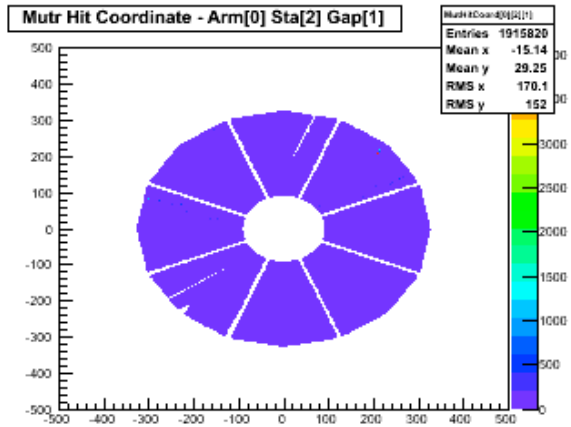






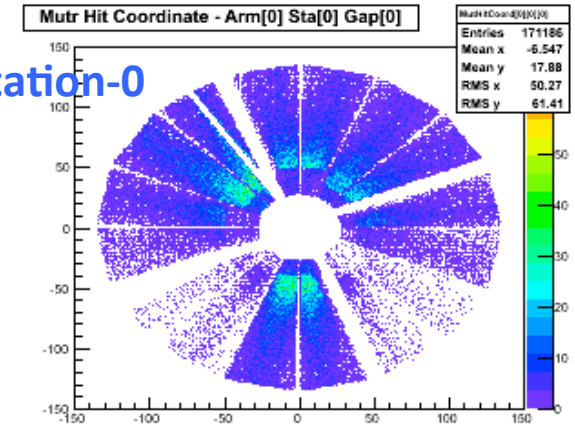
Station-2

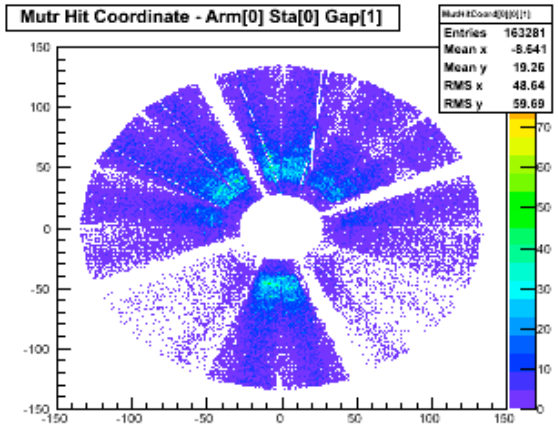


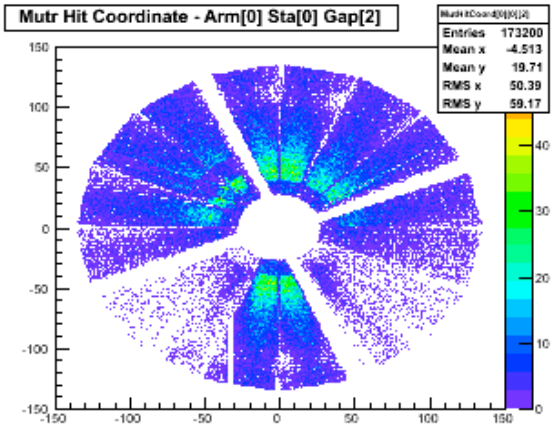


Run 425423
South-arm MuTr
St0, St1 problems.

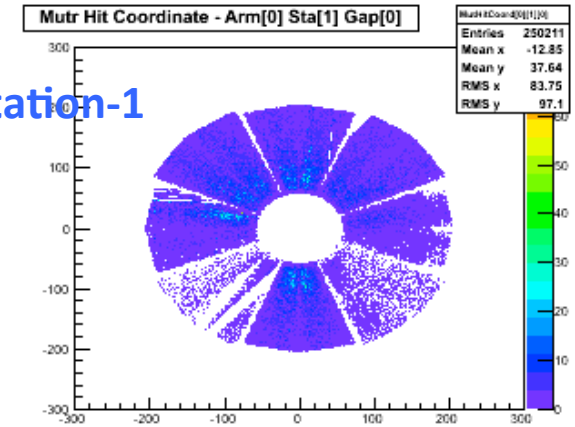
Station-0

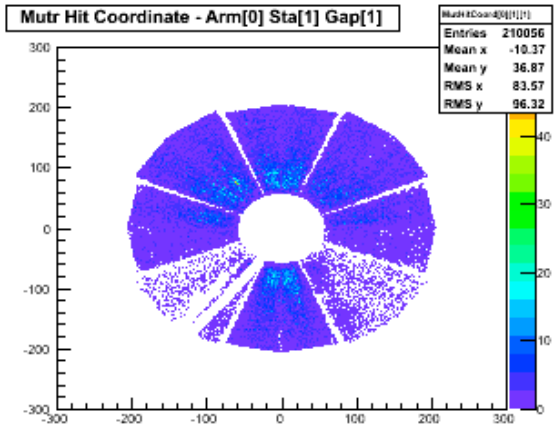


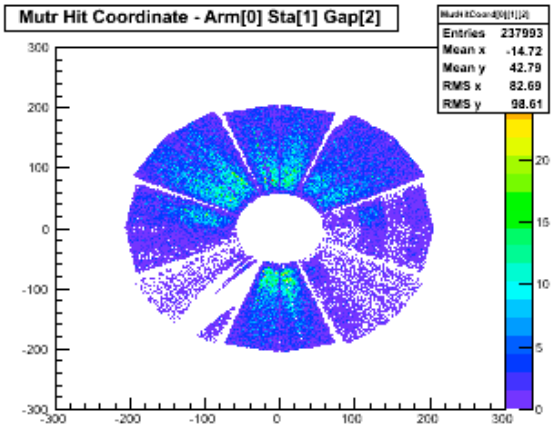




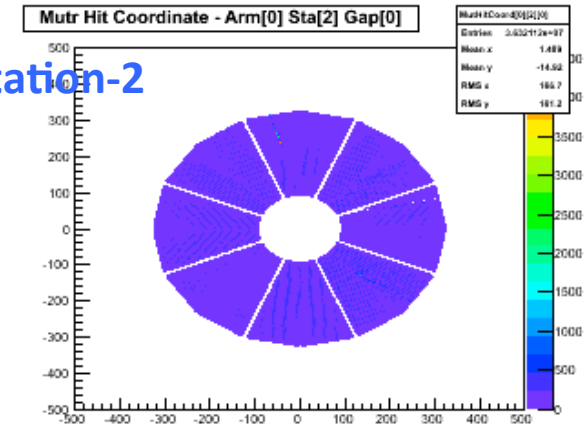
Station-1

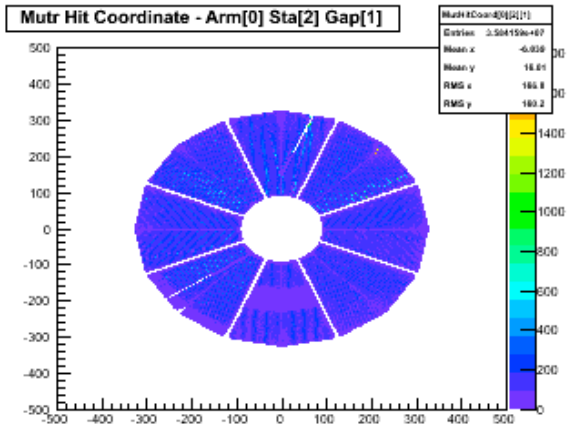






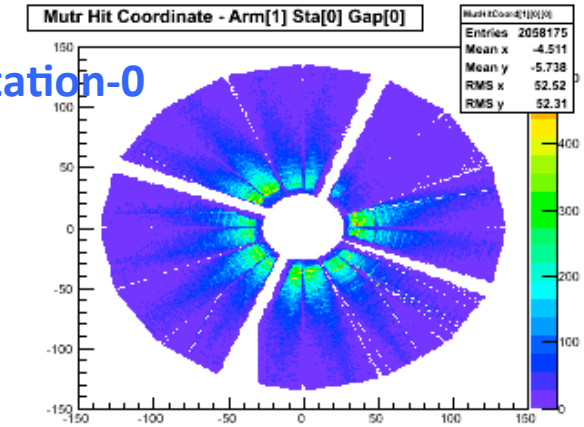
Station-2

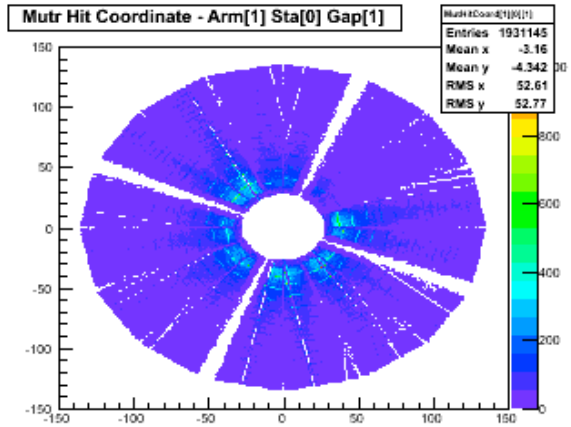


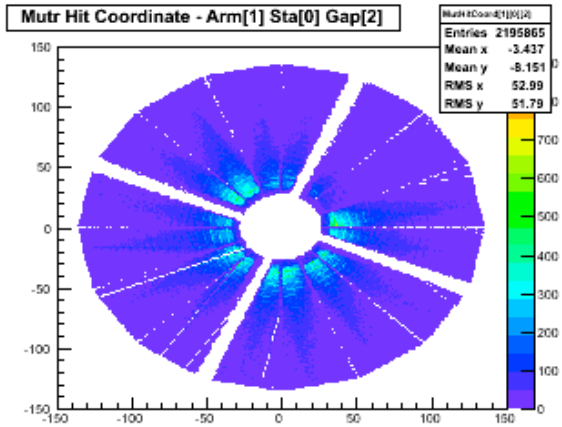


Run 429886-429888
South-arm MuTr
St0, St1 problems.

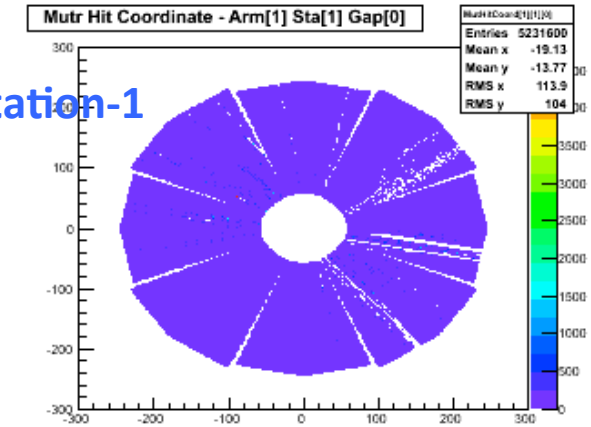
Station-0

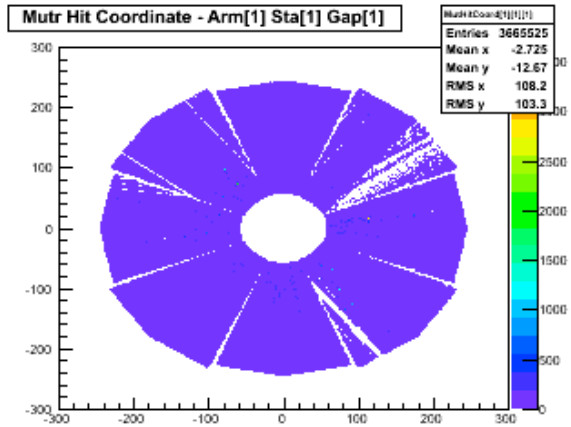


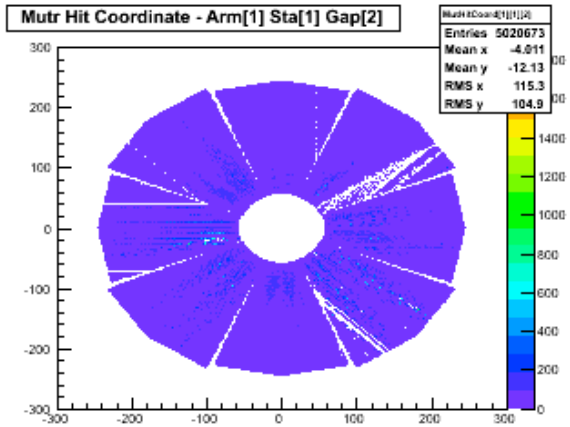




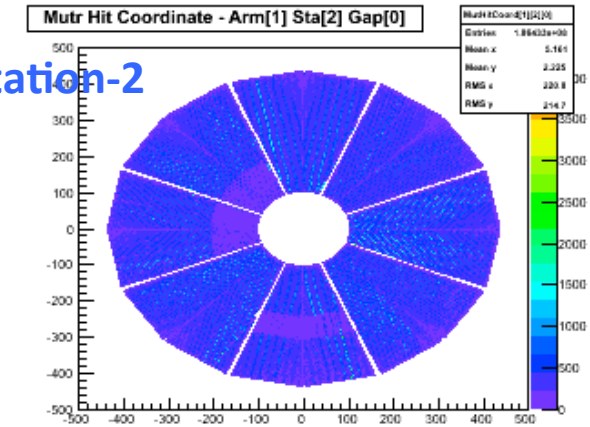
Station-1

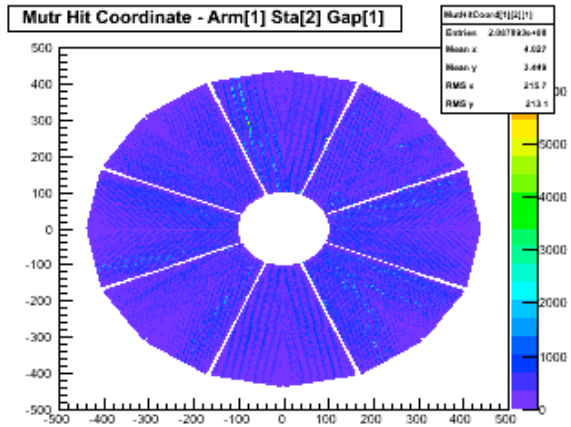






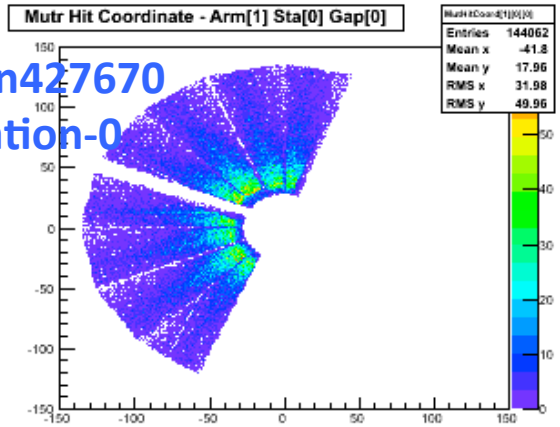
Station-2

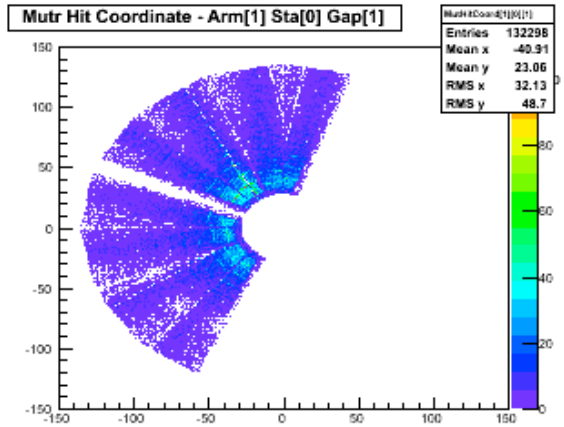


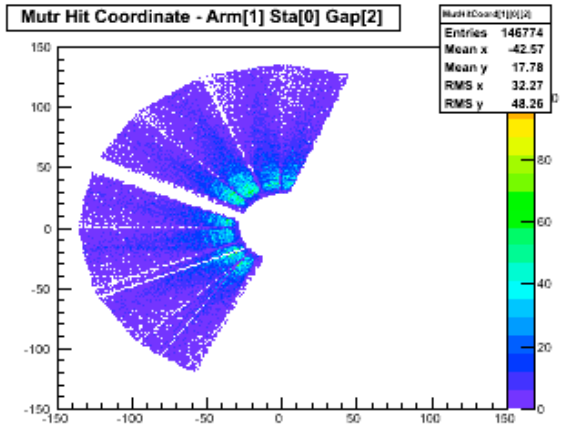


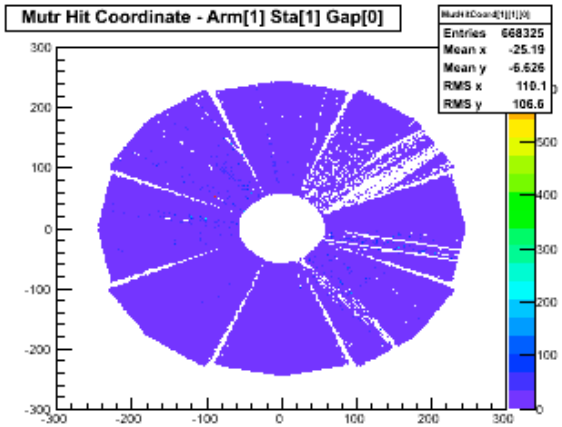
Run 425422. A Good run
North-arm MuTr

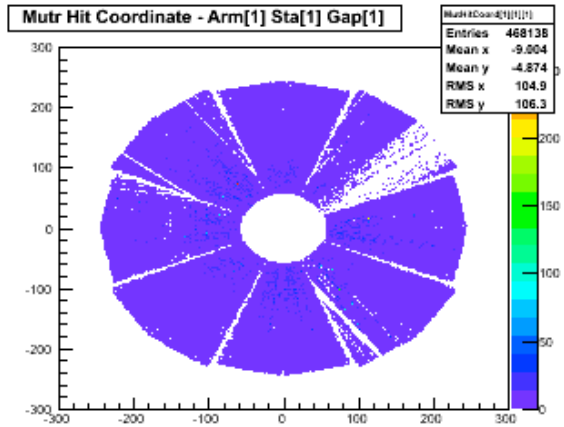
Run427670
Station-0

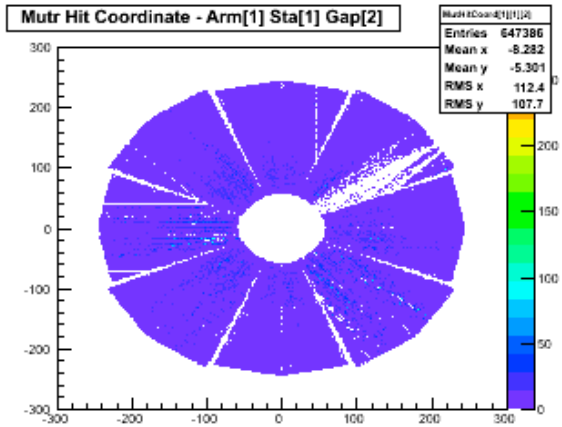


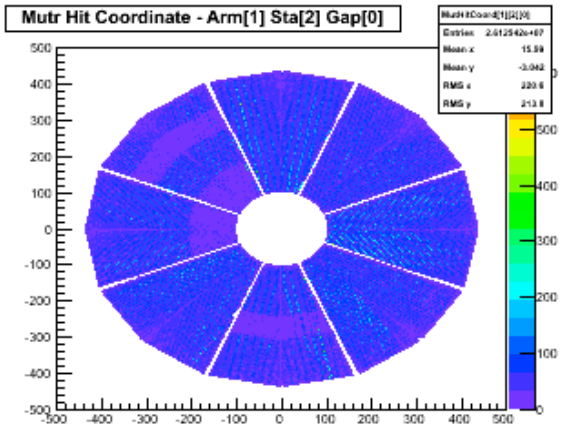


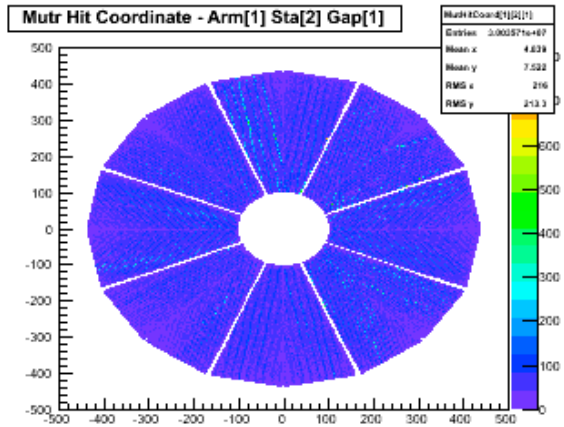






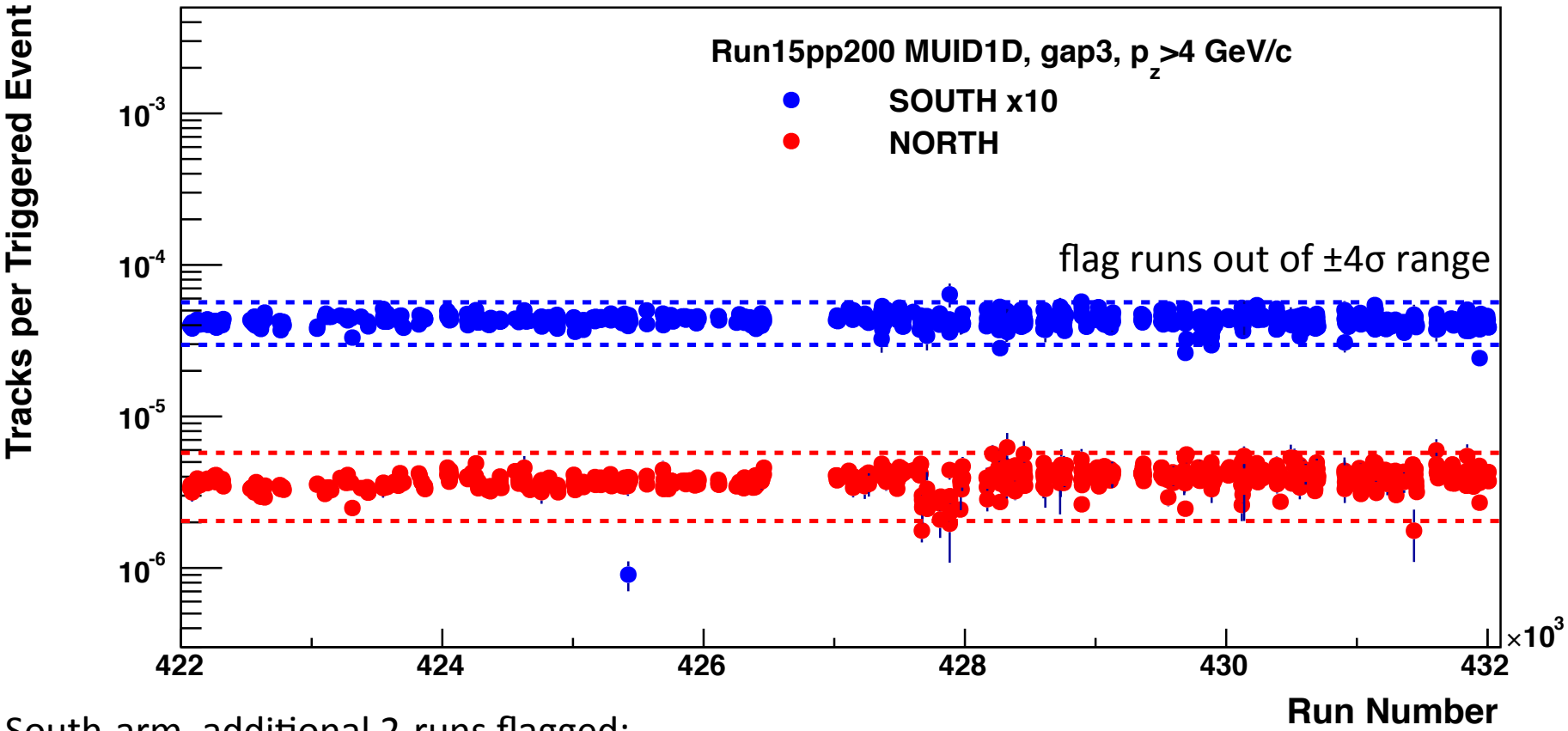






Run 427670-427969
North-arm MuTr
Station-0 half-off.
glink problems on N.St0, N.St1.

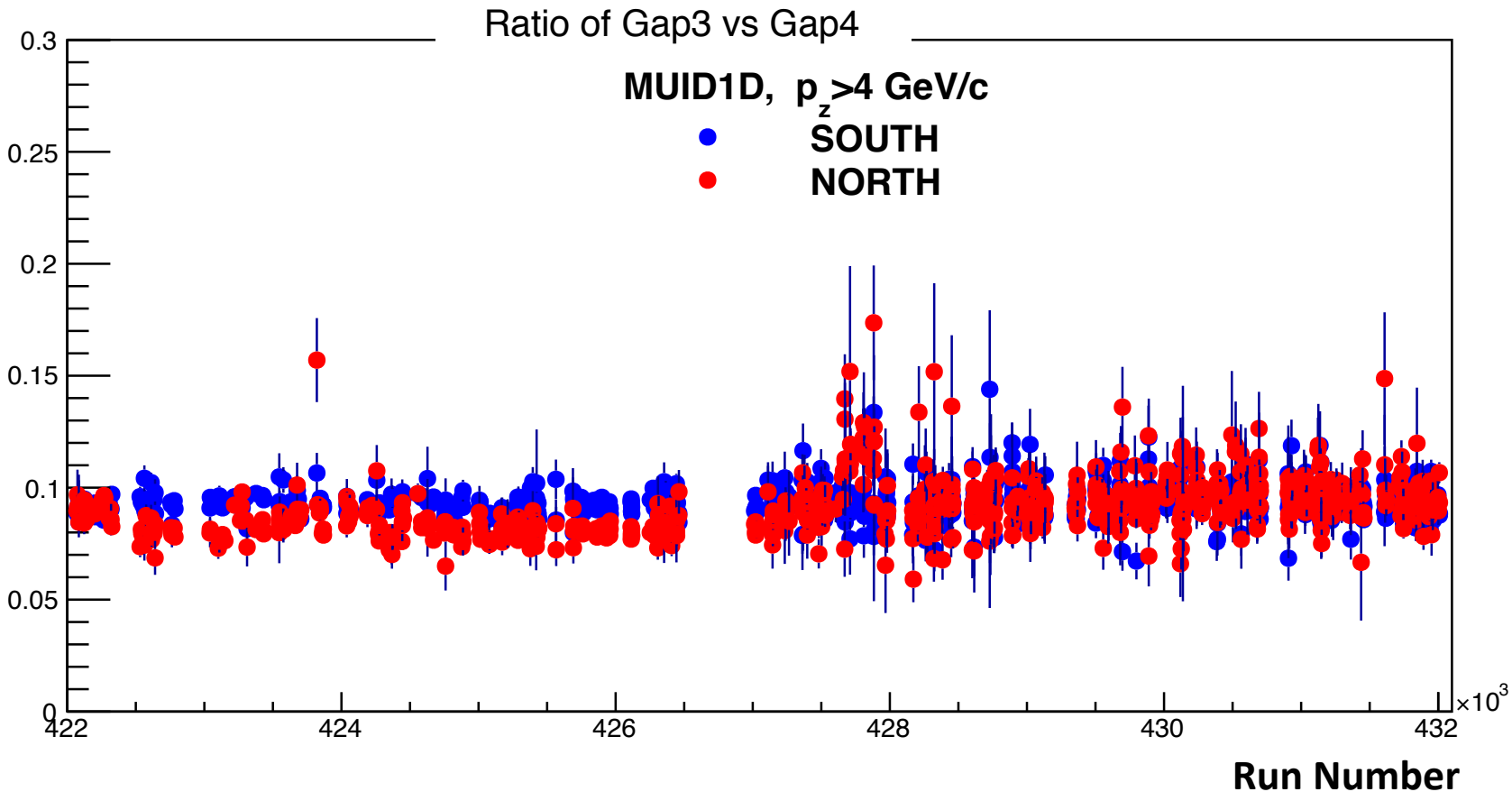
Tracks-per-Triggered-Events: Trigger=MUID1D, lastgap=3



South-arm, additional 2-runs flagged:
427883 (very short run),428891 (15 min. Comment: Stopped due to low livetimes ~0.70)

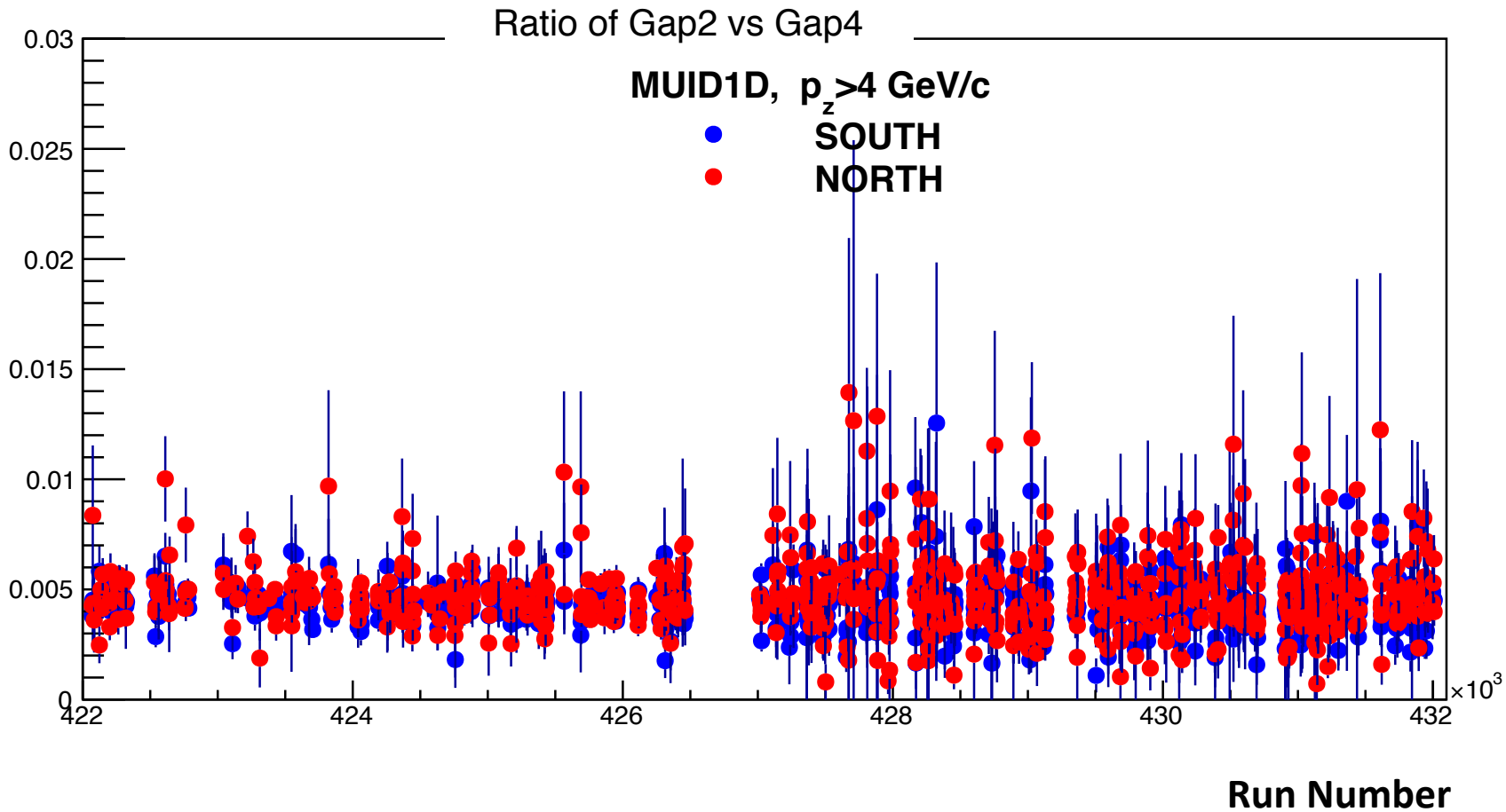
North-arm, additional 2-runs flagged:
428323 (short run, 7 min),431608 (short run, 8 min.)

Ratio gap3/gap4: Trigger=MUID1D



Ratio of gap3/gap4 in MUID1D triggered events is reasonably stable, ~10%

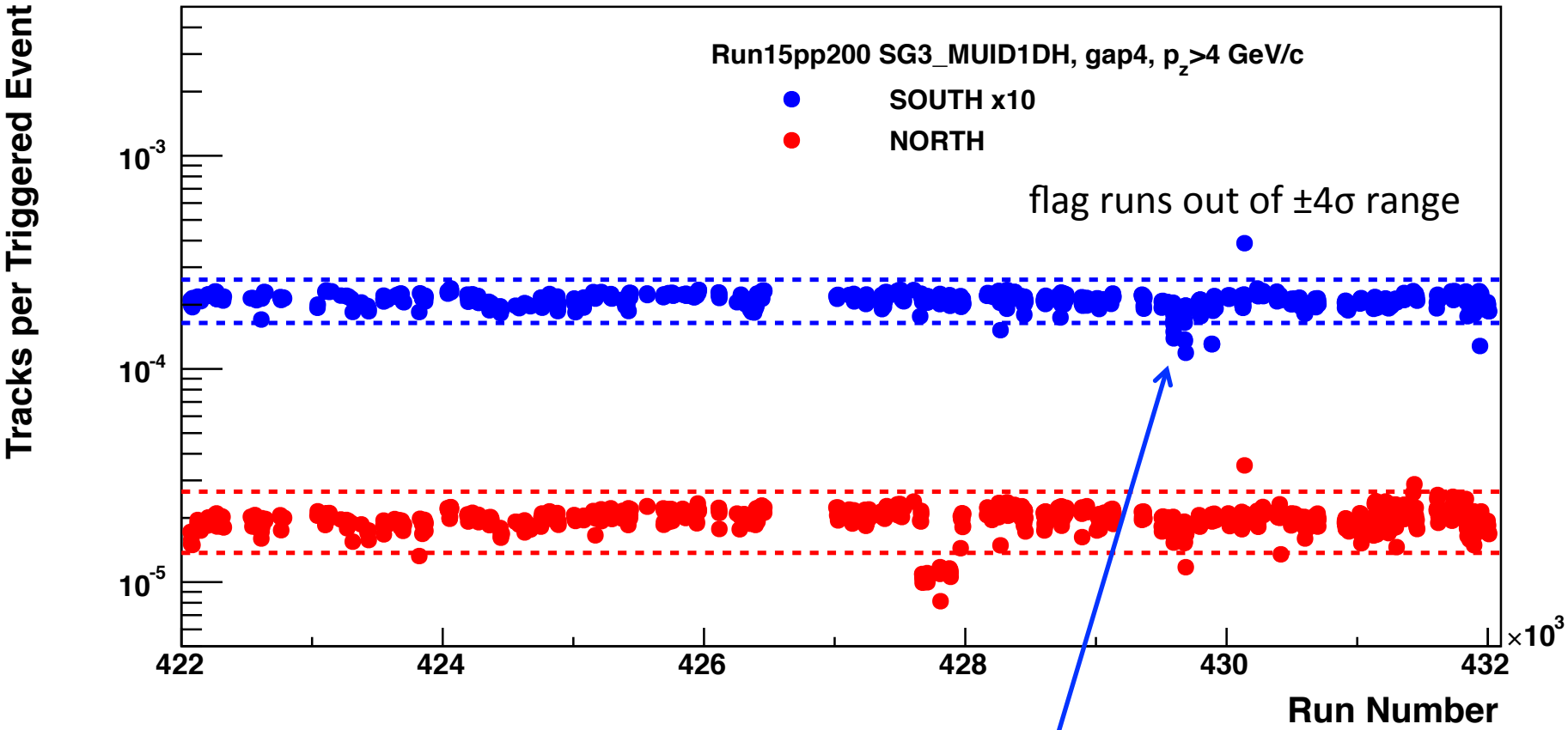
Ratio gap2/gap4: Trigger=MUID1D



A very small fraction (~0.5%) of MUID1D triggered events end-up as lastgap=2 events after reconstruction. Ignore them for the moment.

For high-momentum single-muon triggered events only (SG3_MUID1D1H)

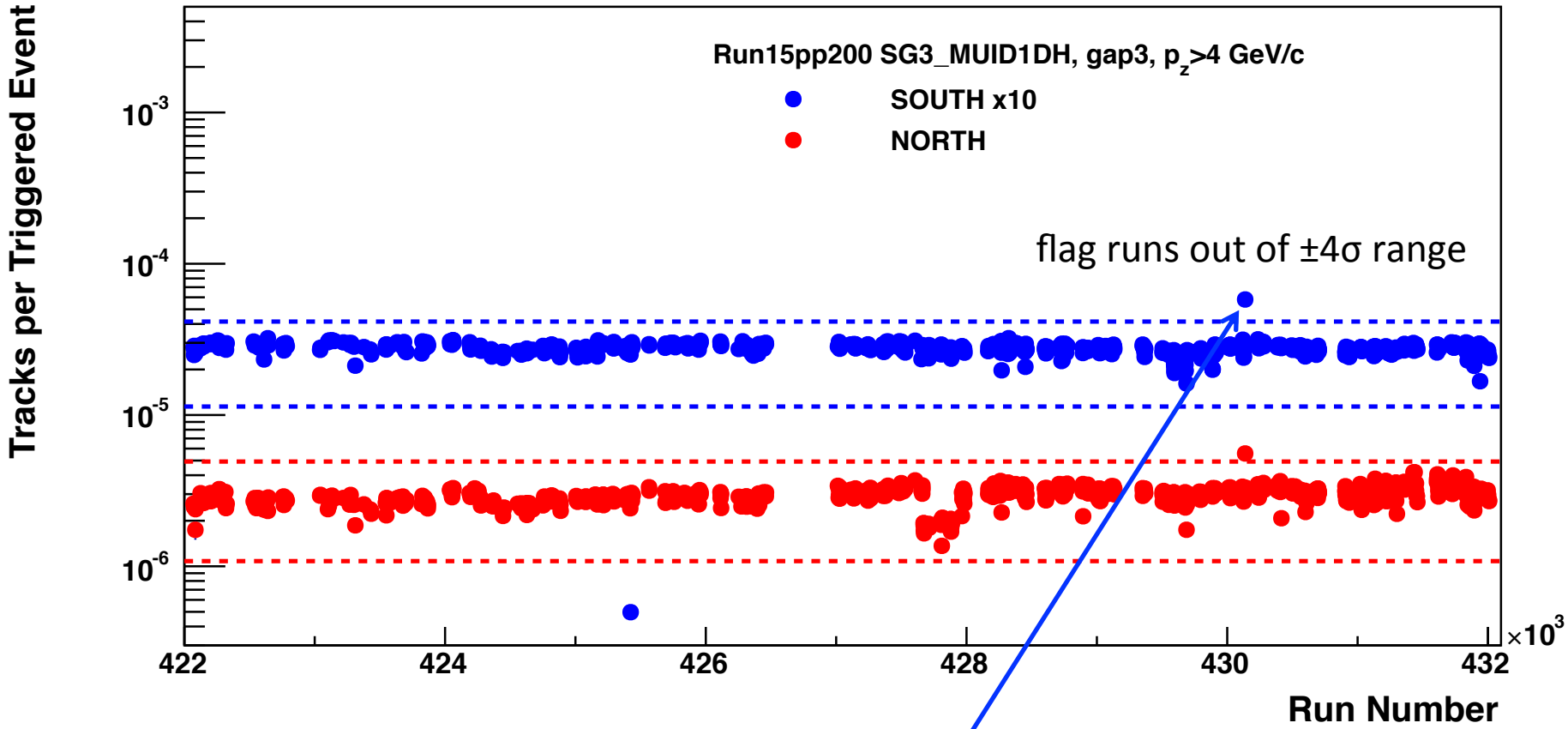
Tracks-Scaled-to-per-BBC-Triggered-Events: Trigger=SG3_MUID1D1H, lastgap=4



South-arm for SG3 triggered-events only, additional 5 runs flagged:
429593,429594,429595,429678,429680 (comments: ended with mutrigger issues)

North-arm for SG3 triggered-events only 7 runs flagged:
431932,431937,431938,431940,431941,431942,431943 (comments: north sg3 taken out).

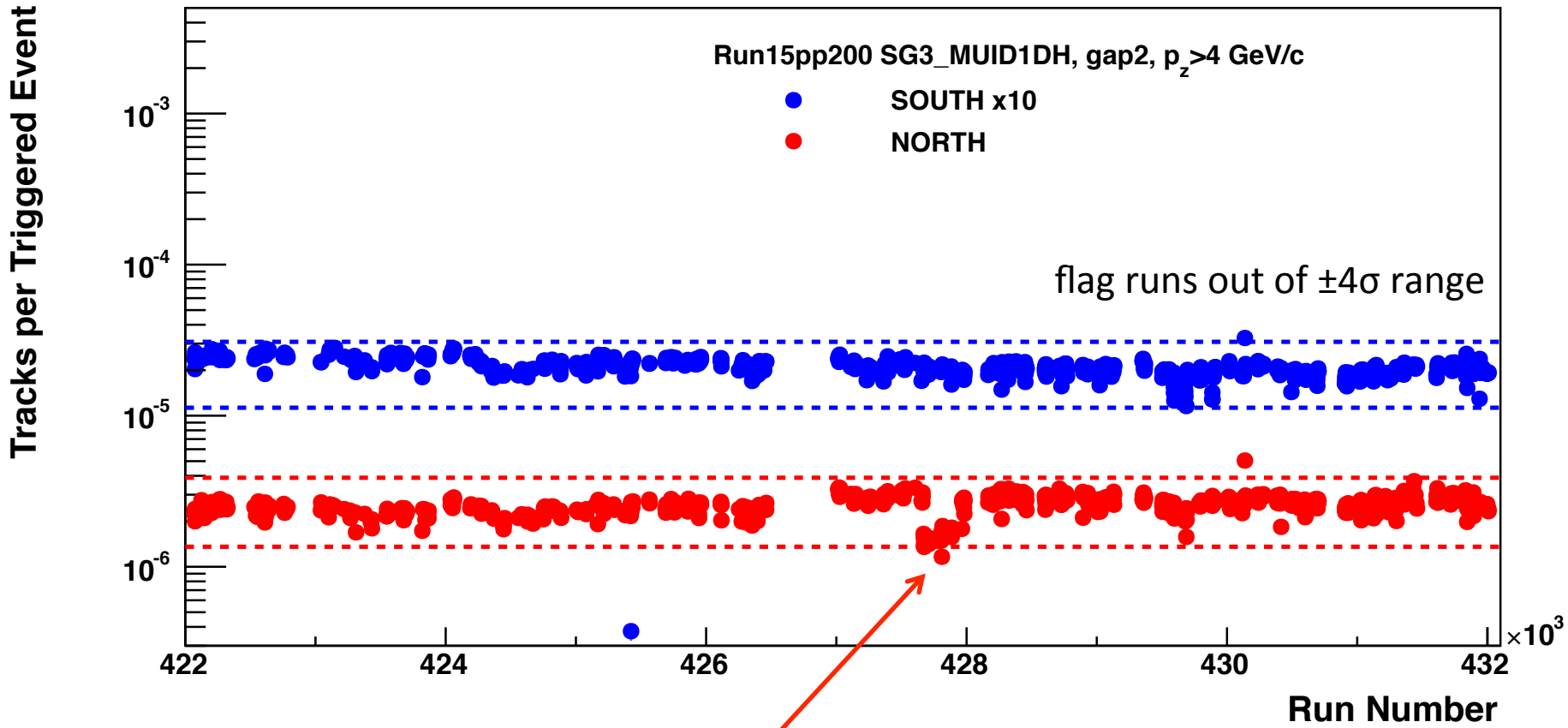
Tracks-Scaled-to-per-BBC-Triggered-Events: Trigger=SG3_MUID1D1H, lastgap=3



South-arm for SG3 triggered-events only, 1-runs flagged:
430137 (short run, 6 min)

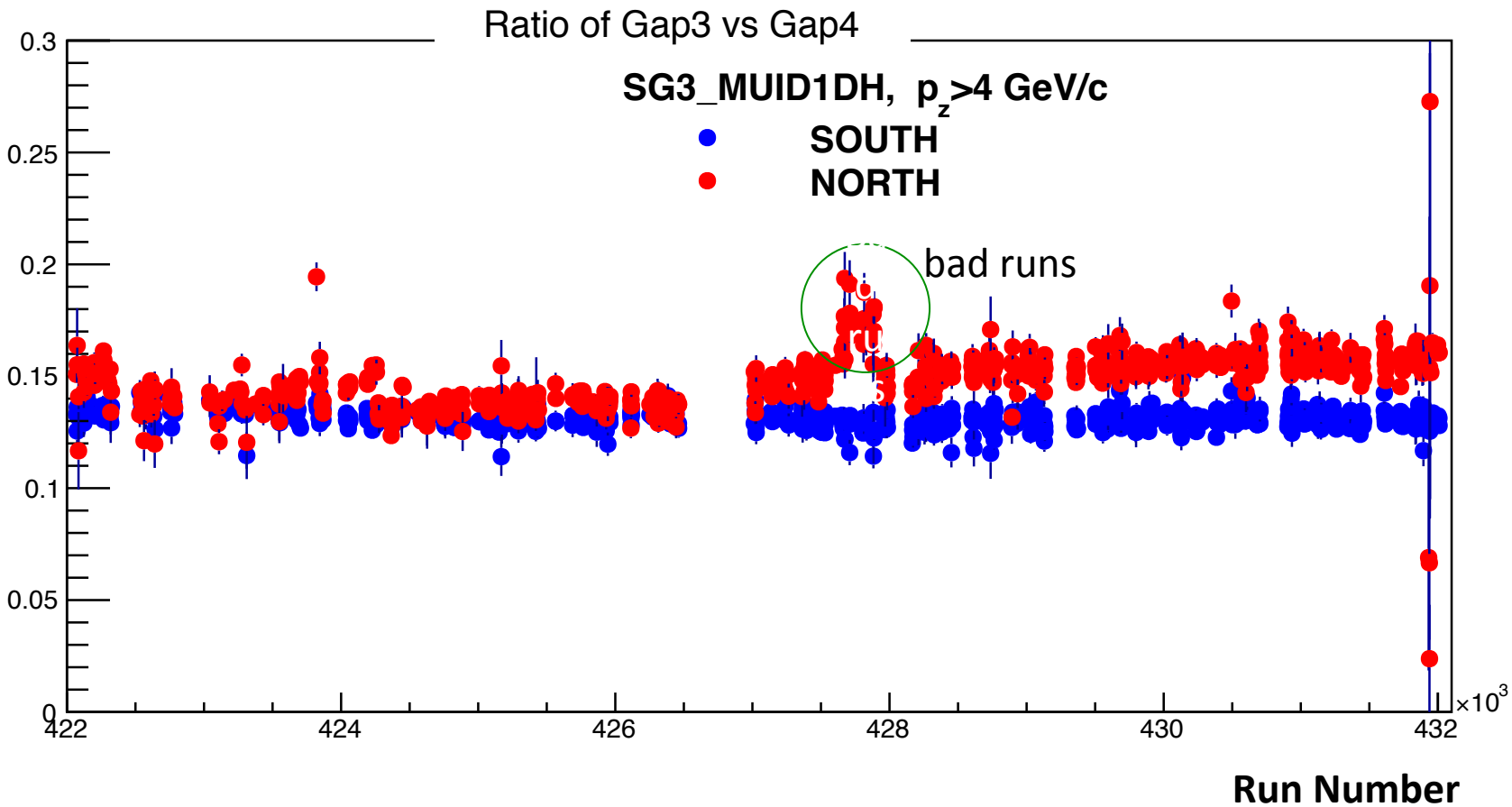
North-arm for SG3 triggered-events only, 7 runs flagged:
431932,431937,431938,431940,431941,431942,431943 (comments: north sg3 taken out).

Tracks-Scaled-to-per-BBC-Triggered-Events: Trigger=SG3_MUID1D1H, lastgap=2



North-arm for SG3 triggered-events only, 2 runs flagged:
427674 (Low live rate ~0.72), 427810 (short run, 6 min.)

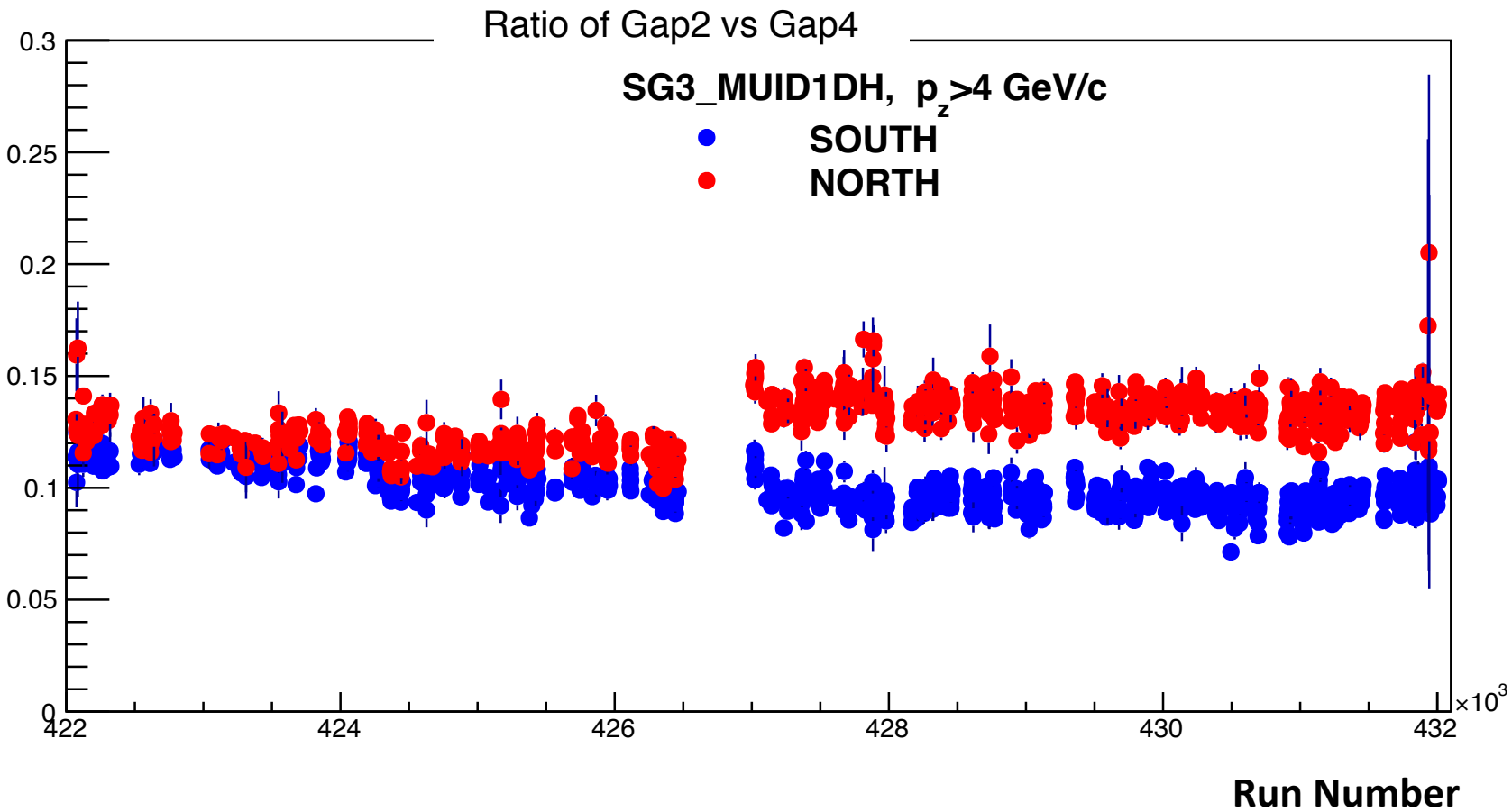
Ratio gap3/gap4: Trigger=SG3_MUID1D1H



Ratio of gap3/gap4 in SG3_MUID1D1H triggered events is reasonably stable, ~13-15%.

High statistics gap3 events in SG3 trigger.

Ratio gap2/gap4: Trigger=SG3_MUID1D1H



Ratio of gap2/gap4 in SG3_MUID1D1H triggered events is reasonably stable, ~10-15%.

1H trigger worked-well

High statistics gap2 events in SG3 trigger.

Summary: run15pp200 Flagged Runs

N-422611, S-422611 Comment: a. Backgrounds were high in N1~N3 for whole period. Stopped the Run once Backgrounds improved seriously by MCR

425433: rejected. missing MuID HV record, RunLog looks fine. Might be a good run.
N-427654,S-427654, MuID HV were off for the last 5 minutes in the run.

N-427656-427969, N.St0, N.St1 daq problems.
427674, short 14 min. Comment: Low live rate ~0.72.

N-428728, S-428728, low live-time, ~0.25.
N-428891, S-428891, 15 min. Comment: Stopped due to low livetimes ~0.70.
N-423311, S-423311, Comment: MuTr were testing out trigger rates.
N-423820, S-423820, Comment: High background, and poor livetime ~0.60.
N-429687, S-429687. 24 min run, both arm yields low.

S-429886-429888. S.St0, S.st1 problems.
430519: MuTr HV was OFF
Missing on taxi-6729 from production 424439, 427656, 430402, 430519.
430415 North yield low, for both MUID1D and SG3

N-431939, S-431939, both arm yields low, Comment: Muon North SG3 triggers off due to detector problems.

For SG3-MUID1D1H triggered events only flagged-runs

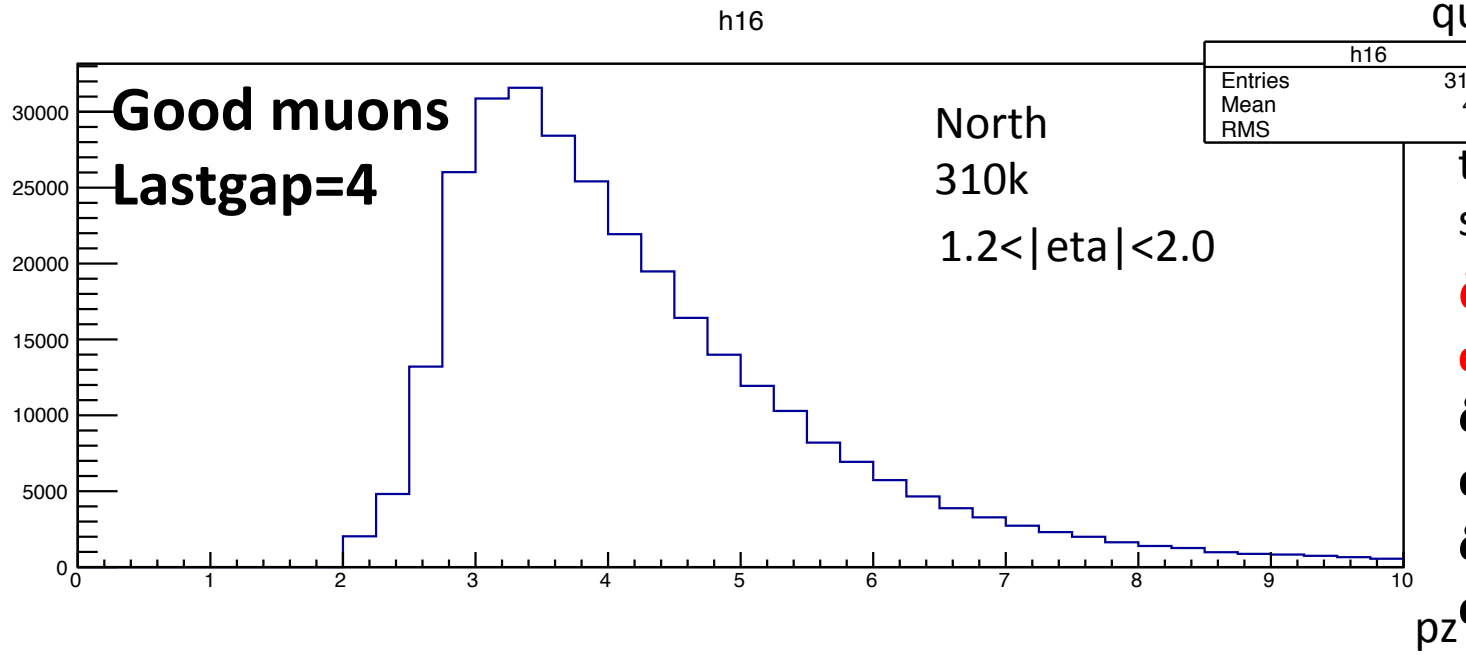
South-arm for SG3 triggered-events only, additional 5 runs flagged:
429593,429594,429595,429678,429680 (comments: ended with mutrigger issues)

North-arm for SG3 triggered-events only, additional 7 runs flagged:
431932,431937,431938,431940,431941,431942,431943 (comments: north sg3 taken out).

I want to remind you ….

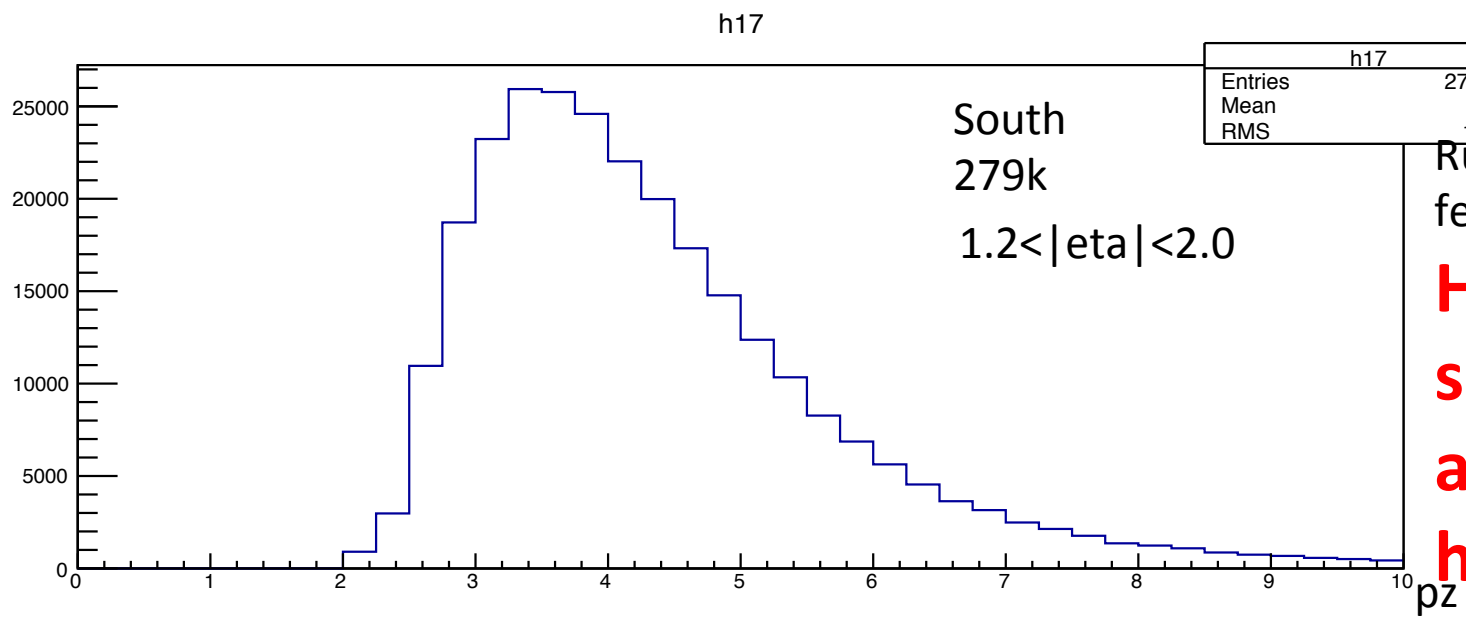
Run427360 BBC_rate=1.56 MHz, March 20th, 2015.
100 minutes. sg3_N: 1kHz, sg3_S: 240 Hz.

sg3&MUID1D triggered good quality muon events



this run alone:
stat. uncertainty:

$\delta(A_N) = 0.5\%$
each arm for muon
$\delta(A_N) = 1.3\%$
each arm for gap3
$\delta(A_N) = 1.6\%$
each arm for gap2

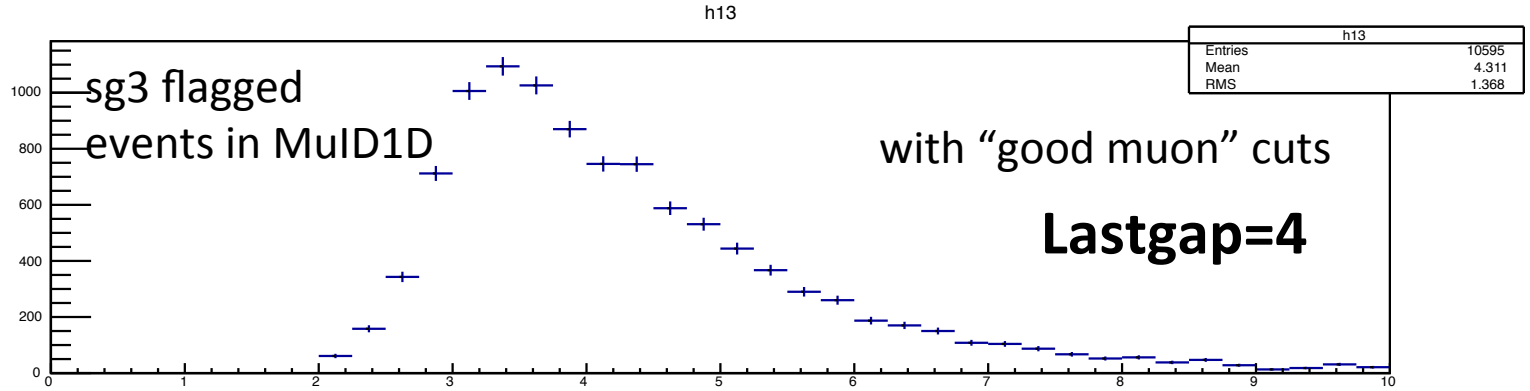


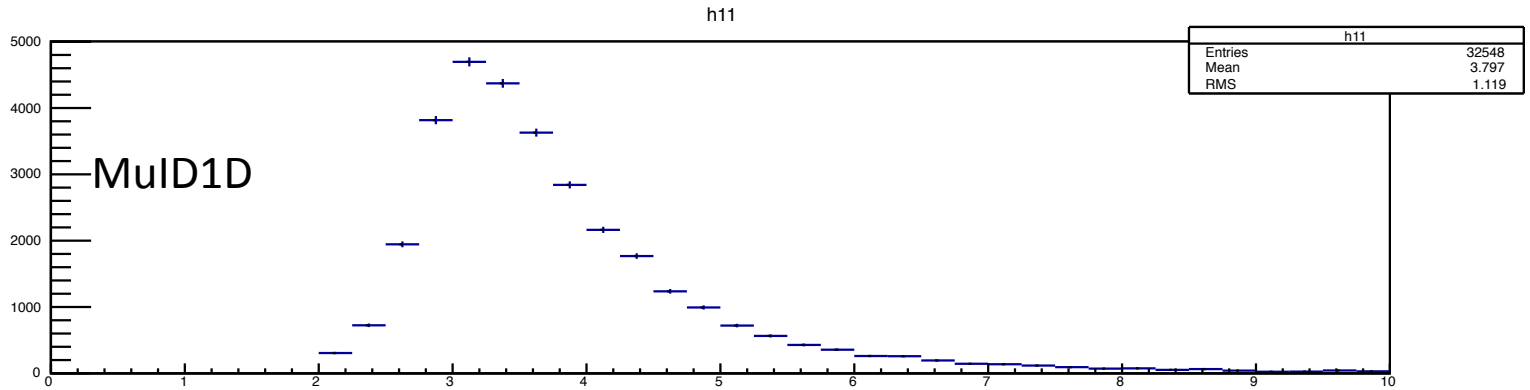
Run15 pp200 have few 100 good runs.

High precision single-muon and single-hadron A_N !!!

Run-426445, taken on March 14th, 2015

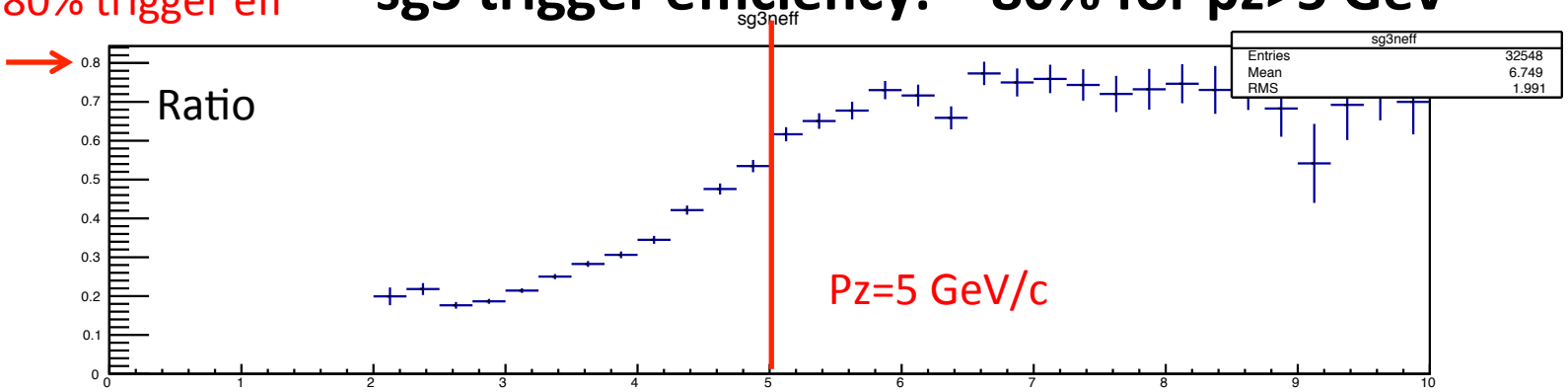
North Arm





80% trigger eff

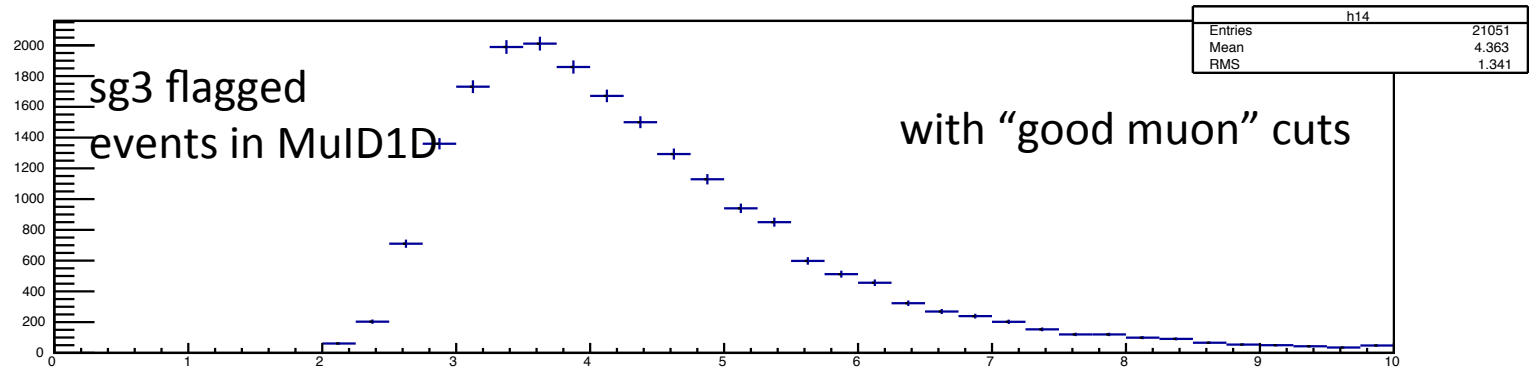
sg3 trigger efficiency: ~ 80% for pz>5 Gev

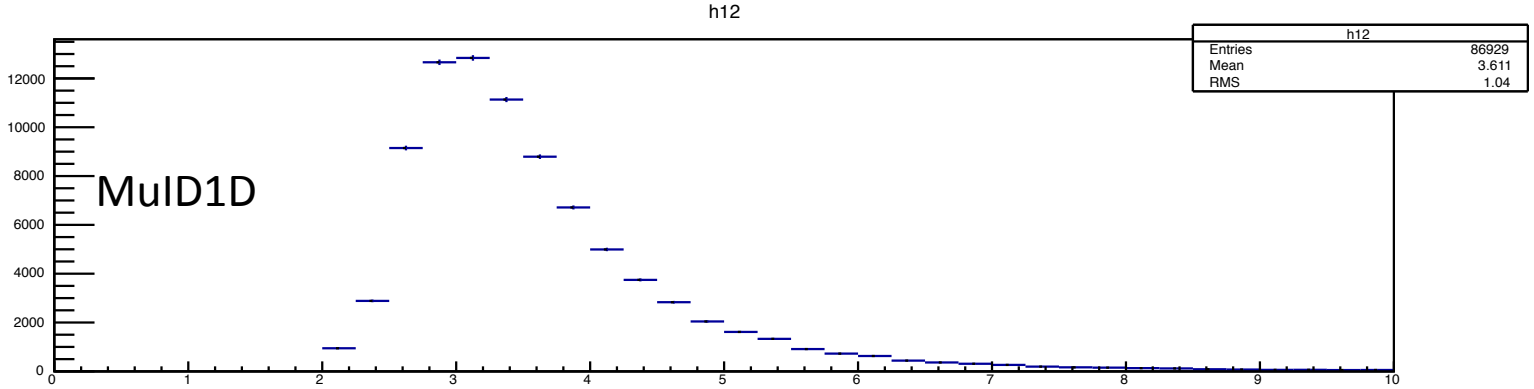


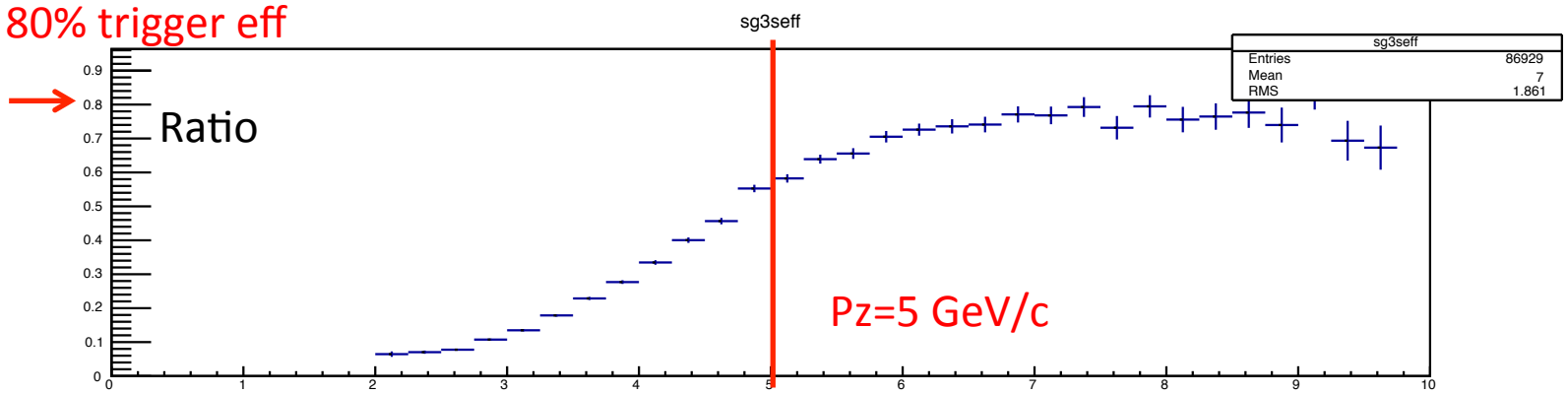
Pz (GeV/c)

Run-426445, taken on March 14th 2015

South Arm







Pz (GeV/c)

Backup Slides

From Itaru, on possible spin-sign screw-ups:

Missing Runs Summary (pp)

pp

Fill	Run	Duration [min]	Symptom
18678	422375	49	Magnet trip
18697	423413	70	Magnet trip
18723	424439	22	Can be recovered
18754	425567	35	Magnet trip
18765	425941	76	Magnet trip
18787	427129	6	Recovered
	427136	7	Recovered
	427137	60	Recovered
18942	431236	31	Magnet trip

None of them passed run selection.