

# BES-II/FXT Run-by-Run QA Status Report

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*17 December 2012*

Note: BES-II Run-by-Run QA Status Page (maintained by Rongrong Ma):  
<https://drupal.star.bnl.gov/STAR/pwg/common/bes-ii-run-qa>

**Updated December 17<sup>th</sup>, 2021  
→ Updated to include analysis  
of Ashik's December 17<sup>th</sup> QA  
board report**

Outline for 17 December 2021 Status Report:

- Injection Runs:
  - 19.6 GeV COL → Final
  - 14.6 GeV COL → Final
- Bad runs lists:
  - 19.6 GeV COL → Assessment
  - 14.6 GeV COL → Look Ahead
  - 4.59 (3.2) GeV FXT → Look Ahead

## Injection runs (19.6 GeV COL and 14.6 GeV COL)

- **19.6 GeV COL**
  - Initial List of inj. Runs prepared by Gene
  - Ashik and Li Ke found additional inj. runs during the course of Run-by-Run QA → These have been added
  - DAC found additional inj. Runs by going through the online log book day-by-day → These have been added
  - Total of 275 Injection Runs identified
  - Final list of inj. Runs can be found at:
    - <https://drupal.star.bnl.gov/STAR/pwg/common/bes-ii-run-qa/bes-ii-196-gev-col>
- **14.6 GeV COL**
  - Initial list prepared by DAC going through log book day-by-day
  - Cross checked with list prepared by Jeff in 2019
  - Total of 401 Injection Runs Identified
  - Final list of inj. Runs can be found at:
    - <https://drupal.star.bnl.gov/STAR/pwg/common/bes-ii-run-qa/Run19-AuAu-146-GeV-COL-1>

# Assessment of Bad Runs List for 19.6 GeV COL Au+Au

Referring to Ashik's slides from December 13<sup>th</sup> , 2021

## 74 consistent badruns (Ashik and Li-Ke both found)

20057050 20060025 20062011 20062012 20062036 20063011  
20063039 20064009 20067024 20067045 20067046 20069030  
20071005 20071006 20072034 ~~20073071~~ ~~20075014~~ 20075015  
20076040 ~~20076058~~ 20076059 20077018 20081002 20081014  
20081015 20082060 20083024 20086012 20087007 20090024  
20091012 20057026 20072035 20072036 20089008 20090011  
20091011 20092054 20065018 20072039 20064012 20072041  
20064011 20069032 20072045 ~~20069054~~ 20072047 ~~20058000~~  
20058001 20058002 20060012 20060060 20067023 20067029  
~~20070041~~ 20070042 20070043 20070044 20071001 20071004  
20074027 20077017 ~~20060021~~ 20060061 20063035 20067014  
20067030 ~~20071000~~ 20071037 20082065 20060022 20060062  
20067015 20057025

Injection runs

Not badrun: \_\_\_\_\_

New badruns: 20063034, 20072048

## Comments about Changes:

Run 20073071 → Now Ashik Only

Run 20075014 → Junk Run, no events

Run 20076058 → Not a real run, 0

Run 20069054 → Now Ashik Only

Run 20058000 → Not a real run

Run 20070041 → Injection run

Run 20060021 → Not a real run

Run 20071000 → Not a real run

Run 20063034 → Previously Ashik Only

Run 20072048 → Previously Ashik only

## Comments about Changes:

### Extra 5 badruns (Ashik):

20064040 20062010 ~~20063034~~ 20064017 ~~20072048~~ New: 20073071, 20069054

Run 20063034 → Previously Ashik Only

### Extra 7 badruns (Li-Ke):

~~20073072~~ 20058004 20058005 20070047 20071027 20058003

Run 20072048 → Previously Ashik only

~~20071036~~ New: 20064008

Run 20069054 → Previously Both

Run 20073071 → Previously Both

Run 20073072 → Good Run

Run 20071036 → Injection run

Run 20064008 → Short run (1 min)

## Ashik's December 13<sup>th</sup> update:

- Eliminates seven cases that are either in the Injection run list or not real runs
- Changes some runs from Ashik only to both (or vice versa)
- Li Ke adds one short run
- Eight runs are injections runs: 20075015, 20076040, 20076059, 20077017, 20077018, 20081015, 20090011, 20091012

# From Ashik's December 17<sup>th</sup> QA Board Report:

## 55 consistent badruns (Ashik and Li-Ke)

20057050 20060025 20062011 20062012 20062036 20063011 I  
20063039 20064009 20067024 20067045 20067046 20069030  
20071005 20071006 20072034 20073071 20081002 20081014  
20082060 20086012 20087007 20090024 20091011 20092054  
20064012 20065018 20072035 20072036 20089008 20063034  
20072039 20064011 20072041 20072045 20072047 20058001  
20058002 20060012 20063035 20067023 20067029 20070042  
20070043 20070044 20071001 20071004 20074027 20082065  
20060060 20060061 20067014 20067030 20071037 20060022  
20060062

## 5 extra badruns (Ashik)

20057007 20069032 20083024 20064008 20069054

## 10 extra badruns (Li-Ke)

20064040 20073072 20057026 20058004 20058005 20063036  
20070047 20071027 20057025 20058003

**New Slide December 17<sup>th</sup>, 2021  
→ Updated to include analysis  
of Ashik's December 17<sup>th</sup> QA  
board report**

## Additions and Deletions

(wrt to Ashik's December 13<sup>th</sup> Report)

### Additions:

- 20057007 → (3 min) Run stopped for eTOF errors
- 20063036 → No relevant comments
- 20073072 → iTPC Sector 24 RDO 1,2,3  
(Run already included with TPC issues)

### Deletions:

- 20062010 → (1 min run) ShiftLeader Marked as Junk  
(Propose we keep this as bad)
- 20064017 → Low intensity, holding fill while fixing bc
- 20067015 → No relevant comments
- 20072048 → No relevant comments

55 Runs found as bad by both Ashik and Li Ke

5 Runs found by Ashik only

10 Runs found by Li Ke only

Keep run 20062010 as bad

**→ Total of 71 runs to consider as bad**

**Updated December 17<sup>th</sup>, 2021  
→ Updated to include analysis  
of Ashik's December 17<sup>th</sup> QA  
board report**

**Total Number of injection runs → 275**

**Total runs to be considered bad due to iTPC Sector 24 RDO 1,2,3 → 31 (28 additional)**

**→ Total "Bad Runs" = 71 + 28 = 99**

# Fraction of data lost in QA

Updated December 17<sup>th</sup>, 2021  
→ Updated to include analysis  
of Ashik's December 17<sup>th</sup> QA  
board report

Total events in the 19.6 GeV Data set: → 582M HLTgood (Target was 400M)

Fraction of data included in the Injection runs →

Average HLTgood events in an Injection run (37 random injection runs) → 0.204M HLTgood/run

→ 275 runs X 0.204M = 56.1M HLTgood events lost in the injection runs

→ 56.1M/582M = 9.6% of all data lost in the Injection runs

Fraction of data included in the Bad runs list:

→ 27.2M HLTgood events

→ 27.2M/582M = 4.7% of all data lost in bad runs list

Fraction of data included in the Bad runs list (iTPC Sector 24 RDO 1,2,3):

→ 20.8M HLTgood events

→ 20.8M/582M = 3.5% of all data lost from iTPC Sector 24 RDO 1,2,3

All told propose to exclude 56.1M (Inj. Runs) + 27.4M (Bad runs) + 20.6M (iTPC) = 104.1 M

Total events available for analysis = 582 – 104.1 = 477.9M (Target was 400M)



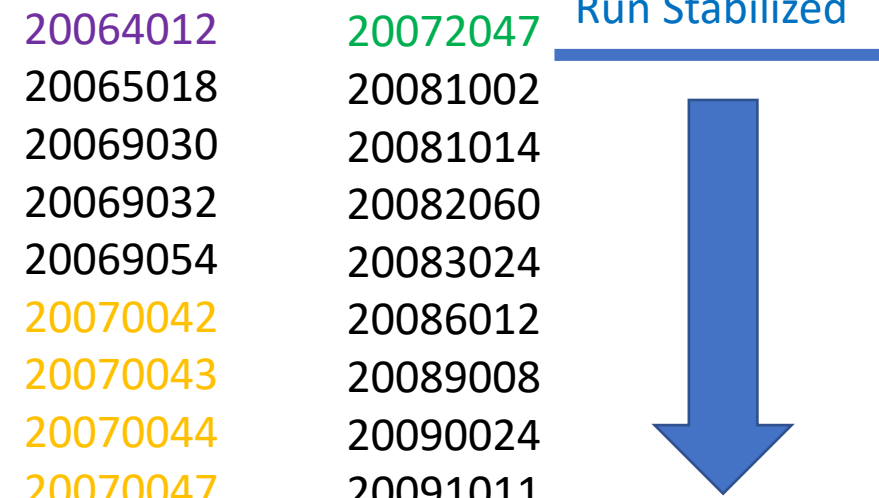
**Updated December 17<sup>th</sup>, 2021**  
**→ Updated to include analysis of Ashik's December 17<sup>th</sup> QA board report**

# Reasons for Rejecting runs (Total of 71 runs identified by bad, 27.2M HLTgood)

- 13 Short runs (<5 minutes) (Total 0.25M HLTgood)
- 13 No BTOW (Total 5.6M HLTgood)
- 10 Miscellaneous known issues (Total 2.0M HLTgood)
- 35 Seemingly good runs (Total 19.4M HLTgood)

We note several regions of bad runs:

Short Runs	No BTOW	Known Issues	Good Runs
20057007	20067014	20060012	20057025
20057050	20067023	20062012	20057026
<del>20058003</del>	<del>20067024</del>	20063011	<del>20058001</del>
20060025	20067029	<del>20063034</del>	20058002
20062010	20067030	20072035	20058004
20062011	20067045	20073071	20058005
20062035	20067046	20073072	20060022
20063036	20071001	20074027	20060060
20063039	20071004	20082065	20060061
20064008	20071005	20087007	20060062
20064040	20071006		20063036
20072041	20071027		20064009
20092054	20071037		20064011

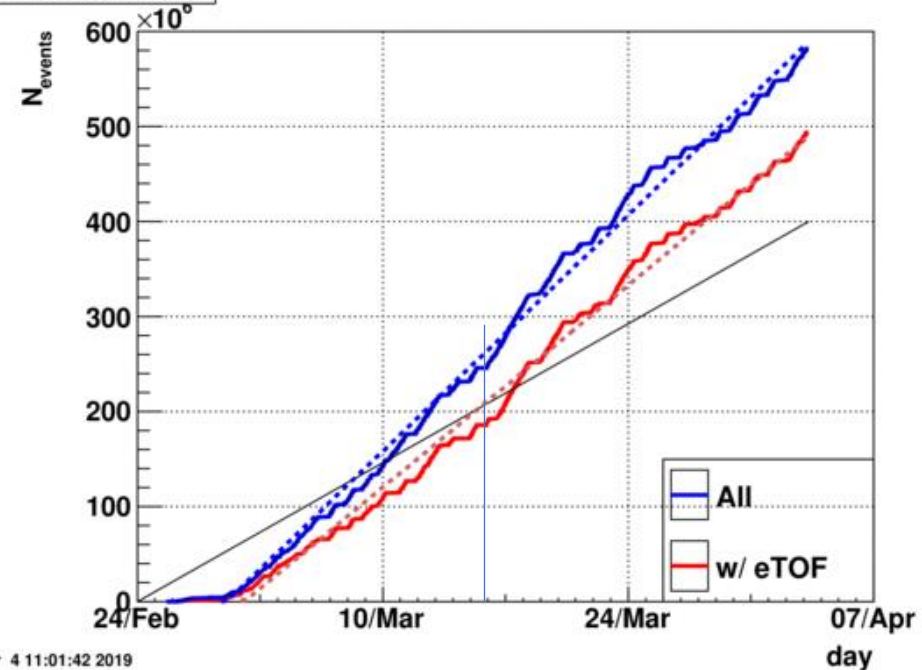


Energy	Start	Finish	First Run	Last Run	HLTgood	Target
19.6	Feb 25 <sup>th</sup>	April 3 <sup>rd</sup>	20056032	20093036	582 M	400 M

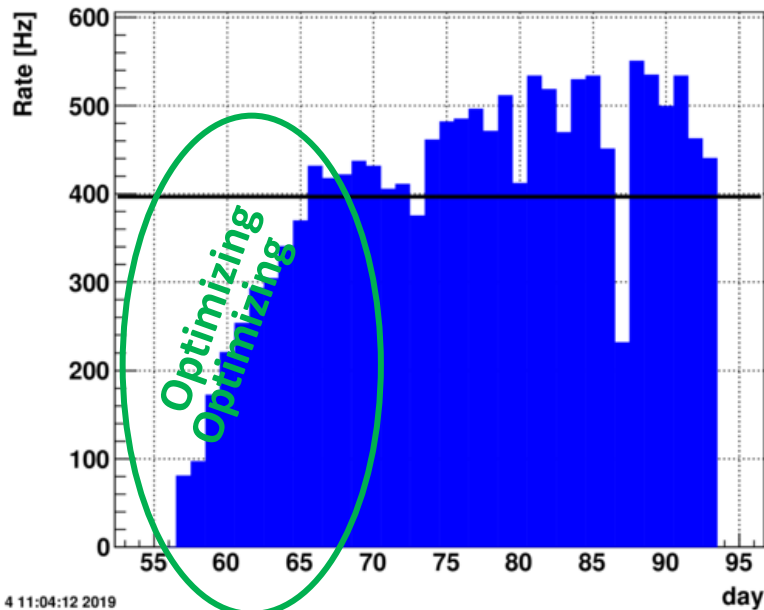
	2011	predicted	achieved
Average HLTgood event rate (Hz)	85	335	<b>400</b>
Data taking (hours per day)	9	10 -15	<b>10</b>
Fill Length (minutes)	30	60	<b>60</b>
DAQ Rate at start of fill (Hz)	500	1700-6800	<b>2000</b>
Ratio of HLTgood/triggers (%)	44%	44%-20%	<b>50%</b>

- Ran 19.6 GeV from Feb 25<sup>th</sup> (56) to April 3<sup>rd</sup> (93)
- Three runs per fill (*injection*, first half, second half)
- Used selective triggering to keep overall DAQ rate down
- Accumulated **582 M** HLTgood w/ eTOF

minbias-hltgood

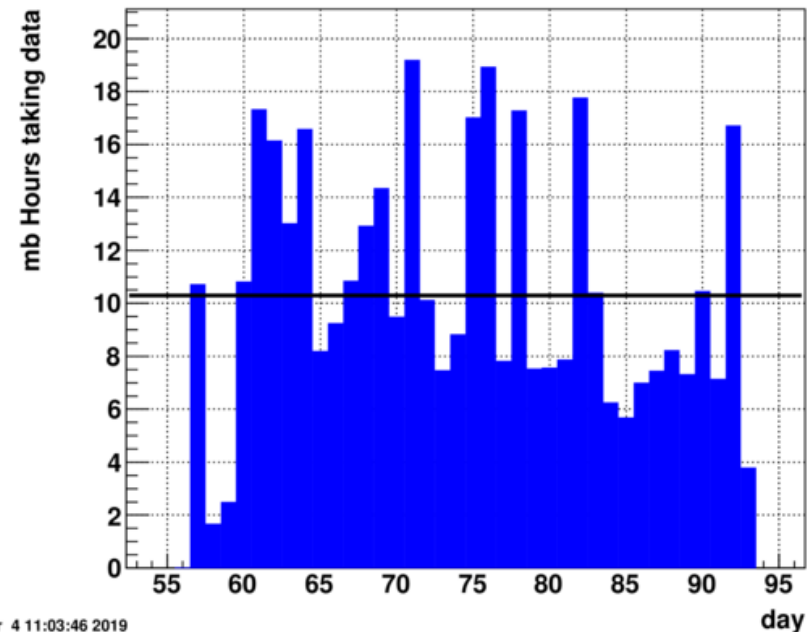


mb\_hlt\_good Average Rate [Hz]



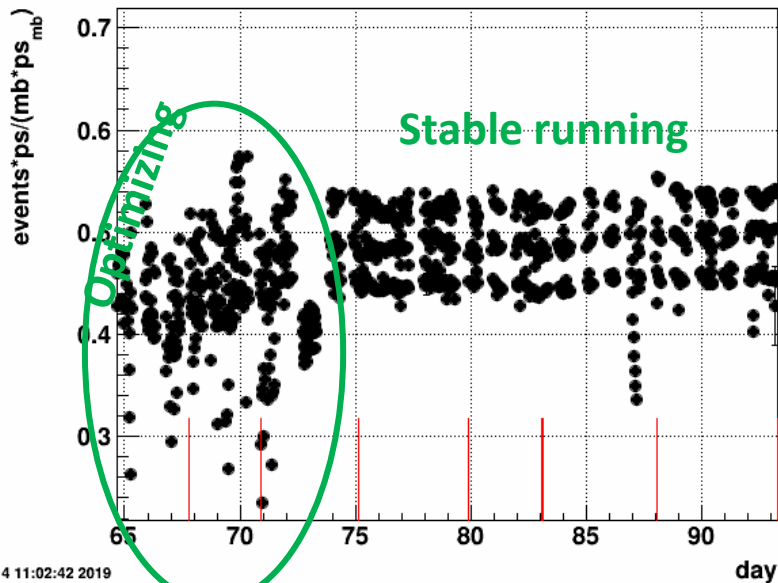
Thu Apr 4 11:04:12 2019

hours\_perday\_mb.txt



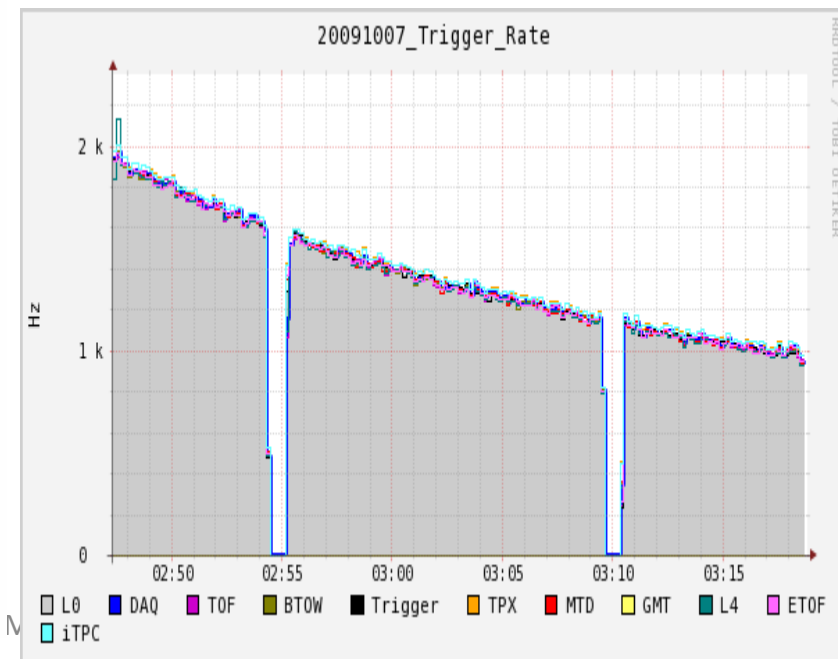
Thu Apr 4 11:03:46 2019

minbias-hltgood\_640032



Thu Apr 4 11:02:42 2019

20091007\_Trigger\_Rate



20057050 20060025 20062011 20062012 20062036 20063011  
20063039 20064009 20067024 20067045 20067046 20069030  
20071005 20071006 20072034 20073071 20075014 20075015  
20076040 20076058 20076059 20077018 20081002 20081014  
20081015 20082060 20083024 20086012 20087007 20090024  
20091012 20057026 20072035 20072036 20089008 20090011  
20091011 20092054 20065018 20072039 20064012 20072041  
20064011 20069032 20072045 20069054 20072047 20058000  
20058001 20058002 20060012 20060060 20067023 20067029  
20070041 20070042 20070043 20070044 20071001 20071004  
20074027 20077017 20060021 20060061 20063035 20067014  
20067030 20071000 20071037 20082065 20060022 20060062  
20067015 20057025

The bad runs list is not sequential, and identifying why the algorithm rejected a given run is difficult.

Trying to make sense of this list, I can see several sequential regions.

# Where are the nine clusters of bad runs?

Day 60  
3 runs

Day 64  
4 runs

Day 71  
6 runs

Day 73  
31 runs

Day 58  
5 runs

Day 62  
3 runs

Day 67  
7 runs

Day 70  
4 runs

Day 72  
7 runs

Day 58 – Lo sDCA

Day 60 – Hi dE/dx

Day 62 – Hi dE/dx → iTPC [8]

Day 64 – Lo Ref

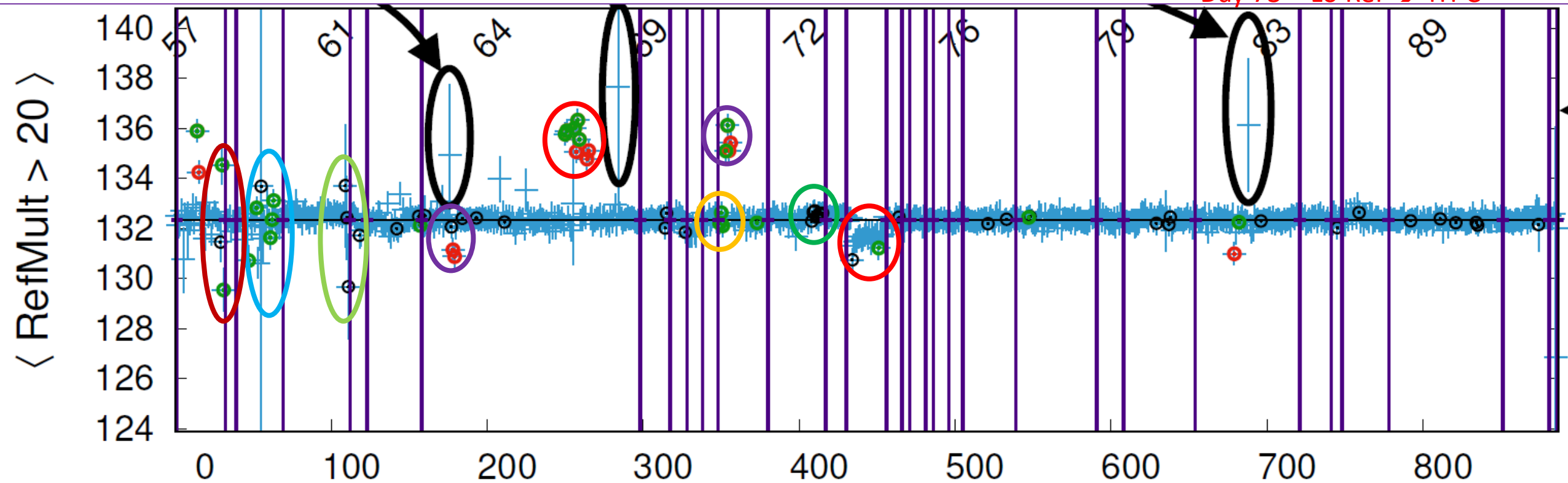
Day 67 – Hi Ref → No BTOW

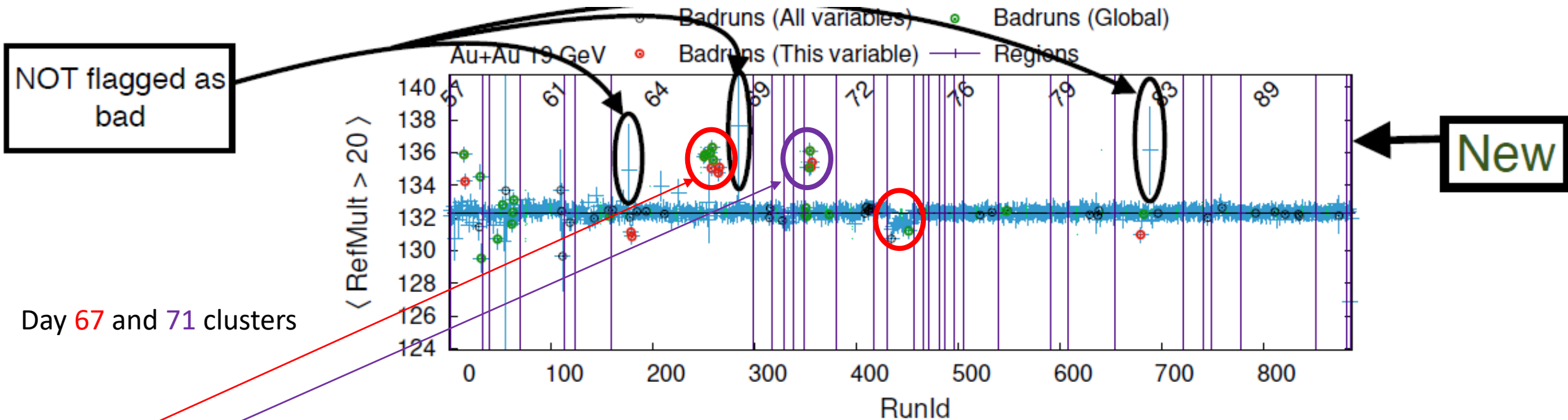
Day 70 – Hi sDCA

Day 71 – Hi Ref → No BTOW

Day 72 – Hi eta

Day 73 – Lo Ref → iTPC





Day 67 and 71 clusters

9 runs this variable

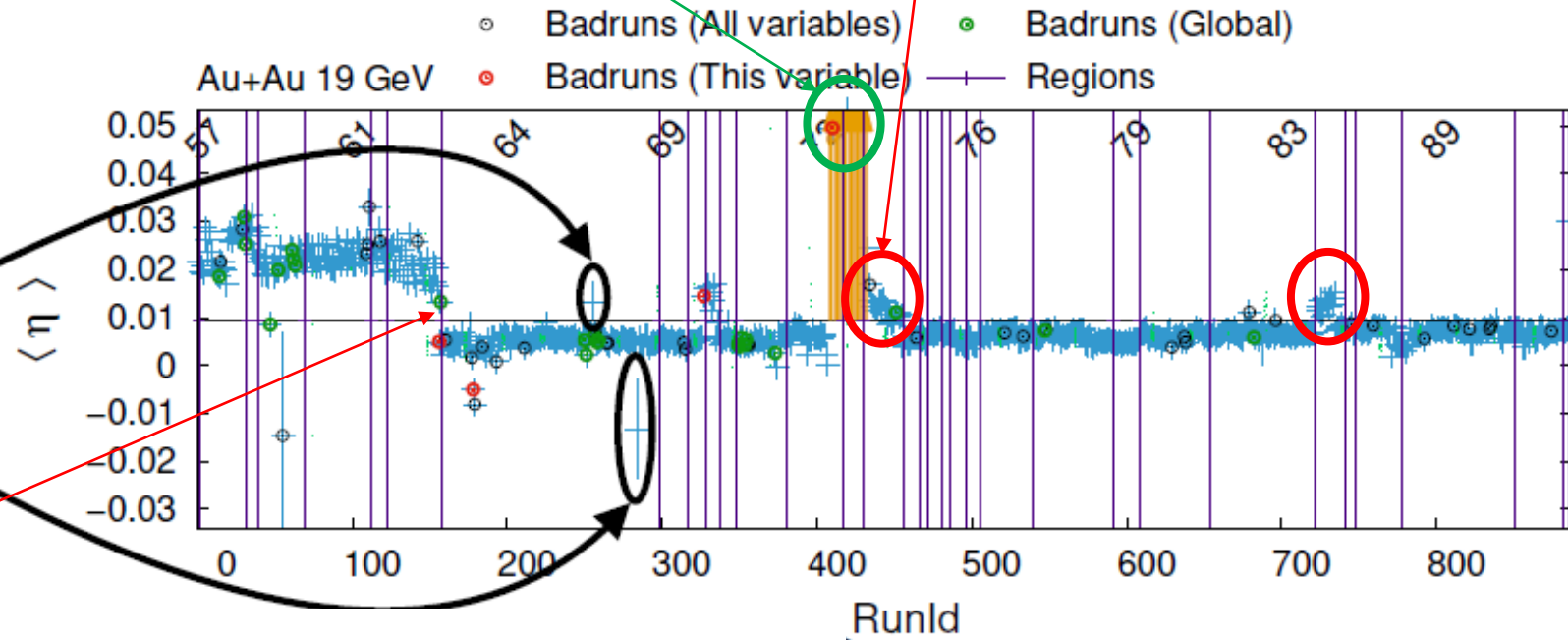
22 Globals

- BTOW out runs 20067014, 023, 024, 029, 030, 045, 046 → QA found all runs
- BTOW out runs 20071001, 004, 005, 006, 027, 037 → QA found all runs

★ iTPC Sector24 iTPC 1,2,3 off runs 20073071 to 20075013 → 42 runs are bad, QA only found 2

Day 72 cluster

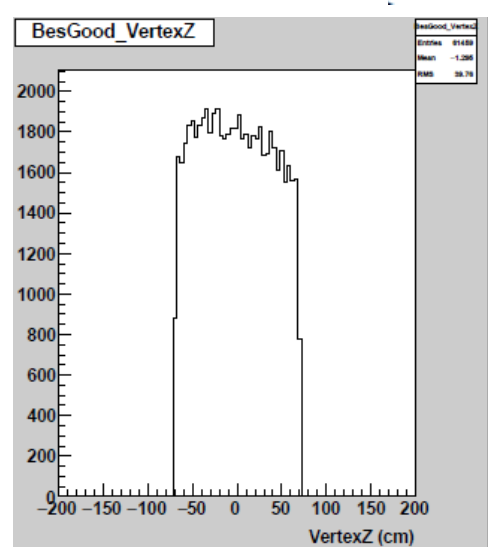
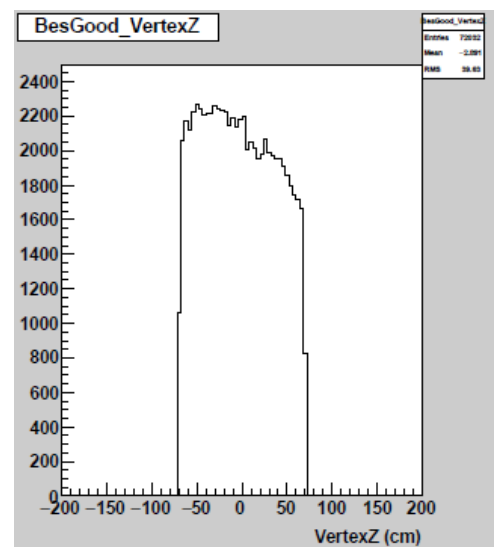
iTPC Sector 24 RDO 1,2,3



NOT flagged as bad

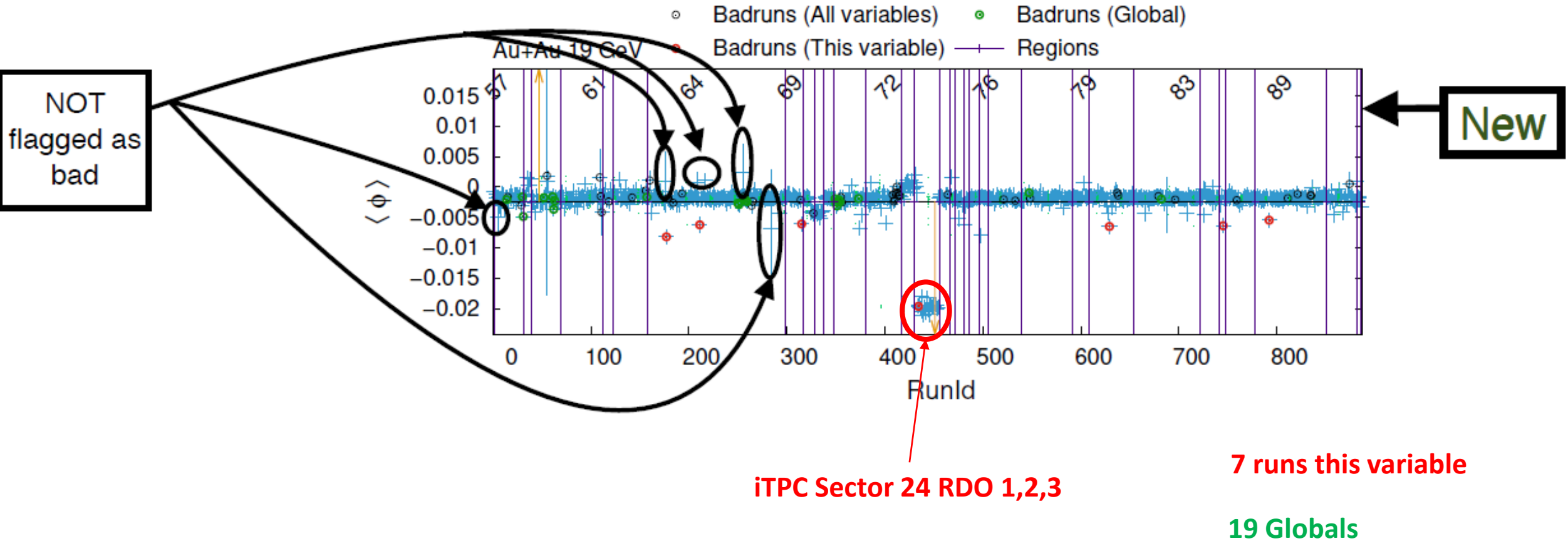
New

What happened here?  
The collider retuned the beam to shift the vertex (run 20063034)

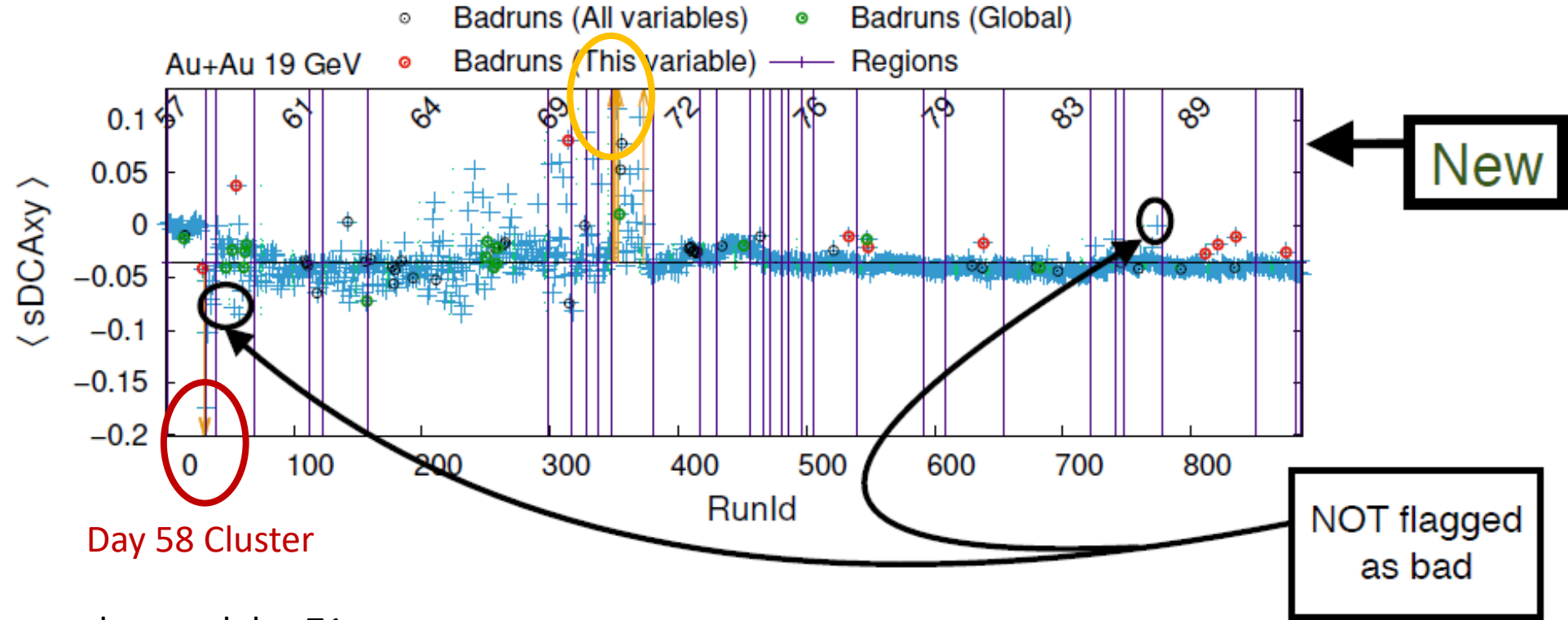


4 runs this variable

21 Globals





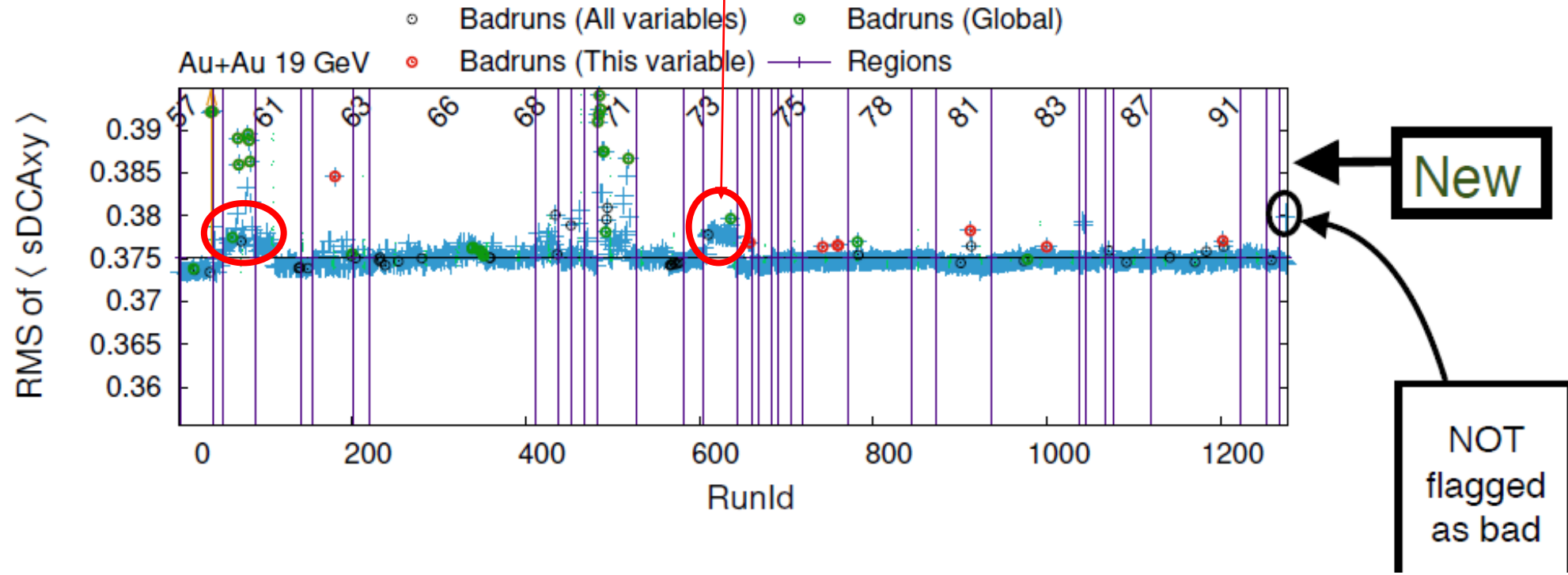


Overall beam quality improved around day 71

10 runs this variable

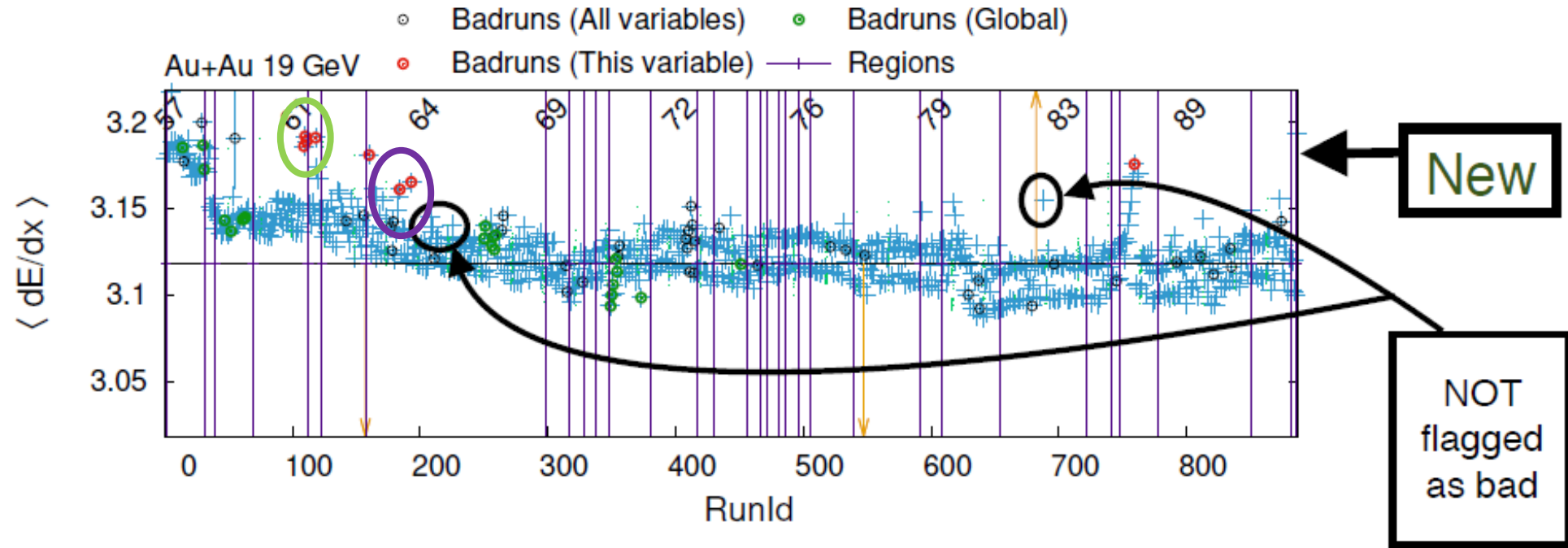
17 Globals

35 Black dots



7 runs this variable

21 Globals



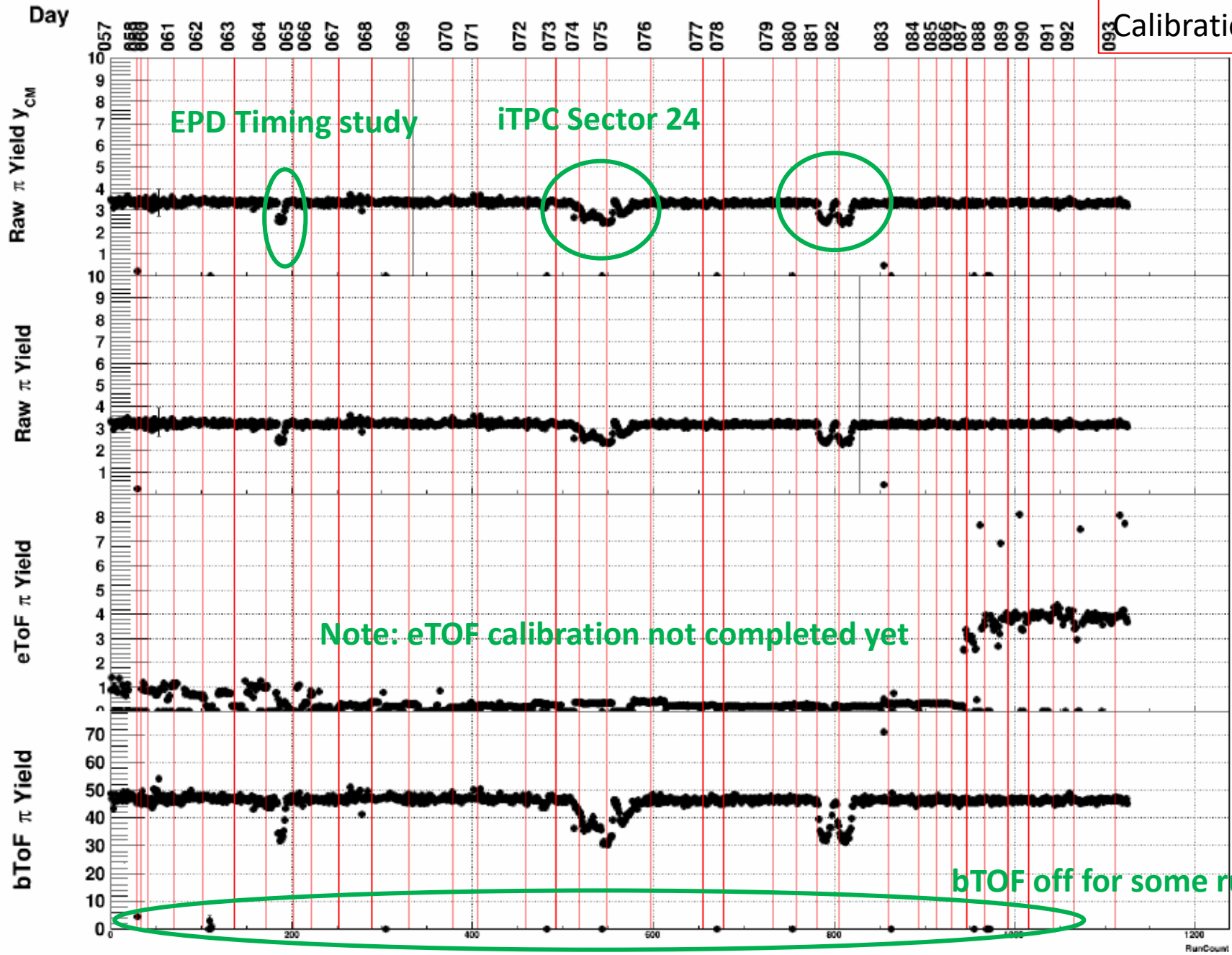
**dE/dx calibration does show both long duration drifts, and First/Second run variations**

**7 runs this variable**

**18 Globals**

# Run-by-Run QA

Ben Kimelman July 17, 2021  
Calibration production



Primary Tracks

Found in the Injection runs list

**Unexplained reason**

```
badUnexplained[6] = {20058001, 20062009, 20062010, 20062011, 20062012, 20082065};
```

Found in the Bad runs list

**No TOF (using nToFT0 cut)**

```
badNoToF[9] = {20068020, 20072041, 20077017, 20079044, 20083006, 20087009, 20088003, 20088004, 20088005};
```

Bad runs list did not check bTOF

**iTPC sector 24 issue (RDO 1, 2, and 3)**

```
badITPC24[44] = {20073071, 2073072, 20073074, 20073076, 20074001, 20074002, 20074003, 20074004, 20074005, 20074006, 20074007, 20074008, 20074009, 20074010, 20074011, 20074012, 20074014, 20074016, 20074017, 20074018, 20074019, 20074020, 20074021, 20074023, 20074026, 20074027, 20074029, 20074030, 20074032, 30072033, 20074034, 20074043, 20074044, 20074045, 40074046, 20075001, 20076002, 20075004, 20075006, 20075007, 20075008, 20075009, 20075011, 20075013};
```

Only found two of these (11 are injectionruns) → Recommend that we add the other 29 runs

**Dip related to EPD TAC offset testing and adjustments**

```
badEPDTAC[8] = {20064020, 20064025, 20064030, 20064032, 20064033, 20064034, 20064037, 20064038};
```

None found

**Dip in pion yield 2**

```
badPionYield[16] = {20081002, 20081003, 20081004, 20081005, 20081006, 20081007, 20081008, 20081009, 20081010, 20081012, 20081013, 20081014, 20081015, 20081016, 20081017, 20082018};
```

Only found two of these

# Summary of all runs found as bad

Run Number	Ashik #6	Li Ke #4		minbias	minbias-hltg	Comment
20057025	20057025	20057025	1	669557	265585	No relevant co
20057026	20057026	20057026	1	526700	191601	No relevant co
20057050	20057050	20057050	1	65973	11831	(5 min)
20058001	20058001	20058001	1	1335148	224555	No relevant co
20058002	20058002	20058002	1	598977	100277	No relevant co
20058003		20058003	3	94148	30036	(3 min run) Nc
20058004		20058004	3	610000	173623	No relevant co
20058005		20058005	3	213272	53195	No relevant co
20060012	20060012	20060012	1	267409	89806	no iTPC[8]
20060022	20060022	20060022	1	927894	174838	No relevant co
20060025	20060025	20060025	1	77	0	(1 minrun) Rui
20060060	20060060	20060060	1	514493	123938	No relevant co
20060061	20060061	20060061	1	1107713	247135	No relevant co
20060062	20060062	20060062	1	605128	126528	No relevant co
20062010	20062010		2	2747	1271	(1 min run) Sh
20062011	20062011	20062011	1	5938	2620	(2 min run) Sh
20062012	20062012	20062012	1	267409	89806	No iTPC[8], sh
20062036	20062036	20062036	1	1577	29104	(3 min run) GN
20063011	20063011	20063011	1	234699	102927	Ended with tr
20063034	20063034	20063034	1	678382	254921	This run is with
20063035	20063035	20063035	1	208146	89528	(4 min) Lost be
20063039	20063039	20063039	1	89528	10493	(1 min) No log
20064008		20064008	3	2371	930	(1 min run)

20064009	20064009	20064009	1	1639202	1639202	No relevant comments	
20064011	20064011	20064011	1	2619478	1198312	No relevant comments	
20064012	20064012	20064012	1	1398261	628538	No relevant comments	
20064017	20064017		2	373952	116641	Low intensity, holding fill while fixin	
20064040	20064040		2	102185	47768	(3 min run) Started run 30 bunches	
20065018	20065018	20065018	1	2338986	1031600	No relevant comments	
20067014	20067014	20067014	1	1166409	450329	No BTOW - Working on BTOW (mar	
20067015	20067015	20067015	1	725825	275692	No relevant comments	
20067023	20067023	20067023	1	1388969	583108	No BTOW - DO's working on BEMC	
20067024	20067024	20067024	1	478029	194817	No BTOW	
20067029	20067029	20067029	1	1596783	690796	No BTOW	
20067030	20067030	20067030	1	1408276	580177	No BTOW	
20067045	20067045	20067045	1	362502	154621	No BTOW	
20067046	20067046	20067046	1	246767	103724	No BTOW	
20069030	20069030	20069030	1	1049354	442028	No relevant comments	
20069032	20069032	20069032	1	790574	334683	No relevant comments	
20069054	20069054		2	1962718	1021214	No relevant comments	
20070042	20070042	20070042	1	3266194	956760	No relevant comments	
20070043	20070043	20070043	1	576574	123686	No relevant comments	
20070044	20070044	20070044	1	1492691	304241	No relevant comments	
20070047		20070047	3	2914586	990780	No relevant comments	
20071001	20071001	20071001	1	2010074	473628	No BTOW	
20071004	20071004	20071004	1	1318389	573551	No BTOW	
20071005	20071005	20071005	1	1410107	516646	No BTOW	
20071006	20071006	20071006	1	1142276	343408	No BTOW	
20071027		20071027	3	1236102	337286	No BTOW	
20071037	20071037	20071037	1	1601976	562538	No BTOW	
20072034	20072034	20072034	1	1070454	445212	No relevant comments	

20072035	20072035	20072035	1	1288730	518625	BTOW has problems with PMT box	
20072036	20072036	20072036	1	248522	96286	No relevant comments	
20072039	20072039	20072039	1	2165684	866567	No relevant comments	
20072041	20072041	20072041	1	52047	20198	(1 min run)	
20072045	20072045	20072045	1	470773	177522	No relevant comments	
20072047	20072047	20072047	1	2086379	834039	No relevant comments	
20072048	20072048	20072048	1	1173935	446996	No relevant comments	
20073071	20073071		2	483383	238624	itpc sector 17 RDO 3 failed	
20074027	20074027	20074027	1	1487901	691476	No relevant comments	
20081002	20081002	20081002	1	2326001	1150534	No relevant comments	
20081014	20081014	20081014	1	1270618	565340	No relevant comments	
20082060	20082060	20082060	1	1210361	648376	No relevant comments	
20082065	20082065	20082065	1	1794790	868939	Beam Lost - TPC anodes and cathod	
20083024	20083024	20083024	1	1286786	569118	No relevant comments	
20086012	20086012	20086012	1	2401949	1207077	No relevant comments	
20087007	20087007	20087007	1	204927	68990	low events due to using old, diffuse	
20089008	20089008	20089008	1	1294675	589937	No relevant comments	
20090024	20090024	20090024	1	490130	260817	No relevant comments	
20091011	20091011	20091011	1	1064420	478326	No relevant comments	
20092054	20092054	20092054	1	12512	6649	(2 min run)	
Sum of all Bad runs					27819970		



20073071	20073071		483383	238624	itpc sector 17 RDO 3 failed
20073072	20073072		708267	323324	iTPC Sector 24 RDO 1,2,3
20073076	20073076		2406754	1169663	iTPC Sector 24 RDO 1,2,3
20074001	20074001		1111619	501944	iTPC Sector 24 RDO 1,2,3
20074003	20074003		501944	314547	iTPC Sector 24 RDO 1,2,3
20074004	20074004		1659482	1659482	iTPC Sector 24 RDO 1,2,3
20074005	20074005		615465	278230	iTPC Sector 24 RDO 1,2,3
20074007	20074007		2205456	1081484	iTPC Sector 24 RDO 1,2,3
20074008	20074008		902160	412178	iTPC Sector 24 RDO 1,2,3
20074009	20074009		123761	54510	iTPC Sector 24 RDO 1,2,3
20074012	20074012		2032532	1008179	iTPC Sector 24 RDO 1,2,3
20074014	20074014		1201533	546208	iTPC Sector 24 RDO 1,2,3
20074017	20074017		2198068	1058653	iTPC Sector 24 RDO 1,2,3
20074018	20074018		1144211	517305	iTPC Sector 24 RDO 1,2,3
20074020	20074020		2514885	1219155	iTPC Sector 24 RDO 1,2,3
20074021	20074021		1172001	527823	iTPC Sector 24 RDO 1,2,3
20074026	20074026		976366	474530	iTPC Sector 24 RDO 1,2,3
20074027	20074027	20074027	1487901	691476	iTPC Sector 24 RDO 1,2,3
20074029	20074029		417524	182096	iTPC Sector 24 RDO 1,2,3
20074032	20074032		2352835	1147563	iTPC Sector 24 RDO 1,2,3
20074033	20074033		1113362	504275	iTPC Sector 24 RDO 1,2,3
20074034	20074034		2581120	0	iTPC Sector 24 RDO 1,2,3
20074044	20074044		2347487	1164892	iTPC Sector 24 RDO 1,2,3
20074045	20074045		1308657	598088	iTPC Sector 24 RDO 1,2,3
20075001	20075001		2406162	1175830	iTPC Sector 24 RDO 1,2,3
20075002	20075002		1429120	643216	iTPC Sector 24 RDO 1,2,3
20075006	20075006		2291282	1113064	iTPC Sector 24 RDO 1,2,3
20075007	20075007		1085588	491917	iTPC Sector 24 RDO 1,2,3
20075009	20075009		1032644	521550	iTPC Sector 24 RDO 1,2,3
20075011	20075011		1923024	919319	iTPC Sector 24 RDO 1,2,3
20075013	20075013		662450	296053	iTPC Sector 24 RDO 1,2,3

## **Conclusions for 19.6 GeV:**

- **Most bad runs come from nine “clusters” → All before stable running**
- **Four “clusters” associated with detector issues**
- **Five likely from poor beam conditions**

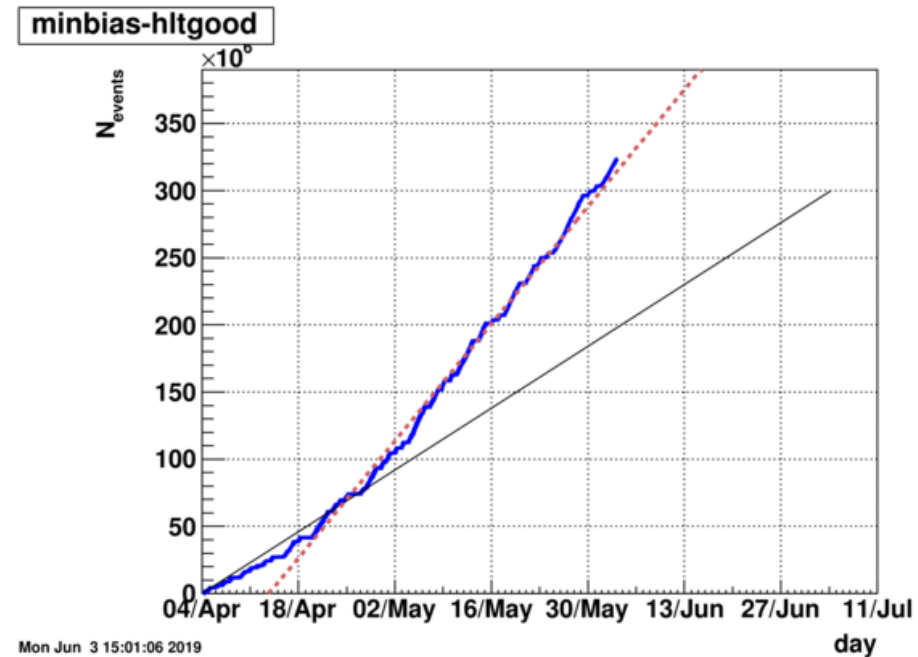
## **Recommendations:**

- 1) Accept the 71 runs marked as bad from Ashik and Li Ke**
- 2) Add an addition 29 bad runs for a period with iTPC Sector 24 RDO 1,2,3 out**
- 3) Reject the 275 injection runs**

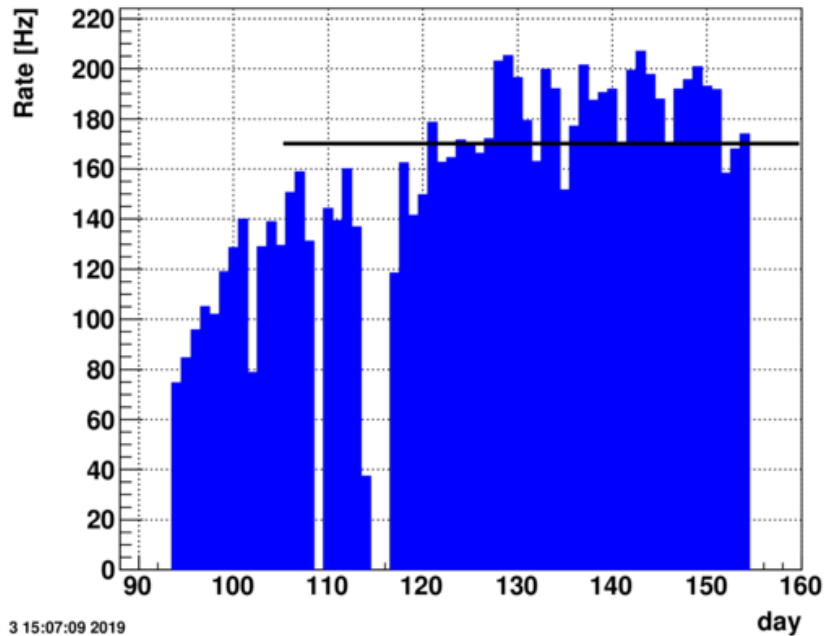
# Look-Ahead of Bad Runs List for 14.6 GeV COL Au+Au

	2011	predicted	achieved
Average HLTgood event rate (Hz)	50	145-165	<b>180</b>
Data taking (hours per day)	10	10 -15	<b>15 or 6</b>
Fill Length (minutes)	30	45	<b>45</b>
DAQ Rate at start of fill (Hz)	1000	1200	<b>900</b>
Ratio of HLTgood/triggers (%)	30%	35%-30%	<b>40%</b>

- 14.6 GeV April 4<sup>th</sup> to June 3<sup>rd</sup>.
- Accumulated 324 M good events  
Target was 310 M.
- The run pretty met the optimistic projections.

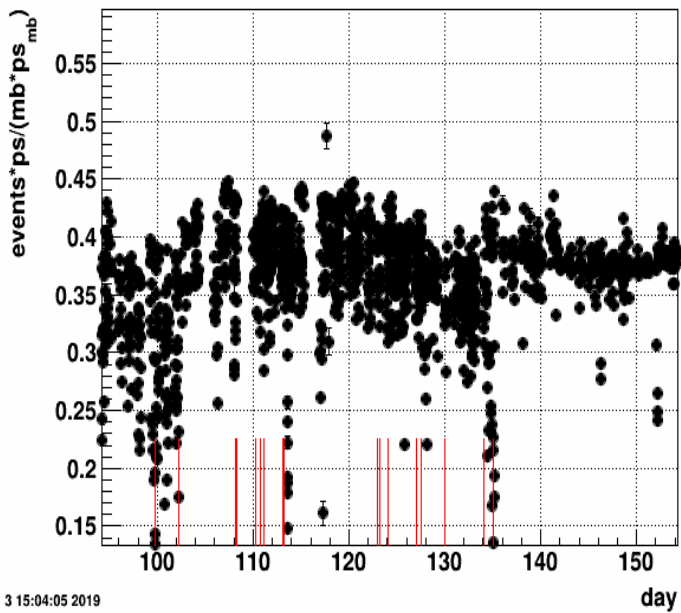


mb\_hlt\_good Average Rate [Hz]



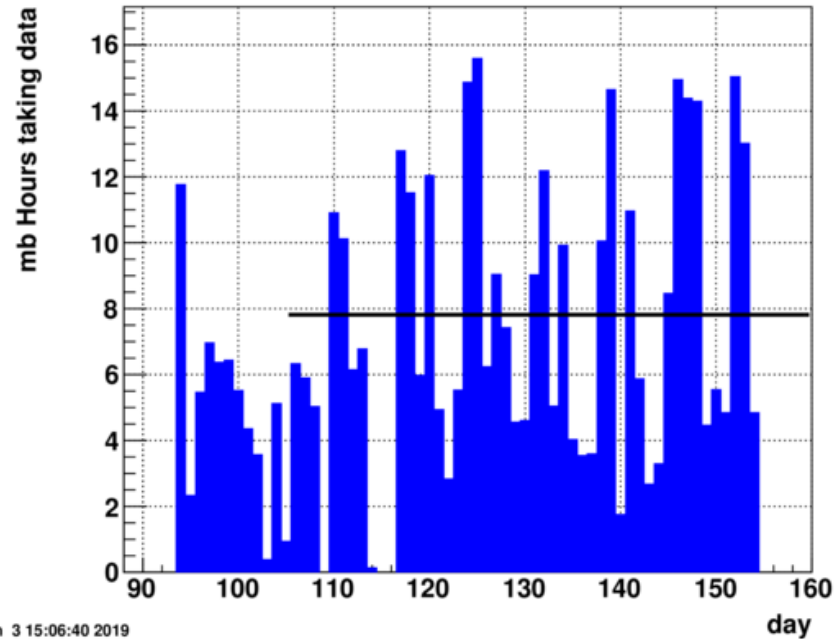
Mon Jun 3 15:07:09 2019

minbias-hltgood\_650002



Mon Jun 3 15:04:05 2019

hours\_perday\_mb.txt

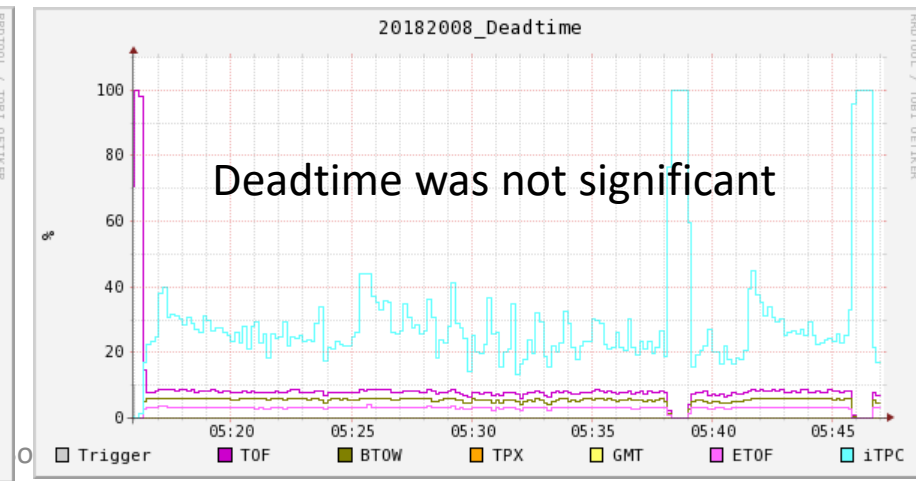
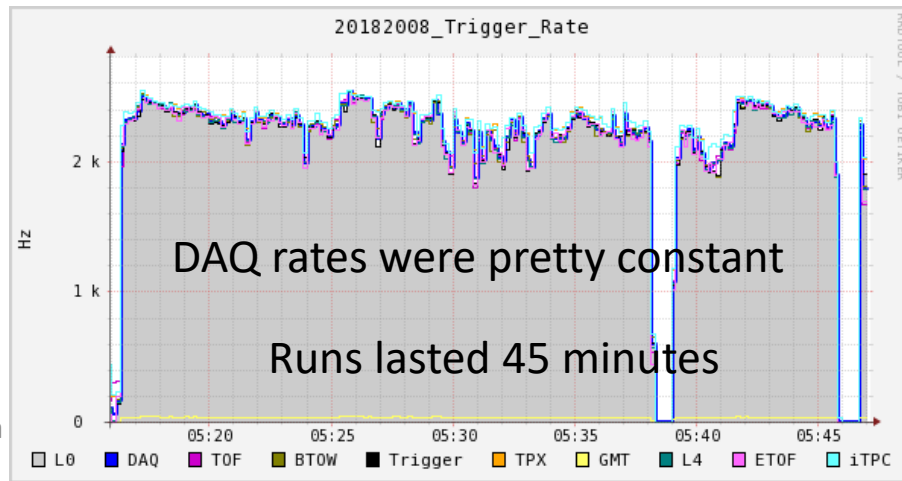
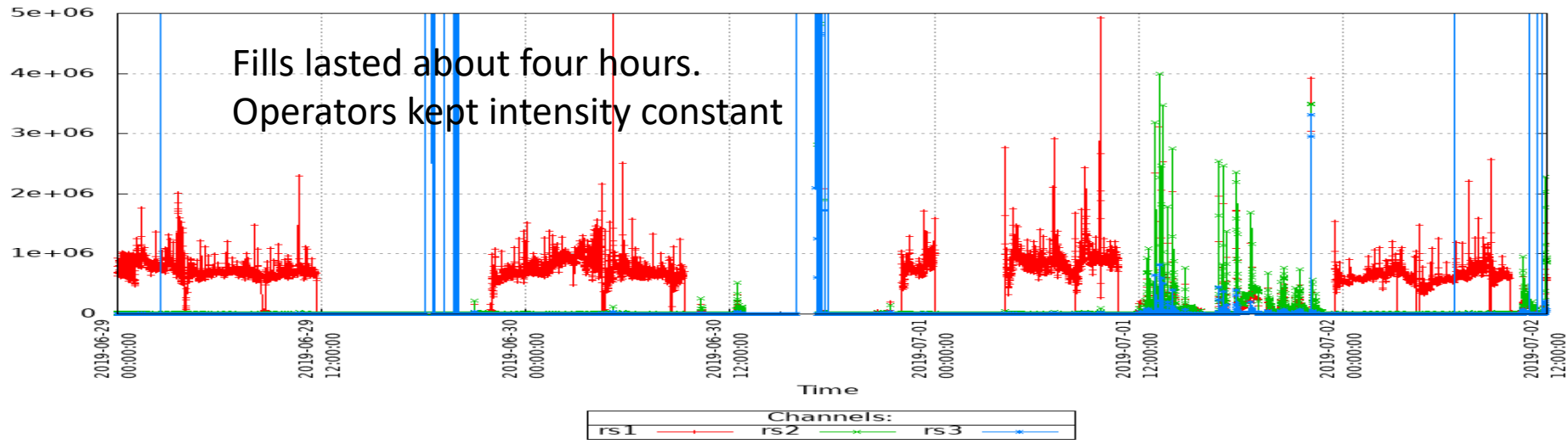


Mon Jun 3 15:06:40 2019

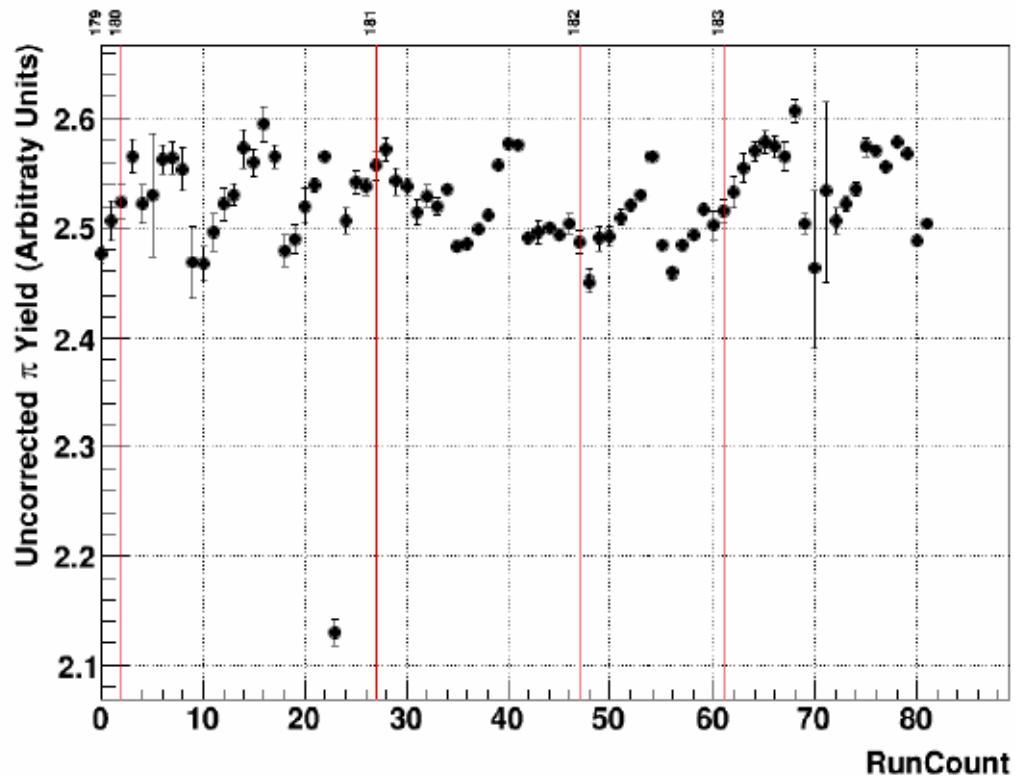
# Look-Ahead of Bad Runs List for 4.59 (3.2) GeV FXT Au+Au

Ran four successive overnights; June 28<sup>th</sup> – July 2<sup>nd</sup> , 2019

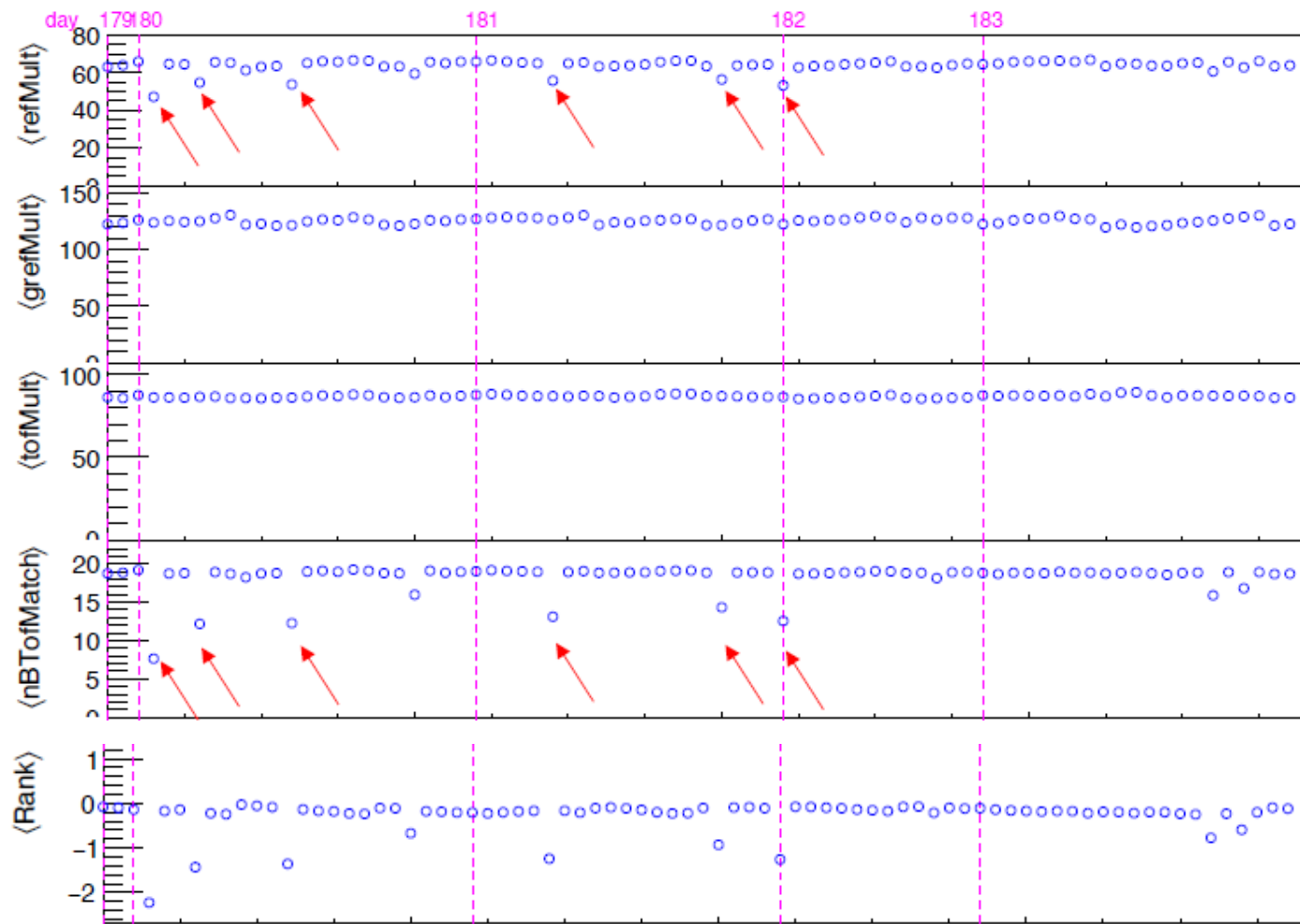
Acquired about 50 M good events each overnight → met the 200 M target



# Au+Au $\sqrt{s_{NN}} = 4.59\text{ GeV}$ FXT Pion Yields



Periodic rise occurs over length of fill. Looking into this with TPC group, possible issue with space charge corrections being applied. Also, fill number the same between run 20180010 and 20181009, spanning  $\sim 24$  hours (sent email to STAR-Ops on Wednesday)



BulkCorr Physics QA  
for fast offline 7.7 GeV, 9.2 GeV, and FXT4.59 GeV

Takafumi Niida (WSU)

T. Niida, June 27/2019

20180002, 20180007, 20180013, 20180022, 20181006  
20181042, 20182006, 20183020, 20183022

No obvious reason was found in ShiftLog