

Beam cogging determination for run 13

Quick steps

- choose two runs from two fills which consist unintended missing bunches
- R14146026 from fill 17554 & R14140046 from fill 17529
- check the measured fill patterns at <http://online.star.bnl.gov/cdev/> and confirmed by the cdev records
- Produce bx7 spectrum using MuDST.root files for each run
- compared fill patterns with histogram to determine beam cogging

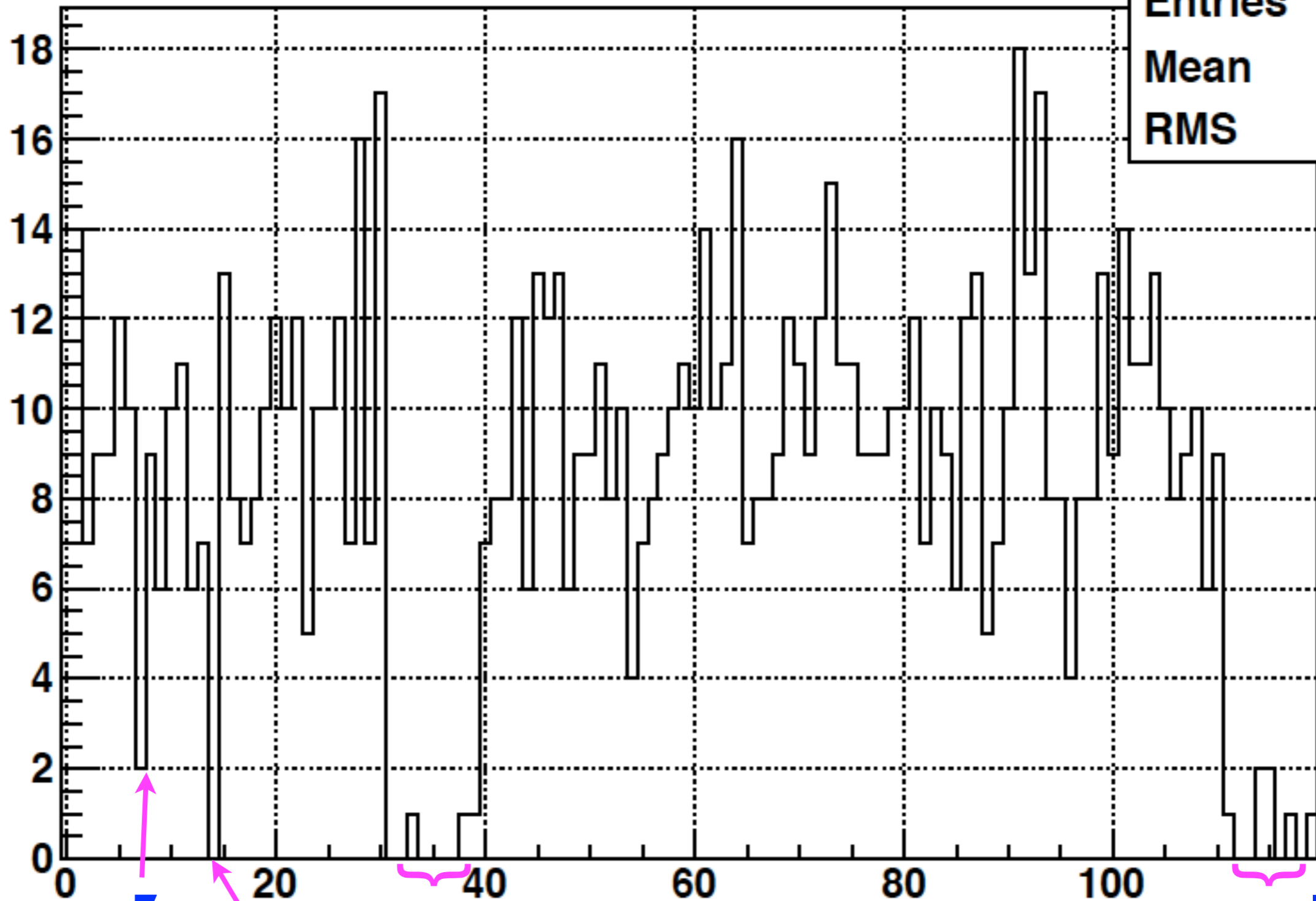
Missing bunches of Fill 17554

RF Bucket	Missing BB	Missing YB
262		87
283		94
334	111	111
337	112	112
340	113	113
343	114	114
346	115	115
349	116	116
352	117	117
355	118	118
358	119	119

RI4146026

Rate vs. true bXing from bx7

bX7	
Entries	1000
Mean	58.21
RMS	32.73



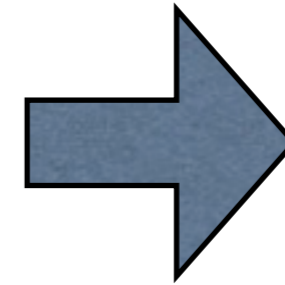
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bXing at STAR IP

111-119

Beam cogging using R14140046

- One gap in the interval 111-119
- Another gap 31-39
- two missing bunches at 7, 14



bx7 is tied to the
Blue beam

Yellow beam shift

- $111 - 31 = 80$
- $119 - 39 = 80$

Double check with missing bunches

- missing bunch ID 87 appearing at 7 $\Rightarrow 87 - 7 = 80$
- missing bunch ID 94 appearing at 14 $\Rightarrow 94 - 14 = 80$

STAR blue beam bunch 1 collide with
yellow beam bunch 80 at $bx7=0$

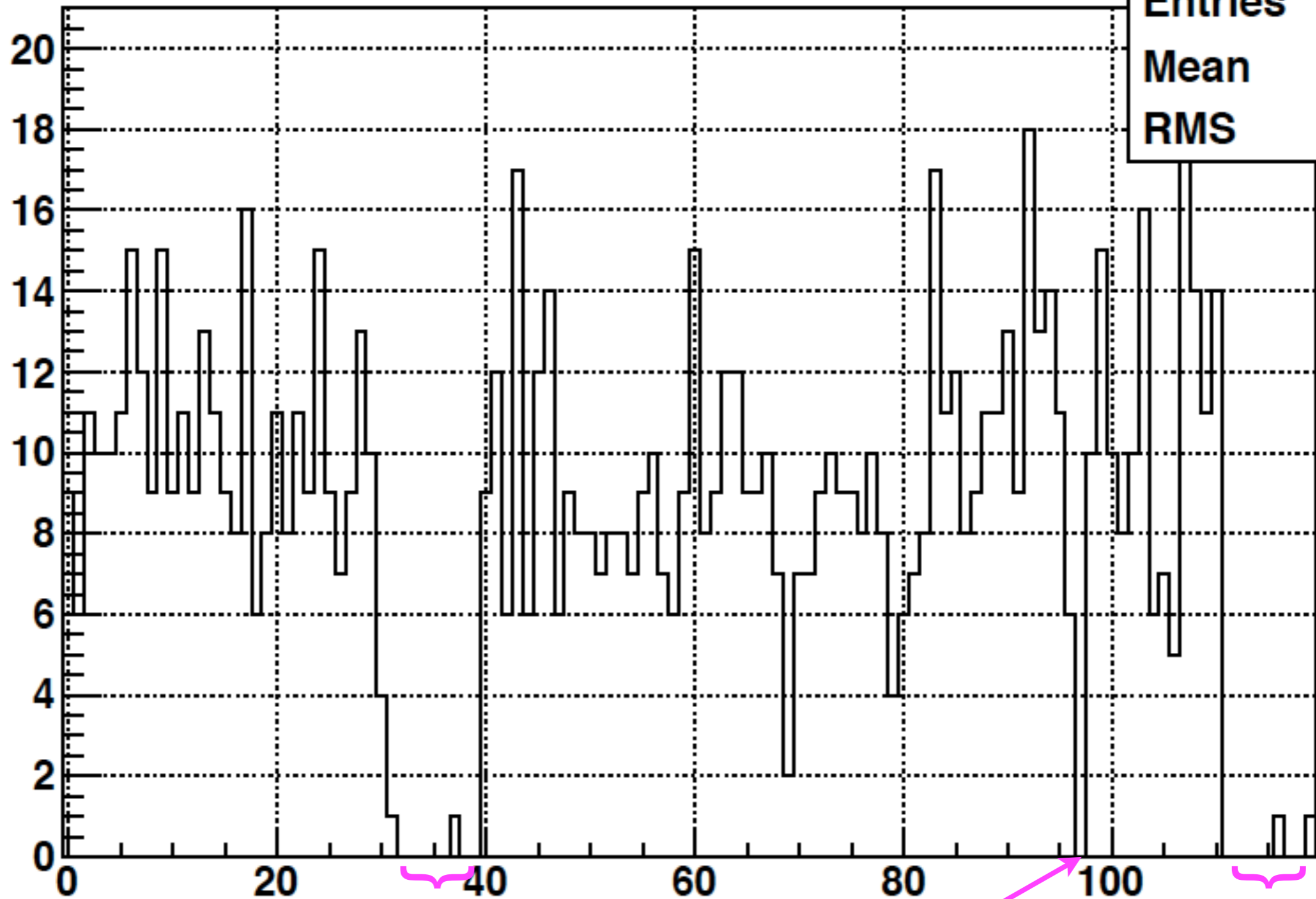
Missing bunches of Fill 17529

RF Bucket	Missing BB	Missing YB
172		57
334	111	111
337	112	112
340	113	113
343	114	114
346	115	115
349	116	116
352	117	117
355	118	118
358	119	119

RI4140046

Rate vs. true bXing from bx7

bX7	
Entries	1000
Mean	57.04
RMS	34.02



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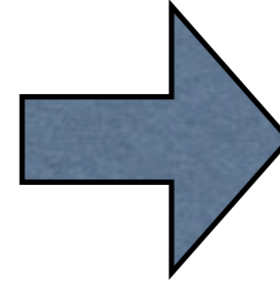
31-39

bXing at STAR IP 111-119

97

Beam cogging using R14146026

- One gap in the interval 111-119
- Another gap 31-39
- One missing bunch at 97



bx7 is tied to the
Blue beam

Yellow beam shift

- $111 - 31 = 80$
- $119 - 39 = 80$

Double check with missing bunch

- missing bunch ID 57 appearing at 97 $\Rightarrow 57 + (120 - 97) = 80$

STAR blue beam bunch 1 collide with
yellow beam bunch 80 at $bx7=0$

