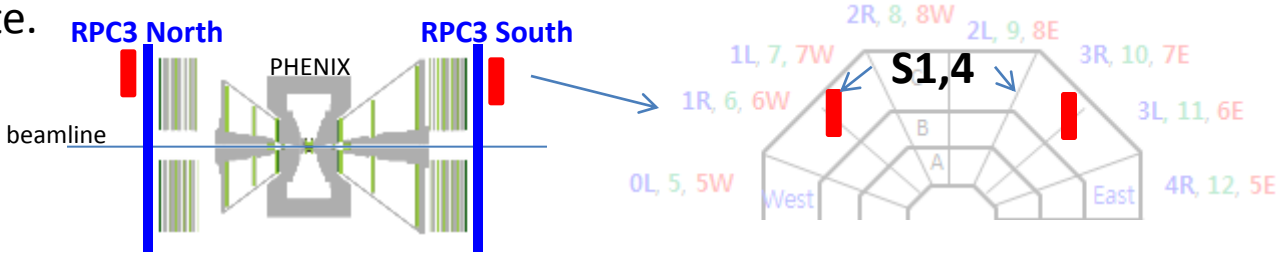
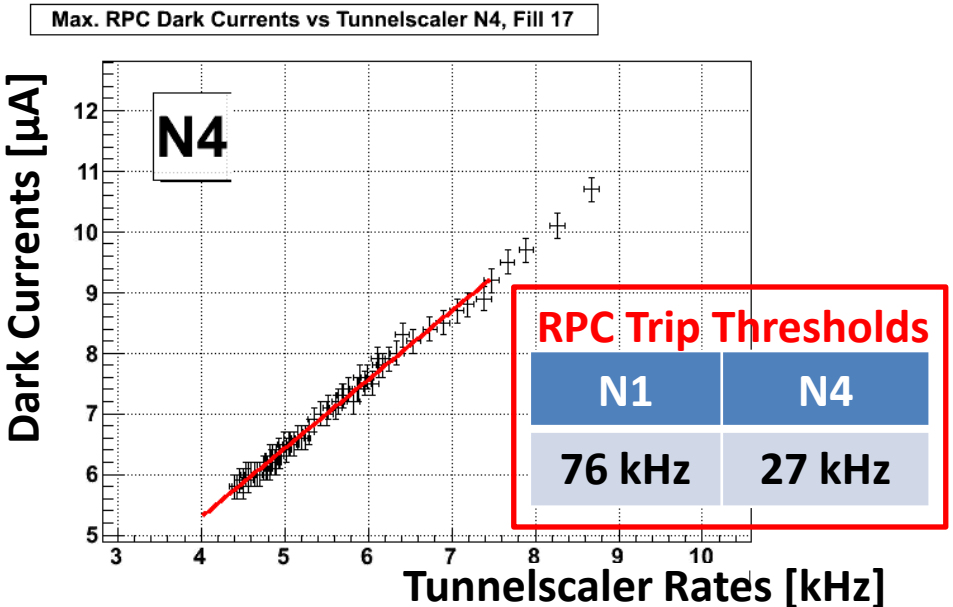
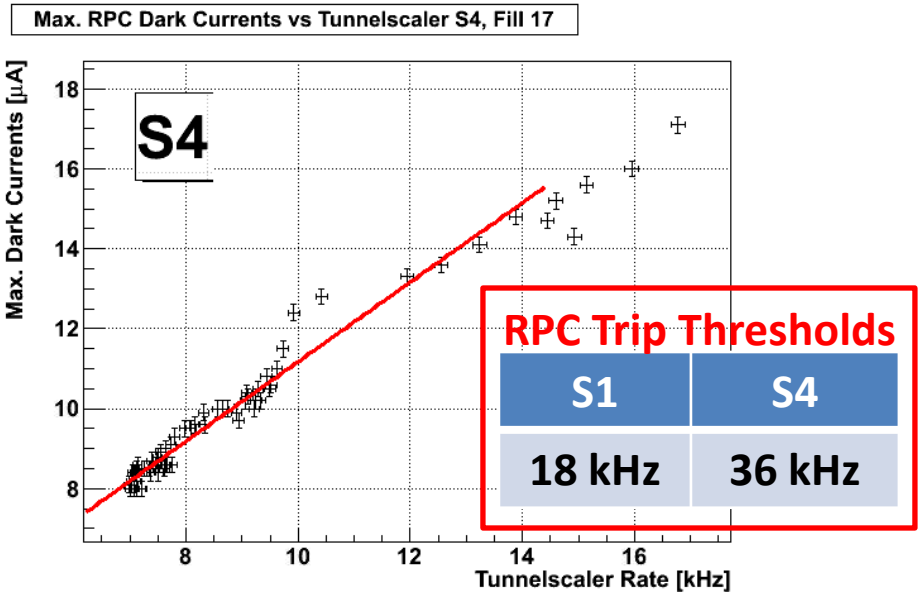
1) Correlation Study between PHENIX RPC Dark Currents vs. PHENIX Tunnel Scalers

- **Objective of study:**
  * Give CAD metrics by which PHENIX RPCs can safely take W data.

- **Analysis:**
  * Linearly fit correlations between PHENIX tunnel scaler rates (at RPCs) and RPC dark currents.
  * Extrapolate fit results to trip thresholds of RPC3 (50muA), read off corresponding tunnel scaler rate.

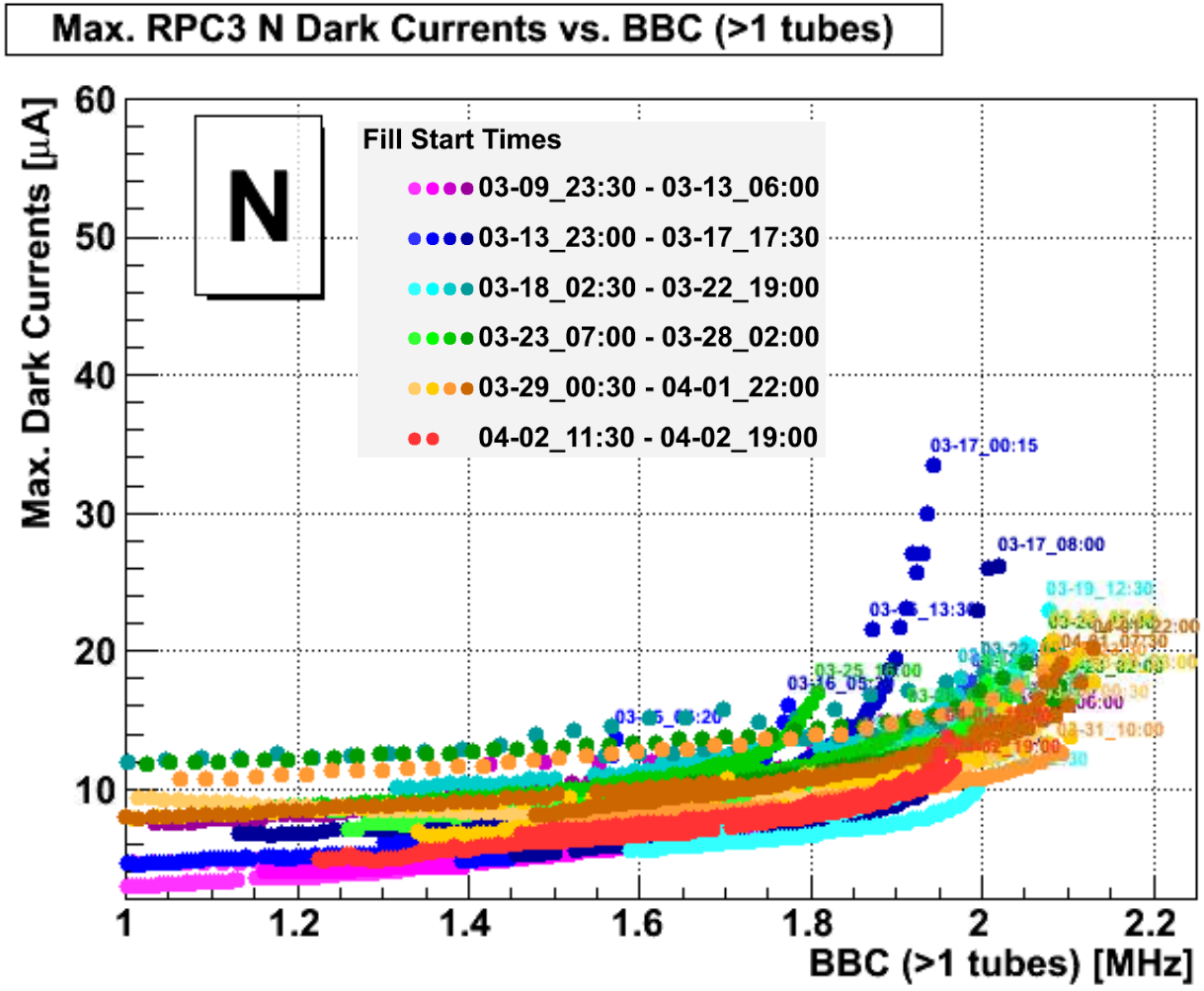






2) Visualization of RPC Dark Currents vs. BBC (>1 tubes)

- all fills > 3 hrs for old lattice (before maintenance day 4/3)
- at RPC3 North yellow is the incoming beam, collimated in south of PHENIX.
- RPC3 North dark currents moderate and consistent over all Run-13 fills



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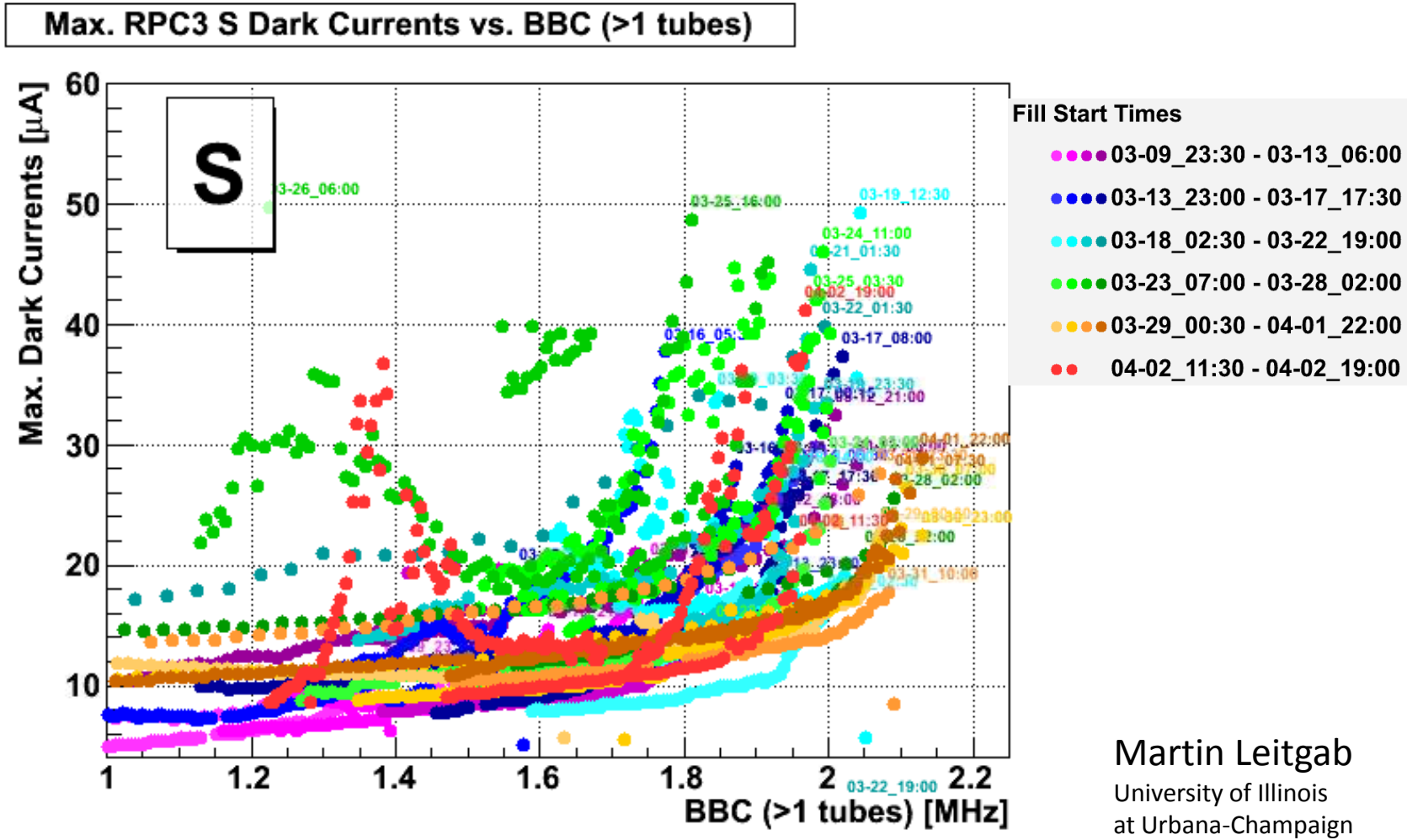
2) Visualization of RPC Dark Currents vs. BBC (>1 tubes)

- all fills > 3 hrs for old lattice (before maintenance day 4/3)
- at RPC South blue is the incoming beam, collimated in north of PHENIX.
- RPC3 South larger, unsteady dark currents especially at high rates/beginning of each fill
  theories: * quick losses of blue beam (incoming) in beginning of fills
  * collimation back-scatter of yellow beam (outgoing; quicker decay)



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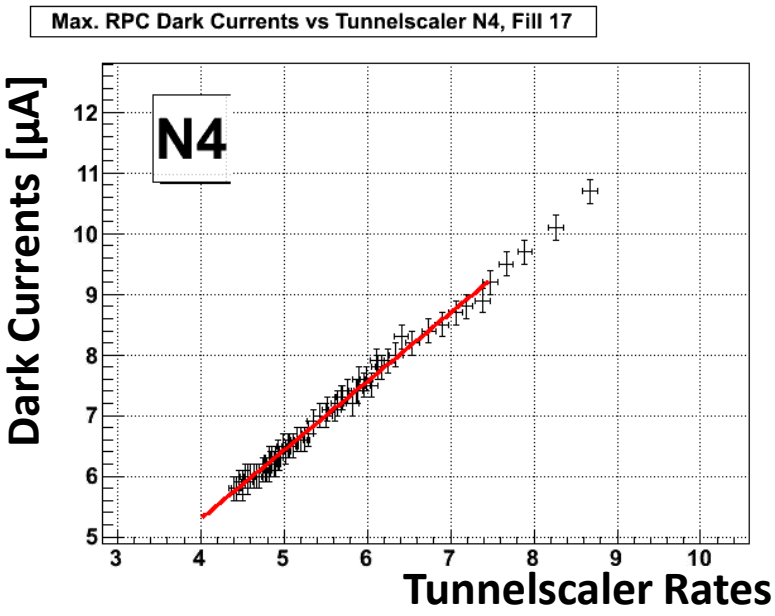
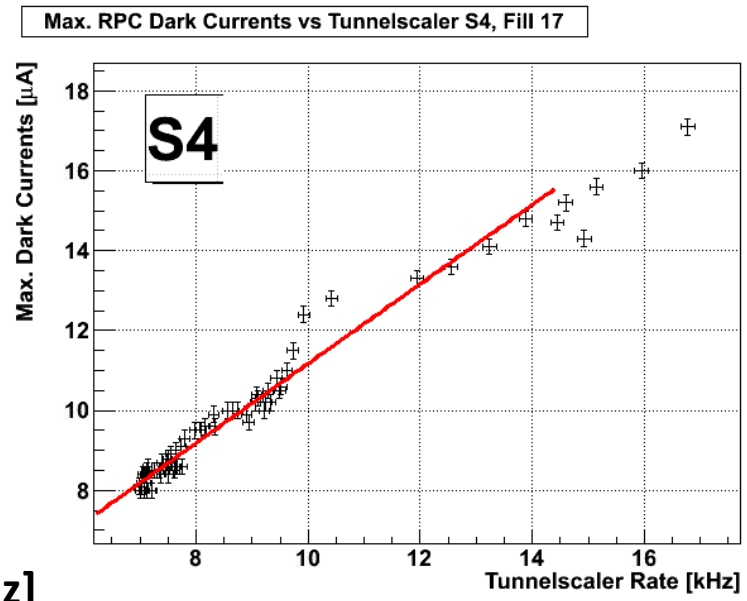
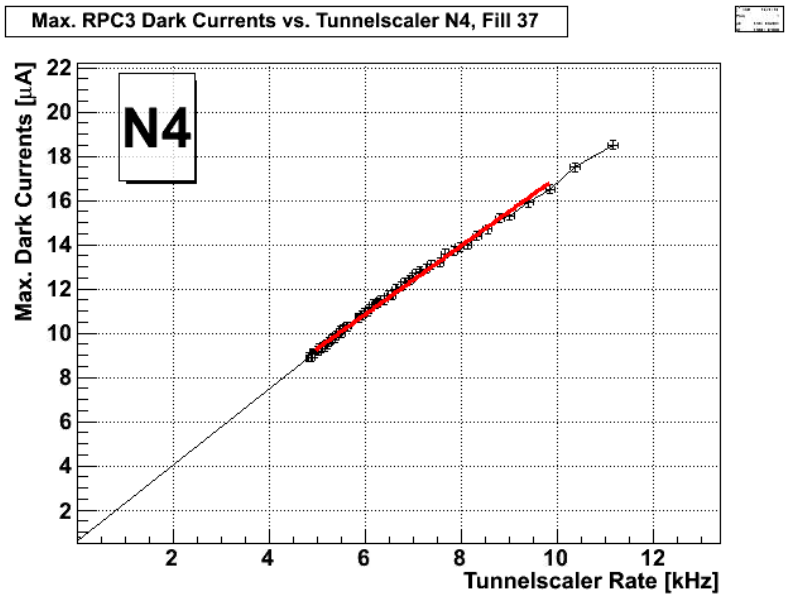
backup

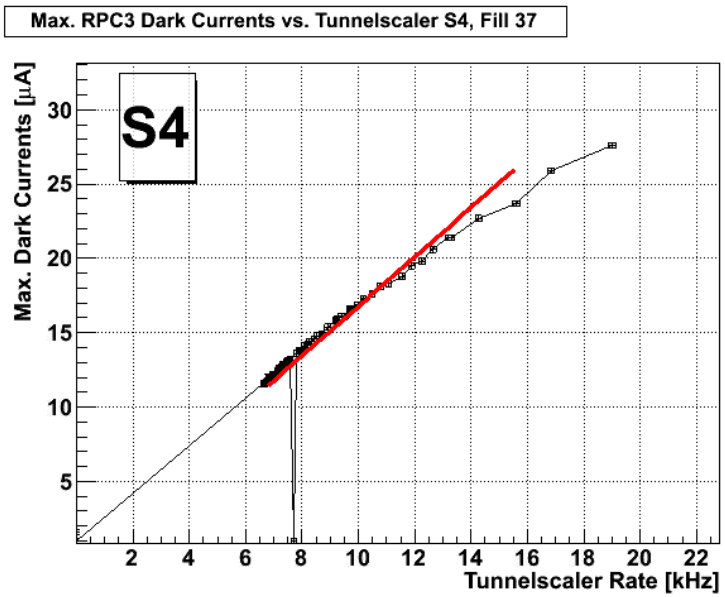
1) Dark Currents vs. Tunnel Scalers Run 13

- Example fits of RPC3 maximum dakr currents vs. counters N4, S4.







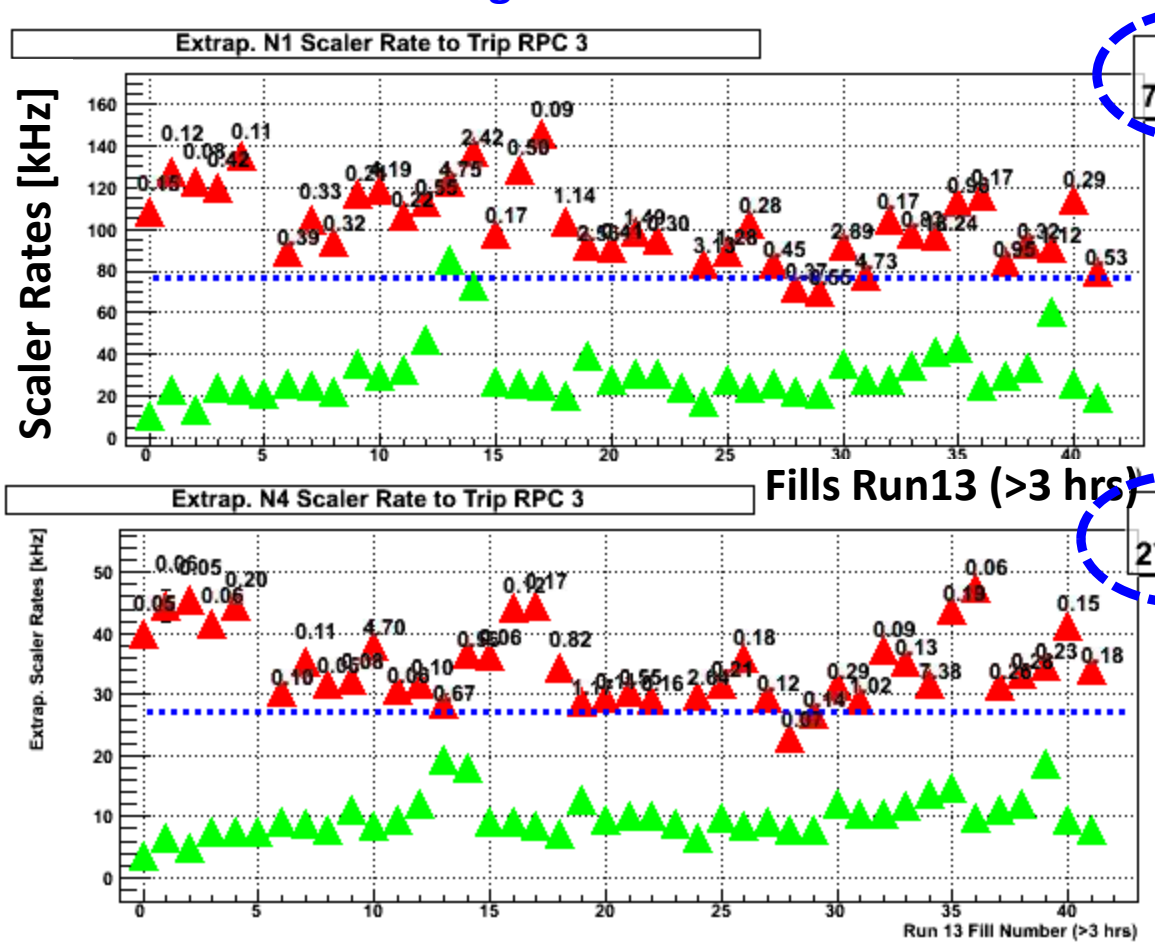


1) Dark Currents vs. Tunnel Scalers Run 13

- plotted on x-axis: fills >3 hrs in Run13; on y-axis:
  - * red triangles: extrapolated scaler rates to trip RPC3;
    (numerical values: reduced chisq of linear fit)
  - * green triangles: maximum scaler rate measured in fill when RPC HV operating.
- require red chisq < 20;
- blue line: average of lowest 5 extrapolated trip rates (equal to number in box)-

could be used as tuning benchmark for CAD!

North



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- require red chisq < 20;
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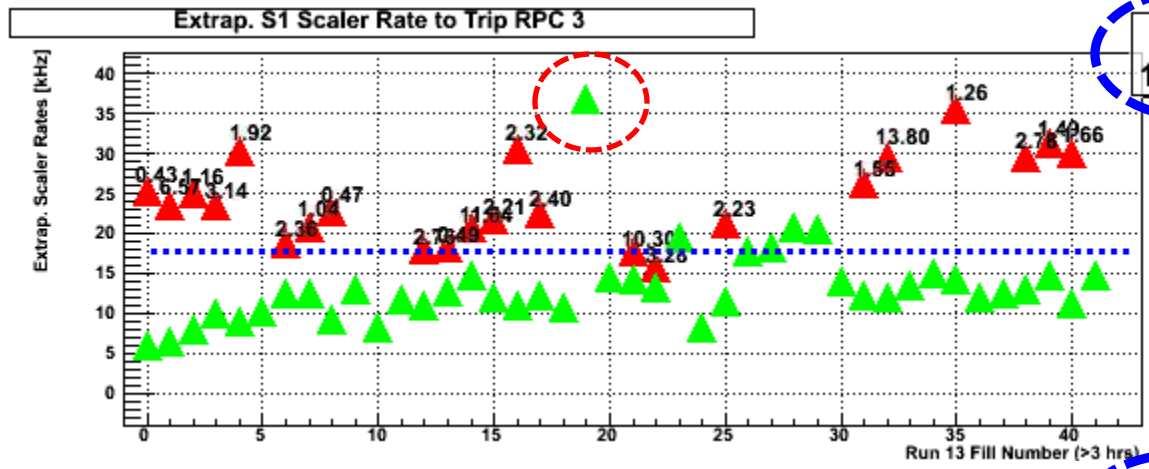
could be used as tuning benchmark for CAD!

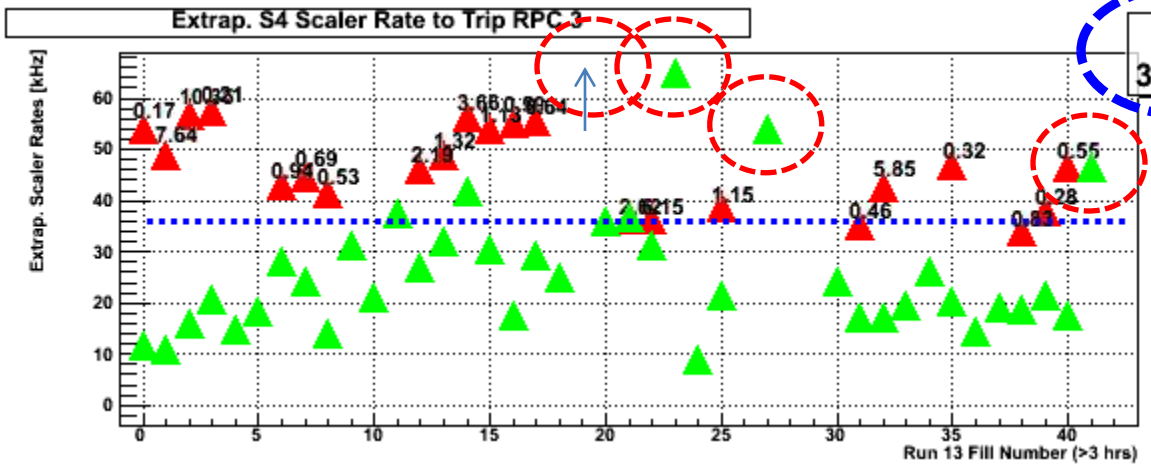
South



Extrapolated trip scaler rate

Average of 5 lowest trip rates

Measured max. scaler rate during fill



Trips occurred

1) Dark Currents vs. Tunnel Scalers Run 13

- will continue analysis for fills with new RHIC lattice, but believe that correlations will be similar.

Average of lowest 5 extrapolated counter rates to trip RPC3 HV channels Run13:

N1	N4
76 kHz	27 kHz

S1	S4
18 kHz	36 kHz

Similar (more primitive) analysis in Run 11

N1: 50 kHz, N4: 31 kHz
S1: 35 kHz, S4: 64 kHz

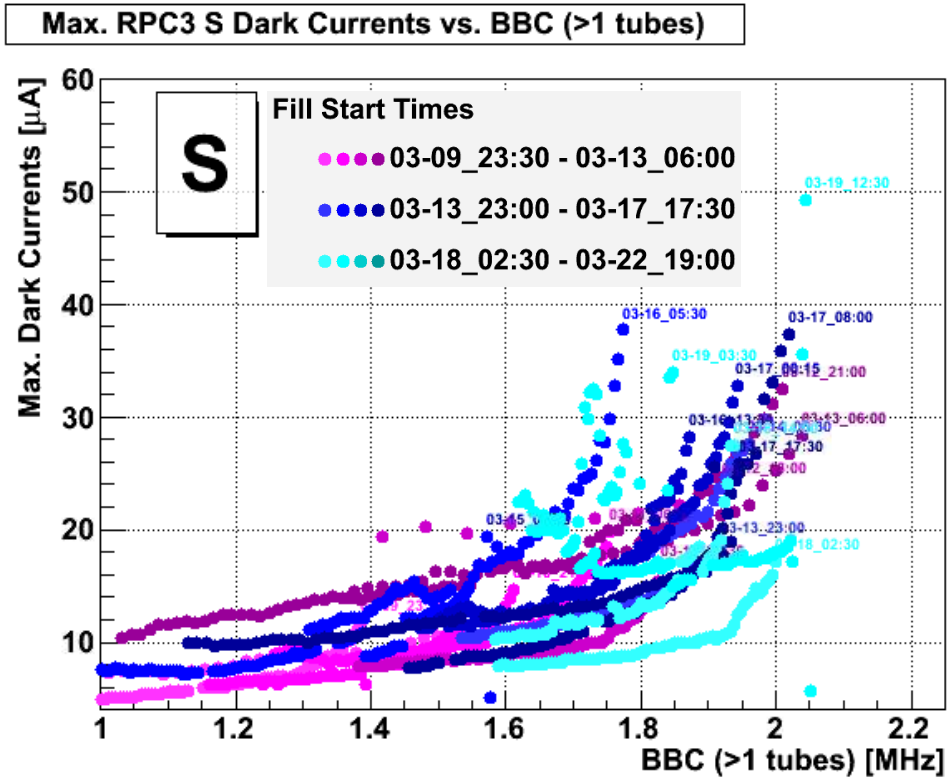
2) Dark Currents vs. BBC (>1 tubes) Run 13

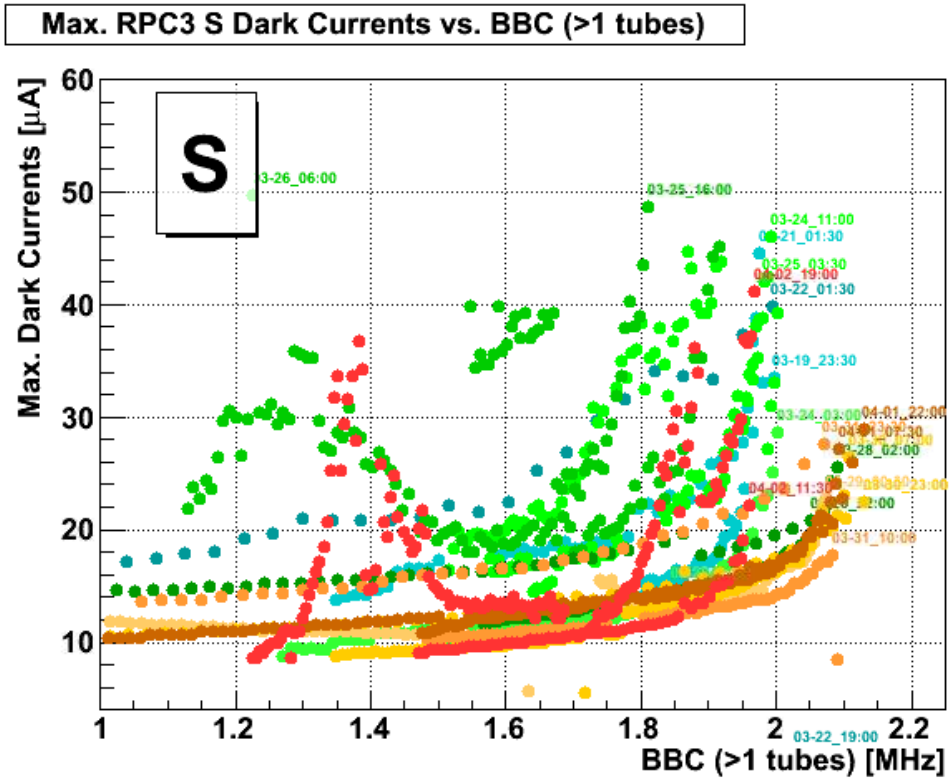
-plotted on x-axis: BBC (>1 tubes) [MHz], on y-axis: max. RPC3 dark currents,
for times when RPC3 HV operating;

- fills >3 hrs in Run13

First 2 weeks of Run13

Latest 2 weeks of Run13





2) Dark Currents vs. BBC (>1 tubes) Run 13

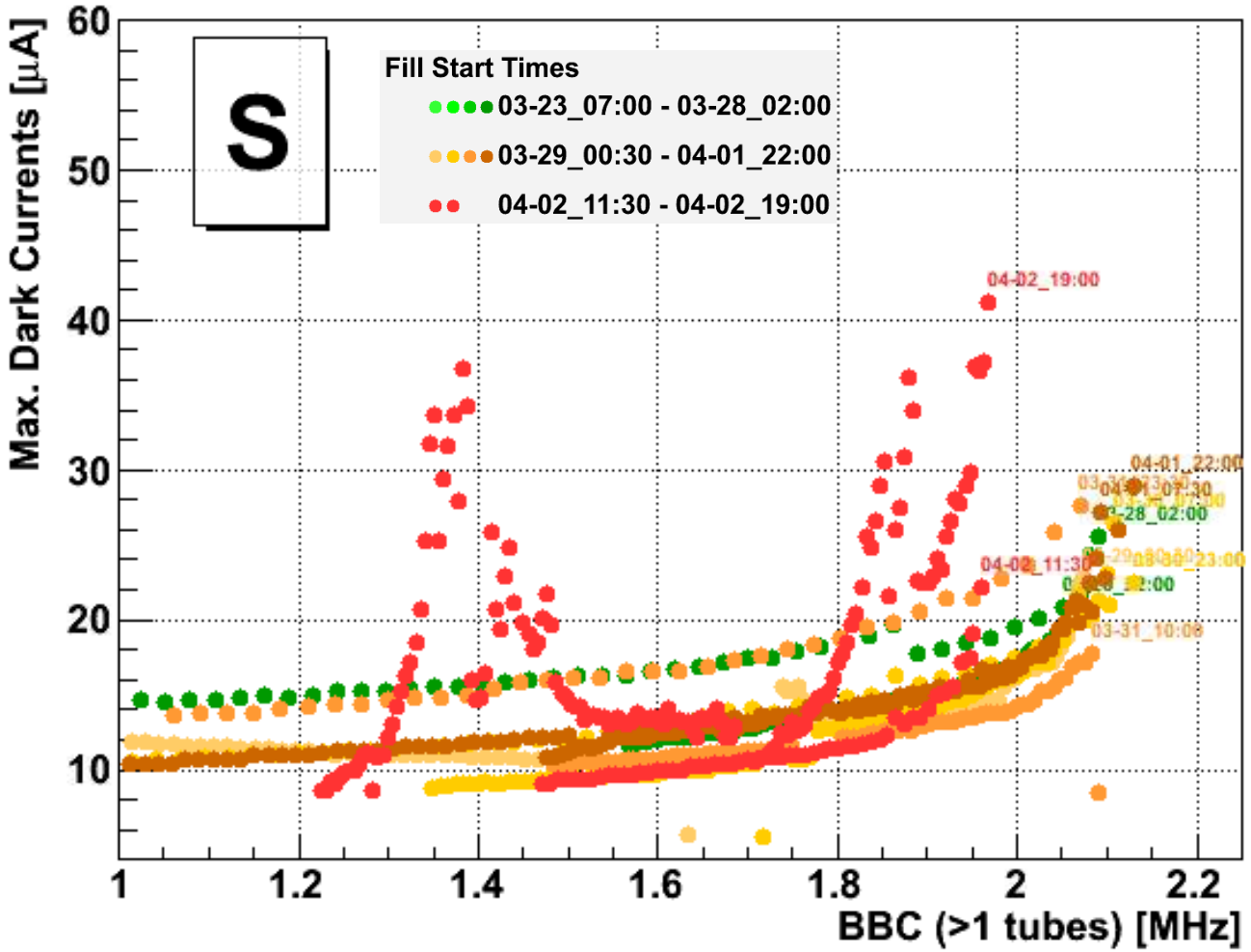
-plotted on x-axis: BBC (>1 tubes) [MHz], on y-axis: max. RPC3 dark currents,
for times when RPC3 HV operating;

- fills >3 hrs in Run13

fill duty factor
~7hr fills: 70/168=42%

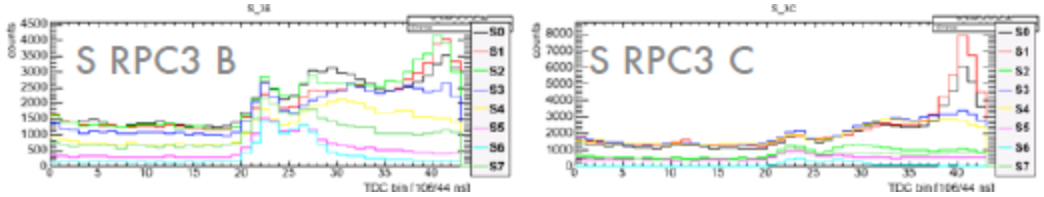
Latest 7 days (10 fills) of Run13

Max. RPC3 S Dark Currents vs. BBC (>1 tubes)



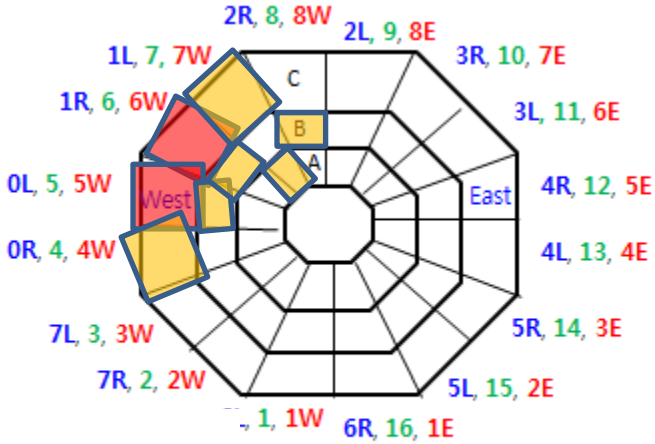
2) Analysis of Sunday 3/24 trips in RPC3 South

- erratic background behavior: some beam manipulation apparently after physics declared
- background scaler counts consistent with extrapolated values from previous slide

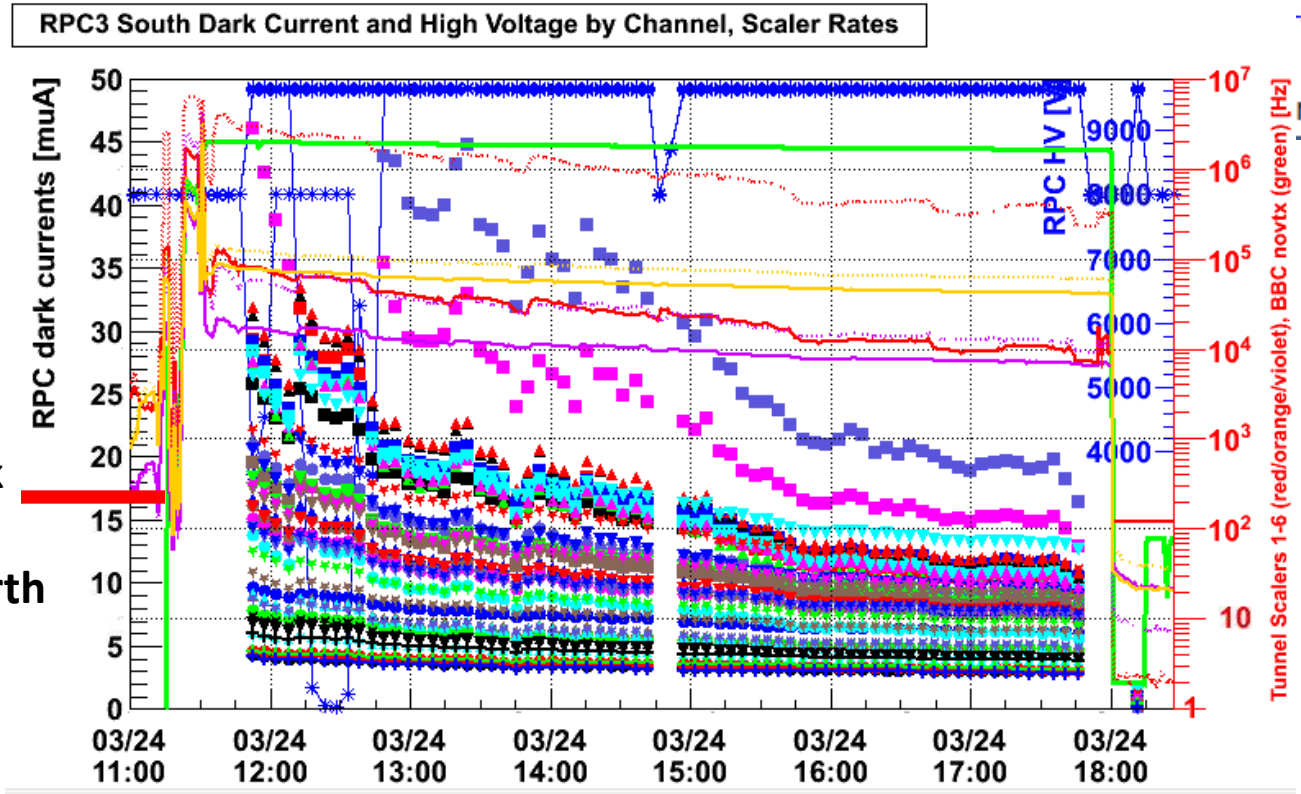


South west side (new massive shielding installed on east)

Trips occurred:
S1 = 21 kHz, S4 = 59 kHz



view from south tunnel
nteraction point



Max dark current RPC3 North

Tripped:

- _5W_0L_C
- _6W_1R_C

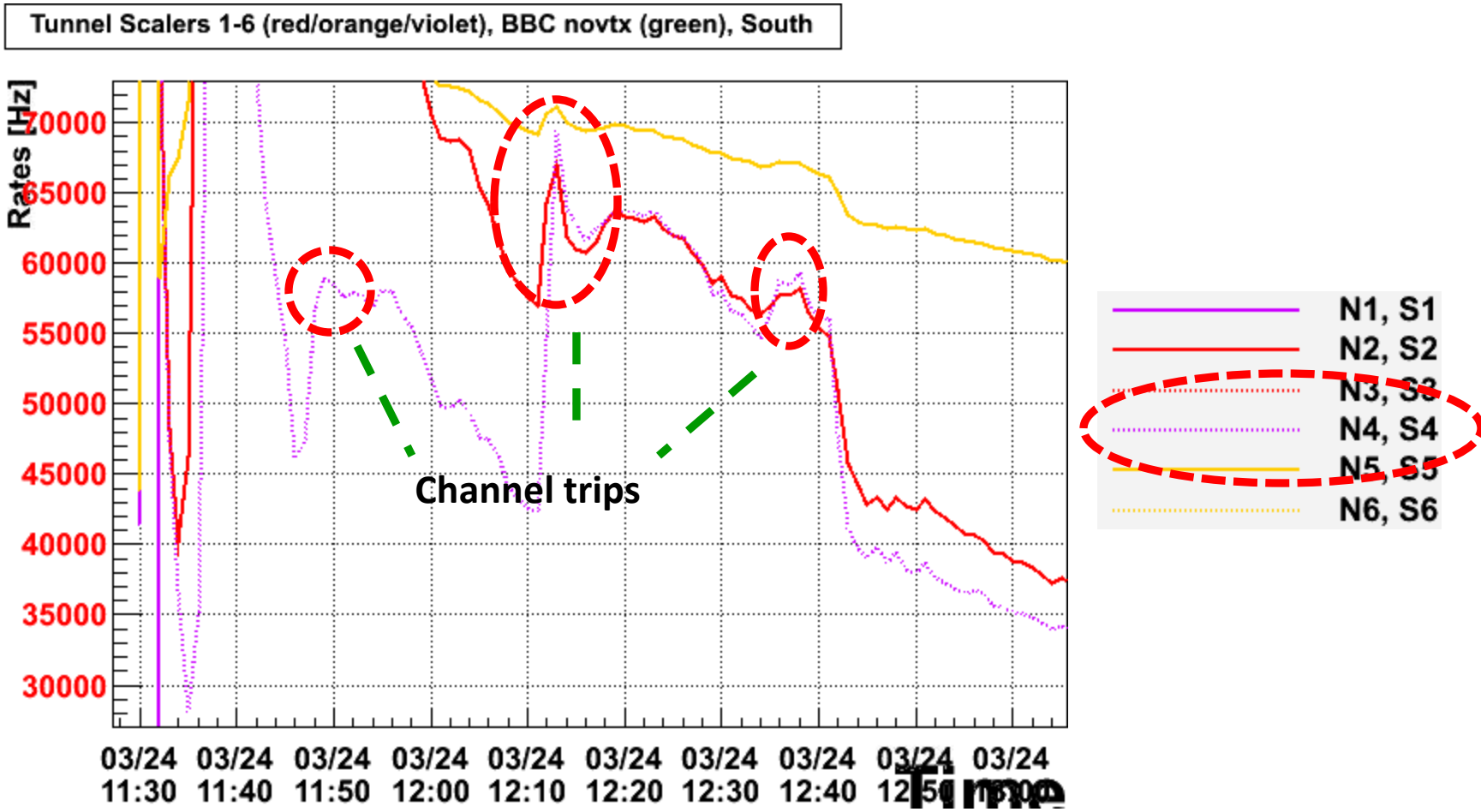
High dark currents:

- _7W_1L_B
- _7W_1L_A
- _4W_0R_C
- _5W_0L_B
- _6W_1R_B
- _8W_2R_B

2) Analysis of Sunday 3/24 trips in RPC3 South

- erratic background behavior: some beam manipulation apparently after physics declared
- background scaler counts consistent with extrapolated values from previous slide

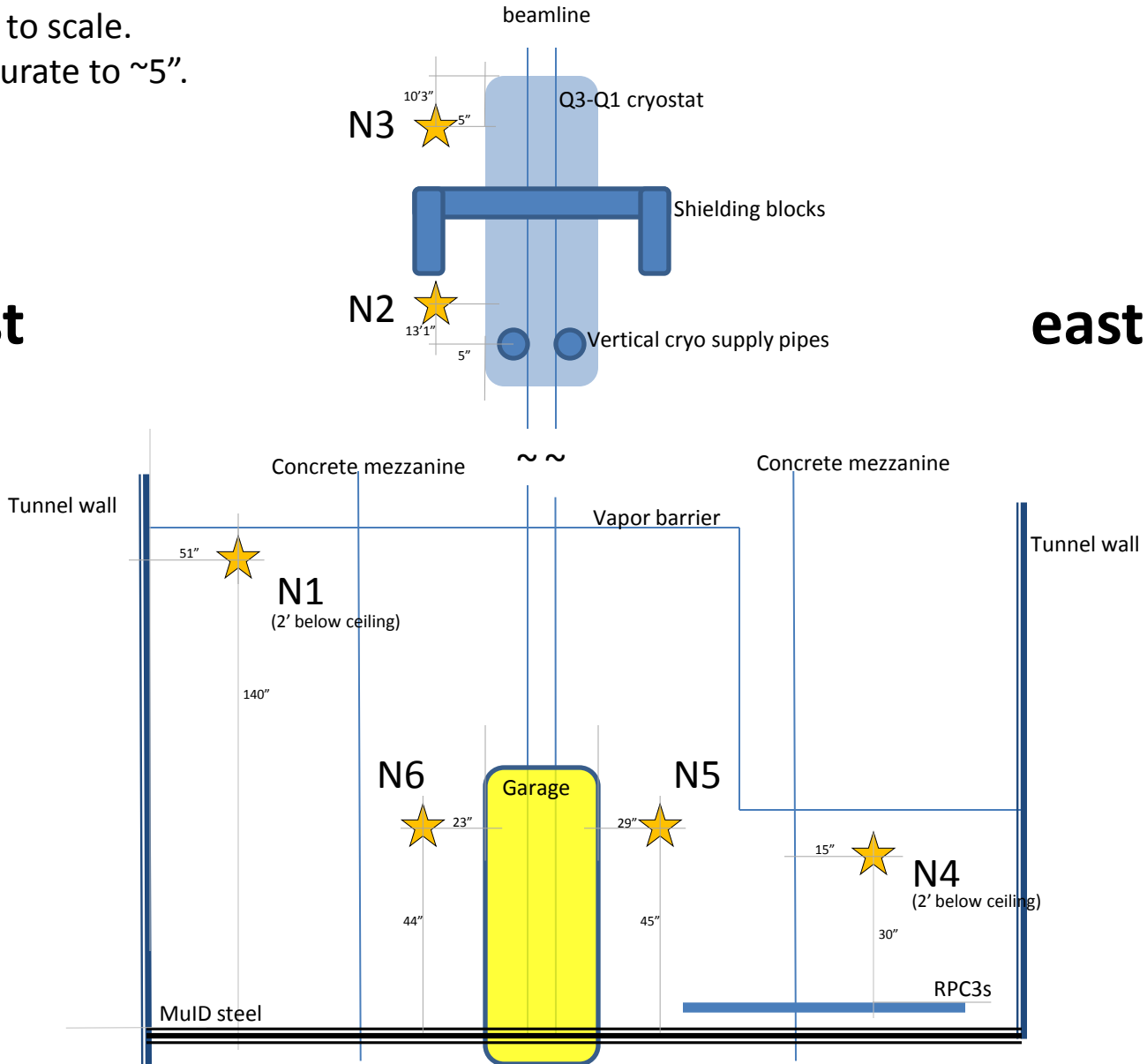
Trips occurred:
S1 = 21 kHz, S4 = 59 kHz (where open shielding, 5W, 6W)



PHENIX Beam Background Counter Positions 02/18/12
North

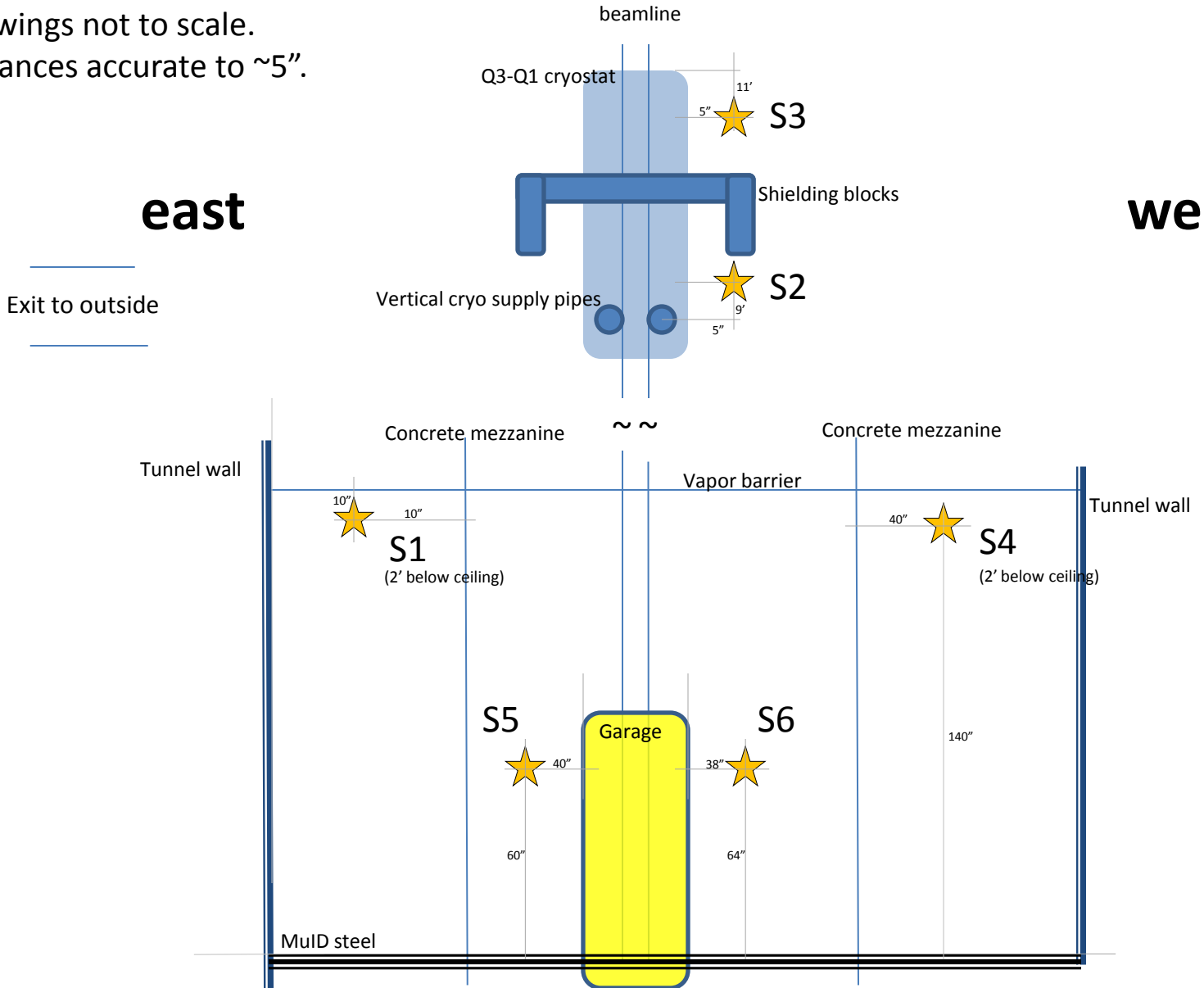
Top view.
Drawings not to scale.
Distances accurate to ~5”.

Exit to 1008

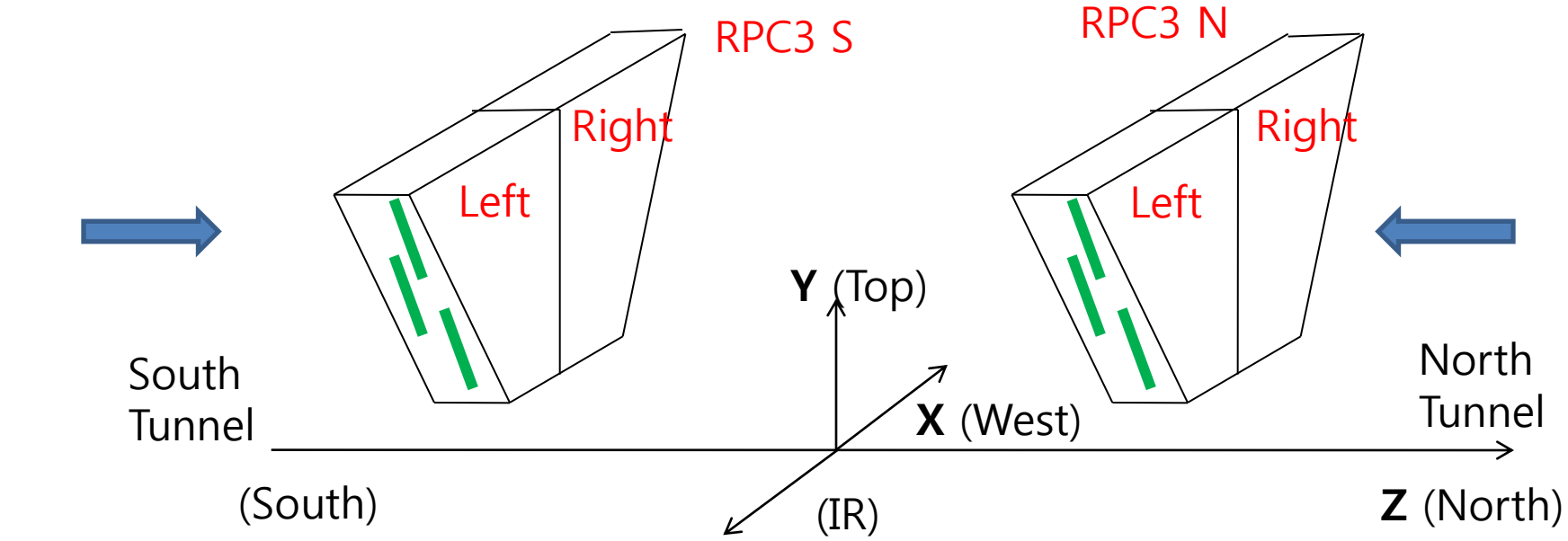


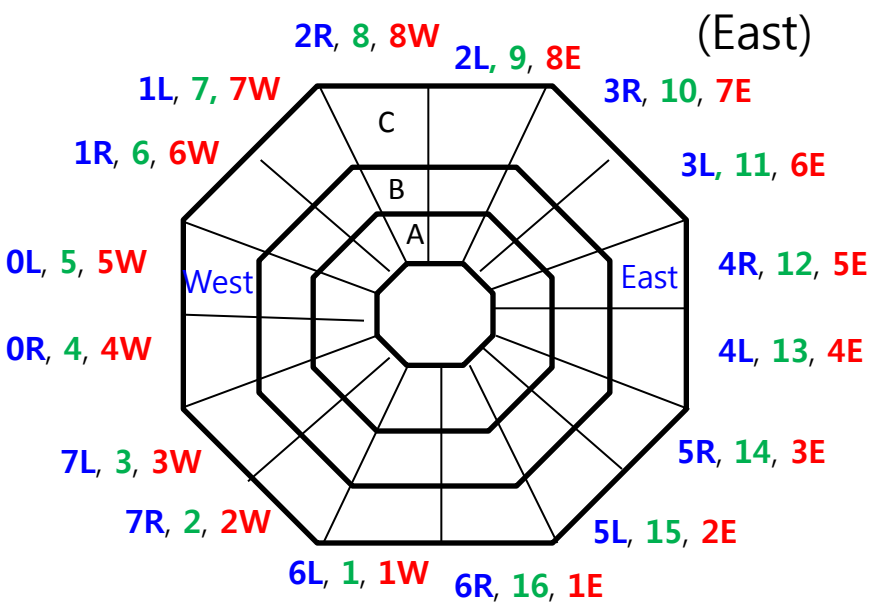
PHENIX Beam Background Counter Positions 02/18/12
South

Top view.
Drawings not to scale.
Distances accurate to ~5”.

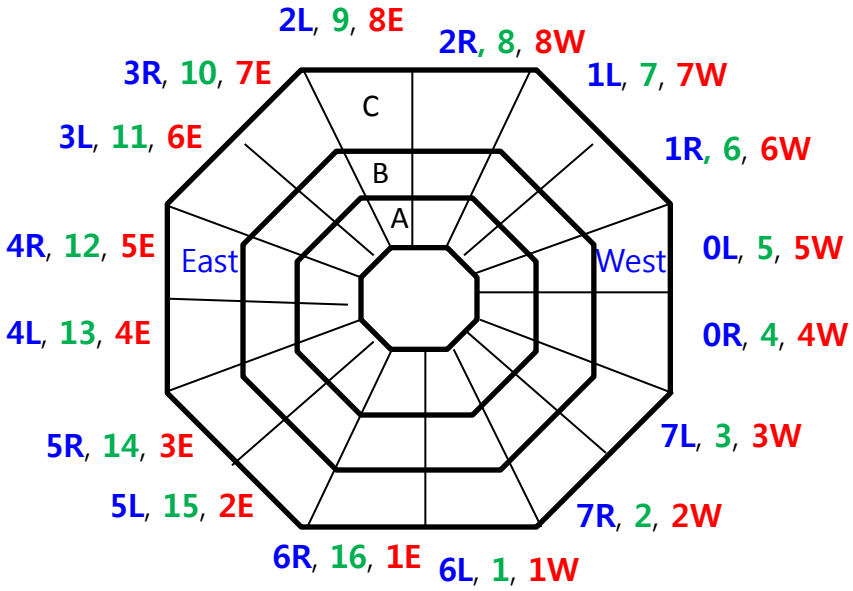


Backup: RPC Nomenclature





RPC3 S: view from south tunnel toward interaction point



RPC3 N: view from north tunnel toward interaction point