

# Run 10 plan based on 25 Nov Revised Plan and $\sqrt{s}=200$ extended by 1 week

- Dec. 1, Begin cool down to 4.5K
- Dec. 4, Cooldown to 4.5K complete in both rings!
- Dec. 5, beam setup in RHIC begins.
- Dec 16, 20 hr unplanned Maintenance day
- Dec 20 (AM)-21(PM), blizzard 09 shut us down
- Dec. 27, RHIC Setup complete, begin Ramp Up for Physics (was 14 Dec, late)
- Dec 31 (midnight-store 11340), Machine, Physics declared (store 11340)  $\sqrt{s}=200$  GeV/n Au-Au
- Jan 2 (midnight) STAR in Physics Mode
- Jan 8 (0600) PHENIX in Physics Mode
- Jan 12, Rebucketing not yet routine, stochastic cooling still to come.
- Jan 22, changed beta\* from 0.6 to 0.7 meters, rebucketing ~established, yellow transverse stochastic cooling on
- Mar. 18 (0556), End 10 week  $\sqrt{s} = 200$  GeV/n Run, begin  $\sqrt{s} = 62.4$  GeV/n setup
- Mar. ~~20~~ **19**, Begin 4 week  $\sqrt{s} = 62.4$  GeV/n run
  - **Machine physics 19 March for stores  $\geq 11954$**
  - **PHENIX Physics 19 Mar for stores  $\geq 11955$**
  - **STAR Physics 22 March for stores  $\geq 11976$**
- Apr. 8, End 2.9 week  $\sqrt{s} = 62.4$  GeV/n Run, begin  $\sqrt{s} = 39$  GeV/n setup
- Apr. 9, Begin 1.5 week  $\sqrt{s} = 39$  GeV/n run
  - Machine physics 9 April for stores  $\geq 12119$
  - PHENIX and STAR Physics 9 April for stores  $\geq 12122$
- Apr. 14, 24 hours APEX for n= 0.67 studies
- Apr. 22, End 1.9 week  $\sqrt{s} = 39$  GeV/n Run
- Apr 22, Begin  $\sqrt{s} = 7.7$  GeV/n setup (12 hr pol. switches)
- Apr 24 (fill 12238, 2300 hrs), Begin 4 week  $\sqrt{s} = 7.7$  GeV/n run
  
- May 22 End 4 week  $\sqrt{s} = 7.7$  GeV/n Run, begin  $\sqrt{s} = 11.5$  GeV/n setup **(4-6 hr polarity switch, if necessary)**
- **May 23 – 28 IPAC (Kyoto)**
- **May 22 – Jun 3, Satogata is away**
- May 24, begin  $\sqrt{s} = 11.5$  GeV/n for STAR
- Jun 7, end 2 week  $\sqrt{s} = 11.5$  GeV/n run, begin  $\sqrt{s} = 5$  GeV/n setup **(4-6 hr polarity switch, if necessary)**
- Jun 9, begin  $\sqrt{s} = 5$  GeV development
- Jun 12, end 3 days at  $\sqrt{s} = 5$  GeV/n
- Jun 13, Begin Cryo Warm-up
- Jun 14, Warm-up complete, Run 10 ends – **27.9 CRYO WEEKS**
- **Last Week of June – Commission EBIS with He beam to NSRL**

## Run 10 plan based on 25 Nov Revised Plan and $\sqrt{s}=200$ extended by 1 week

- Apr. 8, End 2.9 week  $\sqrt{s} = 62.4$  GeV/n Run, begin  $\sqrt{s} = 39$  GeV/n setup
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- Apr 24 (fill 12238, 2300 hrs), Begin 4 week  $\sqrt{s} = 7.7$  GeV/n run

- May 13 plus another day (or two?)  $\sqrt{s} = 5$  GeV/n development, 8 hour blocks

- May 22(Saturday) 24(Monday) End 4 week  $\sqrt{s} = 7.7$  GeV/n Run, begin  $\sqrt{s} = 11.5$  GeV/n setup (4-6 hr polarity switch)
- May 22 – Jun 3, Satogata is away
- May 23 – 28 IPAC (Kyoto)
- May 24 26, begin  $\sqrt{s} = 11.5$  GeV/n for STAR
- Jun 7 9, end 2 week  $\sqrt{s} = 11.5$  GeV/n run, begin  $\sqrt{s} = 5$  GeV/n setup (4-6 hr polarity switch)

- **10-12 Jun – contingency**

- ~~Jun 9, begin  $\sqrt{s} = 5$  GeV development~~
- ~~Jun 12, end 3 days at  $\sqrt{s} = 5$  GeV/n~~
- Jun 13 , Begin Cryo Warm-up
- Jun 14, Warm-up complete, Run 10 ends – 27.9 CRYO WEEKS
- Last Week of June – Commission EBIS with He beam to NSRL

# Run 10 Au-Au Goals

4/27/10

- STAR

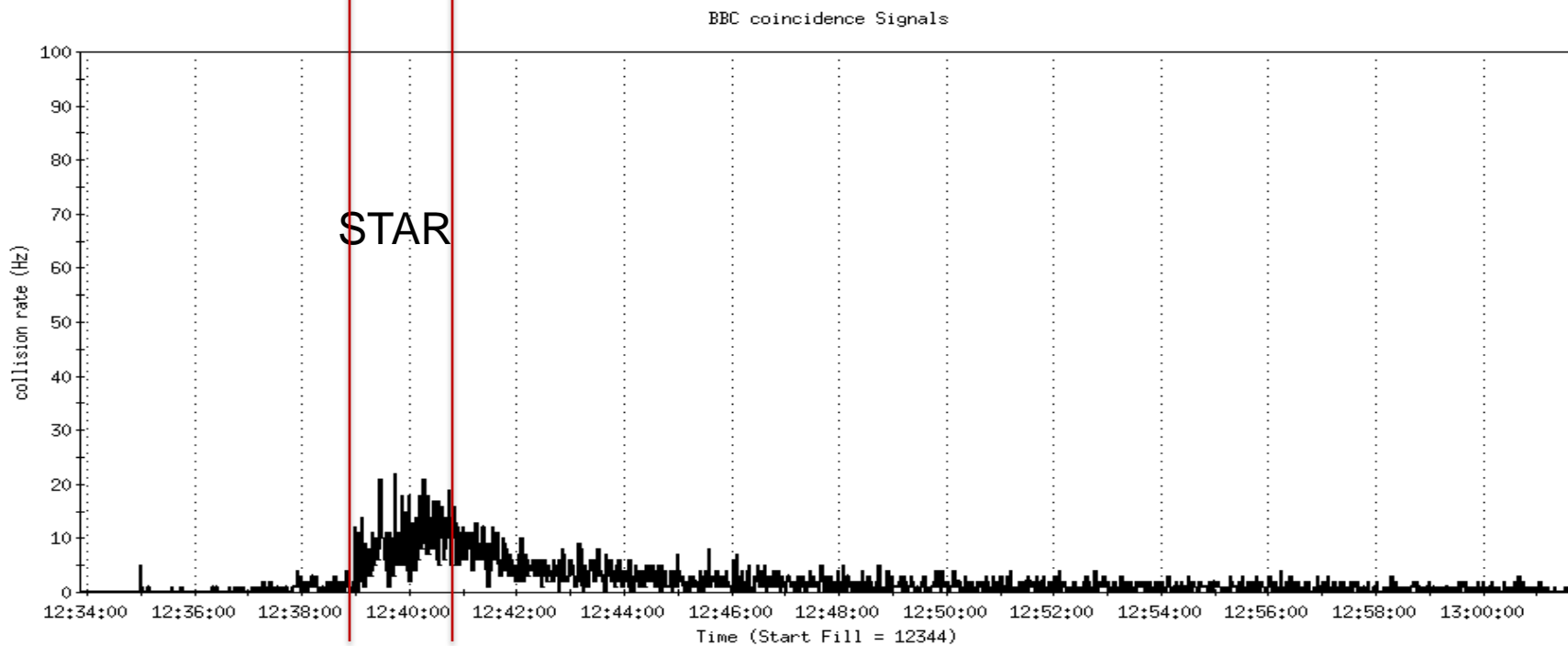
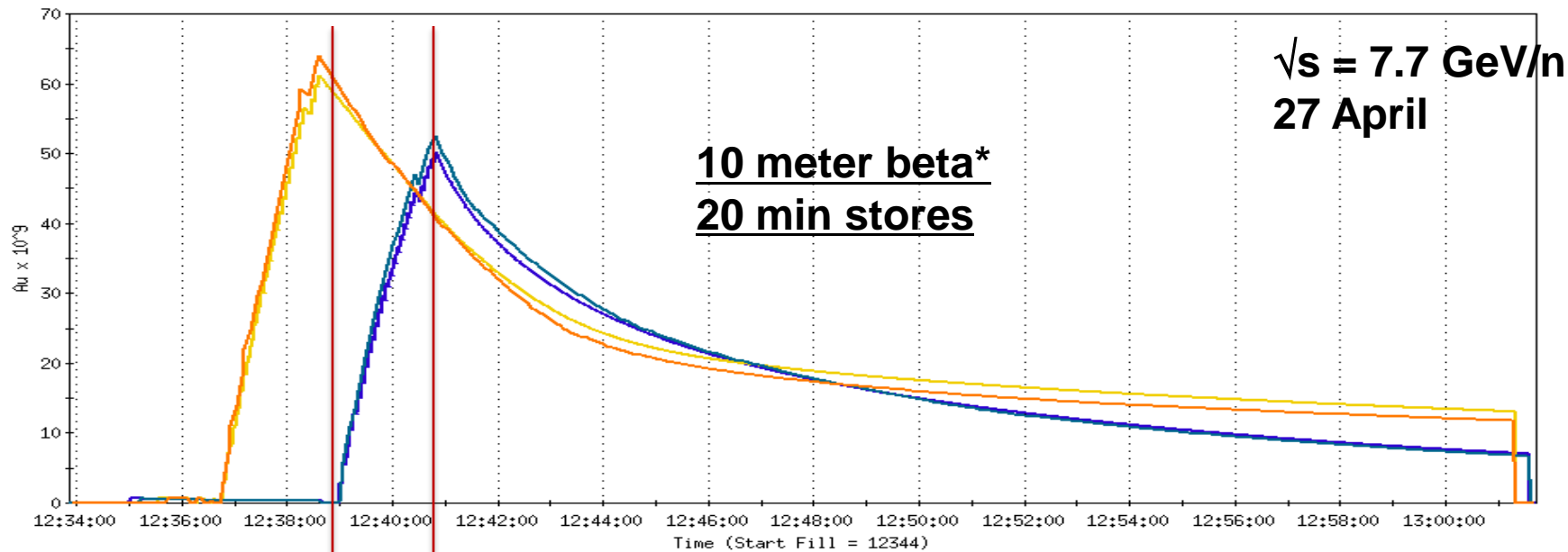
- $\sqrt{s} = 7.7 \text{ GeV/n}$

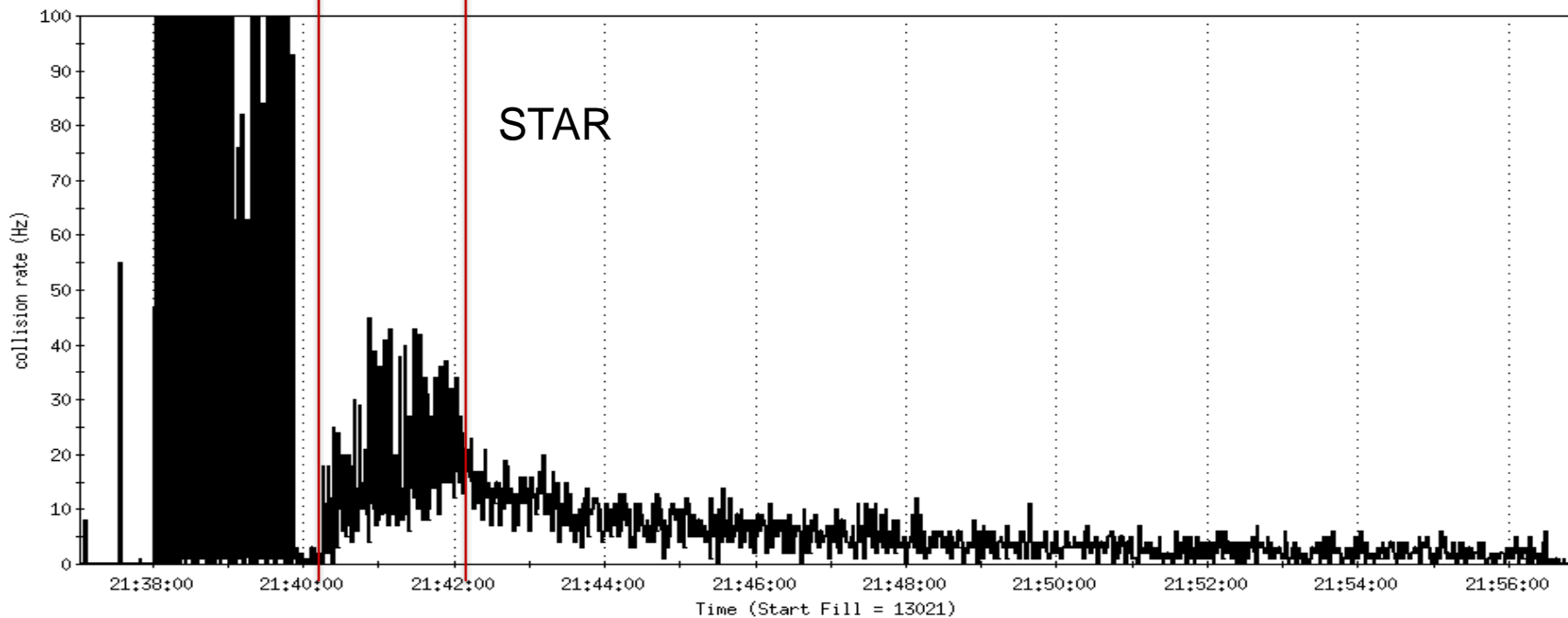
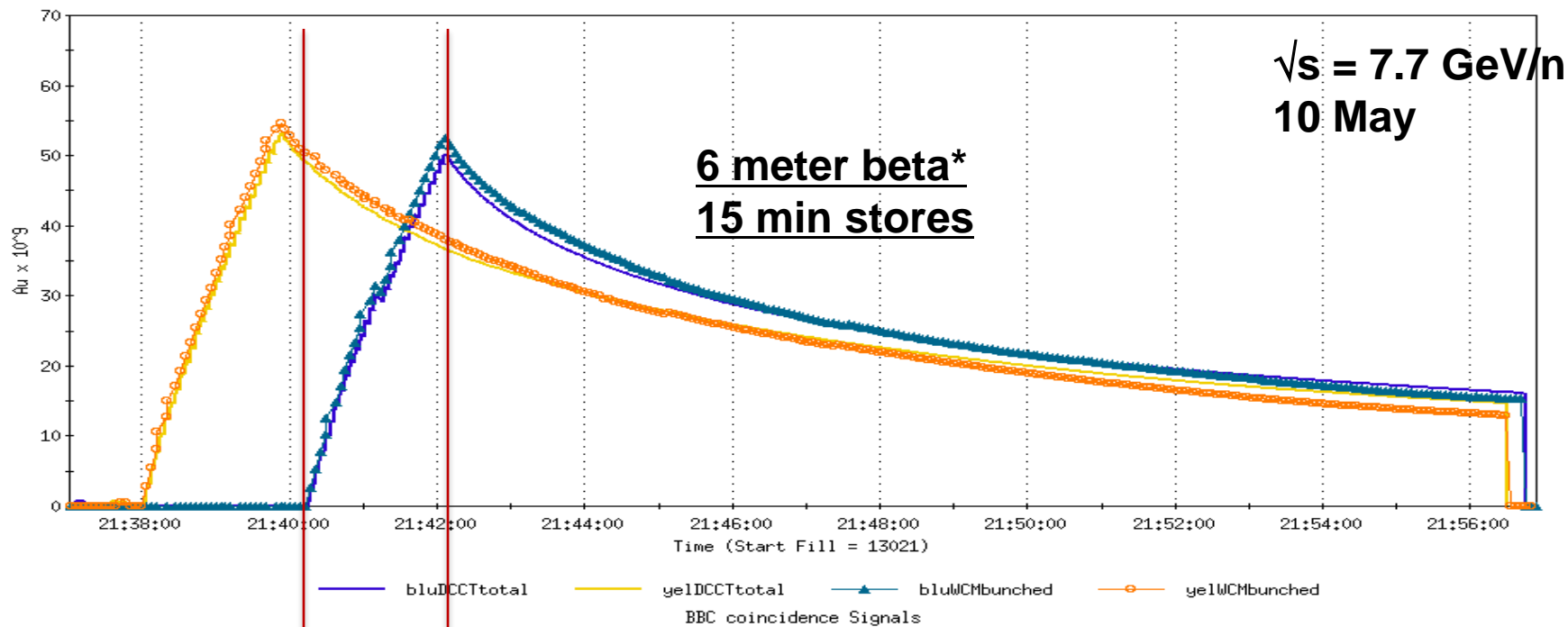
- Luminosity Sampled/Delivered = ?/?  $\mu\text{b}^{-1}$
    - 5M Min-bias events

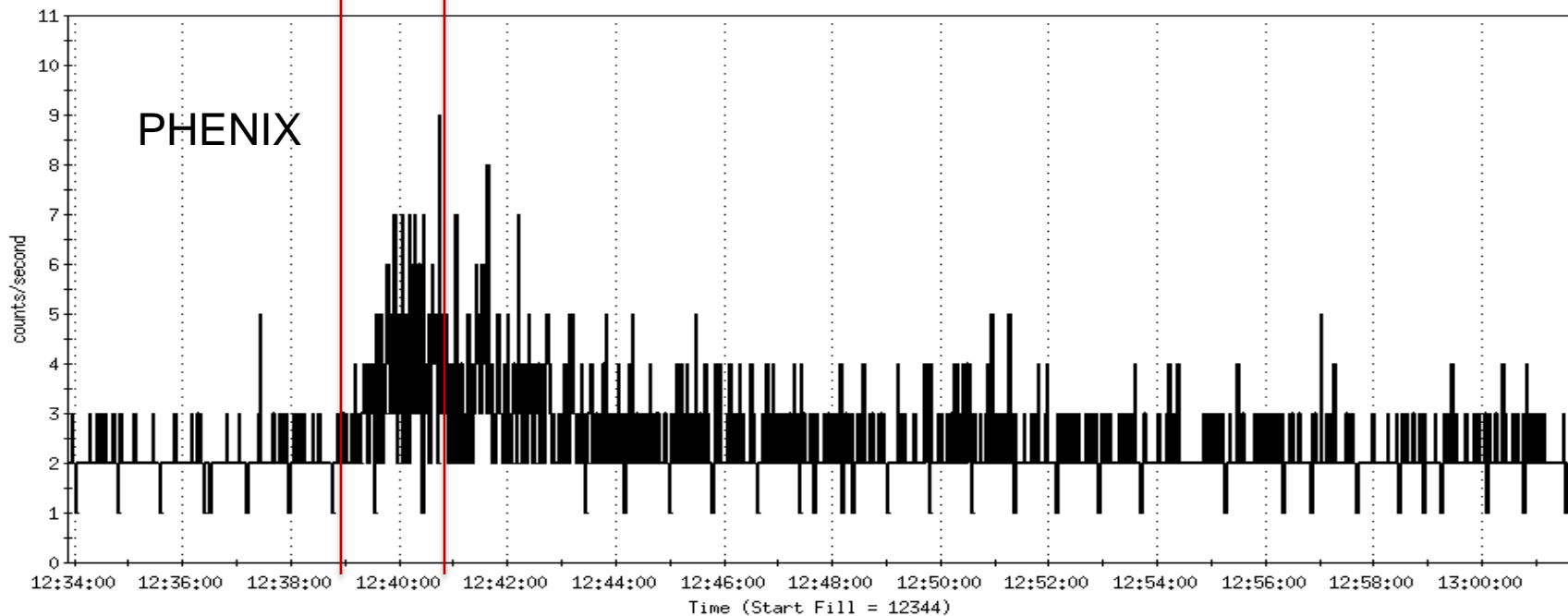
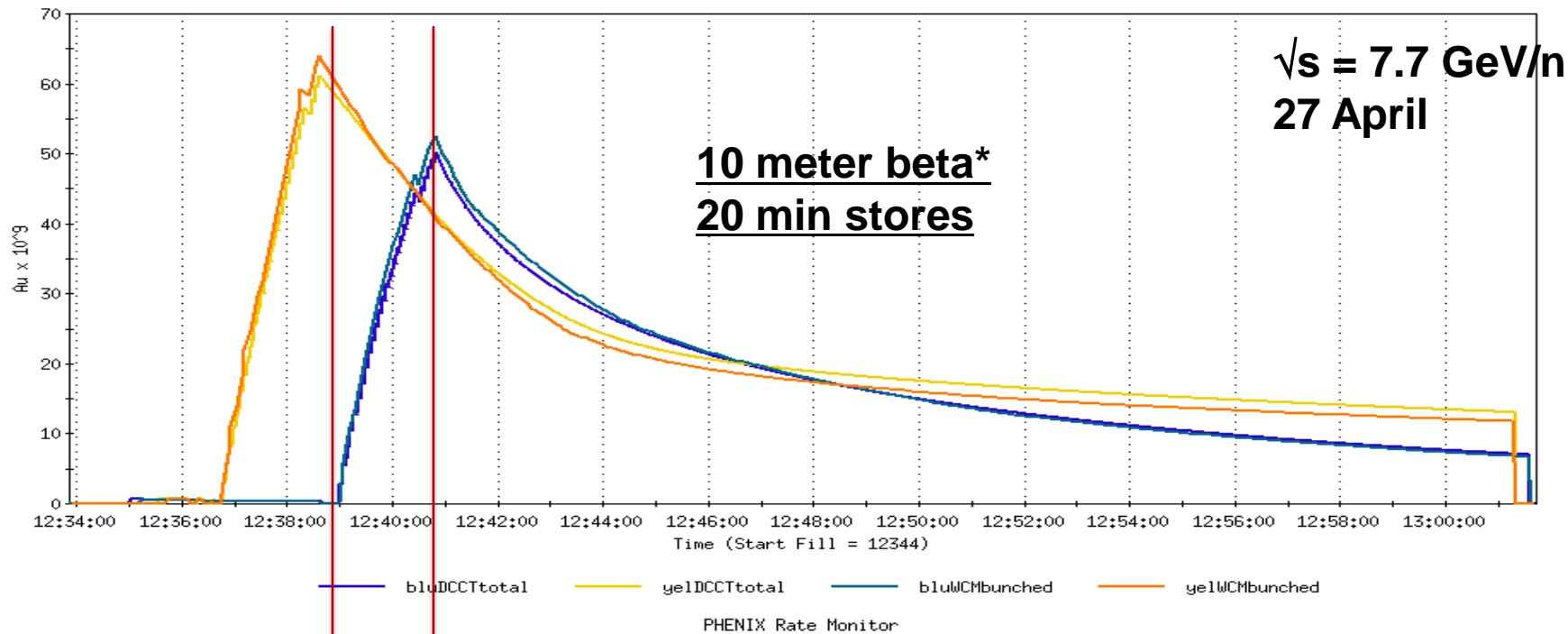
- PHENIX

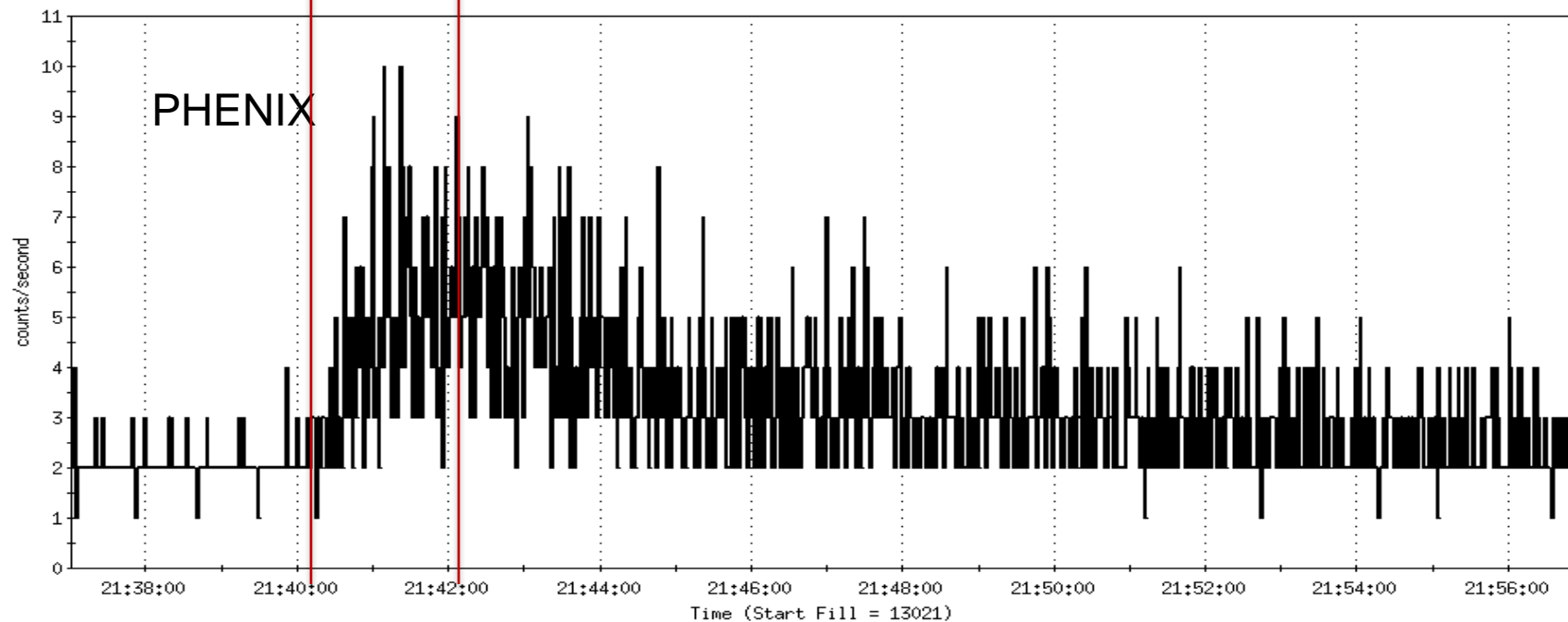
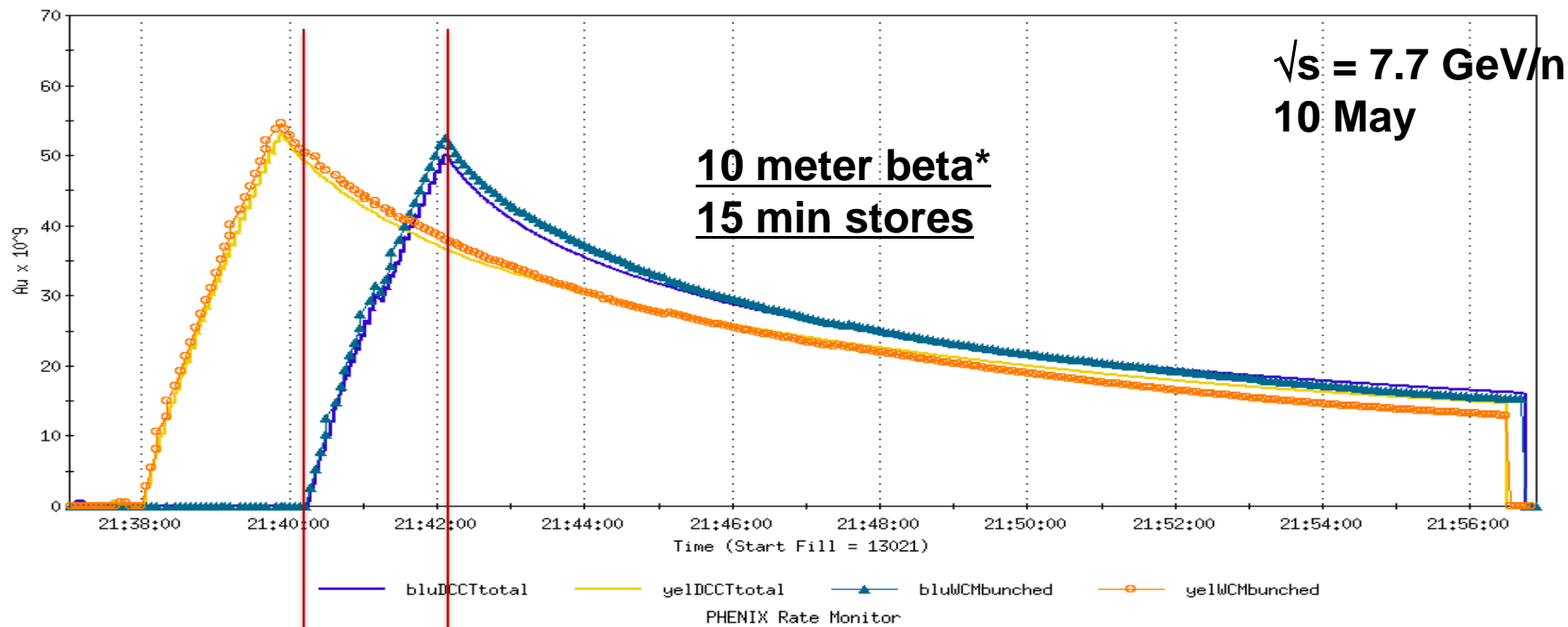
- $\sqrt{s} = 7.7 \text{ GeV/n}$

- Luminosity Recorded/Delivered = ?/?  $\mu\text{b}^{-1}$
    - 0.5M Min-bias events

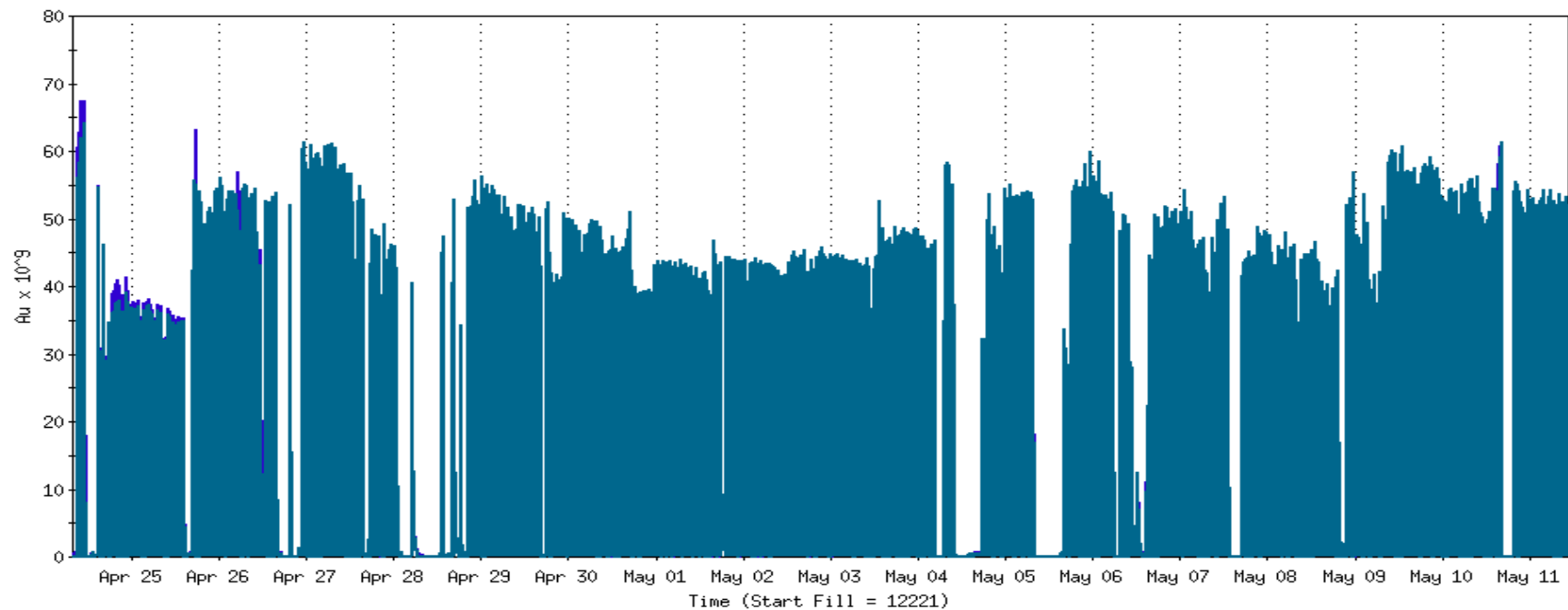
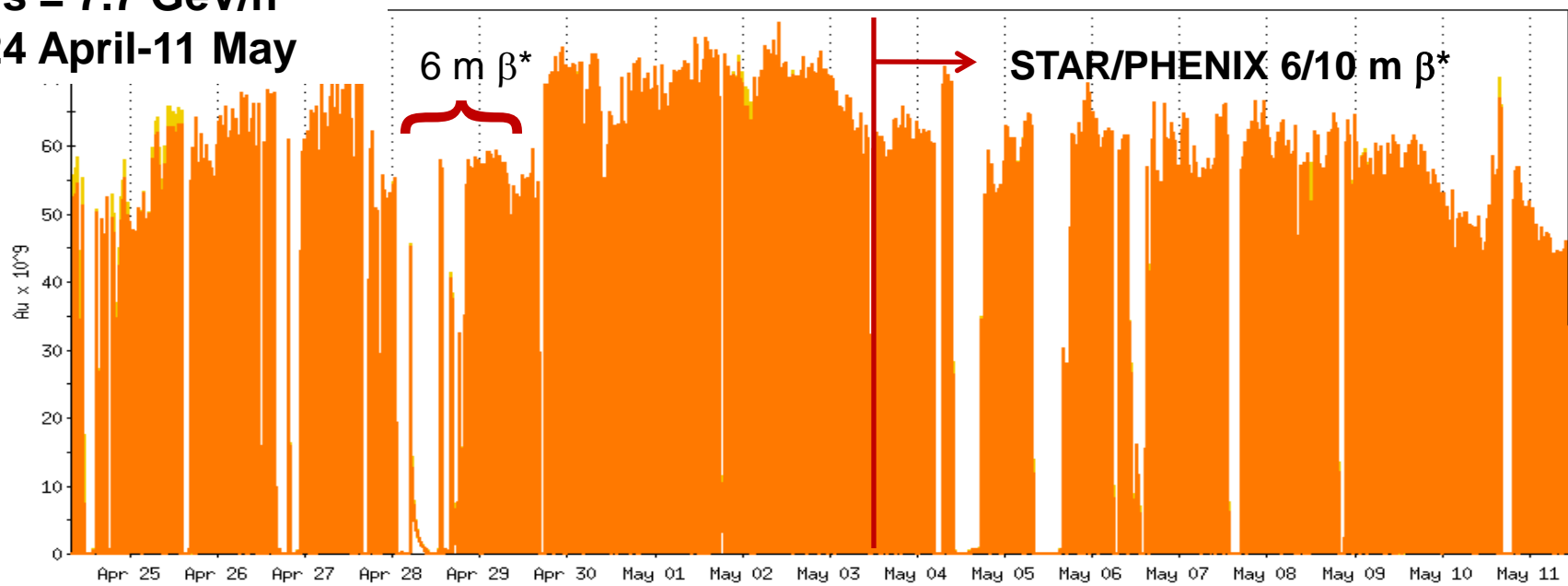




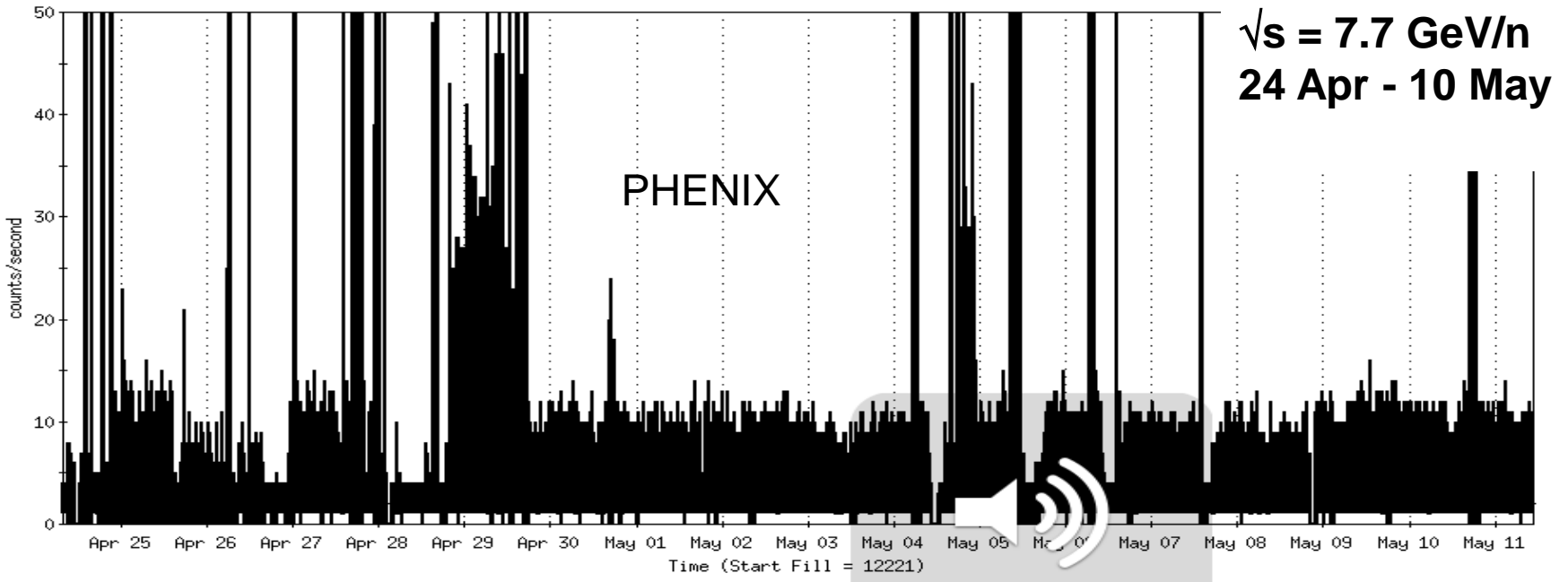




$\sqrt{s} = 7.7 \text{ GeV/n}$   
 24 April-11 May

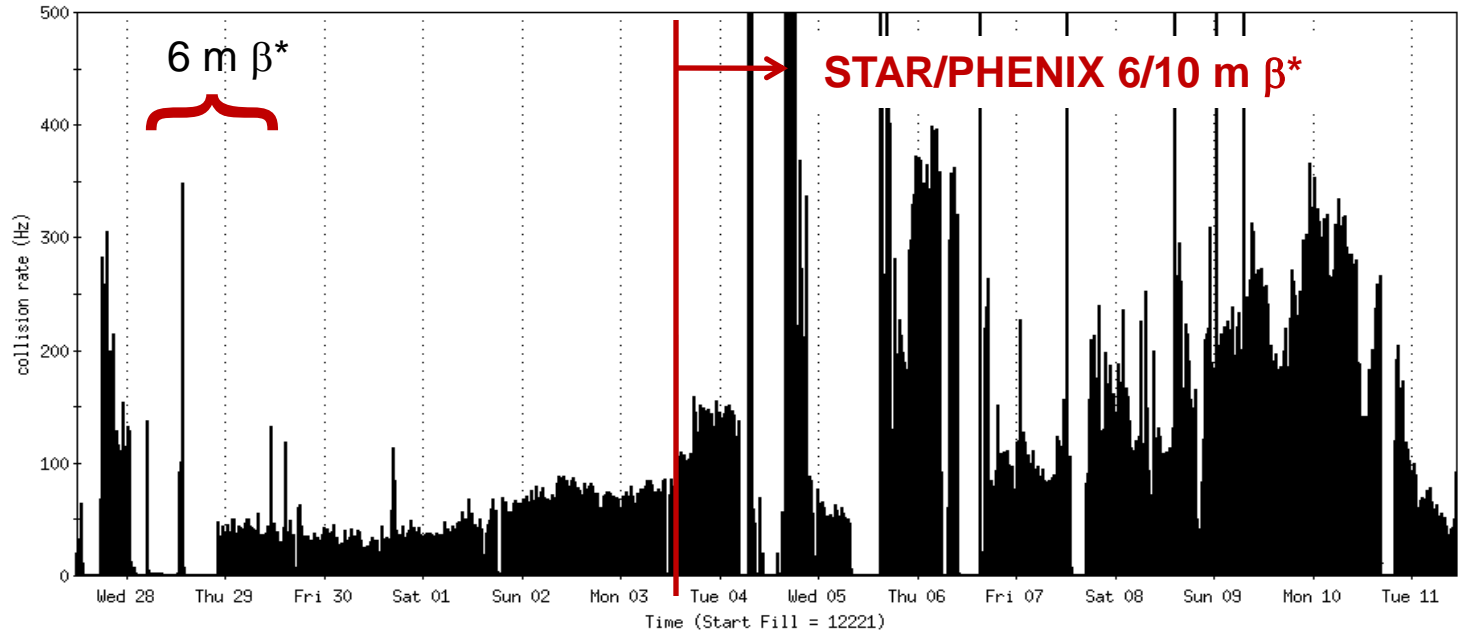






BBC coincidence Signals

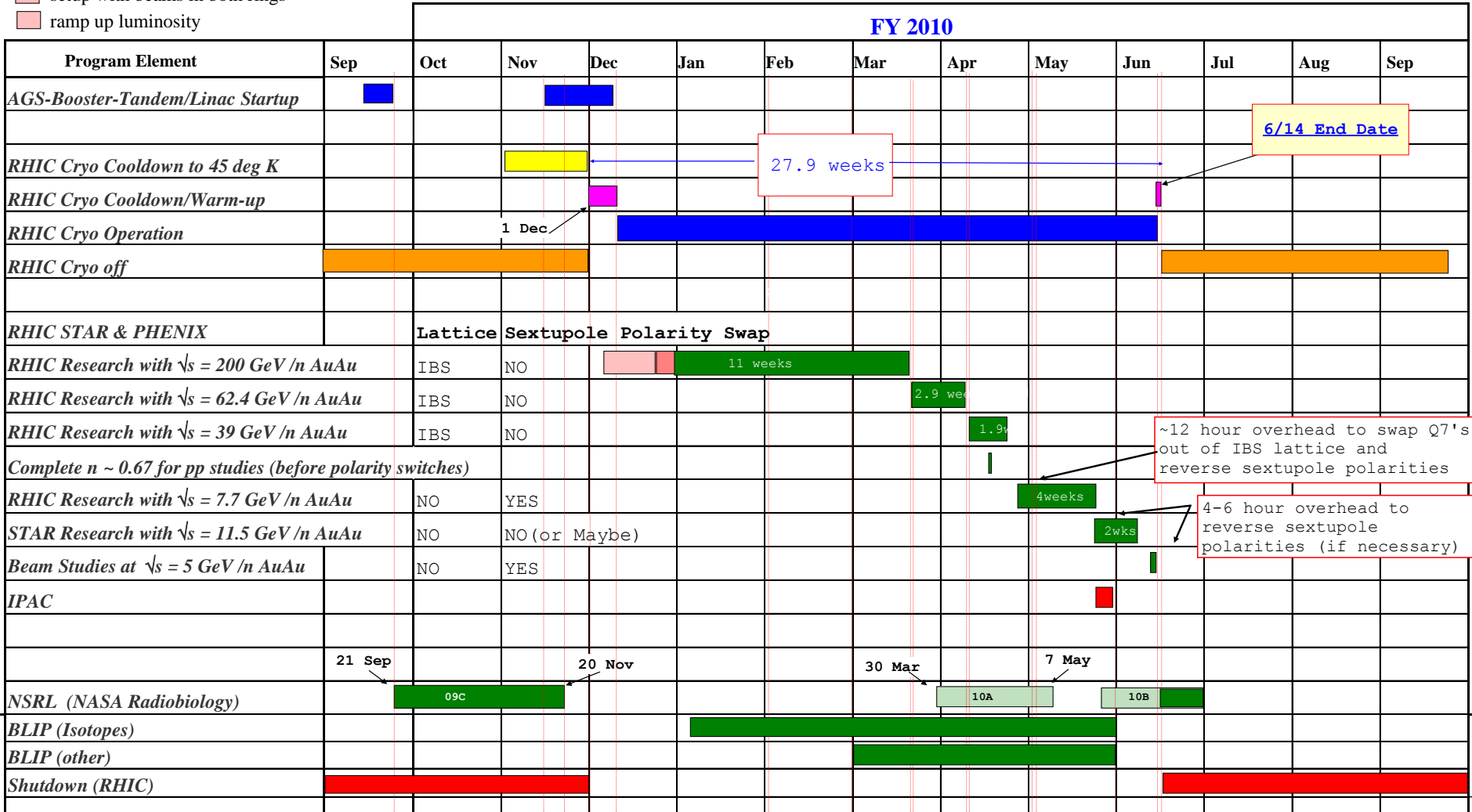
STAR



# C-A Operations-FY10

*as run/planned*

- concurrent with RHIC
- setup with beams in both rings
- ramp up luminosity



6/14 End Date

27.9 weeks

1 Dec

~12 hour overhead to swap Q7's out of IBS lattice and reverse sextupole polarities

4-6 hour overhead to reverse sextupole polarities (if necessary)

Table 6: Detailed plan for Run-10.

## PHENIX BUR

|                    | $\sqrt{s_{NN}}$ | weeks     | events | comment                    |
|--------------------|-----------------|-----------|--------|----------------------------|
| cooldown           |                 | 2         |        |                            |
| Au+Au start/rampup | 200             | 3         |        |                            |
| Au+Au physics      | 200             | 10        |        | record 1.4nb <sup>-1</sup> |
|                    | 62.4            | 3.5       | 350M   | ← (Actual 2.9 weeks, 660M) |
|                    | ≈ 39            | 1.6       | 50M    | ← (Actual 1.9 weeks, 250M) |
|                    | 27              | 4.5       | 25M    |                            |
| p+p development    | 500             | 4         |        | PHENIX ops as needed       |
| p+p physics        | 22.4            | 1         | 2.5B   |                            |
| warm-up            |                 | 0.5       |        |                            |
| <b>TOTAL</b>       |                 | <b>30</b> |        |                            |

Table II: Detailed breakdown of Critical Point search and Beam Energy Scan

## STAR BUR

| Beam Energy | Event Rate | 8-hr Days/<br>1M Events | Events proposed | 8-hr days proposed |
|-------------|------------|-------------------------|-----------------|--------------------|
| 5           | 0.8        | 45                      | 100 k           | 5                  |
| 7.7         | 3          | 11                      | 5 M             | 56                 |
| 11.5        | 10         | 3.7                     | 5M              | 19                 |
| 17.3        | 33         | 1.1                     | 15M             | 16                 |
| 27          | 92         | 0.4                     | 33M             | 12                 |
| 39          | 190        | 0.2                     | 24M             | 5                  |

Actual Average ZDC Rate ~1200 Hz



190

24M

←

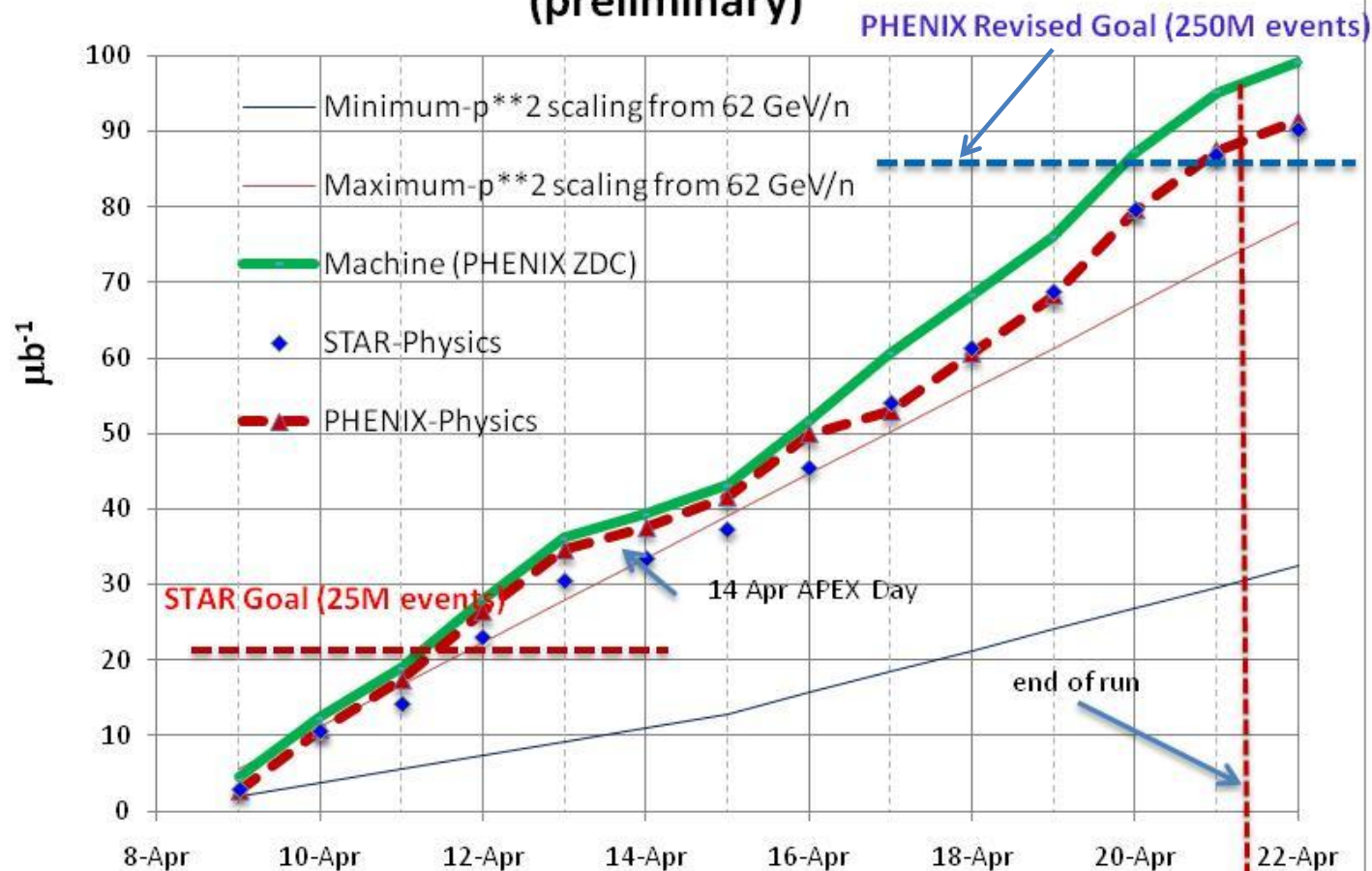
(Actual 1.9 weeks, ~250M)

Archive

# Future Topics

- Toward Smaller  $\beta^*$  - new quad triplets – D. Trbojevic

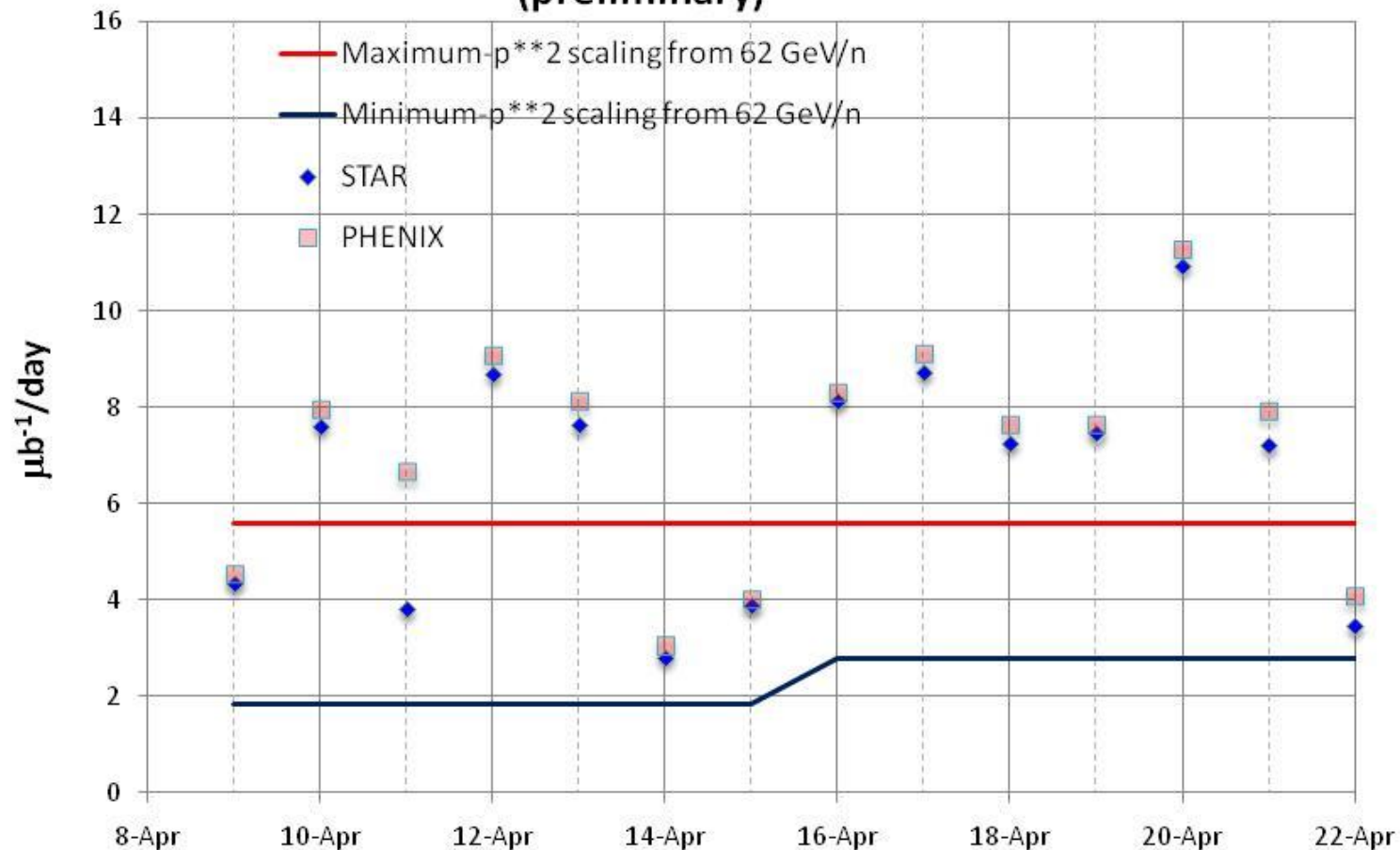
# Run 10 $\sqrt{s} = 39$ GeV/n Au Delivered Luminosity (preliminary)



22 April, through final store 11217  
preliminary

Date (end of day total)

# Run 10, $\sqrt{s} = 39$ GeV/n Au Delivered Luminosity per day (preliminary)

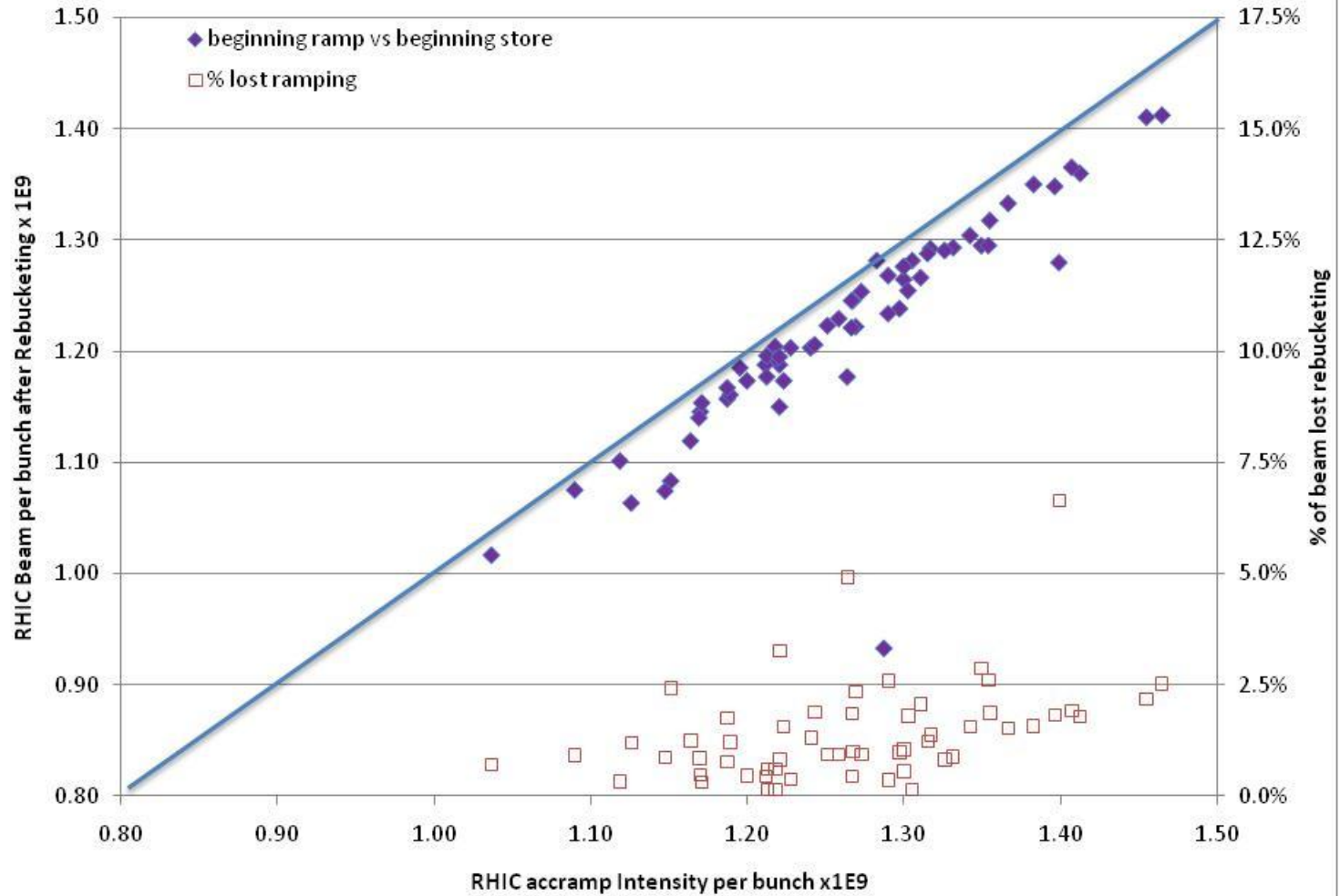


22 April, through final store 11217  
preliminary

Date (end of day total)

22 April, through final store 11217  
preliminary

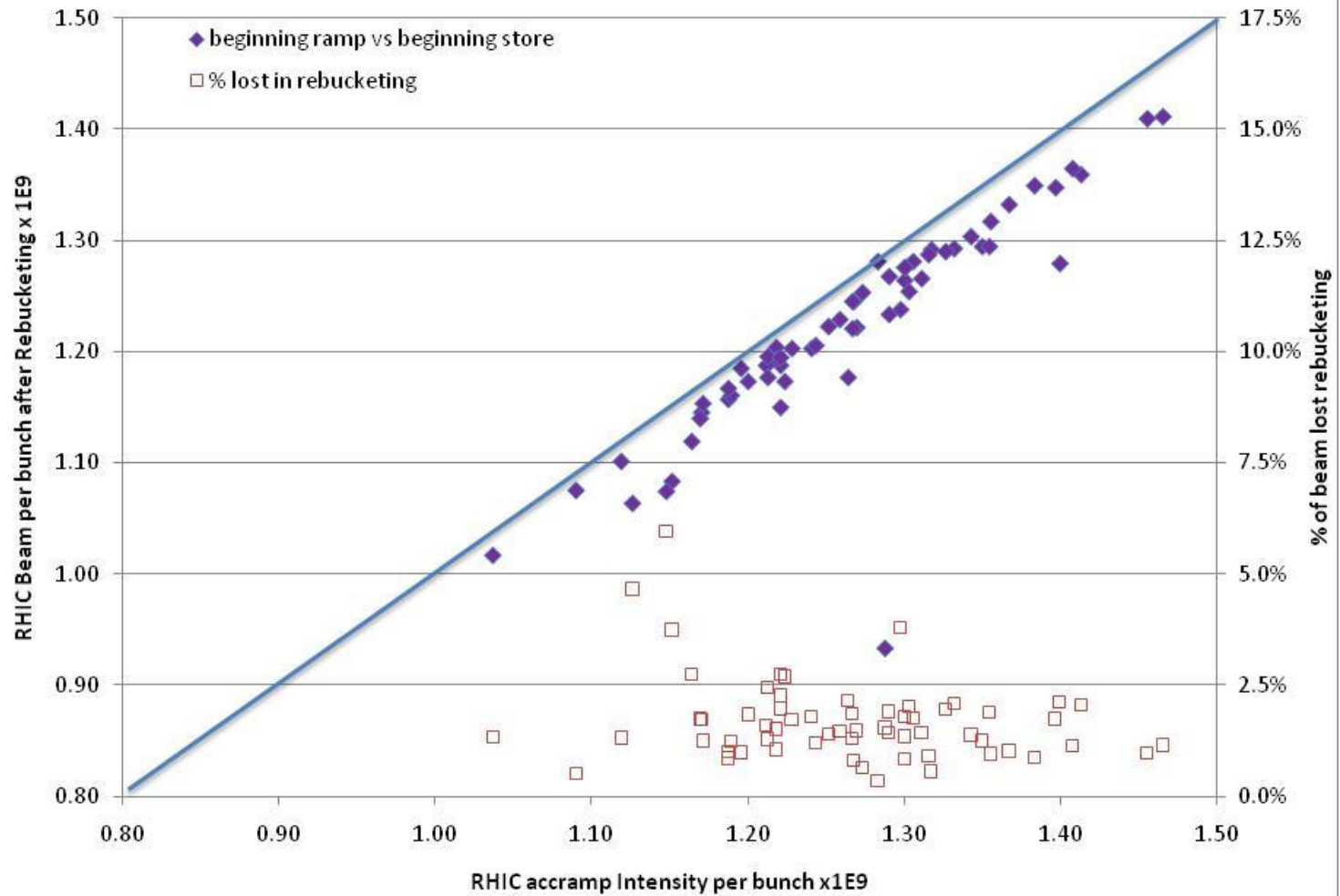
## Run 10, 39 GeV AuAu





22 April, through final store 11217  
preliminary

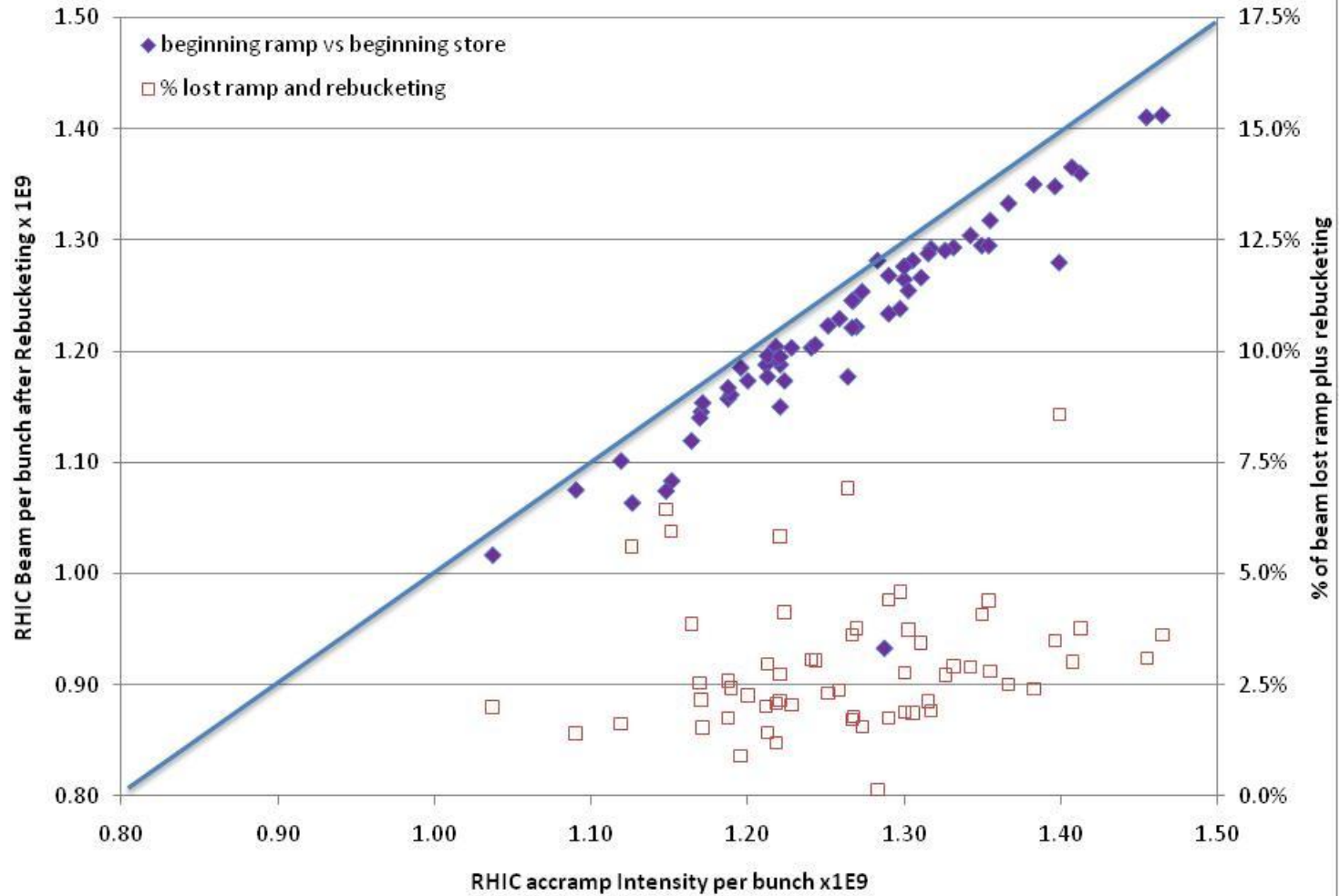
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preliminary

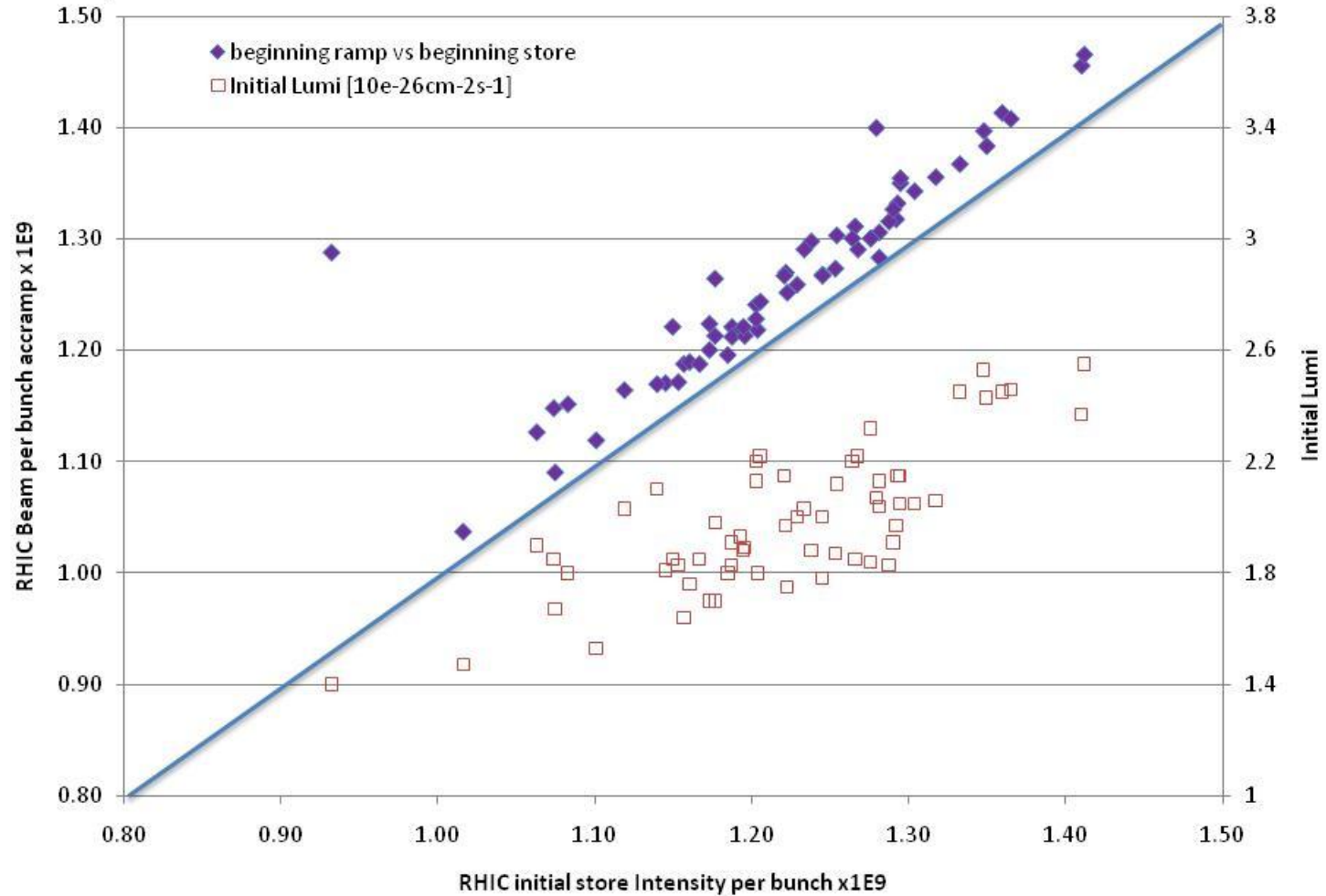
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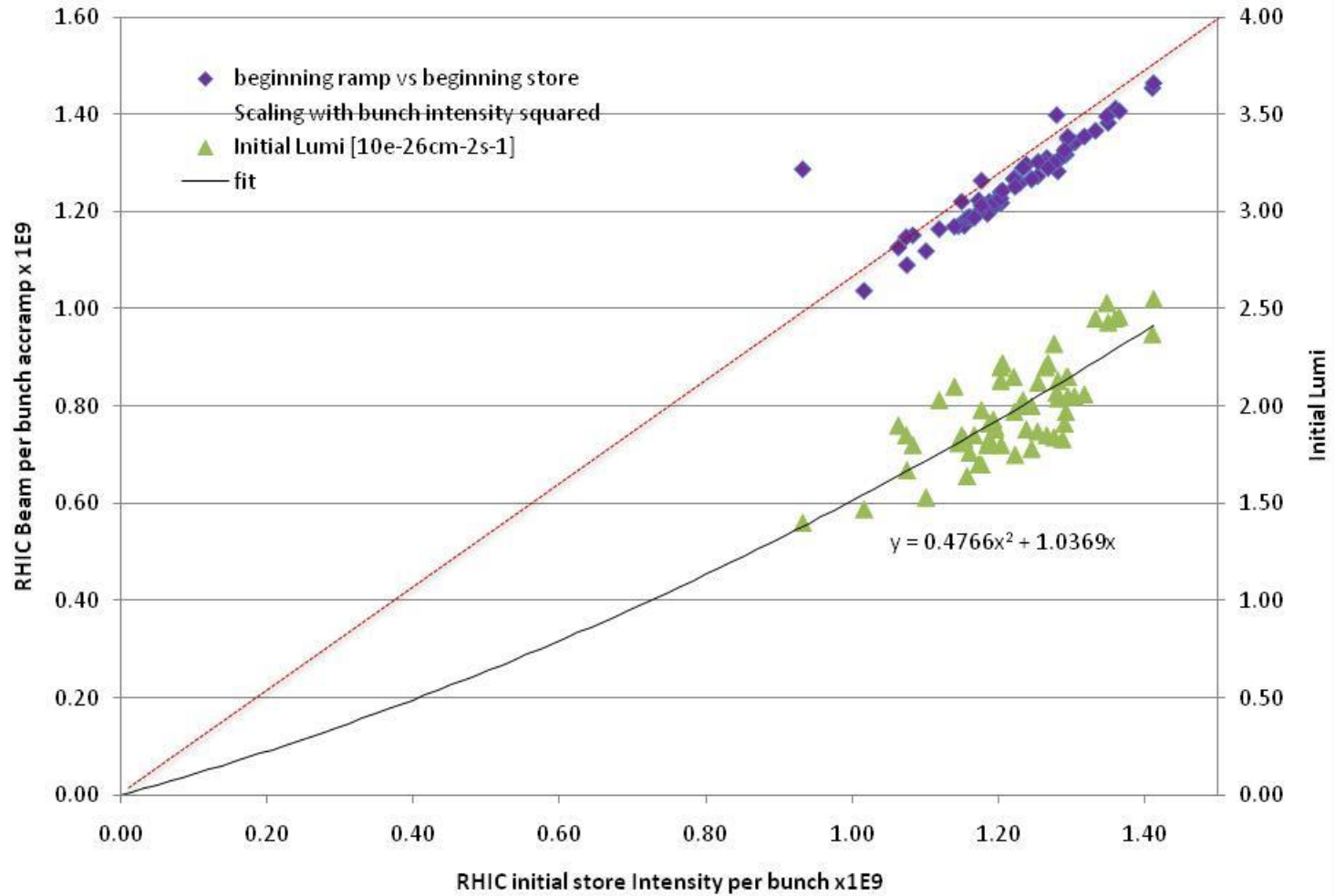
preliminary

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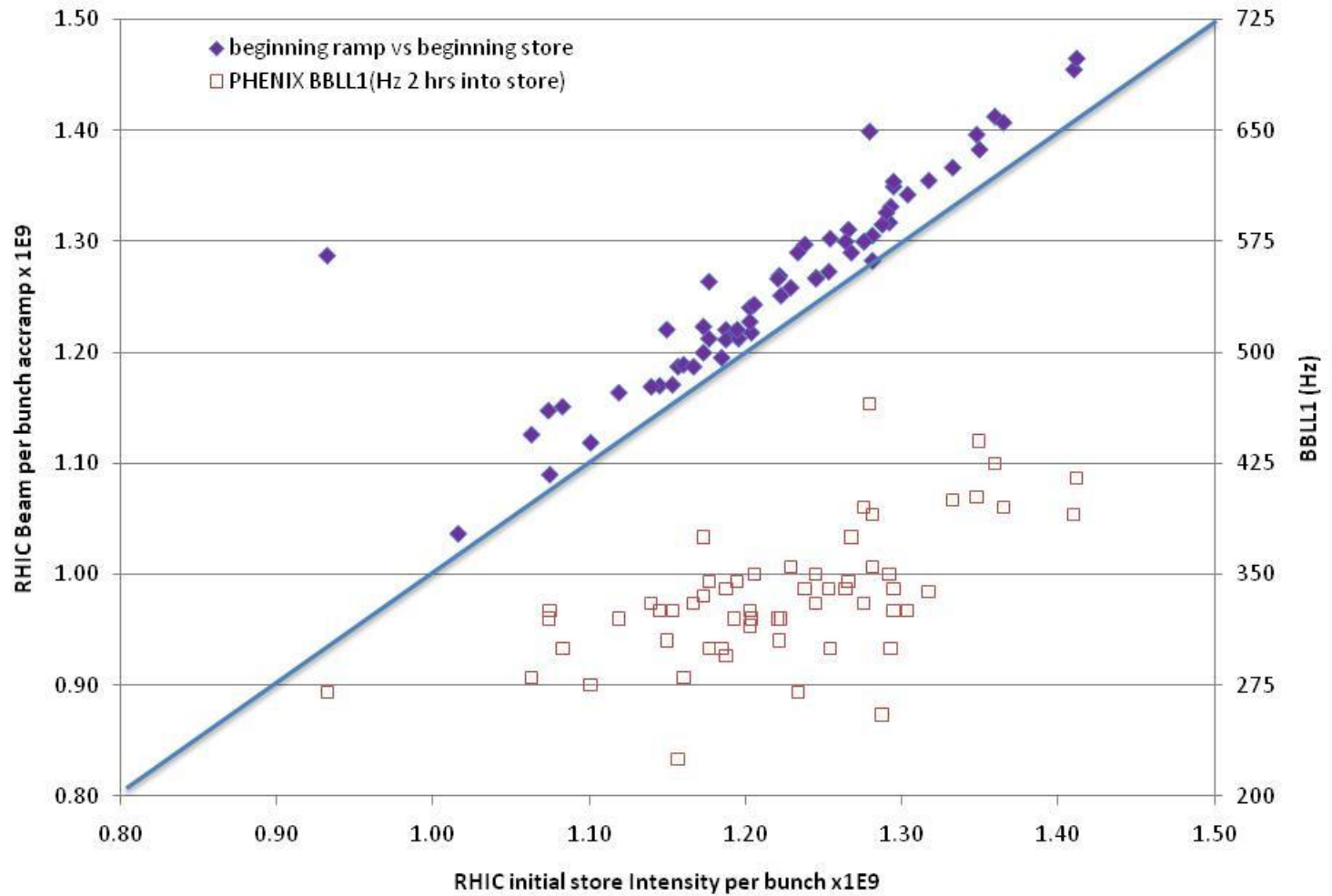


22 April, through final store 11217  
preliminary

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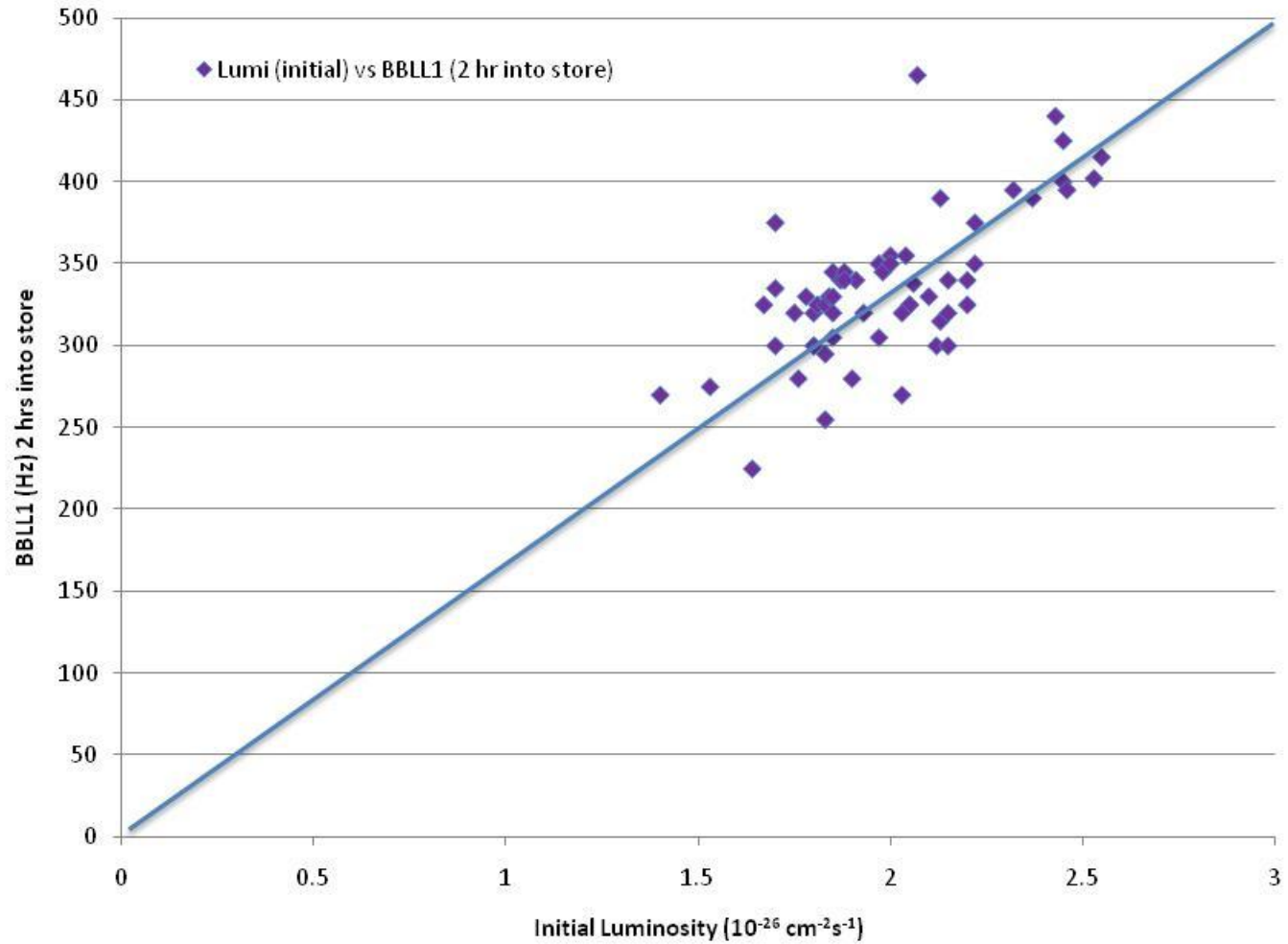


# Run 10, 39 GeV AuAu



22 April, through final store 11217  
preliminary

## Run 10, 39 GeV AuAu



# Run 10 Au-Au Goals, $\sqrt{s} = 39 \text{ GeV/n}$

4/13/10

- STAR

- $\sqrt{s} = 39 \text{ GeV/n}$

- Luminosity Sampled/Delivered = ?/?  $\mu\text{b}^{-1}$

- 24M Min-bias events

- PHENIX

- $\sqrt{s} = 39 \text{ GeV/n}$

- Luminosity Recorded/Delivered = ?/?  $\mu\text{b}^{-1}$

- 50M Min-bias events <30 cm vertex, (revised request 250M)

**We should revisit Luminosity Projections**

Table 6: Detailed plan for Run-10. PHENIX BUR

|                    | $\sqrt{s_{NN}}$ | weeks     | events | comment                         |
|--------------------|-----------------|-----------|--------|---------------------------------|
| cooldown           |                 | 2         |        |                                 |
| Au+Au start/rampup | 200             | 3         |        |                                 |
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| p+p development    | 500             | 4         |        | PHENIX ops as needed            |
| p+p physics        | 22.4            | 1         | 2.5B   |                                 |
| warm-up            |                 | 0.5       |        |                                 |
| <b>TOTAL</b>       |                 | <b>30</b> |        |                                 |

Table II: Detailed breakdown of Critical Point search and Beam Energy Scan

**STAR BUR**

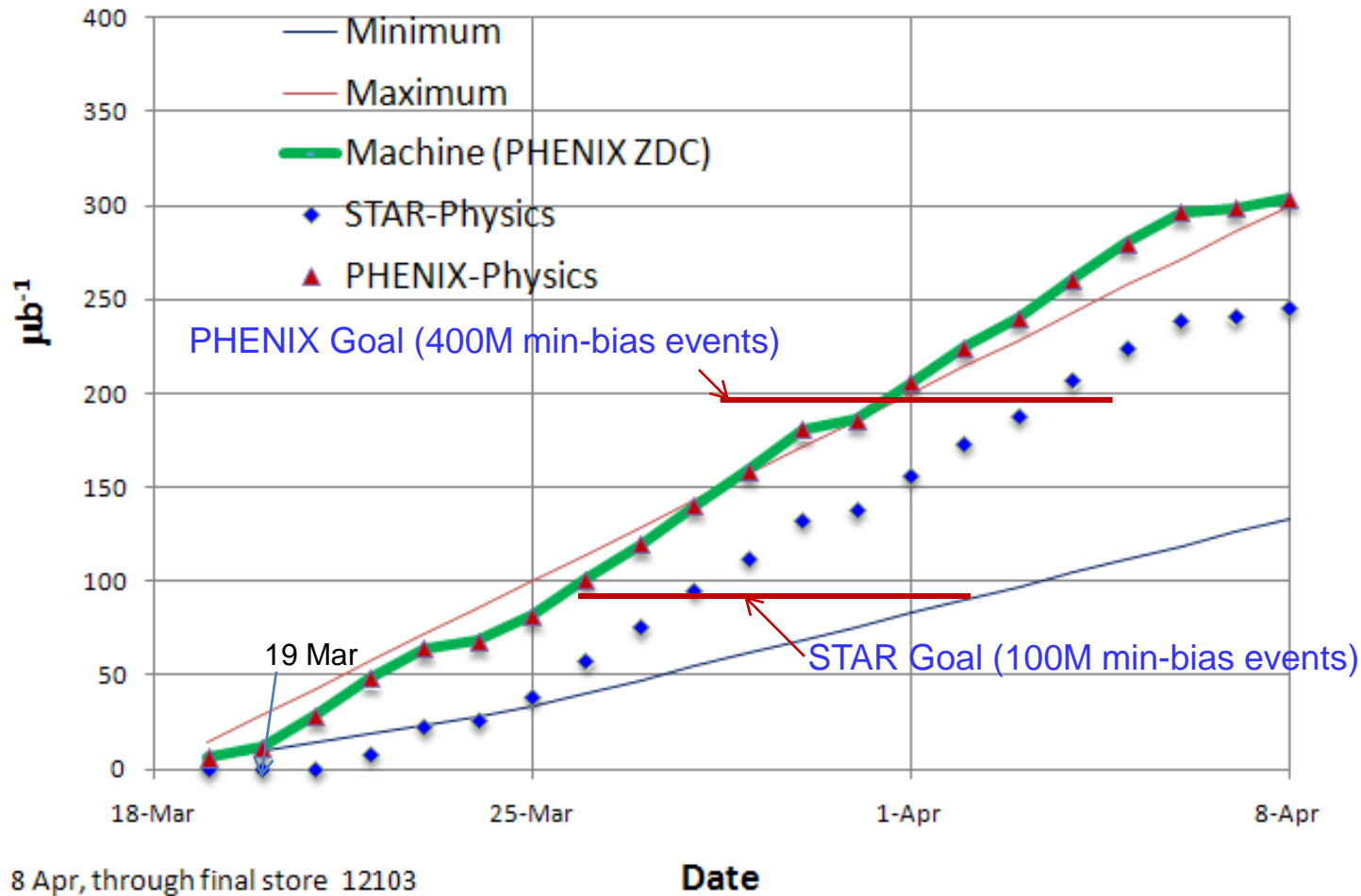
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| 27          | 92         | 0.4                     | 33M             | 12                 |
| 39          | <b>190</b> | 0.2                     | 24M             | 5                  |

**Actual Average ZDC Rate ~1200 Hz** →

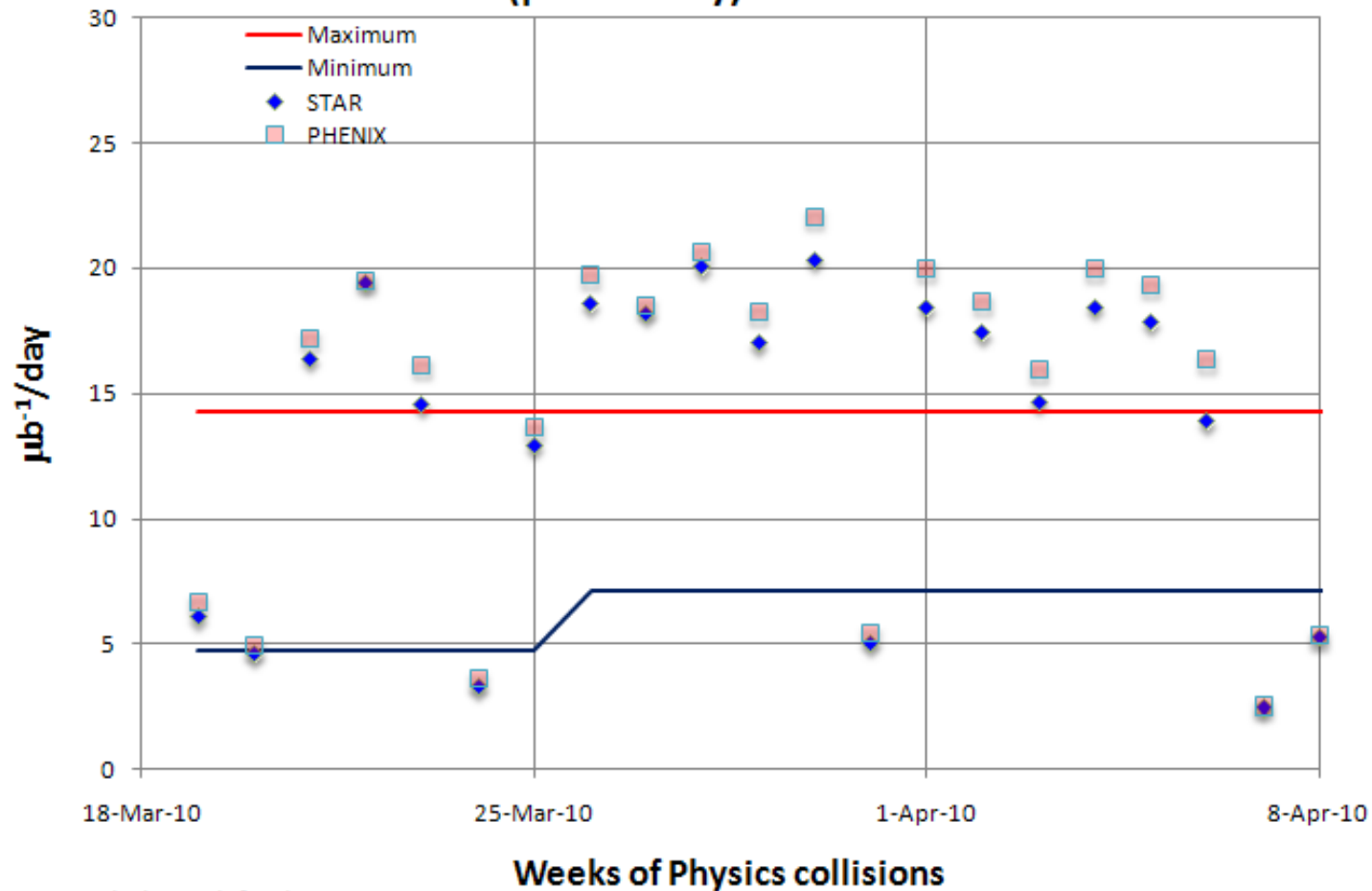




# Run 10 31 x 31 GeV/n Au Delivered Luminosity (preliminary)



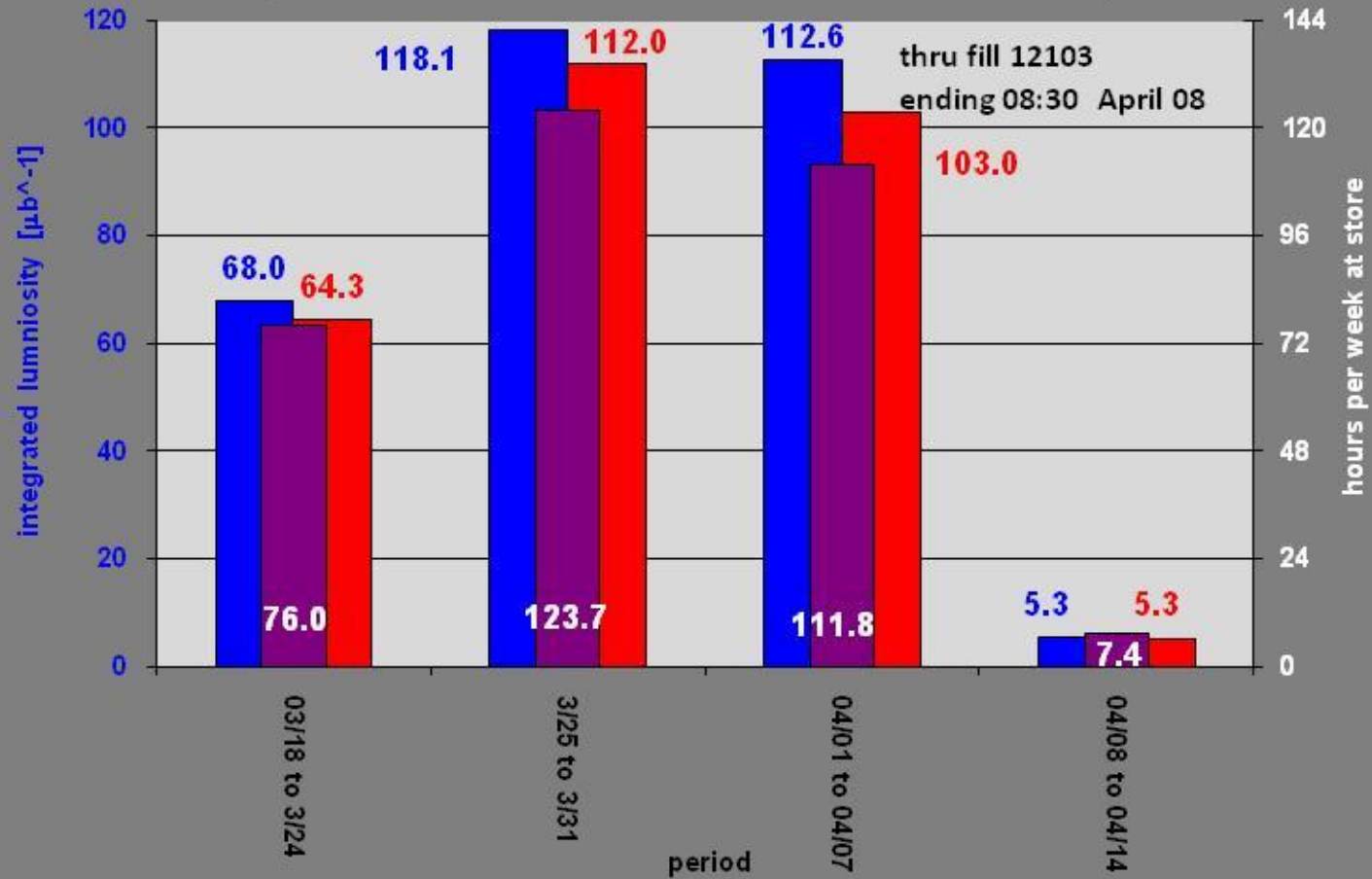
## Run 10, 31 x 31 GeV/n Au Delivered Luminosity per day (preliminary)



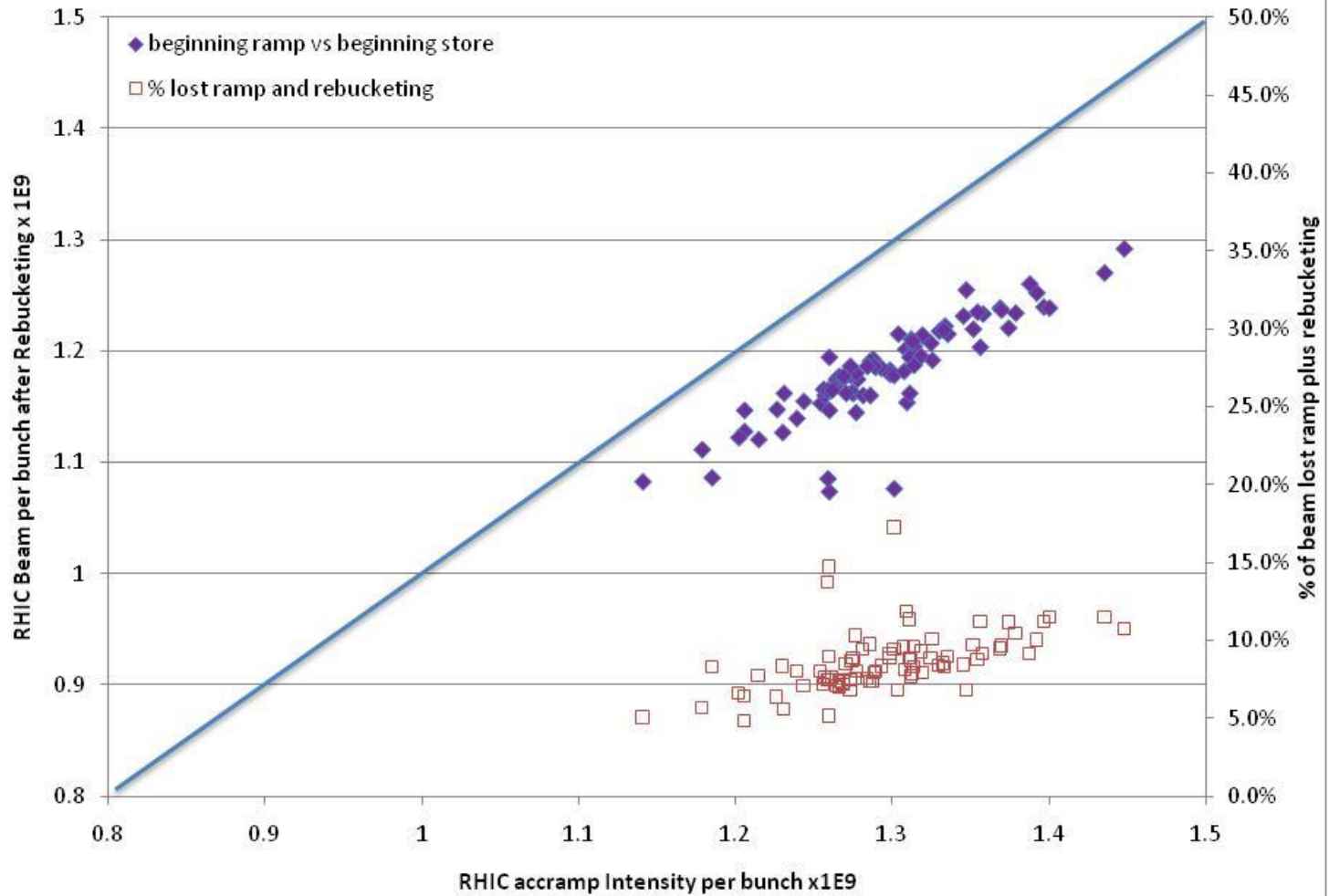
8 April, through final store 12103

### Run 10 (AuAu) -- Integrated Luminosity by week

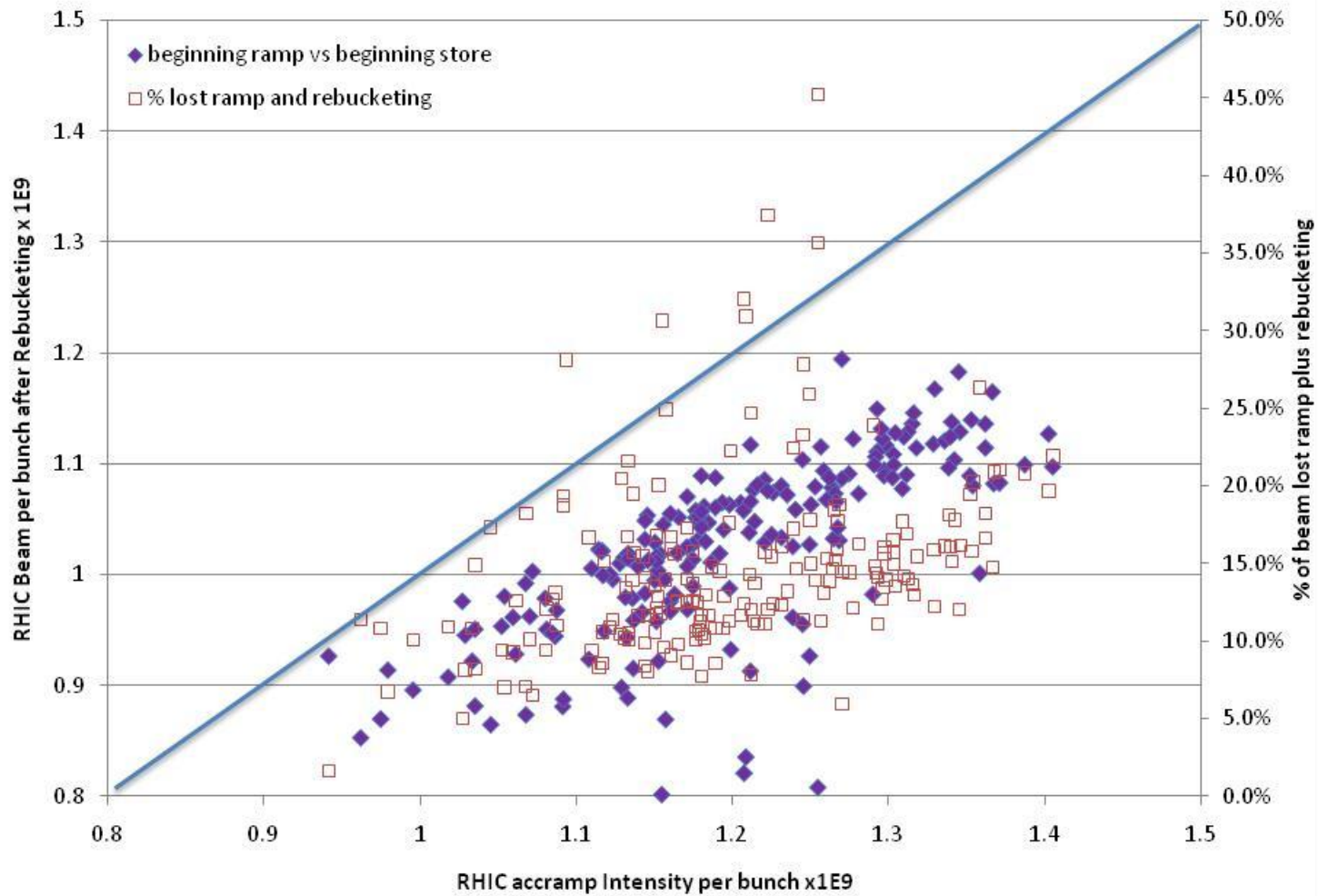
$\sqrt{s} = 62 \text{ GeV/n}$   
final



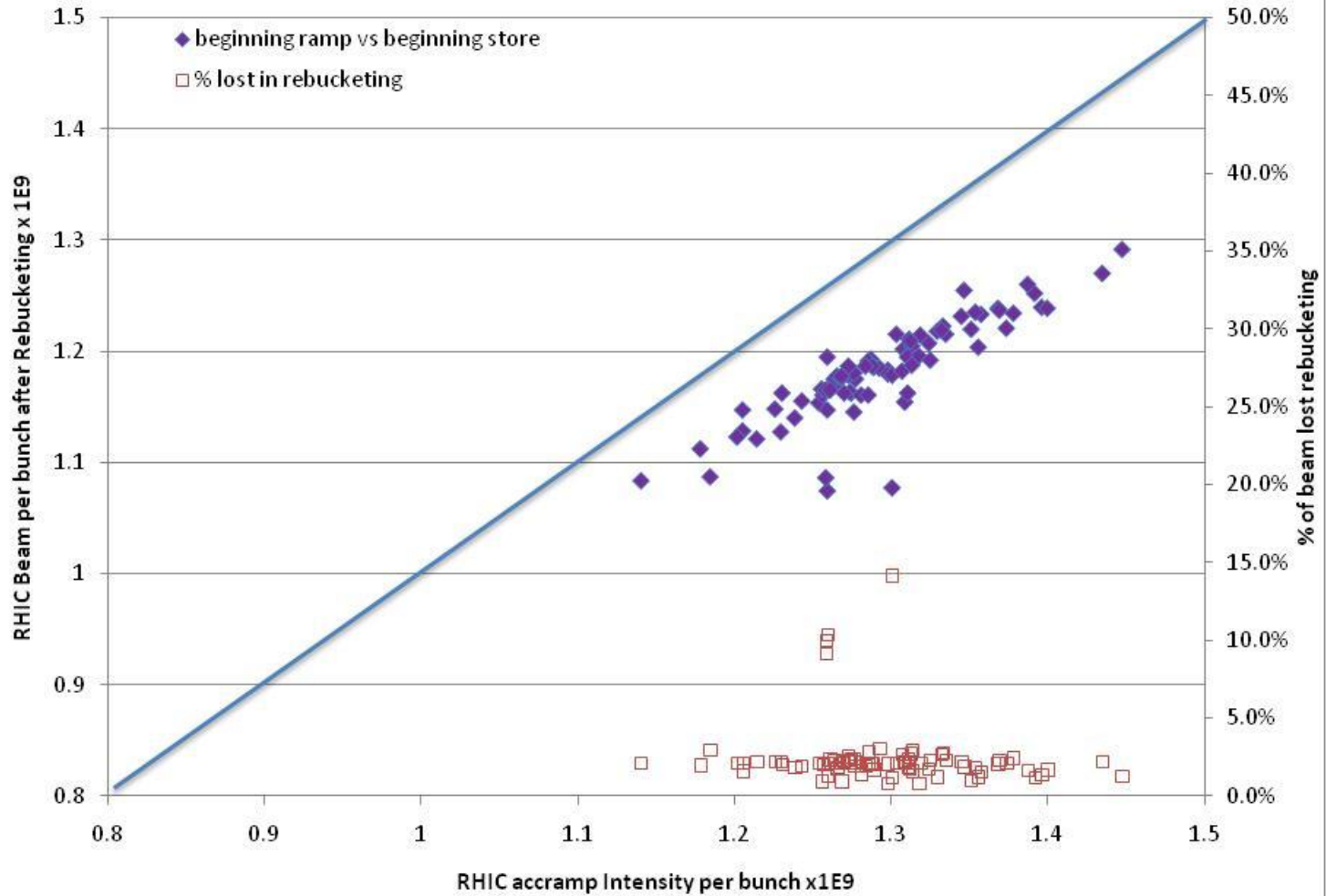
# Run 10, 62 GeV AuAu



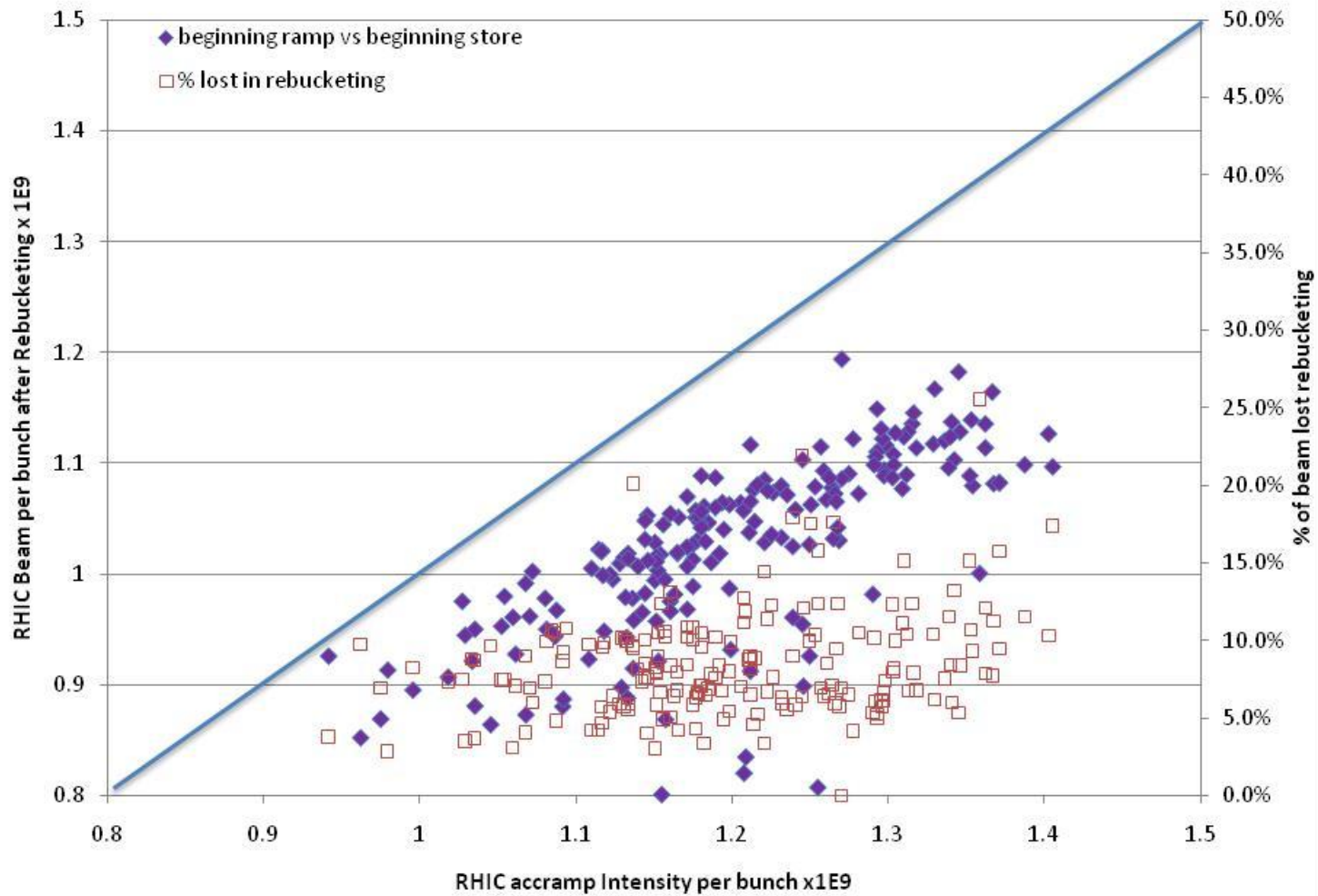
# Run 10, $\sqrt{s} = 200$ GeV AuAu



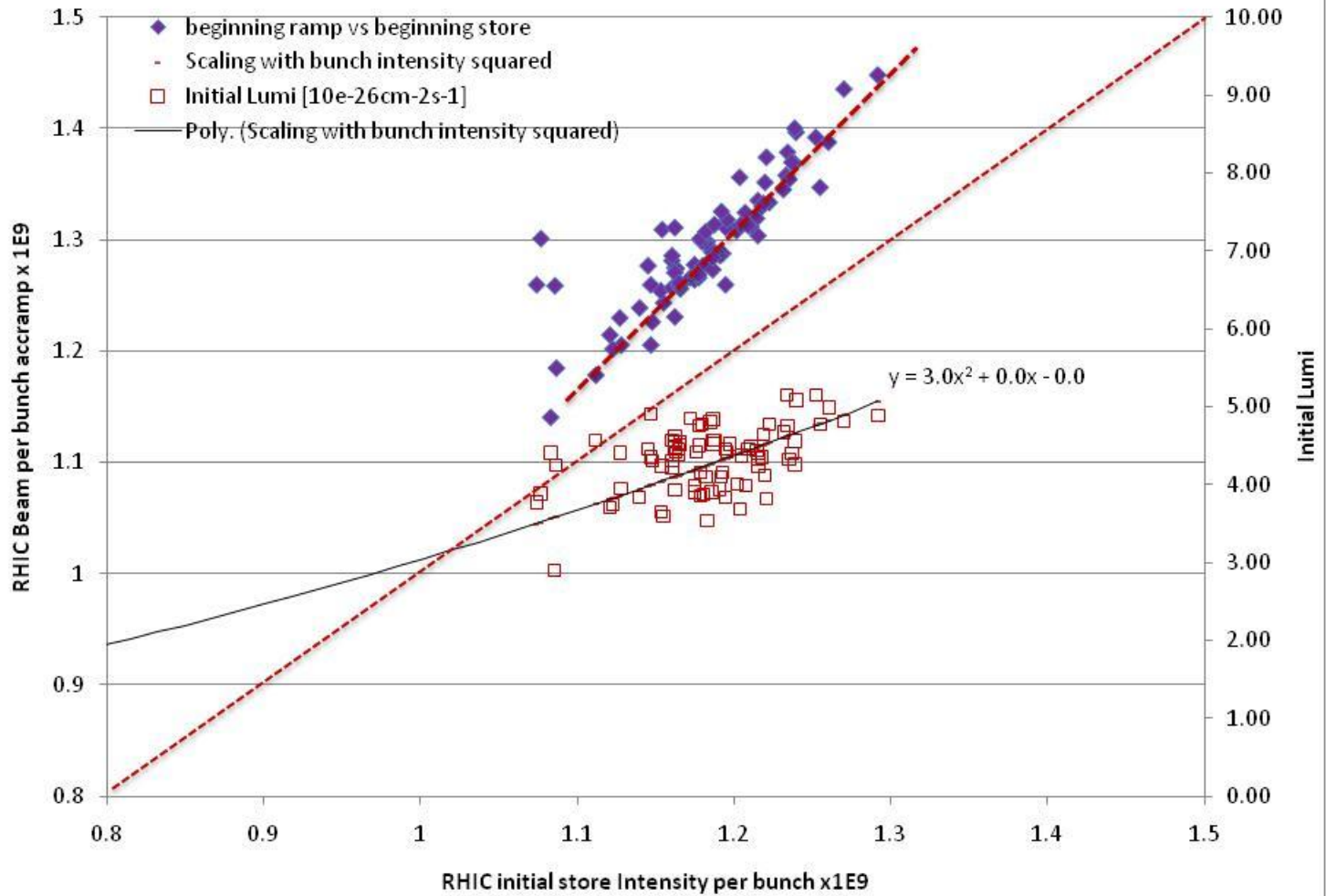
# Run 10, 62 GeV AuAu



# Run 10, $\sqrt{s} = 200$ GeV AuAu

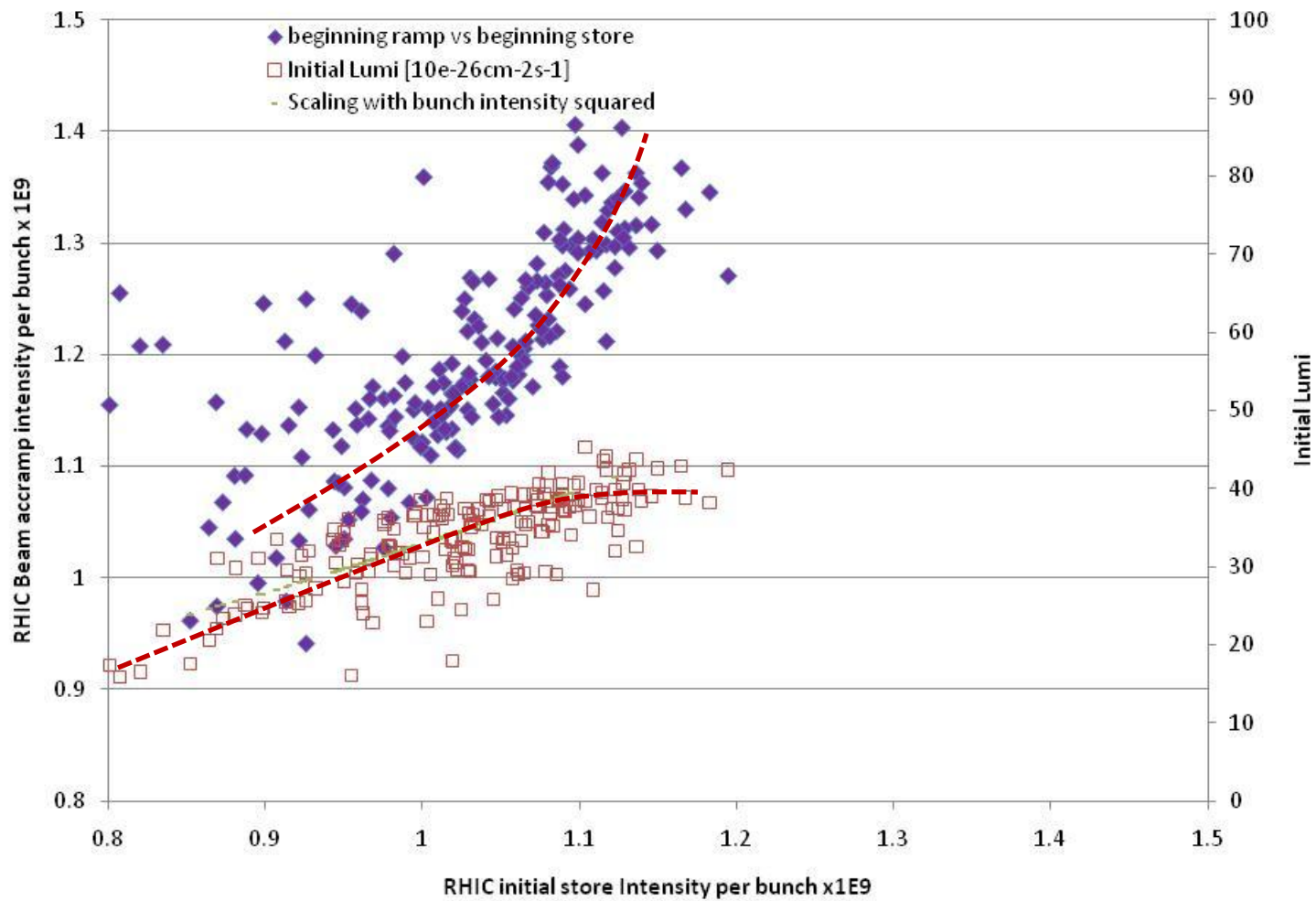


# Run 10, 62 GeV AuAu





# Run 10, $\sqrt{s} = 200$ GeV AuAu



# Run 10 Au-Au Goals

3/30/10

- STAR

- $\sqrt{s} = 62 \text{ GeV/n}$

- Luminosity Sampled/Delivered = ?/90  $\mu\text{b}^{-1}$

- 100M Min-bias events

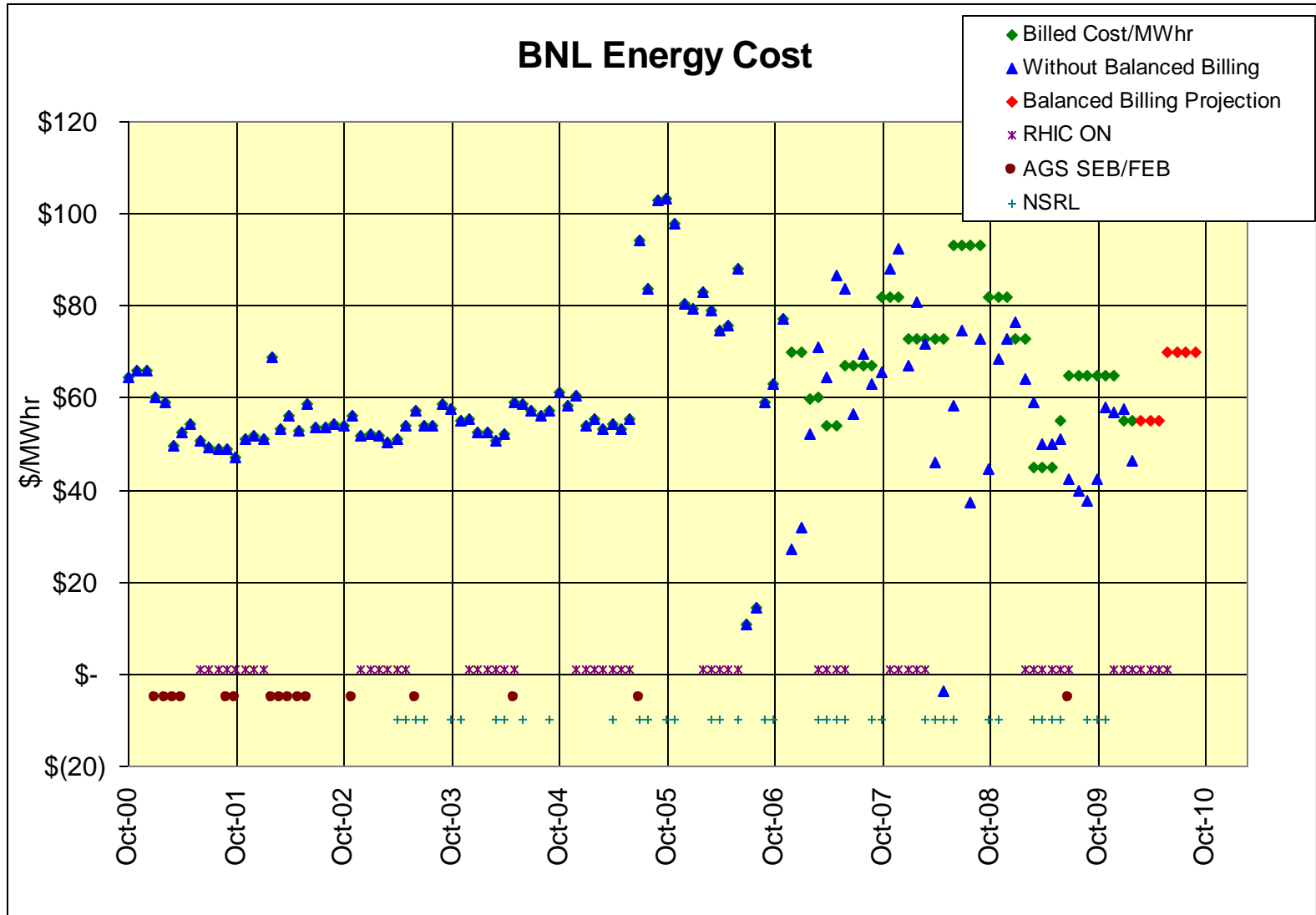
- PHENIX

- $\sqrt{s} = 62 \text{ GeV/n}$

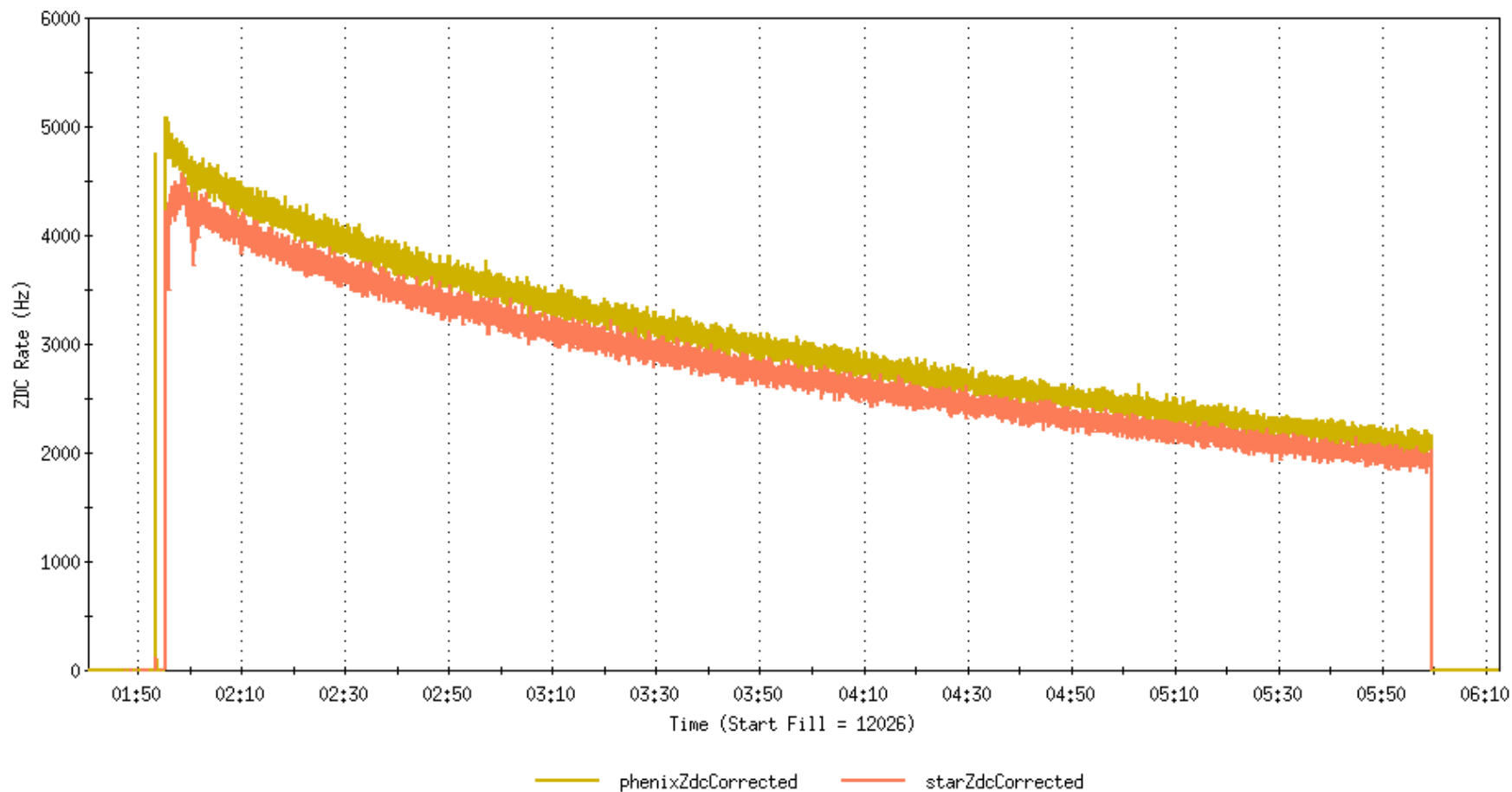
- Luminosity Recorded/Delivered = 64/193  $\mu\text{b}^{-1}$

- 400M Min-bias events

Through Feb 2010

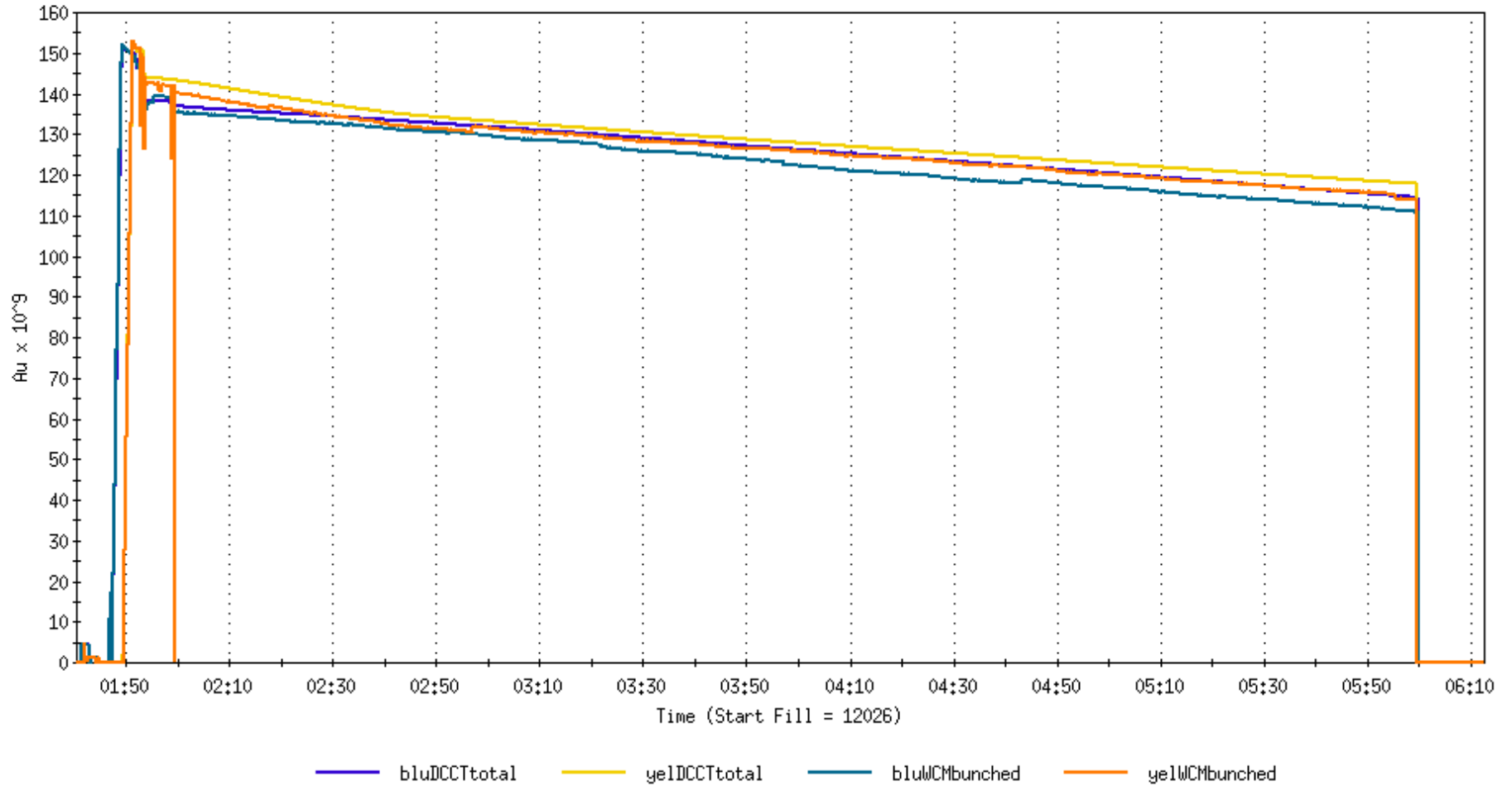


# First Store Monday, 29 March, Store 12026

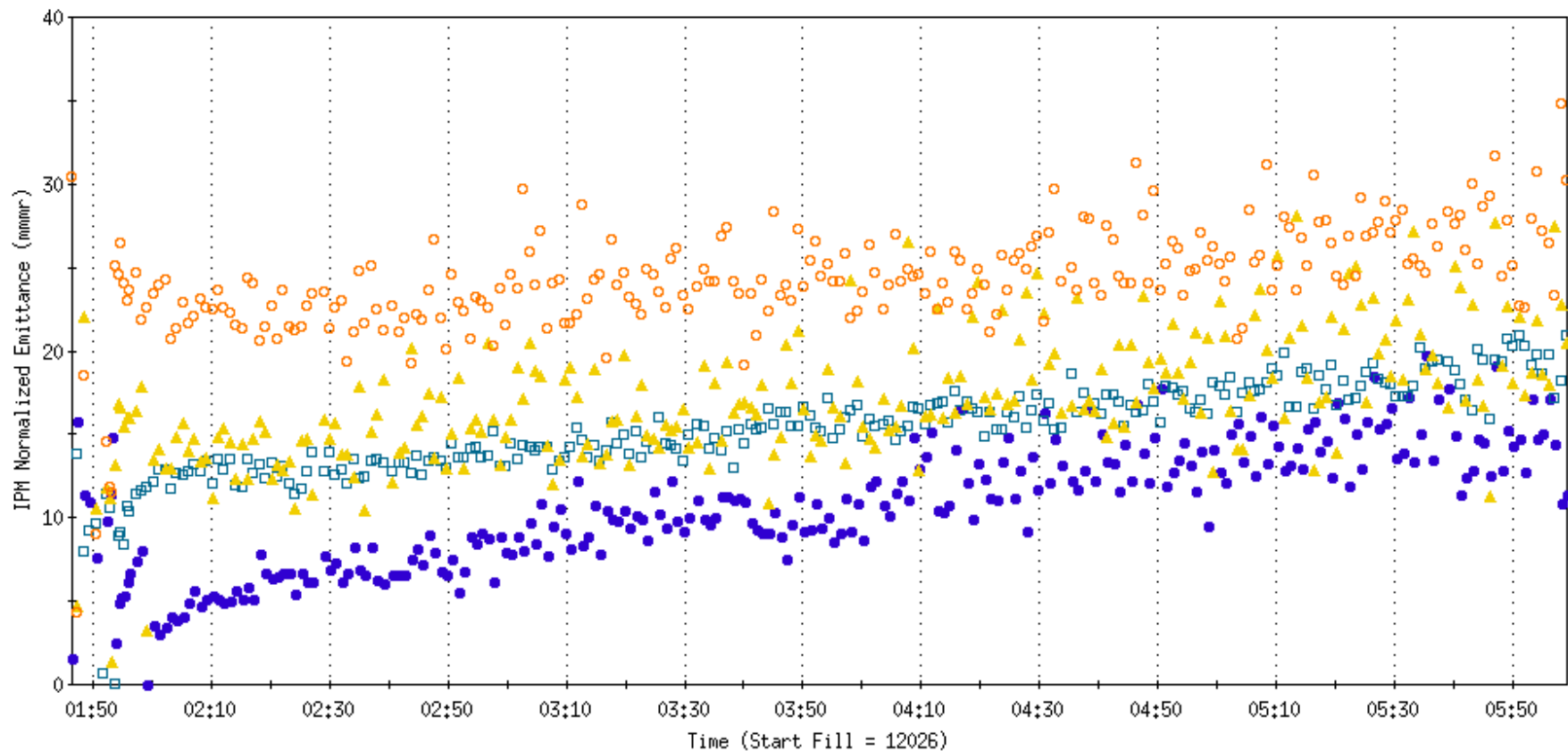


# First Store Monday, 29 March, Store 12026

RHIC - DCCT total beam & WCM bunched beam

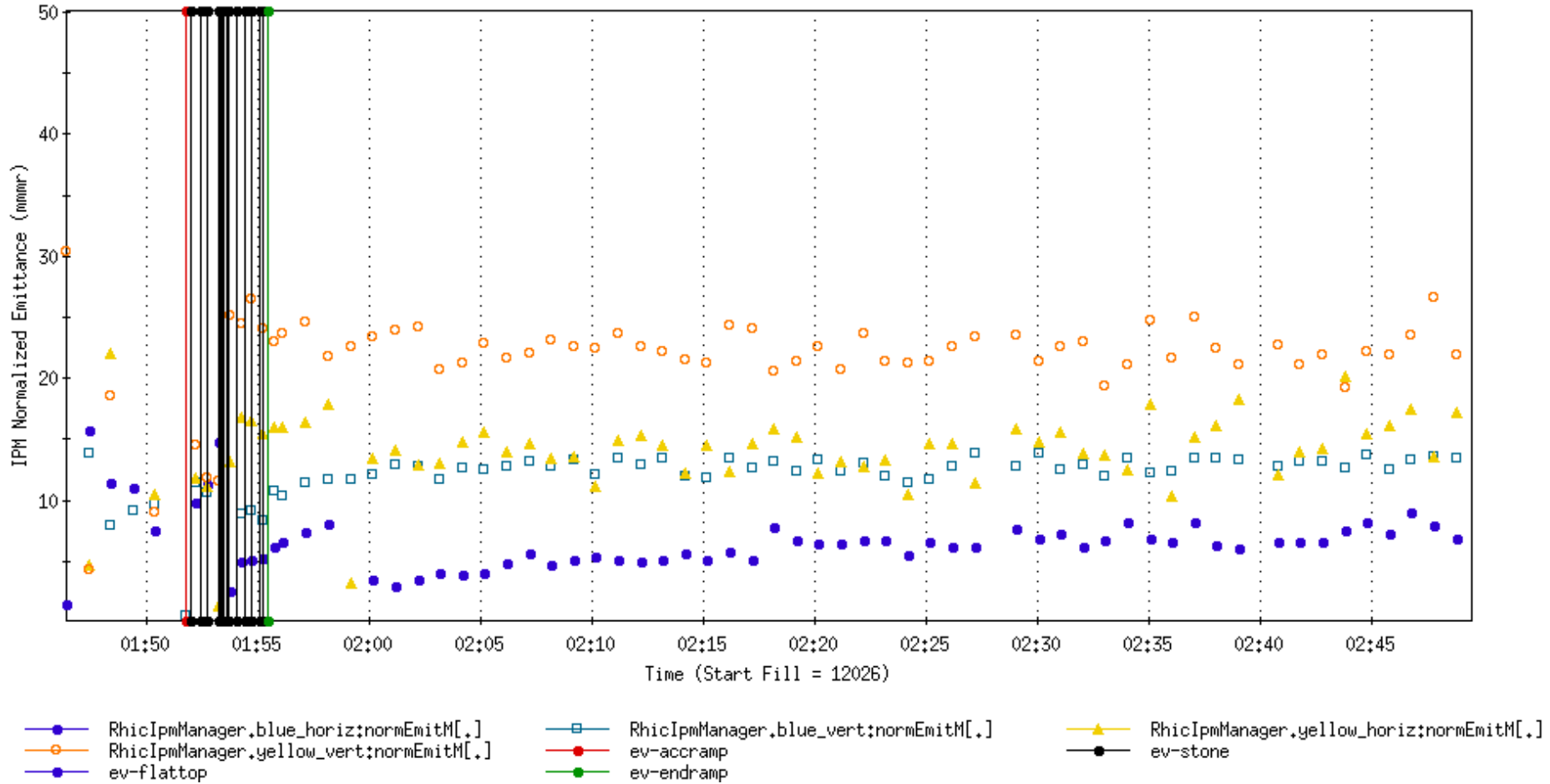


# First Store Monday, 29 March, Store 12026

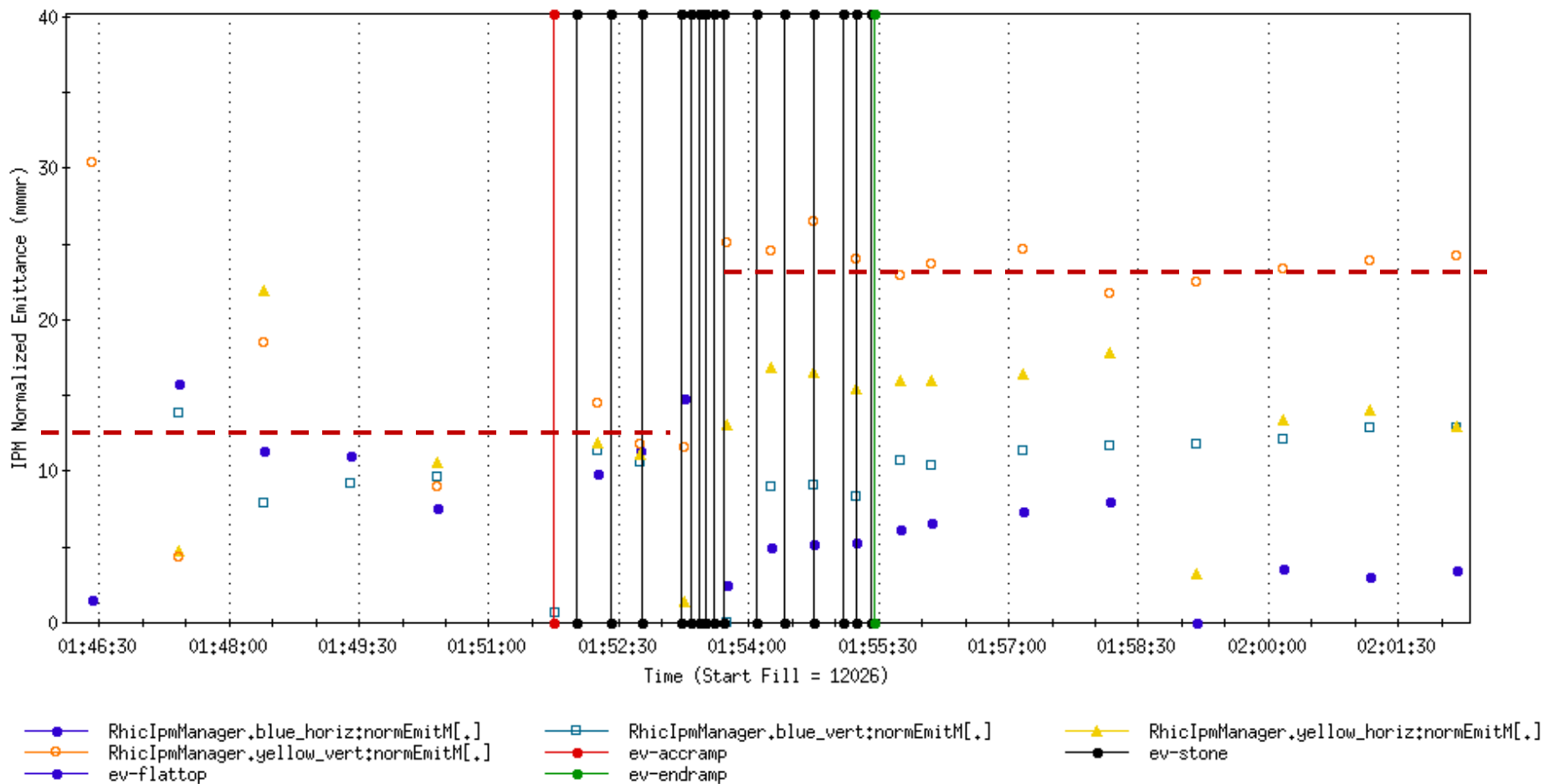


—●— RhicIpmManager,blue\_horiz;normEmitM[.]      —□— RhicIpmManager,blue\_vert;normEmitM[.]  
—▲— RhicIpmManager,yellow\_horiz;normEmitM[.]      —○— RhicIpmManager,yellow\_vert;normEmitM[.]

# First Store Monday, 29 March, Store 12026



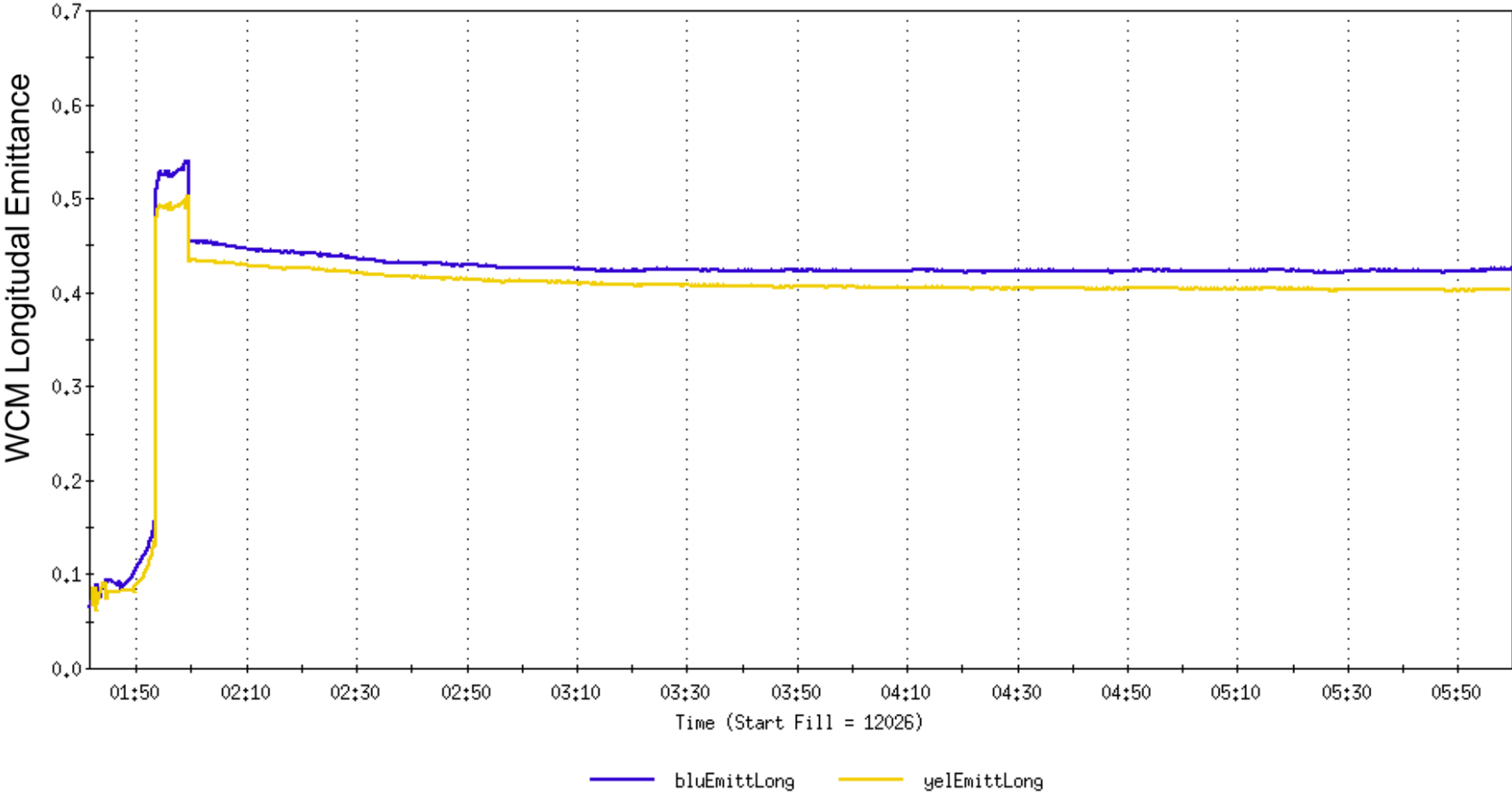
# First Store Monday, 29 March, Store 12026



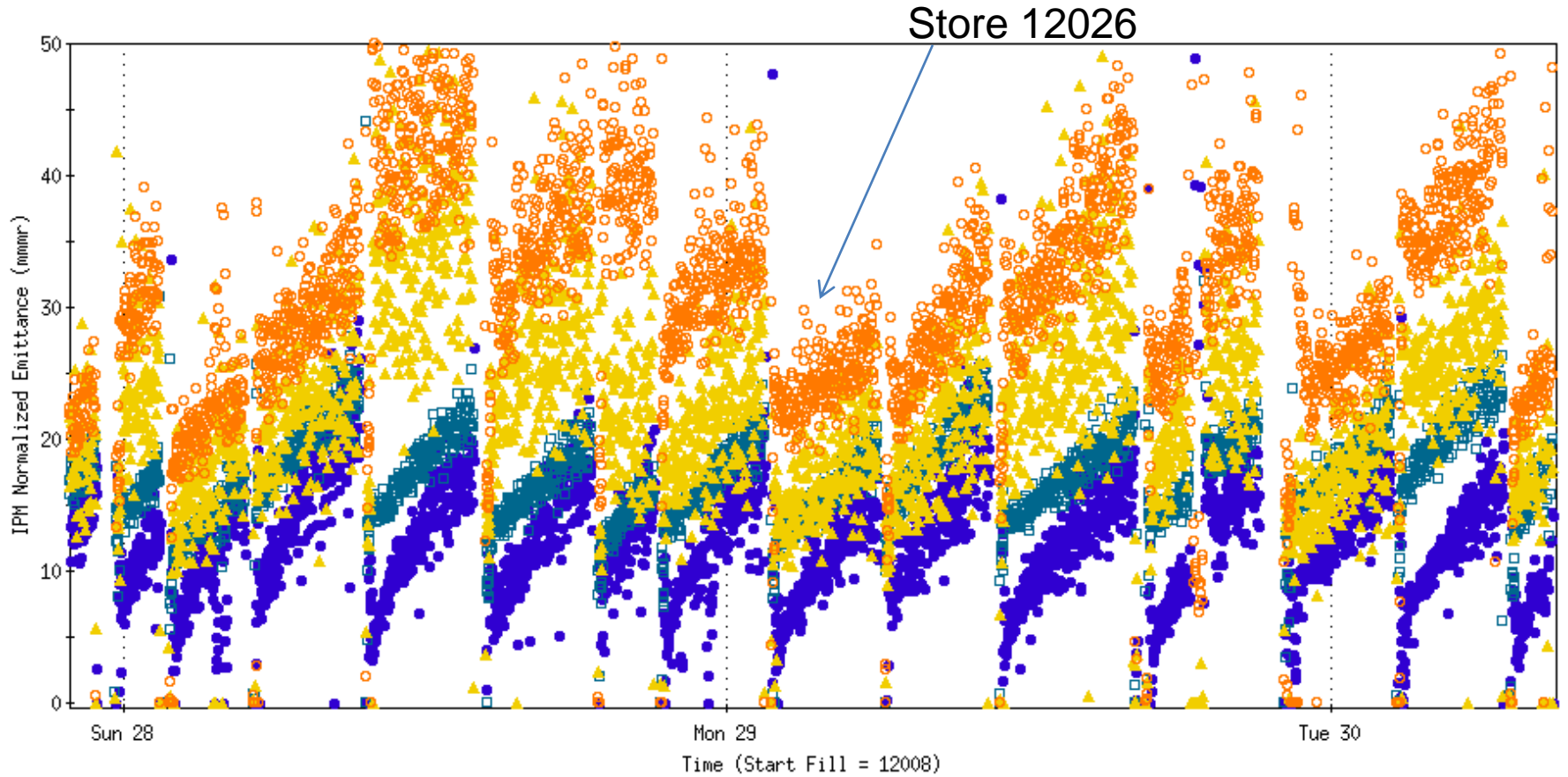


# First Store Monday, 29 March, Store 12026

Long Emitt from WCM

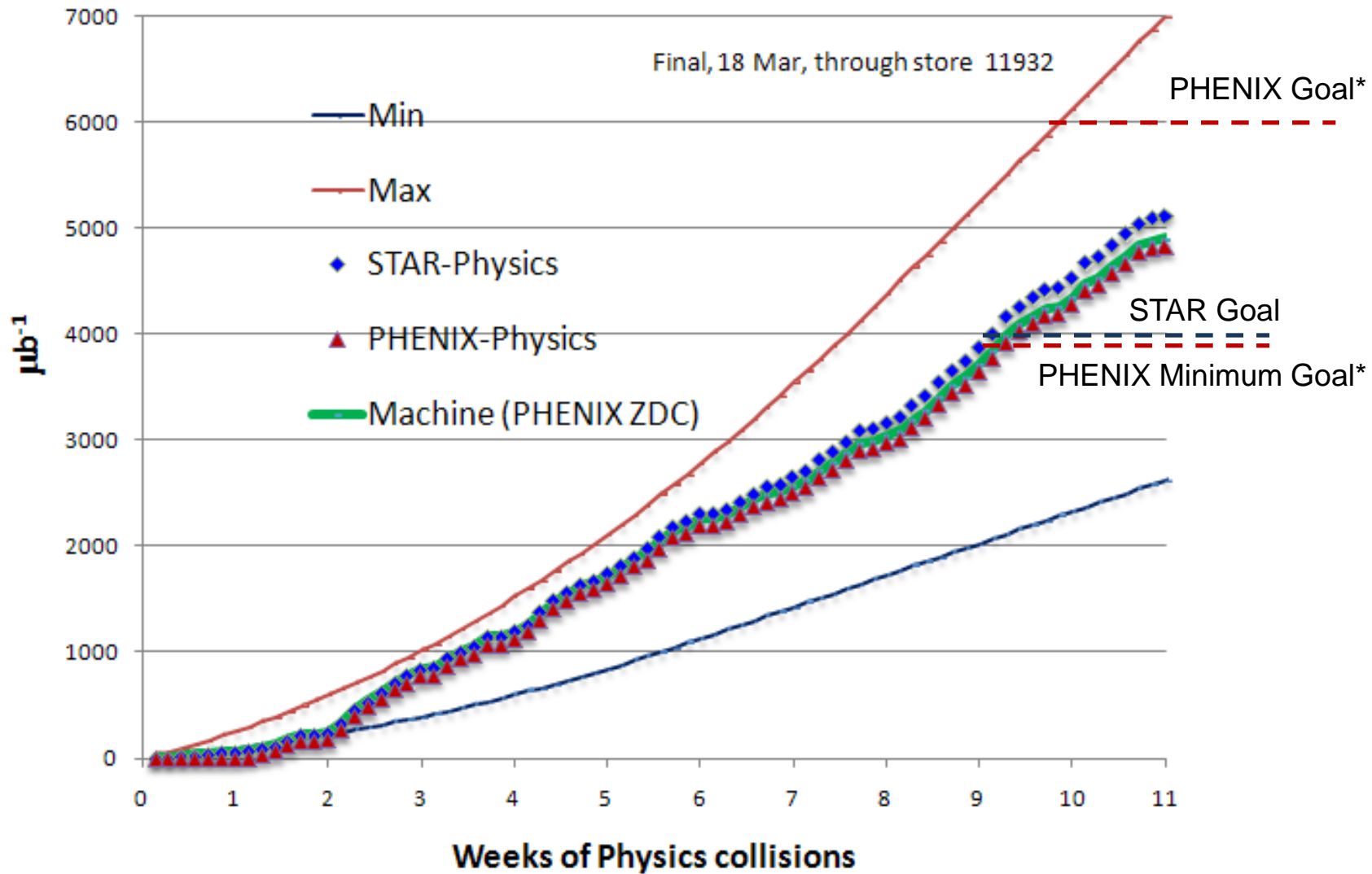


# 31 x 31 GeV/n Au horiz and vert emittances



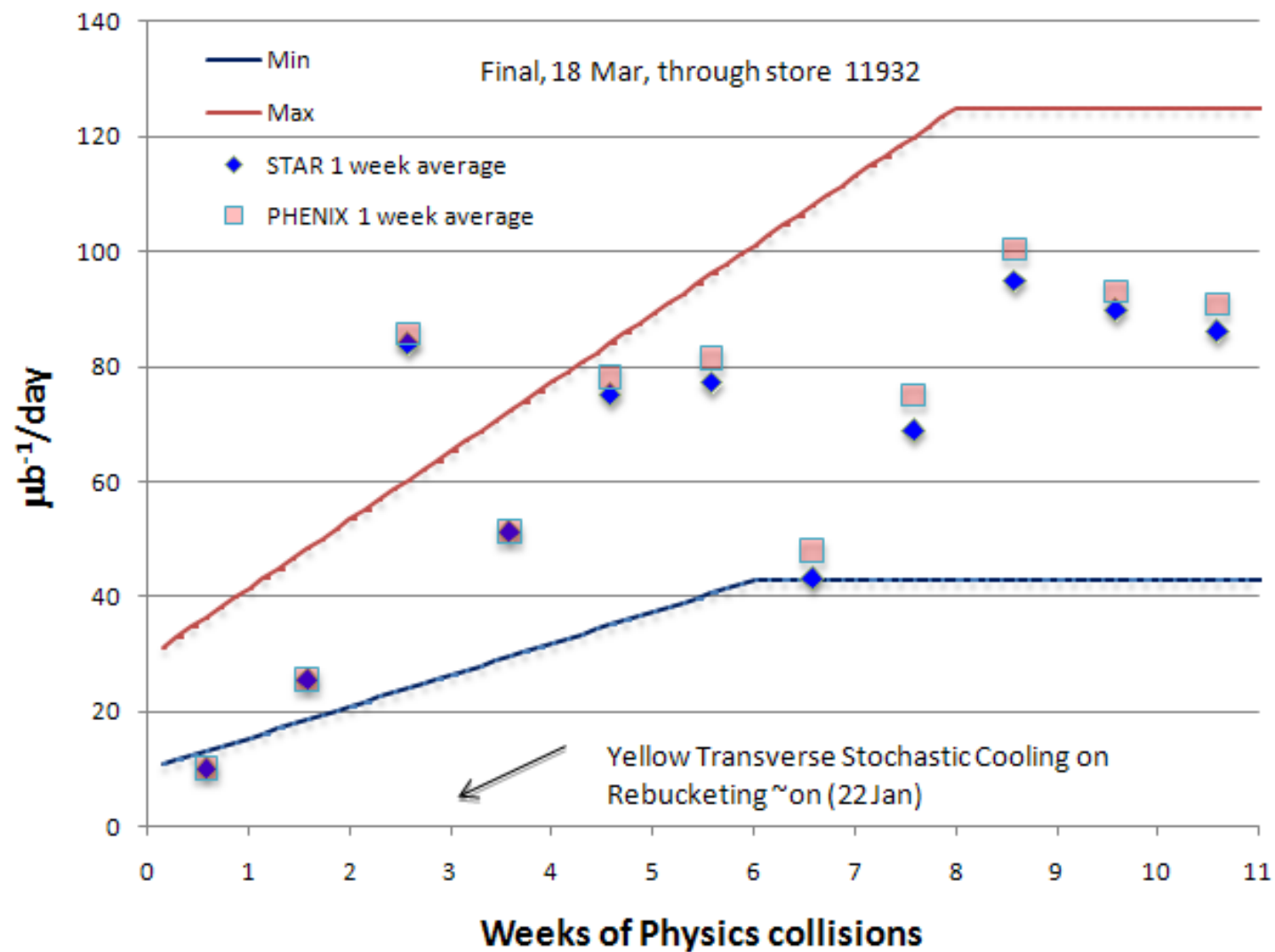
- RhicIpmManager.blue\_horiz;normEmitM[.]
- ▲— RhicIpmManager.yellow\_horiz;normEmitM[.]
- RhicIpmManager.blue\_vert;normEmitM[.]
- RhicIpmManager.yellow\_vert;normEmitM[.]

# Run 10 100 x 100 GeV/n Au Delivered Luminosity



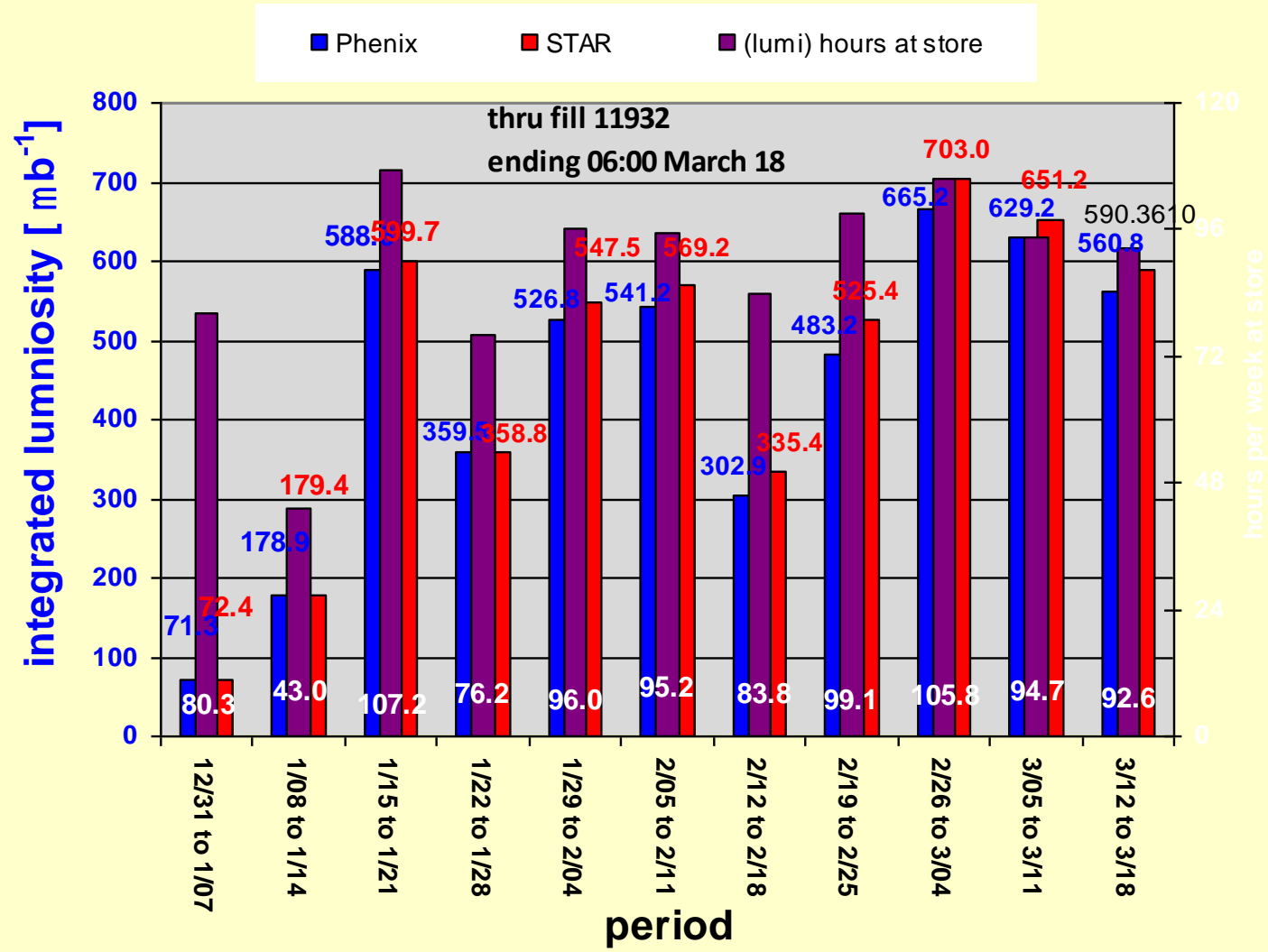
\* With 20 cm sigma IR diamond

## Run 10 100 x 100 GeV/n Au Delivered Luminosity per day

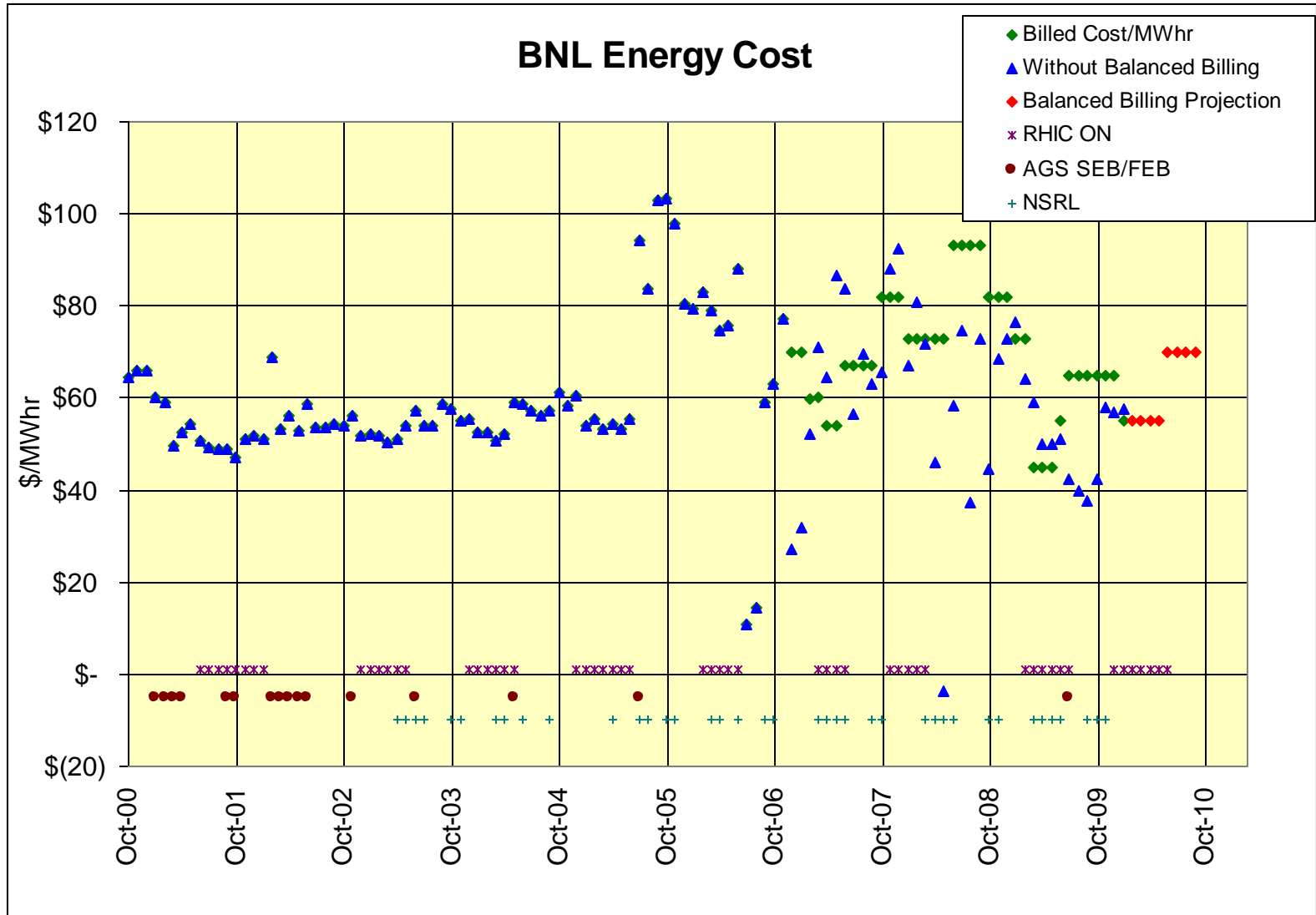


Average hours per week at store = 88.5

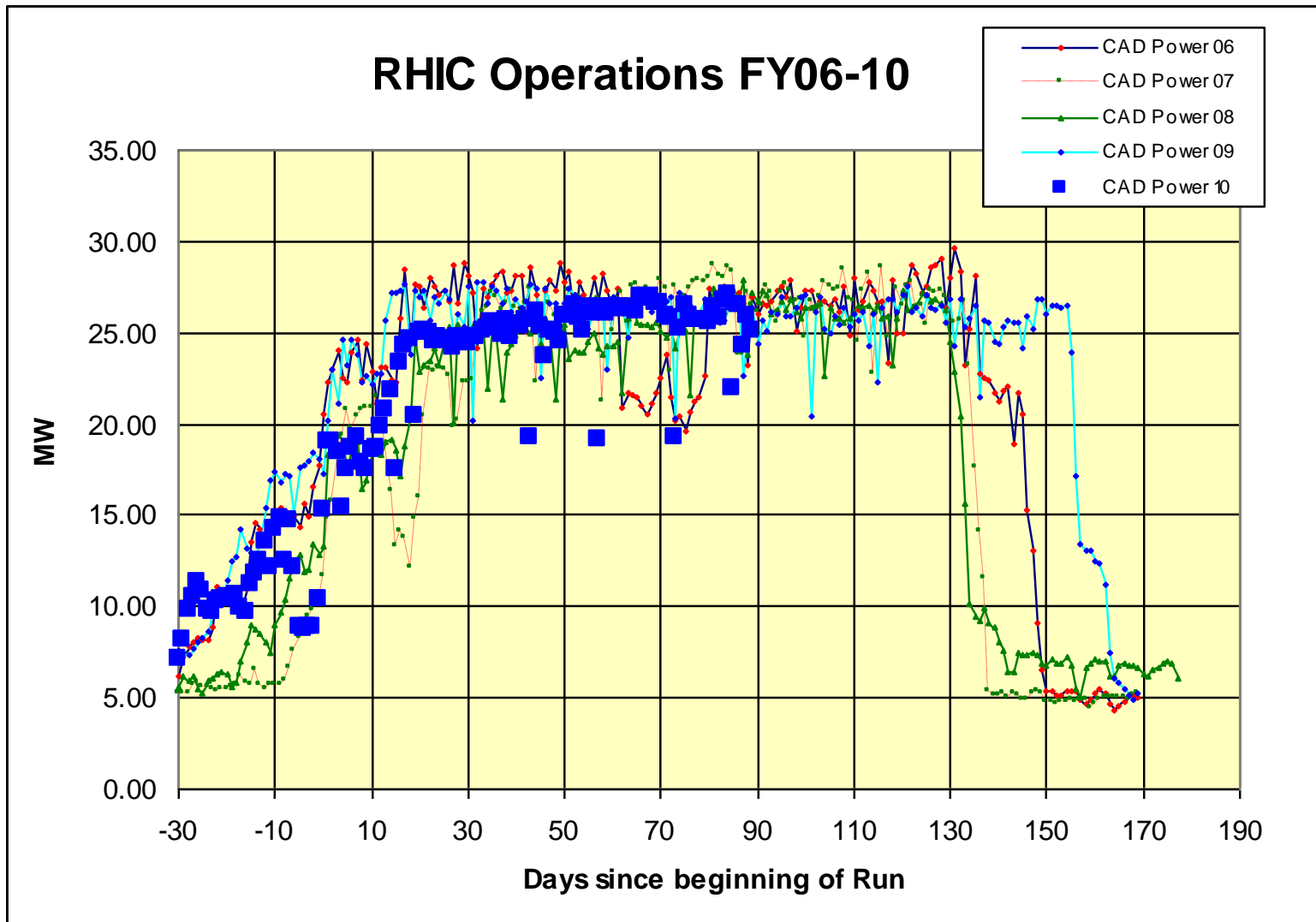
### Run 10 (AuAu) -- Integrated Luminosity by week



Through Jan 2010



Through 2/28/10



31 Dec 1<sup>st</sup> Physics Store 11340, 0.6 m  $\beta^*$  No cooling or rebucketing, STAR 3.2  $\mu\text{b}^{-1}$ , 2.6 hr store

| Ring          | Bunches/Cycles | Avg Bunch in RHIC (10 <sup>6</sup> ions) | Avg Efficiency XCBM to RHIC | XCBM to Uxf1 | <i>Uxf1 to Wxf</i> | <i>Wxf to Arc</i> | <i>Arc to RHIC</i> |
|---------------|----------------|--|-----------------------------|--------------|--------------------|-------------------|--------------------|
| <b>Blue</b>   | 56/56          | 909                                      | 0.836                       | 1.056        | <i>0.963</i>       | <i>0.992</i>      | <i>0.828</i>       |
| <b>Yellow</b> | 56/56          | 990                                      | 0.971                       | 1.085        | <i>0.962</i>       | <i>0.959</i>      | <i>0.970</i>       |

18 Jan Physics Store 11489, 0.6 m  $\beta^*$  No cooling or rebucketing, STAR 22.6  $\mu\text{b}^{-1}$ , 3.9 hr store

| Ring          | Bunches/Cycles | Avg Bunch in RHIC (10 <sup>6</sup> ions) | Avg Efficiency XCBM to RHIC | XCBM to Uxf1 | <i>Uxf1 to Wxf</i> | <i>Wxf to Arc</i> | <i>Arc to RHIC</i> |
|---------------|----------------|--|-----------------------------|--------------|--------------------|-------------------|--------------------|
| <b>Blue</b>   | 111/28         | 1196                                     | 0.911                       | 1.024        | <i>0.961</i>       | <i>0.999</i>      | <i>0.927</i>       |
| <b>Yellow</b> | 111/29         | 1168                                     | 0.879                       | 1.023        | <i>0.961</i>       | <i>0.989</i>      | <i>0.905</i>       |

28 Feb Physics Store 11824, 0.7 m  $\beta^*$  with some cooling and with rebucketing, STAR 32.7  $\mu\text{b}^{-1}$ , 3.9 hr store

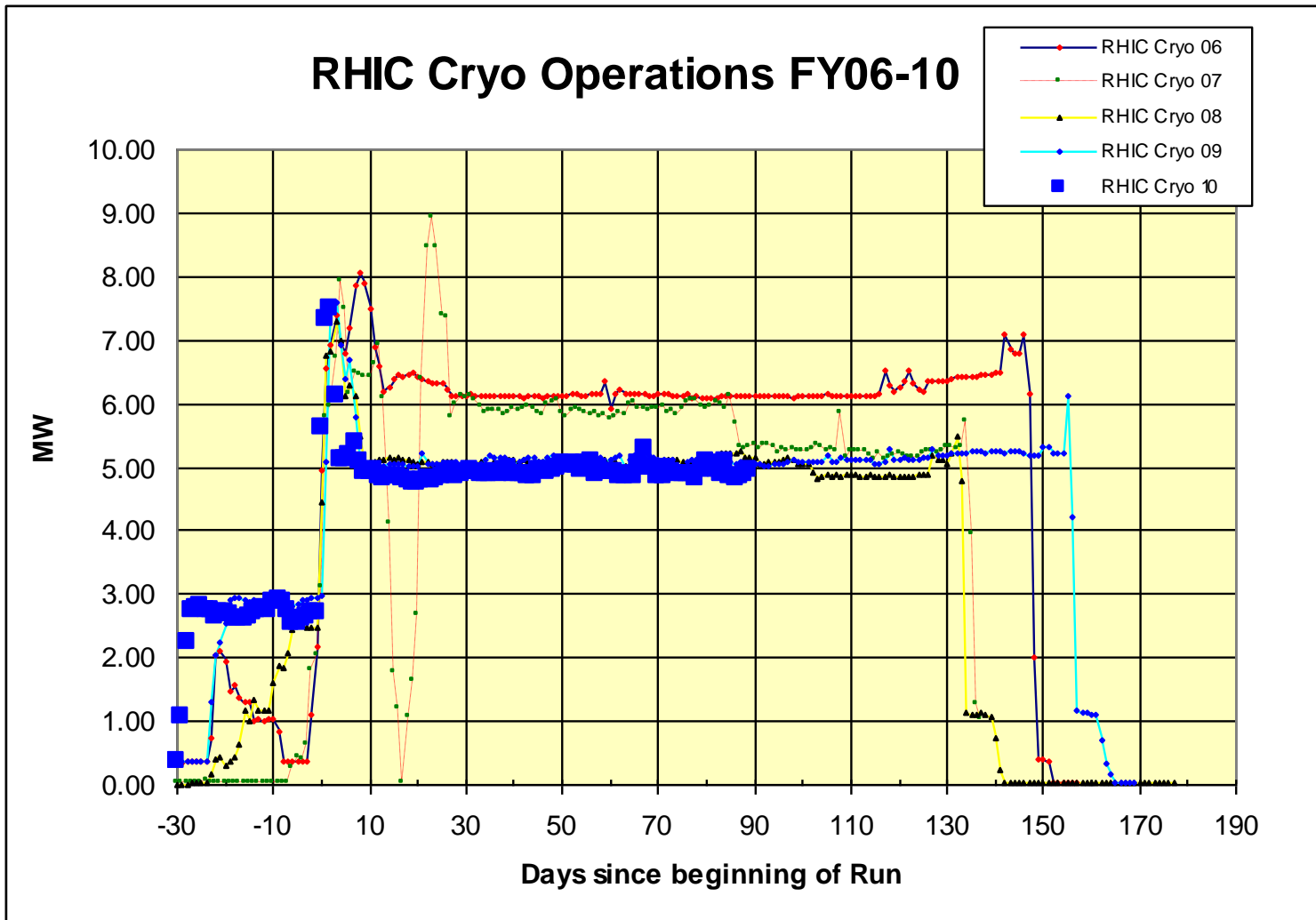
| Ring          | Bunches/Cycles | Avg Bunch in RHIC (10 <sup>6</sup> ions) | Avg Efficiency XCBM to RHIC | XCBM to Uxf1 | <i>Uxf1 to Wxf</i> | <i>Wxf to Arc</i> | <i>Arc to RHIC</i> |
|---------------|----------------|--|-----------------------------|--------------|--------------------|-------------------|--------------------|
| <b>Blue</b>   | 111/28         | 1262                                     | 0.917                       | 0.975        | <i>0.961</i>       | <i>1.001</i>      | <i>0.977</i>       |
| <b>Yellow</b> | 111/28         | 1246                                     | 0.910                       | 0.961        | <i>0.964</i>       | <i>0.988</i>      | <i>0.994</i>       |

2 Mar Physics Store 11834, 0.7 m  $\beta^*$  with some cooling and with rebucketing, STAR 29.4  $\mu\text{b}^{-1}$ , 3.9 hr store)

| Ring          | Bunches/Cycles | Avg Bunch in RHIC (10 <sup>6</sup> ions) | Avg Efficiency XCBM to RHIC | XCBM to Uxf1 | <i>Uxf1 to Wxf</i> | <i>Wxf to Arc</i> | <i>Arc to RHIC</i> |
|---------------|----------------|--|-----------------------------|--------------|--------------------|-------------------|--------------------|
| <b>Blue</b>   | 111/28         | 1354                                     | 0.927                       | 0.990        | <i>0.965</i>       | <i>1.003</i>      | <i>0.968</i>       |
| <b>Yellow</b> | 111/28         | 1377                                     | 0.931                       | 0.990        | <i>0.964</i>       | <i>0.989</i>      | <i>0.987</i>       |

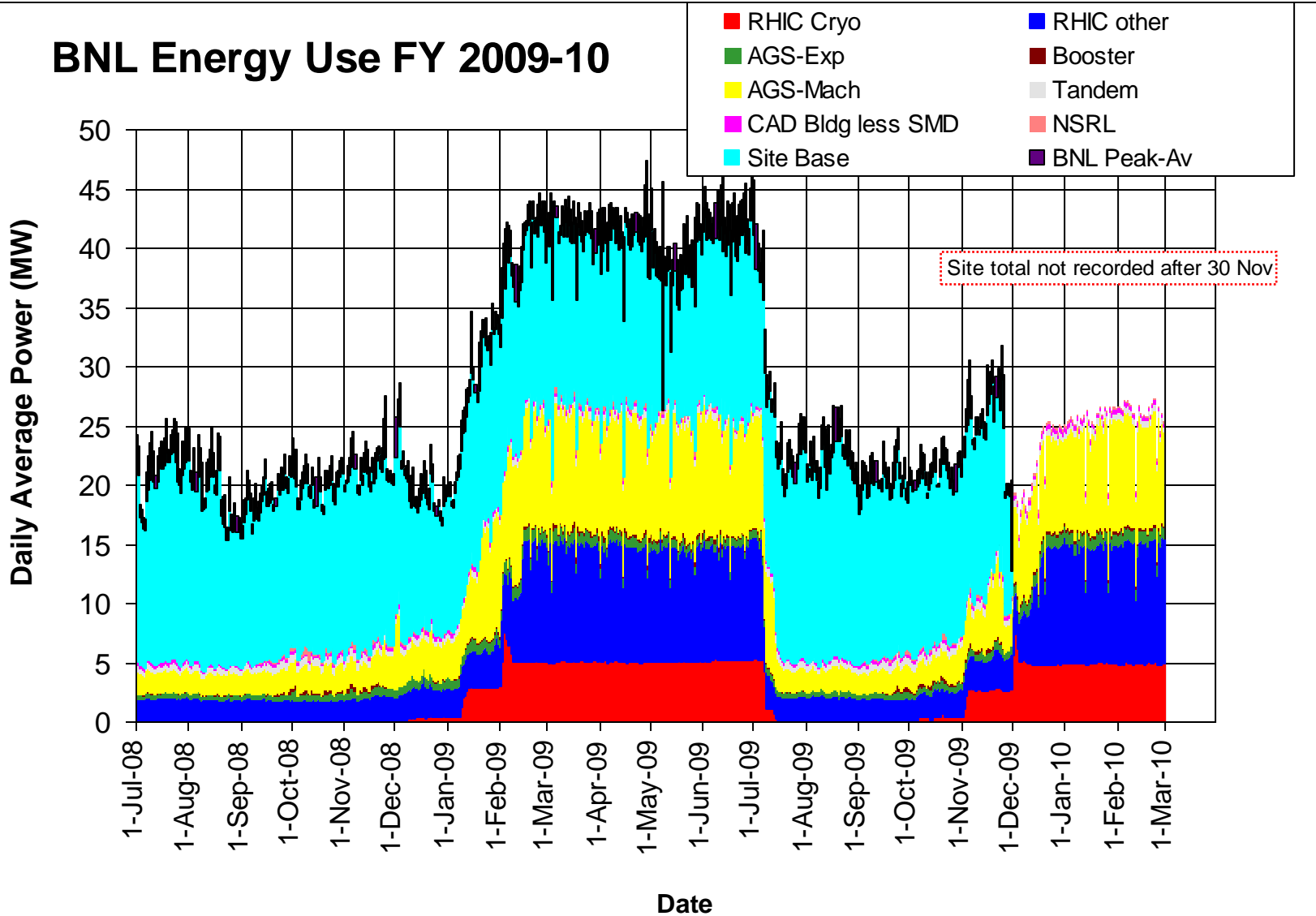


Through 2/28/10



Through 2/28/10

# BNL Energy Use FY 2009-10



## Revised Run 10 Plan, Nov 25, 2009

| $\sqrt{s_{NN}}$ (GeV)                          | Physics production or beam studies weeks |                 |
|--|--|-----------------|
|  | 25-cryoweek run                          | 27-cryoweek run |
| 200  | 10                                       | 10              |
| 62.4   | 4  | 4               |
| 39   | 1.5                                      | 1.5             |
| 27   | 0  | 0               |
| 18   | 0  | 0               |
| 11.5 @ STAR                                    | 0  | 2               |
| 7.7  | 4  | 4               |
| Beam studies @ 5 GeV and<br>@ $v \approx 0.67$ | 0.5                                      | 0.5             |

# Run 10 Au-Au Goals

11/19/09

- STAR

- $\sqrt{s} = 200 \text{ GeV/n}$

- Luminosity Sampled/Delivered = 2/4 nb<sup>-1</sup>
    - 250M Central Events
    - 300M Min-bias events

- PHENIX

- $\sqrt{s} = 200 \text{ GeV/n}$

- Luminosity Recorded/Delivered = 1.4/>6 nb<sup>-1</sup>
    - Minimum Goal:
      - Luminosity Recorded/Delivered = 1.1/3.9 nb<sup>-1</sup>

Time from start of 4.5 deg cooldown to Physics

