

RUN 11 RHIC MACHINE/EXPERIMENTS MEETING

17 May 2011

Agenda:

- $\sqrt{s} = 200$ GeV AuAu progress

Run 11 Plan based on PAC recommendation/ALD Guidance and available funds 5/17/10 update

- 3 Jan, Begin cool-down to 4.5K
- 8 Jan, Cool-down to 4.5K complete in both rings, preliminary setup begins
- 24 Jan, 1 week Ramp-up with 8 hr/night beam to experiments
- **11 Feb (machine and ~experiments), begin ~10 week physics run ($\sqrt{s} = 500$ GeV pp)**
- 7 Mar, cryo troubles, extended maintenance, 0900 hrs till 2000 hrs 14 Mar – lost 7.5 days
- 17 Mar, power distribution problem, extended maintenance, 1930 hrs till 0315 hrs 20 Mar – lost 2.3 days
- **18 Apr, end 9.4 week physics run at $\sqrt{s} = 500$ GeV**
- 18 Apr jet target polarization measurement at injection (<5%)
- 19 Apr, short maintenance followed by setup for $\sqrt{s} = 18$ GeV AuAu
- **23 Apr, begin ~1 week physics run ($\sqrt{s} = 19.6$ AuAu)**
- **2 May 08:00, end 1.3 week physics run at $\sqrt{s} = 19.6$ GeV**
- 2 May, begin setup for $\sqrt{s} = 200$ AuAu
- 5 May, begin 2 day Ramp-up with 8 hr/night beam to experiments
- **6 May 11:37, begin ~8 week physics run at ($\sqrt{s} = 200$ GeV/n AuAu)**

- **17 May- TODAY**
- **29 June, end 7.7 week AuAu physics run at $\sqrt{s} = 200$ GeV/n , begin warm-up**
- **30 June, cryo warm-up ~ complete, end 25.4 weeks cryo operation**

What's missing :

- **Run into July?**
- Uranium test/physics run
- **Low energy test run** ← only 2 days!

$\sqrt{s} = 200 \text{ GeV/n AuAu}$ luminosity goals (to be updated)

STAR

2000 μb^{-1} sampled / 60% = 3300 μb^{-1} delivered

PHENIX

700 μb^{-1} sampled / ?% = ? μb^{-1} delivered

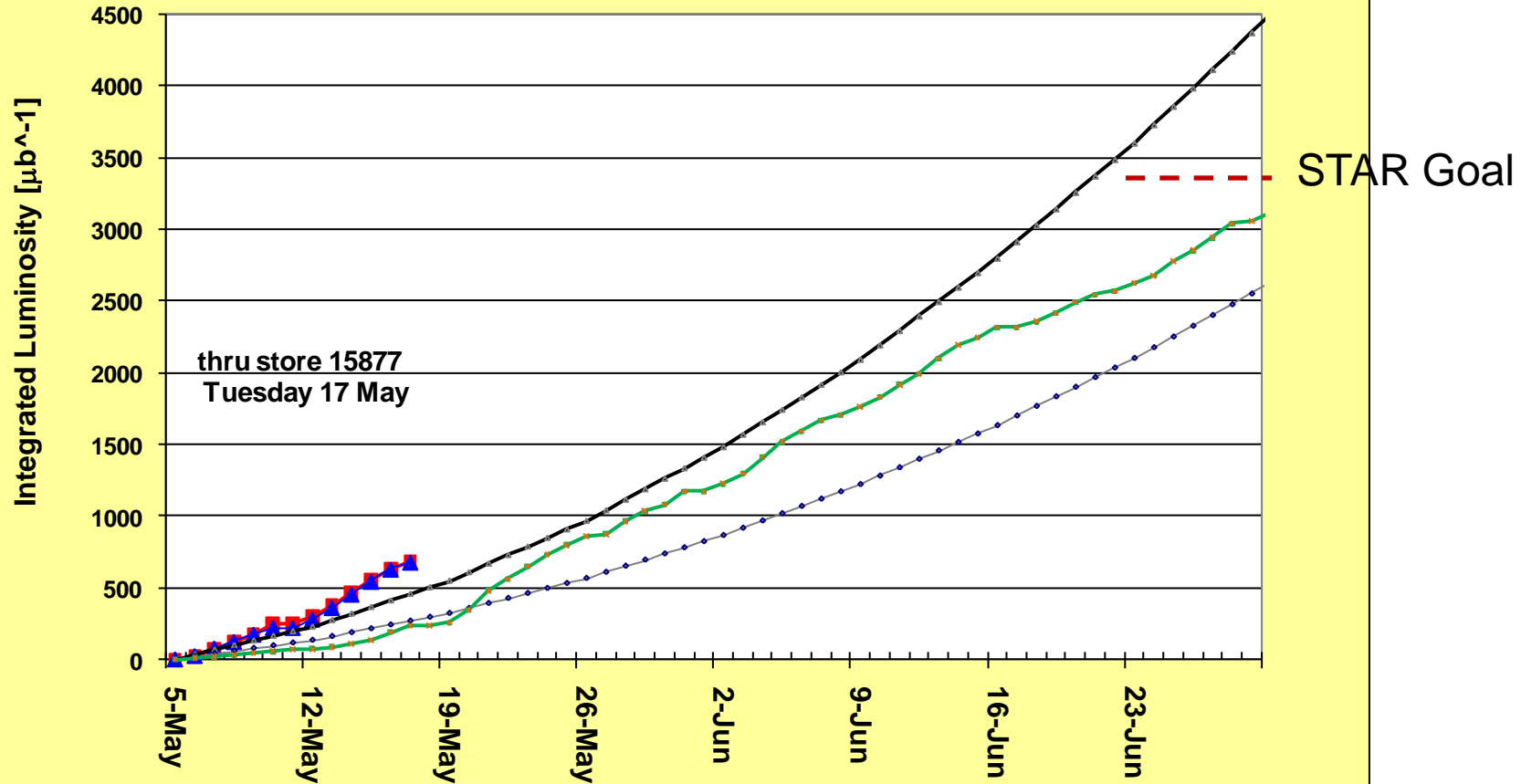
Estimate from PHENIX Beam Use Proposal

- Live Time = 97%
- Uptime = 65%
- +/- 10 cm vertex = 25%

(with corrected STAR singles correction)

Run11 RHIC AuAu Integrated Luminosity for Physics ($v_s = 200 \text{ GeV/n}$)

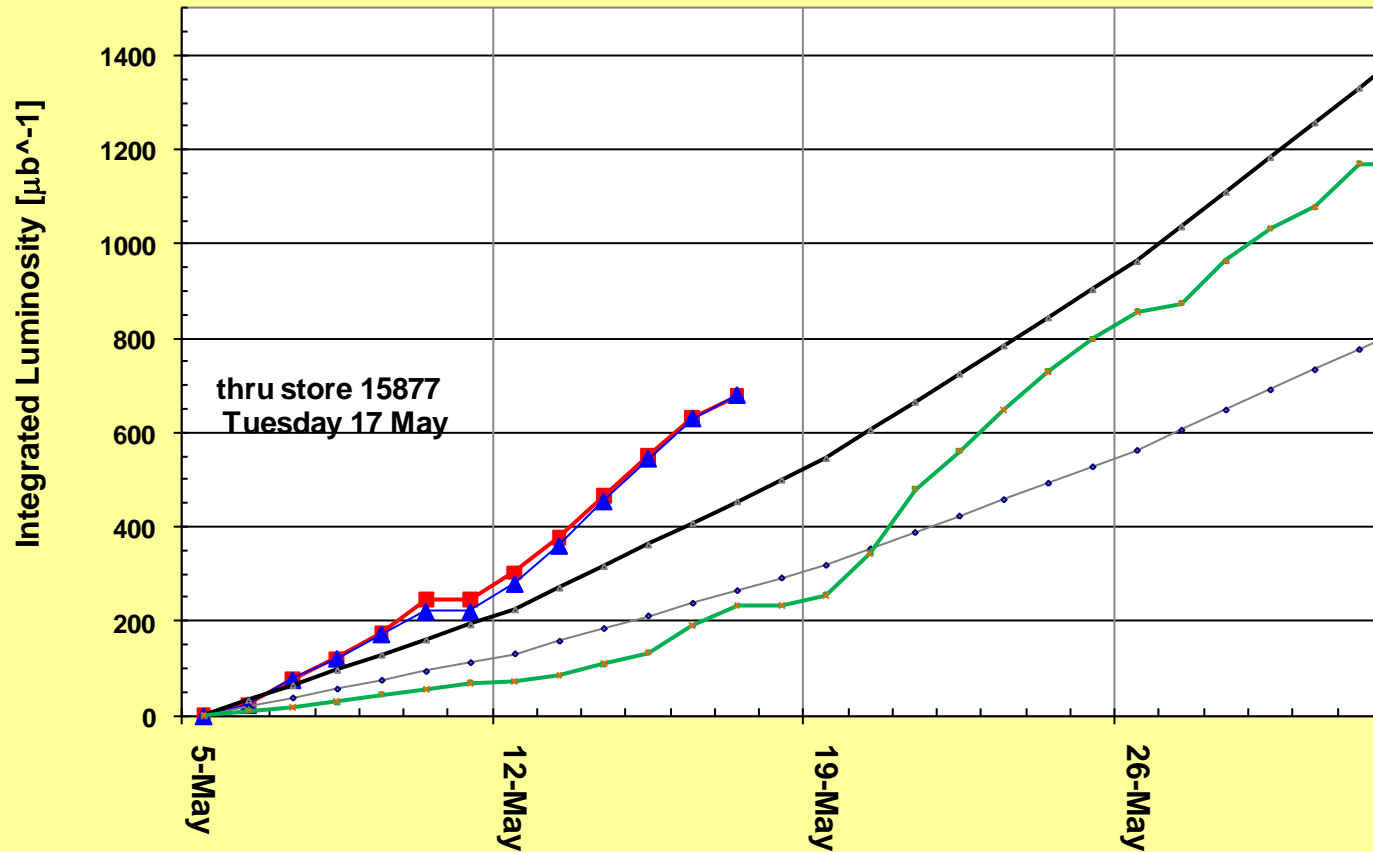
■ STAR ▲ PHENIX — Lmax ● Lmin — Phenix Run10



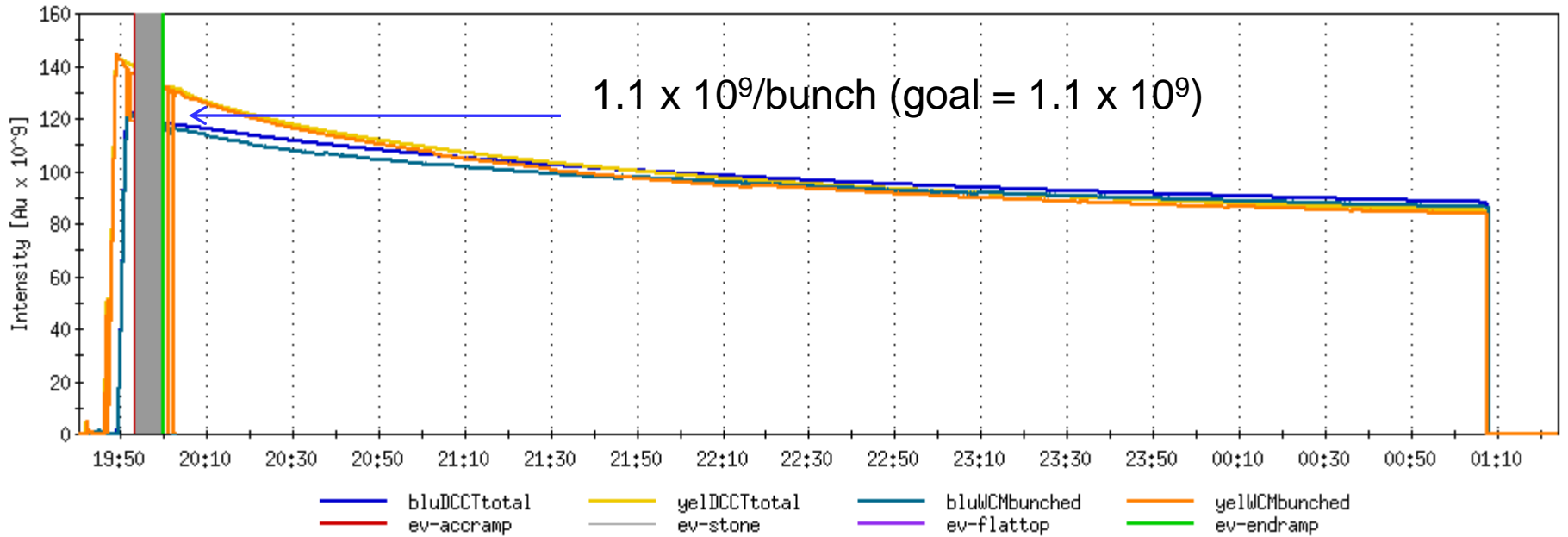
(with corrected STAR singles correction)

Run11 RHIC AuAu Integrated Luminosity for Physics ($v_s = 200 \text{ GeV/n}$)

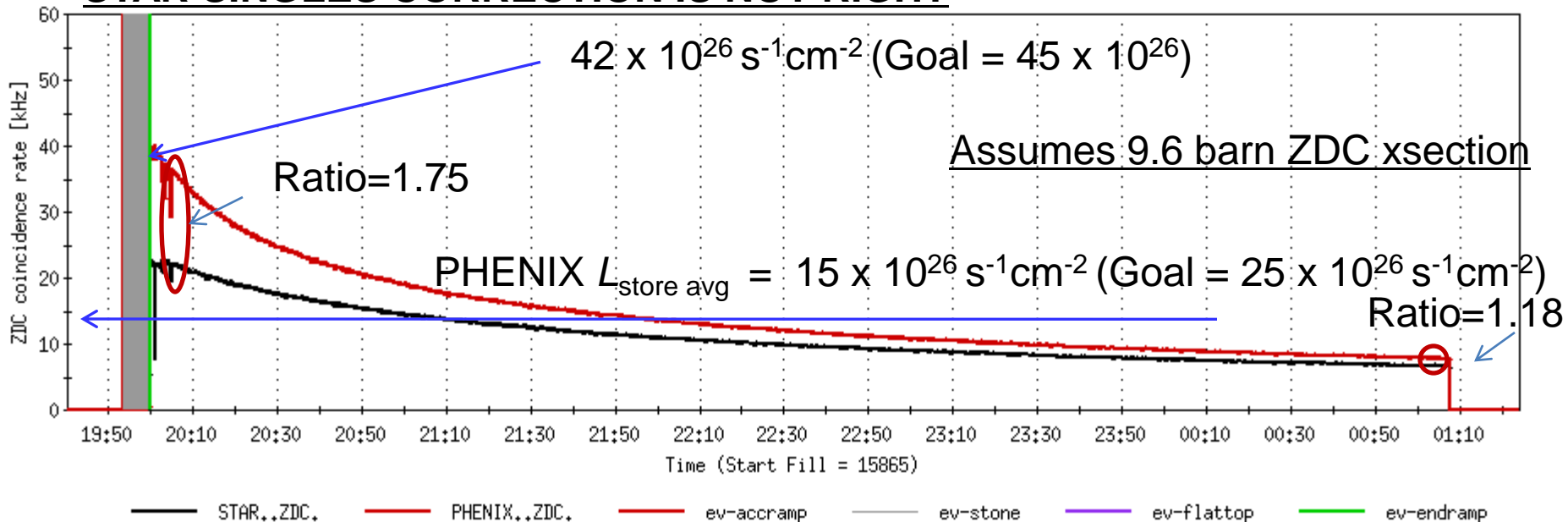
■ STAR ▲ PHENIX — Lmax ● Lmin ◆ Phenix Run10



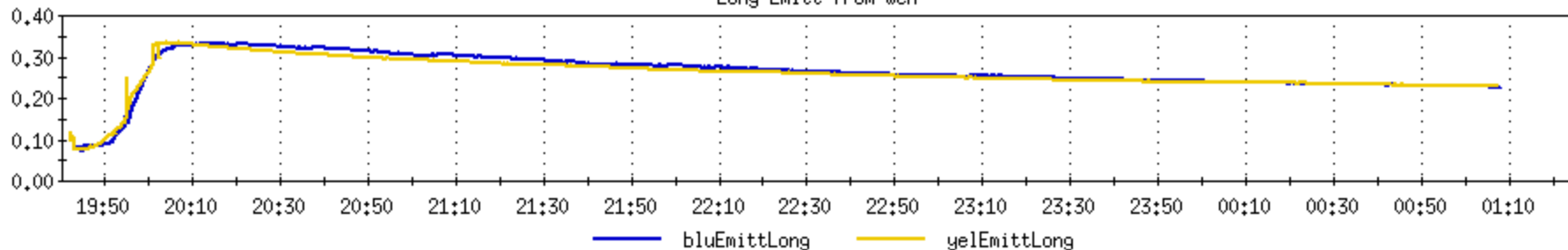
“Typical” Store 15865, 111/111 bunches, 0.75 (goal 0.65) m β^* , Longitudinal cooling only



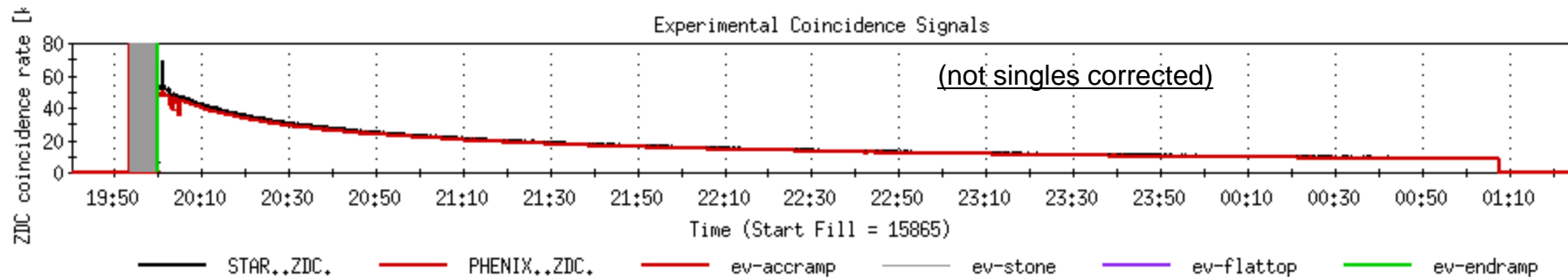
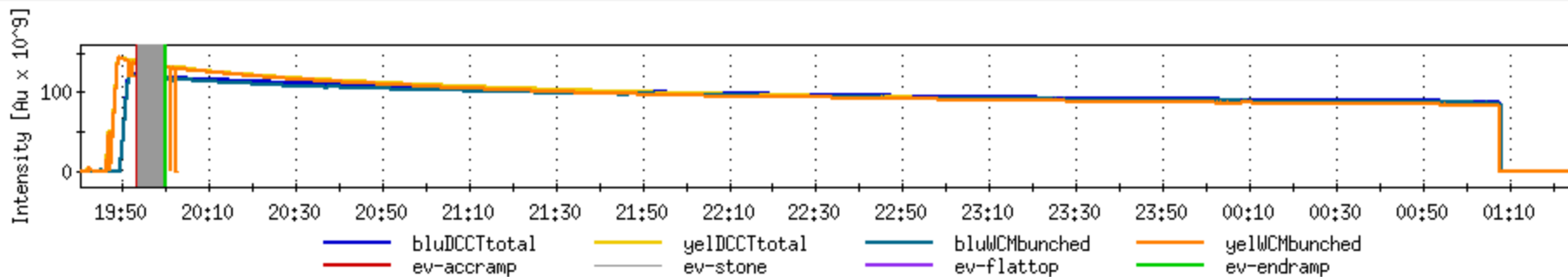
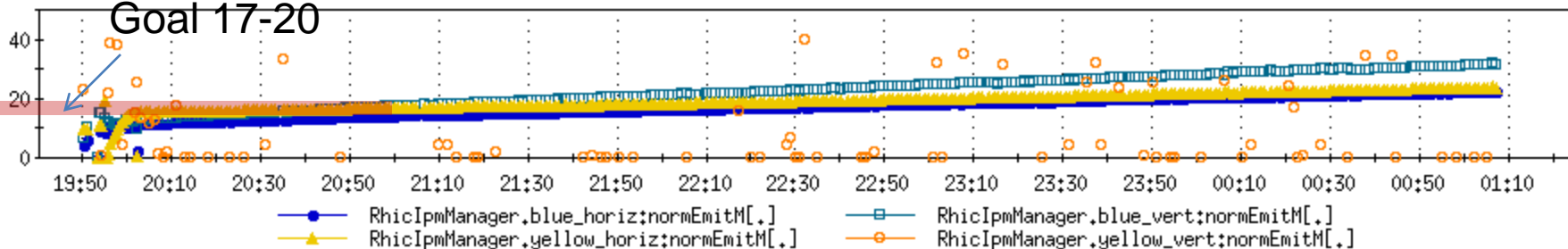
STAR SINGLES CORRECTION IS NOT RIGHT (singles corrected)



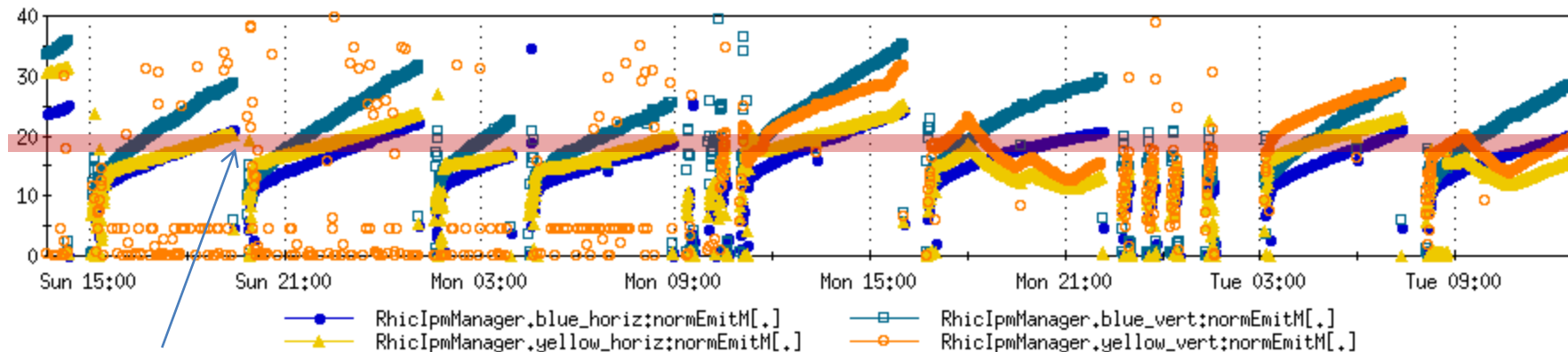
Long Emitt from WCM



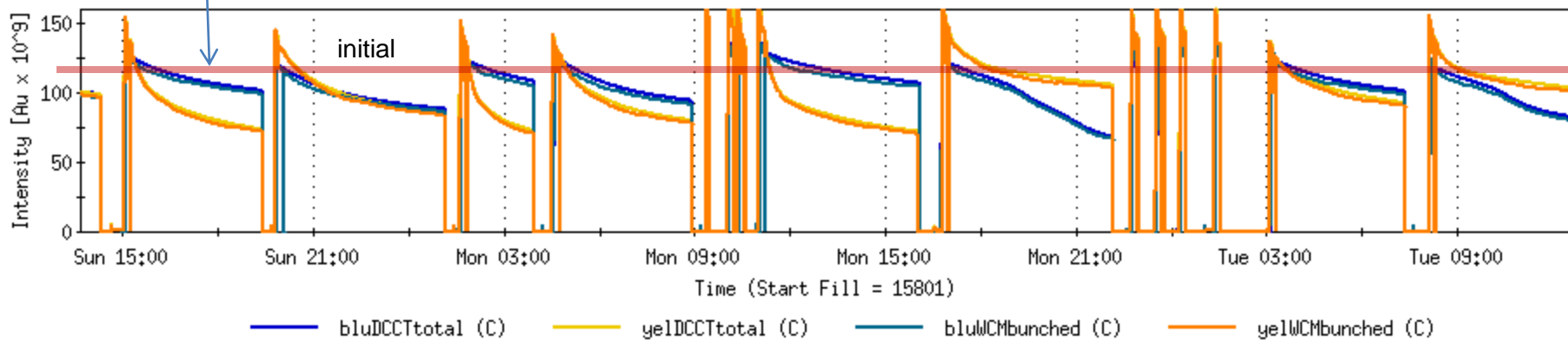
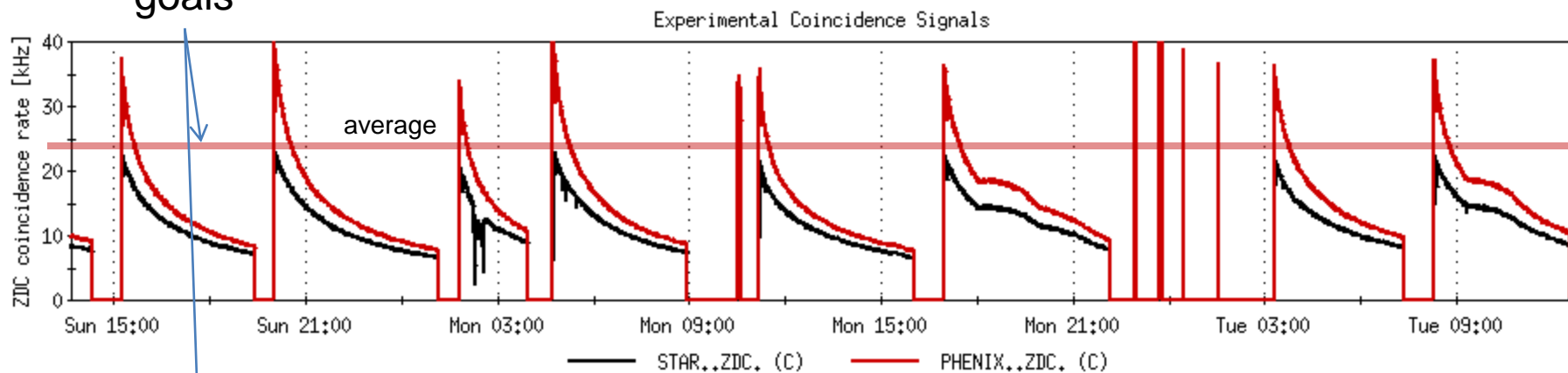
Goal 17-20



Latest Stores

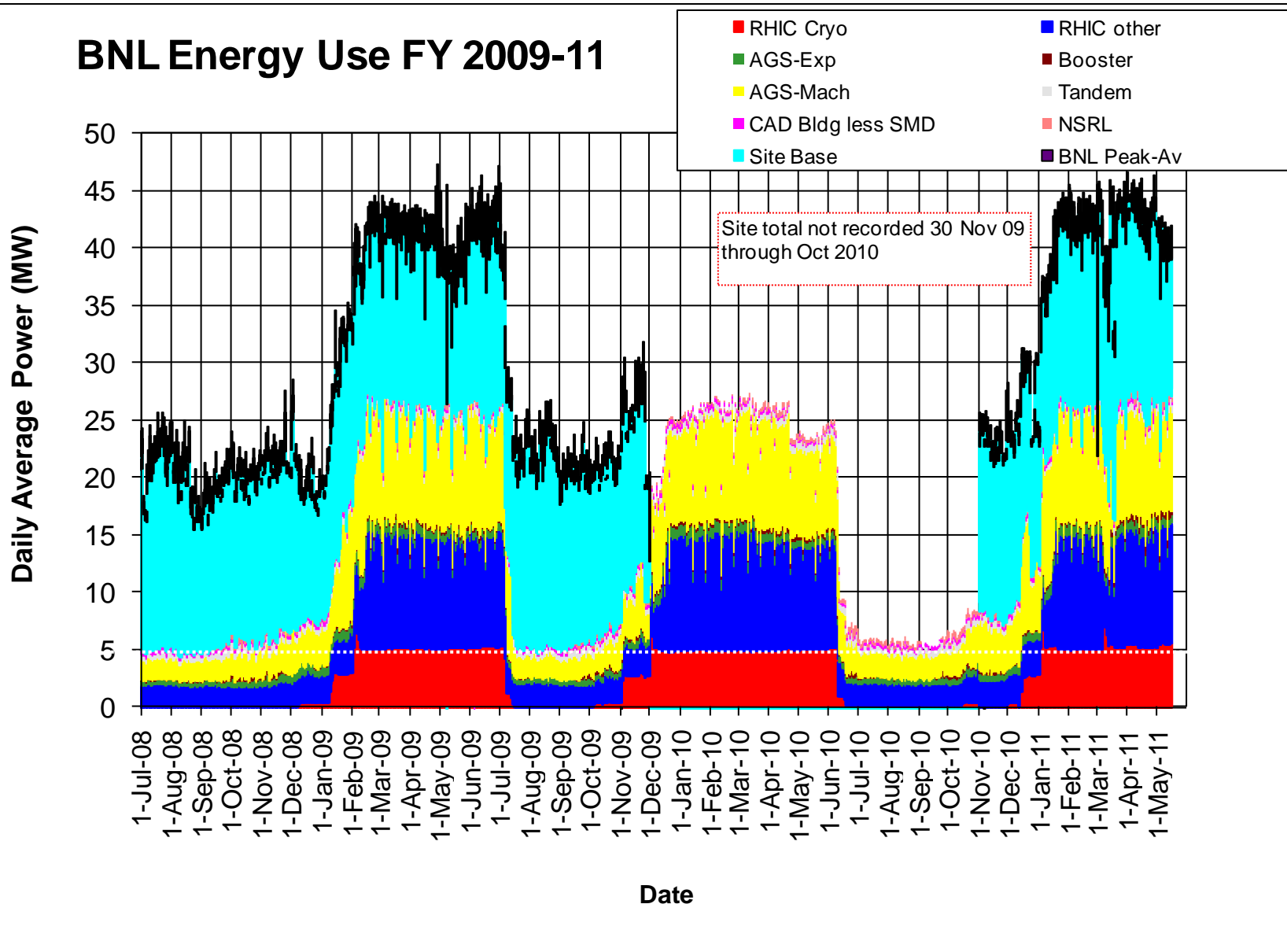


goals



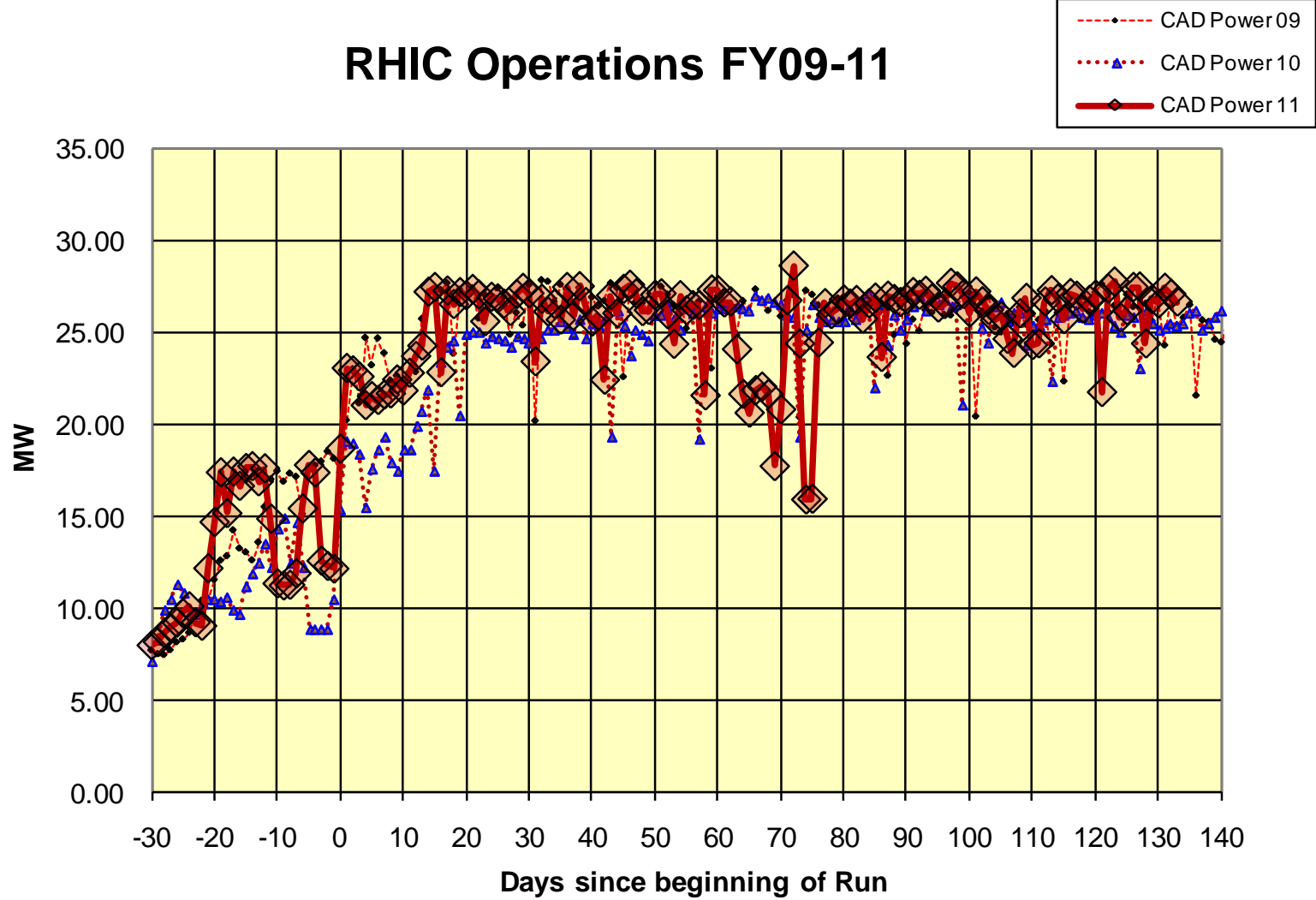
Through 16 May 2011

BNL Energy Use FY 2009-11



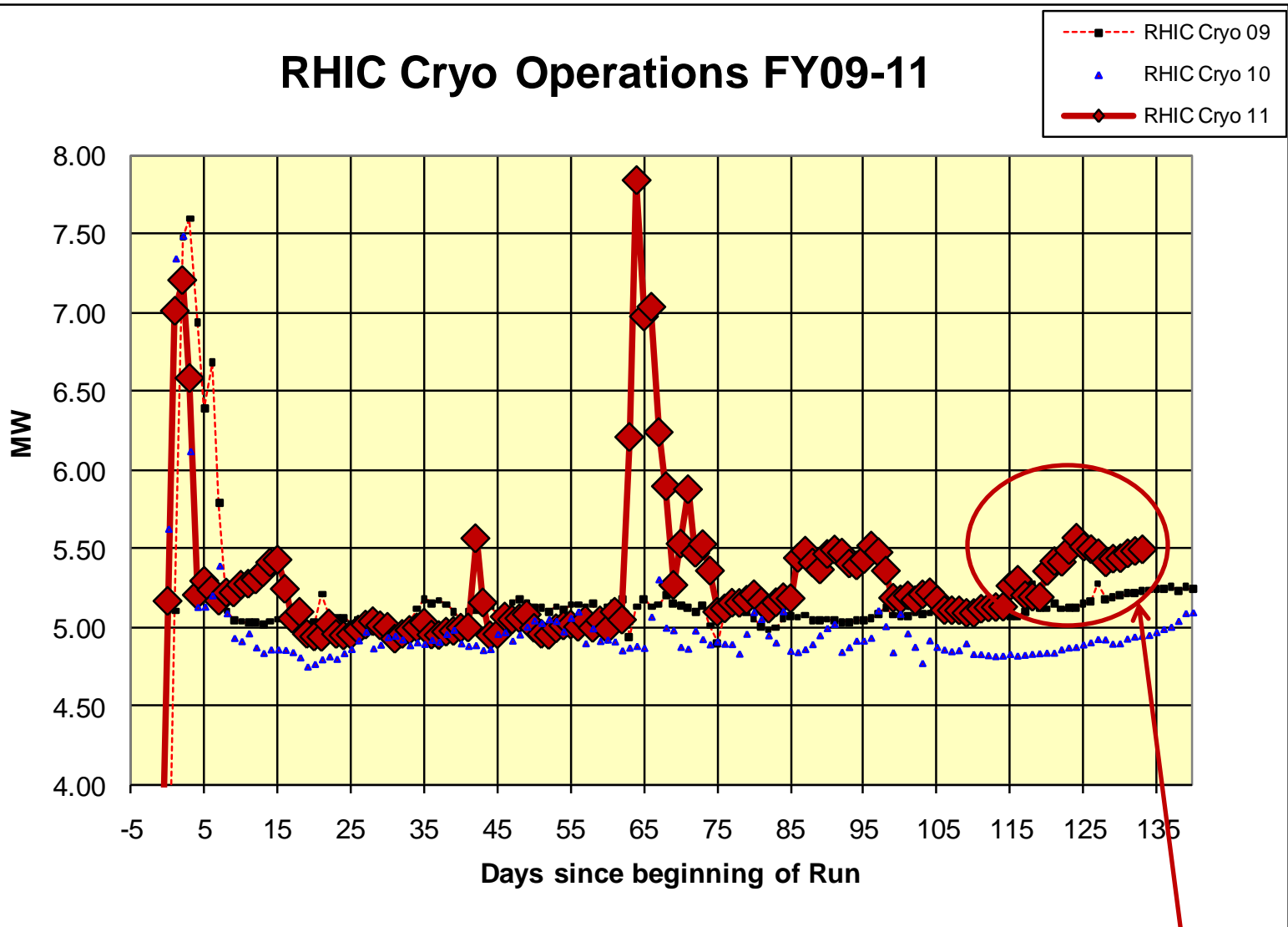
Through 16 May 2011

RHIC Operations FY09-11



Through 16 May 2011

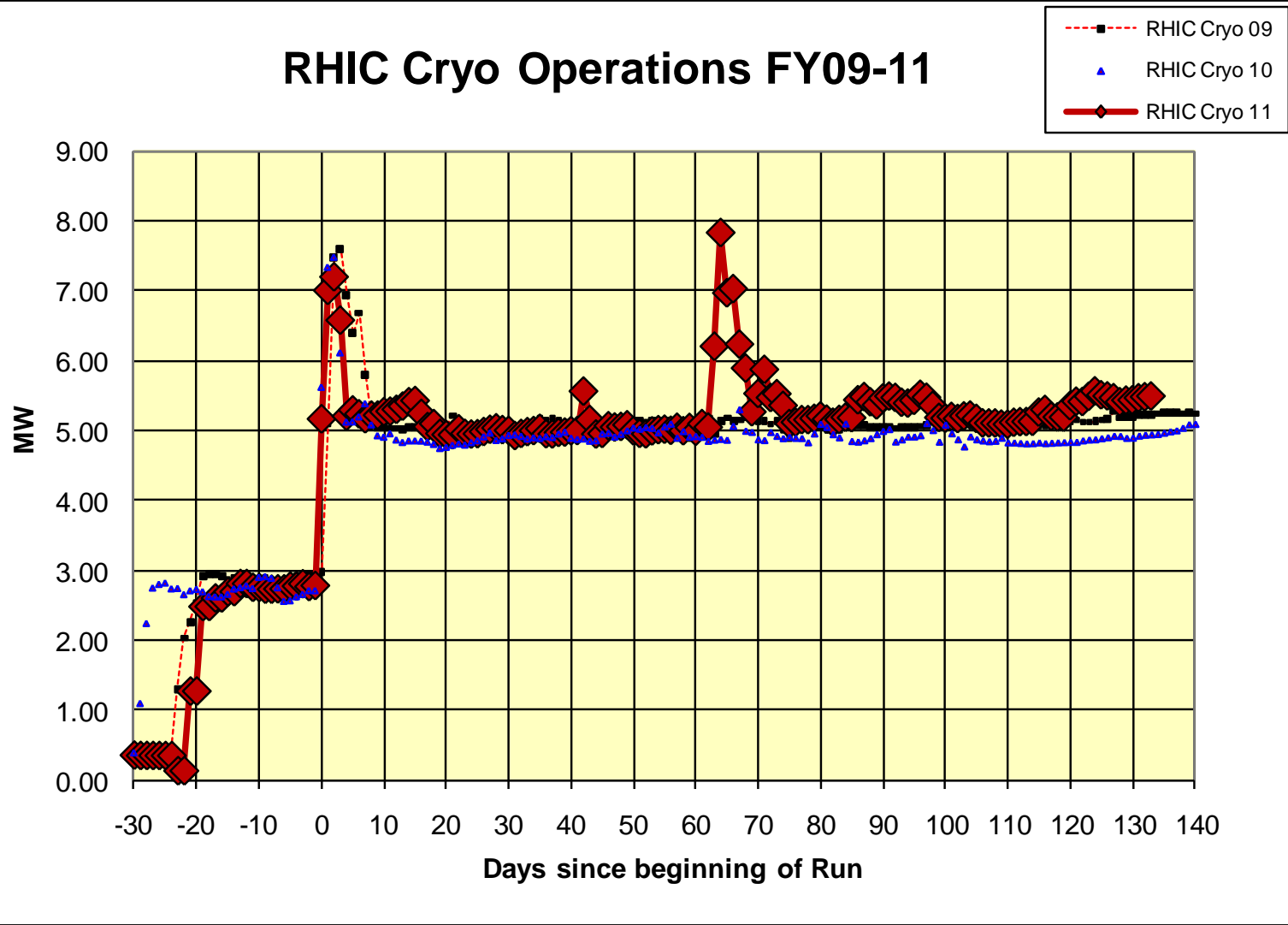
RHIC Cryo Operations FY09-11



Possible oil contamination in one of the heat exchangers

Through 16 May 2011

RHIC Cryo Operations FY09-11

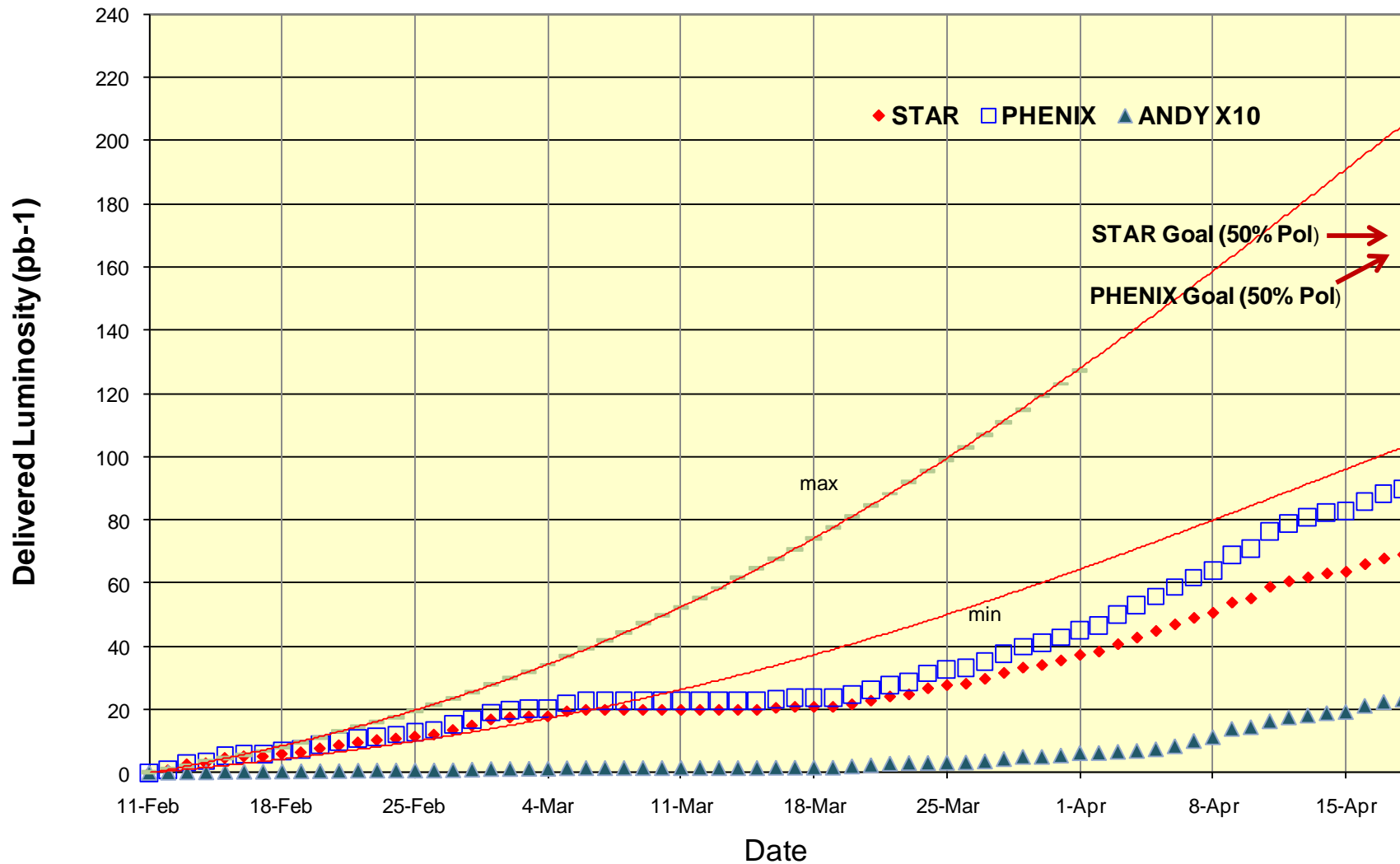


Old information

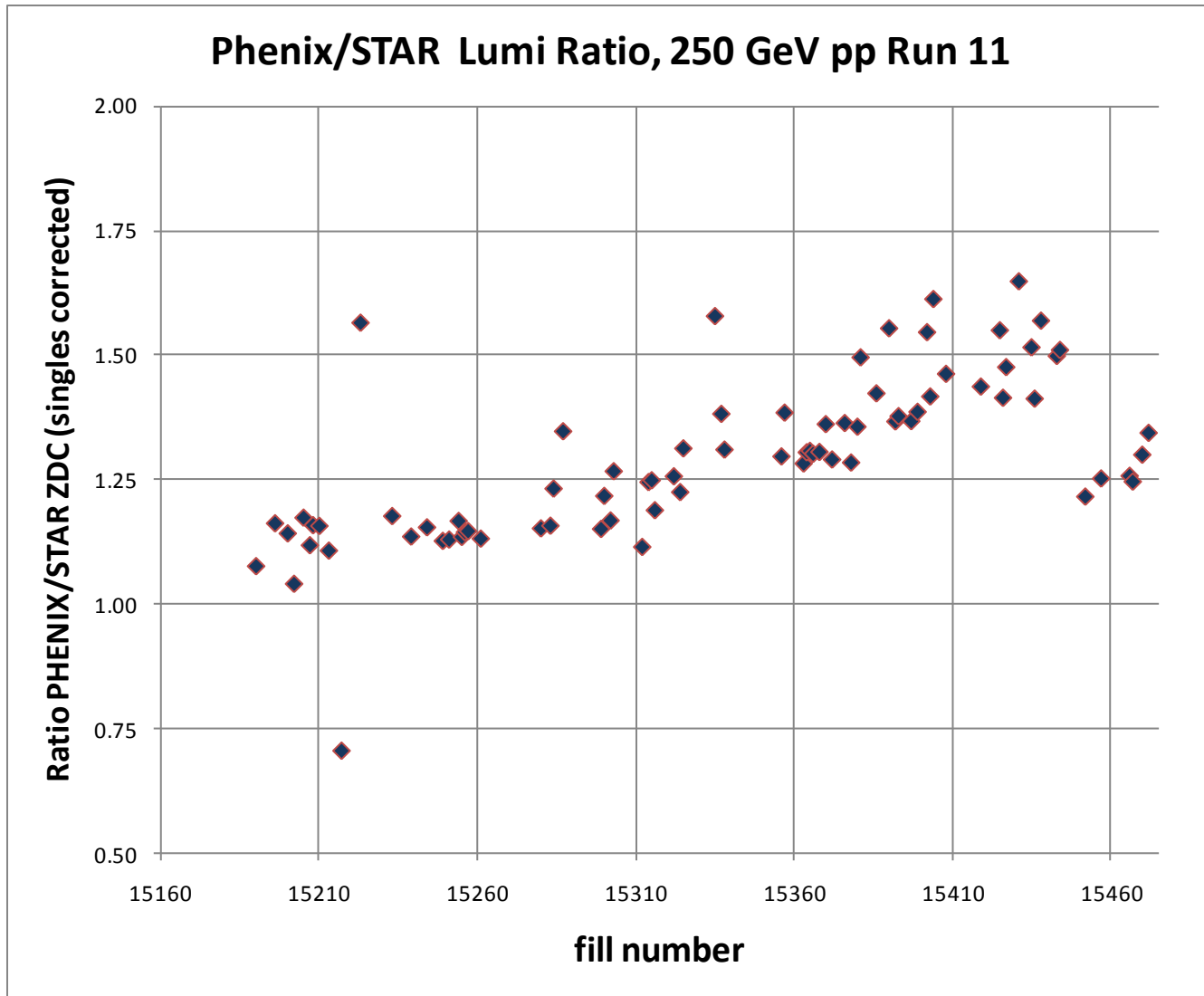
Run 11 250 x 250 GeV pp, Luminosity

thru final fill 15472, 18 Apr

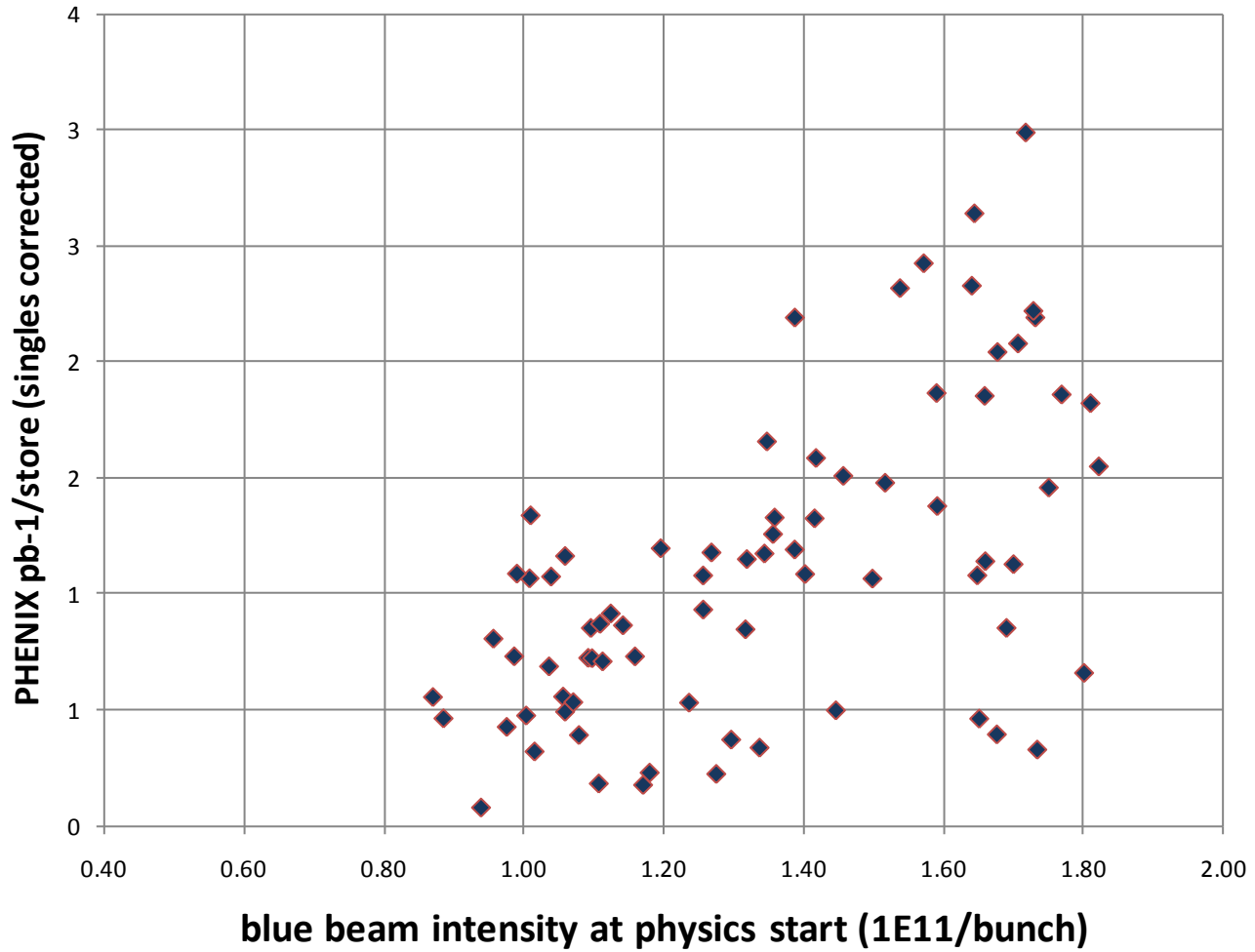
2.9 mb STAR, 2.7 mb PHENIX, 2.8 mb (not right) ANDY



Final Lumi should change as it appears there's an issue with the singles correction



Phenix Lumi vs beam intensity, 250 GeV pp Run 11

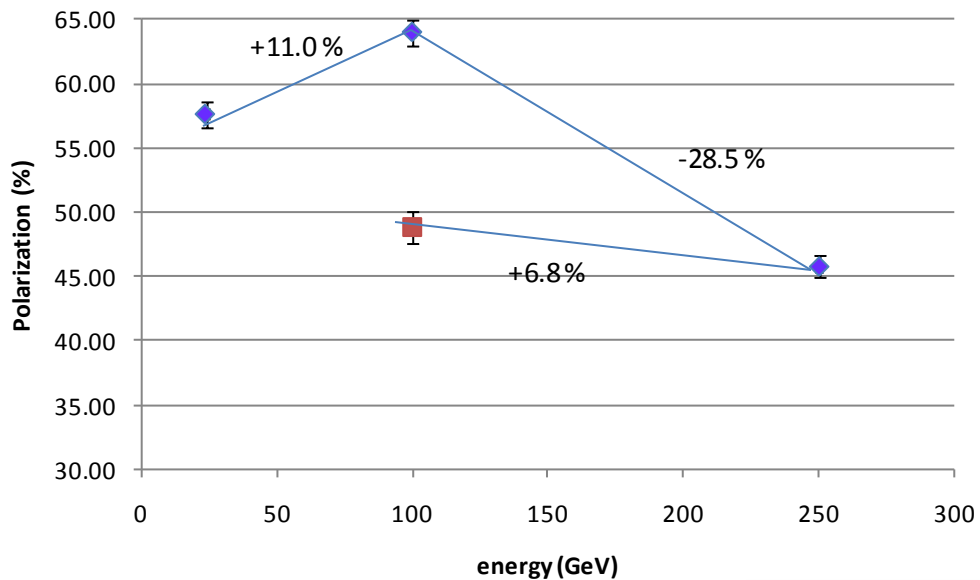


Run 11 Plan based on PAC recommendation/ALD Guidance and available funds 4/26/10 update (1/2)

- 3 Jan, Begin cool-down to 4.5K
- 8 Jan, Cool-down to 4.5K complete in both rings, preliminary setup begins
- ~11 Jan, 2 ½ weeks beam setup for $\sqrt{s} = 500$ GeV pp in RHIC begins.
- 15 Jan, power supply work/DX training complete
- 17 Jan, first successful ramp
- 19 Jan, 1st maint day
- 24 Jan, 1 week Ramp-up with 8 hr/night beam to experiments
- **11 Feb (machine and ~experiments), begin ~10 week physics run ($\sqrt{s} = 500$ GeV pp)**
- 16 Feb, AGS Jump Quads in routine operation for RHIC injection
- 24 Feb, 9 MHz cavity in routine operation
- 7 Mar, cryo troubles, extended maintenance, 0900 hrs till 2000 hrs 14 Mar – lost 7.5 days
- 17 Mar, power distribution problem, extended maintenance, 1930 hrs till 0315 hrs 20 Mar – lost 2.3 days
- 28 March – 1 April, PAC 2011
- **15 April Continuing Resolution Ends, guidance to follow**
- **18 Apr, end 9.4 week pp physics run at $\sqrt{s} = 500$ GeV**
- 18 Apr jet target polarization measurement at injection (<5%)
- 19 Apr, short maintenance followed by setup for $\sqrt{s} = 18$ GeV AuAu
- **23 Apr, begin ~1 week physics run ($\sqrt{s} = 19.6$ AuAu)**

- **2 May, end 1.3 week physics run at $\sqrt{s} = 19.6$ GeV**

**Up down ramp, Blue Beam
polarization with current analyzing powers**



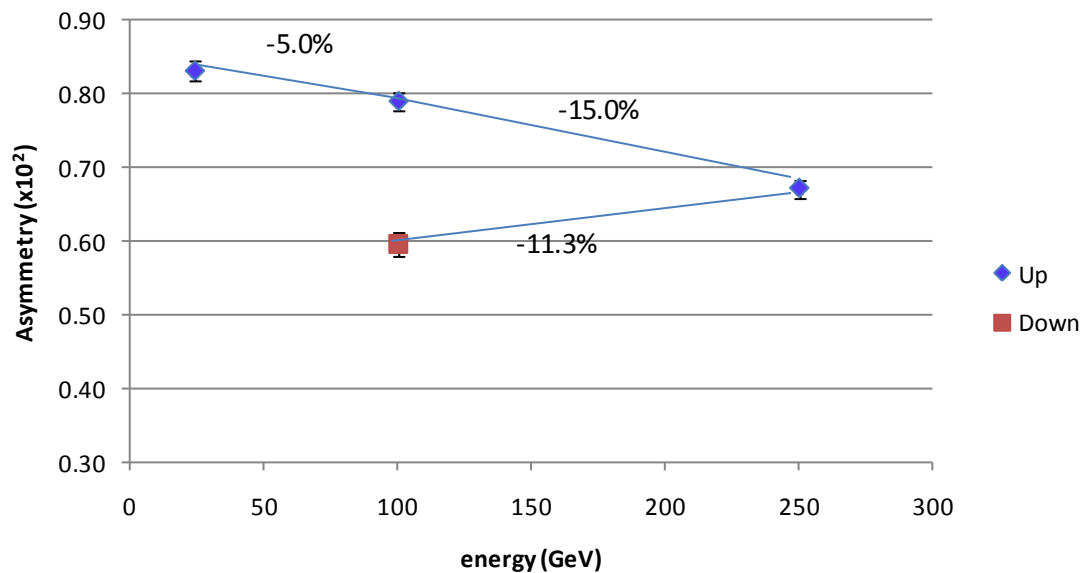
7 April Up-Down Ramp measurement
Blue Beam

Current CNI average analyzing powers are:

Energy	AN
24	0.0144
100	0.0122
250	0.0147

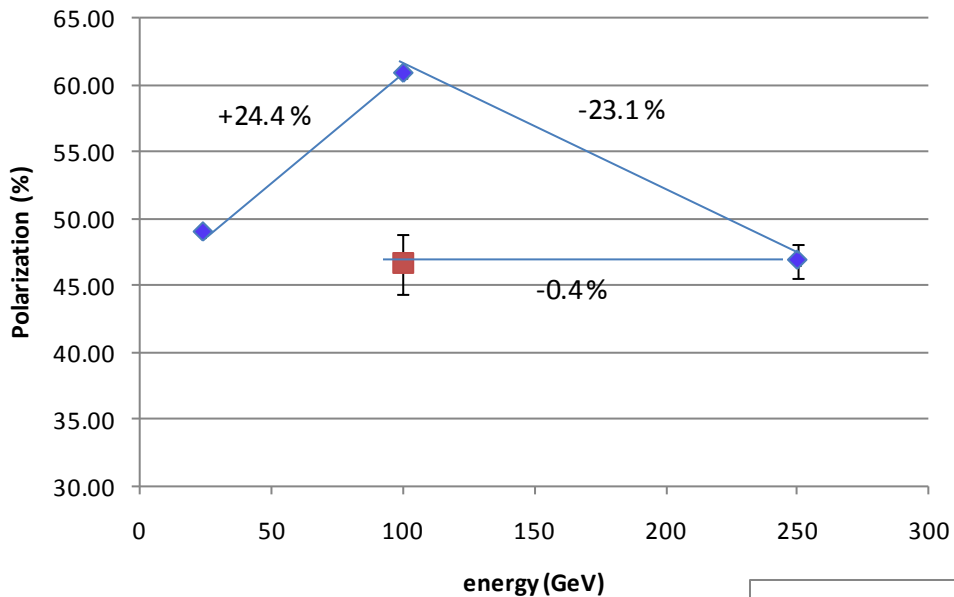
◆ Up
■ Down

**Up down ramp, Blue Beam
Asymmetry**



◆ Up
■ Down

Up down ramp, Yellow Beam
polarization (#1 only) with current analyzing powers



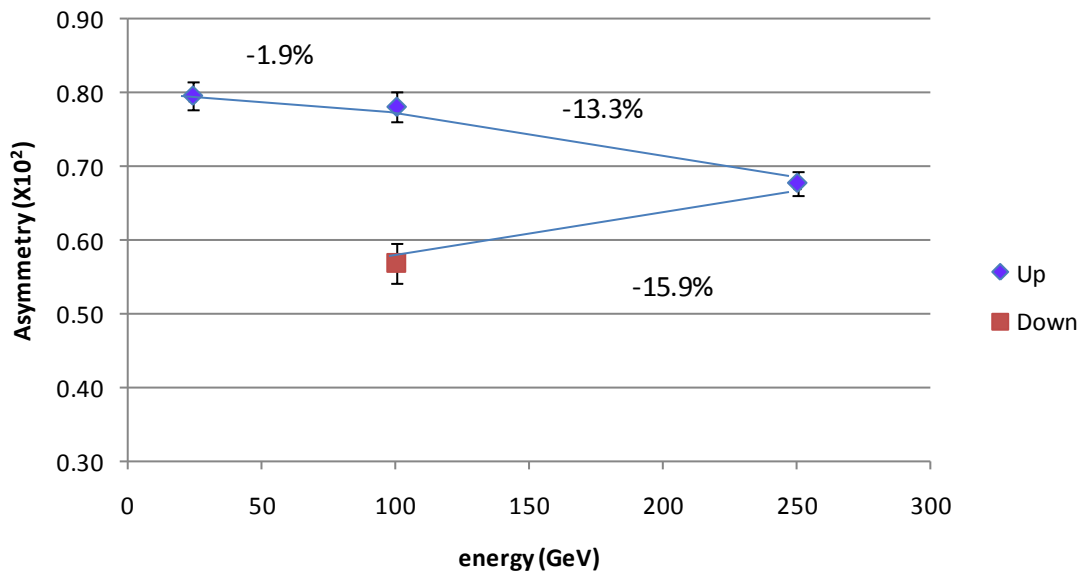
7 April Up-Down Ramp measurement
 Yellow Beam (only Yellow 1 was used as Yellow 2 was acting up)

Current CNI average analyzing powers are:

Energy	AN
24	0.0144
100	0.0122
250	0.0147

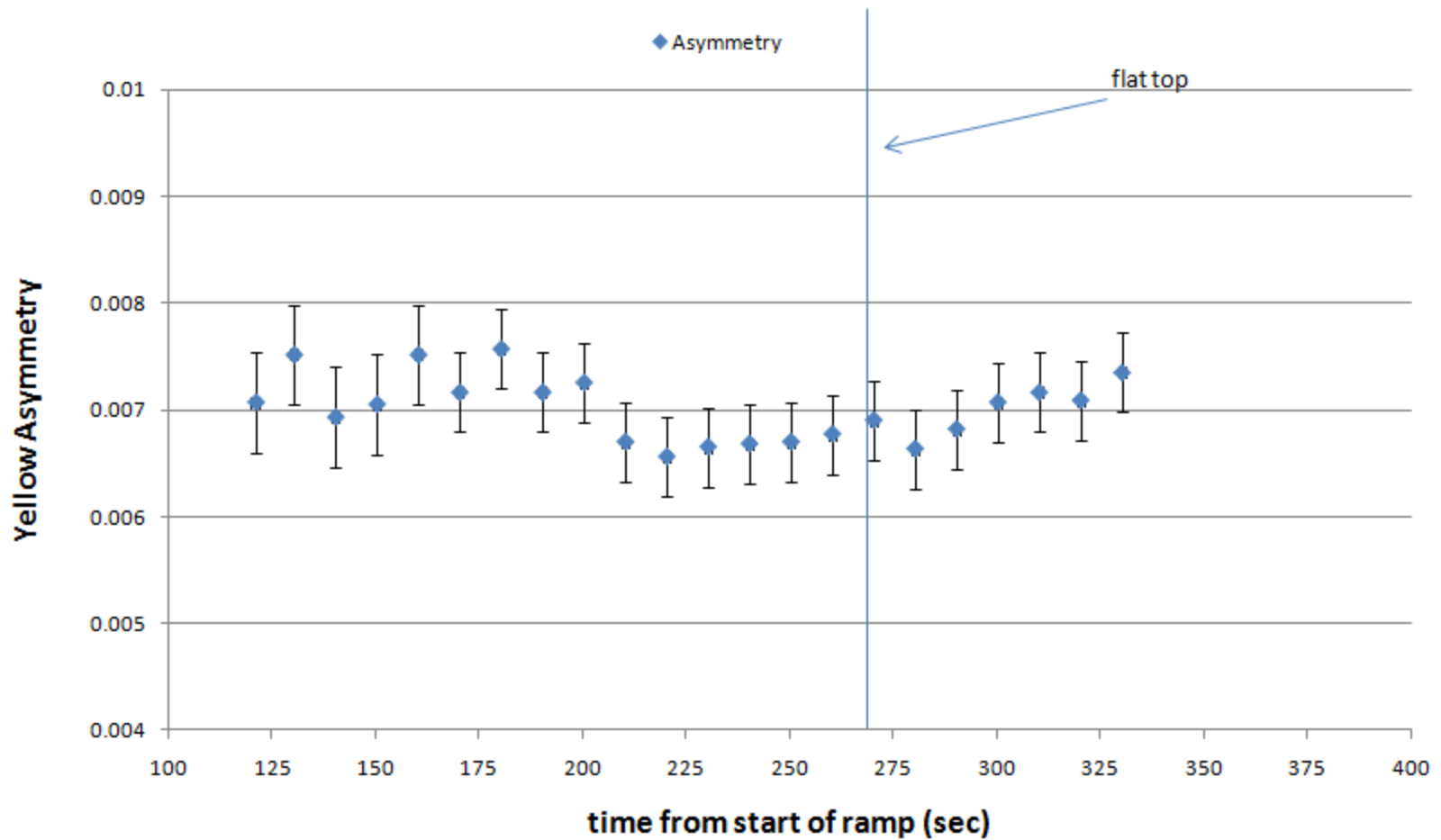
◆ Up
 ■ Down

Up down ramp, Yellow Beam
asymmetry (CNI #1 only)

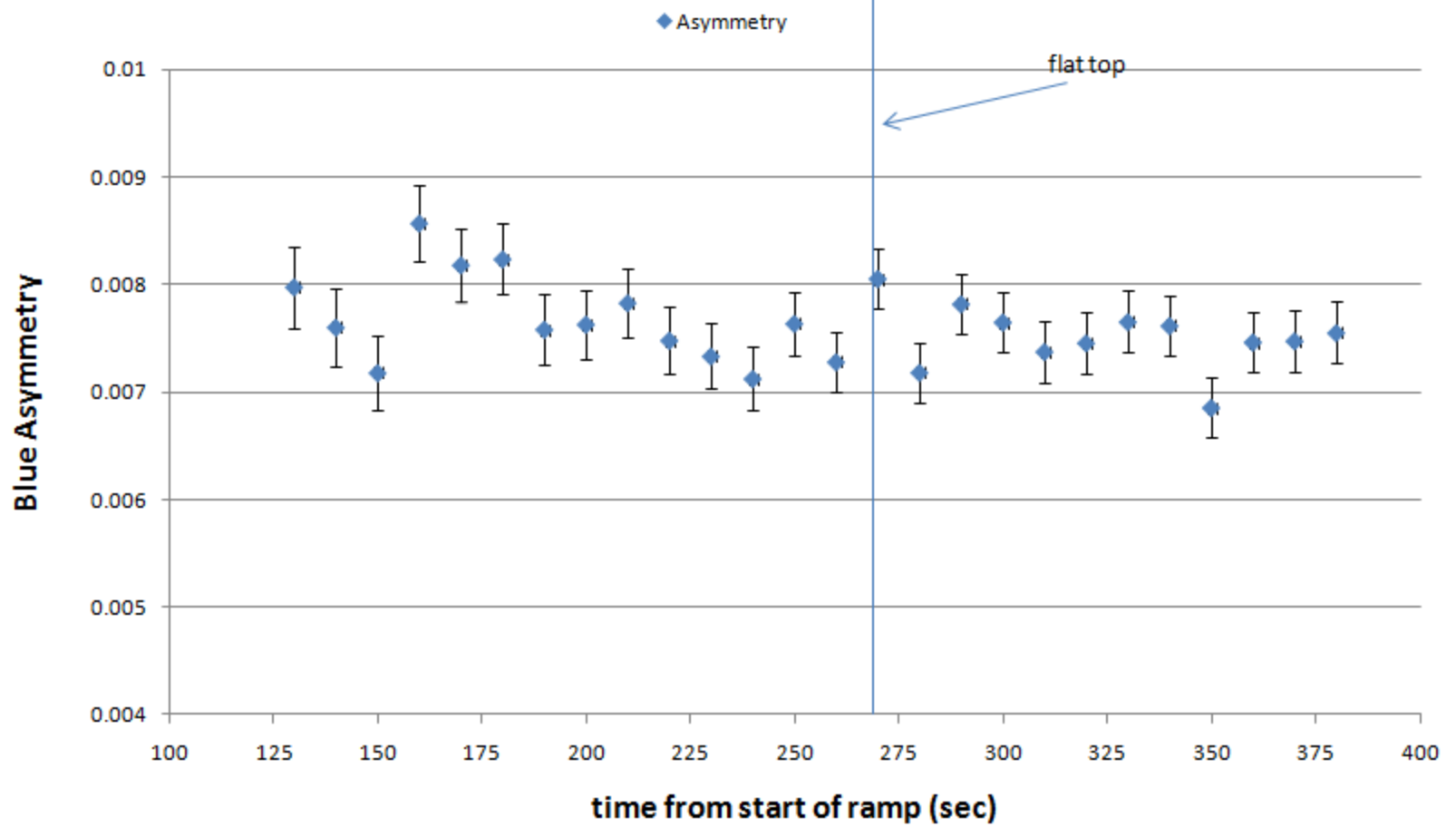


◆ Up
 ■ Down

CNI On the Ramp, fill 15366

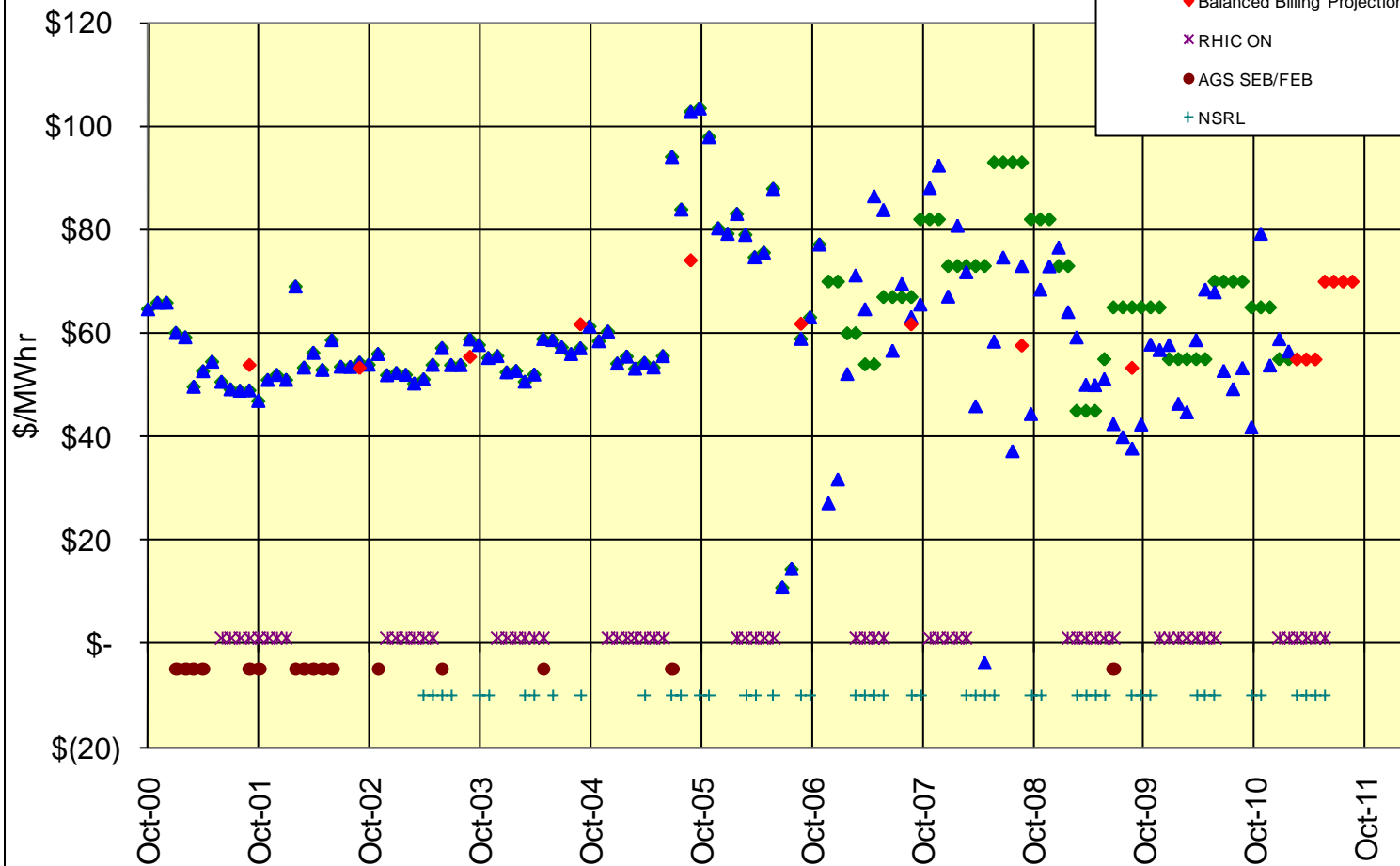


CNI On the Ramp, fill 15378

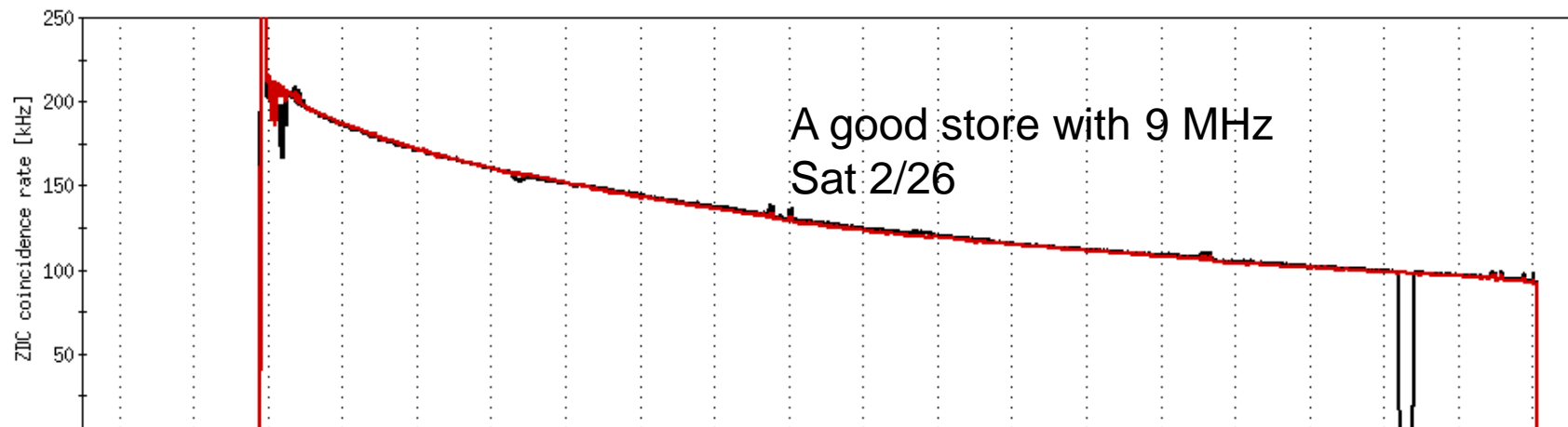


BNL Energy Cost

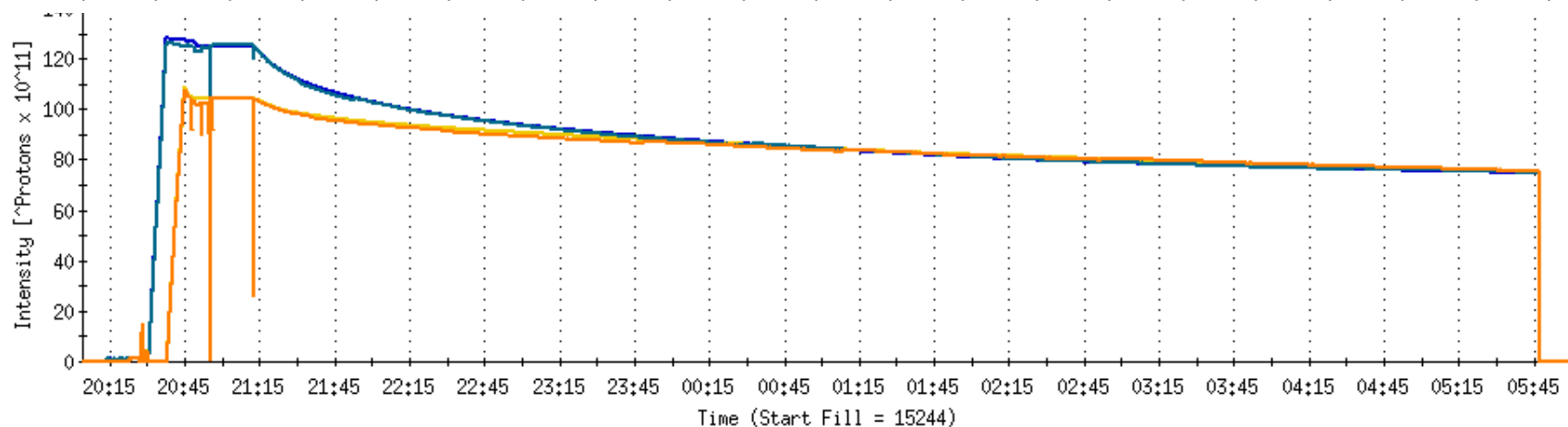
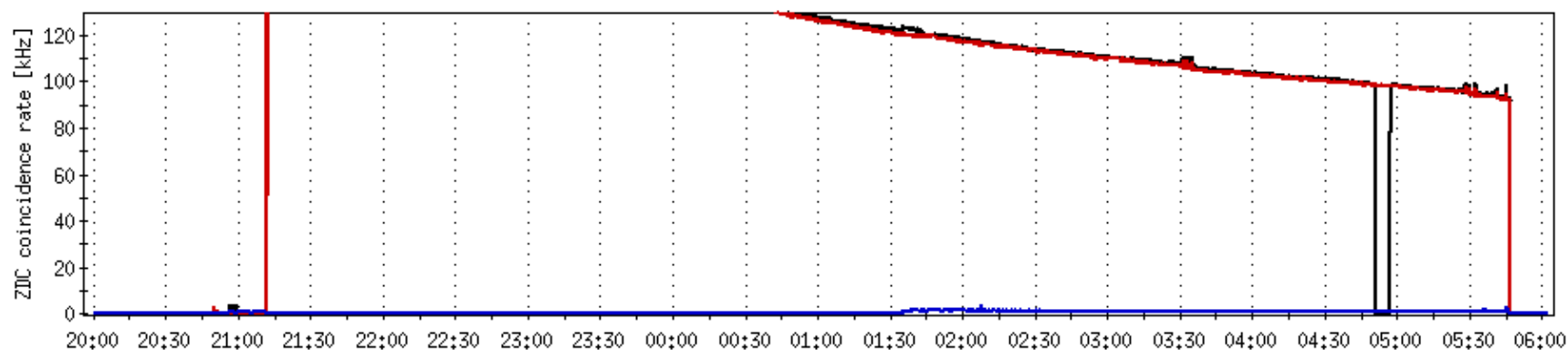
through Feb 2011



Experimental Coincidence Signals



Experimental Coincidence Signals

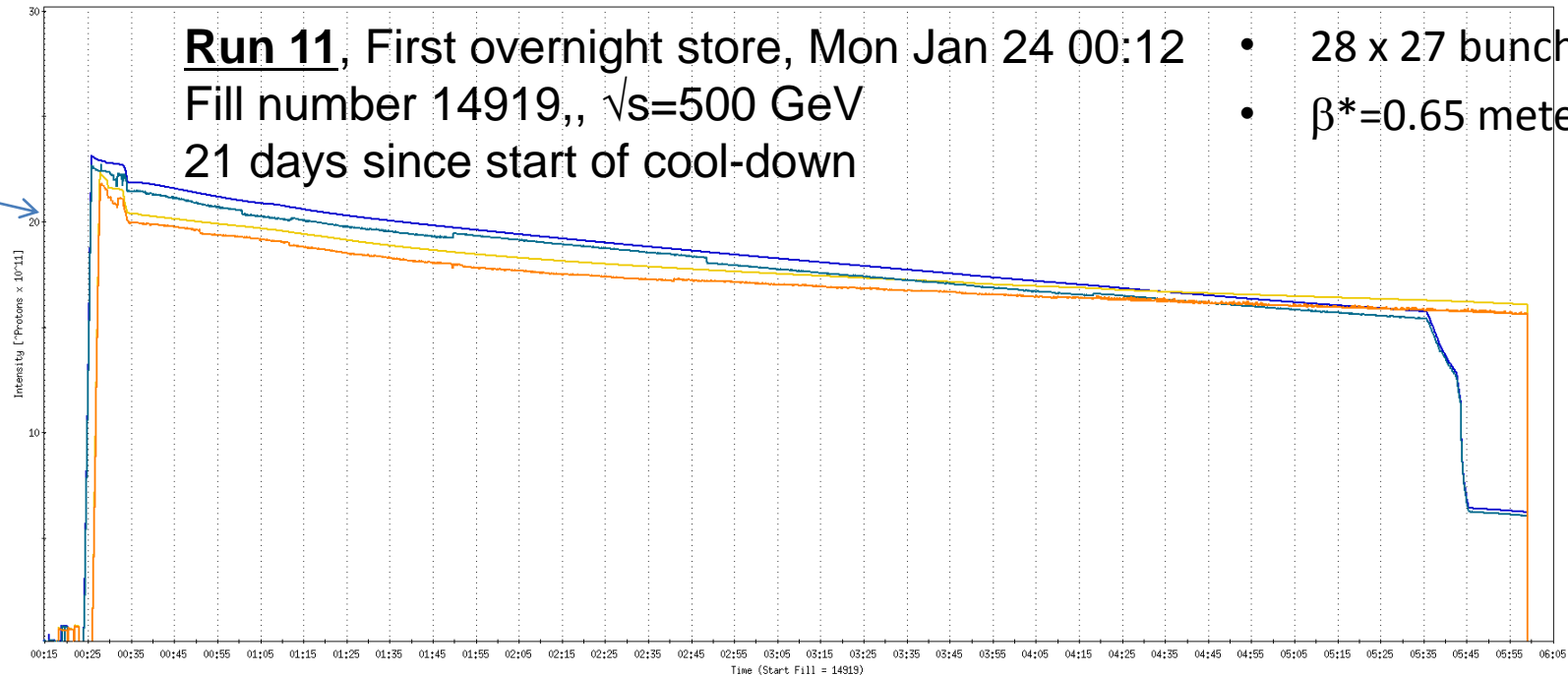


— bluDCCTtotal — ye1DCCTtotal — bluWCMbunched — ye1WCMbunched

Run 11, First overnight store, Mon Jan 24 00:12
Fill number 14919,, $\sqrt{s}=500$ GeV
21 days since start of cool-down

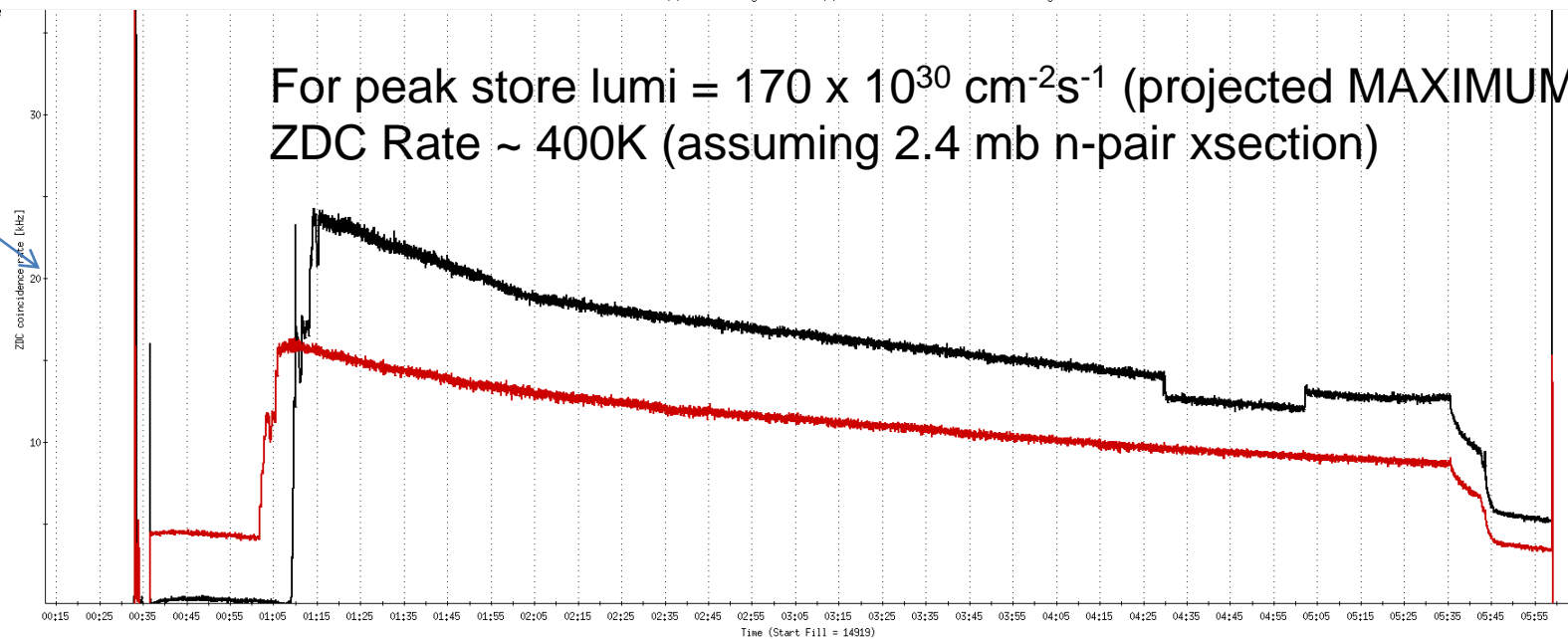
- 28 x 27 bunches
- $\beta^*=0.65$ meters

20 x 10¹¹



For peak store lumi = $170 \times 10^{30} \text{ cm}^{-2}\text{s}^{-1}$ (projected MAXIMUM)
ZDC Rate ~ 400K (assuming 2.4 mb n-pair xsection)

20K



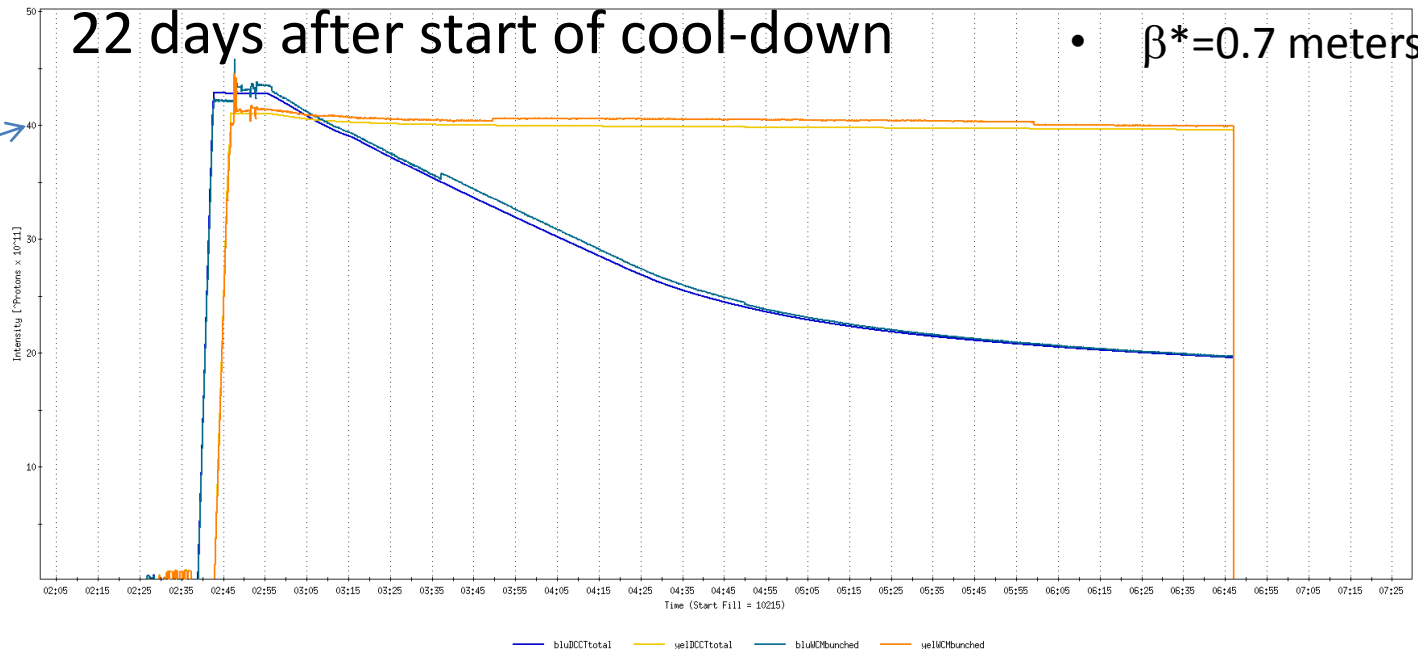
Run 9, First overnight store at $\sqrt{s}=500$ GeV

• 56 x 56 bunches

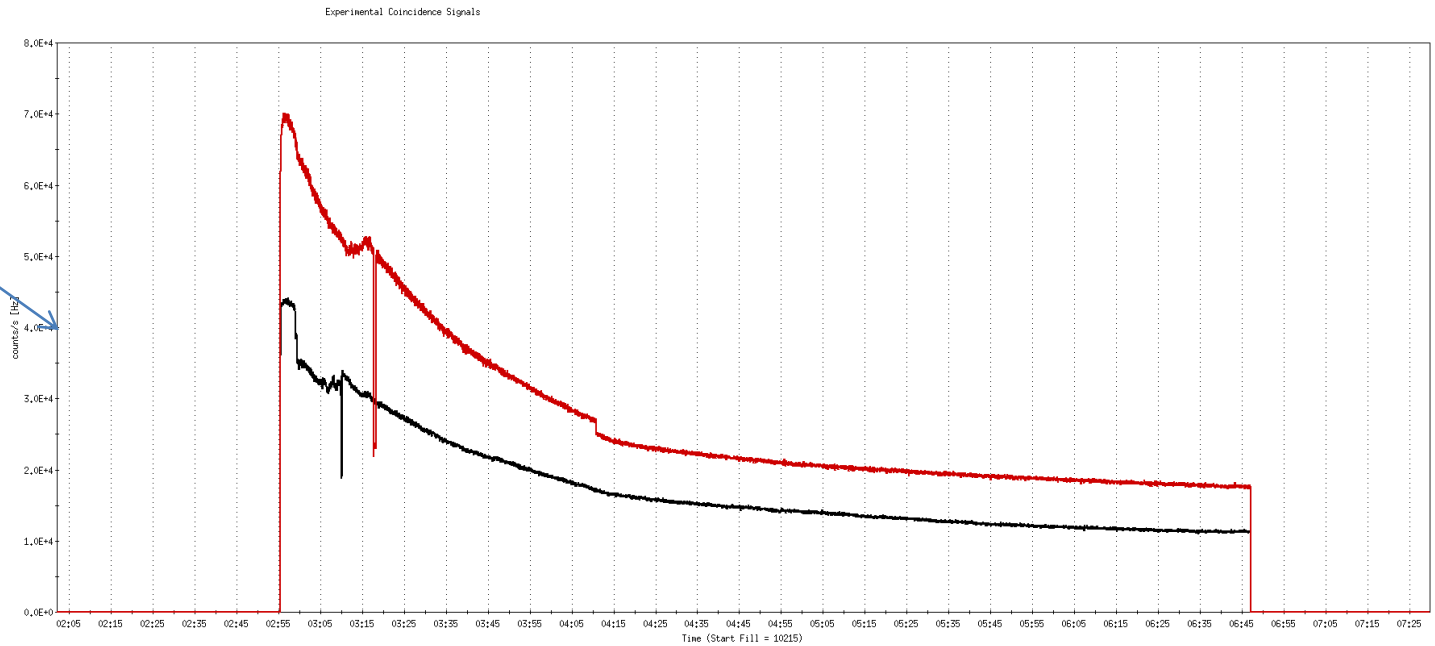
• $\beta^*=0.7$ meters

22 days after start of cool-down

40×10^{11}

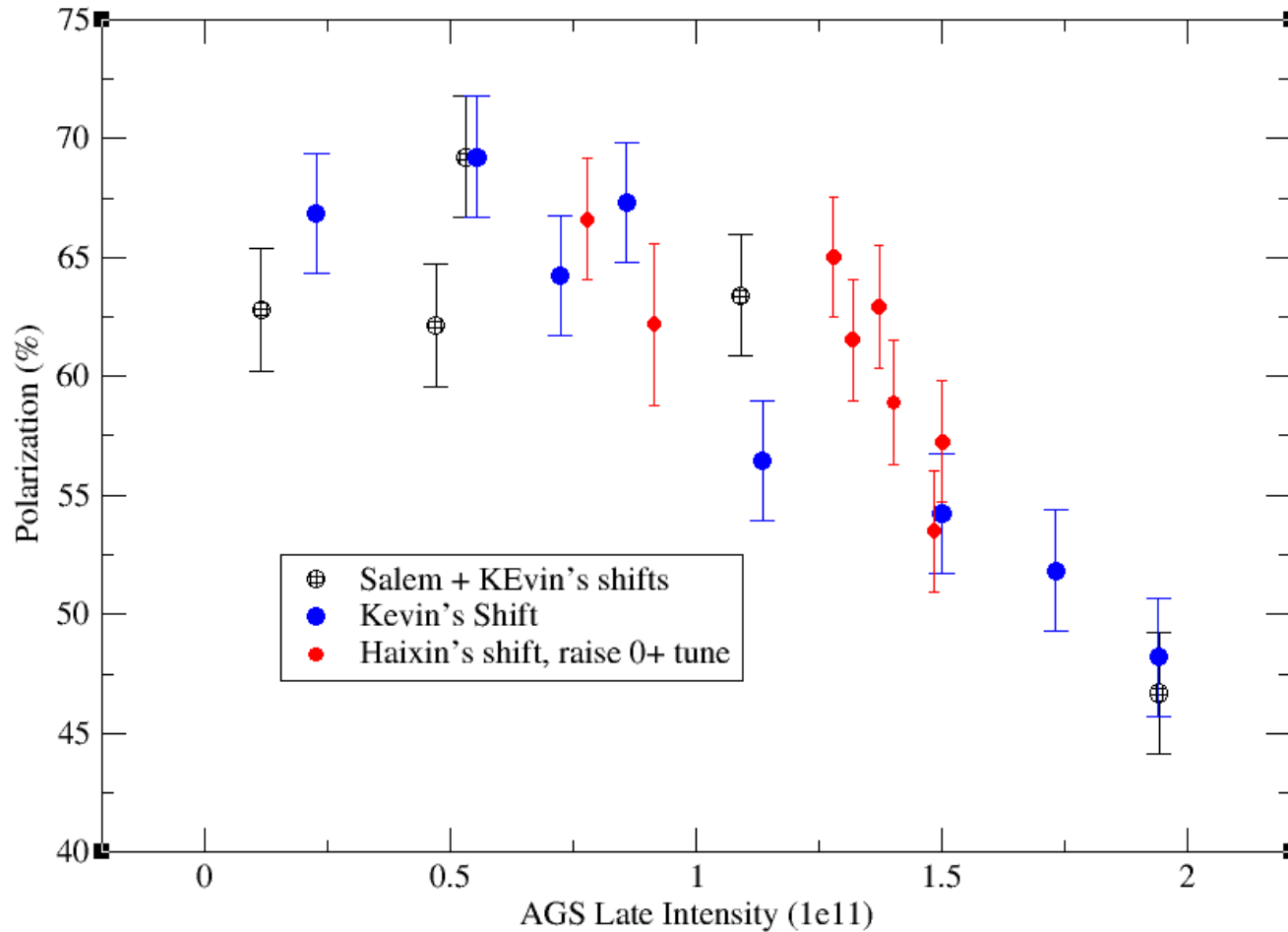


40K



G0: X, Y = [-0.402176, 34.134]

AGS pp log, 23 Feb 09, 00:26

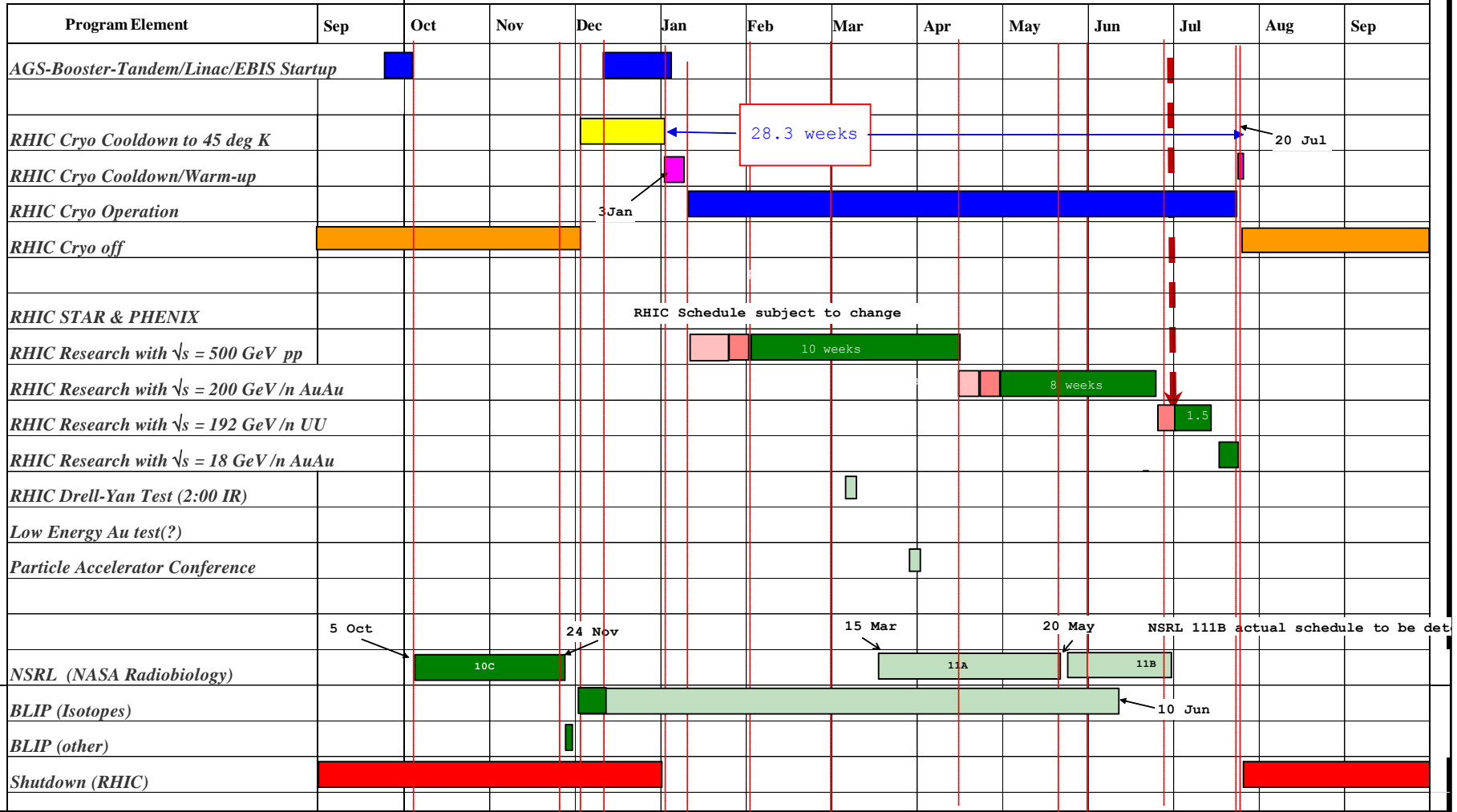


C-A Operations-FY11

planned (budget permitting)

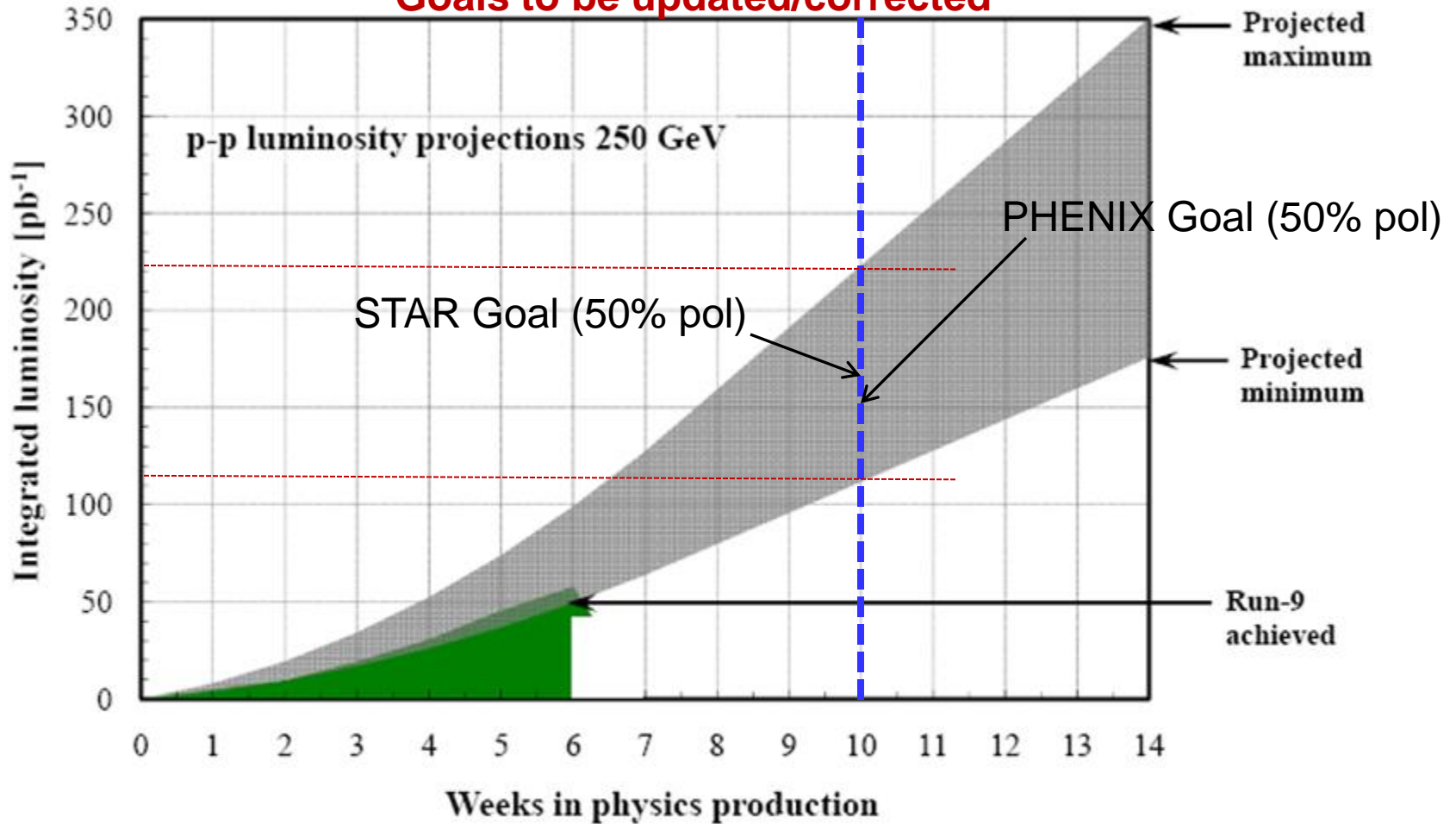
- concurrent with RHIC
- setup with beams
- ramp up luminosity

FY 2011



Run-11 p[↑]-p[↑] luminosity projections

Goals to be updated/corrected

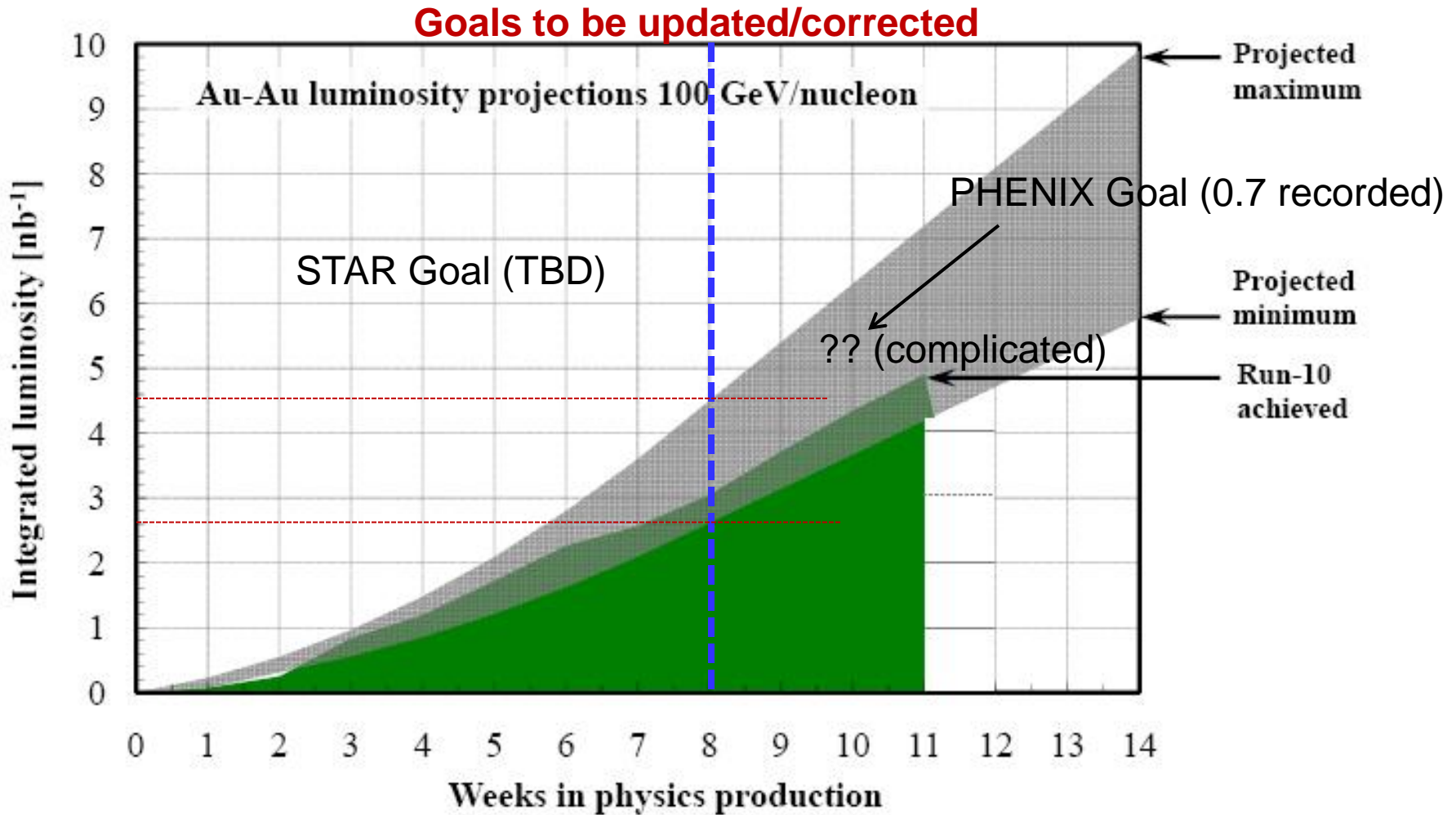


Assume 8 weeks to ramp-up for max.

Expect store $P_{\text{avg}} = 35\text{-}50\%$, L_{avg} up to $100 \times 10^{30} \text{cm}^{-2} \text{s}^{-1}$ (+80%).

[from Run-9 to max projection: $\beta^* = 0.7 \rightarrow 0.6 \text{ m}$, $N_b = 1.1 \rightarrow 1.4 \times 10^{11}$]

Run-11 Au-Au luminosity projections 100 GeV/nucleon



Assume 6 weeks to ramp-up for min, and 8 weeks for max (stoch. cooling re-commissioning).

Expect L_{avg} up to $25 \times 10^{26} \text{cm}^{-2} \text{s}^{-1}$ (+25%).

[from Run-10 to max: $\beta^* = 0.75 \rightarrow 0.65$ m, $N_b = 1.1 \rightarrow 1.1 \times 10^9$, more cooling]