

RUN 11 RHIC MACHINE/EXPERIMENTS MEETING

26 Apr 2011

Agenda:

- Progress reports, $\sqrt{s} = 18$ GeV/n Au-Au run

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

- 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)**

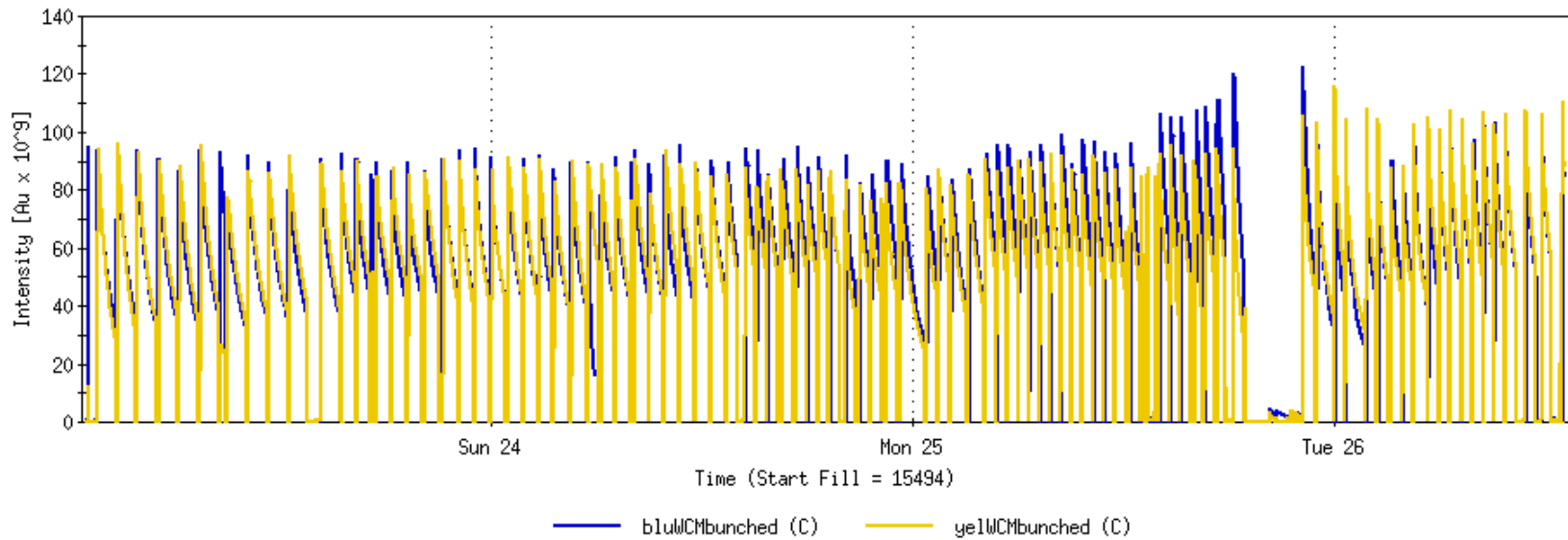
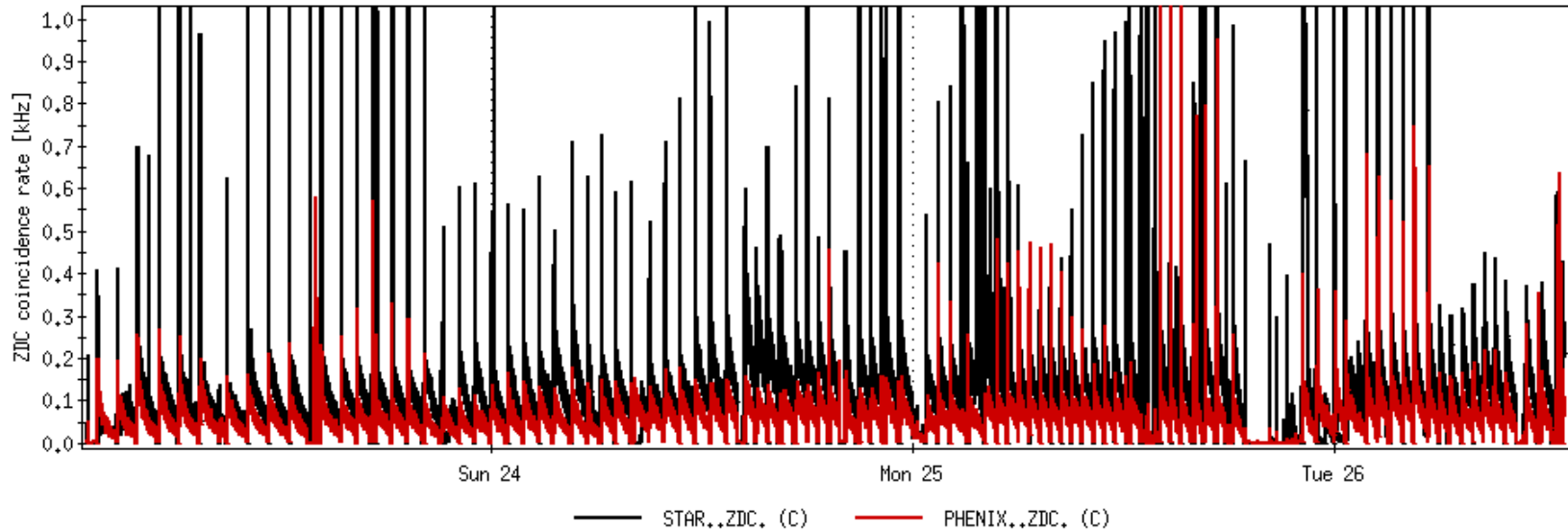
- **26 April - TODAY**
- **2 May, end 1.3 week physics run at $\sqrt{s} = 19.6$ GeV**
- 2 May, begin 1 week setup for $\sqrt{s} = 200$ AuAu
- 9 May (or sooner), begin 1 week Ramp-up with 8 hr/night beam to experiments
- **16 May, begin ?? week physics run at ($\sqrt{s} = 200$ GeV/n AuAu)**
- **29 June, end 6.3 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 :

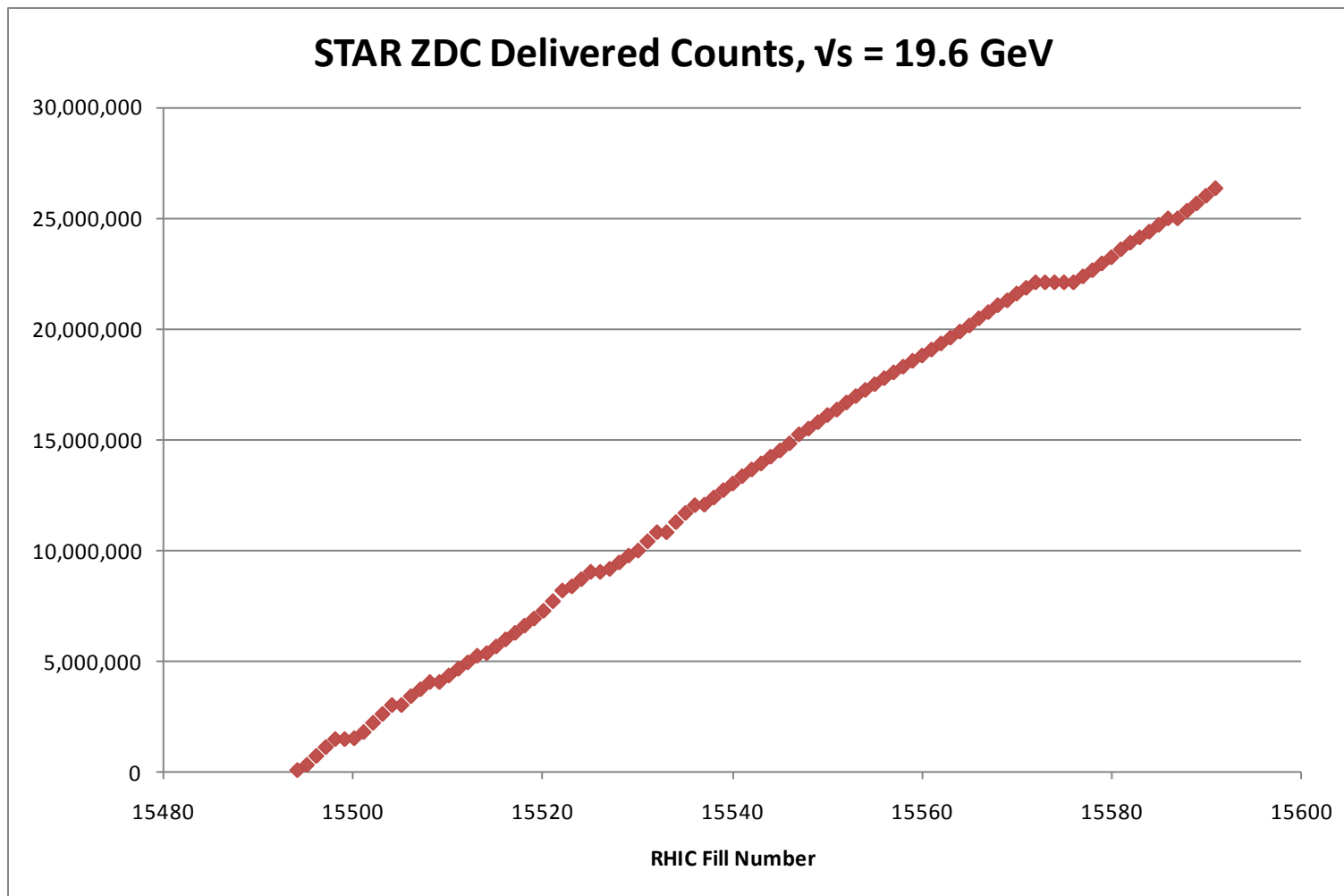
- **Run into July?**
 - Uranium test/physics run
 - **Low energy test run**
- only 2 days!
-

AuAu at $\sqrt{s} = 19.6$ GeV – all runs to date

Experimental Coincidence Signals

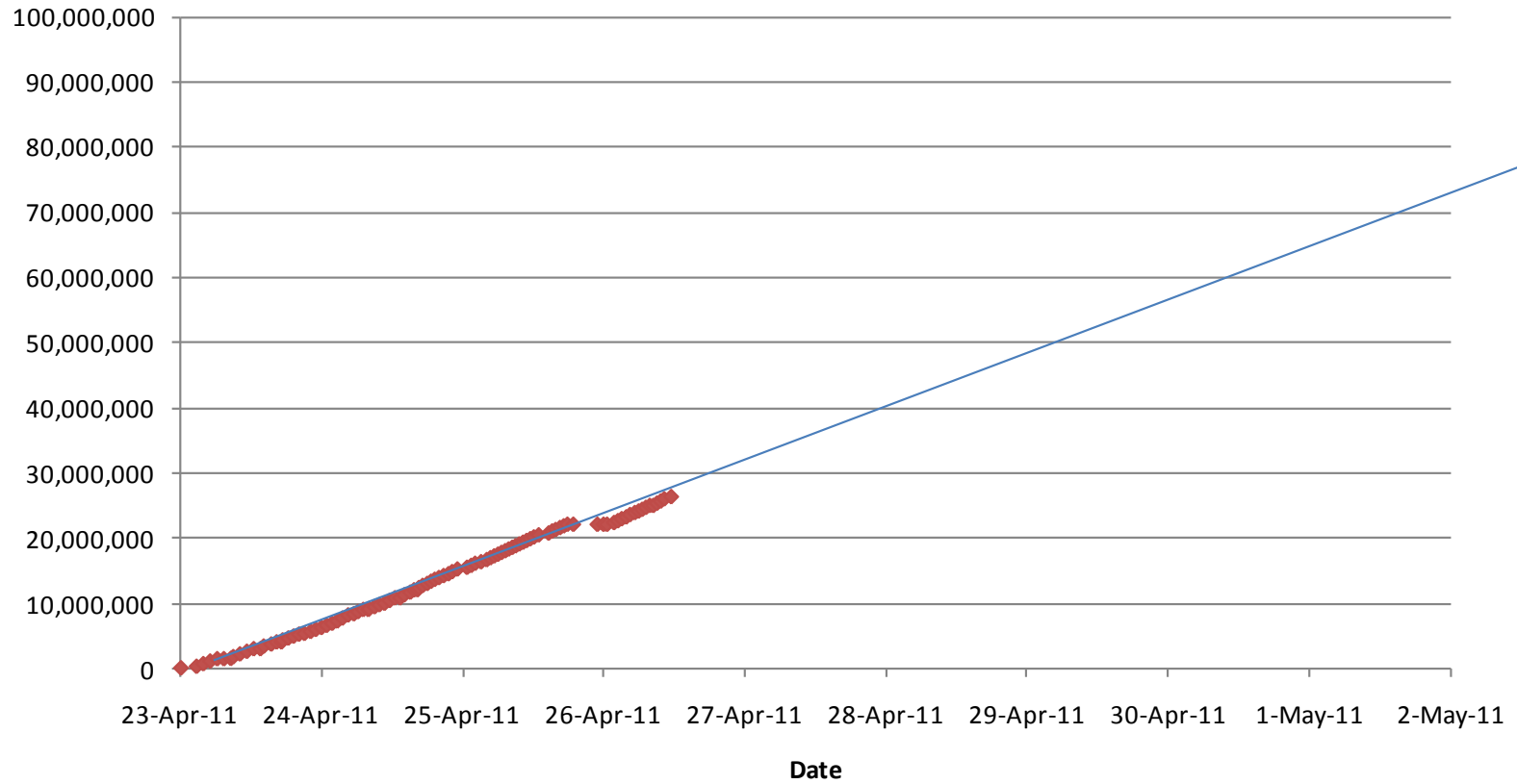


Thru fill 15591



Thru fill 15591

STAR ZDC Delivered Counts, $\sqrt{s} = 19.6$ GeV



Run into July – an issue...

Power demand penalty (part 1)

- Transmission = \$5,680/MW
- NYPA administrative = \$190/MW
 - Total = \$5,870/MW
 - RHIC ON/OFF difference ~ 20 MW
 - RHIC ON demand charge = $20 \times \$5870 = \$117,400$
- LIPA “wheeling” charge
 - RHIC ON = \$123,000
 - RHIC OFF = \$63,550
 - Difference = \$59,450
- **Total Demand Penalty = \$117,400 + \$59,450 = \$176,850**

Power demand penalty (part 2)

- BNL is assessed another penalty based on the BNL power demand on the day of the NY state peak power demand for the summer
- The penalty is assessed as a monthly charge during the next year.
- Mark Toscano estimates the penalty would be about \$27,000 x 20 MW = **\$544,000** but risk is low as the NY State peak in past years has occurred in August.
- Plus balanced billing costs are \$70/MWhr in June and July

Old information

RUN 11 RHIC MACHINE/EXPERIMENTS MEETING

DECISIONS

- 11/23/2010, APEX: Agreed to new APEX schedule, 12 hour sessions (0800-2400) every other week away from maintenance days.
- 2/25/2011, CNI Polarimeters Normalization: Beginning with physics store 15239, changed CNI Polarimeter analyzing power to agree with jet target polarization measurements ...18% lower polarization than before.
- **4/11-15/2011, End 250 GeV pp on 18 April, switch to 18 GeV AuAu on after jet target polarization measurement at injection is completed**

Decisions (cont')

- 3/25/2011: AnDY Collisions (W. Fischer, L. Bland, E. Aschenauer, S. Vigdor):

(1) A. Drees will test the sequence developed to address both orbit and tune effects of AnDY at the end of a store (or multiple stores if needed).

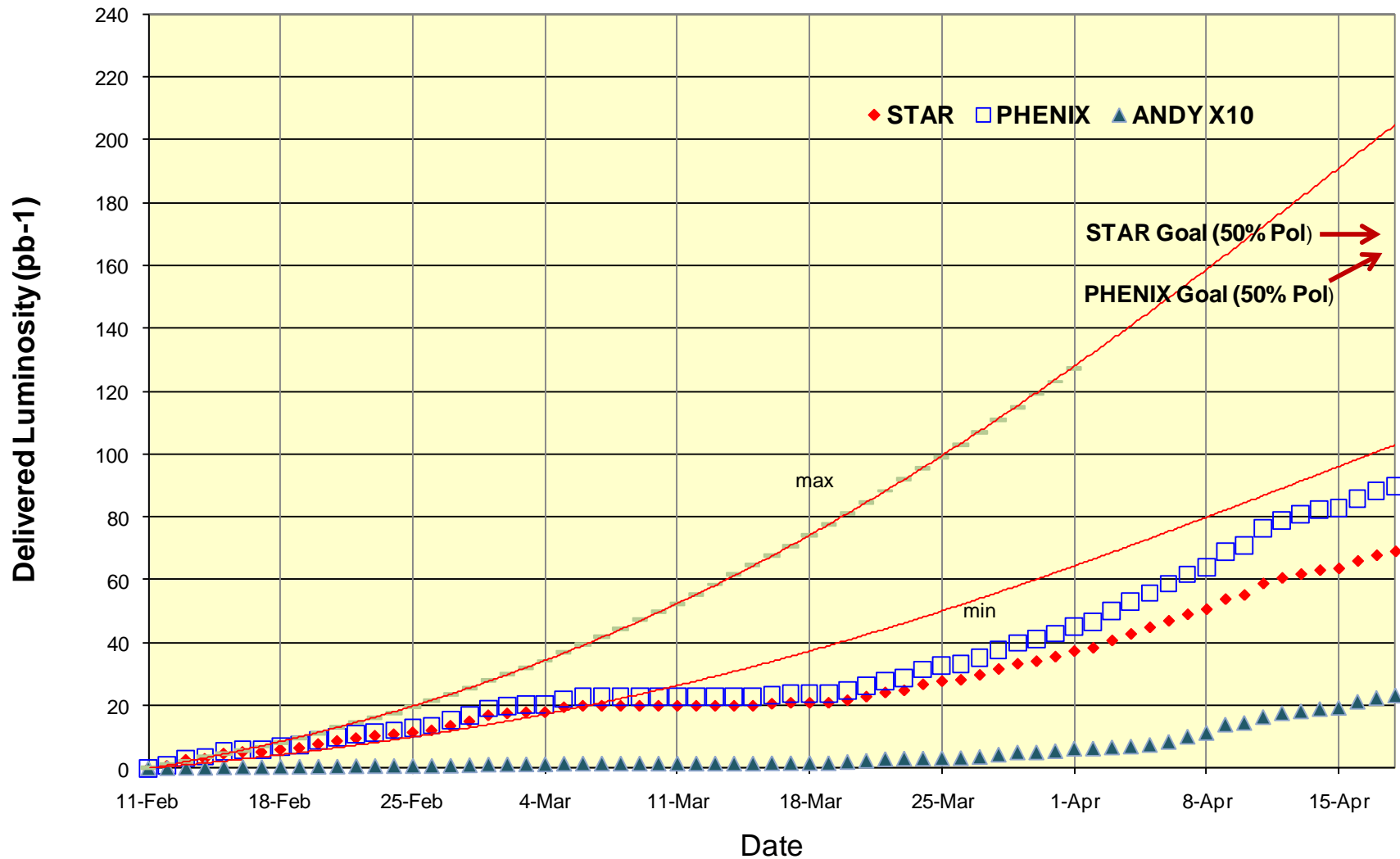
(2) When the proper functioning of the sequence is demonstrated we will go back to a $1.05e11$ /bunch threshold, and increase every store by another $0.05e11$ /bunch until we reach a 10-20% luminosity impact on STAR and PHENIX. In the event the prescribed bunch intensity is not reached during the store then AnDY should be steered into collision during the last 30 minutes of the store.

(3) When the tune scan on the ramp finishes (~2 more tune to test), we will increase the store length to 10h or more, (with PHENIX/STAR concurrence), with this AnDY will have more time available after turning on.

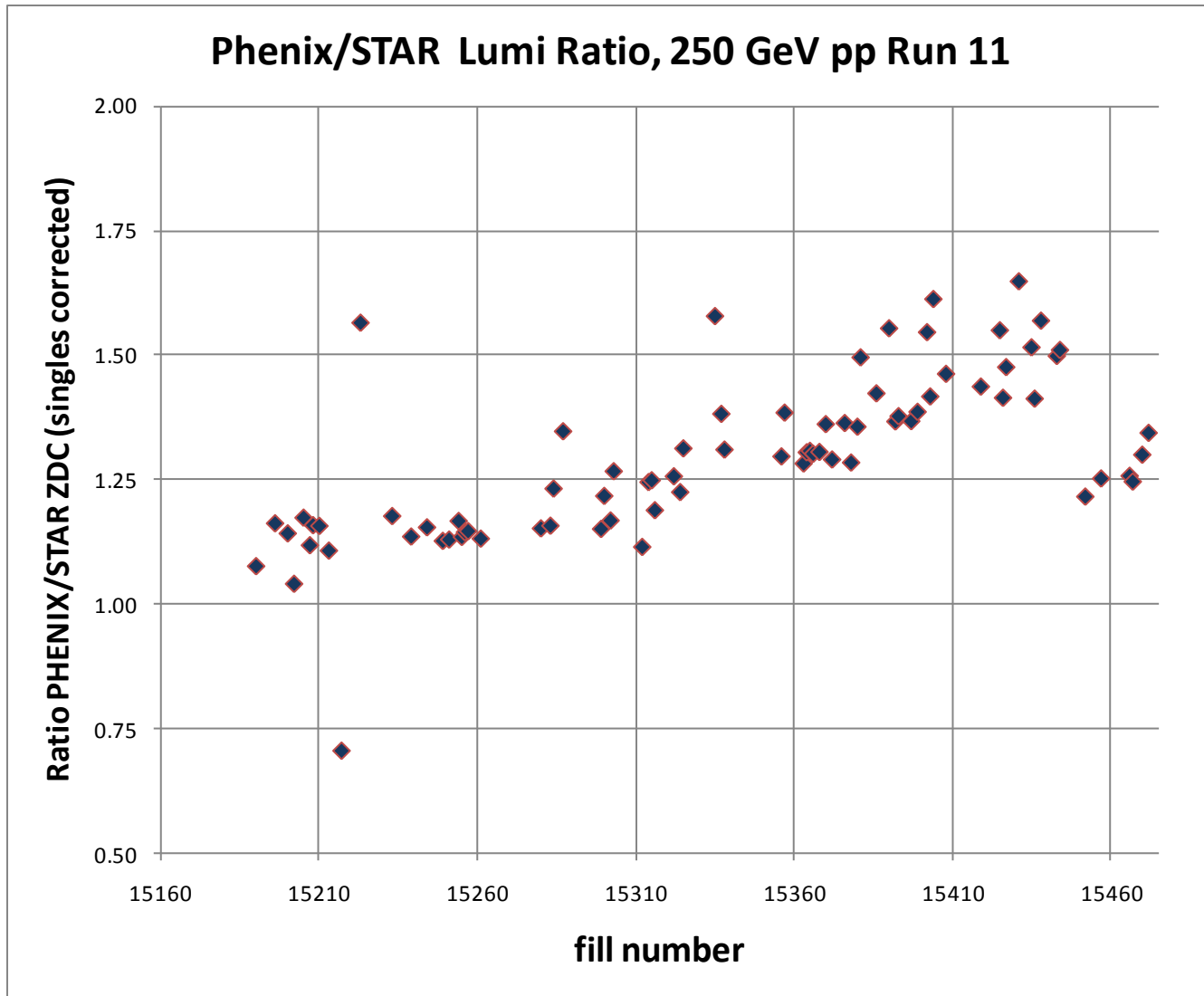
Run 11 250 x 250 GeV pp, Luminosity

thru final fill 15472, 18 Apr

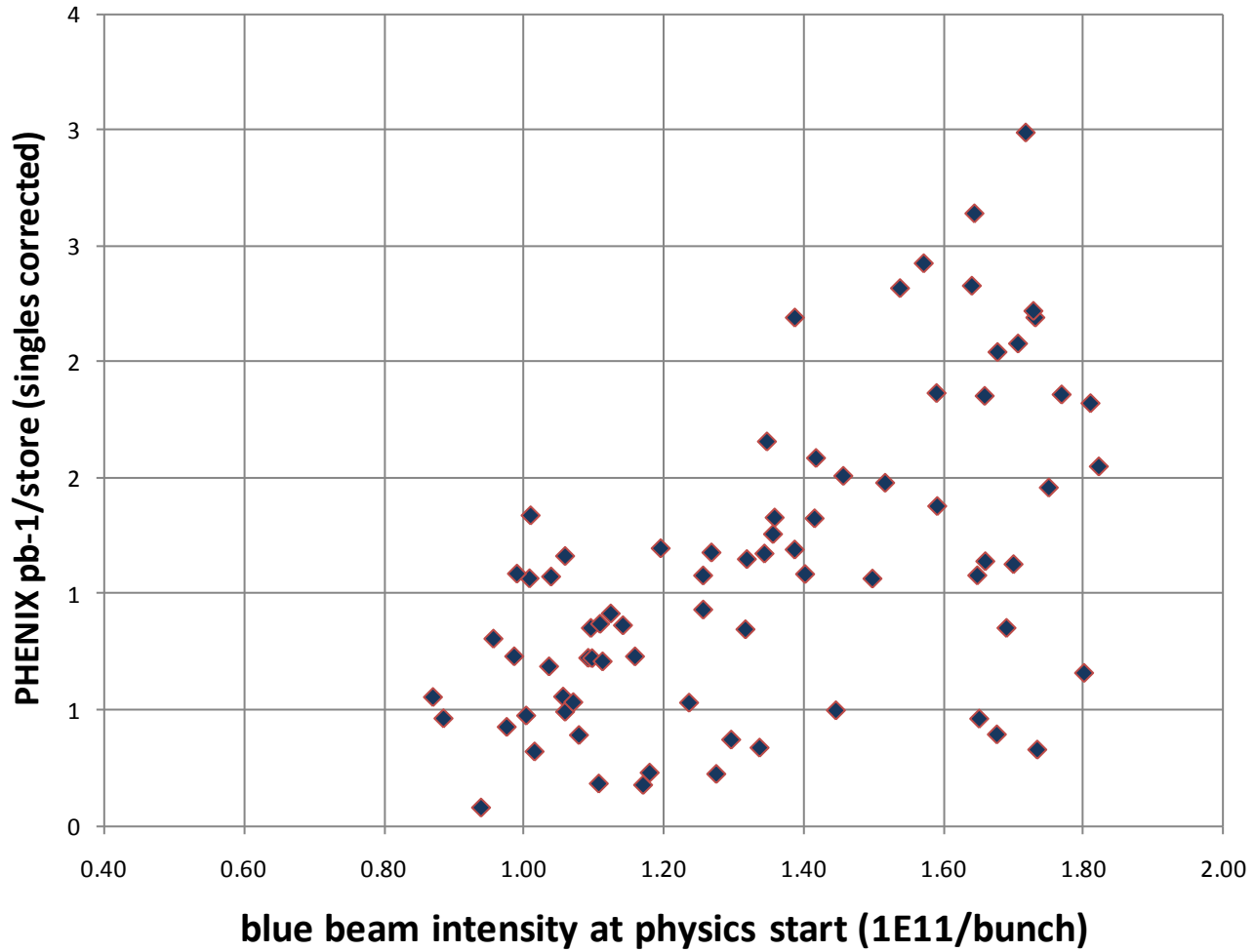
2.9 mb STAR, 2.7 mb PHENIX, 2.8 mb (not right) ANDY



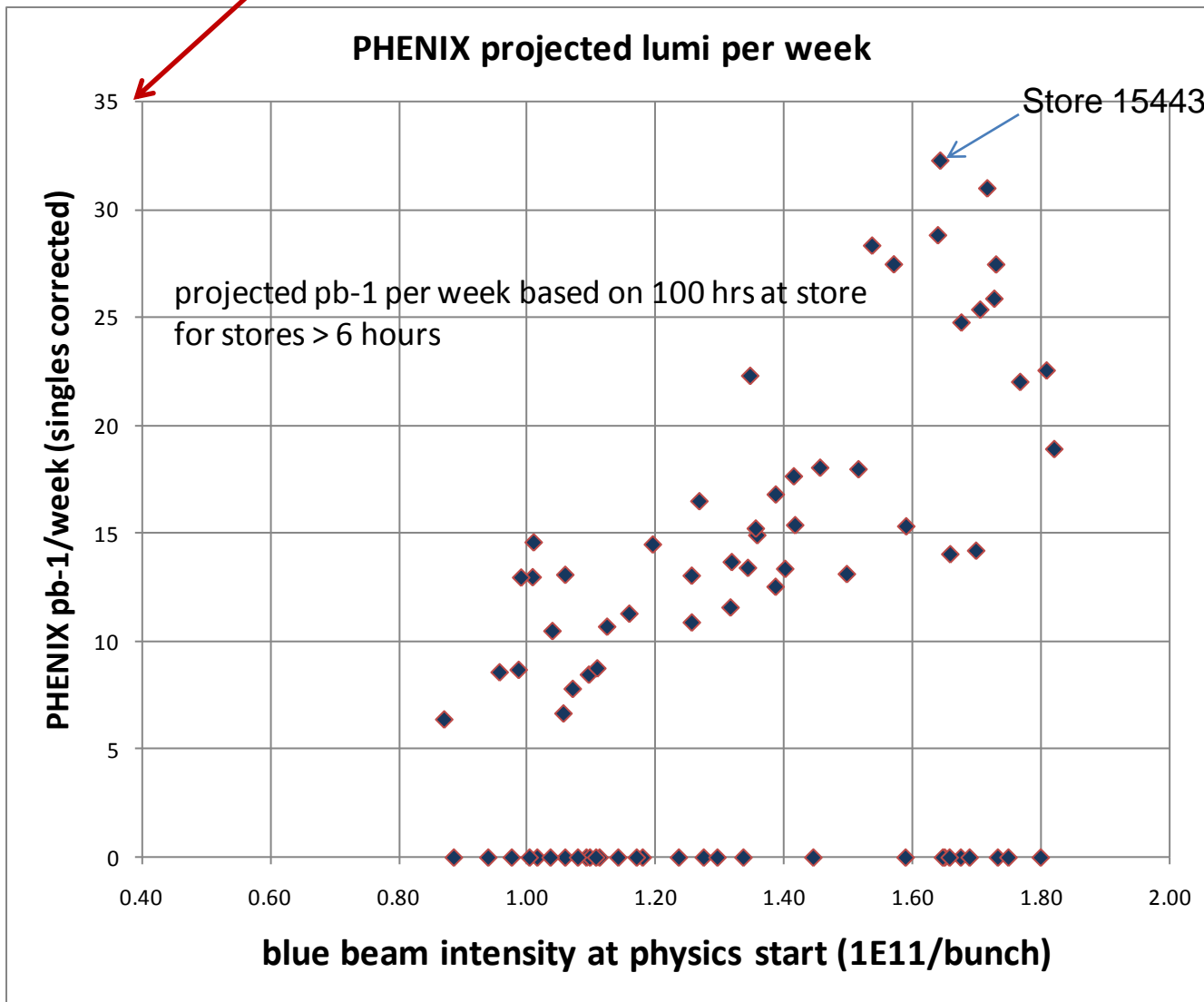
Final Lumi should change as it appears there's an issue with the singles correction



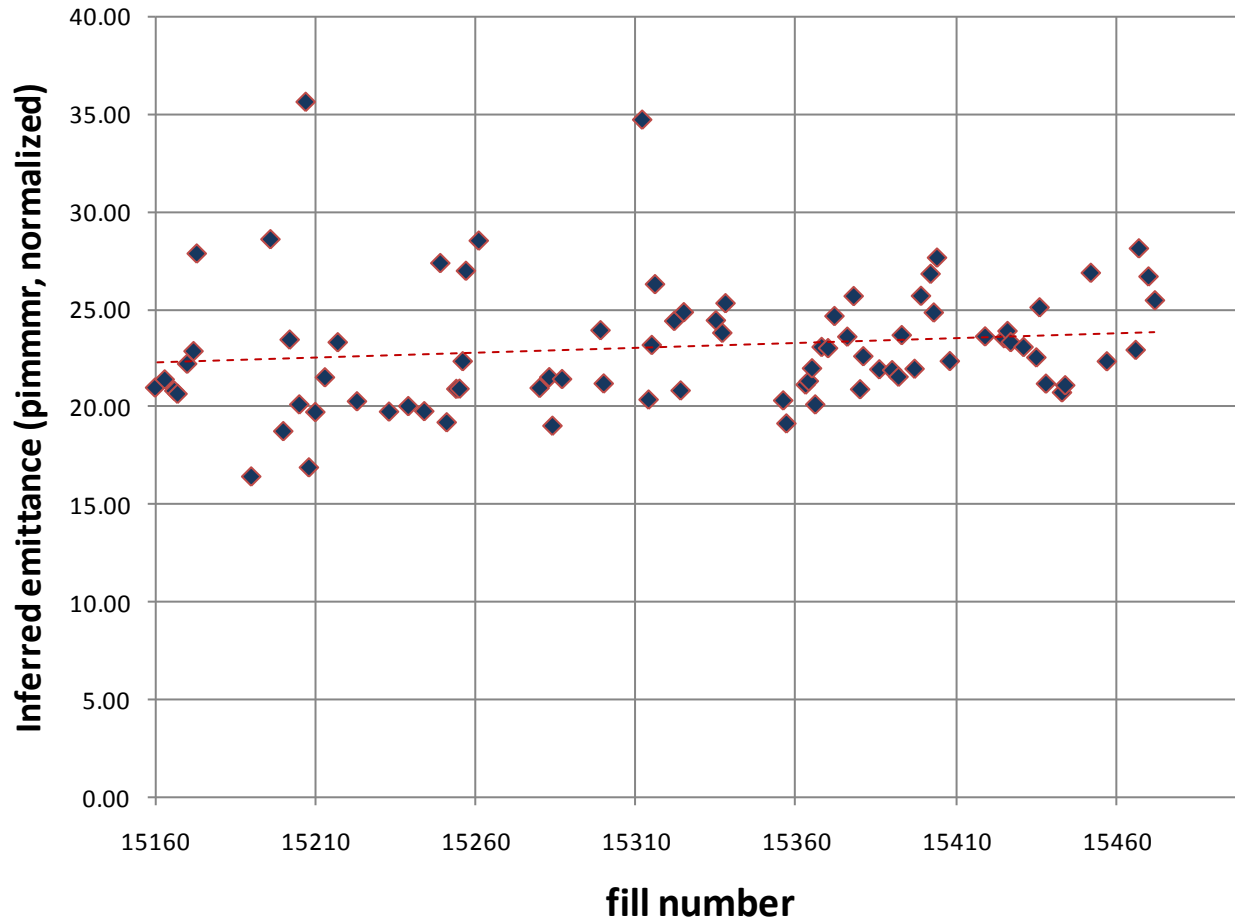
Phenix Lumi vs beam intensity, 250 GeV pp Run 11



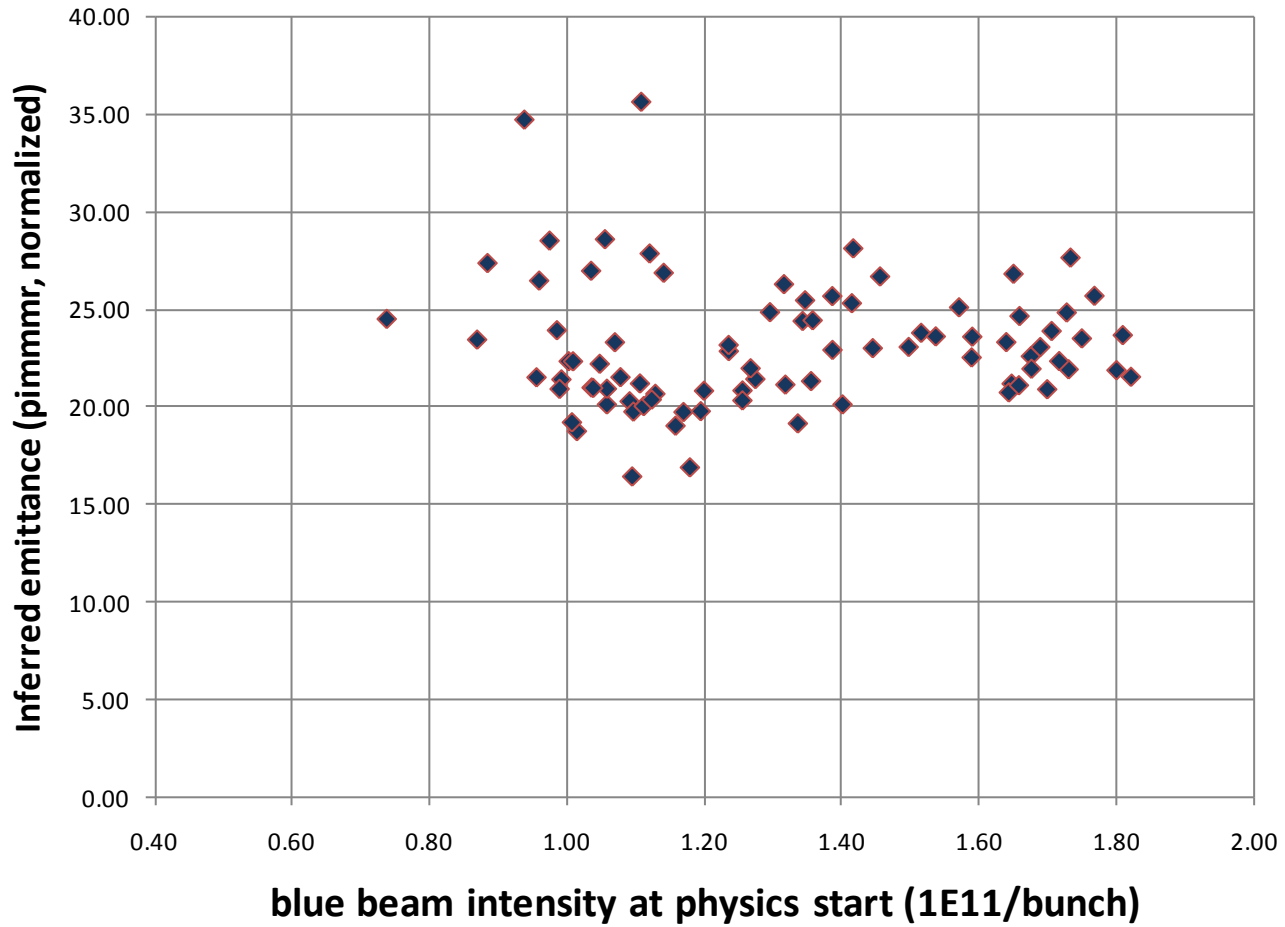
Run 11 projected maximum



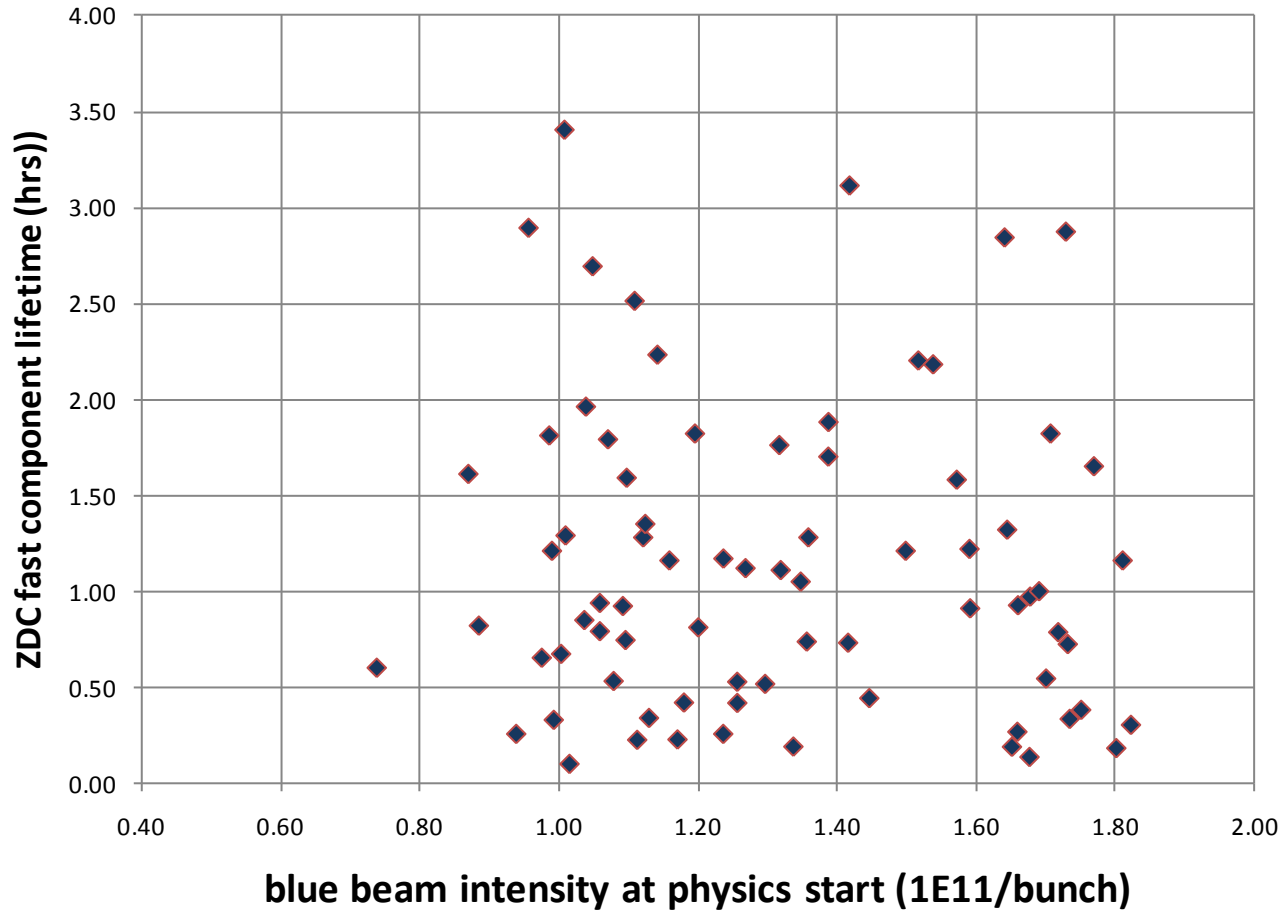
**inferred beam emittance vs beam intensity, 250 GeV pp
Run 11**



**inferred beam emittance vs beam intensity, 250 GeV pp
Run 11**



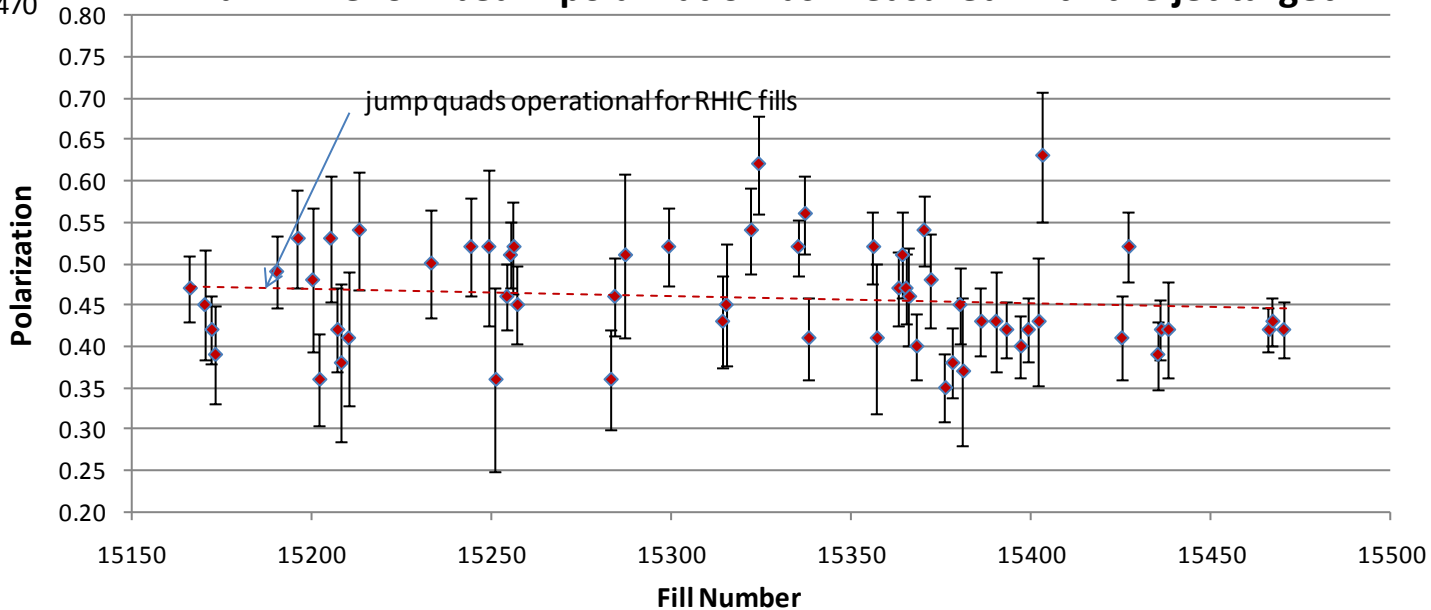
ZDC fast component lifetime vs beam intensity, 250 GeV pp Run 11



4/17/2011

fill 15470

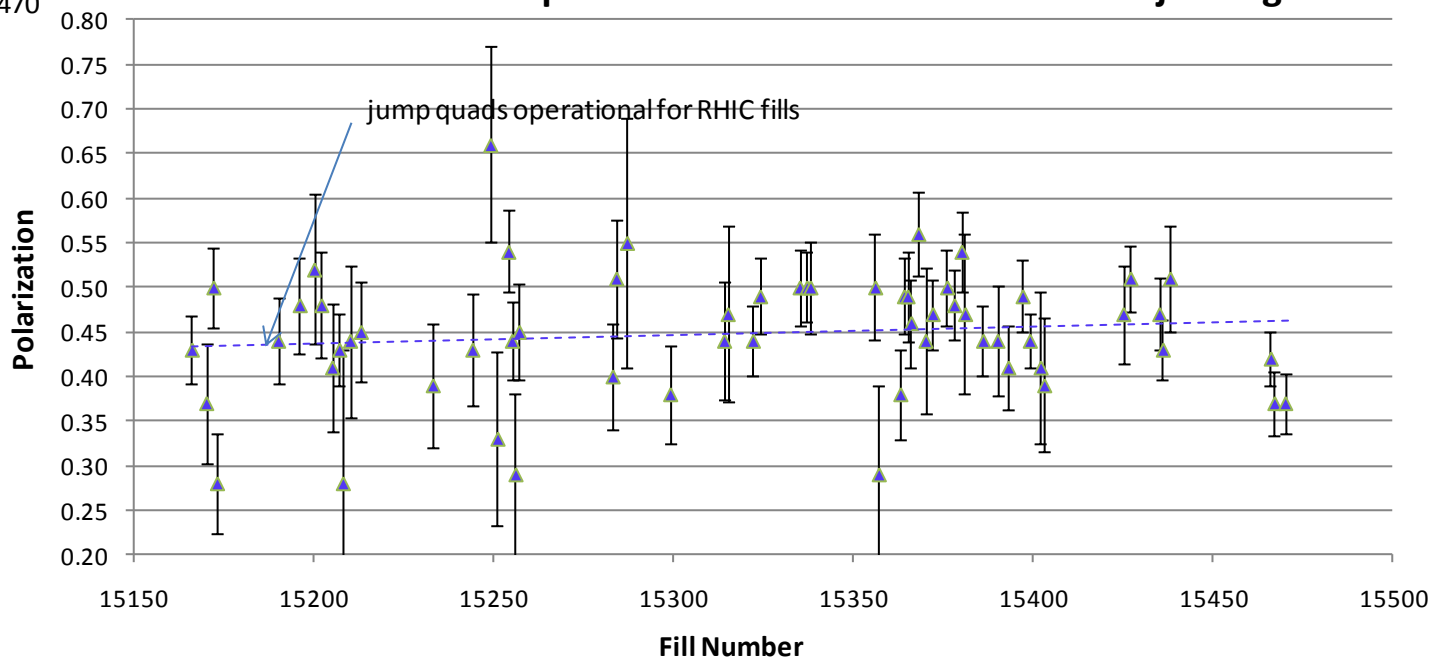
Run 11 Yellow beam polarization as measured with the jet target



4/17/2011

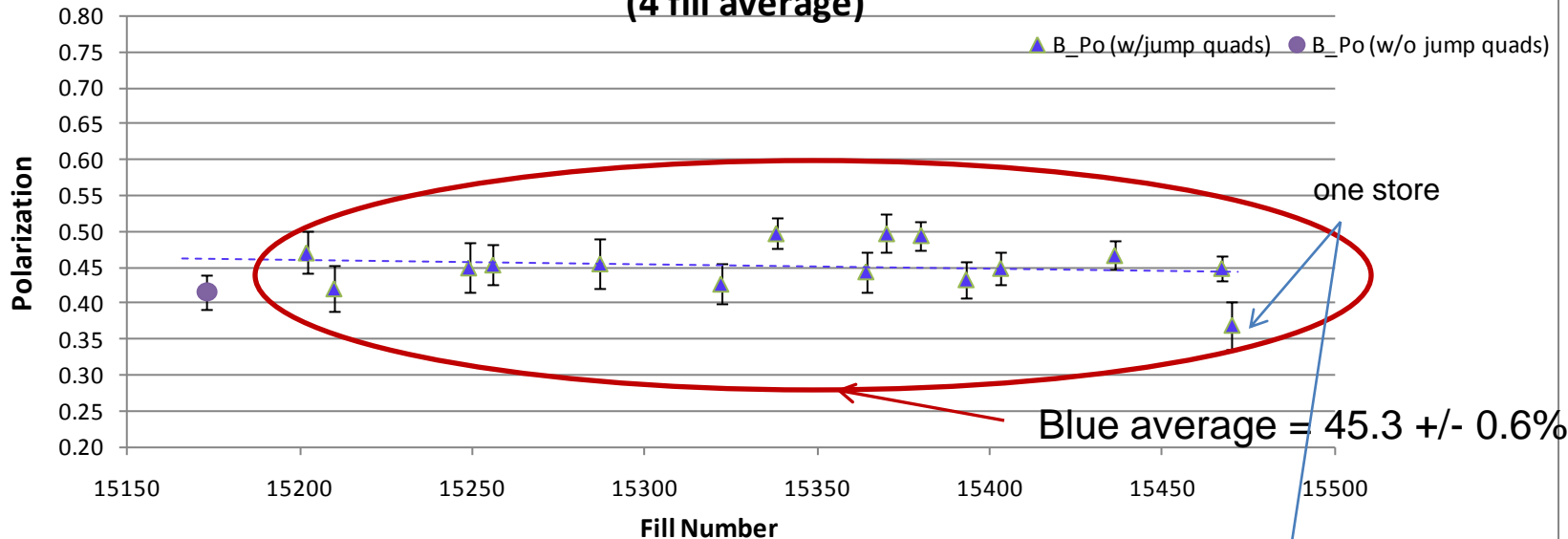
fill 15470

Run 11 Blue beam polarization as measured with the jet target



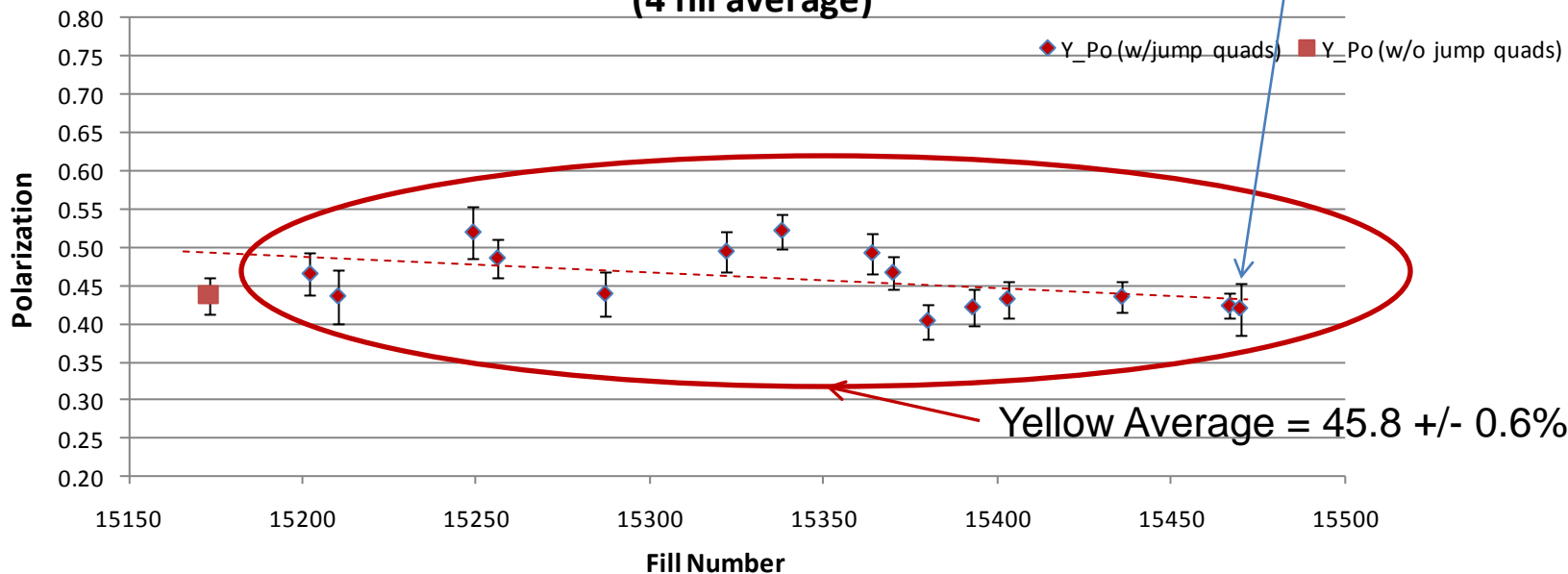
4/17/2011
fill 15470

Run 11 polarization as measured with jet target (4 fill average)



4/17/2011
fill 15470

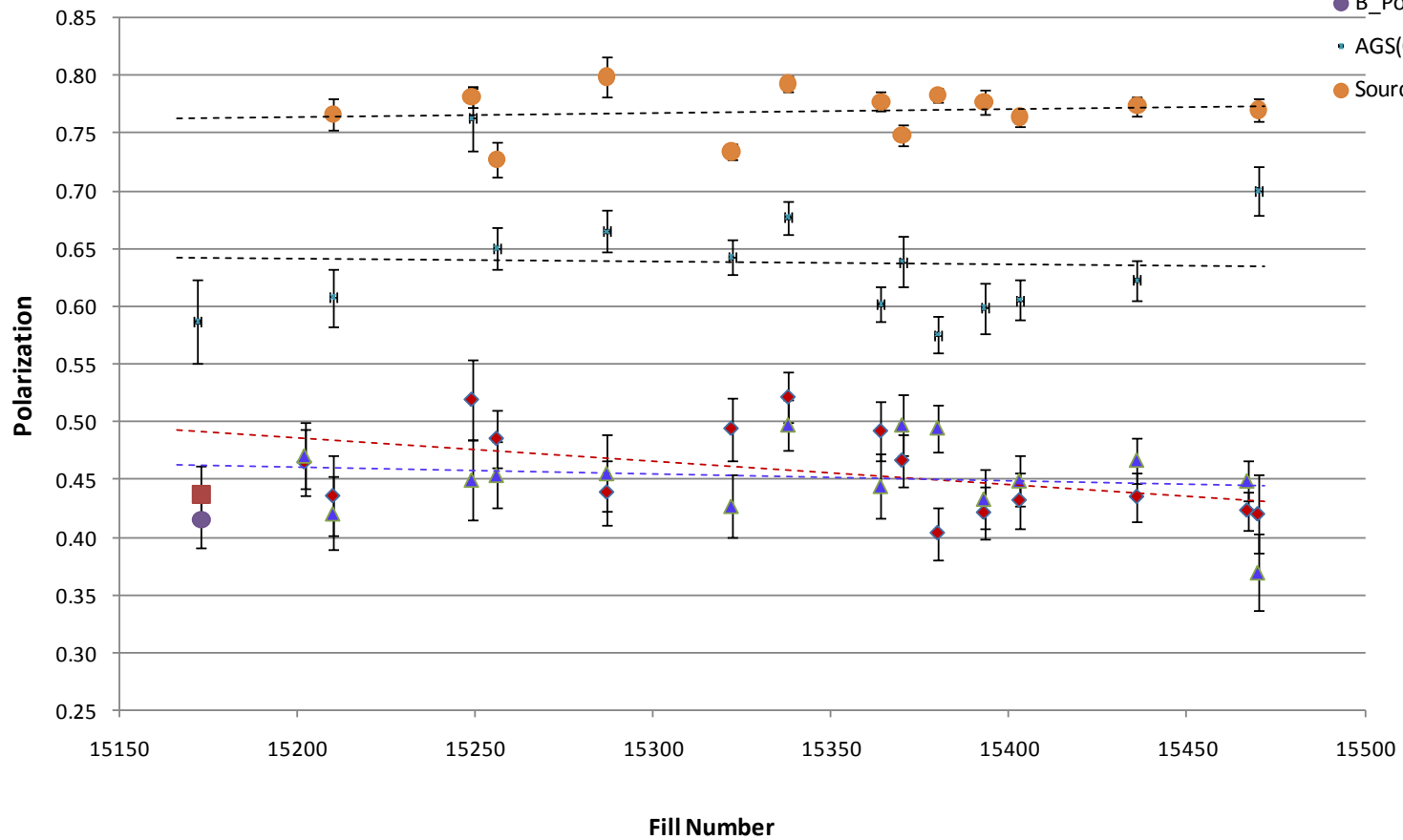
Run 11 polarization as measured with jet target (4 fill average)



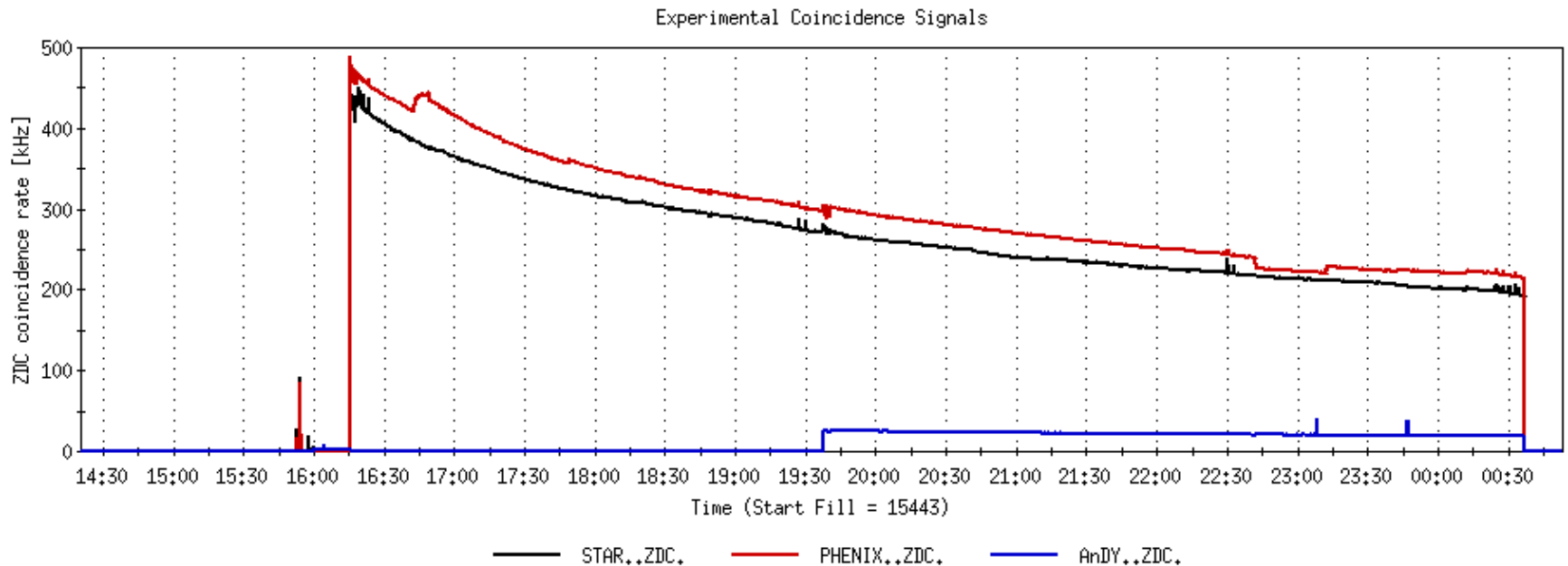
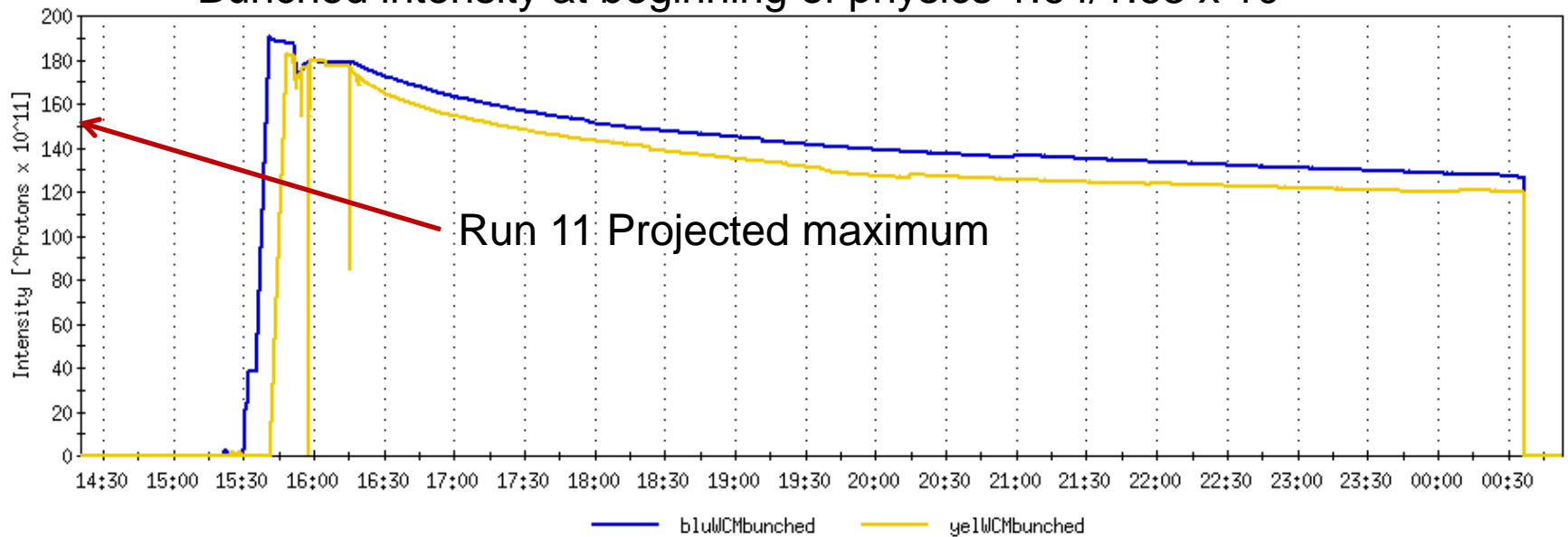
4/17/2011
fill 15470

Run 11 Source, AGS polarization (CNI), 250 GeV RHIC (jet target) (4 fill average when available)

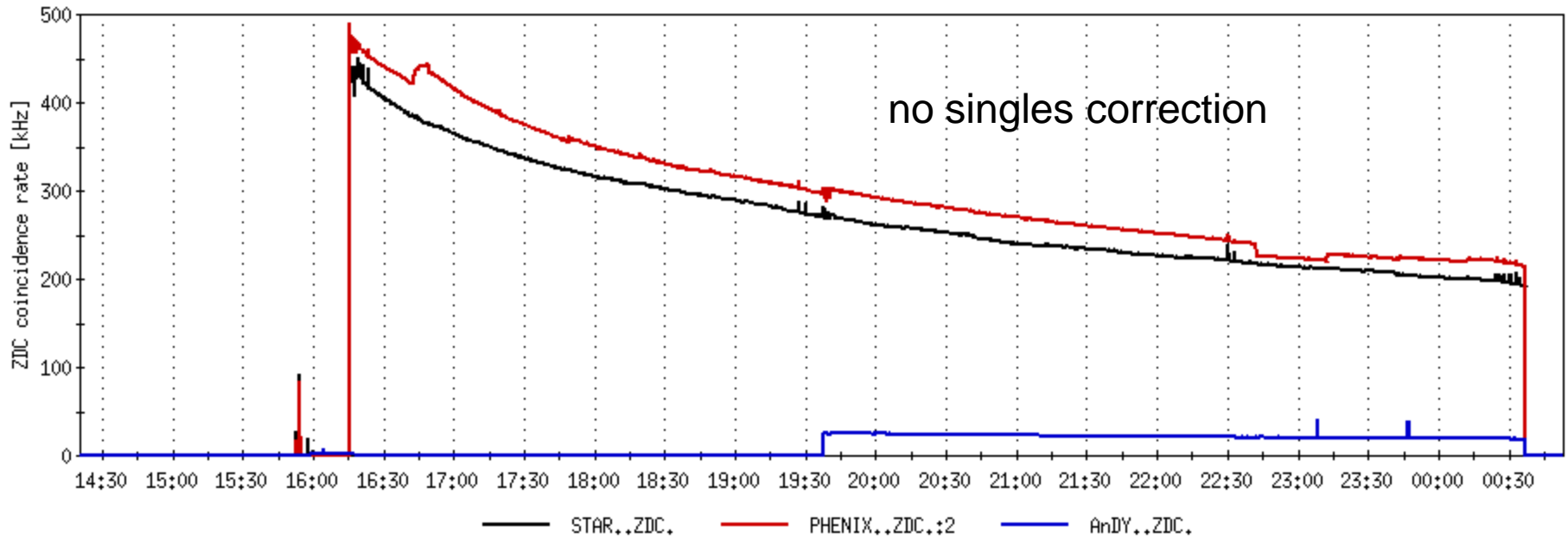
- ◆ Y_Po (w/jump quads)
- ▲ B_Po (w/jump quads)
- Y_Po (w/o jump quads)
- B_Po (w/o jump quads)
- ◆ AGS(CNI)
- Source



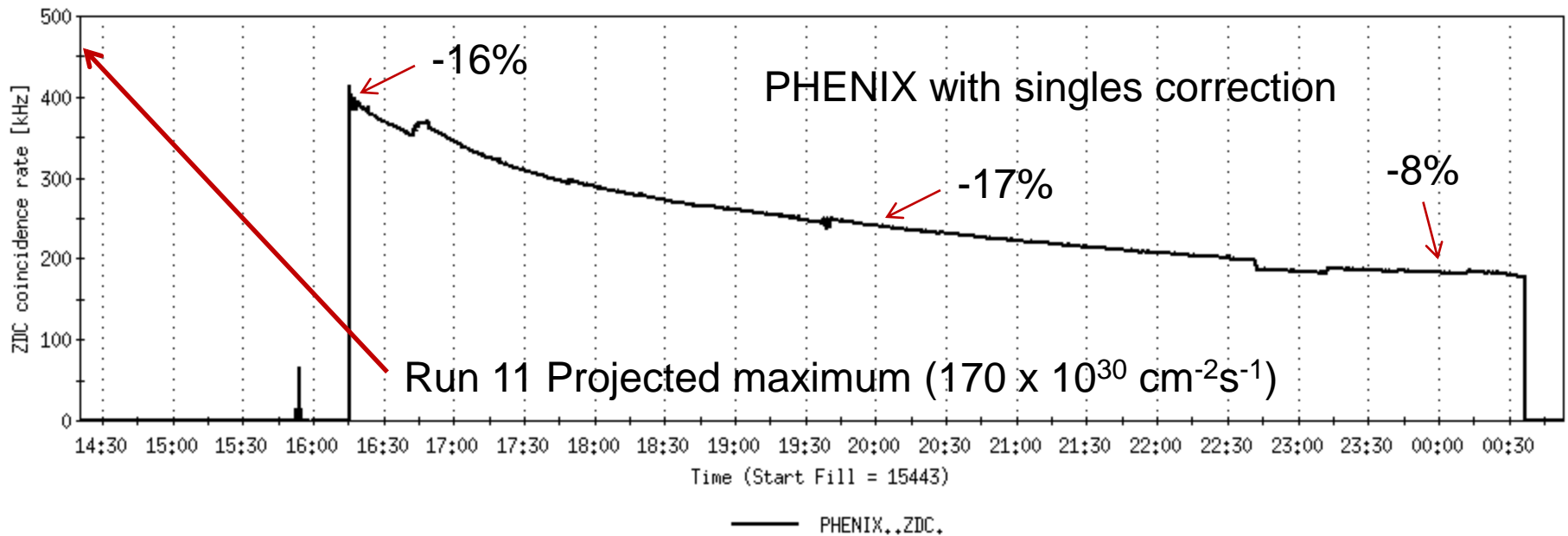
~ Best Store (scaling to 100 hrs at store), 12 April
8.2 hour store, 2.64 pb⁻¹, peak lumi 143 x 10³⁰ cm⁻²s⁻¹
Bunched intensity at beginning of physics 1.64/1.63 x 10¹¹



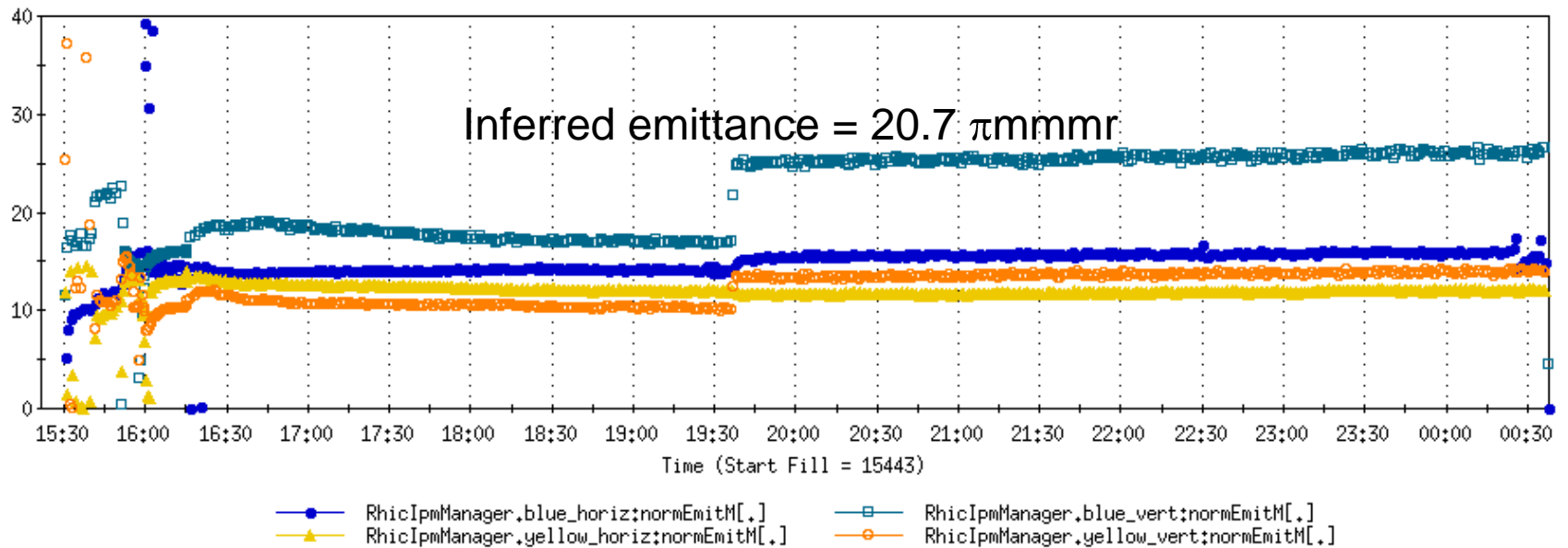
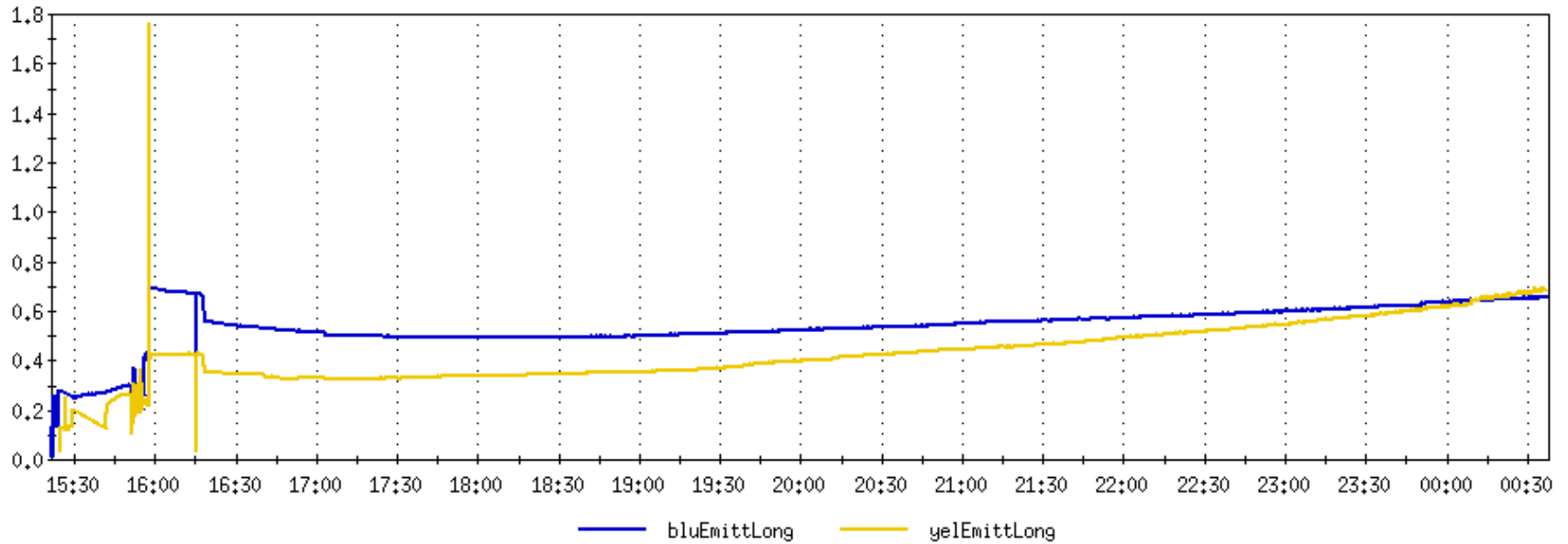
Experimental Coincidence Signals



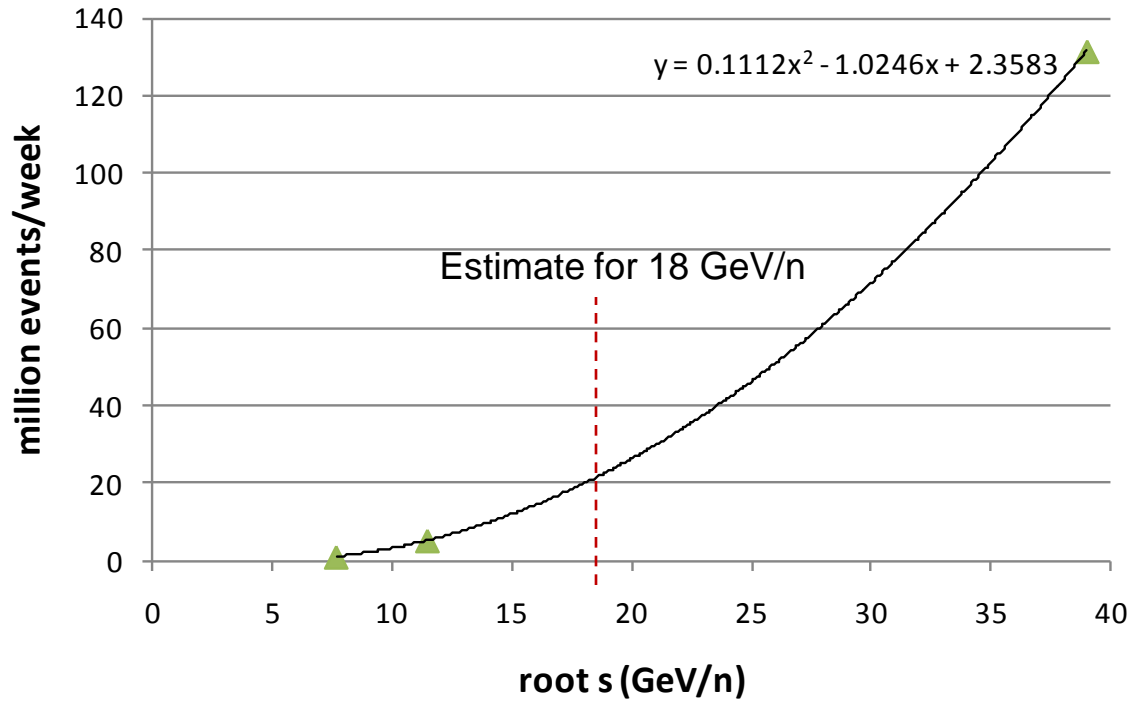
Experimental Coincidence Signals



Long Emitt from WCM

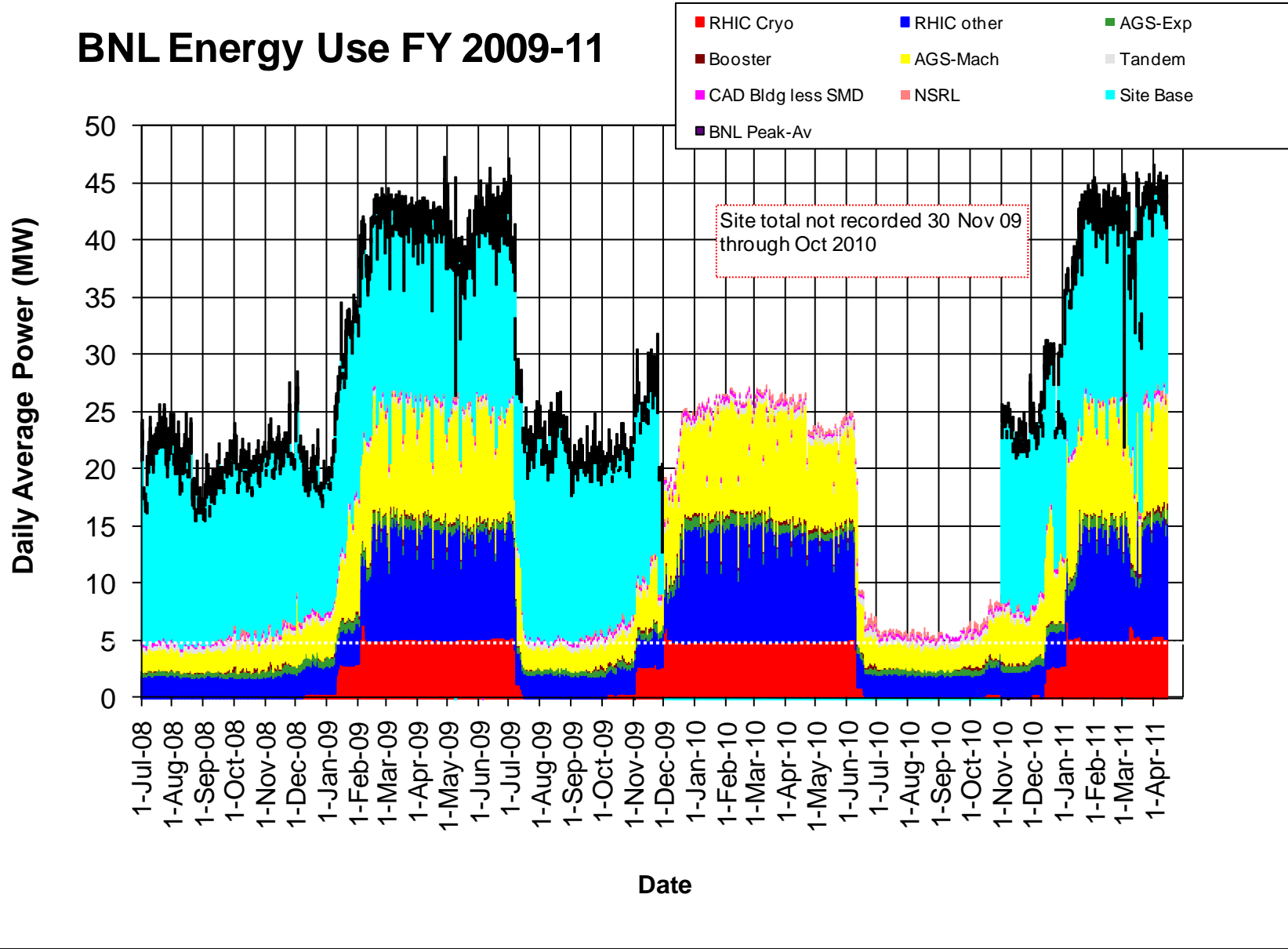


Low energy AuAu, million events/week

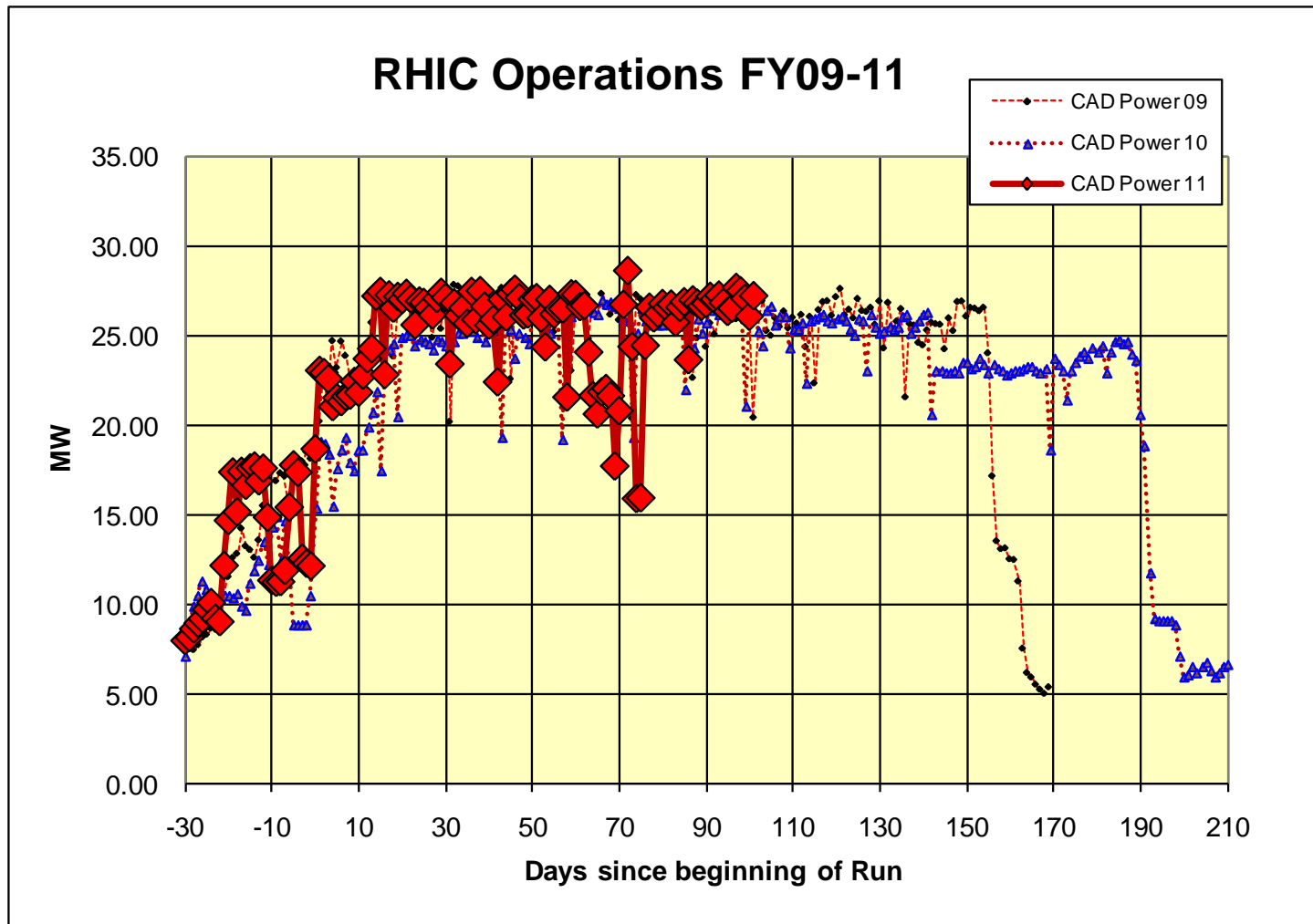


Through 14 Apr 2011

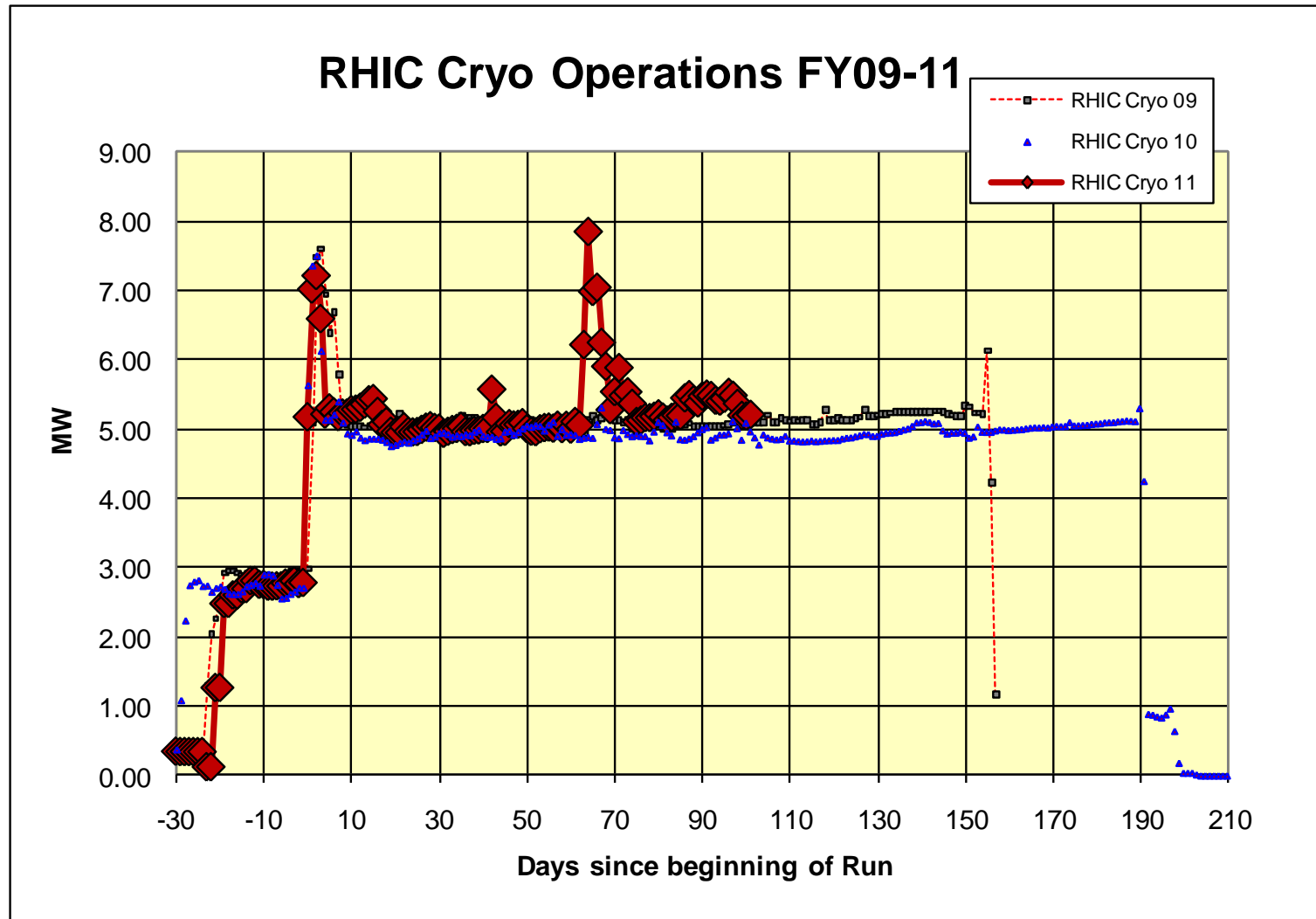
BNL Energy Use FY 2009-11



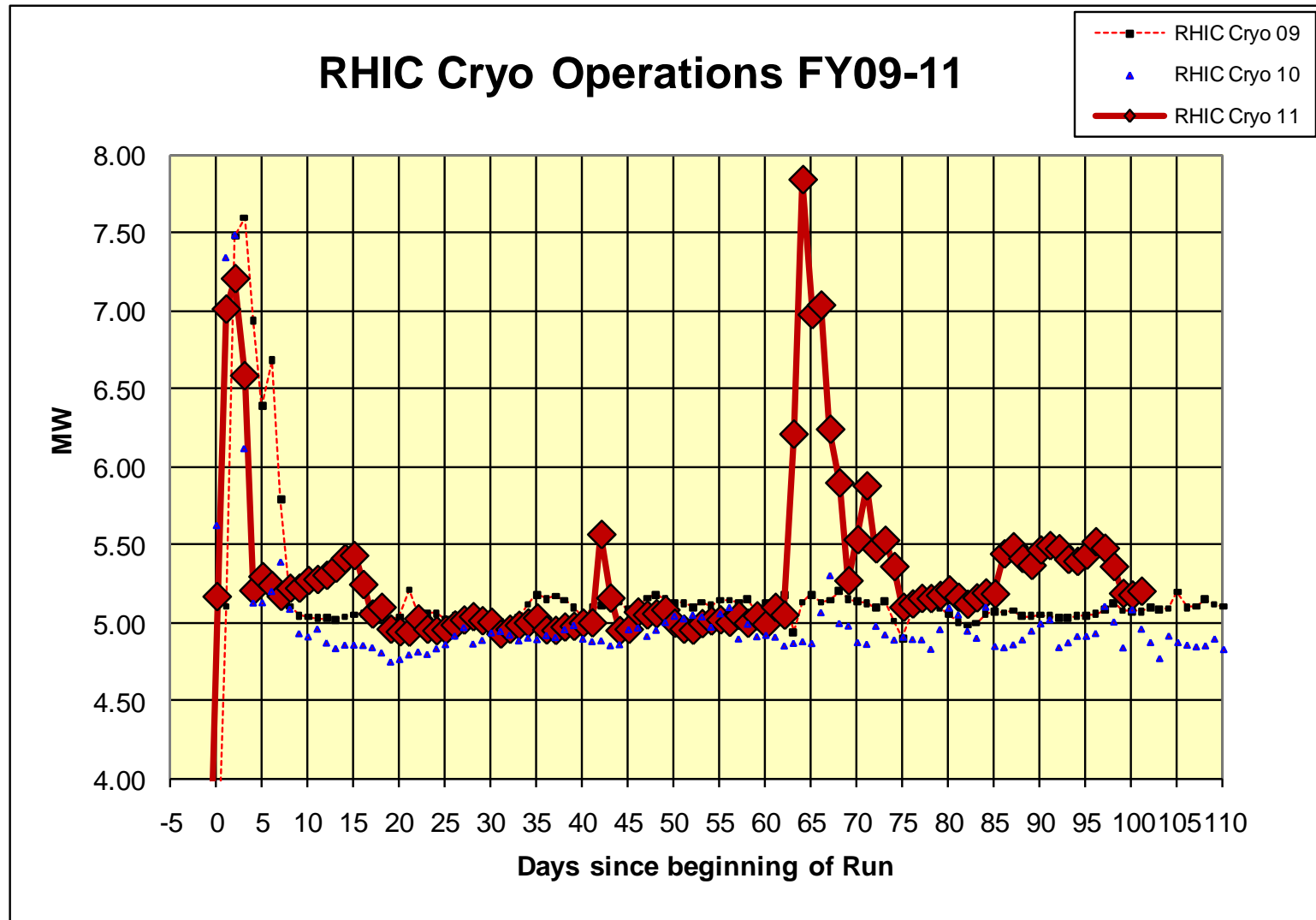
Through 14 Apr 2011



Through 14 Apr 2011



Through 14 Apr 2011

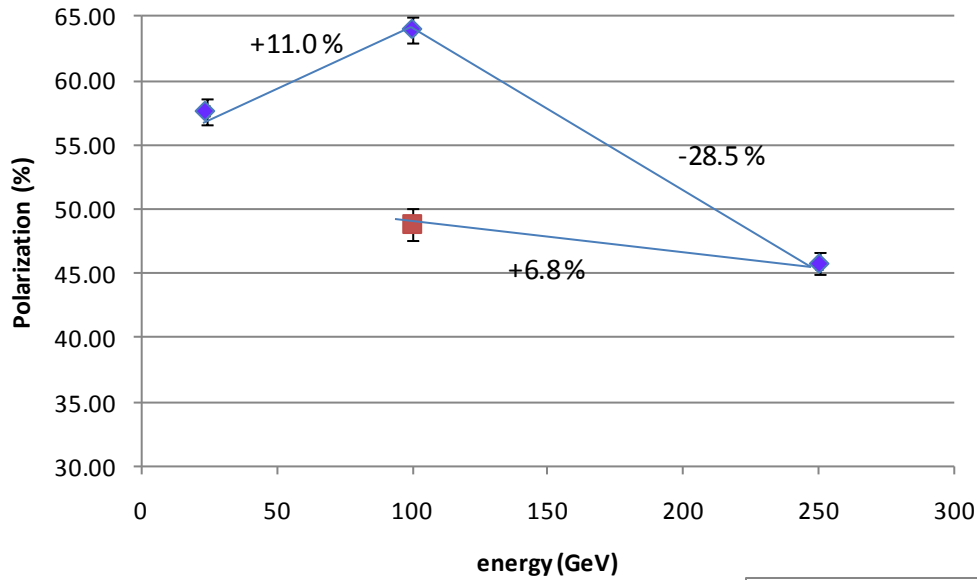


Run 11 Plan based on PAC recommendation/ALD Guidance and available funds 4/26/10 update (1/2)

- 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**

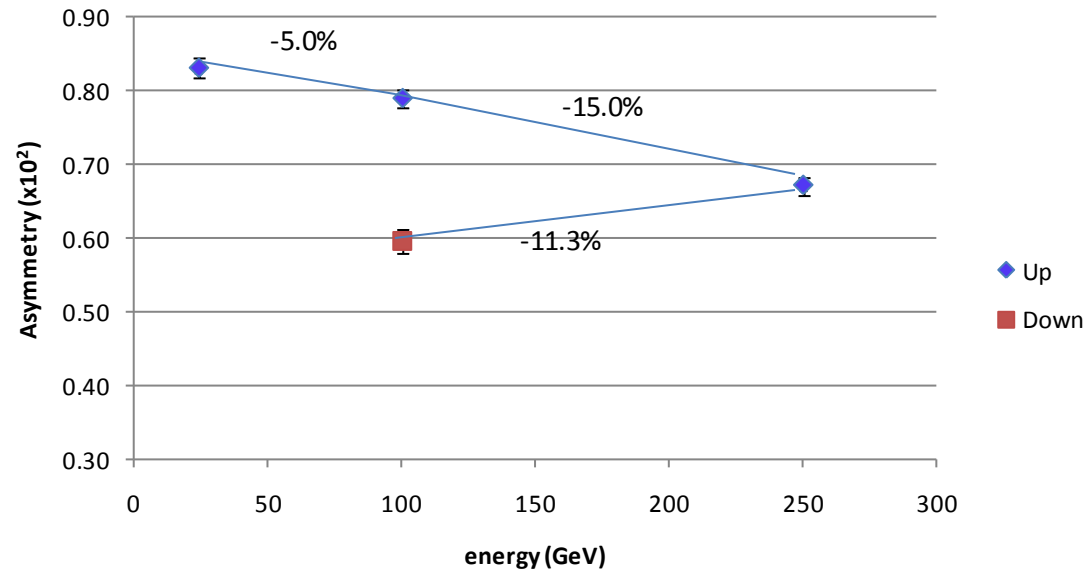


7 April Up-Down Ramp measurement
Blue Beam

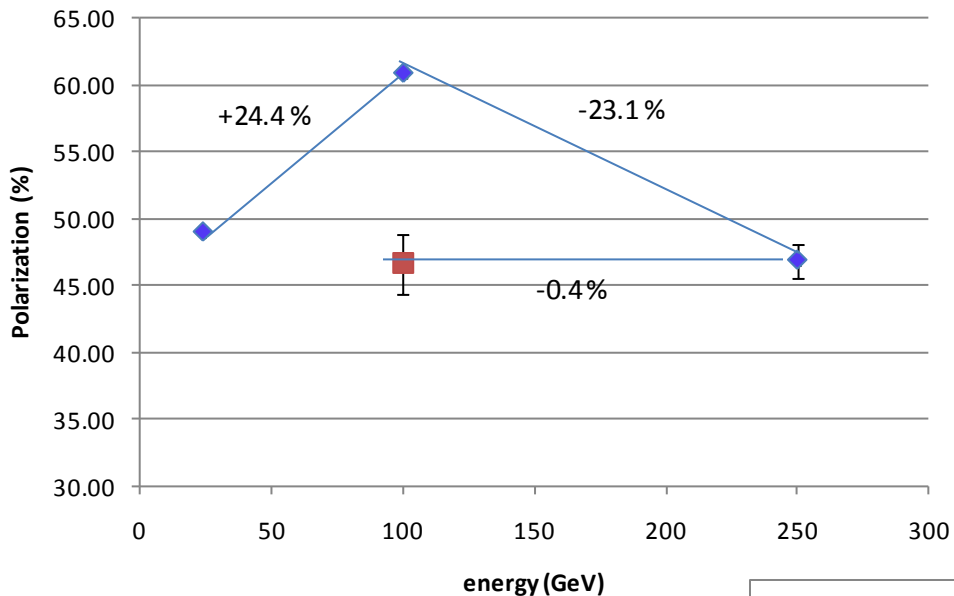
Current CNI average analyzing powers are:

Energy	AN
24	0.0144
100	0.0122
250	0.0147

**Up down ramp, Blue Beam
Asymmetry**



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



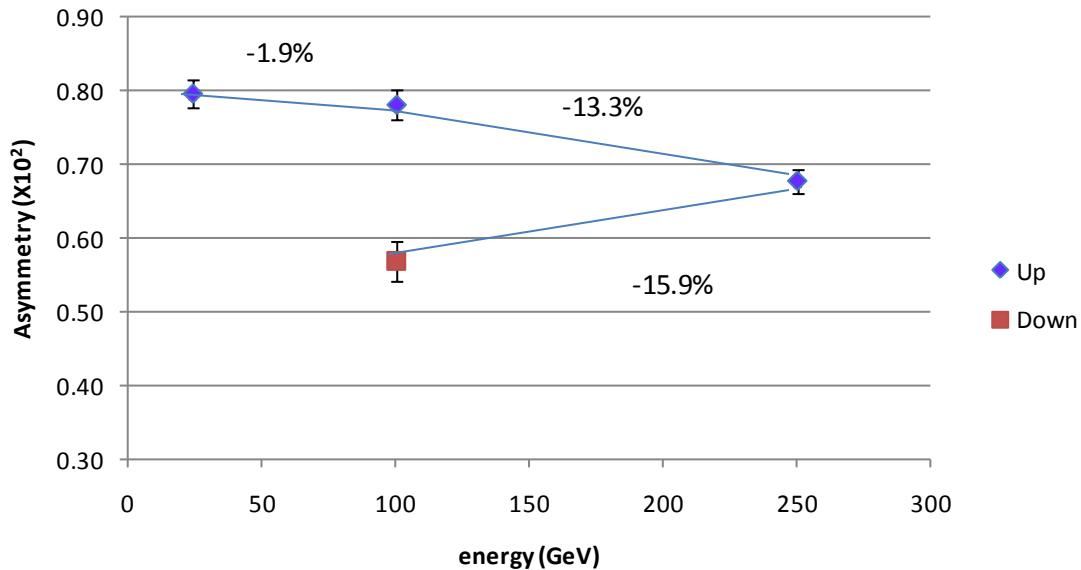
7 April Up-Down Ramp measurement
 Yellow Beam (only Yellow 1 was used as Yellow 2 was acting up)

Current CNI average analyzing powers are:

Energy	AN
24	0.0144
100	0.0122
250	0.0147

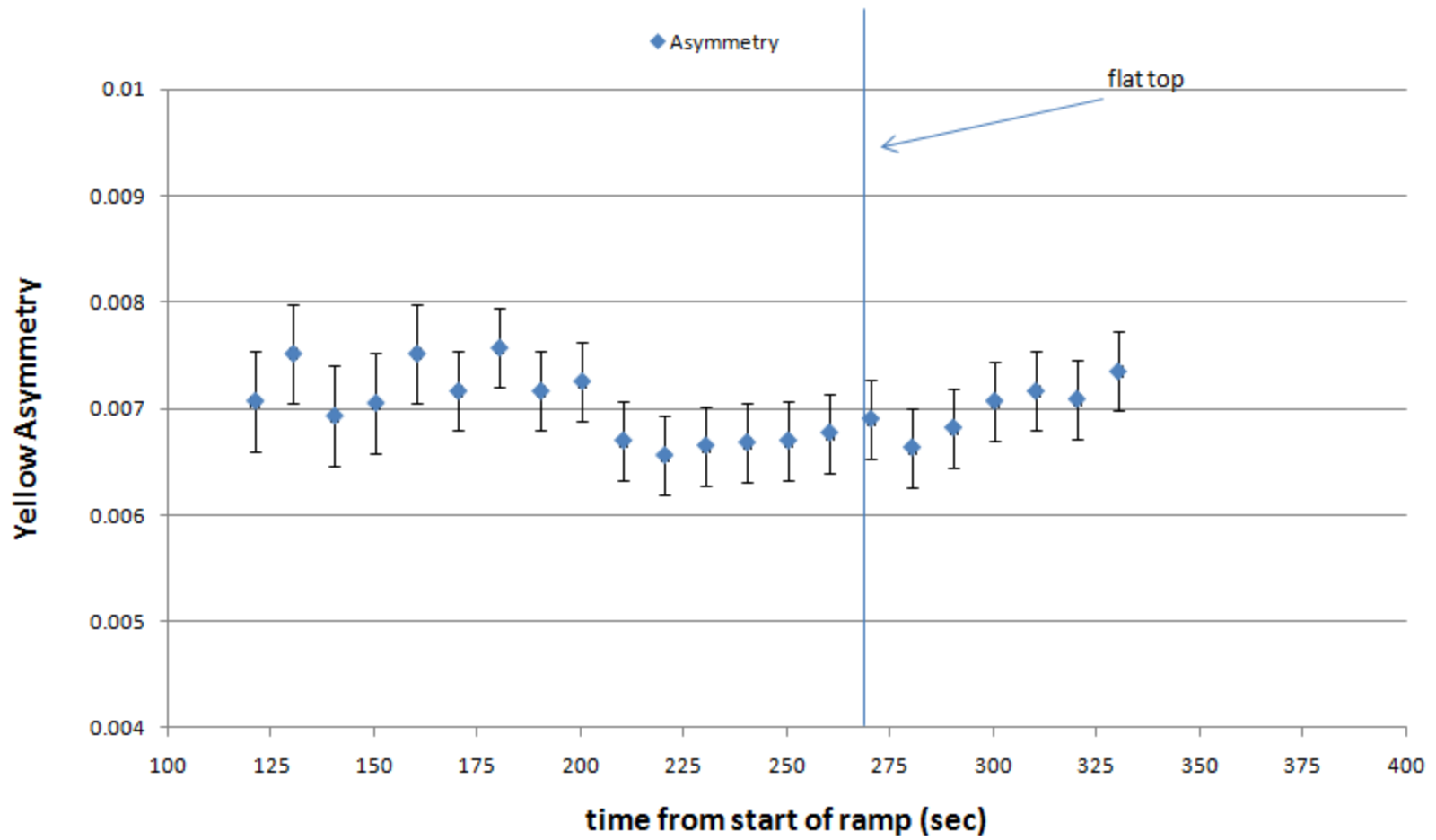
◆ Up
 ■ Down

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

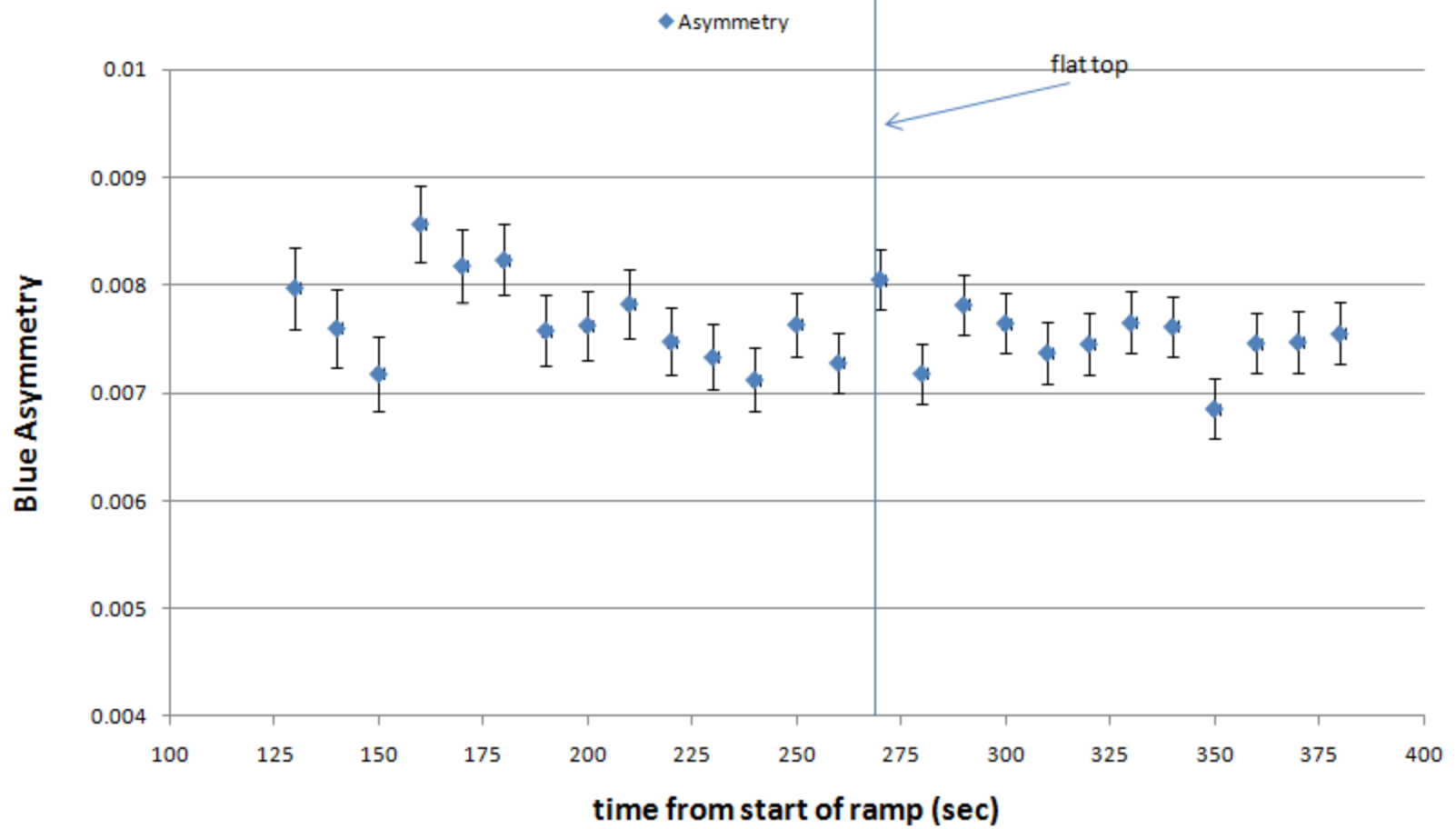


◆ Up
 ■ Down

CNI On the Ramp, fill 15366

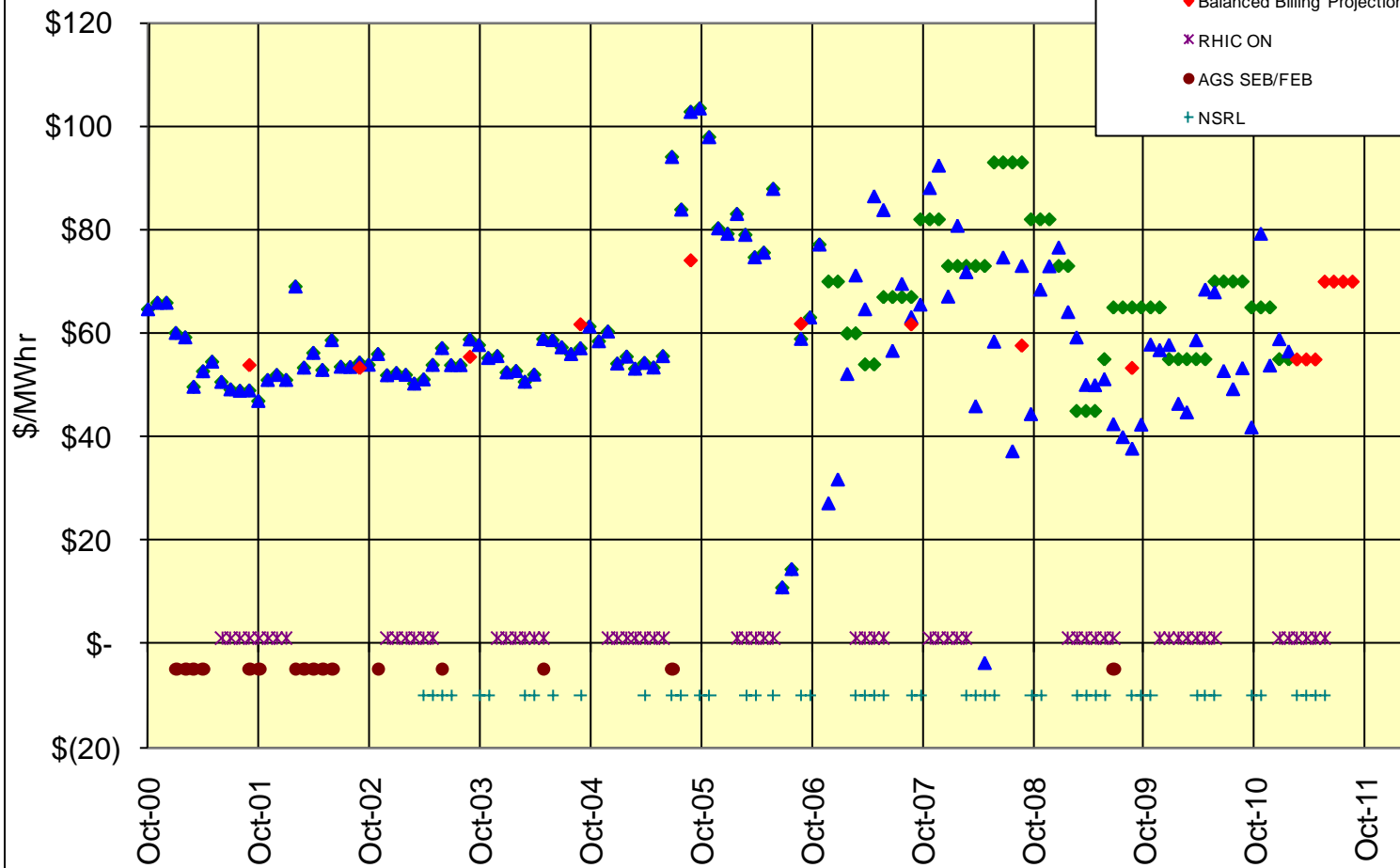


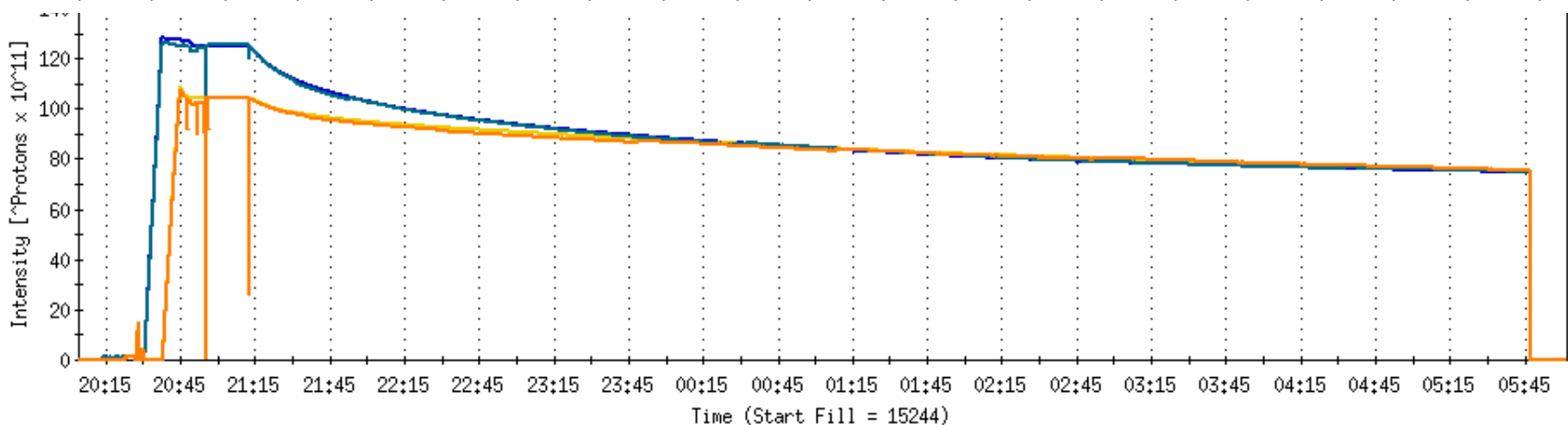
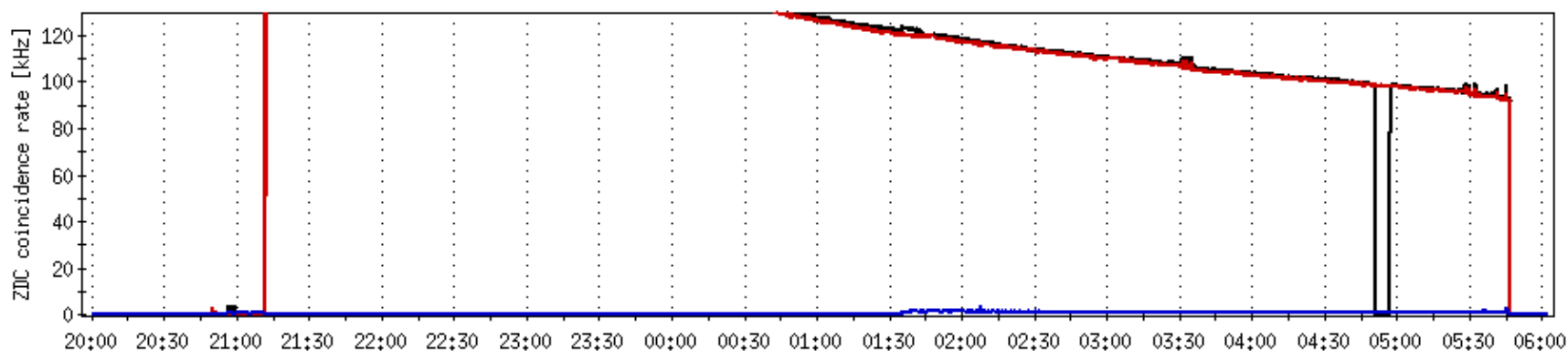
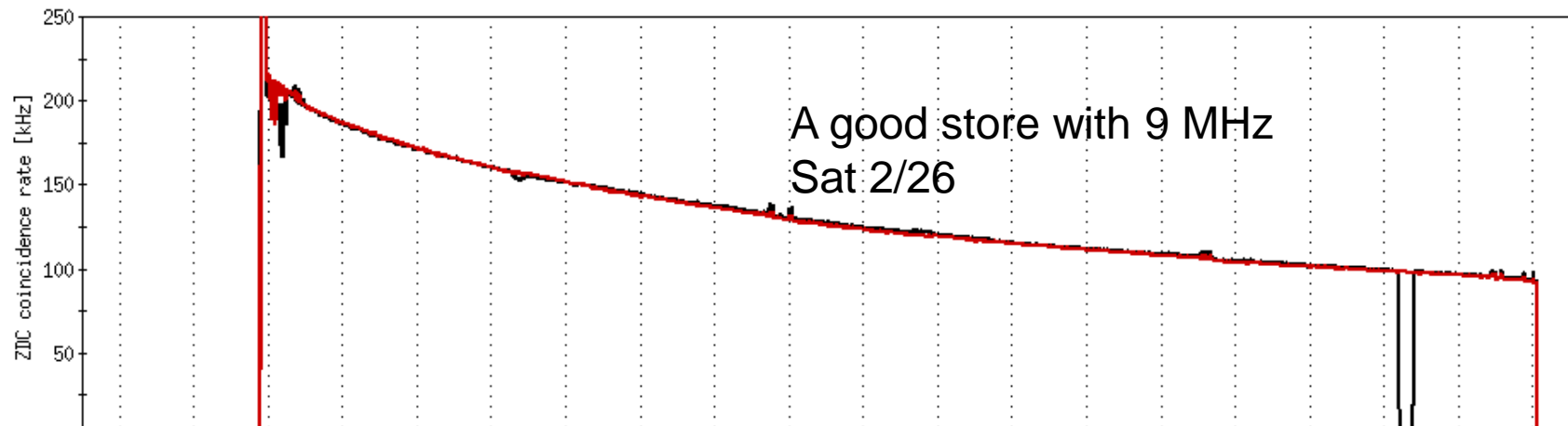
CNI On the Ramp, fill 15378



BNL Energy Cost

through Feb 2011

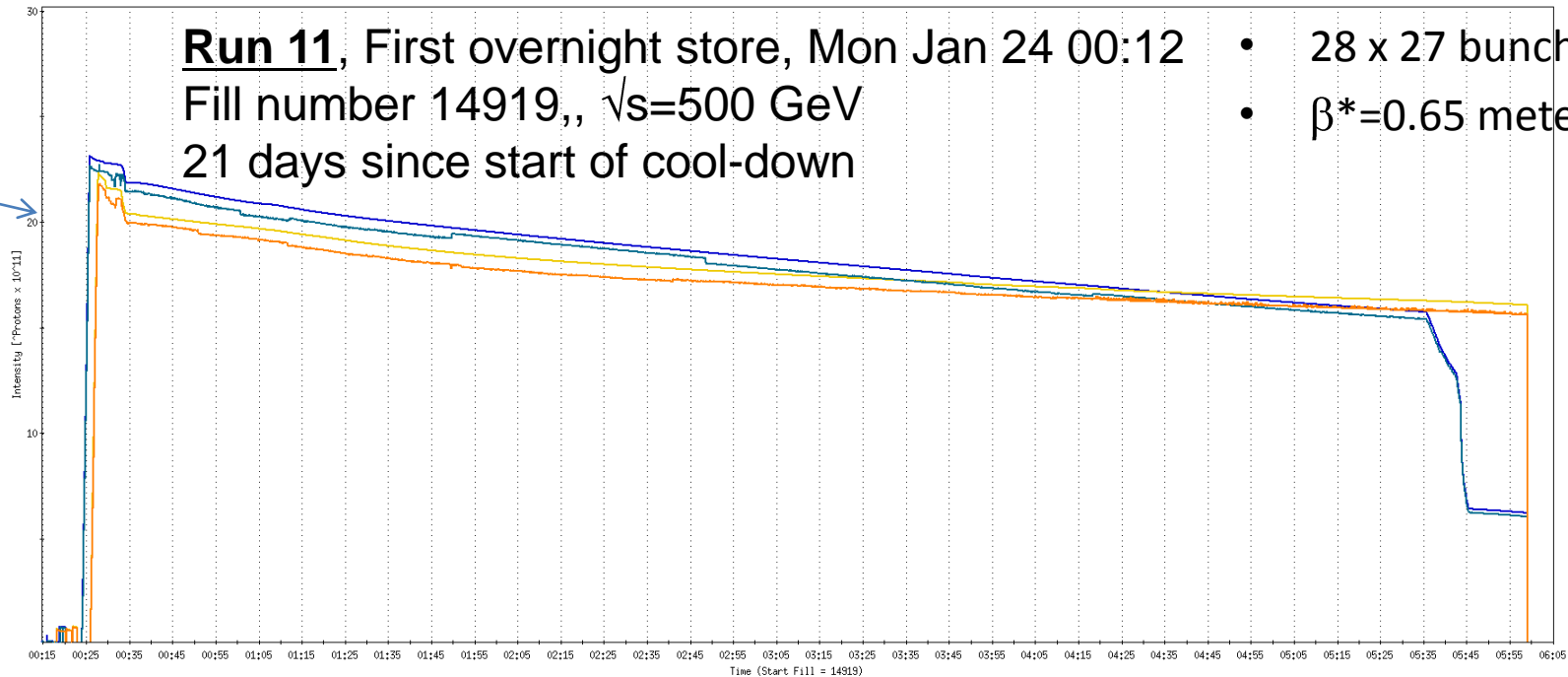




Run 11, First overnight store, Mon Jan 24 00:12
Fill number 14919,, $\sqrt{s}=500$ GeV
21 days since start of cool-down

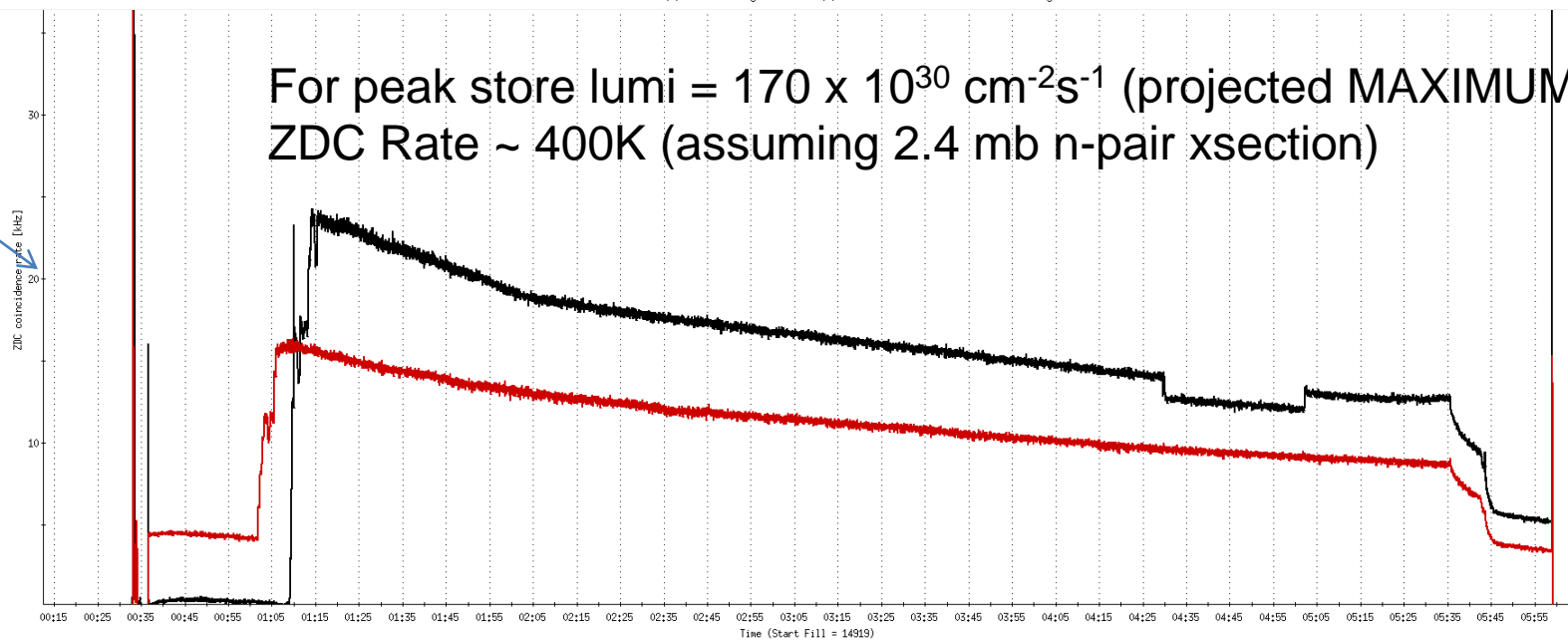
- 28 x 27 bunches
- $\beta^*=0.65$ meters

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



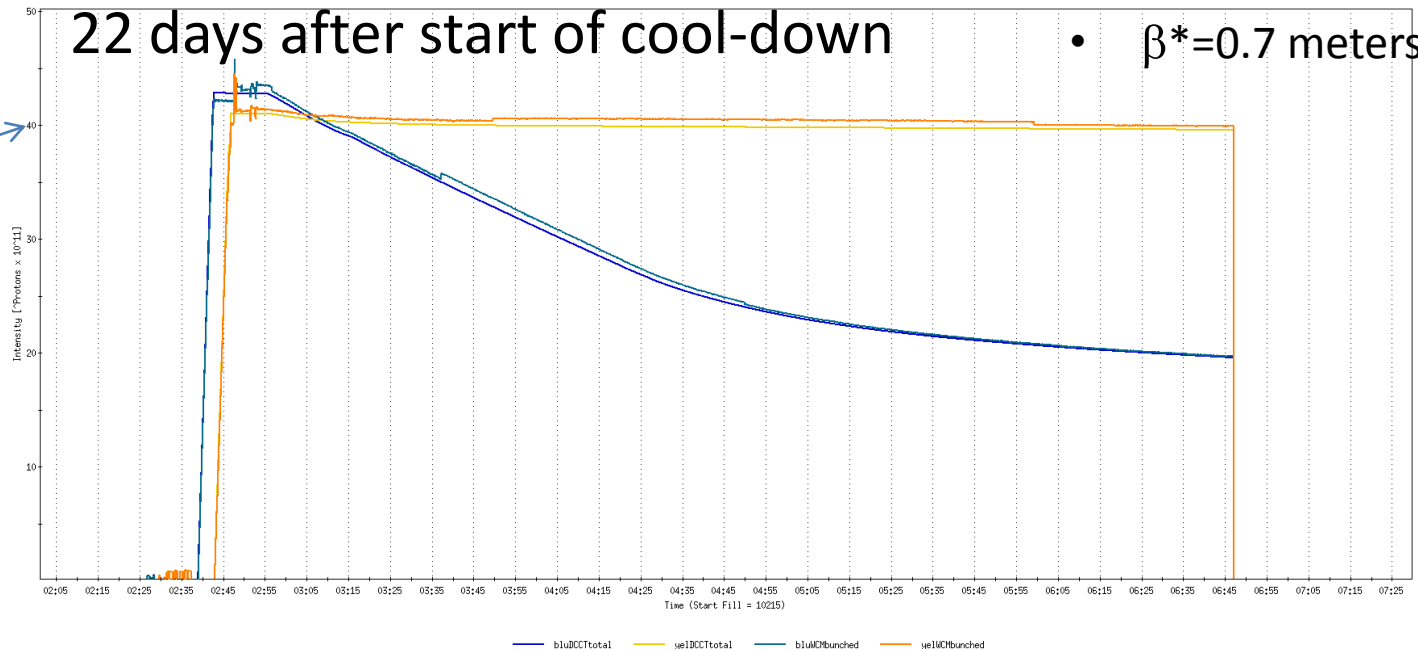
Run 9, First overnight store at $\sqrt{s}=500$ GeV

• 56 x 56 bunches

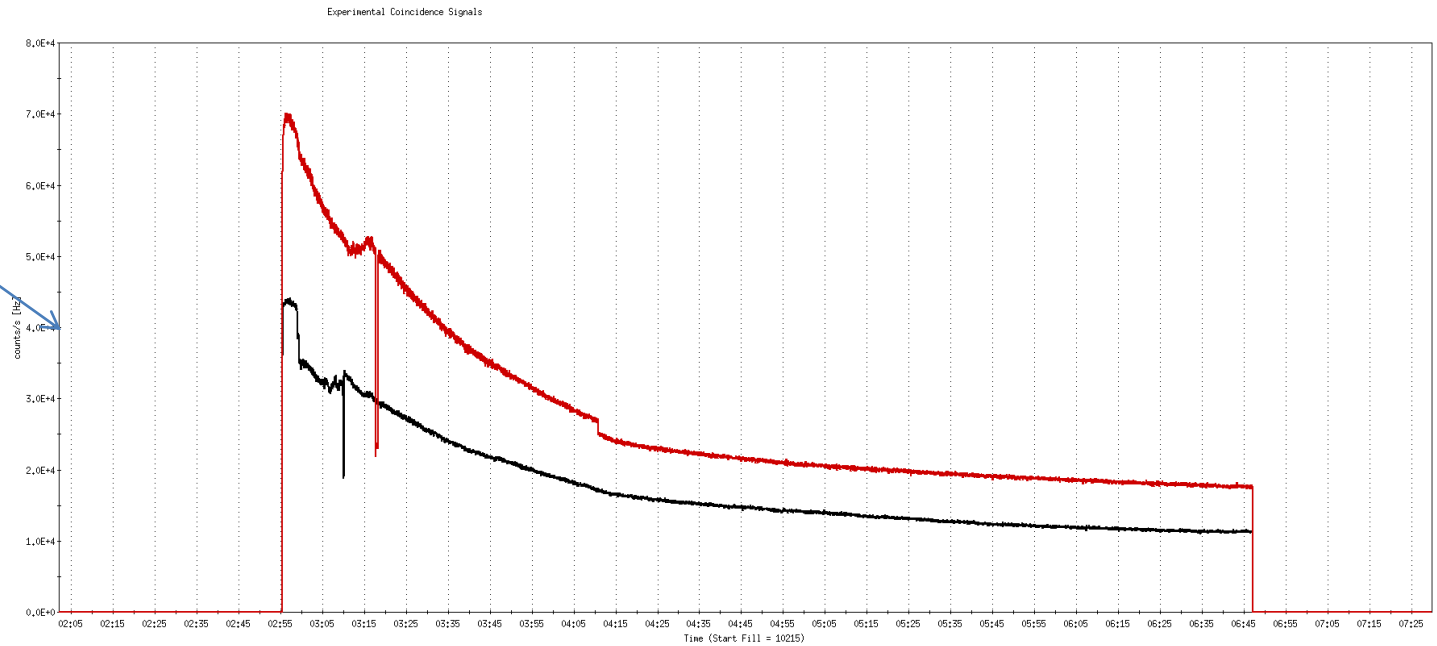
• $\beta^*=0.7$ meters

22 days after start of cool-down

40×10^{11}

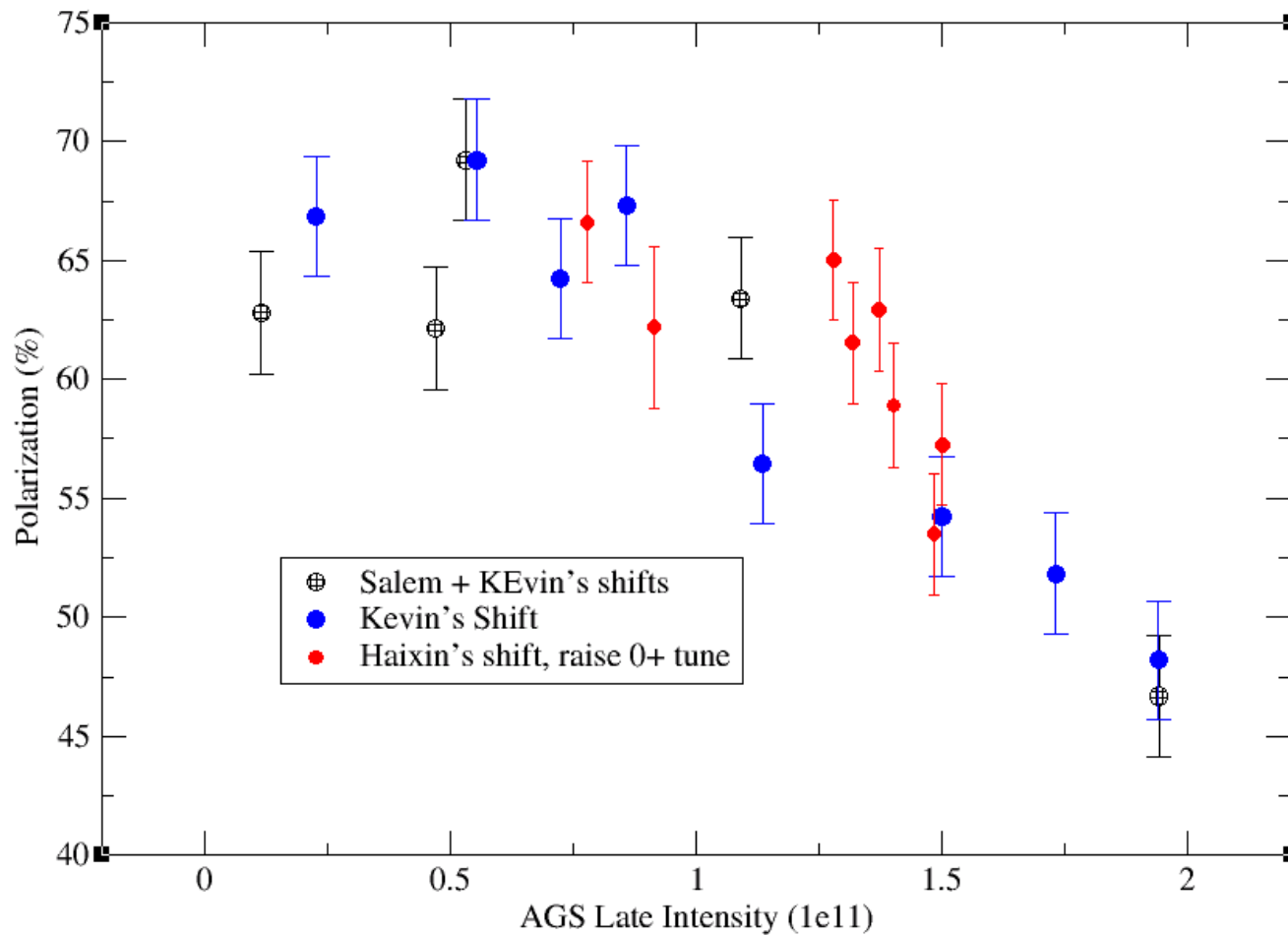


40K



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

AGS pp log, 23 Feb 09, 00:26

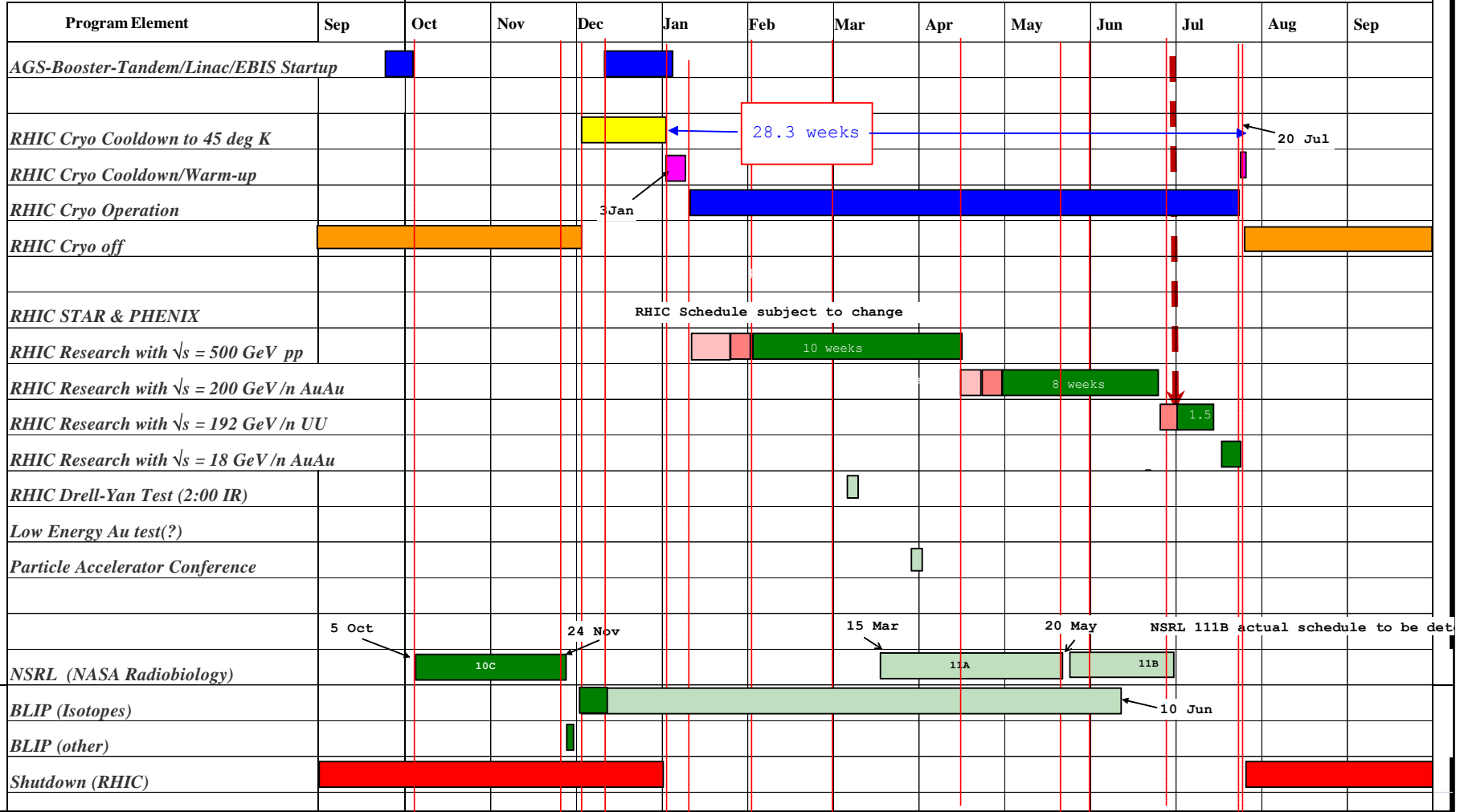


C-A Operations-FY11

planned (budget permitting)

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

FY 2011



28.3 weeks

RHIC Schedule subject to change

10 weeks

8 weeks

1.5

3Jan

20 Jul

5 Oct

24 Nov

15 Mar

20 May

10c

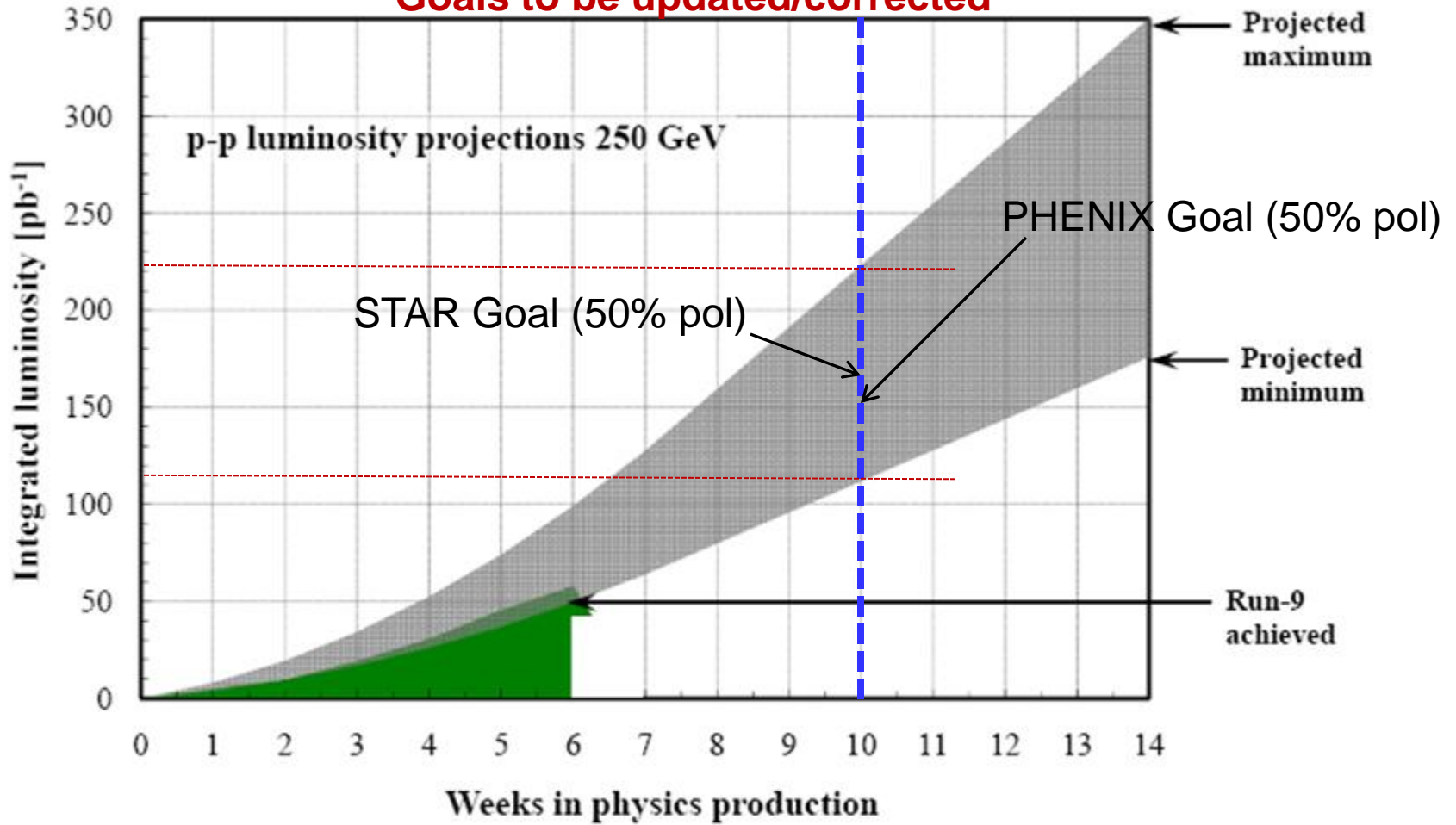
11A

11B

10 Jun

Run-11 p↑-p↑ luminosity projections

Goals to be updated/corrected

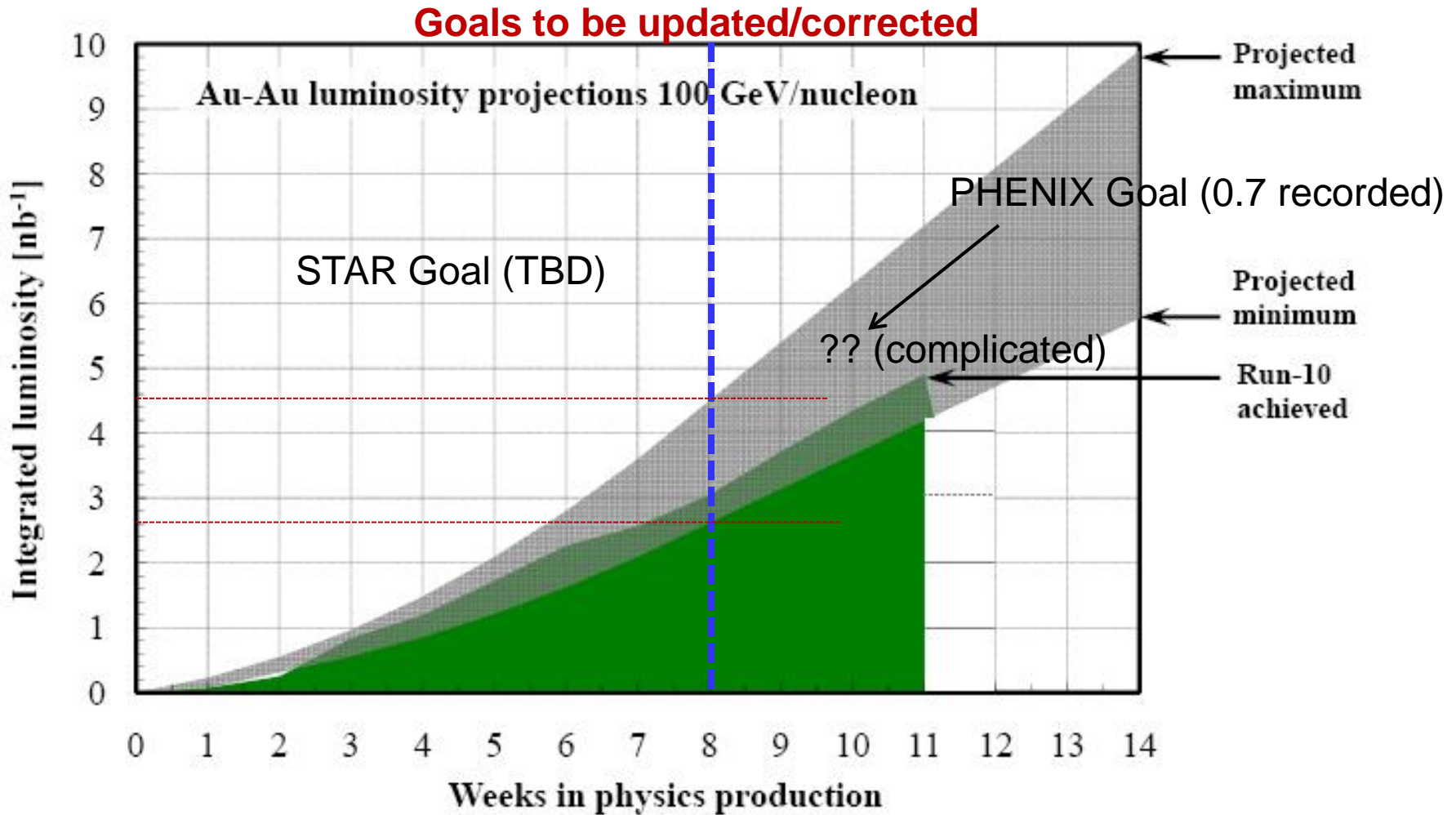


Assume 8 weeks to ramp-up for max.

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]