

# Run 12 RHIC Machine/Experiments Meeting

28 Feb 2012

## Agenda:

- Discussion - when to end the 200 GeV pp run... presently scheduled to end early Friday morning, 9 March. (STAR, PHENIX and Machine)
  - When are Lumi goals projected be reached.
  - Special requests (low intensity run, angle scans, critical APEX studies outside of normal APEX time etc..)
  - Maintenance needs before 500 GeV run begins
  - Other
- Request for APEX schedule change during 500 GeV pp run (M. Bai)
- Request from AnDY for 2:00 DX training/beta\* development/500 GeV operation (L. Bland)
- Other business (All)

**Run 12 Plan based on 20 weeks cryo operation**  
**–an example 20 week schedule based on Vincent’s pp start-up plan\***

**Note physics weeks for 250 pp and HI are still to be determined**

\* [http://www.cadops.bnl.gov/AGS/Operations/OpsWiki/index.php/RHIC\\_Setup:\\_Polarized\\_Protons](http://www.cadops.bnl.gov/AGS/Operations/OpsWiki/index.php/RHIC_Setup:_Polarized_Protons)

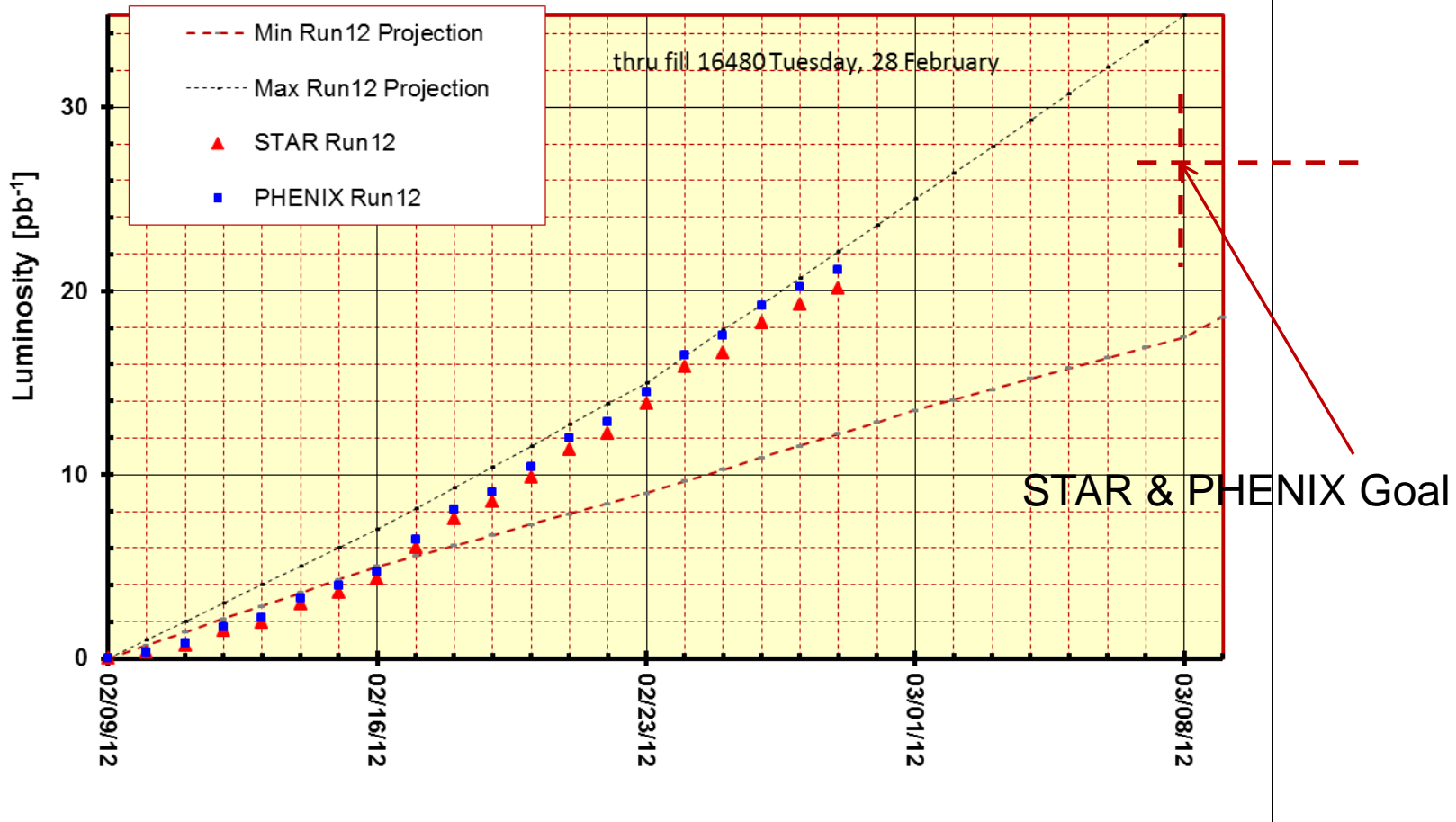
- 17 Jan, Begin cool-down to 4.5K
- 20 Jan, Cool-down to 4.5K in Blue and Yellow Ring complete, begin magnet setup
- 21-28 Jan, pp injection setup
- 28 Jan-3 Feb, LLRF, Ramp and store setup, begin 8 hr/night for experiments
- 3-10 Feb, 1 week ramp-up with 8 hrs/night for experiments
- 10 Feb, with store # 16397, begin 4 weeks pp physics with further ramp-up
- 16 Feb, 24/7 stores begin
- **Today – 28 Feb**
- 9 March, end 4 week  $\sqrt{s} = 200$  GeV pp run, begin ½ week setup for  $\sqrt{s} = 500$  GeV pp
- 13 March, begin 1 week ramp-up to  $\sqrt{s} = 500$  GeV with 8 hrs/night for experiments
- 20 March, begin 5 week pp physics run at  $\sqrt{s} = 500$  GeV
- 24 April, end 5 week pp physics run at  $\sqrt{s} = 500$  GeV

If Uranium or Cu-Au...

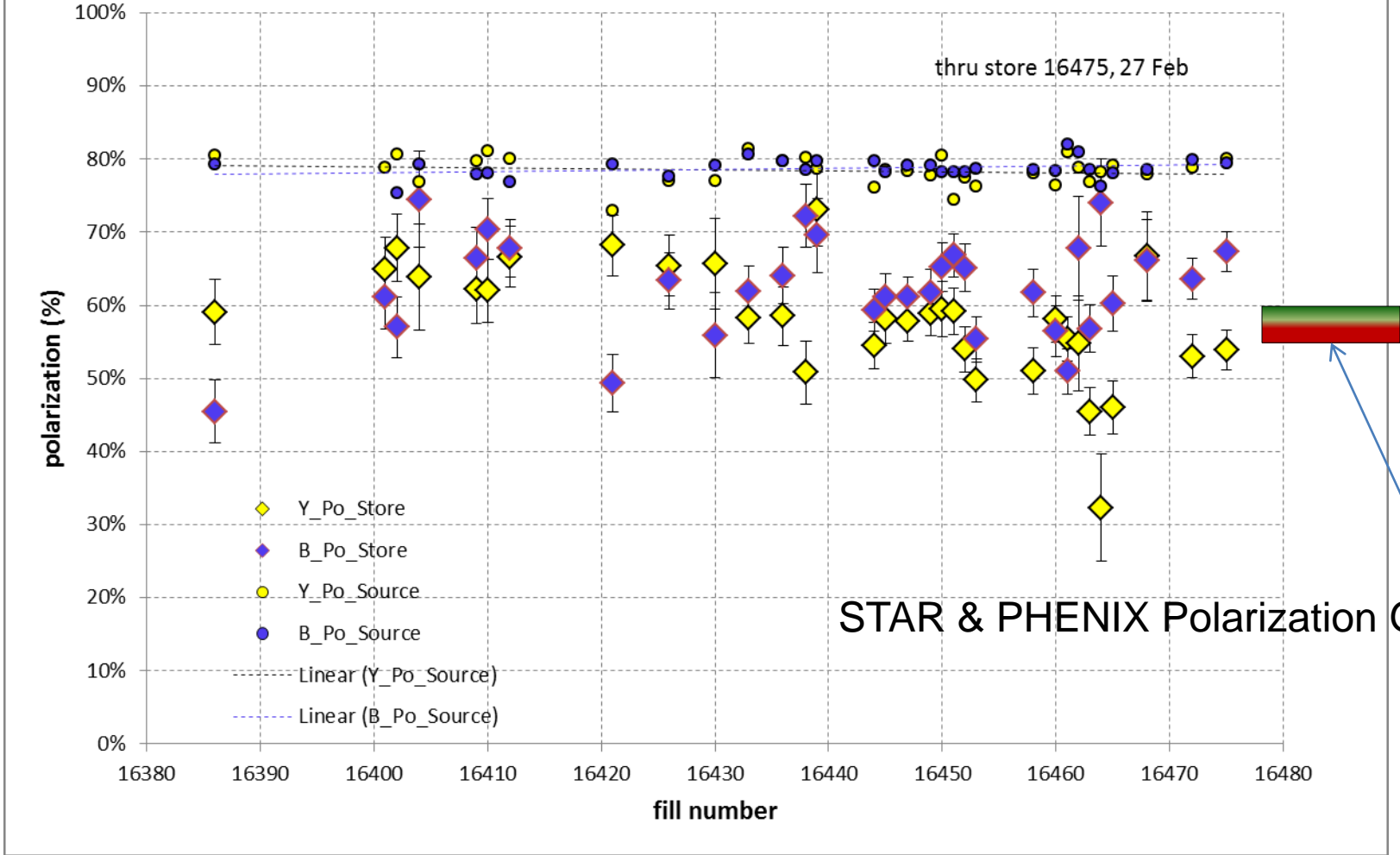
- 24 April, begin 1 week setup for UU or CuAu (no overnight stores for experiments)
- 1 May, begin 4.5 week UU or CuAu physics run
- 20-25 May: IPAC
- 2 June end 4.5 week UU or CuAu physics run
- 2 June, begin cryo warm-up
- 5 June, cryo warm-up complete (20.0 cryo-weeks)

**Total Physics Weeks = 13.5**

**RHIC p<sup>+</sup>p<sup>+</sup> Physics Luminosity Run-12 ( $\sqrt{s}=200$  GeV)**  
***Preliminary Run12 xsections (STAR/PHENIX 0.275/0.29 mb)***



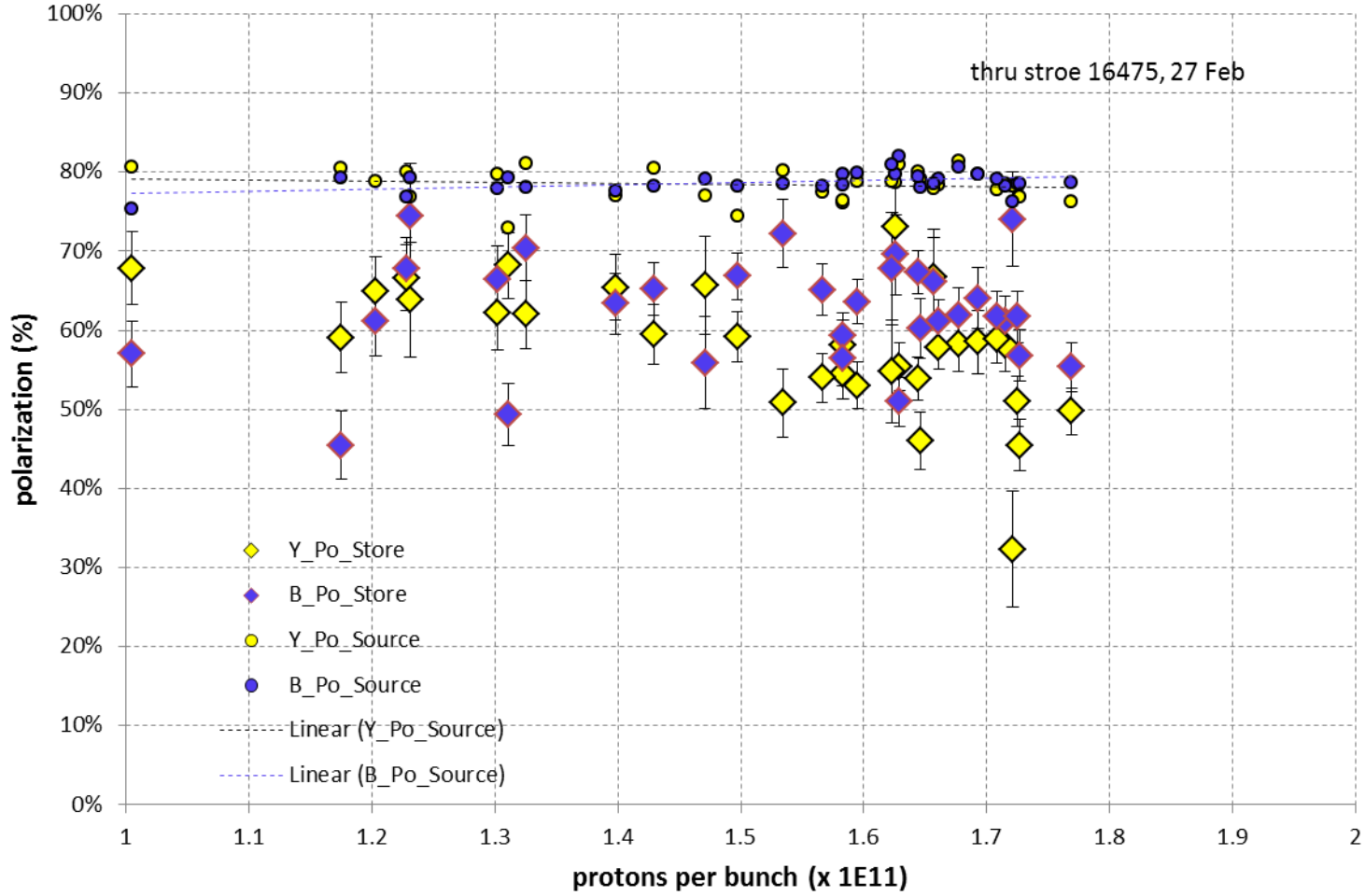
# Run12 100 x 100 Gev pp Jet target Polarization results



Blue Jet weighted average =  $62.5\% \pm 0.8$ ; source blue average =  $78.5\%$  → **20% lost**  
 Yellow Jet weighted average =  $56.9\% \pm 0.8$ ; source yellow average =  $78.7\%$  → **28% lost**

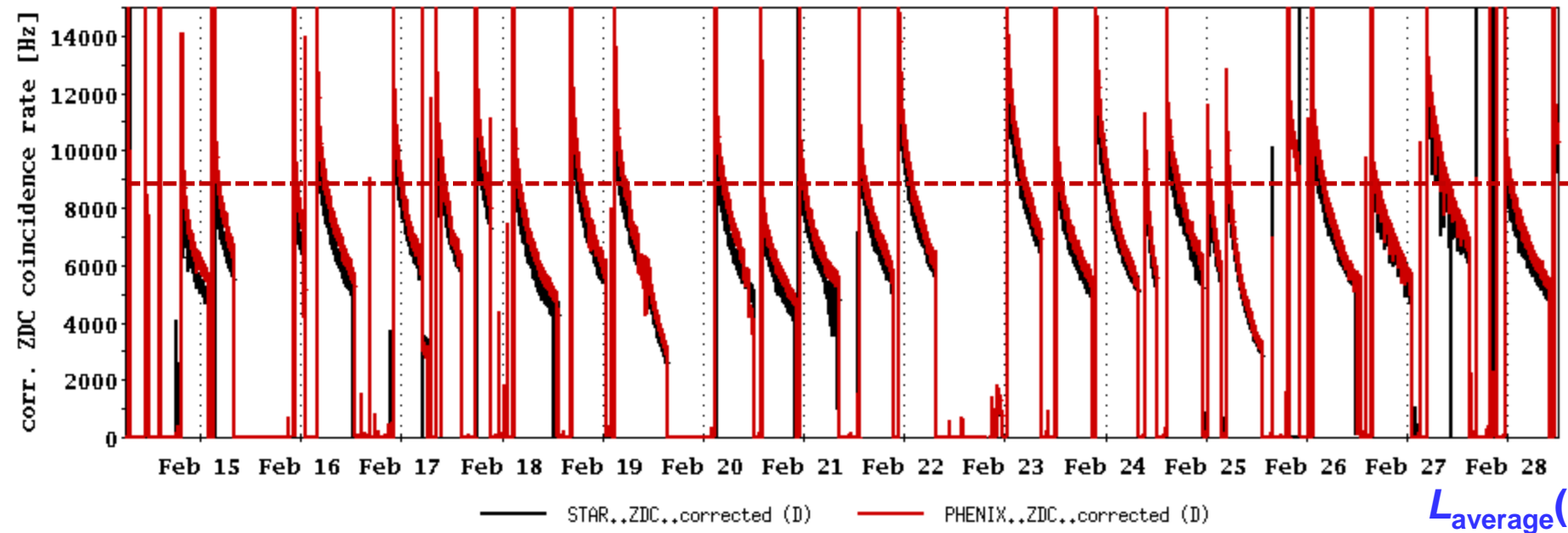
# Run12 100 x 100 Gev pp Jet target Polarization results

thru stroe 16475, 27 Feb

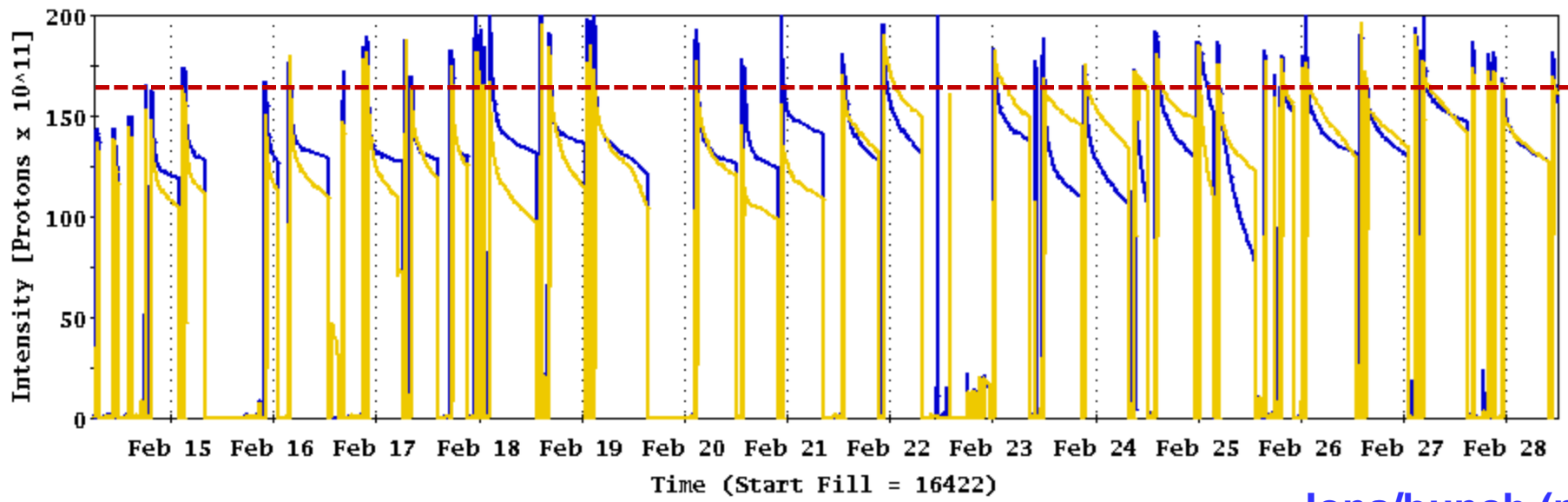


Accidental corrected Exp. Coinc. Signals

Past Week

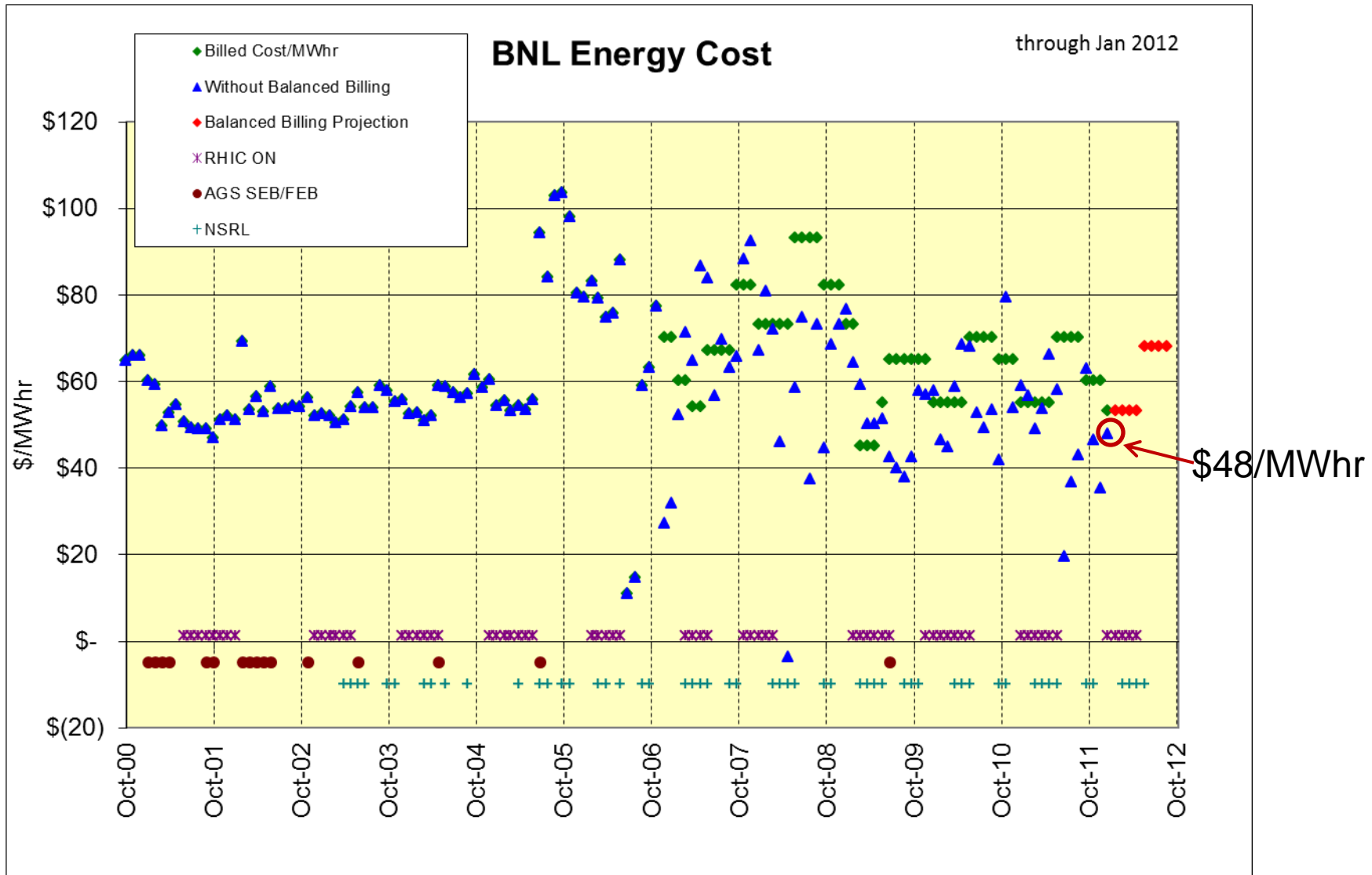


Lverage (m  
(0.29 mb xsec)

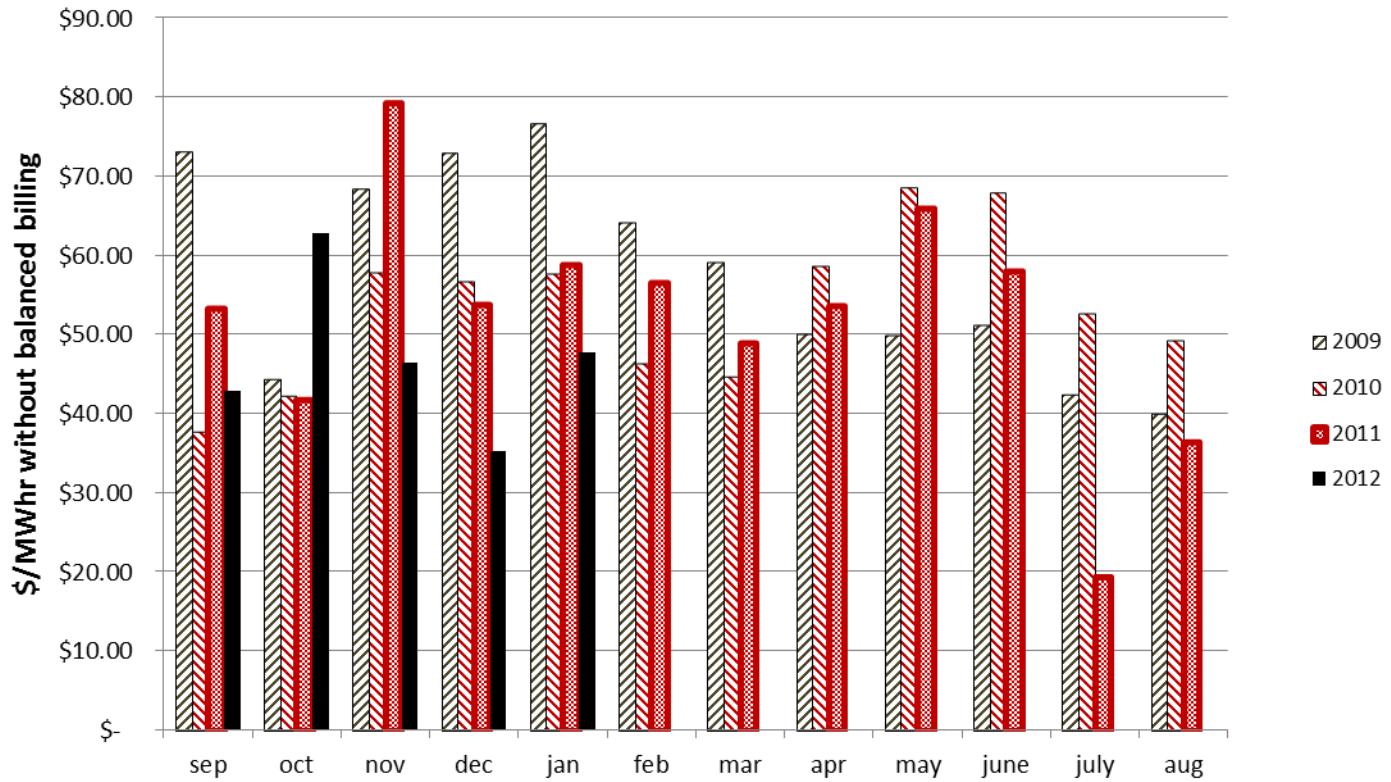


Ions/bunch (ma

\$ in BNL Balanced Billing Bank for FY12 (through Jan) = +\$1,157K

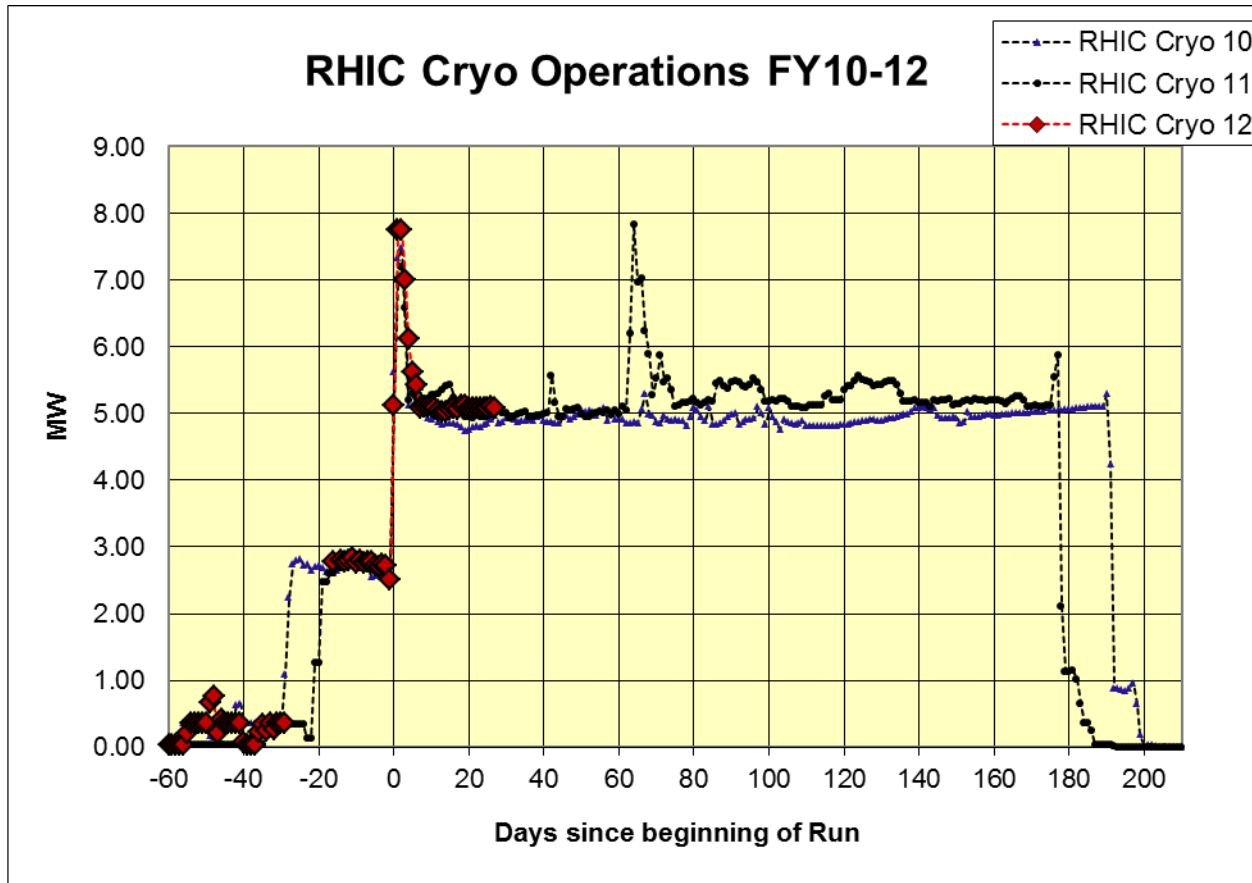


# BNL Electricity Cost

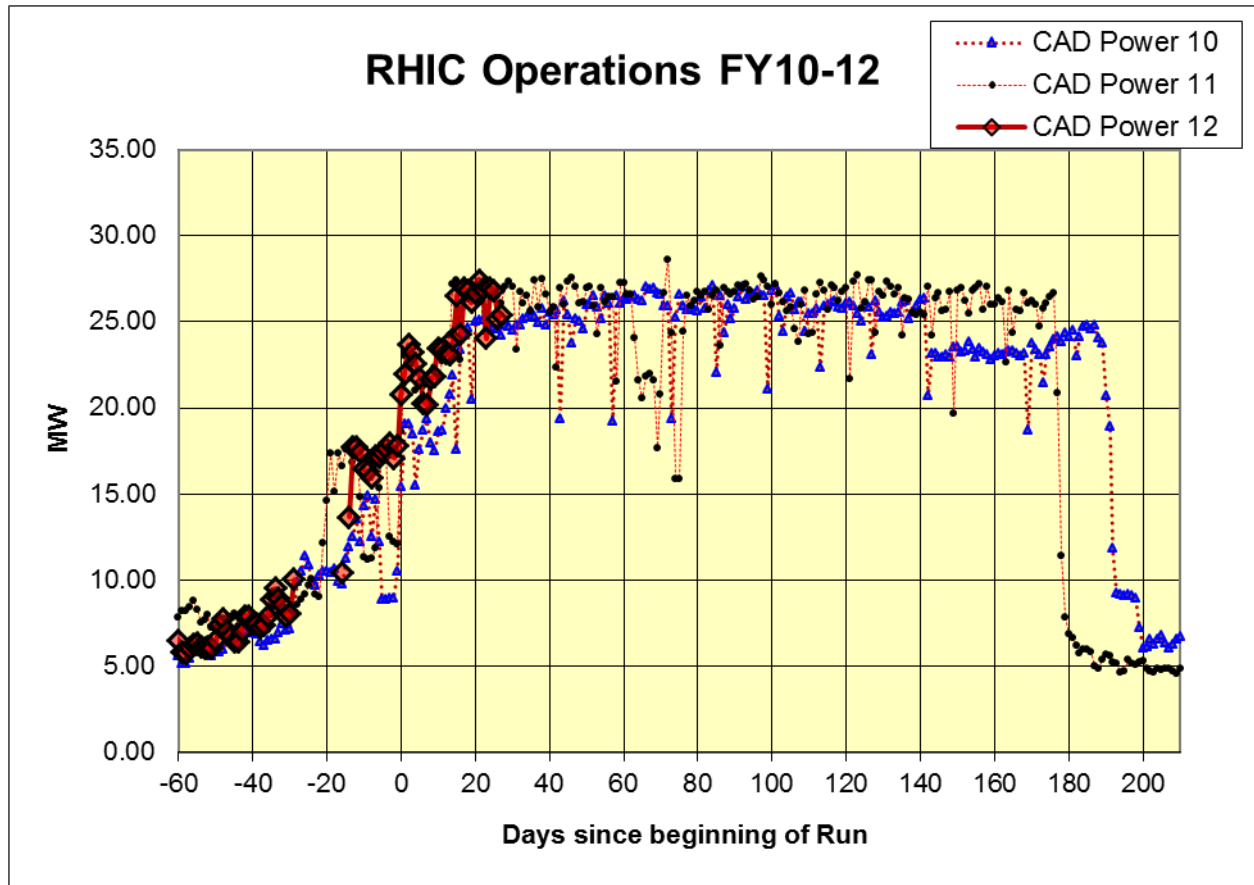




As of 13 Feb 2012

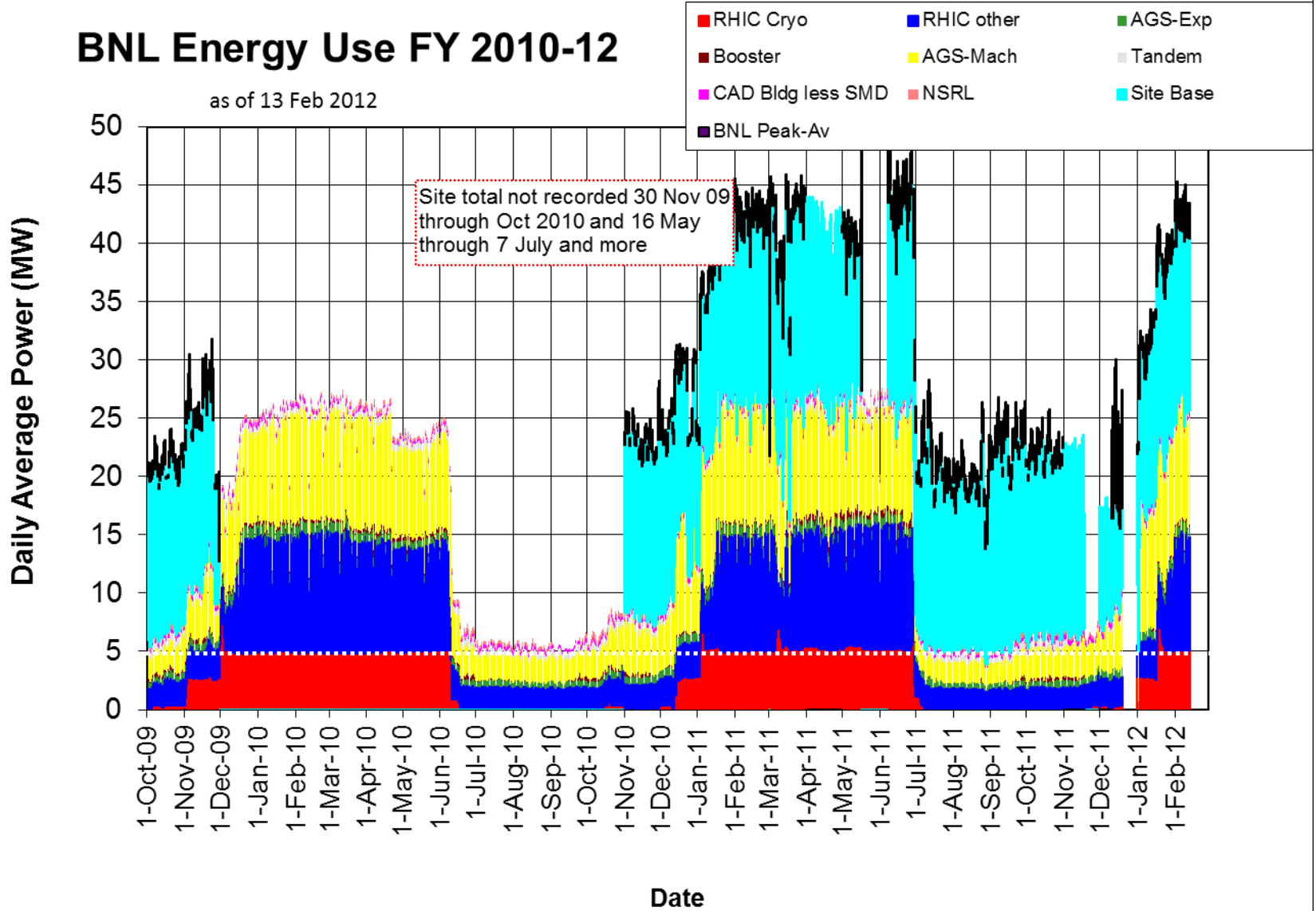


As of 13 Feb 2012



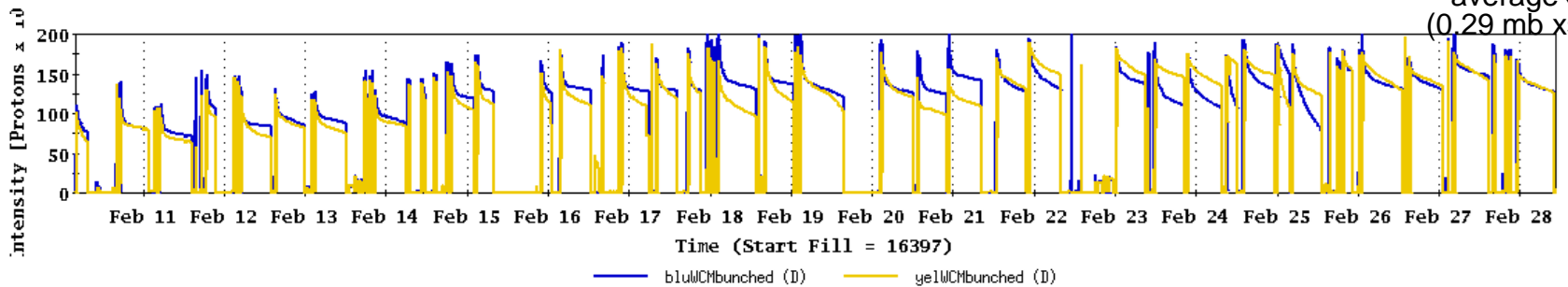
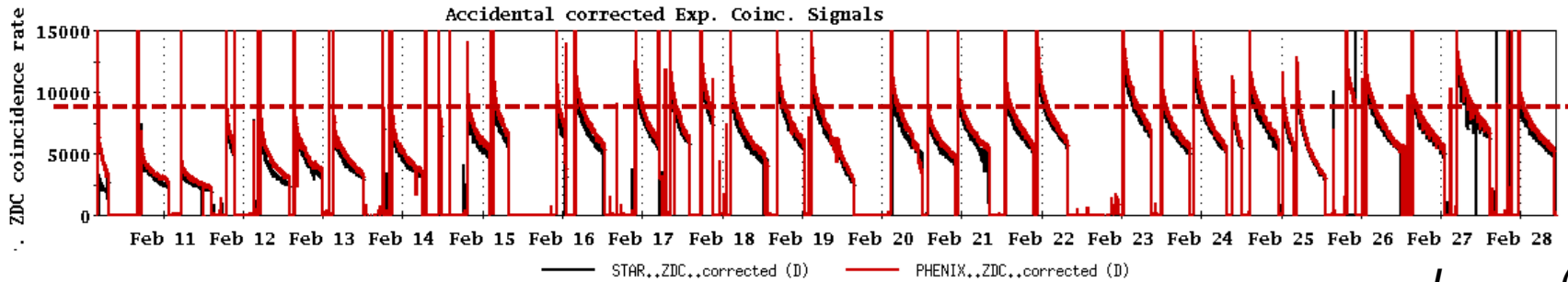
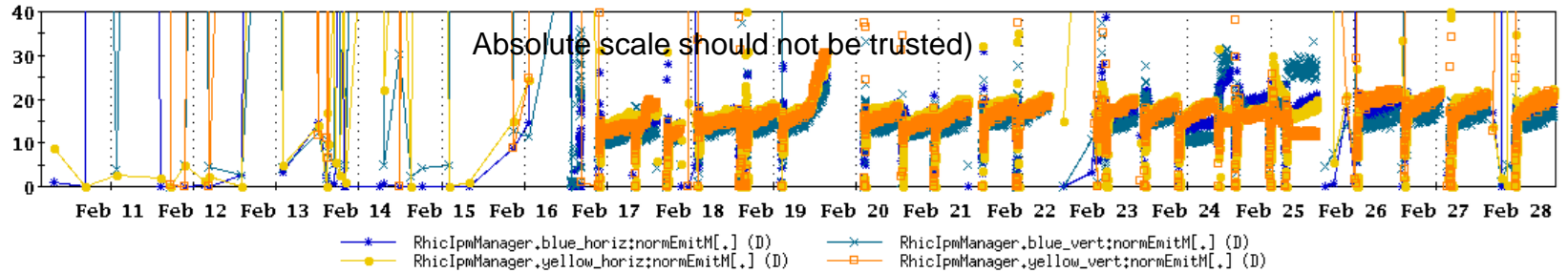
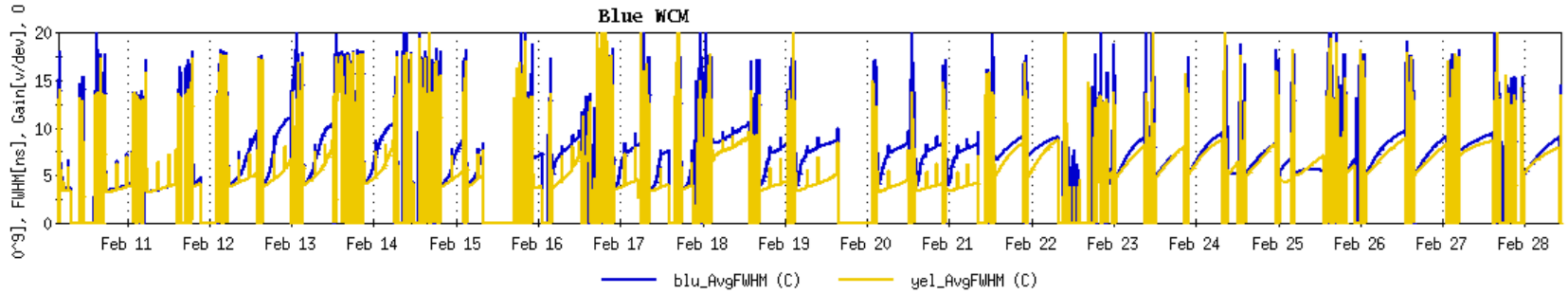
# BNL Energy Use FY 2010-12

as of 13 Feb 2012



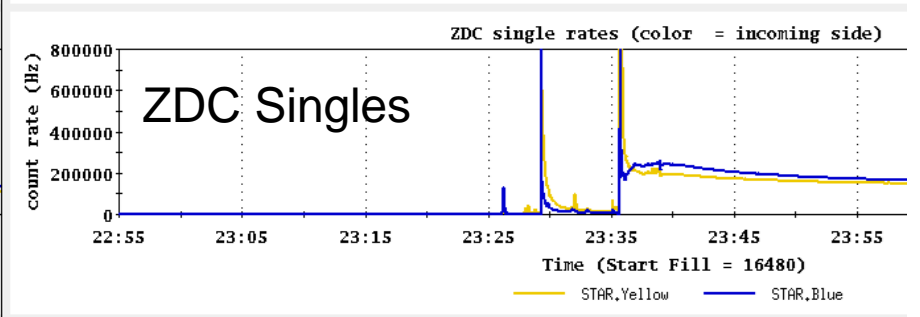
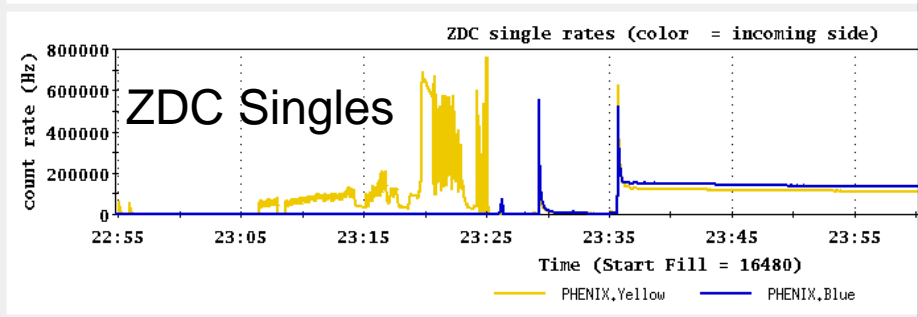
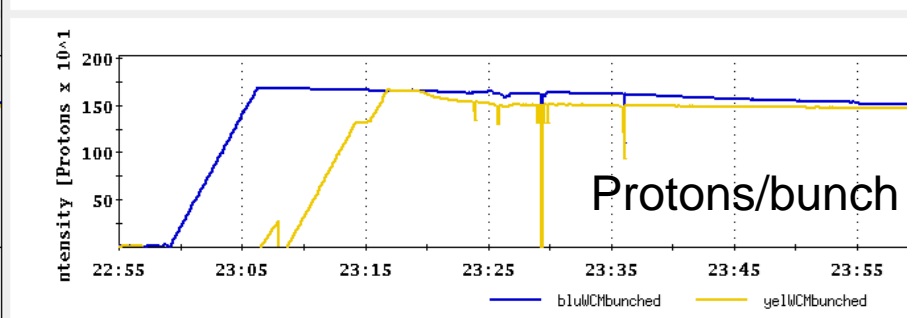
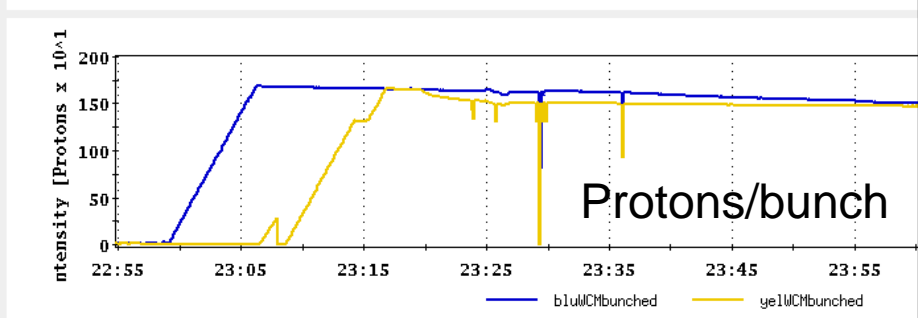
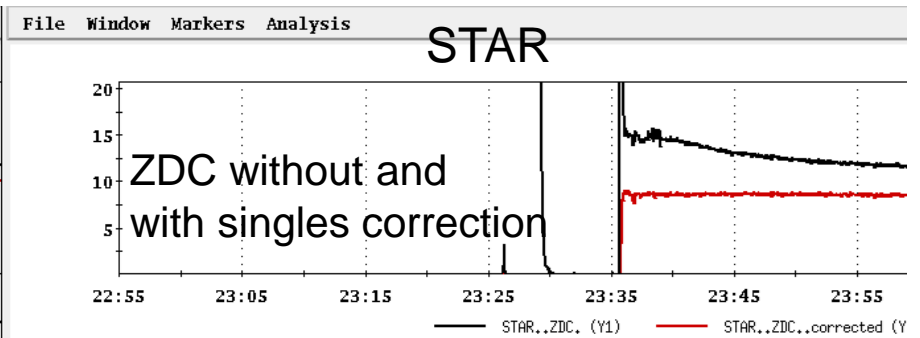
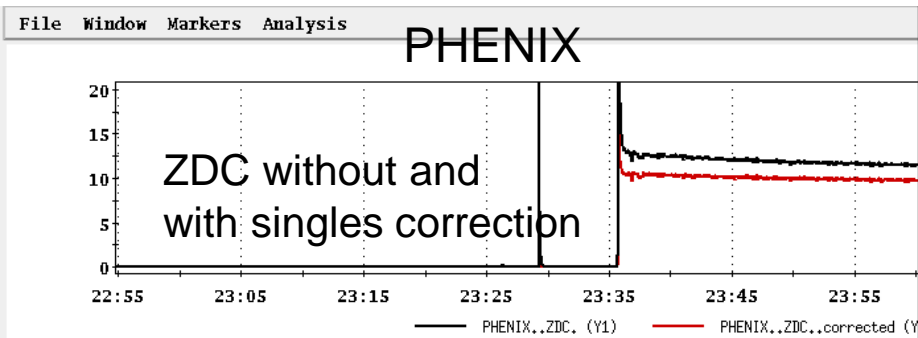
Other Slides

# Run 12 Physics Stores to 28 Feb

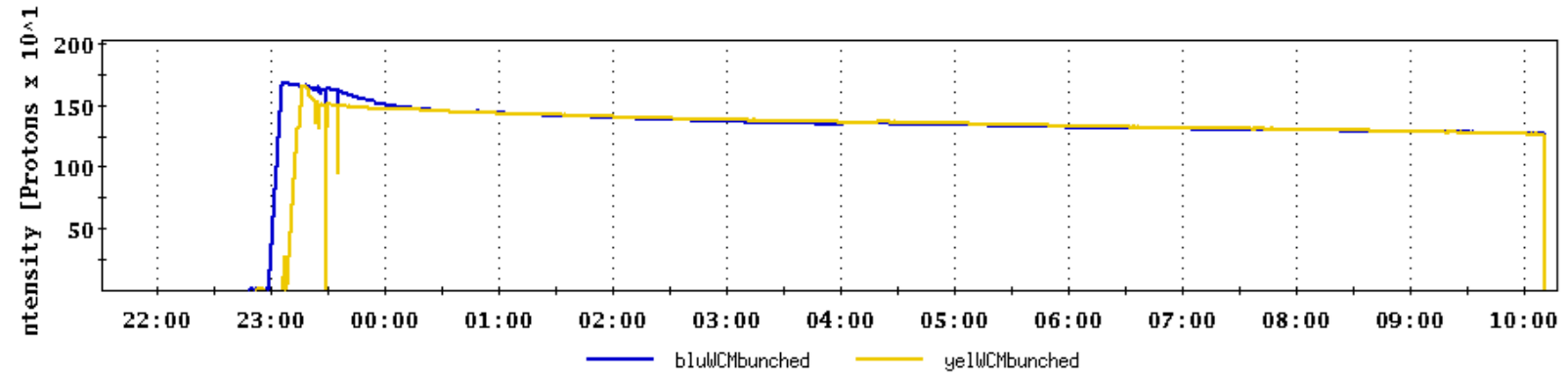
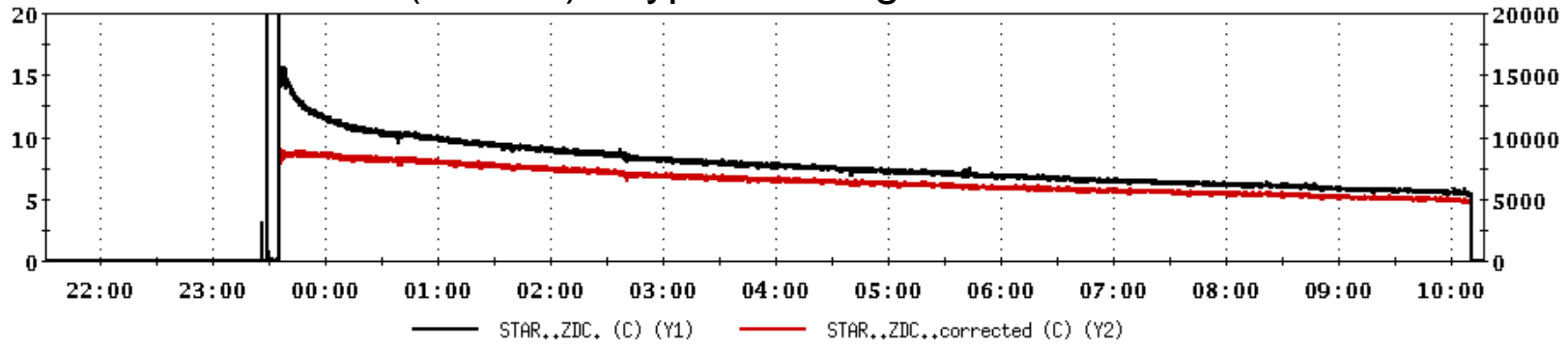


$L_{\text{average}}(\text{max})$   
 (0.29 mb x section)

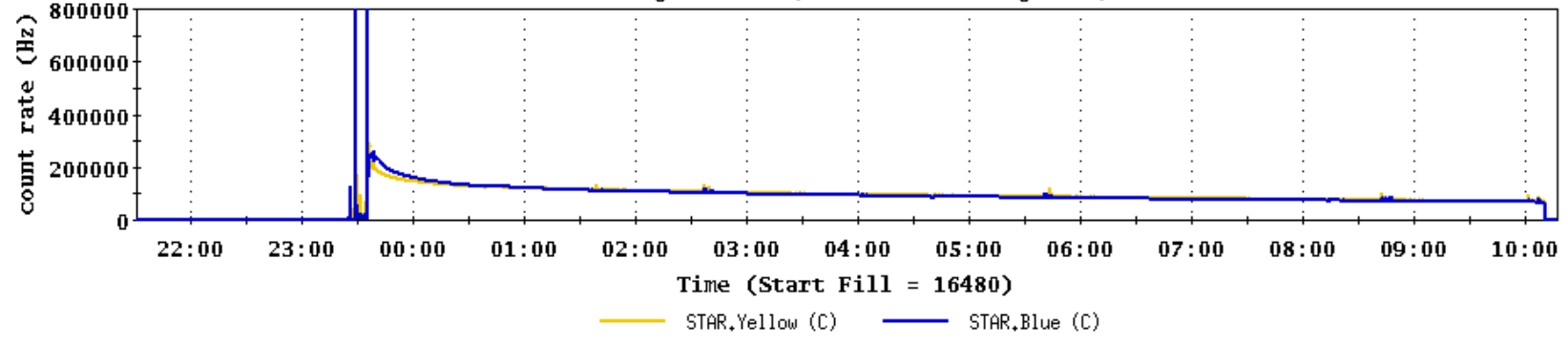
# Store 16480 (27 Feb) – typical background issues



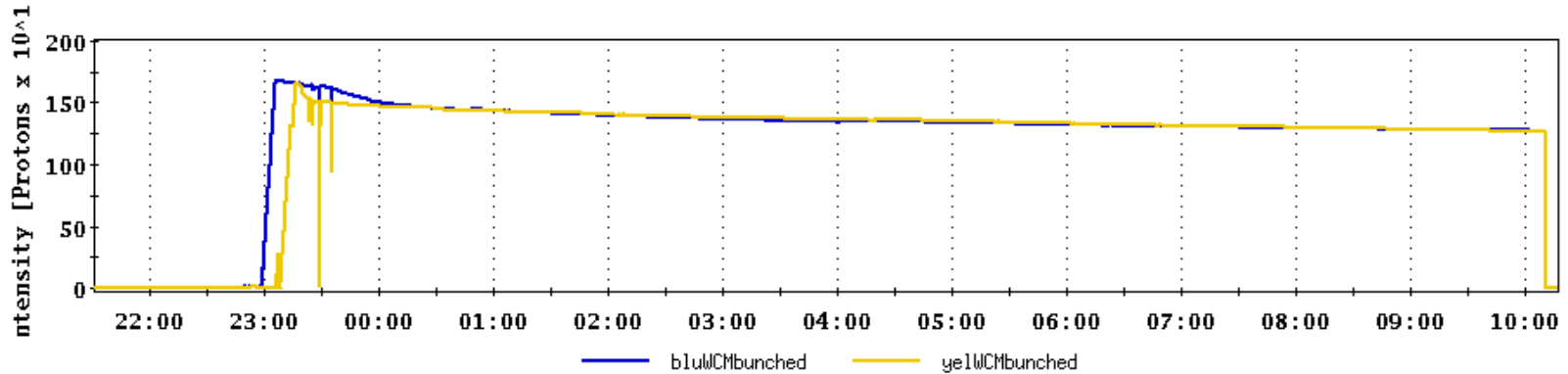
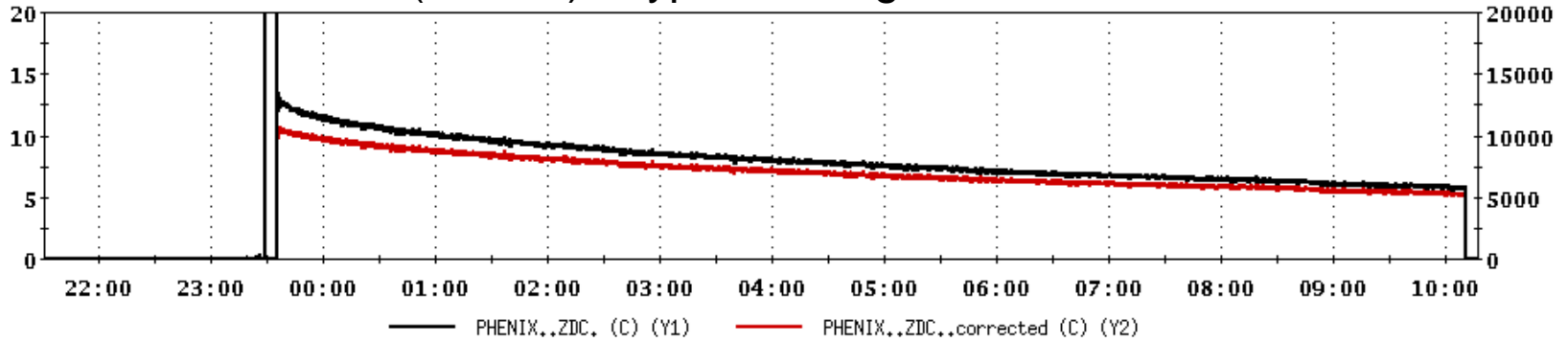
# Store 16480 (27 Feb) – typical background issues



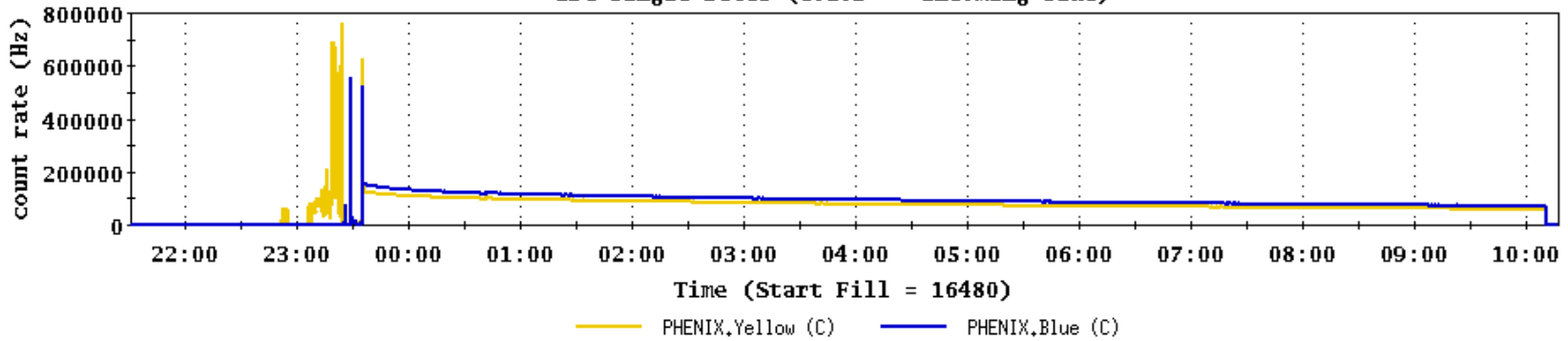
## ZDC single rates (color = incoming side)



# Store 16480 (27 Feb) – typical background issues



## ZDC single rates (color = incoming side)

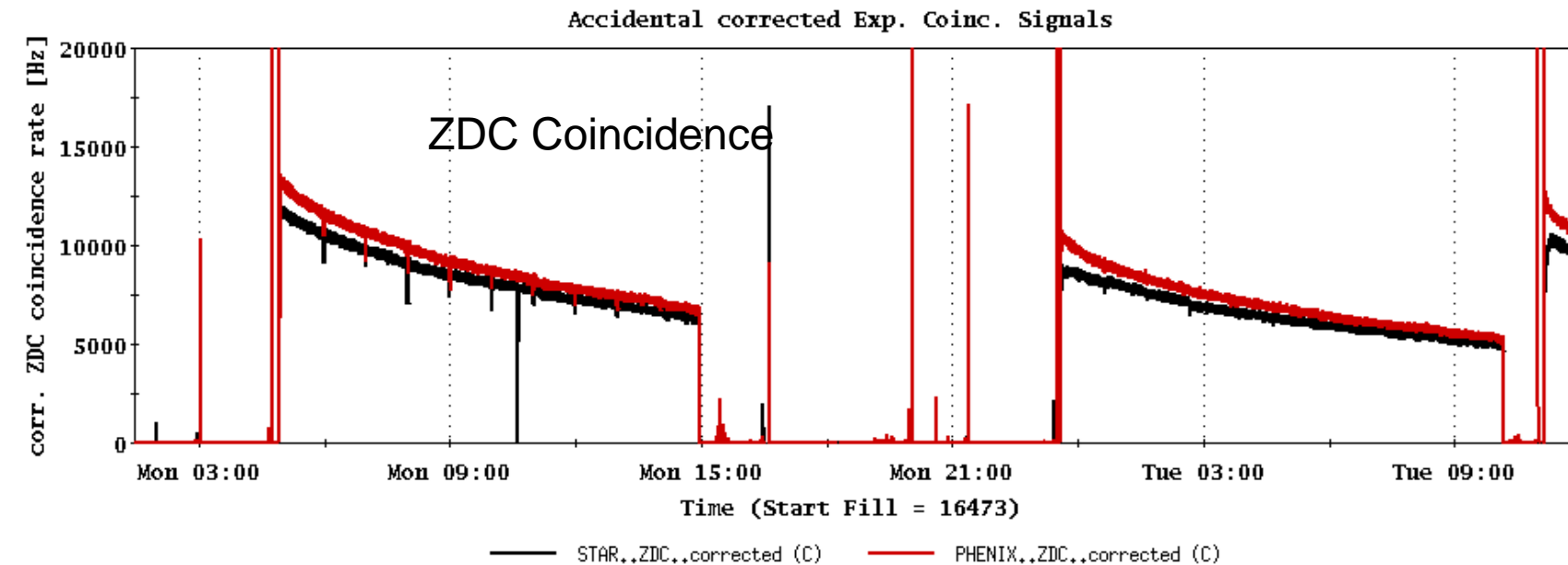
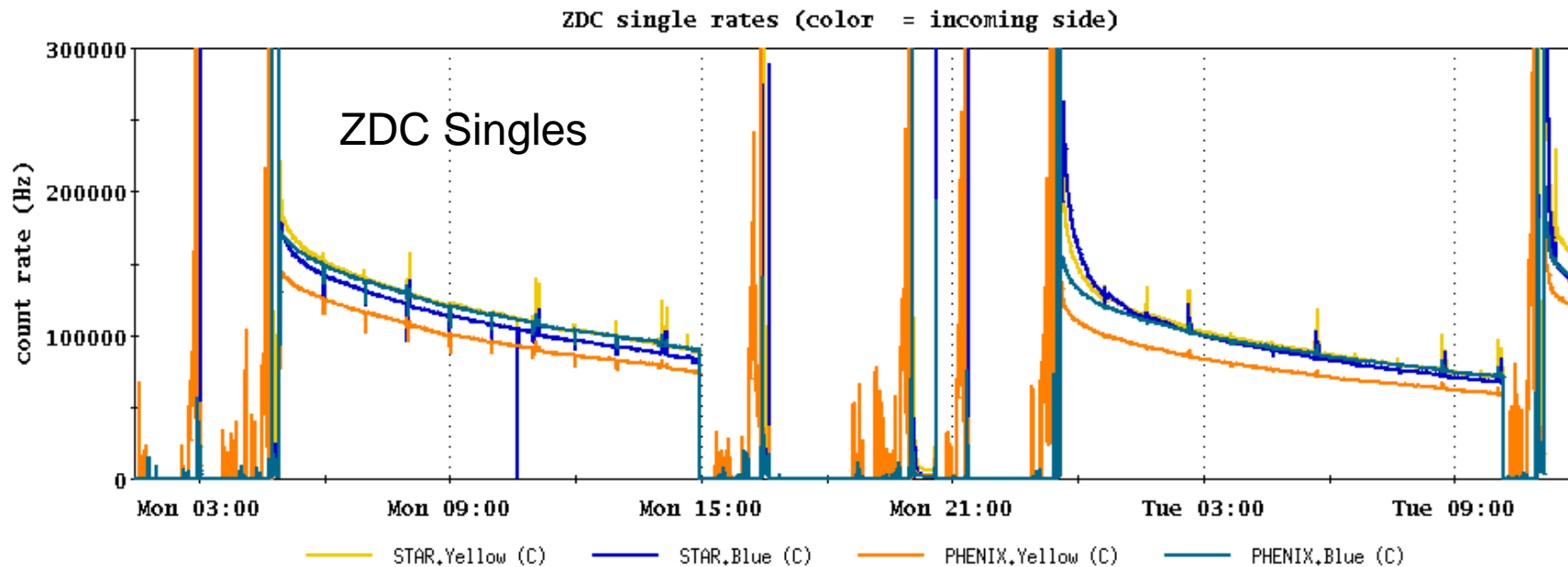




# Collision steering corrections background issues 26-27 Feb

RHIC/Experiments/AllExpCollAccCorr.logreq 02/27/2012 01:27 - 02/28 11:45

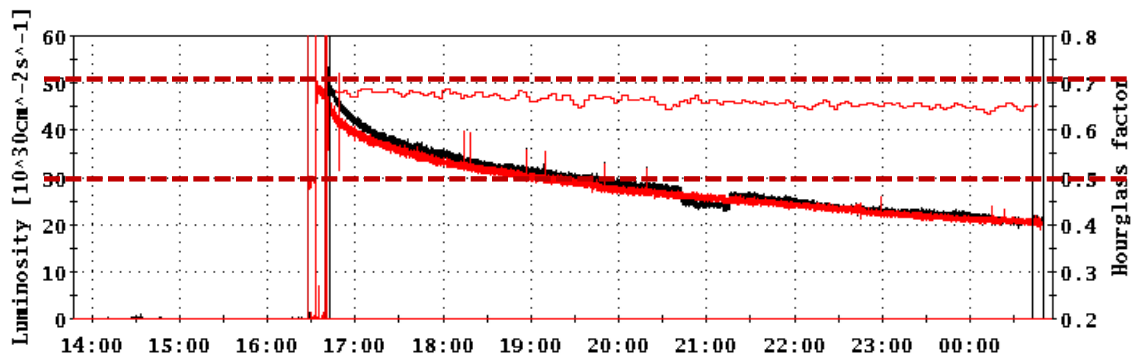
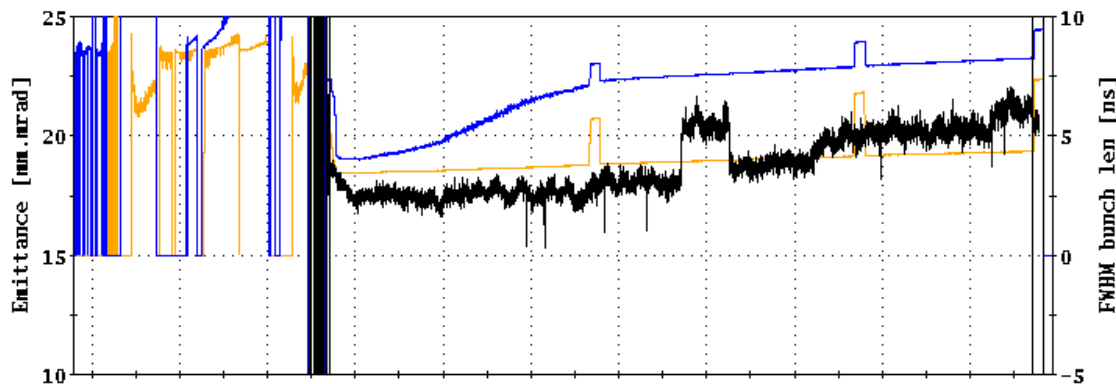
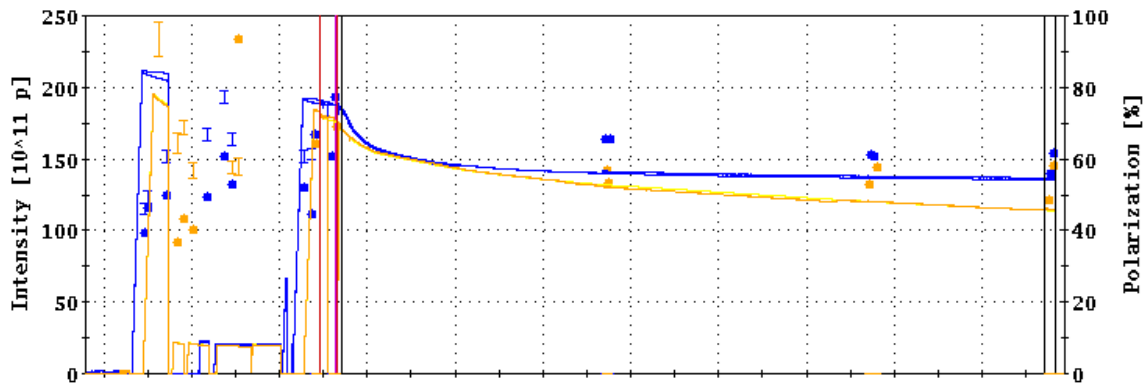
File Window Markers Analysis



# Example -- Store 16445, Sat Feb 18

Setup Display

Help



Fill  Update Species   
 Run

Beam Parameters  
 Pattern  gamma

Collision Parameters

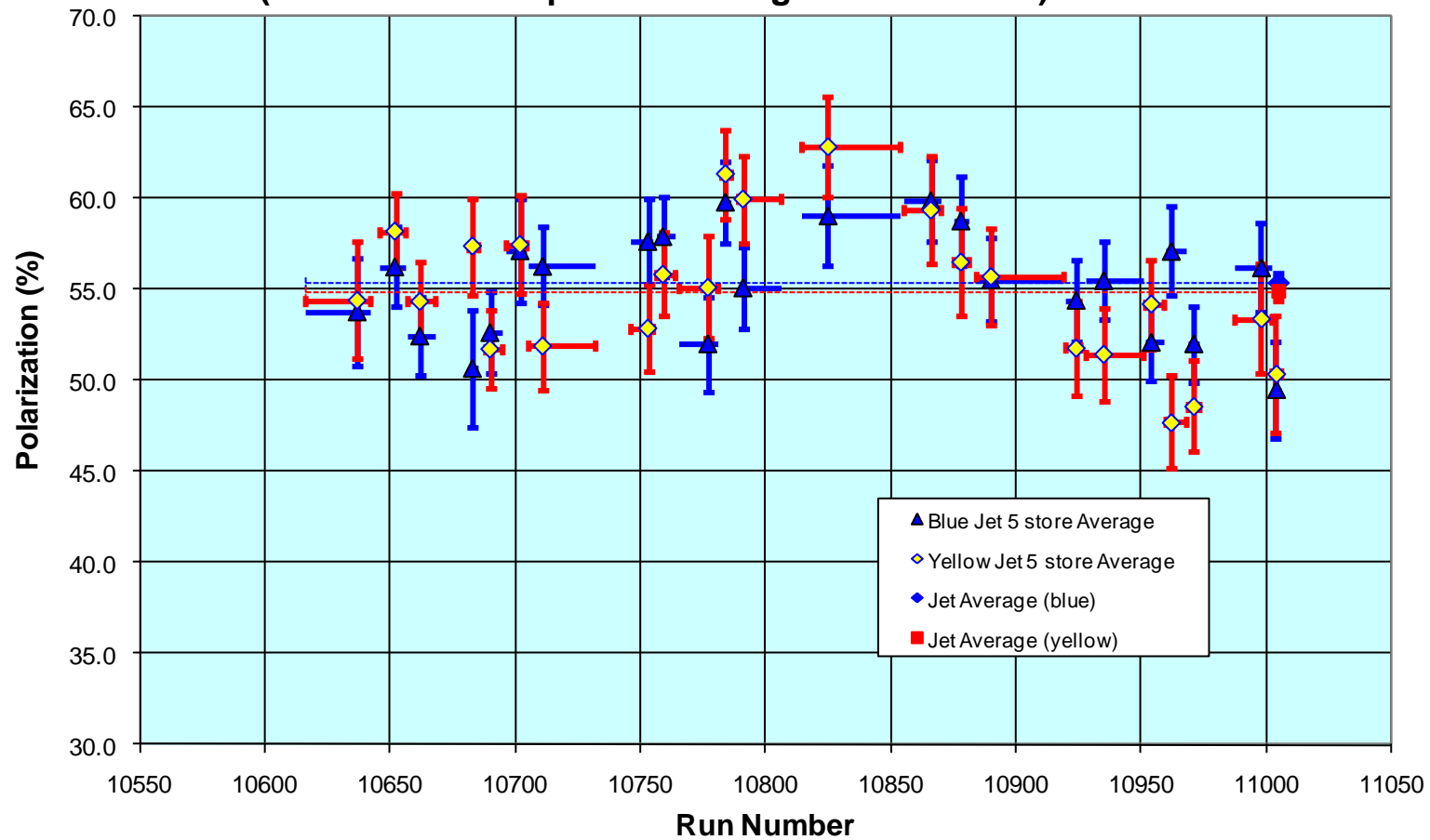
	PHENIX	STAR
No collisions	<input type="text" value="107"/>	<input type="text" value="102"/>
beta* [m]	<input type="text" value="0.85"/>	<input type="text" value="0.85"/>
sigma [mb]	<input type="text" value="0.284"/>	<input type="text" value="0.270"/>
Single Correction	<input type="checkbox"/> All	<input type="checkbox"/> All
sig(1n)/sig(2n)	<input type="text" value="3.000"/>	<input type="text" value="3.000"/>

Fit

dcct  wcm  zdc  Exp  Fit

$L_{\text{peak}}(\text{max})$   
 $L_{\text{store average}}(\text{max})$

**Run 9 200 GeV Jet Target, preliminary results  
(thru 28Jun each point is average over 5 stores)**



Blue Jet weighted average =  $55.4 \pm 0.5$

Yellow Jet weighted average =  $54.9 \pm 0.5$

## Run 12 projection for $\sqrt{s} = 200$ GeV pp

STAR Goal: 27 pb<sup>-1</sup> delivered with 55-60 % polarization

PHENIX Goal: 27 pb<sup>-1</sup> delivered with 55-60 % polarization

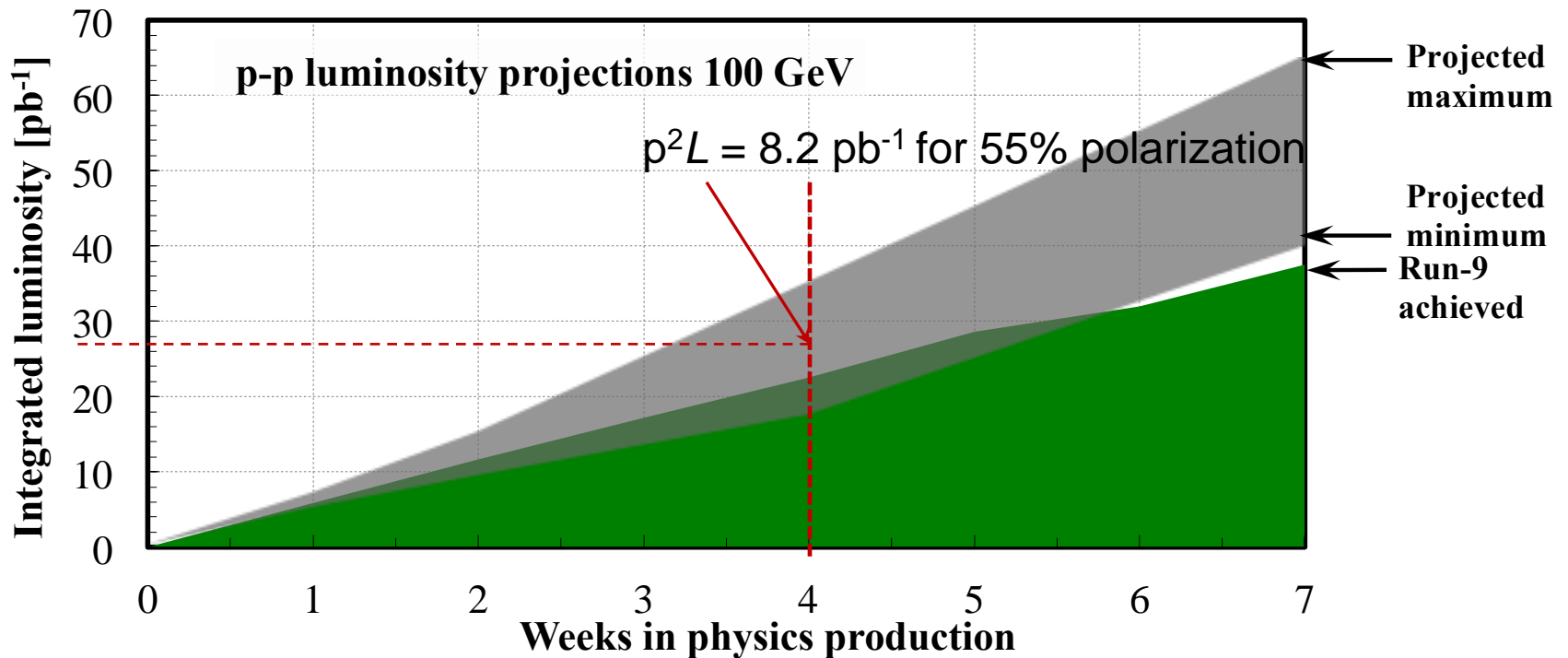


Figure 3: Projected minimum and maximum integrated luminosities for polarized proton collisions at 100 GeV beam energy, assuming a linear weekly luminosity ramp-up in 4 weeks. An average store polarization between 50 and 60% is expected.

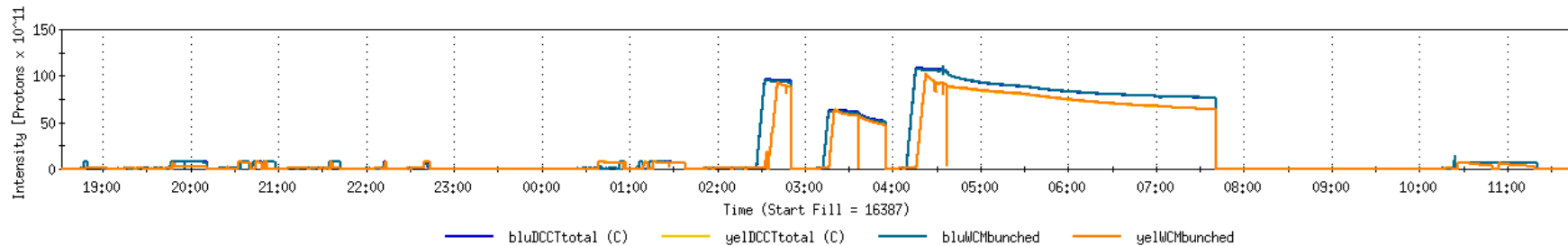
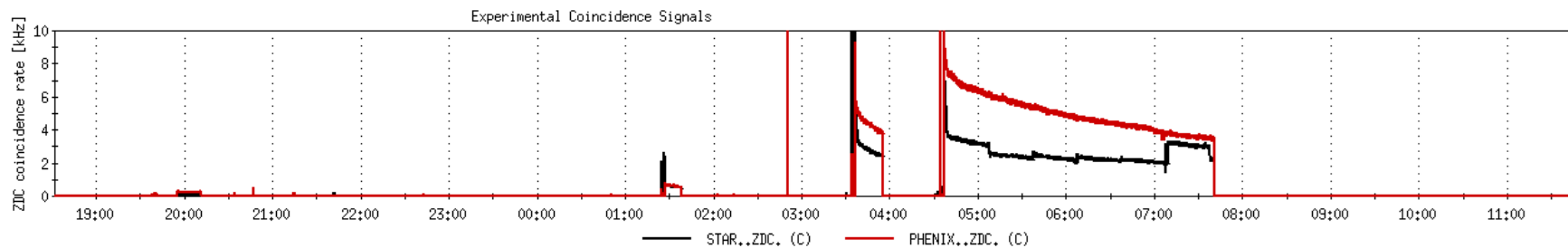
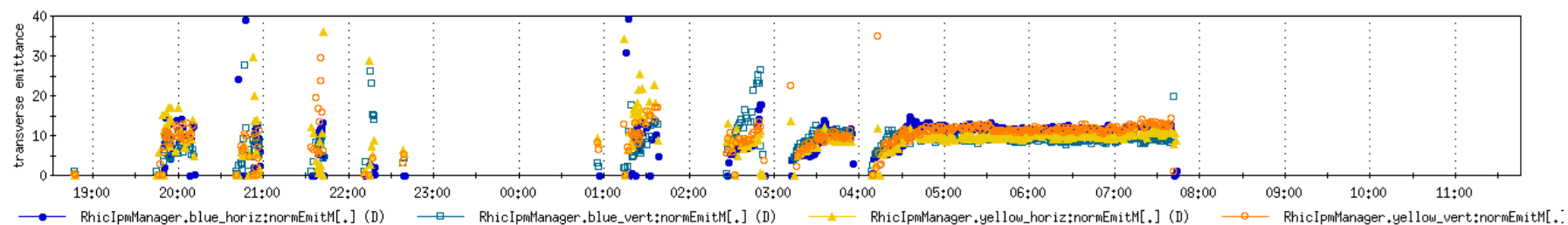
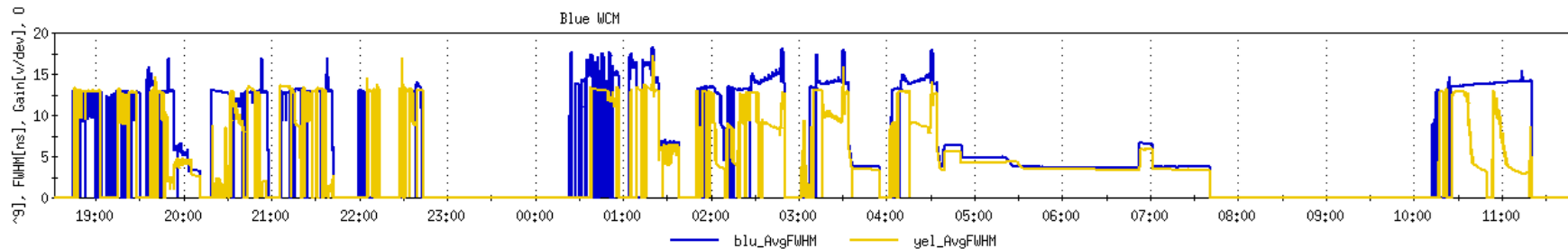
From Fischer et. Al. "RHIC Collider Projections (FY 2012 – FY 2016)"

14 October 2011

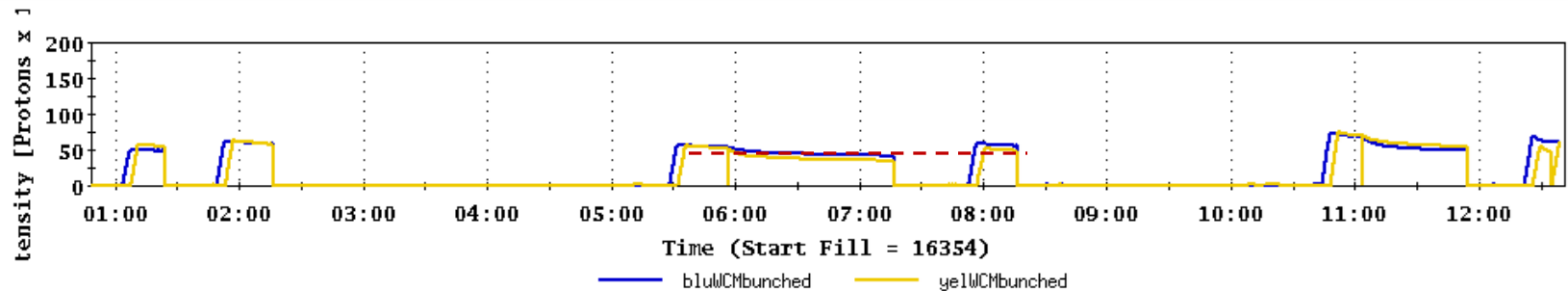
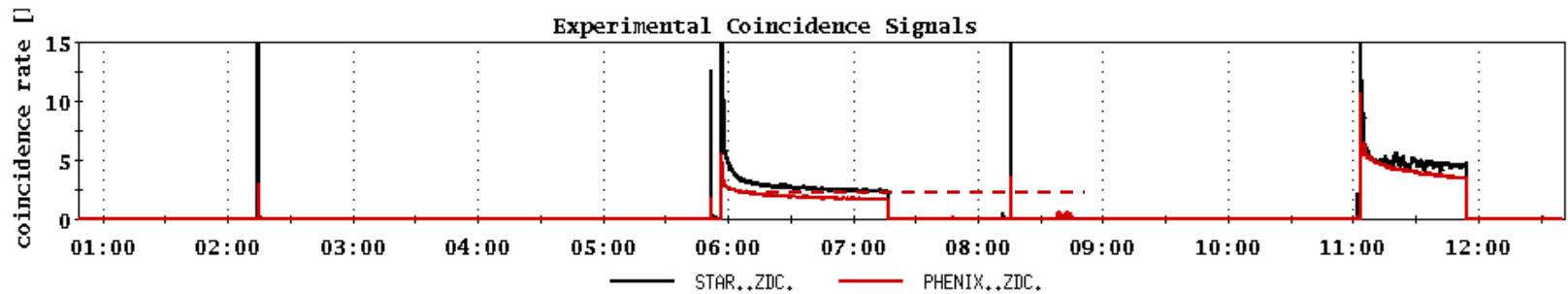
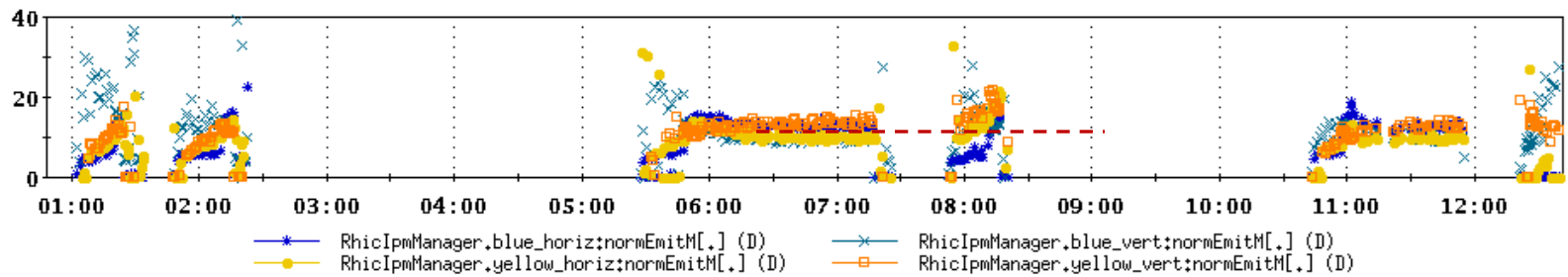
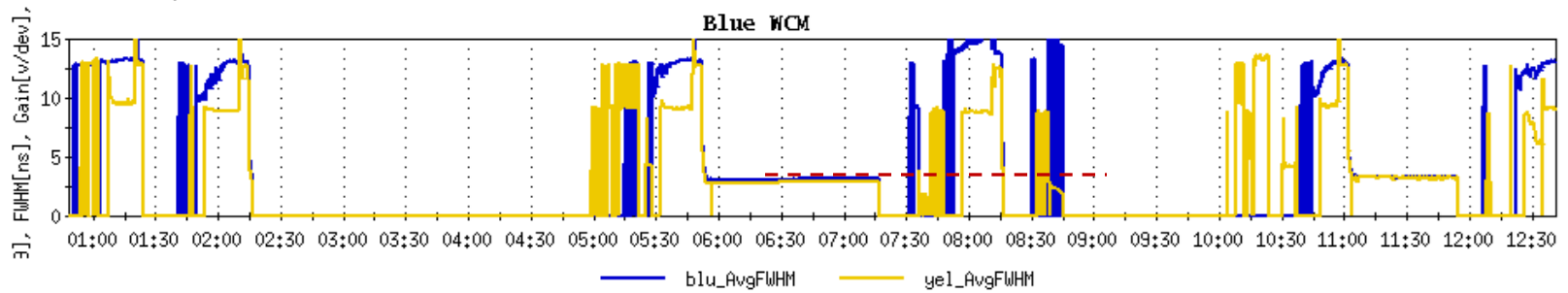
# First Physics Store (#16397, 04:01, 10 Feb)

RHIC/BeamIons.logreq 02/09/2012 18:31 - 02/10 11:46

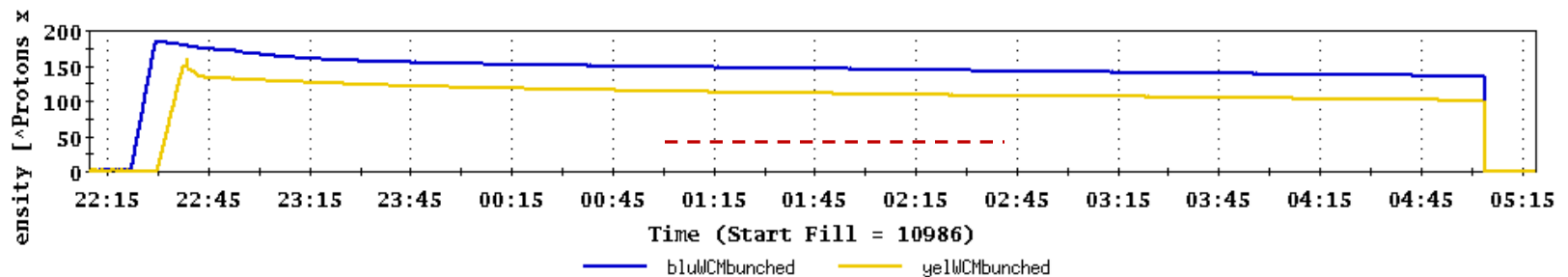
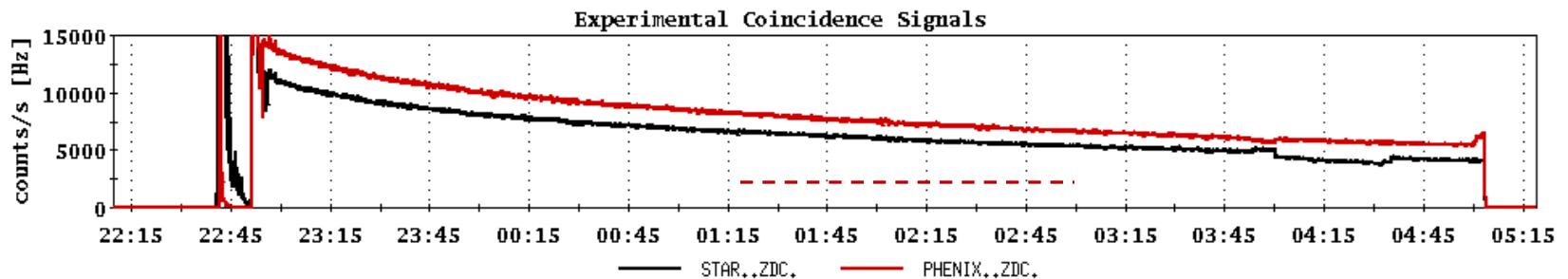
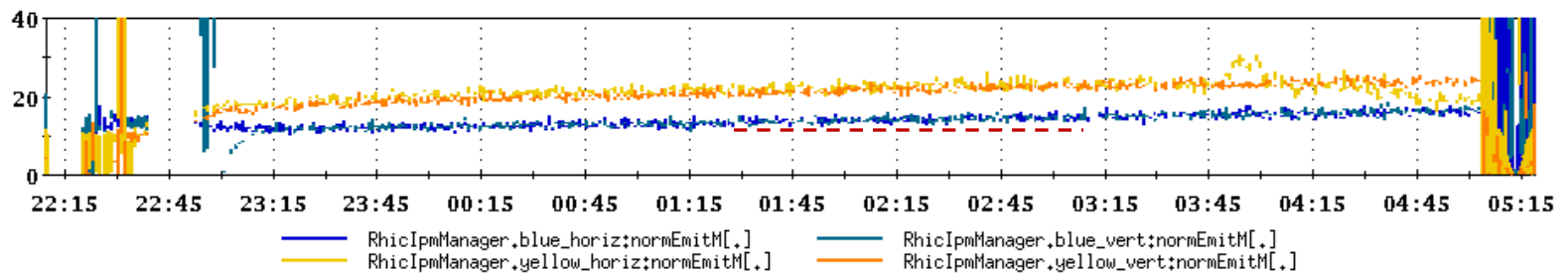
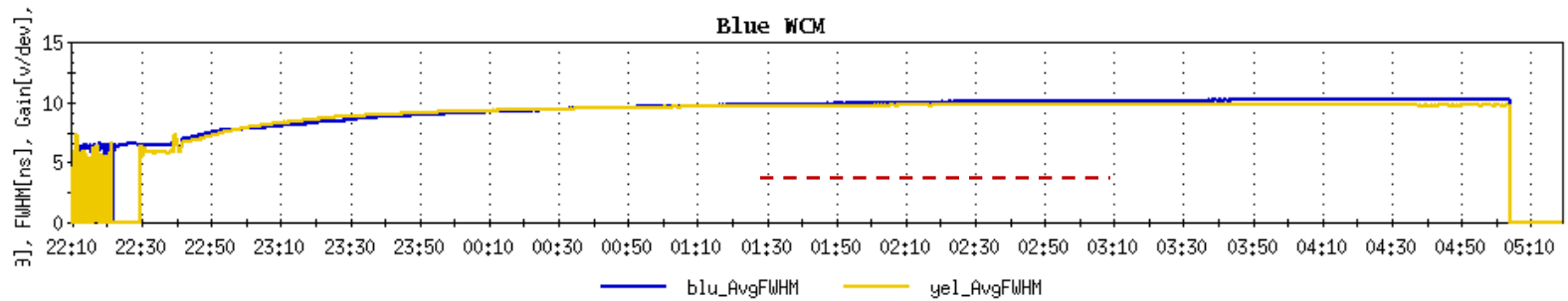
File Window Markers Analysis



Today, 7 Feb 2012

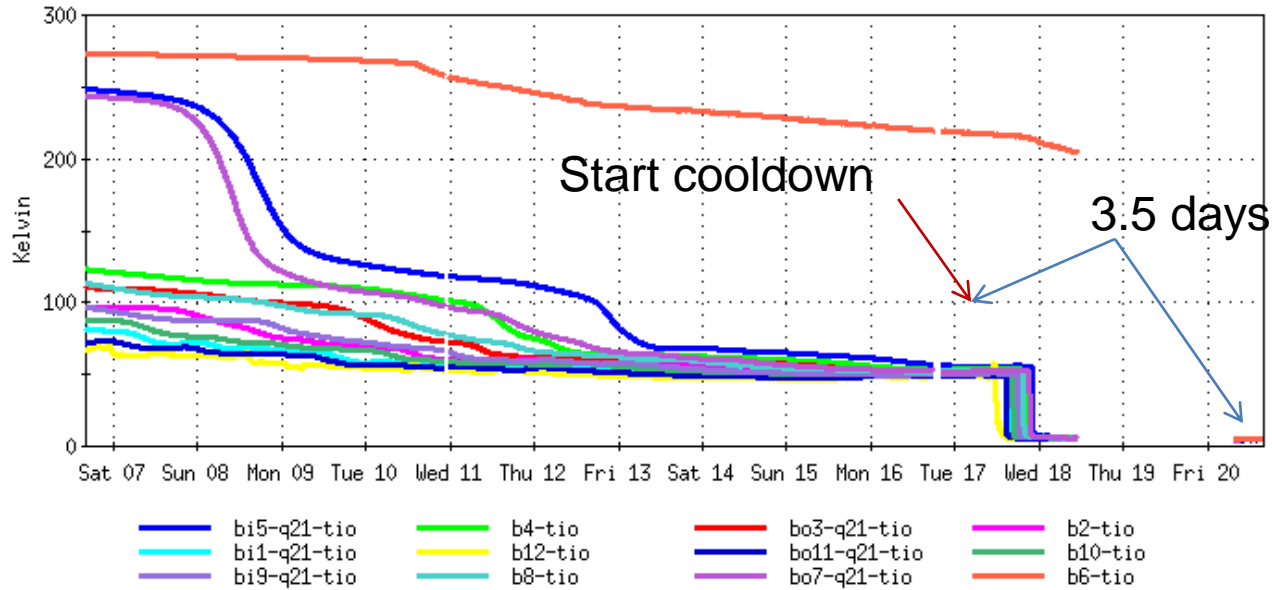


# Typical Store from Run 9, 100 x 100 GeV pp

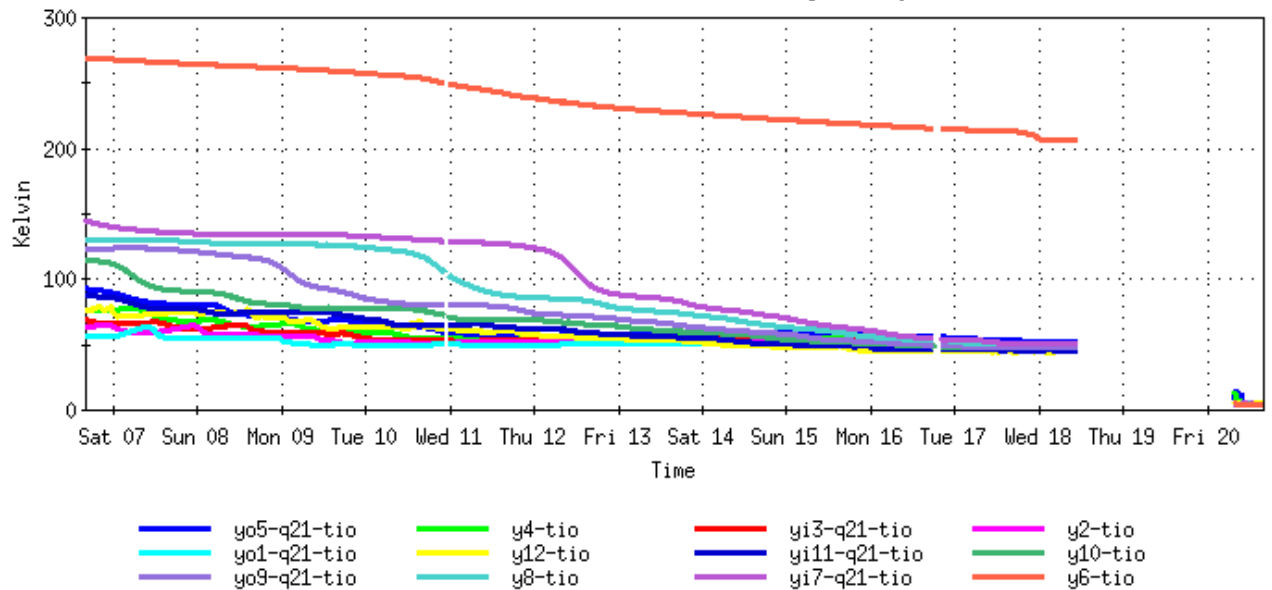


Blue Cryo Temperatures

As of 16:18 hrs 20 Jan






Yellow Cryo Temperatures

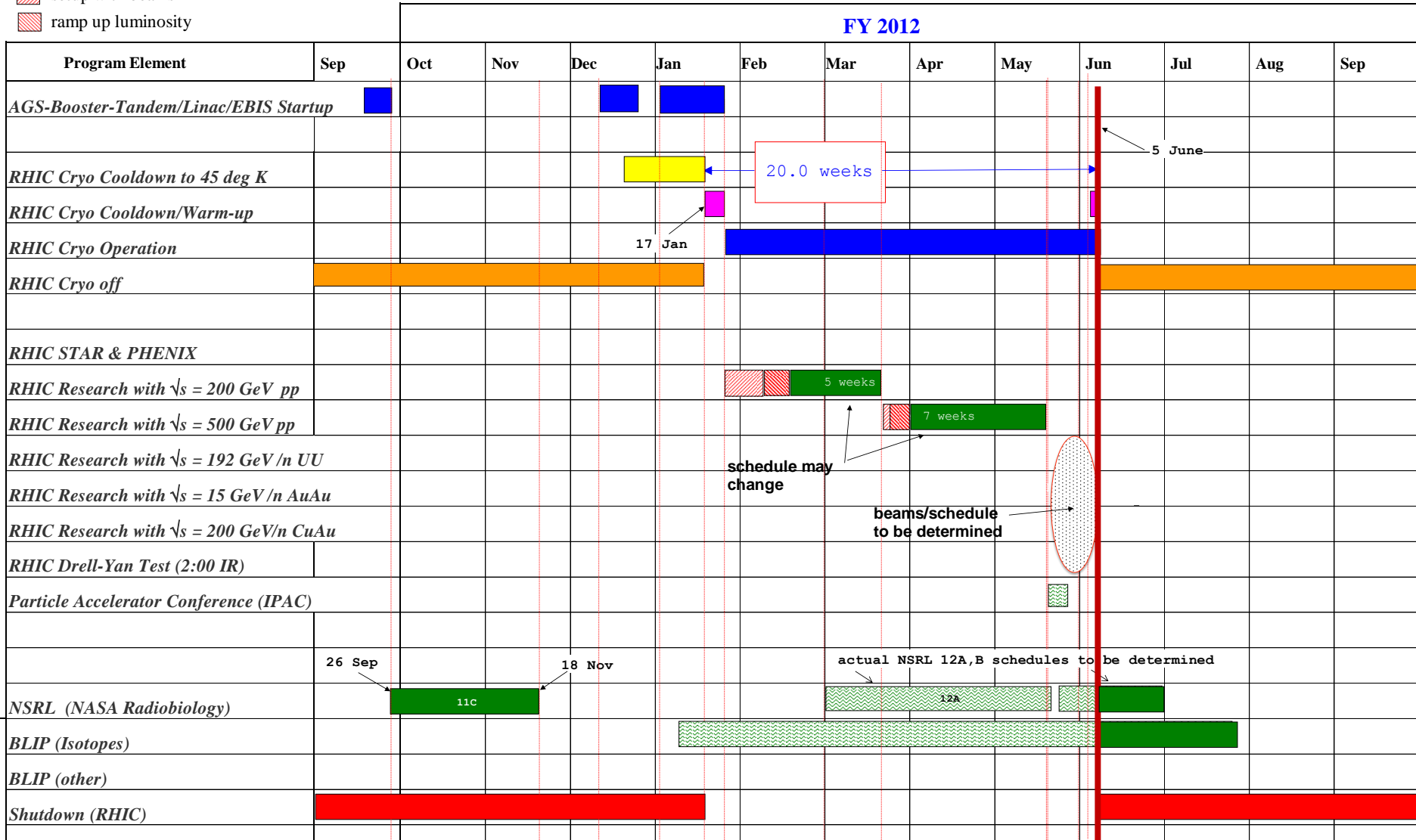




# C-A Operations-FY12

planned (budget permitting)

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



# Recommendations following the June 6-8, 2011 PAC

For Run 12 the PAC recommends the following (*in order of priority*):

- 5 weeks of running with polarized proton collisions at 200 GeV.
- 7 weeks of running with polarized proton collisions at 500 GeV.
- 5 weeks of running with Cu+Au collisions at 200 GeV.
- 3 weeks of running with U+U collisions at 193 GeV.

For Run13 the PAC recommends the following (*not in order of priority*):

- 12 weeks of running with polarized proton collisions at 500 GeV.
- 5 week of running with polarized proton collisions at 200 GeV.
- 7 weeks of running with Au+Au collisions at full energy.

## Cryo Issue

Our helium supplier no longer able to meet our peak demand of 4 trailers in a one week period. They can give us one trailer a week starting on December 31st, so we expect to have all the helium we need, on time, but we will have to store most of it in the dewars outside 1006B. This will result in our 4K cooldown being a little less stable and predictable than it has been for the past few years when we received all of the helium at 1005R over a short period of time. Because of this, I expect the 4K cooldown will take a least one additional day.

### **Cryogenic System Cooldown Projection based on Full Compressor Power Starting on January 17, 2012**

**.5 to 1 MW – Nov 23, 2011 through Dec 18, 2011** (temporary peaks up to 2 MW)

Scrub of RHIC rings and cryo plant, 14 atm pressure test of blue sextants 2/3 and 8/9 M-lines. Main compressor testing and scrub.

**2.8 MW – Dec 19, 2011 through Jan 16, 2012**

12/19/11	Start 45K cooldown of cryo plant
12/20/11	Start 45K wave in both RHIC rings
12/31/11	First liquid helium delivery, 1006B
01/07/12	Second liquid helium delivery, 1006B
01/14/12	Third liquid helium delivery, 1005R

**6 to 8 MW – Jan 17, 2012 through Jan 22, 2012**

01/17/12	Start 4K wave in Blue ring, Hi potting (3 days)
01/20/12	Estimate blue ring cold and stable, soak complete, ready for magnet powering.
01/20/12	Start 4K wave in Yellow ring, Hi potting (3 days)
01/21/12	Fourth liquid helium delivery
01/23/12	Estimate yellow ring cold and stable, soak complete, ready for magnet powering.

**5 MW starting on Jan 23, 2012**

01/23/12	Start T7 turbine
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## FY2012

Sept billed at \$70/MWhr actual cost \$42.86 -- \$438K added to bank

Oct billed at \$60/MWhr actual cost \$62.80 -- \$45.5K withdrawn from bank

FY2012 Bank Total = \$392,563

FY2012 Electric Rates			FY11 Rates
Month	Original	Revised	As Billed
	\$/kWh	\$/kWh	\$/kWh
Oct-11	0.060		0.065
Nov-11	0.060		0.065
Dec-11	0.060		0.065
Jan-12	0.053		0.055
Feb-12	0.053		0.055
Mar-12	0.053		0.055
Apr-12	0.053		0.055
May-12	0.053		0.055
Jun-12	0.068		0.070
Jul-12	0.068		0.070
Aug-12	0.068		0.070
Sep-12	0.068		0.070

# From Fischer et. al. "RHIC Collider Projections (FY 2012 – FY 2016)"

14 October 2011

Cool-down from 50 K to 4 K	1 week	
Set-up mode 1 (p↑-p↑ at 100 GeV)	1 week	(no dedicated time for experiments)
Ramp-up mode 1	2 week	(8 h/night for experiments)
Data taking mode 1 with further ramp-up	5 weeks	
Set-up mode 2 (p↑-p↑ at 250 GeV)	½ week	(no dedicated time for experiments)
Ramp-up mode 2	1 week	(8 h/night for experiments)
Data taking mode 2 with further ramp-up	7 weeks	
Set-up mode 3 (U-U at 100 GeV/nucleon)	1 week	(no dedicated time for experiments)
Data taking mode 3 with further ramp-up	3 weeks	
Warm-up	½ week	



## Run 12 projection for $\sqrt{s} = 500$ GeV pp

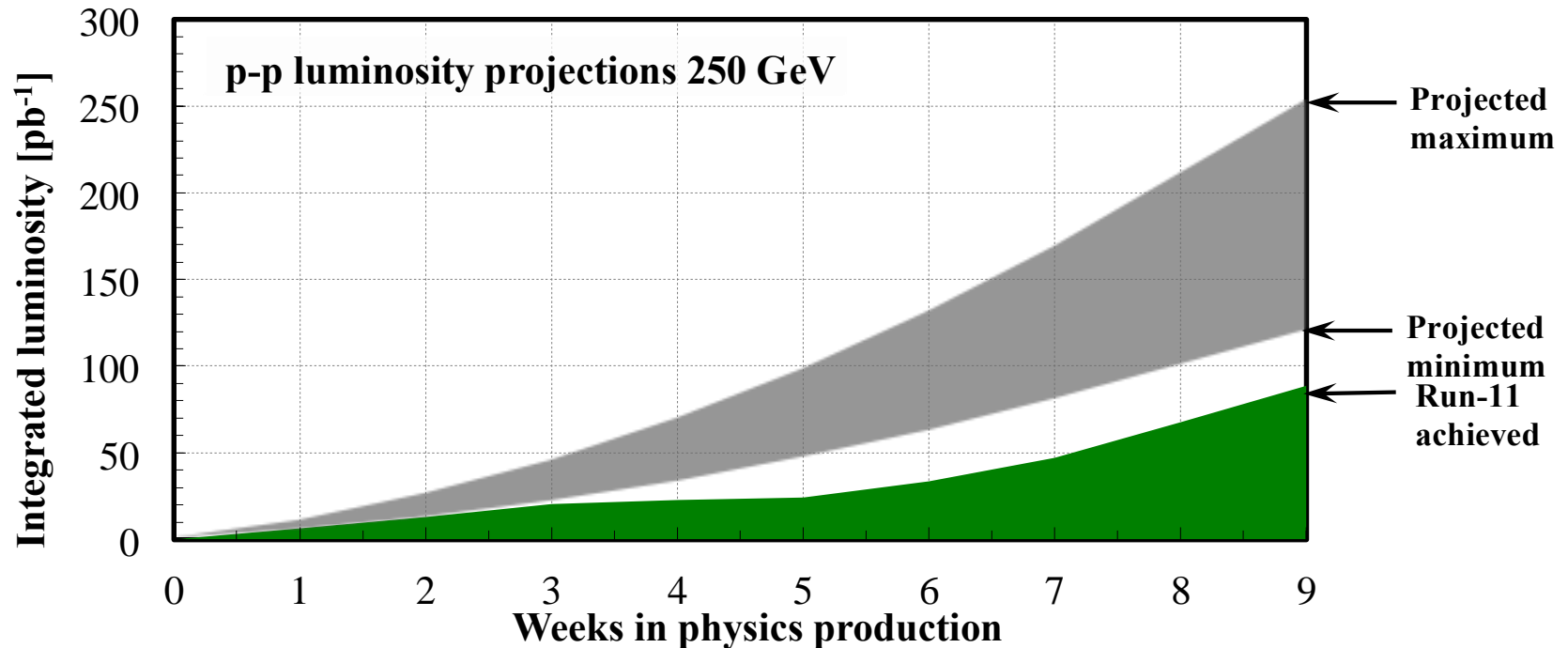


Figure 4: Projected minimum and maximum integrated luminosities for polarized proton collisions at 250 GeV beam energy, assuming linear weekly luminosity ramp-up in 8 weeks. An average store polarization between 45 and 50% is expected.

From Fischer et. Al. "RHIC Collider Projections (FY 2012 – FY 2016)"

14 October 2011

# Run 12 projection for $\sqrt{s} = 193$ GeV/n UU

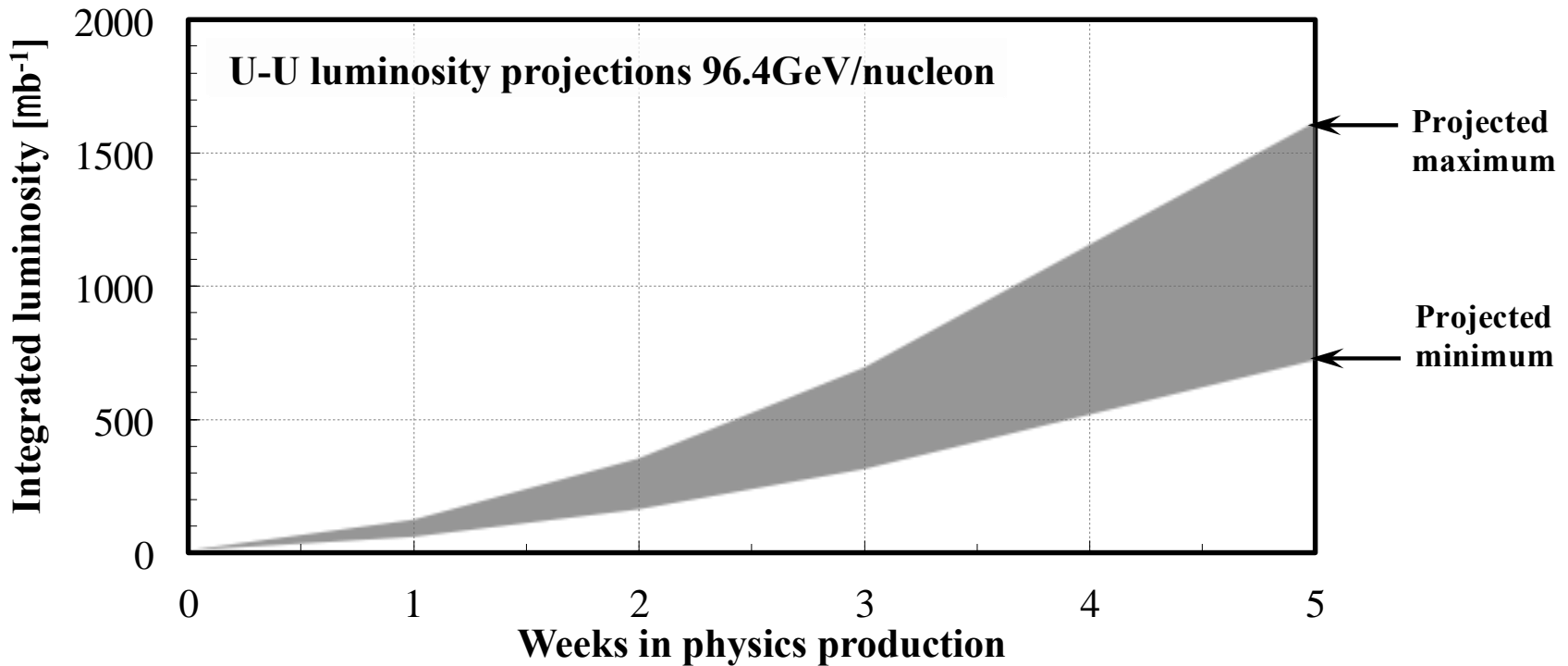


Figure 5: Projected minimum and maximum integrated luminosities for uranium-uranium at 96.4 GeV/nucleon, assuming linear weekly luminosity ramp-up in 48 weeks.

From Fischer et. Al. "RHIC Collider Projections (FY 2012 – FY 2016)"

14 October 2011

## Run 12 projection for $\sqrt{s} = 200$ GeV/n CuAu

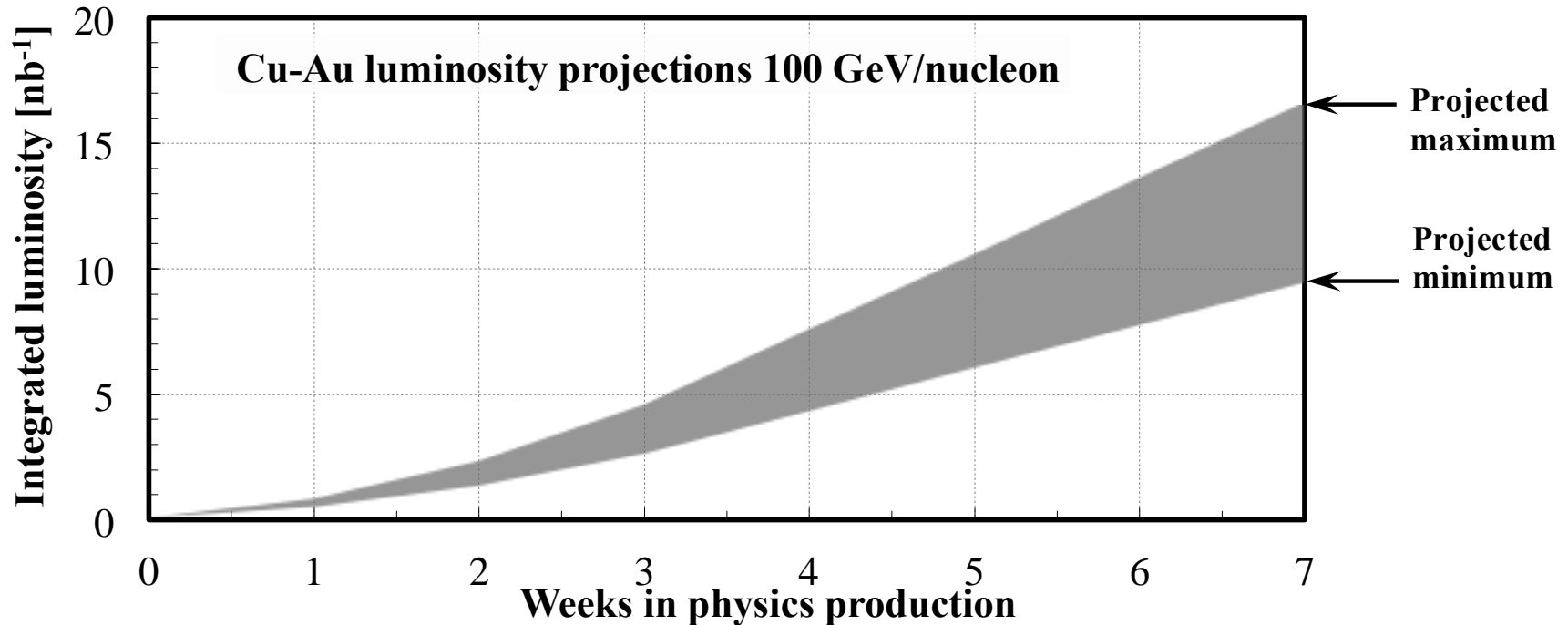


Figure 6: Projected minimum and maximum integrated luminosities for copper-gold collisions at 100 GeV/nucleon beam energy, assuming linear weekly luminosity ramp-up in 4 weeks.

From Fischer et. Al. "RHIC Collider Projections (FY 2012 – FY 2016)"

14 October 2011