

Run 15 RHIC Machine/Experiments Meeting

26 May 2015

Agenda:

- **Run 15 Schedule (Pile)**
- **When to begin pAl run? (experiments)**

Run 15 plan based on 22 weeks cryo operation

with 10 day extension of the 100 GeV pp run and **3 days added to end**

- 20 Jan, Begin cool-down to 4.5K
- 21 Jan (morning), Blue cold
- 22 Jan (evening), Yellow cold
- 23 Jan (after midnight), Beam in Blue
- 7 Feb, First overnight stores for experiments
- 10 Feb (3 days early) store 18662, Begin 9 week $\sqrt{s}=200$ GeV pp physics run
- 14-17 Mar, Power Dip downtime
- 27 April (Mon, 0700), End 10.9 week $\sqrt{s}=200$ GeV pp physics run
- ~~8~~ 4 May (Fri **Mon**), [**4 days early, store 19020**]
Begin 5 week $\sqrt{s}=200$ GeV/n pAu physics run

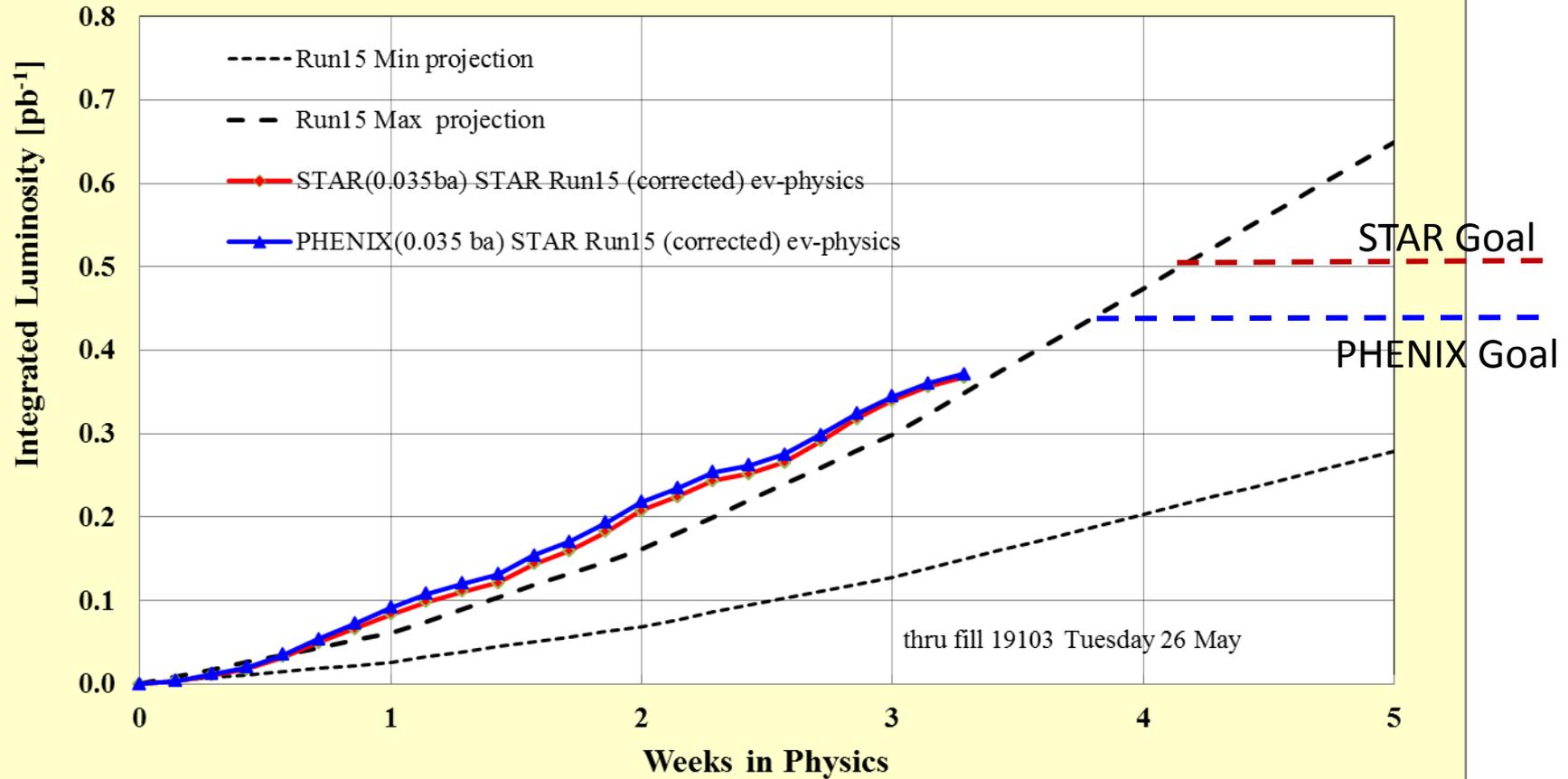
today, 26 May...

- ~~12~~ 8 June (Fri **Mon**), End 5 week $\sqrt{s}=200$ GeV/n pAu physics run
- ~~15~~ 11 June (~~Mon~~ **Thu**), Begin 2 week $\sqrt{s}=200$ GeV/n pAl physics run
- ~~19~~ 22 June (Fri **Mon**), End 11 day $\sqrt{s}=200$ GeV/n pAl physics run
- ~~19~~ 22 June (Fri), begin cryo warm-up
- ~~23~~ 25 June, cryo warm-up complete, 22.4 cryo weeks of operation

See <http://www.rhichome.bnl.gov/AP/Spin2015/> for the Run Coordinator's detailed plan₂

Through fill 19103, 5/26/15

Run15 (pAu) Delivered Luminosity ($\sqrt{s}=200$ GeV)

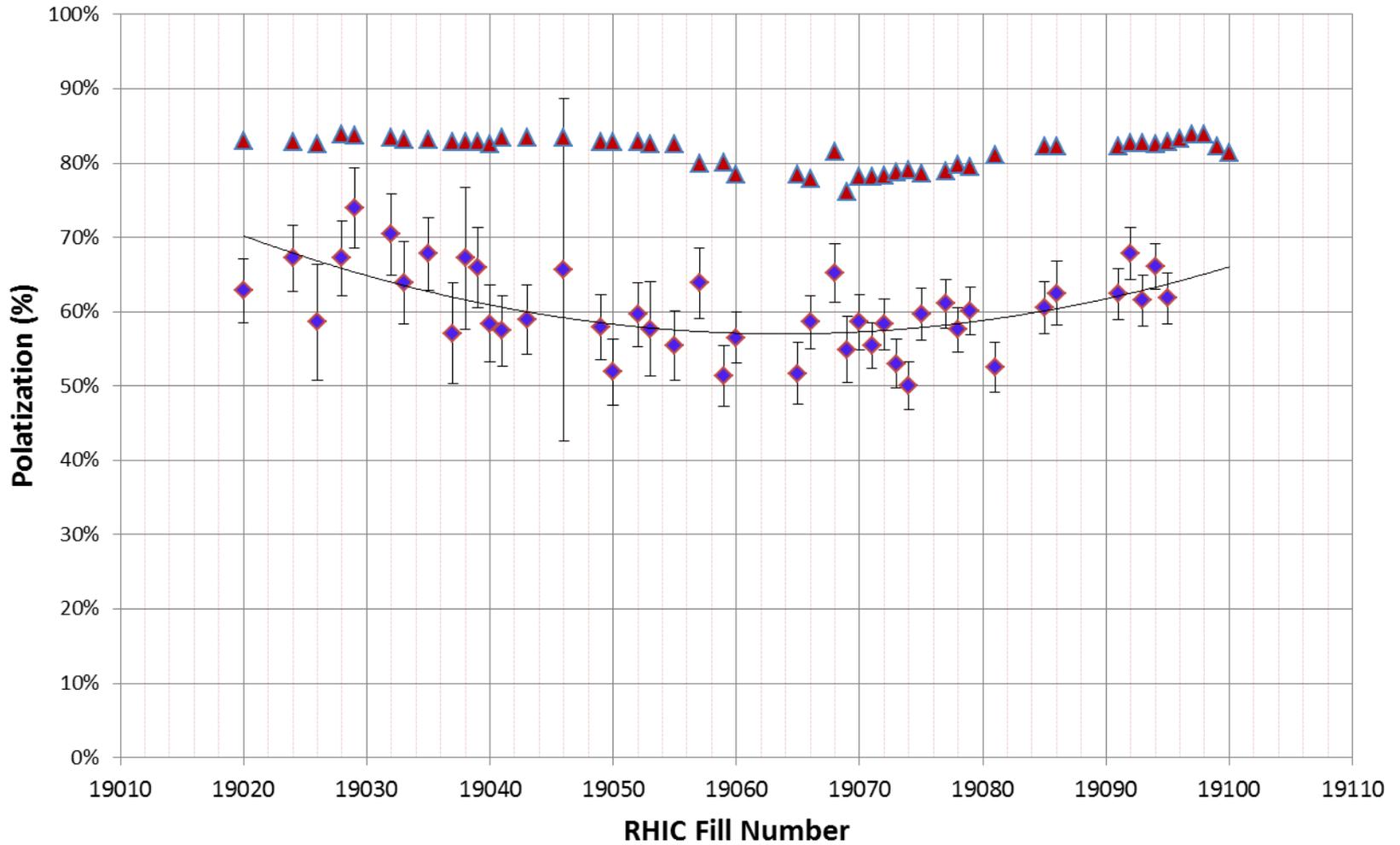


Weighted average $59.6 \pm 0.61\%$

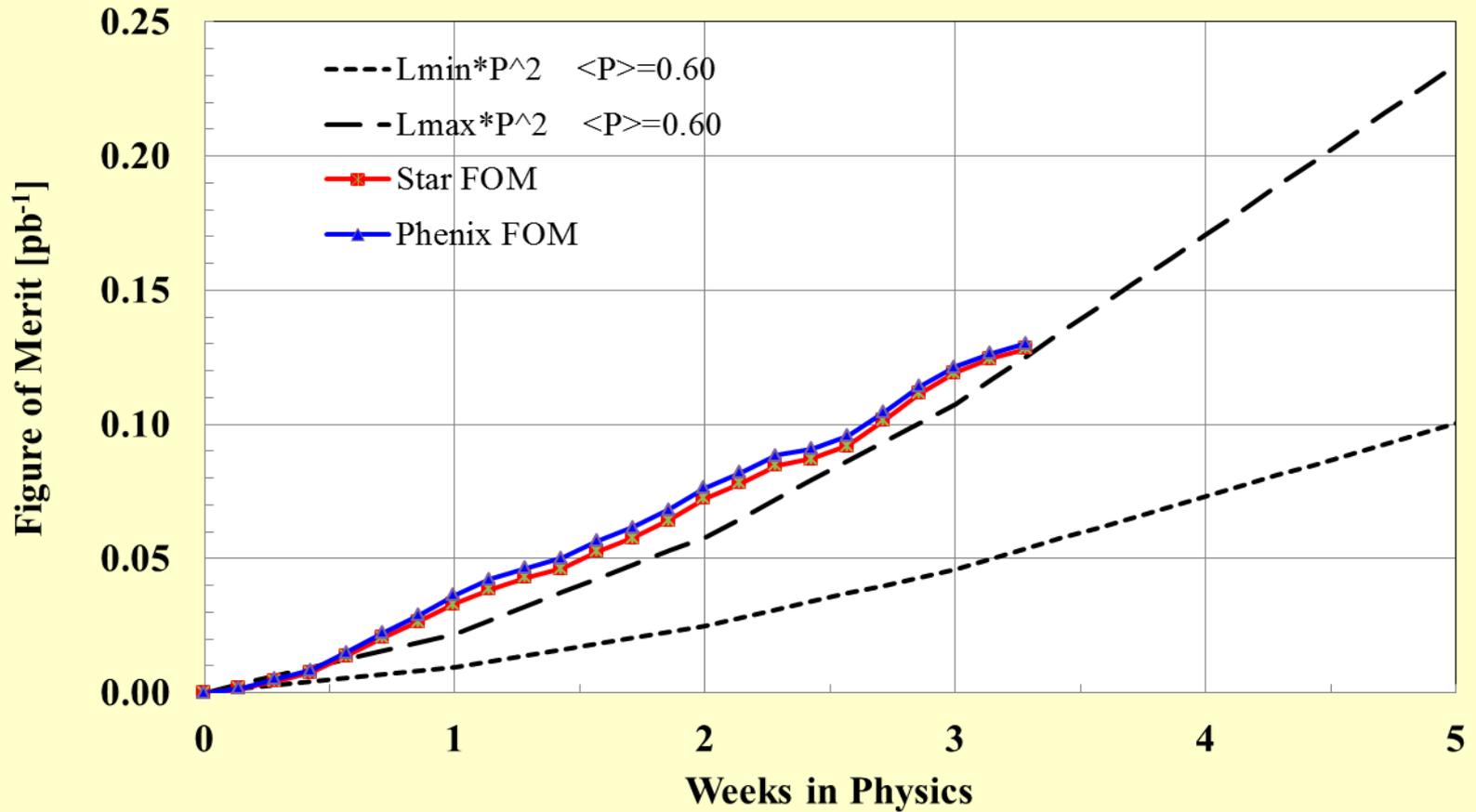
Through fill 19095, 5/23/15

Run 15 pAu Jet Target Polarization Measurements

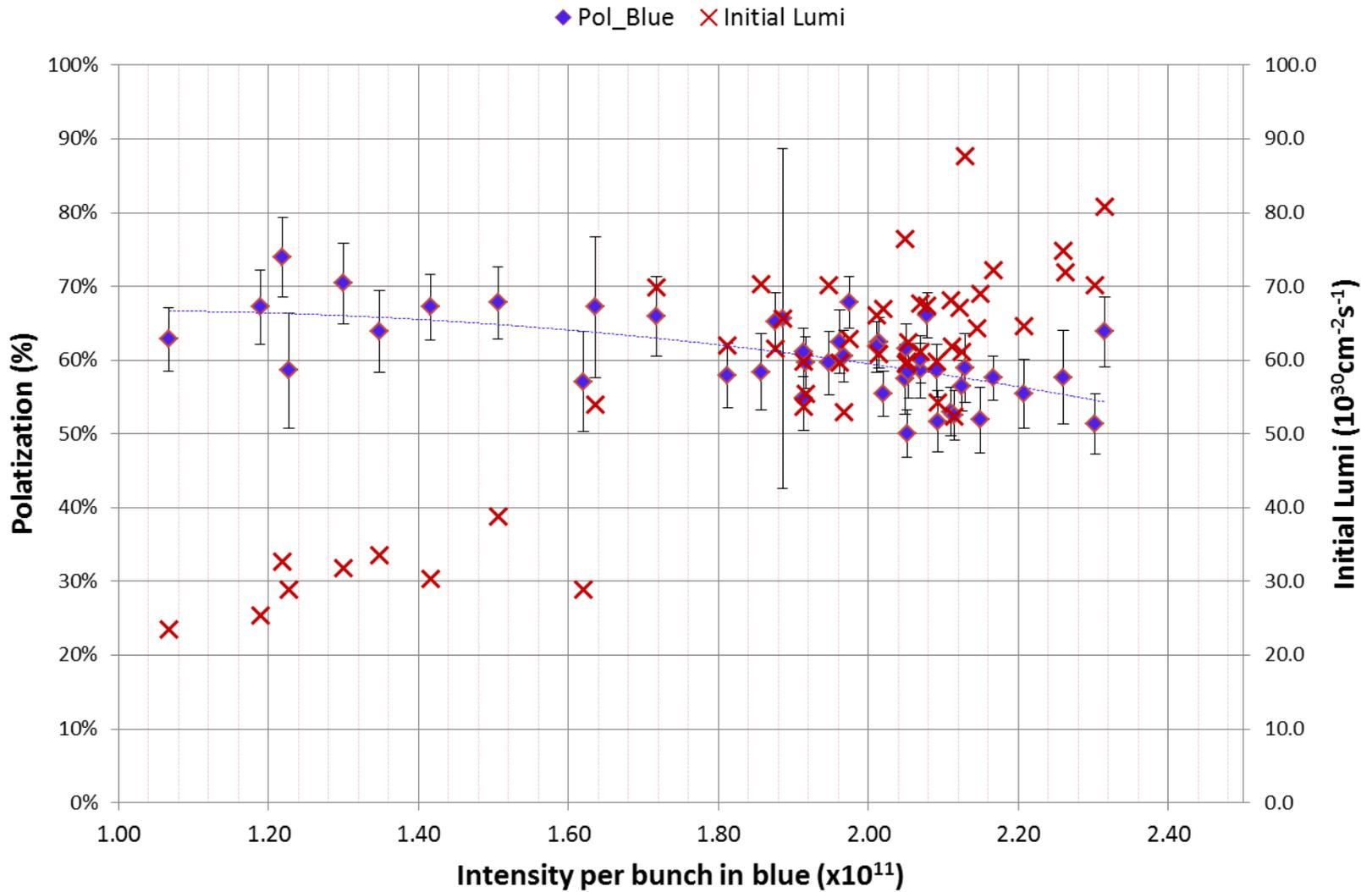
◆ Pol_Blue ▲ Pol_Oppis (LogView) — Poly. (Pol_Blue)



Run15 pAu Figure of Merit, CNI [LP²]



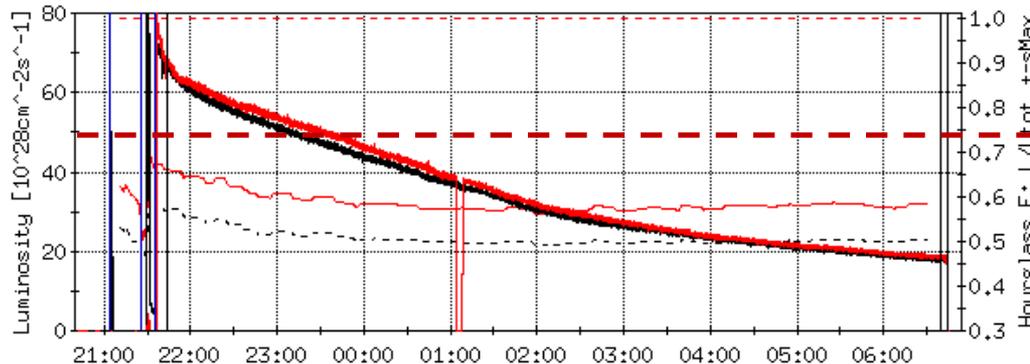
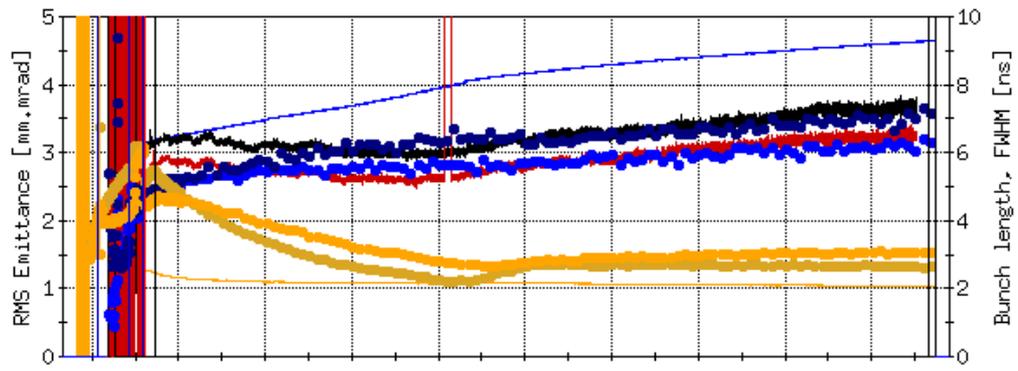
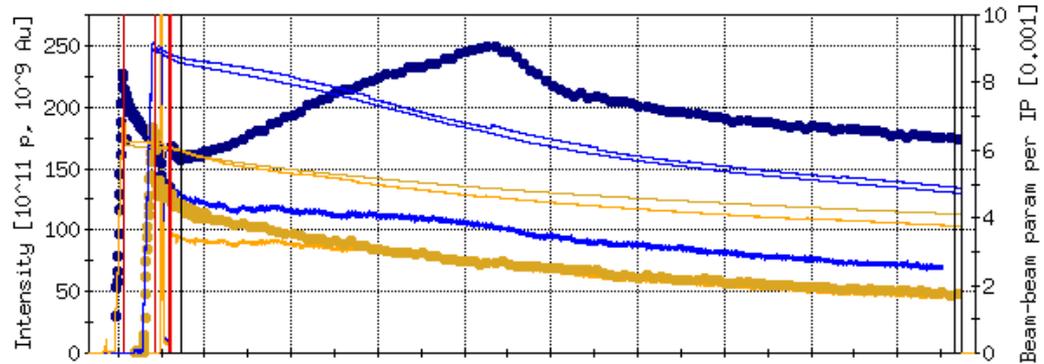
Run 15 pAu Jet Target Polarization Measurements



Archive

Setup Display

Help



Fill: 19078 Update Species: ppAu
 Run: run_fy15

Beam Parameters
 Pattern: 111x109 gamma: 107.396

	PHENIX	STAR
Number collisions	111	102
beta* [m]	0.77	0.77
sMax [m]	0.40	10.00
sigma [mb]	34.000	35.000
Single Correction	All <input type="checkbox"/>	All <input type="checkbox"/>

Update Display

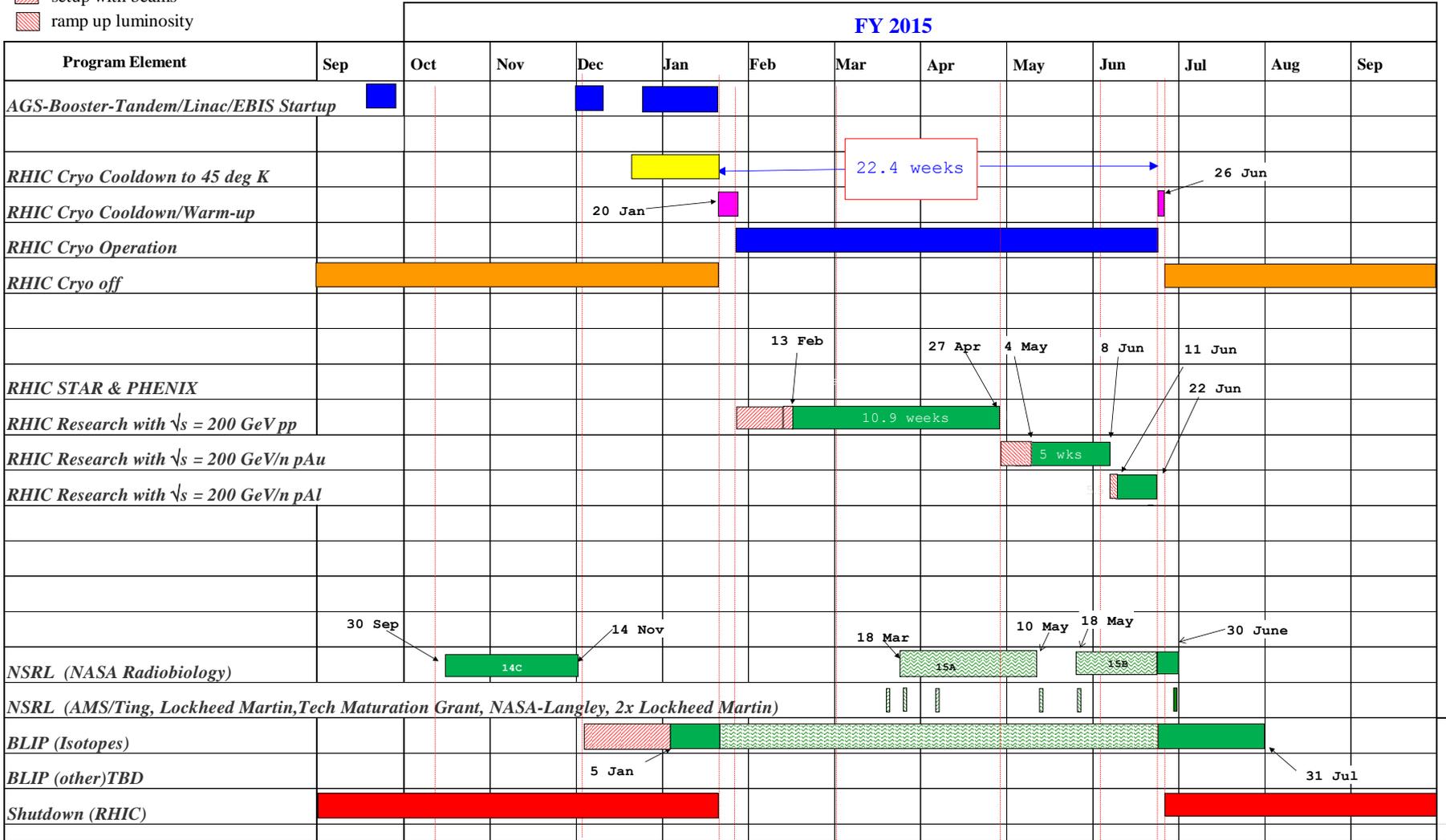
Maximum L_{store} avg

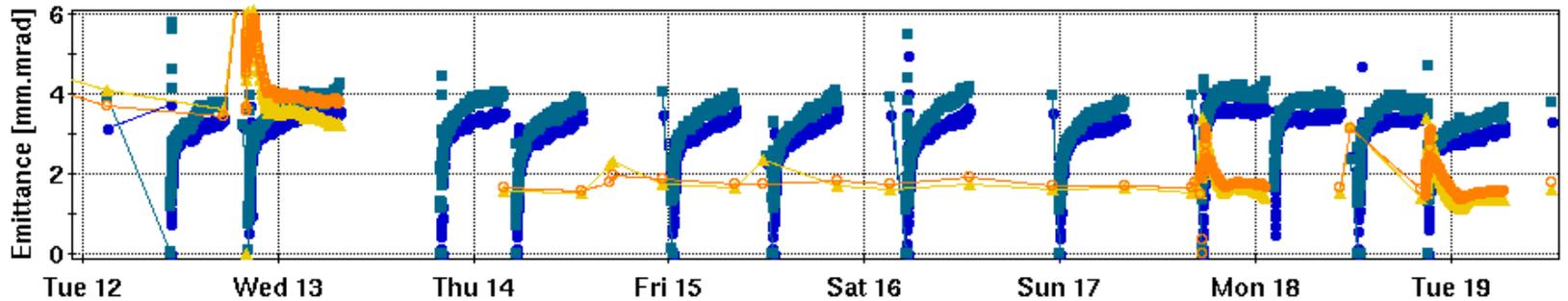
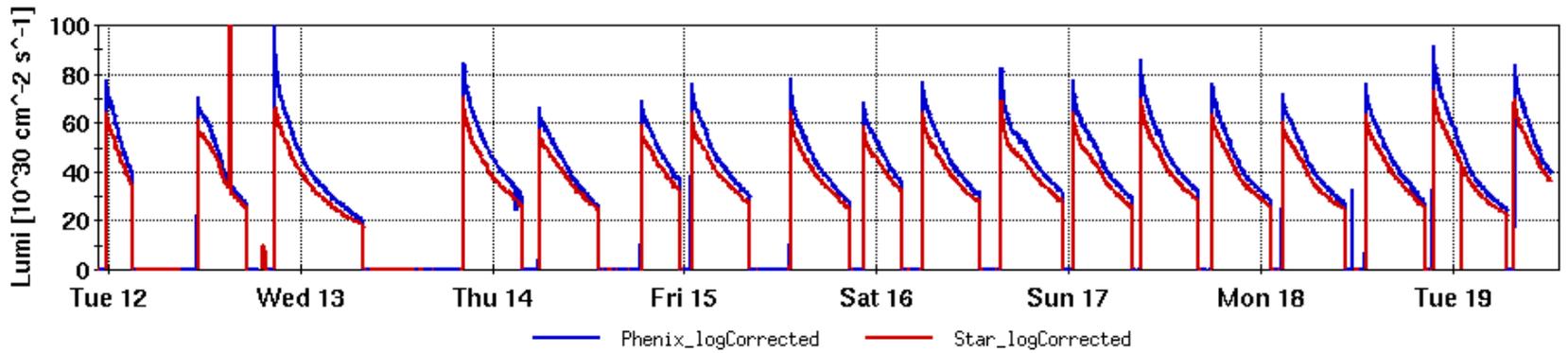
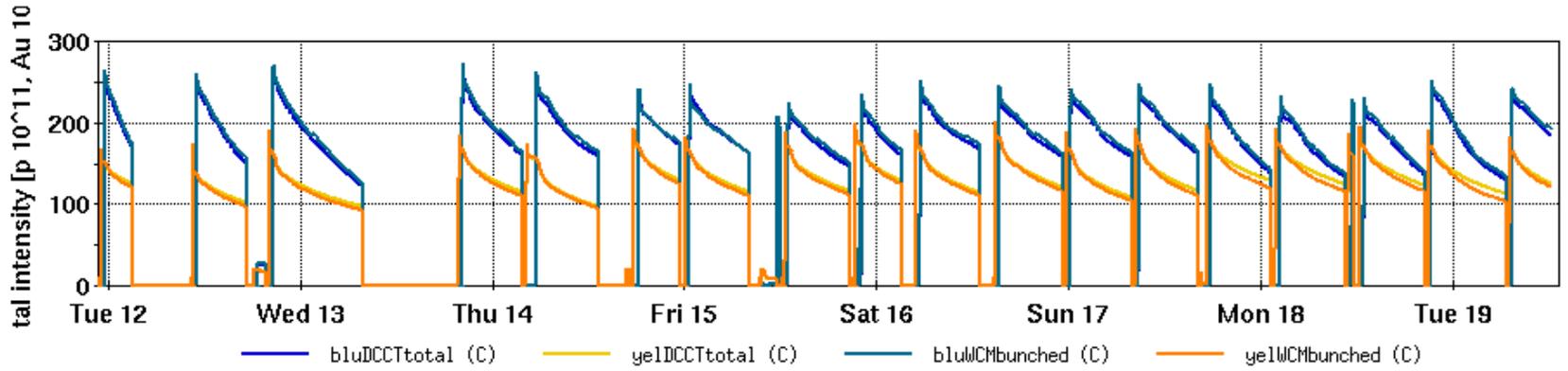
Tue May 19 12:51:00 2015 - INFO : Phenix Int Lumi = 10846
 Tue May 19 12:51:00 2015 - INFO : Star avg Lumi = 3452
 Tue May 19 12:51:00 2015 - INFO : Star Int Lumi = 11195

C-A Operations-FY15

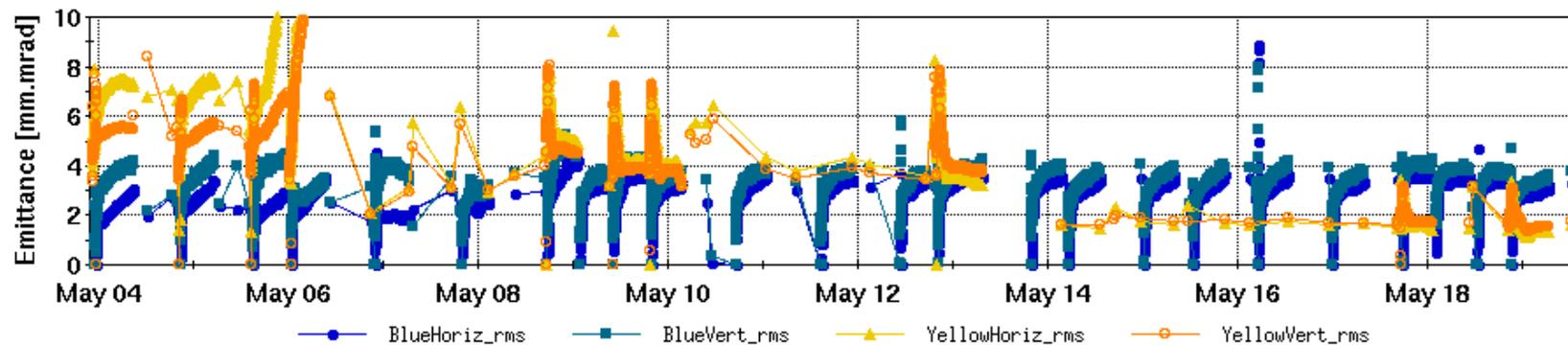
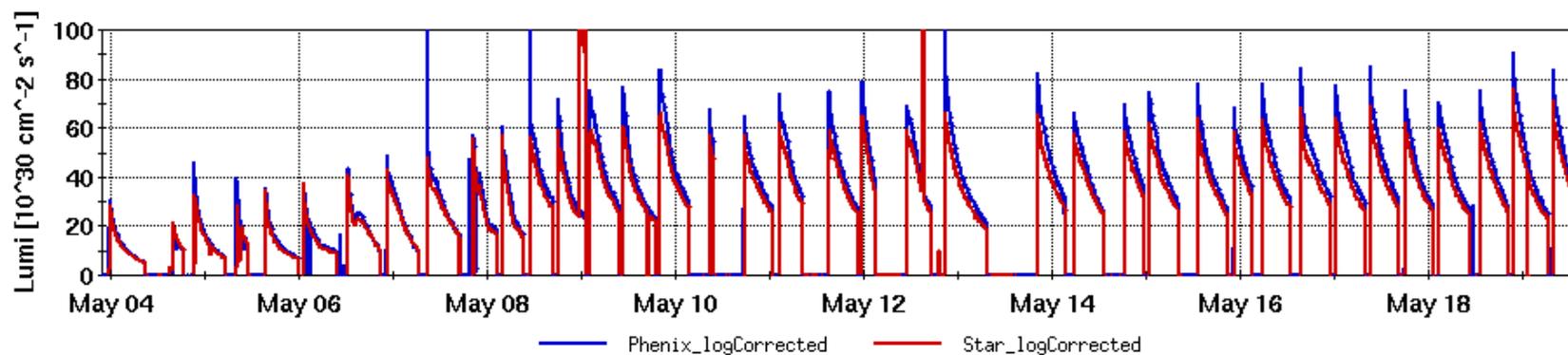
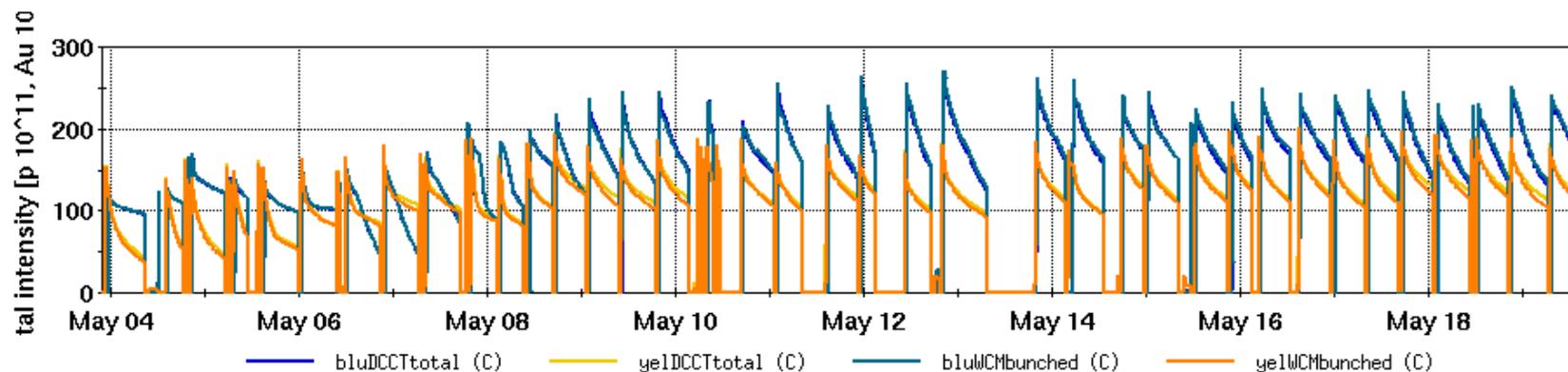
as run, planned

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





File Window Markers Analysis



p+Au @ 200 GeV, Experiment Goals

PHENIX:

- 5 week goal is 190 nb⁻¹ sampled within $|z| < 40$ cm and polarization (transverse) = 60%.
 - Assumptions:
 - Uptime = 70%
 - Fraction of events within 40 cm = 70%
 - Live Time = 90%
- delivered lumi = $190 / (0.7 * 0.7 * 0.9) = 430$ nb⁻¹

STAR:

- 5 week goal is 300 nb⁻¹ sampled and polarization (transverse) = 60%.
 - Assumptions:
 - Sampling efficiency = 60%
- delivered lumi = $300 / (0.6) = 500$ nb⁻¹

Pol goal = 60% (experiments)

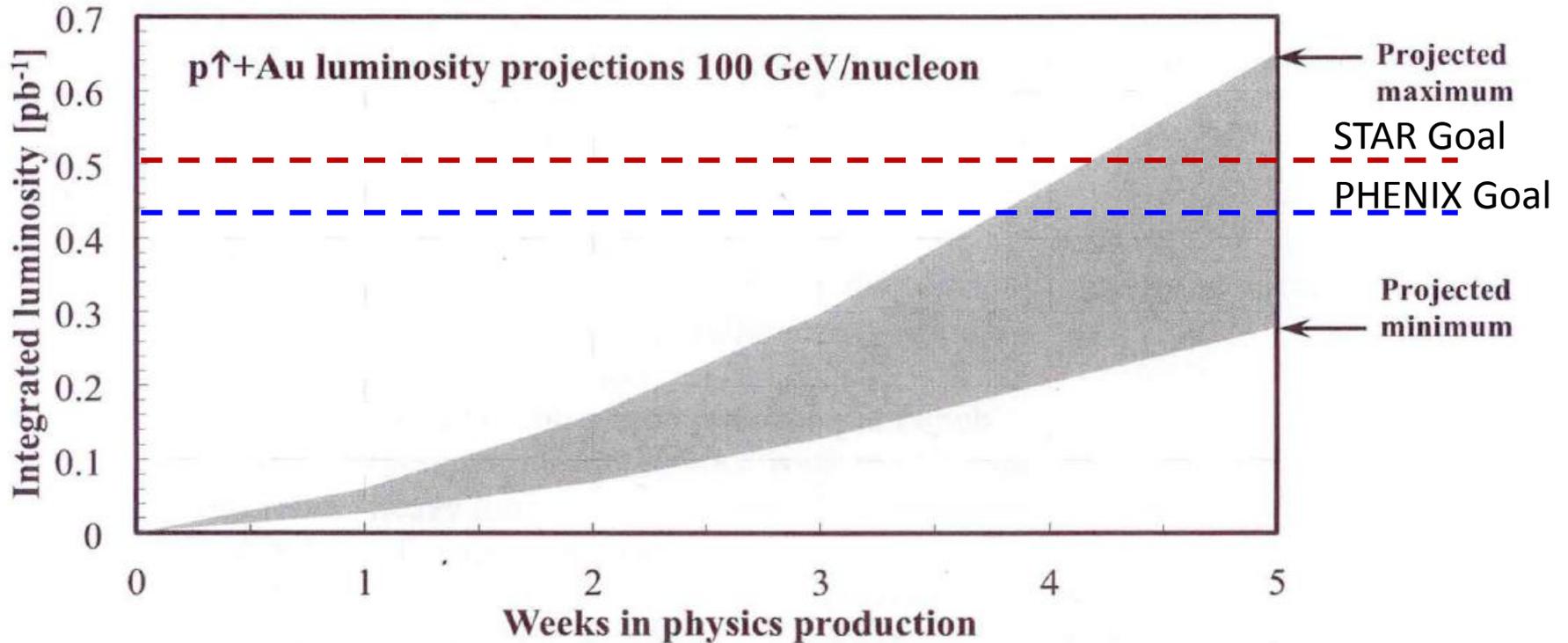
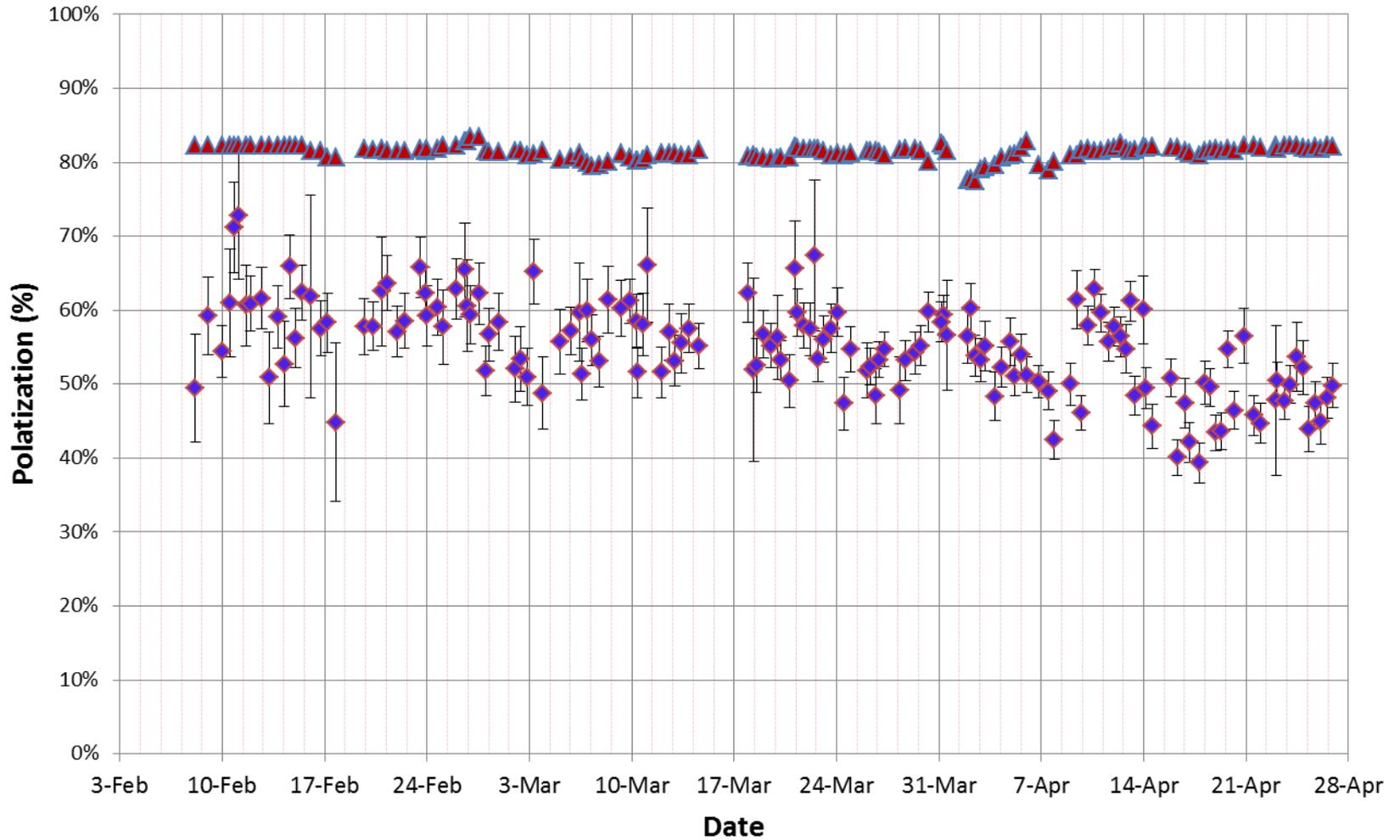


Figure 4: Projected minimum and maximum integrated luminosities for p⁺+Au at 100 GeV/nucleon assuming linear weekly luminosity ramp-up in 4 weeks. The average store polarization of the proton beam expected to be close to the polarization achieved in the 100 GeV p⁺+p⁺ run.

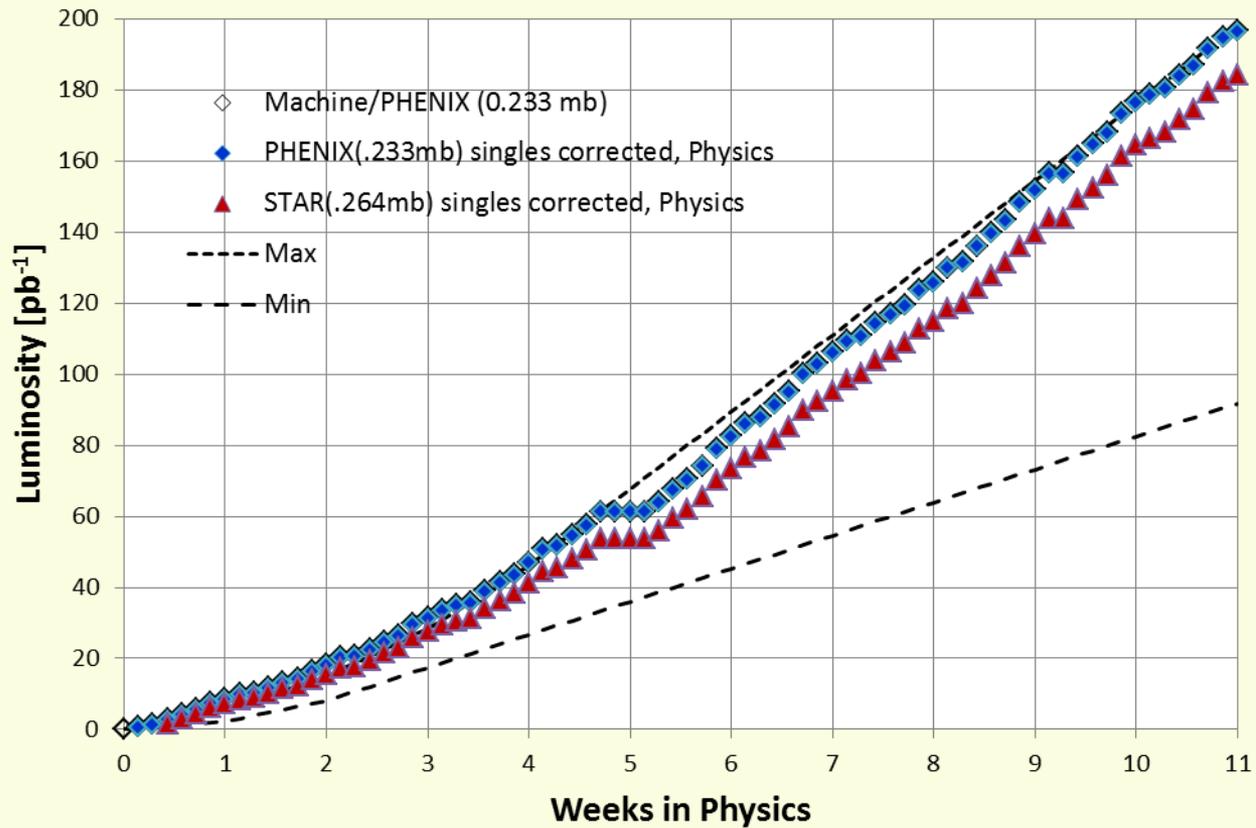
Run 15 Jet Target Polarization Measurements

◆ Pol_Blue ▲ Pol_Oppis (LogView)

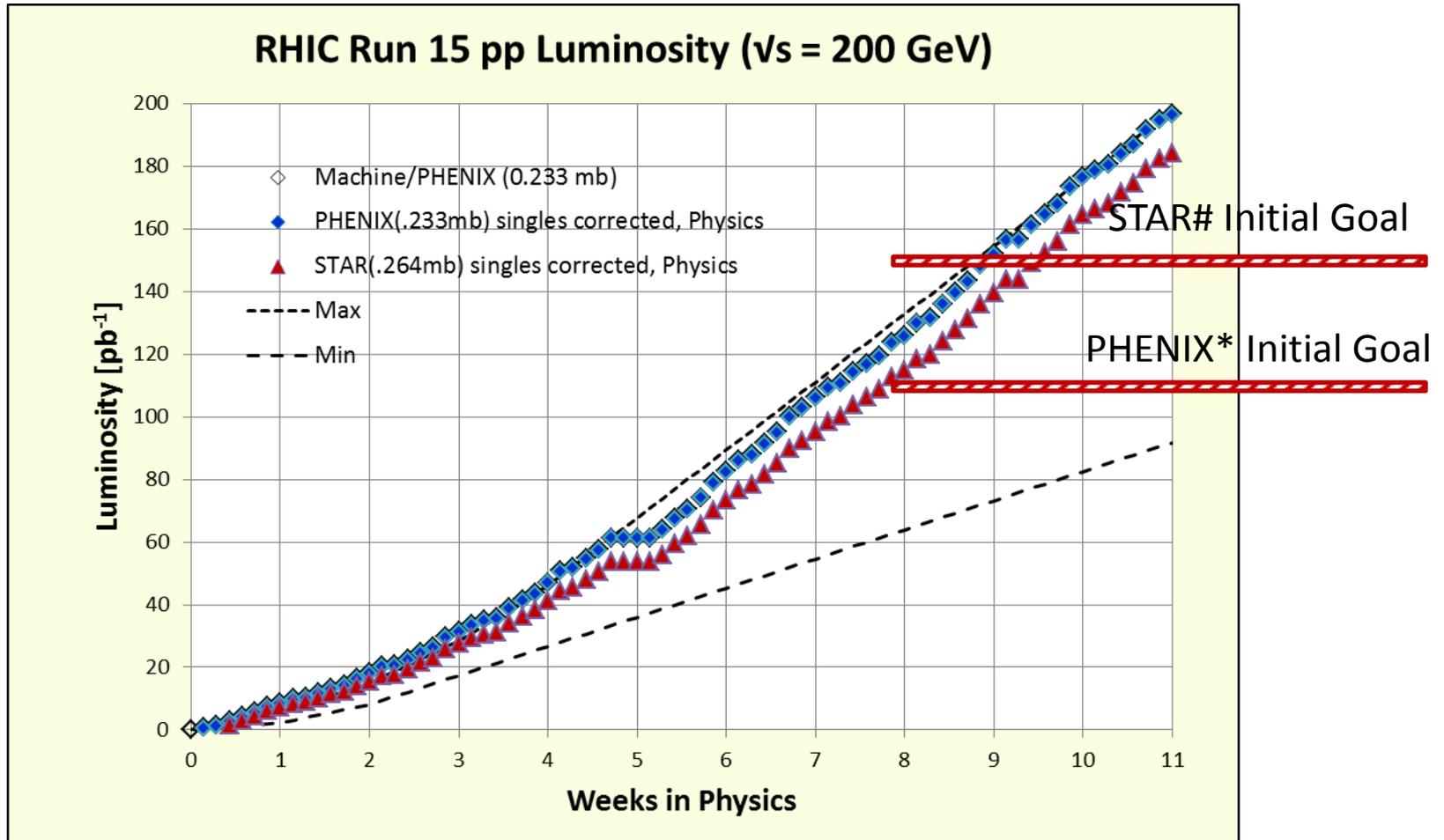


through fill 18926, 4/20/15

RHIC Run 15 pp Final Luminosity ($\sqrt{s} = 200$ GeV)



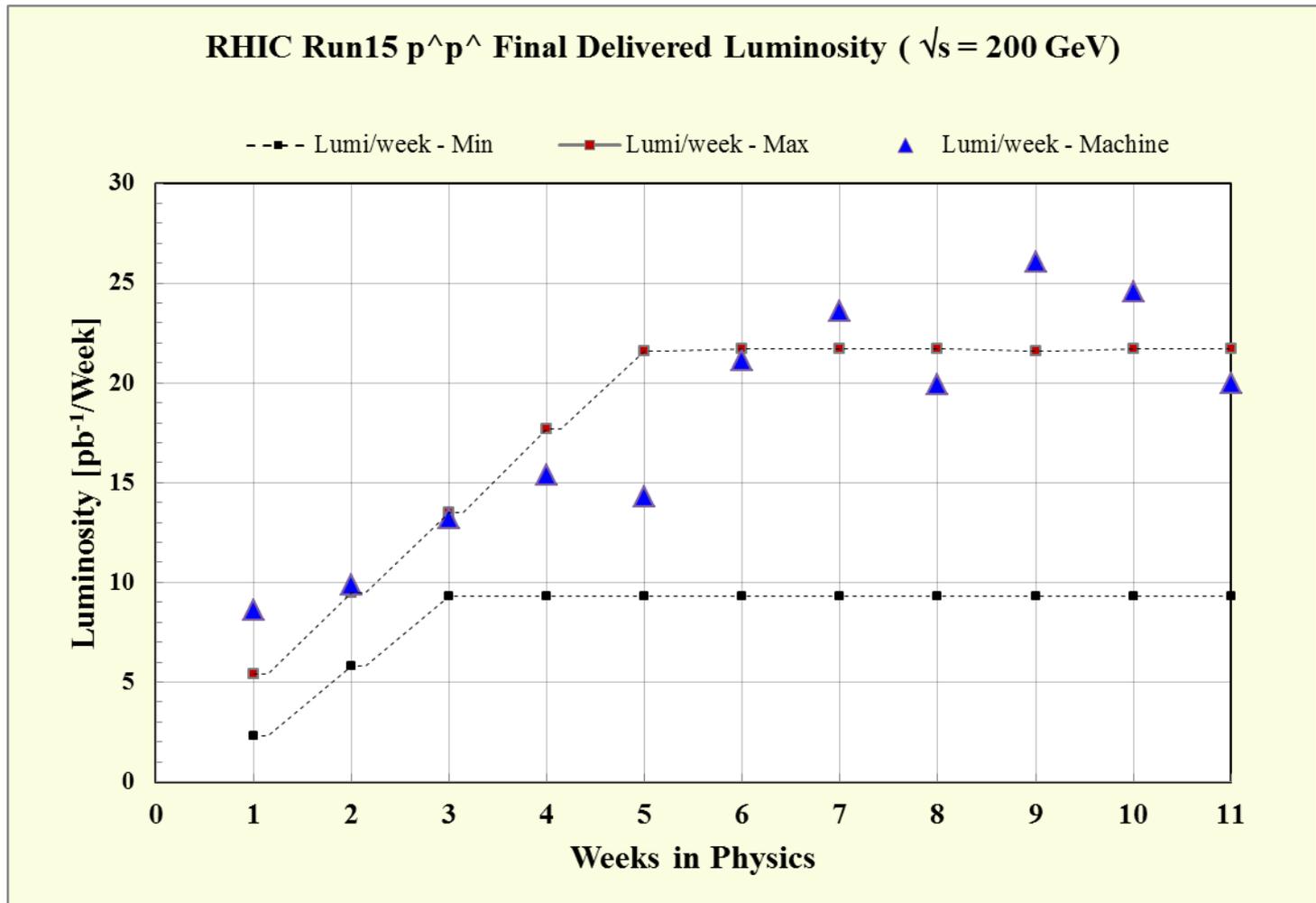
Through final store (18953) 27 April



*Based on beam use request

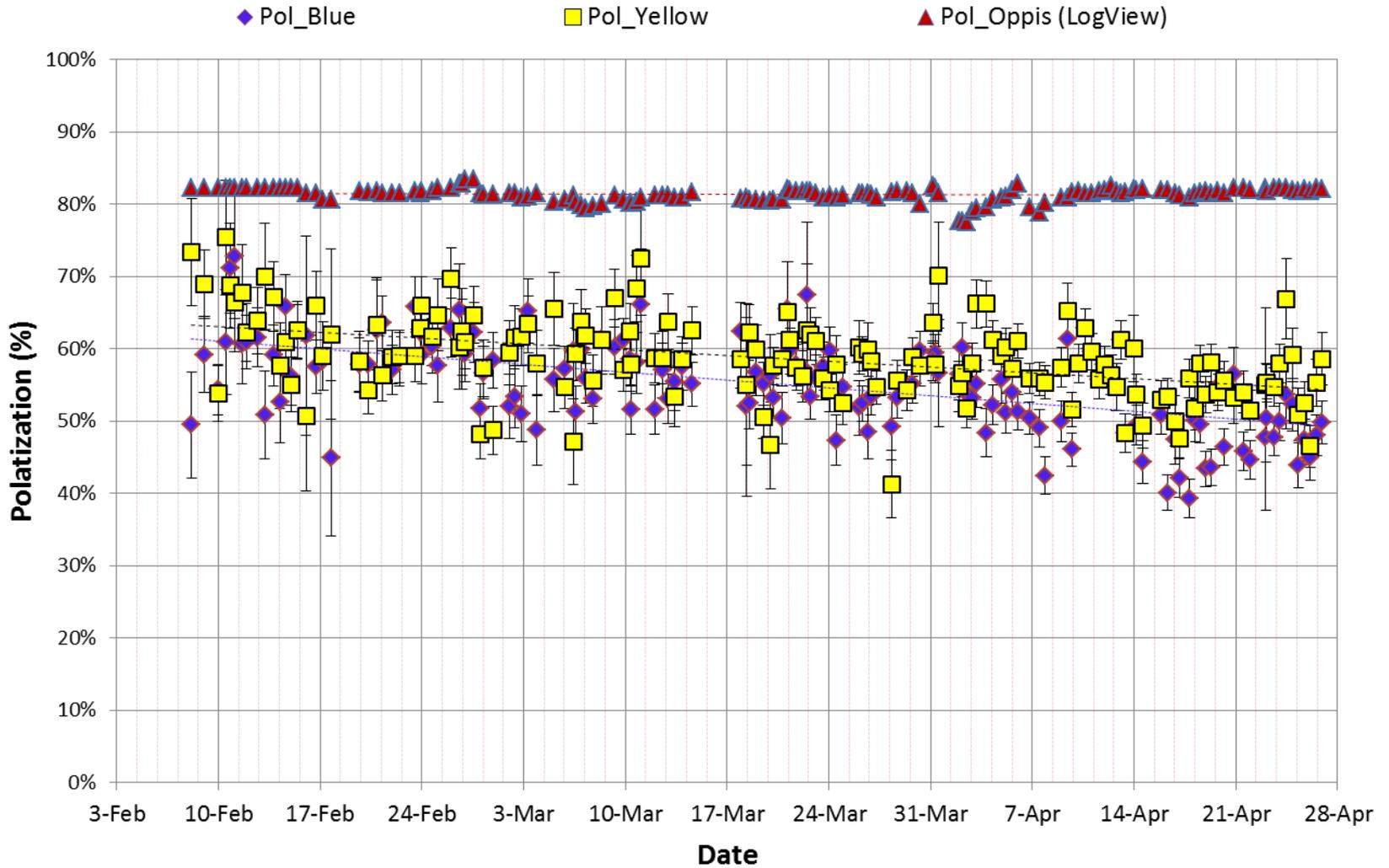
Based on beam use request with 12 weeks physics

Through final store (18953) 27 April



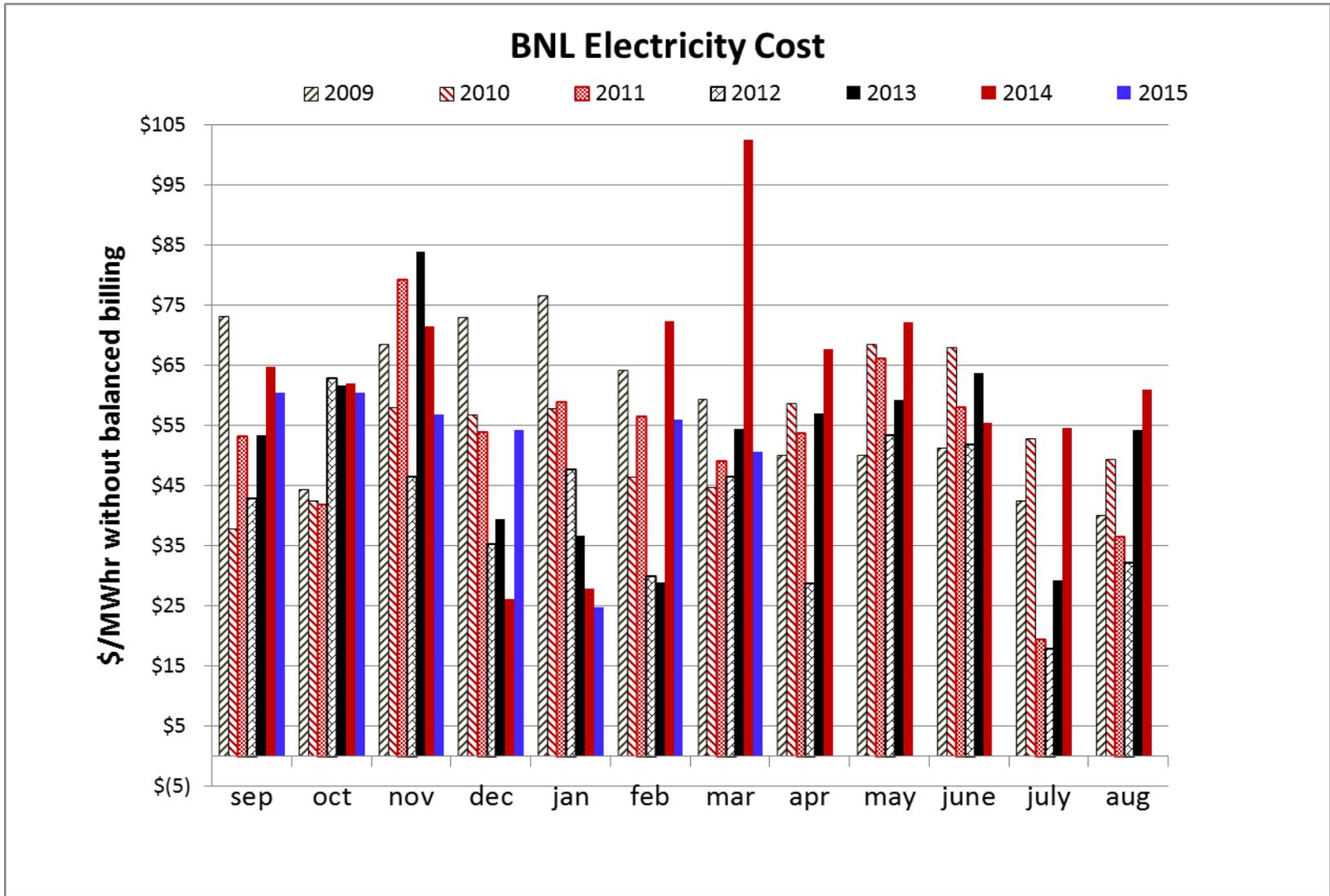
Av Polarization: Blue = $53.5 \pm 0.3\%$; Yellow = $57.4 \pm 0.3\%$ (goal $\geq 60\%$)

Run 15 Jet Target Polarization Measurements



through fill 18926, 4/20/15

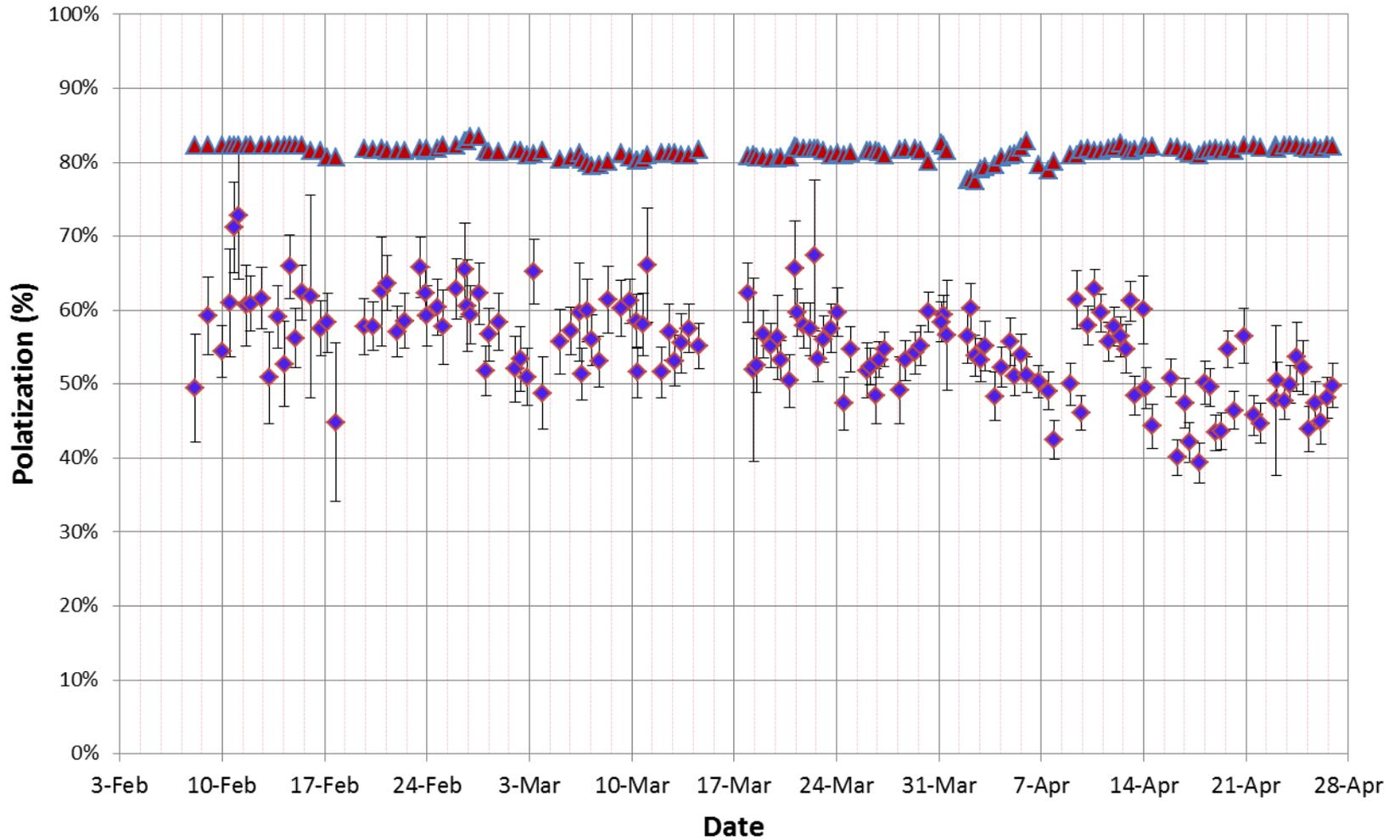
Balanced Billing for the lab - +1,483K through Mar 2015



Supplemental 1

Run 15 Jet Target Polarization Measurements

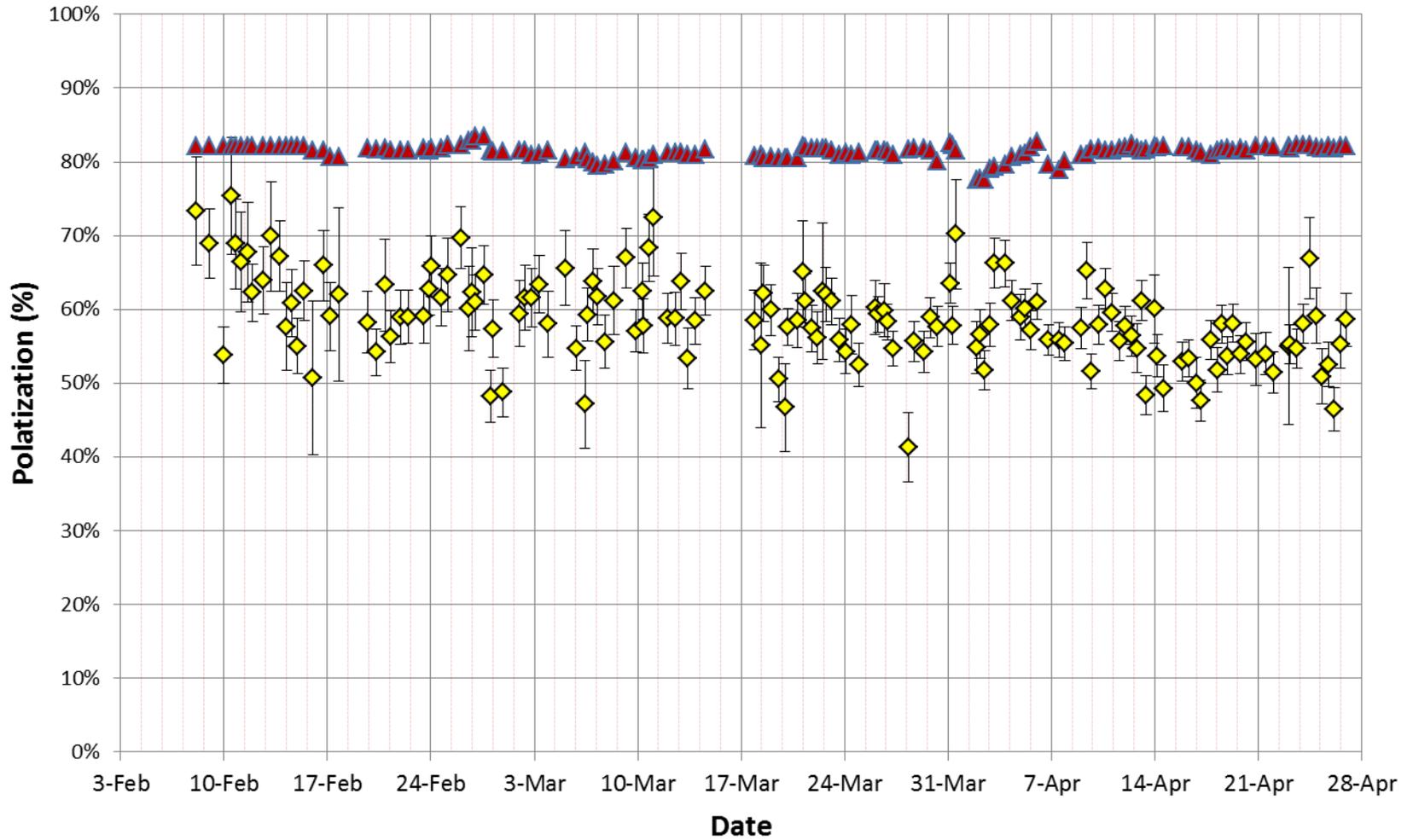
◆ Pol_Blue ▲ Pol_Oppis (LogView)



through fill 18926, 4/20/15

Run 15 Jet Target Polarization Measurements

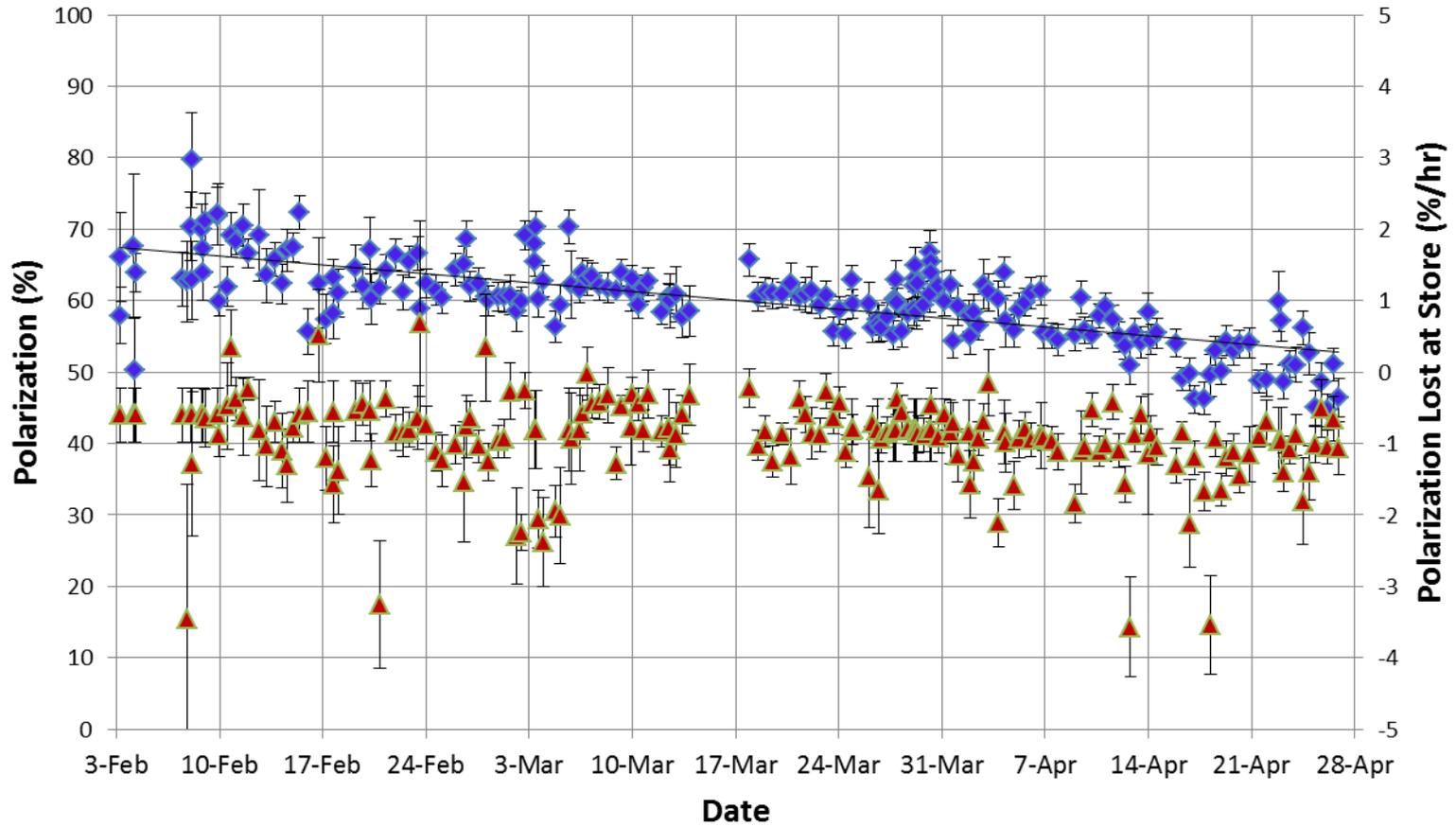
◆ Pol_Yellow ▲ Pol_Oppis (LogView)



through fill 18926, 4/20/15

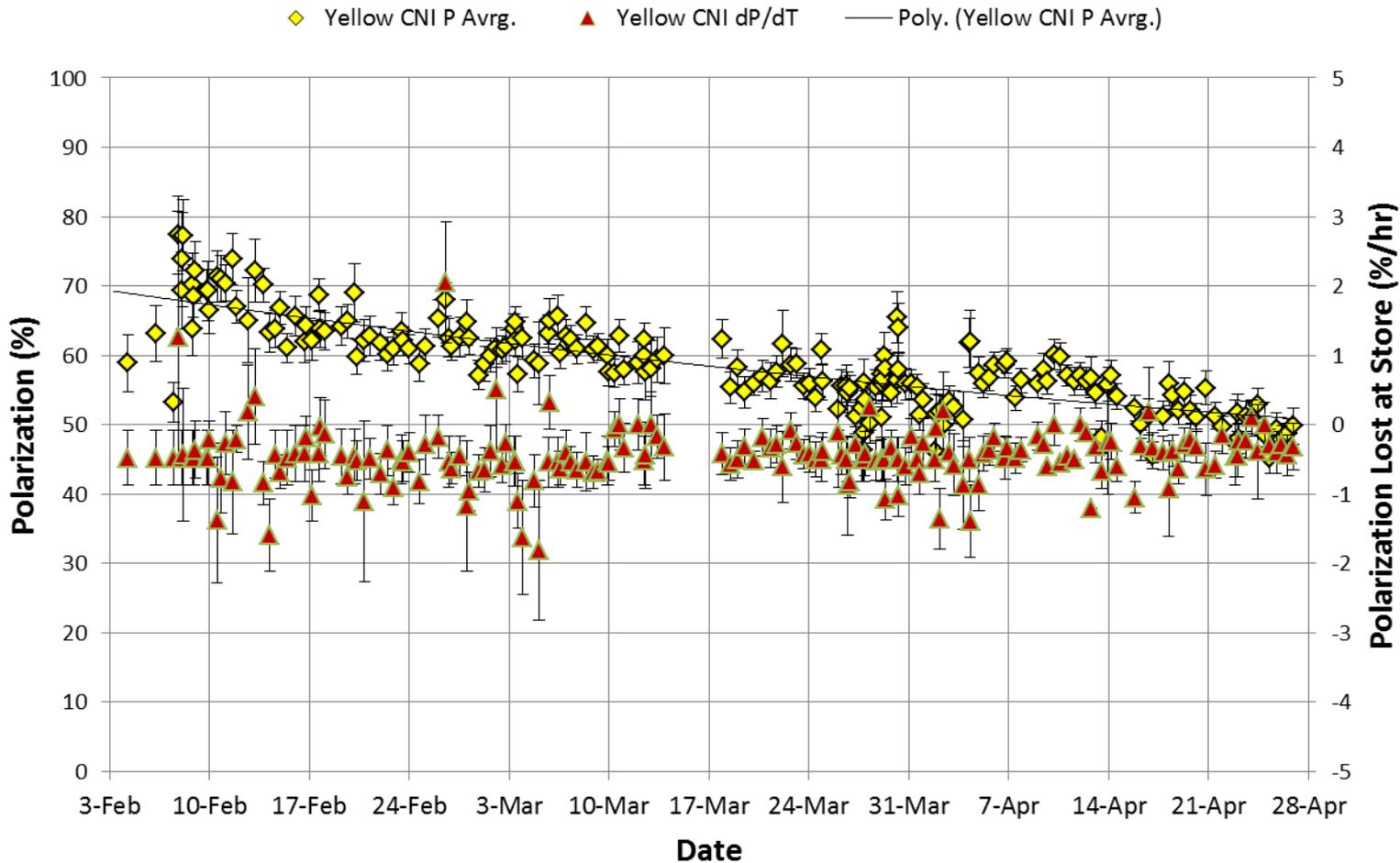
Run 15 Blue Polarization at Store (final-CNI)

◆ Blue CNI P Avg. ▲ Blue CNI dP/dT — Linear (Blue CNI P Avg.)



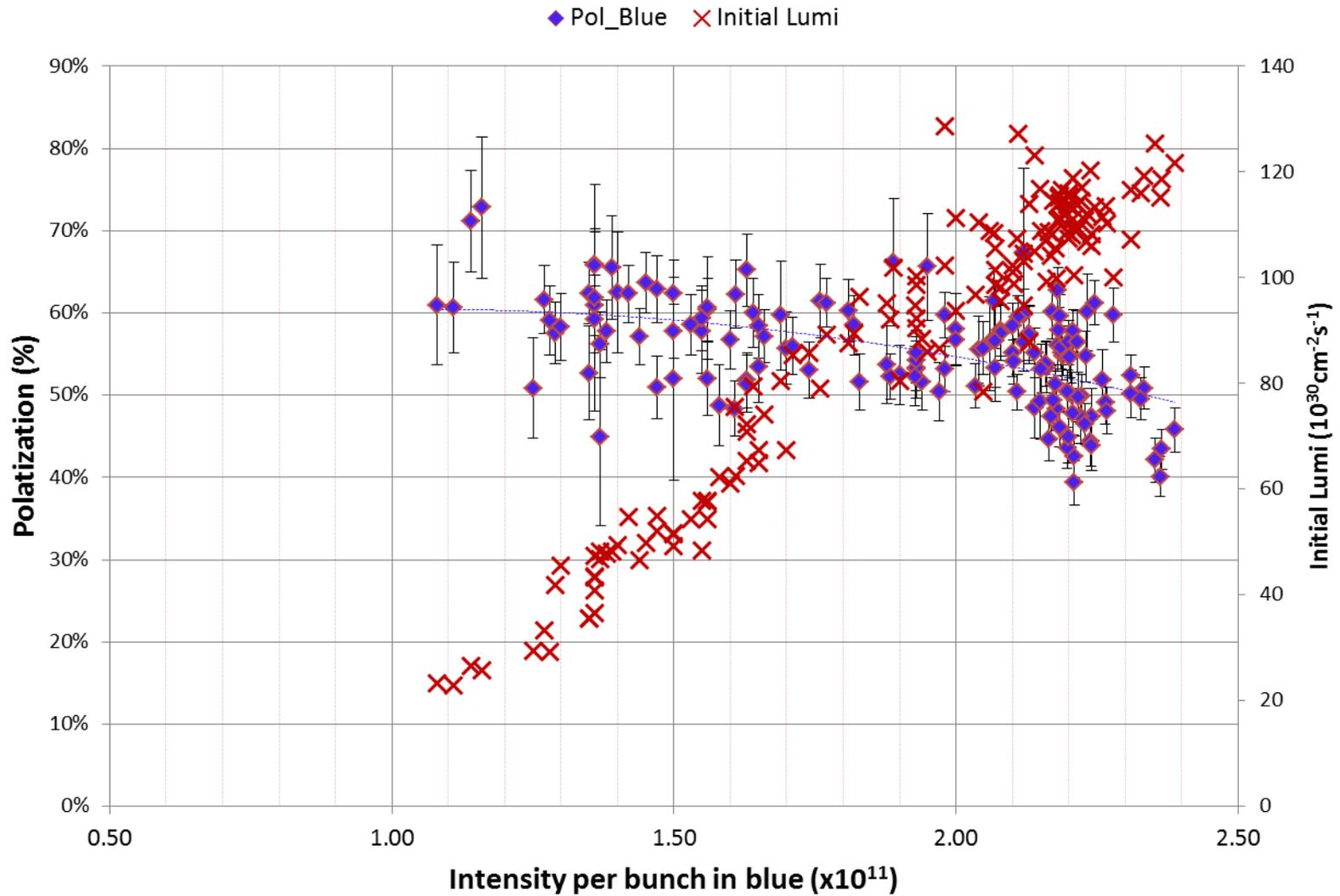
through fill 18928, 4/20/15

Run 15 Yellow Polarization at Store (final-CNI)

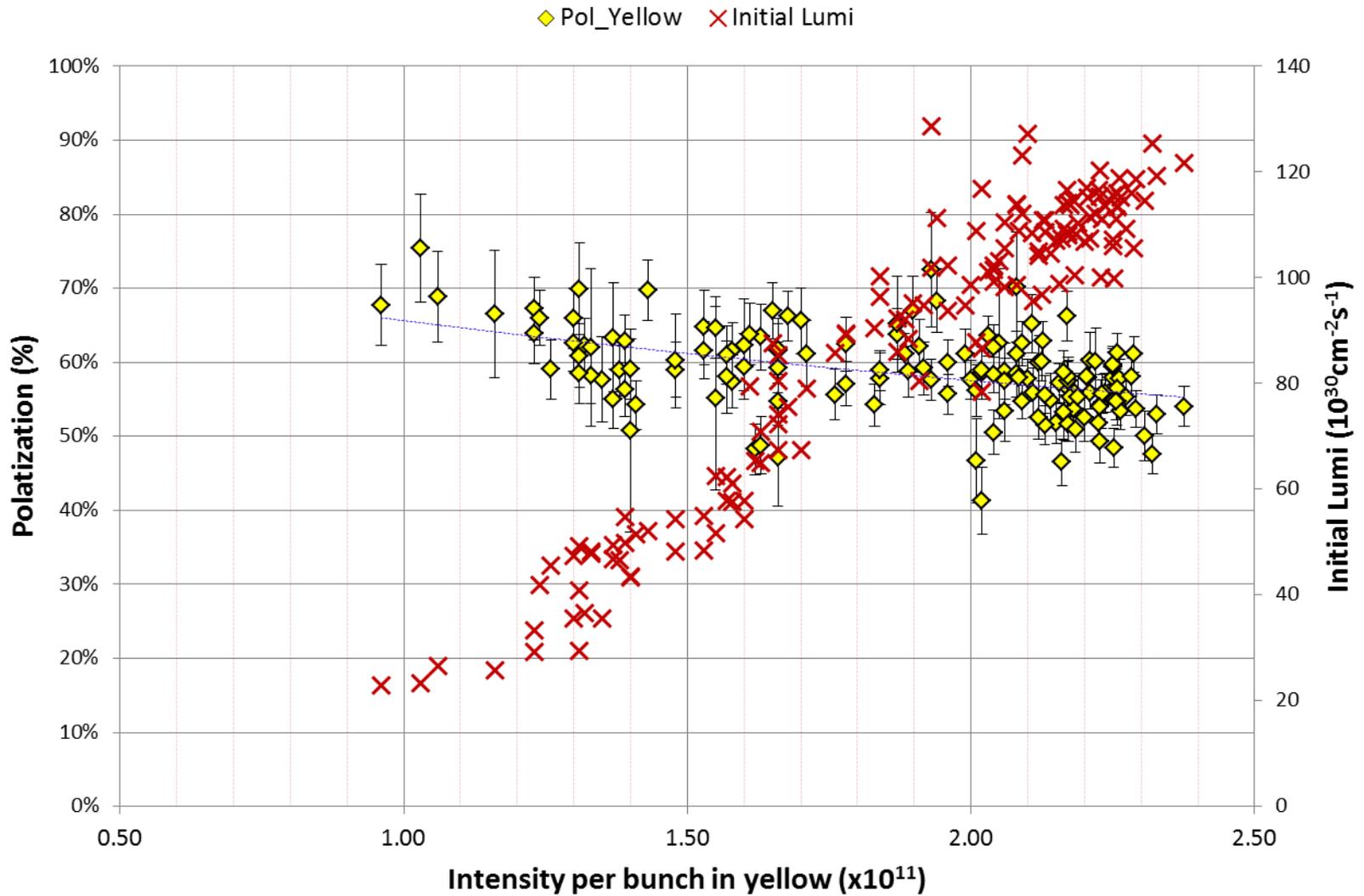


through fill 18928, 4/20/15

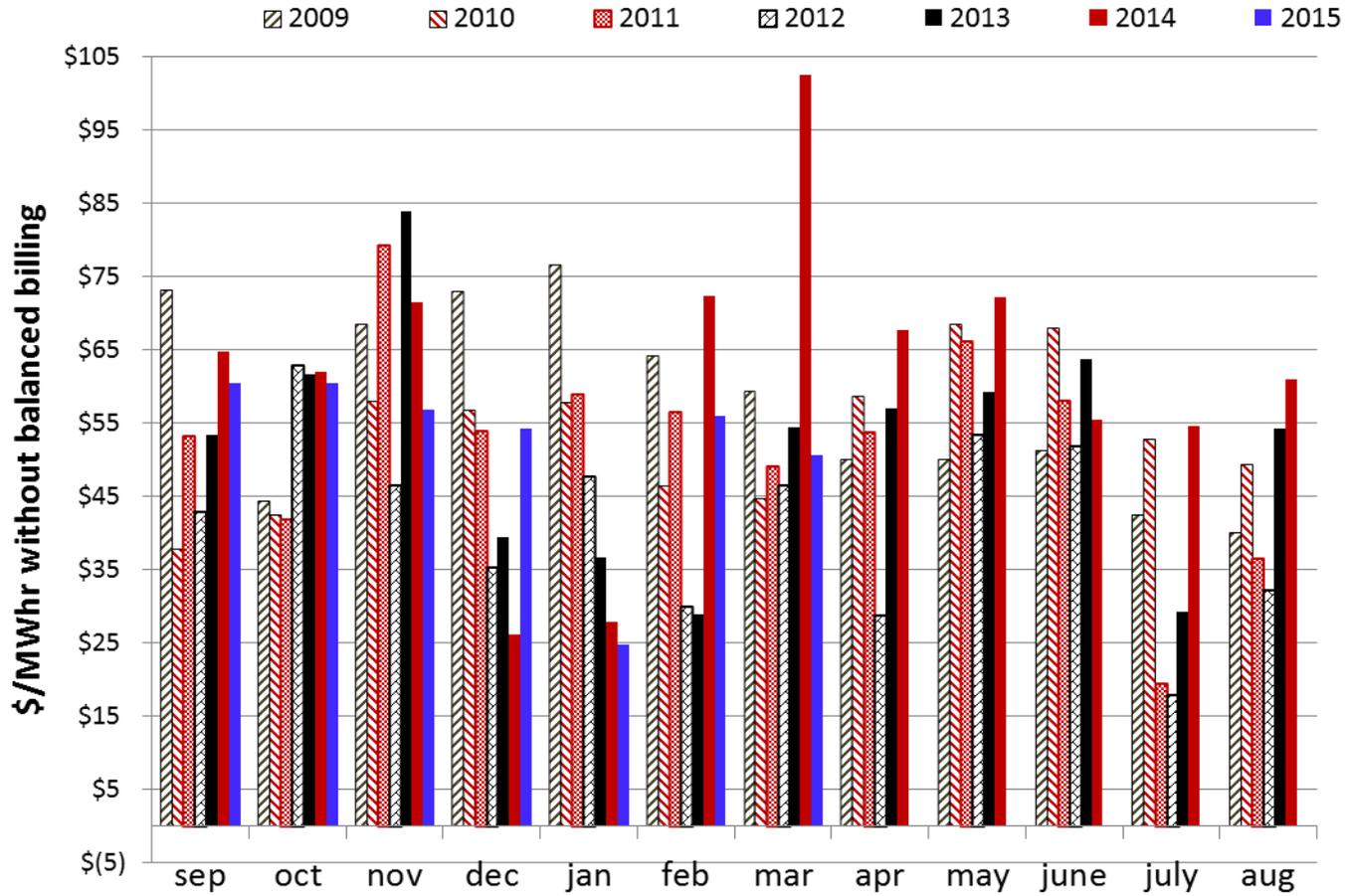
Run 15 Jet Target Polarization Measurements



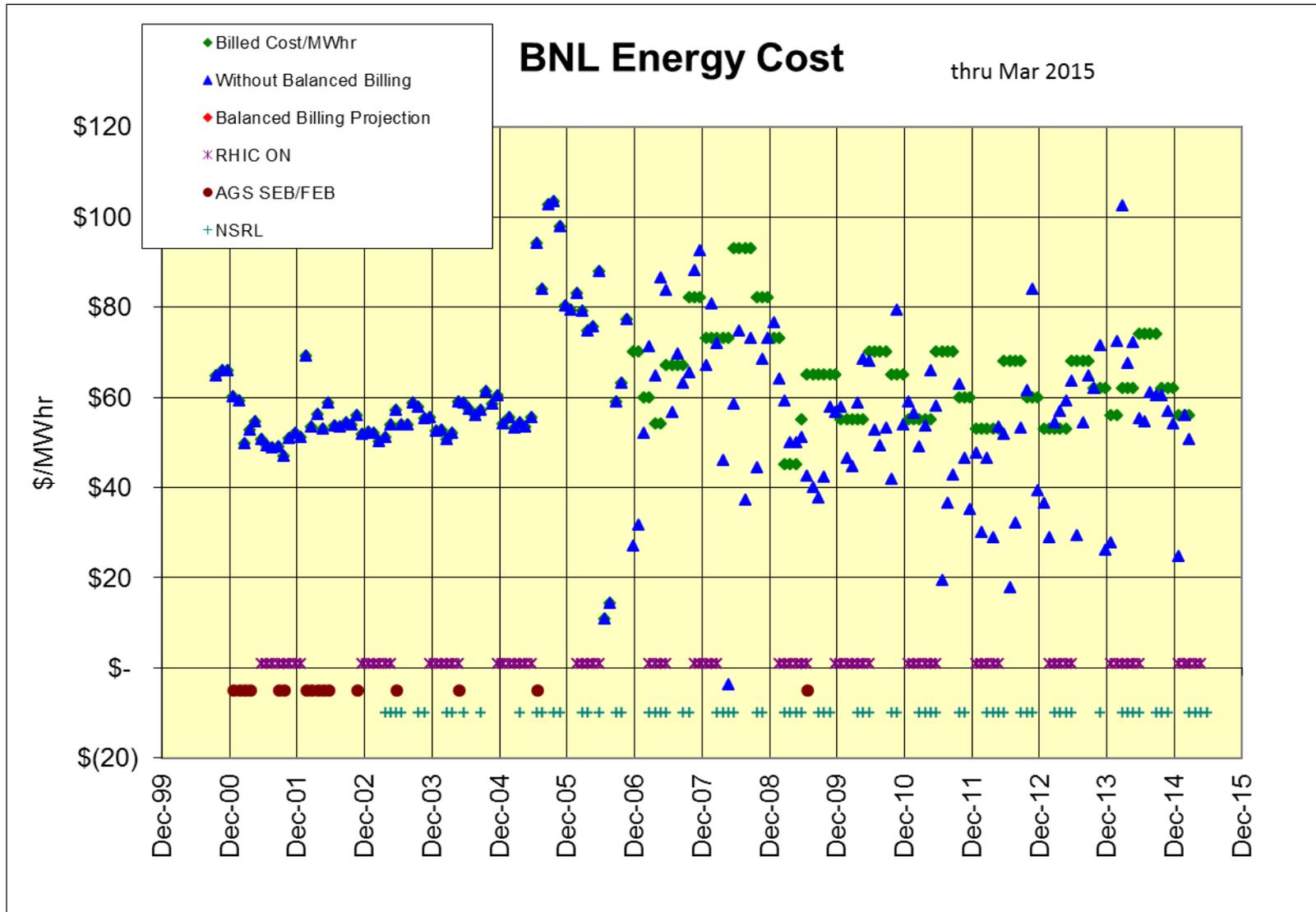
Run 15 Jet Target Polarization Measurements



BNL Electricity Cost

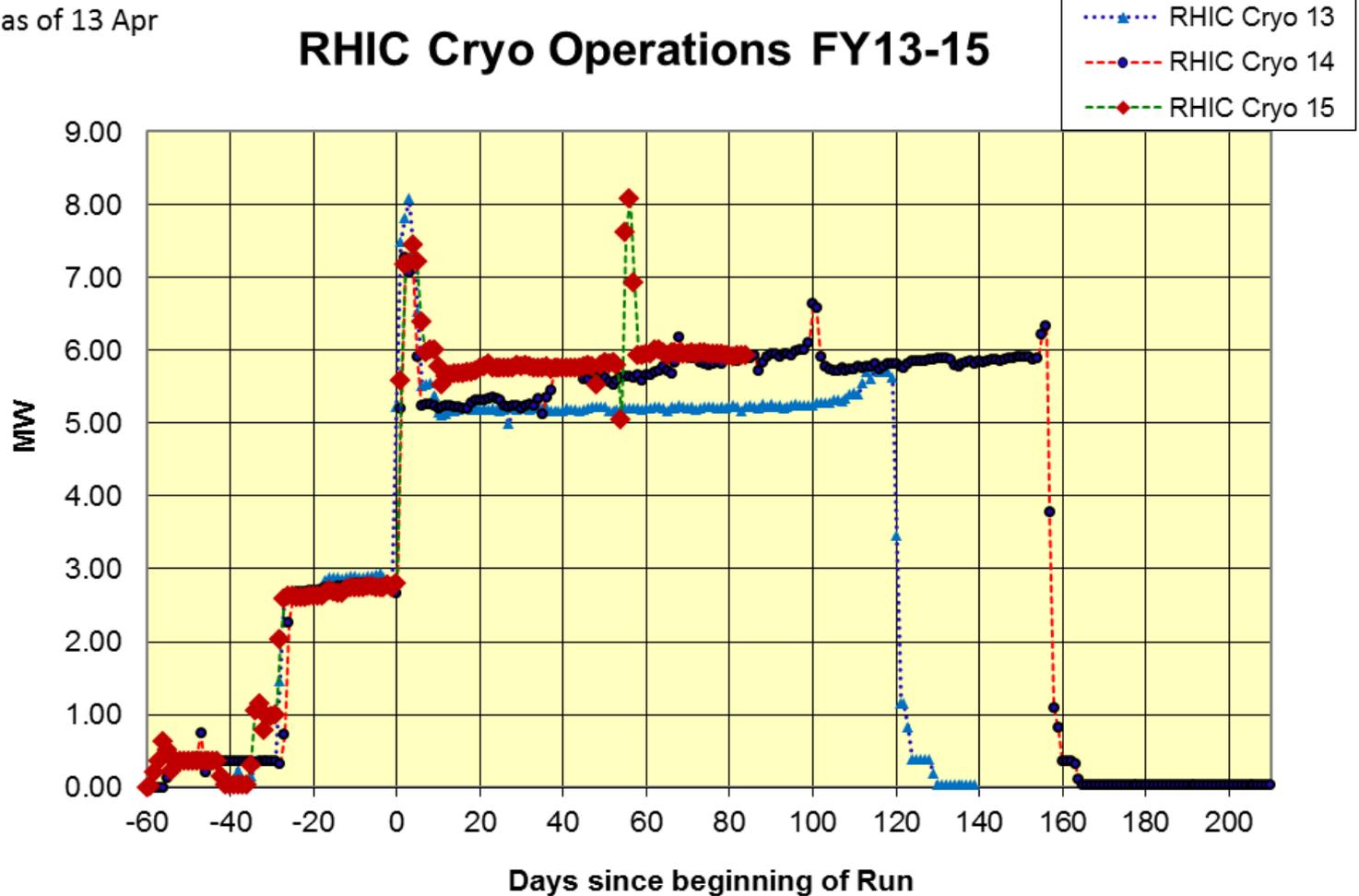


Balanced Billing for the lab - +1,483K through Mar 2015



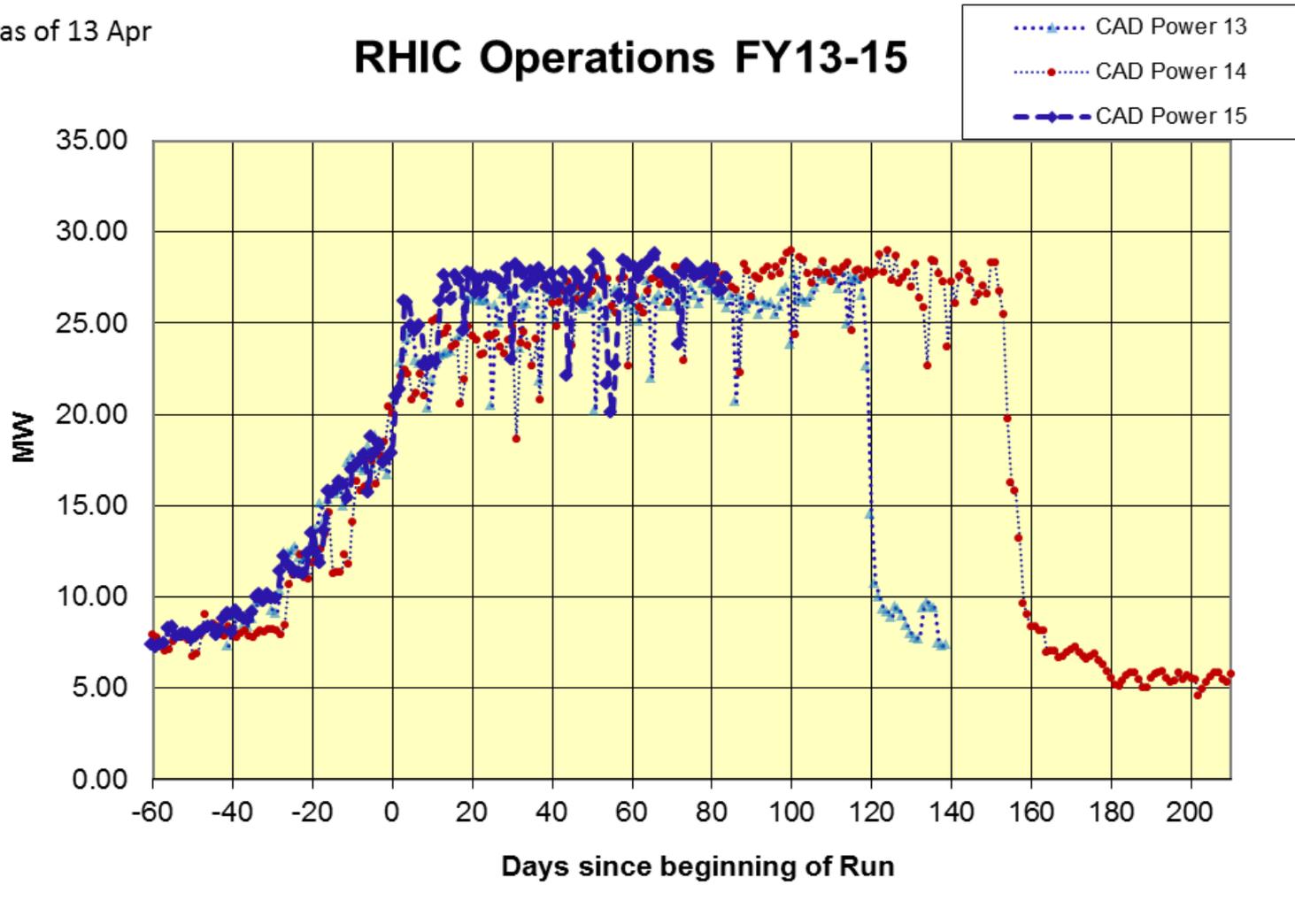
as of 13 Apr

RHIC Cryo Operations FY13-15



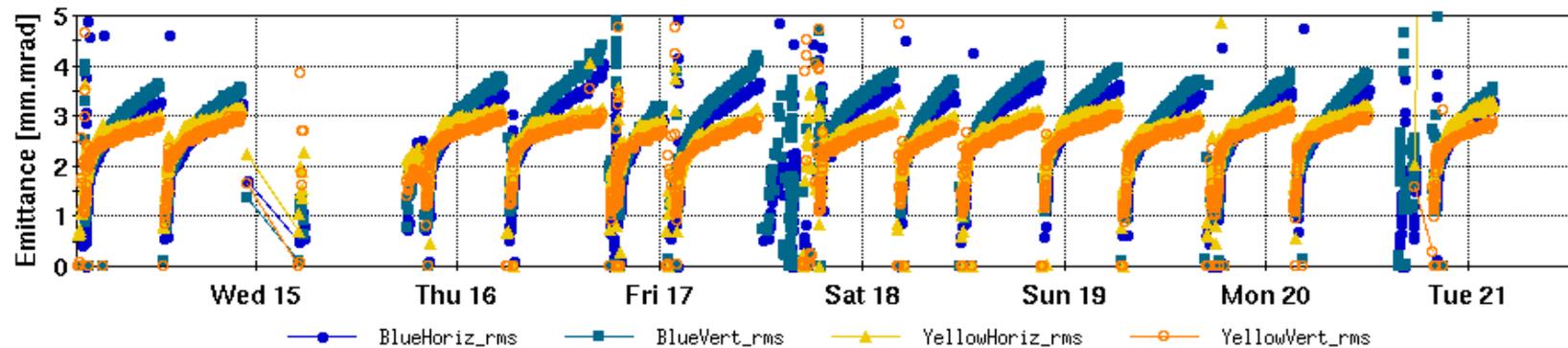
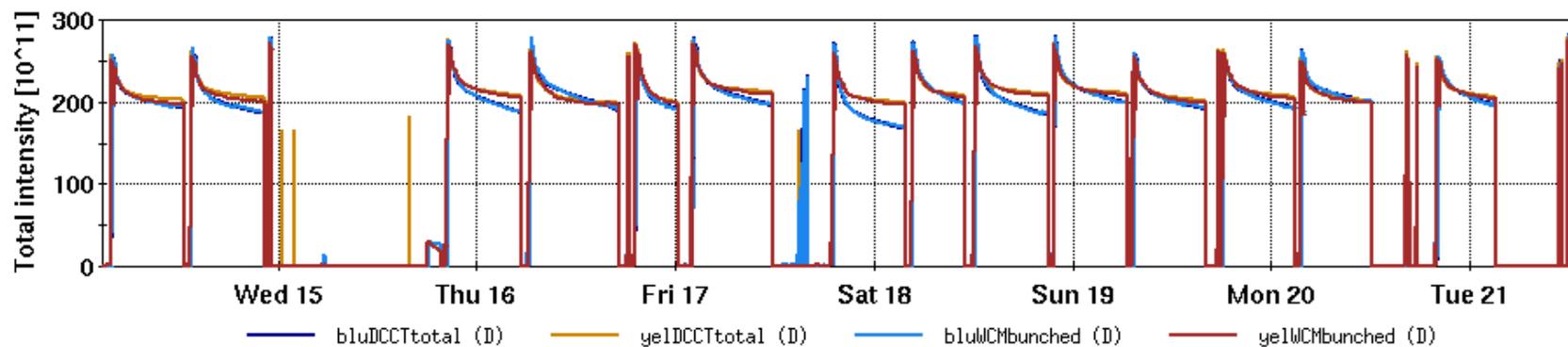
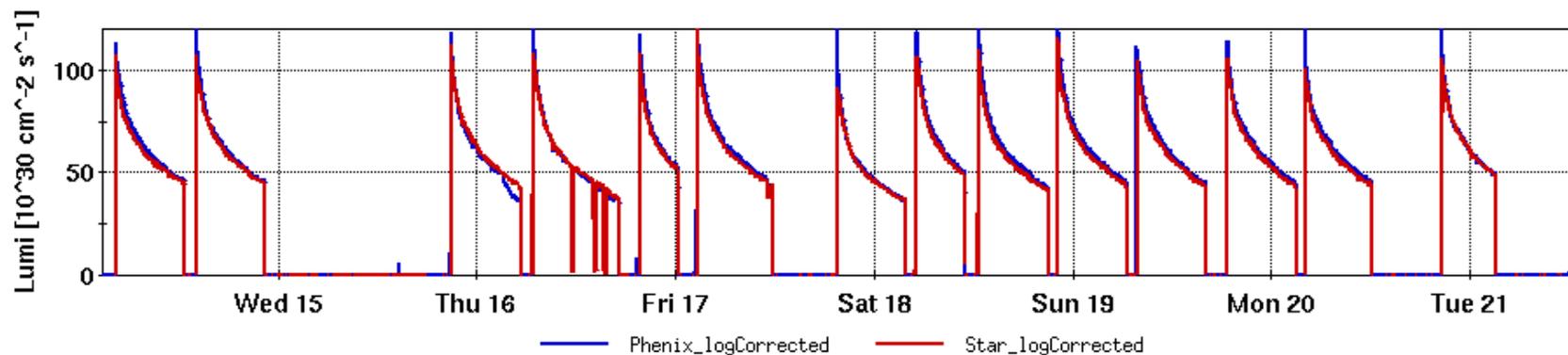
as of 13 Apr

RHIC Operations FY13-15

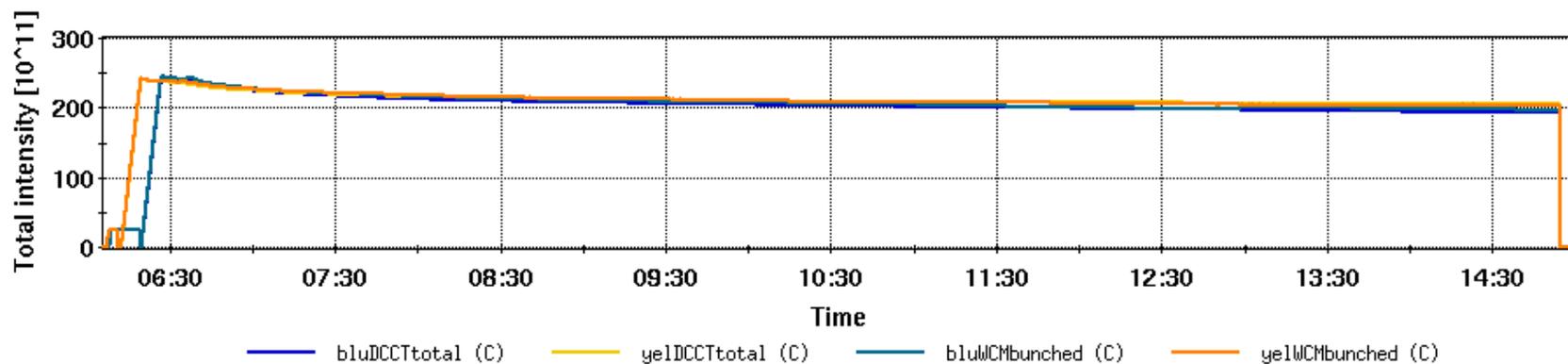
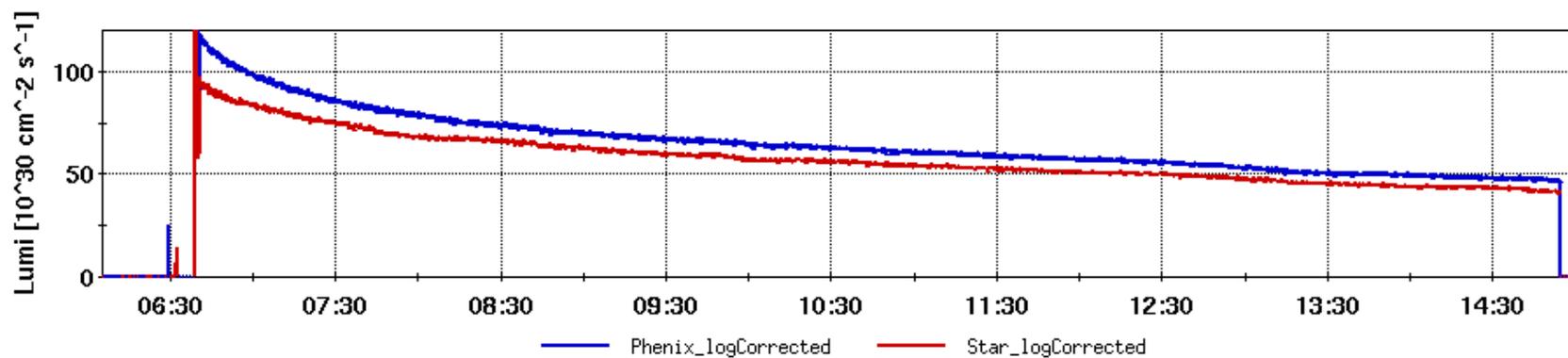
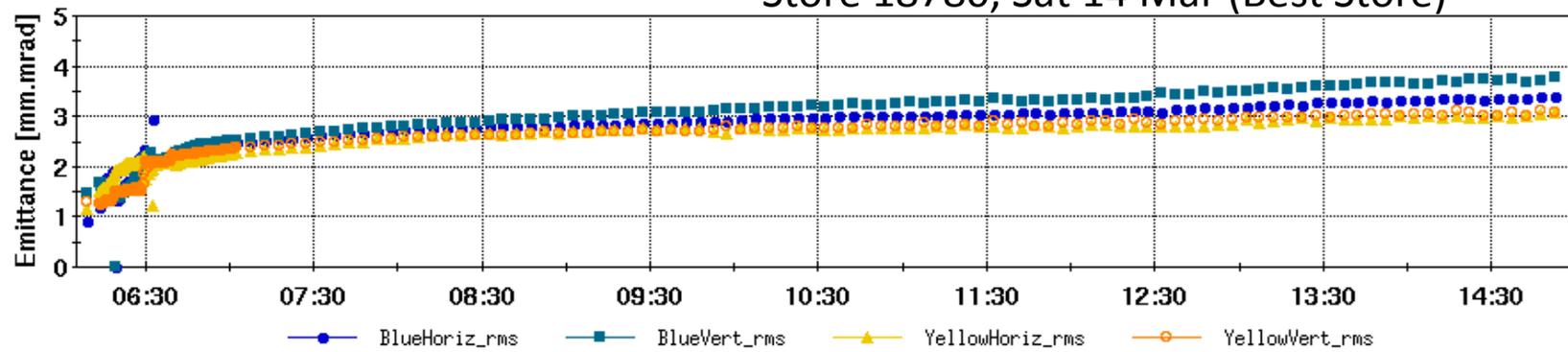




File Window Markers Analysis

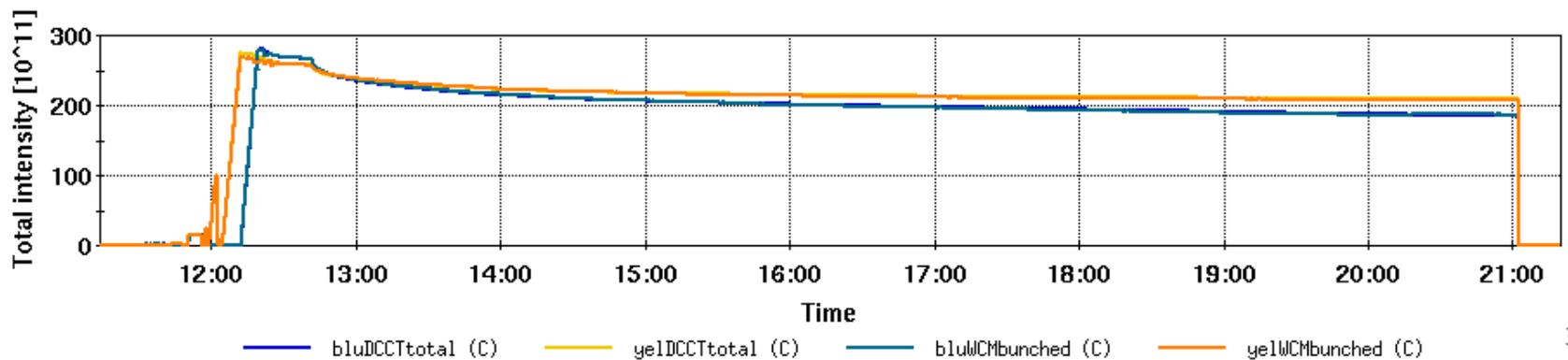
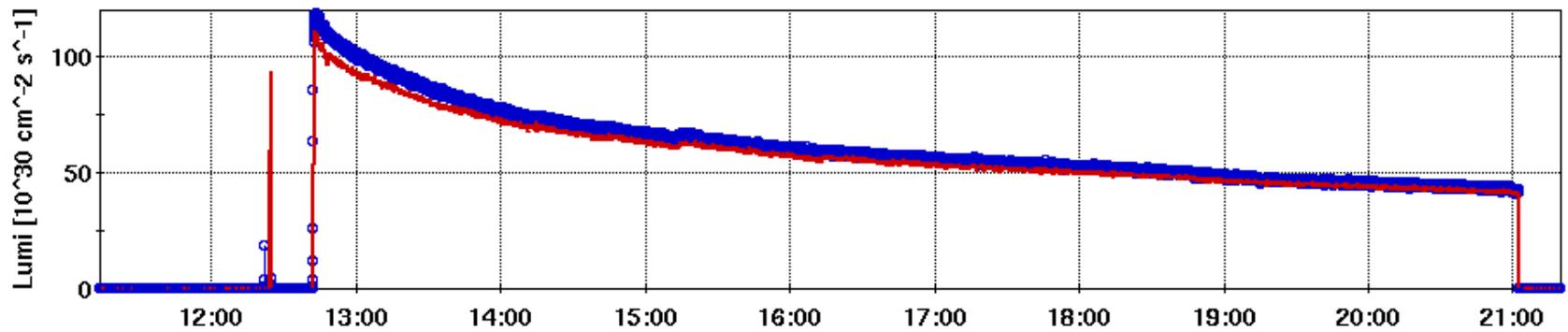
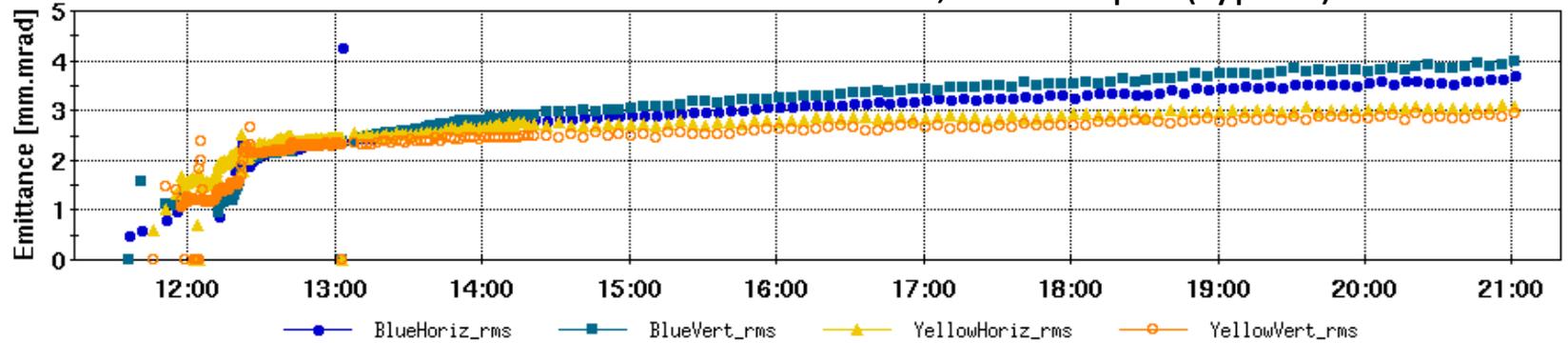


Store 18780, Sat 14 Mar (Best Store)

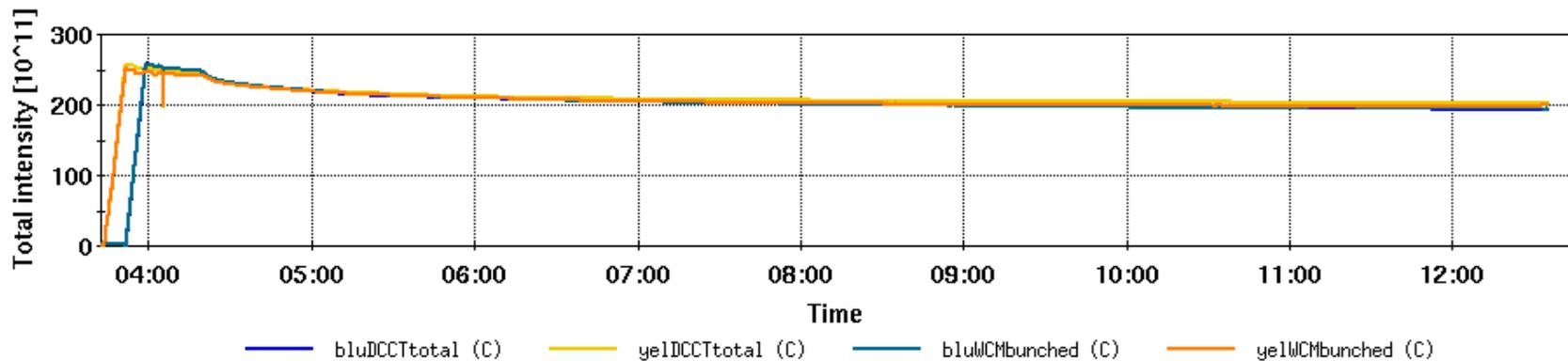
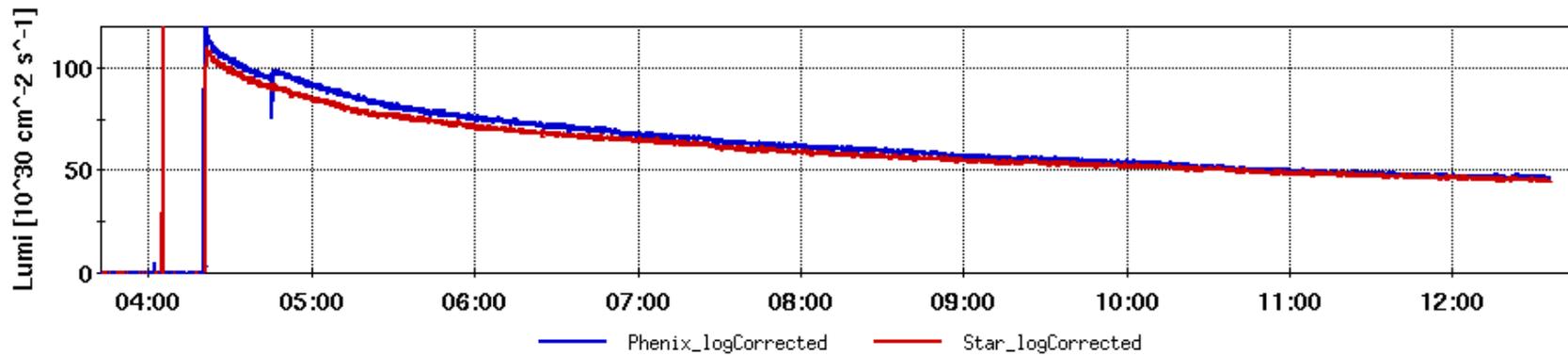
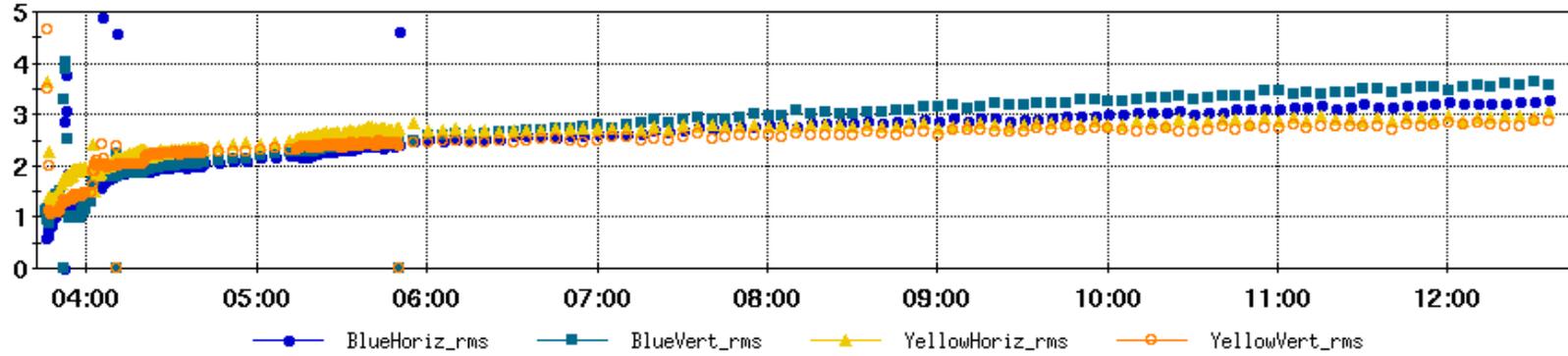




Store 18922, Sat 18 April (typical)

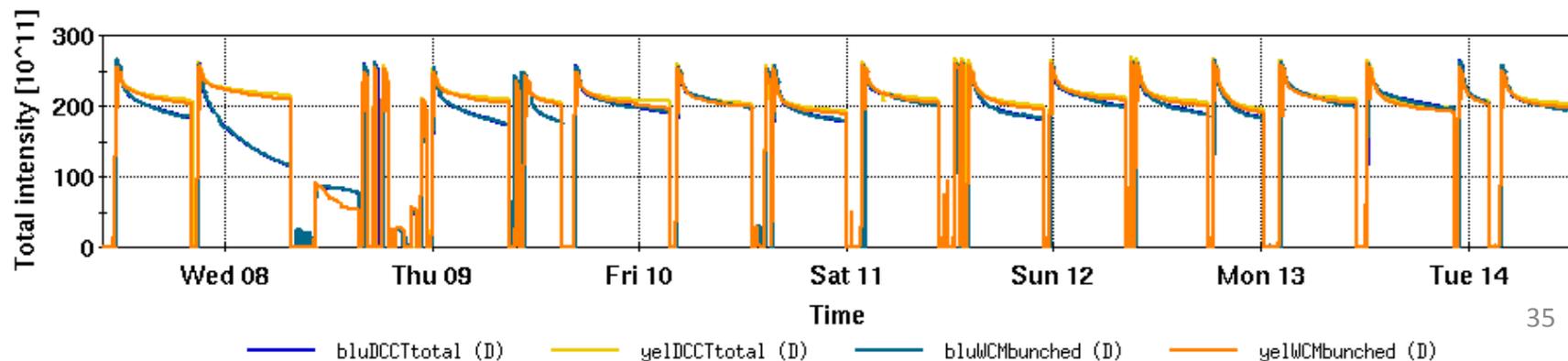
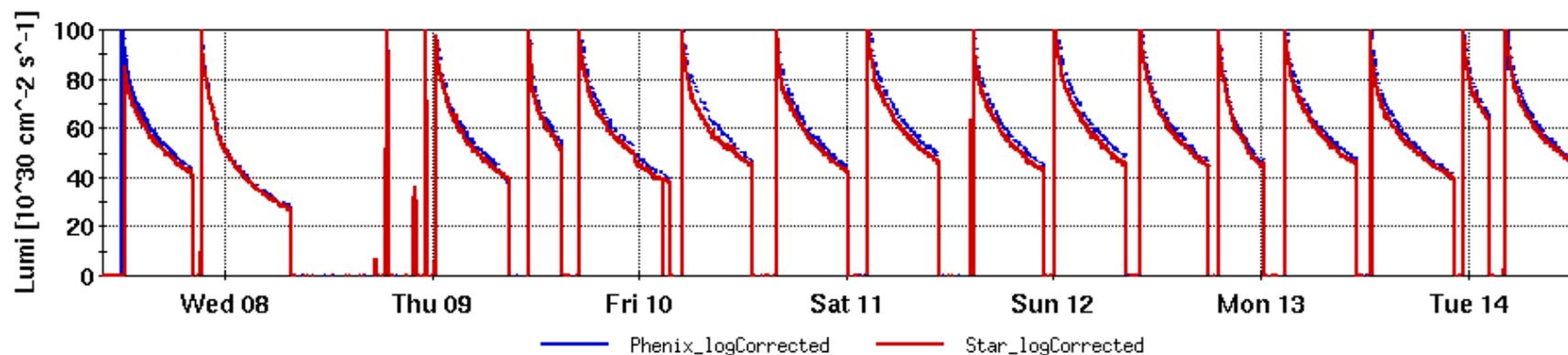
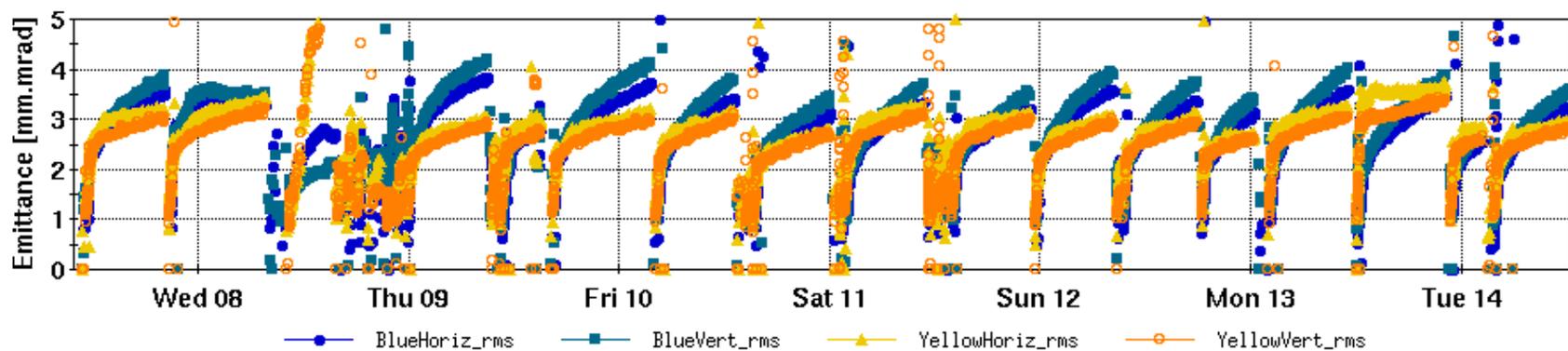


File Window Markers Analysis

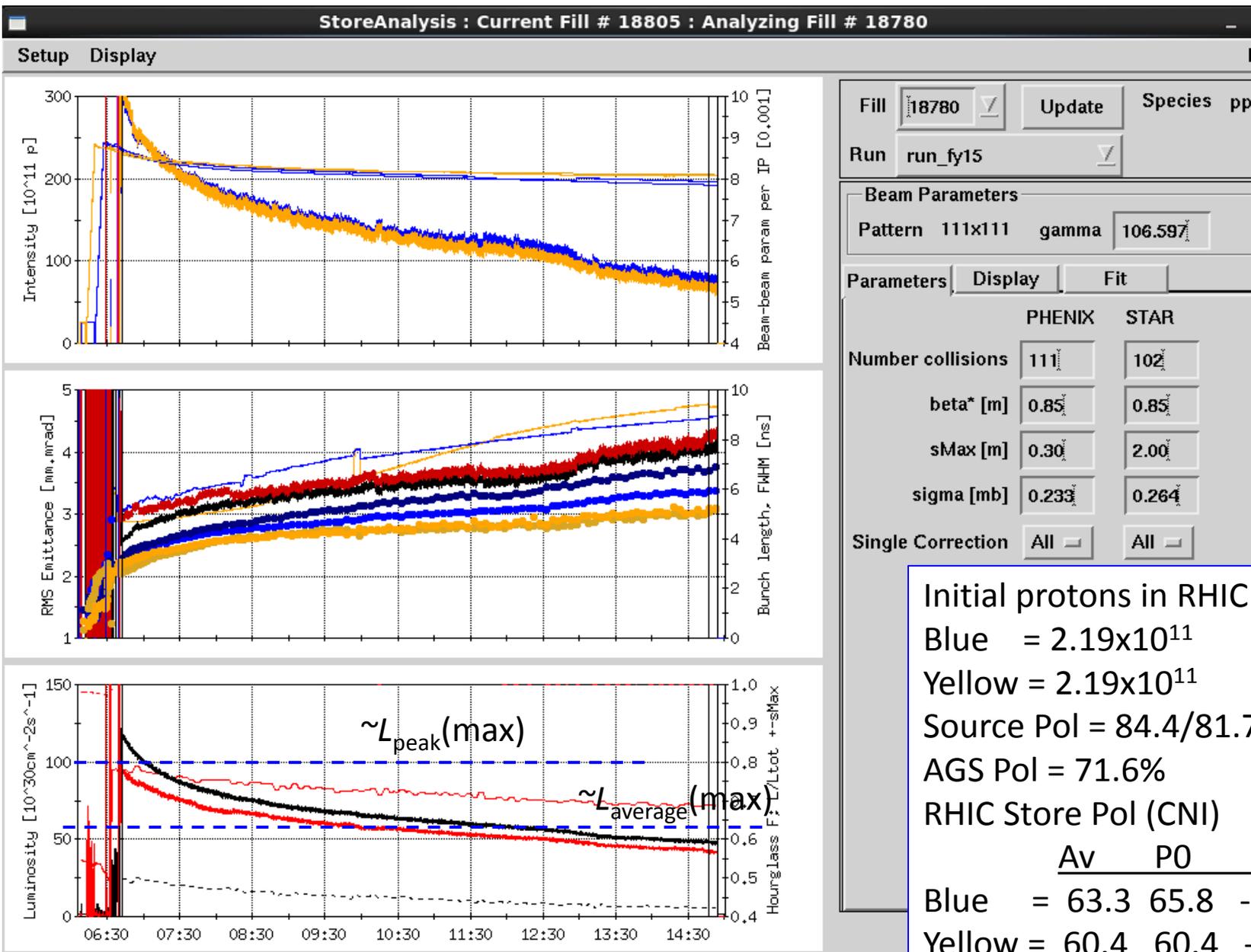




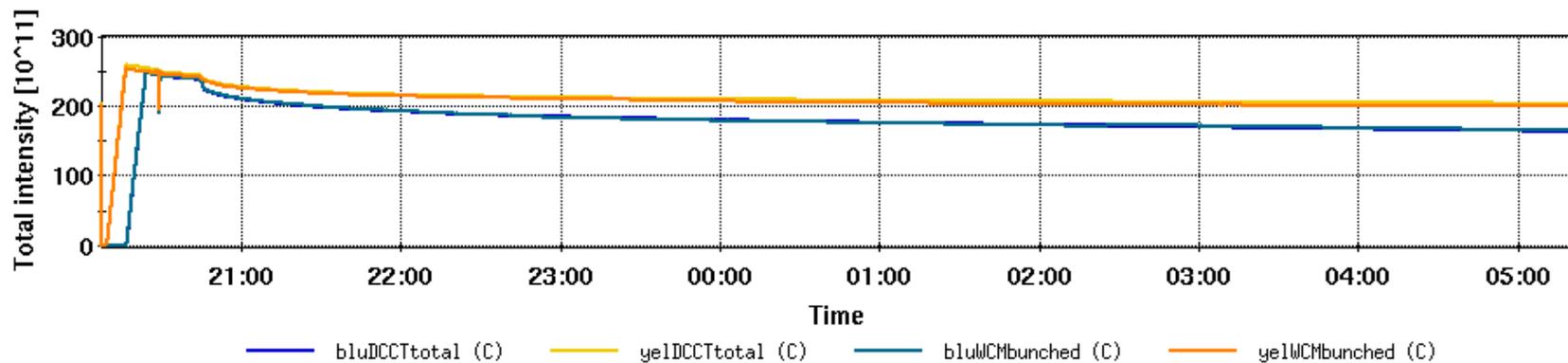
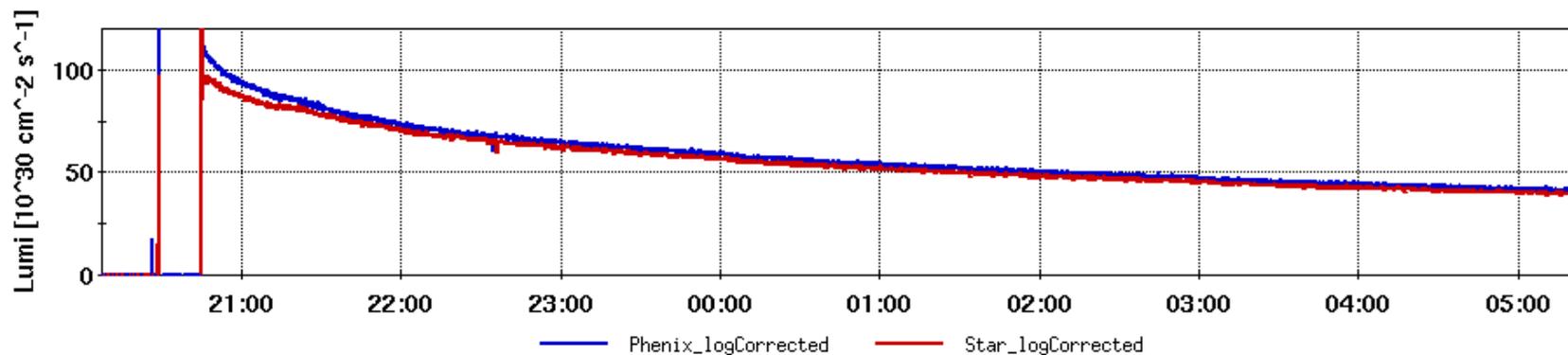
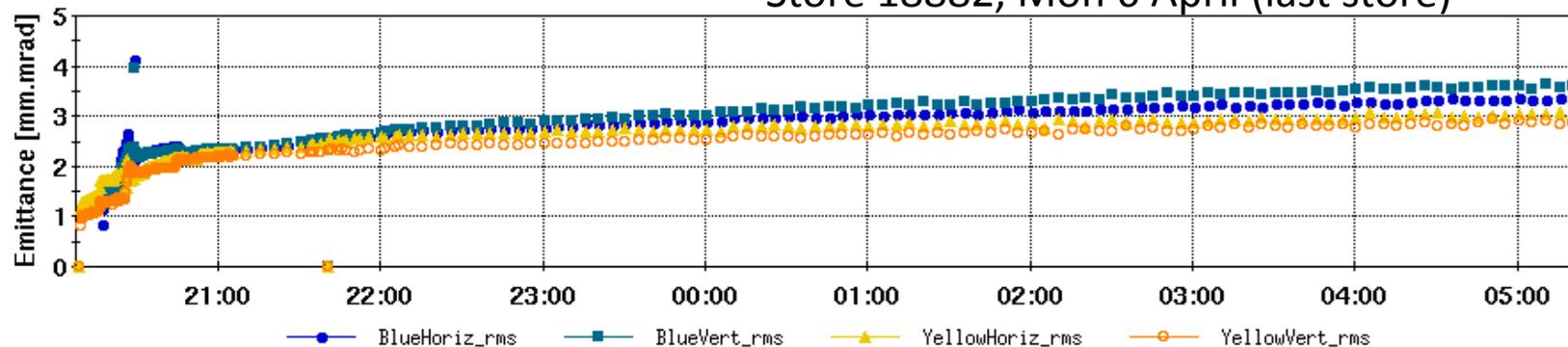
File Window Markers Analysis



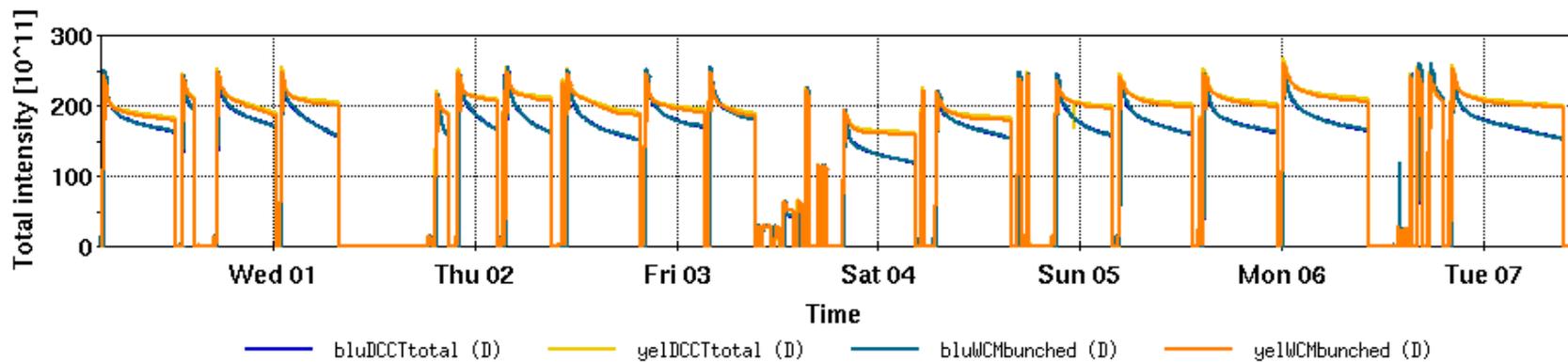
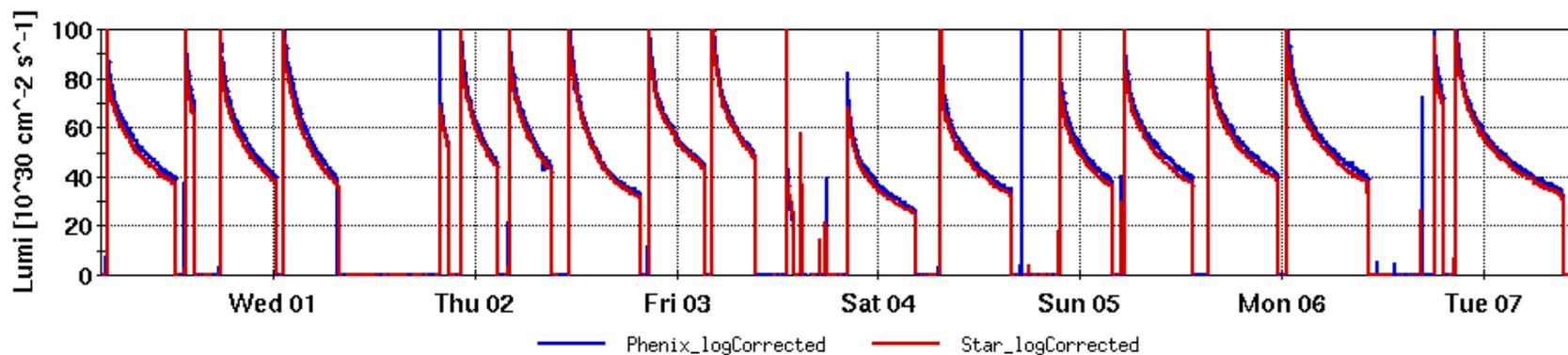
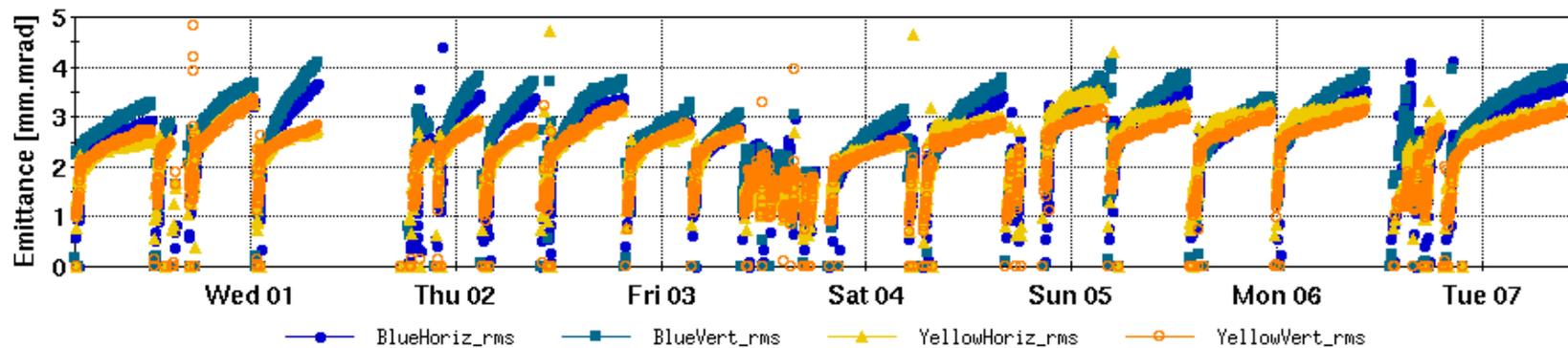
Still Best Store to Date – 18780, Sat 14 Mar –



Store 18882, Mon 6 April (last store)



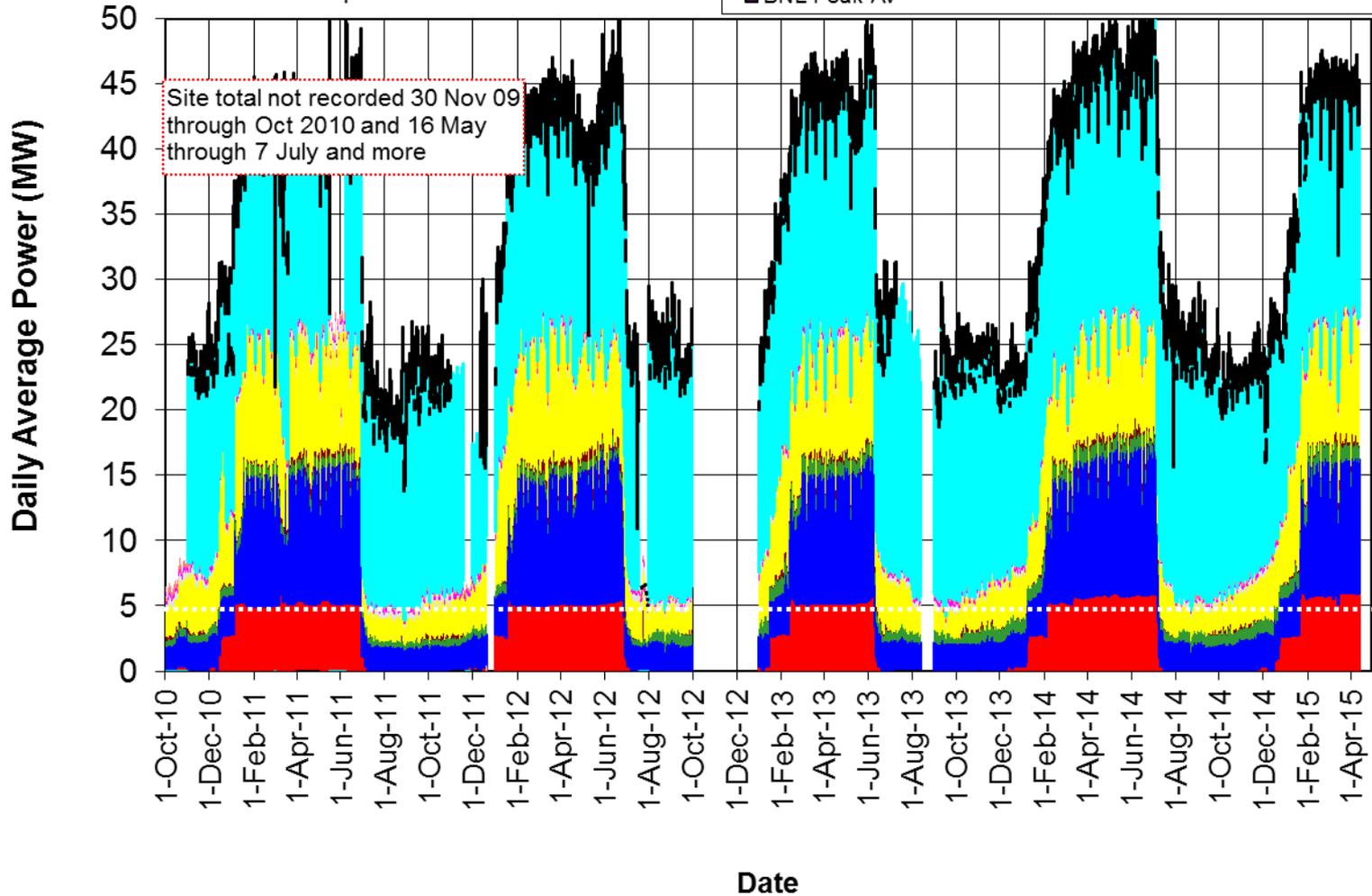
File Window Markers Analysis



BNL Energy Use FY 2011-15

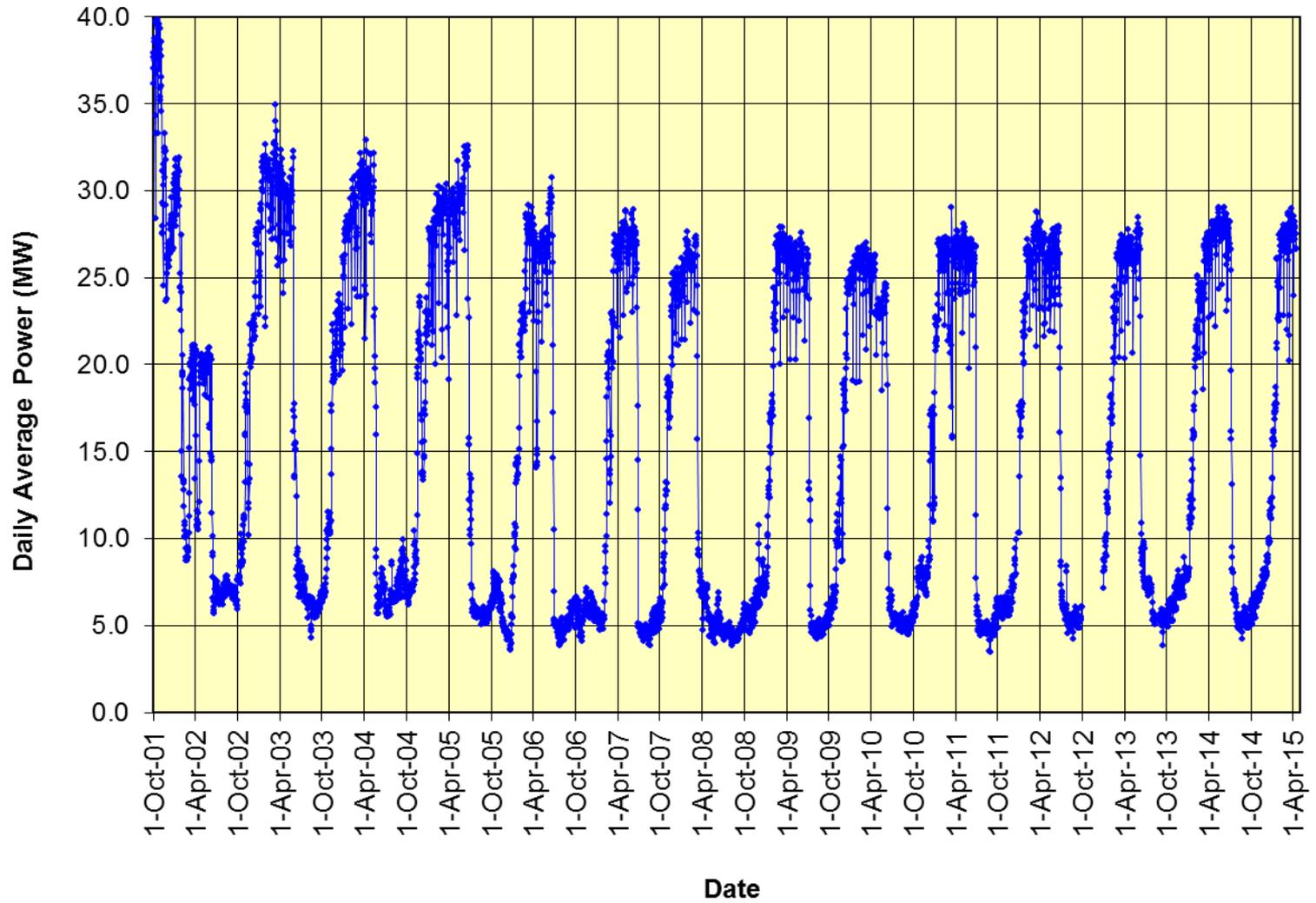
as of 13 Apr 2015

- RHIC Cryo
- RHIC other
- AGS-Exp
- Booster
- AGS-Mach
- Tandem
- CAD Bldg less SMD
- NSRL
- Site Base
- BNL Peak-Av

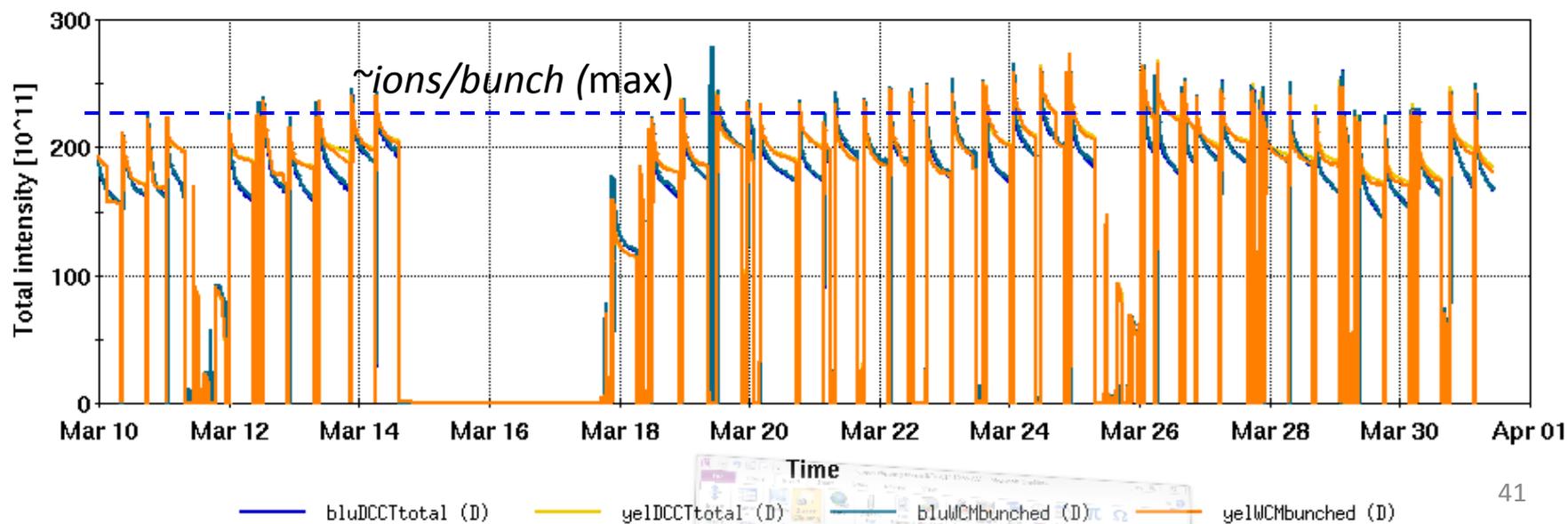
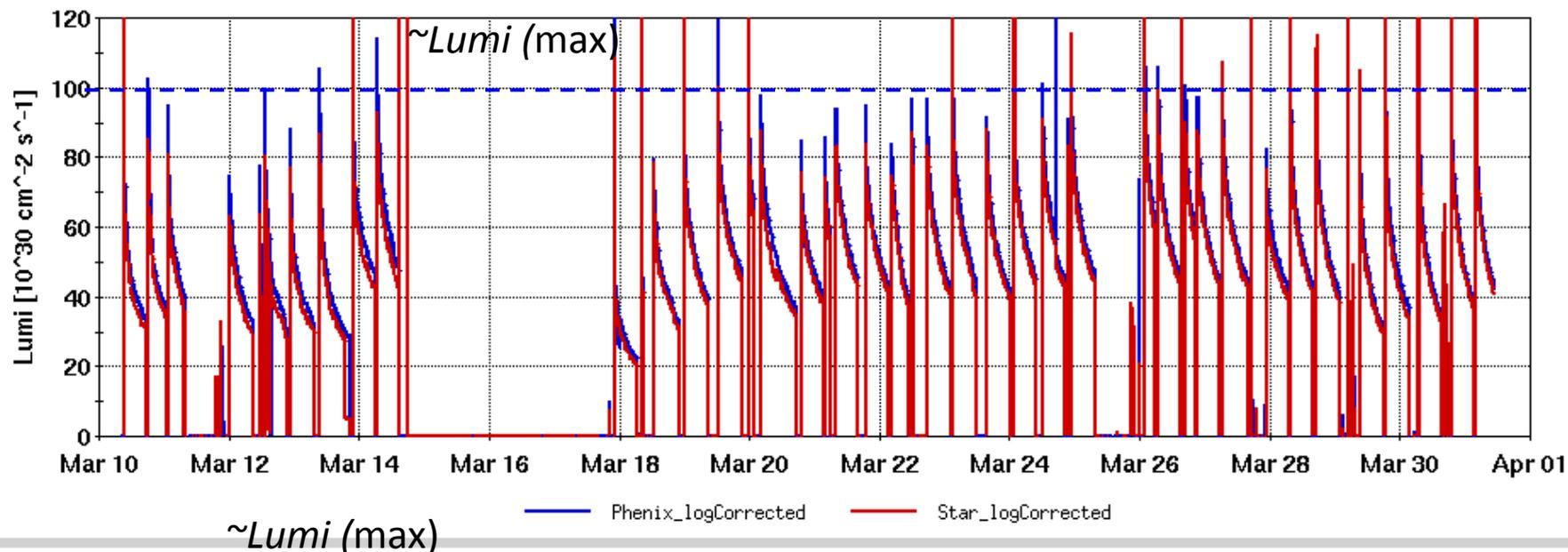


as of 13 Apr 2015

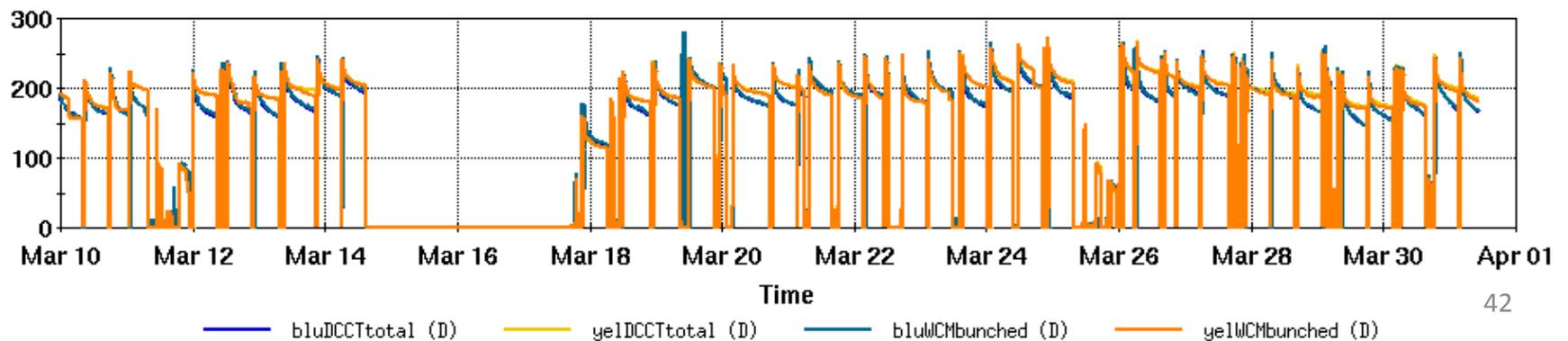
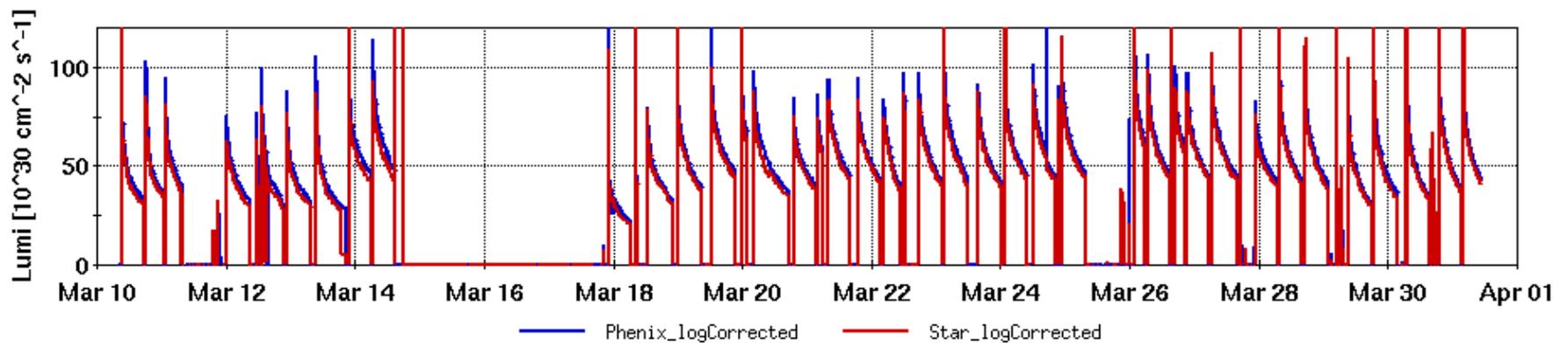
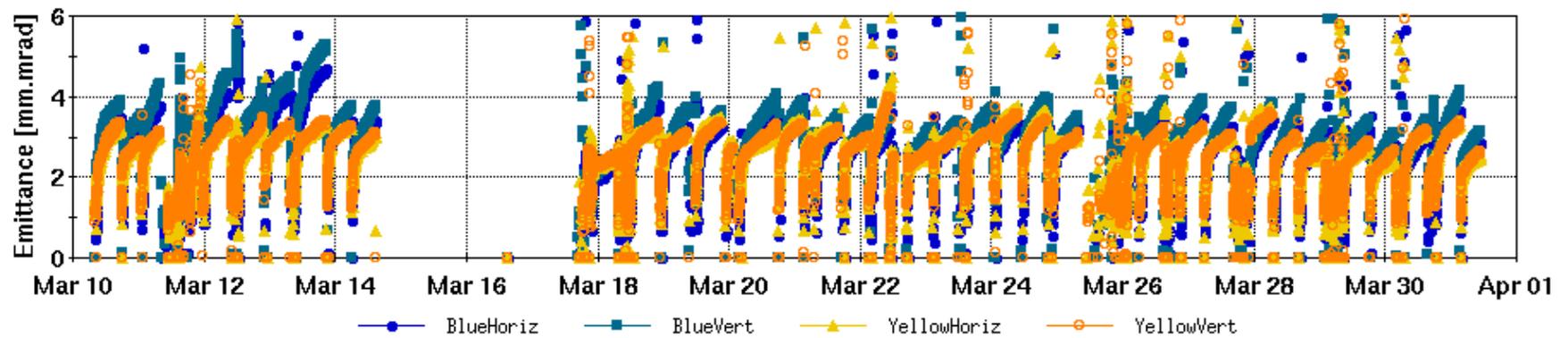
C-AD Energy Use FY 2002-15

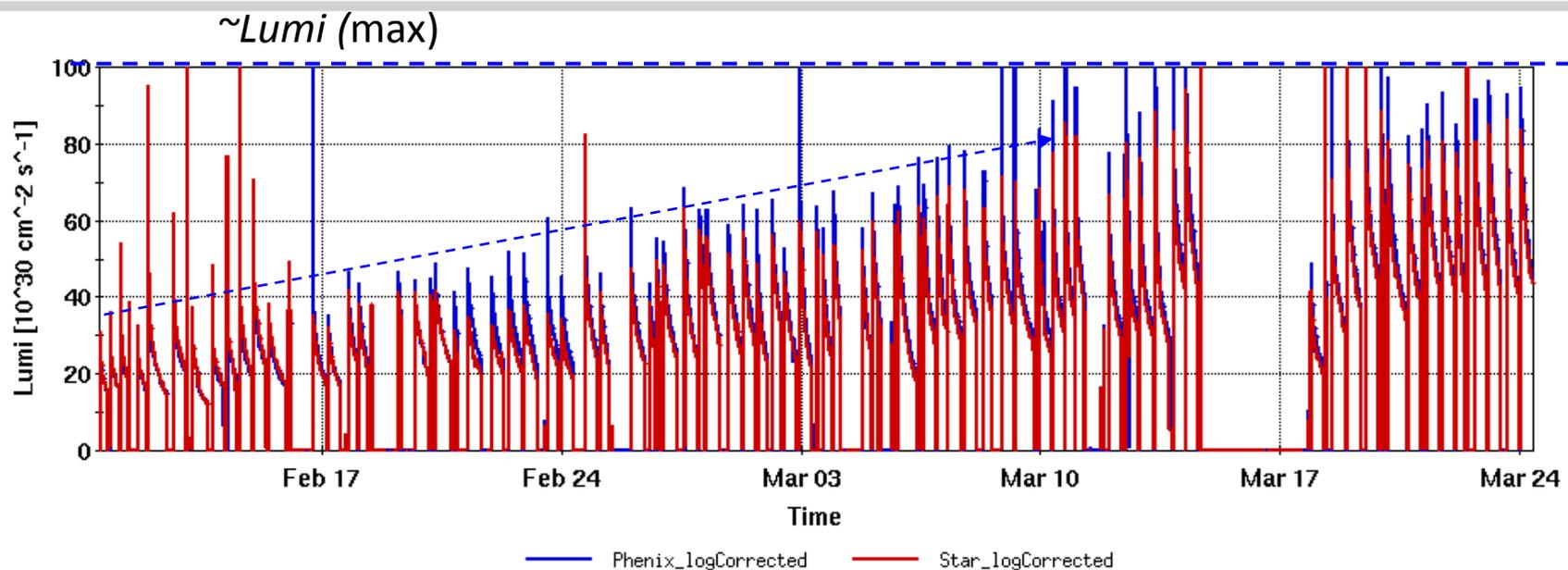
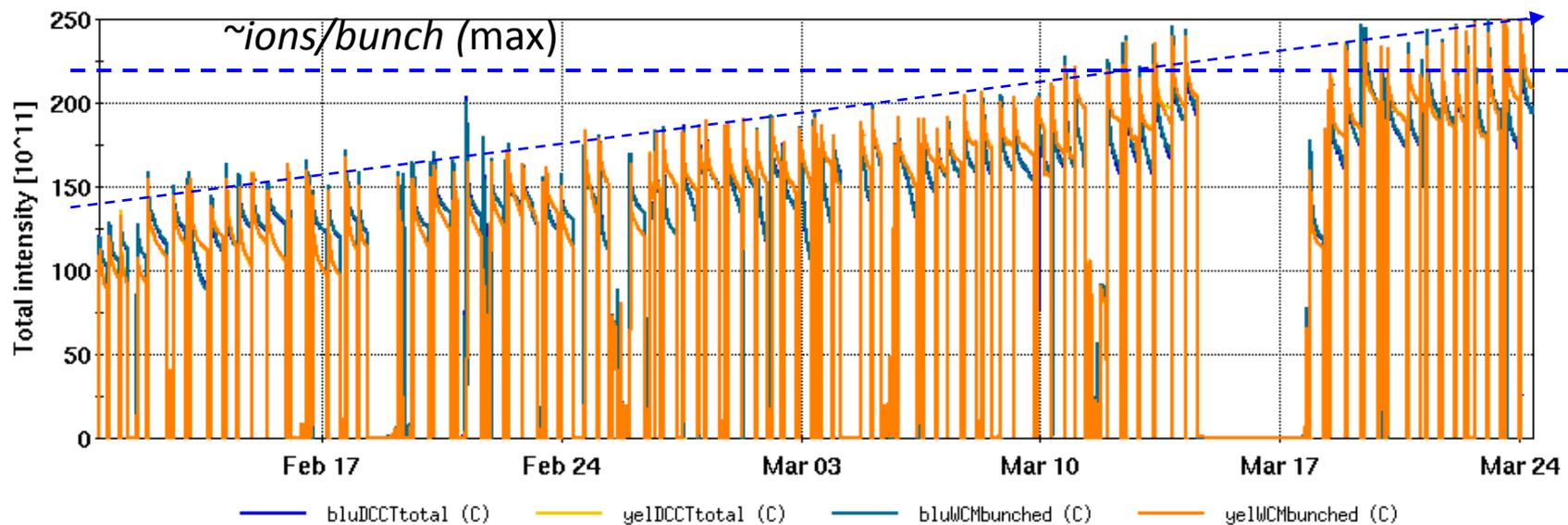


File Window Markers Analysis



File Window Markers Analysis





Run 15 plan based on 22 weeks cryo operation

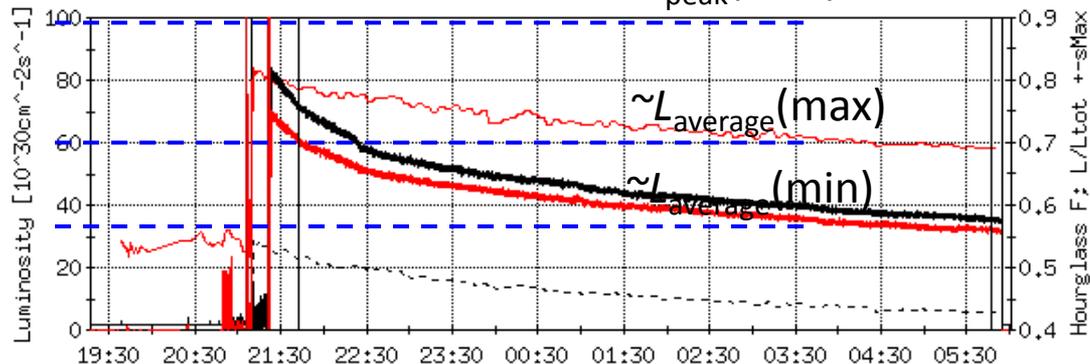
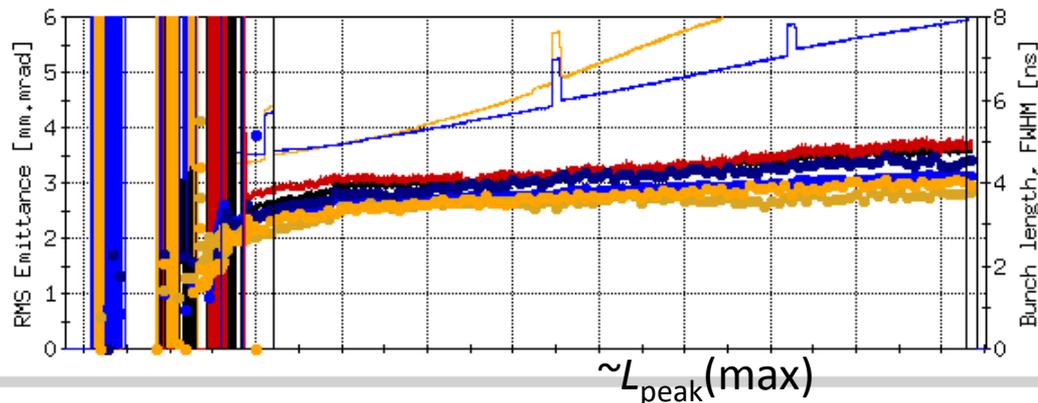
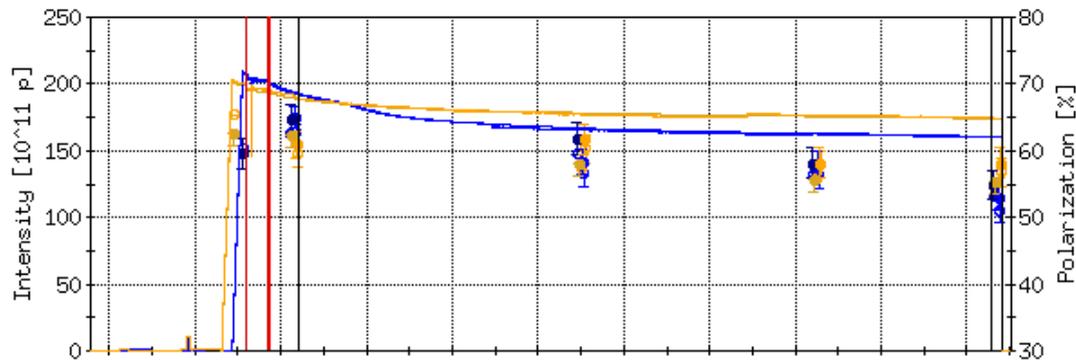
and Fischer et.al. RHIC Collider Projections (FY 2013 – FY 2022), 21 Sep 2014

- 20 Jan, Begin cool-down to 4.5K
- 21 Jan (morning), Blue cold
- 22 Jan (evening), Yellow cold
- 23 Jan (after midnight), Beam in Blue
- 7 Feb, First overnight stores for experiments
- 10 Feb (3 days early) store 18662, Begin 9 week **$\sqrt{s}=200$ GeV pp** physics run
- **14-17 Mar, Power Dip downtime**
- **today, 24 Mar...**
- 17 April (Fri), End 9 week $\sqrt{s}=200$ GeV pp physics run – **note this is a Friday!**
- 28 April (Tue), Begin 5 week **$\sqrt{s}=200$ GeV/n pAu** physics run
- 2 June (Tue), End 5 week $\sqrt{s}=200$ GeV/n pAu physics run
- 5 June (Fri), Begin 2 week **$\sqrt{s}=200$ GeV/n pAl** physics run
- 19 June (Fri), End 2 week $\sqrt{s}=200$ GeV/n pAl physics run
- 19 June (Fri), begin cryo warm-up
- 23 June, cryo warm-up complete, **22.0 cryo weeks** of operation

See <http://www.rhichome.bnl.gov/AP/Spin2015/> for the Run Coordinator's detailed plan

Setup Display

~Previous Best Store to Date – 18761, Mon 9 Mar



Fill Update Species pppp
 Run

Beam Parameters
 Pattern 112x118 gamma

Parameters Display Fit

	PHENIX	STAR
Number collisions	<input type="text" value="111"/>	<input type="text" value="102"/>
beta* [m]	<input type="text" value="0.85"/>	<input type="text" value="0.85"/>
sMax [m]	<input type="text" value="0.30"/>	<input type="text" value="2.00"/>
sigma [mb]	<input type="text" value="0.240"/>	<input type="text" value="0.279"/>
Single Correction	<input type="text" value="All"/>	<input type="text" value="All"/>

Initial protons in RHIC

Blue = 1.82×10^{11}

Yellow = 1.84×10^{11}

Source Pol = 81.5/81.5%

AGS Pol = 68.4%

RHIC Store Pol (CNI)

Av P0 %/hr

Blue =

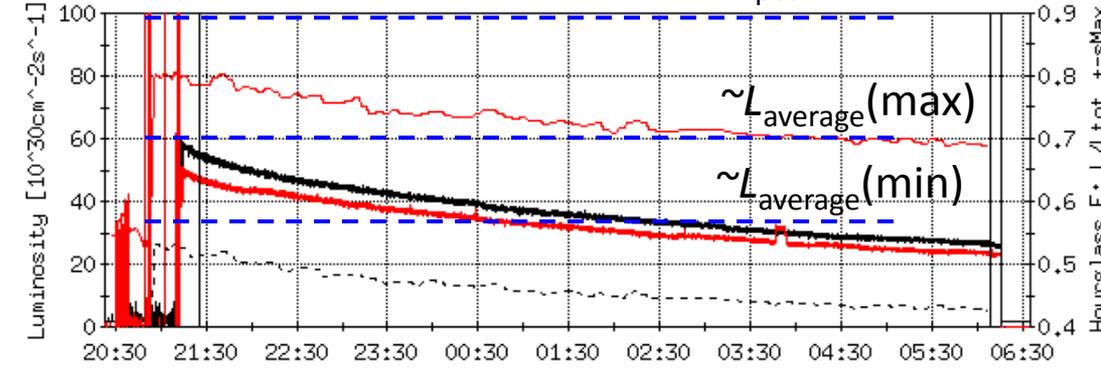
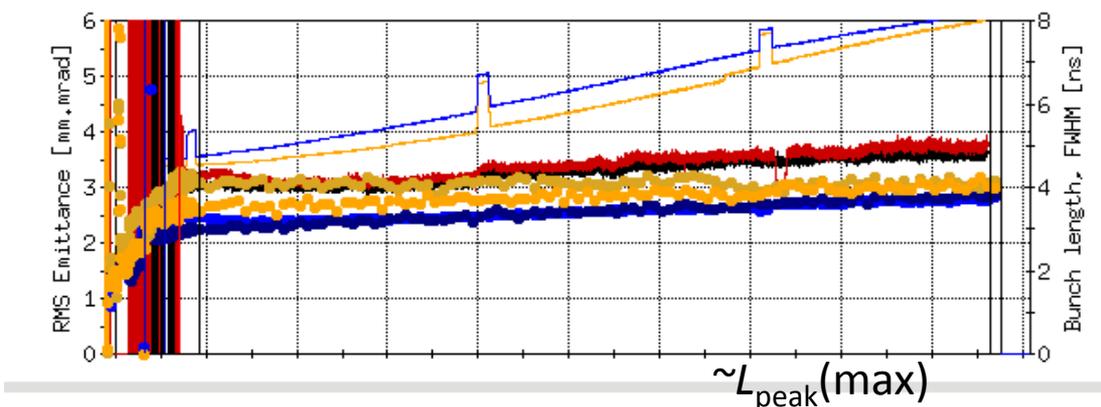
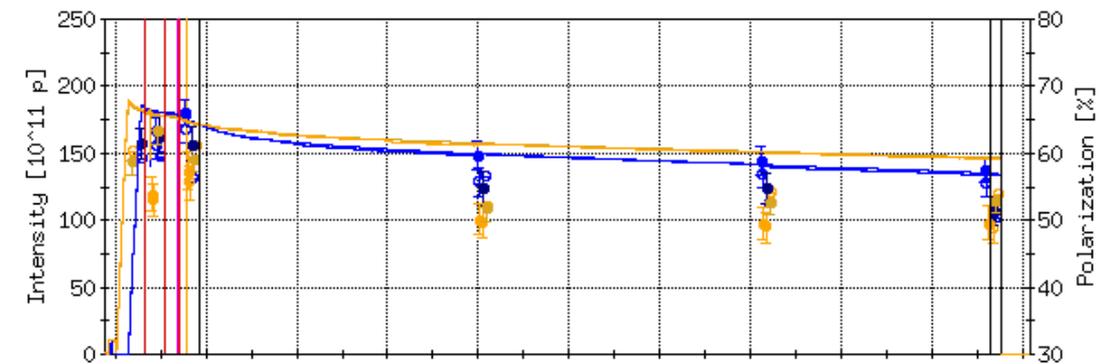
Yellow =

Mon Mar 9 11:01:00 2015 – INFO : Phenix avg Lumi = 453608
 Mon Mar 9 11:01:00 2015 – INFO : Phenix Int Lumi = 1339561
 Mon Mar 9 11:01:00 2015 – INFO : Star avg Lumi = 404874

Previous Best Store to Date – 18726, Sun 1 Mar

Setup Display

Help



Fill Update Species

Run

Beam Parameters

Pattern gamma

Parameters

	PHENIX	STAR
Number collisions	<input type="text" value="111"/>	<input type="text" value="102"/>
beta* [m]	<input type="text" value="0.85"/>	<input type="text" value="0.85"/>
sMax [m]	<input type="text" value="0.30"/>	<input type="text" value="2.00"/>
sigma [mb]	<input type="text" value="0.240"/>	<input type="text" value="0.279"/>
Single Correction	<input type="text" value="All"/>	<input type="text" value="All"/>

Initial protons in RHIC

Blue = 1.68×10^{11}

Yellow = 1.72×10^{11}

Source Pol = 83.5/79.1%

AGS Pol = ?%

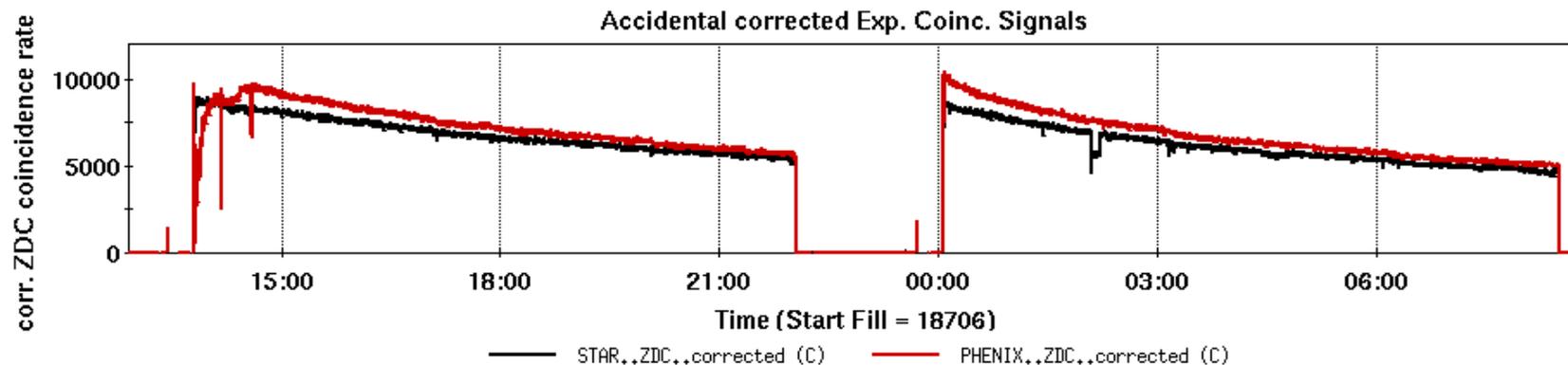
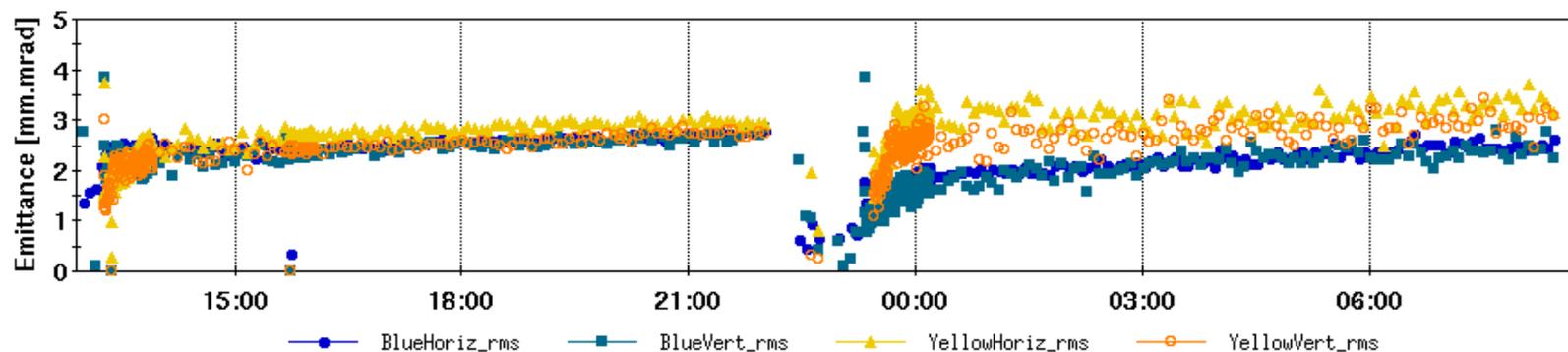
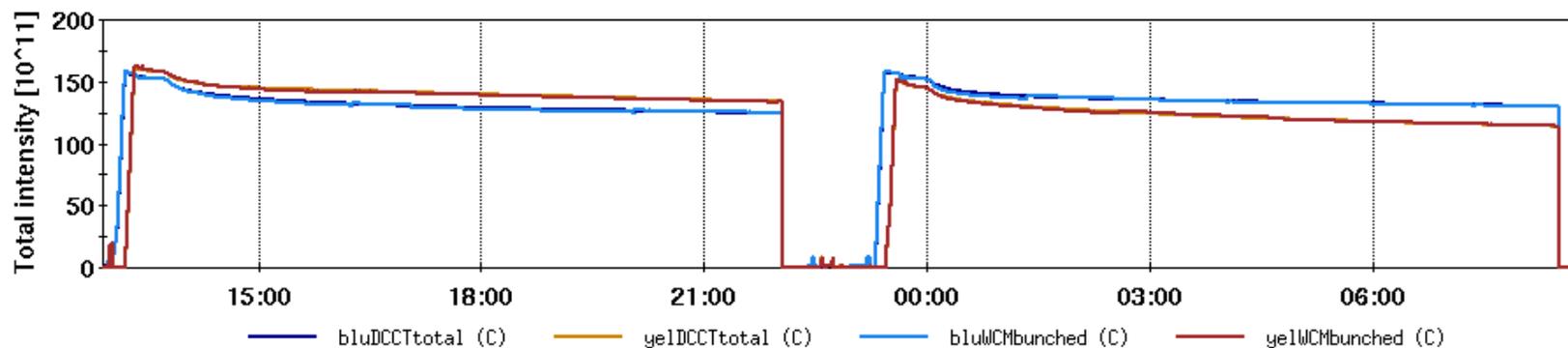
RHIC Store Pol (CNI)

	Av	P0	%/hr
Blue	= 60.5	62.8	-0.97
Yellow	= 57.1	60.2	-0.67

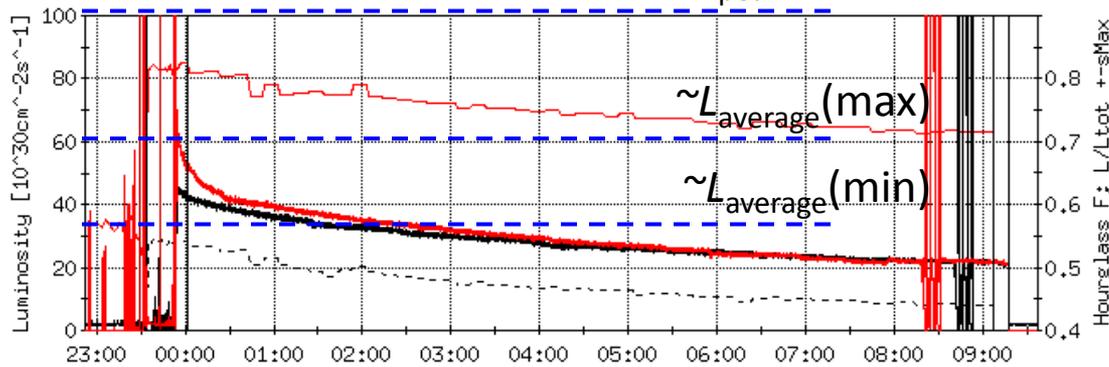
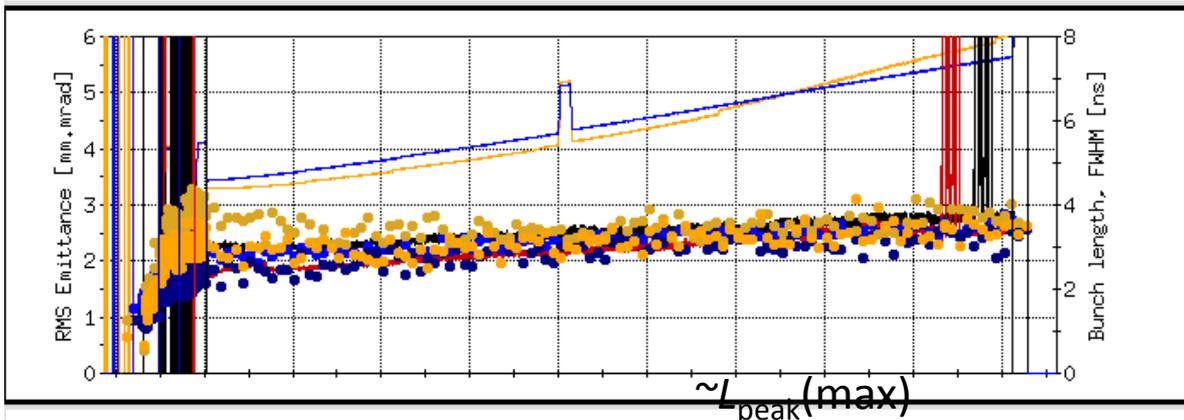
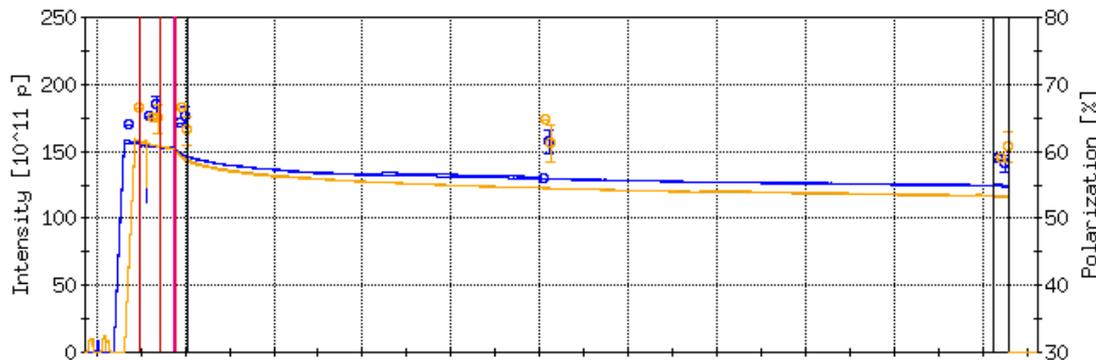
Mon Mar 2 14:56:41 2015 – INFO : Phenix avg Lumi = 361416
 Mon Mar 2 14:56:41 2015 – INFO : Phenix Int Lumi = 1149588
 Mon Mar 2 14:56:41 2015 – INFO : Star avg Lumi = 319993

23 Feb stores 18706 & 18707

File Window Markers Analysis



Previous Best Store – 18676, Sat 14 Feb



Fill Update Species
 Run

Beam Parameters
 Pattern gamma

Parameters

	PHENIX	STAR
Number collisions	<input type="text" value="111"/>	<input type="text" value="102"/>
beta* [m]	<input type="text" value="0.85"/>	<input type="text" value="0.85"/>
sMax [m]	<input type="text" value="0.30"/>	<input type="text" value="2.00"/>
sigma [mb]	<input type="text" value="0.240"/>	<input type="text" value="0.279"/>
Single Correction	<input type="text" value="All"/>	<input type="text" value="All"/>

Source Pol = 81.8/81.9%
 AGS Pol = 73.7%
 RHIC Store Pol

	Av	P0	%/hr
Yellow =	66.8	70.2	-0.68
Blue =	67.4	68.7	-0.78

Tue Feb 17 12:10:13 2015 – INFO : Phenix avg Lumi = 274750
 Tue Feb 17 12:10:13 2015 – INFO : Phenix Int Lumi = 917098
 Tue Feb 17 12:10:13 2015 – INFO : Star avg Lumi = 288131

PHENIX goals 9 weeks, 50pb-1 recorded within 40 cm vertex with 60% pol
STAR goals 12 weeks, 90 pb-1 recorded and 500M MB events, 60 % pol

Estimate of required lumi (based on Run 12 efficiencies):

$$\text{STAR} = 90/0.6 = 150 \text{ pb-1}$$

$$\text{PHENIX} = 50/0.35 = 140 \text{ pb-1}$$

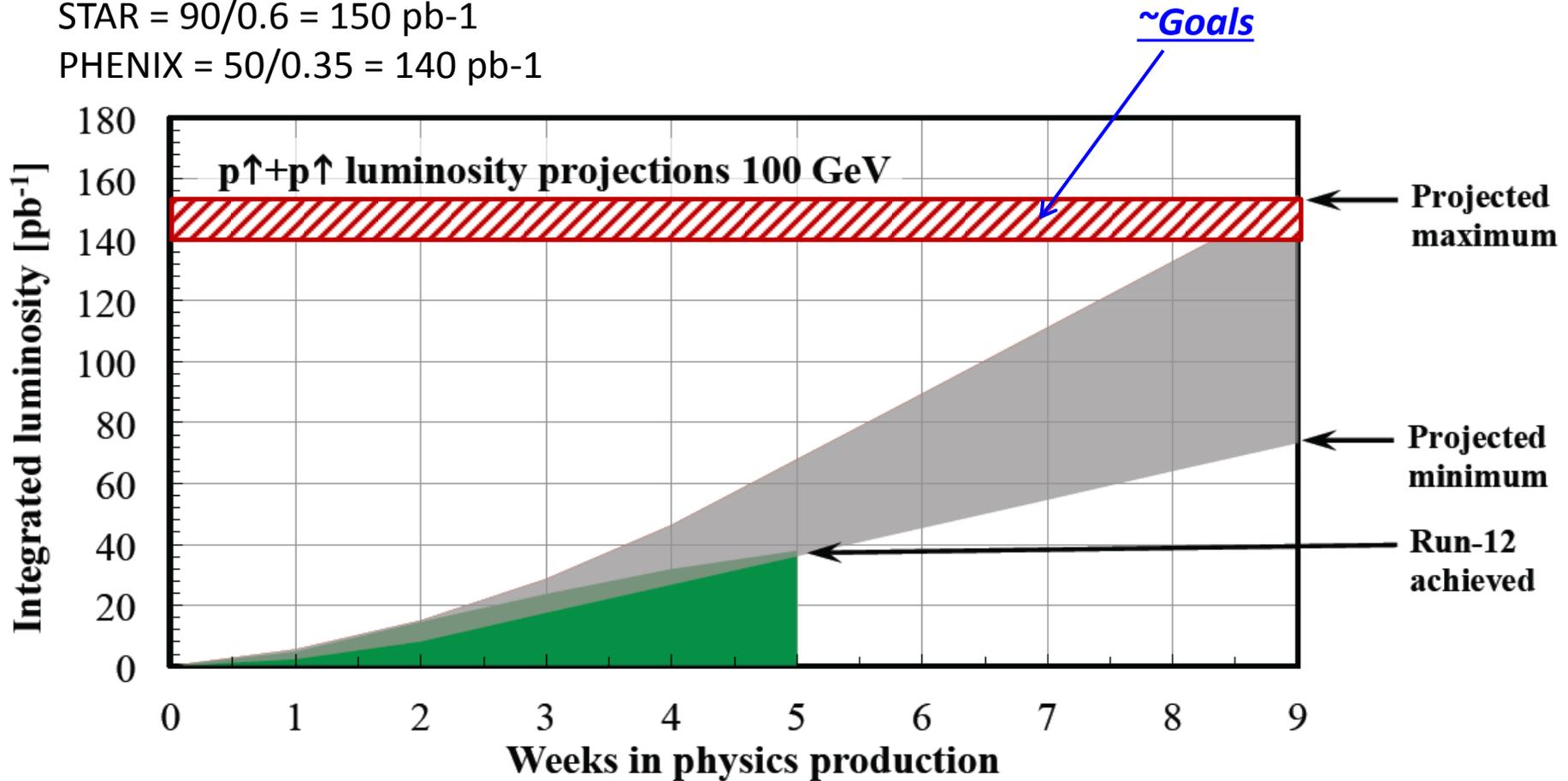


Figure 3: Projected minimum and maximum integrated luminosities for polarized proton collisions at 100 GeV beam energy, assuming linear weekly luminosity ramp-up in 5 weeks. An average store polarization between 59% and up to 63% is expected.

Cryogenic Blue & Yellow Rings (14 days)

[Ring Summary \(1 day\)](#) [Sector Plots \(1 day\)](#) [Sector Plots \(14 days\)](#)

File Window Markers Analysis

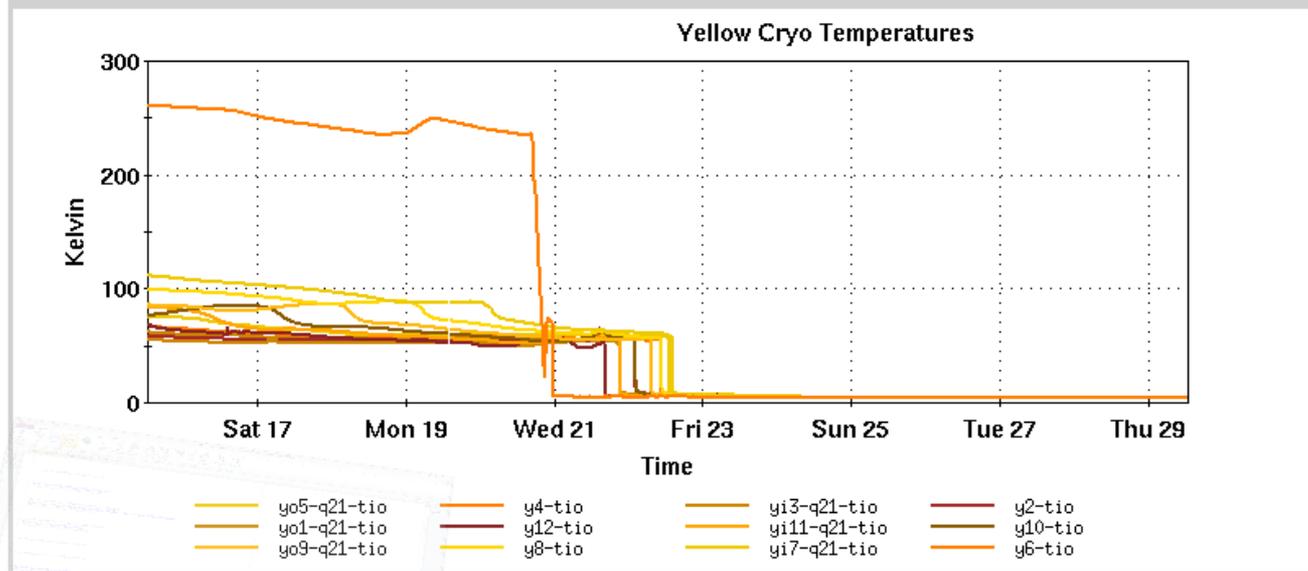
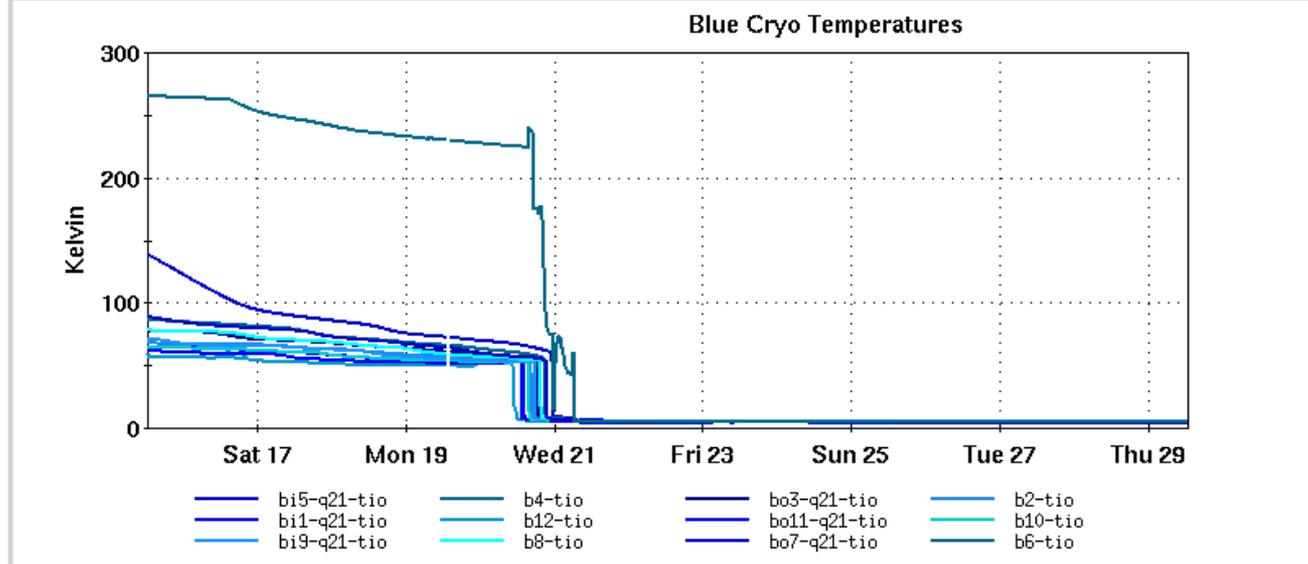




Photo by Andy Freeberg, SLAC National Accelerator Laboratory

breaking

January 16, 2015

20-ton magnet heads to New York

A superconducting magnet begins its journey from SLAC laboratory in California to Brookhaven Lab in New York.

By Justin Eure



PDF download

Imagine an MRI magnet with a central chamber spanning some 9 feet—massive enough to accommodate a standing African elephant. Physicists at the US Department of Energy’s Brookhaven National Laboratory need just such an extraordinary piece of equipment for an upcoming experiment. And, as luck would have it, physicists at SLAC

most popular

January 16, 2015

20-ton magnet heads to New York

A superconducting magnet begins its journey from SLAC laboratory in California to Brookhaven Lab in New York.

January 13, 2015

Dark horse of the dark matter hunt

Dark matter might be made up of a type of particle not many scientists are looking for: the axion.

January 12, 2015

Mirror, mirror

After more than six years of grinding and polishing, the first-ever dual-surface mirror for a major telescope is complete.

symmetry tweets

January 19, 2015

ICYMI: Accelerator-driven carbon dating advances everything from archaeology to medicine: <http://t.co/hqMcZnCCw4>

Who's Who for 2015

RHIC 100 x 100 GeV polarized protons:

Run Coordinator: Vincent Schoefer, schoefer@bnl.gov , 631-344-8453 (office)

RHIC 100 x 100 GeV/n polarized protons on gold and polarized protons on aluminum:

Run Coordinator: Chuyu Liu, cliu1@bnl.gov , 631-344-4431 (office)

Scheduling Physicists:

Yousef Makdisi, makdisi@bnl.gov, 631-344-4932(office) 631-??

Phil Pile, pile@bnl.gov, 631-344-4643 (office), 631-834-2005 (cell)

AGS Liaison:

Haixin Huang, huanghai@bnl.gov , 631-344-5446 (office)

The Plan for Run 15: 22 weeks of cryo operations

Cool-down from 50 K to 4 K	0.5 weeks	
Set-up mode 1 (p↑+p↑ at 100 GeV)	2.5 weeks	(no dedicated time for experiments)
Ramp-up mode 1	0.5 weeks	(8 h/night for experiments)
Data taking mode 1	9 weeks	
Set-up mode 2 (p↑+Au at 100 GeV/nucleon)	1.5 weeks	(no dedicated time for experiments)
Data taking mode 2 with further ramp-up	5 weeks	
Set-up mode 3 (p↑+Al at 100 GeV/nucleon)	0.5 weeks	(no dedicated time for experiments)
Data taking mode 3+1 with further ramp-up	2 weeks	
Warm-up	0.5 week	

From Fischer et. al., RHIC Collider Projections (FY 2014 – FY 2022), 21 Sep 2014