

Run 14 RHIC Machine/Experiments Meeting

29 Apr 2014

Agenda:

- **Run 14 Schedule** (Pile)
- **Machine Status** (Robert-Demolaize)
- **STAR and PHENIX Status** (Experiments)
- 56 MHz update (Belomestnykh)
- **Other**

Call in bridge line is 631-344-8383

Run 14 plan based on 22 weeks cryo operation

and Fischer et.al. RHIC Collider Projections (FY 2013 – FY 2017), 4 Jun 2013

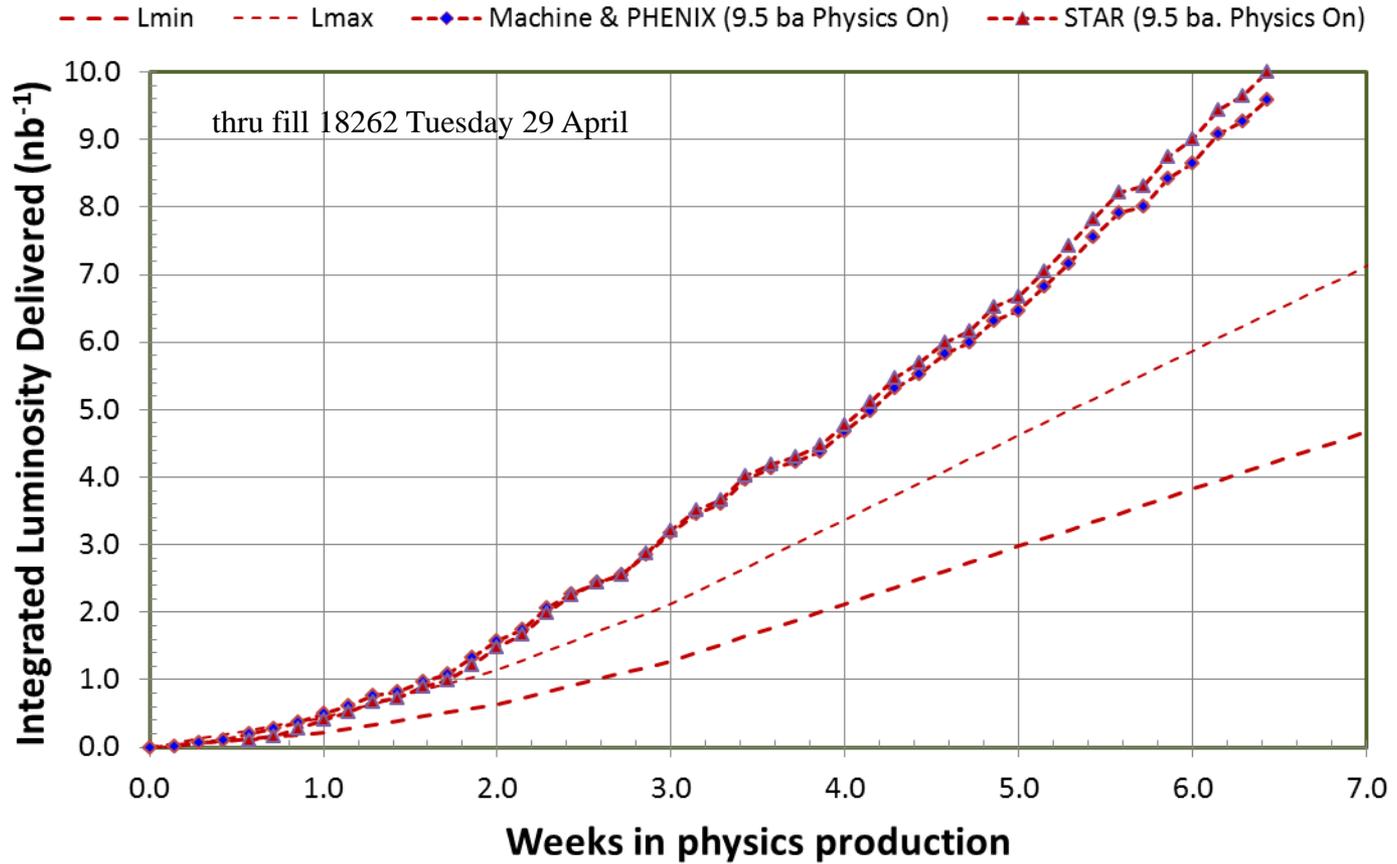
- ✓ 3 Feb, Begin cool-down to 4.5K
- ✓ 4 Feb, Cool-down to 6K in Blue
- ✓ 7 Feb, Blue and Yellow at 4.5 deg K
- ✓ 10-Feb, Beam in Blue and Yellow at injection
- ✓ 15-Feb, Begin $\sqrt{s} = 14.6$ GeV/n AuAu physics
- ~~✓~~ ~~8-10-11~~ Mar (Tuesday, 0800), End $\sqrt{s} = 14.6$ GeV/n AuAu physics run begin setup for $\sqrt{s} = 200$ GeV/n AuAu
- ✓ 15-Mar (~14:00, store 18046), Begin $\sqrt{s} = 200$ GeV/n AuAu physics run
 - ✓ PHENIX 1st physics store = 18046 (15 March)
 - ✓ STAR 1st physics store = 18064 (17 March)

today, 29 Apr...

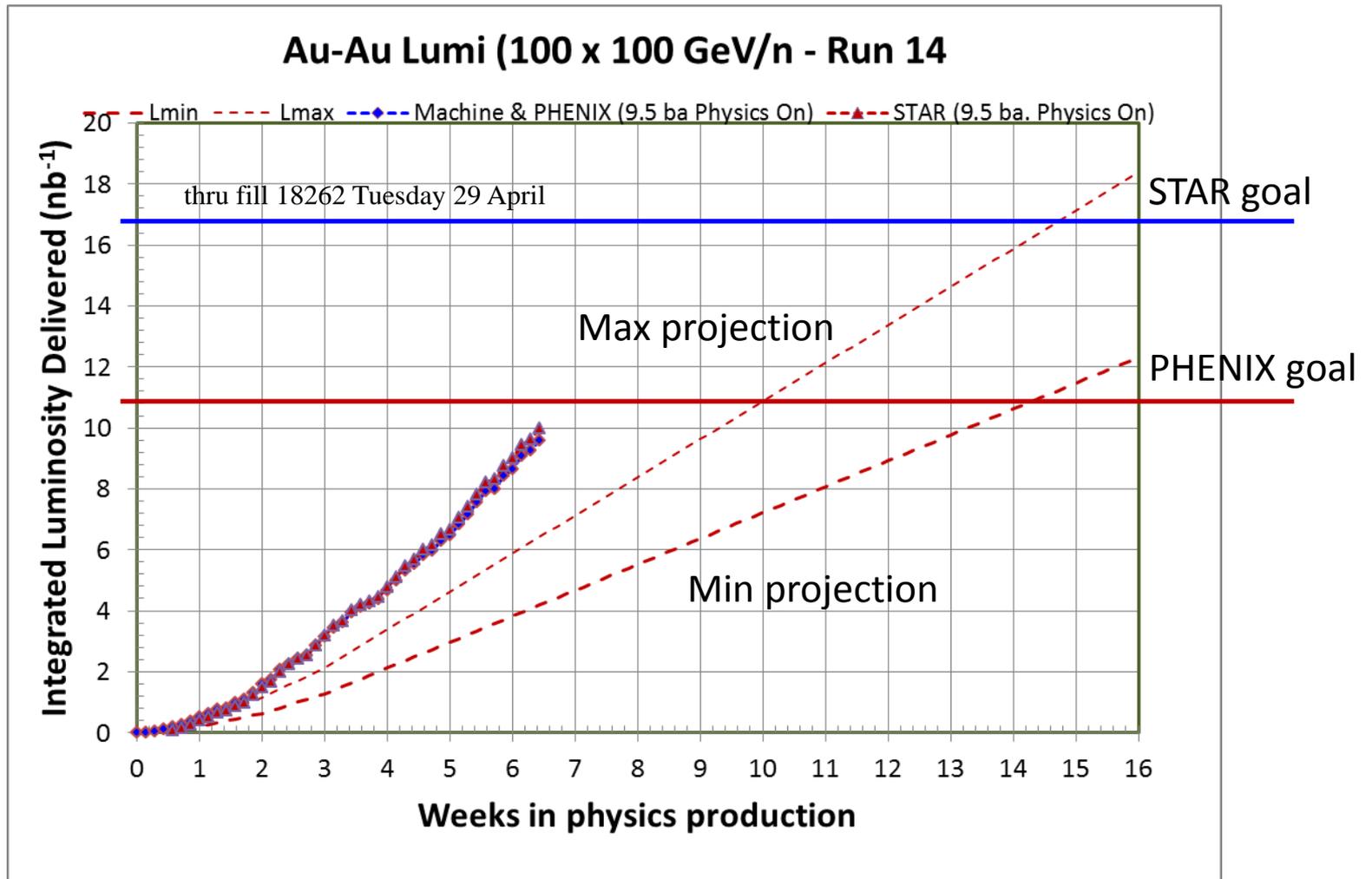
- 27-Jun, End 15 week $\sqrt{s} = 200$ GeV/n AuAu run
- 27-June through 4 July , 7 days contingency/TBD
- 4-July, begin cryo warm-up
- 7- July, warm-up complete, 22.0 cryo weeks of operation

See <http://www.rhichome.bnl.gov/AP/RHIC2014/> for the Run Coordinator's detailed plan

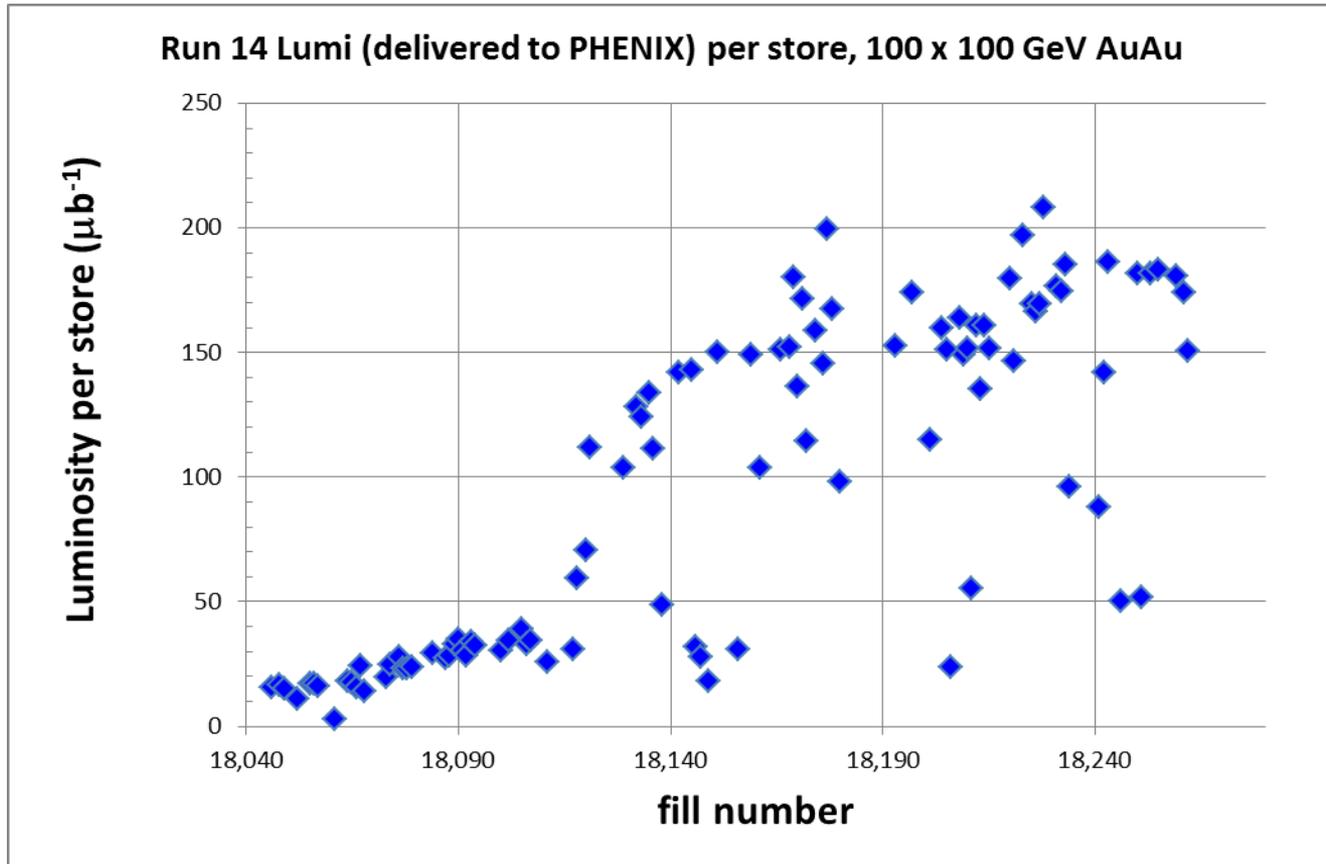
Au-Au Lumi (100 x 100 GeV/n) - Run 14



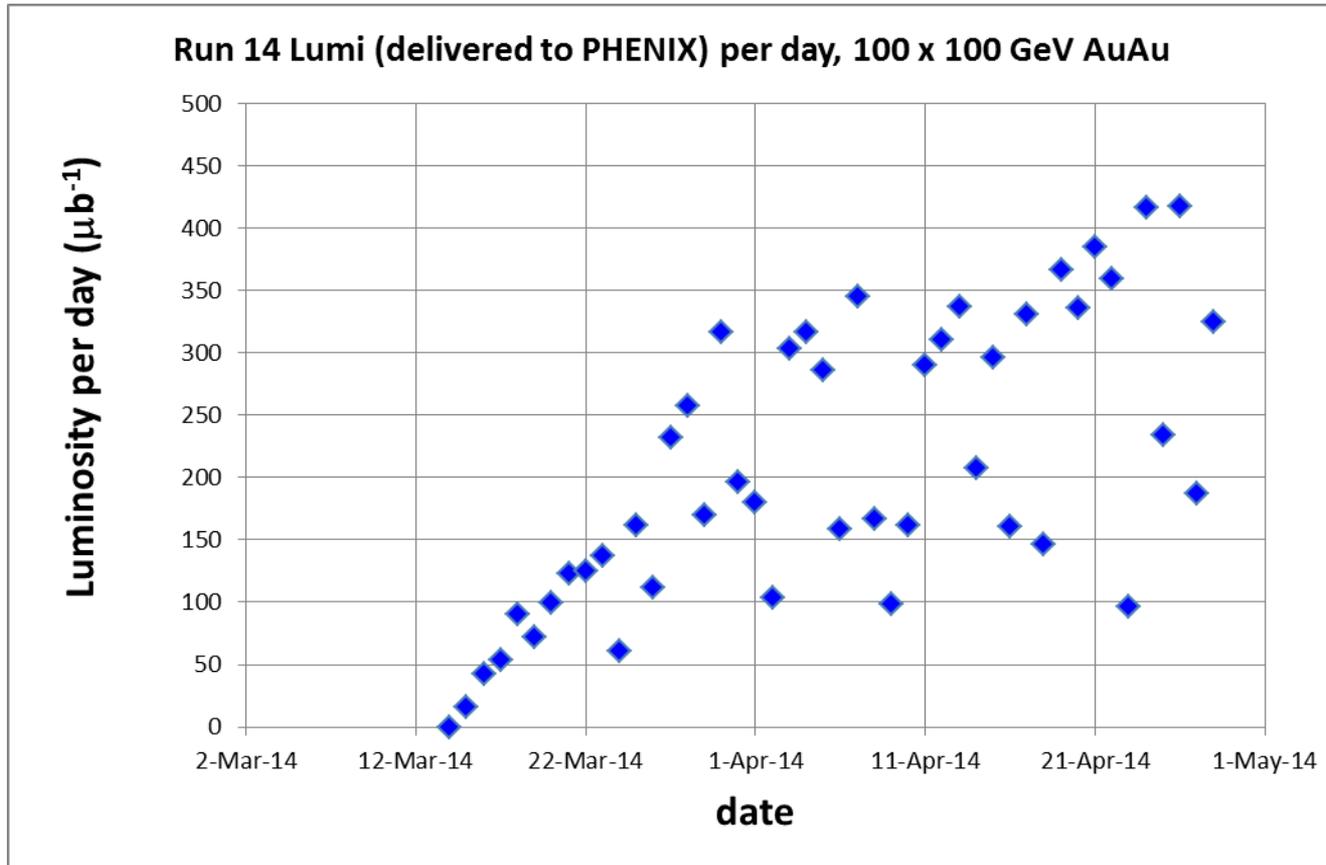
We should update goals soon!



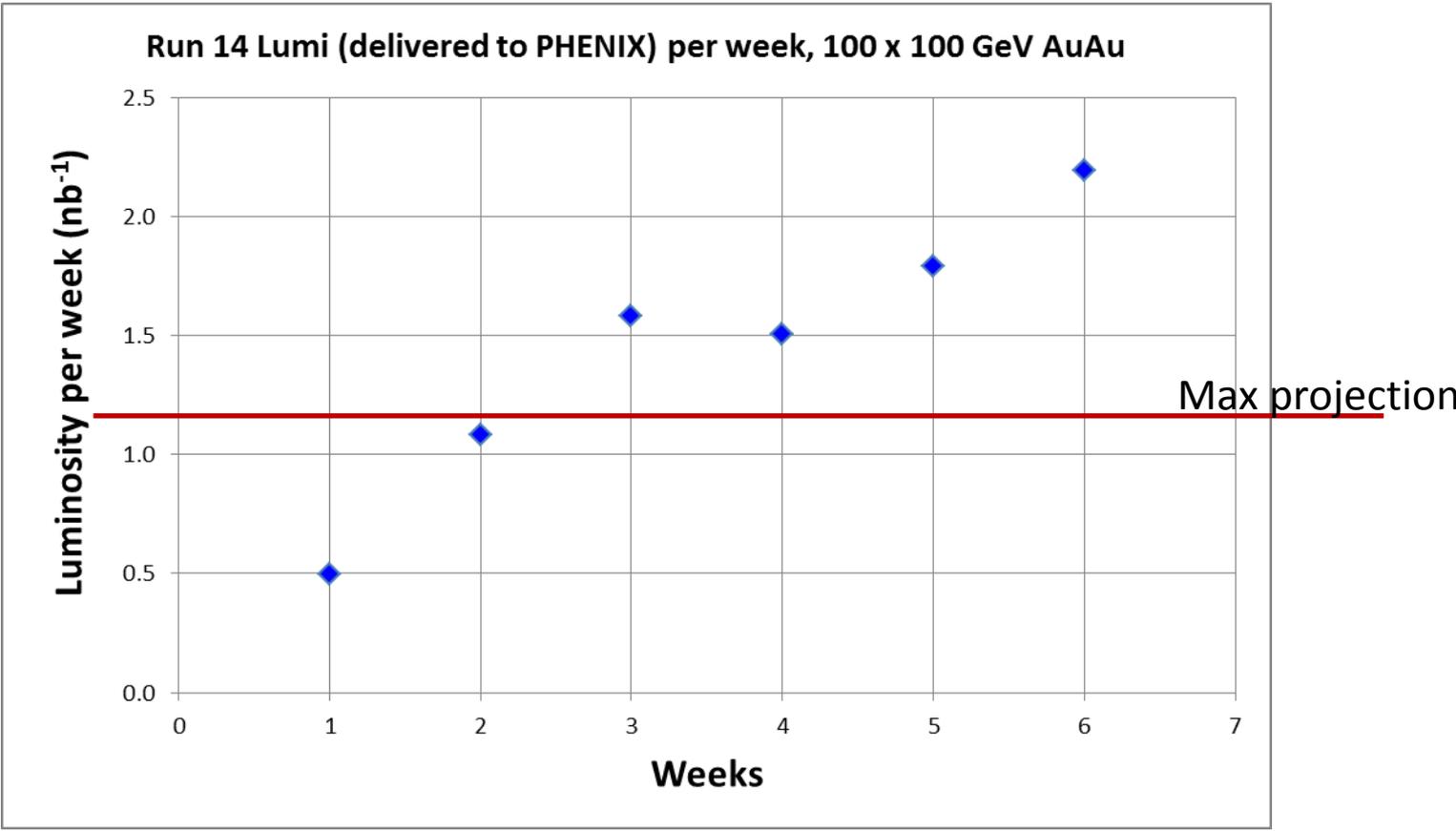
thru fill 18262 Tuesday 29 April



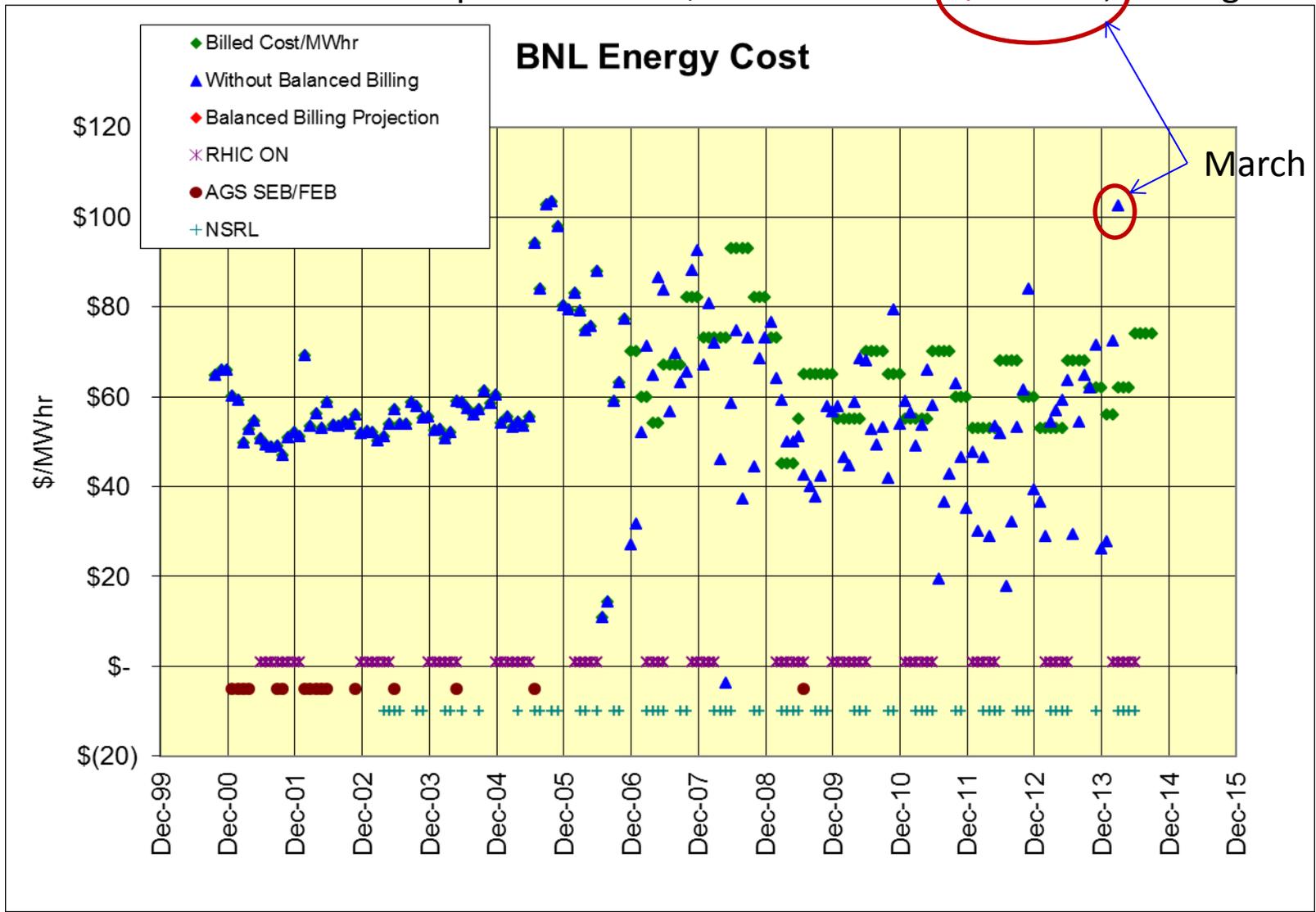
thru fill 18262 Tuesday 29 April



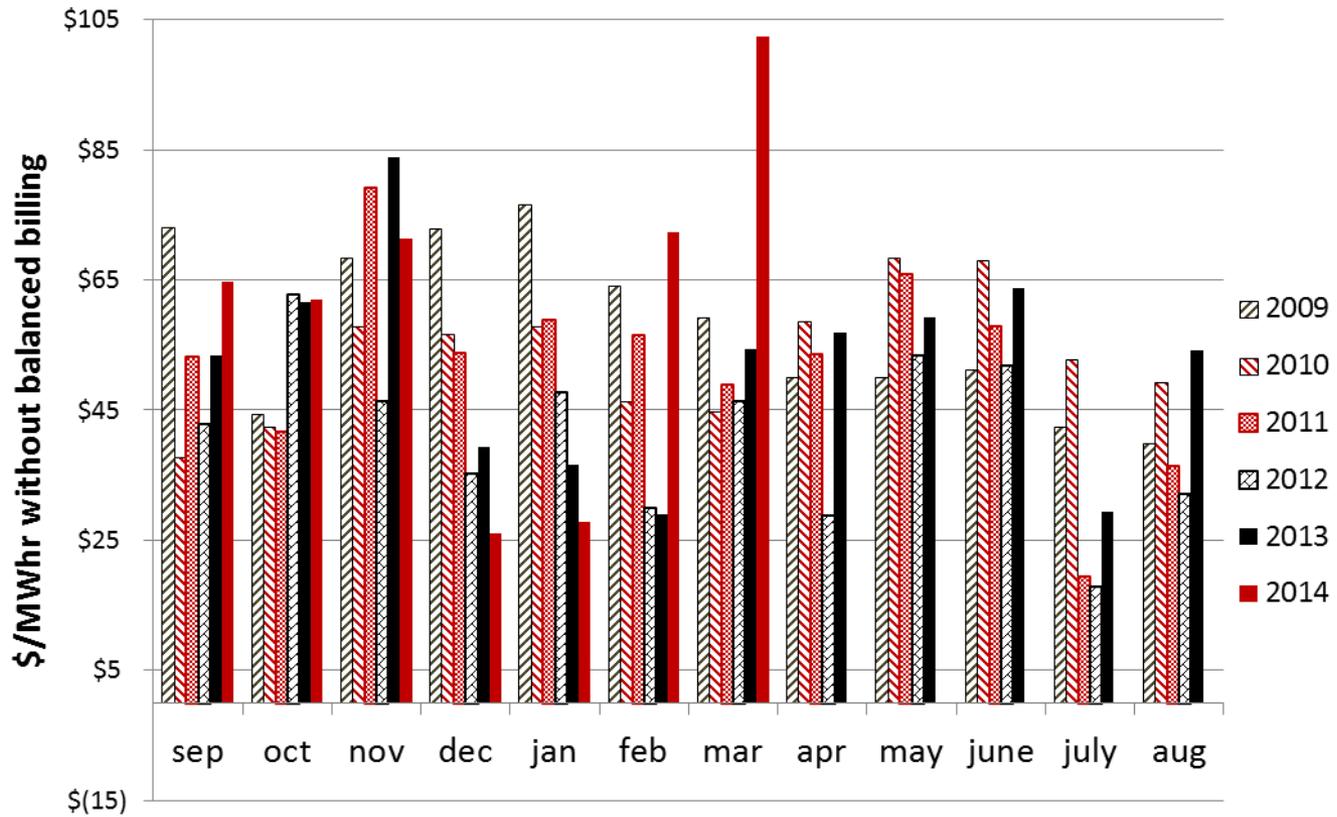
Through 25 April stores

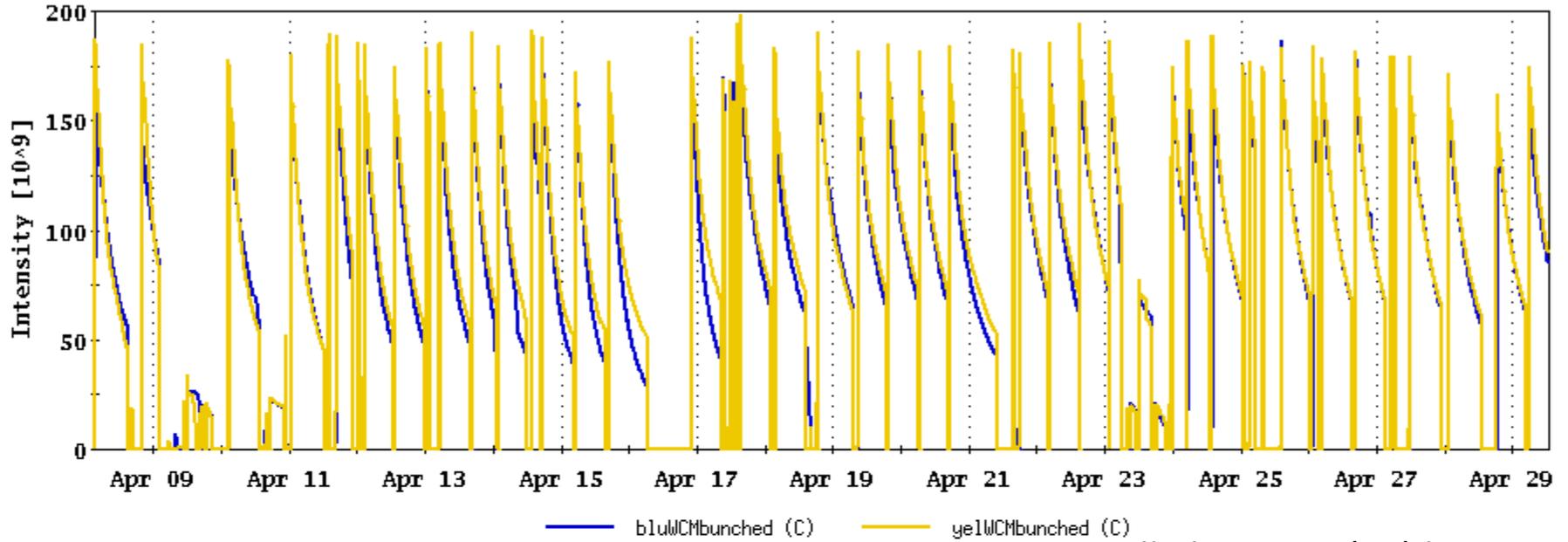


FY 2014 power rebate \$ in BNL bank = **-\$0.680M**, through Mar

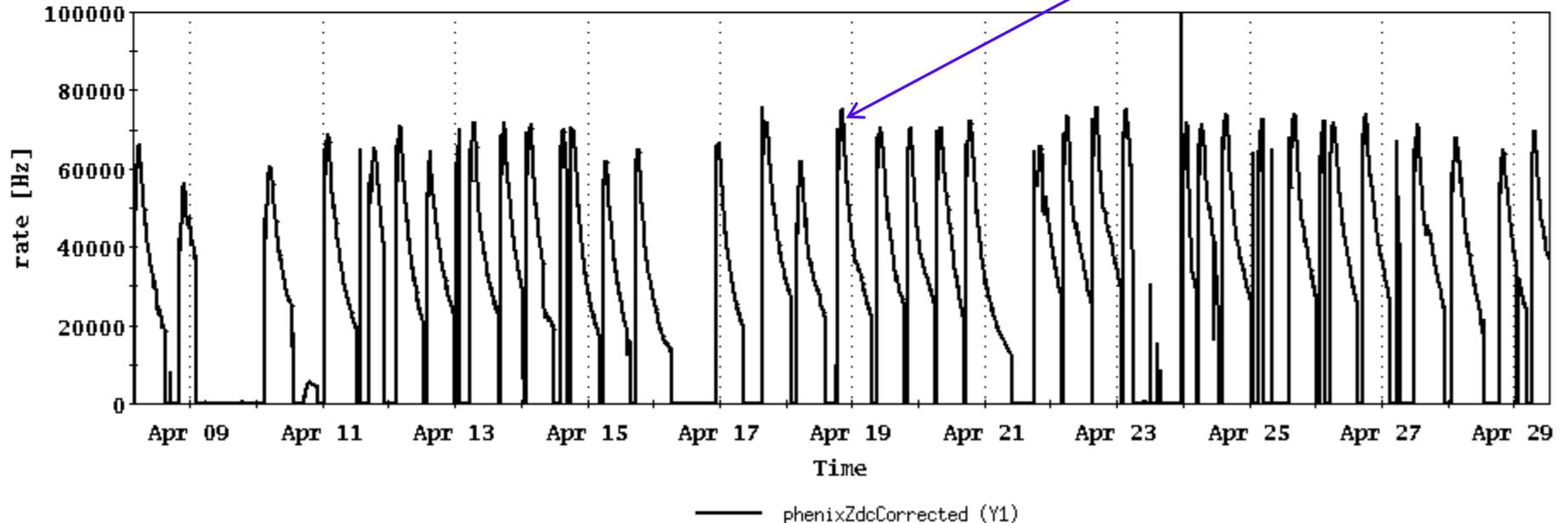


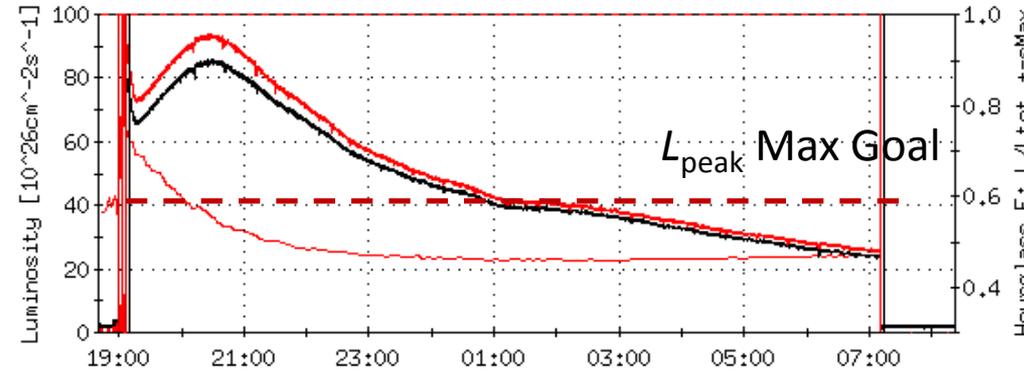
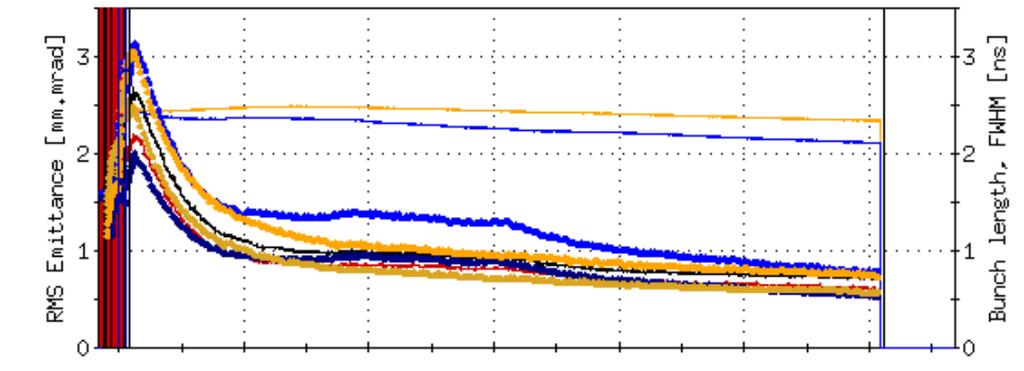
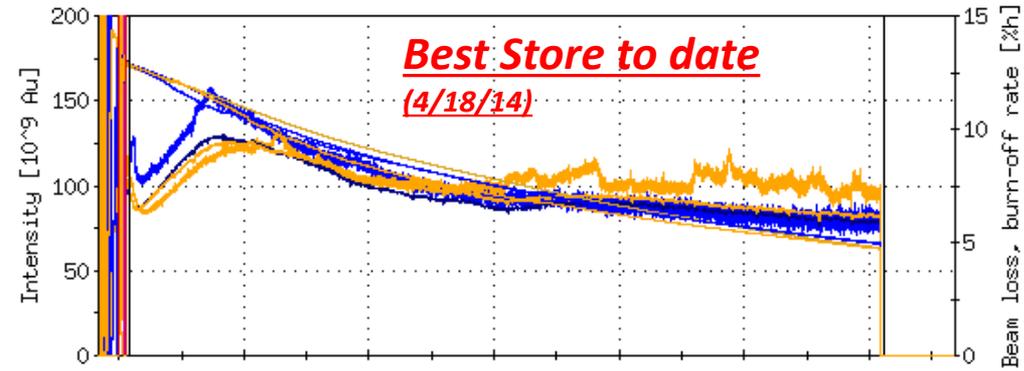
BNL Electricity Cost





Still ~best ~10 (12) hr store





Fill Update Species AuAu
 Run

Beam Parameters
 Pattern gamma

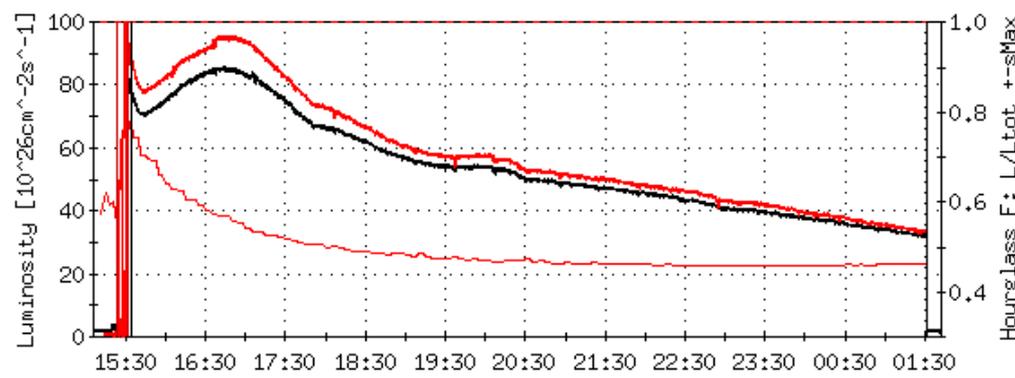
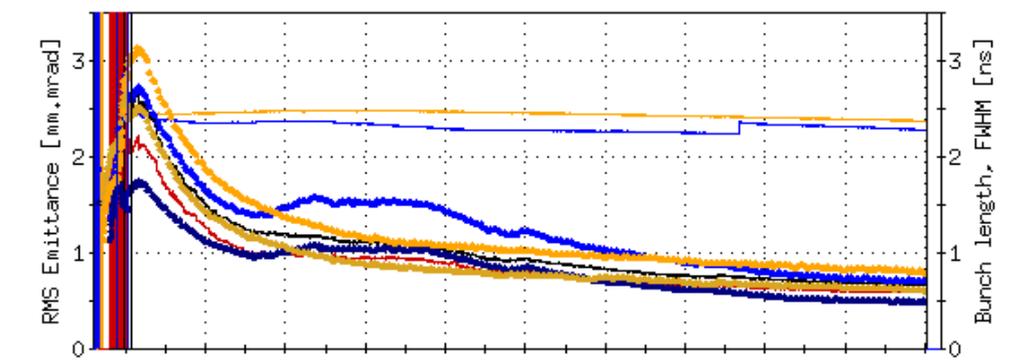
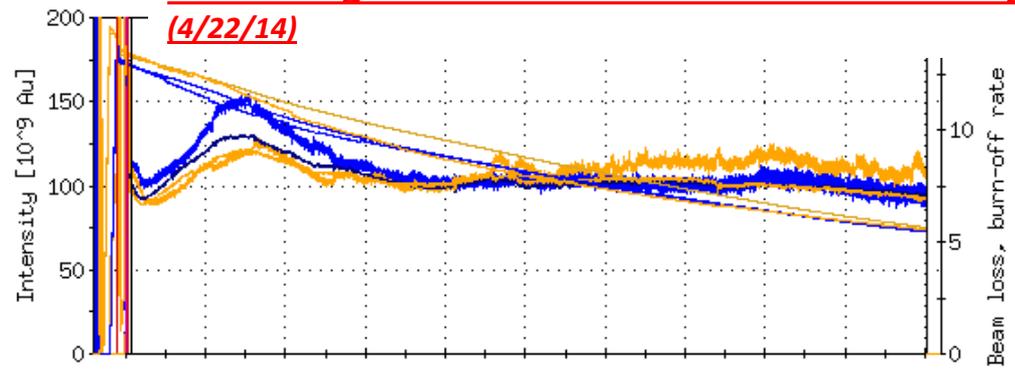
Parameters

	PHENIX	STAR
Number collisions	<input type="text" value="111"/>	<input type="text" value="102"/>
beta* [m]	<input type="text" value="0.70"/>	<input type="text" value="0.70"/>
sMax [m]	<input type="text" value="10.00"/>	<input type="text" value="10.00"/>
sigma [b]	<input type="text" value="9.900"/>	<input type="text" value="9.500"/>
Single Correction	<input type="button" value="All -"/>	<input type="button" value="All -"/>

Setup Dis

Another good store – a lot more about as good!

(4/22/14)



1 18233 Update Species AuAu

Run run_fy14

Beam Parameters
 Pattern 111x111 gamma 107.396

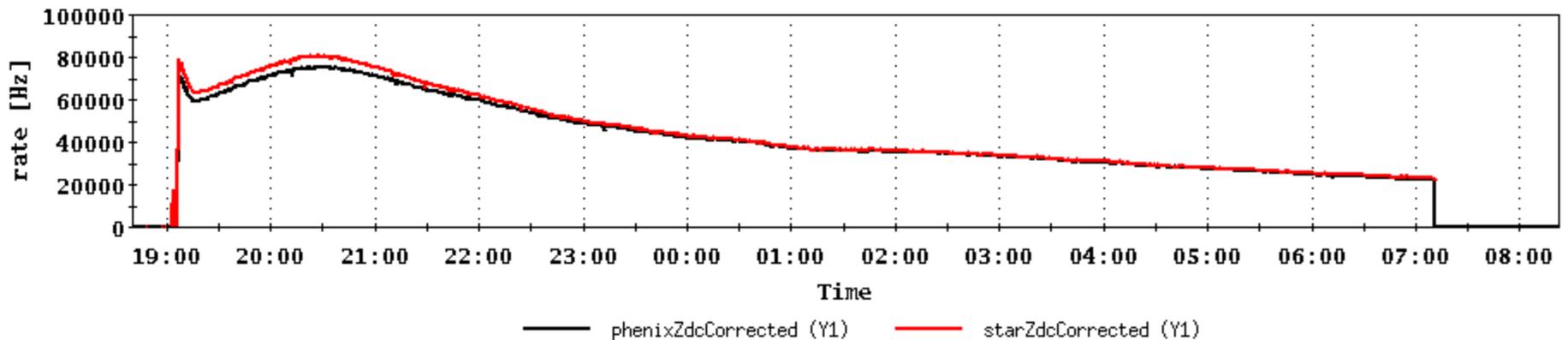
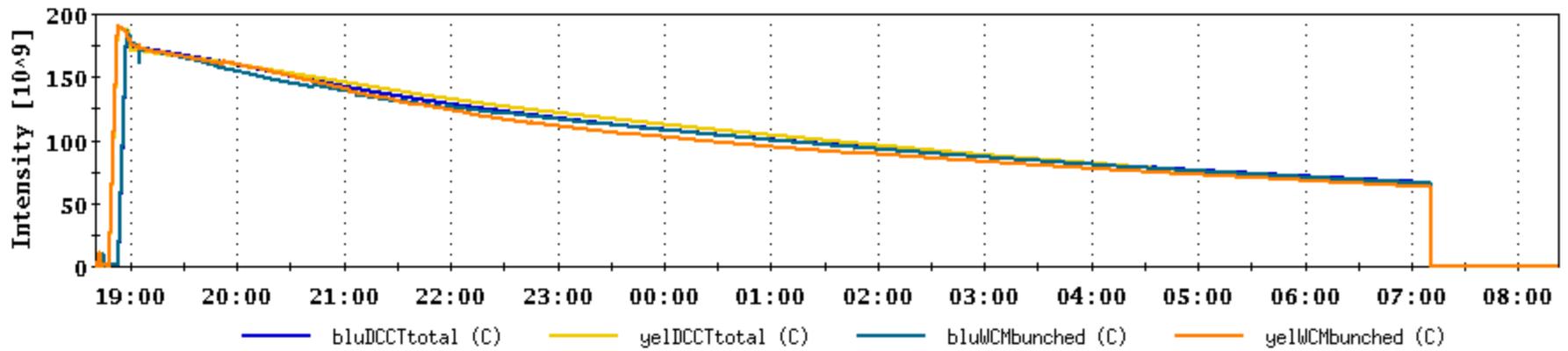
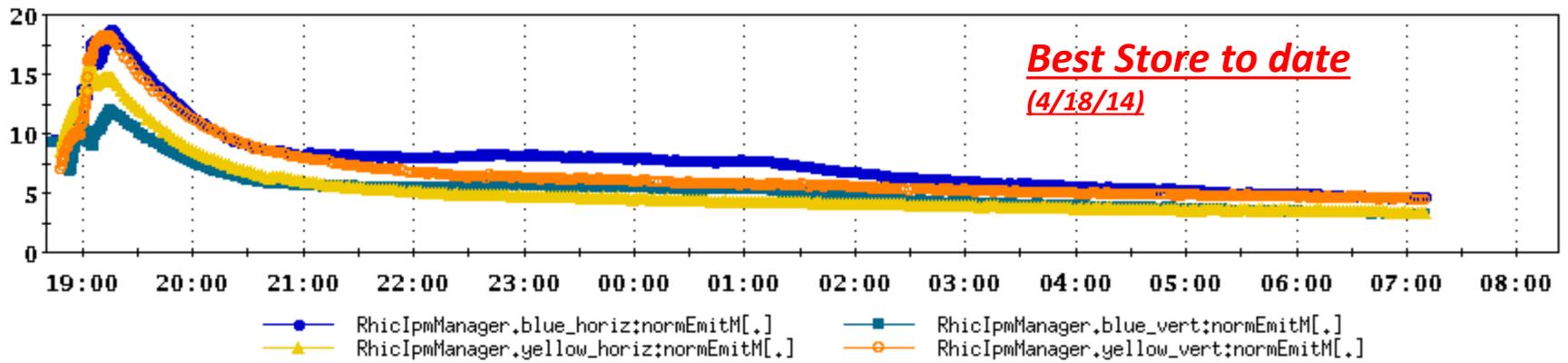
Parameters Display Fit

	PHENIX	STAR
Number collisions	111	102
beta* [m]	0.70	0.70
sMax [m]	10.00	10.00
sigma [b]	9.900	9.500
Single Correction	All	All

Update Display

Tue Apr 29 12:37:22 2014 -- INFO : Phenix Int Lumi = 193339
 Tue Apr 29 12:37:22 2014 -- INFO : Star avg Lumi = 57979
 Tue Apr 29 12:37:22 2014 -- INFO : Star Int Lumi = 208077

Archive



Goals for Run 14 (based on Beam Use Requests)

(11 Feb, DRAFT, to be updated by experiments)

PHENIX

- Au+Au @ 200 GeV for 12 weeks, $L = 1.5 \text{ nb}^{-1}$ sampled luminosity within $|z| < 10 \text{ cm}$
 - ~30% within $|z| < 10 \text{ cm}$
 - ~90% DAQ efficiency
 - ~50% bandwidth, DAQ saturation factor (?)
- 11 nb^{-1} delivered

STAR

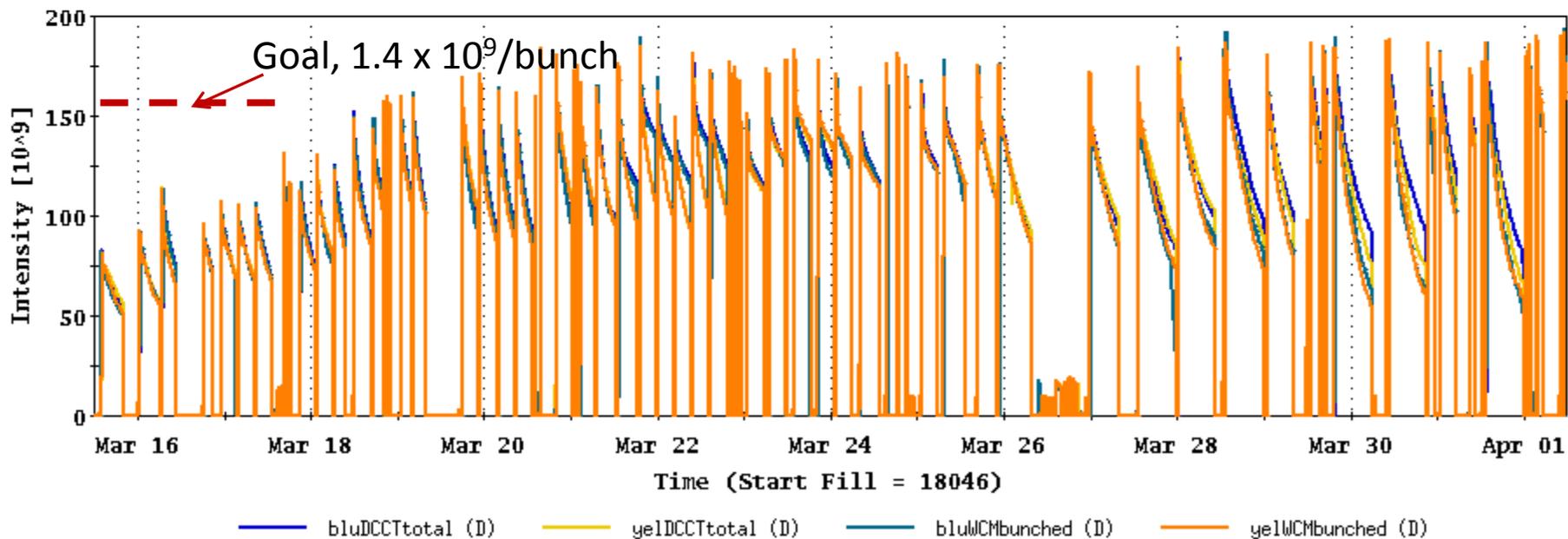
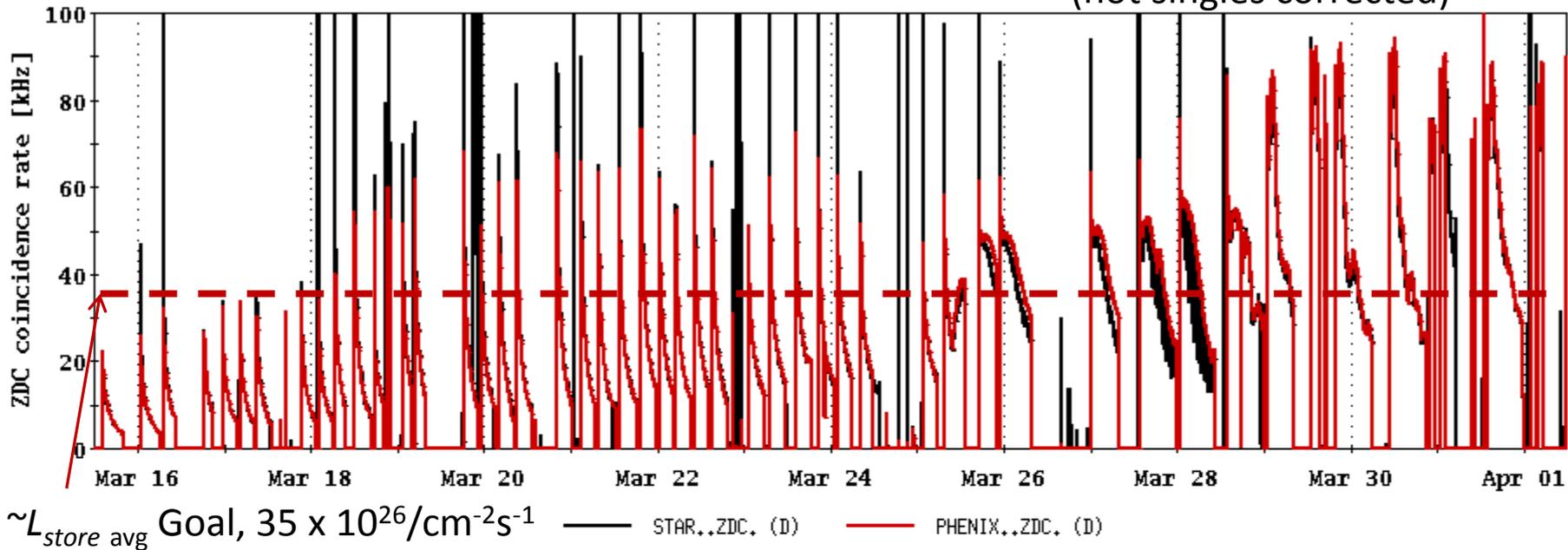
- Au+Au @ 200 GeV for 14 weeks, $L = 10 \text{ nb}^{-1}$ recorded, 10^9 min bias triggers within $|z| < 5 \text{ cm}$ → (2×10^9 triggers required)
 - ~ 60% (should be better) sampling efficiency
- 16.7 nb^{-1} delivered

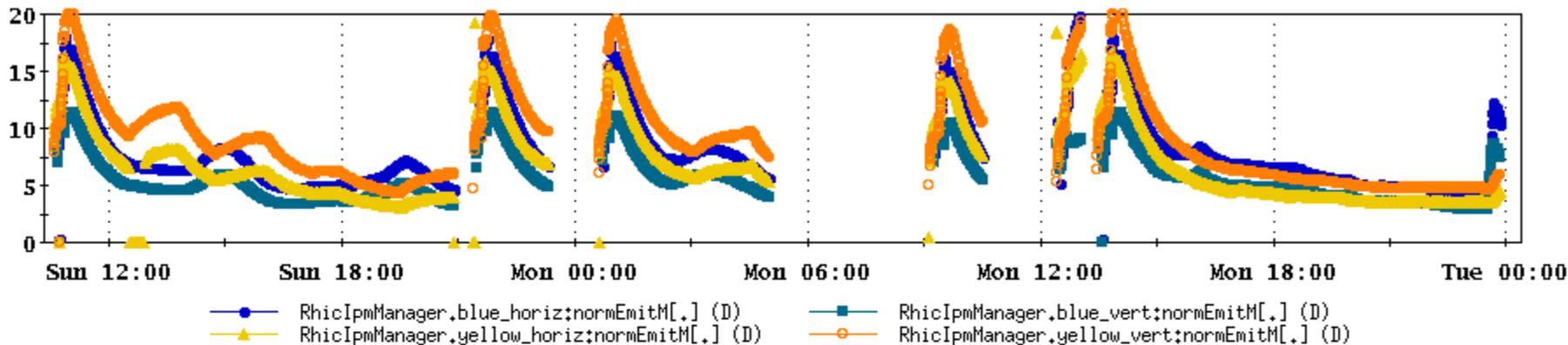
- Au+Au @ 15 GeV for 3 weeks, 150M min bias triggers

4/8/2014 New Electric Rates for this year

FY2014 Rates						
	Original	Revised xxxx				
Month	\$/MWh	\$/MWh				
13-Oct	62	62				
13-Nov	62	62				
13-Dec	62	62				
14-Jan	56	56				
14-Feb	56	56	delta	~ average MW	additional cost at 27 MW	
14-Mar	56	62	\$ 6.00	\$ 27.00	\$ 120,528	
14-Apr	56	62	\$ 6.00	\$ 27.00	\$ 116,640	
14-May	56	62	\$ 6.00	\$ 27.00	\$ 120,528	
14-Jun	69	74	\$ 5.00	\$ 27.00	\$ 97,200	
14-Jul	69	74	\$ 5.00	\$ 5.00	\$ 18,600	
14-Aug	69	74	\$ 5.00	\$ 5.00	\$ 18,600	
14-Sep	69	74	\$ 5.00	\$ 5.00	\$ 18,000	
					\$ 510,096	

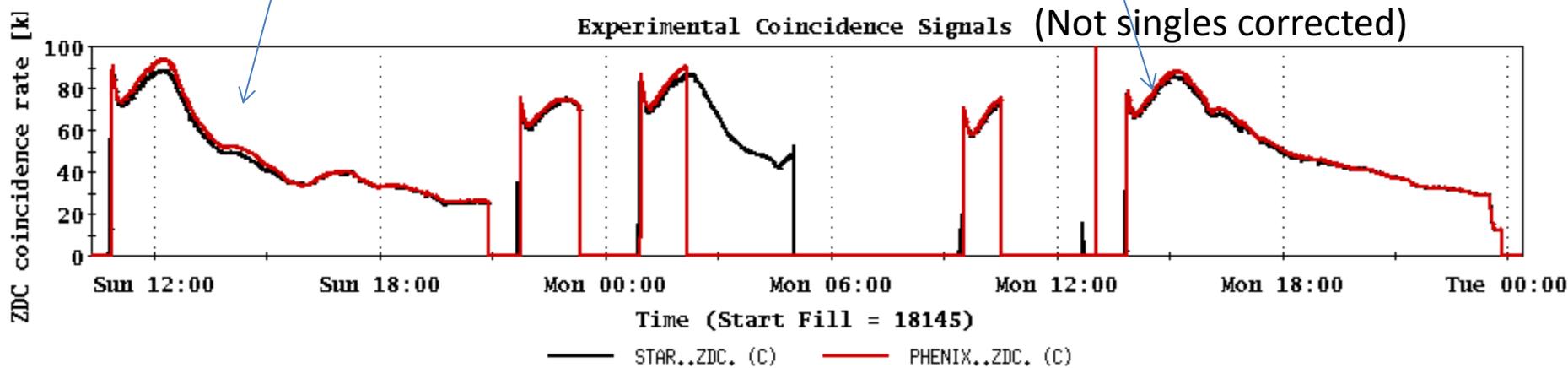
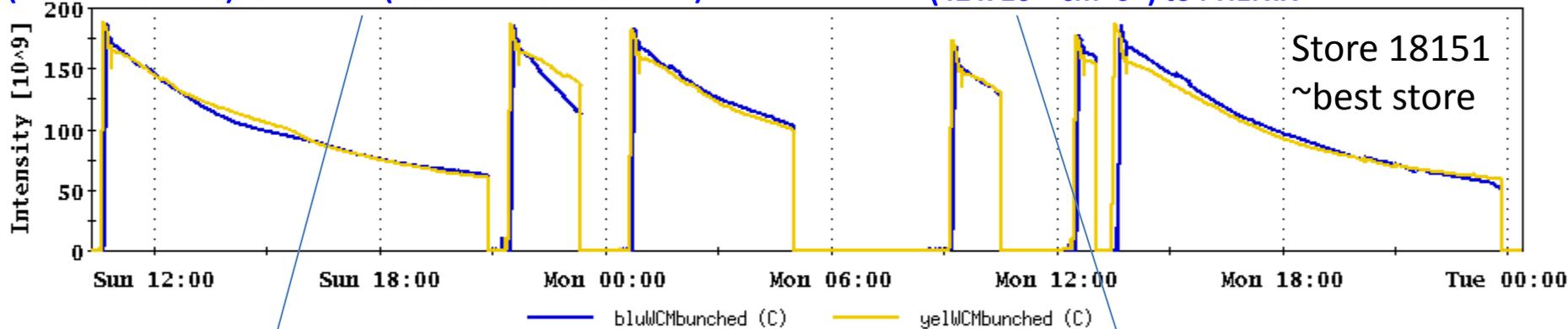
Experimental Coincidence Signals (not singles corrected)





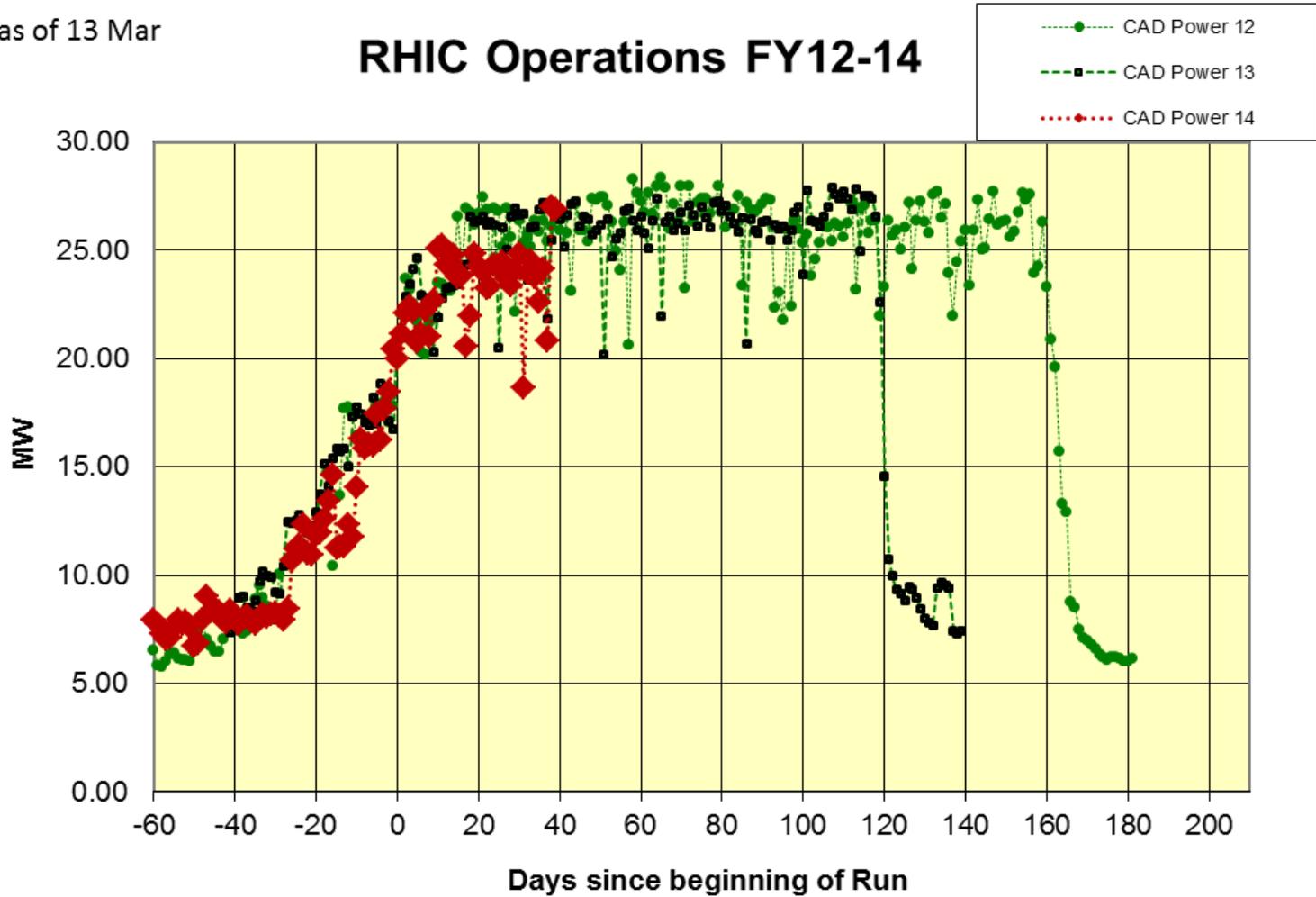
30 Mar, Store 18145, 9 hr 59 min, 0.143 nb^{-1}
 ($40 \times 10^{26} \text{ cm}^{-2}\text{s}^{-1}$) to PHENIX (assumes 9.5 b xscetion)

31 Mar, Store 18151, 9 hr 49 min, 0.149 nb^{-1}
 ($42 \times 10^{26} \text{ cm}^{-2}\text{s}^{-1}$) to PHENIX



as of 13 Mar

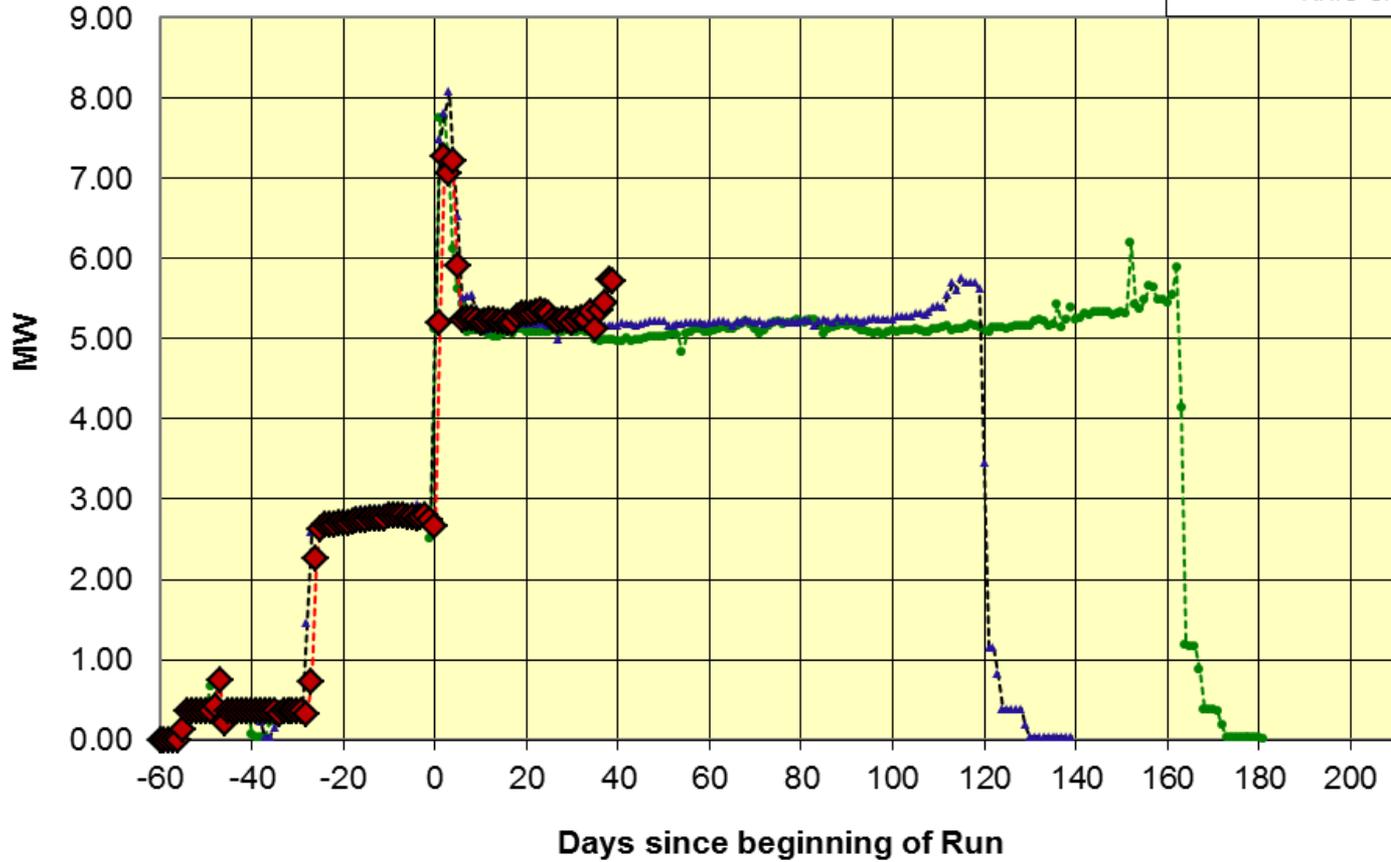
RHIC Operations FY12-14



as of 13 Mar

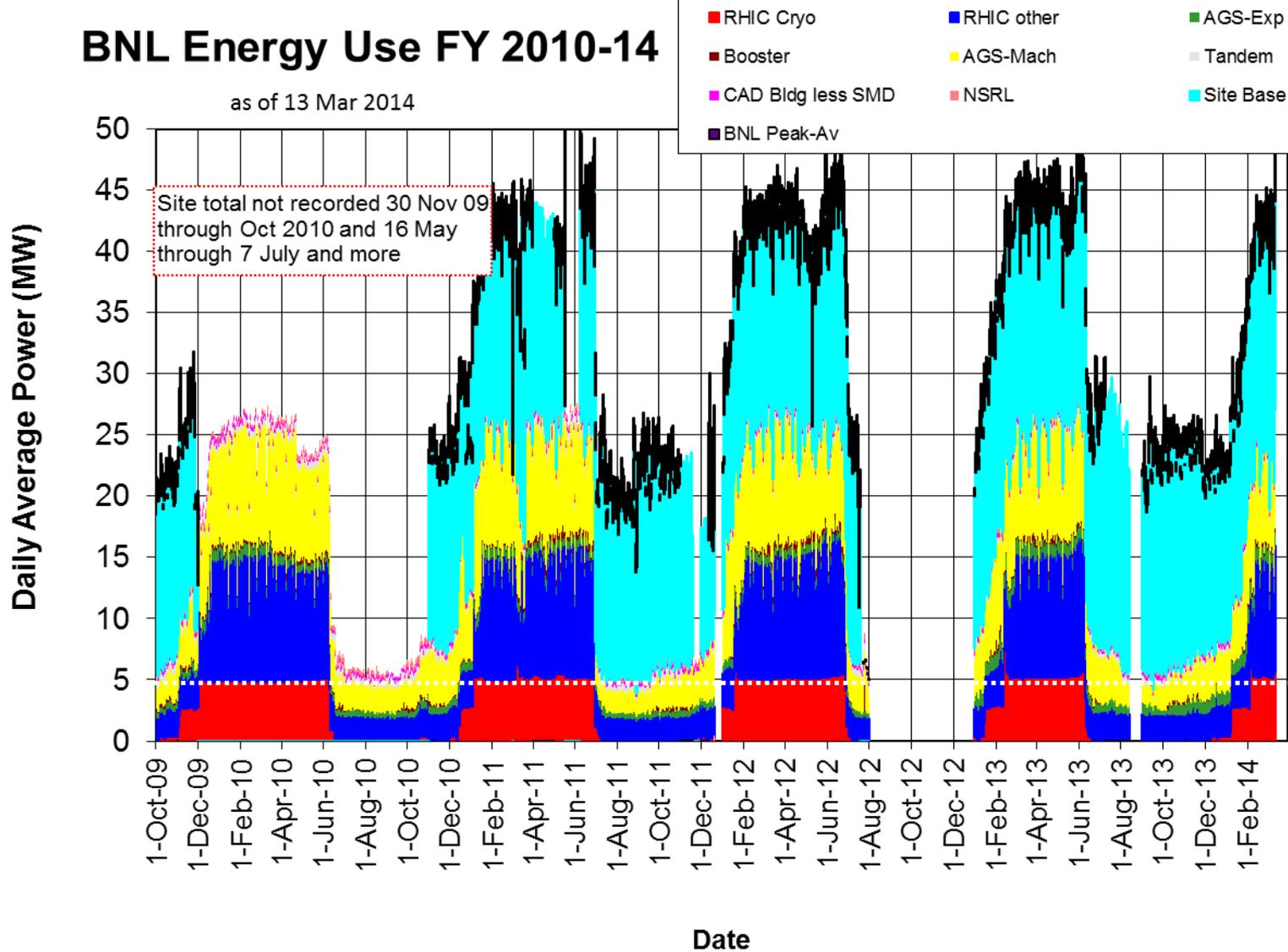
RHIC Cryo Operations FY12-14

- RHIC Cryo 12
- ▲--- RHIC Cryo 13
- ◆--- RHIC Cryo 14



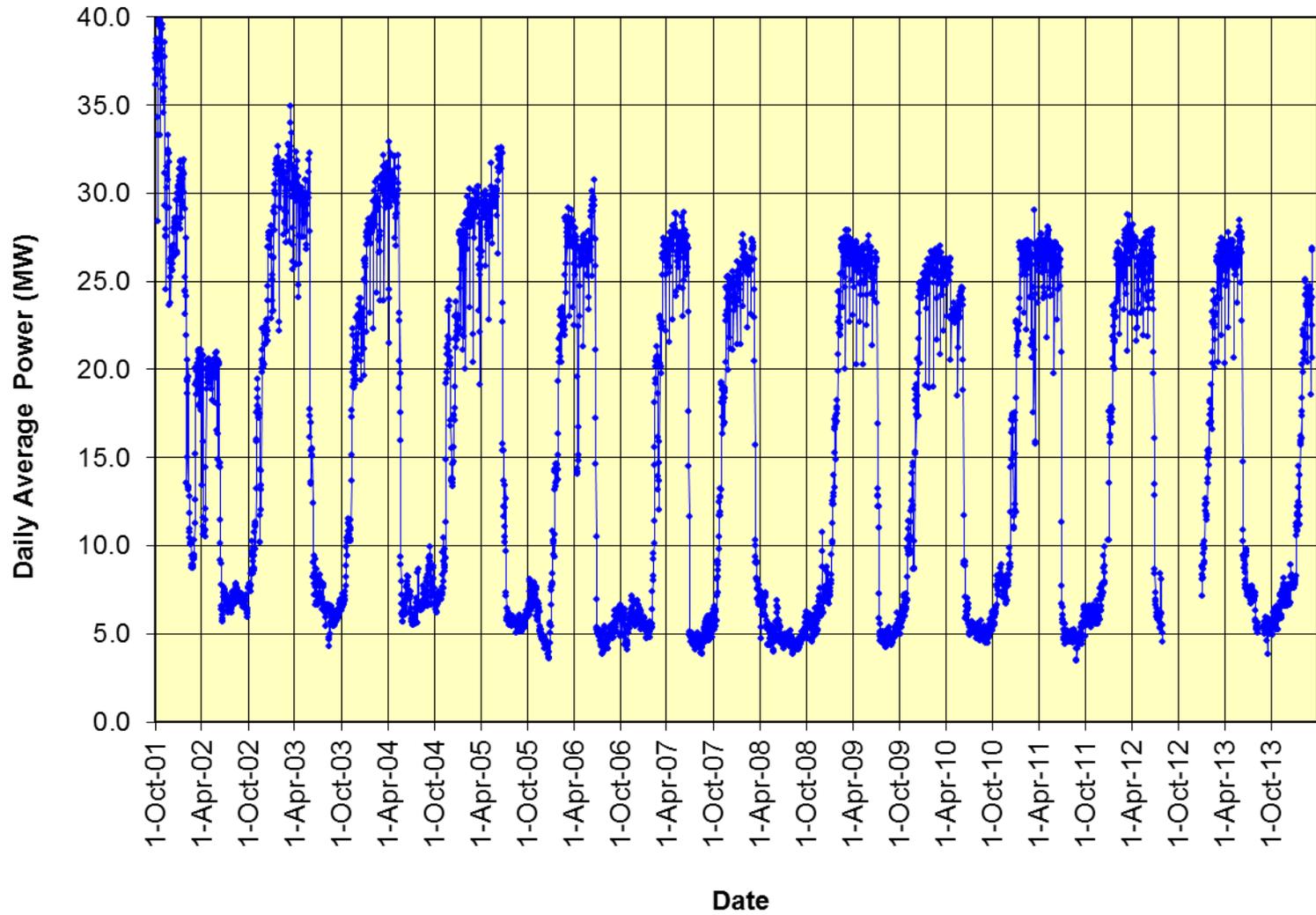
BNL Energy Use FY 2010-14

as of 13 Mar 2014



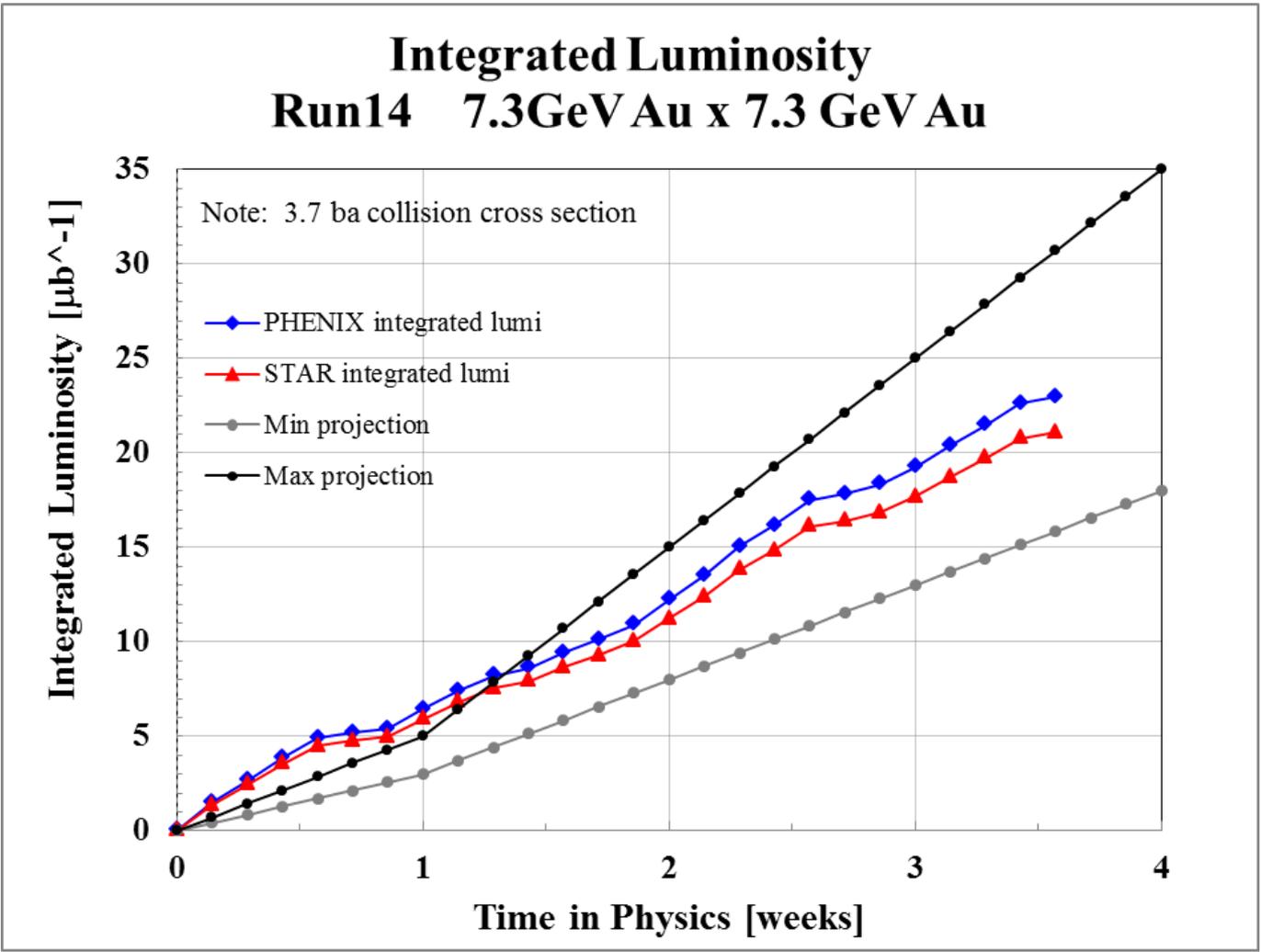
as of 13 Mar 2013

C-AD Energy Use FY 2002-14

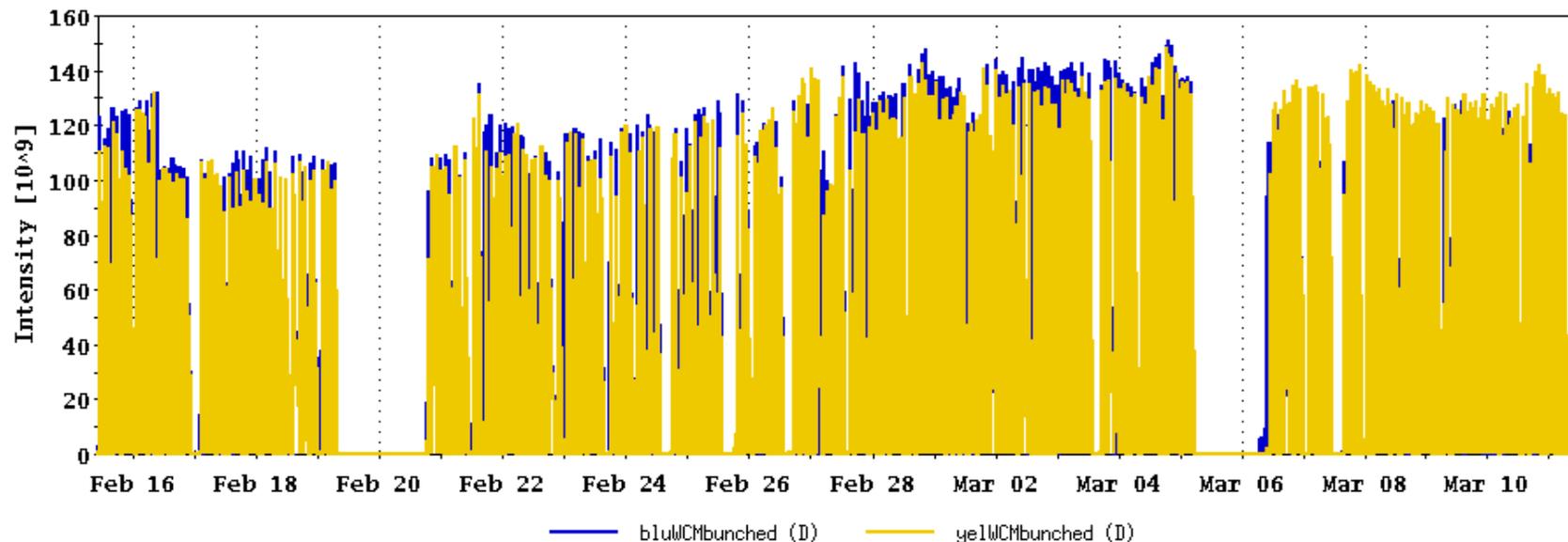


Through final fill 18010, 11 Mar 2015

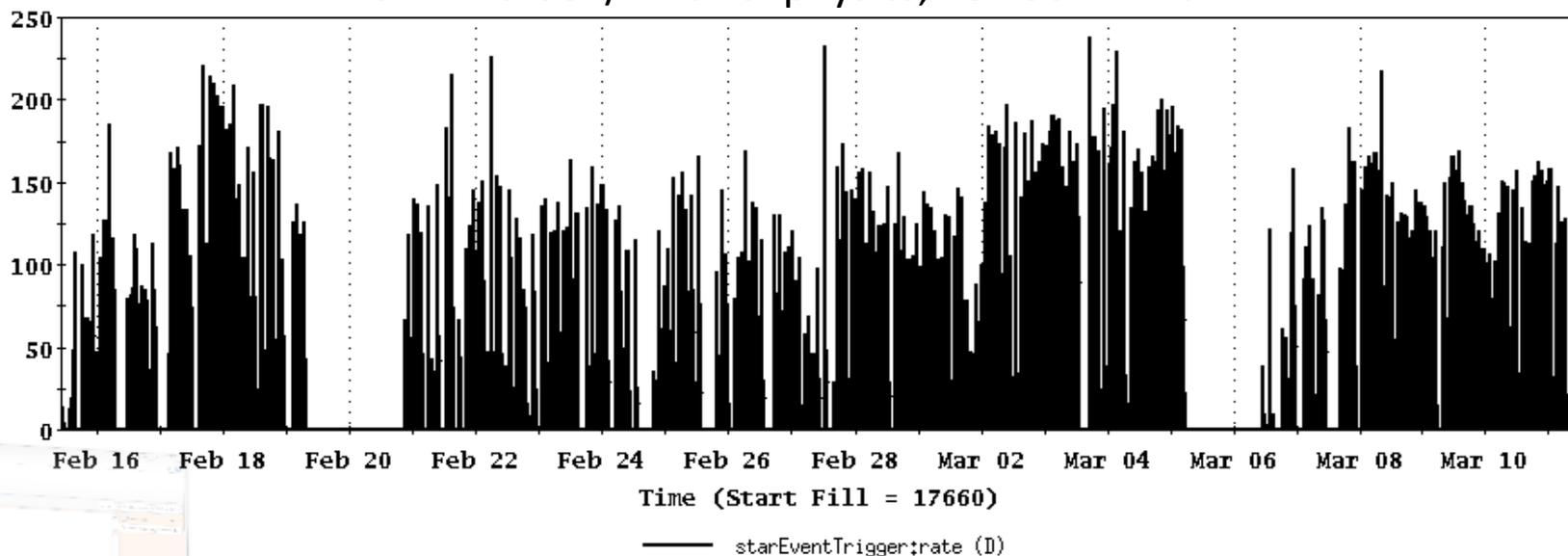
max/min projections from Fischer et.al. "RHIC Collider Projections (FY2014-FY2018)", 4 June 2013

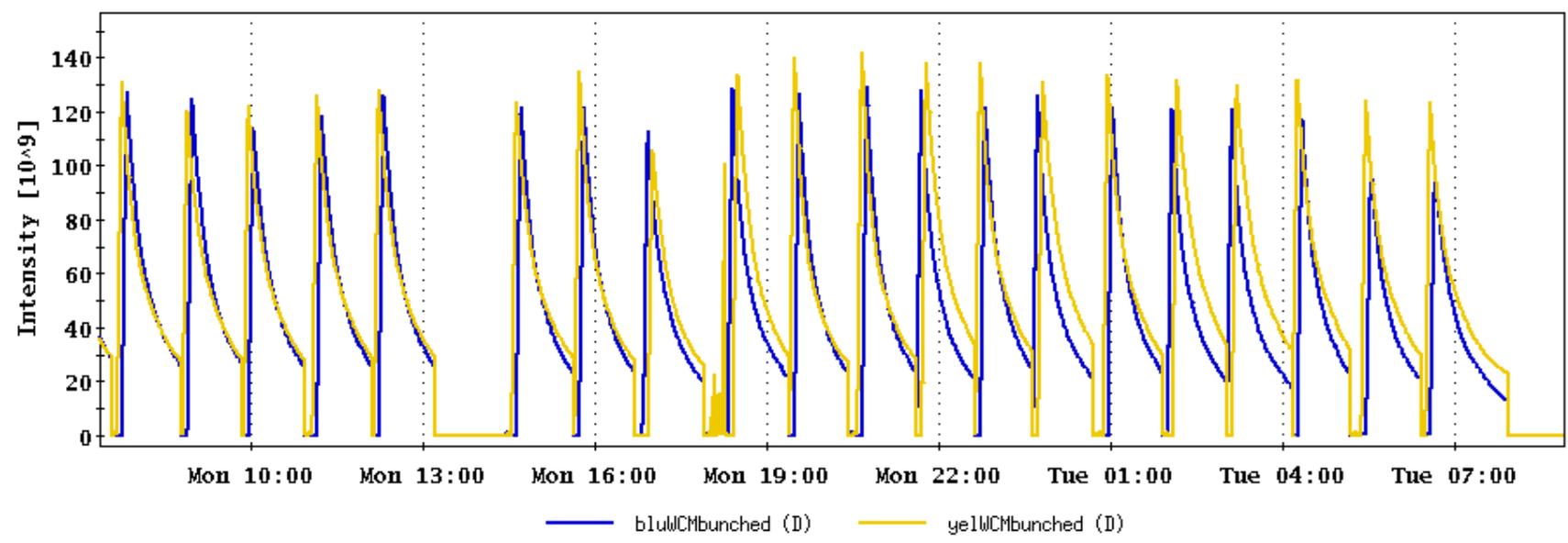


From Ingrassia,
<http://www.cadops.bnl.gov/AGS/Operations/Run14/>

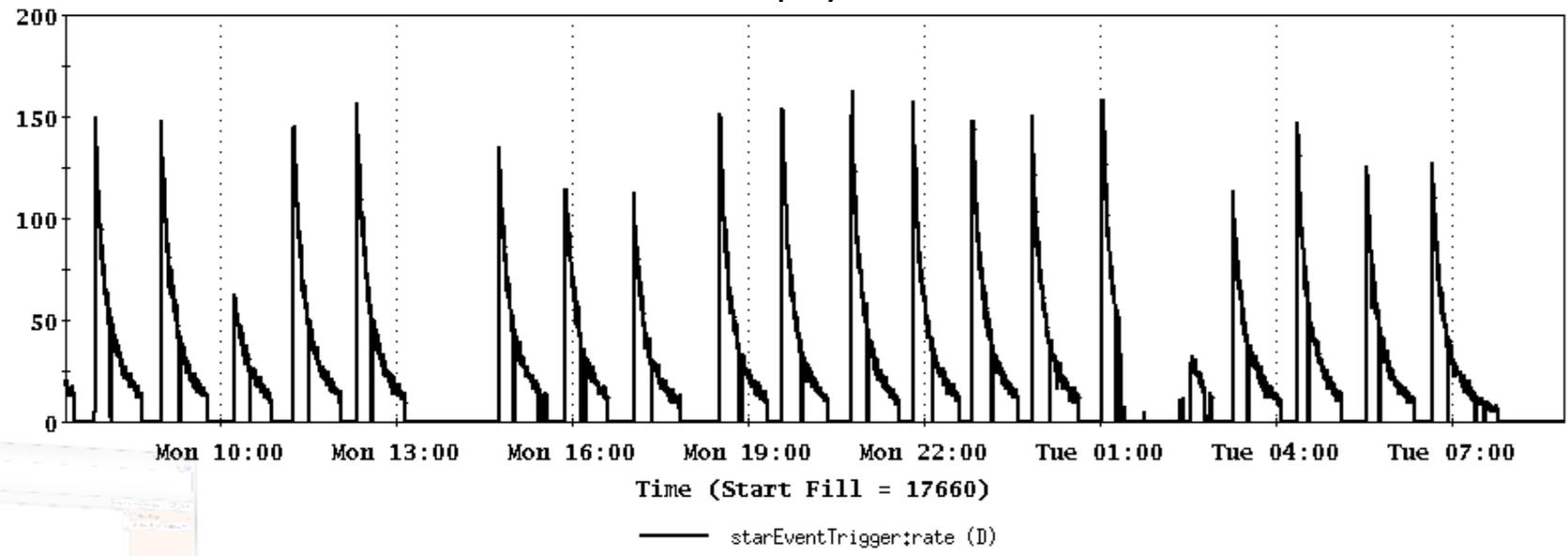


$\sqrt{s} = 14.6$ GeV/n AuAu physics, 15 Feb-11 Mar





$\sqrt{s} = 14.6$ GeV/n AuAu physics, last 24 hours



C-A Operations-FY14

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

planned, budget permitting

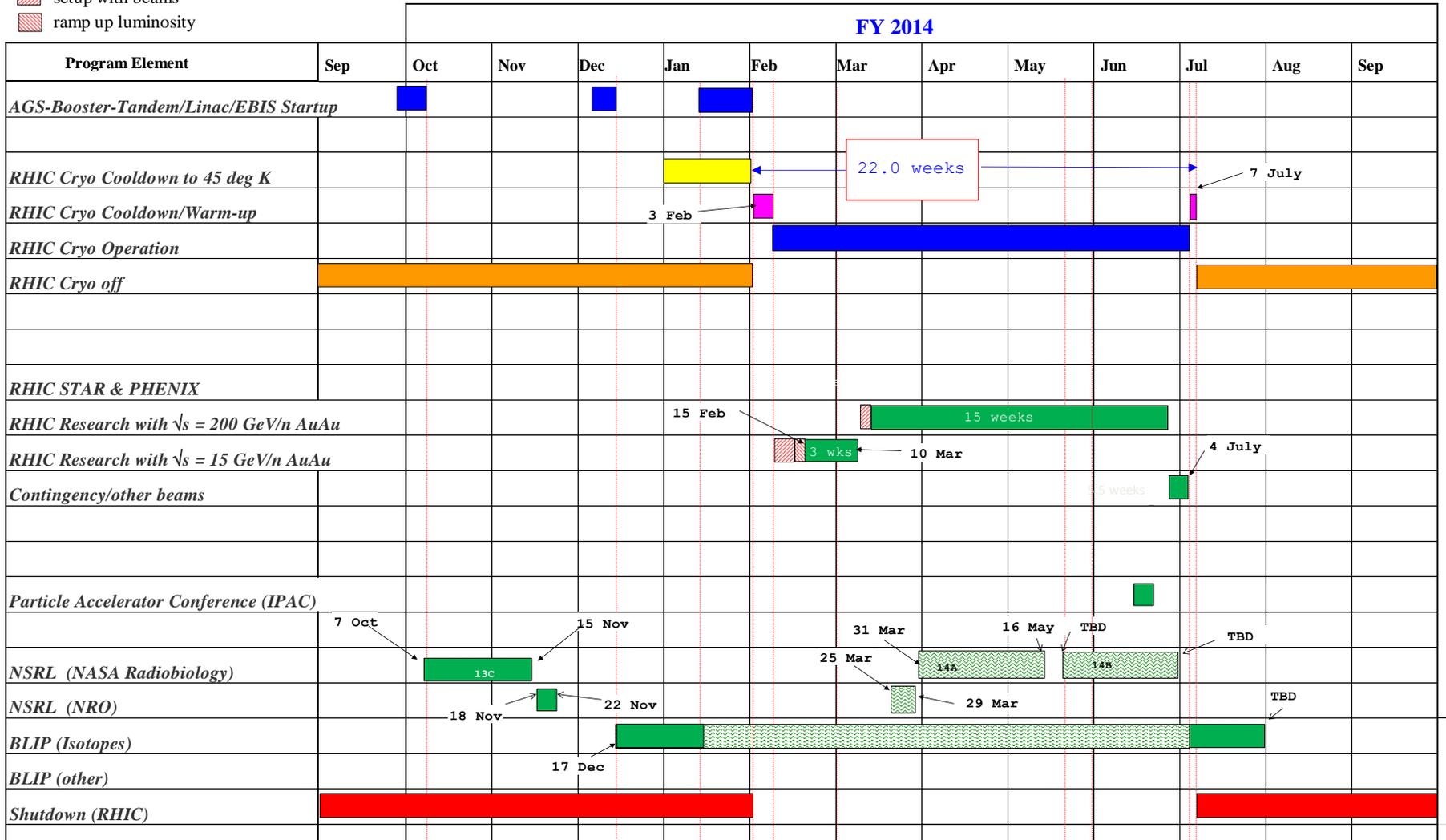


Table 2: Maximum luminosities that can be reached after a sufficiently long running period. The beam energy is stated. Other ion combinations can be estimated on demand. For species combinations not yet run the minimum luminosities are approximately 50% of the maximum.

Mode	Beam energy [GeV/n]	No of colliding bunches	Ions/bunch [10^9]	β^* [m]	Emittance [mm]	L_{peak} [$\text{cm}^{-2}\text{s}^{-1}$]	$L_{\text{store avg}}$ [$\text{cm}^{-2}\text{s}^{-1}$]	L_{week}
Pb-Pb	98.3	111	1.1	0.7	23→8	20×10^{26}	17×10^{26}	0.6 nb^{-1}
Au-Au	100	111	1.4	0.7	23→8	40×10^{26}	35×10^{26}	1.2 nb^{-1}
h-Au *	100	111	20 / 1.3	0.8	20→23	8×10^{28}	5×10^{28}	16 nb^{-1}
d-Au *	100	111	110 / 1.4	0.8	17→25	47×10^{28}	28×10^{28}	95 nb^{-1}
p↑-C	100	111	180 / 20	0.8	18→23	10×10^{32}	7×10^{32}	2.3 pb^{-1}
p↑-Cu	100	111	180 / 4.0	0.8	18→23	200×10^{28}	150×10^{28}	475 nb^{-1}
p↑-Au	100	111	180 / 1.4	0.8	18→23	70×10^{28}	50×10^{28}	165 nb^{-1}
p↑-p↑*	100	107	160	0.85	17→25	65×10^{30}	38×10^{30}	14 pb^{-1}
p↑-p↑*	255	107	200	0.65	20→25	280×10^{30}	170×10^{30}	56 pb^{-1}

* h (helion) – nucleus of the ^3He atom; d (deuteron) – nucleus of the ^2H atom; p (proton) – nucleus of the ^1H atom.

* We expect that an intensity- and time-averaged store polarization P of up to 65%, as measured by the H jet, can be reached at 100 GeV. At 255 GeV we expect the polarization P to reach up to 57%. In Run-11 PHENIX had 107 and STAR 102 colliding bunches.

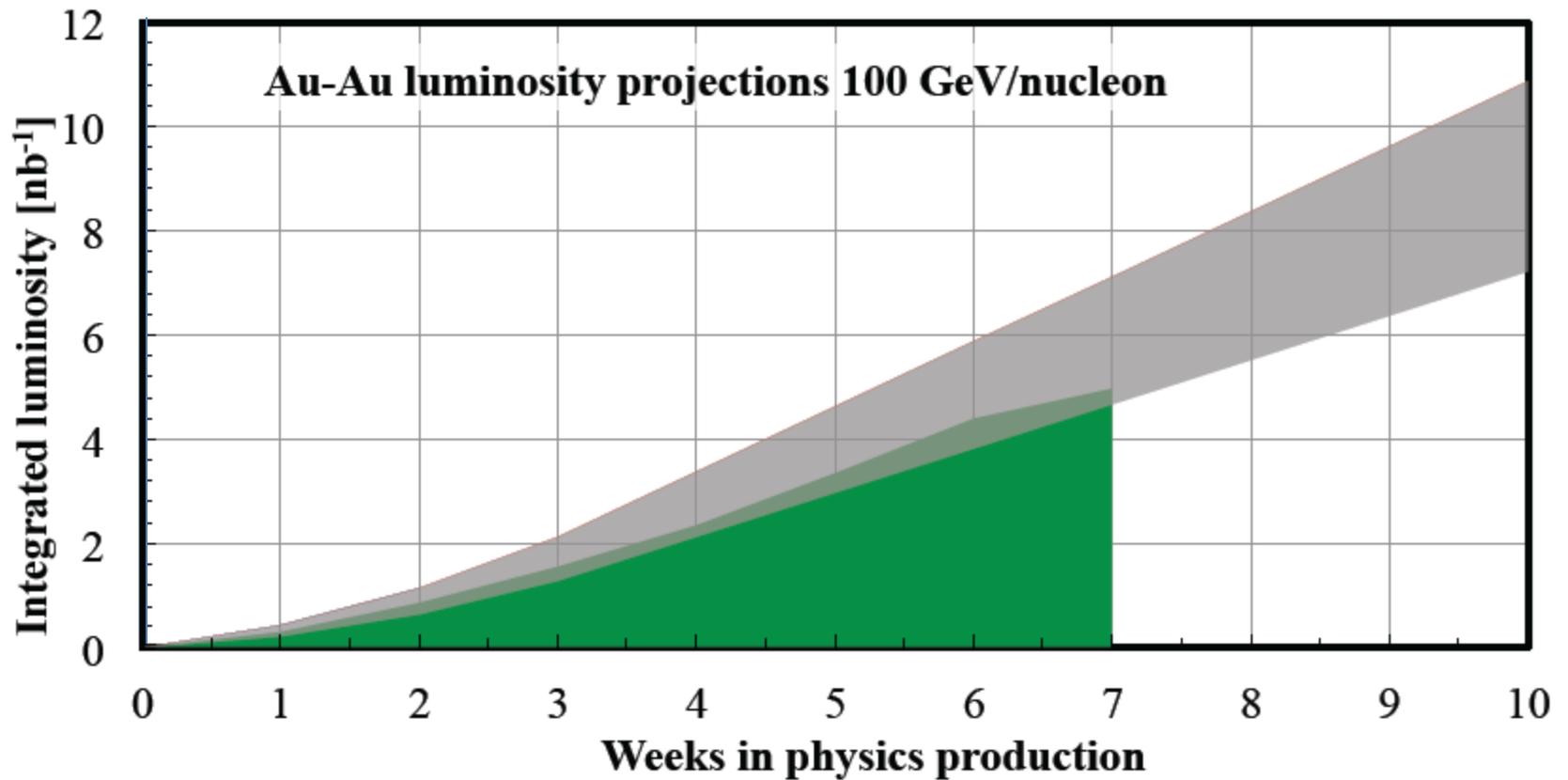
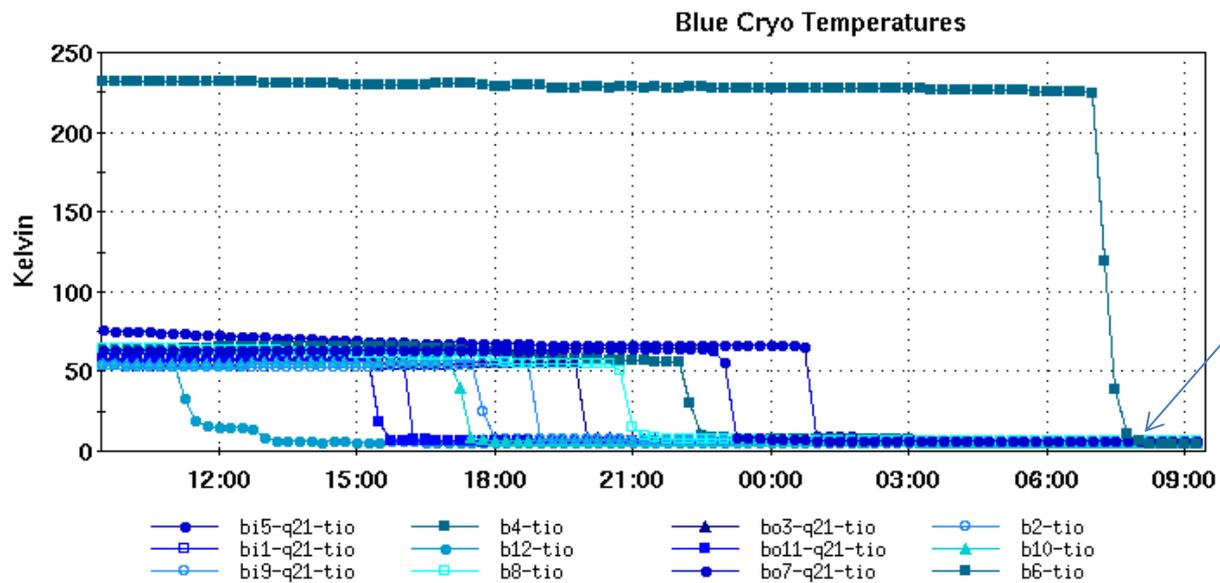
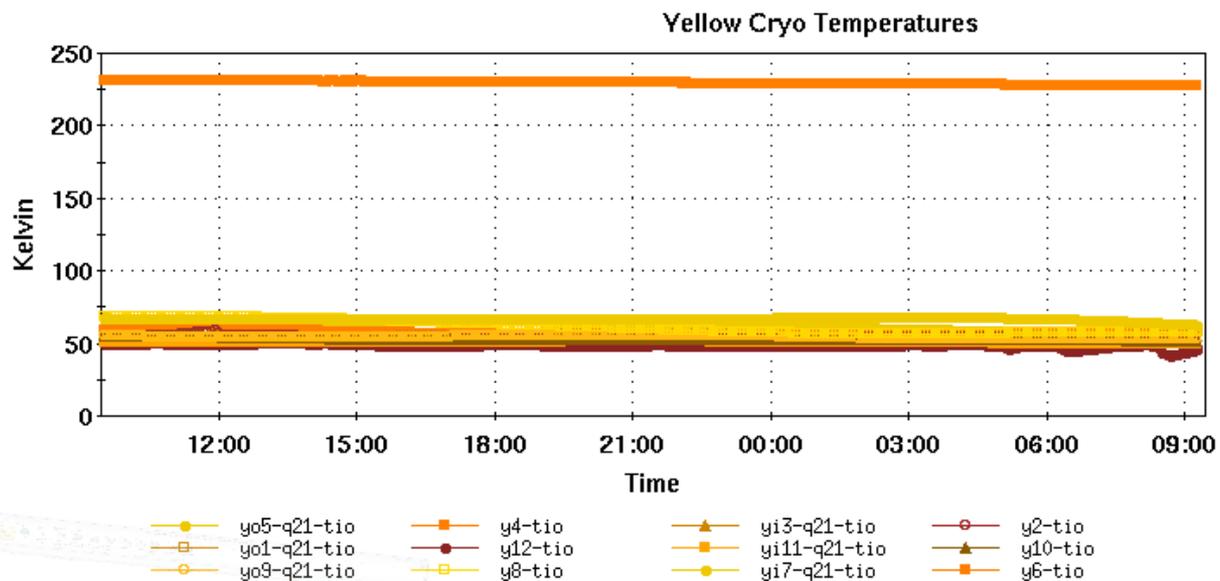


Figure 4: Projected minimum and maximum integrated luminosities for Au-Au at 100 GeV/nucleon.

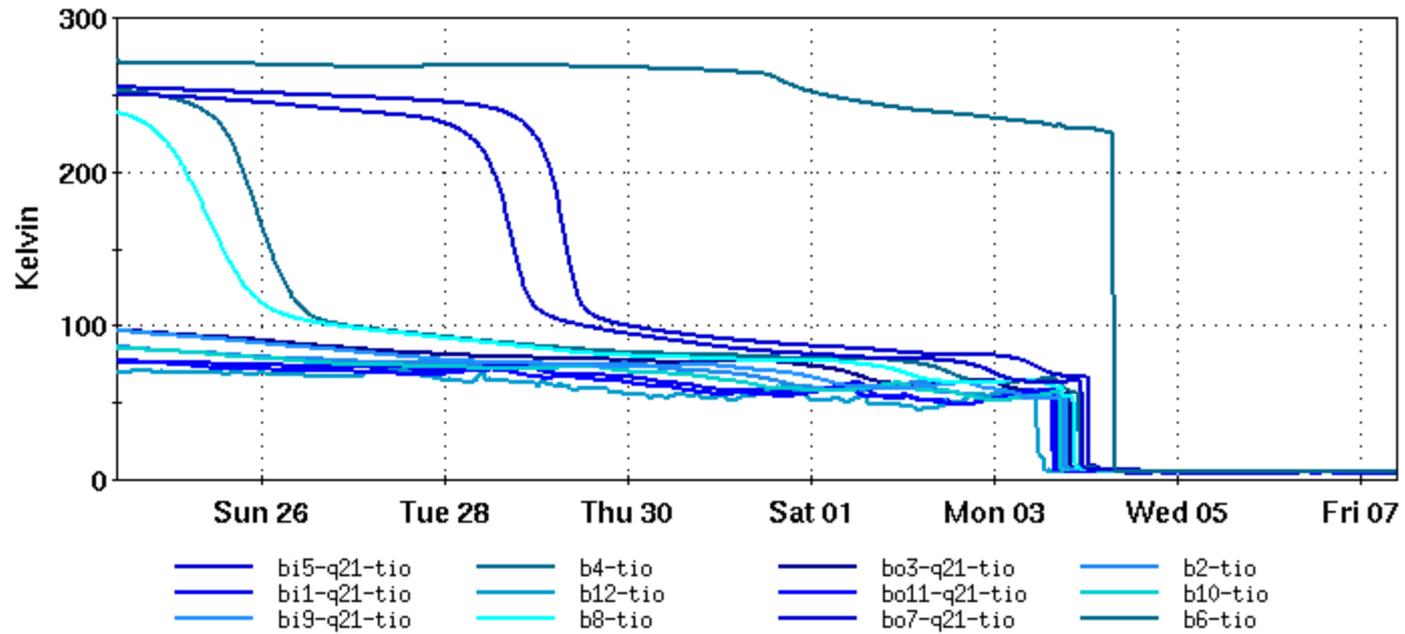


Blue at 4.5 deg

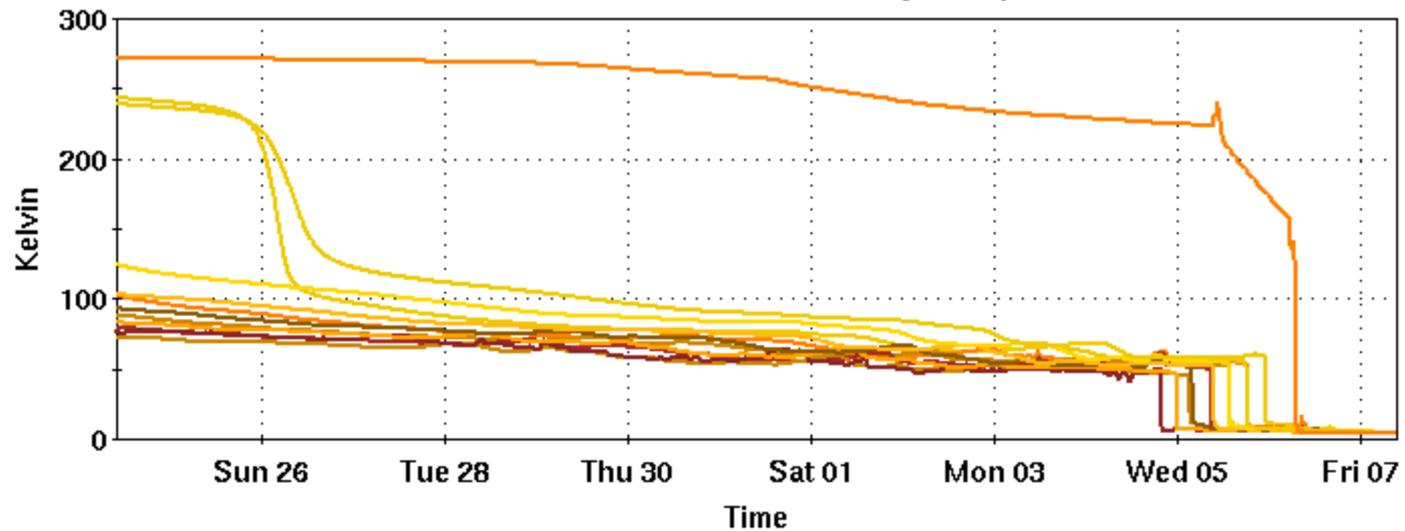


7 Feb 2014, Blue and Yellow at 4.5 deg K

Blue Cryo Temperatures



Yellow Cryo Temperatures



Who's Who for 2014

RHIC Au-Au Run Coordinator Operations:	<u>Gregory Marr</u>	gmarr@bnl.gov	631-344-7810 (office)
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RHIC 7.3 GeV Au-Au Run Coordinator planning:	<u>Christoph Montag</u>	montagc@bnl.gov	631-344-4820 (office)
RHIC 100 GeV Au-Au Run Coordinator planning:	<u>Guillaume Robert-Demolaize</u>	grd@bnl.gov	631-344-8215 (office)
Scheduling Physicist:	<u>Chuyu Liu</u>	cliu1@bnl.gov	631-344-4431 (office)
AGS liaison:	<u>Haixin Huang</u>	huanghai@bnl.gov	631-344-5446 (office)

For example, 20 weeks of RHIC refrigerator operation in FY 2014 could be scheduled in the following way:

Cool-down from 50 K to 4 K	1 week	
Set-up mode 1 (Au-Au at 7.5 GeV/nucleon)	1 week	(no dedicated time for experiments)
Ramp-up mode 1	½ weeks	(8 h/night for experiments)
Data taking mode 1	2 ½ weeks	
Set-up mode 2 (Au-Au at 100 GeV/nucleon)	½ week	(no dedicated time for experiments)
Data taking mode 2 with further ramp-up	10 weeks	
Set-up mode 3 (p↑-p↑ at 100 GeV)	1 week	(no dedicated time for experiments)
Ramp-up mode 3	½ weeks	(8 h/night for experiments)
Data taking mode 3+1 with further ramp-up	2 ½ weeks	
Warm-up	½ week	

From Fischer et. al., RHIC Collider Projections (FY 2014 – FY 2018), 4 June 2013