Run 14 RHIC Machine/Experiments Meeting

18 Mar 2014

<u>Agenda:</u>

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

Call in bridge line is 631-344-8383

Run 14 plan based on 22 weeks cryo operation

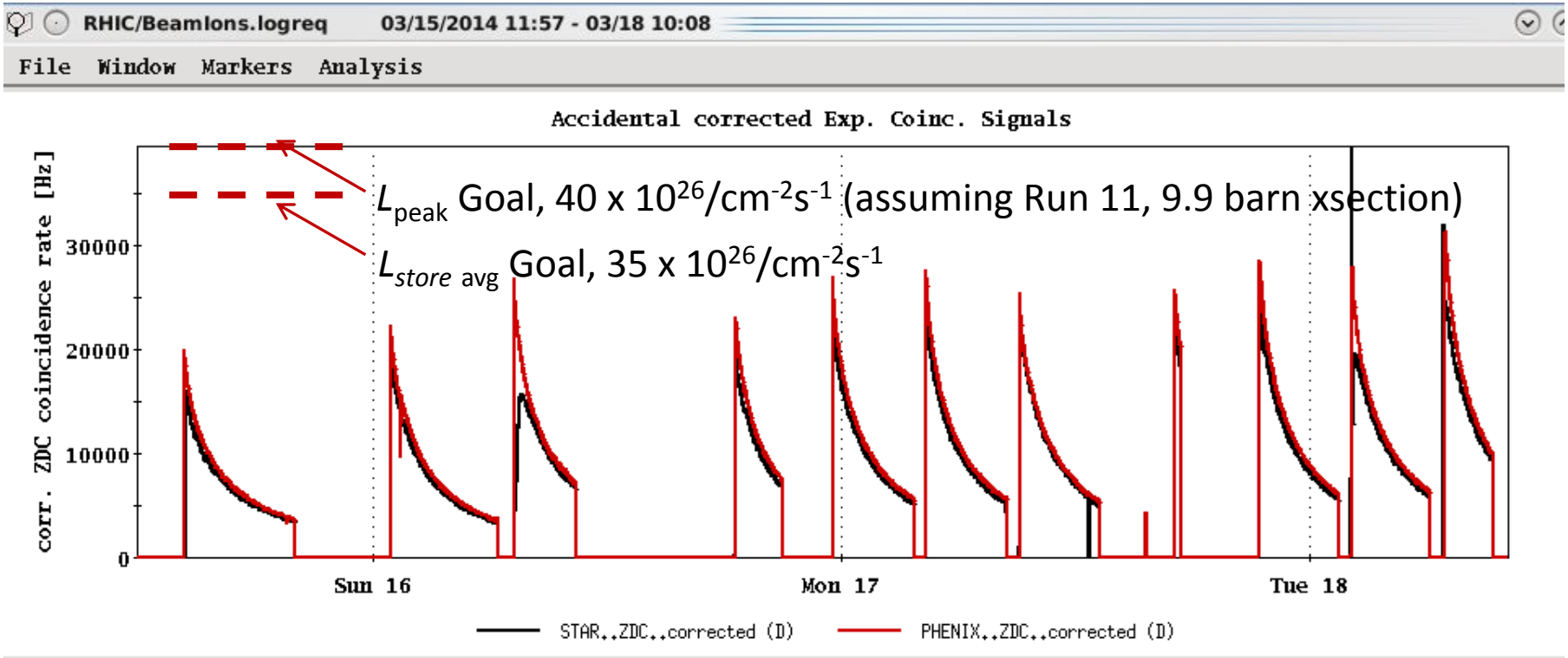
and Fischer et.al. RHIC Collider Projections (FY 2013 – FY 2017), 4 Jun 2013

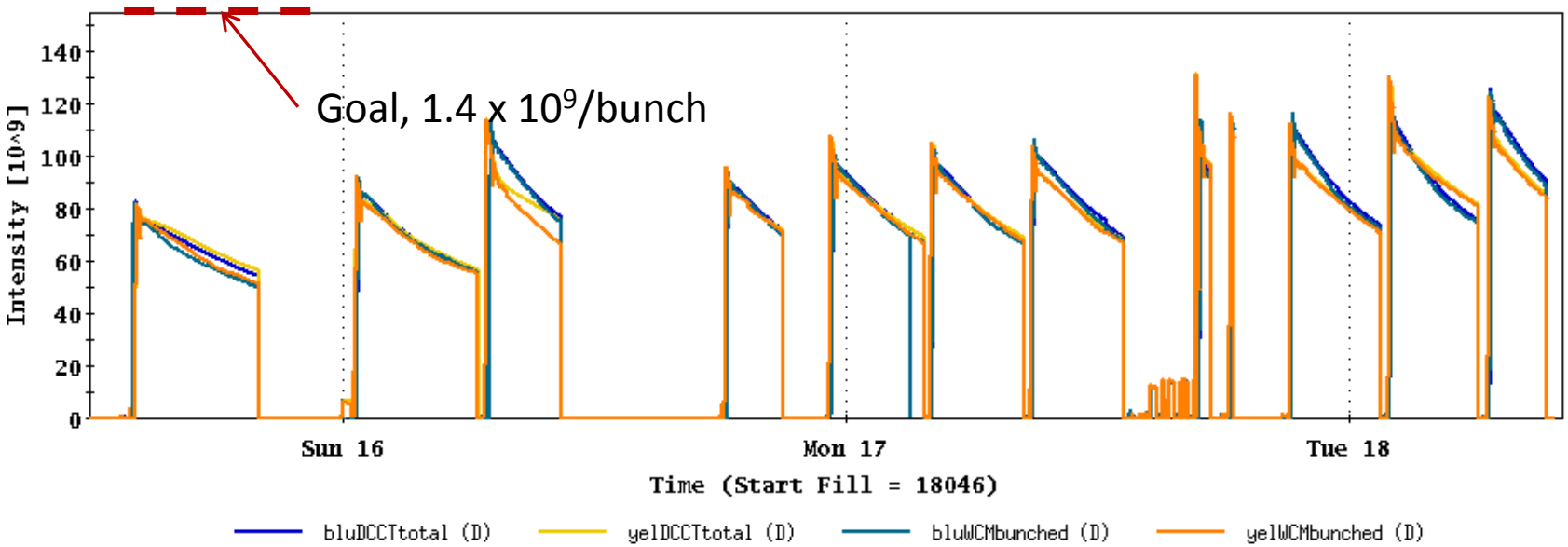
- ✓ 3 Feb, Begin cool-down to 4.5K
- ✓ 4 Feb, Cool-down to 6K in Blue
- ✓ 7 Feb, Blue and Yellow at 4.5 deg K
- ✓ 10-Feb, Beam in Blue and Yellow at injection
- ✓ 15-Feb, Begin √s = 14.6 GeV/n AuAu physics
- ✓ ~~8-10~~ 11 Mar (Tuesday, 0800), End √s = 14.6 GeV/n AuAu physics run begin setup for √s =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

today, 18 Mar…

- 27-Jun, End 15 week √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

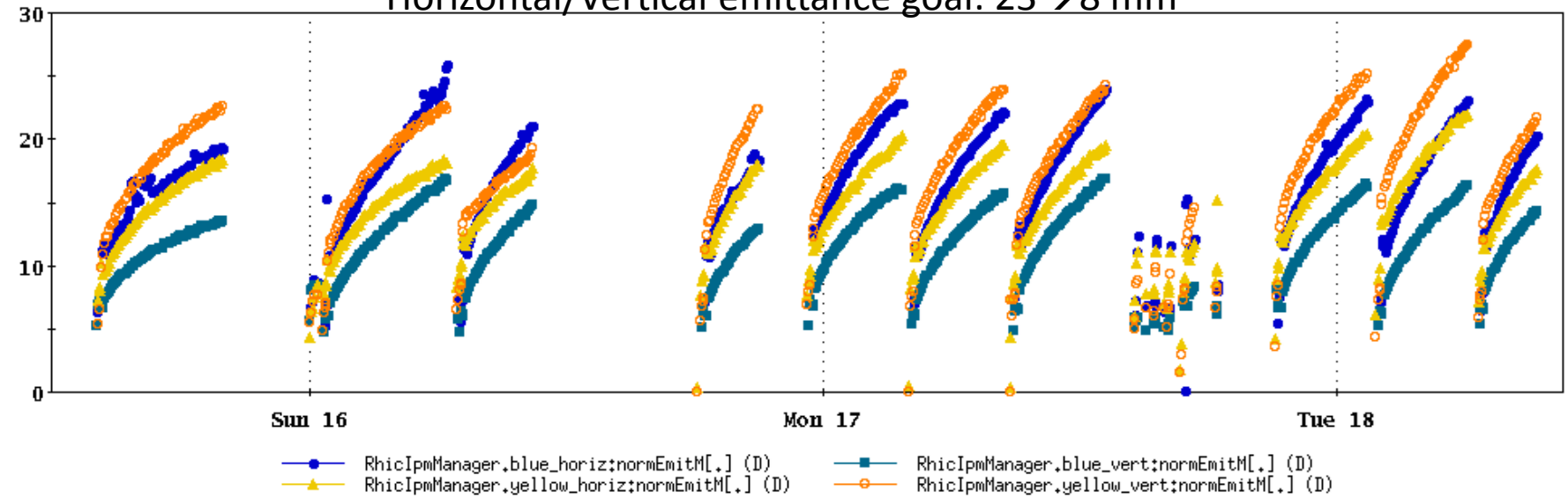

RHIC/BeamIons.logreq
03/15/2014 11:57 - 03/18 10:08
File Window Markers Analysis
Accidental corrected Exp. Coinc. Signals
corr. ZDC coincidence rate [Hz]
0
10000
20000
30000
L_{peak} Goal, 40 x 10^{26}/cm^{-2}s^{-1} (assuming Run 11, 9.9 barn xsection)
$L_{store\ avg}$ Goal, 35 x 10^{26}/cm^{-2}s^{-1}
Sun 16
Mon 17
Tue 18
STAR..ZDC..corrected (D)
PHENIX..ZDC..corrected (D)

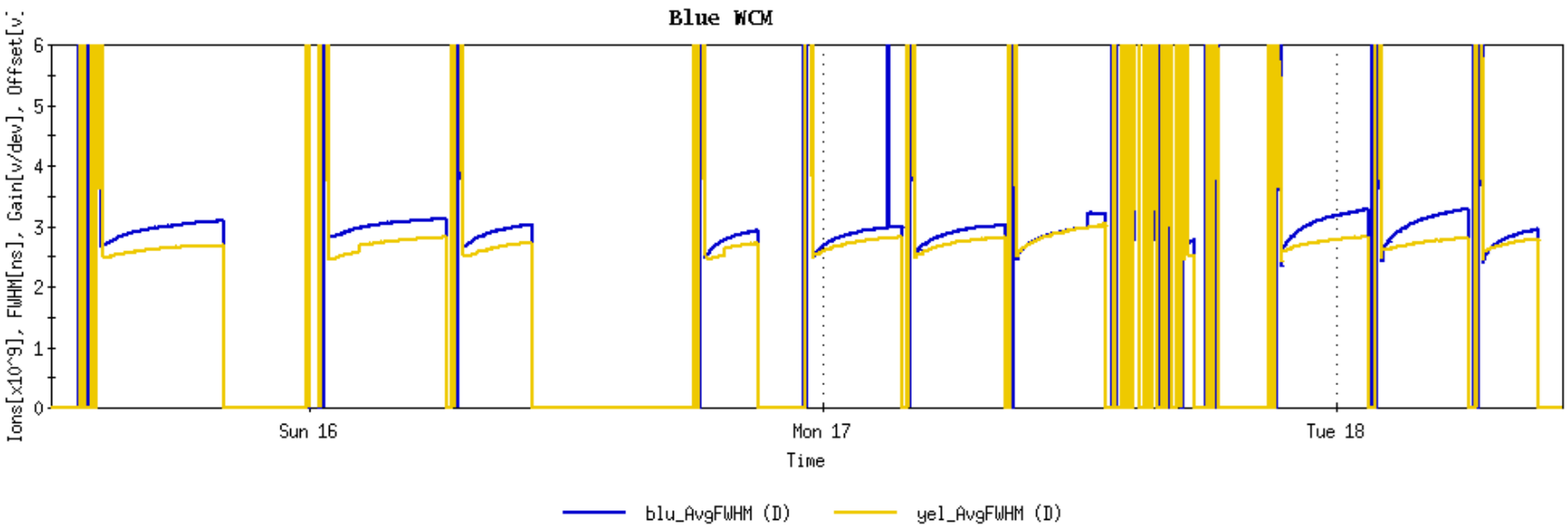

Intensity [10^9]
0
20
40
60
80
100
120
140
Goal, 1.4 x 10^9/bunch
Sun 16
Mon 17
Tue 18
Time (Start Fill = 18046)
bluDCCTtotal (D)
yelDCCTtotal (D)
bluWCMbunched (D)
yelWCMbunched (D)

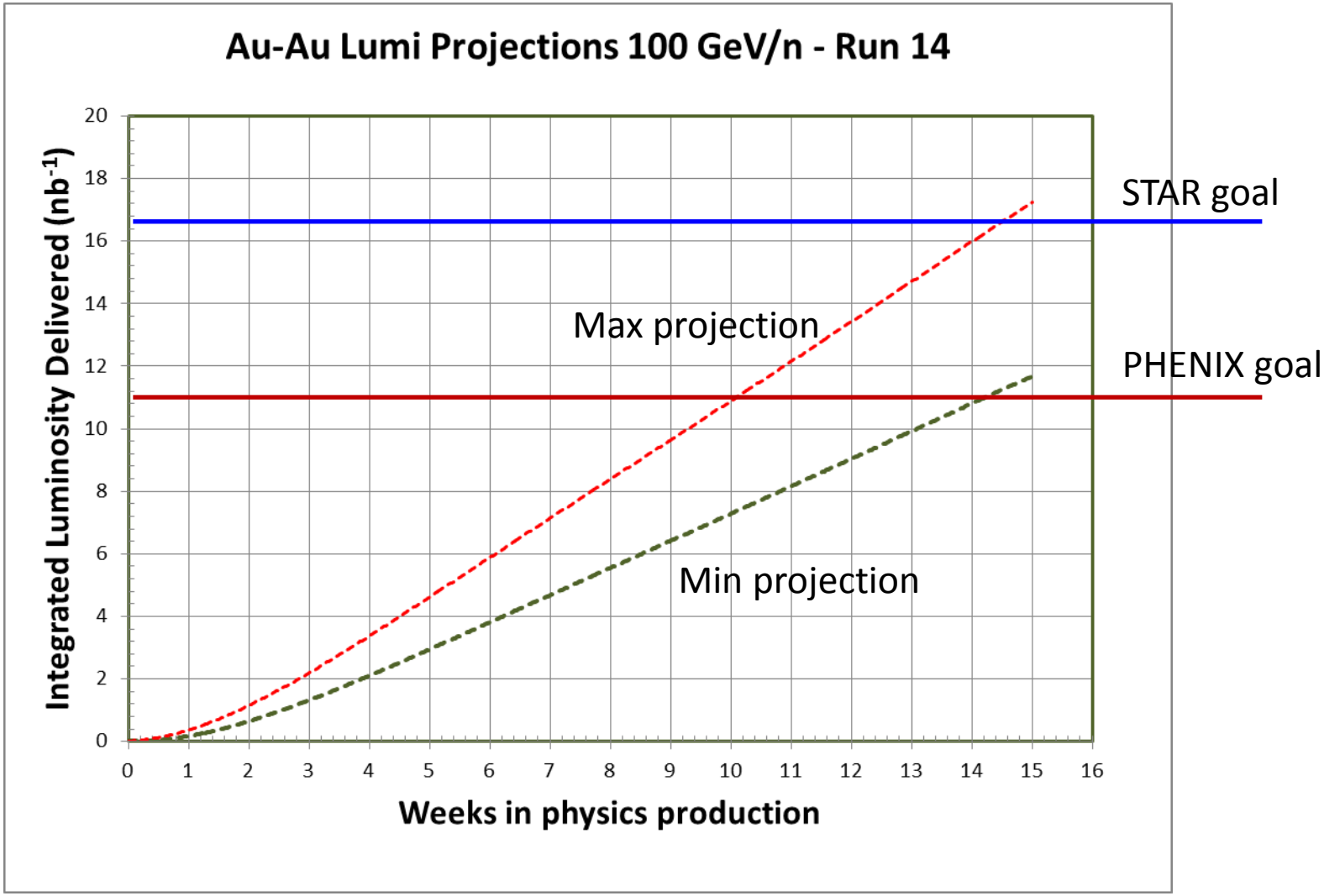
RHIC/Instrumentation/WCM/BunchLength.lvdisp 03/15/2014 11:57 - 03/18 10:34

File Window Markers Analysis

Horizontal/Vertical emittance goal: 23→8 mm







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

Goals for Run 14 (based on Beam Use Requests)

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

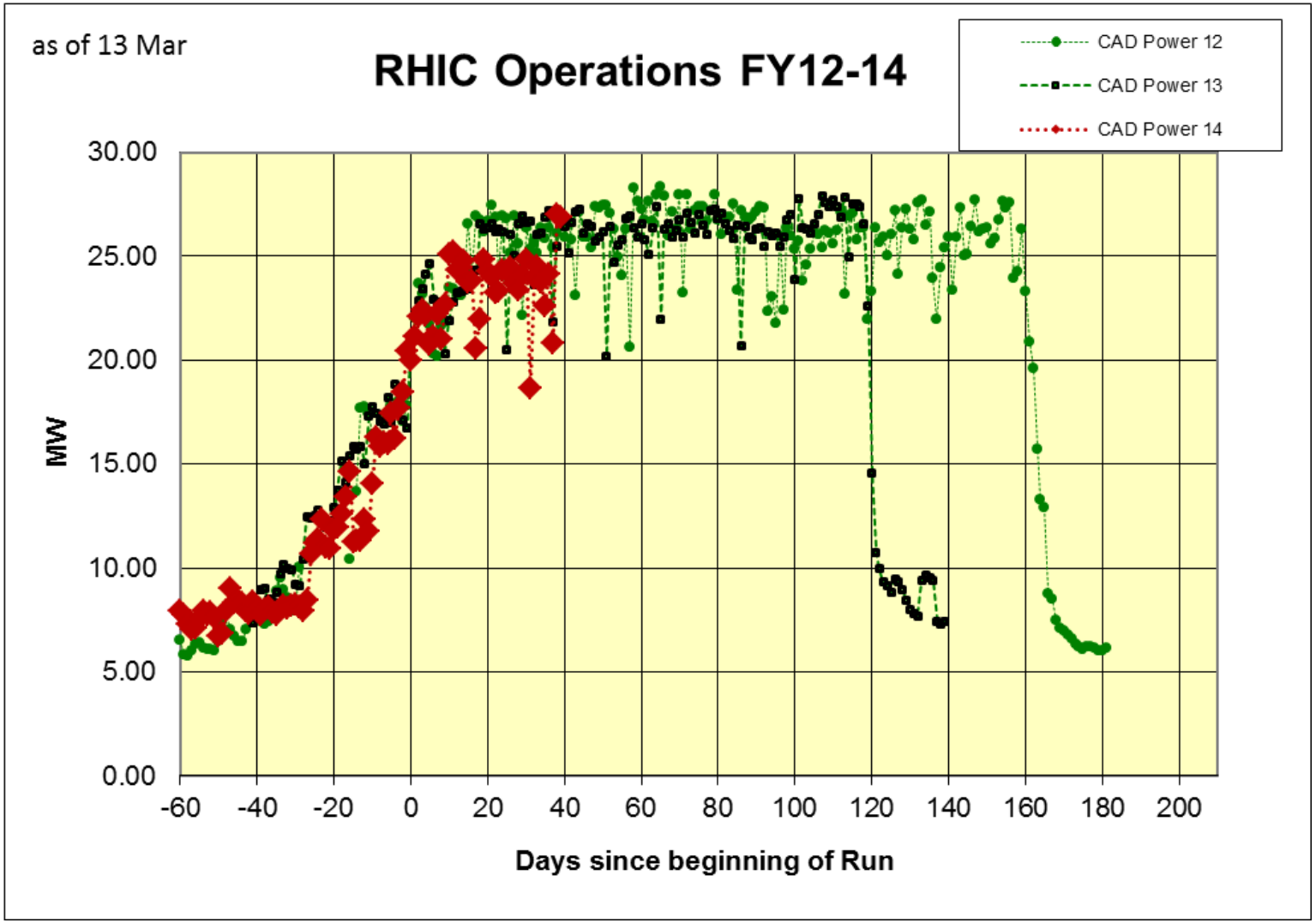
PHENIX

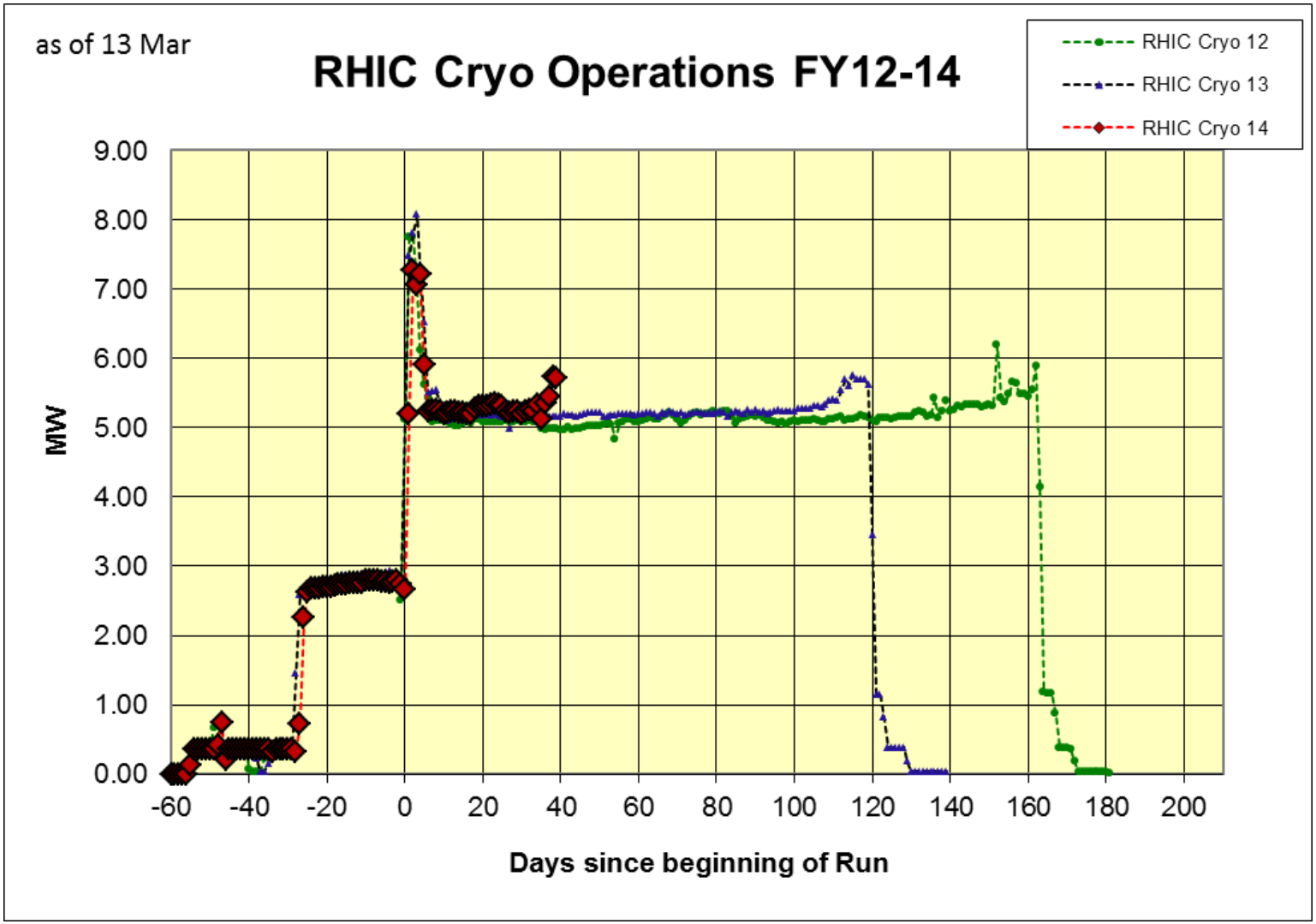
- Au+Au @ 200 GeV for 12 weeks, L = 1.5 nb^{-1} sampled luminosity within |z| < 10 cm]
  - ~30% within |z| < 10 cm]
  - ~90% DAQ efficiency
  - ~50% bandwidth, DAQ saturation factor (?)
  - → 11 nb^{-1} delivered

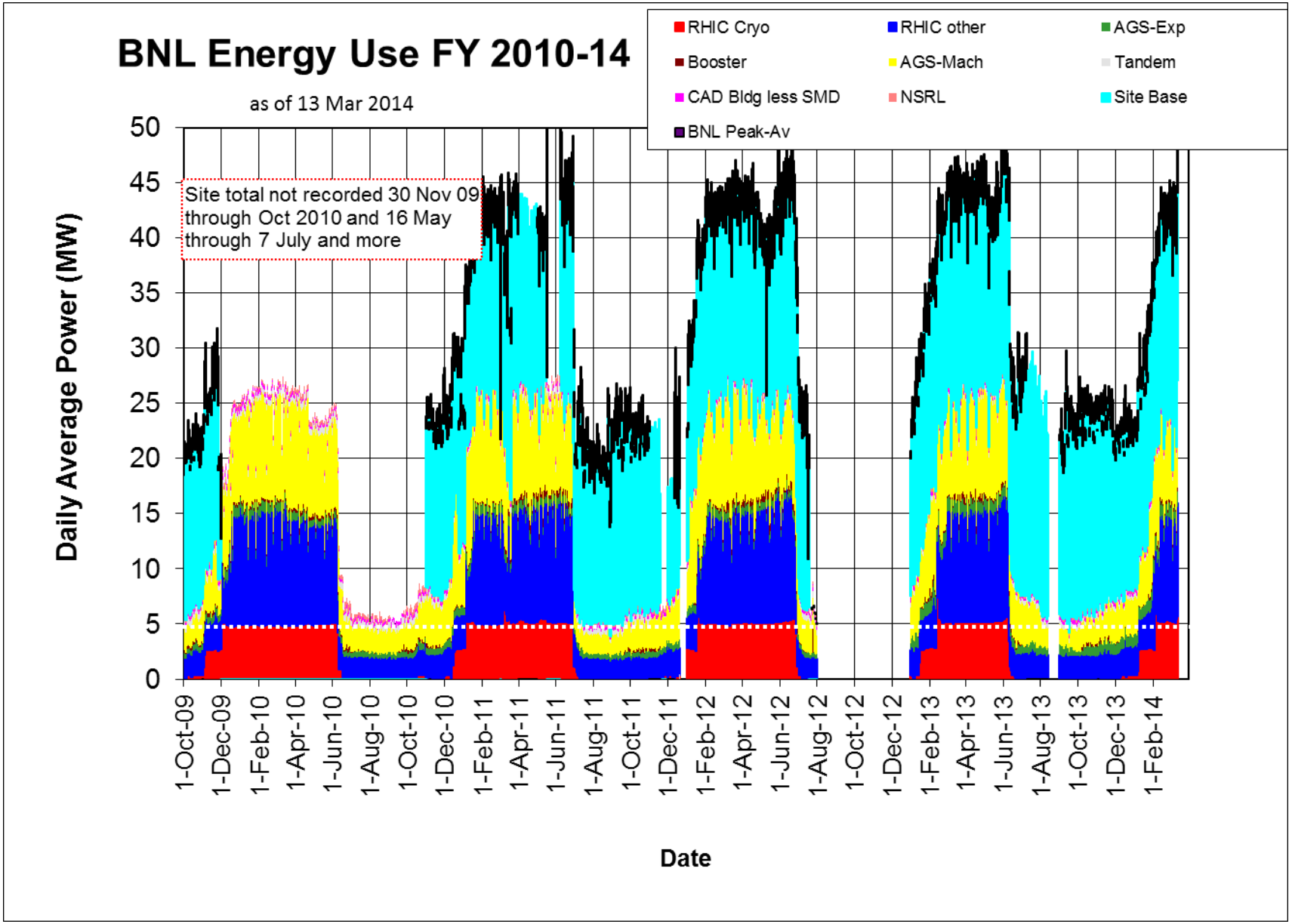
STAR

- Au+Au @ 200 GeV for 14 weeks, L= 10 nb^{-1} recorded, 10^9 min bias triggers within |z| < 5 cm] → ($2x10^9$ triggers required)
  - ~ 60% (should be better) sampling efficiency
  - → 16.7 nb^{-1} delivered

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

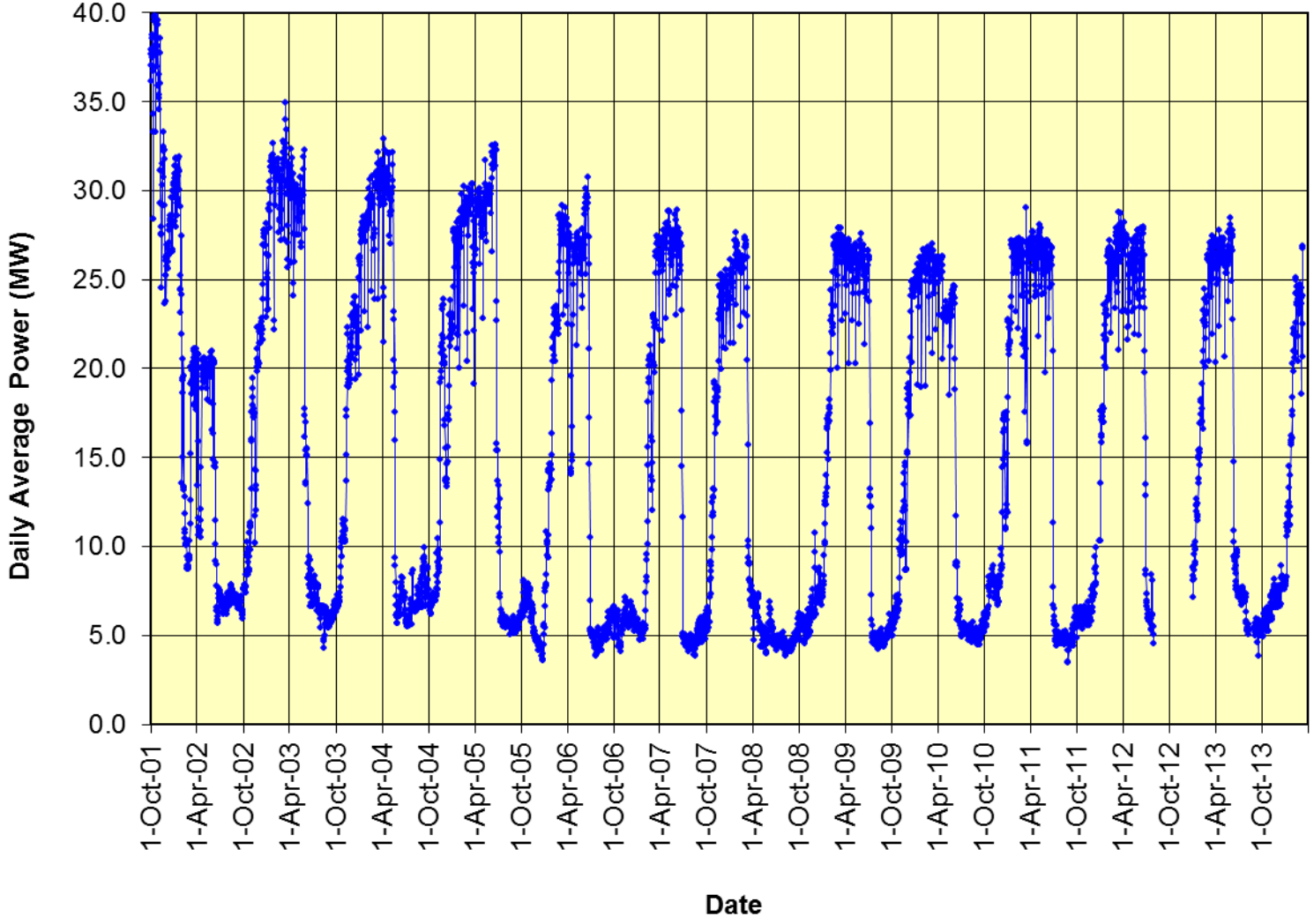

as of 13 Mar
RHIC Operations FY12-14
CAD Power 12
CAD Power 13
CAD Power 14
MW
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-60
-40
-20
0
20
40
60
80
100
120
140
160
180
200
Days since beginning of Run


as of 13 Mar
RHIC Cryo Operations FY12-14
RHIC Cryo 12
RHIC Cryo 13
RHIC Cryo 14
MW
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-60
-40
-20
0
20
40
60
80
100
120
140
160
180
200
Days since beginning of Run


BNL Energy Use FY 2010-14
as of 13 Mar 2014
RHIC Cryo
RHIC other
AGS-Exp
Booster
AGS-Mach
Tandem
CAD Bldg less SMD
NSRL
Site Base
BNL Peak-Av
Site total not recorded 30 Nov 09 through Oct 2010 and 16 May through 7 July and more
Daily Average Power (MW)
0
5
10
15
20
25
30
35
40
45
50
1-Oct-09
1-Dec-09
1-Feb-10
1-Apr-10
1-Jun-10
1-Aug-10
1-Oct-10
1-Dec-10
1-Feb-11
1-Apr-11
1-Jun-11
1-Aug-11
1-Oct-11
1-Dec-11
1-Feb-12
1-Apr-12
1-Jun-12
1-Aug-12
1-Oct-12
1-Dec-12
1-Feb-13
1-Apr-13
1-Jun-13
1-Aug-13
1-Oct-13
1-Dec-13
1-Feb-14
Date

as of 13 Mar 2013

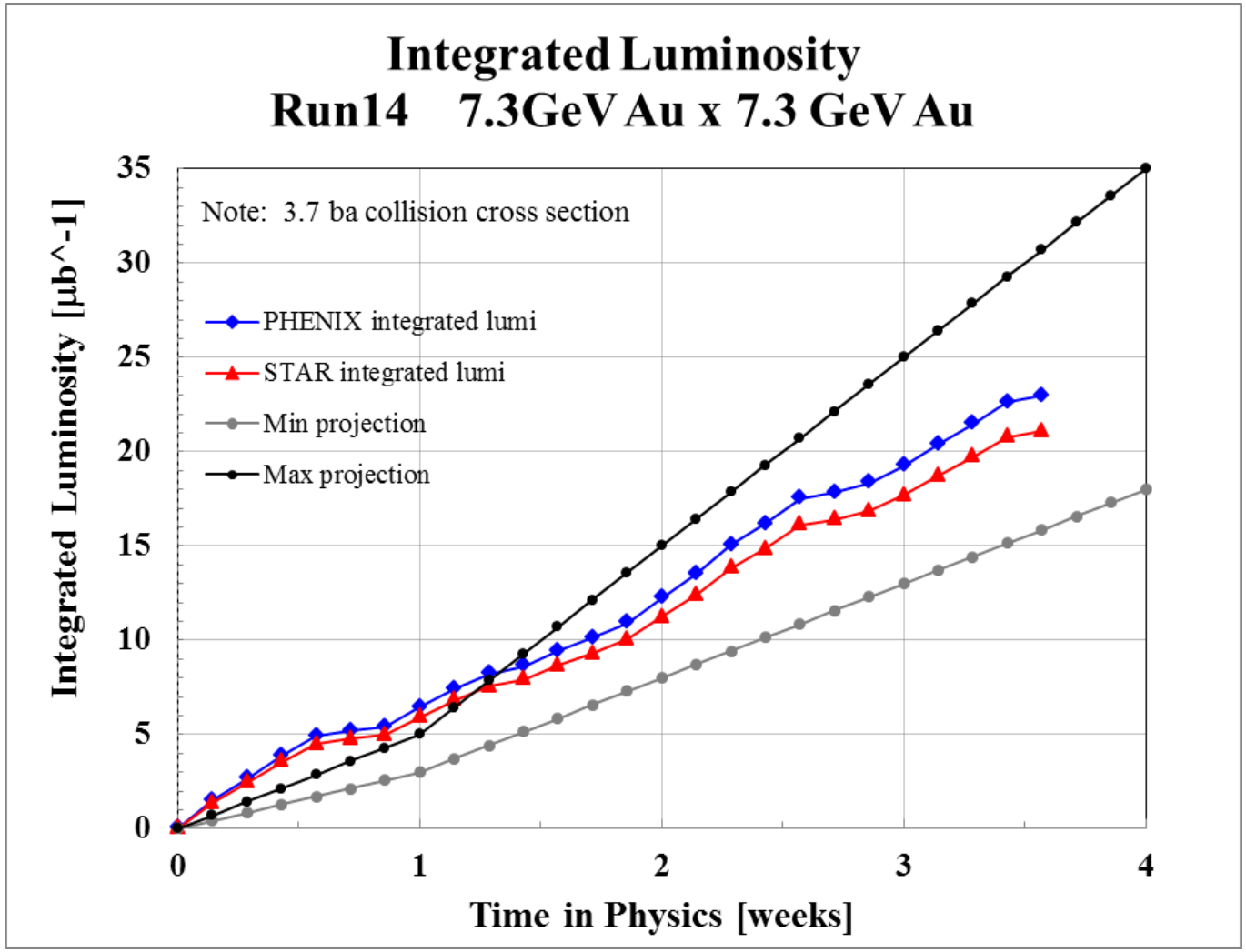
C-AD Energy Use FY 2002-14



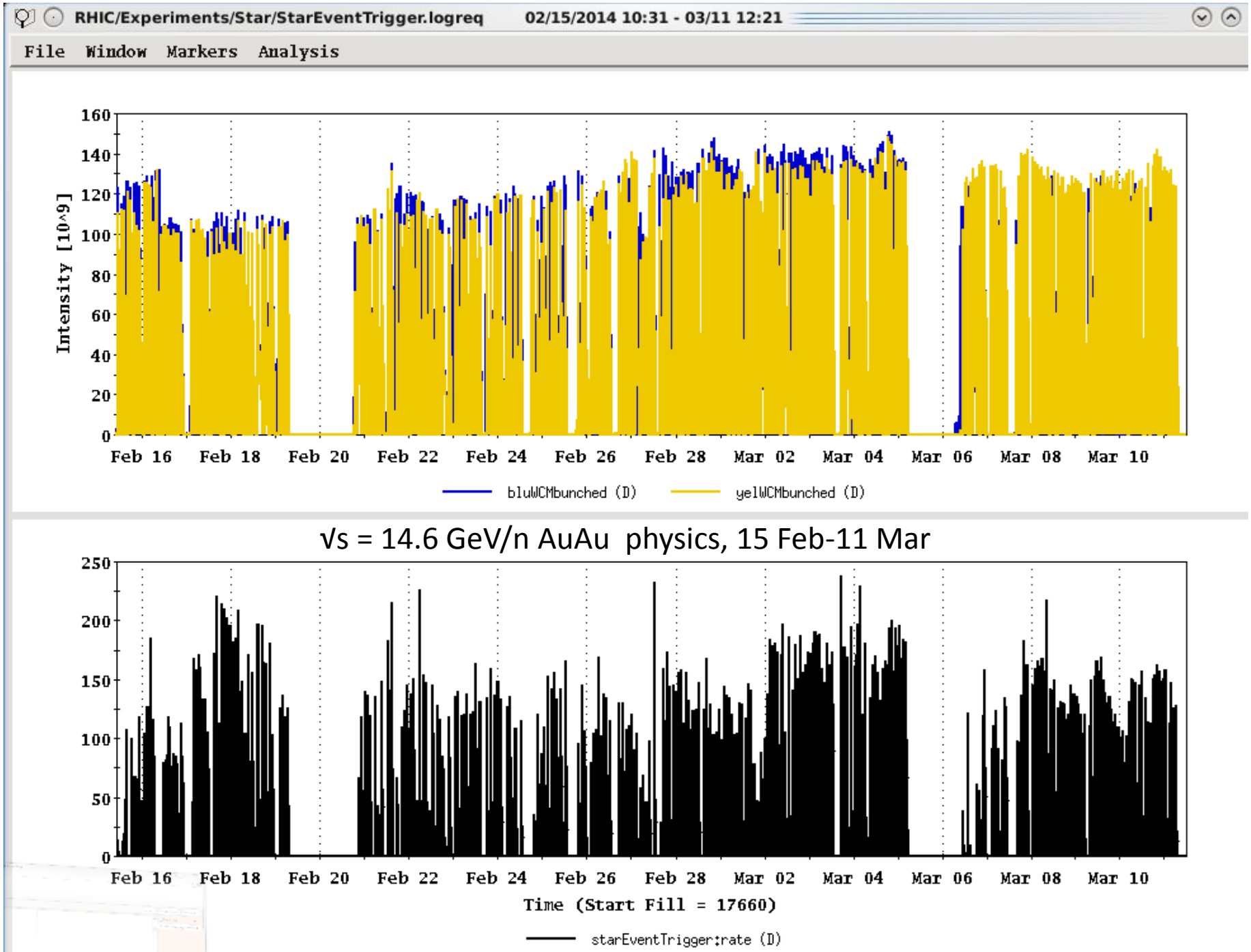
Archive

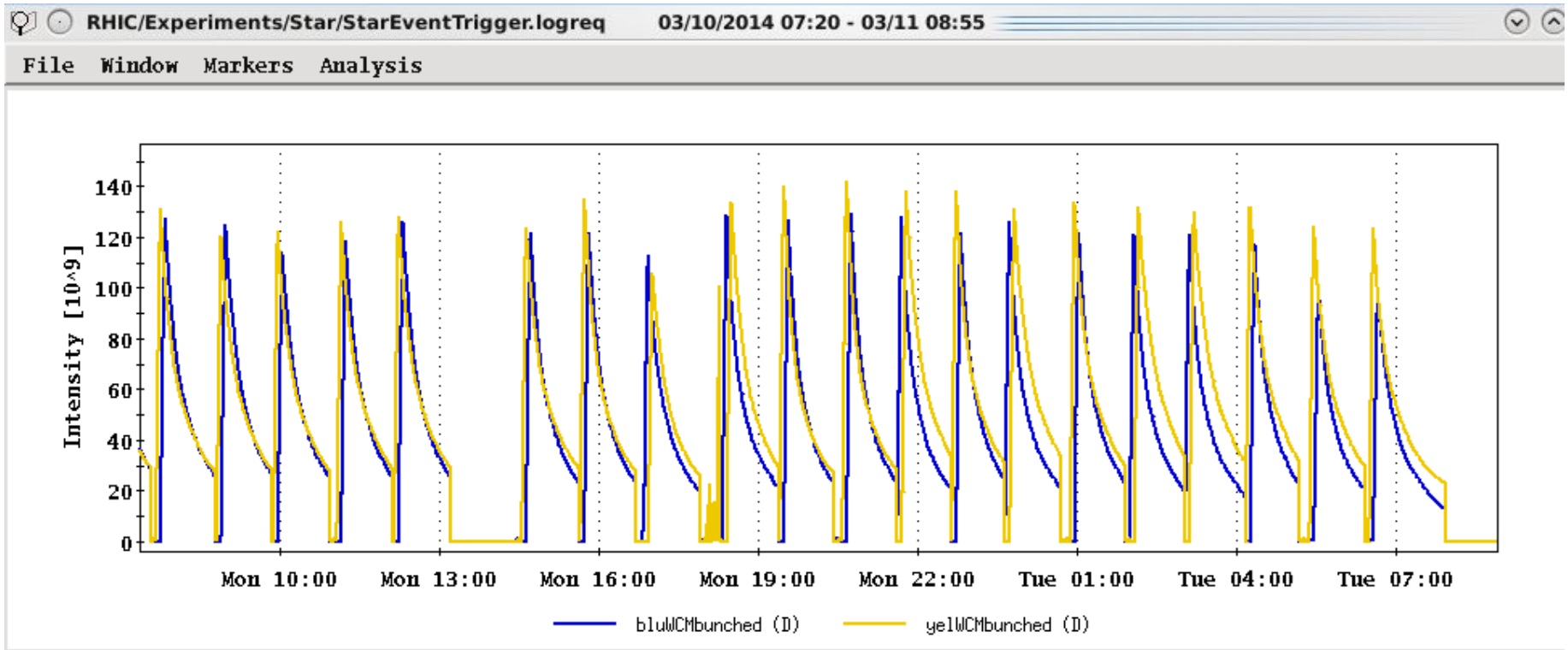
Through final fill 18010, 11 Mar 2015

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

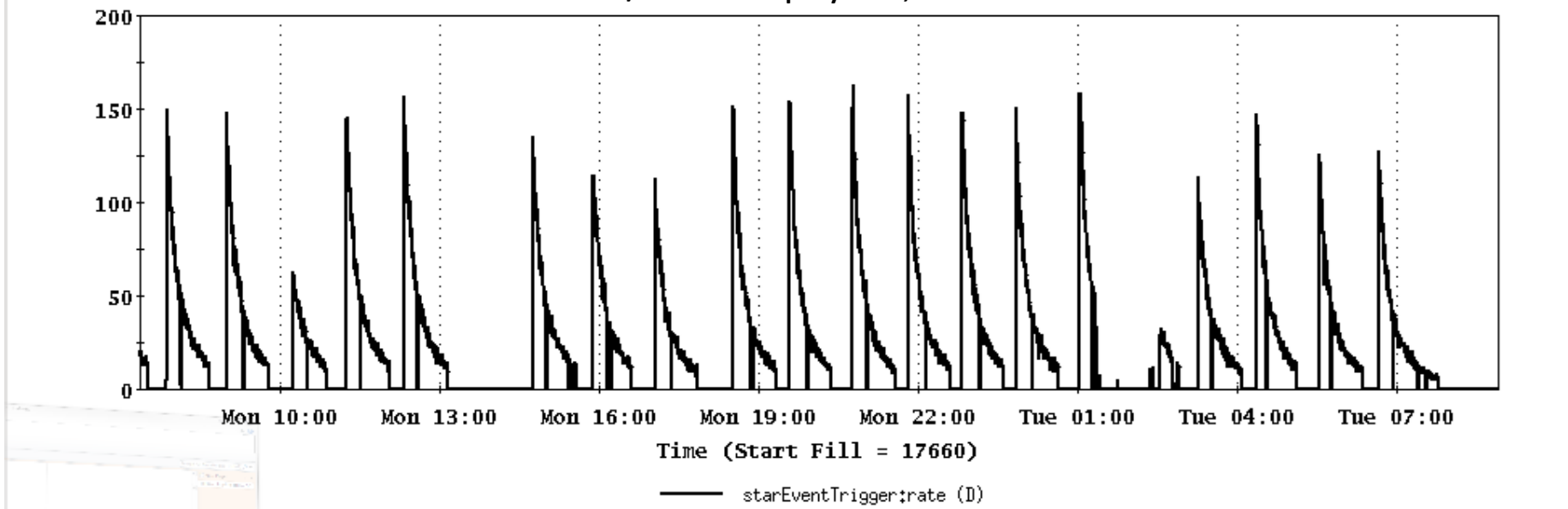


From Ingrassia,
http://www.cadops.bnl.gov/AGS/Operations/Run14/


RHIC/Experiments/Star/StarEventTrigger.logreq
02/15/2014 10:31 - 03/11 12:21
File Window Markers Analysis
Intensity [10^9]
160
140
120
100
80
60
40
20
0
Feb 16 Feb 18 Feb 20 Feb 22 Feb 24 Feb 26 Feb 28 Mar 02 Mar 04 Mar 06 Mar 08 Mar 10
bluWCMbunched (D)
yelWCMbunched (D)
√s = 14.6 GeV/n AuAu physics, 15 Feb-11 Mar
250
200
150
100
50
0
Feb 16 Feb 18 Feb 20 Feb 22 Feb 24 Feb 26 Feb 28 Mar 02 Mar 04 Mar 06 Mar 08 Mar 10
Time (Start Fill = 17660)
starEventTrigger:rate (D)



√s = 14.6 GeV/n AuAu physics, last 24 hours



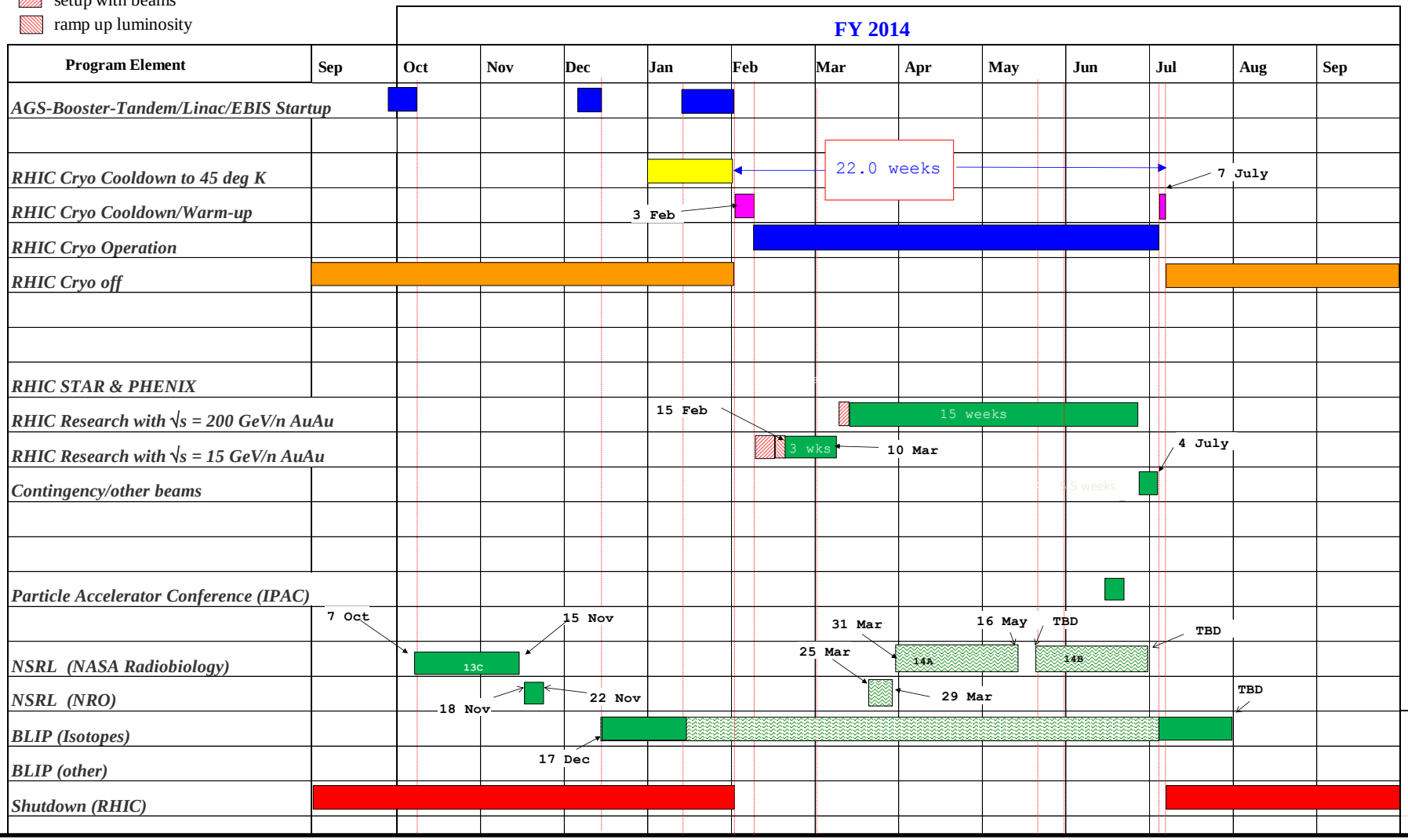
http://www.bnl.gov/cad/esfd

Scheduling Physicist: Chuyu Liu

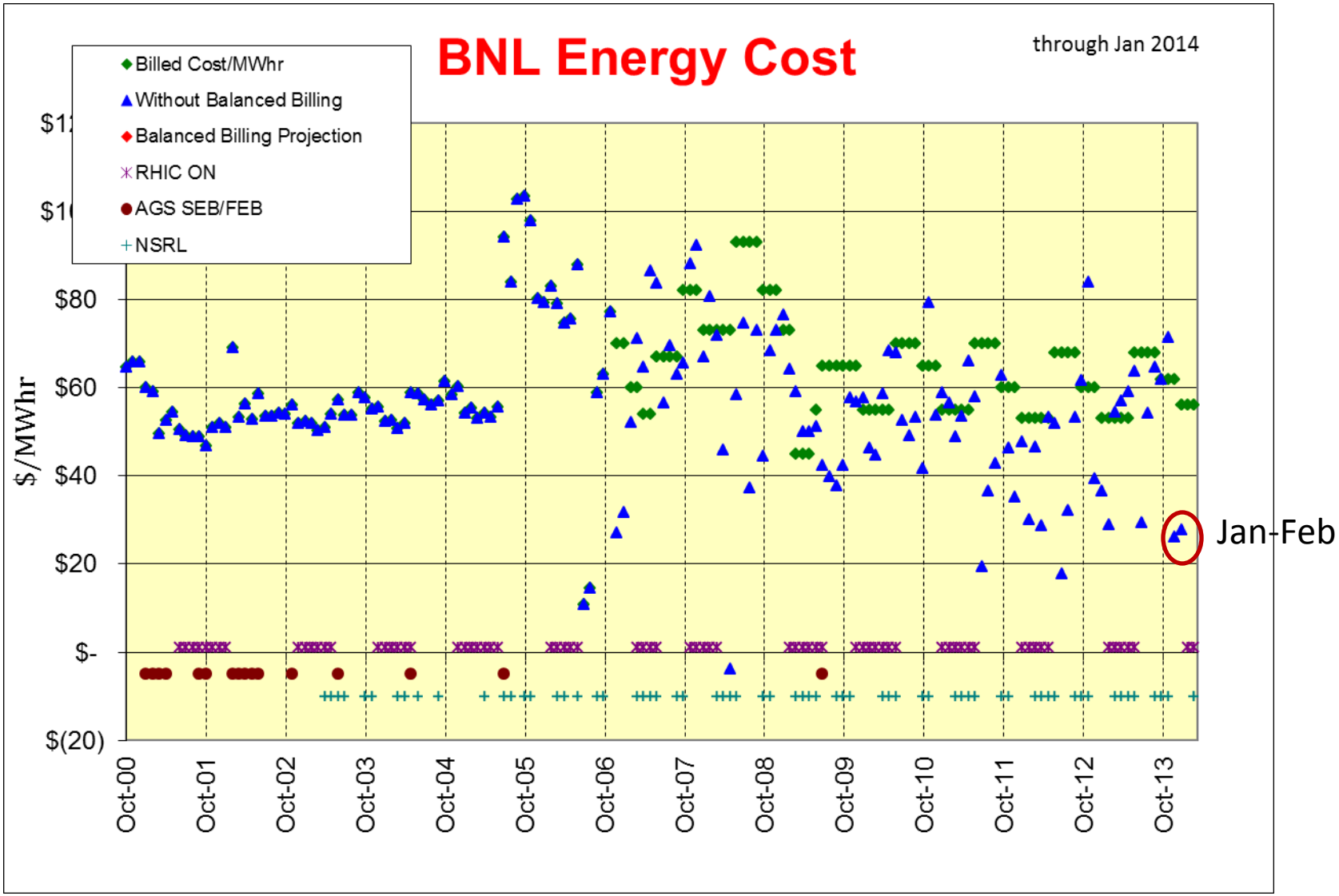
C-A Operations-FY14

4 Mar 14

planned, budget permitting



FY 2014 power rebate $ in BNL bank = $1.07M, through Jan



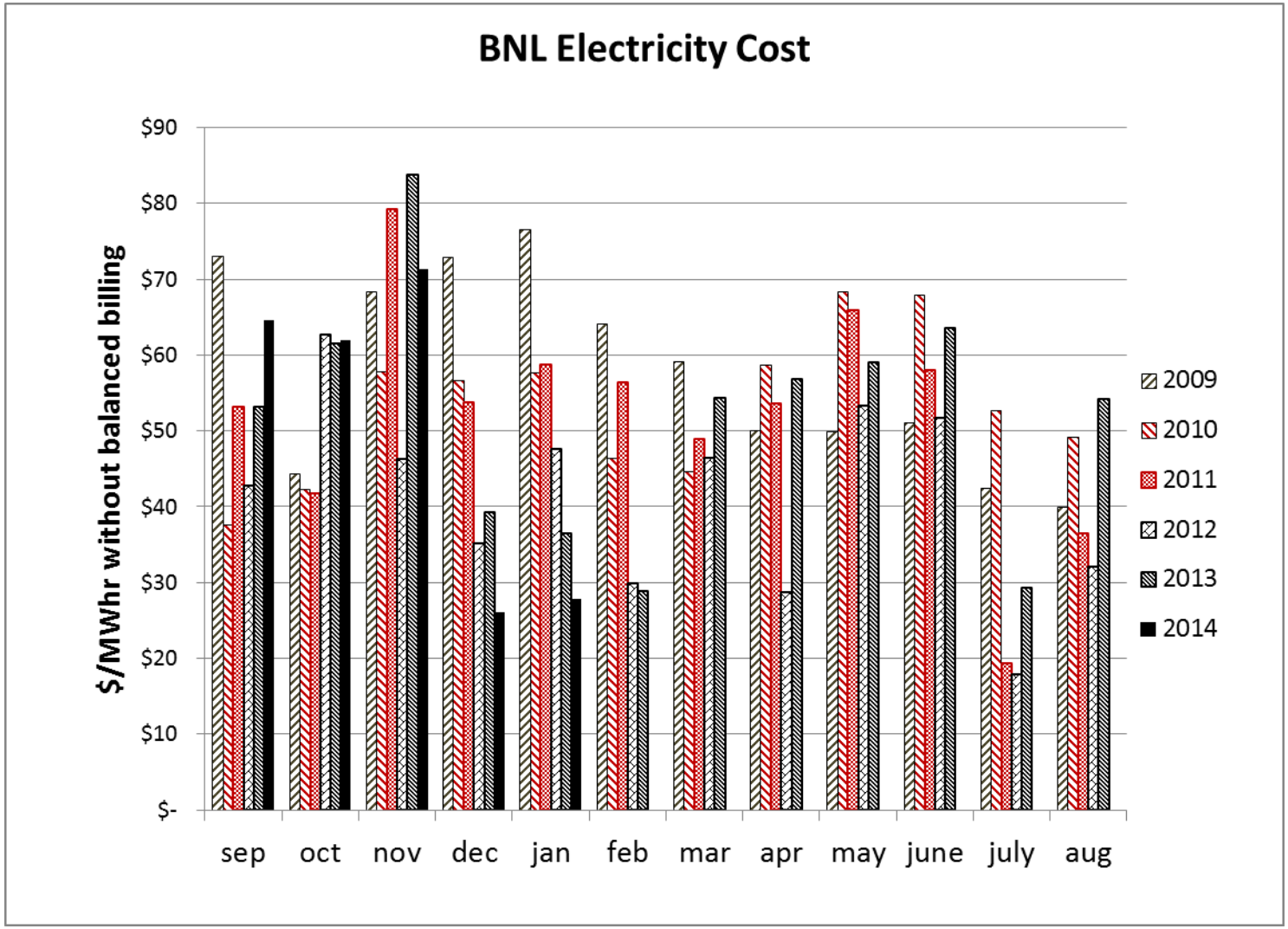

BNL Electricity Cost
$/MWhr without balanced billing
$90
$80
$70
$60
$50
$40
$30
$20
$10
$-
sep
oct
nov
dec
jan
feb
mar
apr
may
june
july
aug
2009
2010
2011
2012
2013
2014

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} [$cm^{-2}s^{-1}$]	$L_{store\ avg}$ [$cm^{-2}s^{-1}$]	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 ^{3}He atom; d (deuteron) – nucleus of the ^{2}H atom; p (proton) – nucleus of the ^{1}H 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.

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

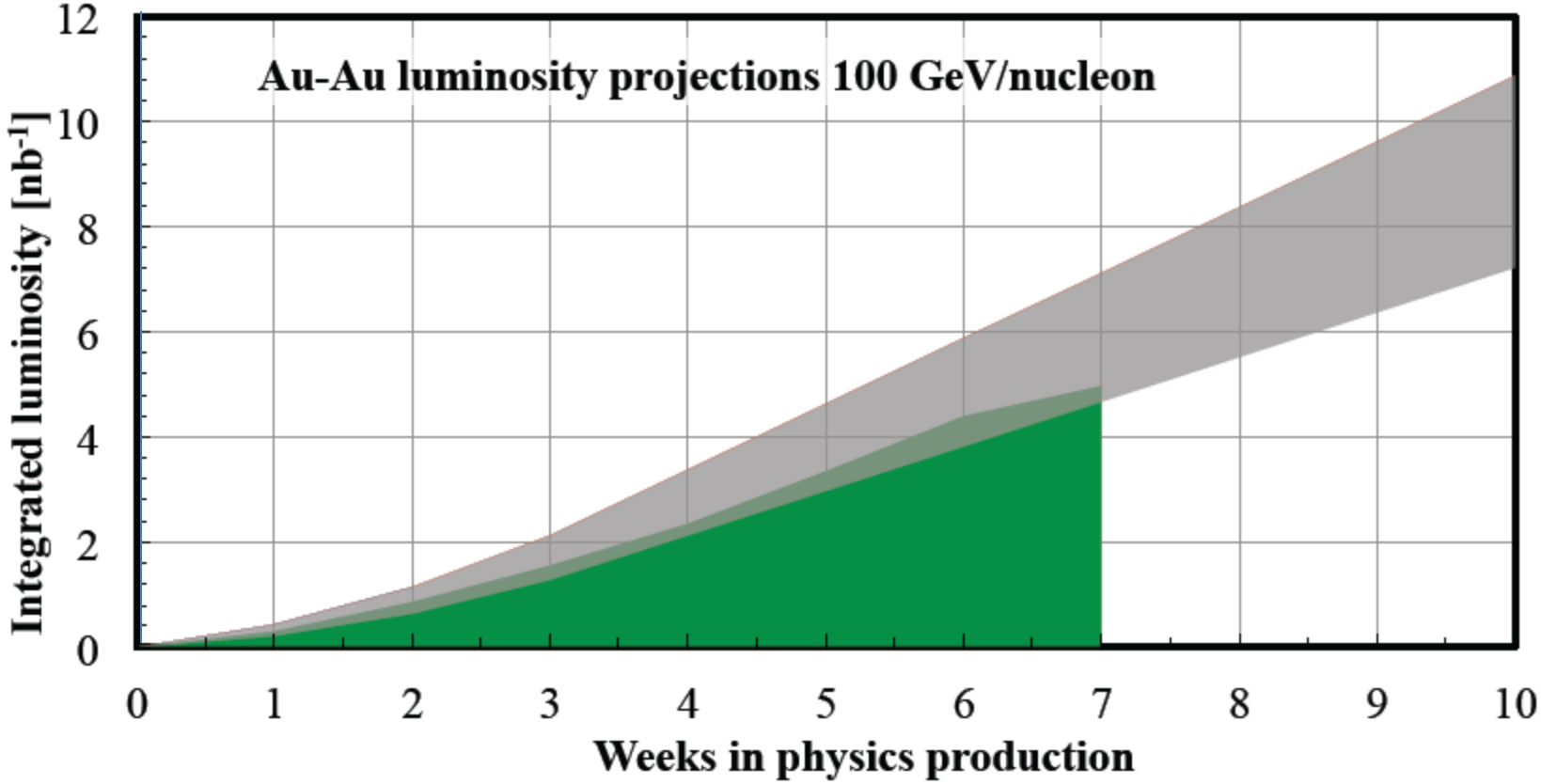


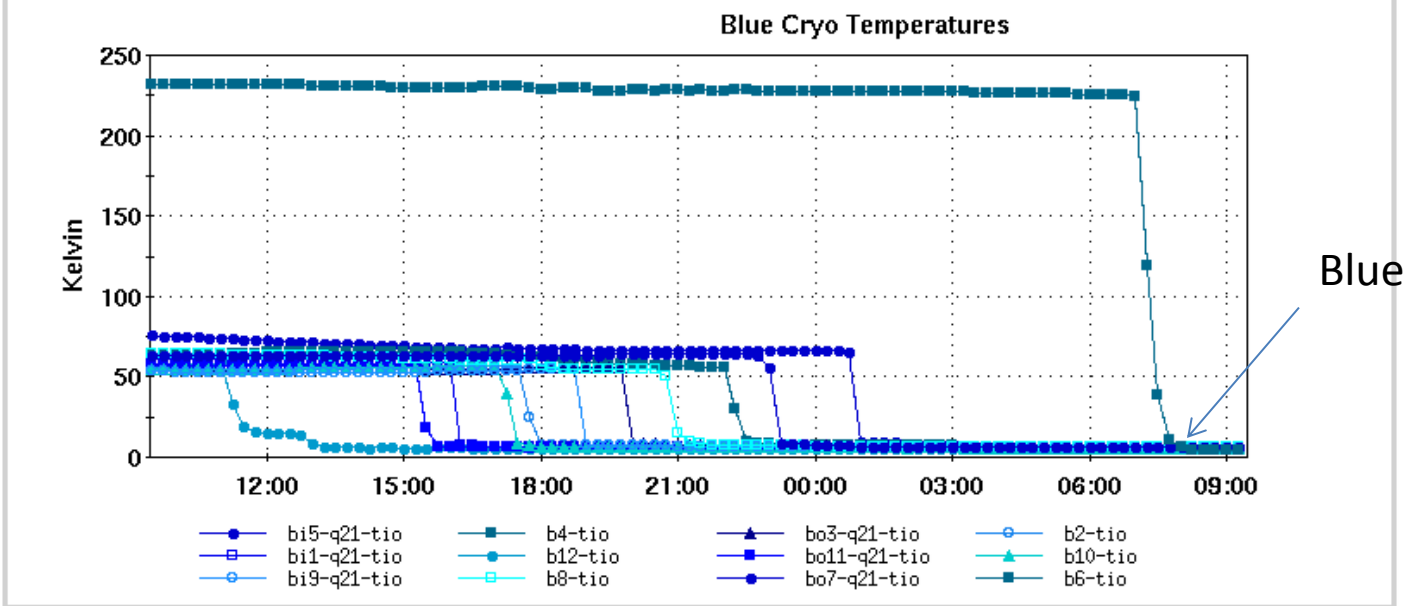
Figure 4: Projected minimum and maximum integrated luminosities for Au-Au at 100 GeV/nucleon.

Fischer et. Al. “RHIC Collider Projections (FY 2014 – FY 2018)”, 4 June 2013

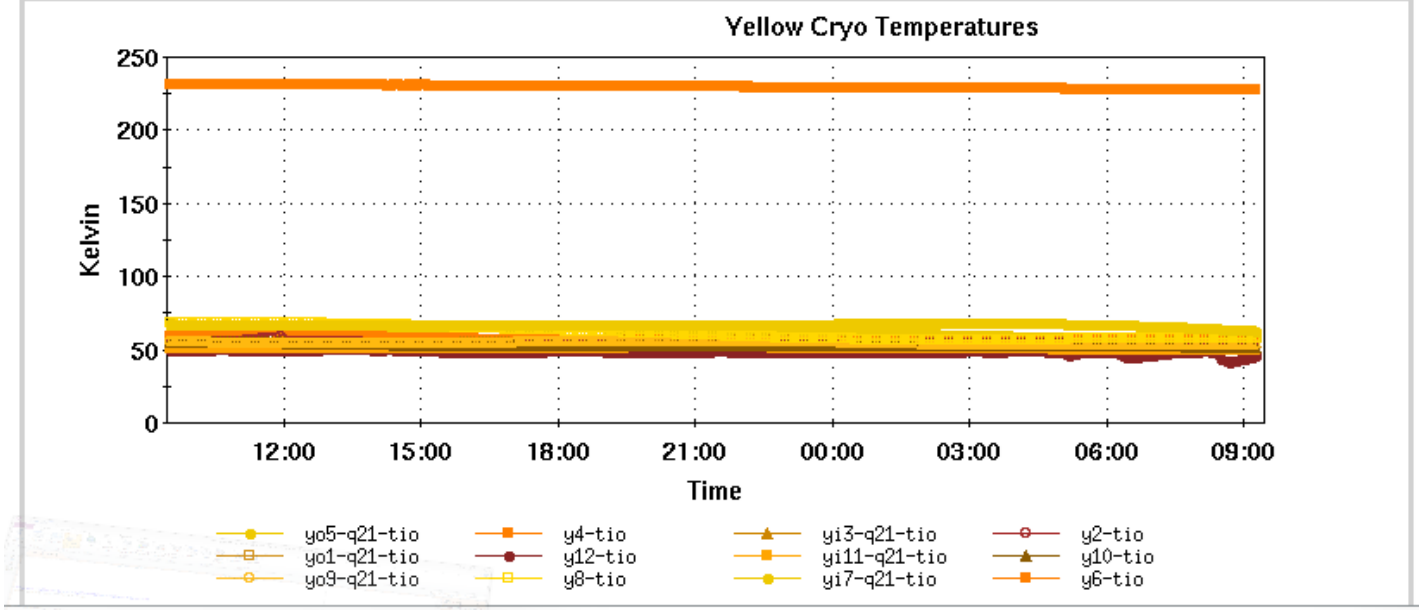
Ring Summary (14 days) Sector Plots (1 day) Sector Plots (14 days)

4 Feb 2014

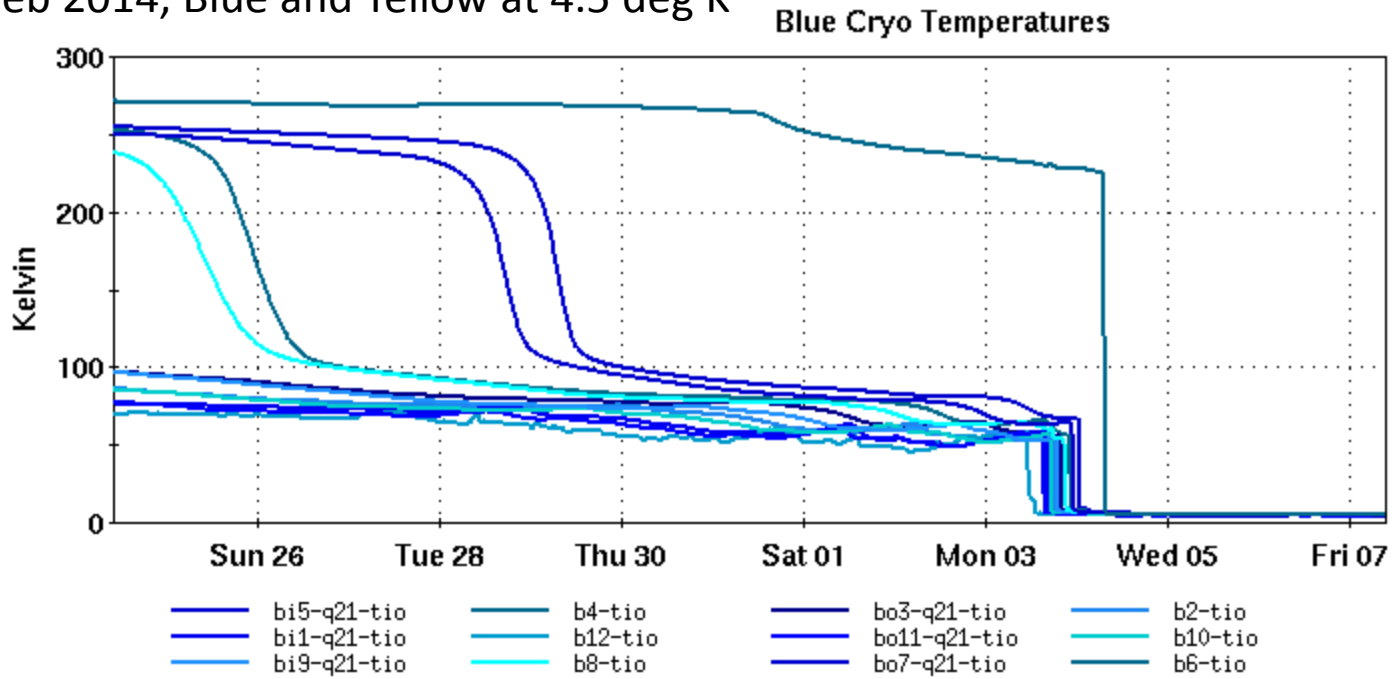
File Window Markers Analysis

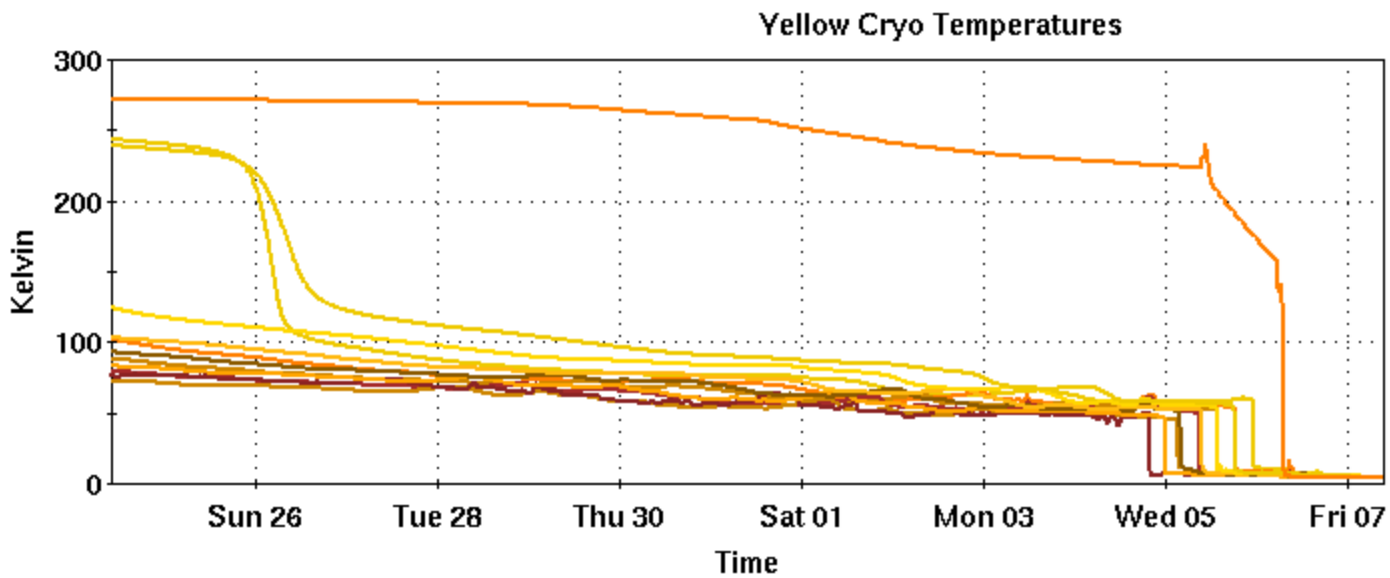


Blue at 4.5 deg



7 Feb 2014, Blue and Yellow at 4.5 deg K





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

Who's Who for 2014

RHIC Au-Au Run Coordinator Operations:	Gregory Marr	gmarr@bnl.gov	631-344-7810 (office)
	Vincent Schoefer	schoefer@bnl.gov	631-344-8453 (office)
	Travis Shrey	shrey@bnl.gov	631-344-7451 (office)
RHIC 7.3 GeV Au-Au Run Coordinator planning:	Christoph Montag	montagc@bnl.gov	631-344-4820 (office)
RHIC 100 GeV Au-Au Run Coordinator planning:	Guillaume Robert-Demolaize	grd@bnl.gov	631-344-8215 (office)
Scheduling Physicist:	Chuyu Liu	cliu1@bnl.gov	631-344-4431 (office)
AGS liaison:	Haixin Huang	huanghai@bnl.gov	631-344-5446 (office)