Run 13 RHIC Machine/Experiments Meeting

13 Jun 2013

Run 13 Summary Slides

Run 13 plan based on 17 weeks cryo operation

- ✓ 11 Feb, Begin cool-down to 4.5K
- ✓ 15 Feb, Cool-down to 4.5K in Blue and Yellow Ring complete, begin magnet setup
- ✓ 26 Feb, first collisions
- ✓ 15 Feb -1 Mar, RHIC √s = 510 GeV pp machine setup
- ✓ 1-8 Mar, machine ramp-up with 8 hr/night for experiment setup
- ✓ 9 Mar (store 17201), begin √s = 510 GeV pp physics run
- ✓ 5 April, reverted to Run 12 lattice
- ✓ 5 Jun , 16 hours, APEX low energy Au study using 5.86 GeV protons.
- ✓ 6,7 or 8 Jun, 4 hours, APEX, spin tune meter development (blue beam only)
- ✓ 10 June (Monday, 0800), end 13.4 week √s = 510 GeV pp physics run, begin cryo warm-up
- ✓ 13 June, cryo warm-up ~complete (17.4 cryo-weeks)

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

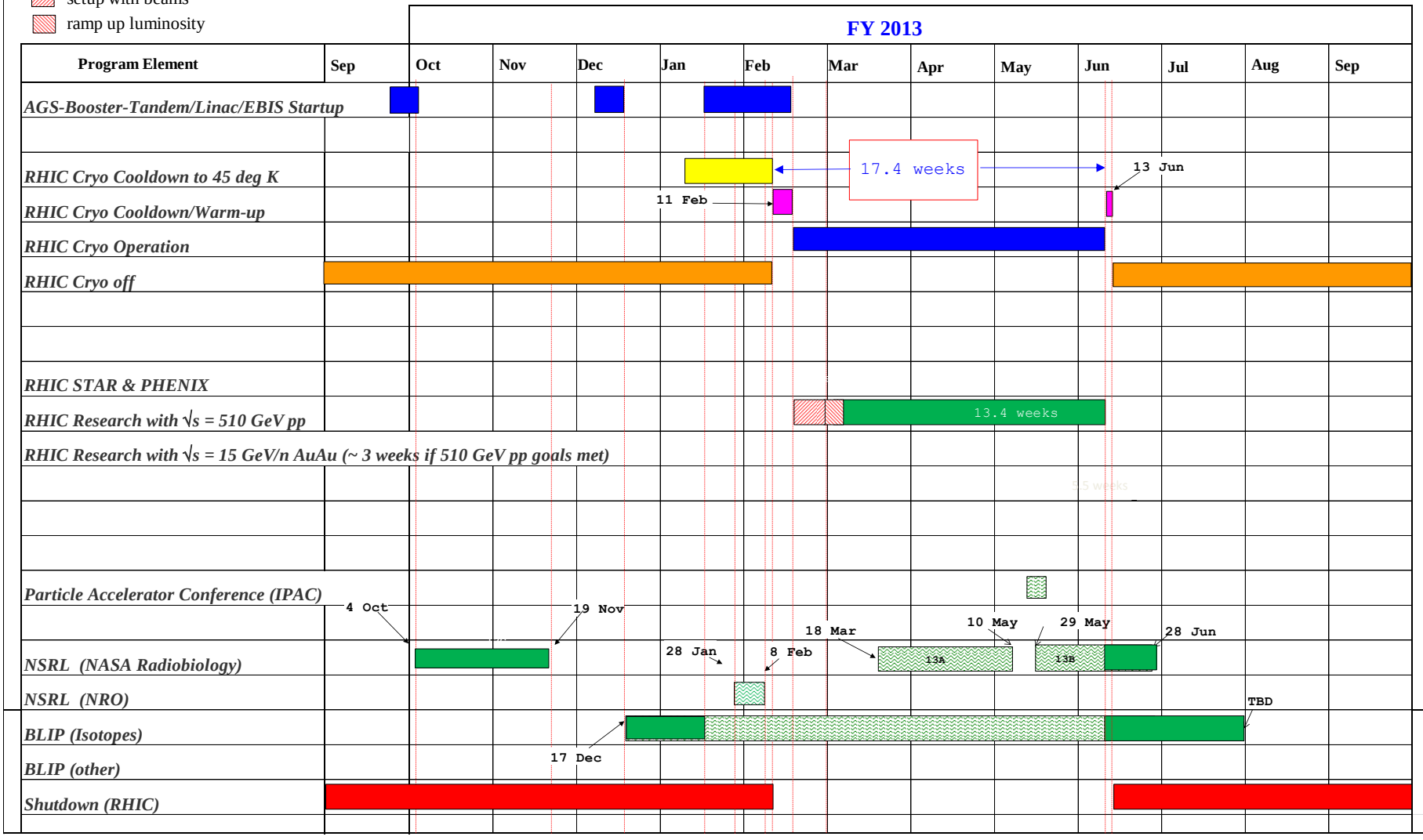
Scheduling Physicist: Andrei Poblaguev

C-A Operations-FY13

13 May 13

concurrent with RHIC
setup with beams
ramp up luminosity

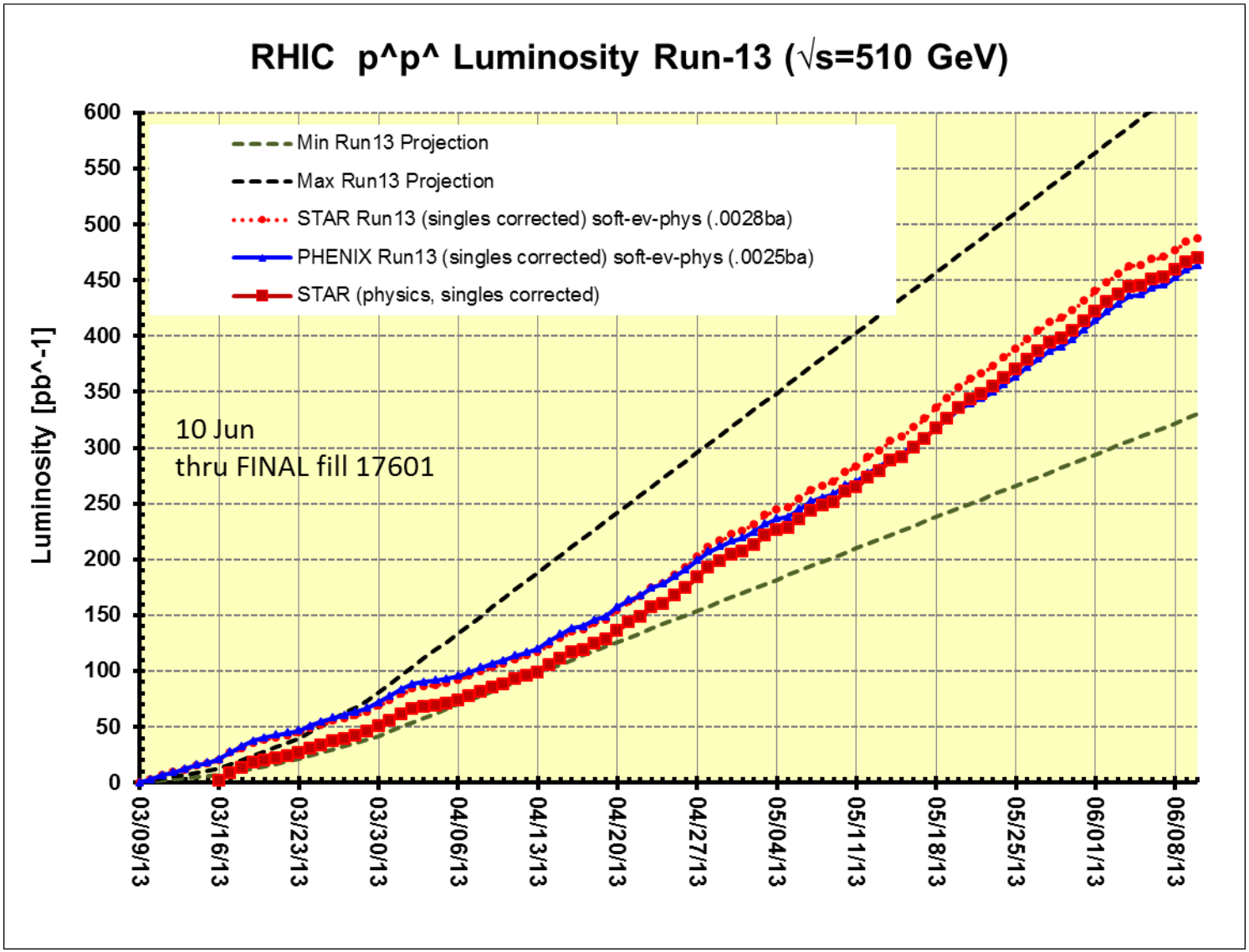
planned, budget permitting



Preliminary, with Run 13 cross sections, PHENIX and STAR ***log based singles correction***

PHENIX Revised Goal, 150 pb^{-1} recorded, 450 pb^{-1} delivered, ≥ 55% polarization

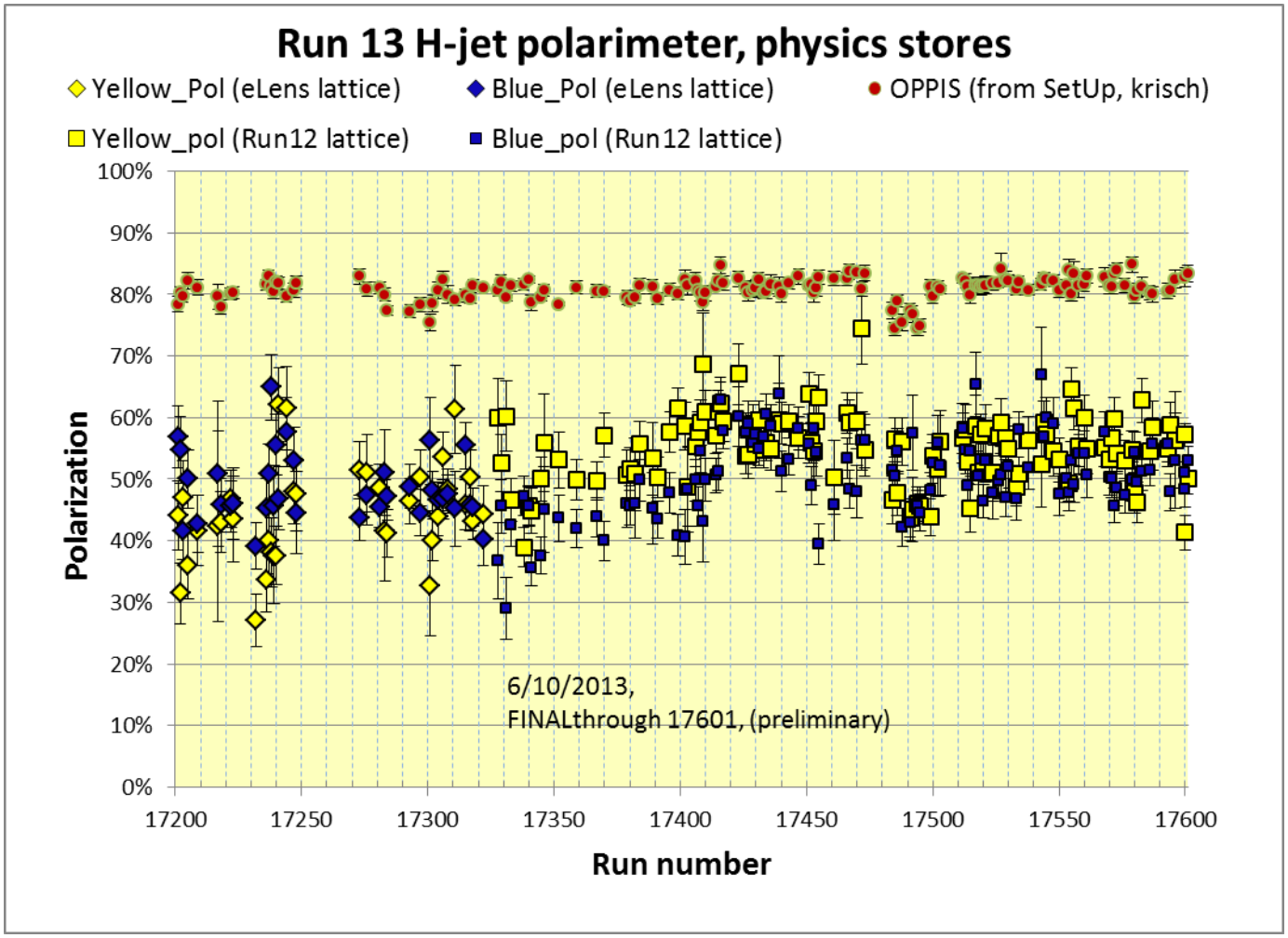
STAR Goal, 165 pb^{-1} recorded, 275 pb^{-1} delivered, ≥ 55% polarization



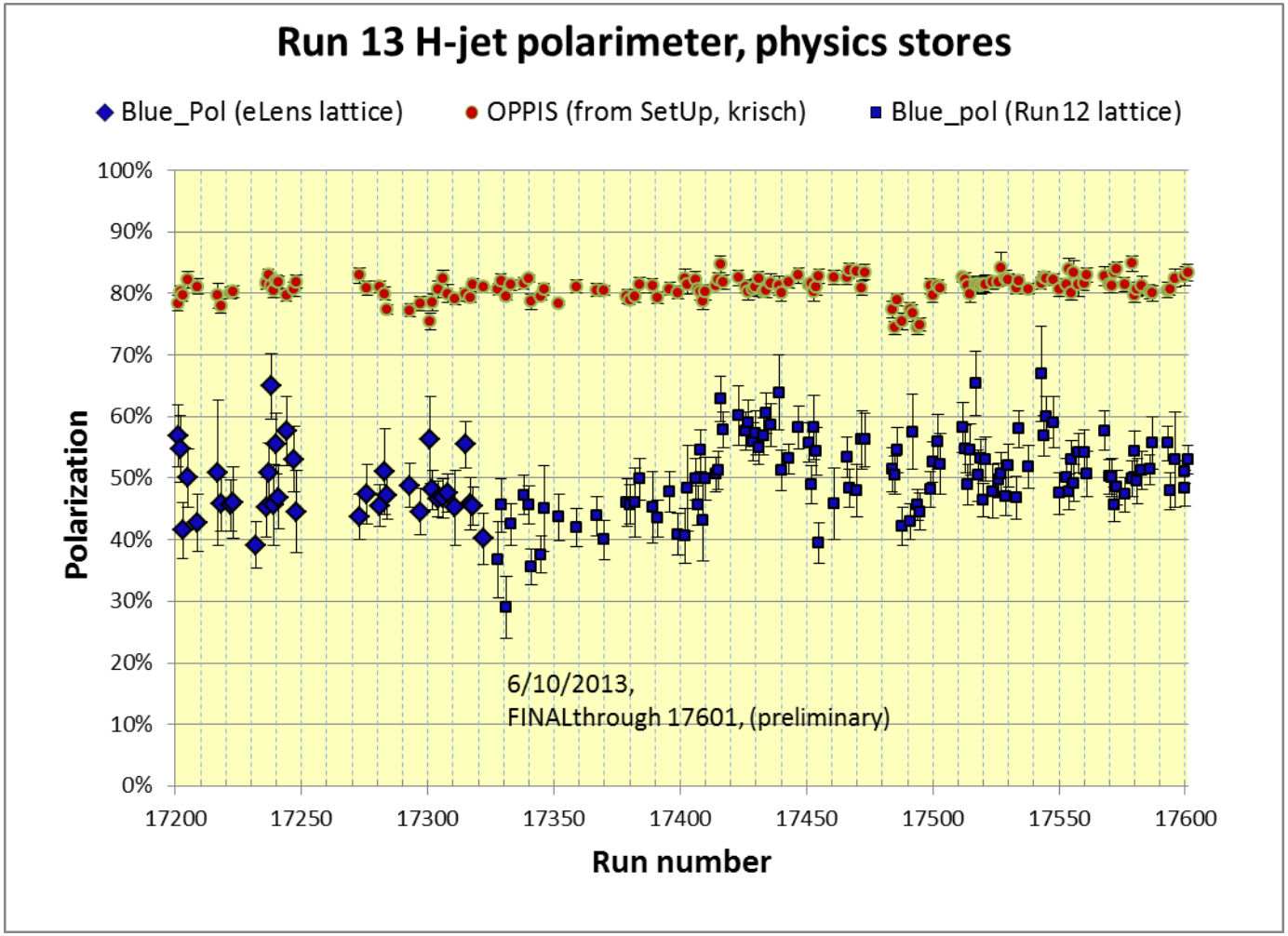
Yellow average = 44.3 ± 0.8%
Blue average = 47.7 ± 0.7%
Average = 46.0%
stores 17201-17322 (eLens lattice)

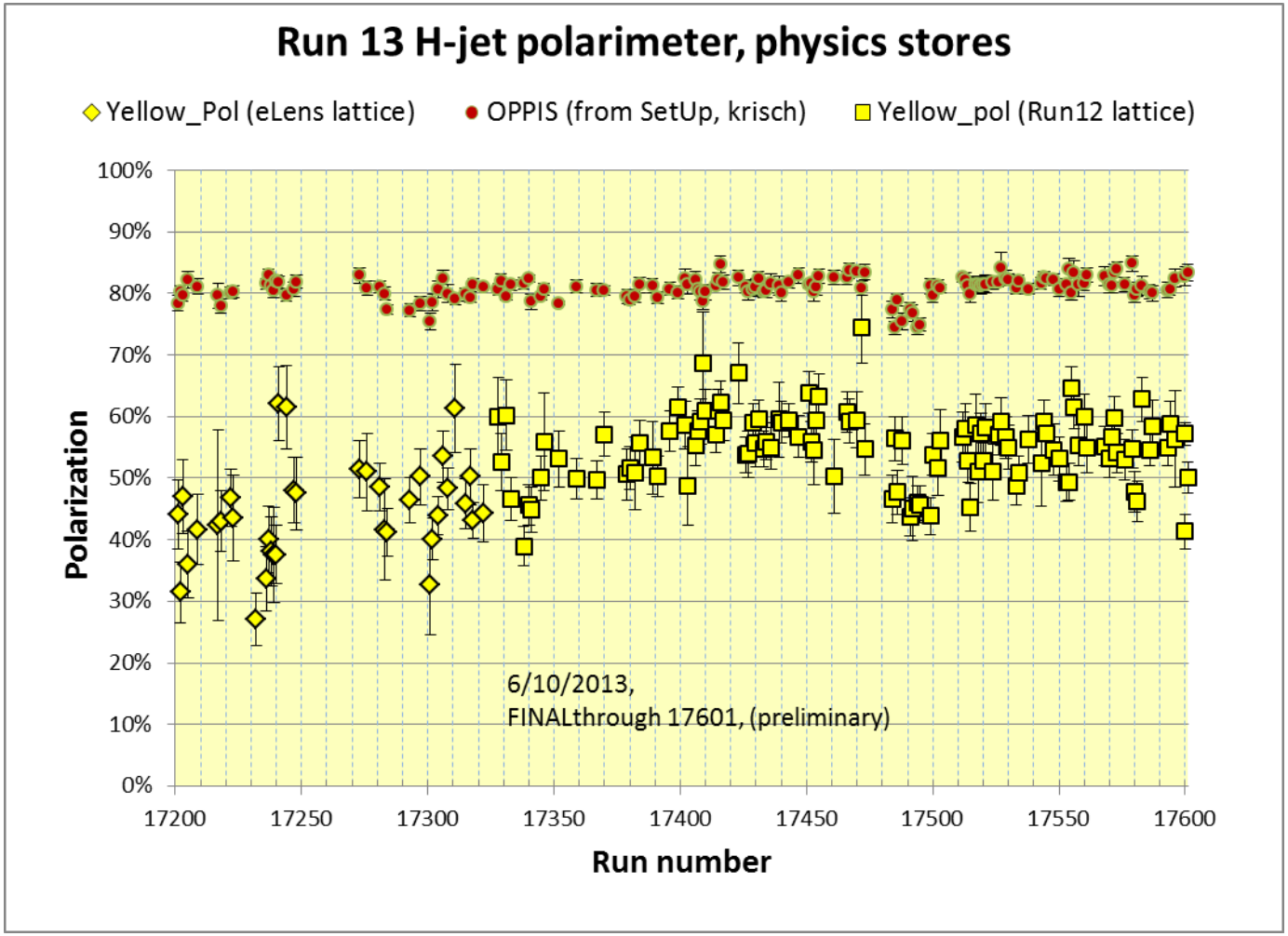
Yellow average = 54.4± 0.3%
Blue average = 50.5 ± 0.3%
Average = 52.5%
stores 17328 – 17601 (Run 12 lattice)

Average for all fills: Blue = 50.1% +/- 0.3%, Yellow = 53.0% +/- 0.3%



https://wiki.bnl.gov/rhicspin/Polarimetry/H-jet/Run13

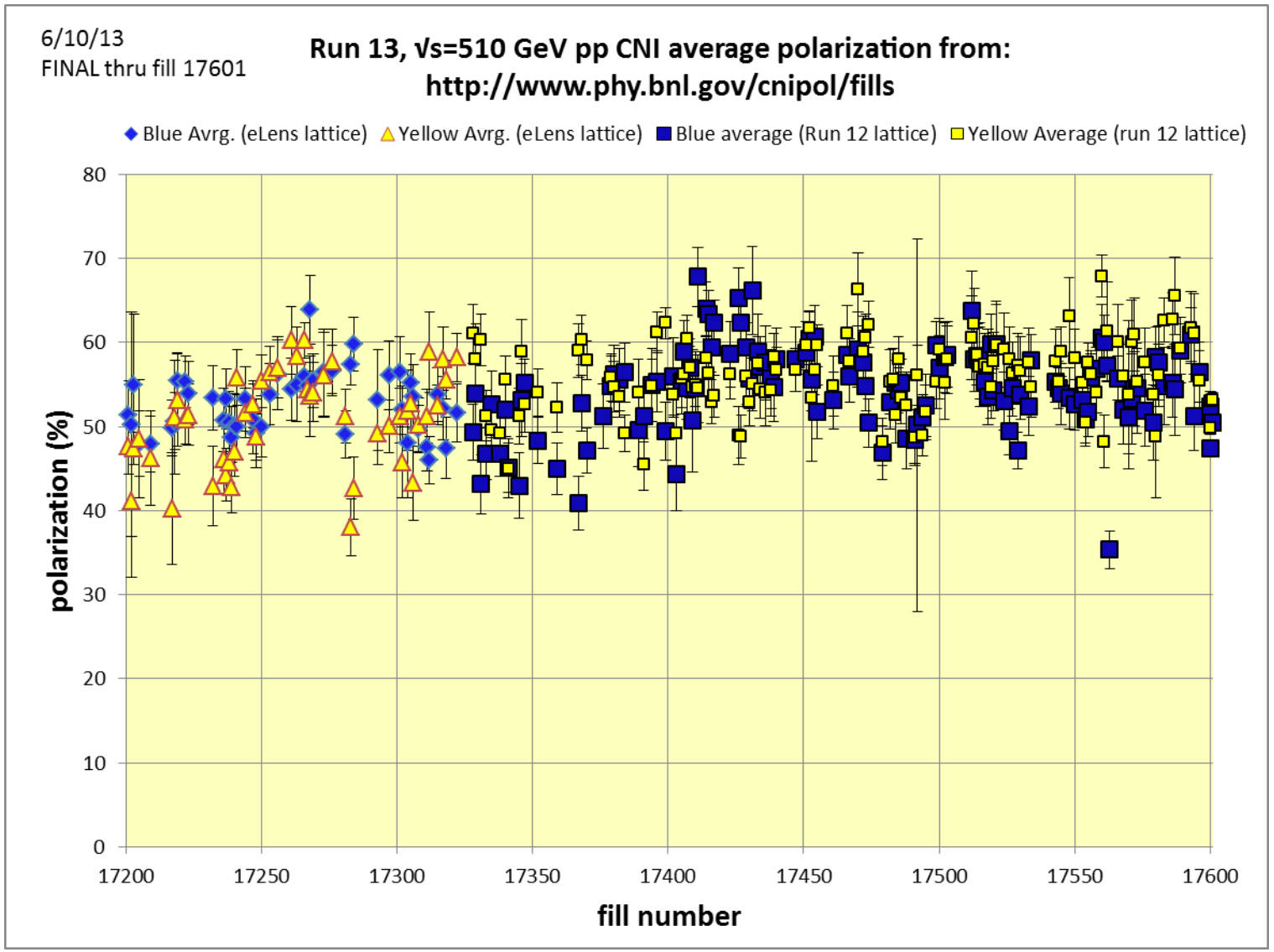

Run 13 H-jet polarimeter, physics stores
Blue_Pol (eLens lattice)
OPPIS (from SetUp, krisch)
Blue_pol (Run12 lattice)
Polarization
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
17200
17250
17300
17350
17400
17450
17500
17550
17600
Run number
6/10/2013,
FINALthrough 17601, (preliminary)

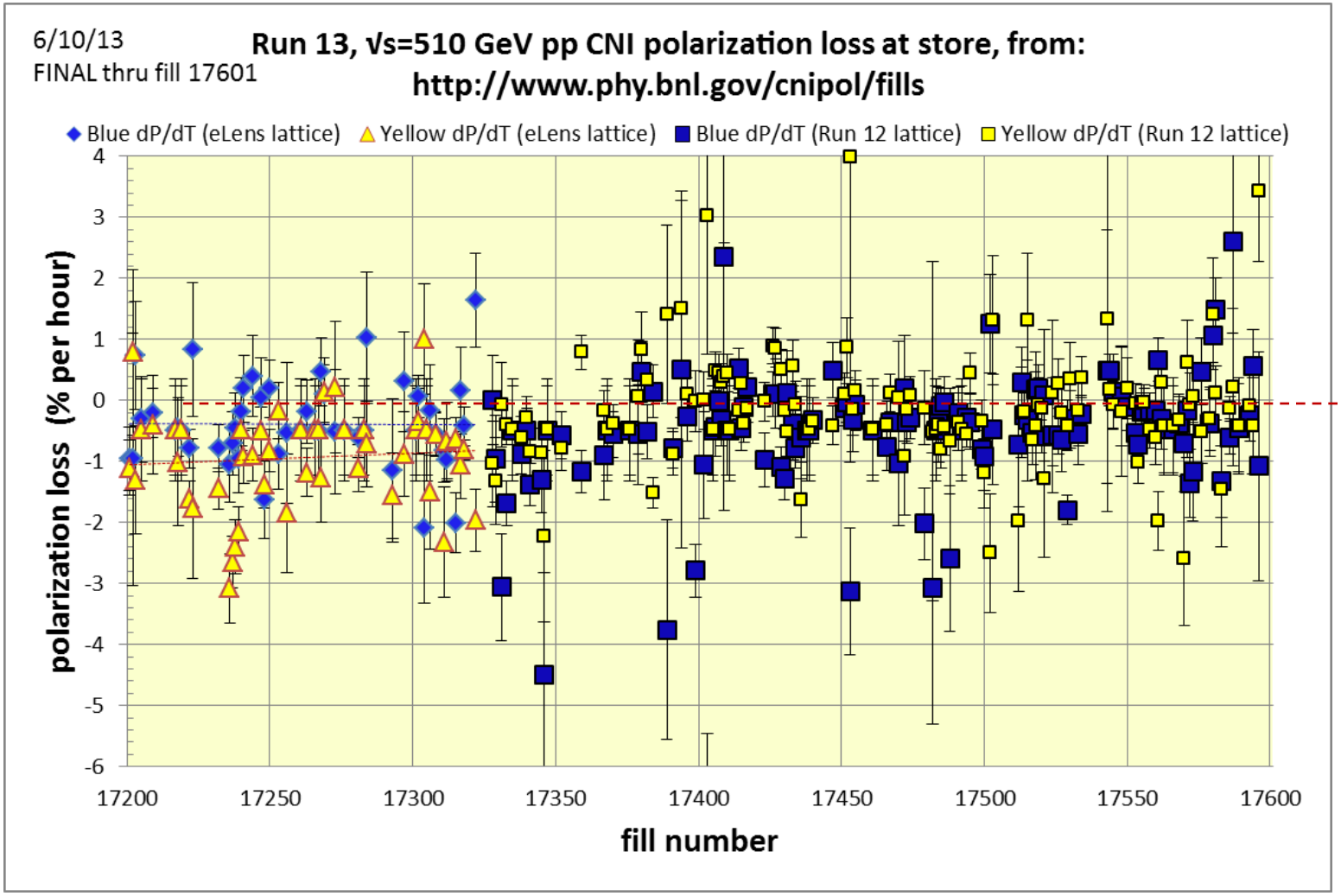

Run 13 H-jet polarimeter, physics stores
Yellow_Pol (eLens lattice)
OPPIS (from SetUp, krisch)
Yellow_pol (Run12 lattice)
Polarization
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
17200
17250
17300
17350
17400
17450
17500
17550
17600
Run number
6/10/2013,
FINALthrough 17601, (preliminary)

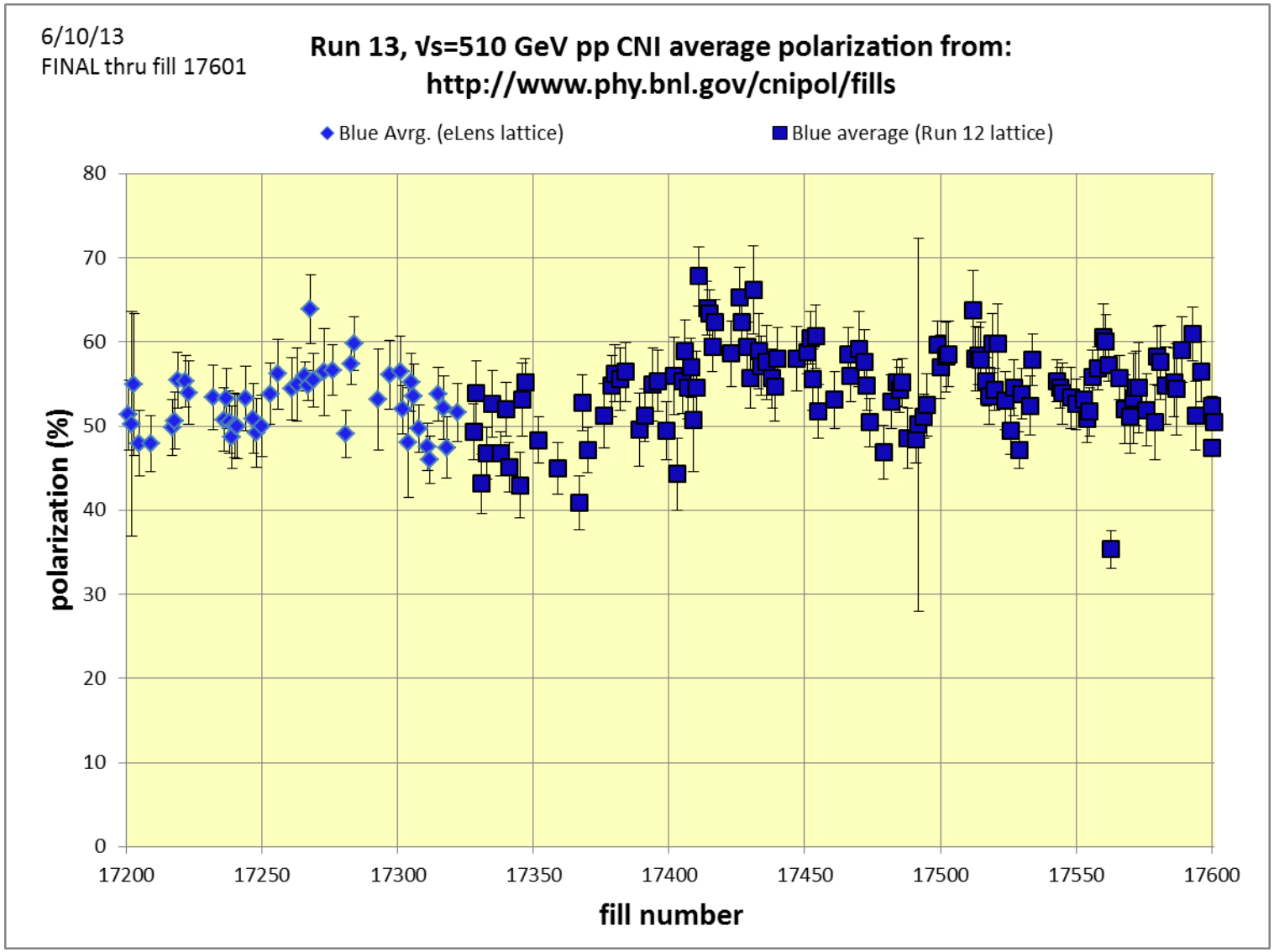
Yellow average = 52.7± 0.5%
Blue average = 53.3± 0.5%
Average = 53.0%
stores 17201-17322 (eLens lattice)

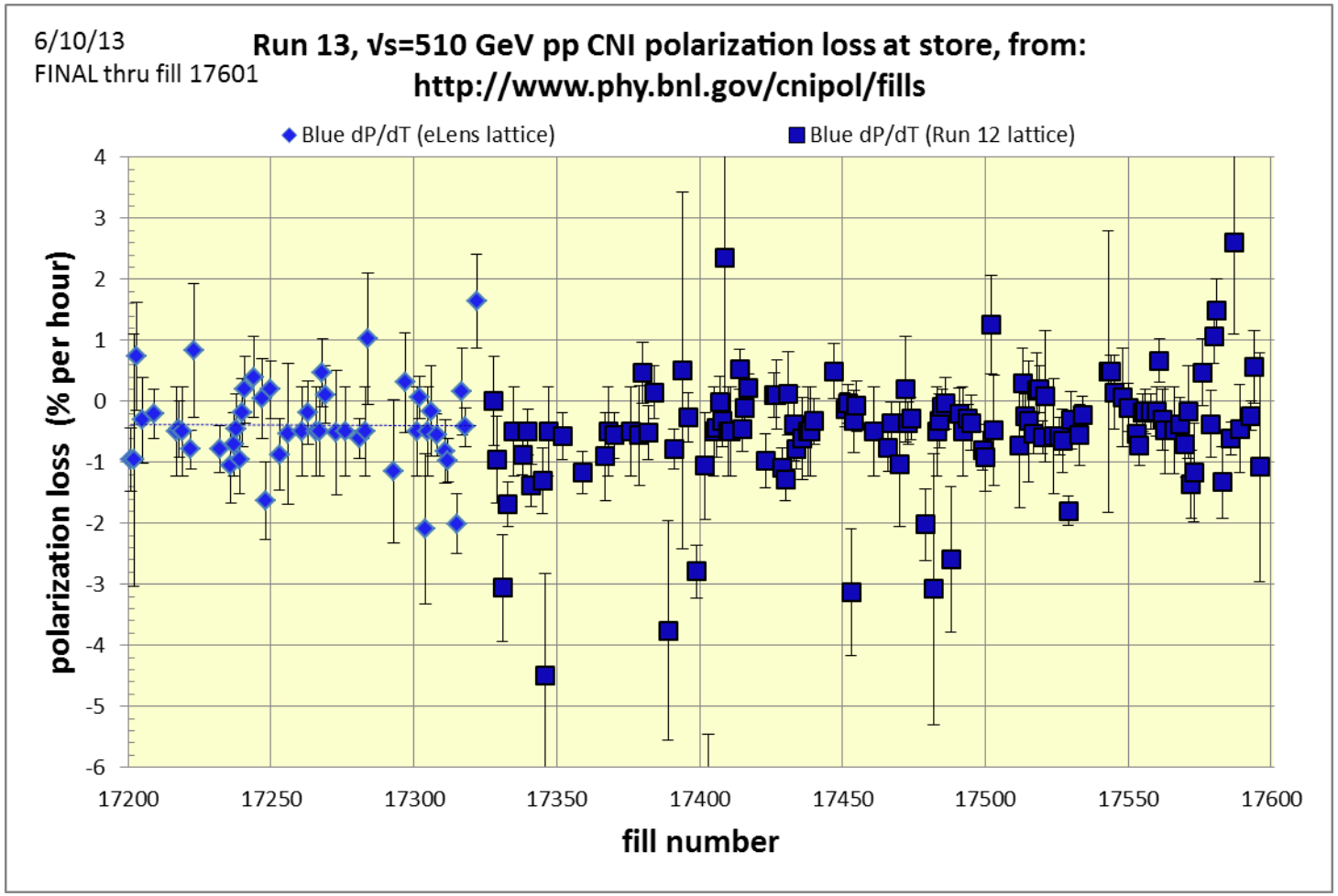
Yellow average = 55.0 ± 0.2%
Blue average = 52.8 ± 0.3%
Average = 53.9%
stores 17328-17601 (Run 12 lattice)

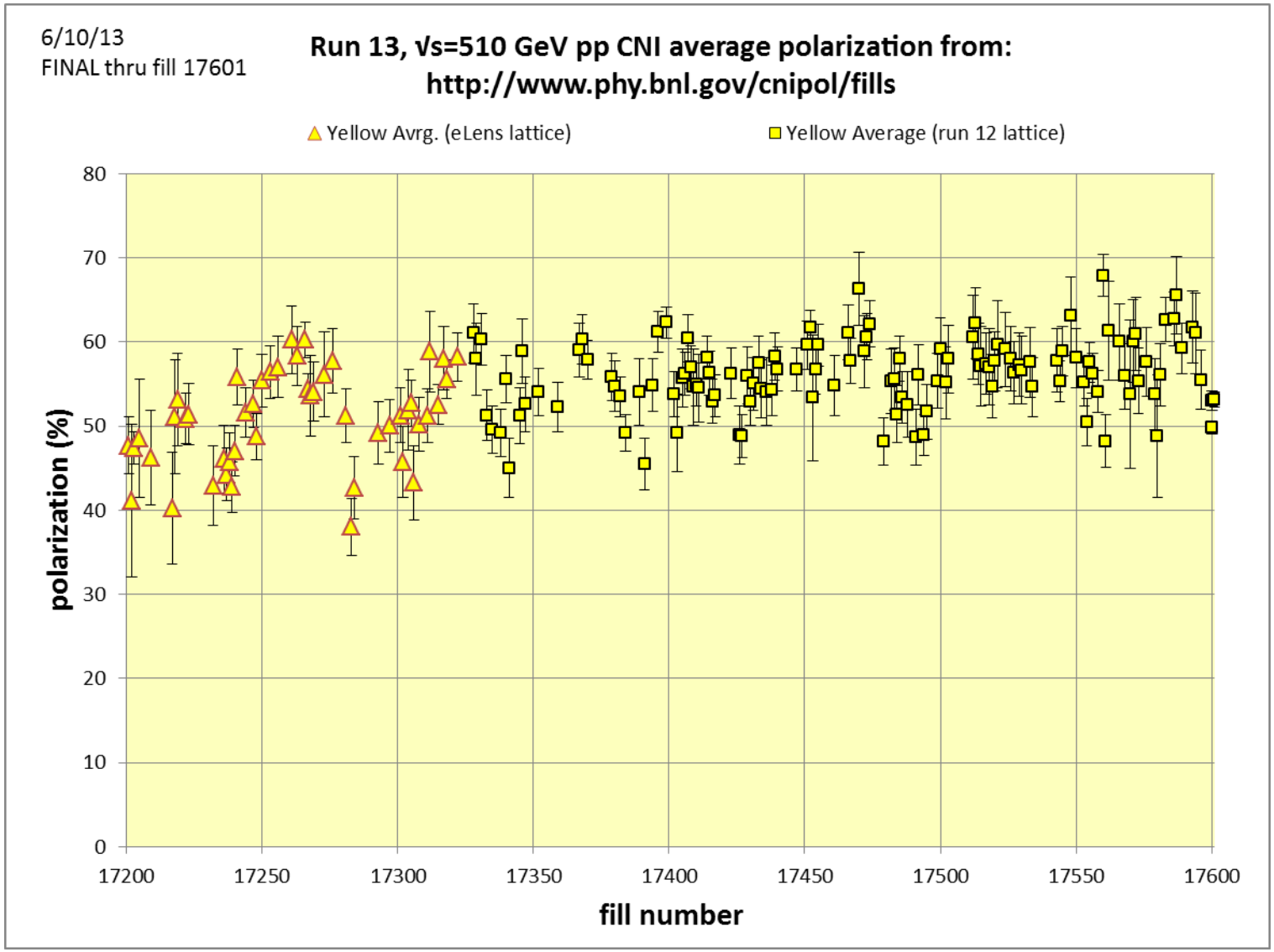
Average for all fills: Blue = 52.9% +/- 0.2%, Yellow = 54.5% +/- 0.2%

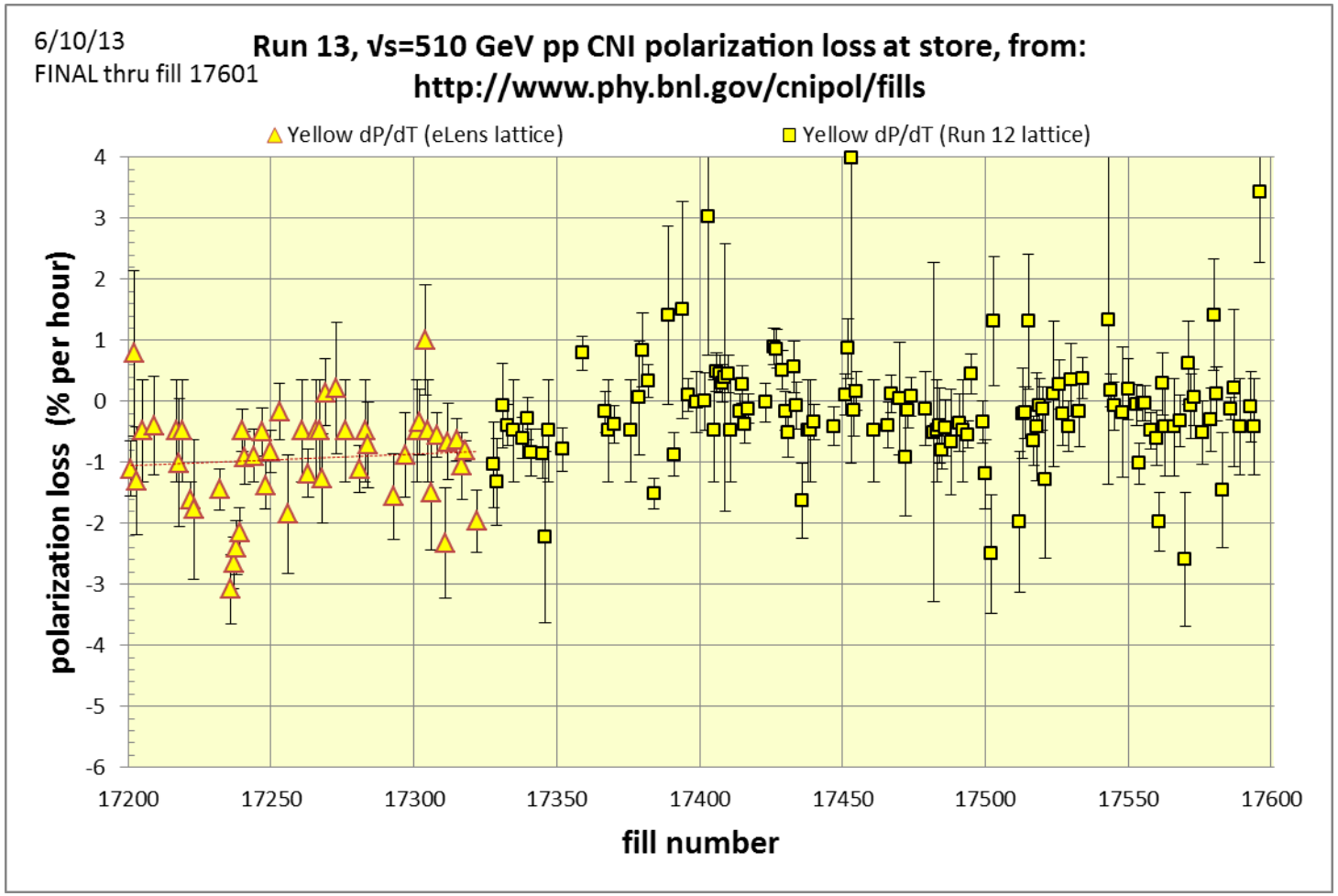



6/10/13
FINAL thru fill 17601
Run 13, √s=510 GeV pp CNI polarization loss at store, from:
http://www.phy.bnl.gov/cnipol/fills
Blue dP/dT (eLens lattice)
Yellow dP/dT (eLens lattice)
Blue dP/dT (Run 12 lattice)
Yellow dP/dT (Run 12 lattice)
polarization loss (% per hour)
4
3
2
1
0
-1
-2
-3
-4
-5
-6
17200
17250
17300
17350
17400
17450
17500
17550
17600
fill number

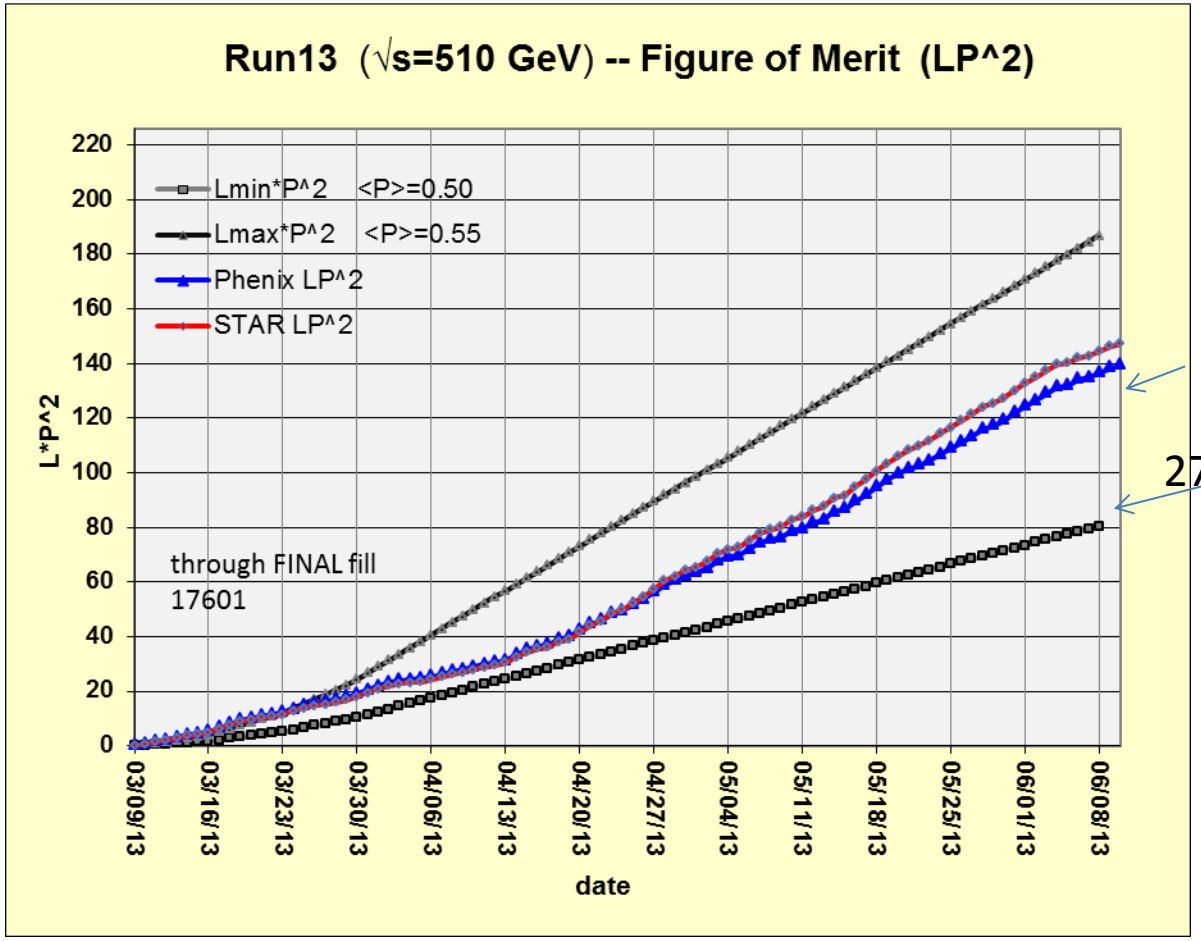

6/10/13
FINAL thru fill 17601
Run 13, √s=510 GeV pp CNI average polarization from:
http://www.phy.bnl.gov/cnipol/fills
Blue Avrg. (eLens lattice)
Blue average (Run 12 lattice)
polarization (%)
0
10
20
30
40
50
60
70
80
17200
17250
17300
17350
17400
17450
17500
17550
17600
fill number


6/10/13
FINAL thru fill 17601
Run 13, √s=510 GeV pp CNI polarization loss at store, from:
http://www.phy.bnl.gov/cnipol/fills
Blue dP/dT (eLens lattice)
Blue dP/dT (Run 12 lattice)
polarization loss (% per hour)
4
3
2
1
0
-1
-2
-3
-4
-5
-6
17200
17250
17300
17350
17400
17450
17500
17550
17600
fill number


6/10/13
FINAL thru fill 17601
Run 13, √s=510 GeV pp CNI average polarization from:
http://www.phy.bnl.gov/cnipol/fills
Yellow Avrg. (eLens lattice)
Yellow Average (run 12 lattice)
polarization (%)
0
10
20
30
40
50
60
70
80
17200
17250
17300
17350
17400
17450
17500
17550
17600
fill number


6/10/13
FINAL thru fill 17601
Run 13, √s=510 GeV pp CNI polarization loss at store, from:
http://www.phy.bnl.gov/cnipol/fills
Yellow dP/dT (eLens lattice)
Yellow dP/dT (Run 12 lattice)
polarization loss (% per hour)
4
3
2
1
0
-1
-2
-3
-4
-5
-6
17200
17250
17300
17350
17400
17450
17500
17550
17600
fill number

Preliminary, with Run 13 cross sections, PHENIX and STAR ***log based singles correction***

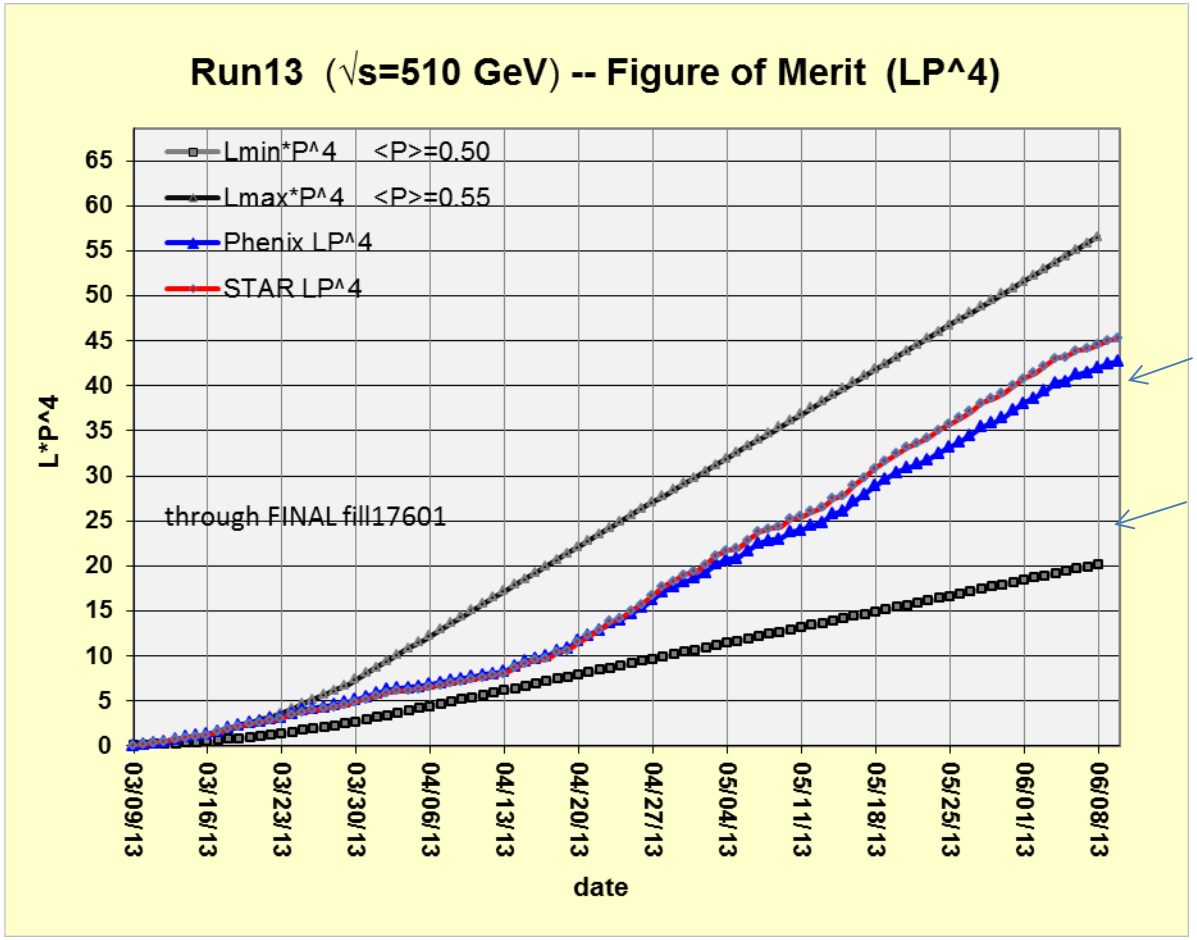


$450*(0.55)^2$

$275*(0.55)^2$

Using average polarizations from CNI polarization from http://www.phy.bnl.gov/cnipol/fills/

Preliminary, with Run 13 cross sections, PHENIX and STAR ***log based singles correction***



Using average polarizations from CNI polarization from http://www.phy.bnl.gov/cnipol/fills/

Additional Information

For Run 13 the PAC recommends the following (*in order of priority*):

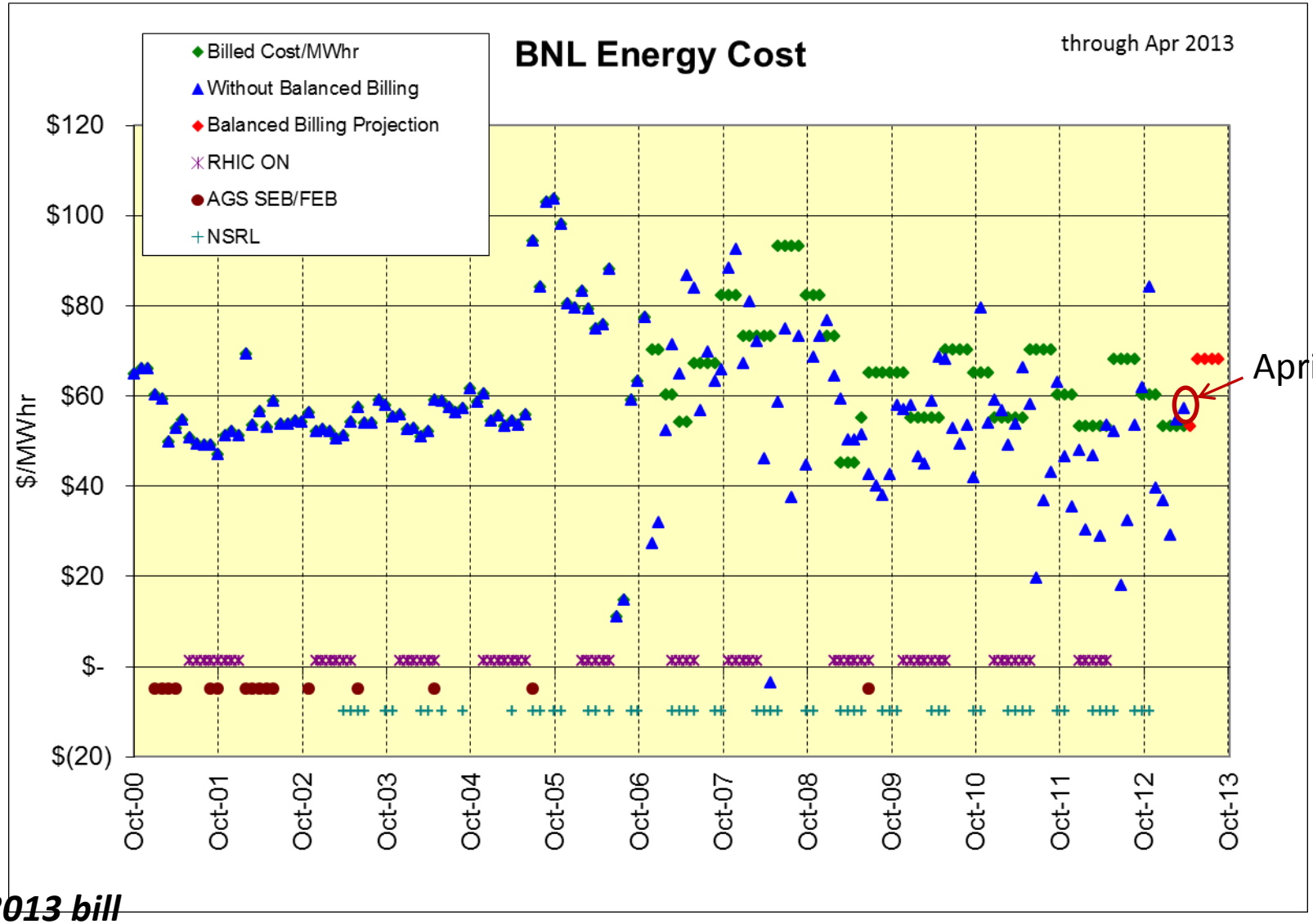
1. Running with polarized proton collisions at 500 GeV to provide an integrated luminosity of 750 pb^{-1} at an average polarization of 55%.

2. Depending on the amount of running time remaining after priority #1
   a. If less than 3 weeks remain, a week of 200 GeV Au+Au collisions.
   b. If at least 3 weeks of running time remain, 3 weeks of 15 GeV Au+Au collisions.

3. 8 days of 62 GeV p+p collisions.

4. At the discretion of the ALD, 4 days of low-luminosity running to accomplish the pp2pp goals.

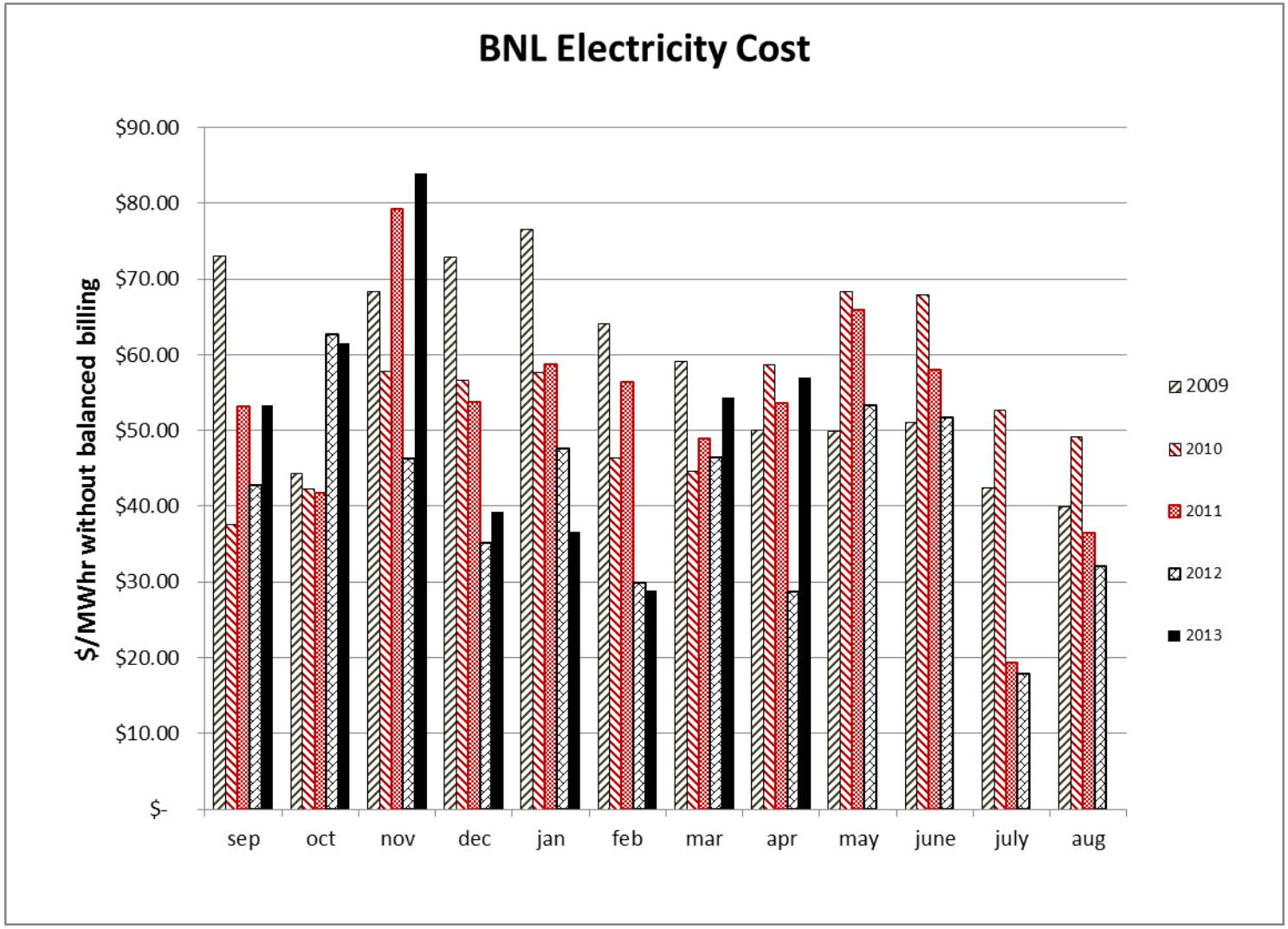
+$962,930K in BNL bank through Mar 2013 (~half should come back to CAD)



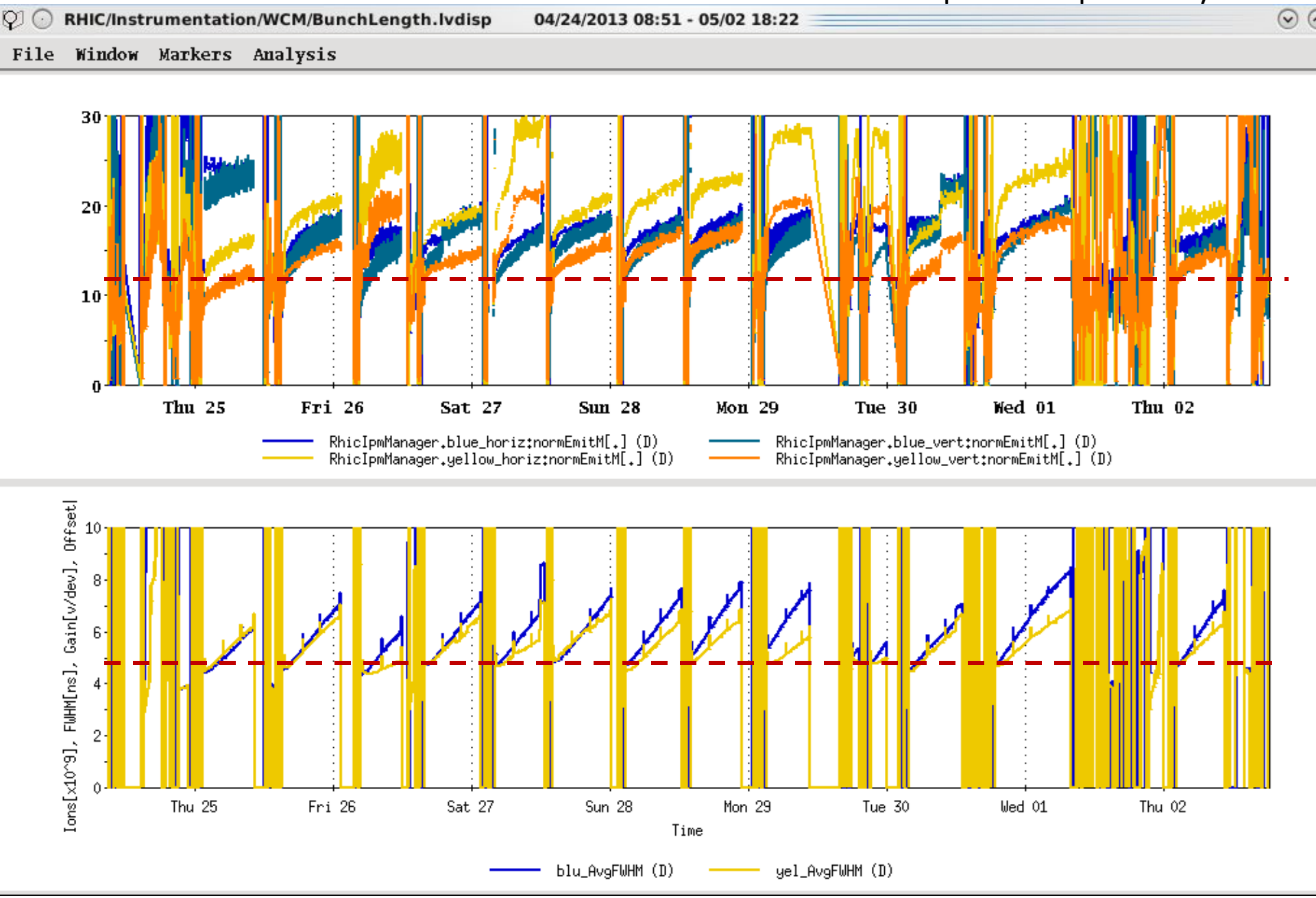
Apr 2013 bill

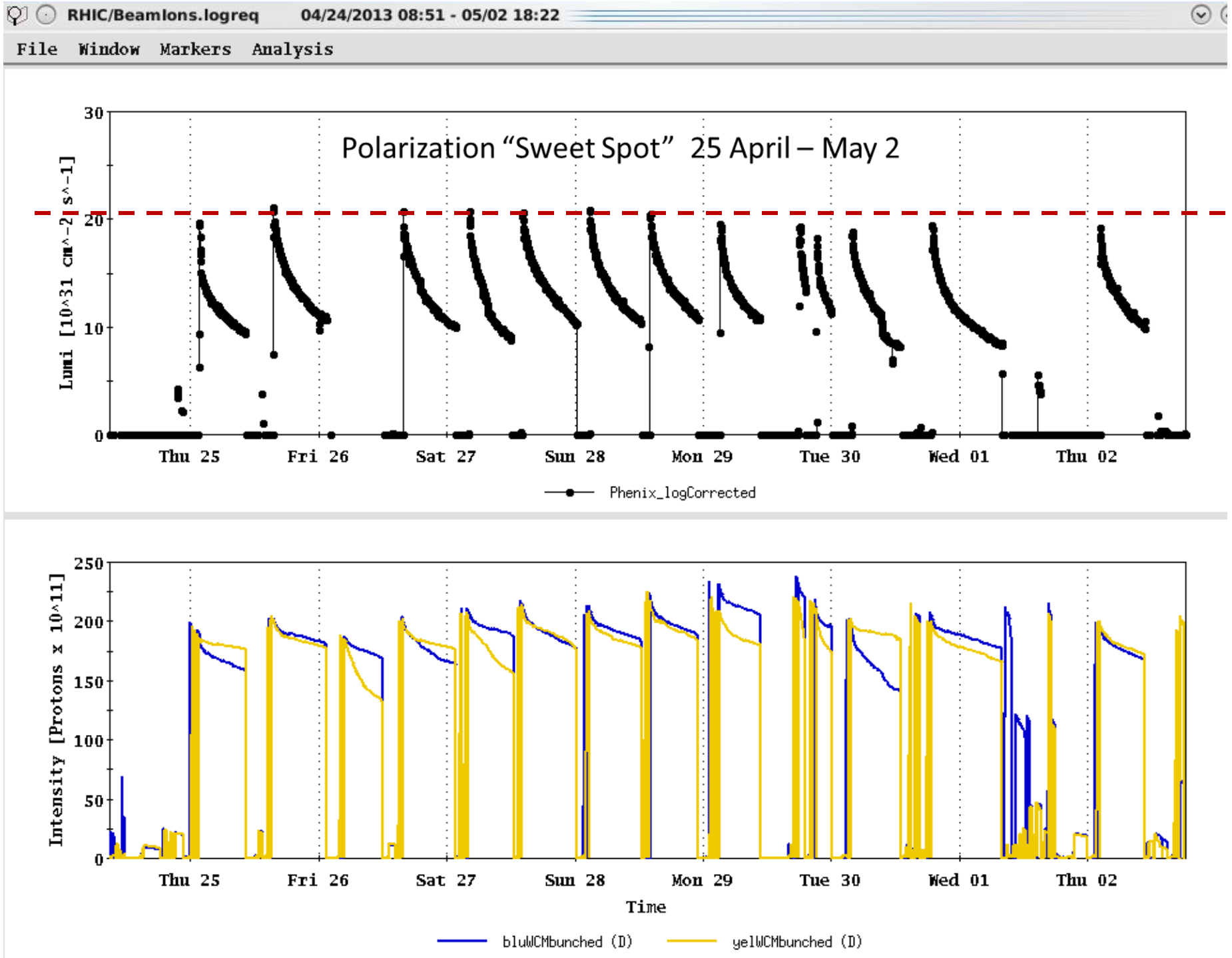
$56.92 actual

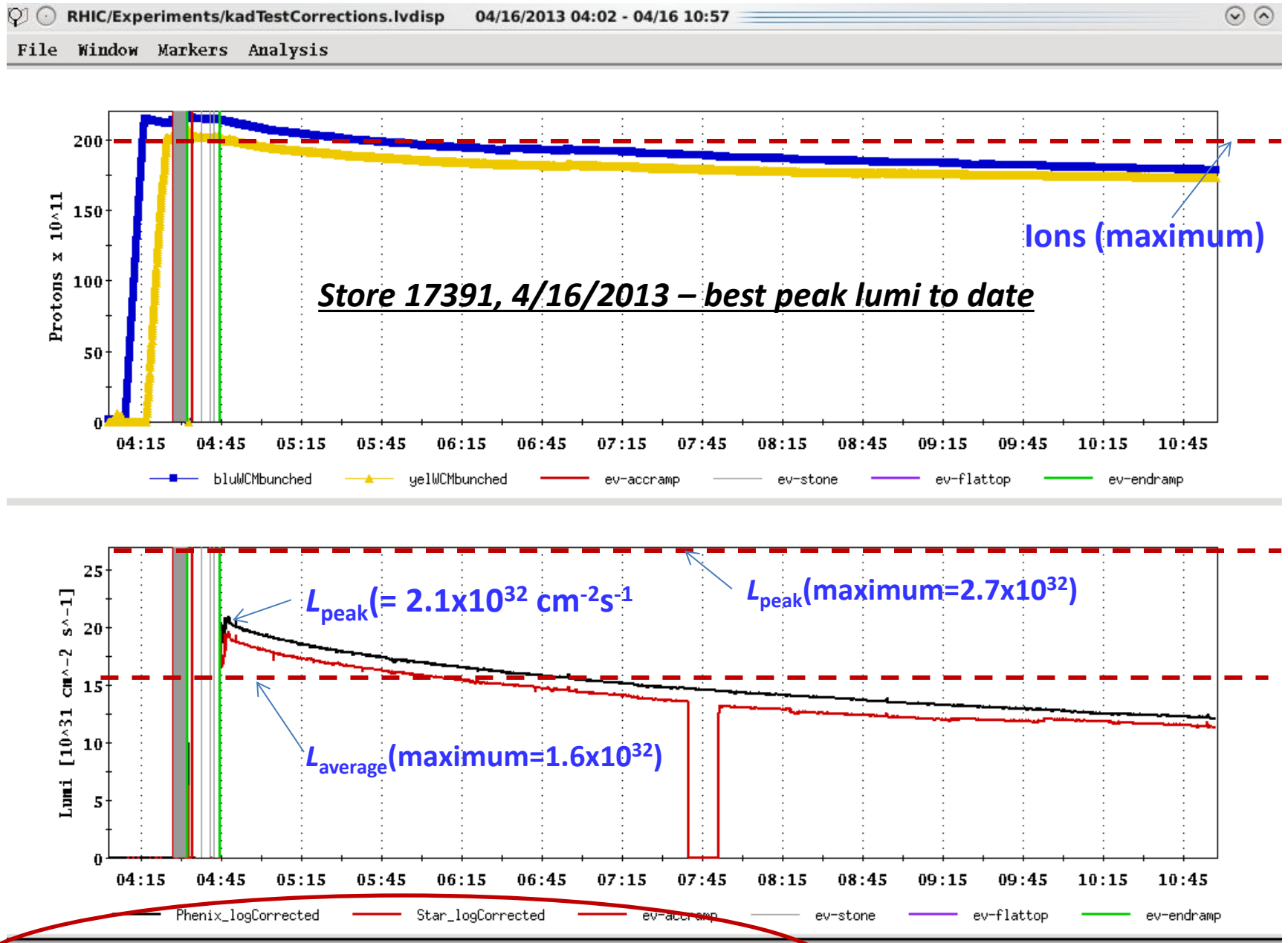
billed at $53/Mwhr

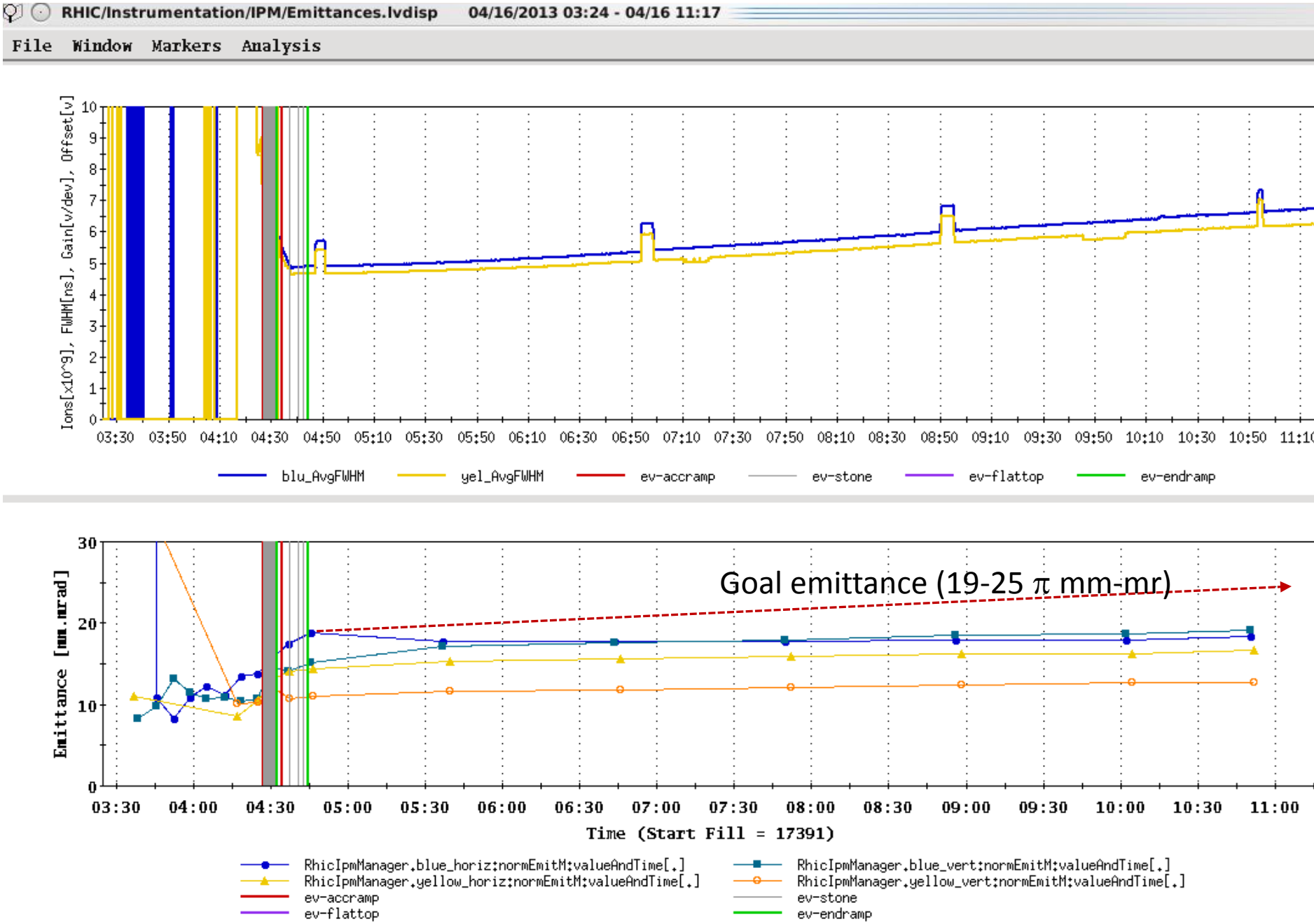

BNL Electricity Cost
$/MWhr without balanced billing
$90.00
$80.00
$70.00
$60.00
$50.00
$40.00
$30.00
$20.00
$10.00
$-
sep
oct
nov
dec
jan
feb
mar
apr
may
june
july
aug
2009
2010
2011
2012
2013

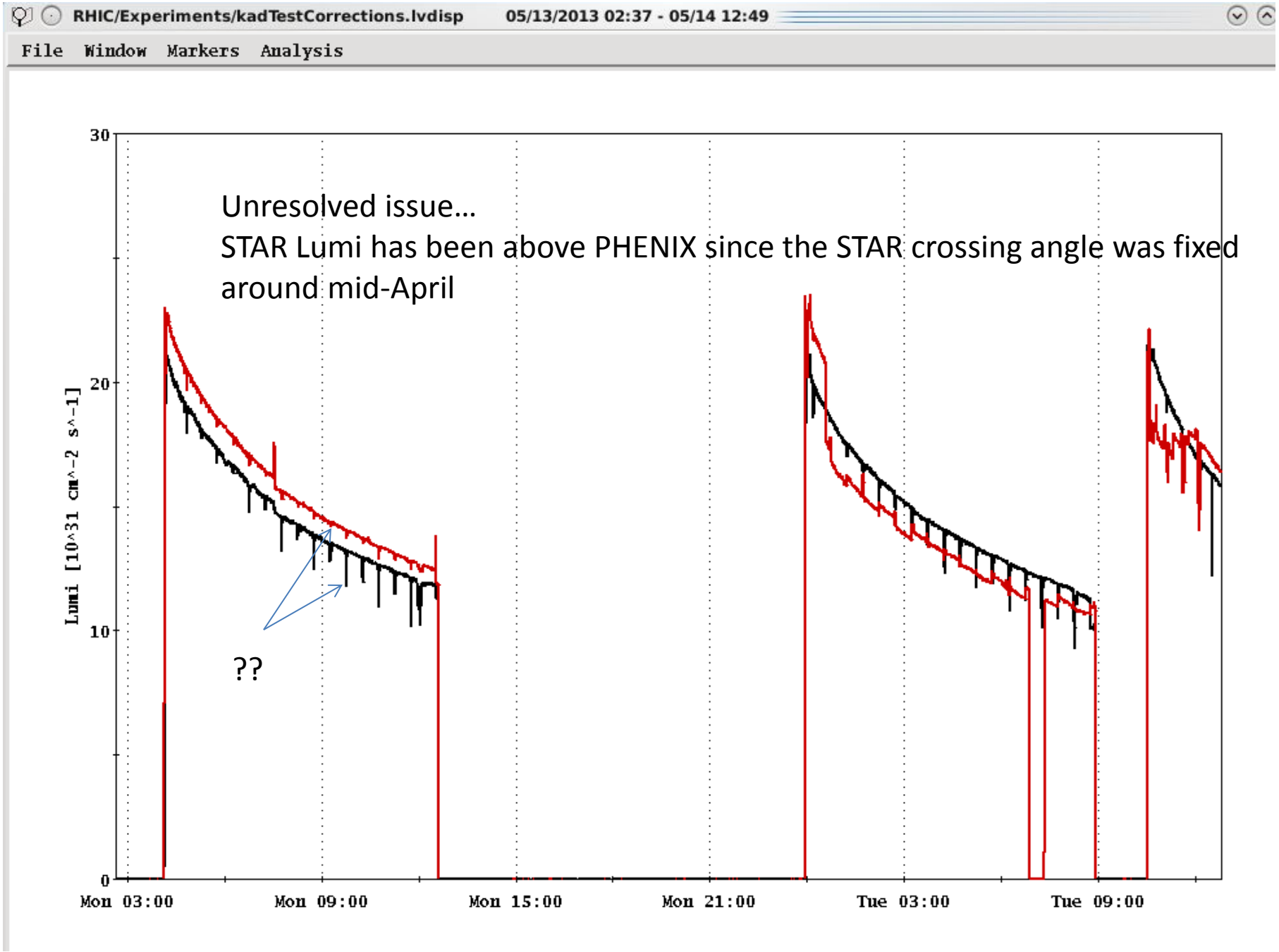
Polarization “Sweet Spot” 25 April – May 2

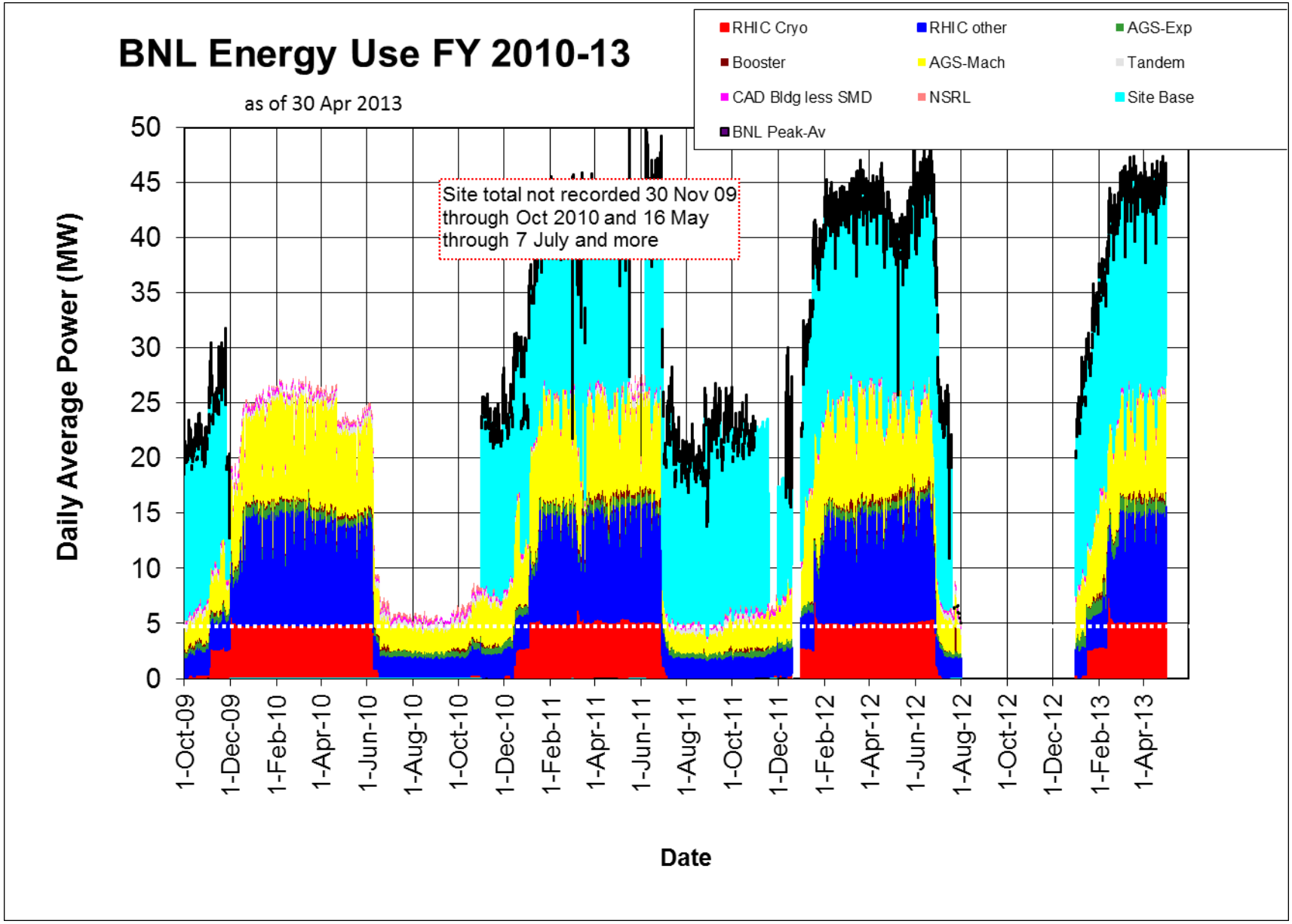


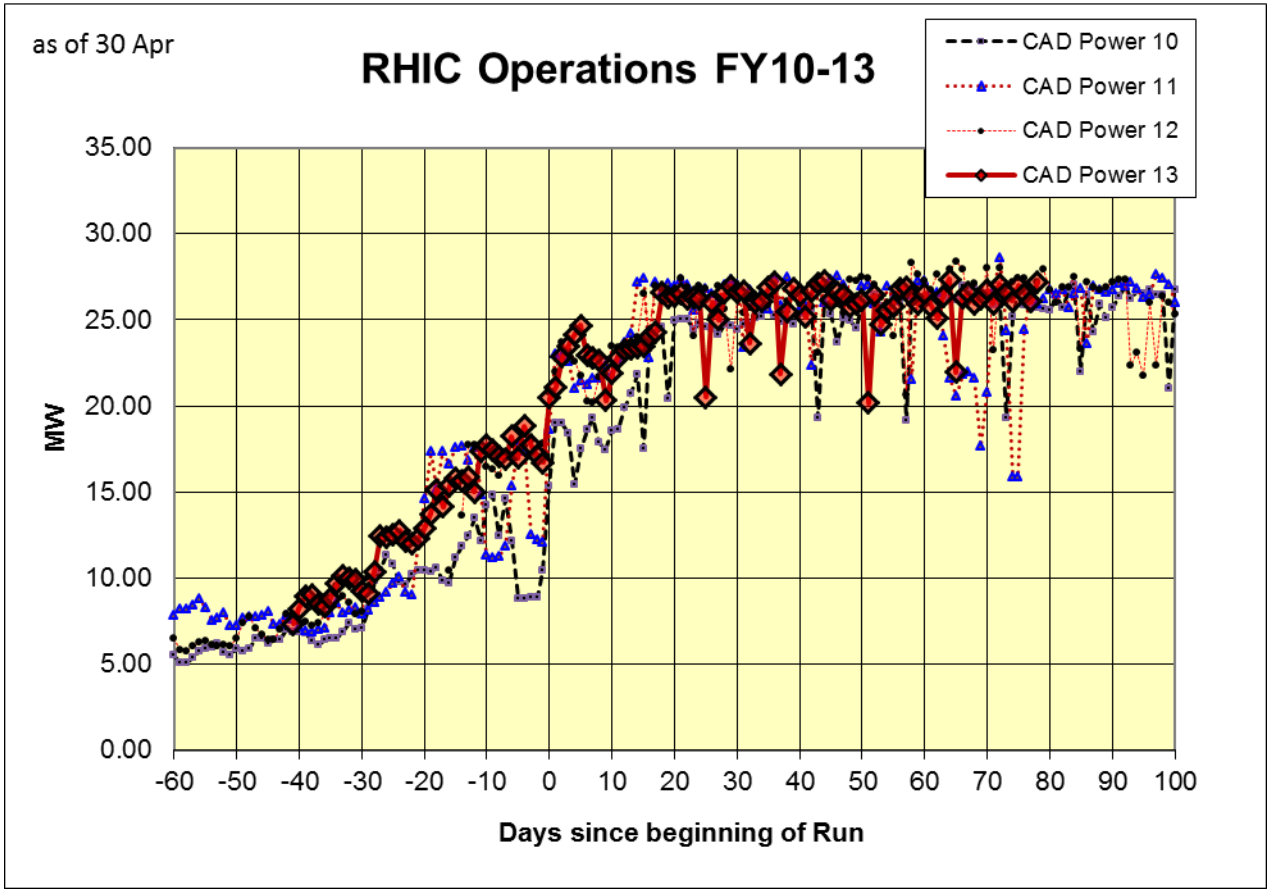

RHIC/BeamIons.logreq
04/24/2013 08:51 - 05/02 18:22
File Window Markers Analysis
Polarization "Sweet Spot" 25 April – May 2
Lumi [10^31 cm^-2 s^-1]
30
20
10
0
Thu 25
Fri 26
Sat 27
Sun 28
Mon 29
Tue 30
Wed 01
Thu 02
Phenix_logCorrected
Intensity [Protons x 10^11]
250
200
150
100
50
0
Time
blu WCMbunched (D)
yel WCMbunched (D)

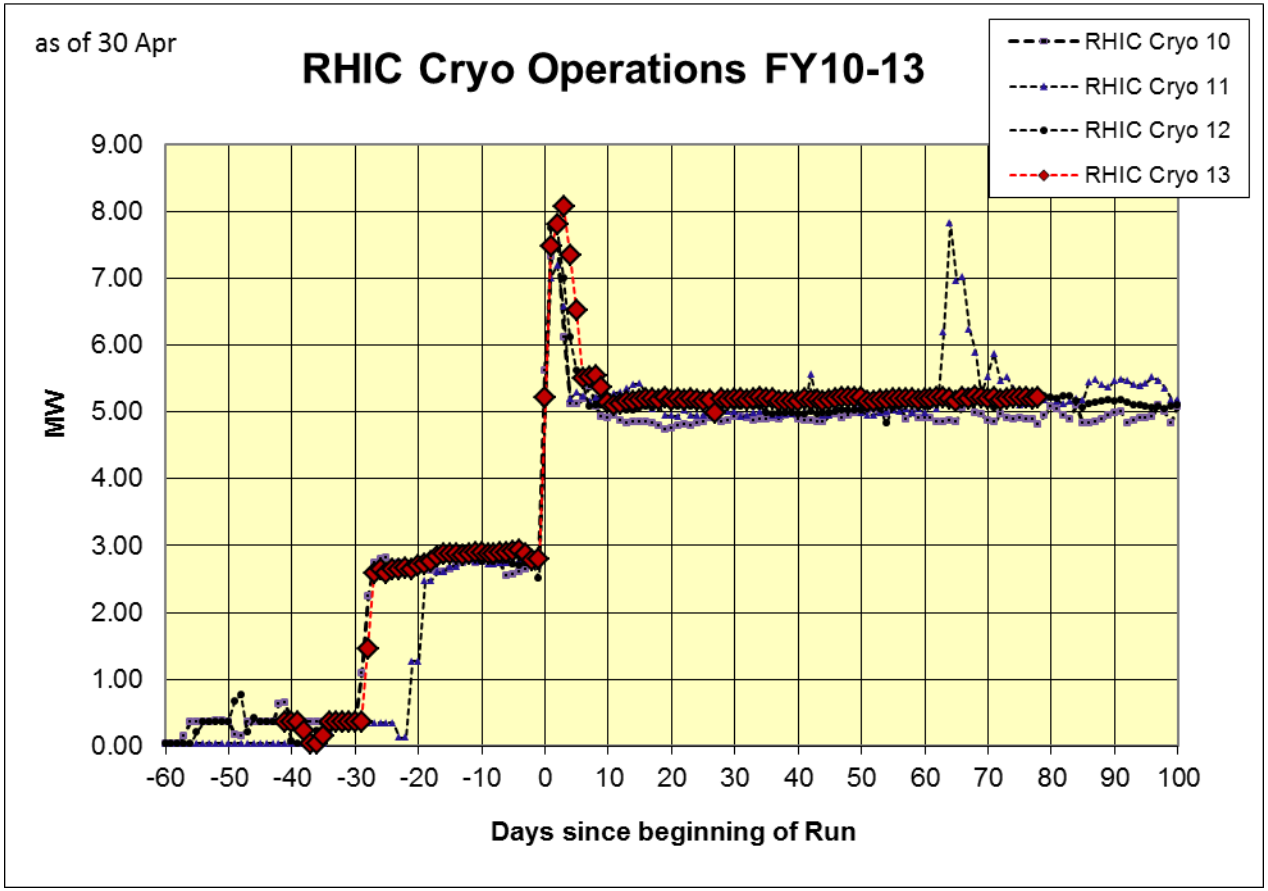

RHIC/Experiments/kadTestCorrections.lvdisp
04/16/2013 04:02 - 04/16 10:57
File Window Markers Analysis
Protons x 10^11
Ions (maximum)
Store 17391, 4/16/2013 – best peak lumi to date
bluWCMbunched
yelWCMbunched
ev-accramp
ev-stone
ev-flattop
ev-endramp
Luni [10^31 cm^-2 s^-1]
L peak (= 2.1x10^32 cm^-2 s^-1
L peak (maximum=2.7x10^32)
L average (maximum=1.6x10^32)
Phenix_logCorrected
Star_logCorrected
Time = Tue Apr 16 04:47:24 2013+0ms, bluWCMbunched = 212.643
Time = Tue Apr 16 04:47:32 2013+0ms, yelWCMbunched = 200.528
Time = Tue Apr 16 04:46:59 2013+5ms, Phenix_logCorrected = 20.7117


RHIC/Instrumentation/IPM/Emittances.lvdisp 04/16/2013 03:24 - 04/16 11:17
File Window Markers Analysis
Ions[x10^9], FWHM[ns], Gain[v/dev], Offset[v]
blu_AvgFWHM
yel_AvgFWHM
ev-accramp
ev-stone
ev-flattop
ev-endramp
Goal emittance (19-25 π mm-mr)
Emittance [mm.mrad]
Time (Start Fill = 17391)
RhicIpmManager.blue_horiz:normEmitM:valueAndTime[.]
RhicIpmManager.yellow_horiz:normEmitM:valueAndTime[.]
RhicIpmManager.blue_vert:normEmitM:valueAndTime[.]
RhicIpmManager.yellow_vert:normEmitM:valueAndTime[.]


RHIC/Experiments/kadTestCorrections.lvdisp
05/13/2013 02:37 - 05/14 12:49
File Window Markers Analysis
Unresolved issue…
STAR Lumi has been above PHENIX since the STAR crossing angle was fixed around mid-April
??
Lumi [10^31 cm^-2 s^-1]
30
20
10
0
Mon 03:00
Mon 09:00
Mon 15:00
Mon 21:00
Tue 03:00
Tue 09:00

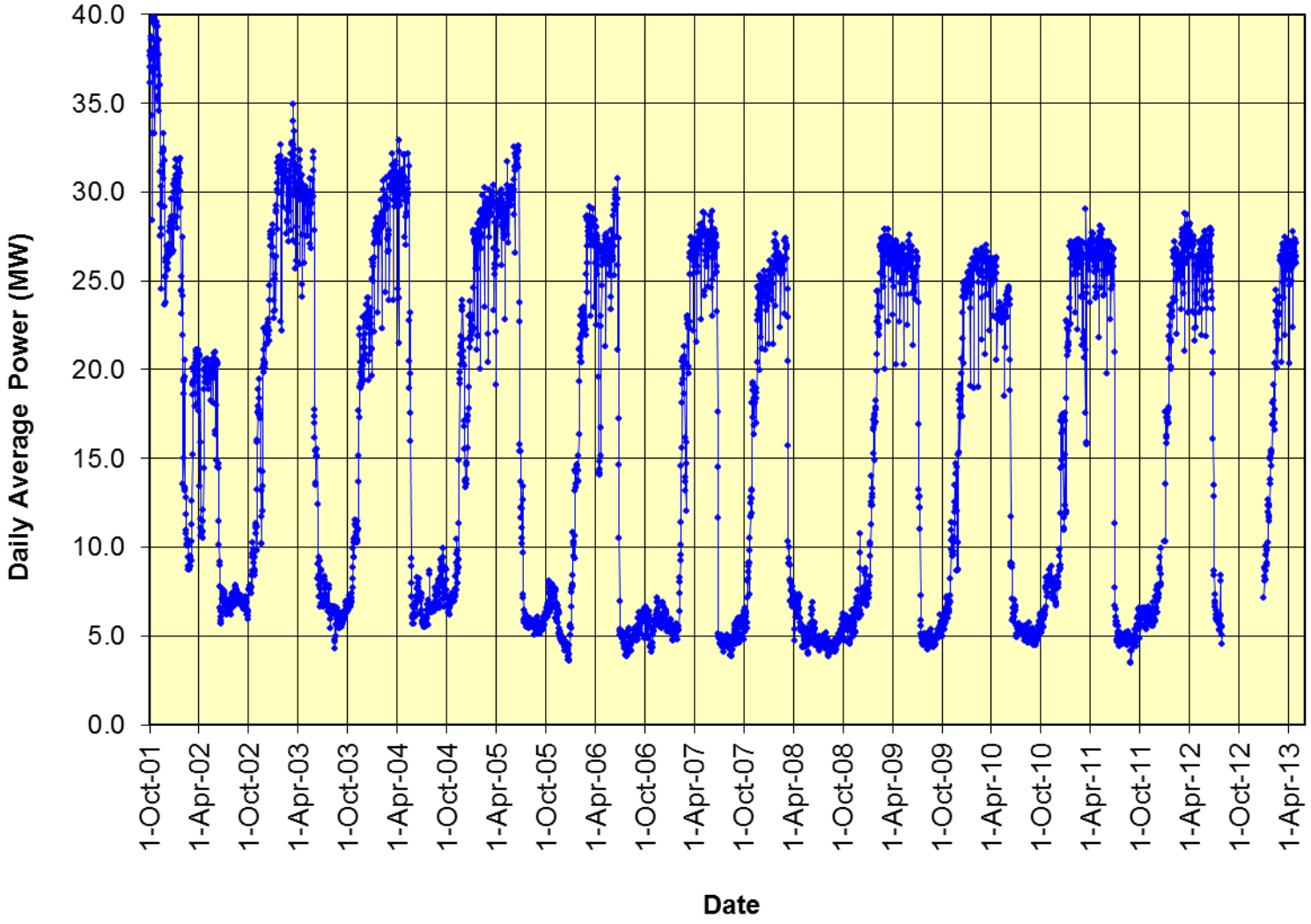

BNL Energy Use FY 2010-13
as of 30 Apr 2013
RHIC Cryo
RHIC other
AGS-Exp
Booster
AGS-Mach
Tandem
CAD Bldg less SMD
NSRL
Site Base
BNL Peak-Av
Site total not recorded 30 Nov 09 through Oct 2010 and 16 May through 7 July and more
Daily Average Power (MW)
50
45
40
35
30
25
20
15
10
5
0
1-Oct-09
1-Dec-09
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
Date


as of 30 Apr
RHIC Operations FY10-13
CAD Power 10
CAD Power 11
CAD Power 12
CAD Power 13
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
MW
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Days since beginning of Run


as of 30 Apr
RHIC Cryo Operations FY10-13
RHIC Cryo 10
RHIC Cryo 11
RHIC Cryo 12
RHIC Cryo 13
MW
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Days since beginning of Run

as of 31 Apr 2013

C-AD Energy Use FY 2002-13



Cryogenic Blue & Yellow Rings (14 days)

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

File Window Markers Analysis