

# RHIC Machine/Detector Planning Meeting

## Agenda

- **Scheduling Physicist Issues (Gardner)**
- **Experiment Issues**
  - **PHENIX (Leitch)**
  - **STAR (Christie)**
  - **Monopole (Dzhordzhadze)**
- **Machine Issues - (Drees)**
- **RHIC Beam Experiments - (Pilat)**
- **RCF Issues - (Throwe)**

# RHIC Run 7 as run/planned

- 12 Feb – cool-down begins
- 17 Feb – blue cold
- 20 Feb – 1<sup>st</sup> beam in blue ring
- 23 Feb – Initial cold wave through yellow ring, not ready for beam
- 24 Feb – cryo problems, cool-down interrupted
- 26 Feb – cryo problems persist, begin warming up cryo plant
- 4 Mar – cryo back on
- 8 Mar – Blue cold again, ready for power supply setup/beam
- 12 Mar – Yellow cold, ready for power supply setup (lost 2.0 weeks)
- 13 Mar – Beam in Yellow, begin 10 day setup with beams
- 20 Mar – Begin ramp-up mode, overnight stores for experiments
- **26 Mar – 100 x 100 GeV/n AuAu Physics declared (Machine)**
- **27 Mar – PHENIX Physics declared**
- 28 Mar – 1<sup>st</sup> Maintenance day
- **3 Apr - STAR Physics declared**
- **15 May - 42 days to go!**
- 26 Jun –end physics (13.1 weeks), begin warm-up to LN2
- 30 Jun – RHIC Cryo switch to LN2 complete, end 19.7 weeks of cryo operation

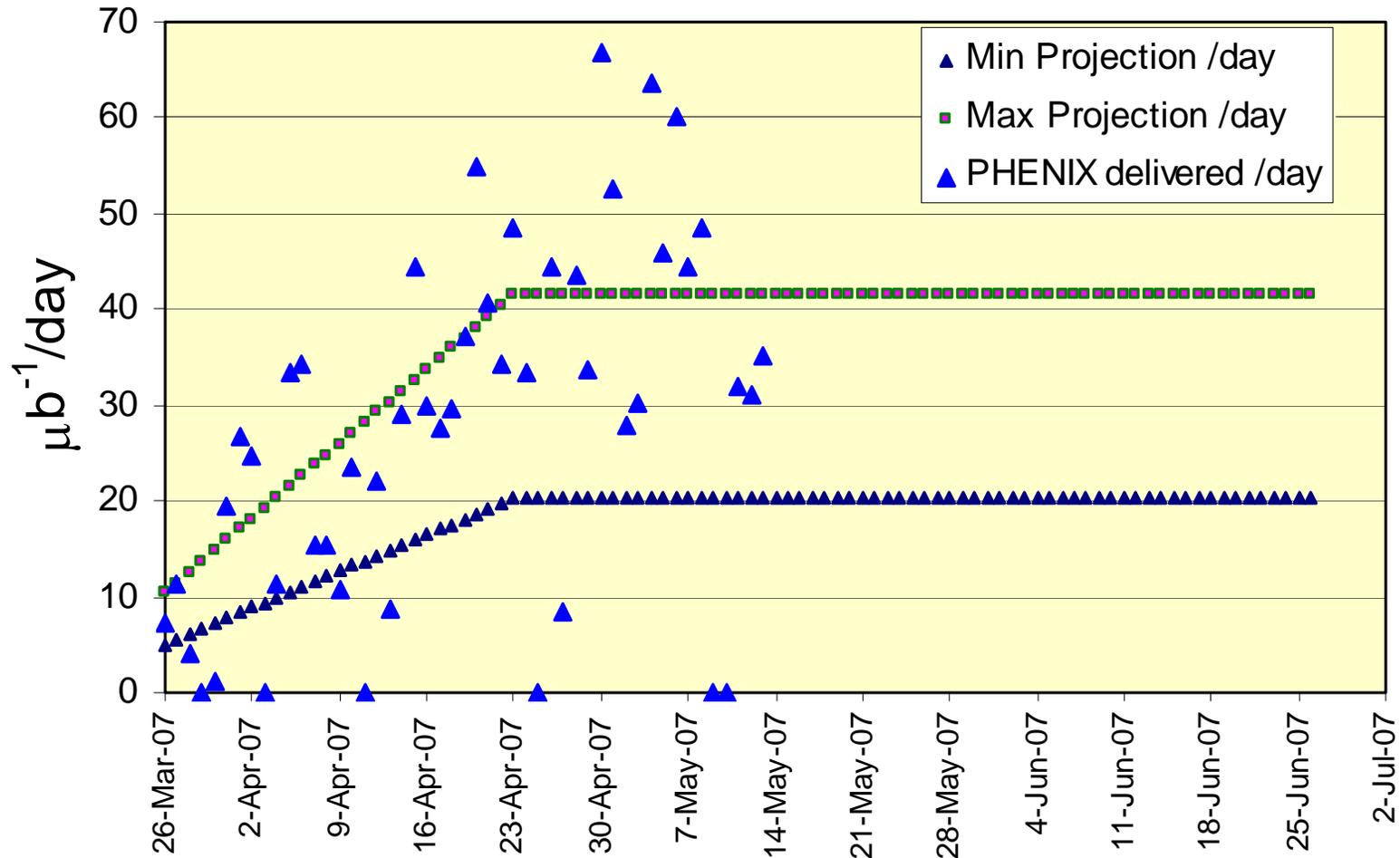
Revised 10 May

## Experiments luminosity goals for the Au-Au run

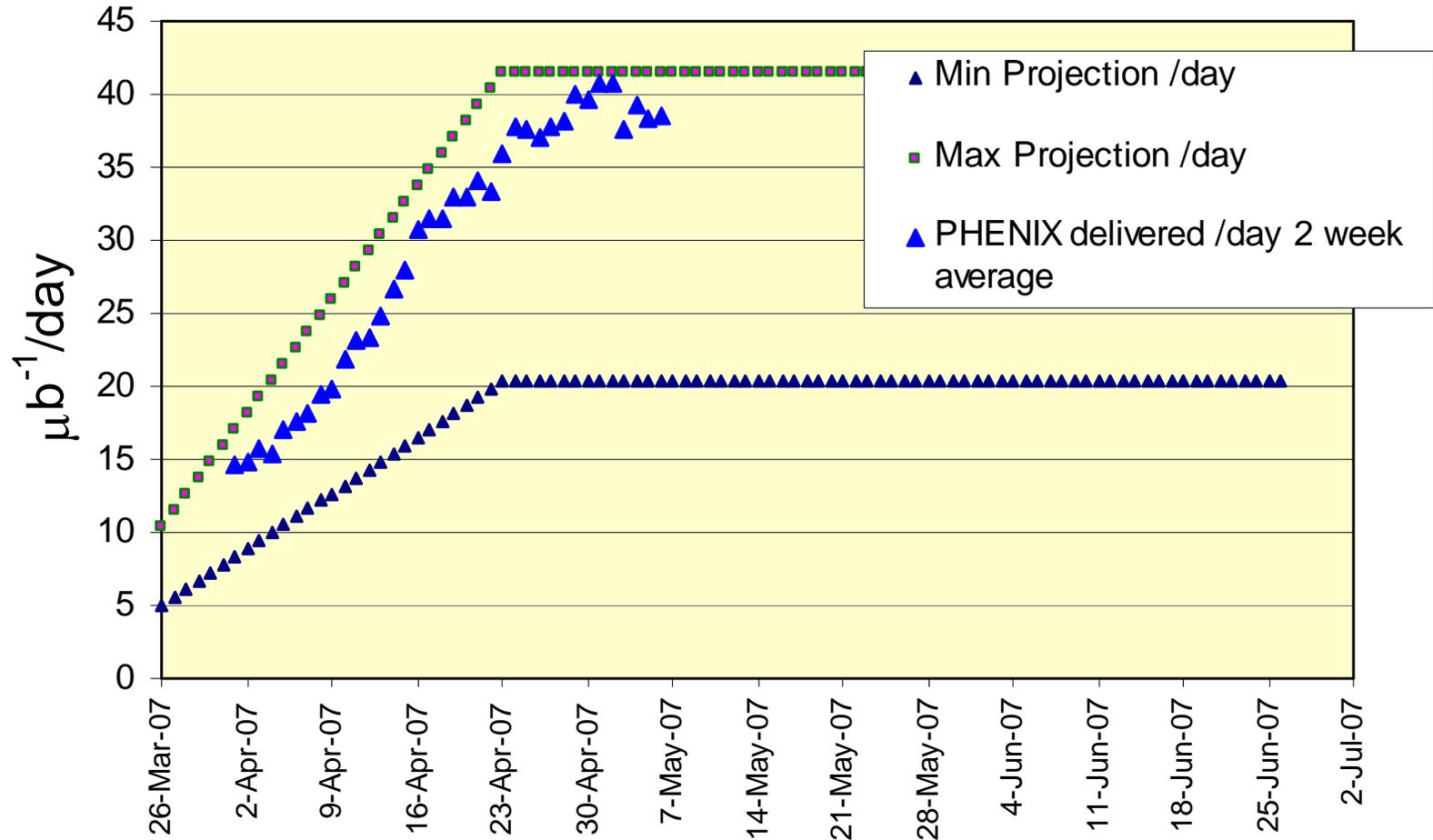
- **PHENIX goals for 100 x 100 GeV/n Au-Au**
  - Delivered Luminosity = **4000**  $\mu\text{b}^{-1}$  (was 2700)
  - Sampled Luminosity = 1100  $\mu\text{b}^{-1}$
  - Overall sampling efficiency = **28.9%** (based on 4/29-5/5 stores)
  
- **STAR goals for 100 x 100 GeV/n Au-Au**
  - Delivered Luminosity = **2800**  $\mu\text{b}^{-1}$  (was 1800)
  - Rare Trigger Sampled Luminosity = **600**  $\mu\text{b}^{-1}$  (was 300)
  - Minimum Bias Triggers = 60M
  - Overall sampling efficiency for rare triggers = **24%** (based on 5/3-5/8 stores)

as of 5/13/07

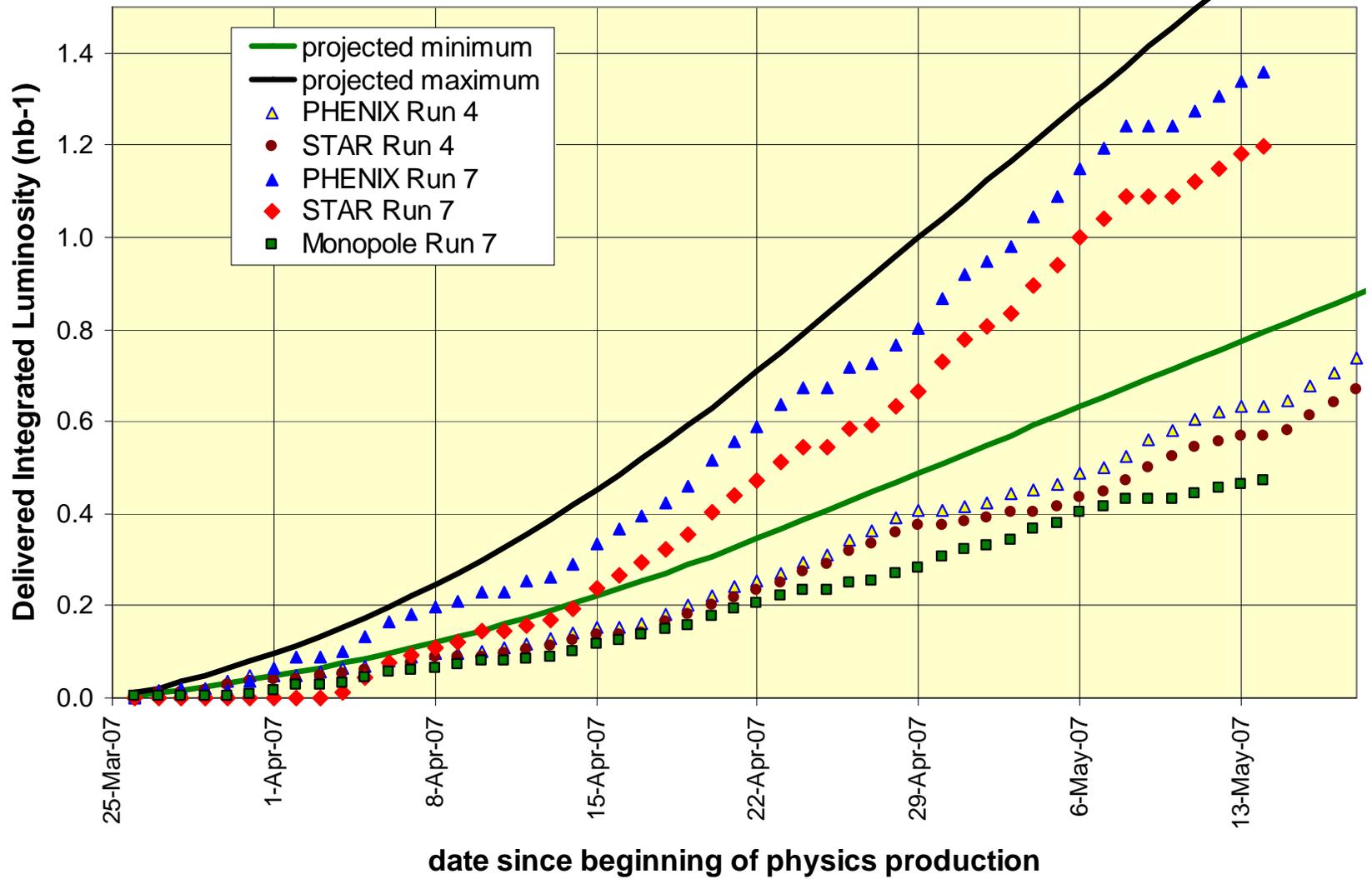
## Run 7 100 x 100 GeV/n AuAu Delivered Luminosity per day



### Run 7 100 x 100 GeV/n AuAu Delivered Luminosity per day averaged over 2 weeks

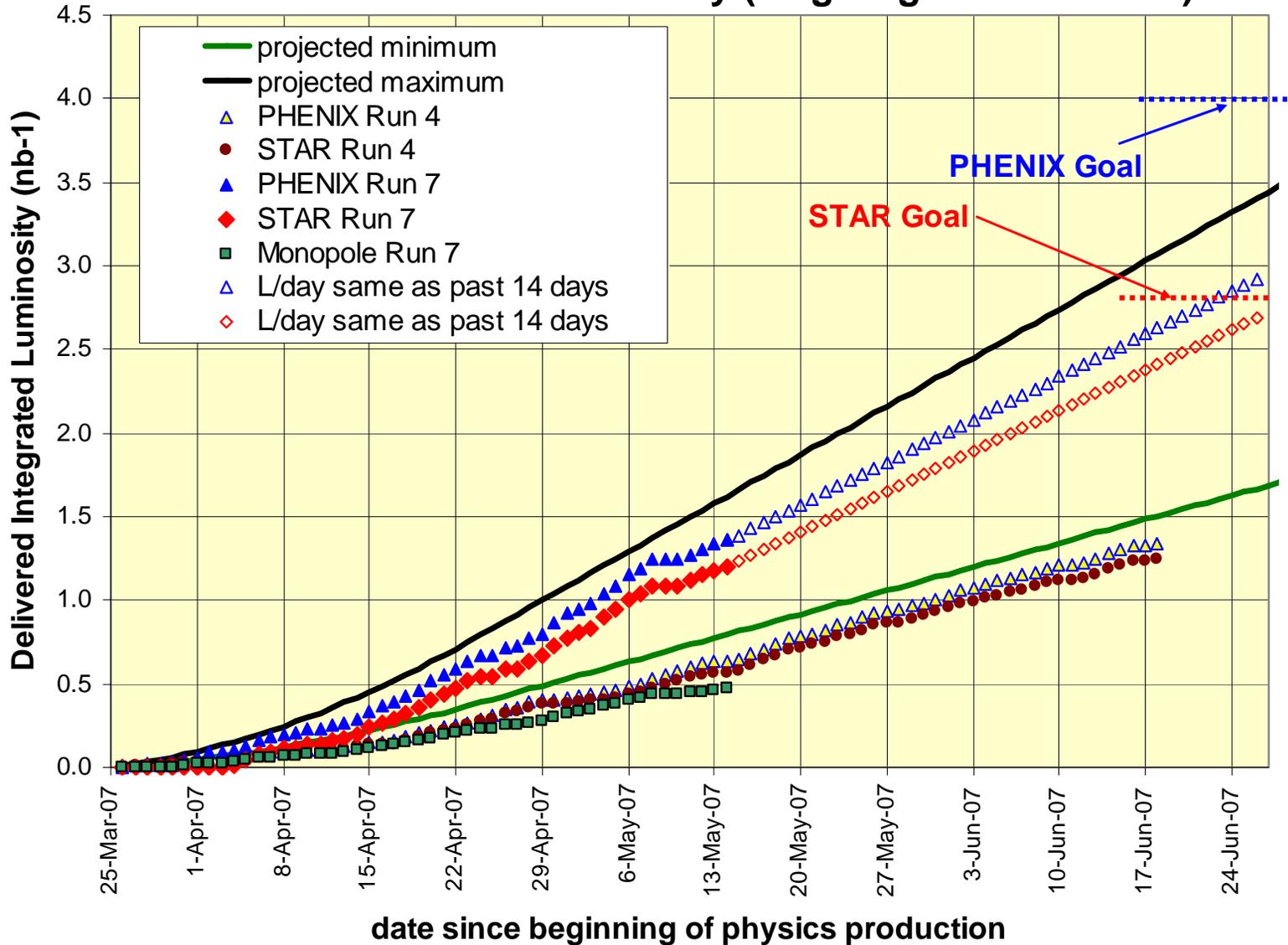


### Run 7 100 GeV/n Au-Au Luminosity



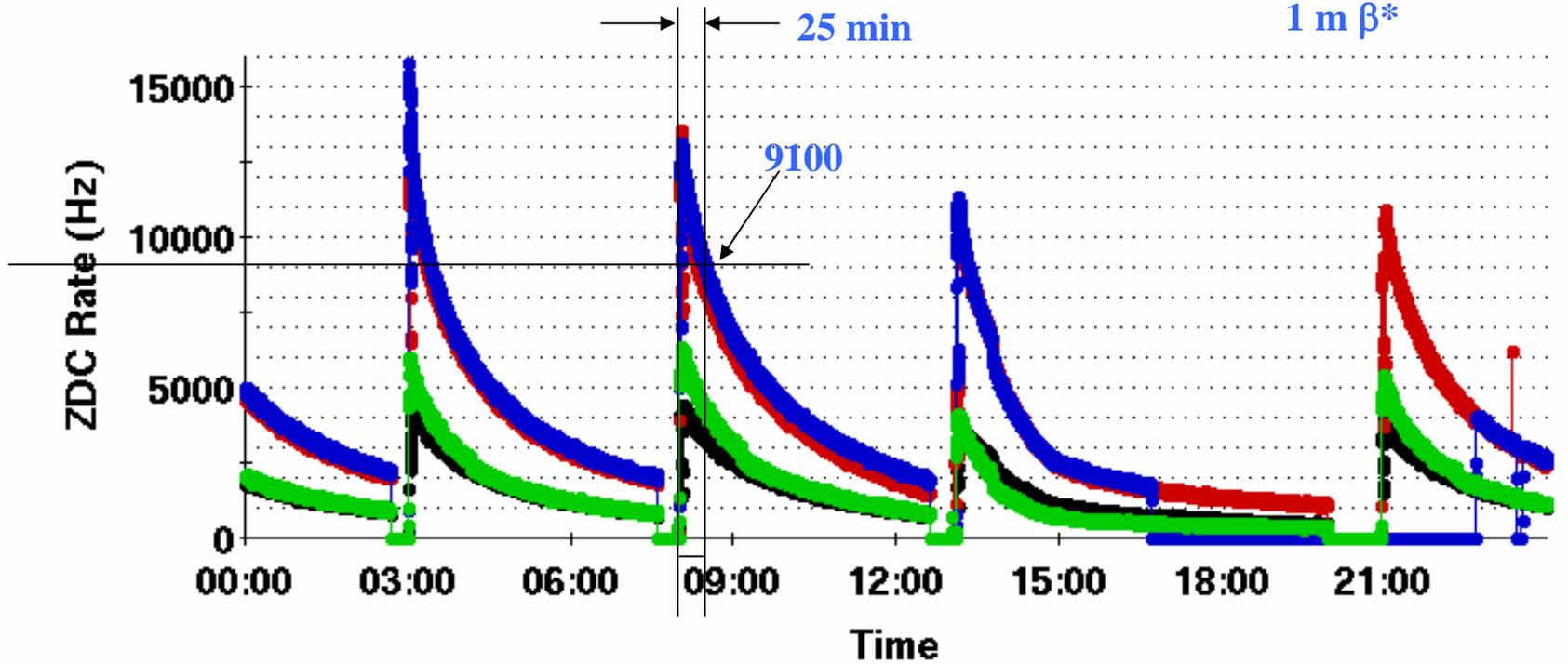
as of 5/14/07

### Run 7 100 GeV/n Au-Au Luminosity (singles/goals corrected)



RHIC Luminosity Sun Mar 21 23:59:57 2004

45 x 45 bunches  
1 m  $\beta^*$

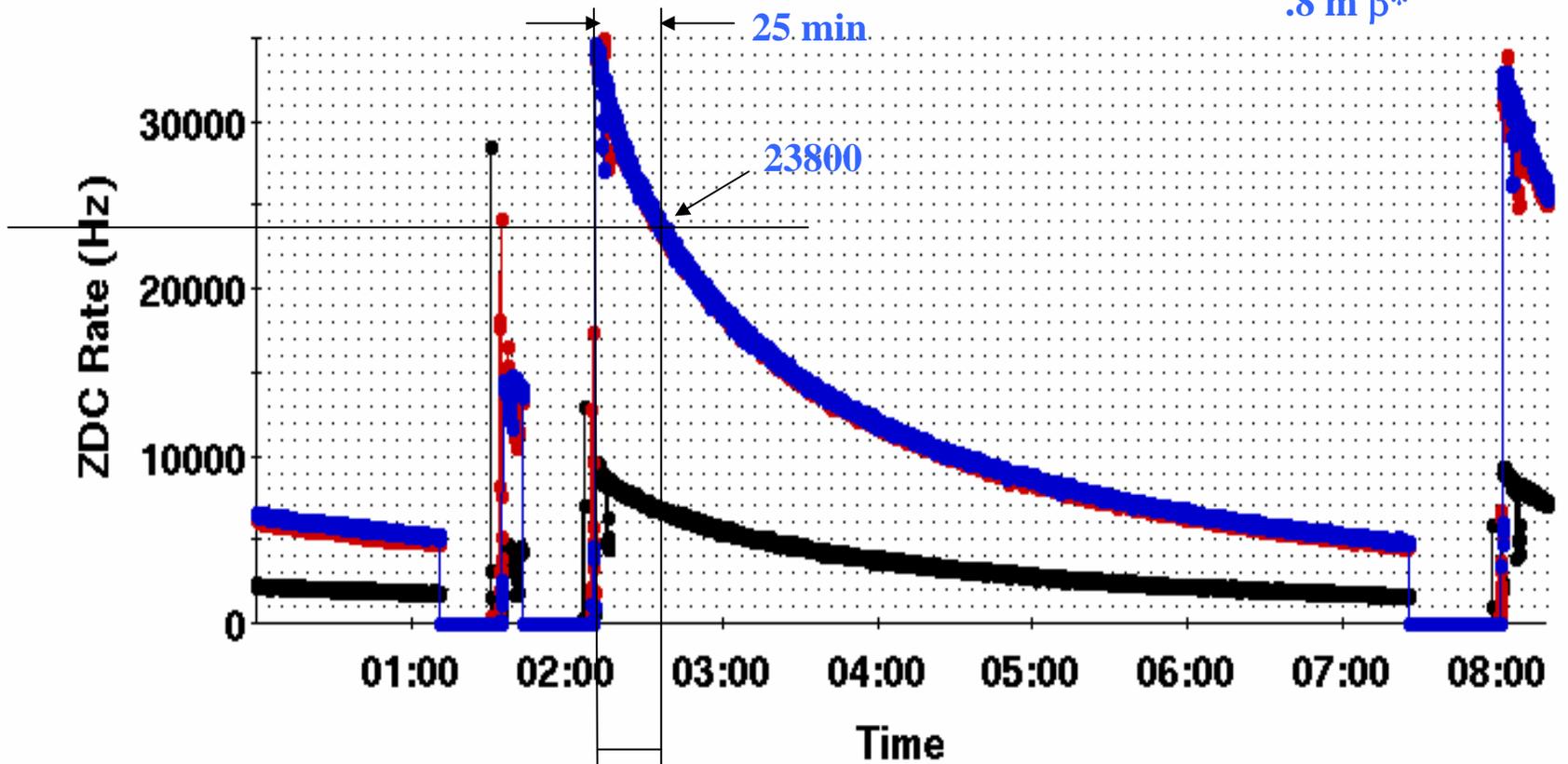


—●— BRAHMS..ZDC.  
—●— PHENIX..ZDC.

—●— STAR..ZDC.  
—●— PHOBOS..ZDC.

RHIC Luminosity Tue May 15 08:18:47 2007

103 x 103 bunches  
.8 m  $\beta^*$

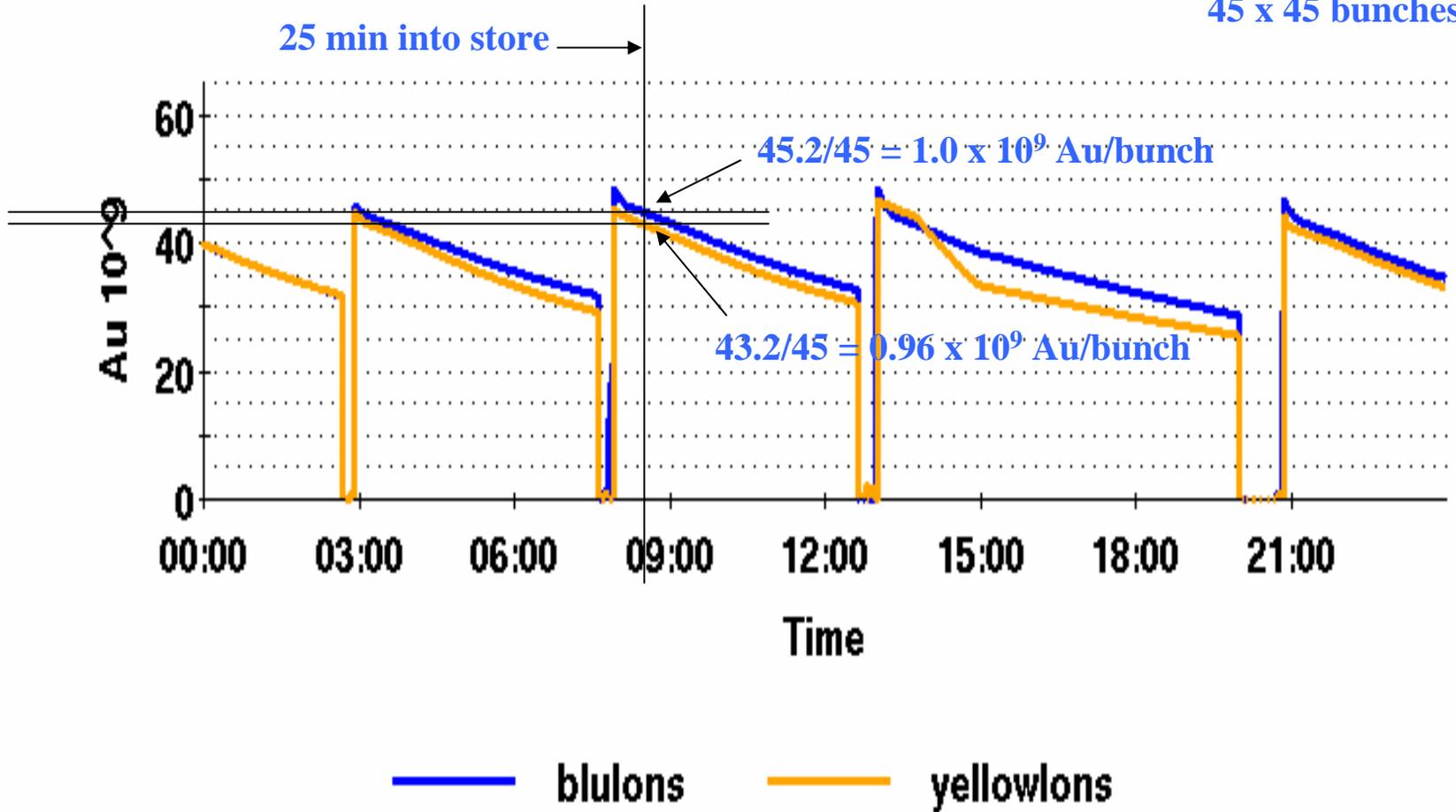


—●— BRAHMS..ZDC.      —●— STAR..ZDC.      —●— PHENIX..ZDC.

# RHIC Beam Intensity Sun Mar 21 23:58:58 2004

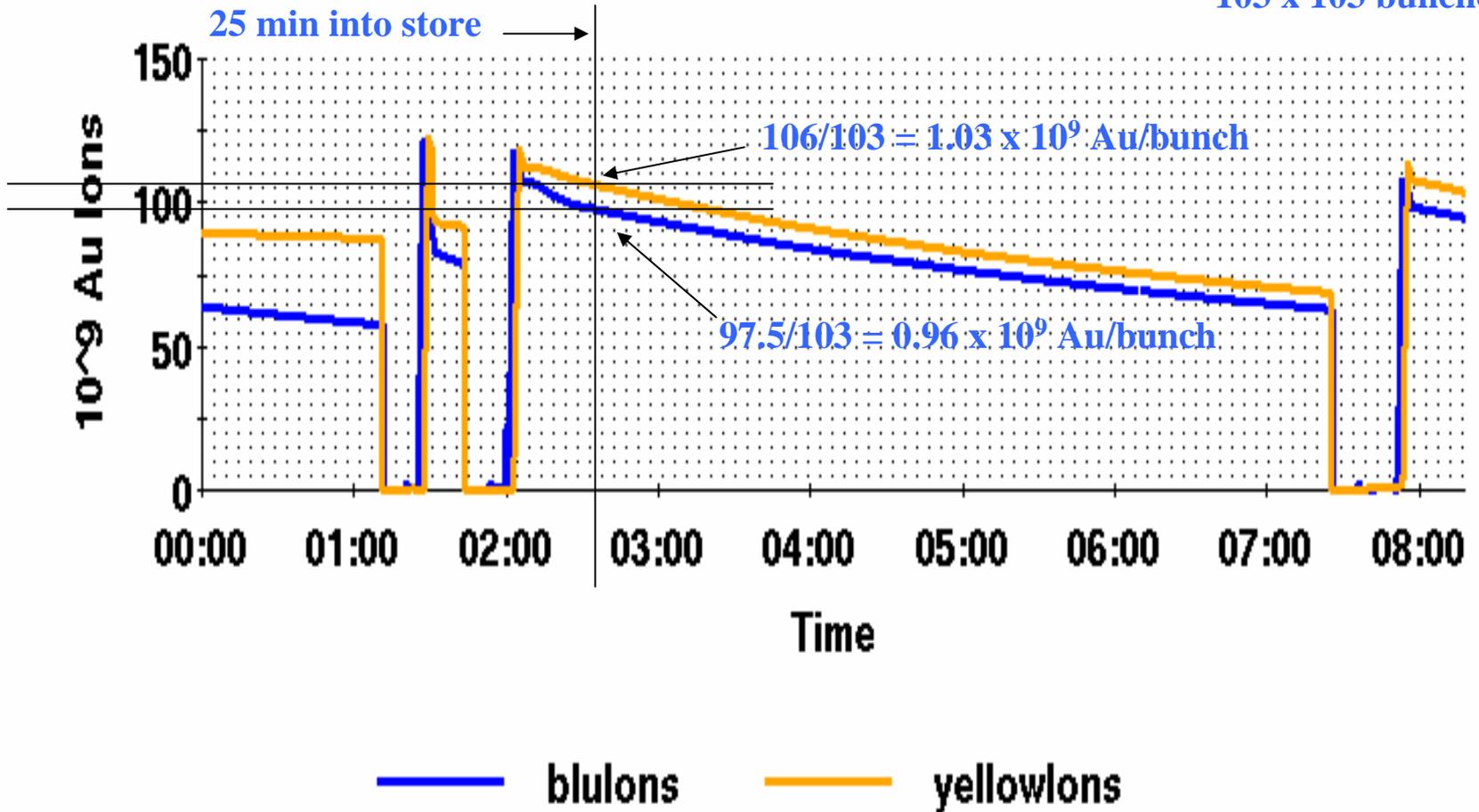
45 x 45 bunches

25 min into store →



# RHIC Beam Intensity Tue May 15 08:18:29 2007

103 x 103 bunches



# For discussion

5/15/07

(revisited – parameters taken ~ 25 minutes into the store)

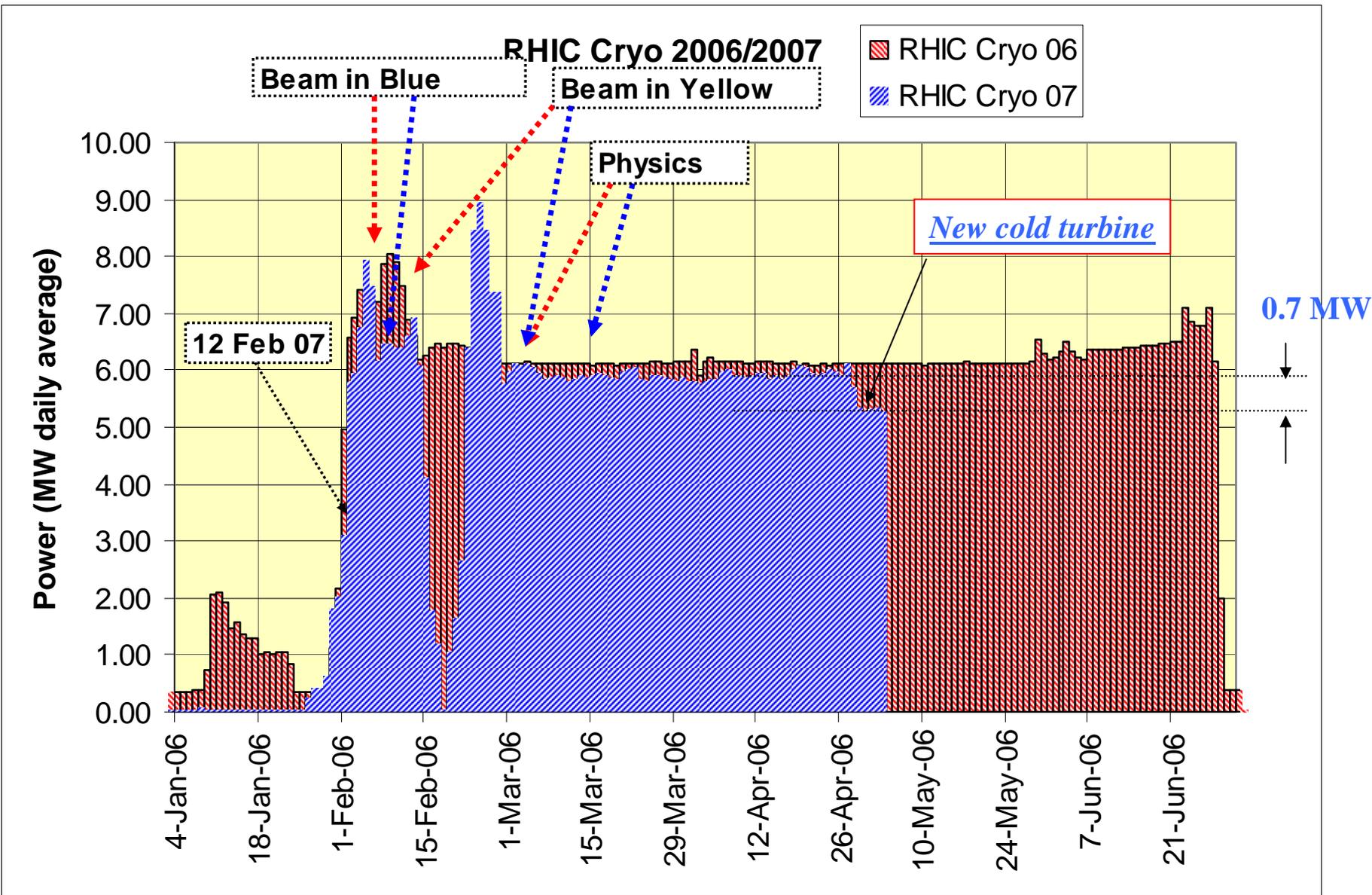
	<u>Run4 (21 Mar 04)</u>	<u>Run7 (15 May 07)</u>
<b>ZDC (initial Hz)</b>	9,100	23,800
<b>N<sub>Au</sub>(10<sup>9</sup>)</b>	45/43	106/97.5
<b>N<sub>Au</sub> Bunches</b>	45	103
<b>Au/Bunch (10<sup>9</sup>)</b>	1.0/0.96	1.03/0.95
<b>β* (m)</b>	1.0	0.8

If the beam emittance is the same for the two runs then:

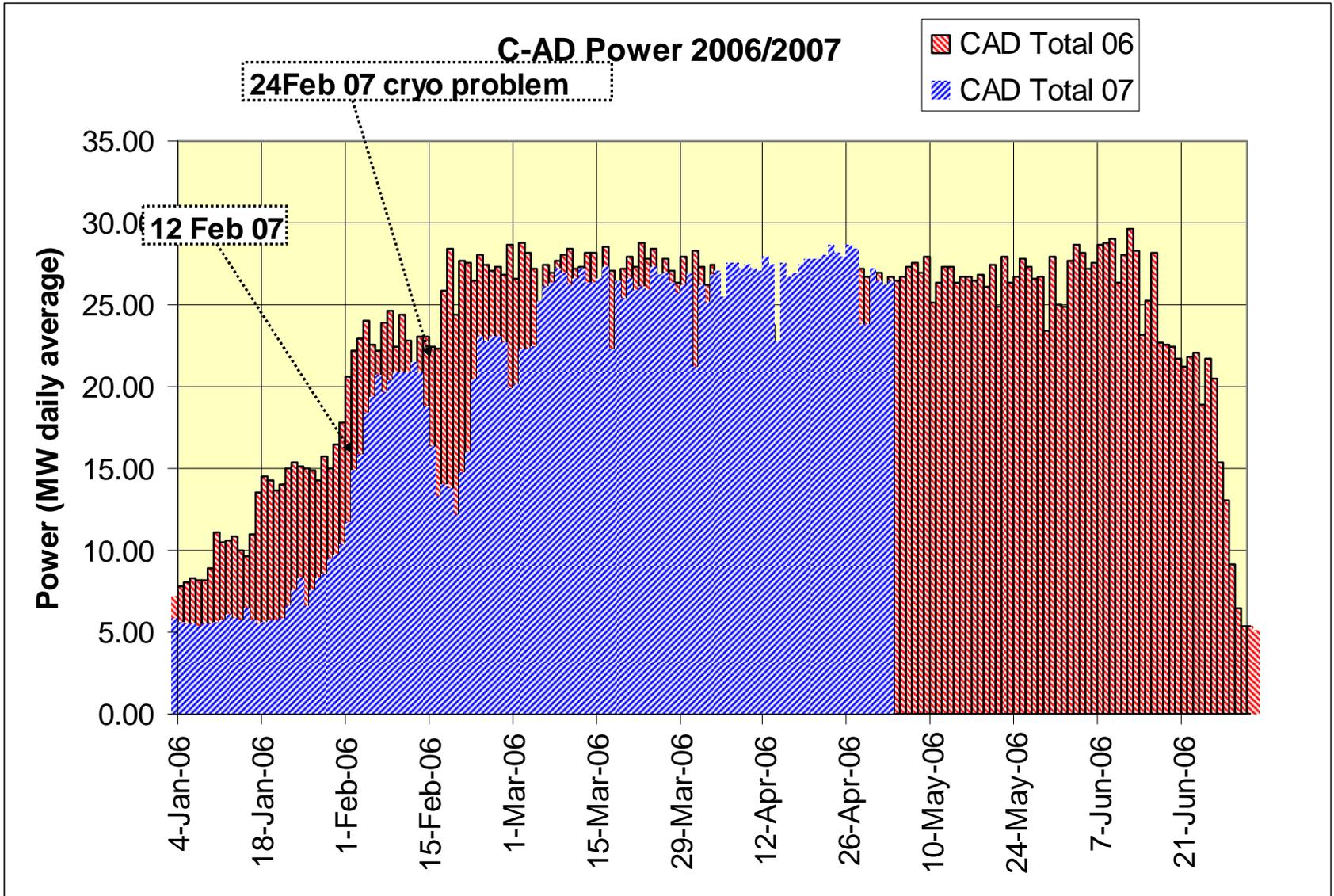
$$\beta^* \text{ for Run 7} = 1.0 (\beta^* \text{ for Run4}) * 9,100/23,800(\text{ZDC's}) * 103/45 (\text{Nbunches}) \\ * (1.03/1)*(0.95/0.96)(\text{bunch intensity}) = 0.89 \text{ meters}$$

Run 7 β\* is supposed to be 0.8 meters

As of 14 May



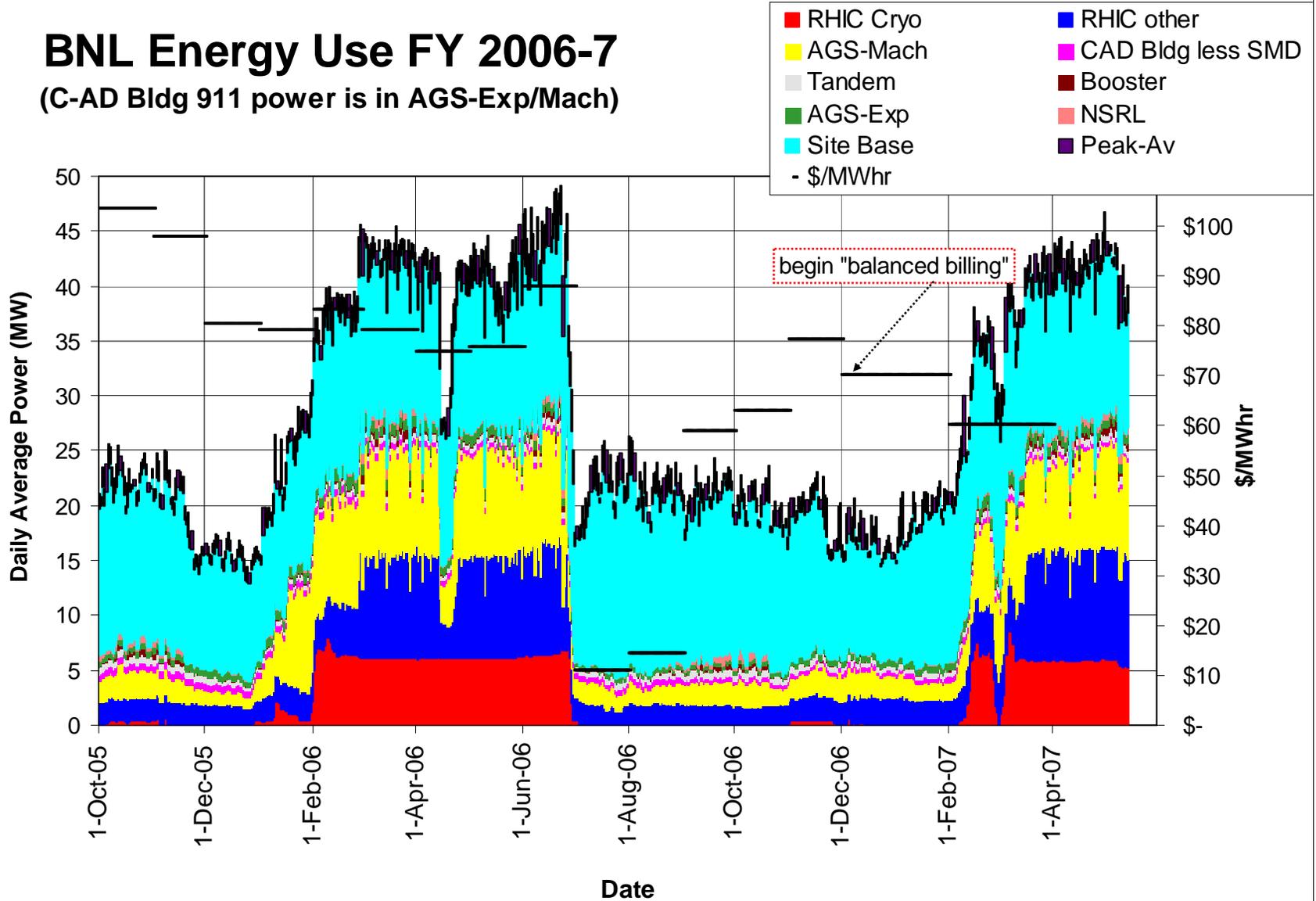
As of 14 May



as of 14 May

# BNL Energy Use FY 2006-7

(C-AD Bldg 911 power is in AGS-Exp/Mach)



# RHIC Machine/Detector Planning Meeting

## Next Meeting

Tuesday, May 1, after Time Meeting

**Yousef Makdisi will moderate**

# RHIC Machine/Detector Planning Meeting

Archive

# For discussion

5/15/07

(revisited – parameters taken ~ 25 minutes into the store)

	<u>Run4 (21 Mar 04)</u>	<u>Run7 (15 May 07)</u>
<b>ZDC (initial Hz)</b>	9600	24272
<b>N<sub>Au</sub>(10<sup>9</sup>)</b>	45	106/98
<b>N<sub>Au</sub> Bunches</b>	45	103
<b>Au/Bunch (10<sup>9</sup>)</b>	1.0	1.03/0.95
<b>β* (m)</b>	1.0	0.9

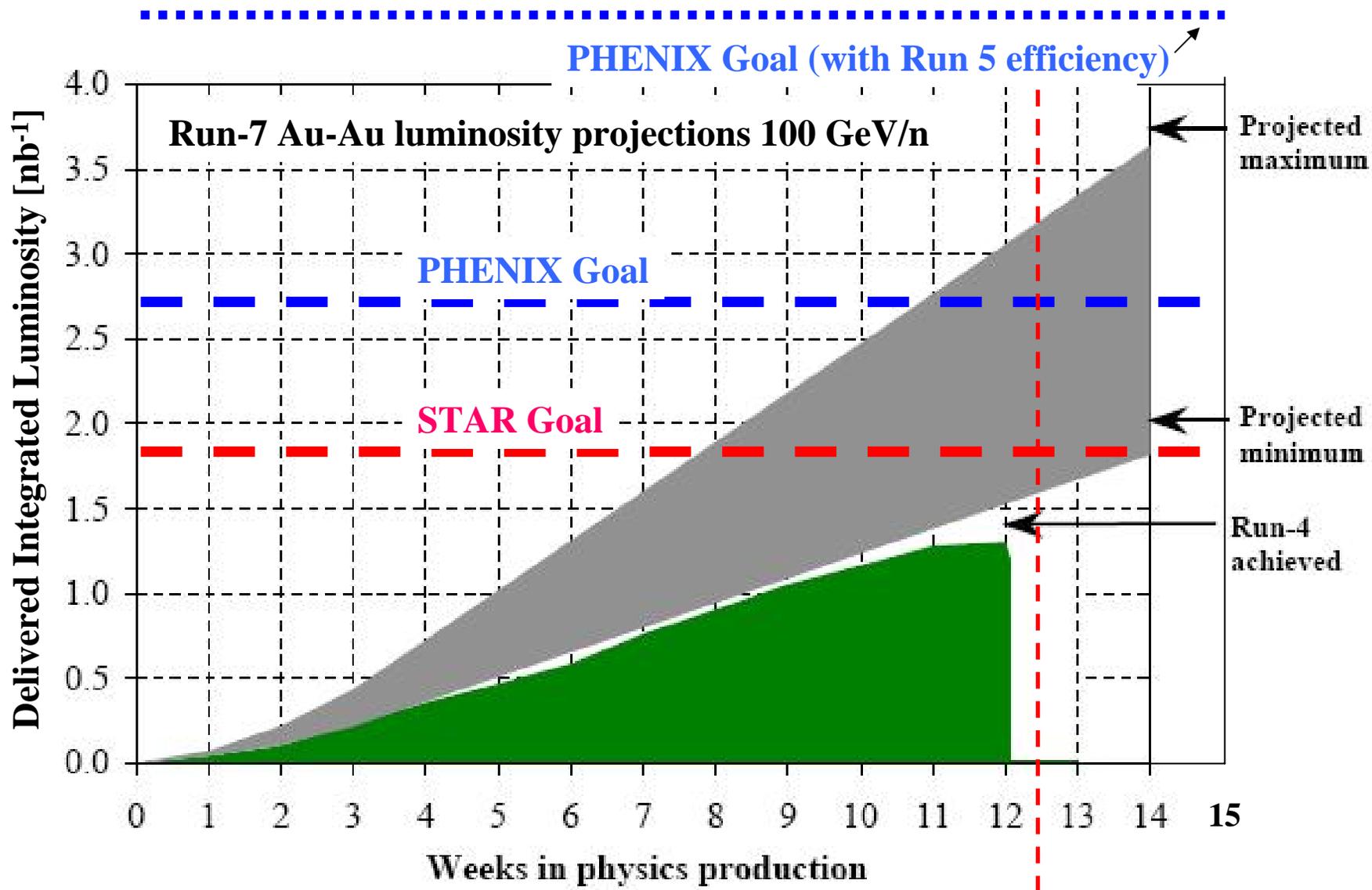
So....If the beam emittance is the same for the two runs we'd get:

$$\text{ZDC (2007)} = 9600 \text{ (typ ZDC Run4)} * 103/45 \text{ (number of bunches)} * (1.03/1.0) * (0.95/1) \text{ (intensity per bunch)} * 1/0.9 \text{ (beta*)} = 23,900$$

Actual = 24,000 Hz → emittance ~10% more than Run4

# End of Store – the present plan, 3/27/07

- Begin first week with 4 hour stores with option for experiments to end store early or extend store – both experiments must agree or store will be terminated after 4 hours.
- After first week, each experiment calculates optimum store time for their experiment. We average the two times and take this as the nominal time at store. This calculation should be revisited at least weekly and details of the calculation defended at our Machine/Experiments Meeting.
- Experiments have the option to end the store early or extend the store – in either case, requires both experiments to agree, otherwise the store will end as scheduled.
- Consideration will be given to the NASA experiments. If the NASA experiments need a few more minutes (up to ~ 15 minutes) to complete an exposure the setup for the next RHIC store should be delayed to accommodate this.
- Minimum luminosity for Machine to keep store - TBD



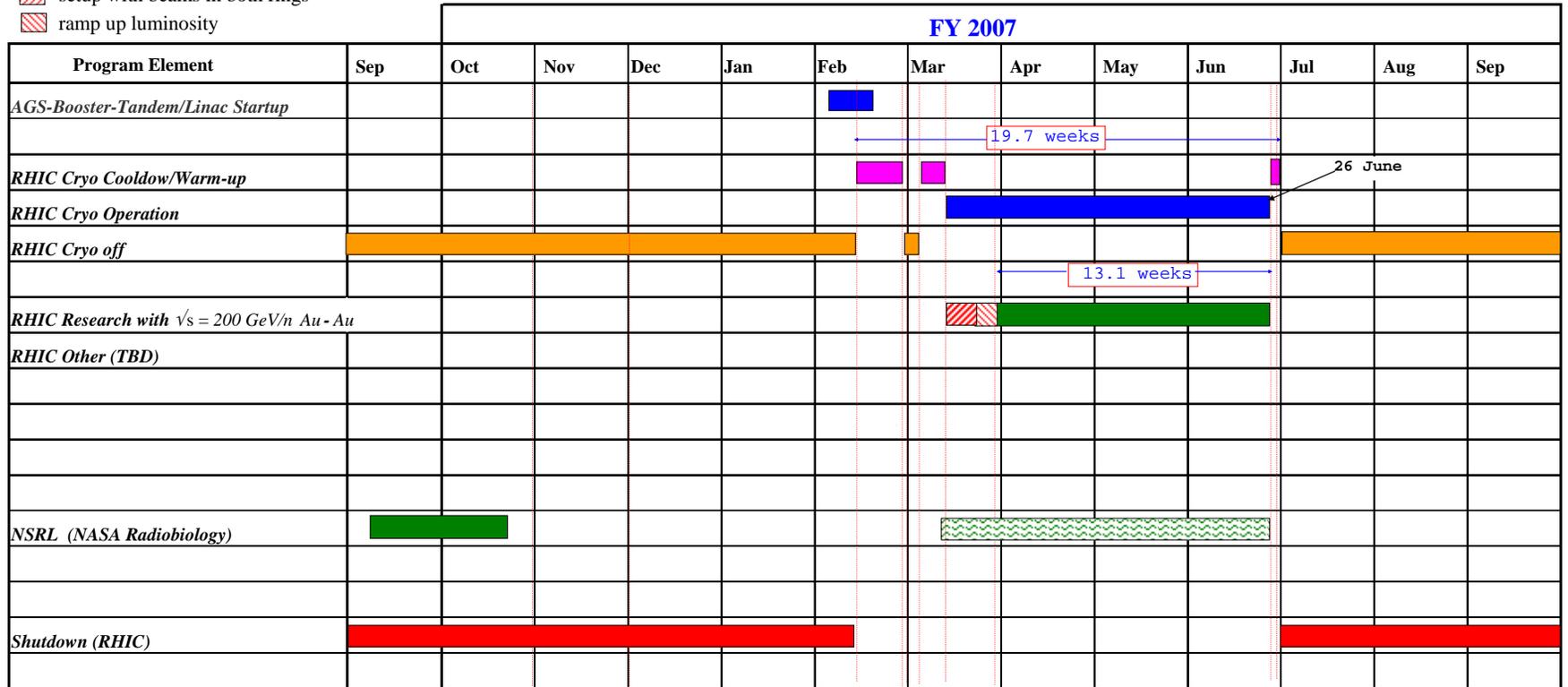
12.6 weeks with 26 June end of physics

# C-A Operations-FY07

27 Mar 07

-  concurrent with RHIC
-  setup with beams in both rings
-  ramp up luminosity

*Plan, subject to change*



26 June

# RHIC Machine/Detector Planning Meeting

## Answer to Questions from the 6 Feb meeting

- (1) **Experiments – What are your luminosity goals for the Au-Au run, Delivered and Sampled?**
- **PHENIX goals for 100 x 100 GeV/n Au-Au**
    - **Delivered Luminosity = 2700  $\mu\text{b}^{-1}$**
    - **Sampled Luminosity = 1100  $\mu\text{b}^{-1}$**
    - **Assumes 68% live time, 60% vertex cut = 40.5% efficient**
    - **However, Run5 efficiency factor was 25% (if so, the Run7 requirement is 4400  $\mu\text{b}^{-1}$  delivered)**
  
  - **STAR goals for 100 x 100 GeV/n Au-Au**
    - **Delivered Luminosity = 1800  $\mu\text{b}^{-1}$**
    - **Sampled Luminosity = 300  $\mu\text{b}^{-1}$  with 60M usable min-bias events**
    - **~50% live time**

# RHIC Machine/Detector Planning Meeting

## Answer to Questions from the 6 Feb meeting (to be revisited)

**(2) Experiments and Machine - If the Au-Au run goes well and luminosity goals are met with a week or two left to go, what should we do?**

– **PHENIX**

- **Probably need 15 weeks to achieve Au-Au goals – highest priority**
- **pp development if well motivated/justified**
  - **Studies to maximize Run8 figure of merit**
  - **500 GeV development**

– **STAR**

- **Low energy Au-Au development, collider issues, triggering...**

– **Machine**

- **1-2 days low energy Au-Au development at 0.5 injection energy**
- **pp development –**
  - **1<sup>st</sup> priority new RHIC working point (needs ~2 weeks)**
  - **2<sup>nd</sup> priority 500 GeV development**

## As of 12 Mar

