

# RHIC Machine/Detector Planning Meeting

## Agenda

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

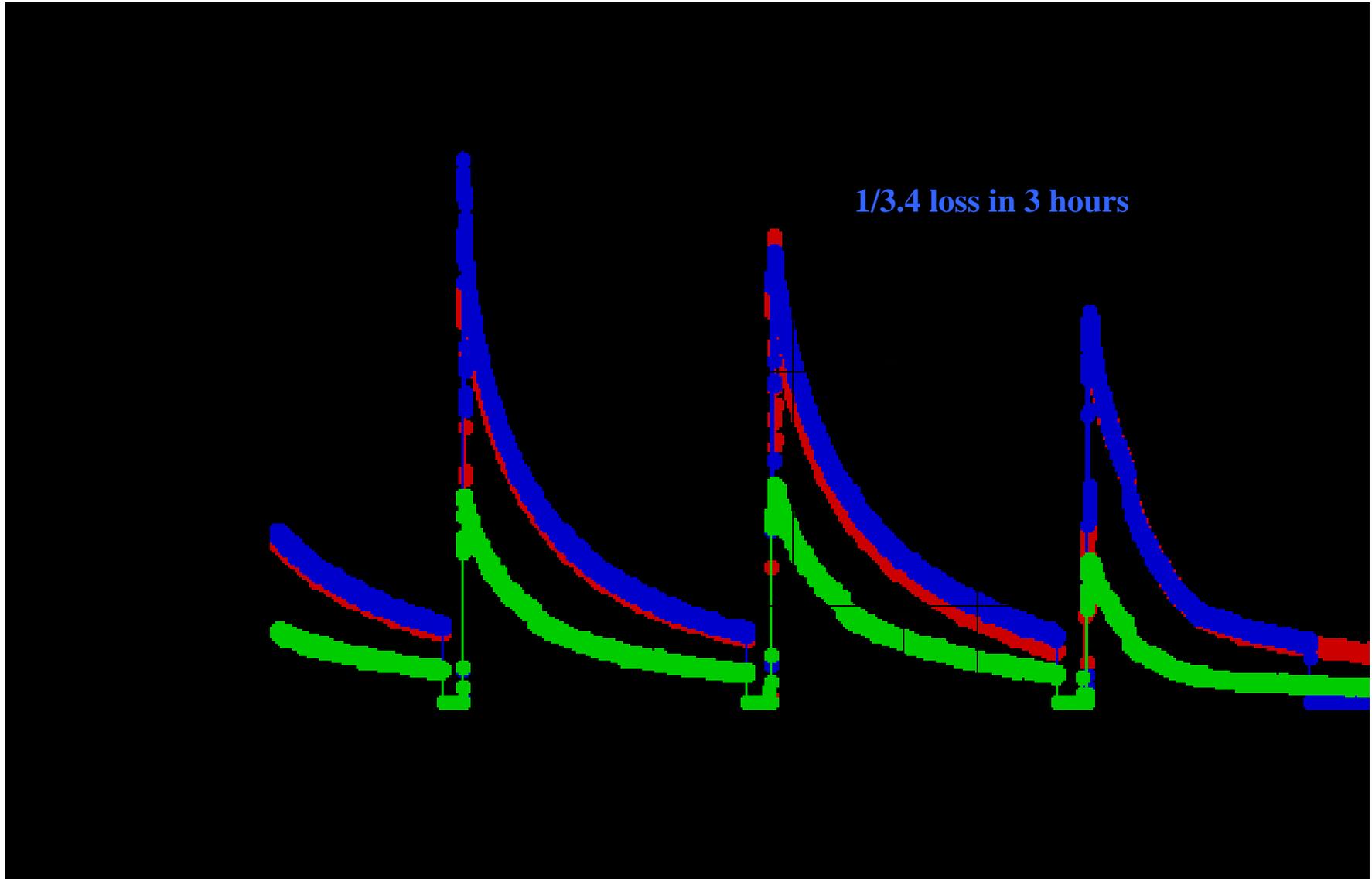
# RHIC Run 7 as run/planned

4/10/07

- 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 and PHENIX)**
- 28 Mar – 1<sup>st</sup> Maintenance day
- **3 Apr - STAR Physics declared**
- 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

$L [10^{26} \text{ cm}^{-2} \text{ s}^{-1}] = \text{ZDC}[\text{kHz}]$

RUN4



10 Apr 07

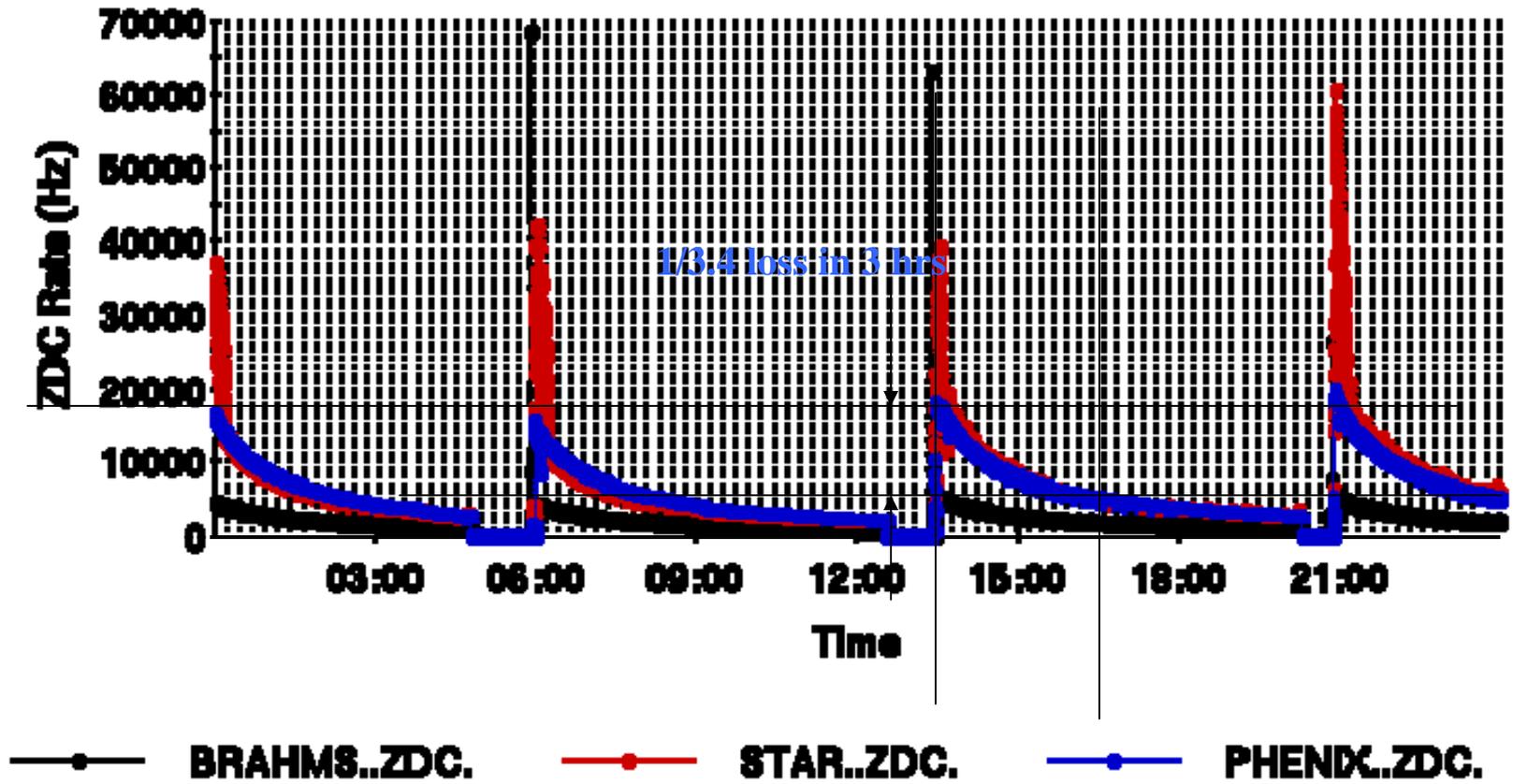
3

$$L [10^{26} \text{ cm}^{-2} \text{ s}^{-1}] = \text{ZDC}[\text{kHz}]$$

RUN5

79 x 79 bunches

### RHIC Luminosity Thu Apr 5 23:58:48 2007

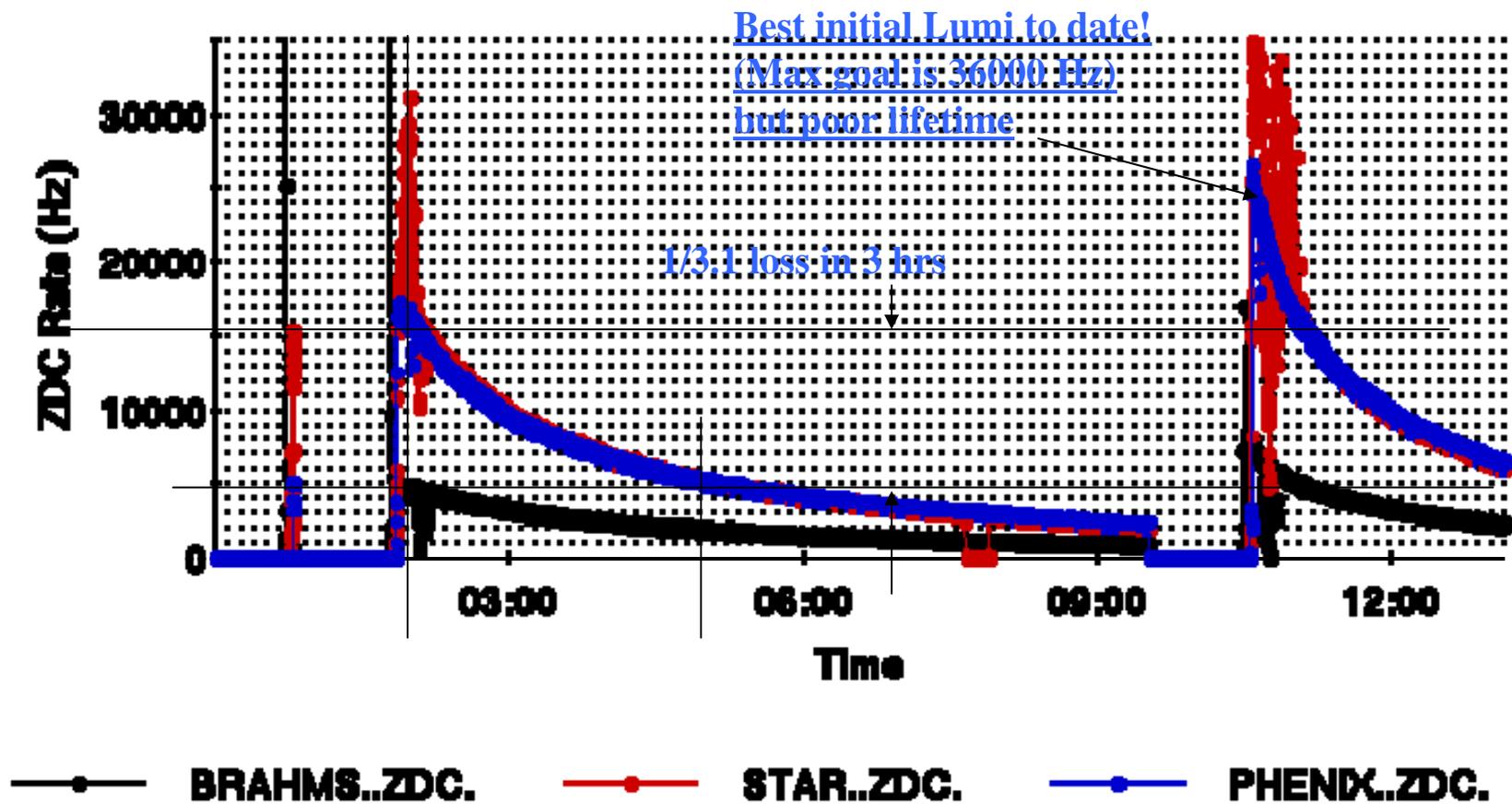


$$L [10^{26} \text{ cm}^{-2} \text{ s}^{-1}] = \text{ZDC}[\text{kHz}]$$

RUN7

93 x 93 bunches

### RHIC Luminosity Tue Apr 10 13:08:47 2007



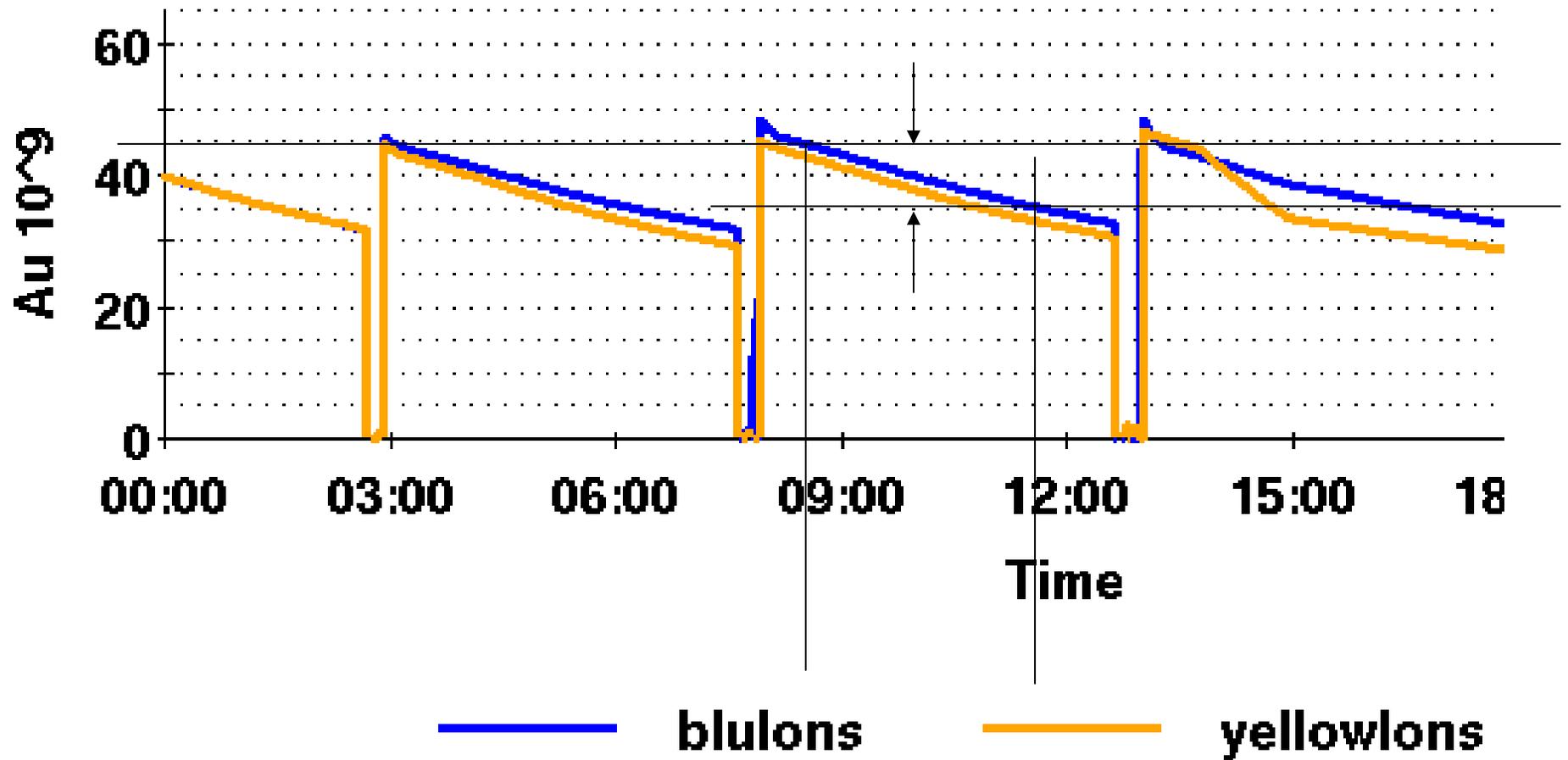
# RUN4

2004 Run

## RHIC Beam Intensity

Sun Mar 21 23:58:58 2004

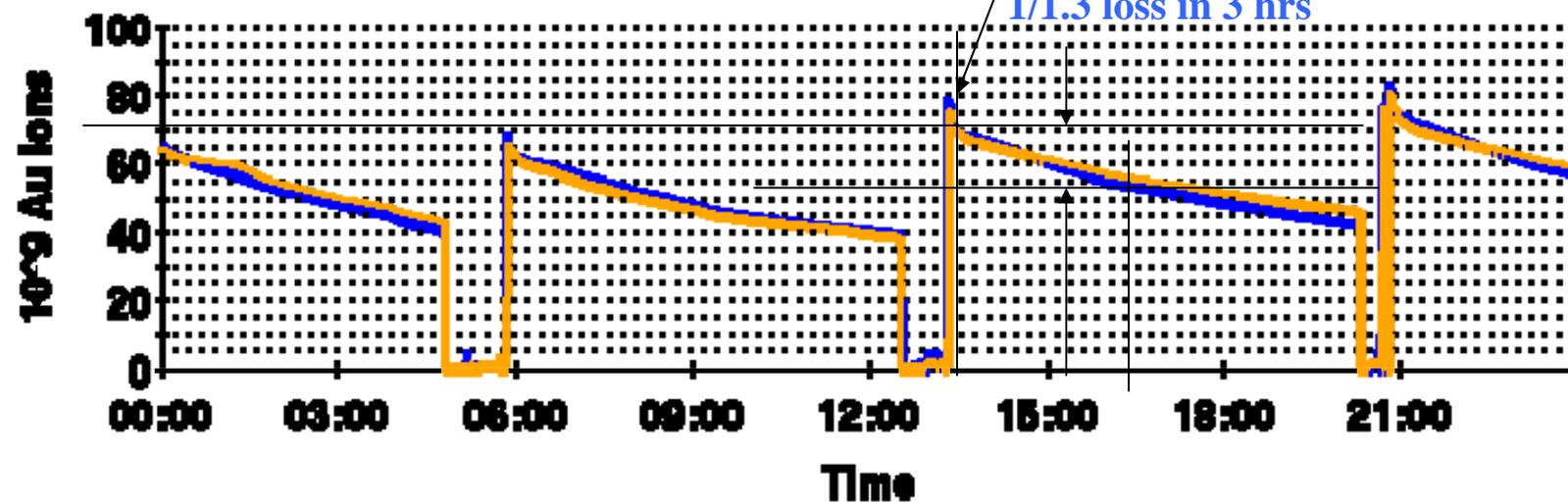
1/1.3 reduction factor in 3 hrs



# RUN7

79 x 79 bunches

## RHIC Beam Intensity Thu Apr 5 23:59:32 2007



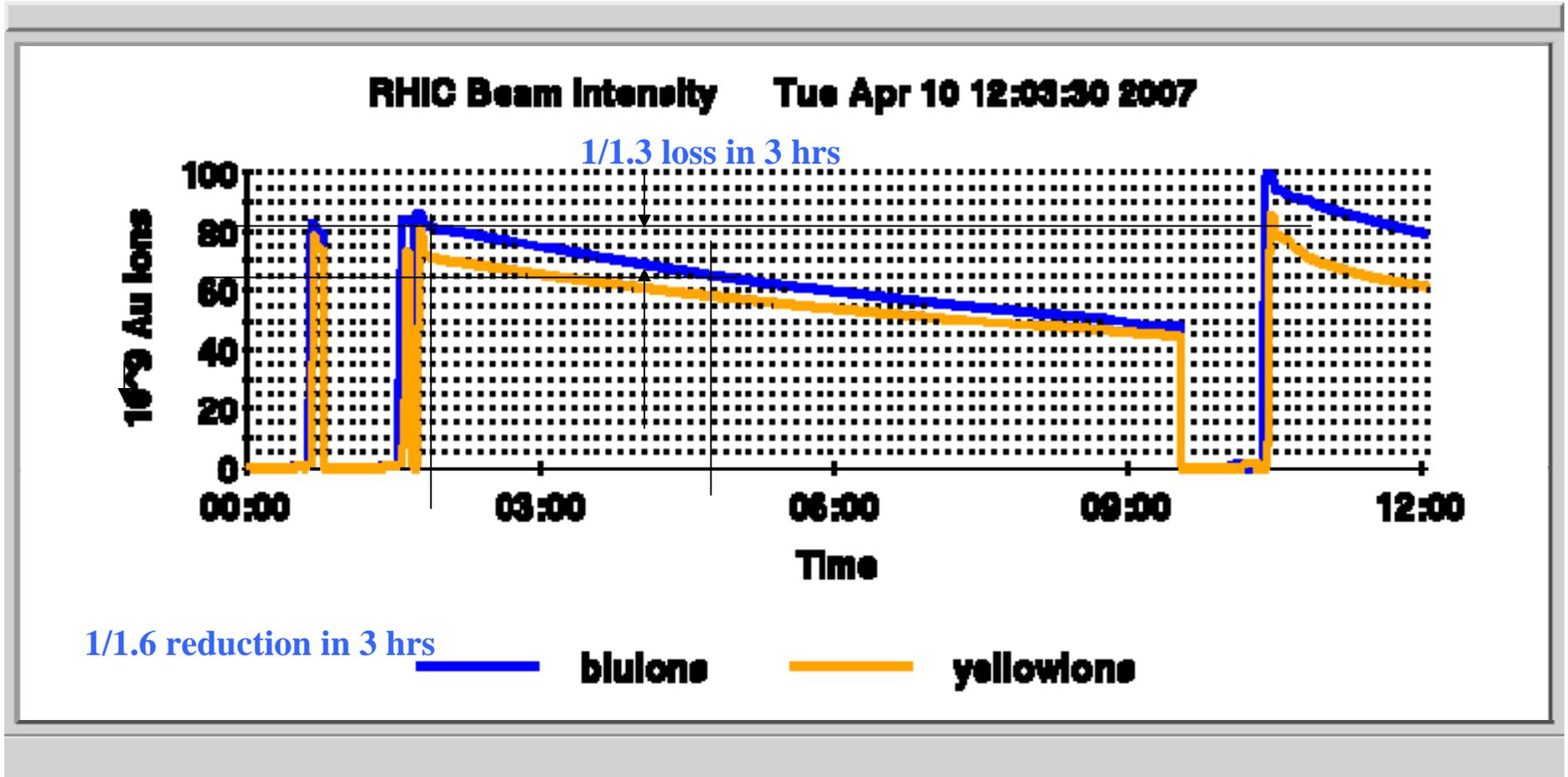
1/1.6 reduction in 3 hrs

**blulons**

**yellowlons**

# RUN7

93 x 93 bunches



# For discussion (1/2)

	<u>Run4 (21 Mar 04)</u>	<u>Run7 (5 Apr 07)</u>
<b>ZDC (initial Hz)</b>	12500	17500
<b>N<sub>Au</sub>(10<sup>9</sup>)</b>	46	70
<b>N<sub>Au</sub> Bunches</b>	45	79
<b>Au/Bunch (10<sup>9</sup>)</b>	1.0	0.9
<b>β* (m)</b>	1.0	0.9

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

$$\text{ZDC (2007)} = 12500 \text{ (typ ZDC Run4)} * 79/45 \text{ (number of bunches)} \\ * (0.9/1.0)^2 \text{ (intensity per bunch)} * 1/0.9 \text{ (beta*)} = 17,700$$

Actual = 17,500 Hz → emittance is about the same

# For discussion (2/2)

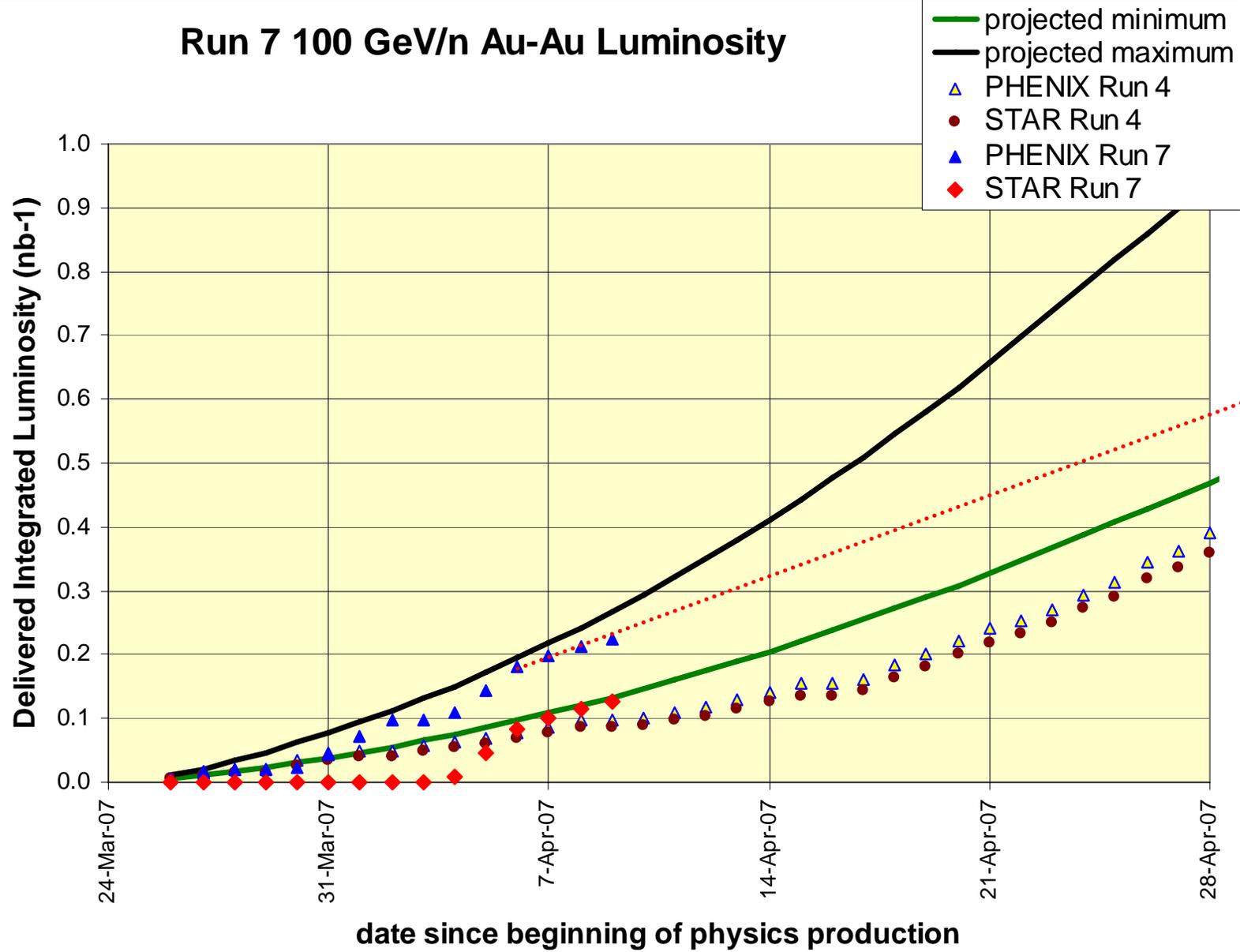
	<u>Run4 (21 Mar 04)</u>	<u>Run7 (10 Apr 07)</u>
<b>ZDC (initial Hz)</b>	12500	16000
<b>N<sub>Au</sub>(10<sup>9</sup>)</b>	46	82/70
<b>N<sub>Au</sub> Bunches</b>	45	93
<b>Au/Bunch (10<sup>9</sup>)</b>	1.0	0.88/0.75
<b>β* (m)</b>	1.0	0.9

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

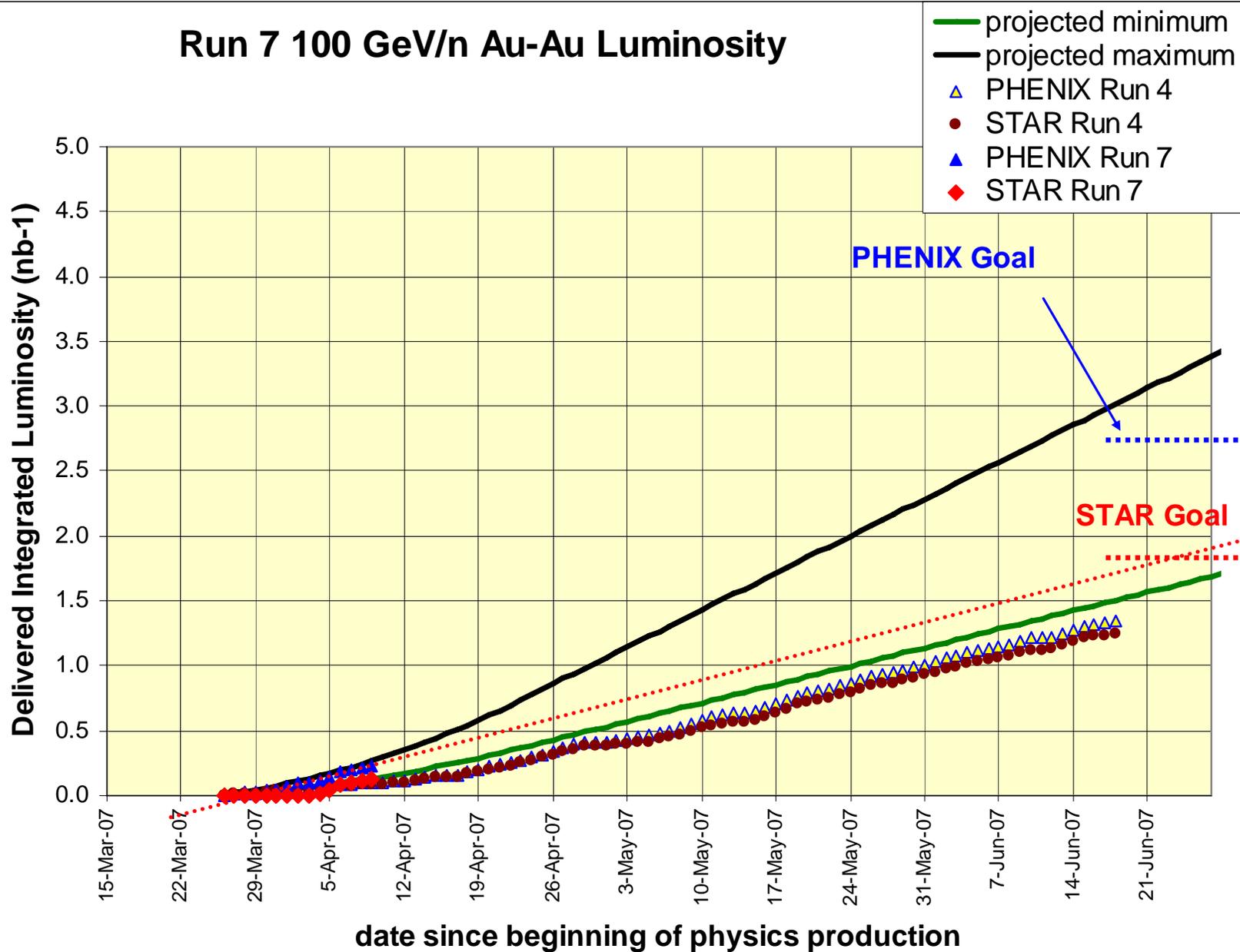
$$\text{ZDC (2007)} = 12500 \text{ (typ ZDC Run4)} * 93/45 \text{ (number of bunches)} \\ * (0.88/1.0) * (0.75/1) \text{ (intensity per bunch)} * 1/0.9 \text{ (beta*)} = 19,000$$

Actual = 16,000 Hz → emittance is **NOT** the same

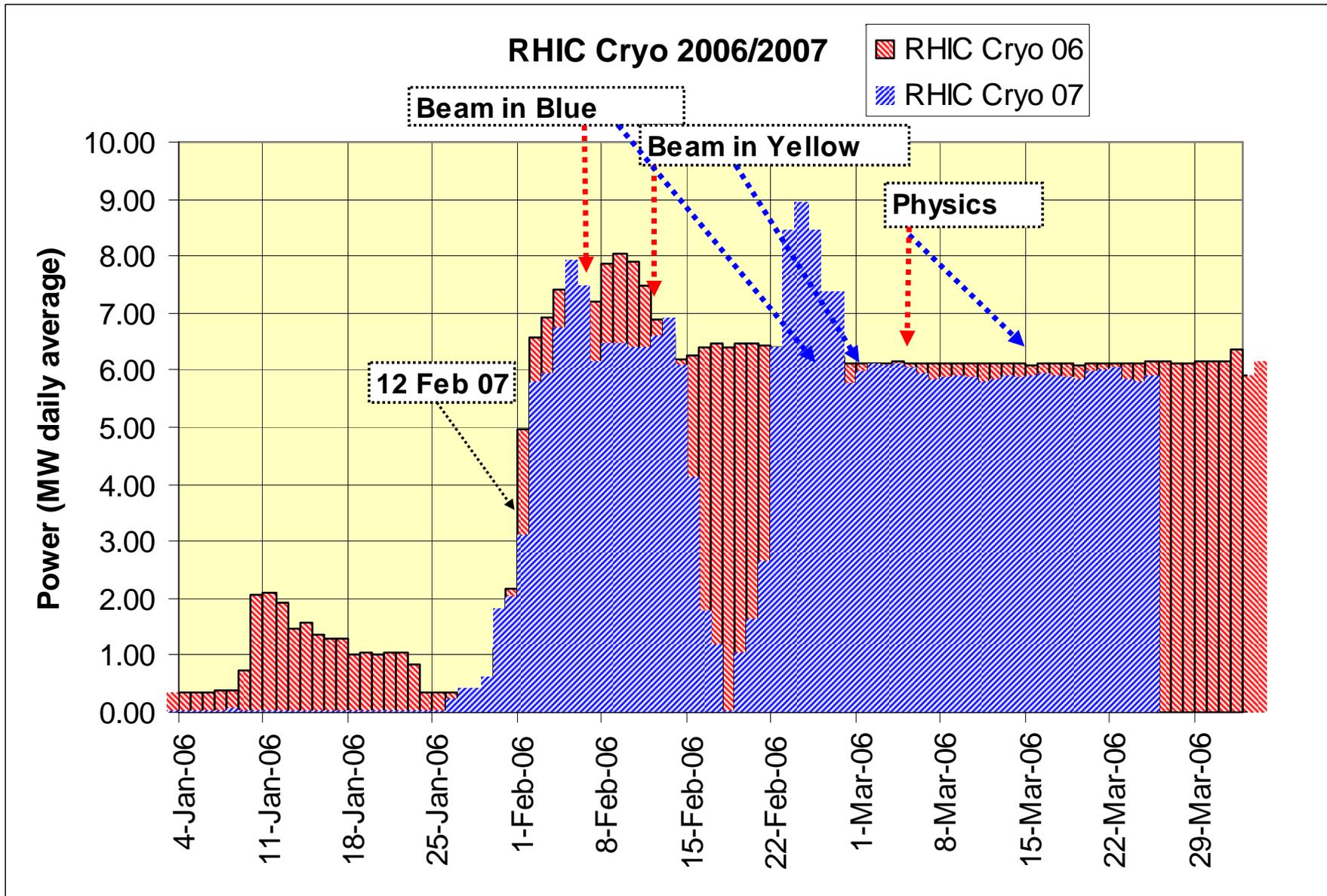
# Run 7 100 GeV/n Au-Au Luminosity



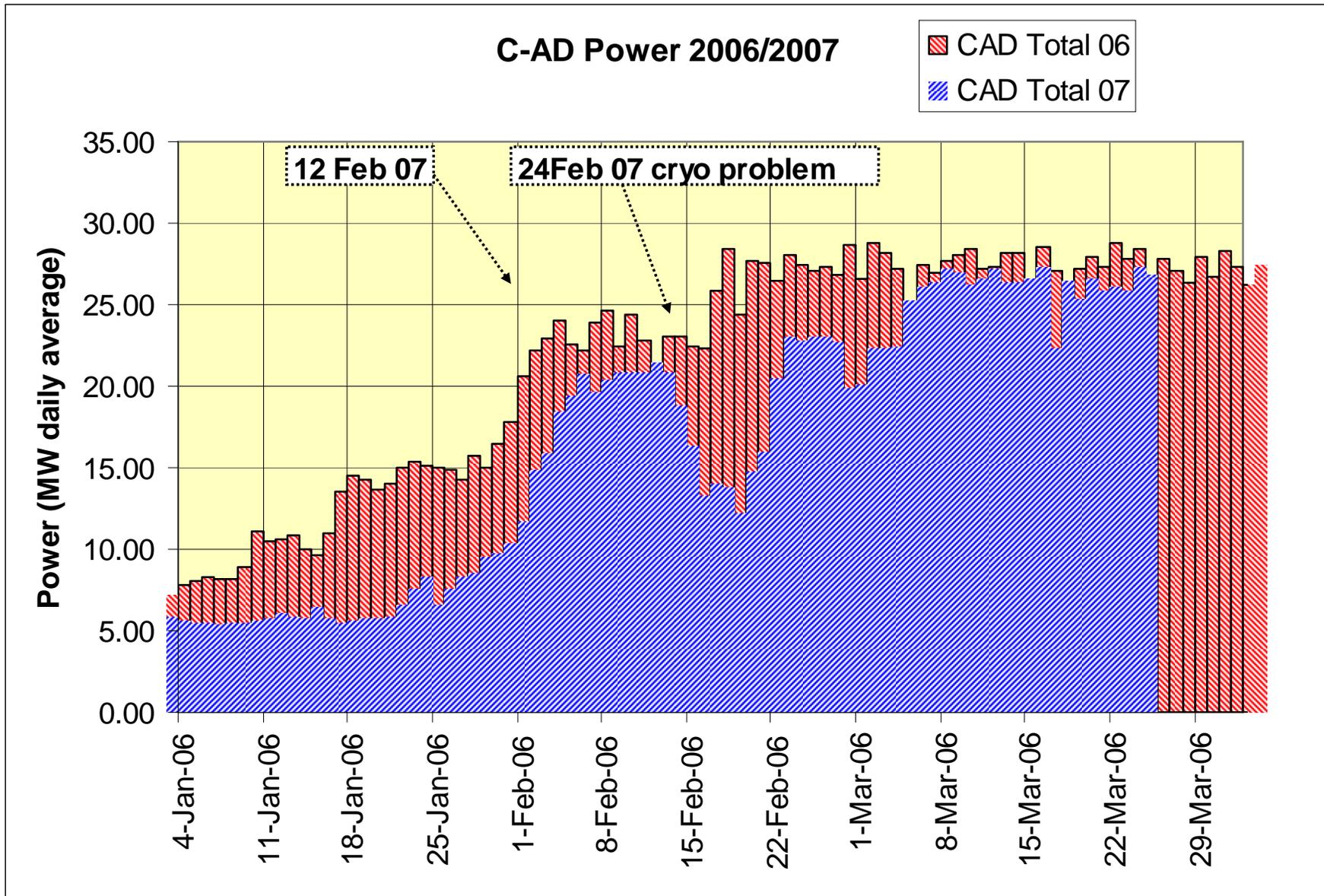
# Run 7 100 GeV/n Au-Au Luminosity



As of 5 Apr



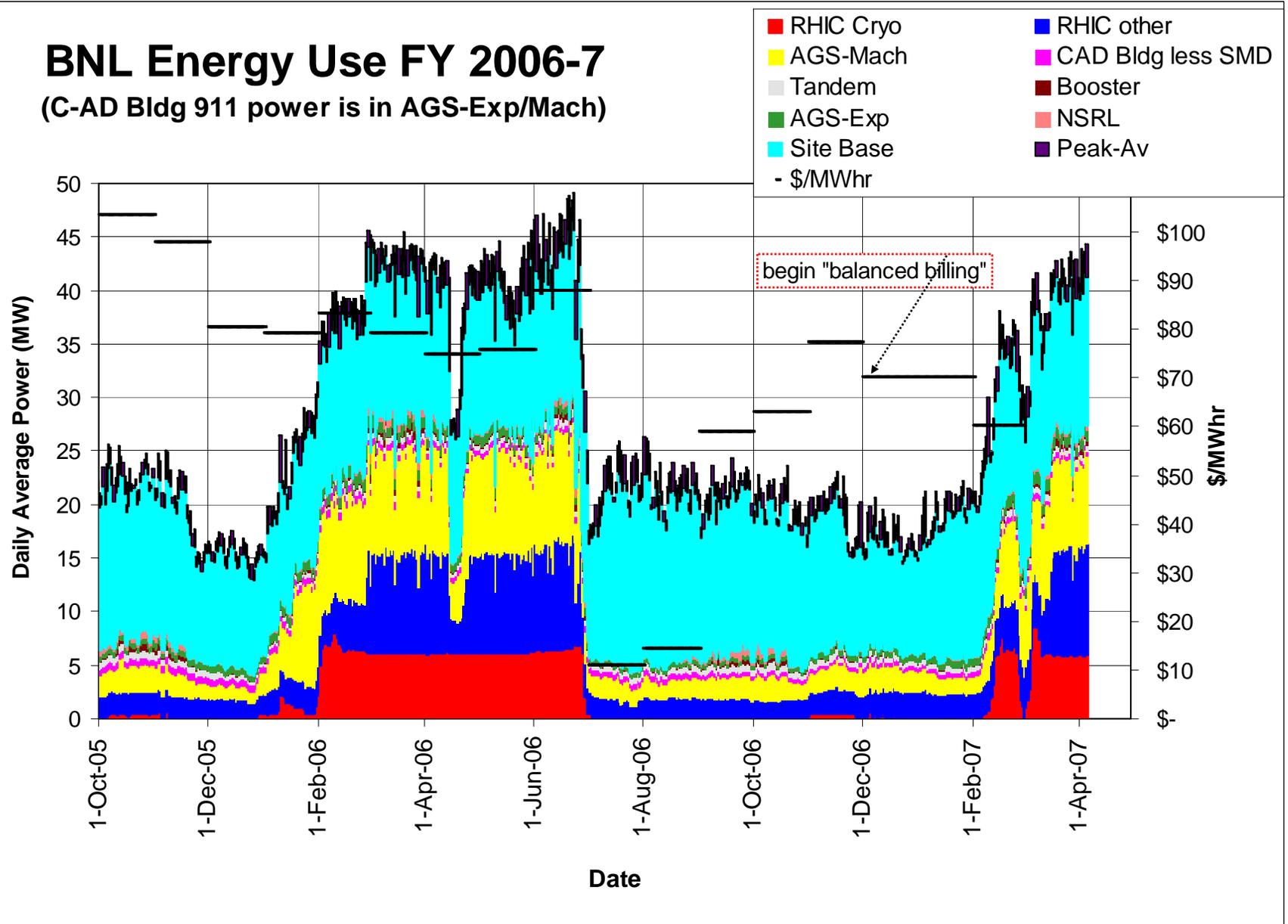
As of 5 Apr



As of 5 Apr

# BNL Energy Use FY 2006-7

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



# RHIC Machine/Detector Planning Meeting

## Next Meeting

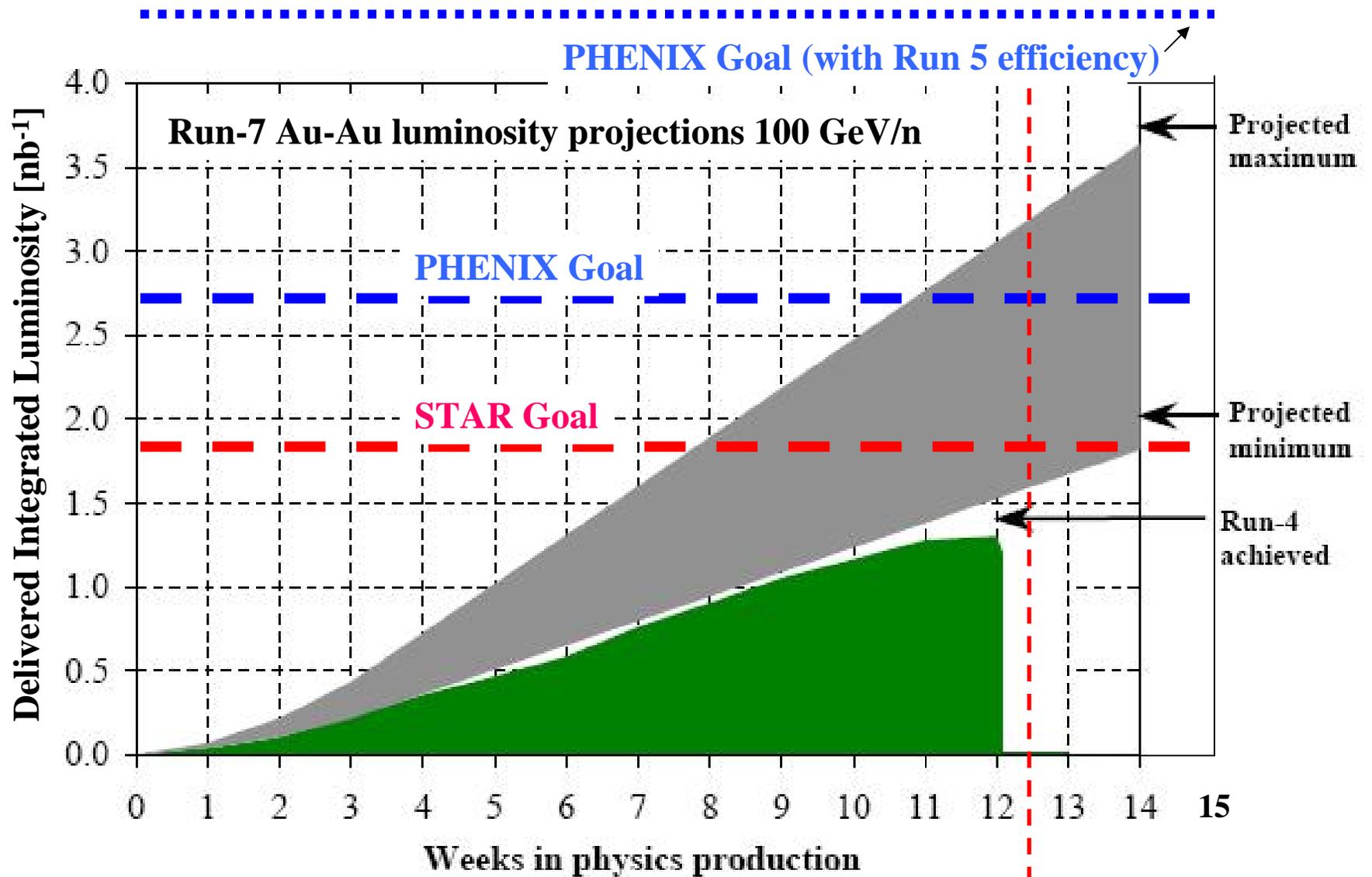
Tuesday, April 17, after Time Meeting

# **RHIC Machine/Detector Planning Meeting**

**Archive**

## 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



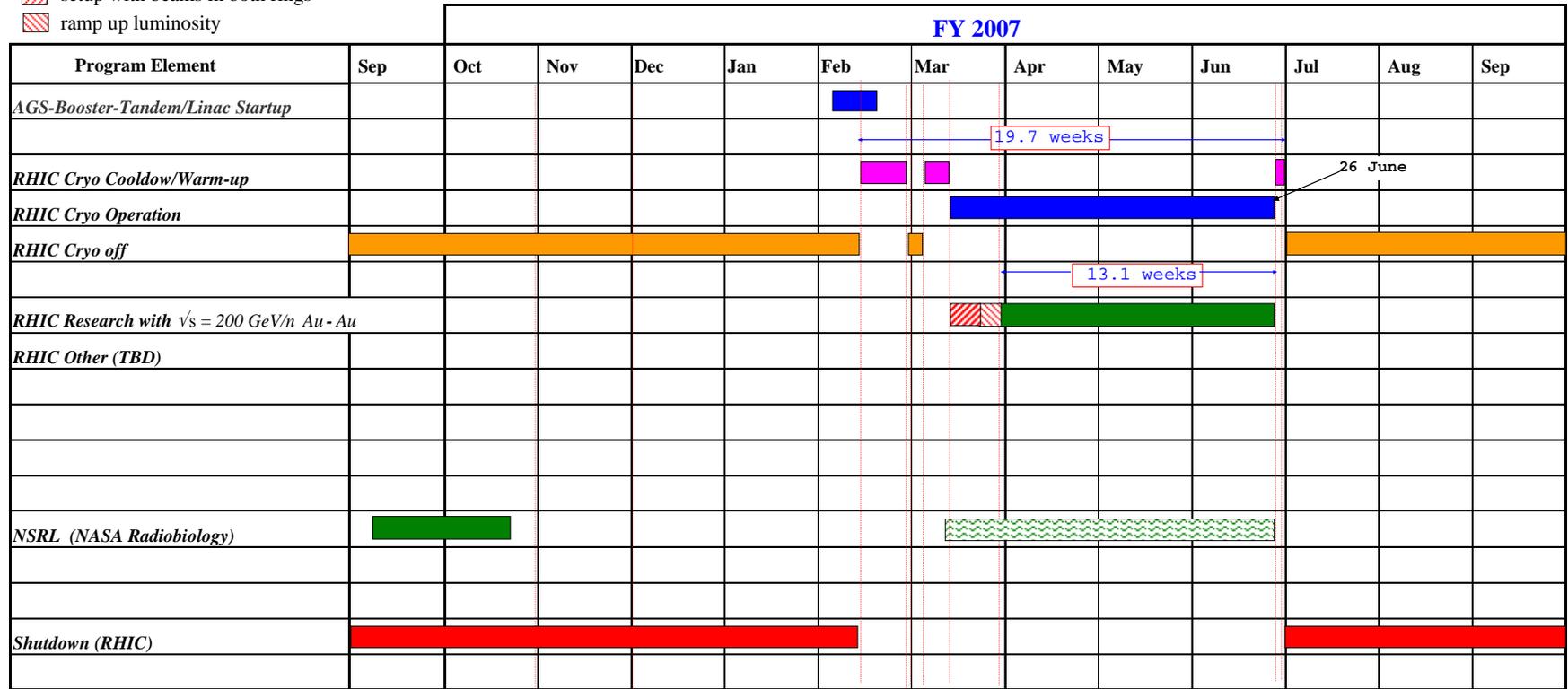
12.6 weeks with 26 June end of physics

# C-A Operations-FY07

27 Mar 07

*Plan, subject to change*

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



# RHIC Machine/Detector Planning Meeting

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

### **(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

