

# RHIC Machine/Detector Planning Meeting

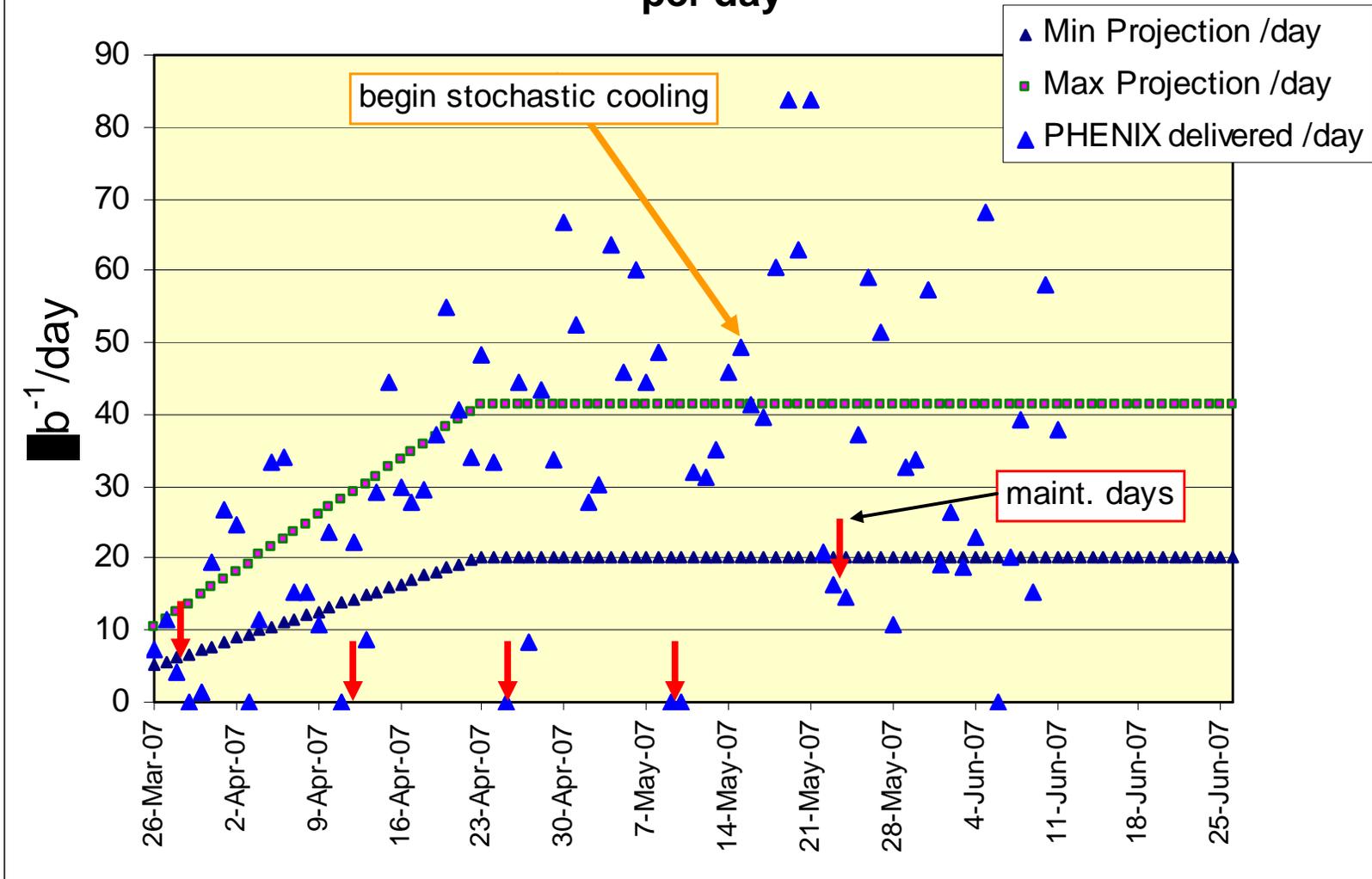
## Agenda

- **RHIC Low-Energy Au Test Run Summary – (Satogata)**
- **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

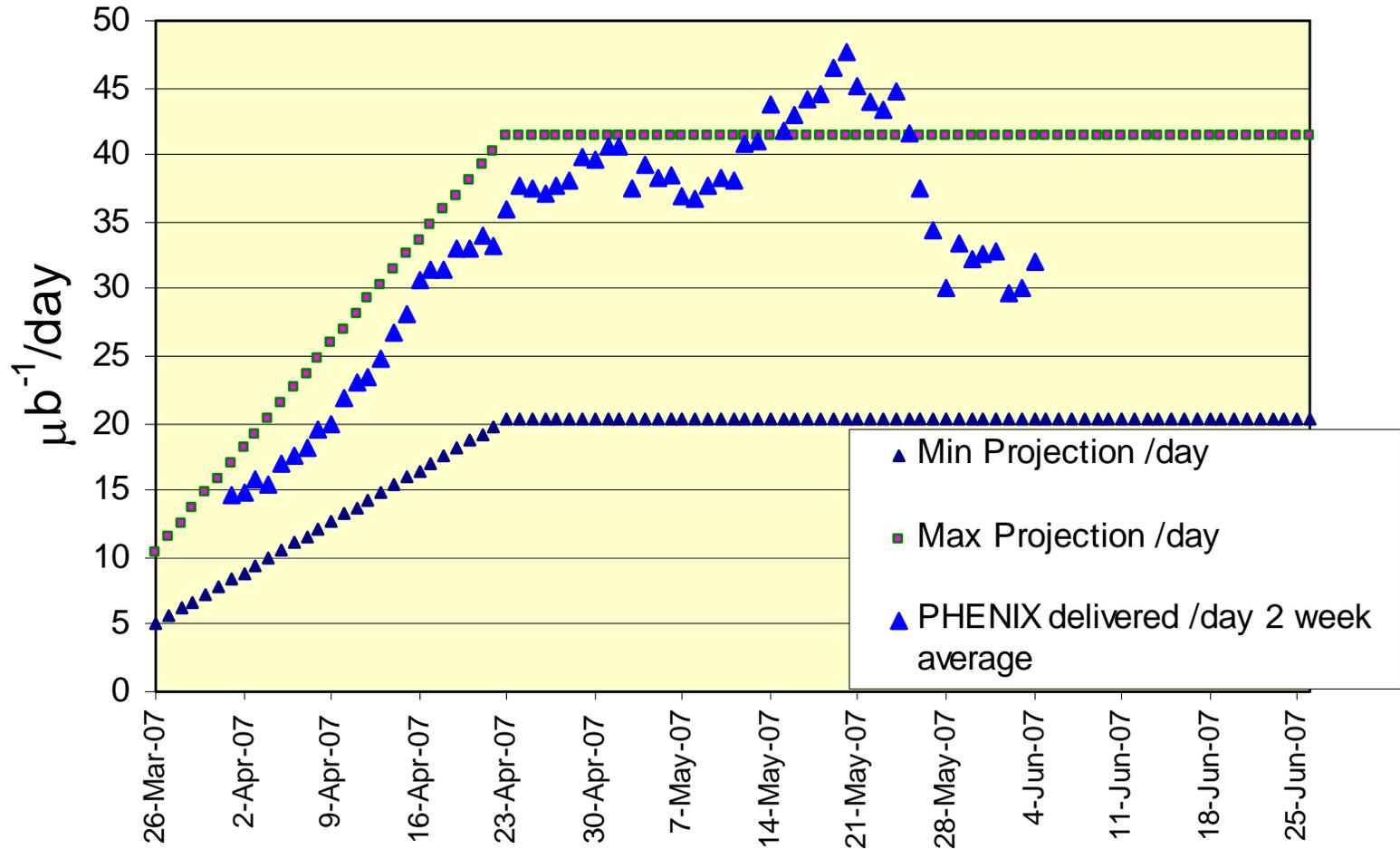
- 12 Feb – cool-down begins
- 17 Feb – blue cold
- 20 Feb – 1<sup>st</sup> beam in blue ring
- 23 Feb – Initial cold wave through yellow ring, not ready for beam
- 24 Feb – cryo problems, cool-down interrupted
- 26 Feb – cryo problems persist, begin warming up cryo plant
- 4 Mar – cryo back on
- 8 Mar – 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**
- 6-7 Jun – 24 hour low energy development run
- **11 Jun - 14 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

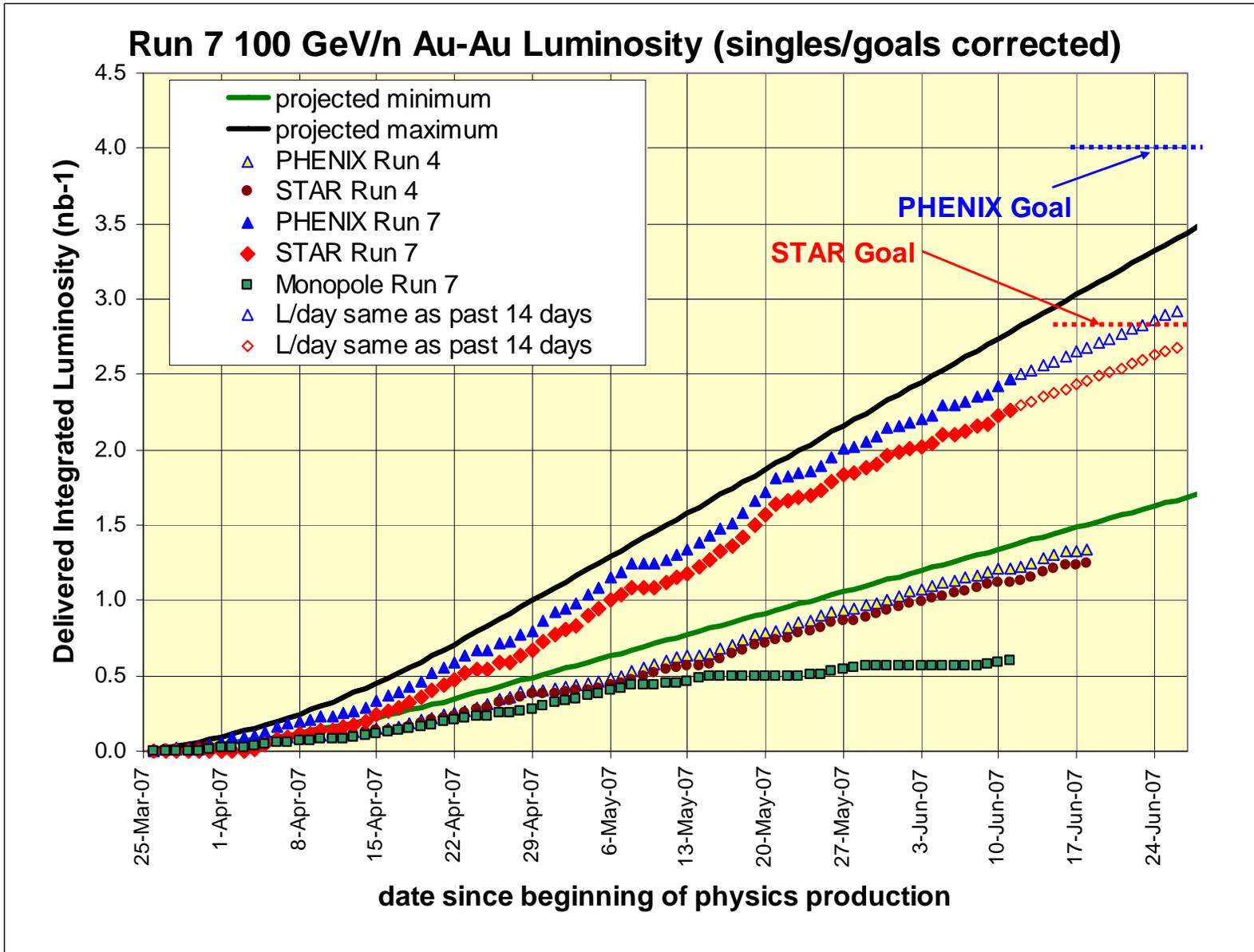
### Run 7 100 x 100 GeV/n AuAu Delivered Luminosity per day

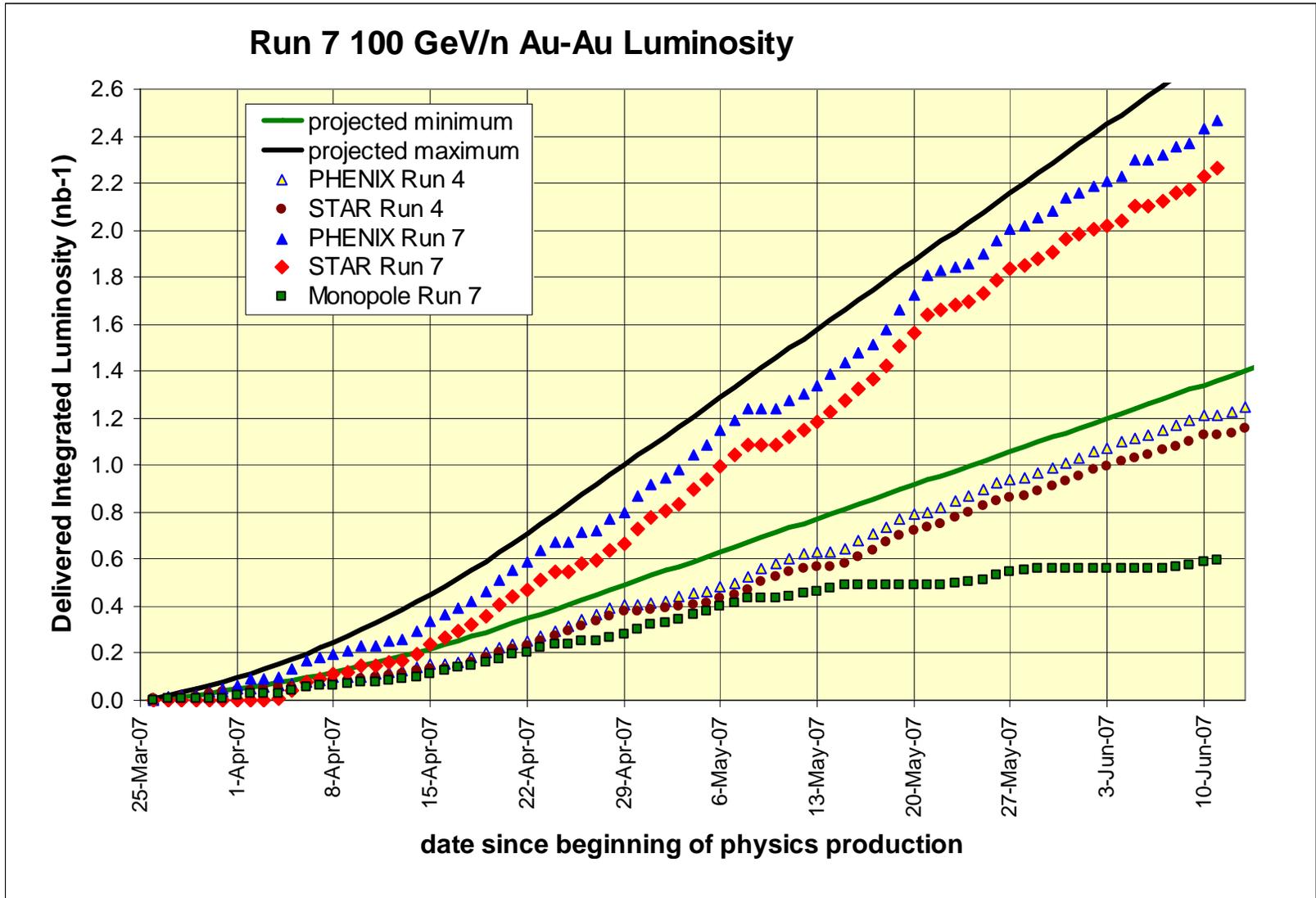




### Run 7 100 x 100 GeV/n AuAu Delivered Luminosity per day averaged over 2 weeks

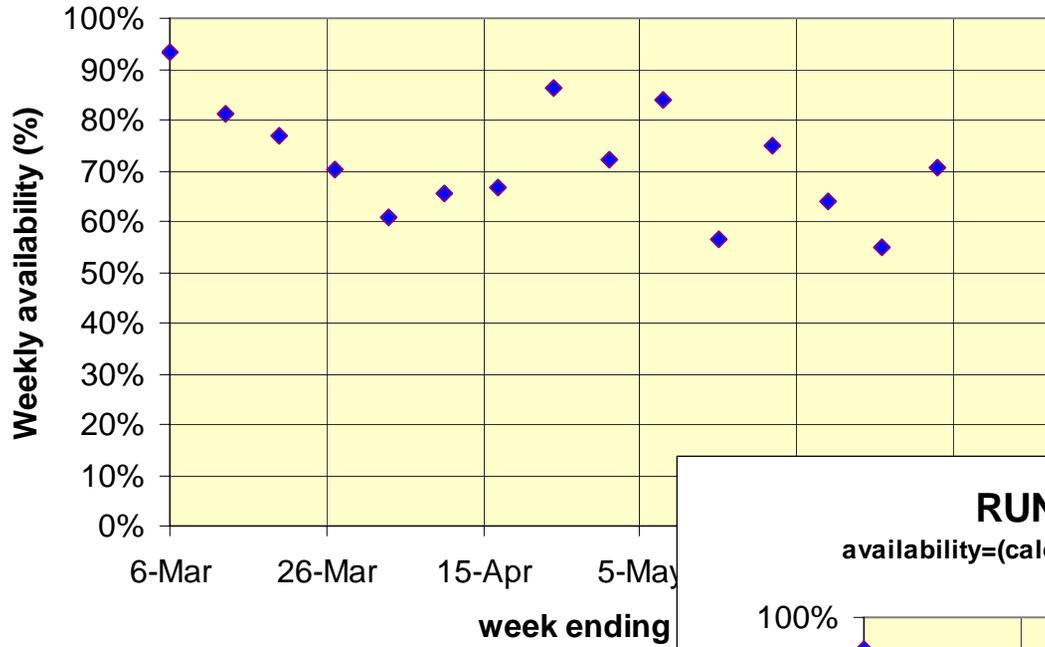






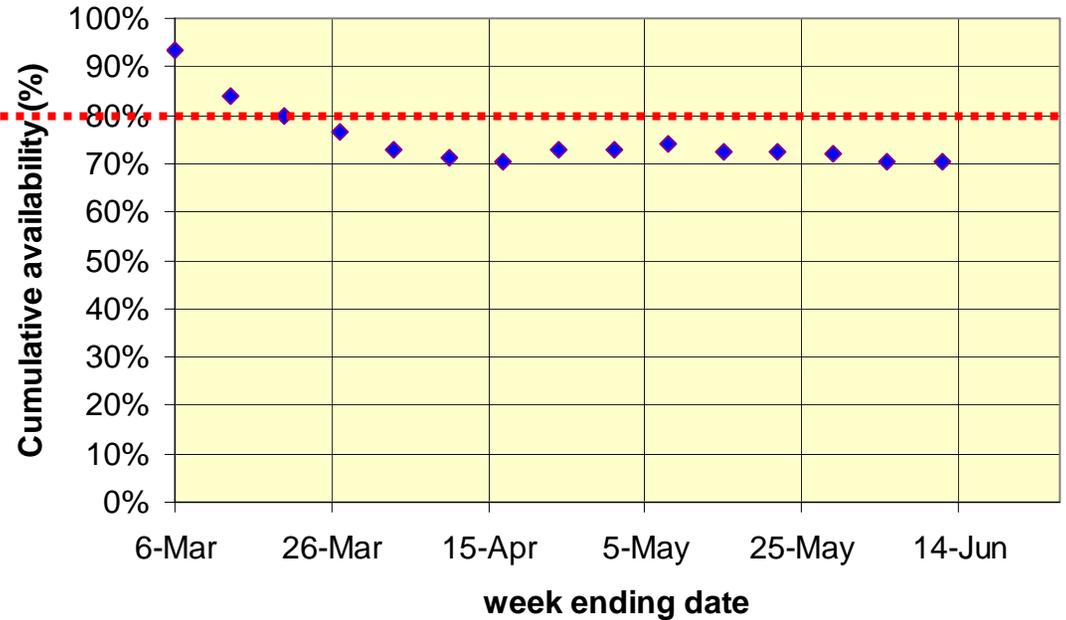
### RUN 7 Weekly Availability

$$\text{availability} = \frac{168 - \text{failure} - \text{scheduled maint}}{168 - \text{scheduled maint}}$$

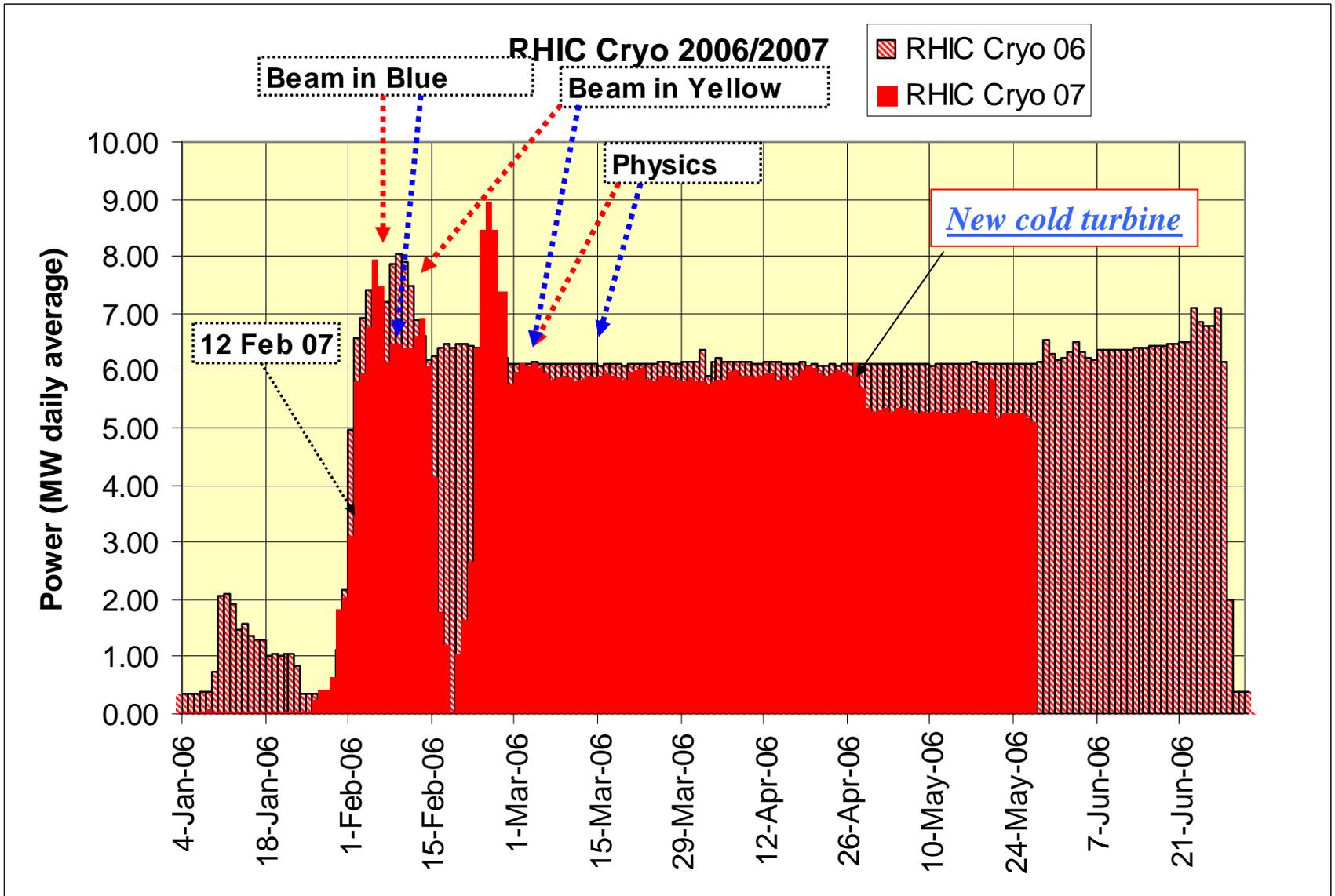


### RUN 7 Cumulative Availability

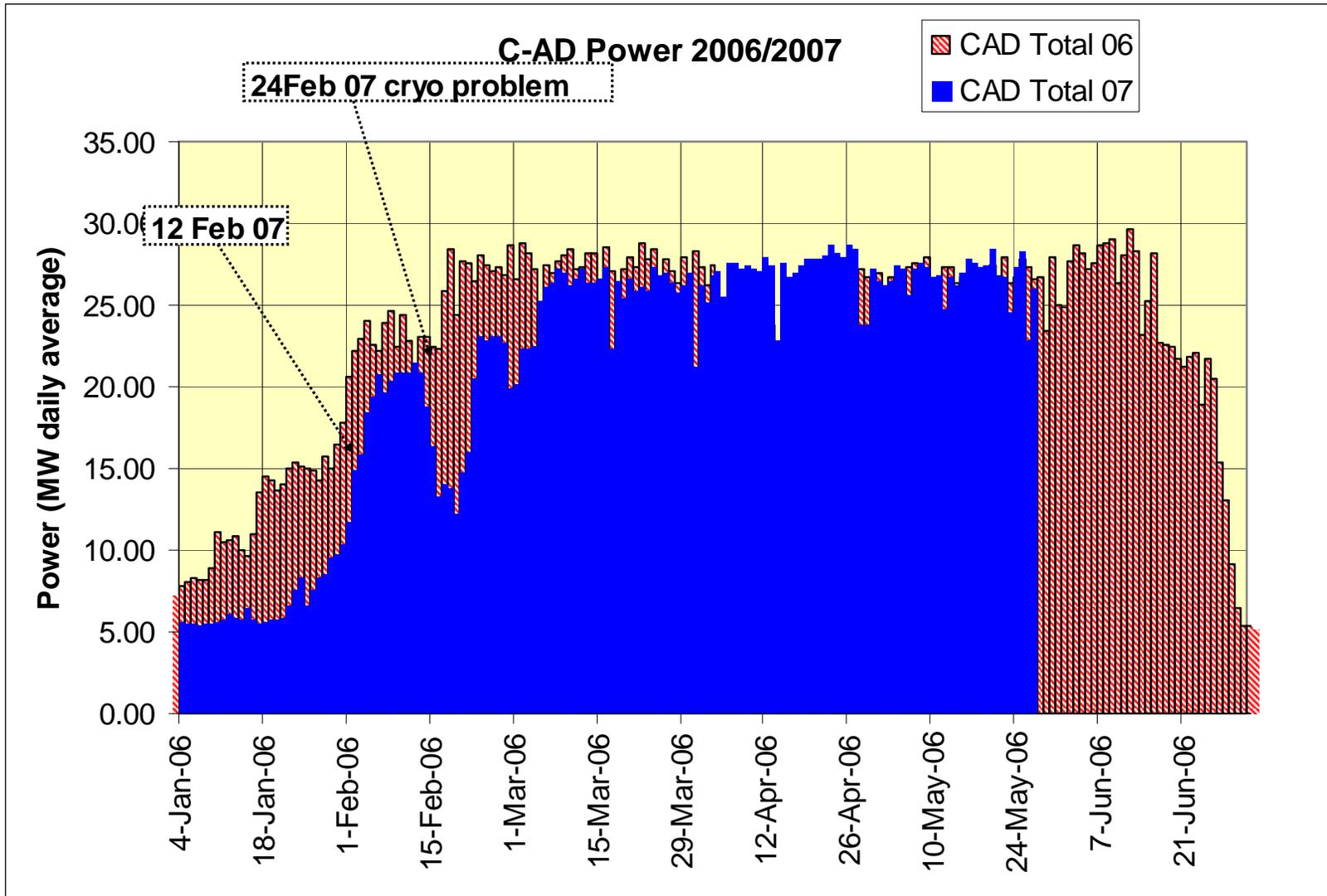
$$\text{availability} = \frac{\text{calendar hrs} - \text{failure} - \text{scheduled maint}}{\text{calendar hrs} - \text{scheduled maintenance}}$$



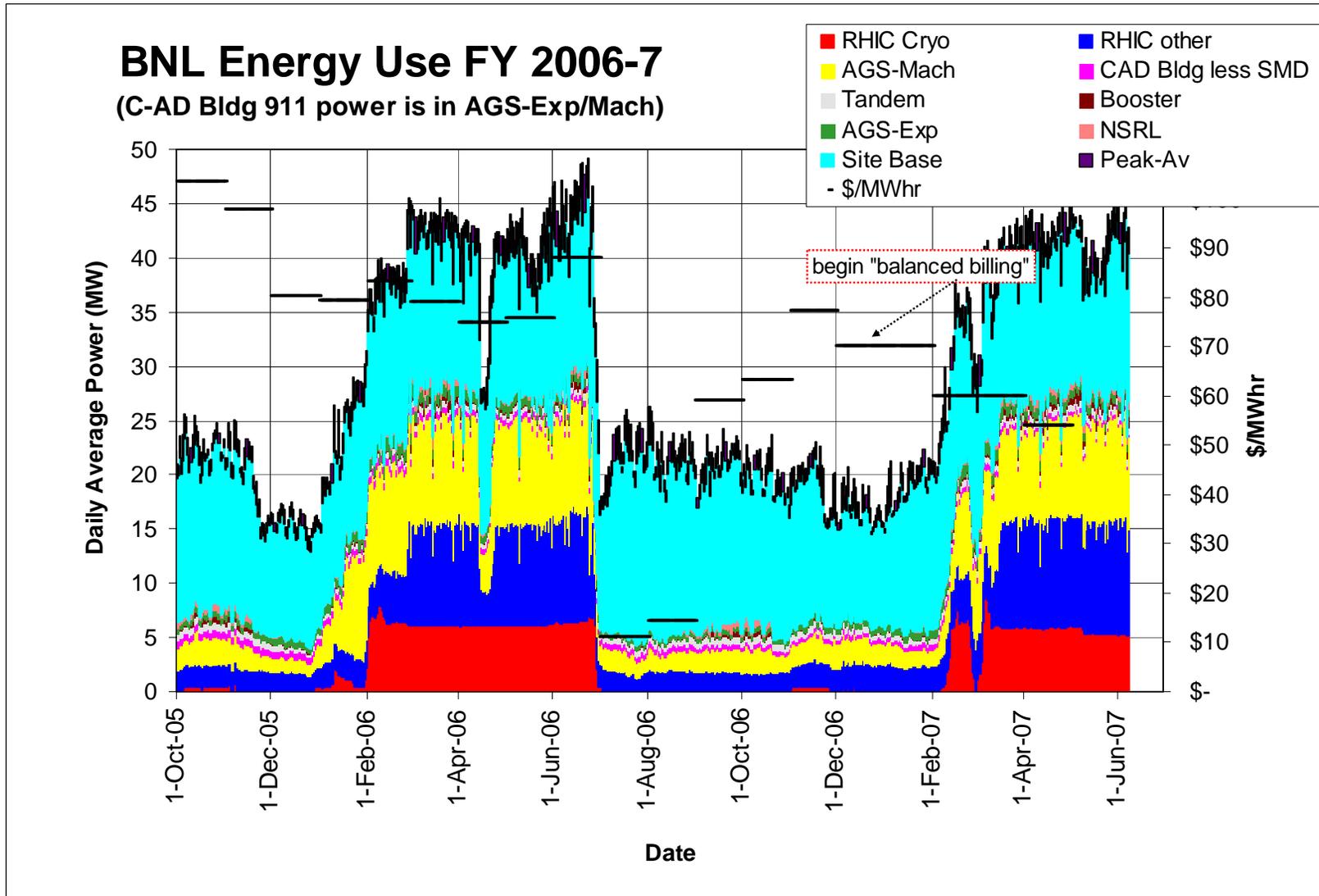
As of 7 June



As of 7 June



as of 31 May



# RHIC Machine/Detector Planning Meeting

## Next Meeting

Tuesday, June 19, after Time Meeting

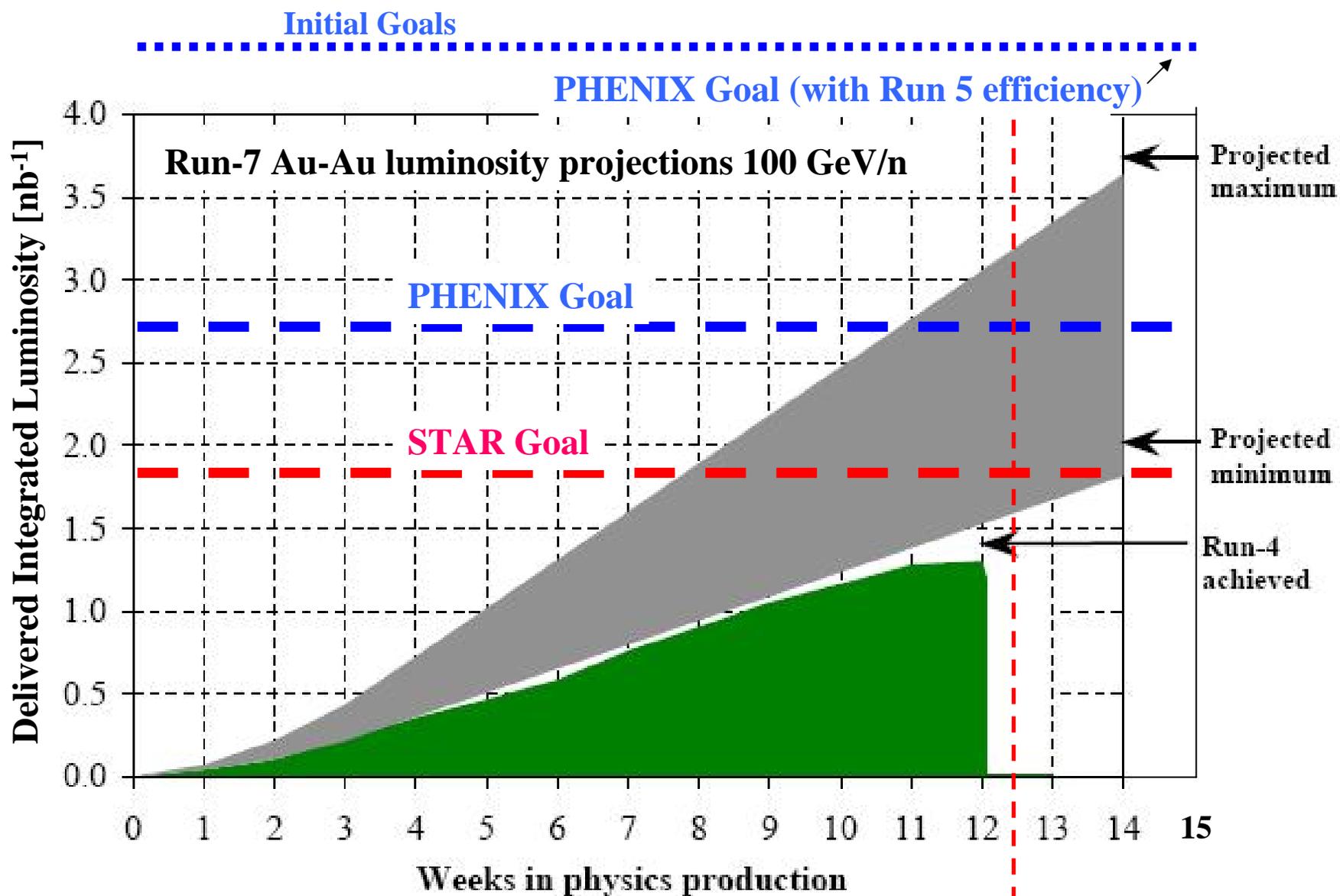
# [RHIC Machine/Detector Planning Meeting](#)

[Archive](#)

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)**



12.6 weeks with 26 June end of physics

# C-A Operations-FY07

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

*Plan, subject to change*

FY 2007

Program Element	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
AGS-Booster-Tandem/Linac Startup														
								19.7 weeks						
RHIC Cryo Cooldown/Warm-up														
RHIC Cryo Operation								26 June						
RHIC Cryo off														
								13.1 weeks						
RHIC Research with $\sqrt{s} = 200$ GeV/n Au - Au														
RHIC Other (TBD)														
NSRL (NASA Radiobiology)														
Shutdown (RHIC)														

# 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**

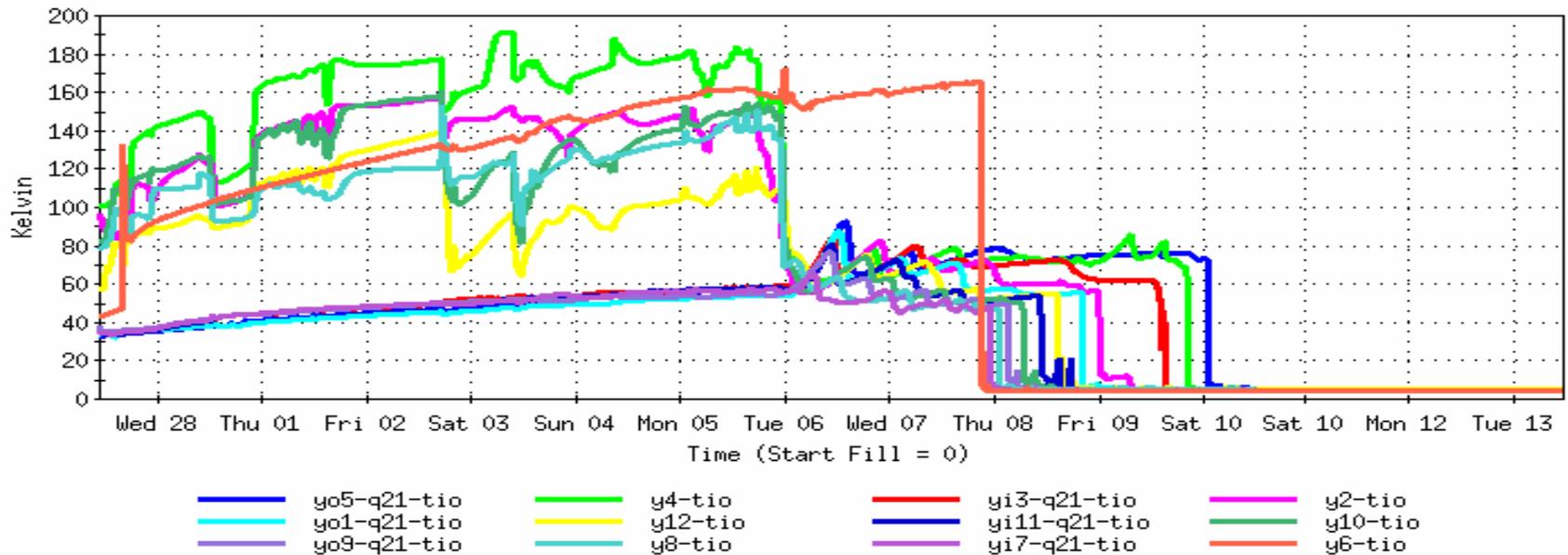
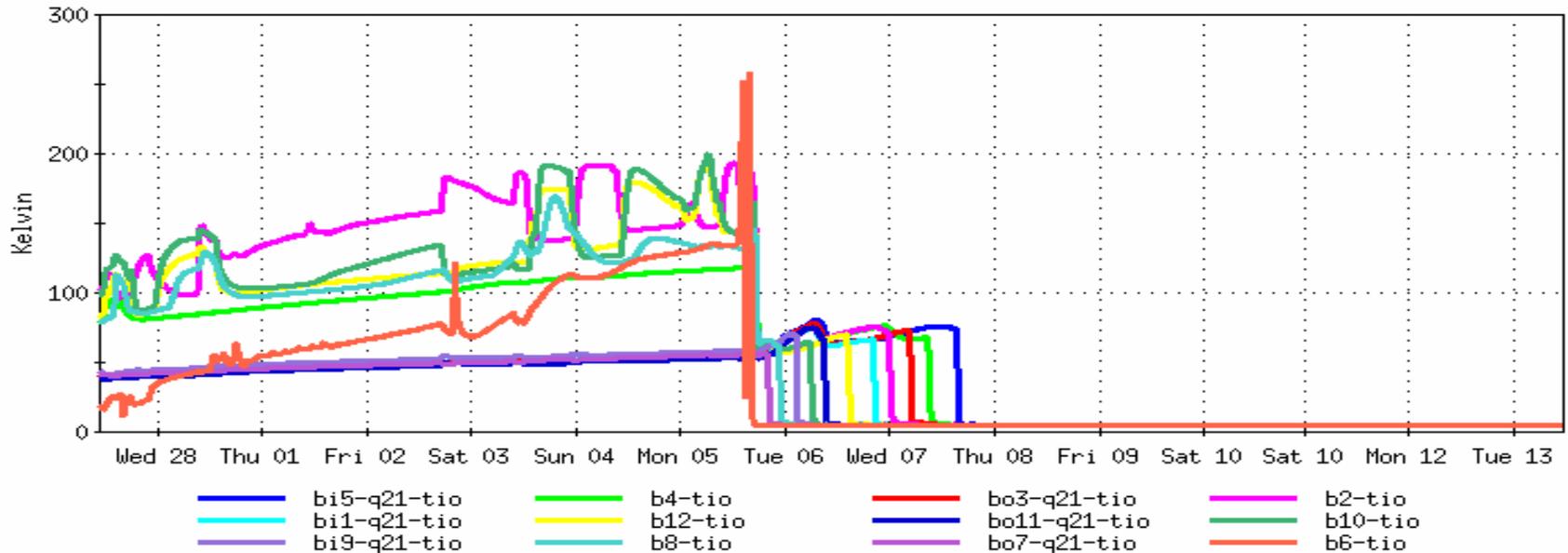
– **STAR**

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

– **Machine**

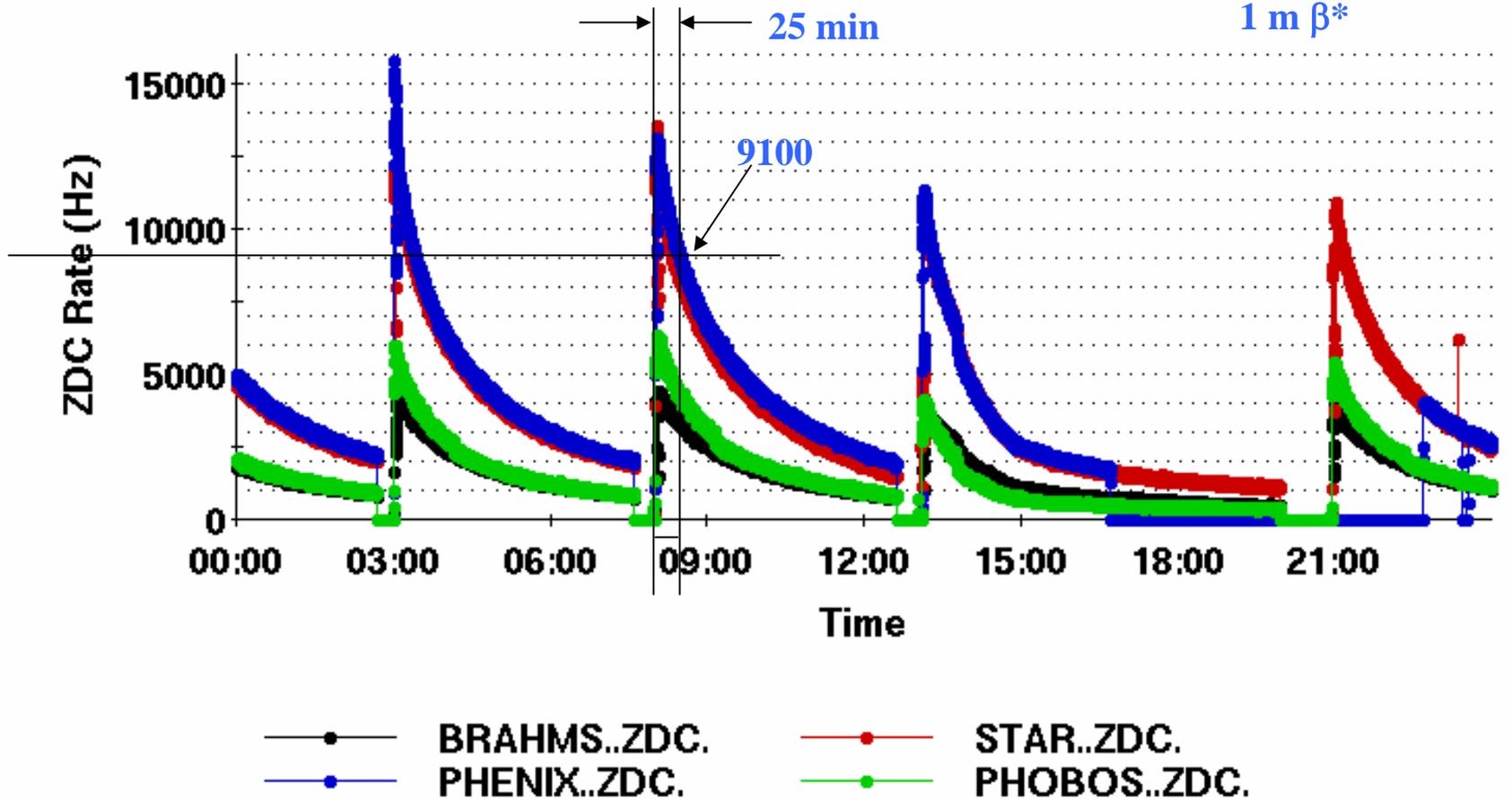
- **1-2 days low energy Au-Au development at 0.5 injection energy**
- **pp development –**
  - **1<sup>st</sup> priority new RHIC working point (needs ~2 weeks)**
  - **2<sup>nd</sup> priority 500 GeV development**

## As of 12 Mar



RHIC Luminosity Sun Mar 21 23:59:57 2004

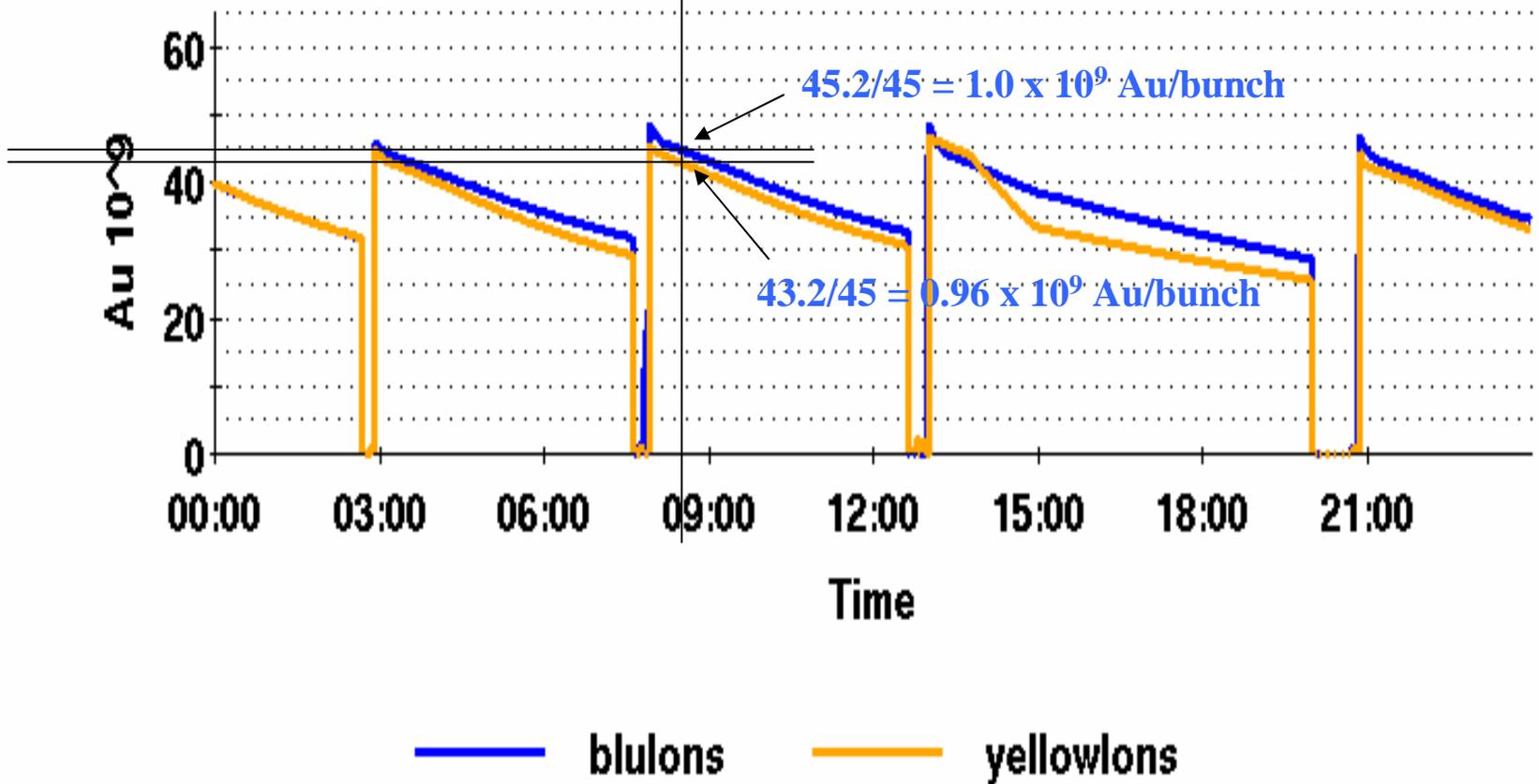
45 x 45 bunches  
1 m  $\beta^*$



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

45 x 45 bunches

25 min into store →



# 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

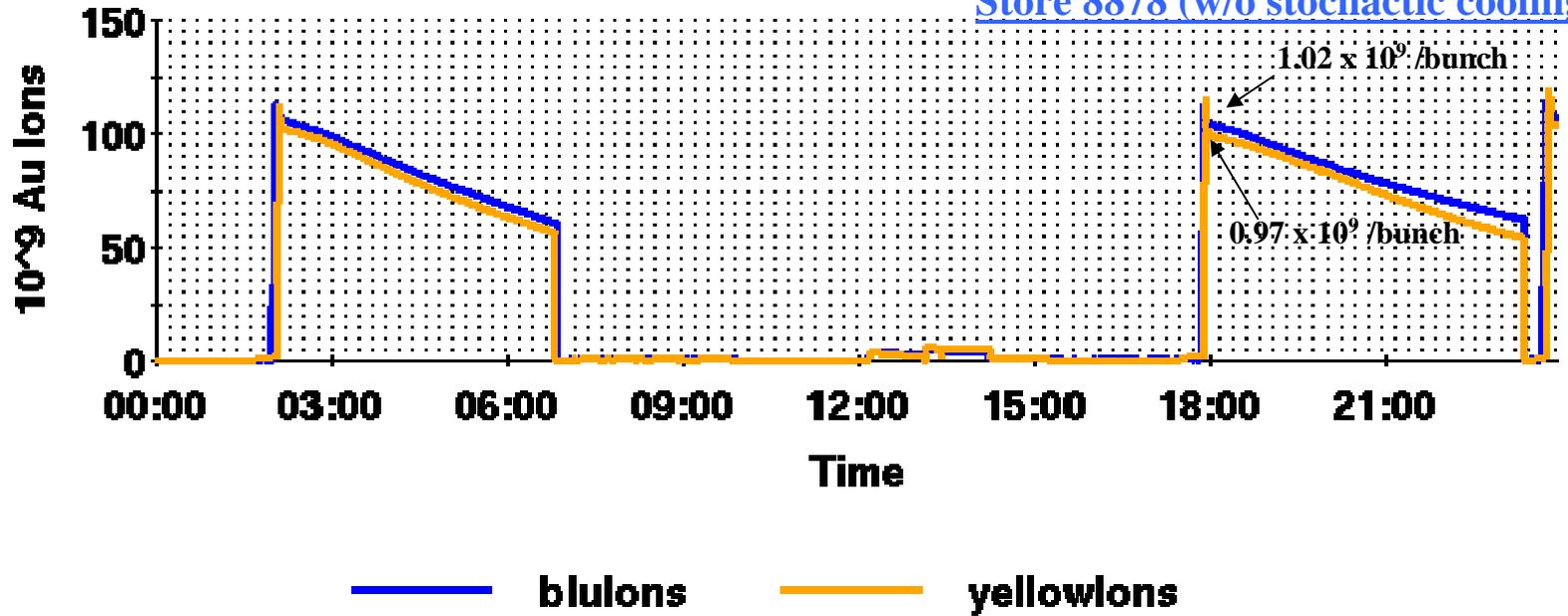
If the beam emittance is the same for the two runs then:

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

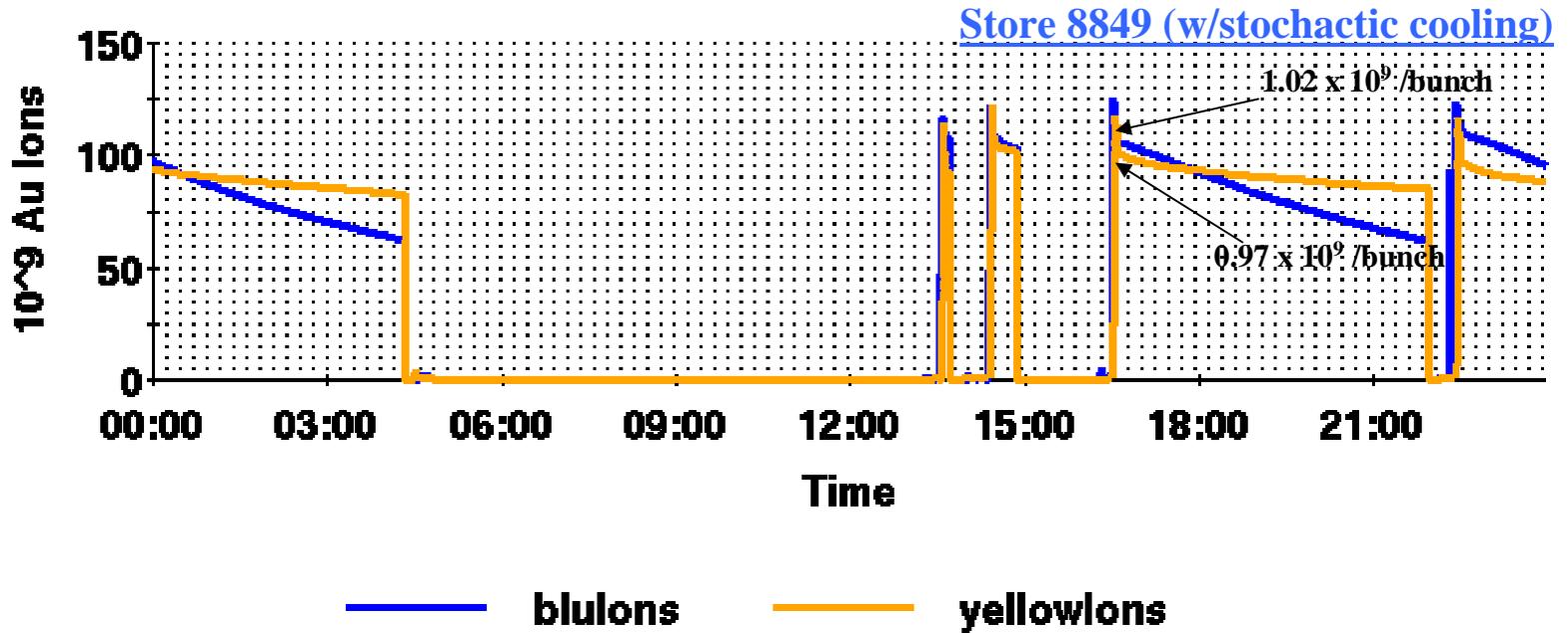
Run 7 β\* is supposed to be 0.8 meters

# RHIC Beam Intensity Wed May 30 23:58:34 2007

Store 8878 (w/o stochastic cooling)

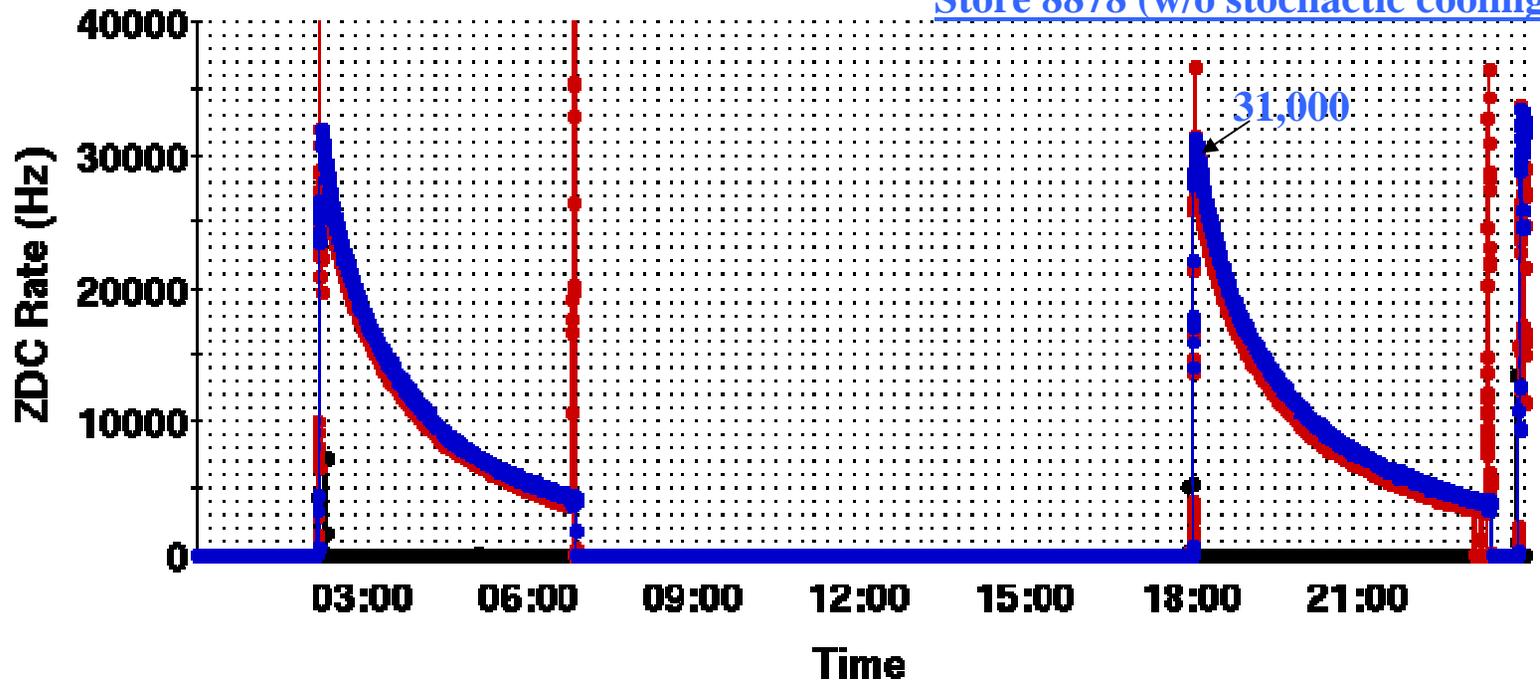


# RHIC Beam Intensity Fri May 25 23:58:31 2007



# RHIC Luminosity Wed May 30 23:58:47 2007

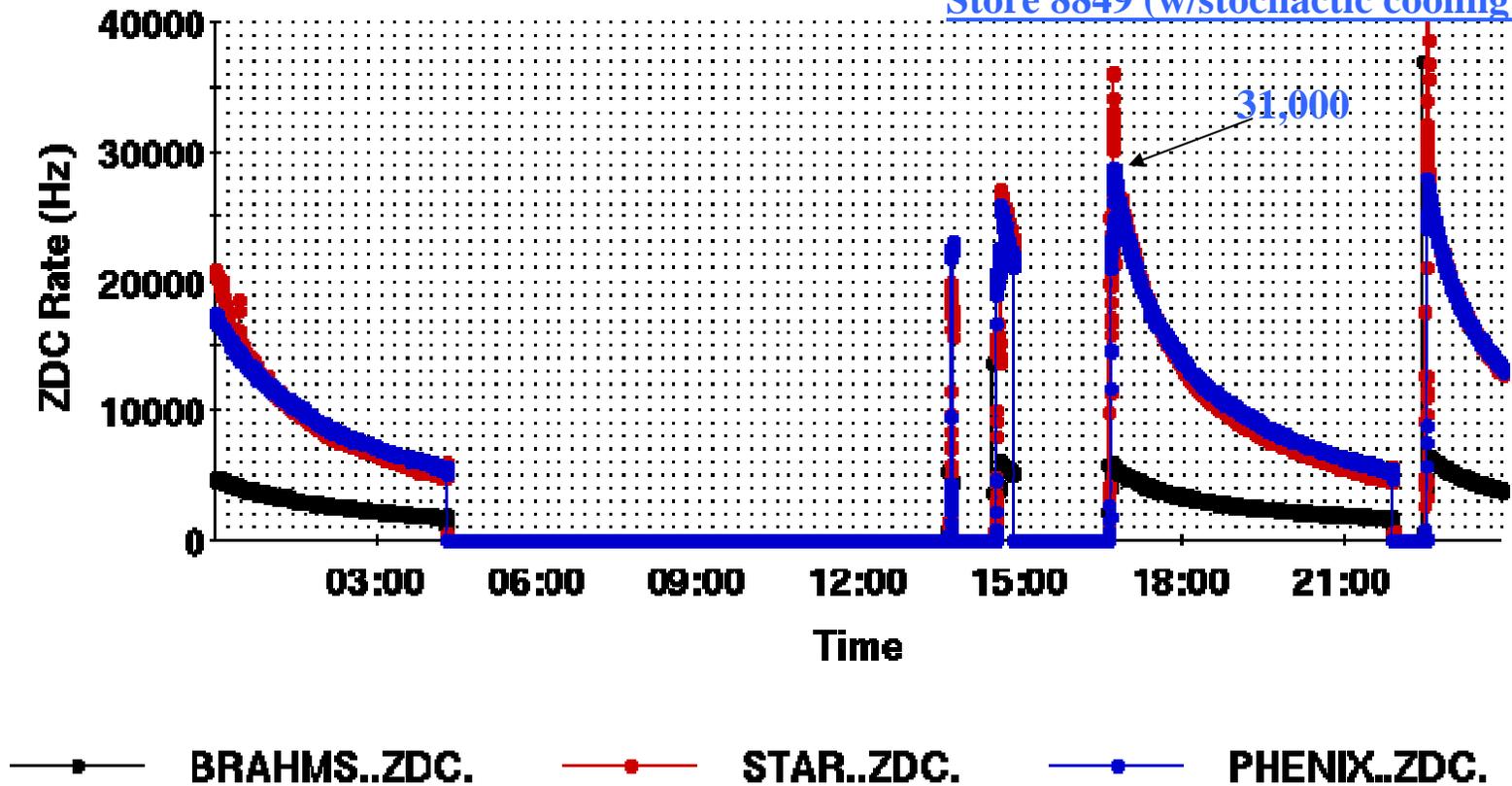
Store 8878 (w/o stochastic cooling)



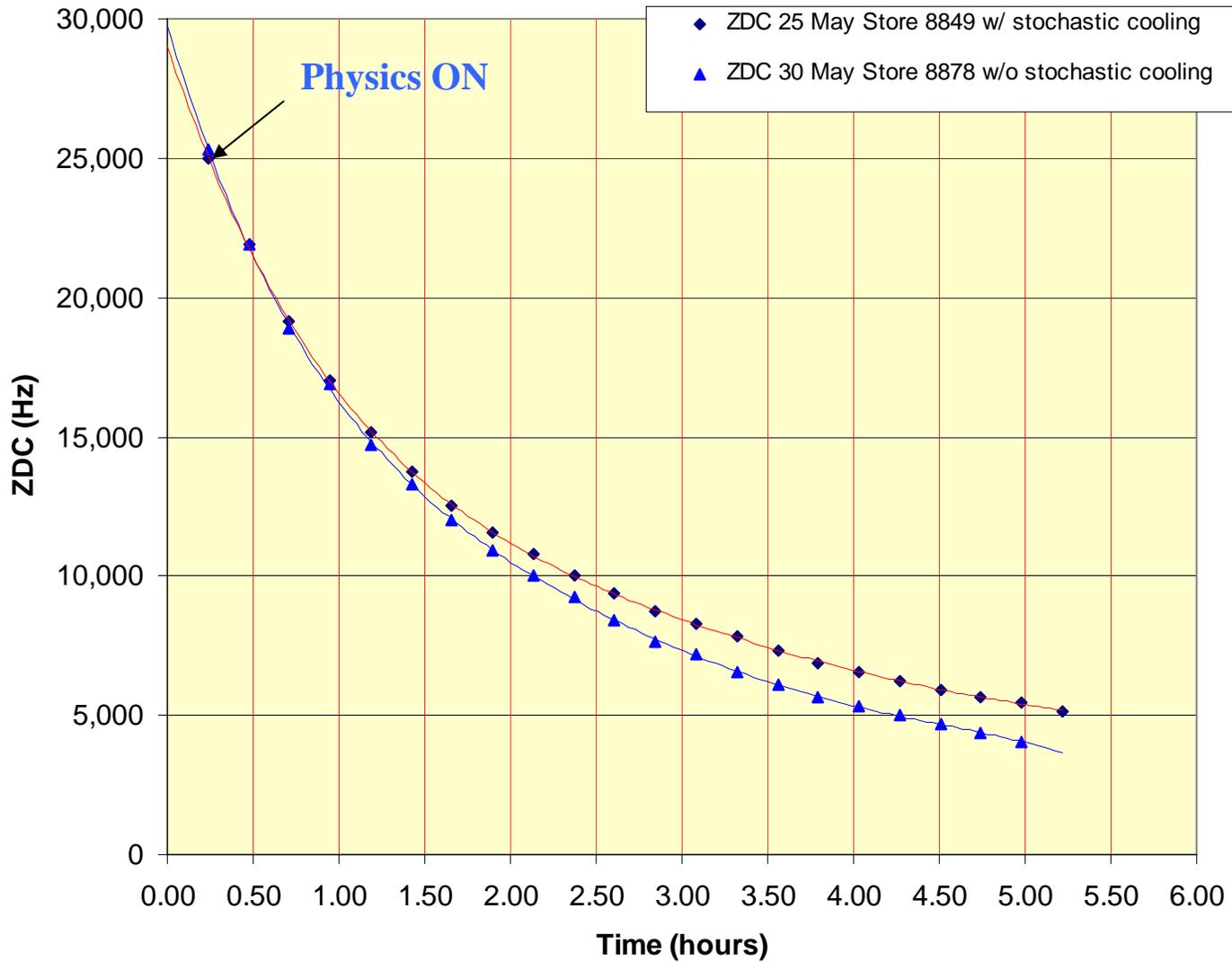
—●— BRAHMS..ZDC.      —●— STAR..ZDC.      —●— PHENIX..ZDC.

# RHIC Luminosity Fri May 25 23:58:50 2007

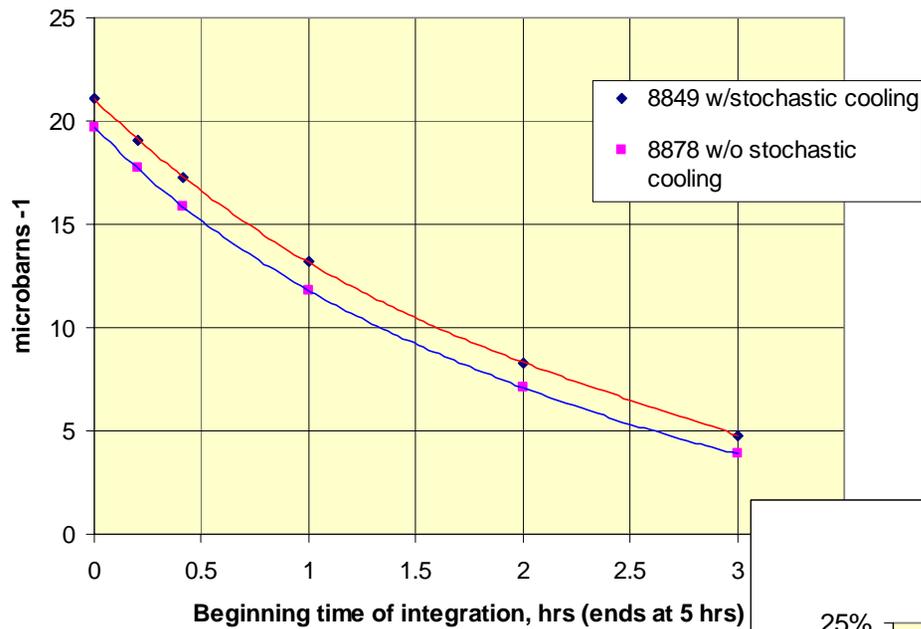
Store 8849 (w/stochastic cooling)



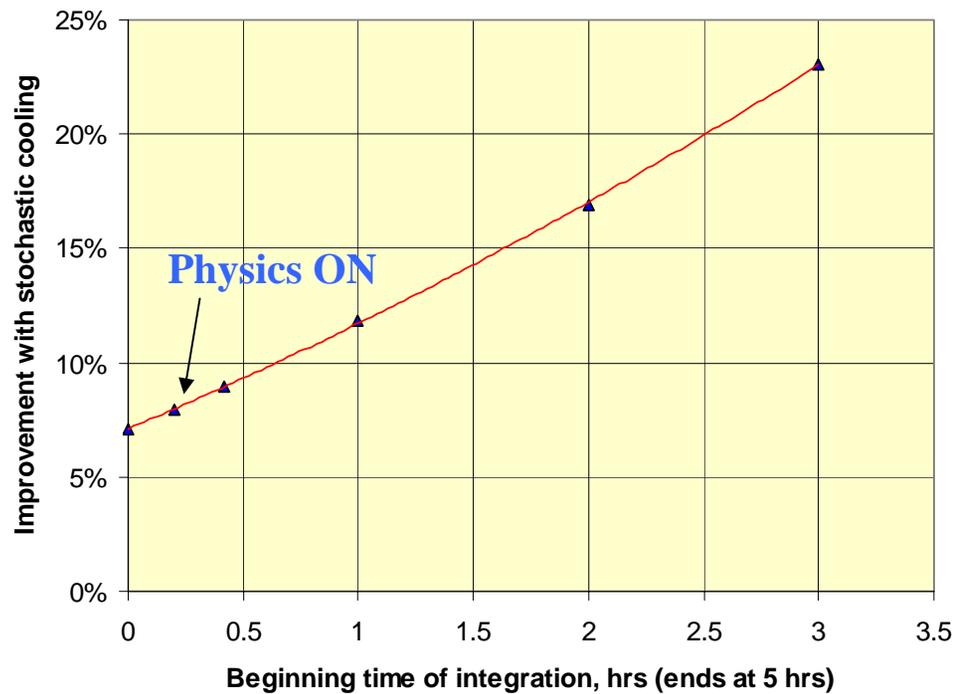
# Run7 AuAu ZDC rates with and without stochastic cooling, with equal initial Au ions/bunch in each ring



Run 7 Stochastic Cooling

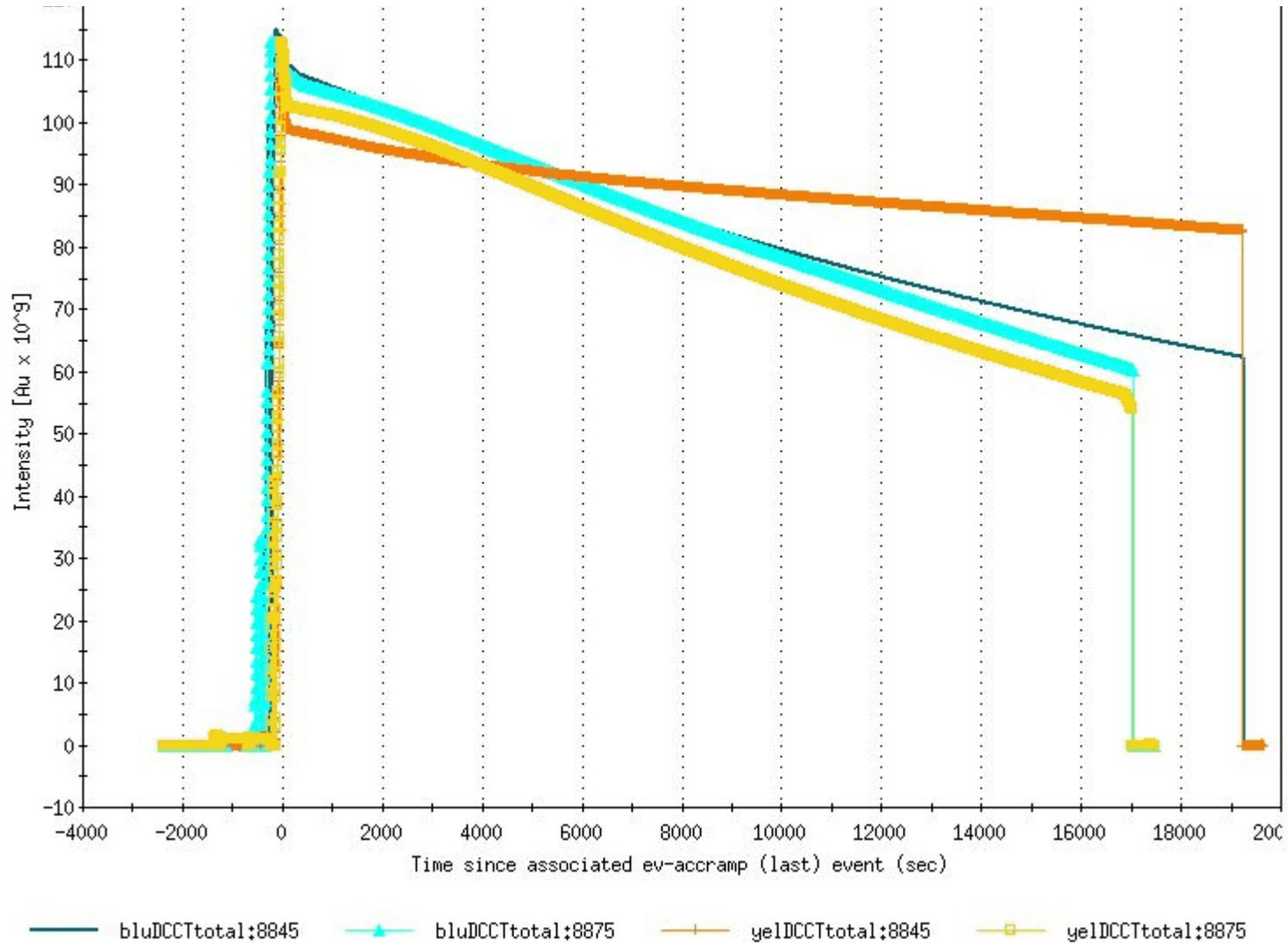


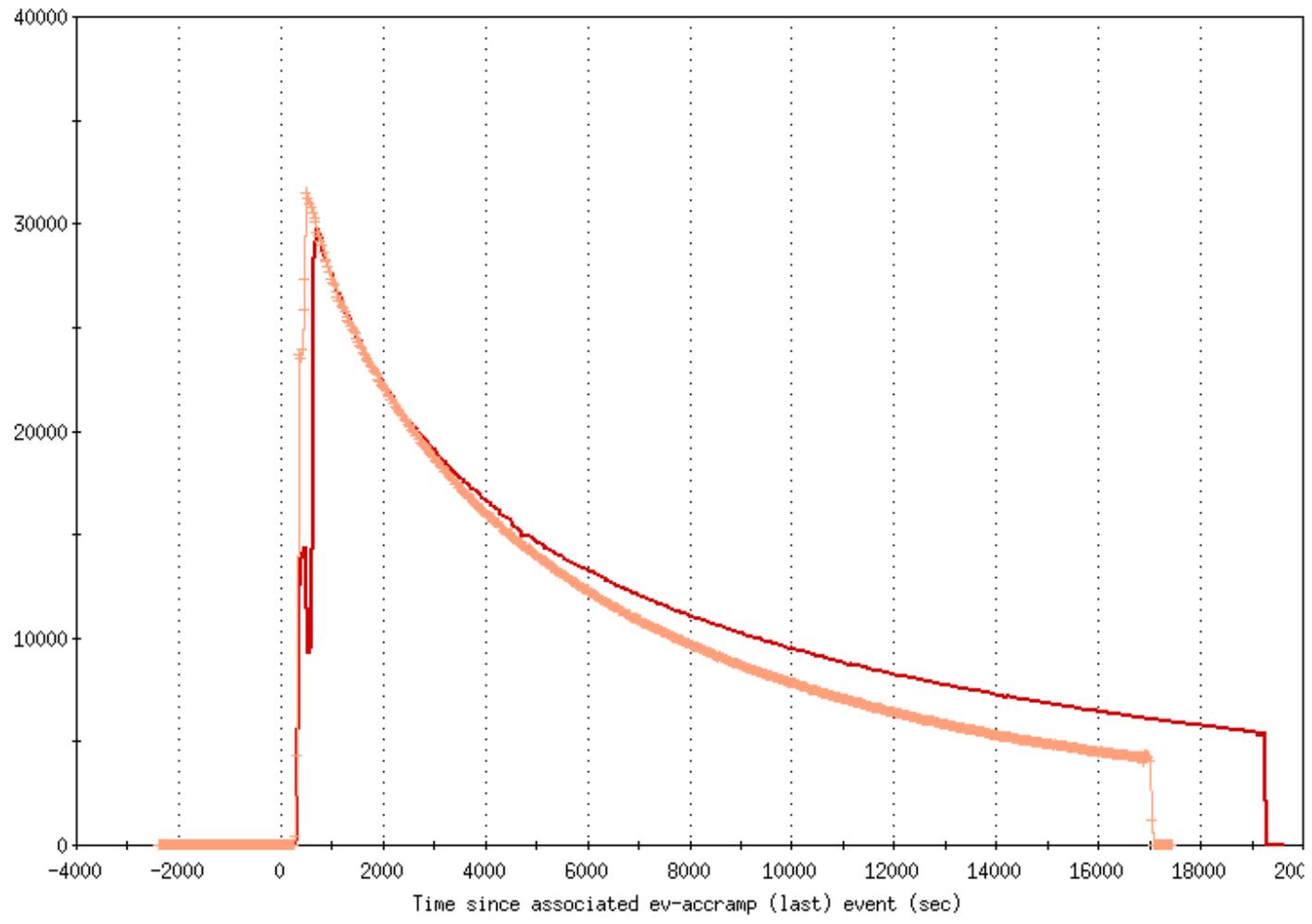
Run 7 Stochastic Cooling, stores 8849 and 8878



12 June 07

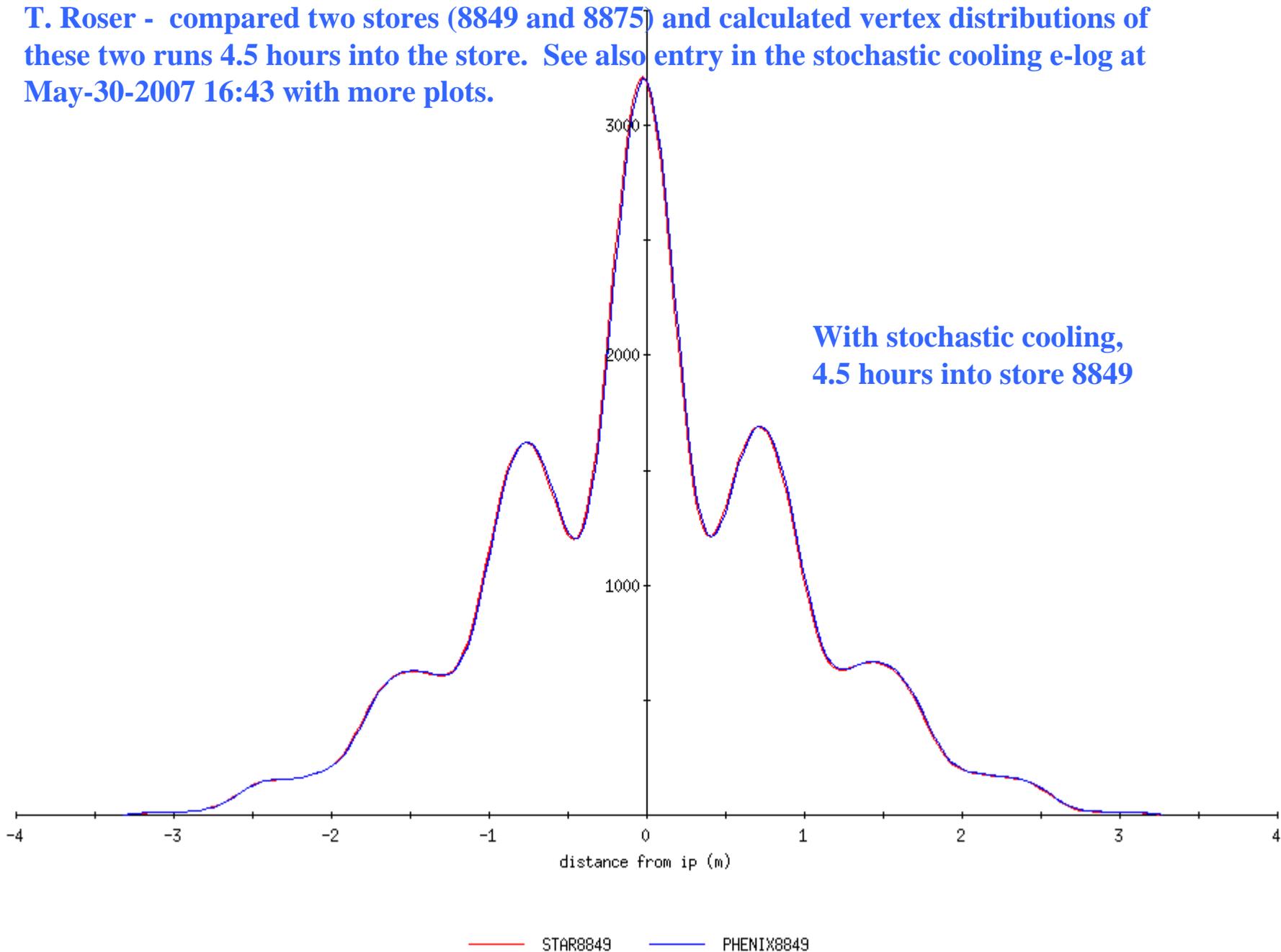
T. Roser - compared two stores (8845 and 8875) and calculated vertex distributions of these two runs 4.5 hours into the store. See also entry in the stochastic cooling e-log at [May-30-2007 16:43](#) with more plots.

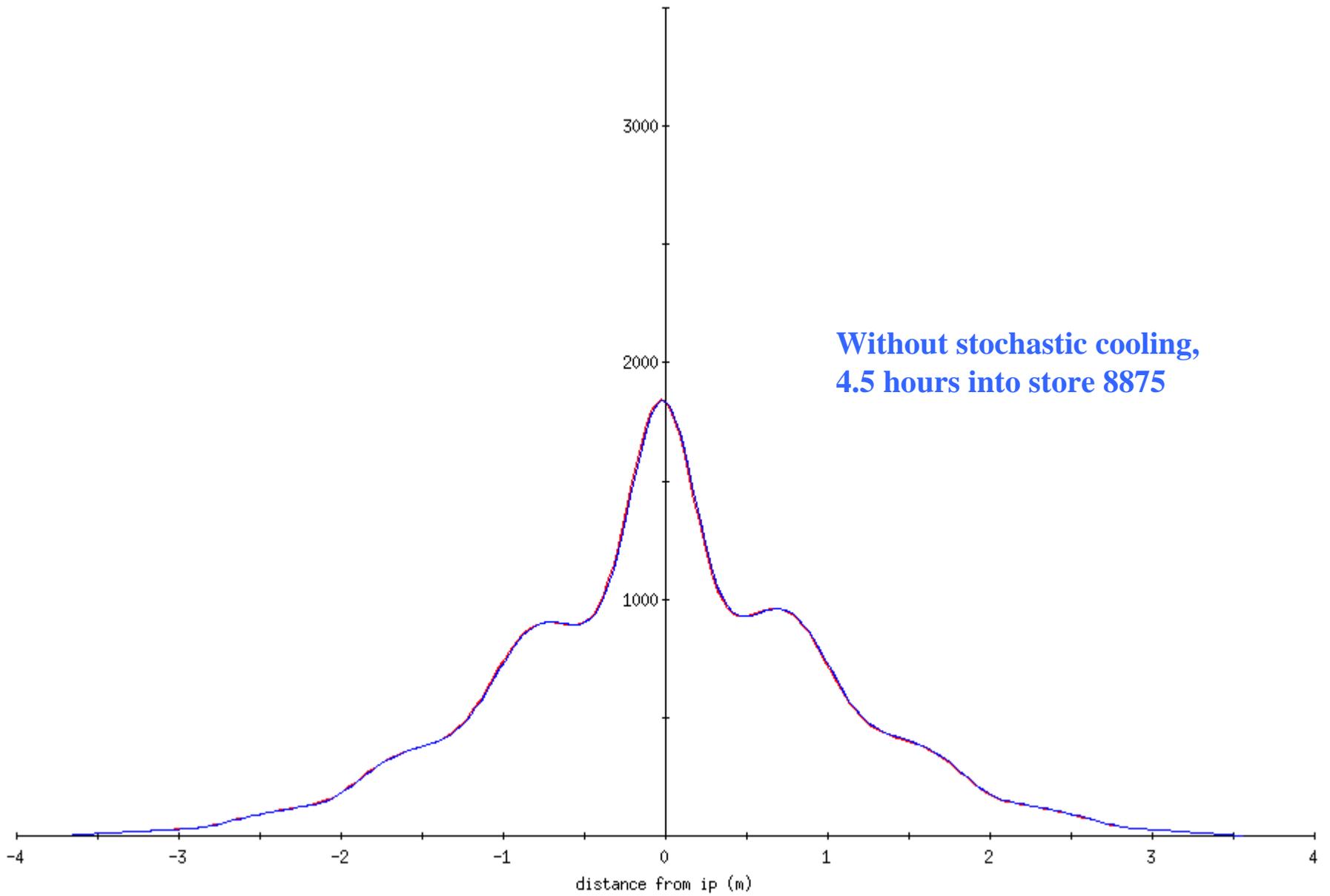




PHENIX:8845 PHENIX:8875

T. Roser - compared two stores (8849 and 8875) and calculated vertex distributions of these two runs 4.5 hours into the store. See also entry in the stochastic cooling e-log at May-30-2007 16:43 with more plots.

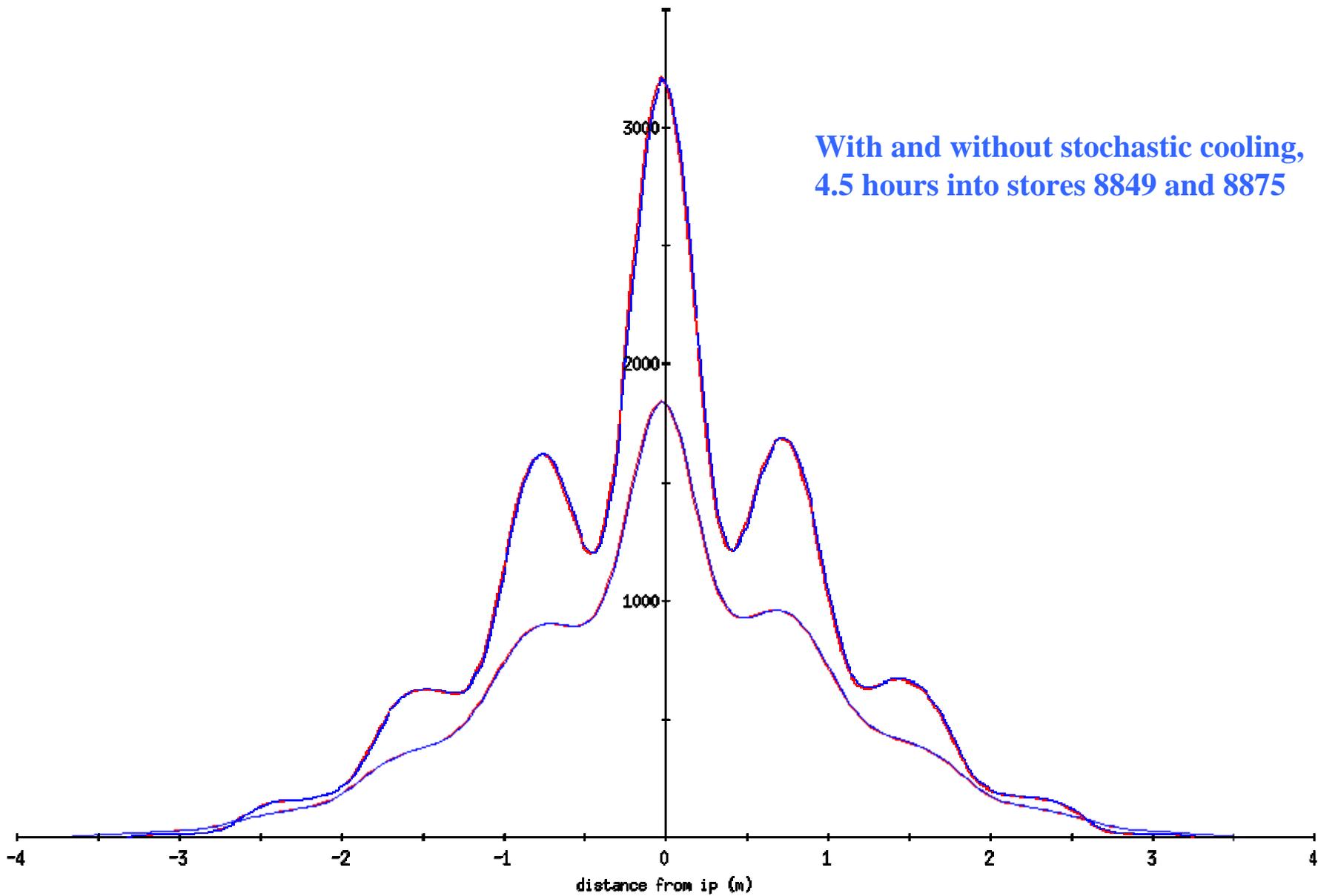




**Without stochastic cooling,  
4.5 hours into store 8875**

— STAR8875    — PHENIX8875

With and without stochastic cooling,  
4.5 hours into stores 8849 and 8875



— STAR8849 — PHENIX8849

Last week revisited – calculation of improvement factor with correction for unequal initial beam intensities

<b>Store</b>	<b>Au/bunch (<math>10^9</math>) T=+25 min</b>	<b>Store Hrs</b>	<b><math>\mu\text{b}^{-1}</math></b>
<b>8776</b>	<b>1.03/0.96</b>	<b>5.0</b>	<b>16.9</b>
<b>8805</b>	<b>1.09/1.02</b>	<b>5.0</b>	<b>20.6</b>

**Improvement =  $20.6/16.9 * (1.03/1.09) * (0.96/1.02) = 1.08$**