

RHIC Machine/Detector Planning Meeting

Agenda

- **Scheduling Physicist Issues (Gardner)**
- **Experiment Issues – (Issue this week is length of store)**
 - **PHENIX (Leitch)**
 - **STAR (Christie)**
 - **Monopole (Dzhordzhadze)**
- **Machine Issues - (Drees)**
 - **Low energy AuAu development run – (Satogata)**
- **RHIC Beam Experiments - (Pilat)**
- **RCF Issues - (Throwe)**

To be revisited TODAY

Experiments luminosity goals for the Au-Au run as of 6 Feb

– PHENIX goals for 100 x 100 GeV/n Au-Au

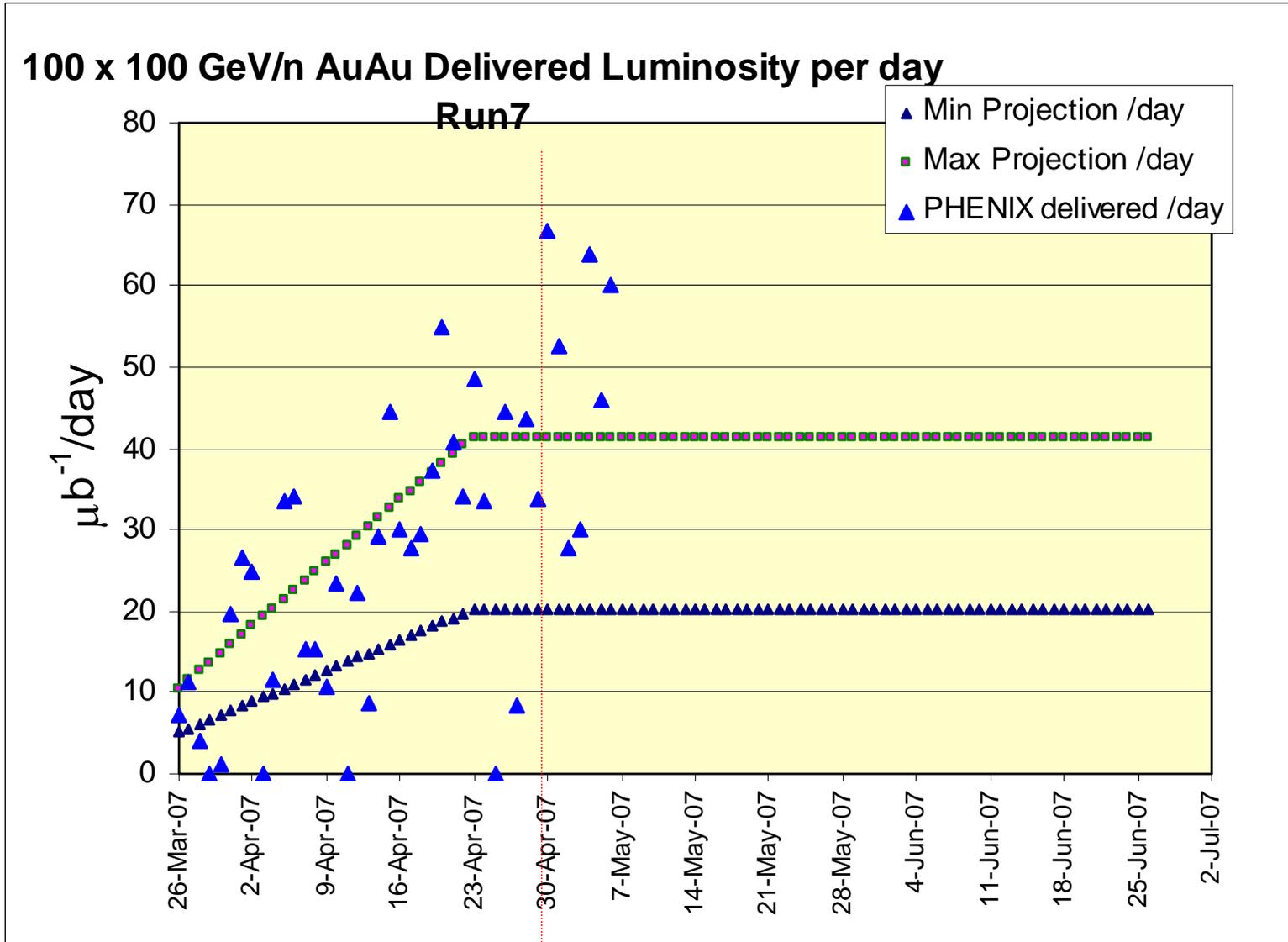
- Delivered Luminosity = 2700 μb^{-1}
- Sampled Luminosity = 1100 μb^{-1}
- Assumes 68% live time, 60% vertex cut = 40.5% efficient
- However, Run5 efficiency factor was 25% (if so, the Run7 requirement is 4400 μb^{-1} delivered)

– STAR goals for 100 x 100 GeV/n Au-Au

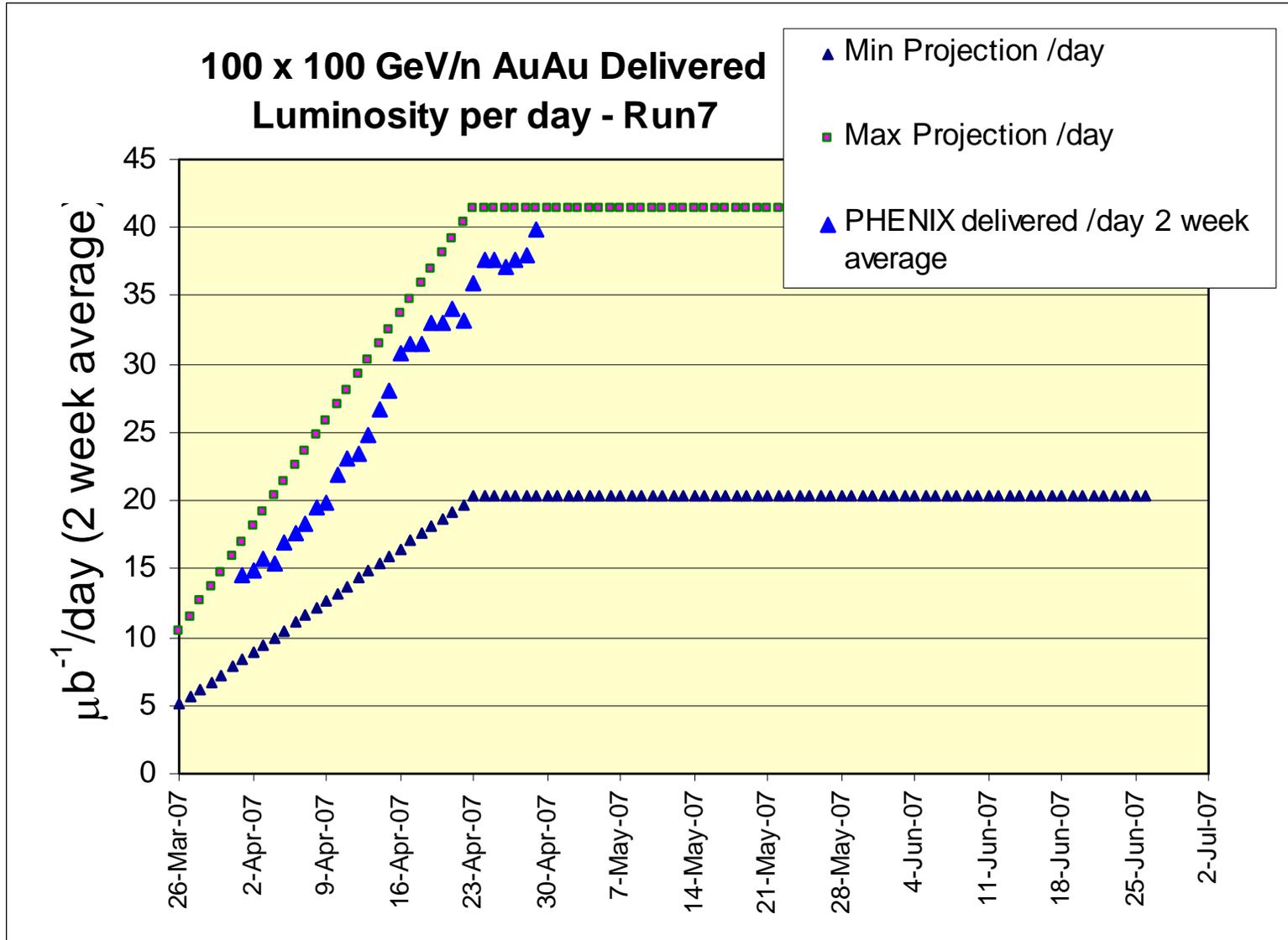
- Delivered Luminosity = 1800 μb^{-1}
- Sampled Luminosity = 300 μb^{-1} with 60M usable min-bias events
- ~50% live time
- 900 hrs @ $\langle L \rangle \sim 6 \times 10^{26} \text{ cm}^{-2} \text{ s}^{-1} \sim 1.8 \text{ nb}^{-1}$ delivered (added 5/8/07)

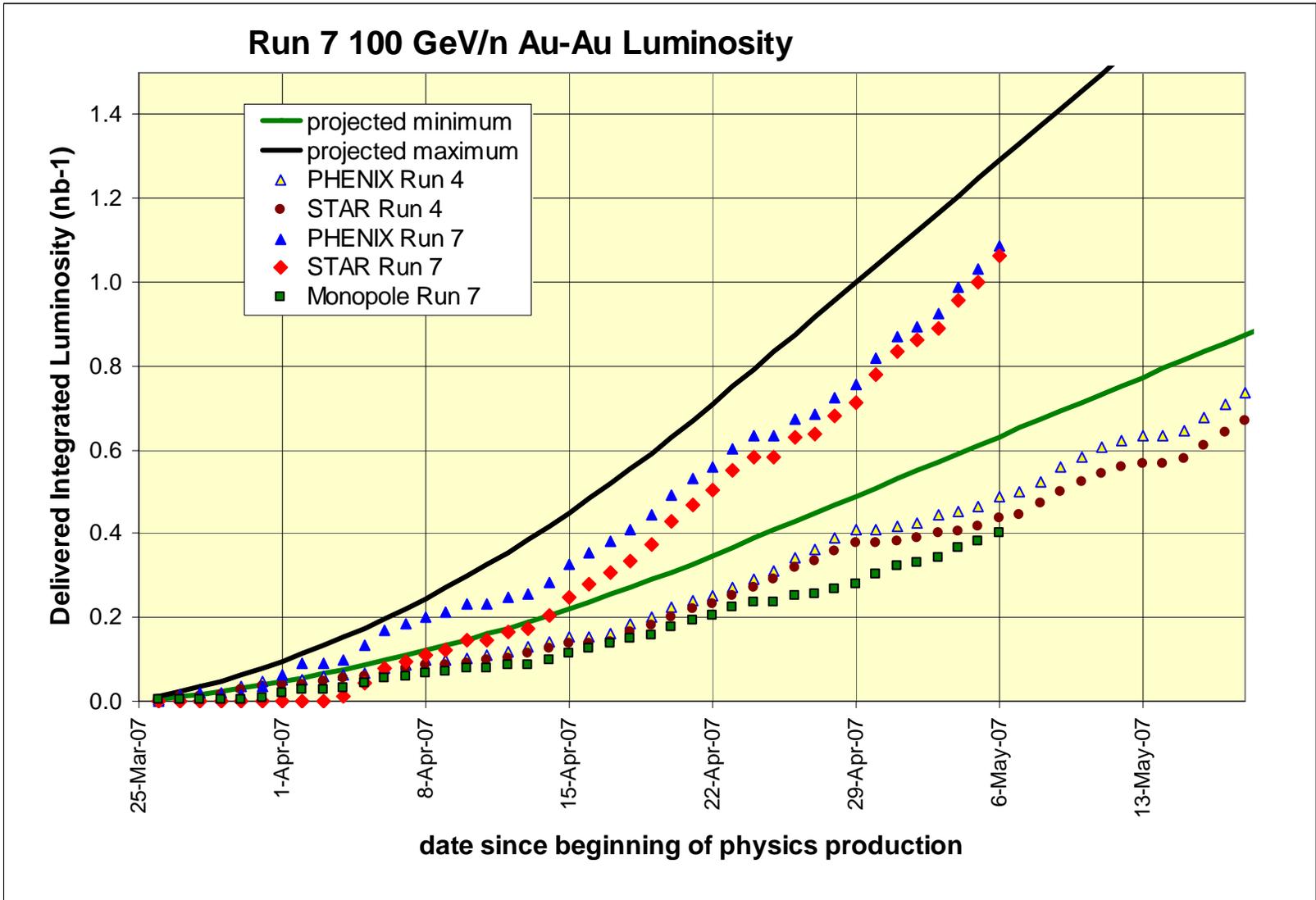
RHIC Run 7 as run/planned

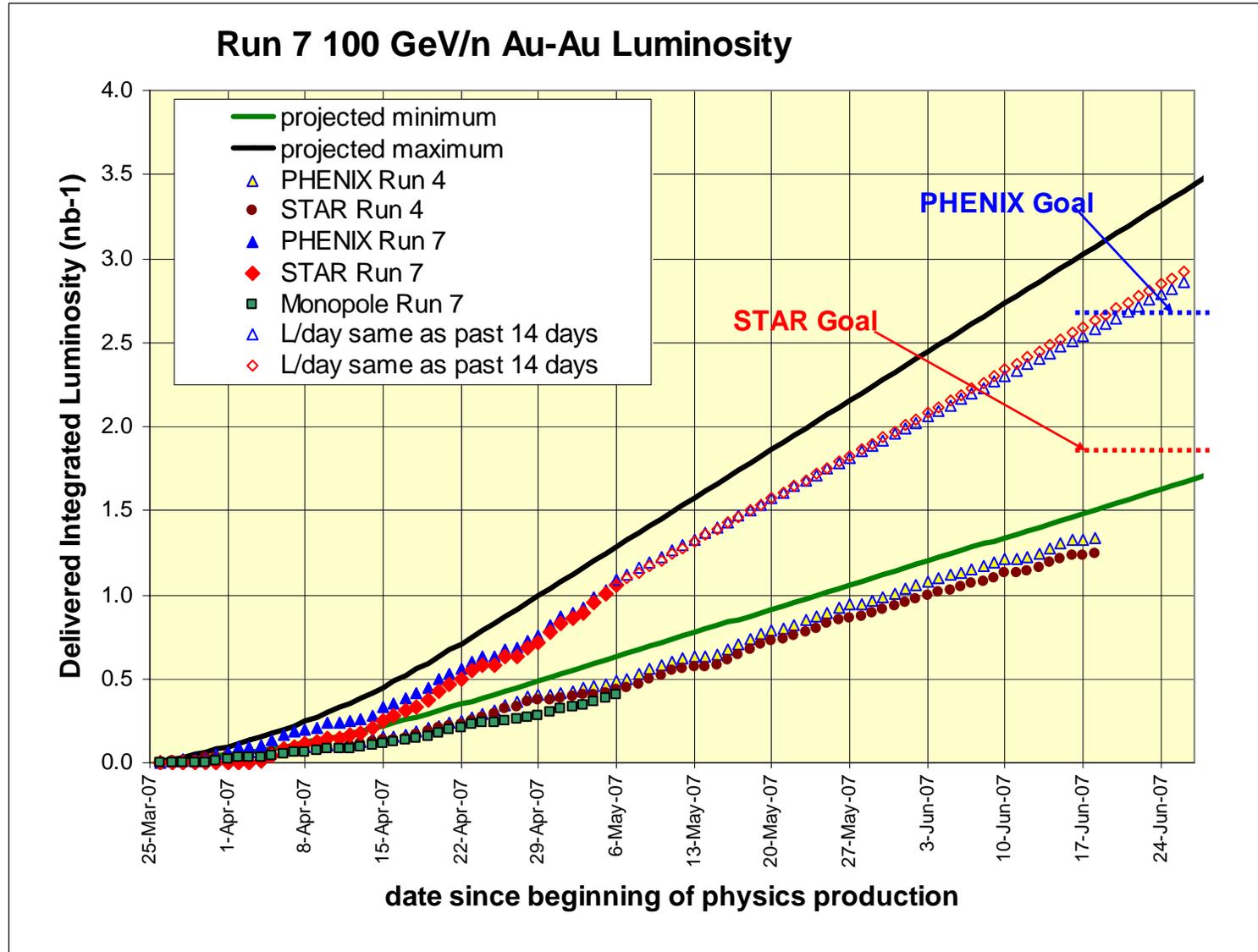
- 12 Feb – cool-down begins
- 17 Feb – blue cold
- 20 Feb – 1st beam in blue ring
- 23 Feb – Initial cold wave through yellow ring, not ready for beam
- 24 Feb – cryo problems, cool-down interrupted
- 26 Feb – cryo problems persist, begin warming up cryo plant
- 4 Mar – cryo back on
- 8 Mar – Blue cold 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 – 1st Maintenance day
- **3 Apr - STAR Physics declared**
- **8 May - 49 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



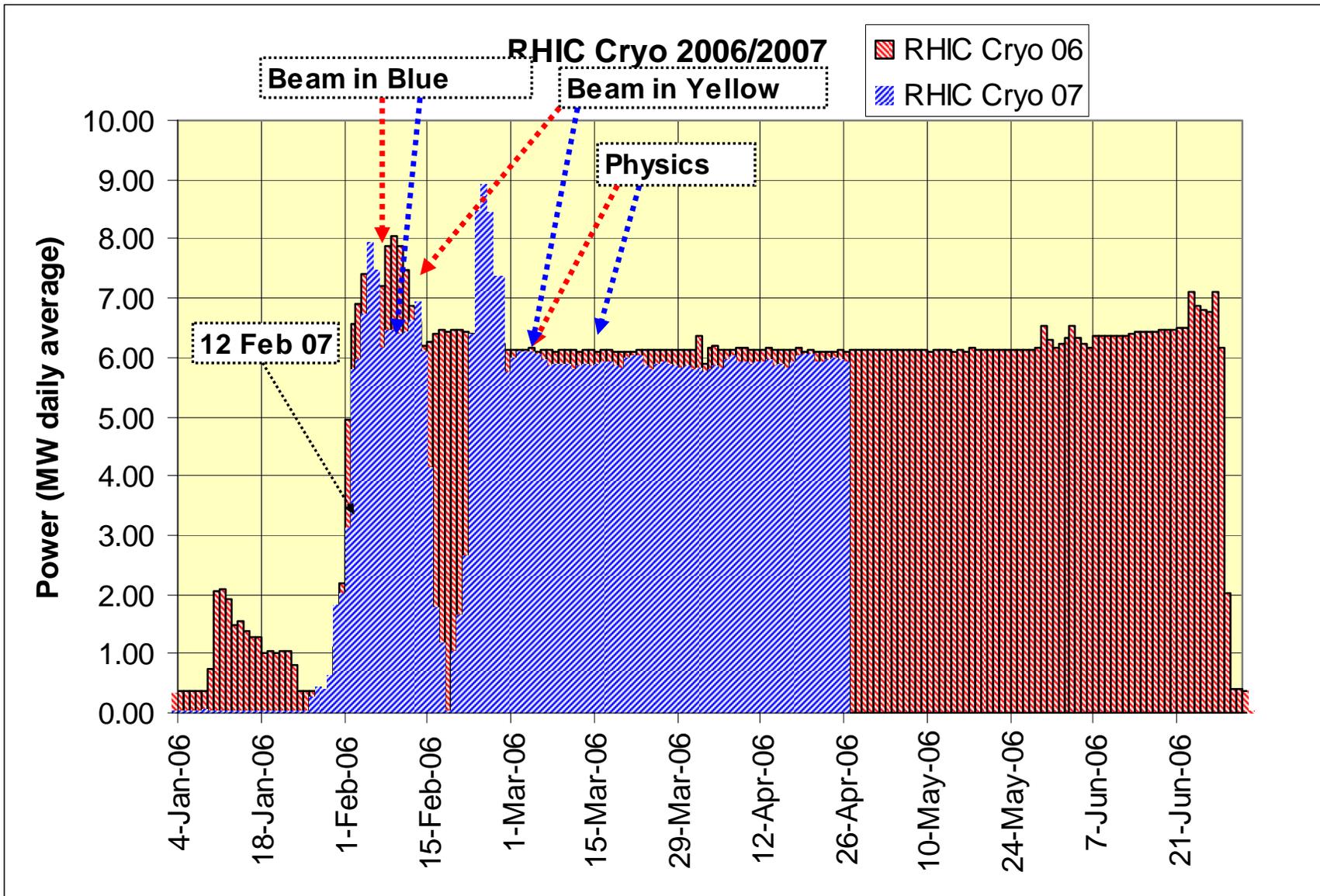
as of 5/6/07



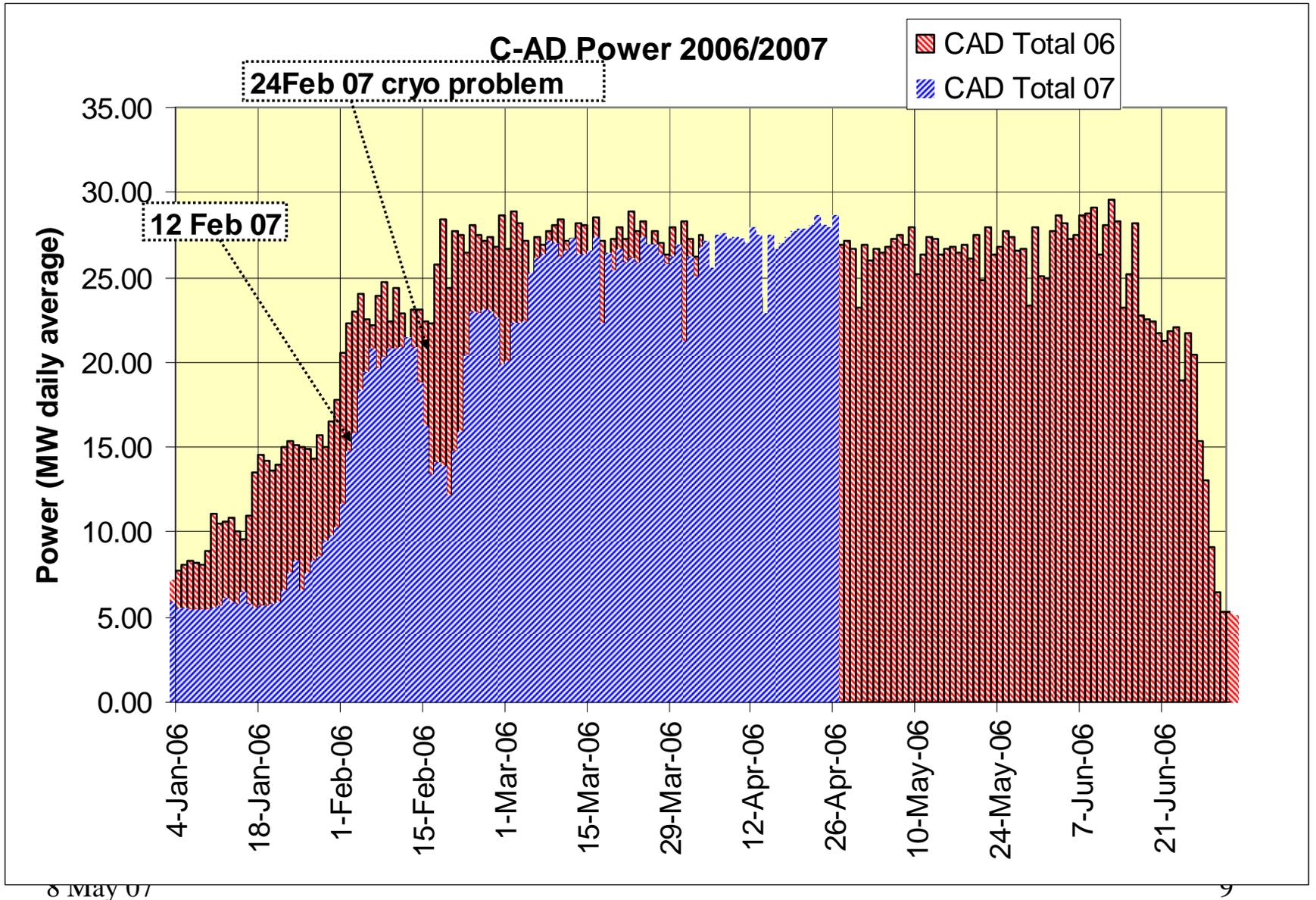




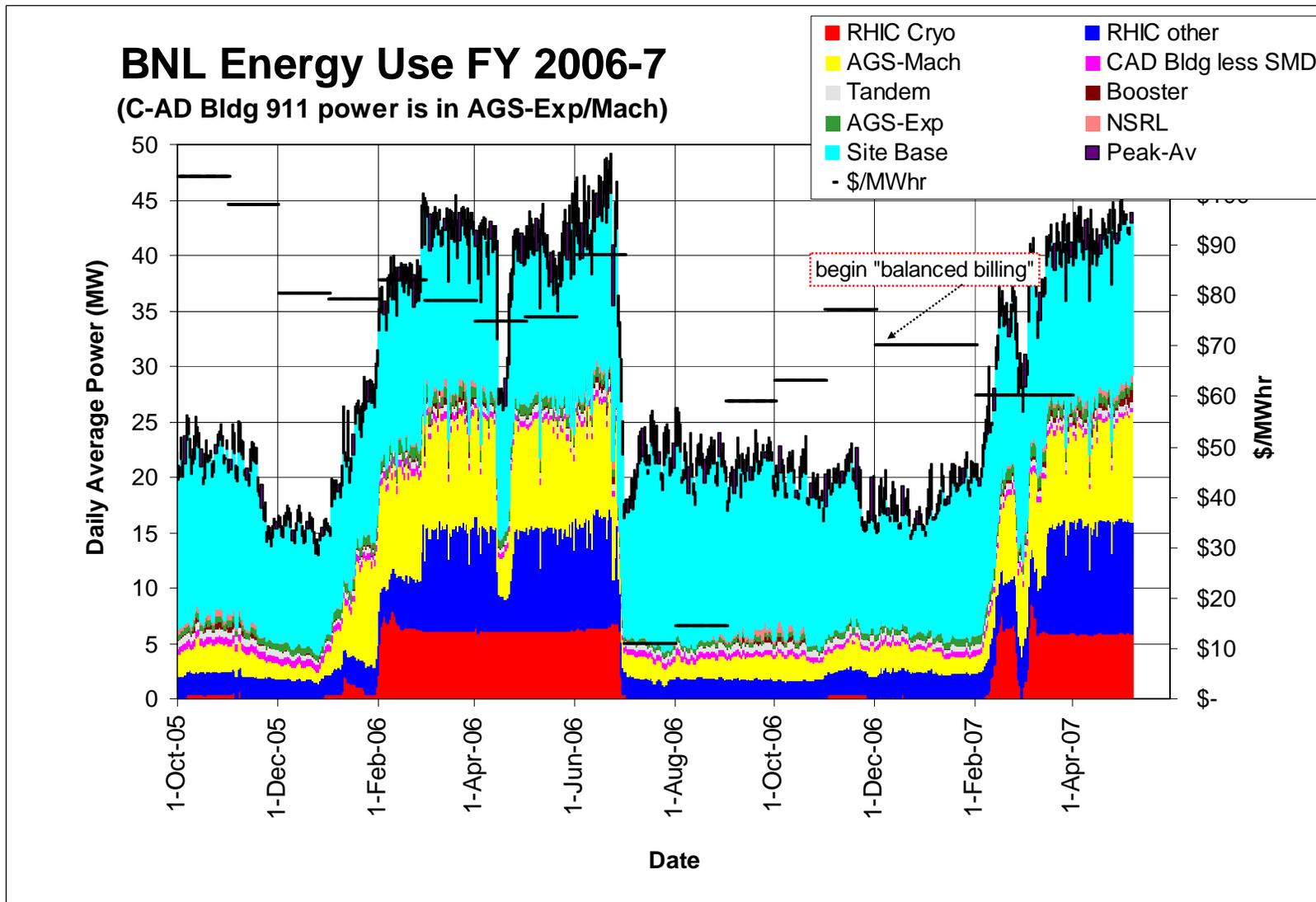
As of 7 May



As of 7 May



as of 7 May



RHIC Machine/Detector Planning Meeting

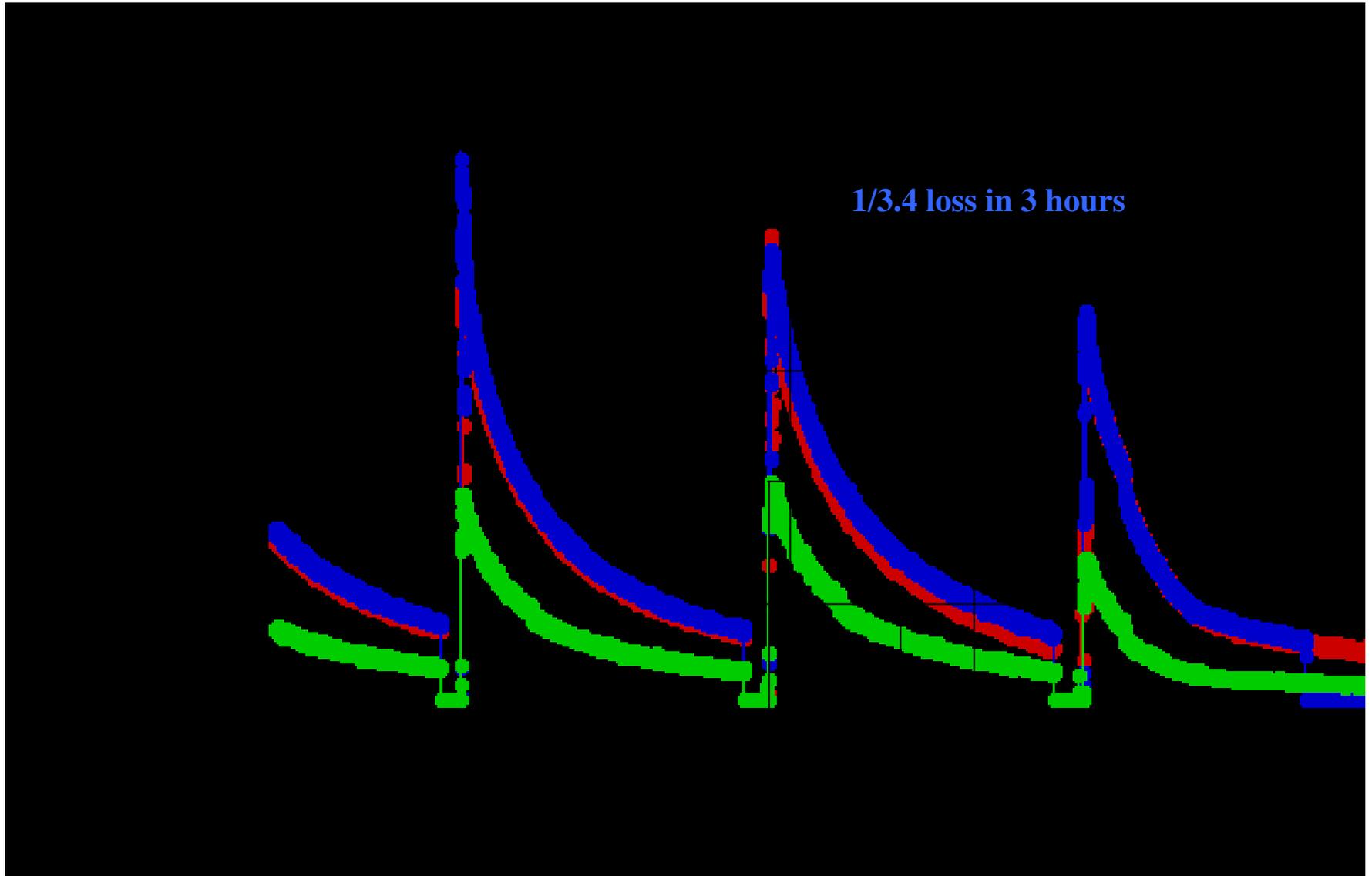
Next Meeting

Tuesday, May 1, after Time Meeting

Yousef Makdisi will moderate

RHIC Machine/Detector Planning Meeting

Archive

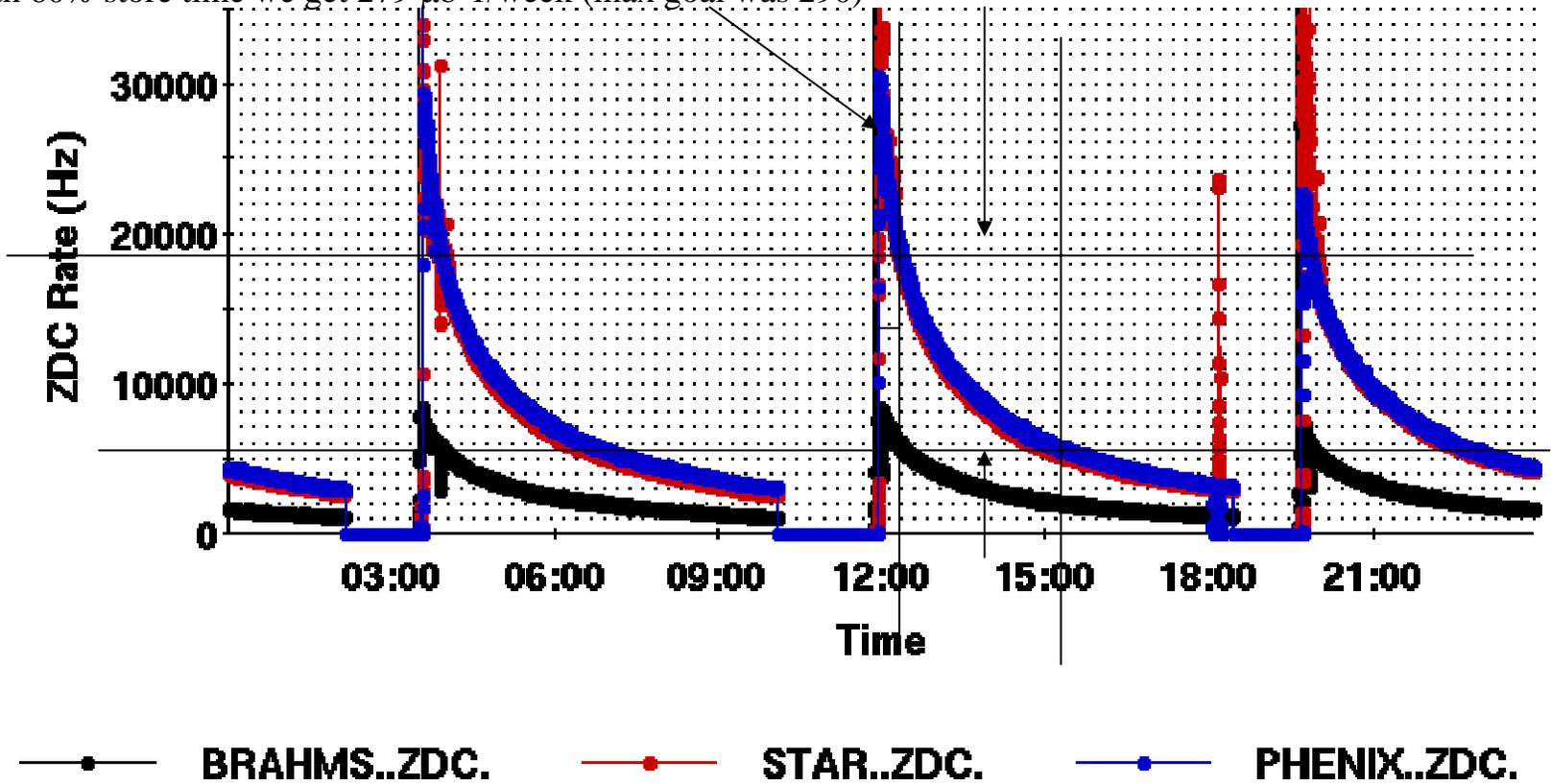


RHIC Luminosity Sun Apr 15 23:58:53 2007

Store 8544, integrated lumi 17.7 μb^{-1} , 6.4 hr store

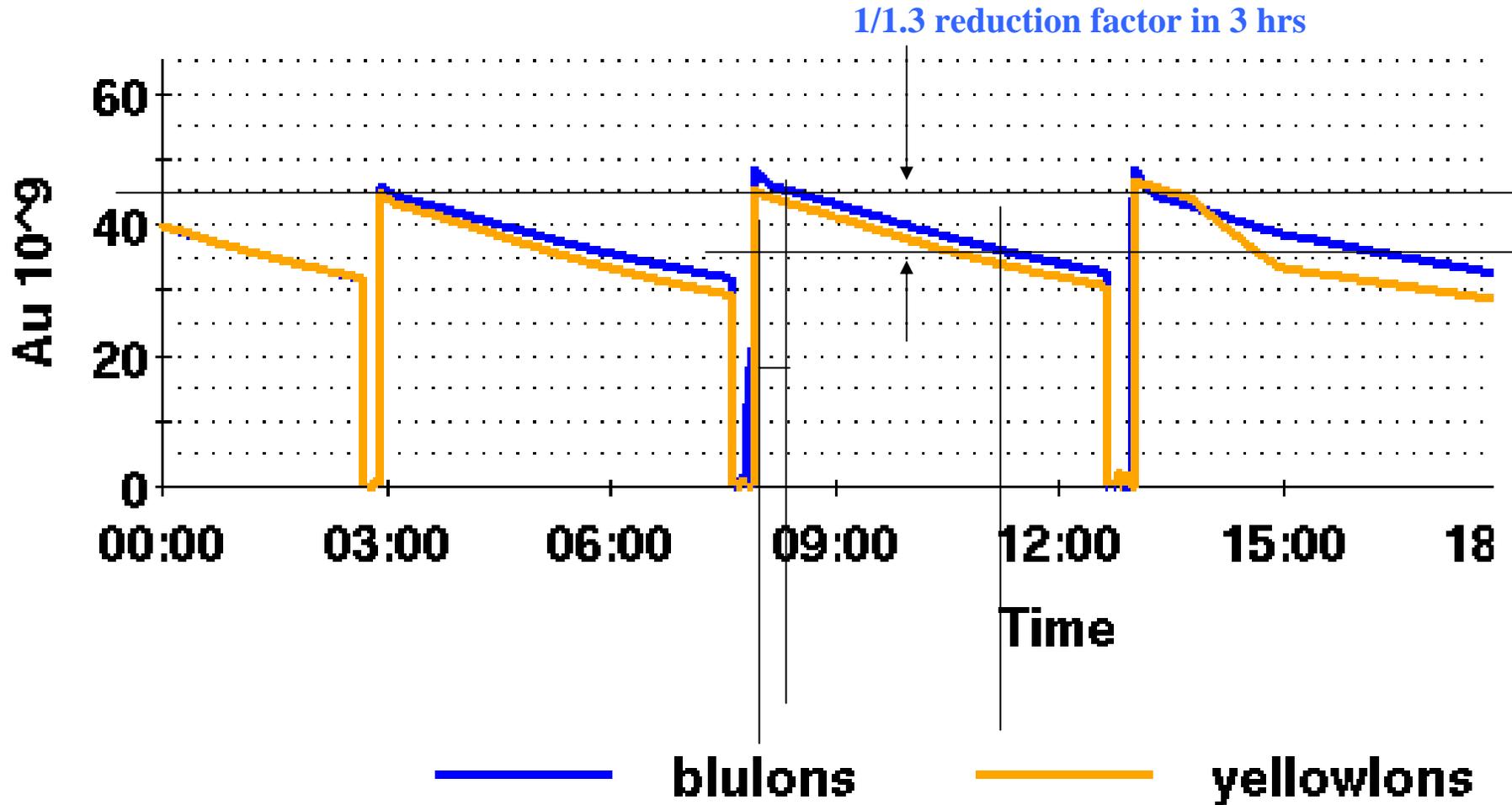
With 60% store time we get 279 $\mu\text{b}^{-1}/\text{week}$ (max goal was 290)

1/3.4 loss in 3 hrs



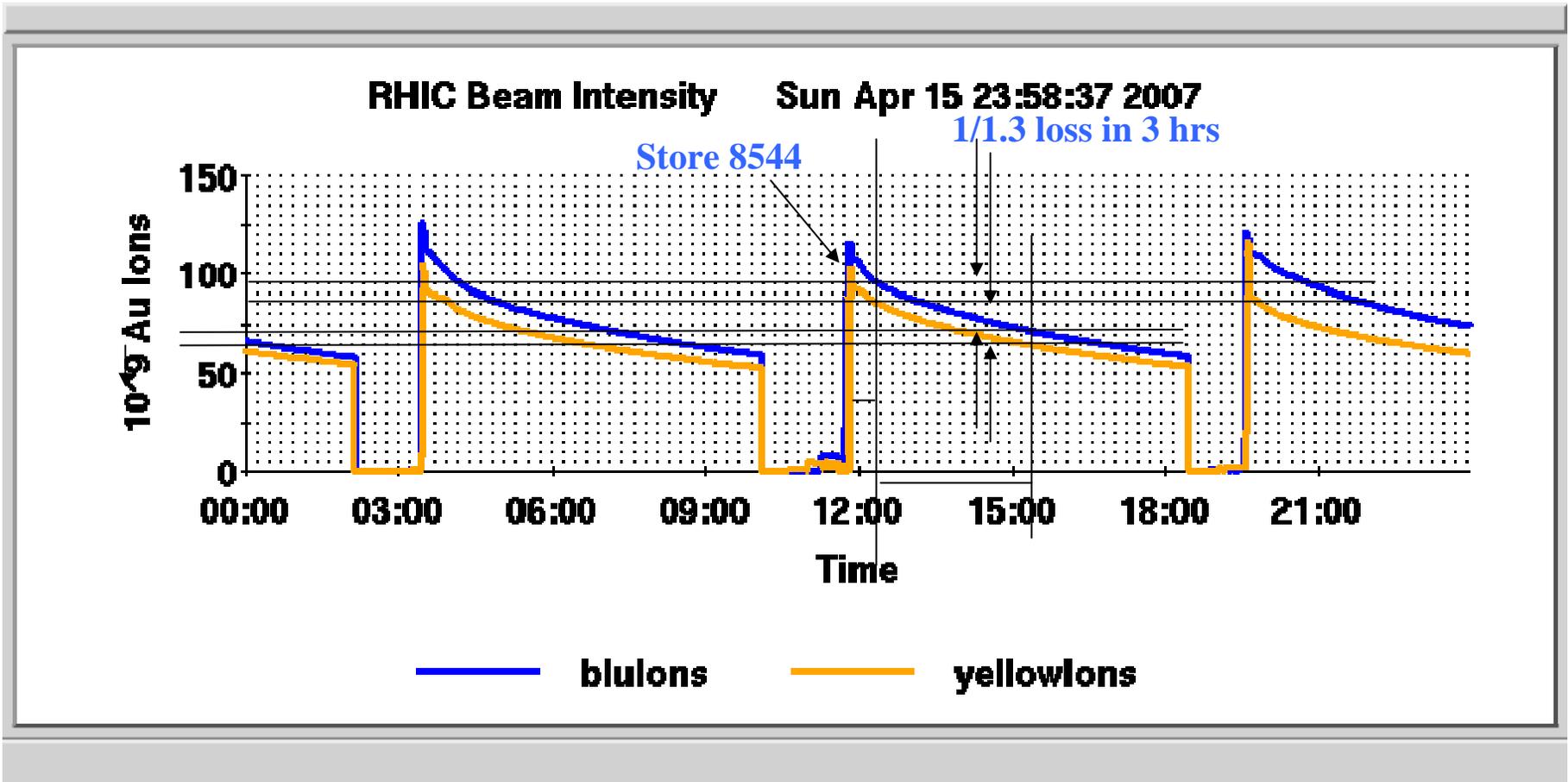
RHIC Beam Intensity

Sun Mar 21 23:58:58 20



RUN7

111 x 111 bunches



For discussion

4/17/07

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

	<u>Run4 (21 Mar 04)</u>	<u>Run7 (15 Apr 07)</u>
ZDC (initial Hz)	9600	18400
$N_{\text{Au}}(10^9)$	45	96/86
N_{Au} Bunches	45	111
Au/Bunch (10^9)	1.0	0.86/0.77
β^* (m)	1.0	0.9

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

$$\text{ZDC (2007)} = 9600 \text{ (typ ZDC Run4)} * 111/45 \text{ (number of bunches)} \\ * (0.77/1.0) * (0.86/1) \text{ (intensity per bunch)} * 1/0.9 \text{ (beta*)} = 17,400$$

Actual = 18,400 Hz \rightarrow emittance ~same as Run4

So if we get to 1.1E9 per bunch we get:

$$\text{ZDC} = 18,400 * (1.1/0.77) * (1.1/0.86) = 33,600 - \textit{20-30 minutes into the store} - \\ -- \text{ recall our goal is 36,000 ZDC at the } \textit{Beginning} \text{ of the store.}$$

For discussion

5/4/07

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

	<u>Run4 (21 Mar 04)</u>	<u>Run7 (4 May 07)</u>
ZDC (initial Hz)	9600	23000
N_{Au}(10⁹)	45	110/101
N_{Au} Bunches	45	103
Au/Bunch (10⁹)	1.0	1.07/0.99
β* (m)	1.0	0.9

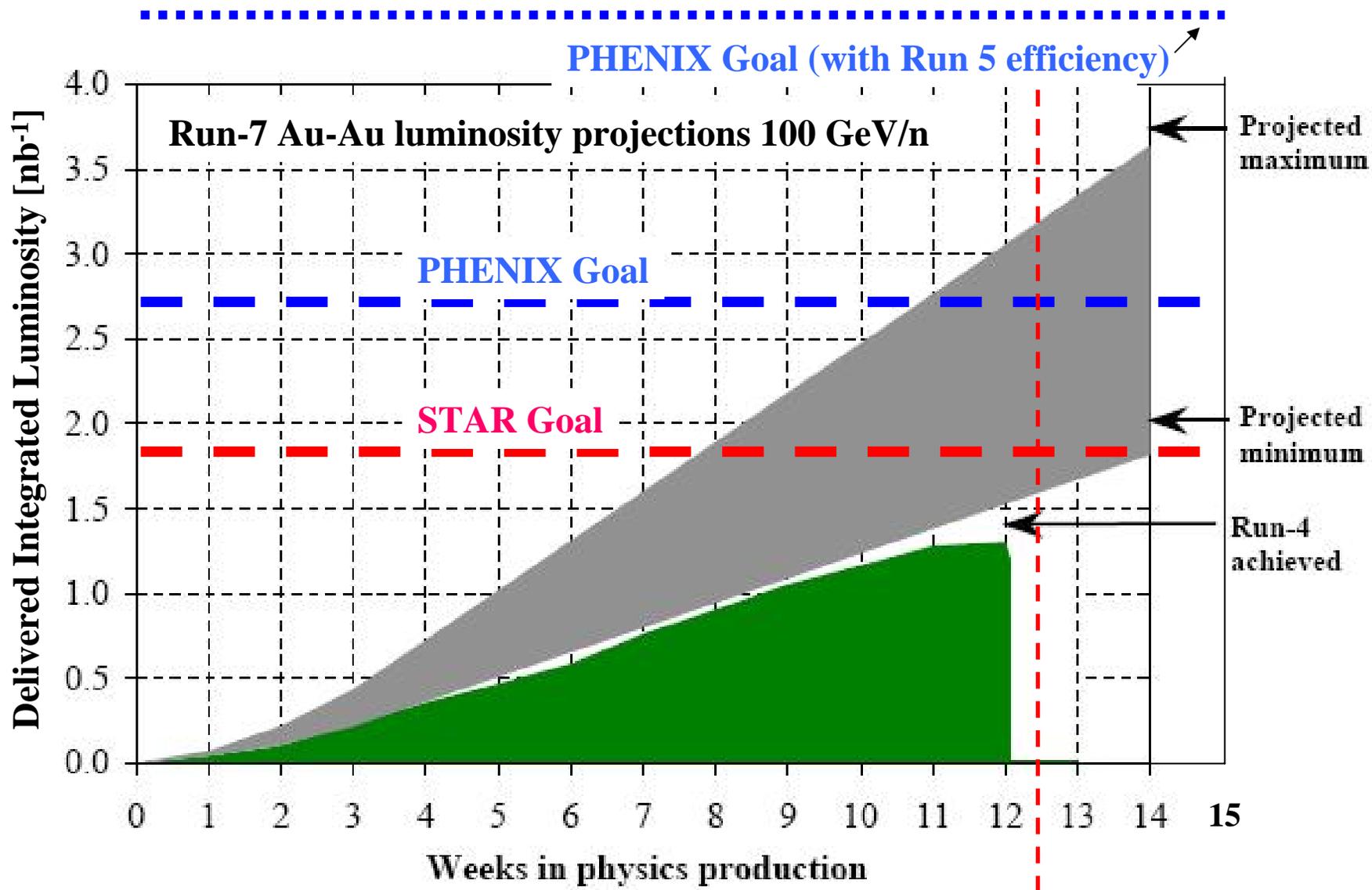
So....If the beam emittance is the same for the two runs we'd get:

$$\text{ZDC (2007)} = 9600 \text{ (typ ZDC Run4)} * 103/45 \text{ (number of bunches)} * (1.07/1.0) * (0.99/1) \text{ (intensity per bunch)} * 1/0.9 \text{ (beta*)} = 25,900$$

Actual = 23,000 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

-  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													
											26 June		
RHIC Cryo Operation													
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 (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 μb^{-1}**
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 - **Assumes 68% live time, 60% vertex cut = 40.5% efficient**
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 - **STAR goals for 100 x 100 GeV/n Au-Au**
 - **Delivered Luminosity = 1800 μb^{-1}**
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 - **~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 –**
 - **1st priority new RHIC working point (needs ~2 weeks)**
 - **2nd priority 500 GeV development**

As of 12 Mar

