Accelerator Maintenance and Support

Getting back on line

General Info

- The Maintenance Support Group manages the activities at CAD during shutdown, failure and Maintenance periods including:
  - Review, approval and organization of scheduled and unscheduled work
  - Access control
  - Work coordination with other departments and divisions
  - Systems start up and recovery
- Maintenance Support manages and coordinates buildings and facilities throughout the year

Maintenance Days

- Driven by both experimental and accelerator needs.
- Major challenges include:
  - Completion of shutdown work, installation, testing and commissioning during “maintenance” days.
  - Preparation for and recovery from changes made during maintenance periods.
  - Recovery of systems after maintenance periods
- Work volume during the maintenance days in run 09 was particularly high.
- Large amounts of shutdown work had to be completed.
- Some new systems were completely installed during maintenance periods.
- Issues unique to Polarized Proton running.
  - Source and Jet maintenance
  - Rotators, snakes, specialized correctors …
- Access Limitations
  - Current limit in the RHIC ring
  - ODH1 in the ring and service buildings

Continued improvement

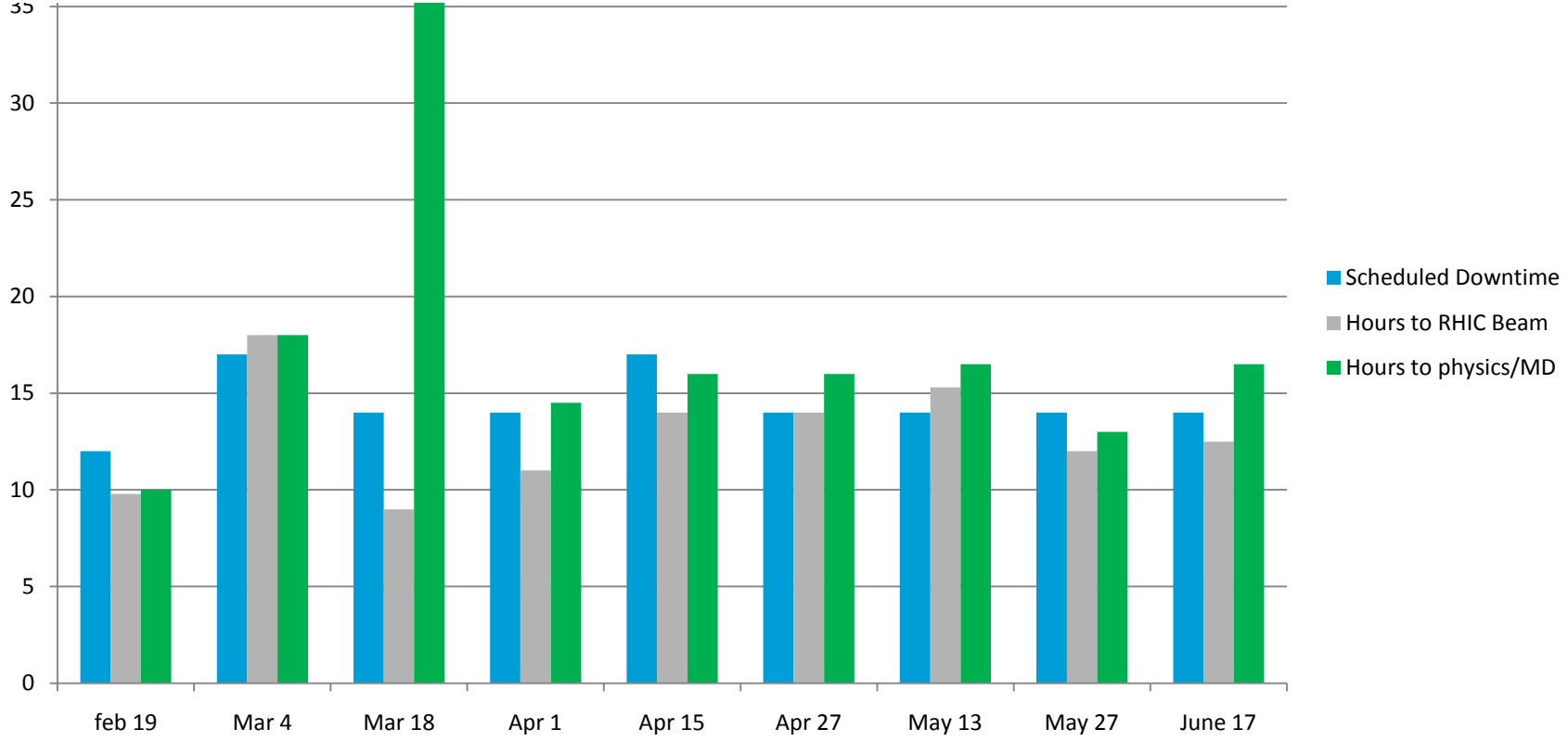
- Continued use, improvement and expansion of the Job Request System as outlined at previous retreats
  - Review and approval of ALL jobs instituted
- Work coordinated around access timetable
  - Sweeps are no longer a limiting factor
- Use of Job Specific LOTO
  - Standing permits for repetitive Vacuum, RF and instrumentation jobs
- Improved system reliability
  - No need for D6 septum flushing!

Job Request System

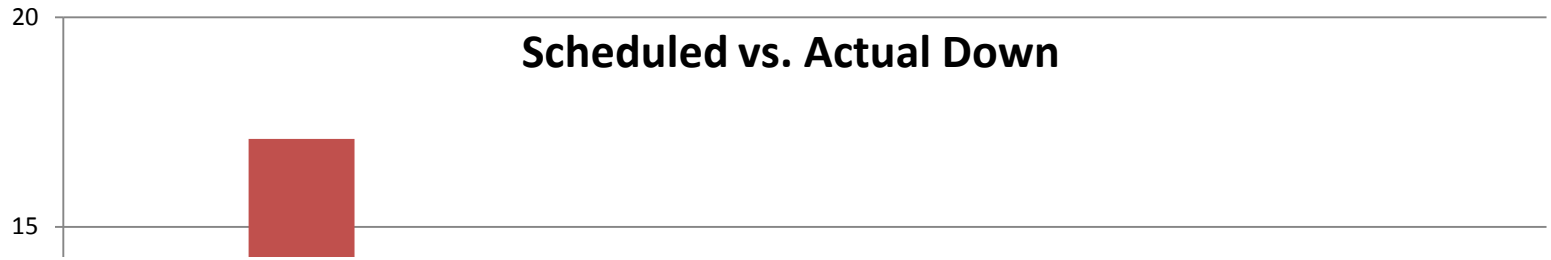
- Added features:
  - Automated email confirmation of job submission and approval
  - Automated MSG notification for late and emergent submissions
  - Added user features
    - Defaults edited to suite user requests
    - Expansion of template forum
  - Global major system acceptance jobs added
    - Define when systems are back to operation
- Experimental input

Maintenance Impact

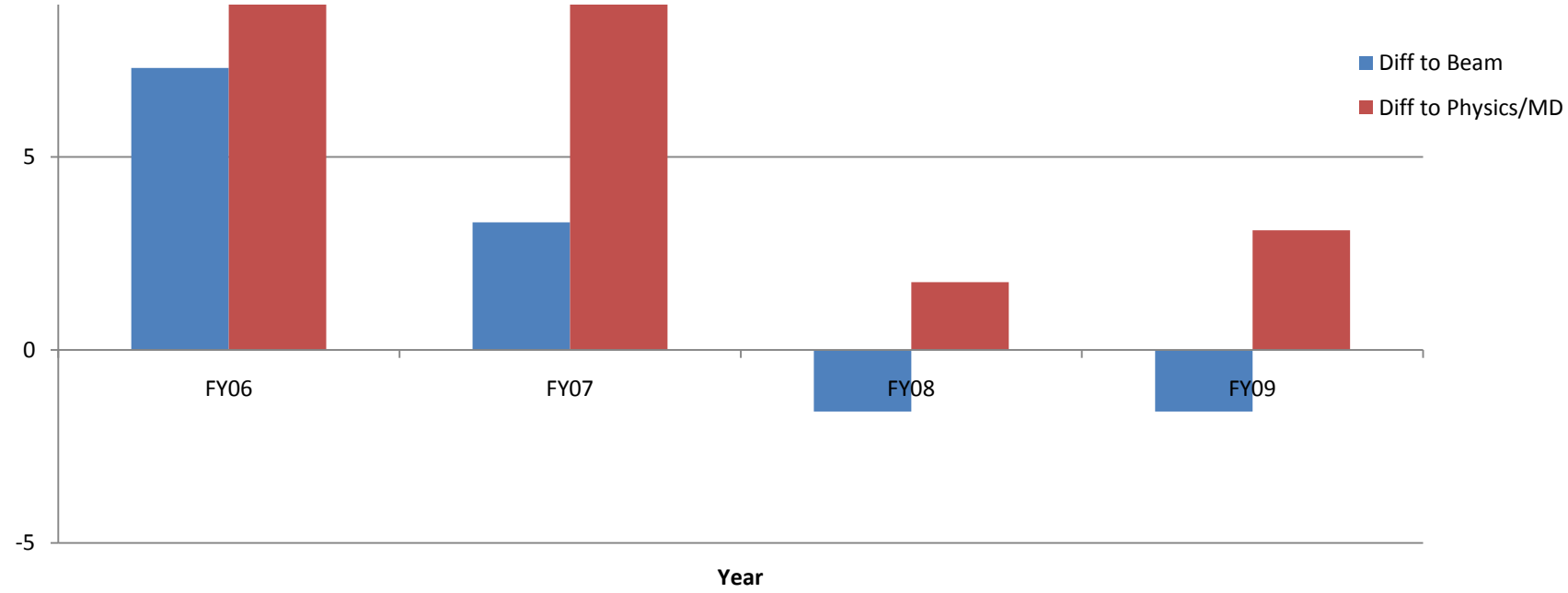
Average Scheduled time = 14.5 hrs
Average Time to first beam = 12.8 hrs
Average Time to Physics or MD = 17.5 hrs (15 hrs w/out DCCT problem)



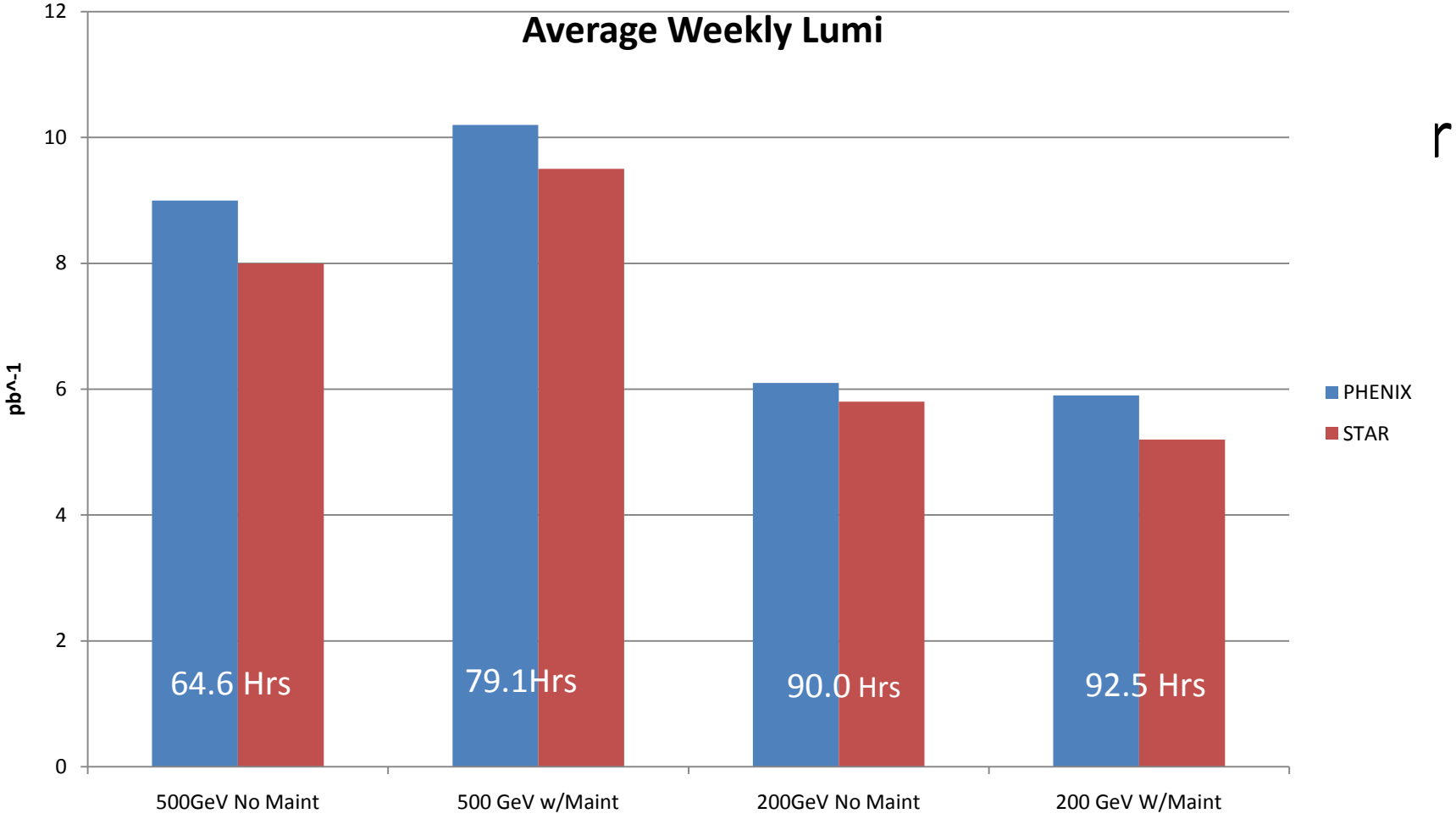
Maintenance Impact Trend



Proper scheduling and incorporating setup leads to more realistic results



Maintenance weeks not obvious in 09



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Keeping bad habits from returning

- Still instances of unnecessary failure during recovery
  - Incomplete testing, devices left in local after work
    - Reduced but not eliminated
- Un-reviewed or approved work
  - Has all but been eliminated

Meeting attendance:

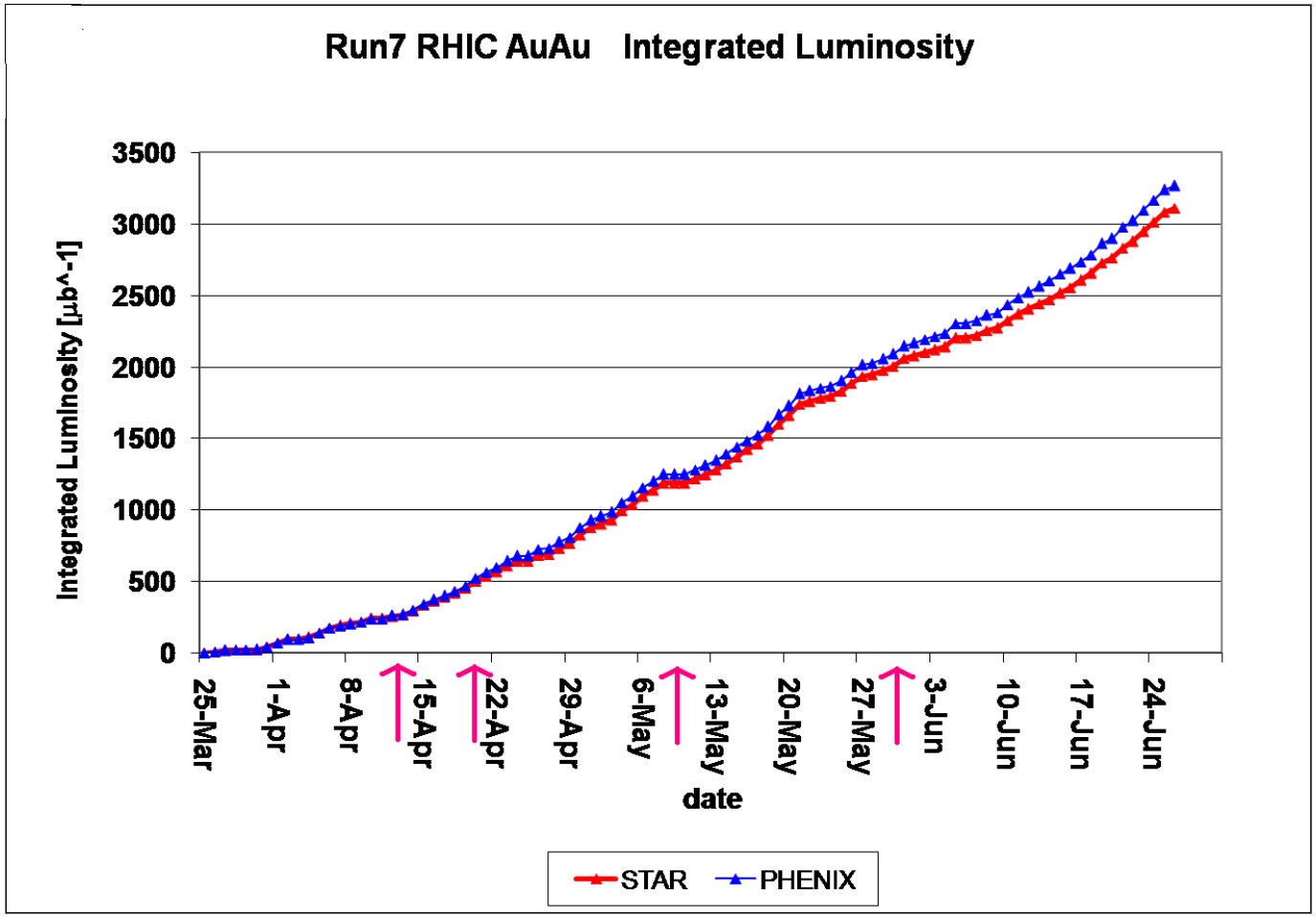
- Maintenance Kickoff
- Shutdown Kickoff
- Startup Kickoff
- Shutdown post mortem

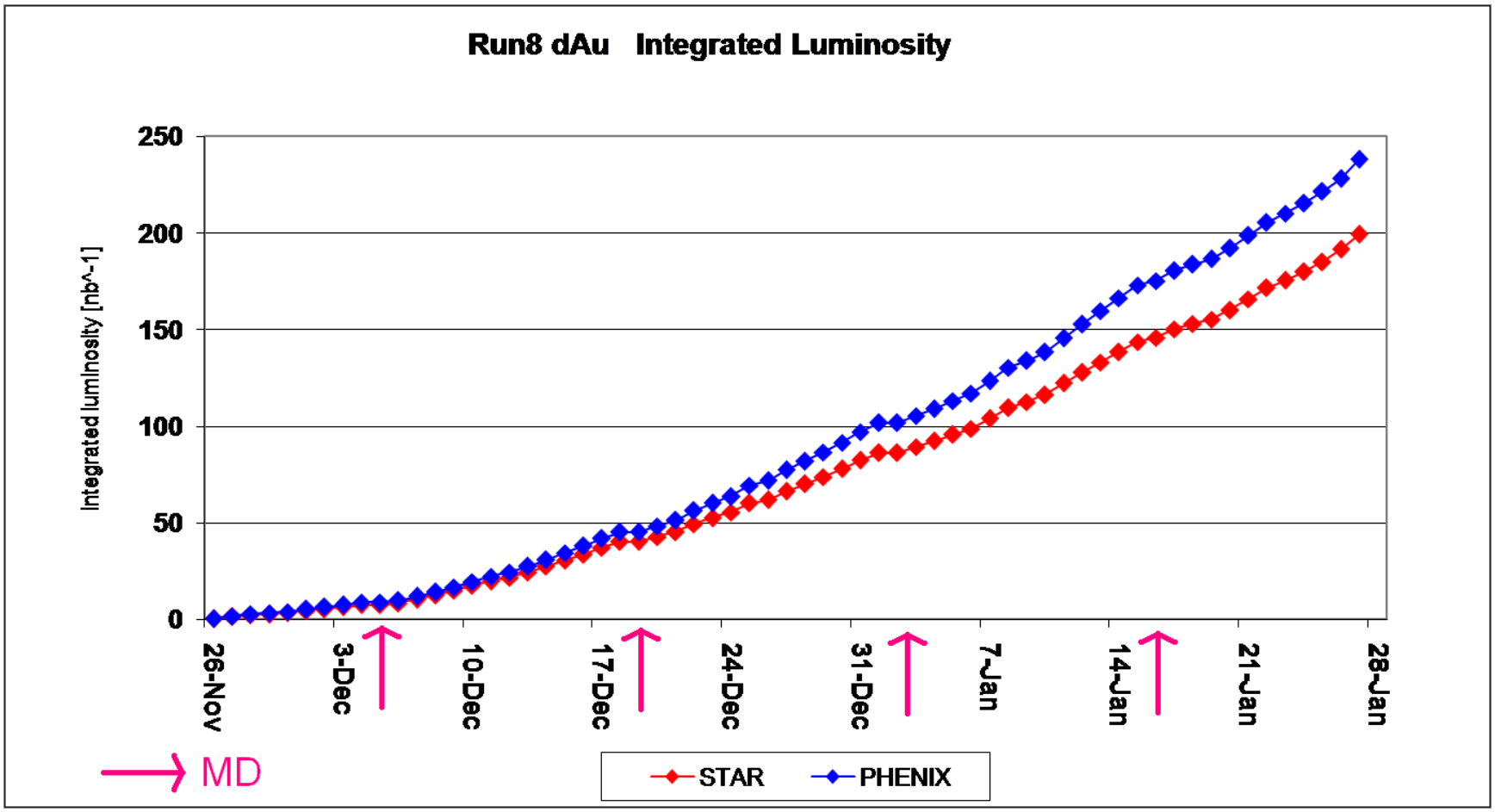
Addressing issues from past retreats…

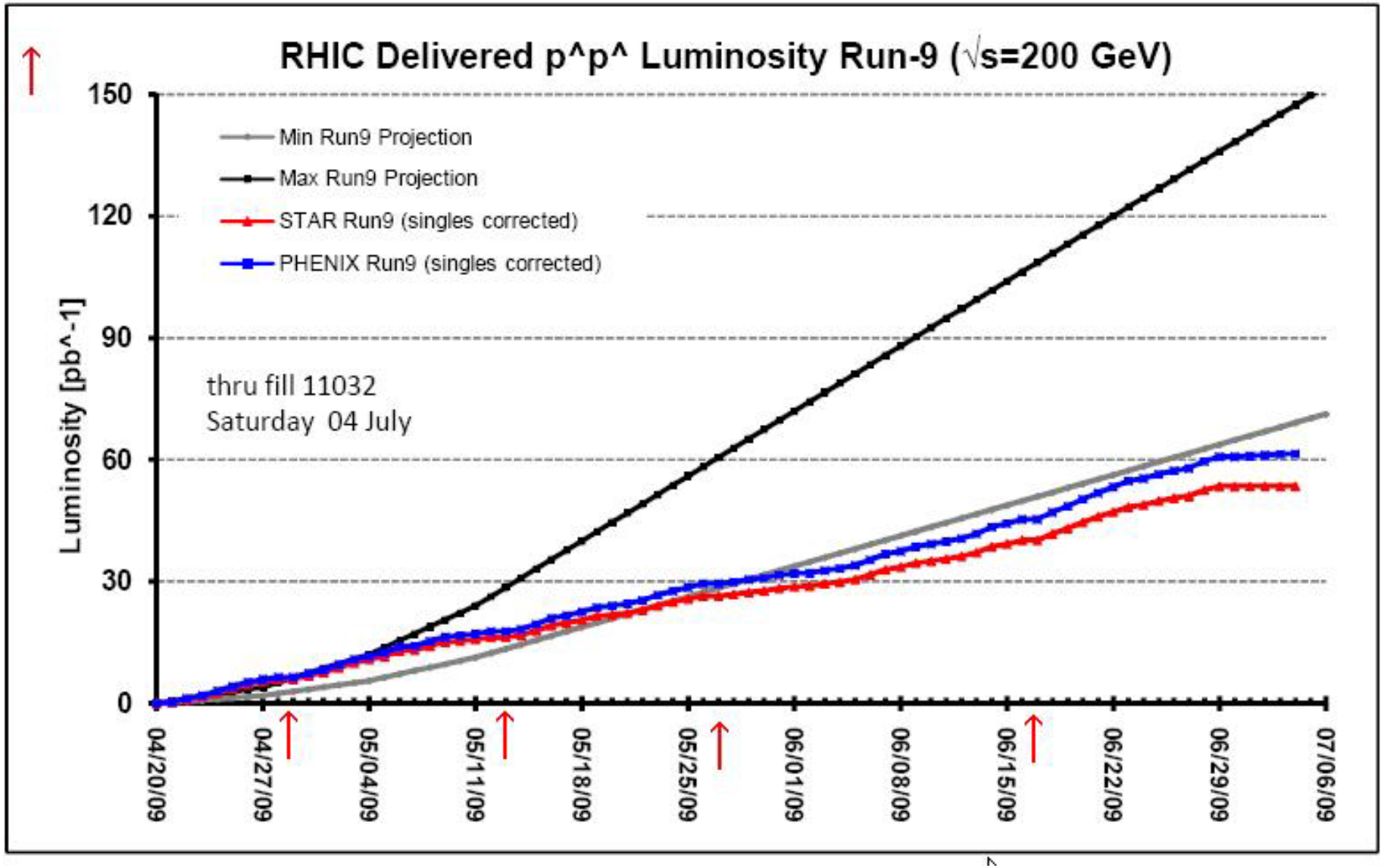
- Understaffed *becomes especially evident on MDs. Have added additional CAS and MCR staff, which helps. Other groups are still quite lean*
- Too much to do:
  - Left over items from setup and shutdown. *Funding etc. makes elimination highly unlikely. Improved scheduling and work planning*
  - New systems installation, testing and troubleshooting *see above*
- Development and other programs running during and after Maintenance Days. *Seems unavoidable, improved organization has helped*
- Preventative Maintenance *Yes, when staffing permits (PE)*
- Continue QA *Improvements*
- Unscheduled Maintenance behind stores *Yes, but painful and risky*
- Hybrid or “flavored” Maintenance *To some extent, this run not so possible*
- Improved system reliability *Yes, notably in the injectors and 50A RHIC correctors*

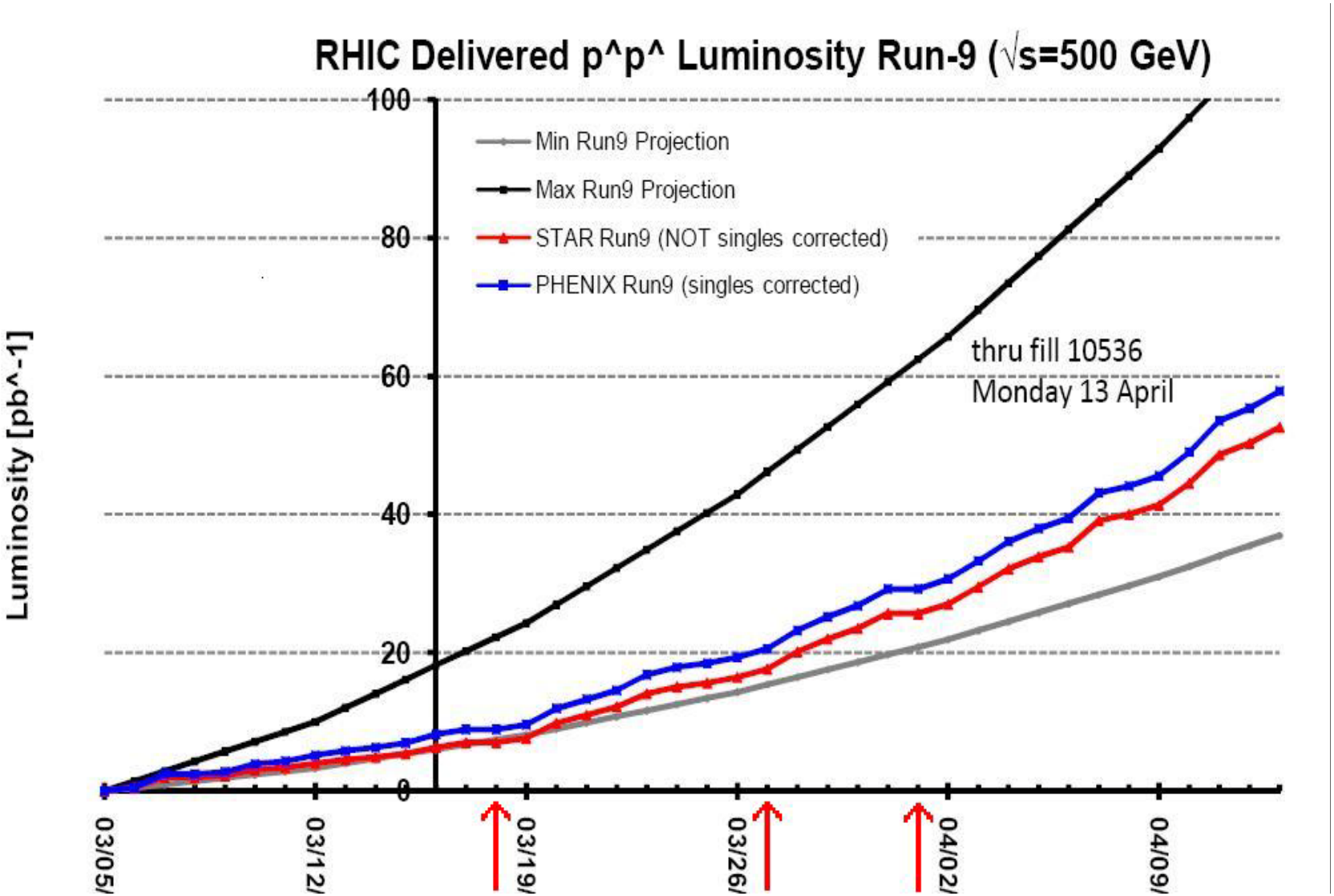
Questions?

Thank you


Run7 RHIC AuAu Integrated Luminosity
Integrated Luminosity [μb^-1]
3500
3000
2500
2000
1500
1000
500
0
25-Mar
1-Apr
8-Apr
15-Apr
22-Apr
29-Apr
6-May
13-May
20-May
27-May
3-Jun
10-Jun
17-Jun
24-Jun
date
STAR
PHENIX


Run8 dAu Integrated Luminosity
Integrated luminosity [nb^-1]
250
200
150
100
50
0
26-Nov
3-Dec
10-Dec
17-Dec
24-Dec
31-Dec
7-Jan
14-Jan
21-Jan
28-Jan
MD
STAR
PHENIX


RHIC Delivered p^p^ Luminosity Run-9 (√s=200 GeV)
Luminosity [pb^-1]
150
120
90
60
30
0
Min Run9 Projection
Max Run9 Projection
STAR Run9 (singles corrected)
PHENIX Run9 (singles corrected)
thru fill 11032
Saturday 04 July
04/20/09
04/27/09
05/04/09
05/11/09
05/18/09
05/25/09
06/01/09
06/08/09
06/15/09
06/22/09
06/29/09
07/06/09


RHIC Delivered p^p^ Luminosity Run-9 (√s=500 GeV)
Luminosity [pb^-1]
100
80
60
40
20
0
Min Run9 Projection
Max Run9 Projection
STAR Run9 (NOT singles corrected)
PHENIX Run9 (singles corrected)
thru fill 10536
Monday 13 April
03/05/
03/12/
03/19/
03/26/
04/02/
04/09/