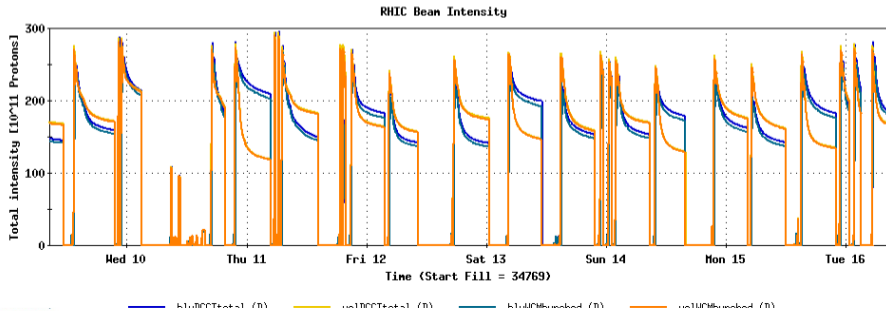
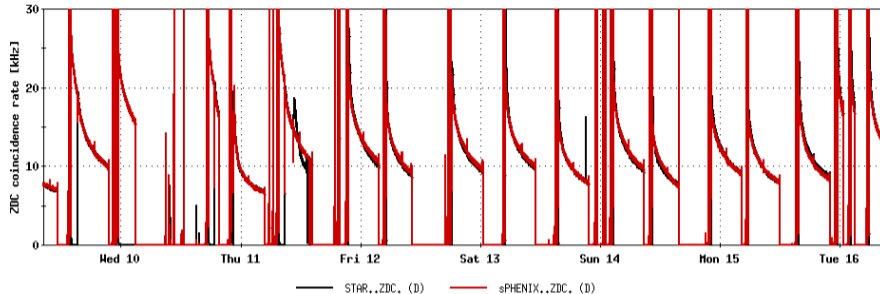


RHIC Status

Kiel Hock

July 9, 2024

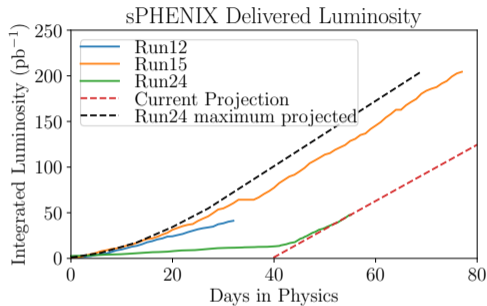
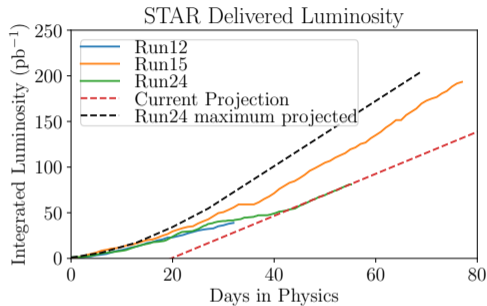
Last Week at RHIC



RHIC Status

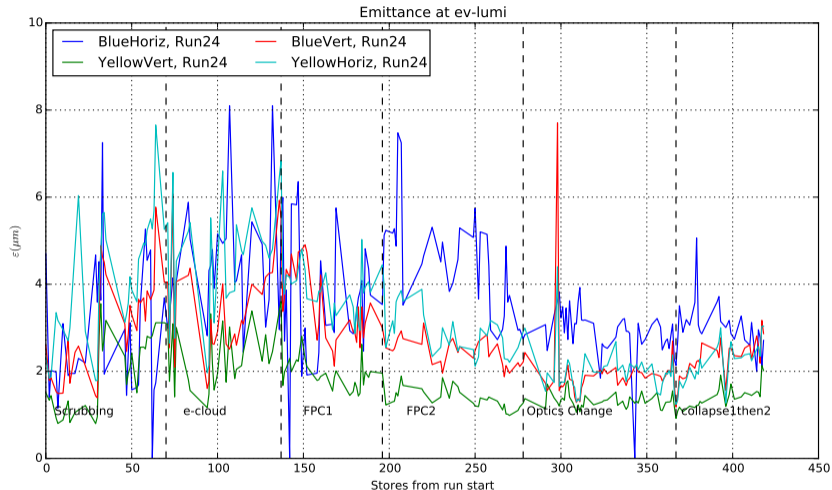
- STAR and sPHENIX operating with 0 mrad crossing angles
- Delivered intensity up to 2.4×10^{11} at physics, lower on recent stores
- Delivered polarization is up to 55%
- STAR and sPHENIX being collapsed at separate times since July 5th
- STAR being collapsed when sPHENIX ZDCs=24 kHz
- APEX last Wednesday where MCR was able to recover within an hour following an access
- Ramp Optics measurement yesterday
- Bump added to IP12 on Friday 7/12 to improve ability to scrap on the blue mask, insignificant change to STAR's backgrounds

RHIC Performance Outlook



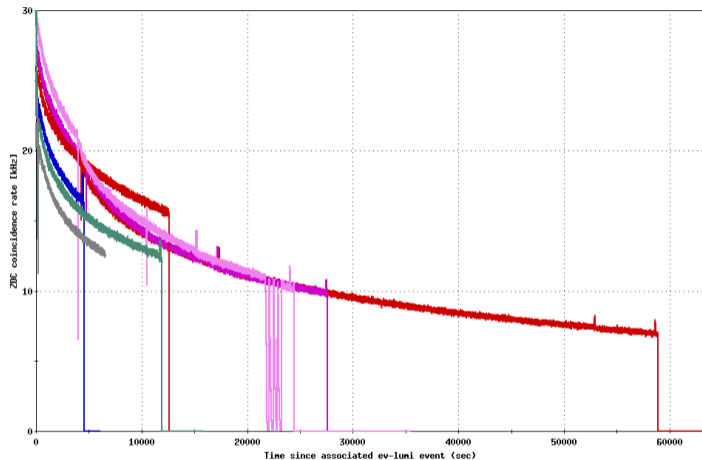
- $L_{max}, L_{min} = 25, 17.0 \text{ pb}^{-1}/\text{week}$ with $\theta = 0 \text{ mrad}$
- Trajectories from last meeting: $L_{STAR,proj} = 16.1 \text{ pb}^{-1}/\text{week}$, $L_{sPHENIX,proj} = 21.6 \text{ pb}^{-1}/\text{week}$
- Trajectories as of this meeting: $L_{STAR,proj} = 17.1 \text{ pb}^{-1}/\text{week}$, $L_{sPHENIX,proj} = 17.6 \text{ pb}^{-1}/\text{week}$

RHIC Performance



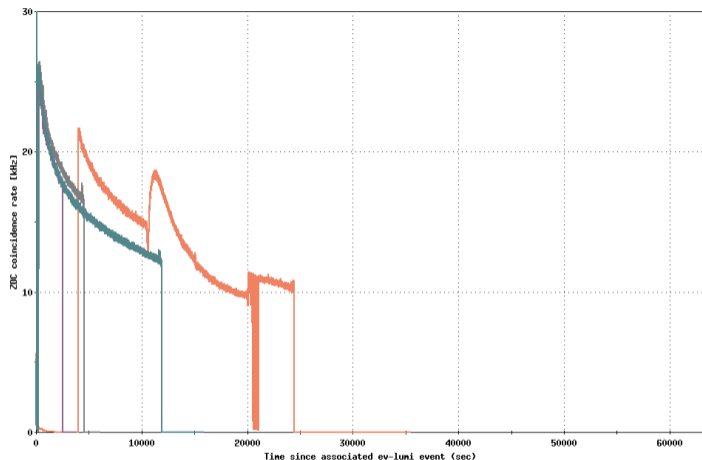
- a small uptick in our emittances at ev-lumi
- this coupled with hitting some intensity limits, have reduced recently delivered rates

Delivered Luminosities, sPHENIX



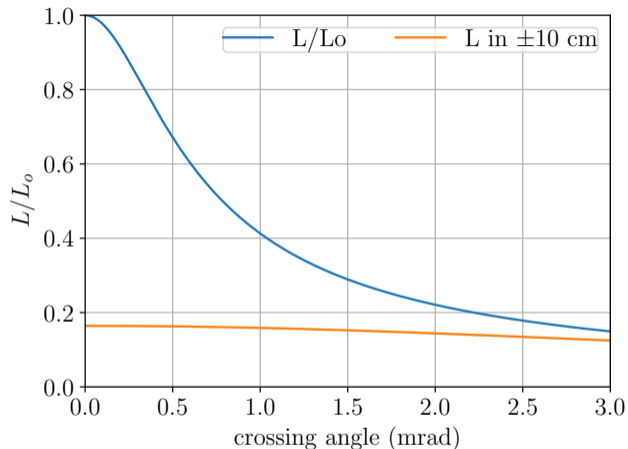
- 3 stores from last week with peak ZDC rates close to 30 kHz (red-tone)
- 3 most recent stores with peak ZDC rates close to 24 kHz (blue-tone and grey)

Delivered Luminosities, STAR



- 1 stores from last week with peak ZDC rates close to 30 kHz (red-tone)
- 2 most recent stores with peak ZDC rates close to 24 kHz (blue-tone)
- Reduced sPHENIX ZDC rates facilitated STAR being turned on almost immediately

Lumi Scaling, revisited



- $\theta = 1.5$ mrad corresponds to $L/L_0 = 31\%$ and 50% of the collisions occur within ± 10 cm
- Largest angle supported given (+) crossing angle and $\beta^* = 60$ cm squeeze

Going forward

1. Resolve emittance growth on ramp to deliver higher luminosities
2. Resolve intensity related limitations to allow further advancement of luminosity
 - ▶ This includes analysis of the recent ramp optics measurements and possibly additional measurements, and RF related intensity limitations.
3. Investigate the backgrounds at STAR and possibly commission a new ramp
4. Investigate other AGS setups to allow for higher intensities with improved emittances
5. Need to demonstrate higher intensity to deliver maximum rates to sPHENIX within ± 10 cm
6. Test squeeze ramp and work into nominal rotation
 - ▶ With the collapse of IP6+IP8 separated, development work needs to be done to allow for the additional ramp and more so the supporting mechanics
 - ▶ Ramping directly into 60 cm lattice at IP8 would not need additional work and would just require setup time
7. Finalize sPHENIX $\theta = +1.5$ mrad crossing angle lattice