STAR Run 24 Report

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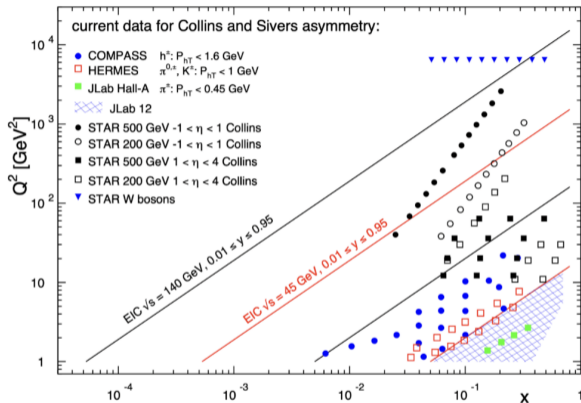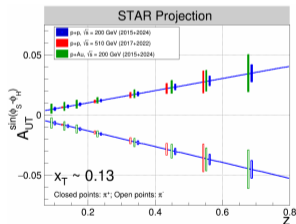
For the STAR Collaboration

BNL, June 13, 2024

RHIC/AGS Users Meeting 2024

Physics case for p+p at 200 GeV

- Radial (horizontal) polarization, previous such polarization was just for 6 days in run 17
- Most overlapping x region with 200 GeV p+p, also the greatest statistical precision
- Important for future comparisons to *ep* data at EIC

Triggers for high-p_T, forward detectors and UPC, dedicated set for low-luminosity running

STAR data taking in 2024 p+p run

- Configuration with forward and DAQ5k upgrades from last year
- Trigger upgrade, reached 7 kHz
- Last opportunity for p+p with iTPC + forward and DAQ upgrades

Beam Use Request for Run 24

$\sqrt{s_{NN}}$ (GeV)	Species	Number Events/ Sampled Luminosity	Year
200	$p+p$	142 pb^{-1}/12w	2024
200	$p+$Au	0.69 pb^{-1}/10.5w	2024
200	Au+Au	18B / 32.7 nb^{-1}/40w	2023+2025

Assuming 24 physics weeks / year
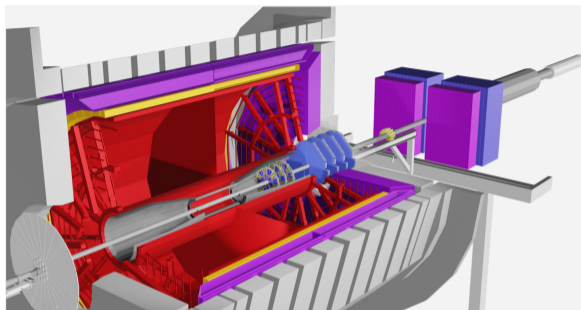
So far smooth running with good utilization of beam time
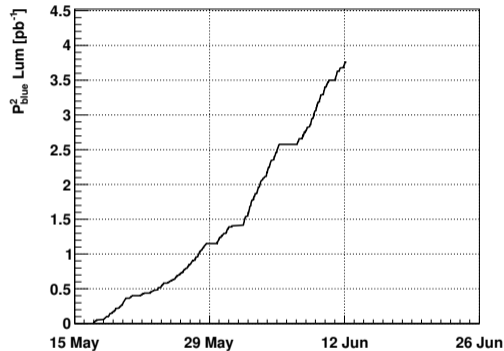
Sampled luminosity till now
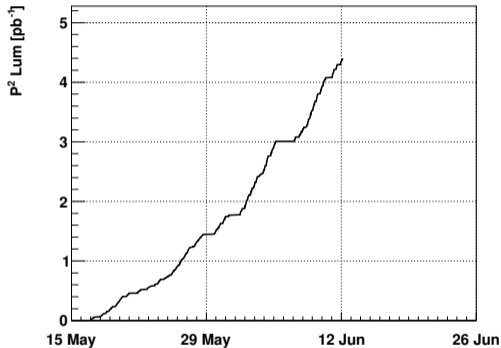

Figure of merit FoM polarization squared times sampled luminosity for barrel (JP2) and forward (FCS) triggers

Low-luminosity data taking at the beginning of the run

- Initial 2 weeks of the run
- Minimum bias trigger as a reference to heavy-ion data
- High multiplicity trigger for collectivity and net proton fluctuations
- Low multiplicity trigger for UPC studies (vector mesons and lepton pairs)
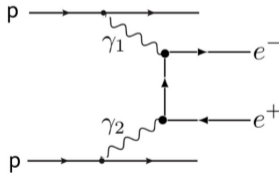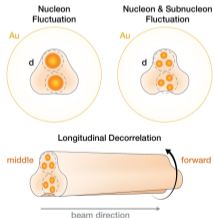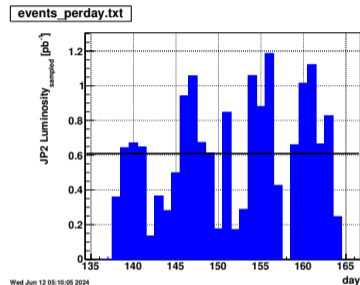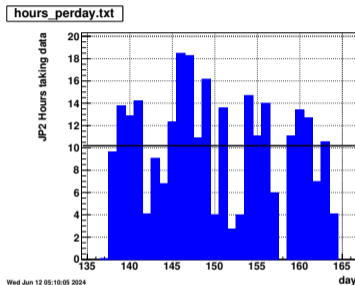

Number of TPC tracks
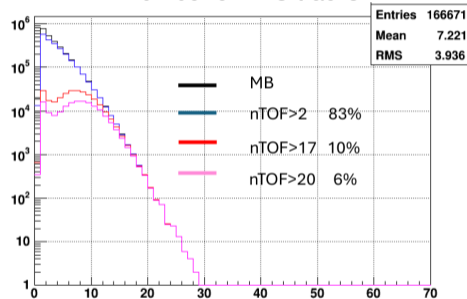
Over 1.5B events for min bias and 1.5B events for high-multiplicity collected
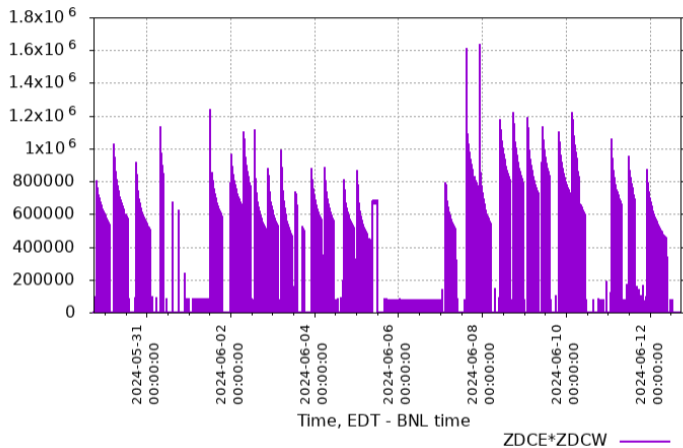
Data taking performance

- Hour of data taking and sampled luminosity per day for JP2 trigger

- Looks similar for other triggers

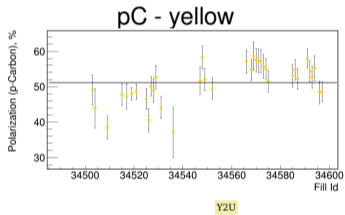Smooth operation, >10 hours of data taking per day on average
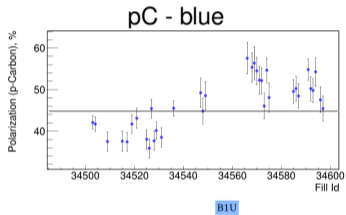
Collisions at STAR

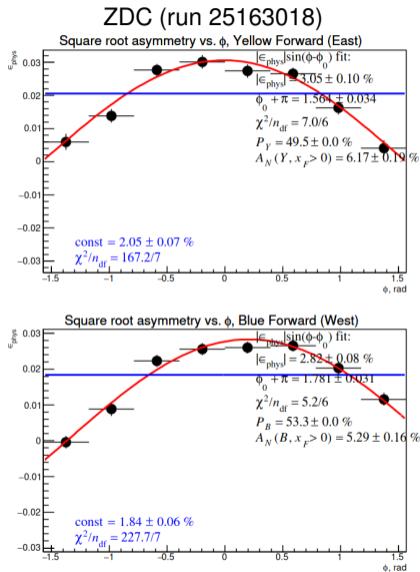- ZDC coincidence, delivered rates by CAD

Stable data taking with varying rates
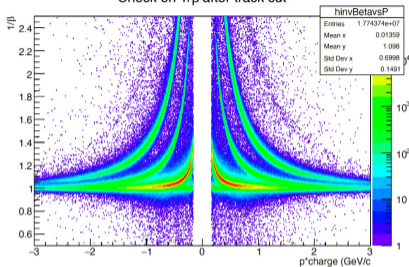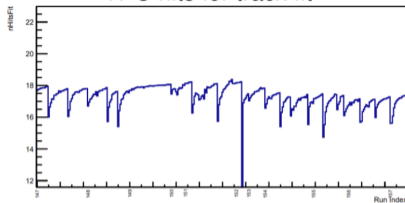
Polarization

- H-jet, pC and local ZDC polarimetry

Data QA - online and offline QA to monitor data quality

TOF identification
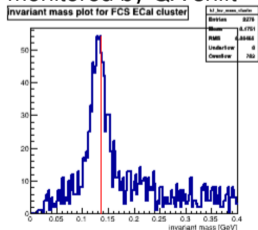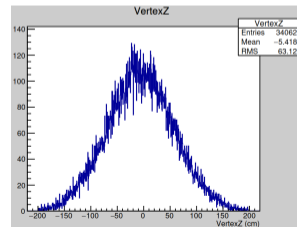Check on 1/β after track cut

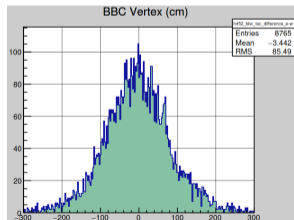

TPC hits for track fit

FCS, fast offline (∼1 day from data taken), π^0 reconstruction, monitored by QA shift
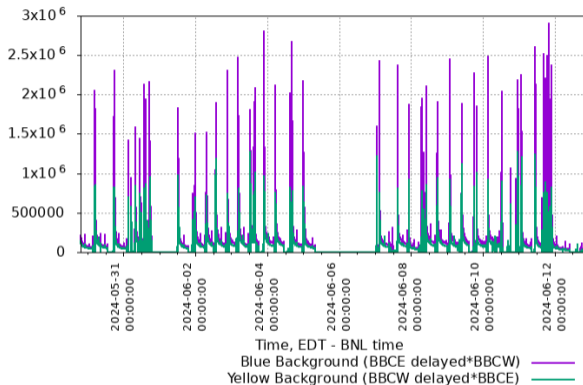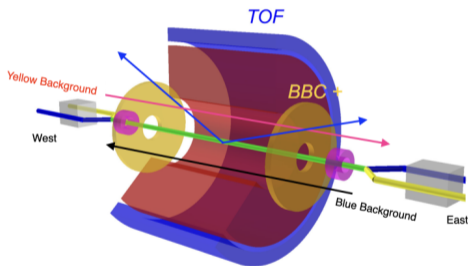

Beam Beam Counter (BBC) and online tracking vertex

Beam backgrounds

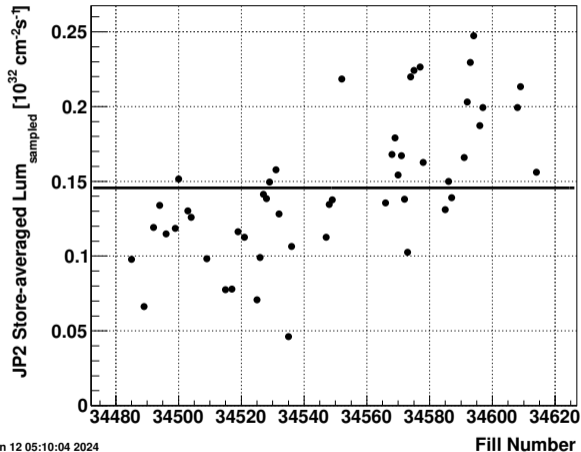- Rates by BBC delayed coincidence (interactions outside nominal interaction point)

Larger backgrounds for blue beam, especially at the beginning of the fill

Sampled luminosity

• Sampled JP2 trigger

Increasing trend with recent fills
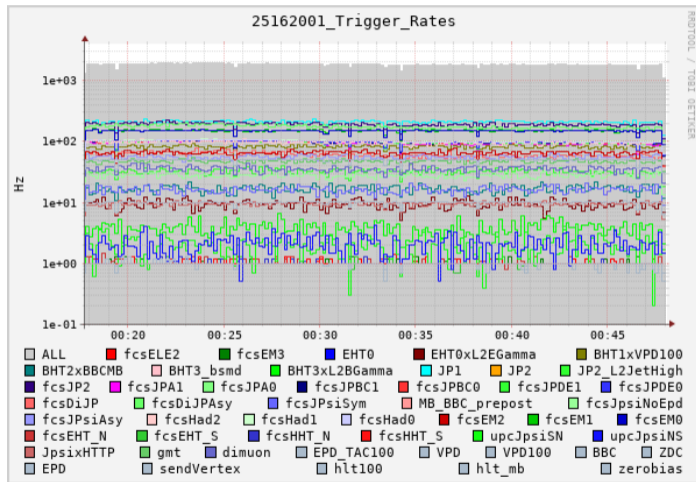

lum_rate_perfill.txt
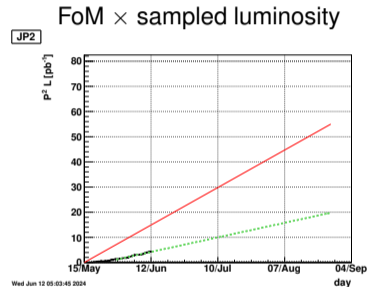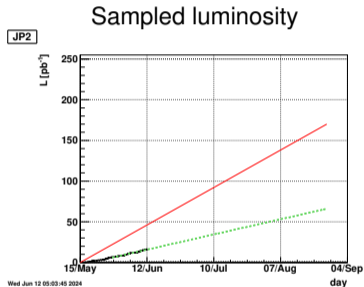
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Trigger rates

- Variety of central, forward and MB triggers

Stable counts for each trigger

Projections till end p+p data taking

- Solid red: our goal consistent with CAD projection

- Dashed green: projection based of current data taking

- Data collected so far show good quality

Sampled luminosity

FoM × sampled luminosity

Likely to sample less than anticipated; we expect improvements in luminosity

Thank you

Big thanks CAD, all the STAR collaborators, and the BNL management for this run