RHIC status

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RHIC status

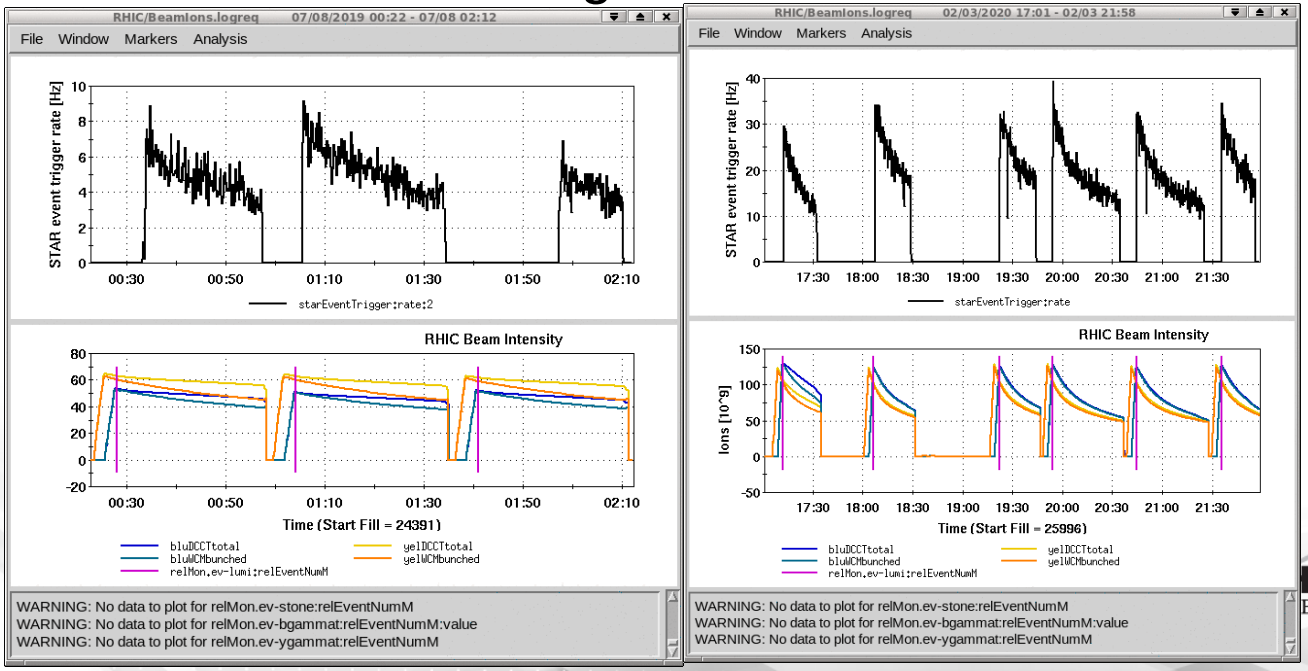
- Beam setup for all FXT energies are completed.
- Physics goals were achieved for four (31.2, 9.8, 19.5, 13.5 GeV) out of 6 FXT energies.
- RHIC ran a few physics stores at 4.6 GeV with and w/o LEReC cooling.

Fixed target experiments

- 31.2 GeV: 2 10-hr stores, vertical emittance blow-up on the ramp
- 9.8 GeV: 8 stores, second collision spot associated with debunched beam develops to the outside of the ring
- 19.5 GeV: 1 23-hr store
- 13.5 GeV: 2 10-hr stores
- 7.3 GeV, 2 5-hr stores so far, used wiggle ramp for machine stability, orbit bump as rate control method for all cases

Collisions at 4.6 GeV

- Comparison between physics stores at 4.59 GeV last year (left) and tonight (right). The improvement factor due to bunch intensity is expected to be (125*100)/(65*50) = 3.9. The peak rate increased from 9 Hz to 30 Hz which is a bit less than what's expected from the intensity improvement due to possible larger beam size.
- Improvement with LEReC cooling is ~60%.



Facts and observations of the collisions at 4.6 GeV

- With ~1E9 ions per bunch, the space charge tune shift is ~0.06.
- With STAR's measurement precision, beam rms size at IP6 was ~ 1.84 mm without cooling over the 20 minutes store. Beam rms at IP6 was ~ 1.69 mm with cooling over the 20 minutes store. Slight decrease of beam size over 40 minutes store is possible however overwhelmed by the measurement statistical errors. Why is beam size not shrinking?

- For the case with cooling, the beam emittance based on STAR beam size measurement is ~ 3 um. Was there a emittance blow-up like at 5.75 GeV? Is there a better working point?

Plans

- Make beta squeeze operational: choose a starting point and end point for beta star at IP6, design tape sequence for executing the squeeze continuously during a store.
- Explore the working point.
- Push up intensity from the source.
- Choose the optimal store length.