New magnet cycle beam study

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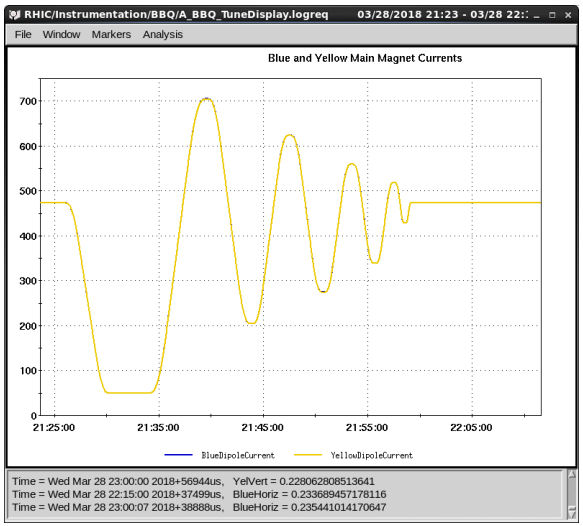
Goal

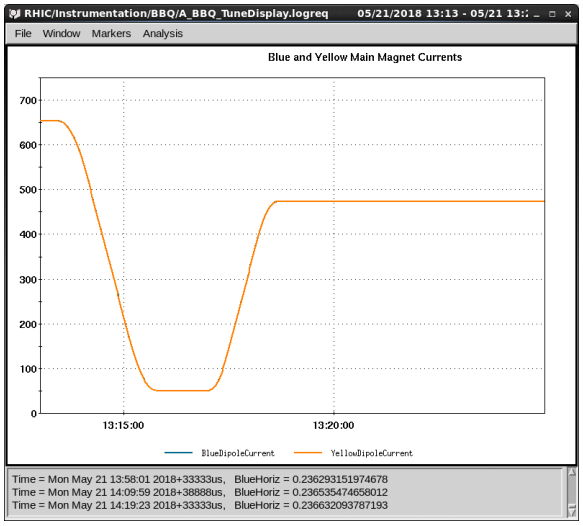
- Reduce high harmonic component of RHIC superconducting dipole at medium and low operating current.
- Improve machine reproducibility for medium and low energy operation.
- Study effect on beam with different magnet cycle profile.

Magnet cycles

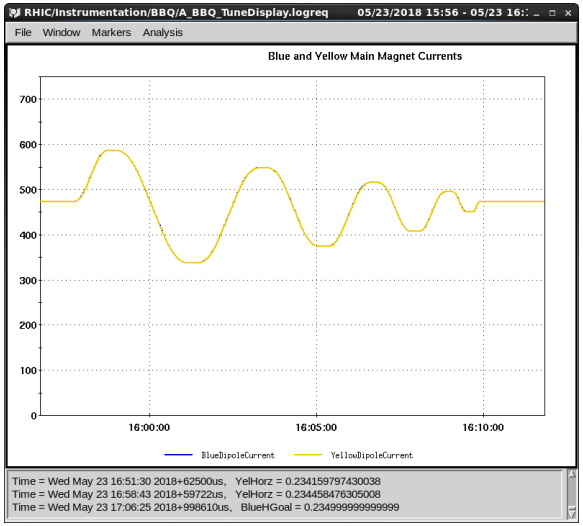
Large wiggle



13.5 GeV operation



Small wiggle

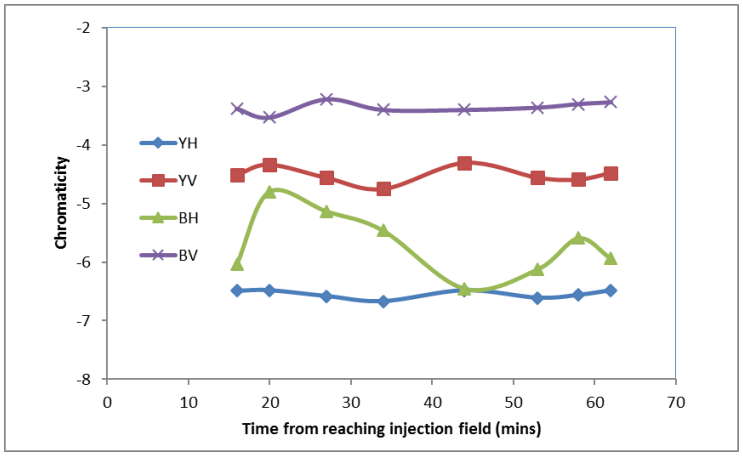


Tune drift

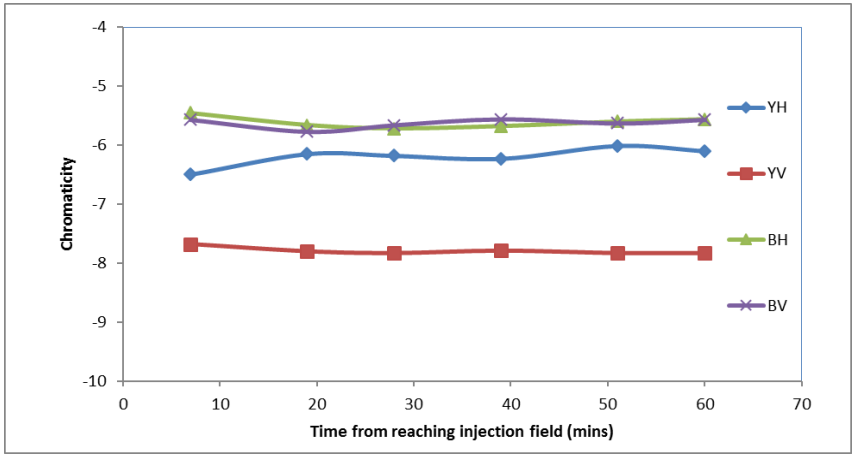
- Drift of tunes in 45 mins after small wiggle cycle: 0.0009, 0.0002, 0.0015, 0.0001 (BH, BV, YH, YV)
  Drift of tunes in 45 mins after 13.5 GeV cycle : 0.0011, 0.0006, 0.0021, 0.0006
  Drift of tunes in 45 mins after large wiggle cycle: 0.0009, 0.0004, 0.0015, 0.0003

Chromaticity

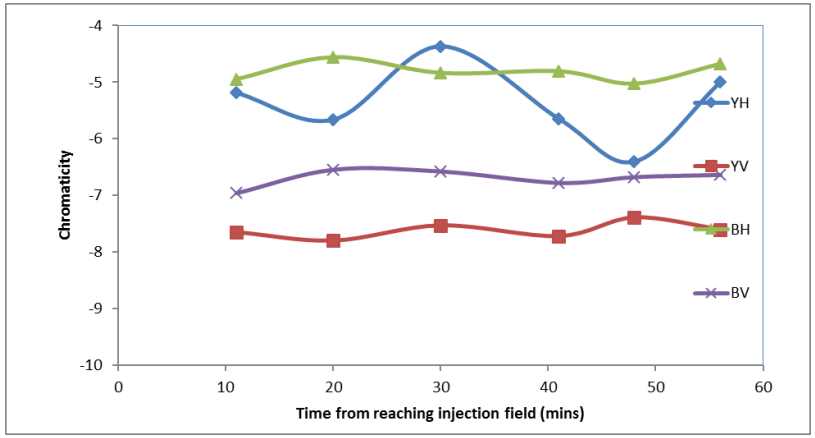
Large wiggle



13.5 GeV operation



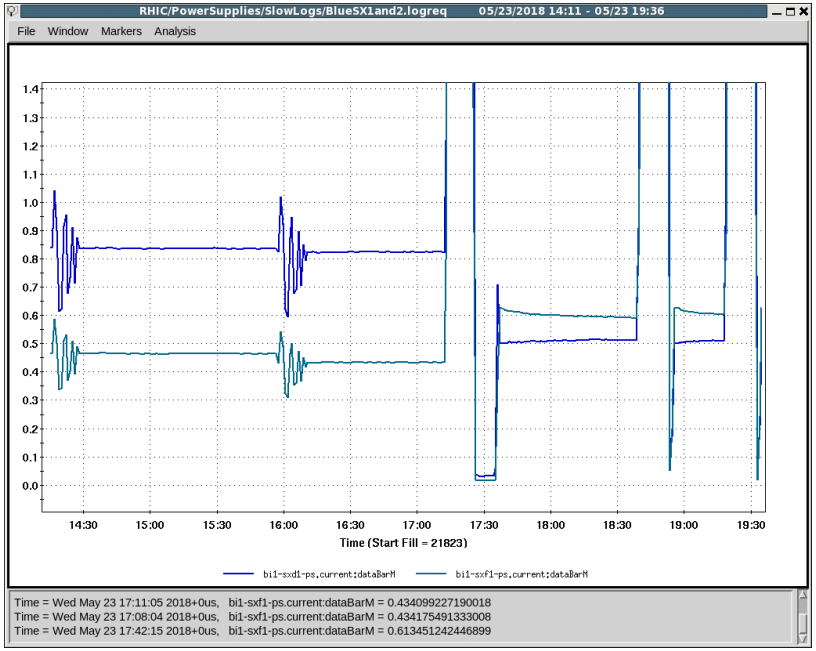
Small wiggle



Summary

- The persistent current decays less if magnet cycle goes to a lower current.
- The persistent current decays even less if the magnet currents go through a wiggle cycle.
- The amplitude of the wiggles being tested did not make a substantial difference in terms of persistent current decay.
- Both wiggle cycles reduced the non-linearity from superconducting dipoles. The amplitude of the cycle didn’t make a substantial difference.

Sextupole polarity



The focusing and defocusing sextupole currents after two wiggle cycle, and after switched back to normal 100 GeV hysteresis cycle. The question is how the currents should change with the wiggle cycle. The set point of chroms went down by ~20 units in horizontal plane and up by ~20 units in vertical plane, so the focusing sextupole current went down and the defocusing sextupole current went up.

Switching polarity?

No