

Fine Decoupling Test for EIC

July 6, 2021

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Plan is good

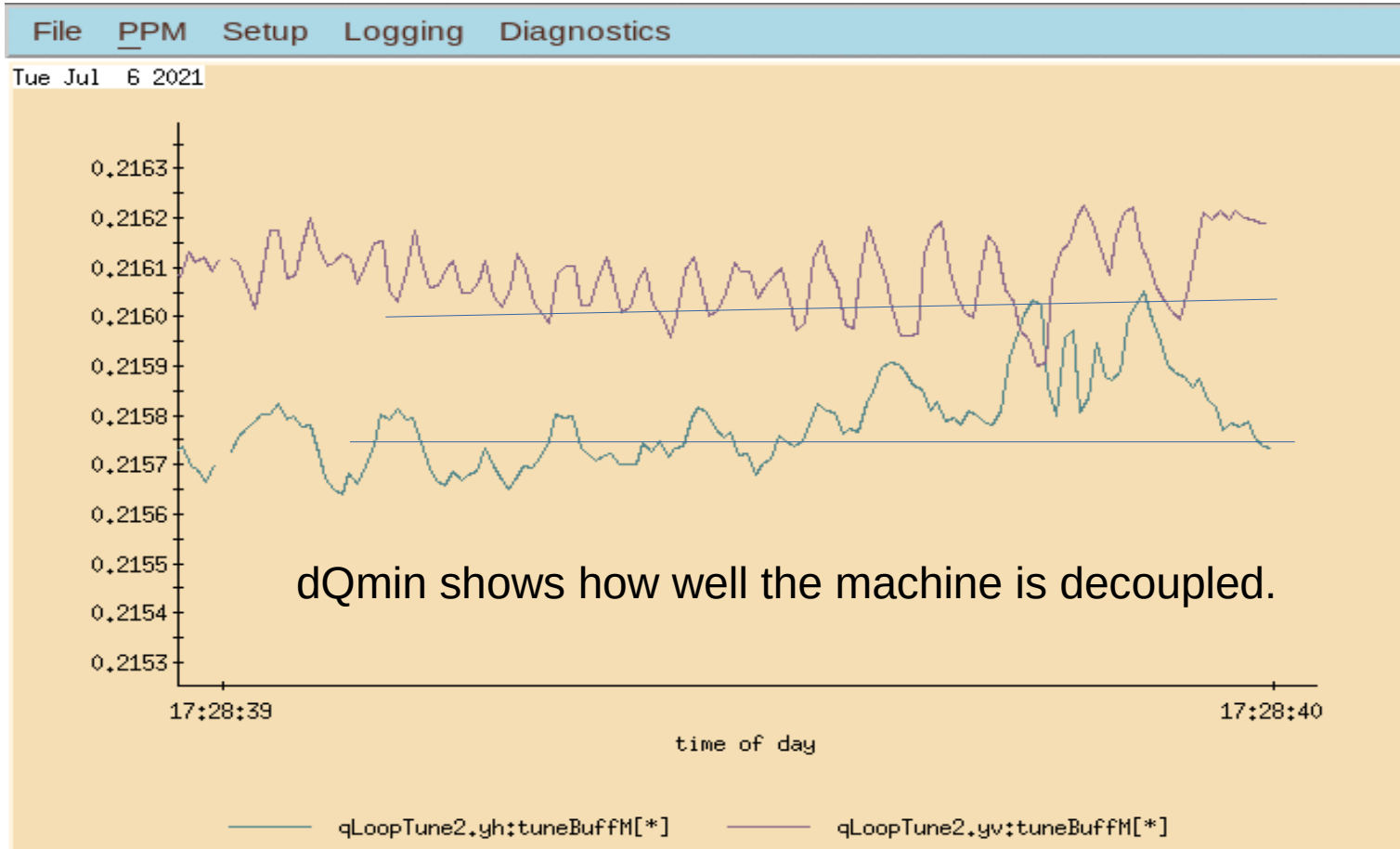
APEX Plan for fine decoupling test :

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- 9.8GeV, with 28 bunches in Yellow ring
- First decouple and measure decoupling and measure minimum tune split.
- Set tunes around (0.235, 0.212) with good lifetime , horizontal offset inject 28 bunches to get maximum ratio of horizontal and vertical emittance ratio
- Using Artus kick to kick horizontal plane for each bunch to get the maximum ratio of horizontal and vertical emittance ratio
- Using collimation to scape vertical plane to get maximum emittance ratio of horizontal and vertical emittance ratio
- With a maximum ratio of horizontal and vertical emittances, slowly increase vertical tune to measure ratio of horizontal and vertical emittance ratio as function of tune split.

Reality is

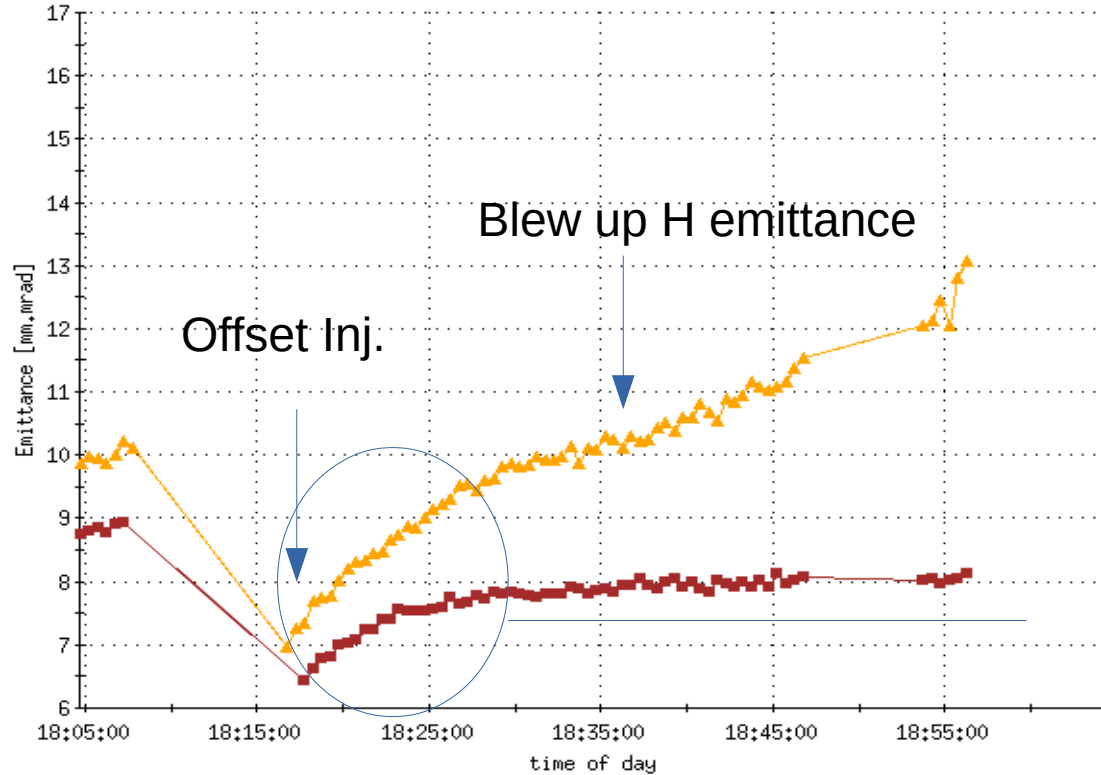
- 1) We started 1 hour late because vacuum access in the ring.
- 2) We were caught by thunder storm about 7pm, and machine stood down for safety. (Totally requested 5 hours. Lost ~ 2.5 hours)
- 3) Unfortunately this time we did not get a larger horizontal emittance from horizontal offset injection. Spent some time to debug the sequence for Artus tune meter kicking (need to kick every bunch, not only first bunch)
- 4) What we obtained:
 - fine decoupling the machine, measured $dQ_{min} < 0.0003$!
 - With Artus kicking and BBQ horizontal plane kicking , we obtained $Kappa = \frac{emit_x}{emit_y} > 1.8$.

Dqmin < 0.0003

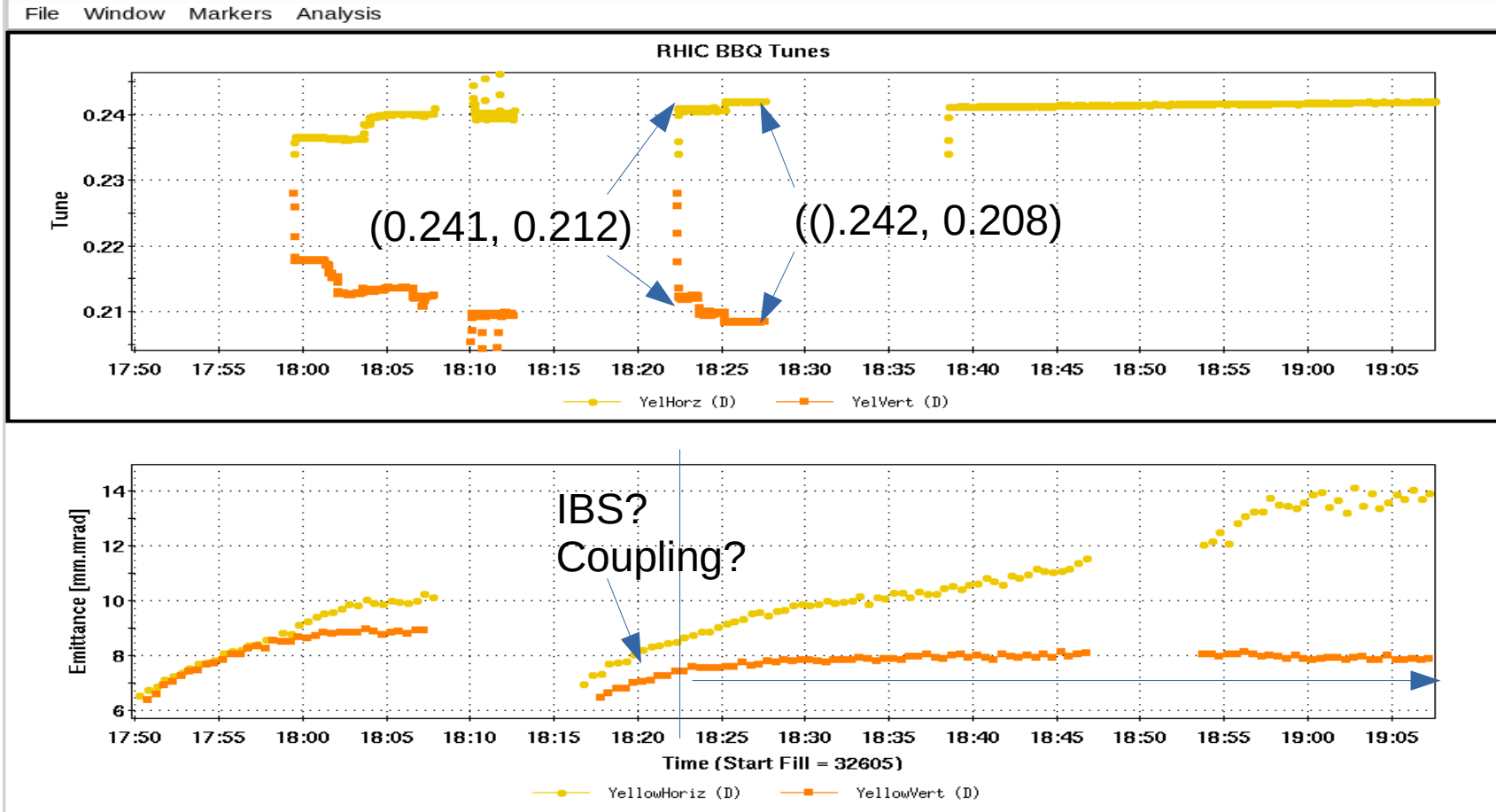


Emittance Evolution

Tue Jul 6 2021

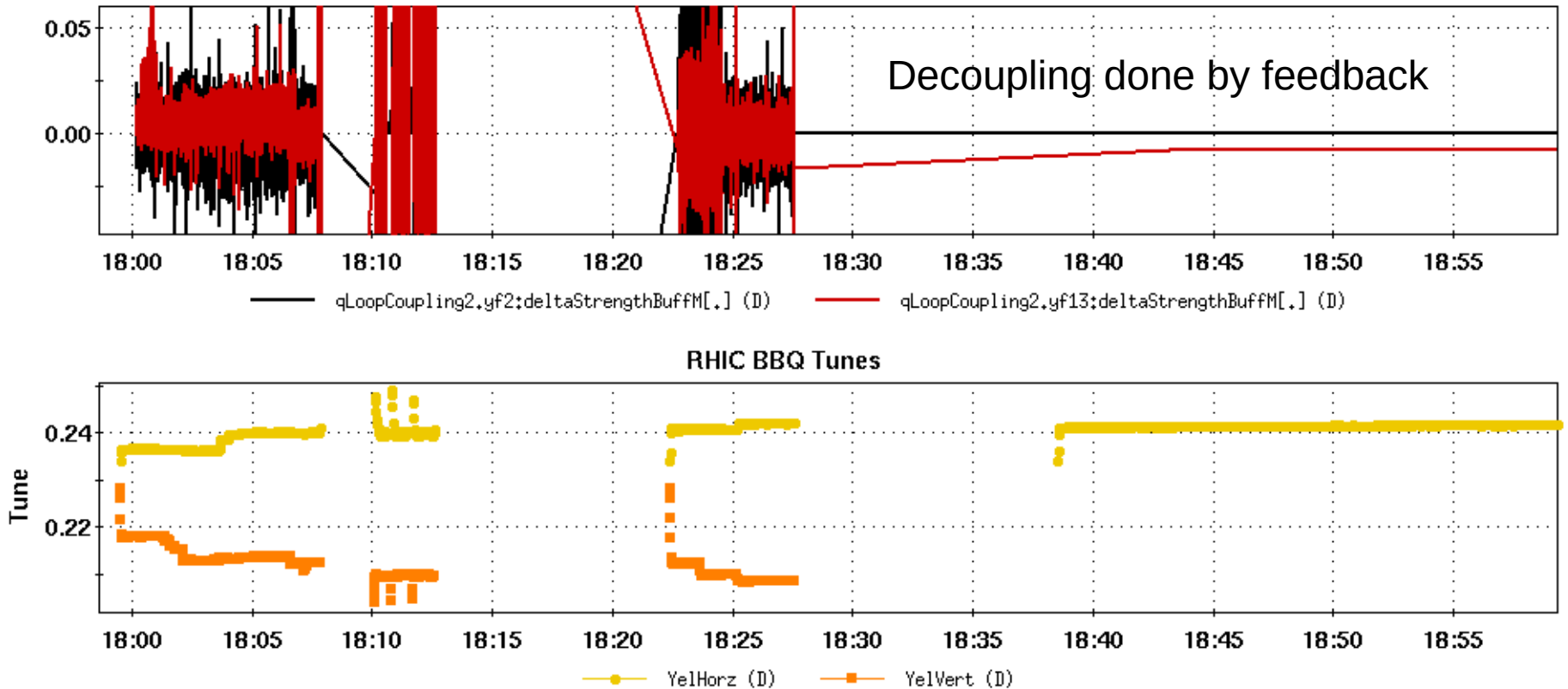


Tunes and Emittances



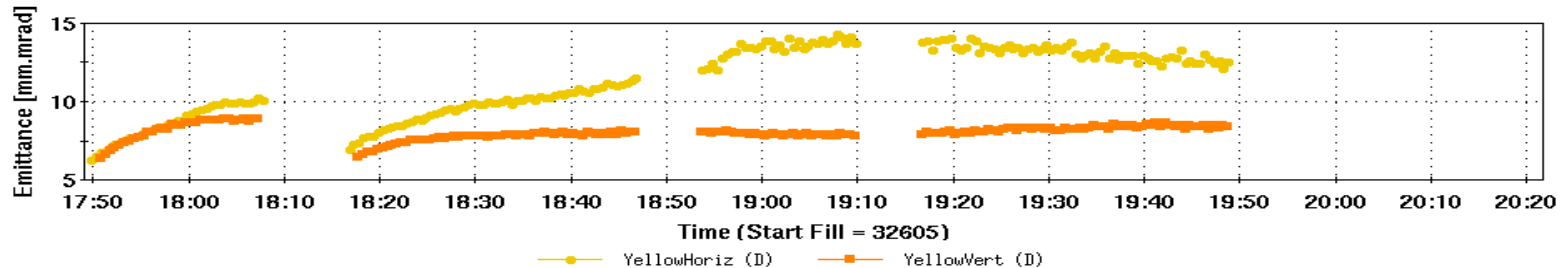
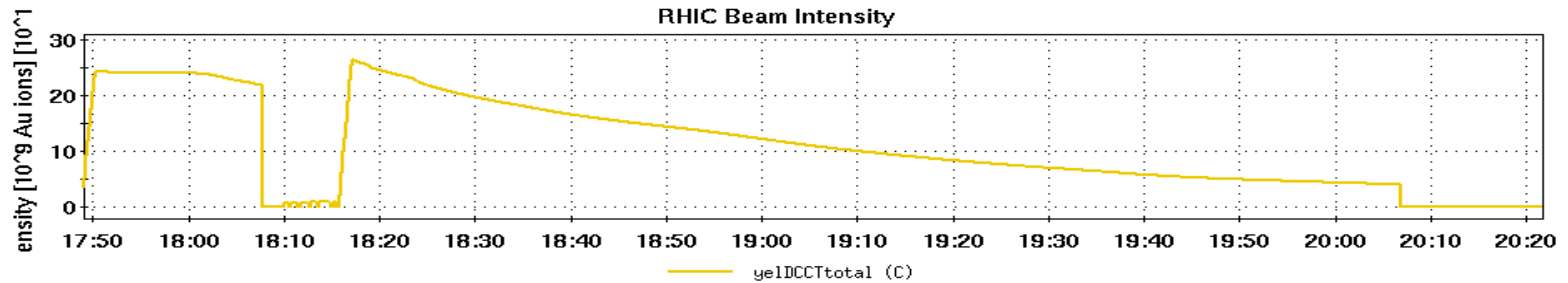
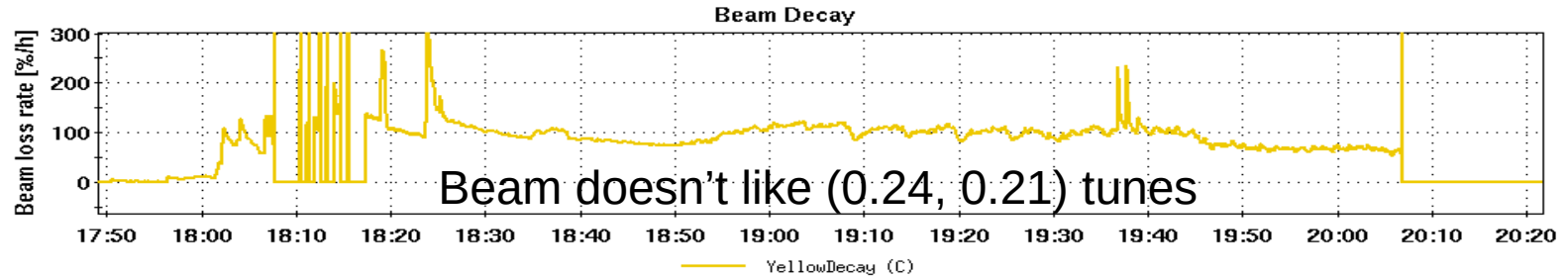
Tunes and Coupling

File Window Markers Analysis



Beam Intensity and Emittances

File Window Markers Analysis



Summary

- 1) $dQ_{\min} < 0.0003$ was obtained.
- 2) With horizontal kickings from Artus and BBQ, maximum ratio of H/V emittances ~ 1.8
- 3) Vertical emittance basically flat during blowing up horizontal emittance. Tunes were (0.241, 0.208).
- 4) Numeric simulation study is going on.