

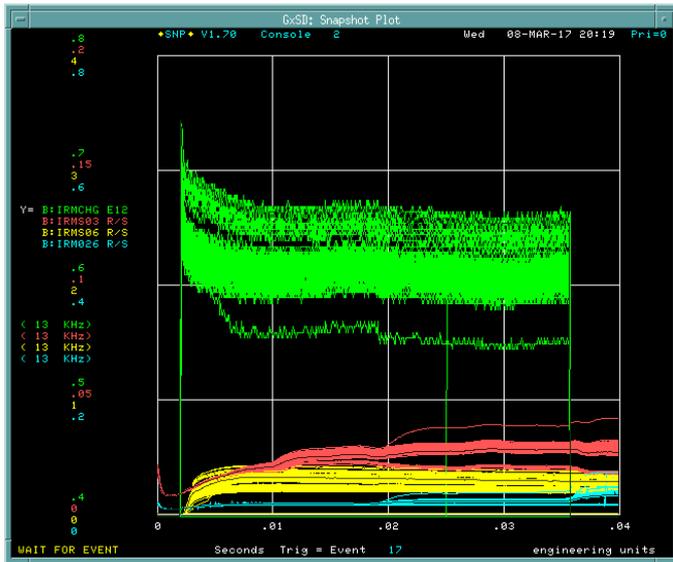
Booster Lattice Measurements

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Goals for the past two weeks

- Measure chromaticity for HEP lattice and pseudo-flat lattice.
- Measure dispersion.
- Perform a tune scan.
- Do a LOCO measurement.

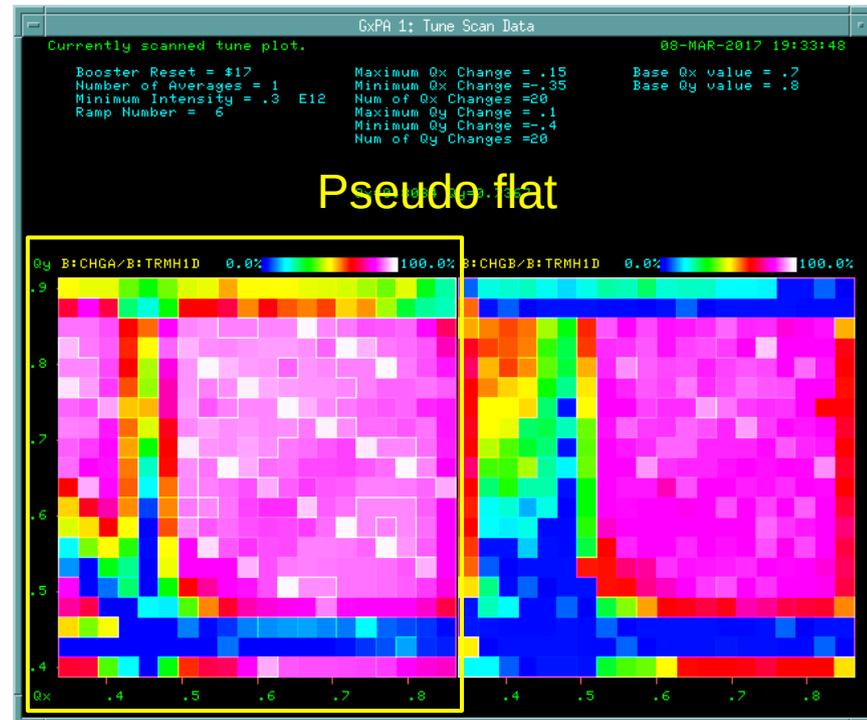
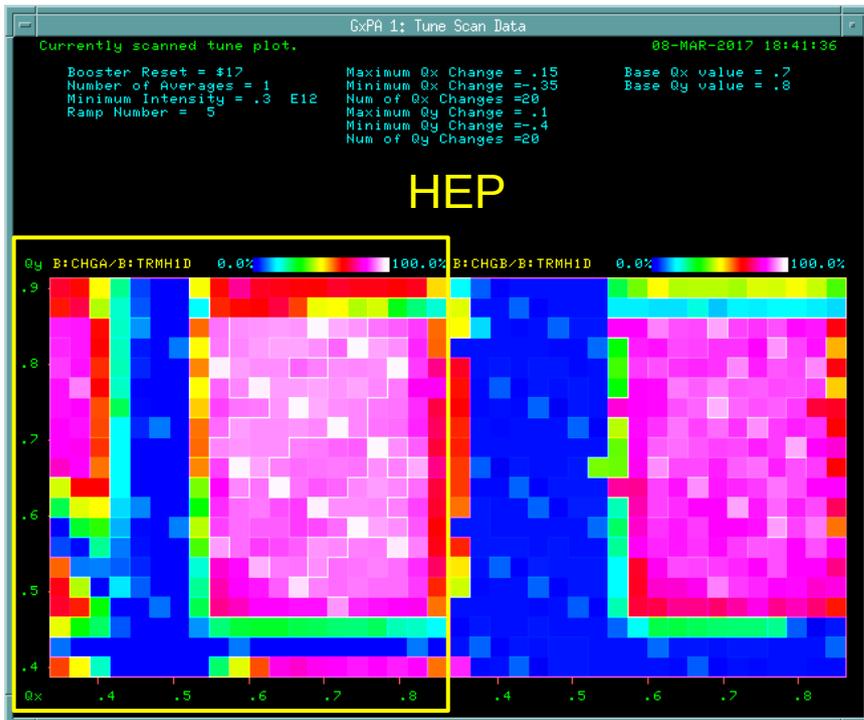
Tune scan (08 Mar 2017)



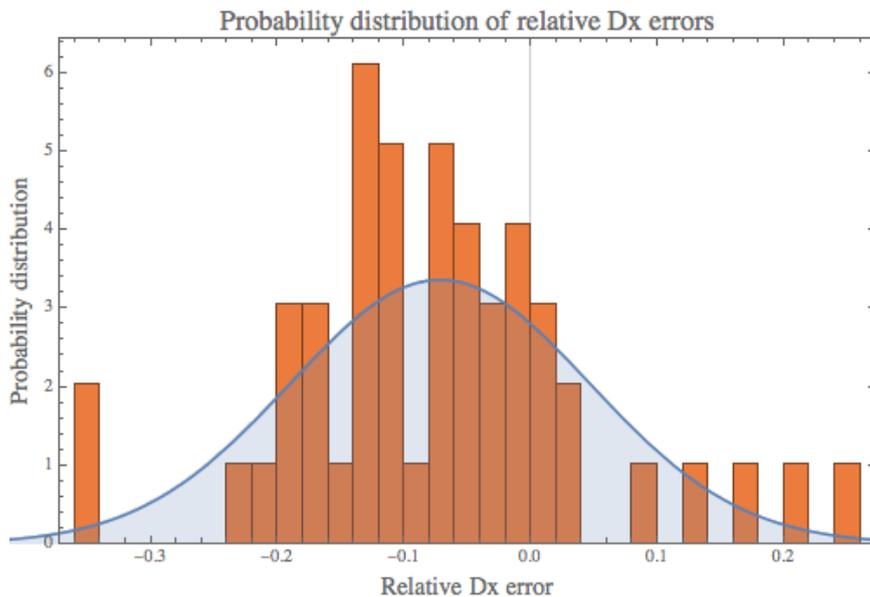
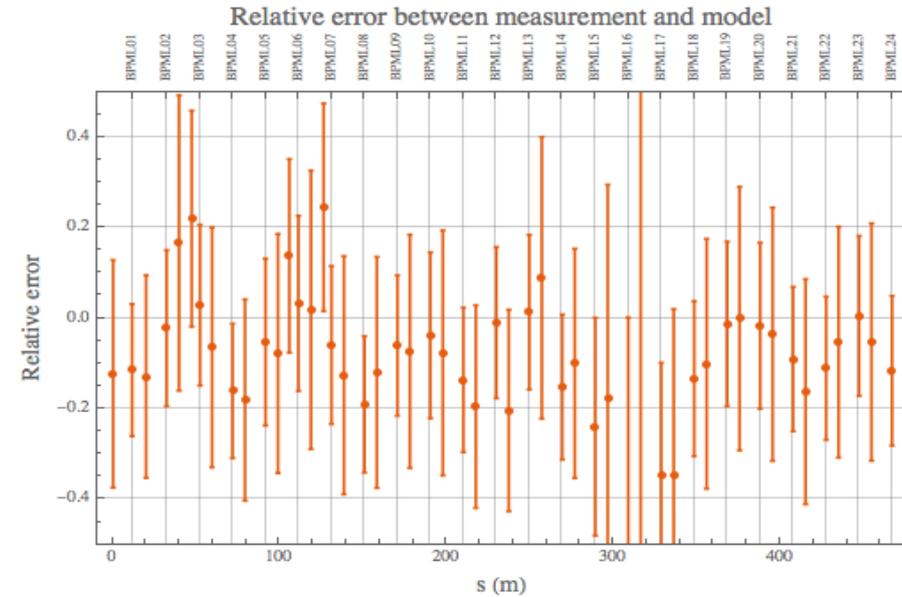
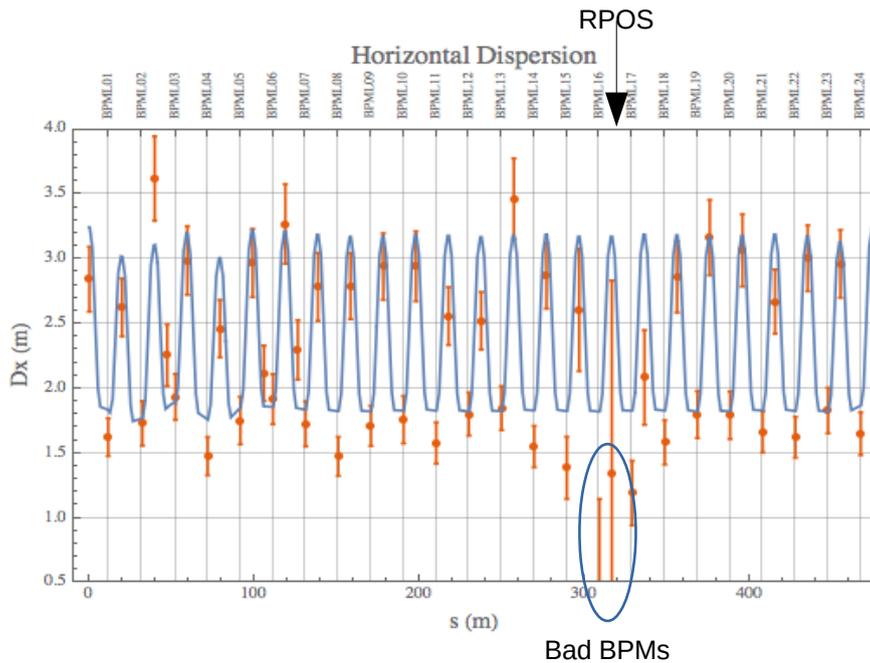
Beam efficiency for both HEP and pseudo-flat lattice < 90% which is not very good. We may need to revisit this.

Although clearly, HEP lattice has very strong 1/2 integer horizontal resonance while for pseudo-flat, it is much weaker.

Vertical 1/2 integer looks a little stronger in pseudo flat lattice.



Pseudo lattice dispersion

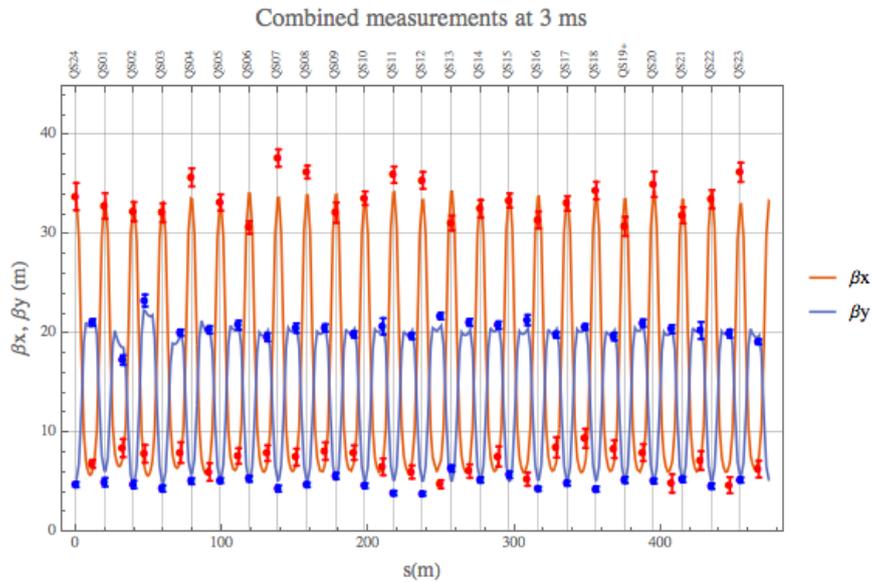


Note: I cannot measure absolute dispersion. Rescaled w.r.t. MADX D_x at rpos. However, I don't know the exact calibration of rpos. Therefore, these plots can be different by a scale factor.

If I set this scale factor = 1, I have a displaced mean error at -0.07 m and standard deviation of the relative error 0.12 after removing 2 obvious outliers.

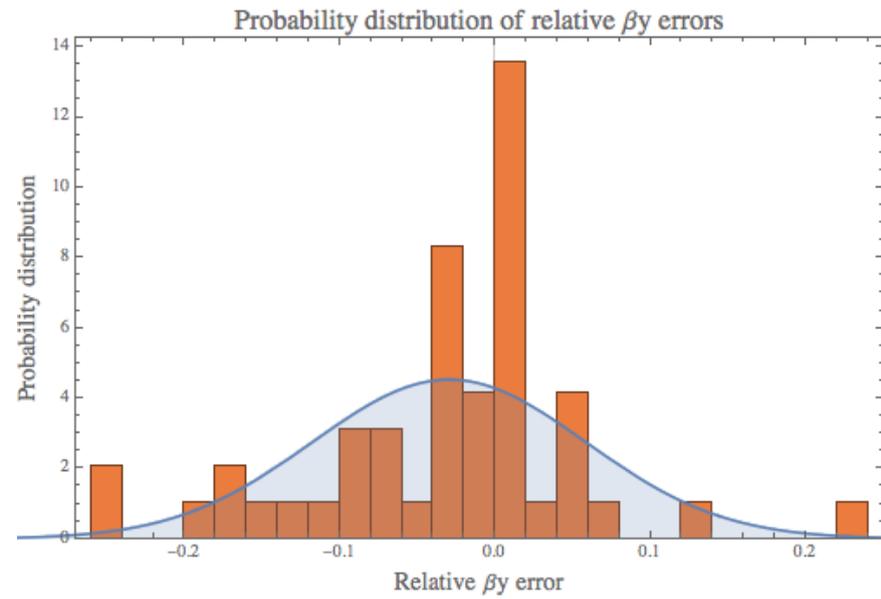
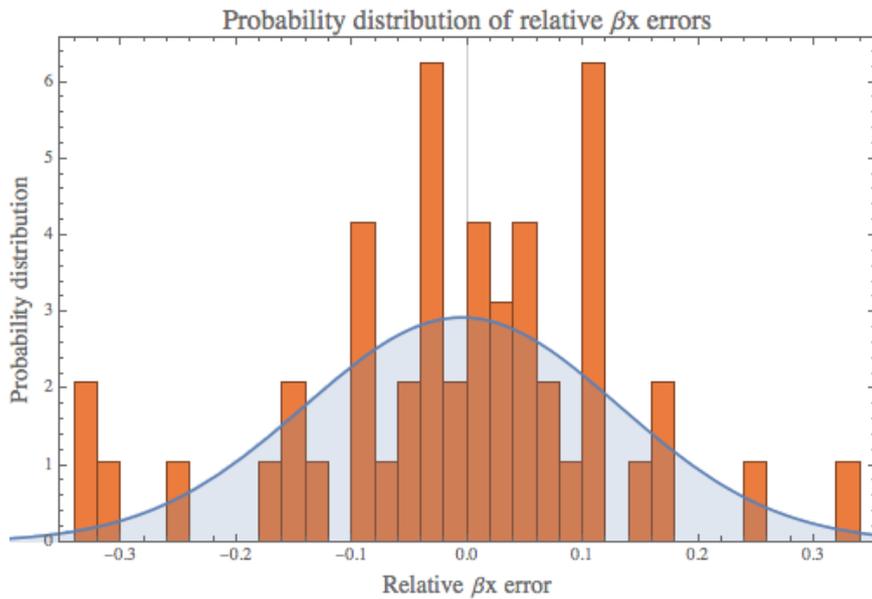
Dispersion relative error w.r.t. model about 10% w.r.t. model (perhaps).

β functions

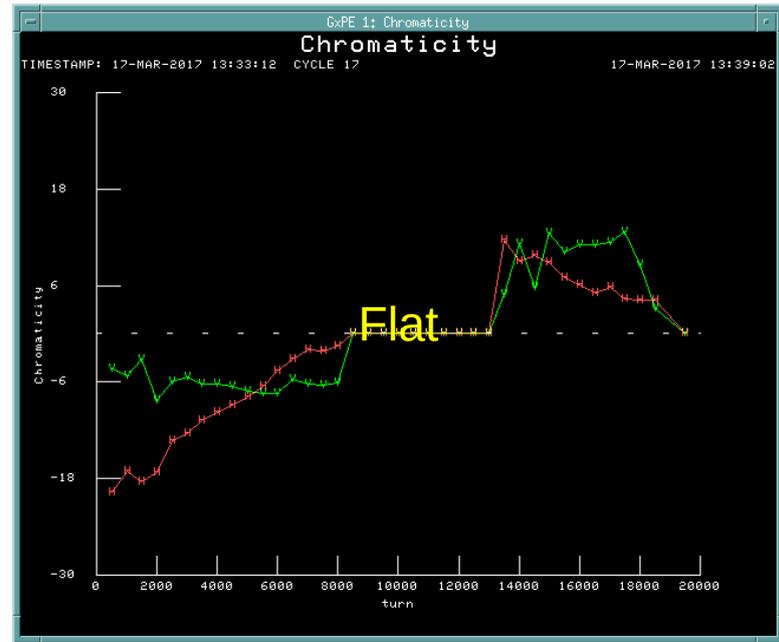
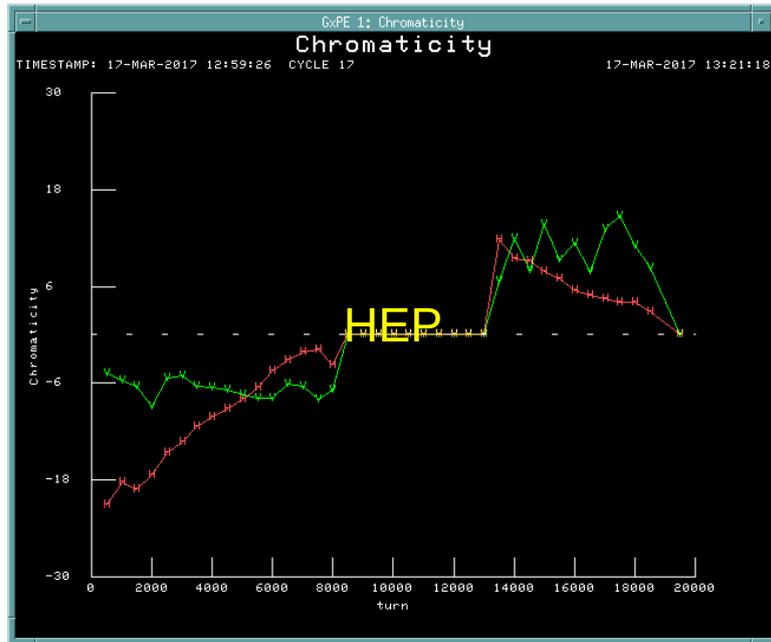


Combined spread in relative error between model and measurement is 14% for β_x and 9% for β_y .

Note β relative errors dominated by low β 's.



Chromaticity



Beam intensity: $0.75e12$ (3 turns in Booster)

Measured chromaticity @ 3.1 ms

HEP: $C_x = -21.0$, $C_y = -4.8$

Pseudo flat: $C_x = -19.7$, $C_y = -4.4$

Not much difference between the two lattices in terms of chromaticities.

Measured tune @ 3.1 ms

HEP: $Q_x = 0.748$, $Q_y = 0.861$

Pseudo flat: $Q_x = 0.753$, $Q_y = 0.862$

Orbit Response

- Orbit response matches model very well **if** I have rpos between 0 to 0.5 its expected effect. (Weird).
 - Rpos effect set to zero
 - Rpos effect set to 1.0
- This effect was not seen in previous studies, e.g. 22 Nov 2016.
 - Beam intensity was higher $\sim 1.2e12$ compared to $0.75e12$ on 13 Mar 2017.
 - This effect is being investigated.