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Split tune operation of a hybrid booster lattice $\nu_x = 3.820$, $\nu_y = 4.830$

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SPLIT TUNE OPERATION OF A HYBRID BOOSTER LATTICE

$$\mathcal{V}_x = 3.820, \mathcal{V}_y = 4.830$$

Booster Technical Note

No. 40

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SPLIT TUNE OPERATION OF A HYBRID BOOSTER LATTICE

$$\nu_x = 3.820, \nu_y = 4.830$$

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Abstract

A comparison is made between operating the hybrid Booster lattice at $\nu_x = 3.830, \nu_y = 3.820$ and $\nu_x = 3.820, \nu_y = 4.830$. The coupling reported previously at $\nu_x = 3.830, \nu_y = 3.820$ is considerably reduced, but indications of effects from the 3rd order structure resonance are still apparent in the horizontal motion.

1. Tracking results for a hybrid Booster lattice¹ operating at $\nu_x = 3.830, \nu_y = 3.820$ show pronounced coupling and indications of the 3rd order structure resonance.²
2. Tracking of the standard combined function Booster lattice³ shows reduced coupling when the horizontal and vertical tunes are split by one unit.⁴ In this note the effects of splitting the tune of the hybrid lattice are reported. Tune selection is based on $\nu_x = 3.820$ being particularly favorable for injection.

Tracking results including the effects of injection eddy current multipoles⁵ are shown in Fig. 1 for $\Delta P/P = 0.0\%$. In Fig. 1(a) appear the previously reported results for $\nu_x = 3.830, \nu_y = 3.820$, and in Fig. 1(b) are the results obtained at $\nu_x = 3.82, \nu_y = 4.830$. Coupling has been reduced; the phase plot for the vertical motion shows a sign of a resonance, while the phase plot for the horizontal motion is still distorted by the 3rd order structure resonance. While improved by splitting the tune, $\nu_x = 3.820$ may still be too close to the structure resonance at $\nu_x = 4.00$.

References

1. J. Claus and S.Y. Lee, private communication.
2. G.F. Dell, Booster Tech Note #37.
3. E. Courant and Z. Parsa, Booster Tech Note #1.
4. G.F. Dell, Booster Tech Note #39.
5. G. Morgan and S. Kahn, Booster Tech Note # 4.

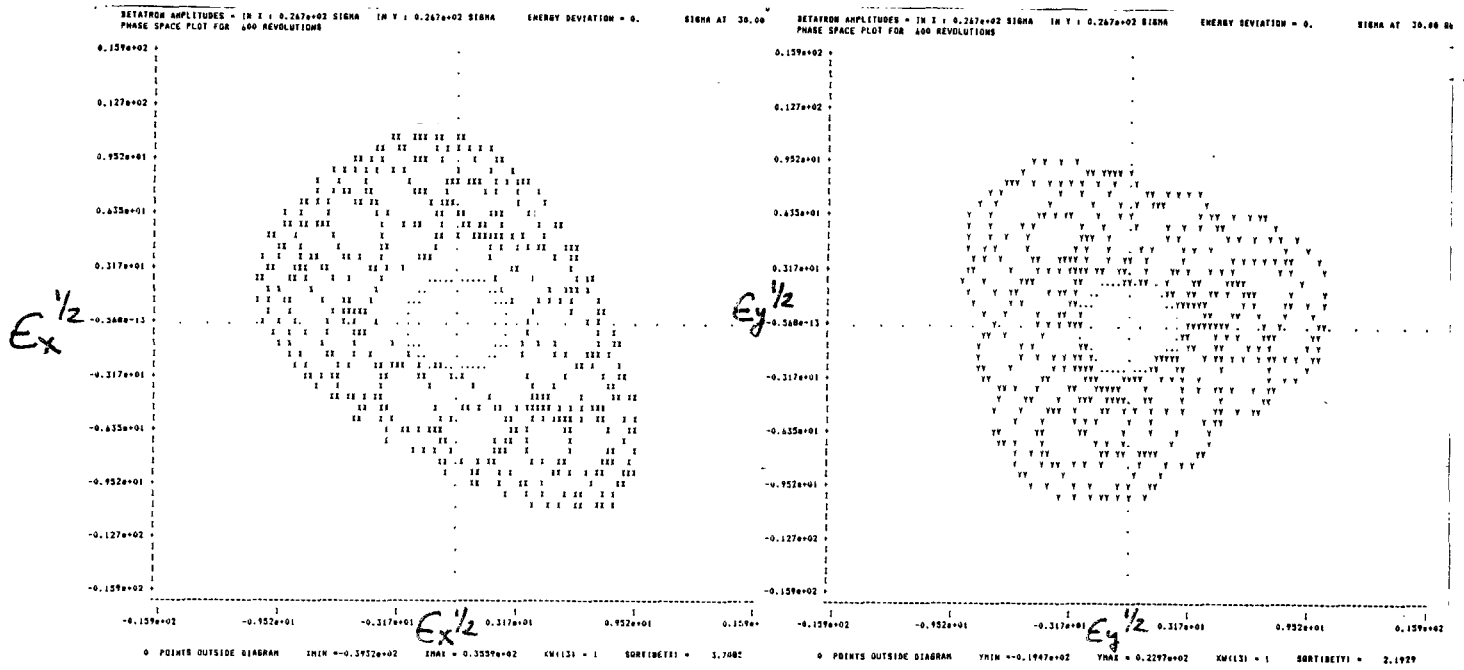


Fig. 1(a) Hybrid lattice, $\nu_x = 3.830$, $\nu_y = 3.820$, With eddy current multipoles.
 $\Delta P/P = 0.0\%$, Chromaticity = 0.0 in both planes, $\epsilon_x = \epsilon_y = 50\pi$ mm mrad.

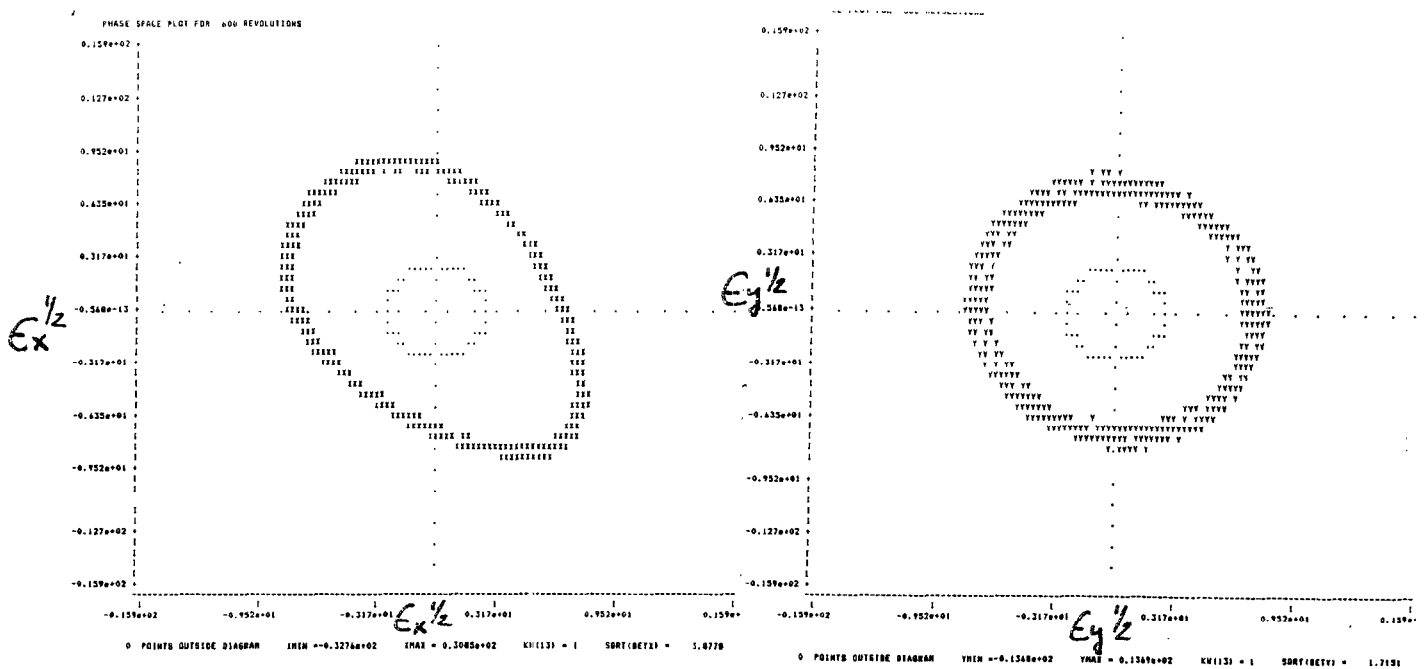


Fig. 1(b) Hybrid lattice, $\nu_x = 3.820$, $\nu_y = 4.830$, With eddy current multipoles.
 $\Delta P/P = 0.0\%$, Chromaticity = 0.0 in both planes, $\epsilon_x = \epsilon_y = 50\pi$ mm mrad.