

# Updates on the HF0F0 Project

*Last two weeks*

Learning how to calculate tune in a lattice  
w/ transverse and longitudinal coupling

Betatron tune is important to acceptance and transverse dynamics  
==> Need to study in order to find appropriate lattice design when longitudinal dimension is introduced

HF0F0 has coupling in 6D

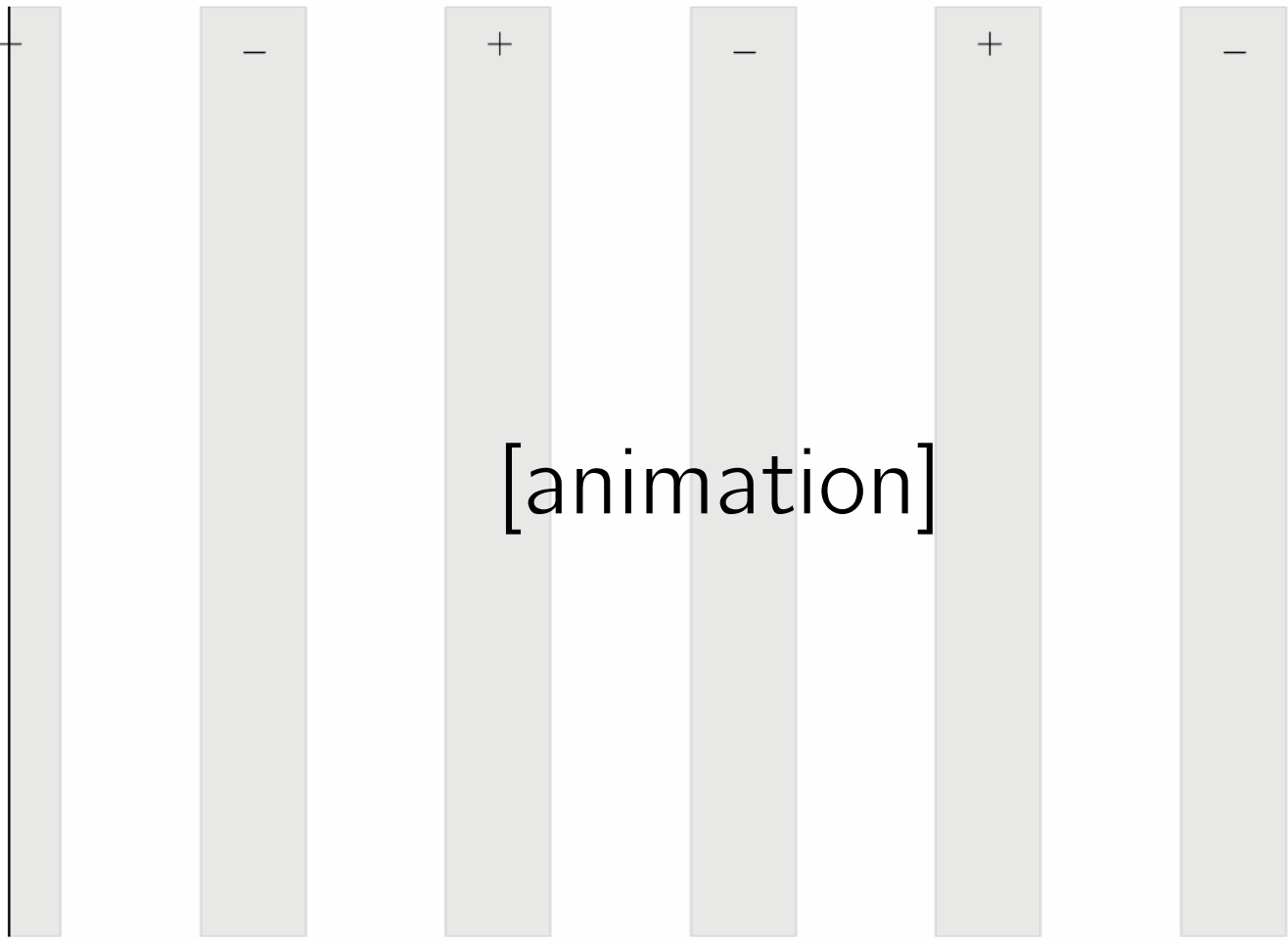
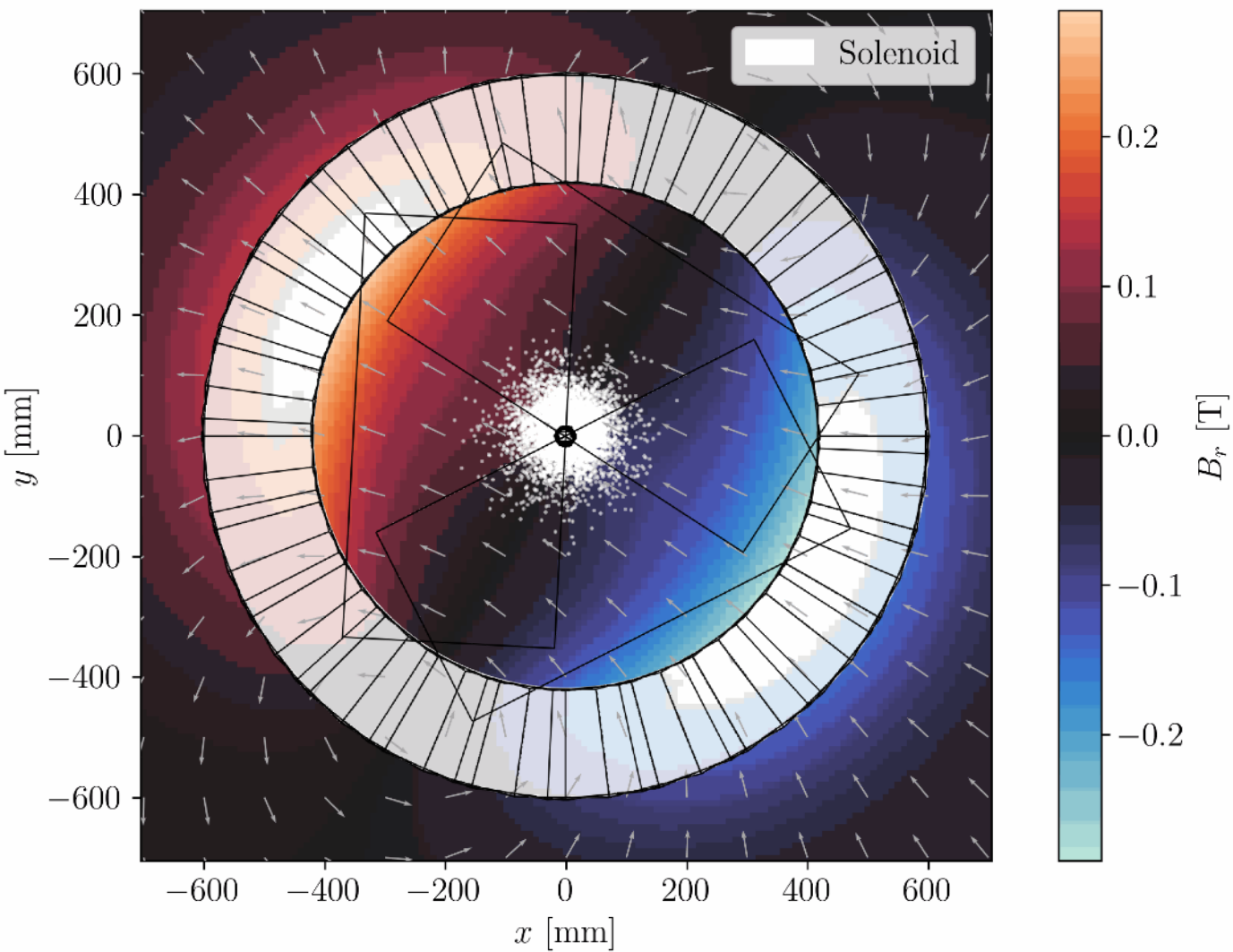
- ==> (1) Procedure for calculating tune is more involved;  
(2) Also need to find synchro-betatron tune!

Open question:  
can we replicate  
Yuri's values?  
—>

**Table 1.** Normal mode tunes and normalized equilibrium emittances.

| Parameter      | Mode I             | Mode II            | Mode III           |
|----------------|--------------------|--------------------|--------------------|
| Tune           | $1.2271 + 0.0100i$ | $1.2375 + 0.0036i$ | $0.1886 + 0.0049i$ |
| Emittance (mm) | 2.28               | 6.13               | 1.93               |

Studying relationship between transverse beam dynamics and absorber orientations



# Updates on the HF0F0 Project

*Next two weeks*

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- ☐ Implement **tune calculation** per literature review —> understand how this impacts orbit-finding / lattice design in 6D
- ☐ Correct some issues in the **orbit-finding procedure** —> towards a lattice design that can operate at any momentum
- ☐ Make some more plots to better visualize and quantify **relationship between absorbers and dispersion** —> look at position and momentum correlations along lattice —> inform placement of absorbers in modified lattice design