

# Frequency maps at the E.S.R.F.



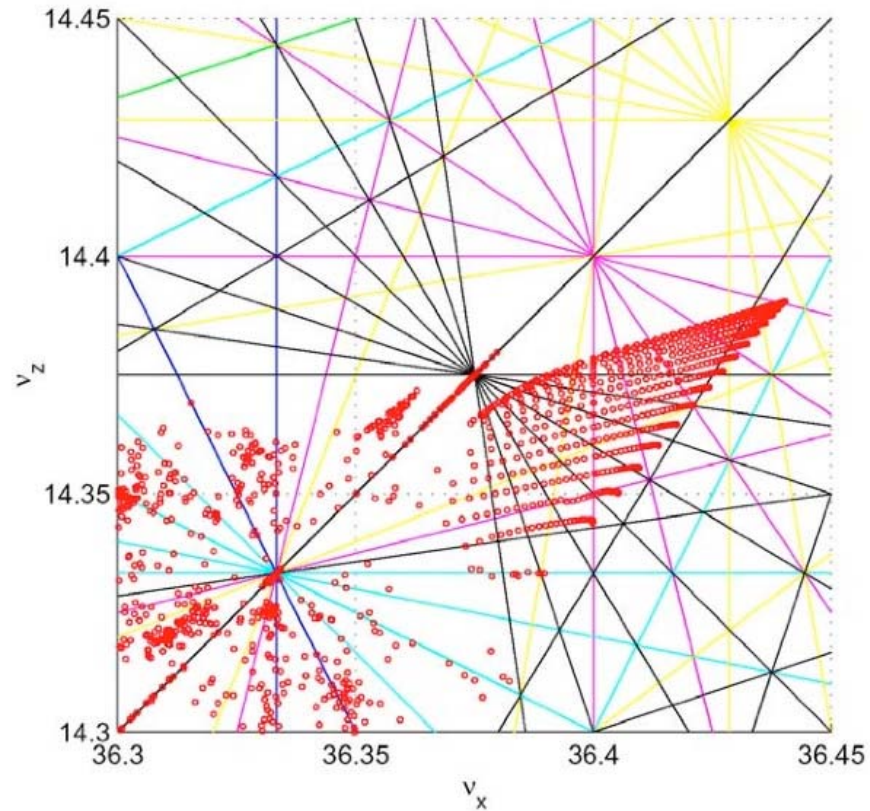
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L. Farvacque  
A . Ropert

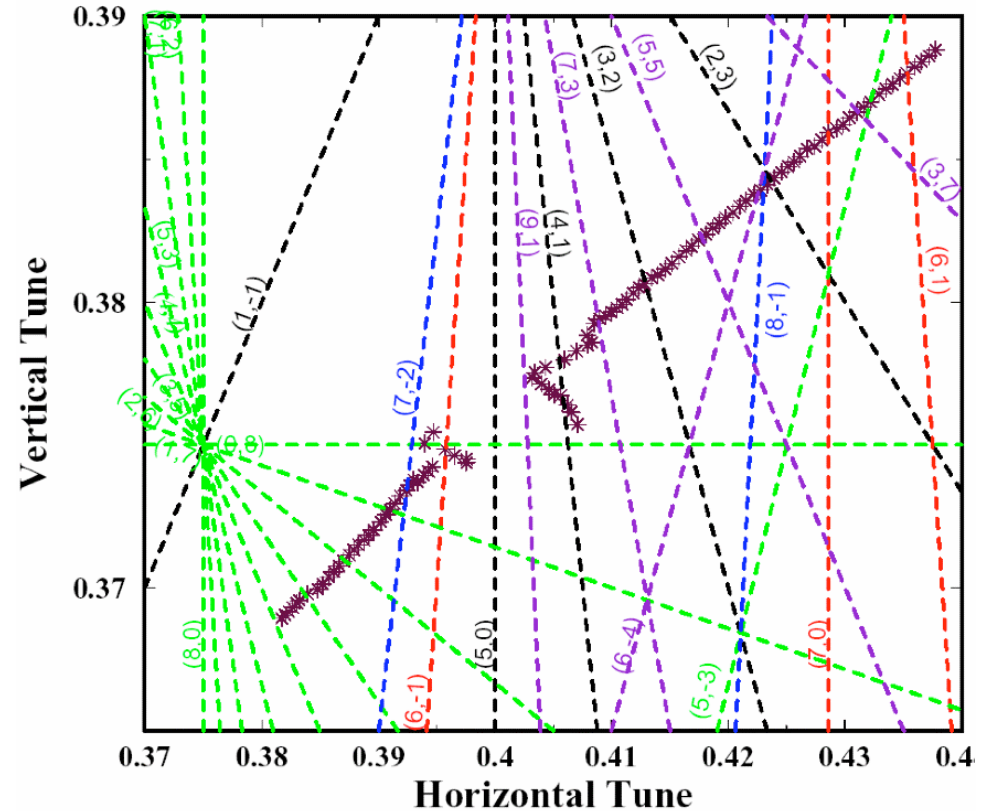
# History

- Frequency mapping was introduced at E.S.R.F. in 2002
  - NAFF algorithm *J. Laskar/Y. Papaphilippou*
  - Exp. Maps: *Y. Papaphilippou*
    - 1000-turn BPM system
      - Pseudo turn-by-turn: lot of averaging required
    - ADAS BPM
      - Single location
      - No linearisation of position computation
  - Simulations: *L. Nadolski, A. Ropert*
    - BETA

# History



*M. Belgroune, L. Nadolski, A. Ropert*



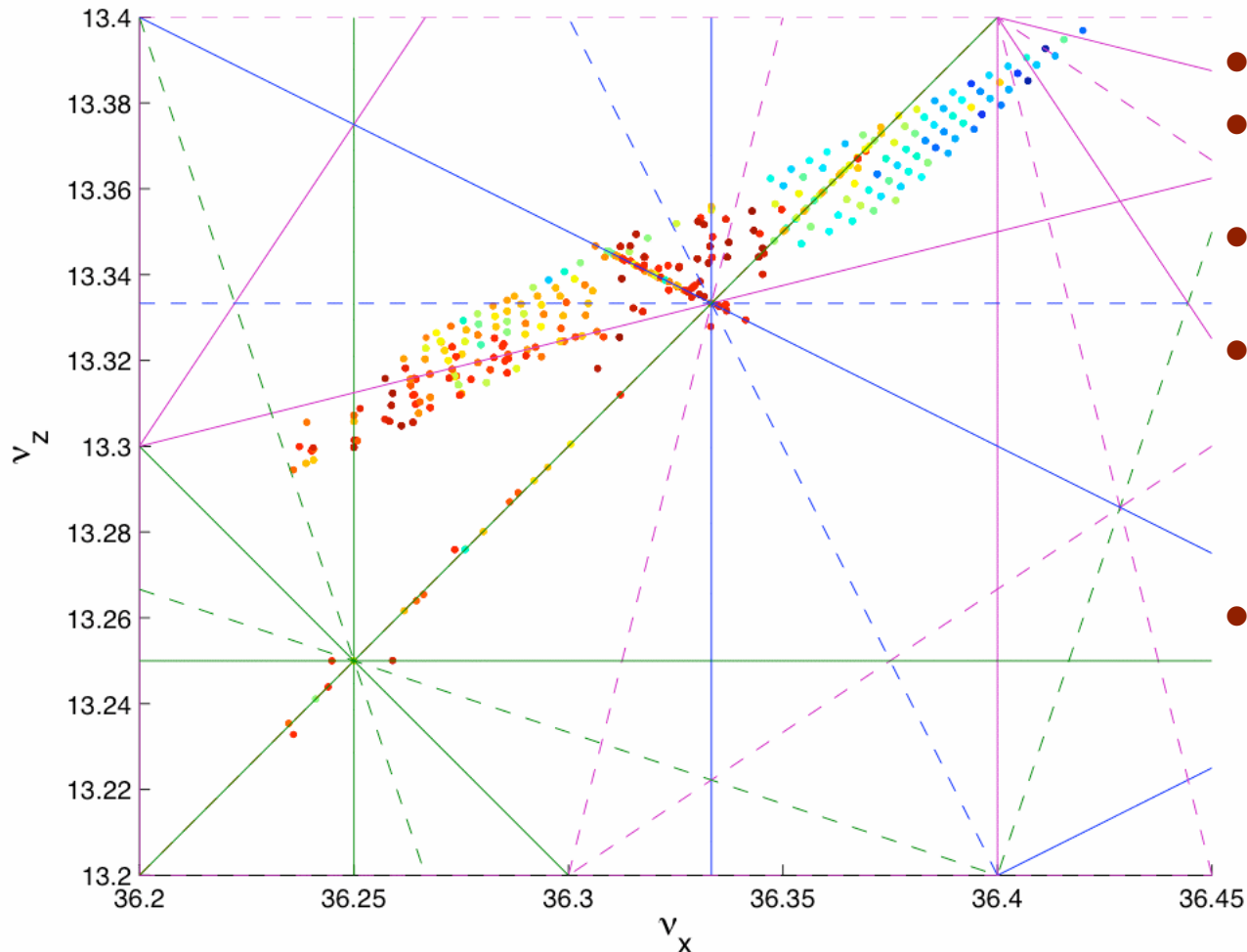
*Y. Papaphilippou*

# What's new in 2008



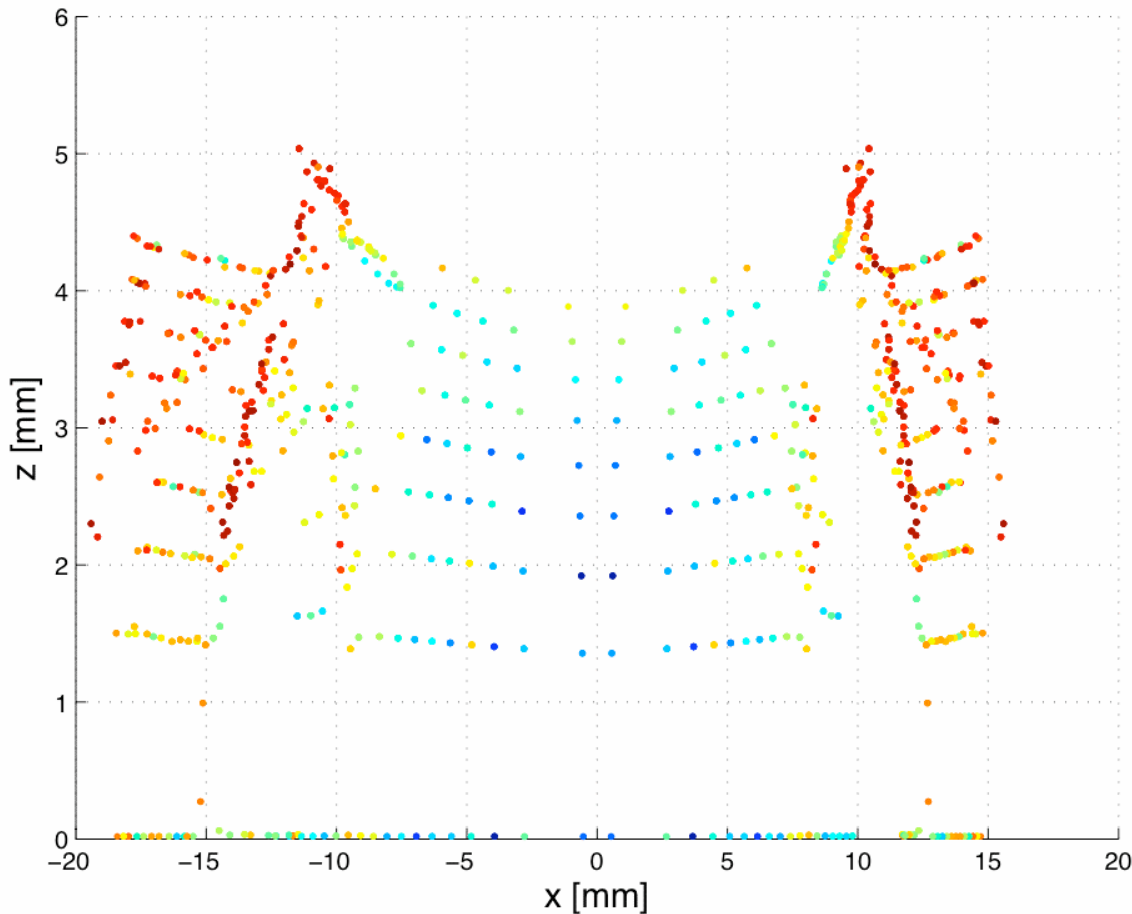
- Testing Libera BPM systems for turn-by turn measurements
  - True turn-by-turn system (no averaging): we could go closer to the limits of aperture,
  - Only 8 positions available at the moment, 224 foreseen,
  - Synchronization with kicker to be improved,
  - Software still in development.
- Investigating the use the transverse multibunch feedback system to get a single bunch turn-by-turn position
  - Not yet tried
- New lattice
  - Doublets instead of triplets in straight sections
  - Vertical tune lowered by one integer
  - One additional sextupole family (S13 and S20 decoupled)

# Simulation



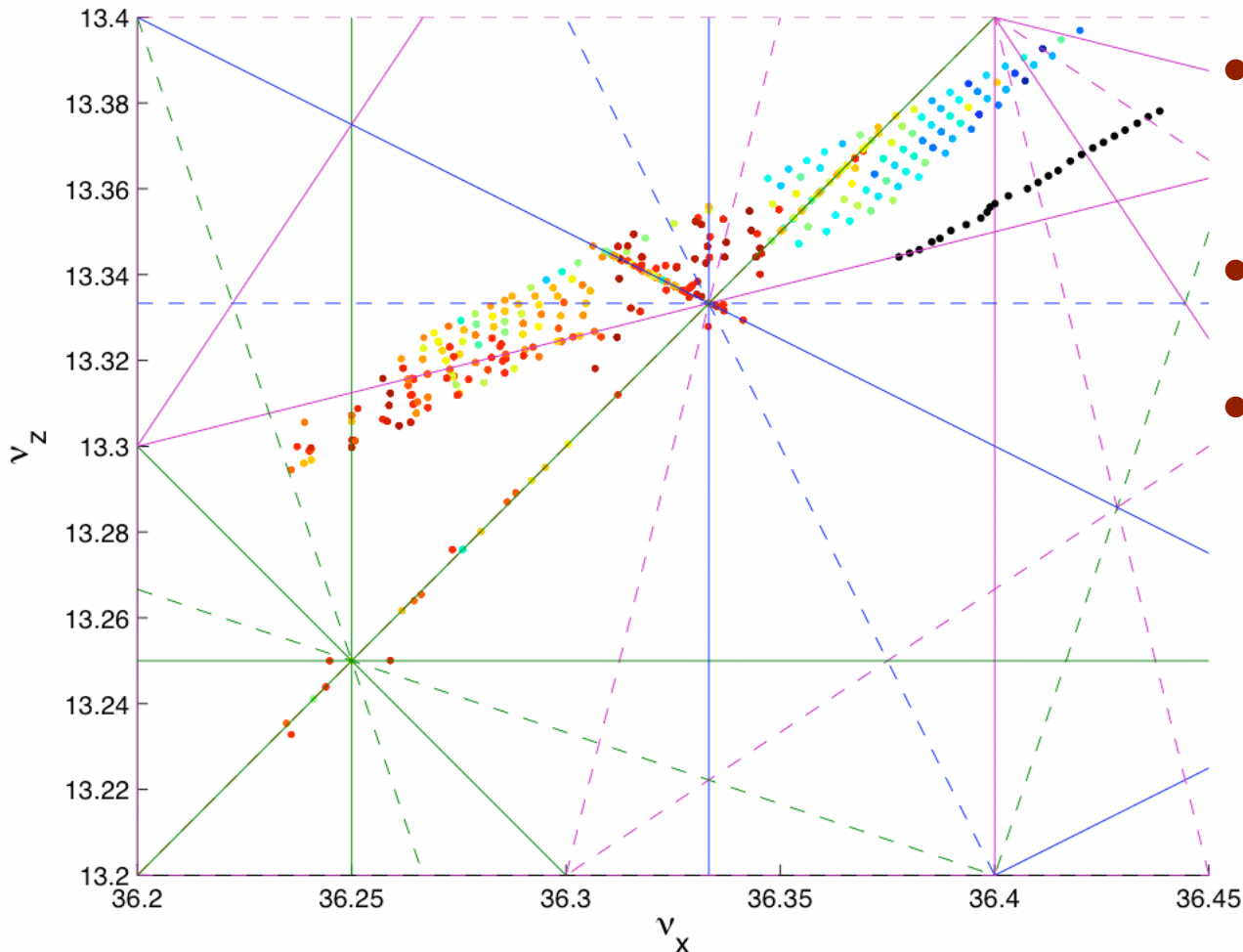
- Present lattice
- Multibunch chromaticity
- No physical restriction
- Errors and corrections are included (except for sextupolar corrections)
- As already mentioned, we suspect the 3<sup>rd</sup> order node to be responsible for aperture limitations

# Simulation: dynamic aperture



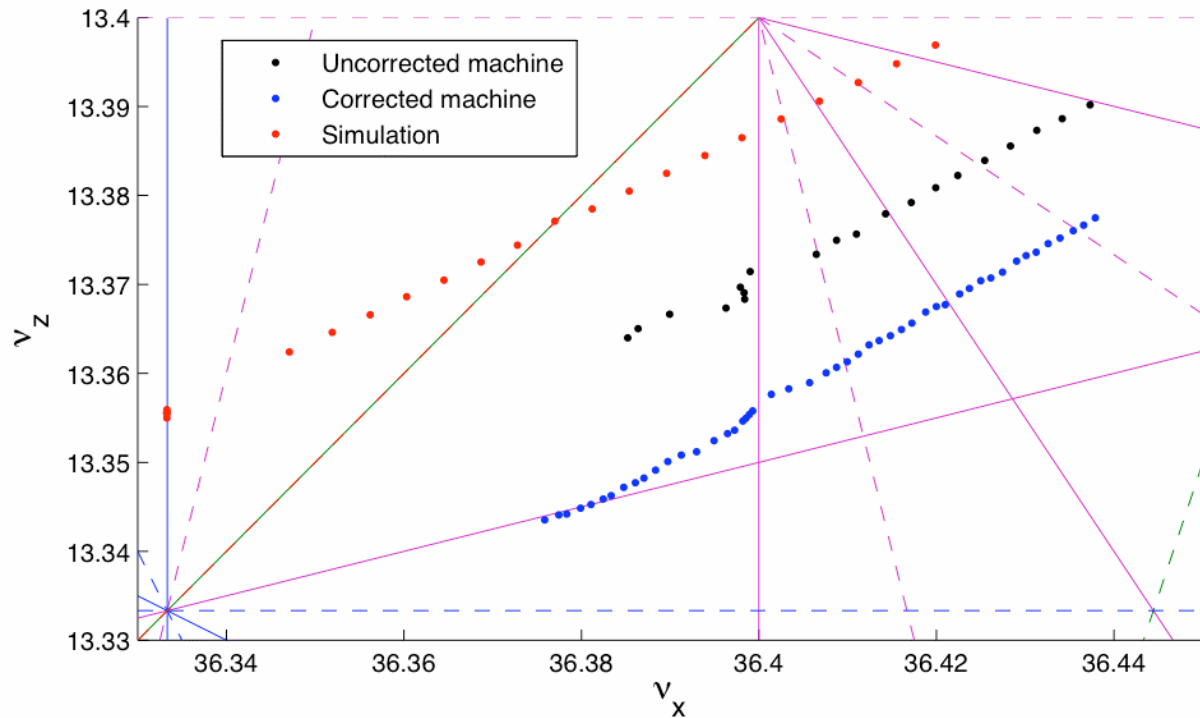
- Simulation on 500 turns
- The aperture reaches -20 mm
- But the chaotic region corresponding to the 3<sup>rd</sup> order node is around -15 mm

# Simulation + experiment



- Very first measurement with Libera BPMs
- Different working point...
- Experimental points stay in the regular region of the map

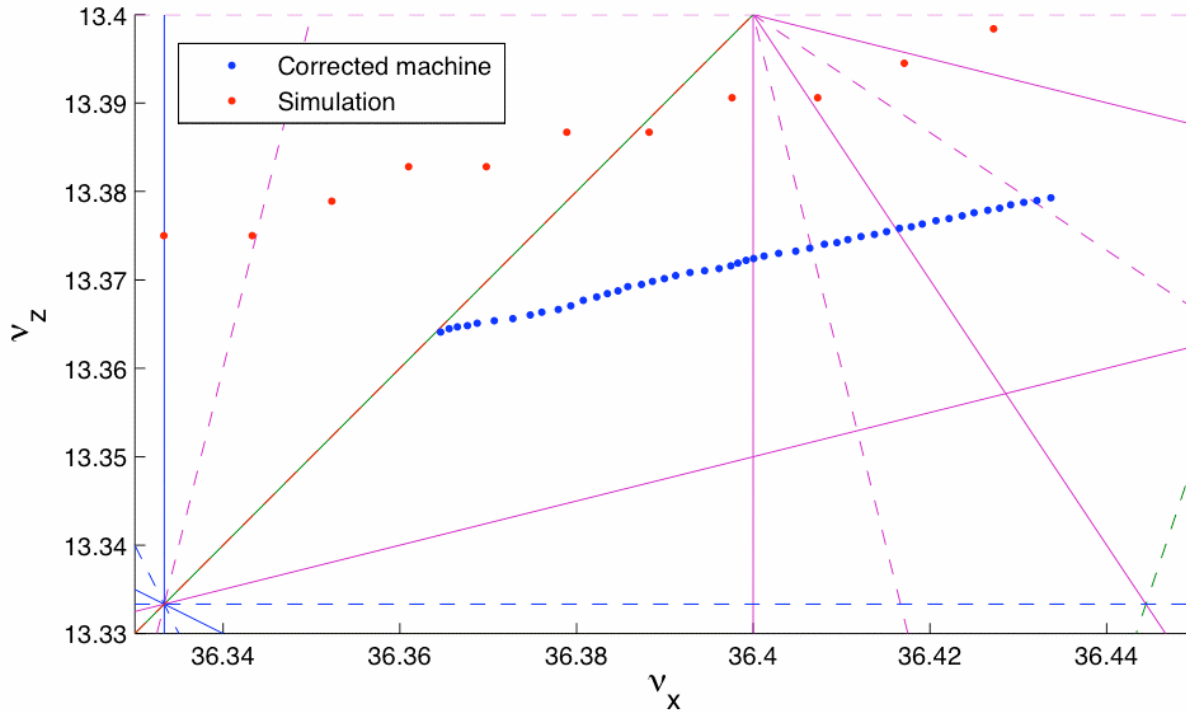
# Comparison



- The tune path is as predicted
- We still see the 5<sup>th</sup> order resonance, though weaker than before



# Zero chromaticity



- We tested the zero chromaticity setting to maximize the number of measurable turns
- No difference with standard tuning

# Conclusions

- First new measurements are promising
- In a few months we should be in a much easier position to measure maps
- Mapping the x-z plane is not very interesting because of the very small vertical aperture
- We will concentrate on mapping the x- $\delta$  plane
  - Most important for lifetime
  - Where puzzling behavior happens (*see to-morrow...*)
  - But still doubts on off-momentum simulations...