

News on the TMCI and SPS transverse impedance

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Agenda

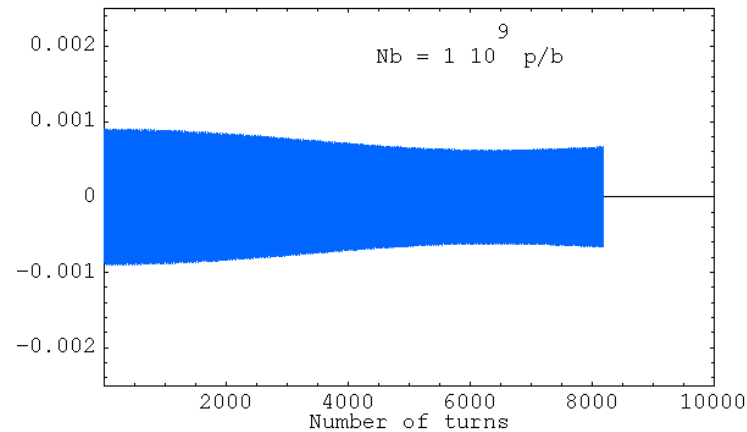
- Transverse motion of an SPS bunch in 2nd RF
- Including the 800 MHz cavities in the SPS impedance model
- Next steps

Transverse motion of an SPS bunch in 2nd RF

- Parameters:
 - Initial momentum spread (2 sigma): 0.00107
 - Initial bunch length: 0.3 m
 - Main RF 2 MV
 - 2nd RF voltage 500 kV in bunch shortening mode (linear ramp between 1000 and 2000 turns)
 - SPS model (beam pipe, BPHs, BPVs, kickers, 200 MHz RF system)

Bunch vertical Position in m

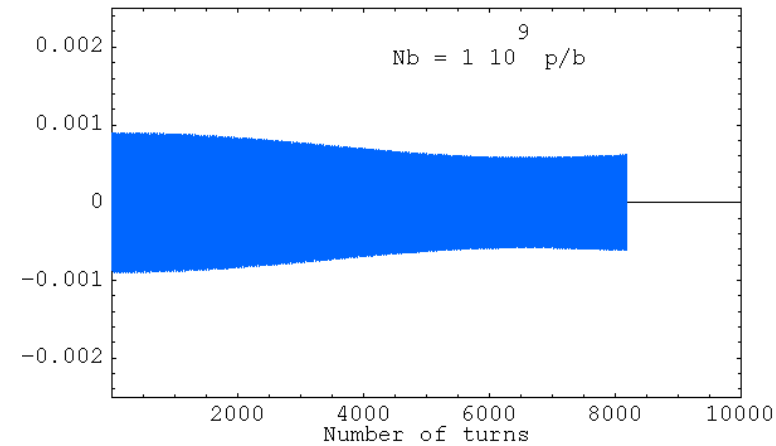
$N_b = 1 \cdot 10^9$ p/b



$V_{2nd RF} = 500$ kV (bunch lengthening)

Bunch vertical Position in m

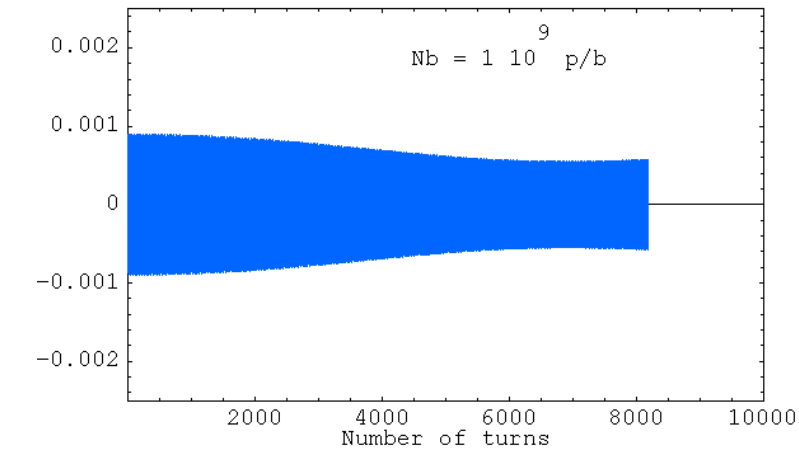
$N_b = 1 \cdot 10^9$ p/b



$V_{2nd RF} = 0$ kV

Bunch vertical Position in m

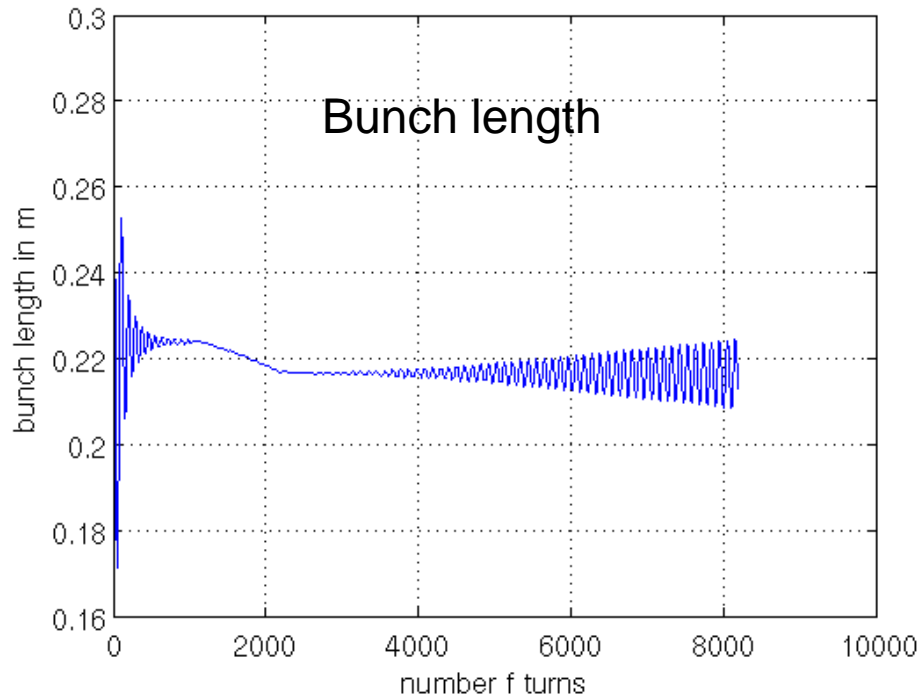
$N_b = 1 \cdot 10^9$ p/b



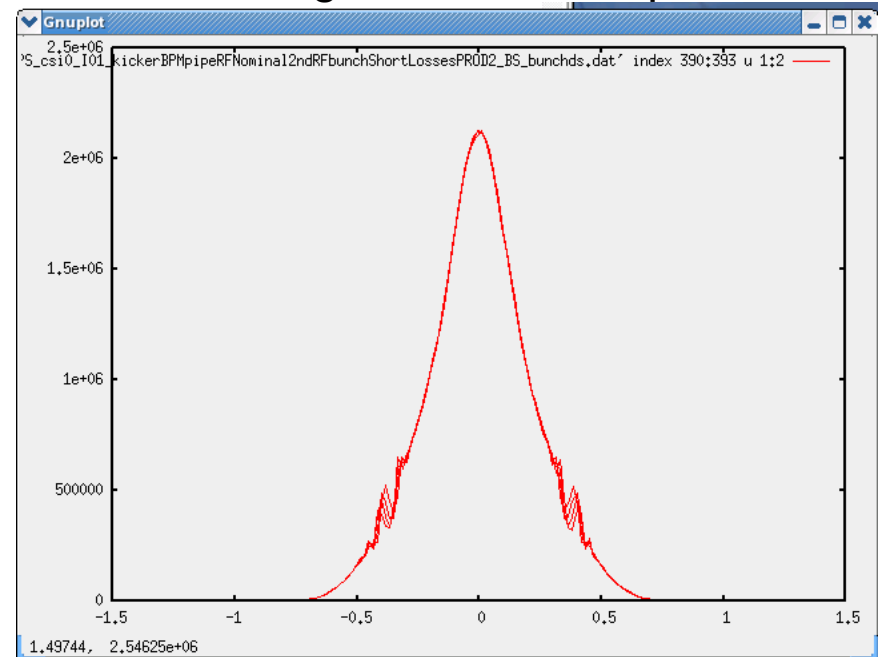
$V_{2nd RF} = 500$ kV (bunch shortening)

2nd RF system

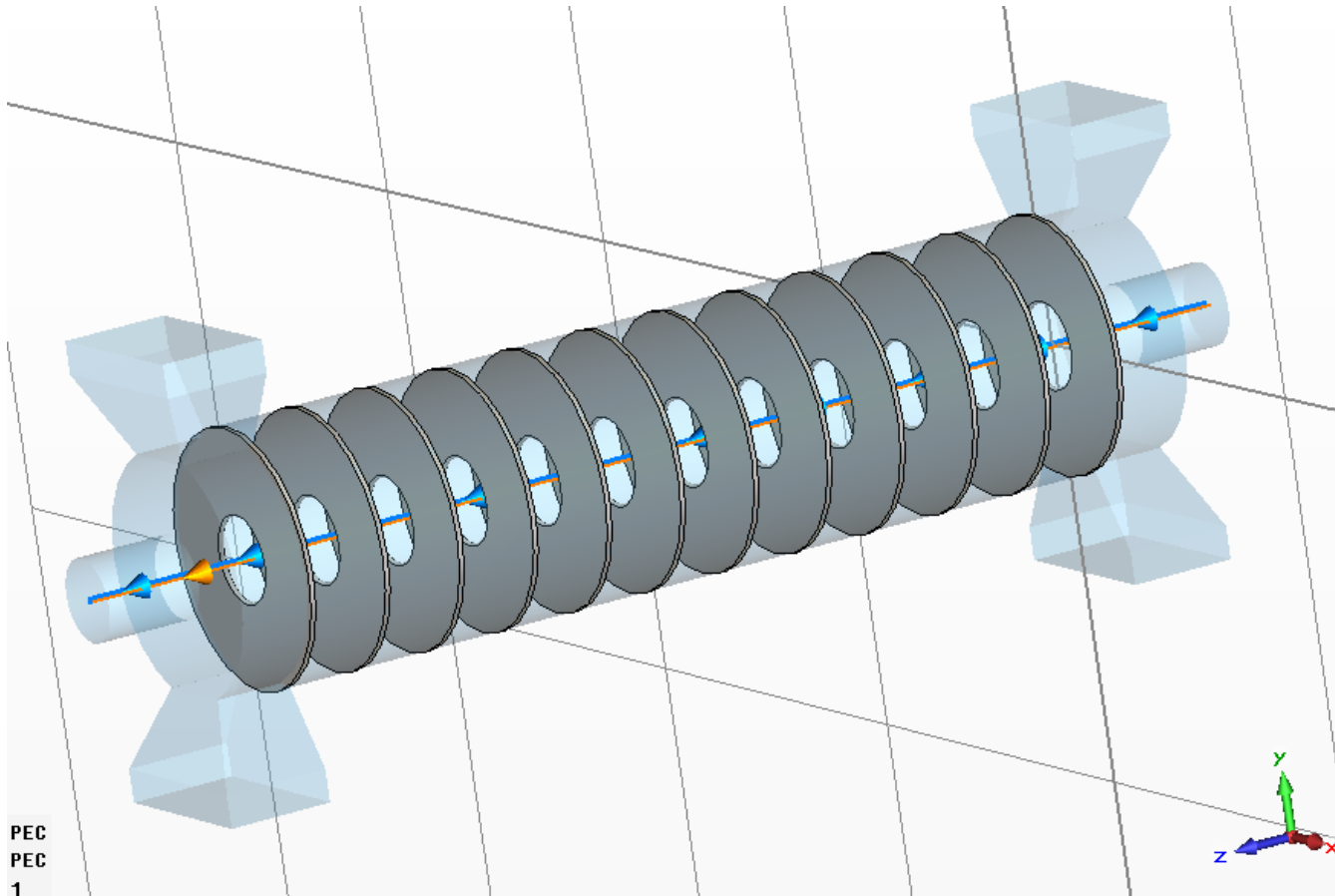
- 800 MHz system seems to make things worse with these parameters
- However, oscillations are seen on the bunch length... to be studied...



Longitudinal bunch profile

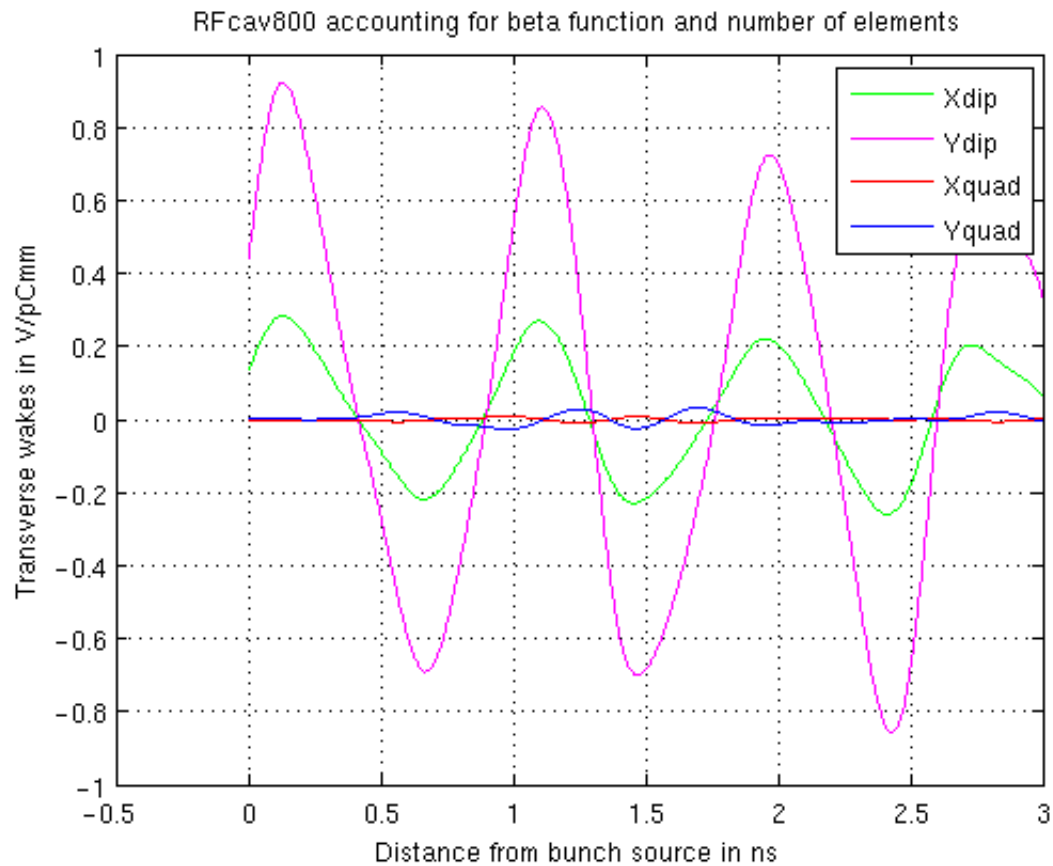


Import of 800 MHz cavities

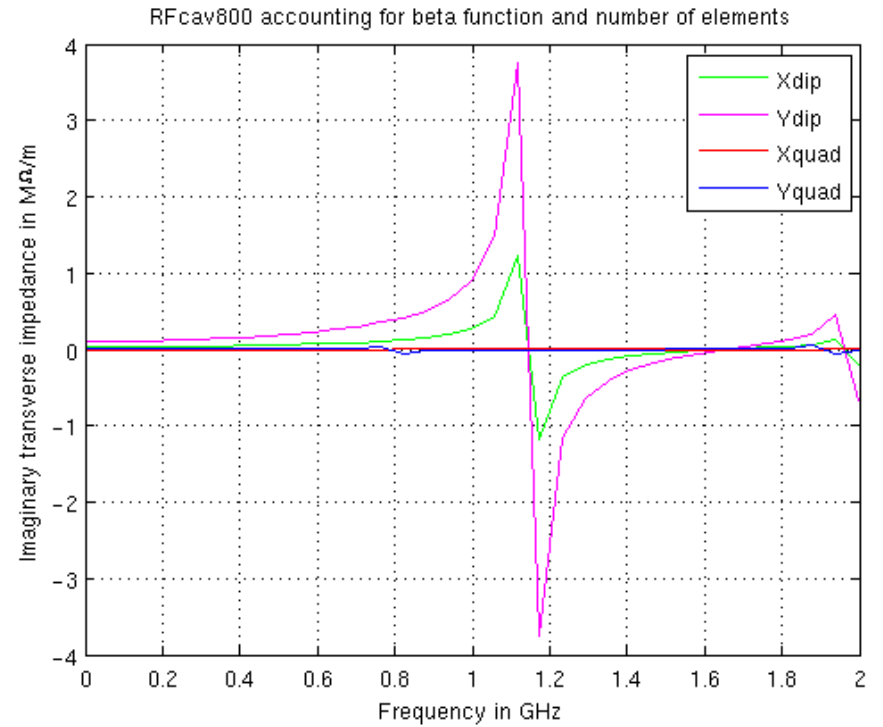
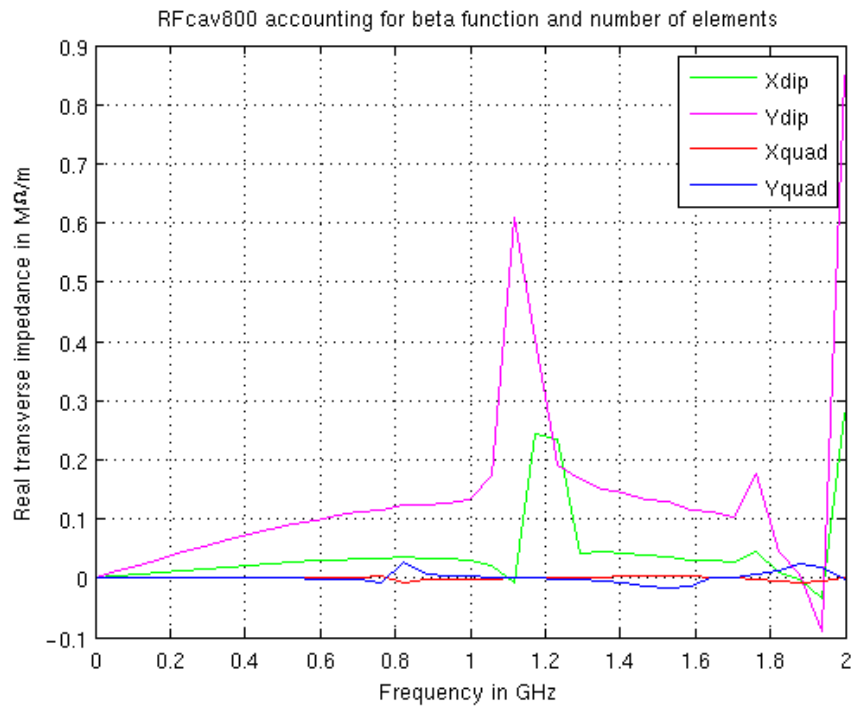


2 ACL cavities of 3 sections (11 cells per section + transition cell)

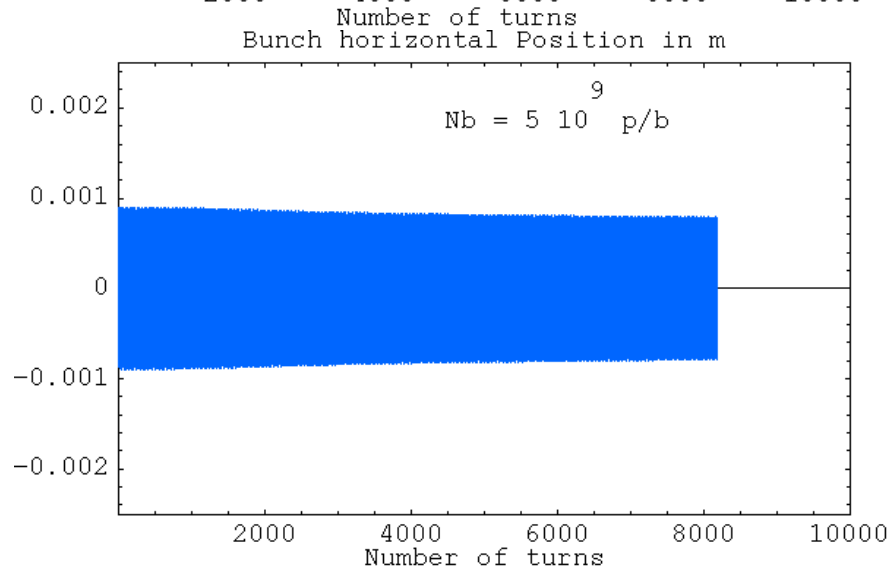
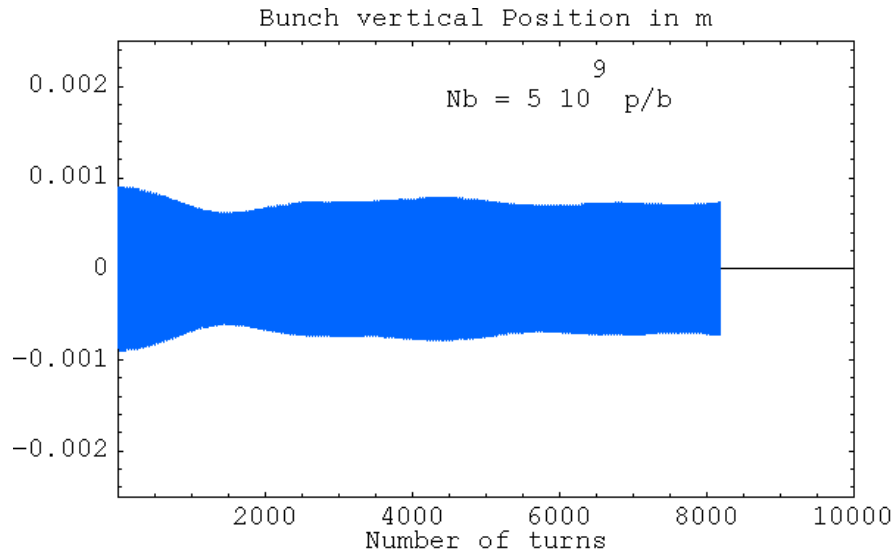
Wakes



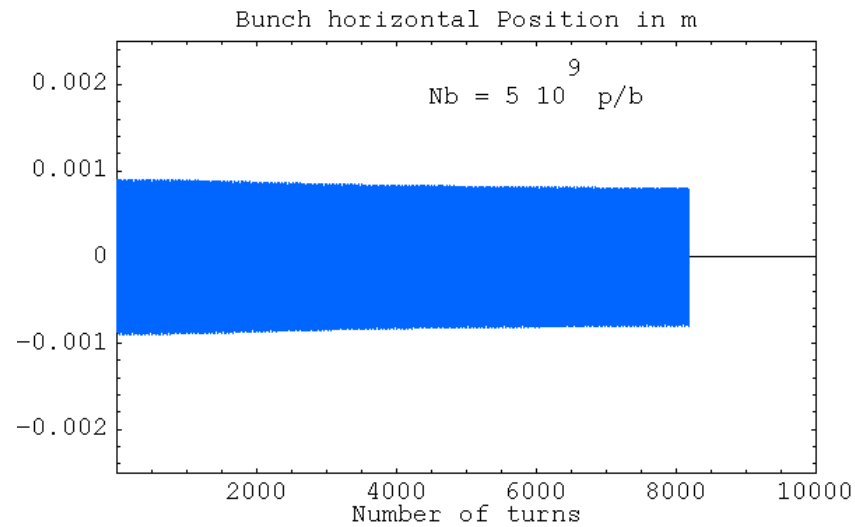
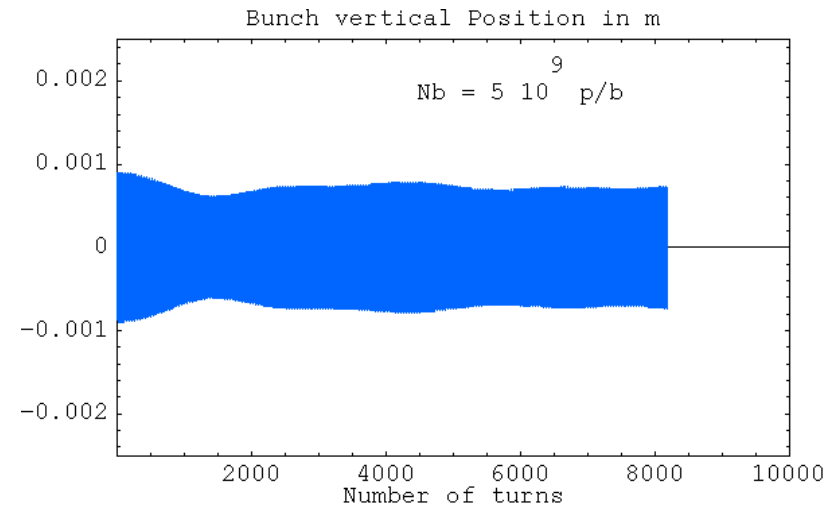
impedance



Without 800 MHz



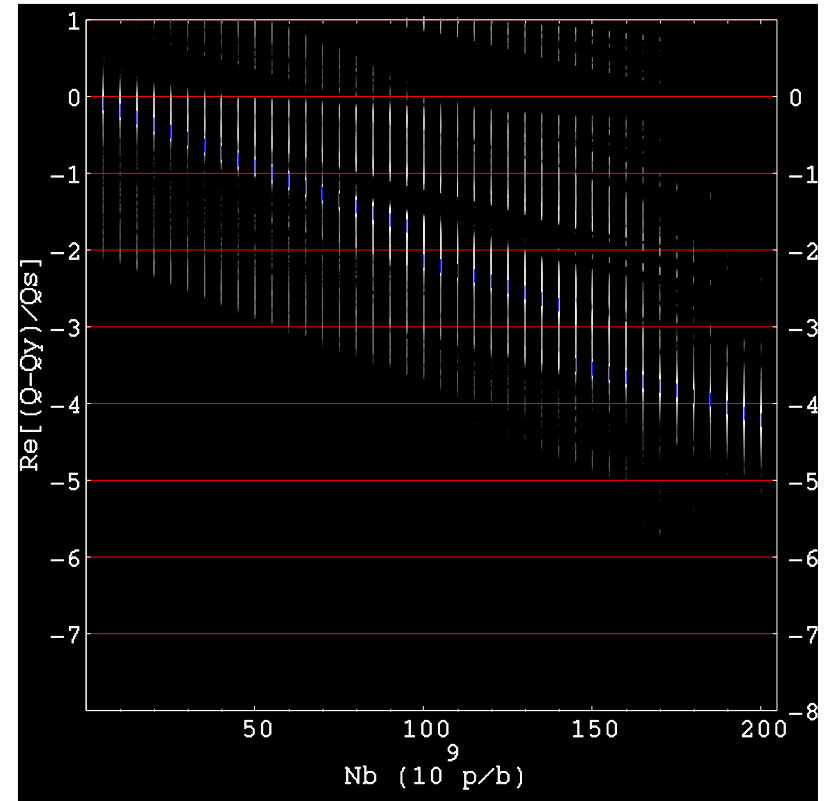
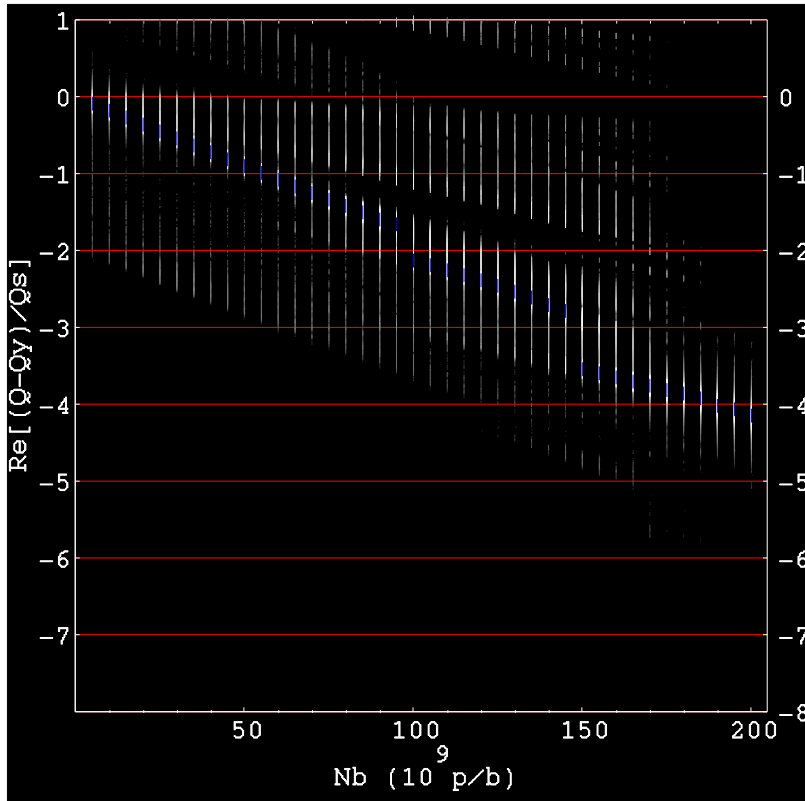
With 800 MHz



Vertical mode spectrum

Without 800 MHz

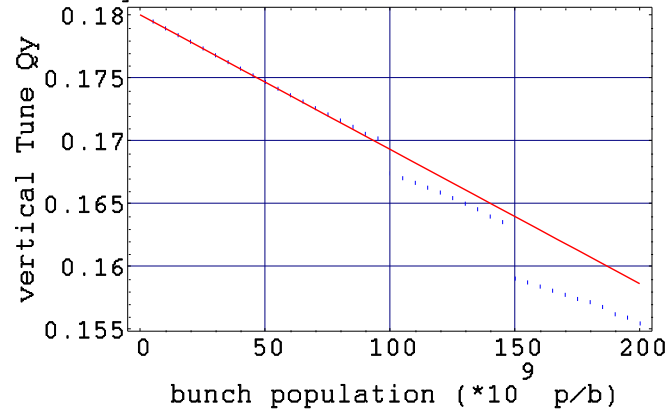
With 800 MHz



Vertical tune shifts

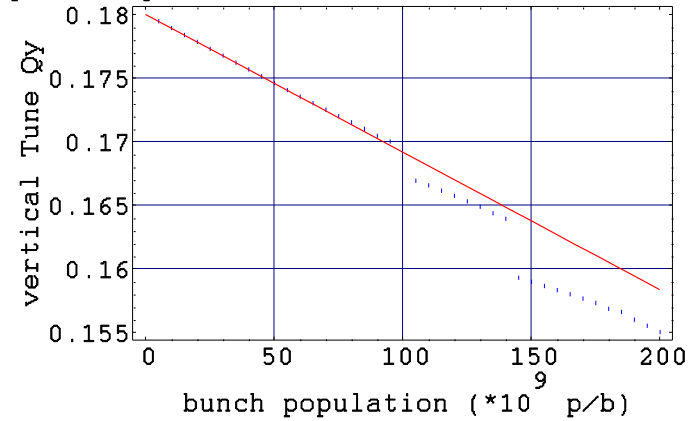
Without 800 MHz

[ZHelmut] = 14.6447 MOhm/m - Tune shift=-0.01071



With 800 MHz

[ZHelmut] = 14.807 MOhm/m - Tune shift=-0.01082



Next steps

- Implement features in Headtail
 - feedback based on work by J Thomson, J Byrd, W. Hofle, G. Rumolo
 - Longitudinal impedance from the wake table
- Import new elements
 - Pumping ports (Olav)
 - ZS, MSE...
 - Improvements of kicker models (Carlo)