TCTP Heating Estimates - Update

Hugo Day

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What this summary has

- Comparison of simulations from both time-domain and frequency-domain simulations
- Heating estimates for a number of different bunch distributions, and with measured bunch spectra

What this summary doesn't have (sadly due to lack of time)

- Some insight into where the beam-induced heating would be localised

BEAM IMPEDANCE - SIMULATIONS

- Time domain simulations - Results from the TCTP with and without ferrite damping tiles
- Frequency domain simulations - Complete results from a TCTP with ferrite (4S60), limited without damping tiles
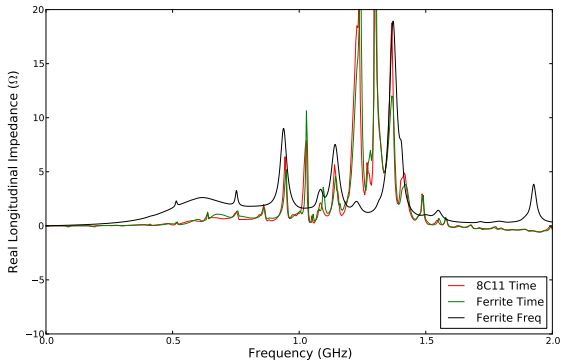
FIGURE 1: Comparison of time and frequency domain simulations of the longitudinal beam coupling impedance for the TCTP with ferrite tiles
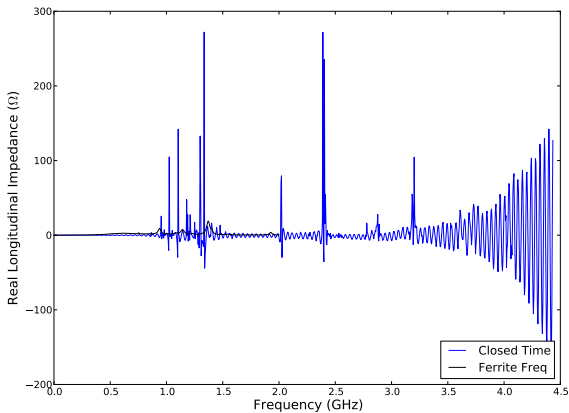
FIGURE 2: Comparison of time and frequency domain simulations of the longitudinal beam coupling impedance for the TCTP with a closed structure
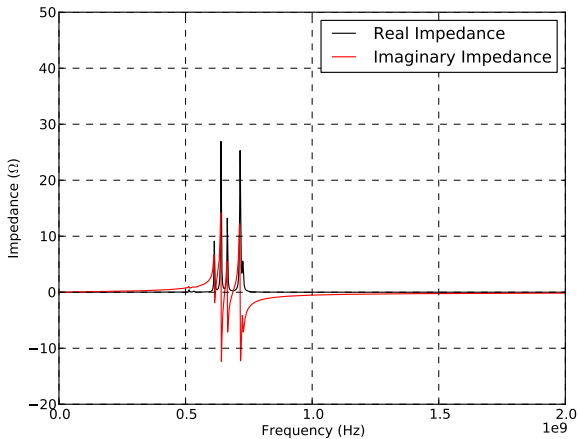
FIGURE 3: Reconstructed impedance from eigenmode simulations of the TCTP with ferrite tiles replaced with vacuum

- There are a number of ways we can calculate the heating estimates
  1. Use an analytical bunch profile and calculate frequency domain components - Most pessimistic depending on profile used. Allows reliable predictions for different bunch spacings/bunch intensities to be made quickly
  2. Use an analytical spectra and assume we have a single spectral line on any resonance
  3. Use a single bunch spectral measurement and apply this for all bunches
  4. Use a multi-bunch measured spectrum and integrate over the entire frequency range - Most realistic
- For all estimates we used 50ns beam with nominal LHC bunch parameters (i.e. $N_b = 1.15 \times 10^{11}$)
- This is because the measured spectra are all done with 50ns beam
- Analytical spectra can be calculated quite easily

HEATING ESTIMATES

	cos^2	Parabolic	Gaussian	Meas. SB	Meas. MB
FD Ferrite (4S60)	10W	6W	5W	9W	4W
FD Vacuum				4W	$\leq$1W
TD Ferrite (4S60)	1.1W	0.4W	0.3W	$\leq$1W	$\leq$1W
TD Ferrite (8C11)	1W	0.4W	0.3W	$\leq$1W	$\leq$1W
TD Closed	3.1W	0.9W	0.7W	$\leq$1W	$\leq$1W