

Unwanted parasitic signals in pulse shape

Charge dependence and stability in the IQ-space means the unwanted pulse features have to be beam generated.

Possible sources:

- Transient effects from strong unsuppressed modes, suggestion to investigate second monopole mode from the dipole cavity.
- A signal from the reference propagated through the electronics.

Matlab analysis:

- Simulate the electronics by multiplying sine waves and looking at the resulting harmonics.
- Independent component analysis on the measured waveforms.

Things to look at experimentally at ATF:

- Check the output of the first stage electronics with a scope (both position and reference).
- Try down-mixing in the second stage electronics with an external LO.
- Check the cavity output (both position and reference) with a scope.
- Spectrum of the frequency-multiplied DR signal.

Questions?

- Is the static signal present in all channels in both X and Y at the same 63 MHz frequency?
- What are the external Q values for A, B vs C, i.e. why are signal levels so much smaller in C?
- Table of electronics gains, consider frequency-converted noise measurements with a spectrum analyser.

BPM simulations

GdfidL simulations:

- 1) Eigenmodes - for given resonant frequency and quality factors + R/Q with post-processing
- 2) Wakefields - for direct response from the cavity
- 3) Adaptor - if not well matched reflections will result in large amount of loss

Preparation for GdfidL simulations:

- Collate all existing BPM cavity information to input to examples at RHUL.
- Read the online GdfidL manual.
- Deduce what quality factor would be optimal by plotting different Qs and considering different degrees of contamination, jitter and the required latency for feedback.

Improving performance of existing BPMs

Sealing suggestions:

- Indium may not provide a good RF seal.
- Instead can try a compressed copper seal (possibly silver or niobium plated - whatever is best for aluminium).
- May have issues with compression with the existing aluminium BPMs and bolts, possibly fixable with stainless steel inserts.
- Potential to experiment with old cavity BPM C? Would need to check with KNU and ATF.

Adaptors and feed throughs:

- In Alexey's experience performance issues often come down to the adaptors. If they are not well matched, too much reflection from the ports results in a large amount of loss, cross-coupling and parasitic waveguide modes.
- Try to acquire more details on the feed throughs of existing BPMs from KNU.