

Cavity BPM processing and hardware upgrade plans

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A. Lyapin, S. Boogert, E. Yamakawa



ROYAL
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UNIVERSITY
OF LONDON

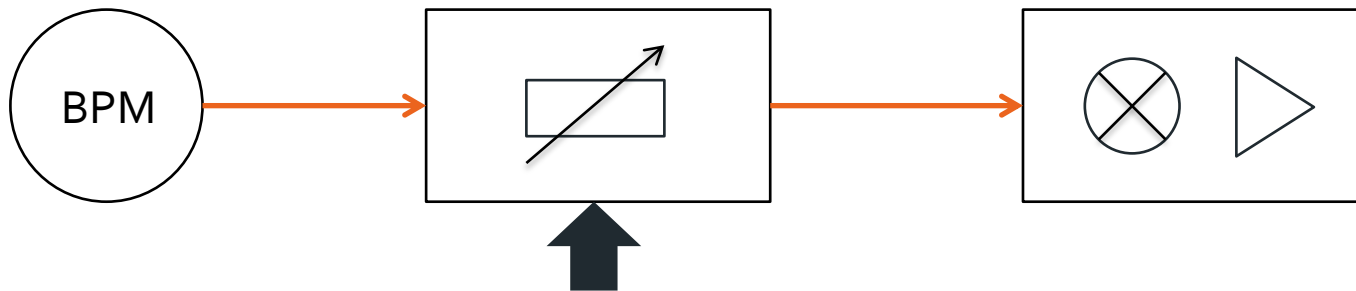
Aims

- Would like to study low-charge and multibunch (multi-train at ATF) operation
- Low vs high charge: need to adjust the sensitivity of the system
- Multibunch: need to upgrade the processing
- Programme primarily supported by CBPM development for light sources, but will have immediate benefit to ATF2 operation (+ CERN/CLIC + e-JADE grants)
- Any upgrades should avoid/minimise interruption to ATF2 studies

- People:
 - Alexey – 2 months from March to May
 - Emi – 1 month in April
 - Stewart – mainly helping behind the scenes, will be at KEK in April for the Workshop

Low charge operation

- Investigate timing (signal shape change) and other issues when going to lower charge
- Locked vs. unlocked operation
- Hardware changes may be required:
 - Remotely controlled attenuators (we are aiming to provide ~7-8 of HMC800's, control via RS232/Ethernet)
 - Try free-running stable LO and clock generators (find what's available) – also useful for measuring the dispersion, currently issues due to 714 MHz harmonic changing



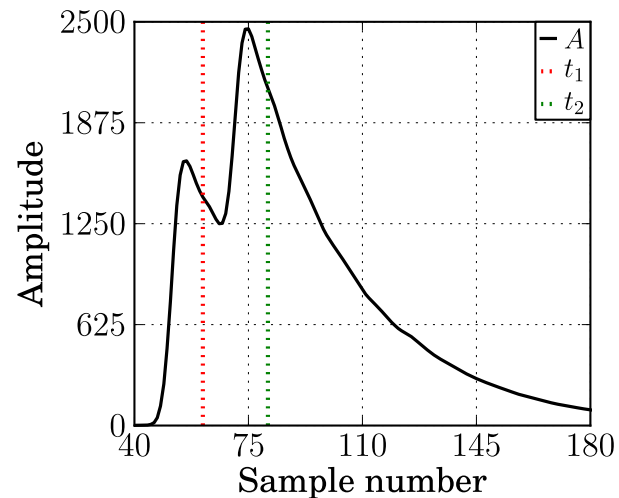
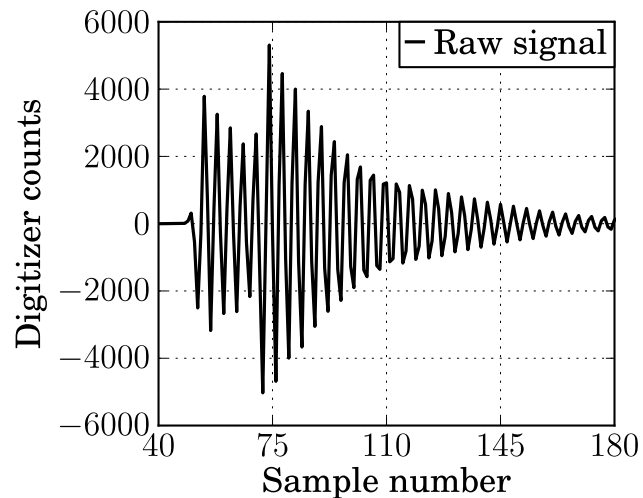
Remote control via RS232/Ethernet

Multibunch studies

- Need to modify processing for multiple bunches
- Investigate time of arrival (diode) signals vs bunch charge, distance
- Plan: replicate existing processing system, then modify step-by-step running in parallel to existing processing
- Hardware: additional processing PC (already at KEK); attenuators may be useful if bunches are offset with respect to each other

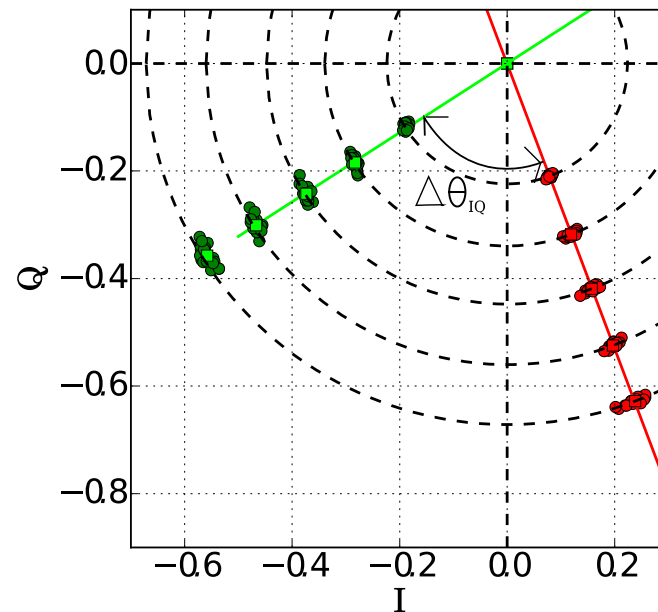
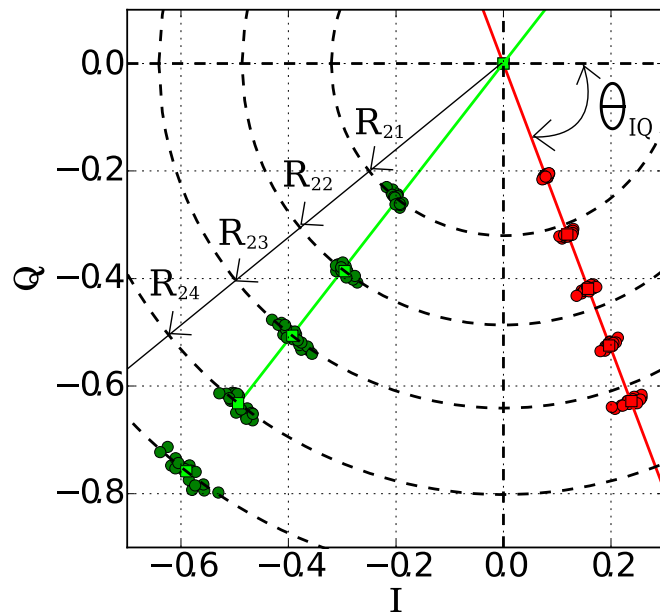
Multibunch processing (1)

- Acquire multiple signals in one digitiser reading
- Remove residual signal by subtracting raw or processed waveforms
- Need arrival time info for subtraction → use diode signal



Multibunch processing (2)

- Subtraction is done on phasors, phase information is important
- Errors in propagating the amplitude and phase degrade the resolution
- Frequency differences between the pos and ref cavities and timing drifts, time of arrival detection are important



Multibunch investigations

- Need at least 3 CBPMs for resolution measurements
- Use the same subset for both low-charge and multibunch
- Instrument with attenuators 3 CBPMs and a reference (+diode sep?) = 8 channels
- Use 1-bit attenuators (still need to choose between 10, 15 and 20 dB)
- Scan timing, charge etc
- Processing for all CBPMs though, checks with the selected 3

Summary

- Upgrades to the ATF system: new processing and PC, remote controlled attenuators
- Will need some beam time for the studies during April-May running, estimating a minimum of:
 - 2-3 half-shifts (ideally, following BPM calibration) for low-charge
 - 2-3 full shifts for multibunch