



Status of the CTF3 BPM systems: a user view

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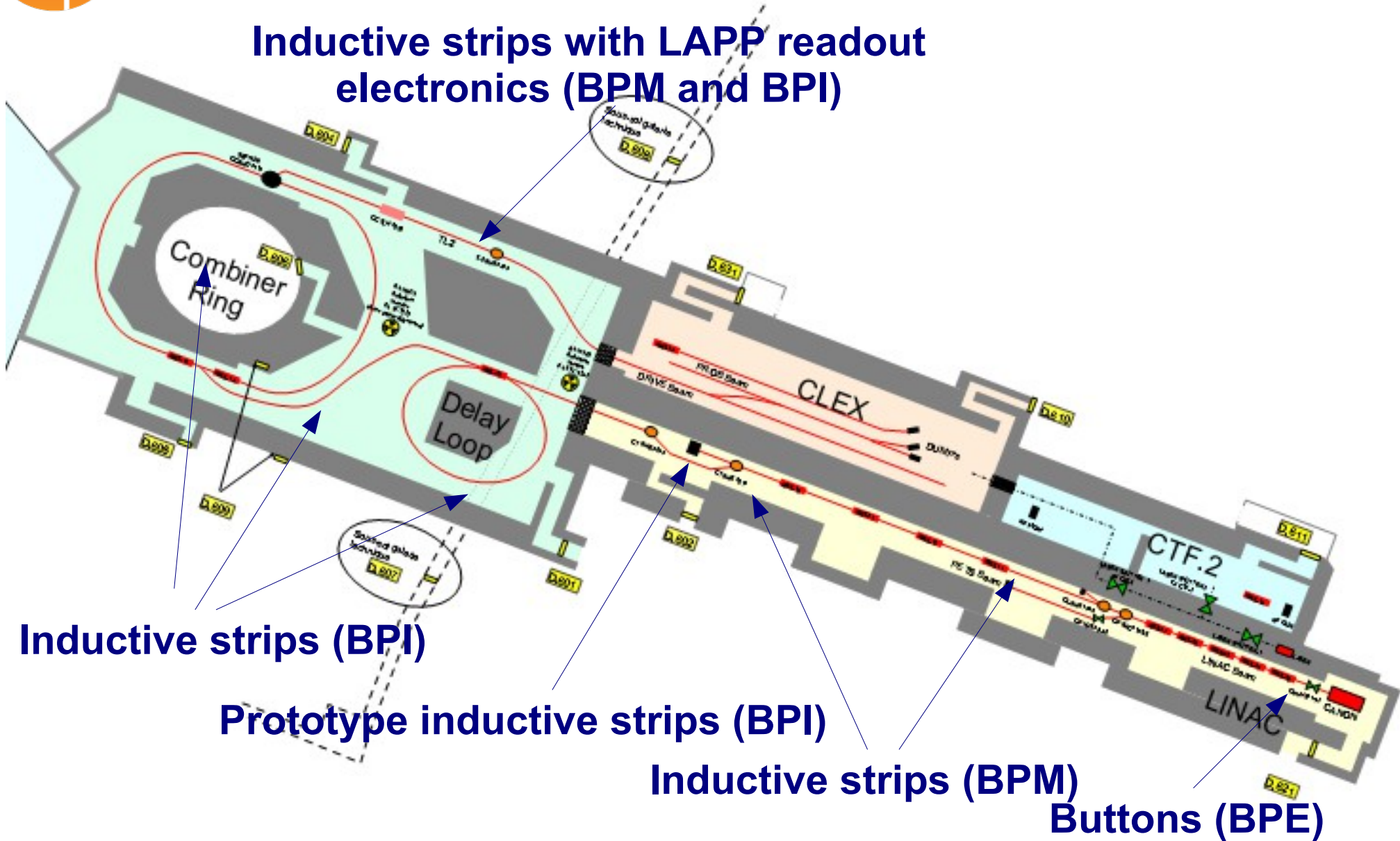
Outline

- CTF3 has over 100 beam position monitors
- Various designs of monitor in different machine sections
 - Button pickups
 - Inductive stripline pickups
 - Cavity BPMs (CALIFES)
- Various signal processing and readout electronics in different machine sections
- Will discuss operational experience of each in turn



BPM locations

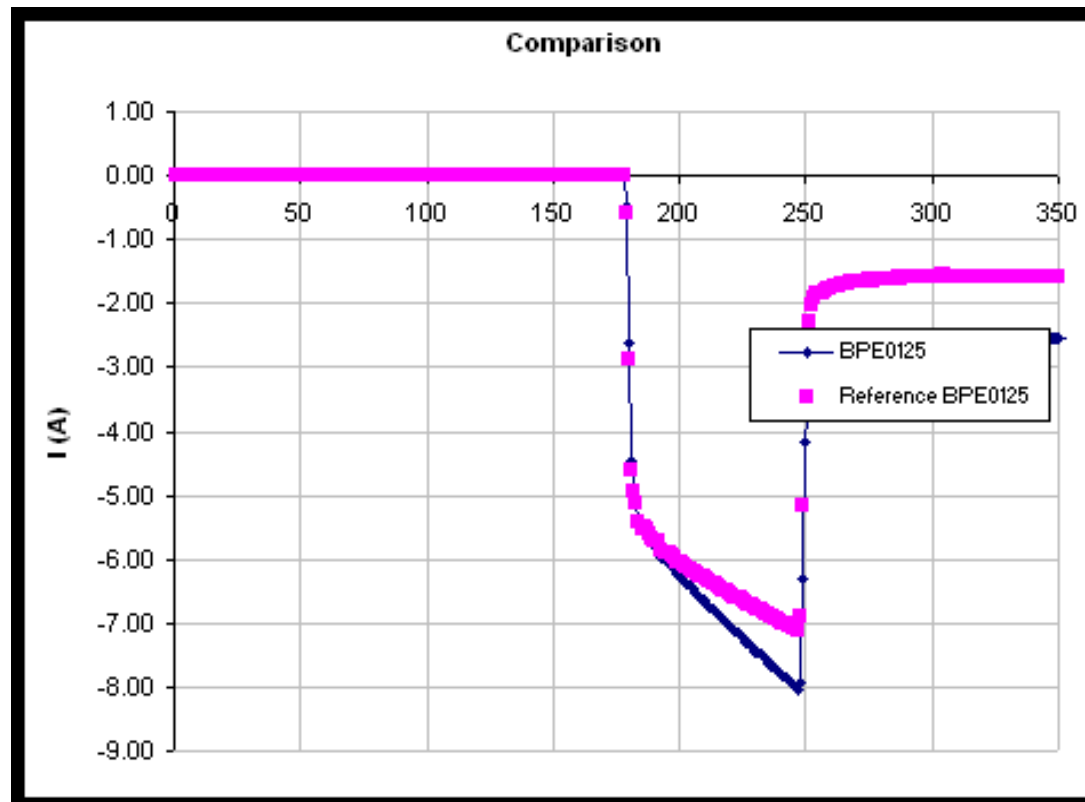
Inductive strips with LAPP readout electronics (BPM and BPI)





Button pickups - BPEs

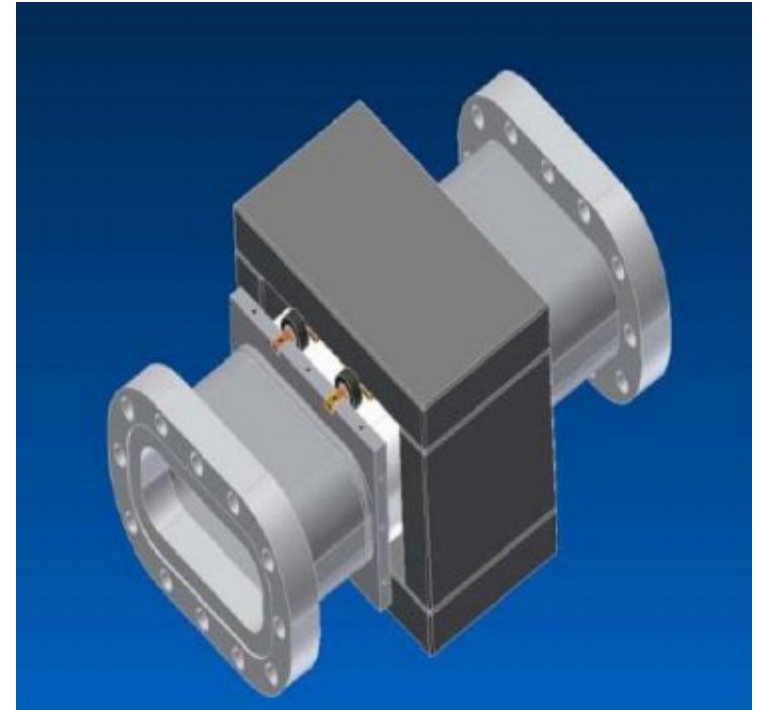
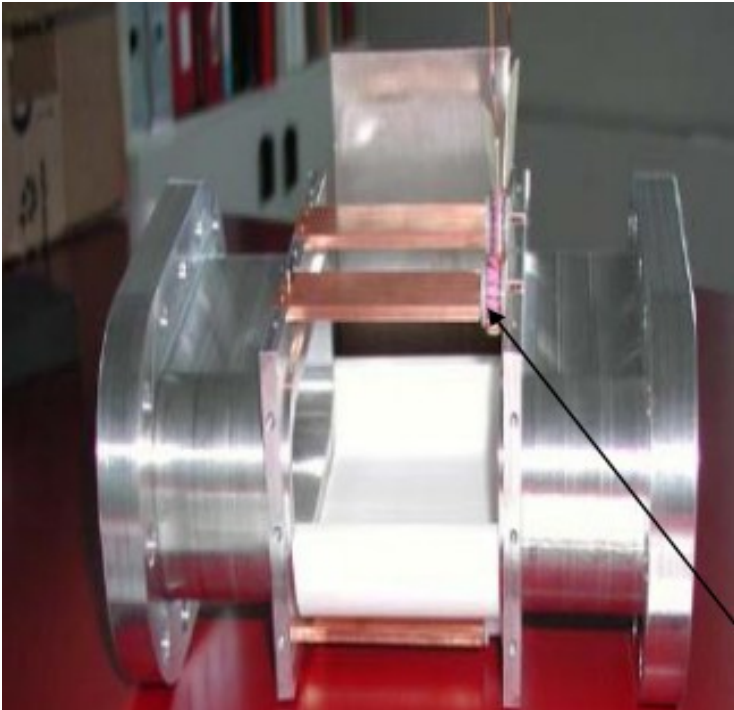
- Two button pickups located at start of linac
- Used only to check beam current from the gun
 - They do the job required





Inductive striplines - BPIs

- Racetrack shape chamber and calibration turn
- Resolution ~ 50 μm
- Ferrite surround to improve low frequency response
 - However, signal droop is still an issue





Inductive striplines - BPMs

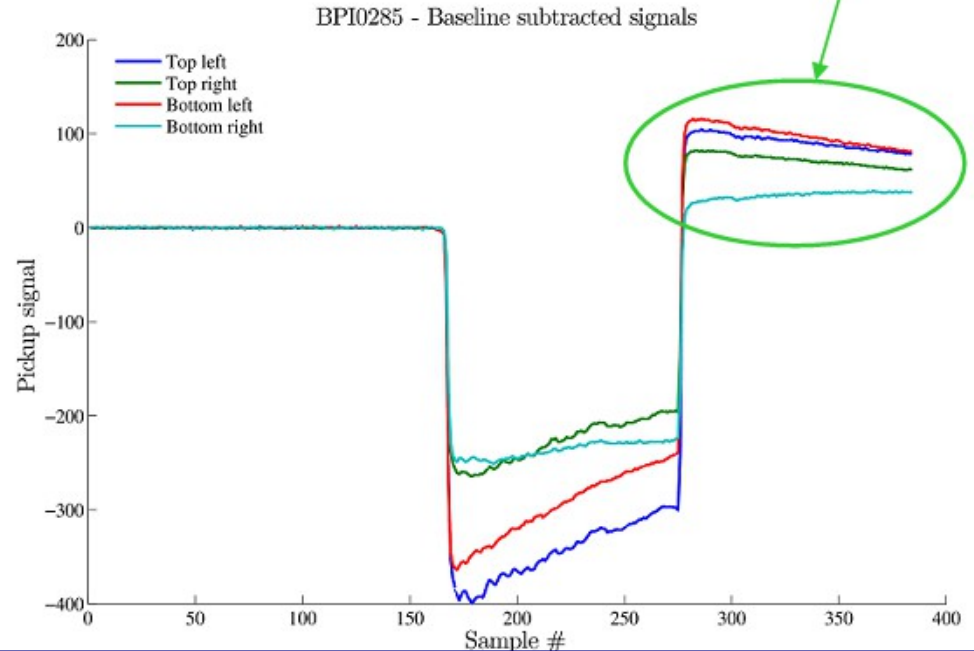
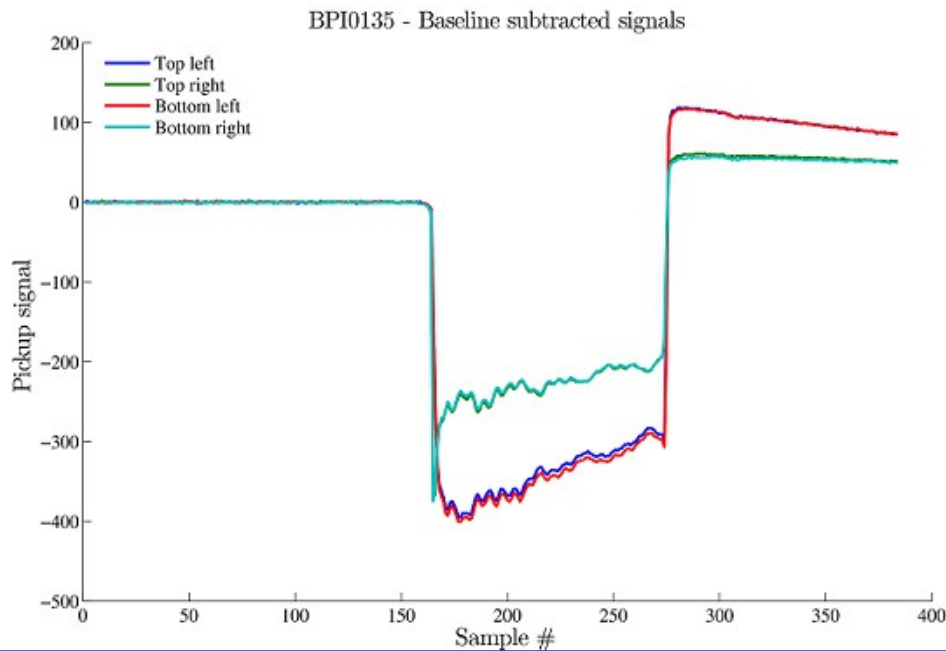
- Circular chamber
- Calibration turn
- Resolution ~ 50 μm
- Better low frequency response than BPI-type monitors





BPIs – delay loop

- The delay loop has only BPI monitors installed
- Standard readout electronics
- No low frequency response compensation electronics
 - We digitise the electrode signals directly
- Droop time constant varies with signal level and electrode

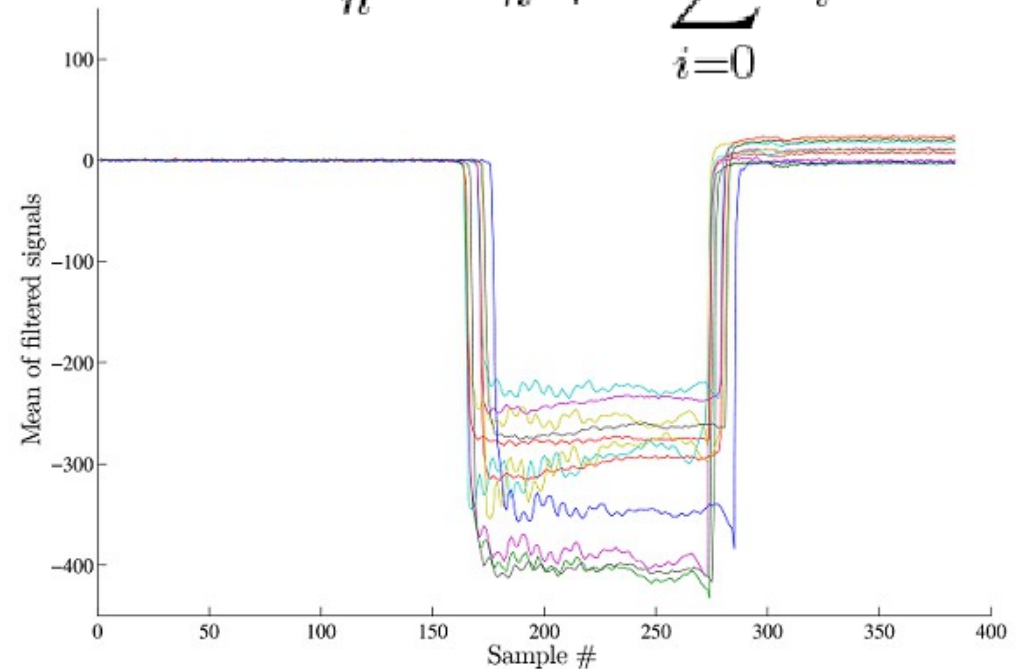
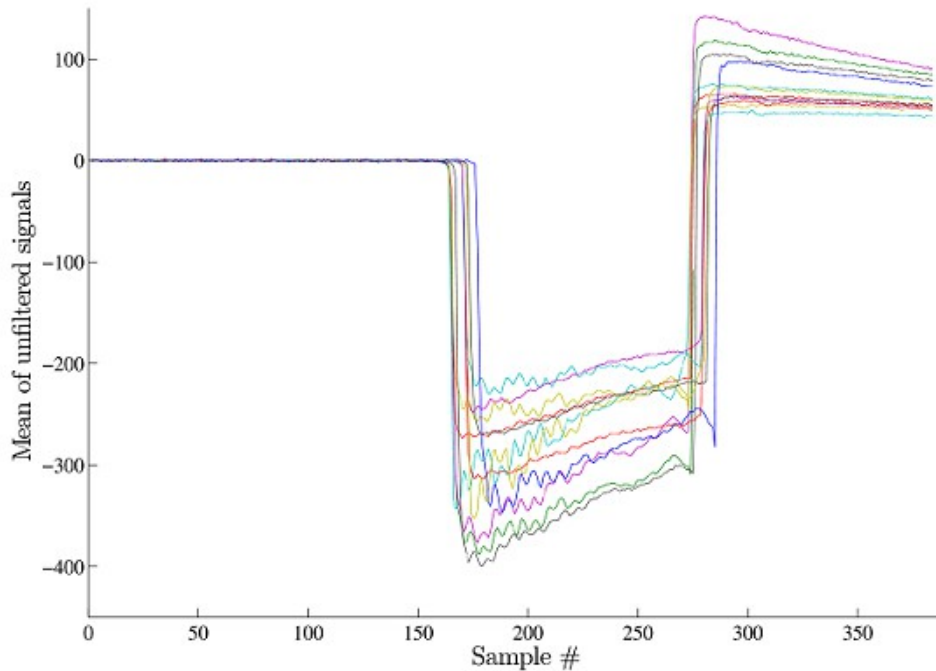




BPIs – delay loop

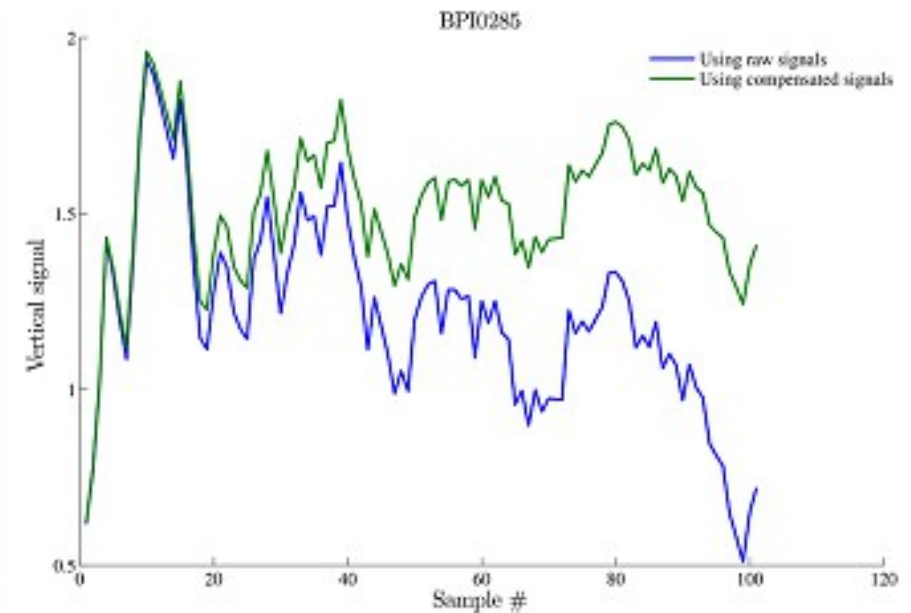
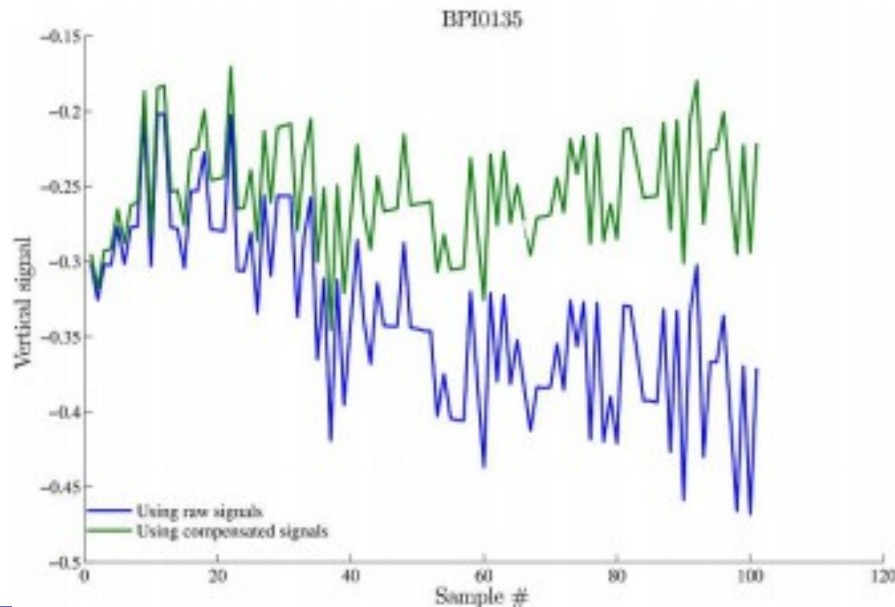
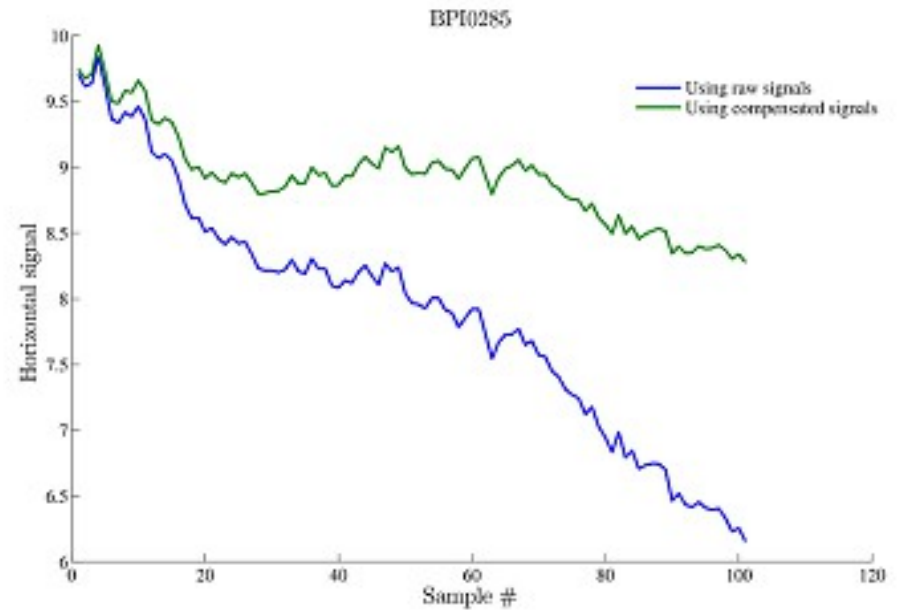
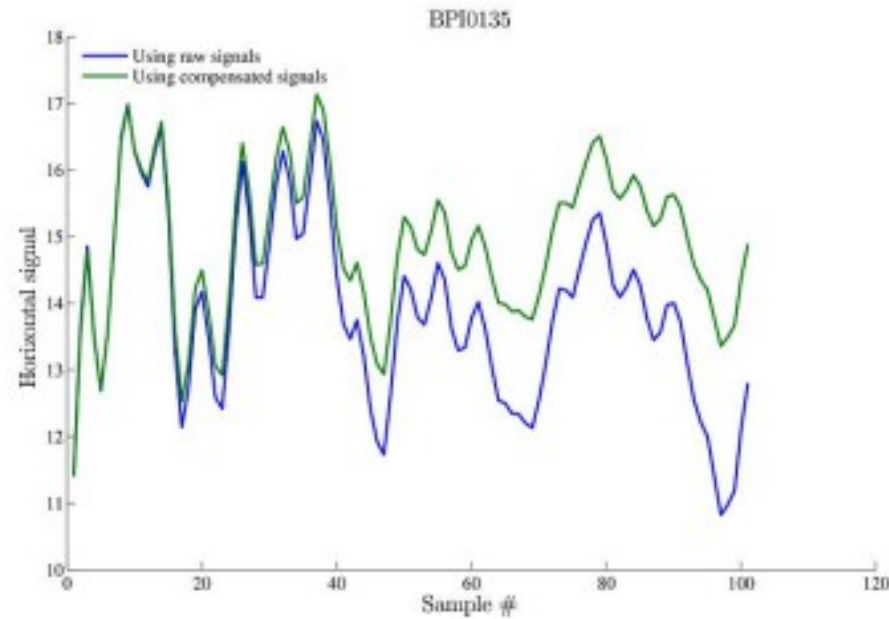
- Signal droop has a significant effect on measured position
 - Can compensate using software IIR filter
 - Extract decay time constant from signal tail
 - Pulse-by-pulse, electrode-by-electrode basis
 - Currently only done offline

$$V'_n = V_n + \lambda \sum_{i=0}^{n-1} V_i$$





BPIs – delay loop





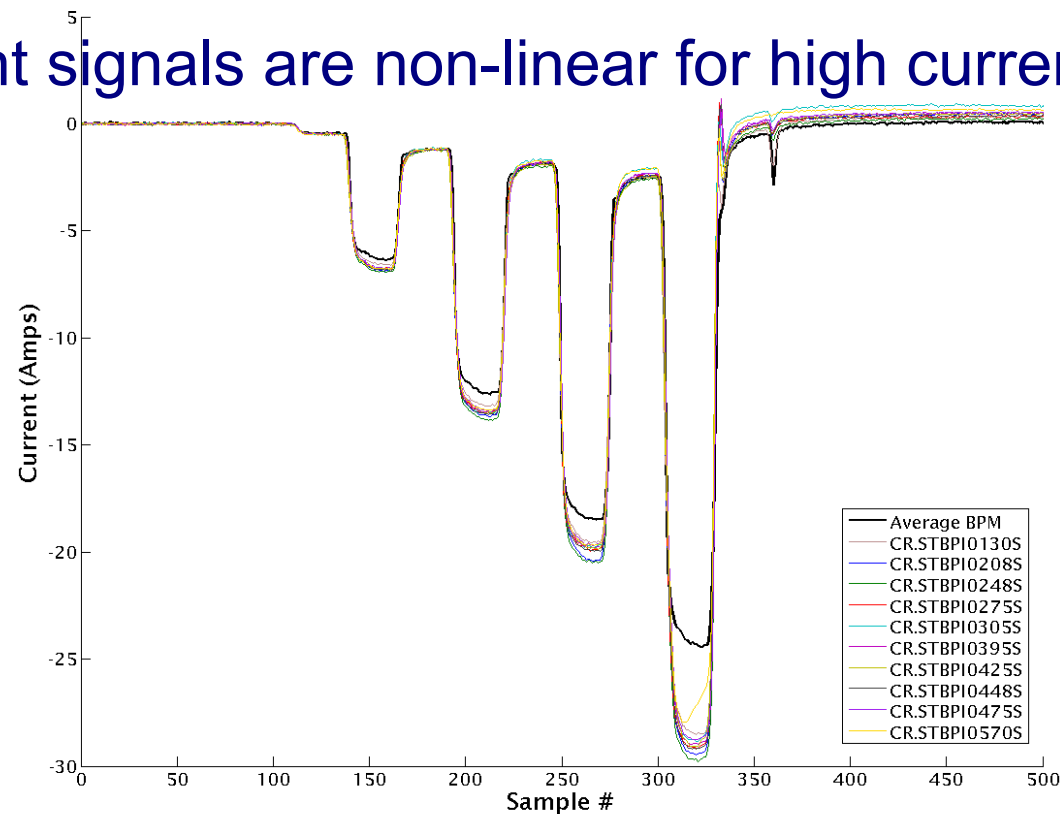
BPIs – Frascati chicane

- Two prototype BPIs installed in centre of chicane
- Standard readout electronics
- No low frequency response compensation electronics
 - We digitise the electrode signals directly
- The low frequency response of the prototypes is very poor



BPMs and BPIs – combiner ring

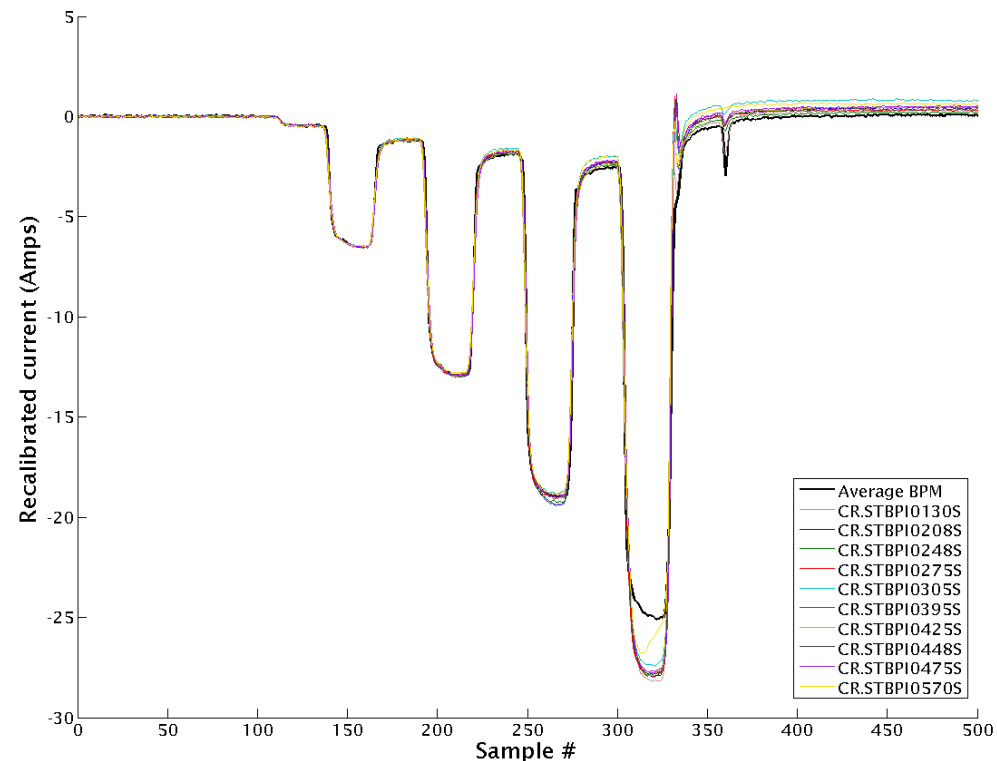
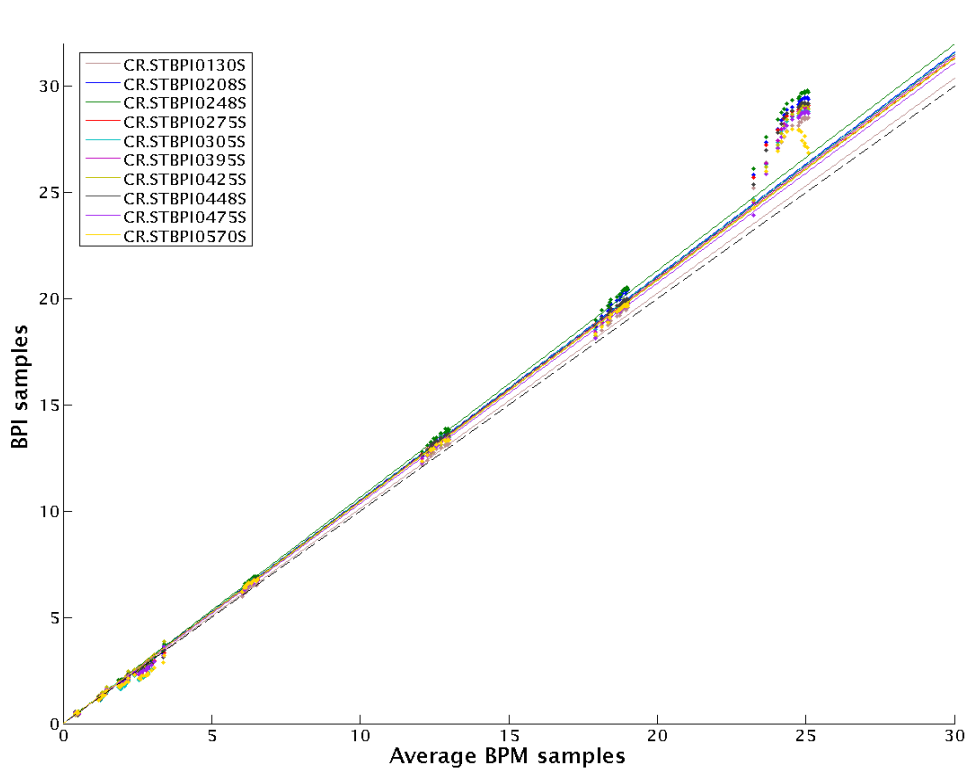
- 4 BPMs and many BPIs with standard readout electronics
- Analogue circuit to compensate for low frequency response
 - We don't digitise electrode signals
- Have had issues with precise calibration of current signals
- BPI current signals are non-linear for high currents





BPMs and BPIs – combiner ring

- Performed beam-based cross-calibration
 - Based only on first turn low-current data
- Source of BPI non-linearity is as yet unknown
 - Plan to insert attenuators between a BPI and its electronics





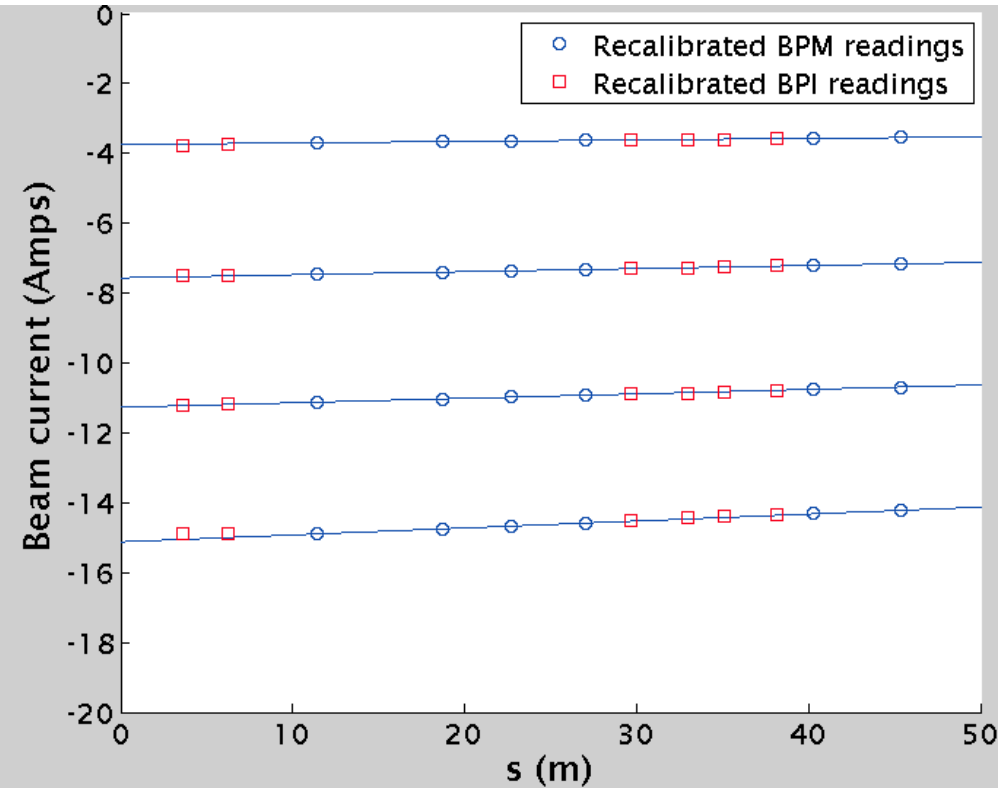
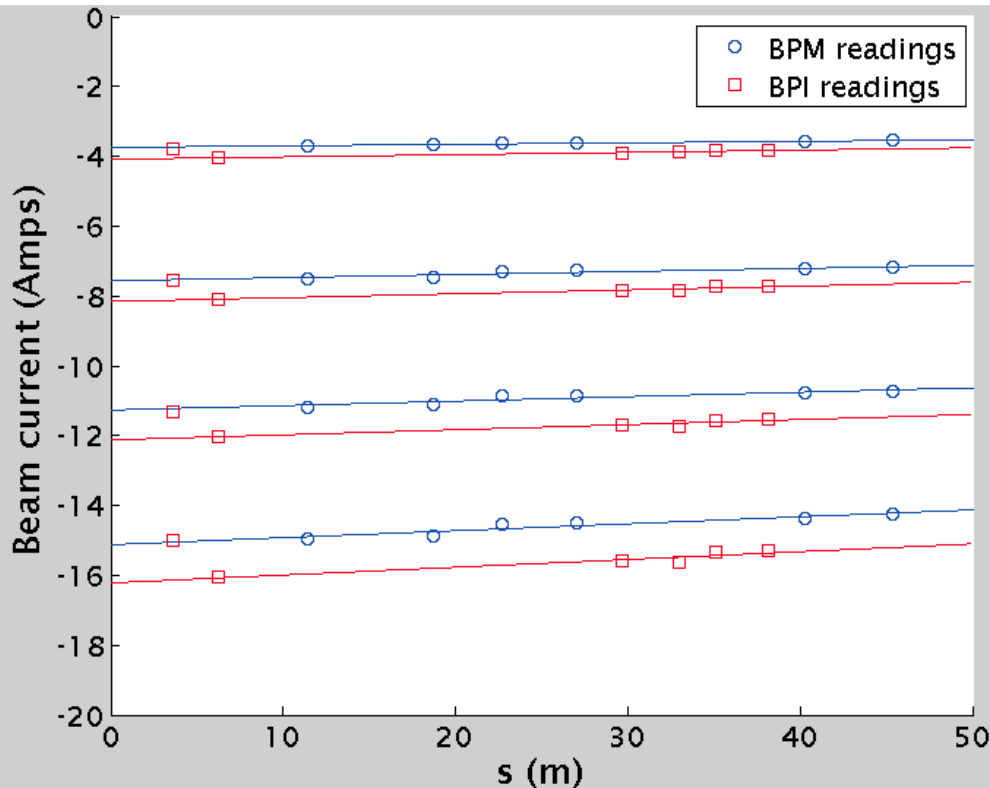
BPMs and BPIs – TL2

- Equal number of BPMs and BPIs with standard readout electronics
- Analogue circuit to compensate for low frequency response
 - We don't digitise electrode signals
- Similar calibration issues to CR BPMs and BPIs
- However, BPI current signals are linear



BPMs and BPIs – TL2

- Again, performed beam-based cross-calibration
 - Extracted different turns from combiner ring
 - Range of beam currents
 - Necessary to take constant beam losses into account





Summary

- In general, CTF3's BPM instrumentation performs well
- We have had some problems however:
- Delay loop BPI signal droop
 - Offline algorithm developed
- Combiner ring and TL2 BPM & BPI current calibration
 - Solved using beam-based recalibration
- Combiner ring BPI non-linearity
 - Still under investigation



Spare

