

BPM system requirements /
Beam measurements with test
DDC channel

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BPM system Requirements

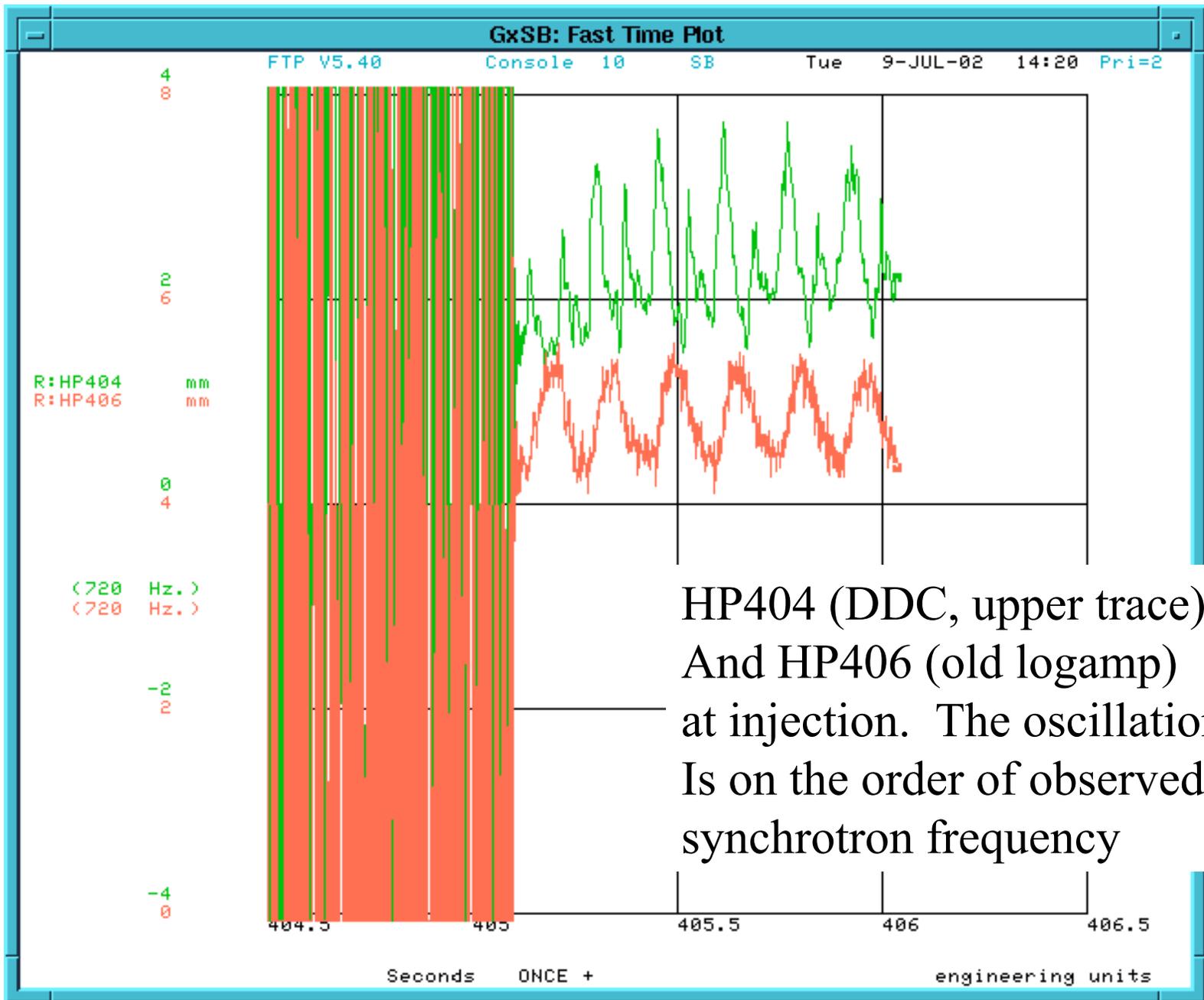
Dynamic range: to be able to measure from $0.3E10$ to $100E10$ particles (injected beam) and 1 to $400E10$ particles (stored beam).

RF conditions: 2.5 MHz, 7.5 MHz bunched or 89 KHz debunched beam in barrier buckets.

Measurement Specifics:

- 1) <0.25 mm rms on absolute position up to ± 10 mm and < 1 mm Absolute position from 10 to 40 mm.
- 2) < 0.15 mm on resolution (rms/reproducibility – subsequent measurements on the same beam)
- 3) Ability to close the Recycler injection orbit to the Closed orbit to < 0.25 mm. We do this in MI with 53 MHz - this is a question of whether one uses a first turn flash or a BLT to do the closure..
- 4) Day to day stability (with automatic calibration procedure if needed)

Some beam measurements with the DDC BPM



GxSB: Fast Time Plot

FTP V5.40 Console 10 SB Tue 9-JUL-02 14:43 Pri=2

6
10

4
0

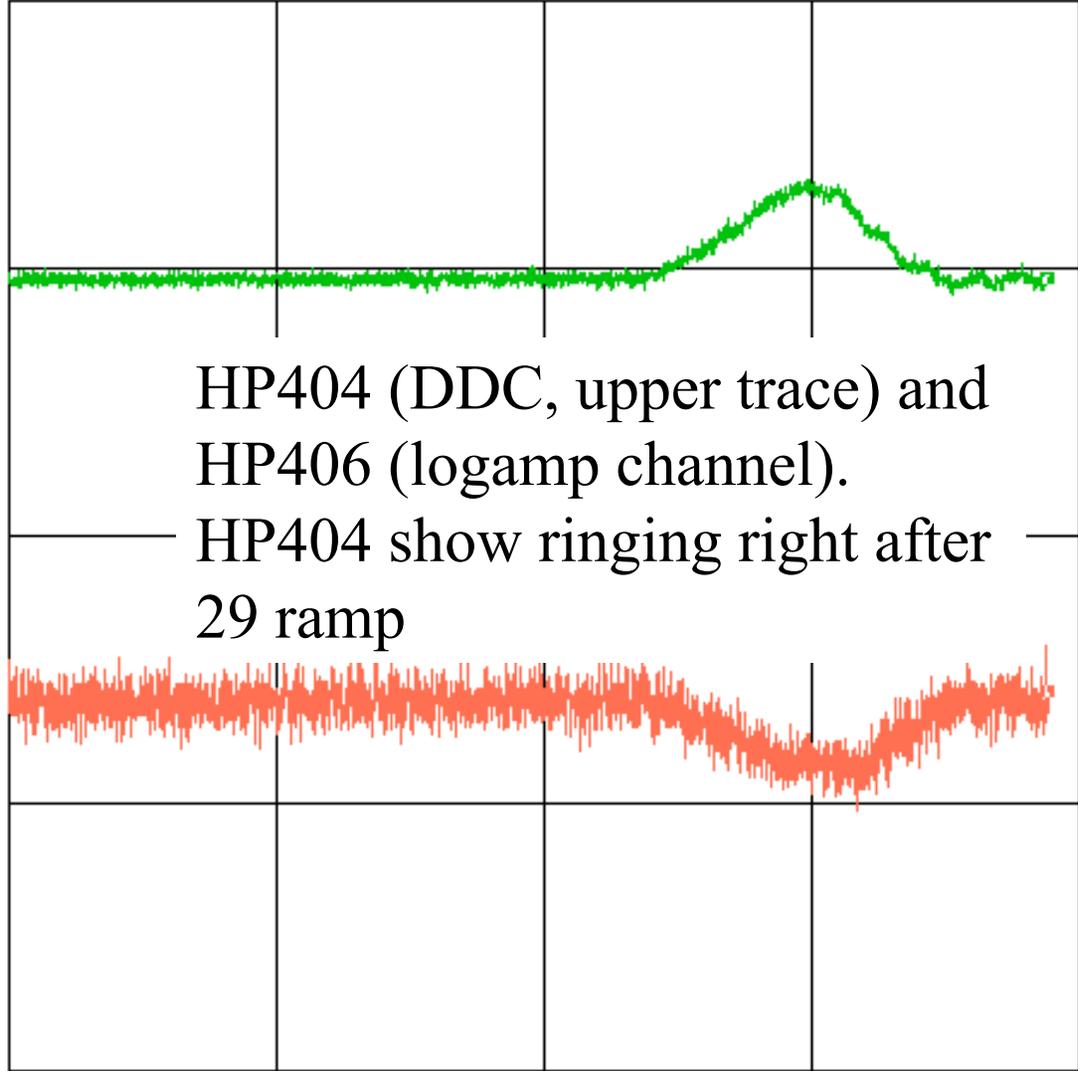
R:HP404 mm
R:HP406 mm

2
6

<720 Hz.>
<720 Hz.>

0
4

-2
2



164 165 166 167 168

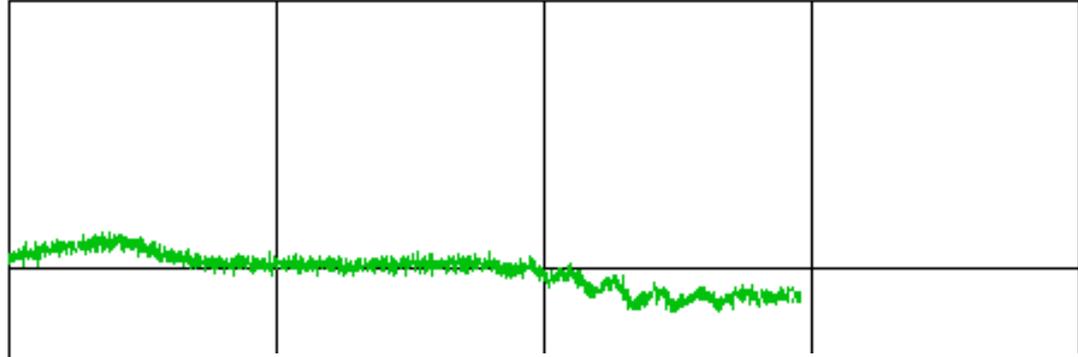
Seconds ONCE +

engineering units

GxSB: Fast Time Plot

FTP V5.40 Console 10 SB Tue 9-JUL-02 14:43 Pri=2

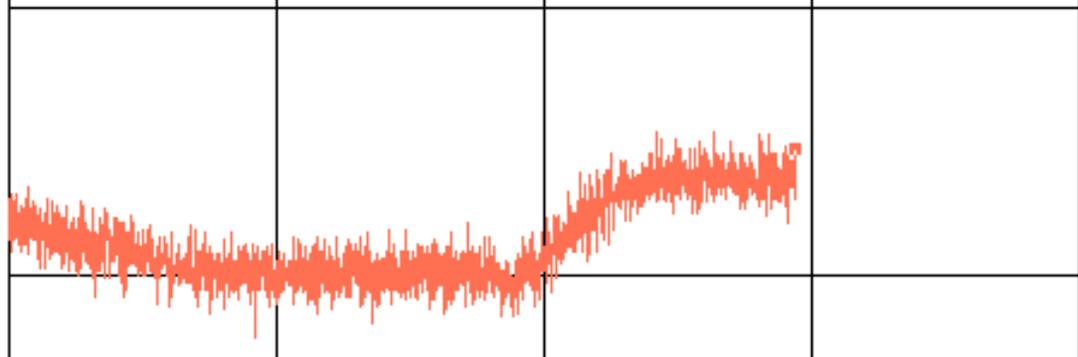
6
10
4
0
R: HP404 mm
R: HP406 mm



HP404 (DDC, upper trace) and
HP406 (logamp) right after 2B ramp

< 720 Hz. >
< 720 Hz. >

2
6
0
4
-2
2



62 63 64 65 66

Seconds ONCE +

engineering units

GxSA: Fast Time Plot

FTP V5.40 Console 3 SA Mon 8-JUL-02 09:54 Pri=2

4

R:HP404 mm

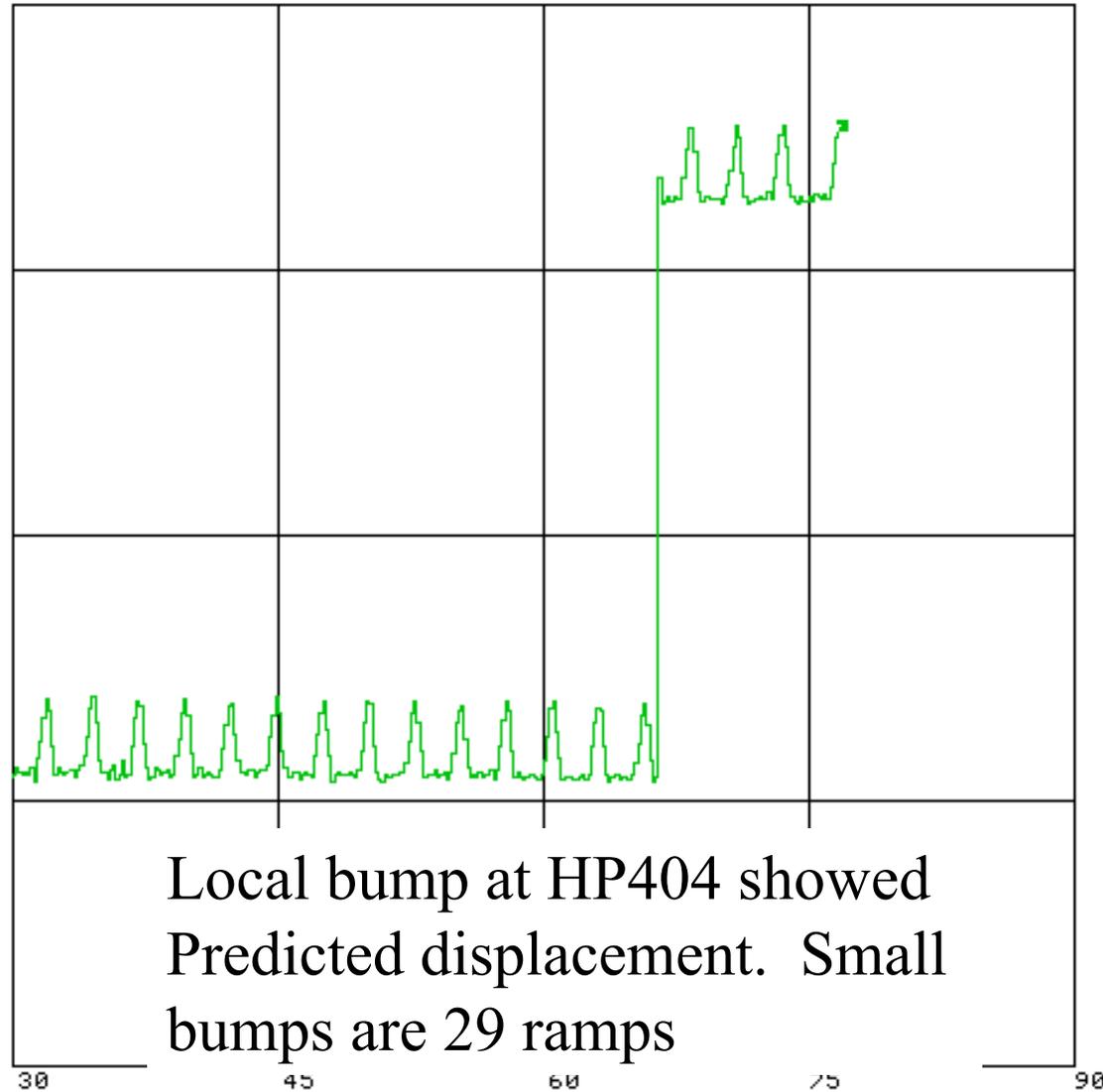
2

0

(720 Hz.)

-2

-4



Local bump at HP404 showed Predicted displacement. Small bumps are 29 ramps

Seconds ONCE +

engineering units

Conclusion

- We are able to see transient phenomena with the DDC BPM channel we could not with even the best behaved logamp channel
- We need to carry out a list of beam measurements to verify these are real beam effects and not instrumentation effects, and to fully evaluate the performance of the DDC approach