FONT Meeting

Friday 21st December 2018

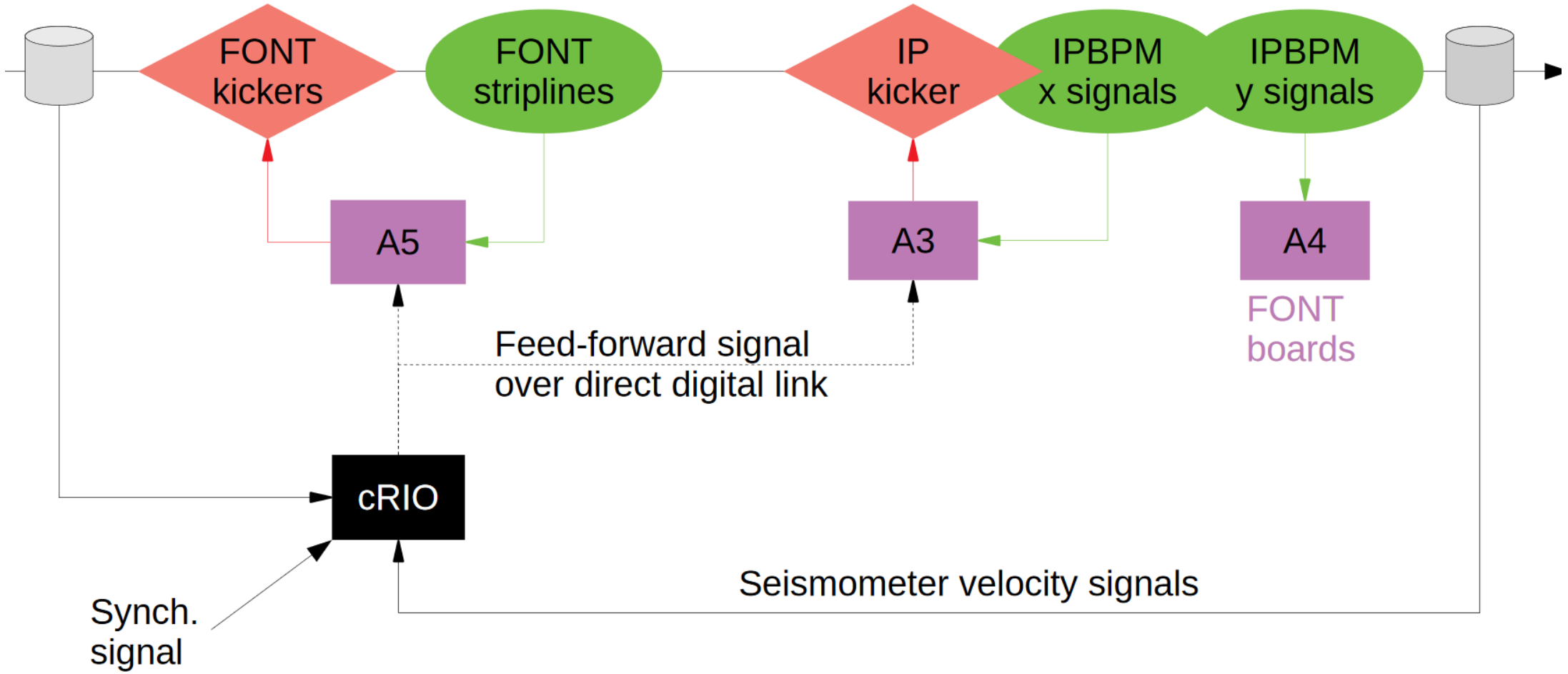
Report from ATF

Douglas BETT

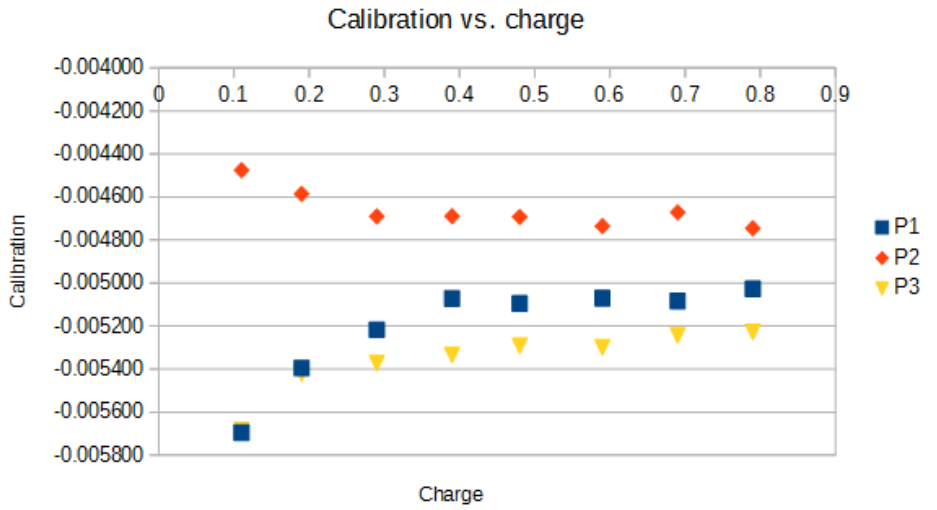
Studies from 2018 Week 48 & 49

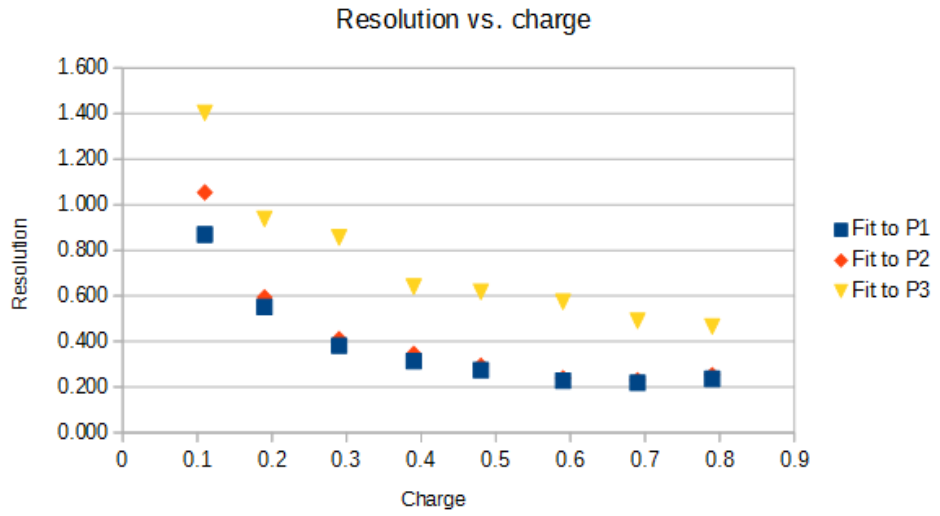
- Week 48 (26-Nov to 30-Nov)
  - Ground motion feed-forward — Tue, Wed, Fri *owl*
  - Intensity dependence — Wed *day*
  - Small beam w. FONT — Thu *day*
- Week 49 (3-Dec to 7-Dec)
  - Diode processor measurements — Mon *day*
  - Octopole alignment — Fri *day*
  - Tidy up of Local Control Room

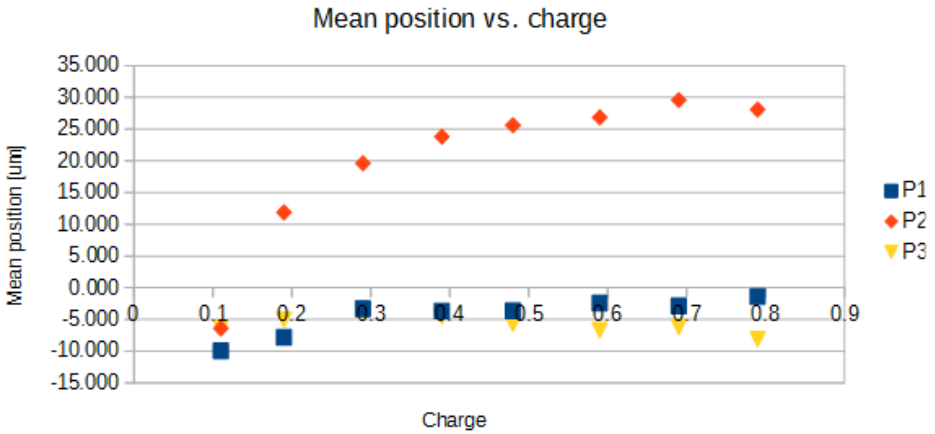
Ground motion feed-forward

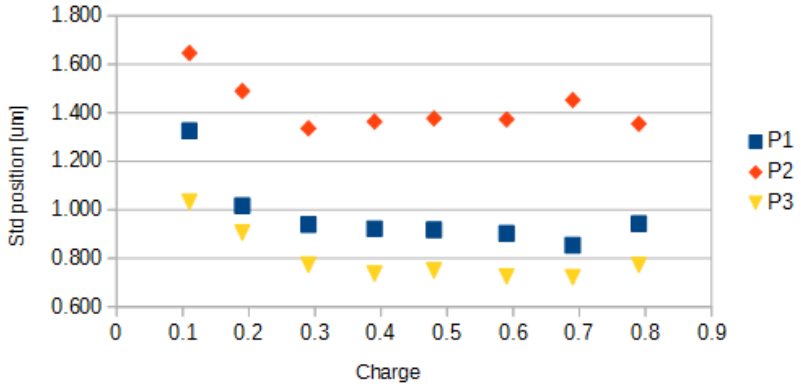


Intensity dependence (Pierre)









Small beam w. FONT

- High P2-P3 position correlation, poor performance of correction downstream compared to that observed upstream → correction mostly at one phase?
- Okugi added a constraint to his optics matching algorithm to create a 90° phase advance from P2 to P3
- The change had a significant effect on jitter at P3 but seemed to make tuning more difficult
- Goal of demonstrating improved correction at downstream BPMs ultimately thwarted by 2 factors:
  - **Incorrect feedback gains** from the DAQ. I seem to recall fixing this bug but the patch must have only been applied to the dedicated DAQ laptop.
  - **Limited width of sample window**. It is only possible to capture bunch 1 in P2 and bunch 2 in MFB1FF for short bunch spacings (max. 76).

OPTICS	Nominal	Modified
P2 jitter [um]	~1.40	~1.30
P3 jitter [um]	~1.60	~0.90
P2-P3 corr.	~0.90	~0.75

Diode processor

- Split P1 signals to drive both conventional P1 processor and diode (signals replace P2, P3 Σ_Q)
- Similar problems as last time attempted – no means of correcting phase dependence of conventional processor, whose performance is drastically reduced by reduction in signal level due to split

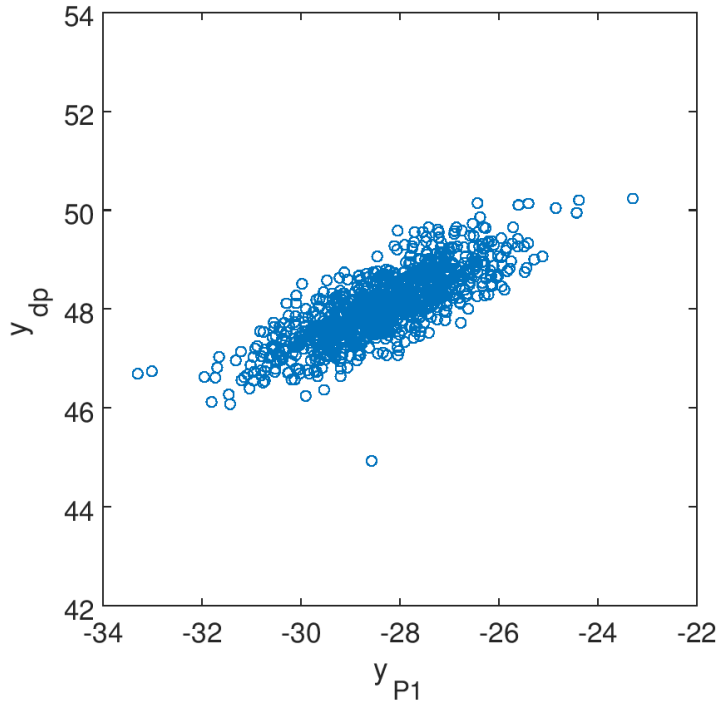
BPM	Mean [um]		Jitter [um]	
	Early	Late	Early	Late
P1	-28.3 | 48.1	-53.9 | 35.7	1.253 | 0.699	1.190 | 0.628
P2	3.2	-28.9	1.673	1.522
P3	-0.4	3.7	1.798	1.625

Resolution	CP	DP	CP	DP
Fit to P1	0.389	0.335	0.469	0.521
Fit to P2	0.523	0.353	0.571	0.442
Fit to P3	0.413	0.376	0.521	0.606

Resolution from CP/DP data only:
Early: 0.581 um, Late: 0.603 um

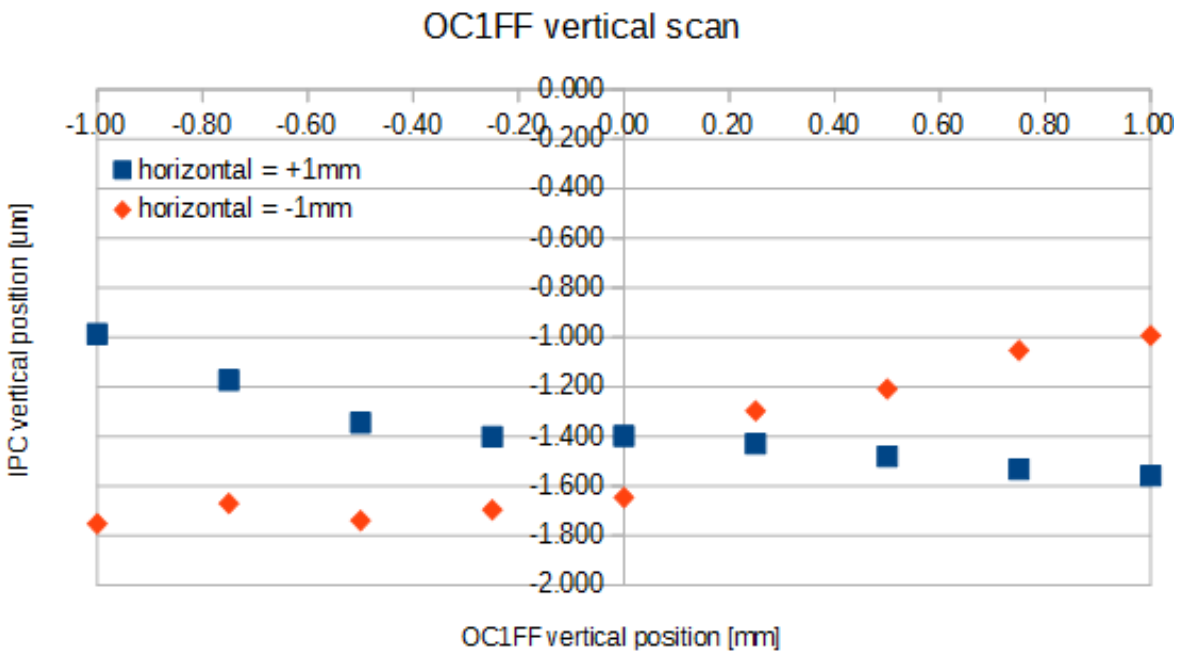
Jitter at P1 predicted from P2 and P3:
Early: 1.135 um, Late: 1.118 um

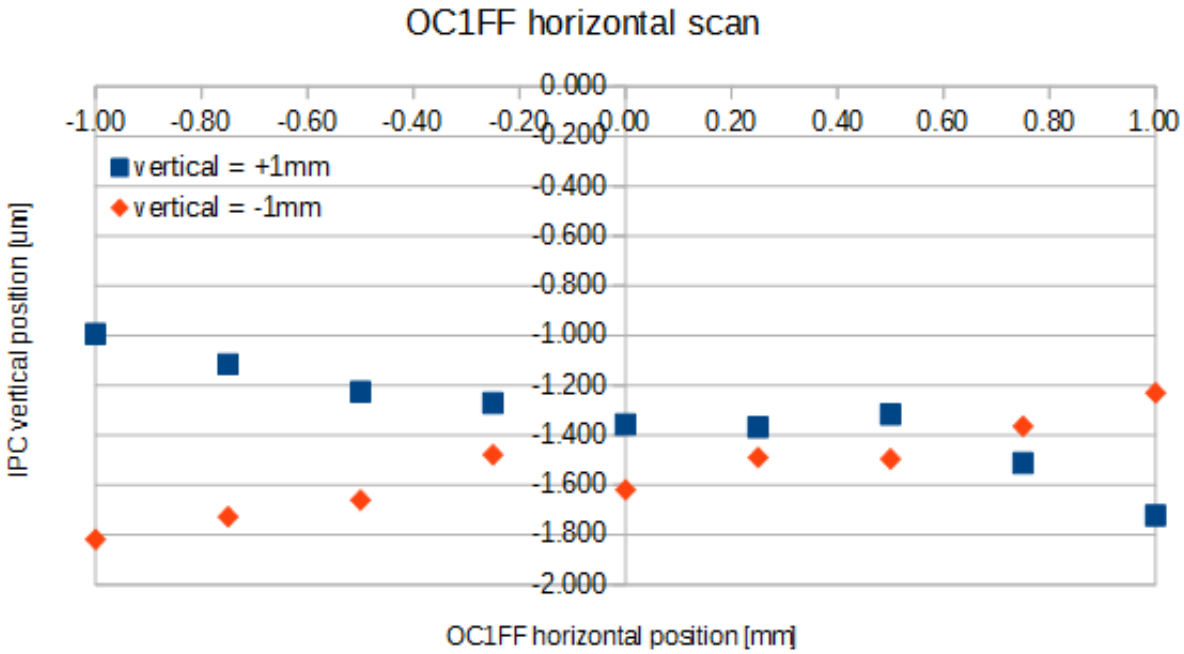
Σ_{P2} ~1600 counts
(sub-200 nm correction was achieved for ~2000 counts)



Would have taken more data but diode processor damaged while removing split

Octopole alignment (Renjun)





Tidy up of Local Control Room

Assorted cables

attenuators and other components

SMA, BNC, LEMO, Type N connectors

toolbox

Hardware

Power cables, power supplies

Conclusion

- FONT system performance met the requirement of our LAPP colleagues
- Not able to demonstrate improved feedback performance downstream with modified optics due to incorrect gains
- Results with upstream BPMs suggest some intensity dependence of orbit
- Nothing useful achieved with diode processor
- Octopole alignment not very convincing
- Local Control Room nice and tidy