FONT Meeting

Friday 12th December 2017

Waist scan and IQ rotation

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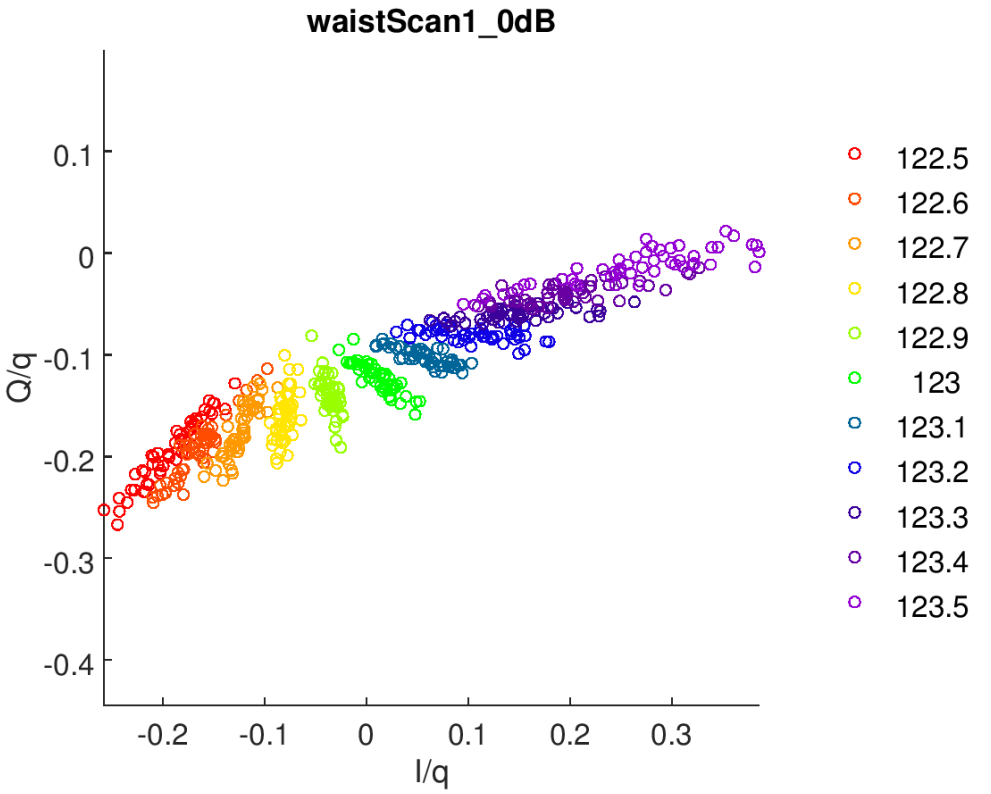
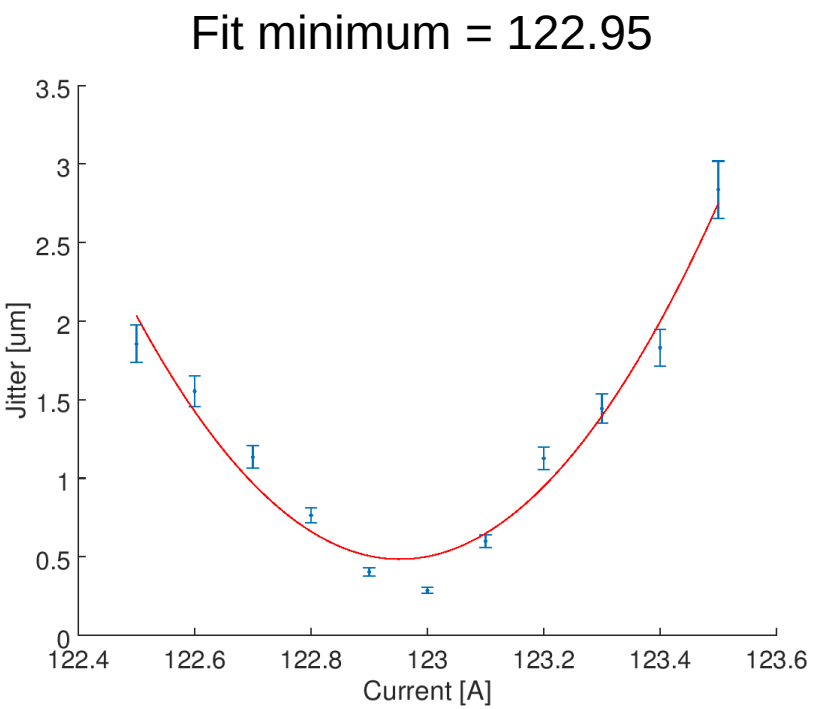
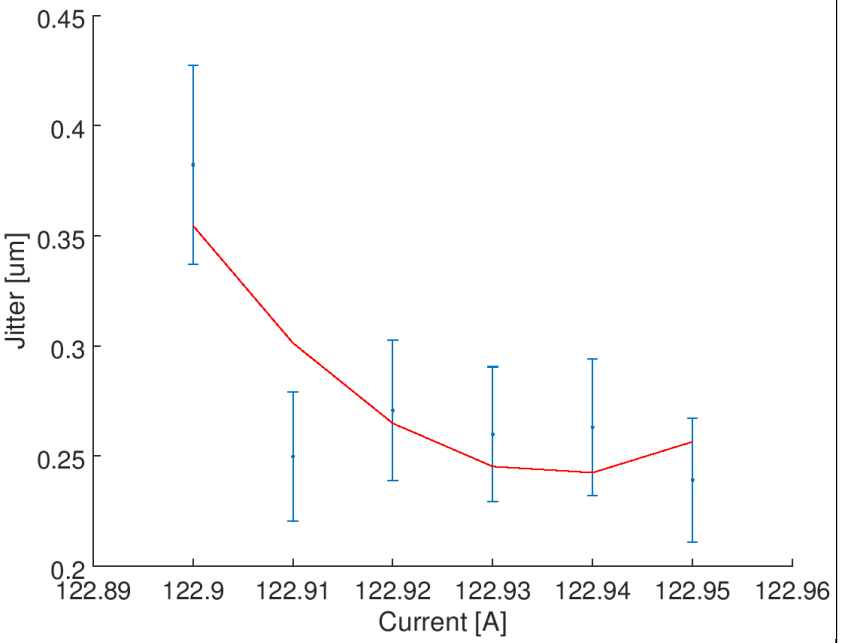
Waist scan 1


waistScan1_0dB
Q/q
I/q
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.2
-0.1
0
0.1
0.2
0.3
122.5
122.6
122.7
122.8
122.9
123
123.1
123.2
123.3
123.4
123.5

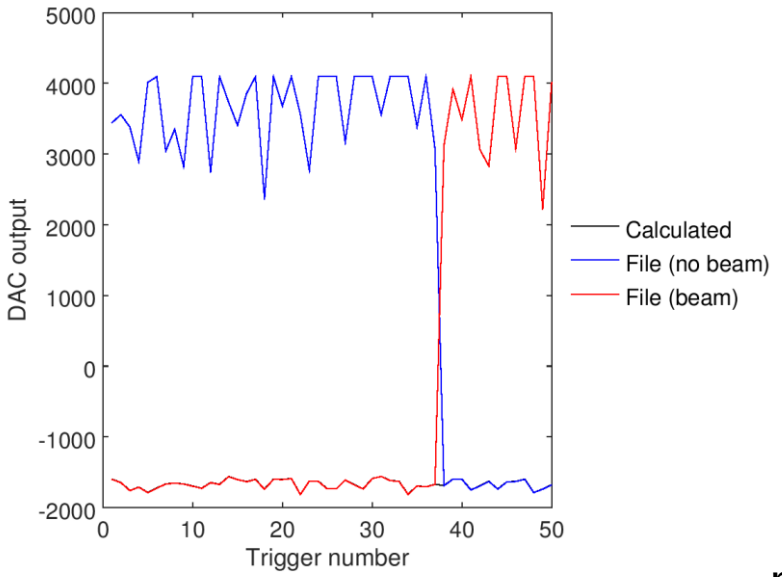

Fit minimum = 122.95
Jitter [um]
Current [A]
3.5
3
2.5
2
1.5
1
0.5
0
122.4
122.6
122.8
123
123.2
123.4
123.6

Waist scan 2

AQF1FF at -10 um



Bonus: DAC issues revisited



~~Bunches present, feedback off~~

Bunches present, feedback on

Beam extraction: 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0

Feedback: 0 – 0 – 1 – 1 – 0 – 0 – 1 – 1 – 0 – 0

~~Bunches absent, feedback off~~

Bunches absent, feedback on

missed trigger

1 – 0 – 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0 – 1 – 0

0 – 0 – 1 – 1 – 0 – 0 – 1 – 1 – 0 – 0 – 1 – 1 – 1 – 0 – 0 – 1 – 1 – 0 – 0 – 1 – 1 – 0

NB – the fact that the feedback on/off pattern looks normal suggests that the trigger was missed by the board itself rather than being dropped by the network or the DAQ

Extra bonus: Gain optimization

(clarification of the “gain optimization” method presented last week)

$\ddot{y}_B$ measured position of second bunch at IPB

$\dot{I}_A, \dot{Q}_A, \dot{I}_C, \dot{Q}_C$ measured I and Q of first bunch for BPMs A and C (charge-normalized)

The gain optimization finds the linear least-squares solution to the expression:

$$\ddot{y}_B = p_{I_A}\dot{I}_A + p_{Q_A}\dot{Q}_A + p_{I_C}\dot{I}_C + p_{Q_C}\dot{Q}_C + c$$

The operation of the feedback algorithm is such that the kick provided to the second bunch is

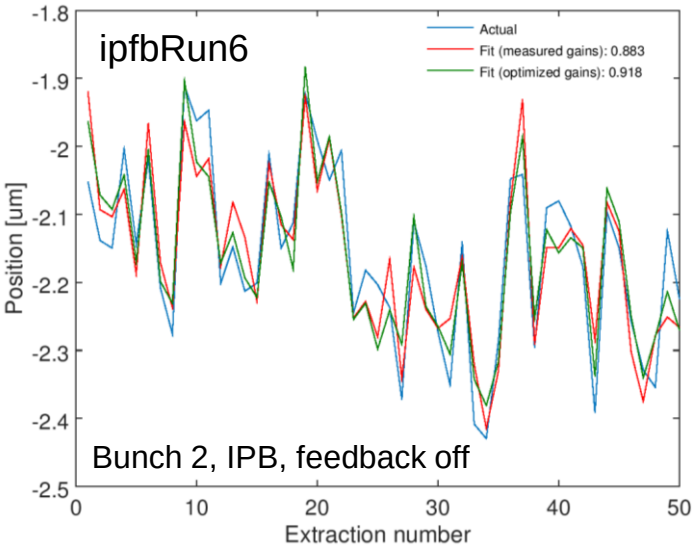
$$v = G_{I_A}\dot{I}_A + G_{Q_A}\dot{Q}_A + G_{I_C}\dot{I}_C + G_{Q_C}\dot{Q}_C$$

The theoretical optimized position is

$$\ddot{Y}_B = \ddot{y}_B + Hv$$ where H is the kicker calibration constant in um/count

And the optimized gains Γ are therefore given by $\Gamma = -p/H$

The standard deviation of $\ddot{Y}_B$ gives the optimized jitter of the second bunch and can be compared with the jitter obtained by using the measured gains instead of the fitted ones.



Summary

- IQ rotation may be more reliable method of determining when the waist is on the BPM than the jitter
- Issue with DAC values brought up last week found to be due to missing trigger