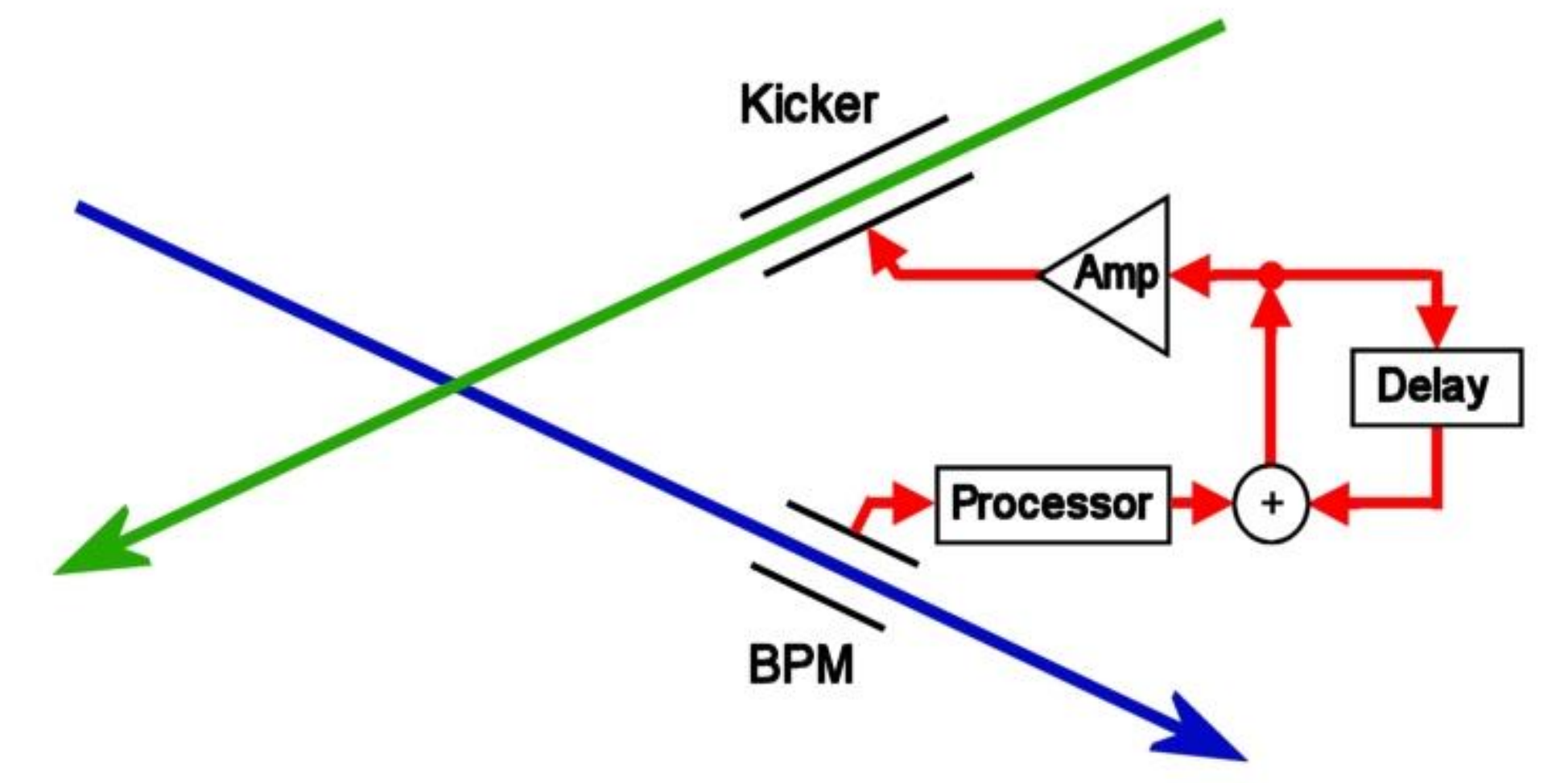


An FPGA-based Bunch-by-Bunch Position and Angle Feedback System at ATF2

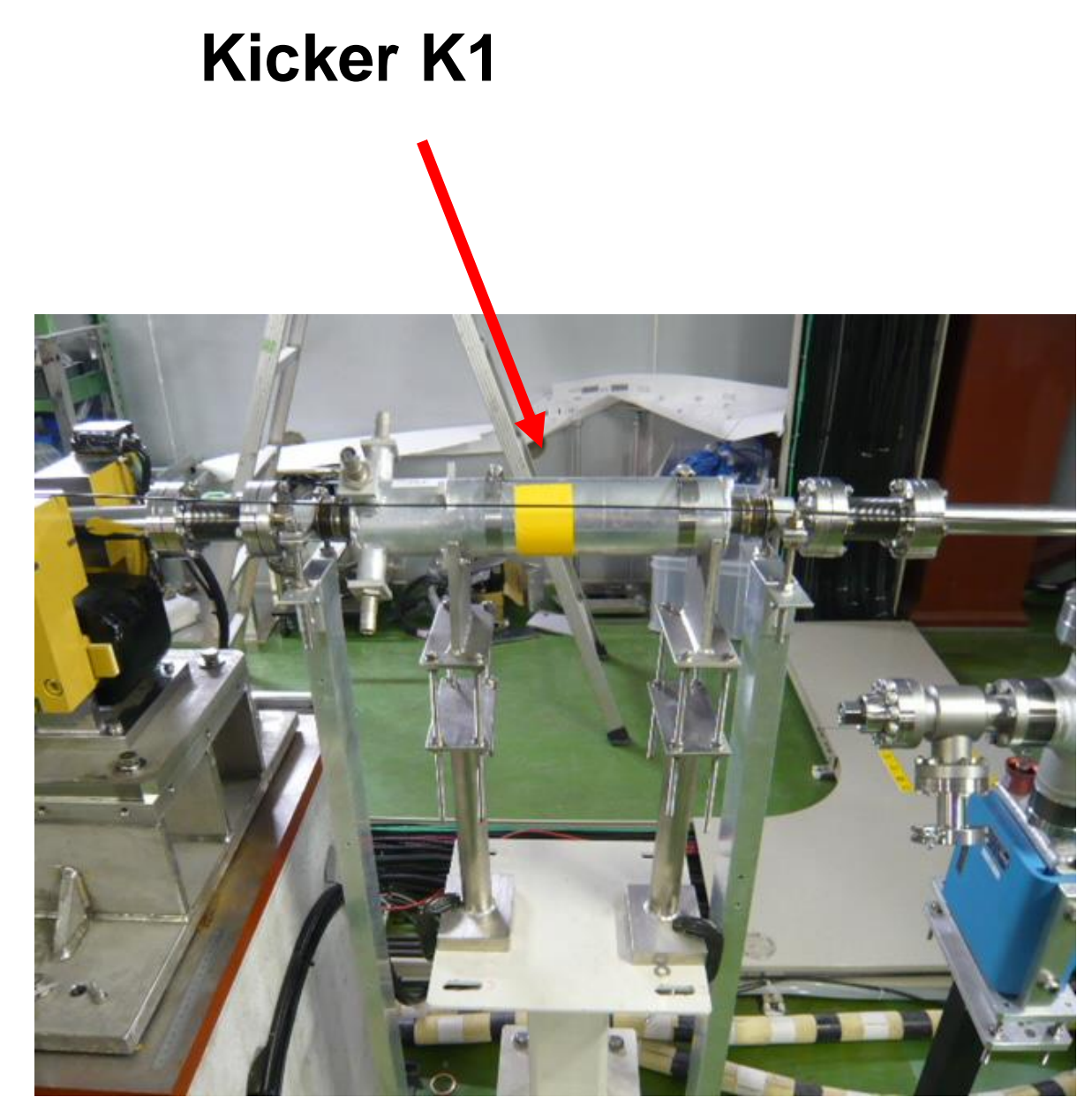
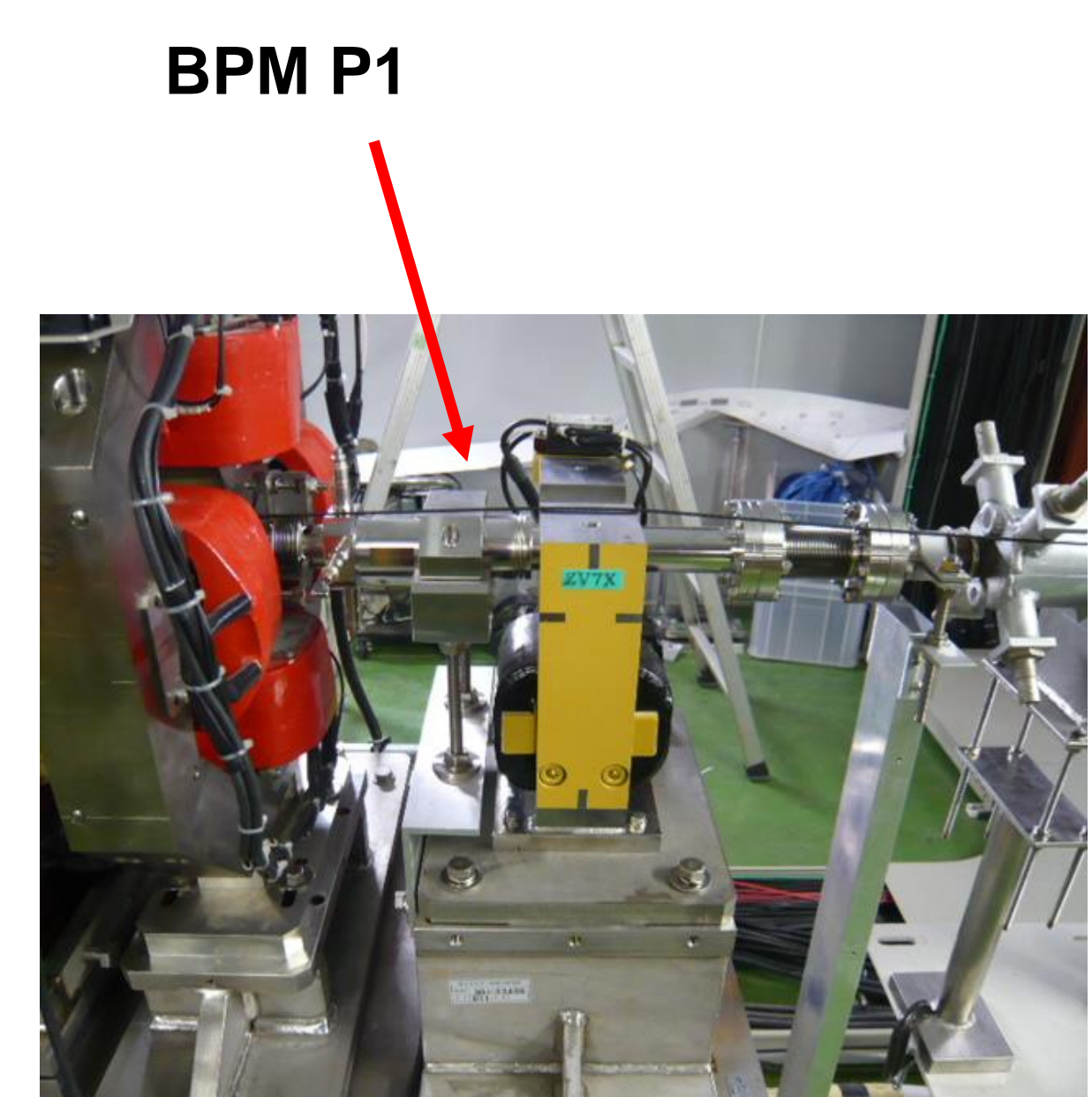
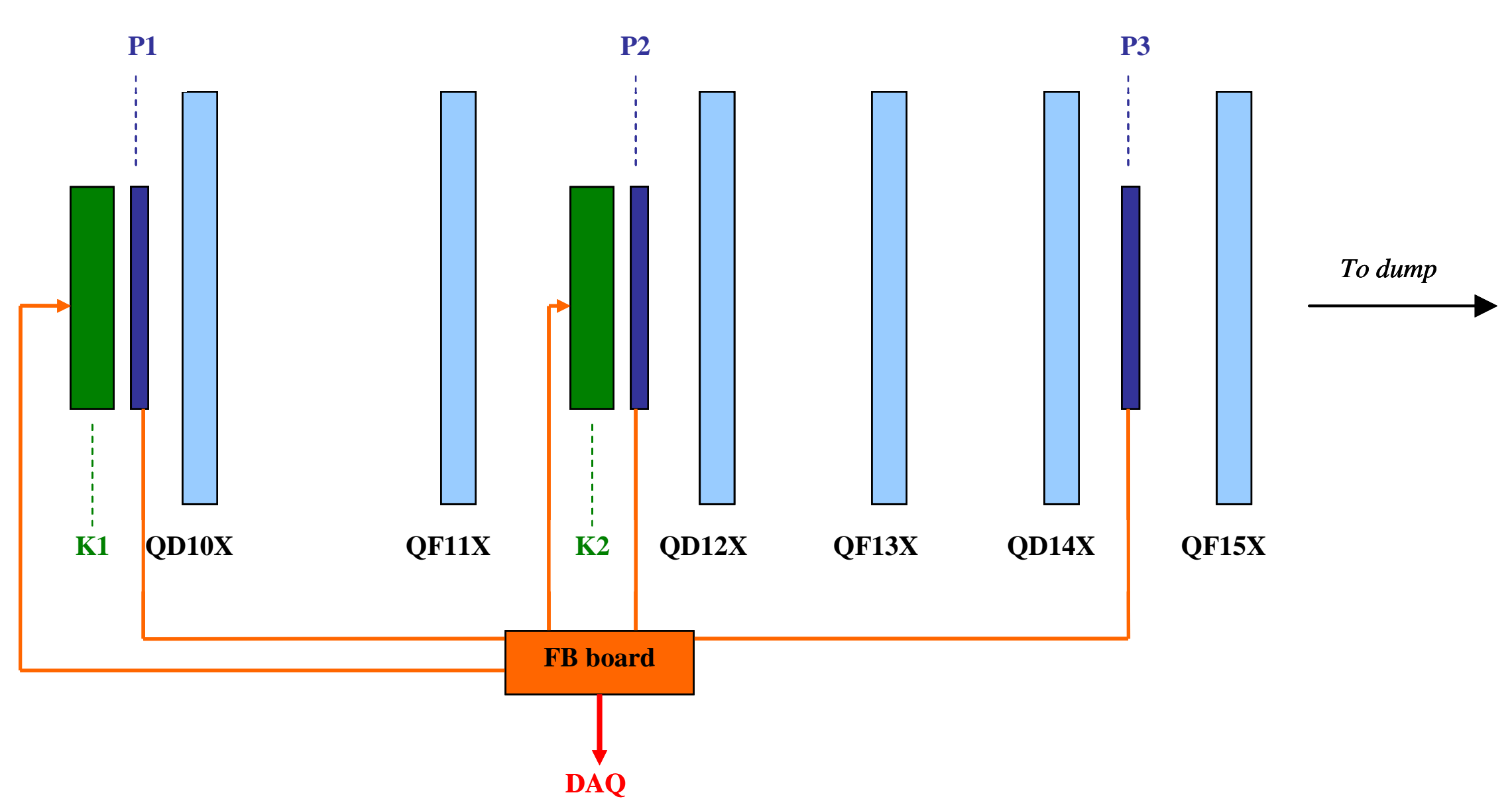
**R. Apsimon^[1], D. Bett^[1], P. Burrows^[1], G. Christian^[1],
**B. Constance^[1], M. Davis^[1], A. Gerbershagen^[1], C. Perry^[1],
J. Resta Lopez^[2]
^[1] *John Adams Institute, Oxford University, UK*
^[2] *IFIC, Valencia, Spain*****

Linear Collider intra-train IP feedback concept:

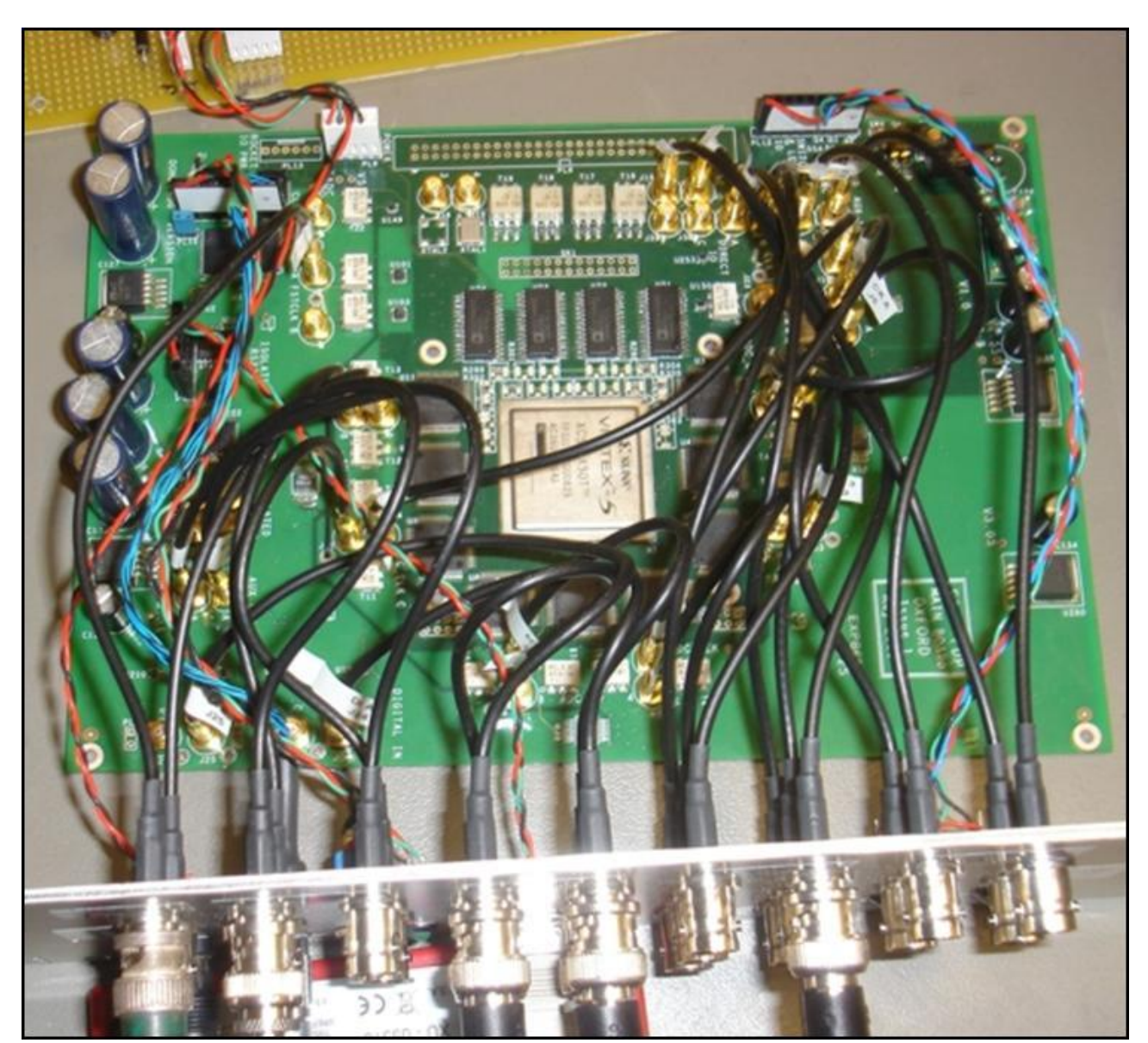


Detect position offset of incoming bunches early in train. Calculate correction and apply with kicker to later bunches

FONT5 digital prototype at KEK ATF2:

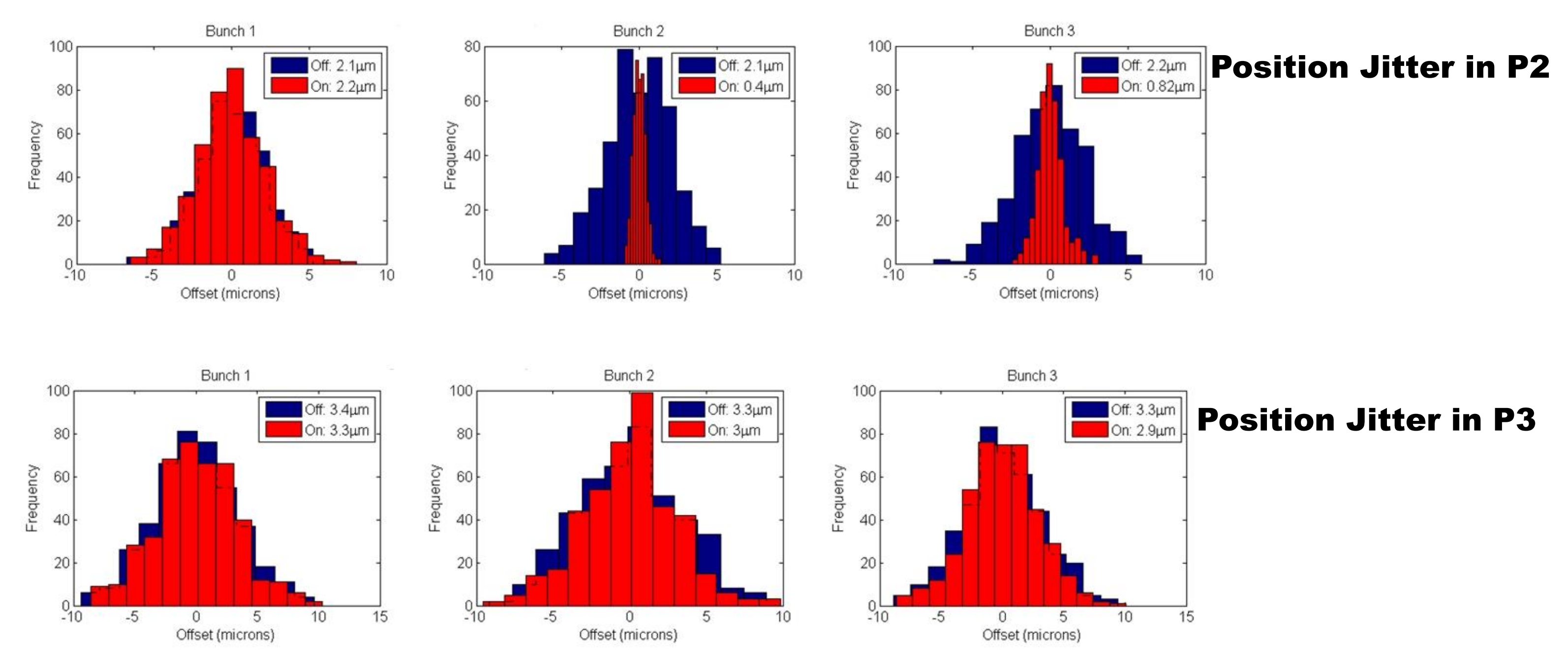


Digital feedback processor:

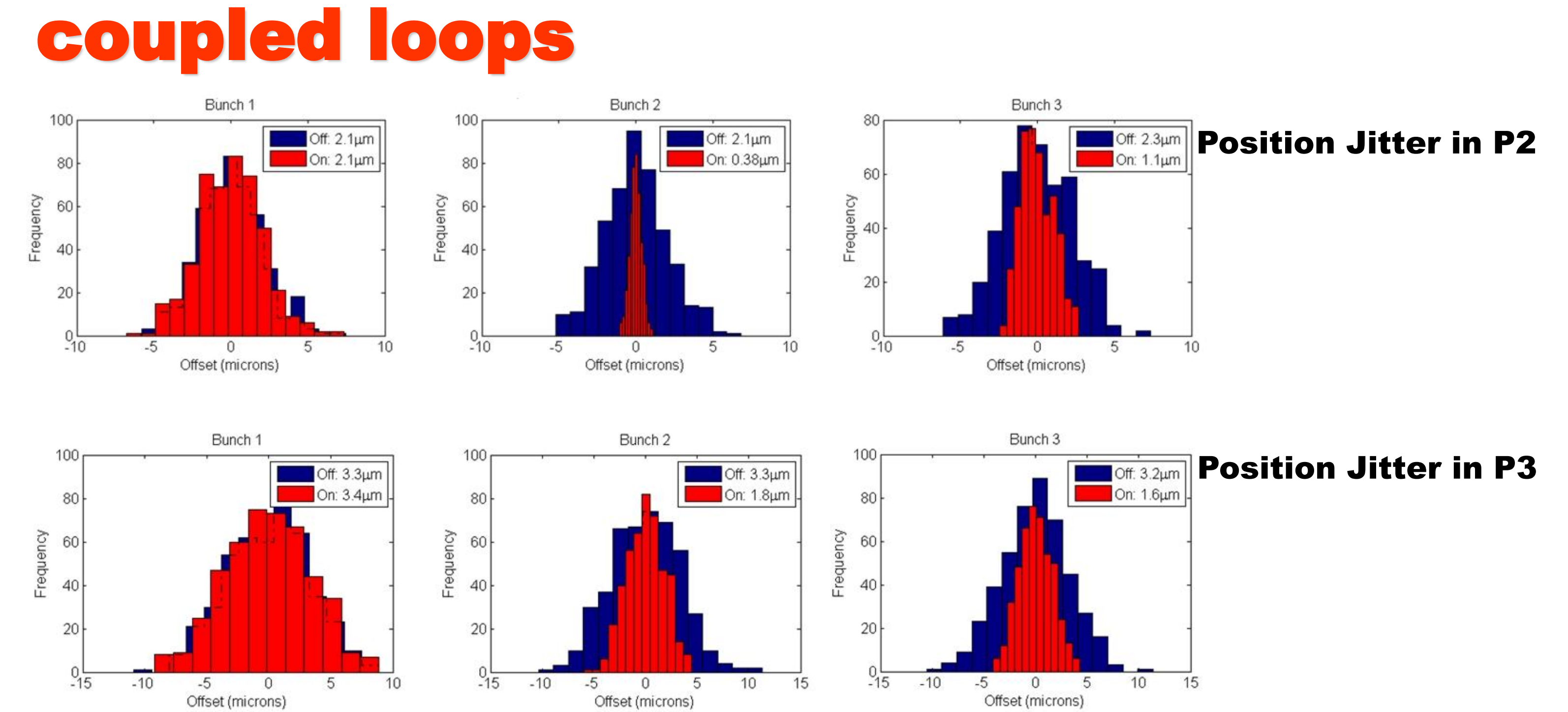


Xilinx Virtex5 FPGA
 Clocked at 357 MHz
 phase-locked to beam
 9 ADC input channels
 (TI ADS5474)
 4 DAC output channels
 (AD9744)

Beam test results: single loop: K1 to P2

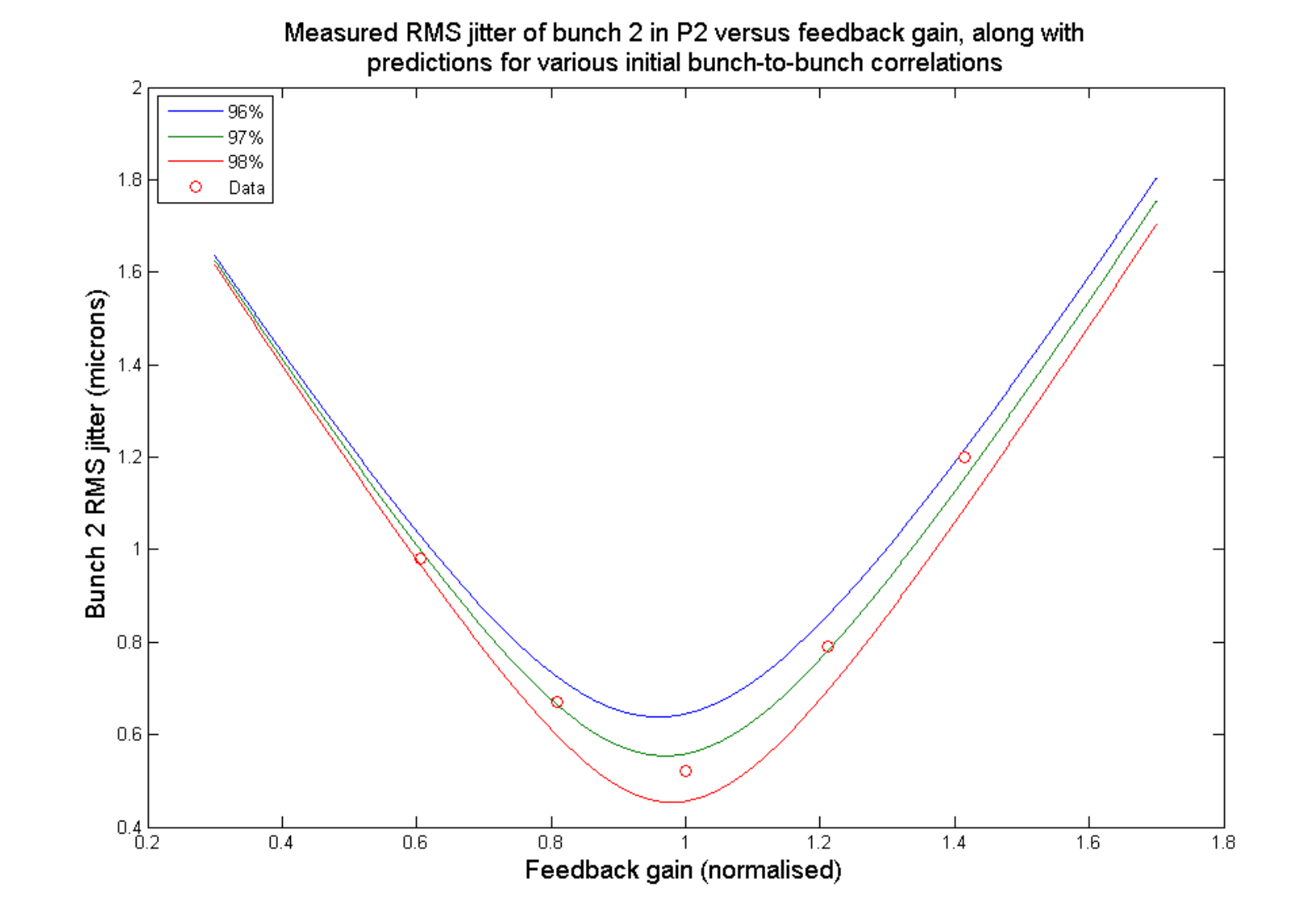


Single loop feedback can only correct the beam jitter at one point in the extraction line

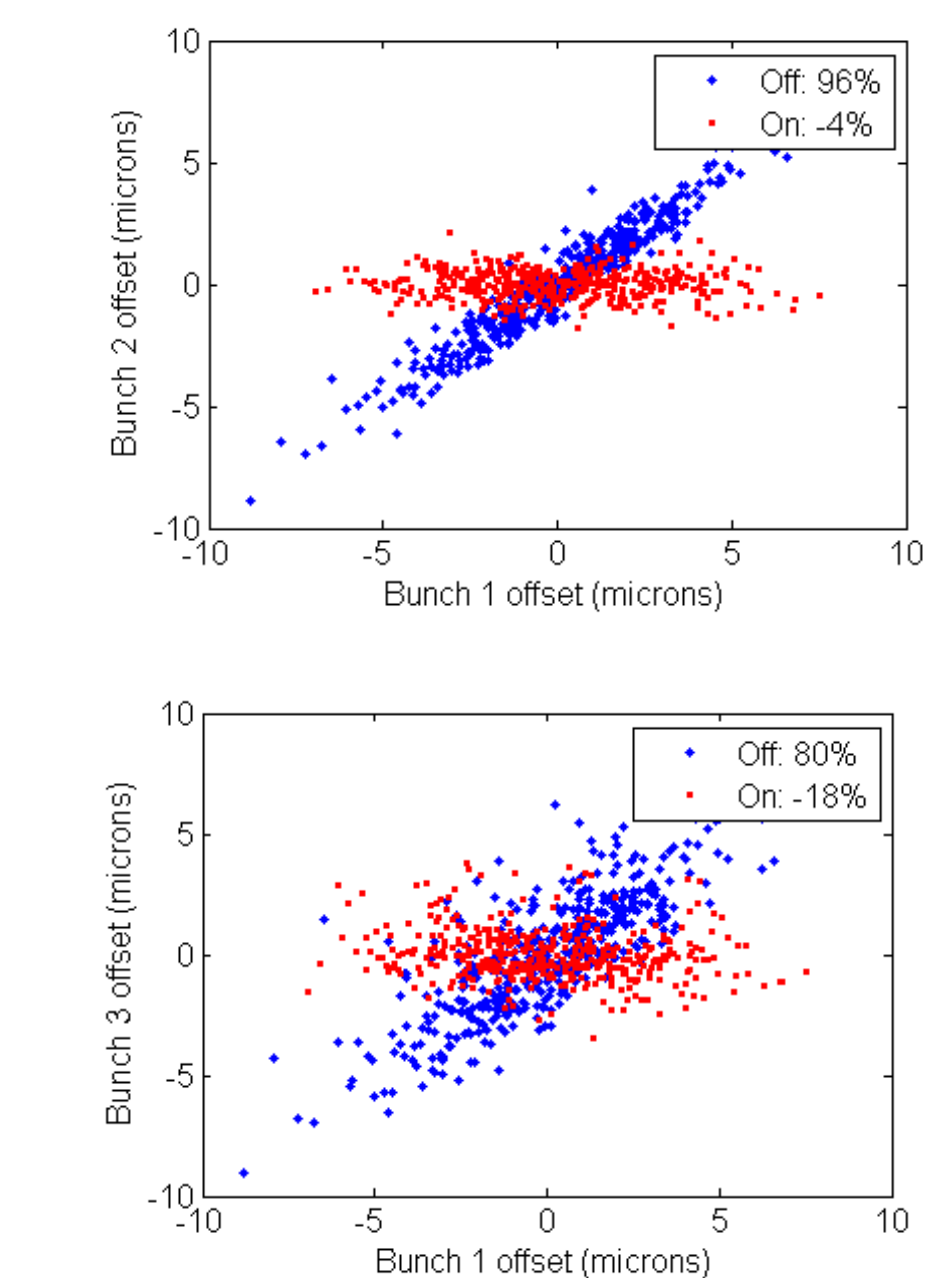


Coupled feedback allows a feedback correction to be maintained over an extended distance

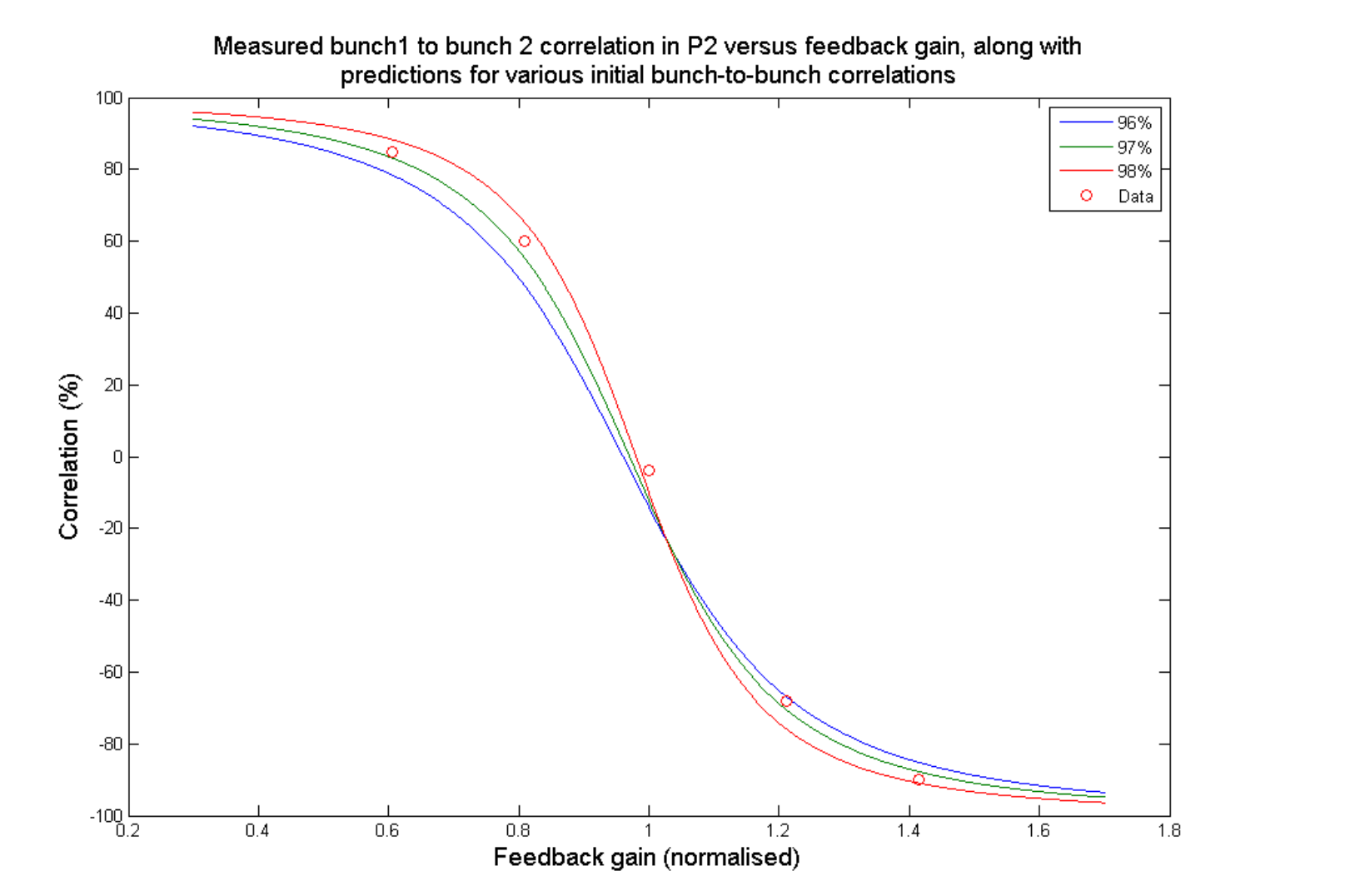
Jitter vs. FB loop gain



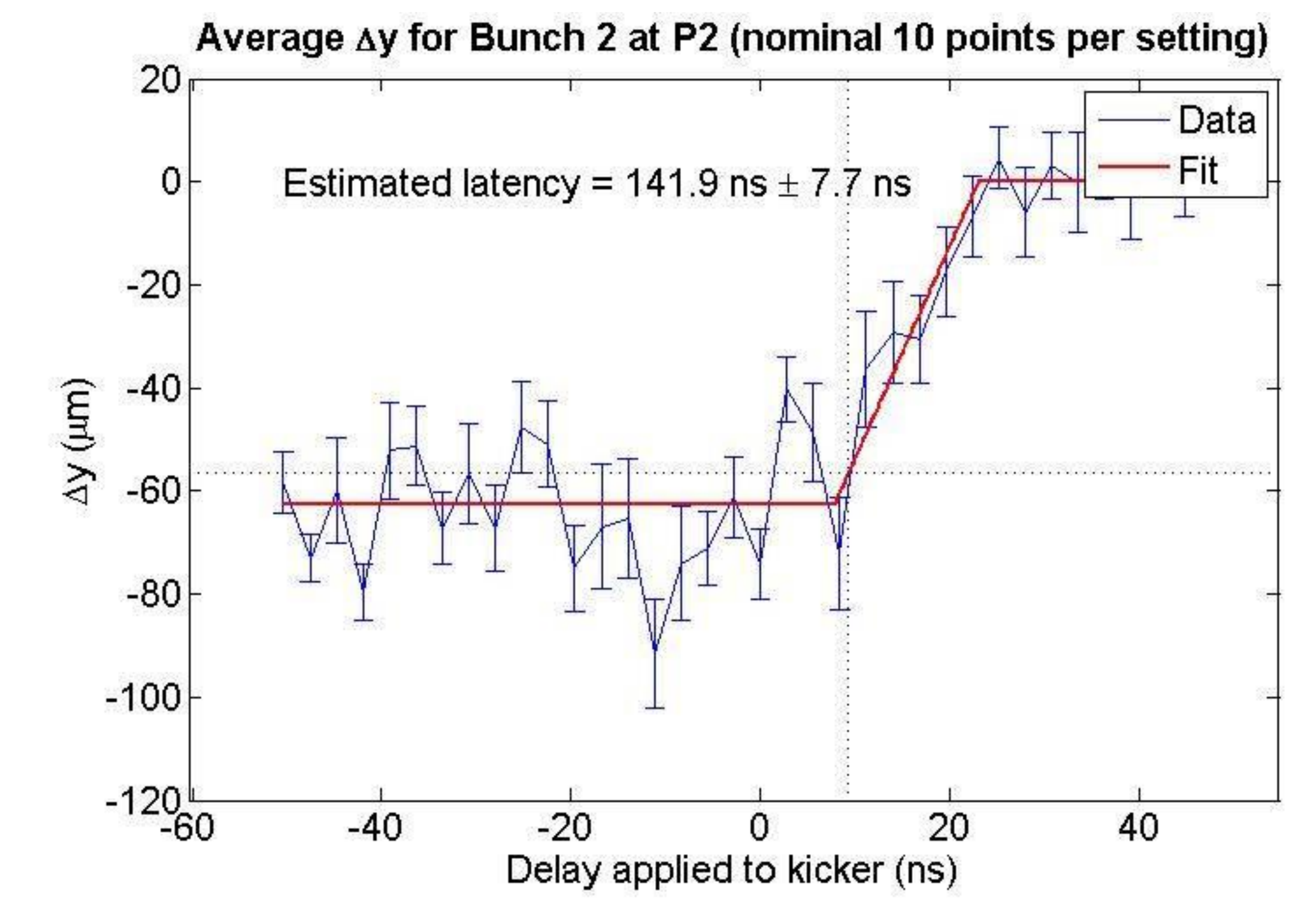
Performance of FB: removes correlations between bunches



Bunch correlations vs. FB loop gain



Feedback latency measurements:



Measurement of the latency of the K1 to P3 feedback loop. This is the longest feedback path in the FONT system and is therefore the critical path. The latency must be less than 154ns for bunch to bunch feedback to be achieved.