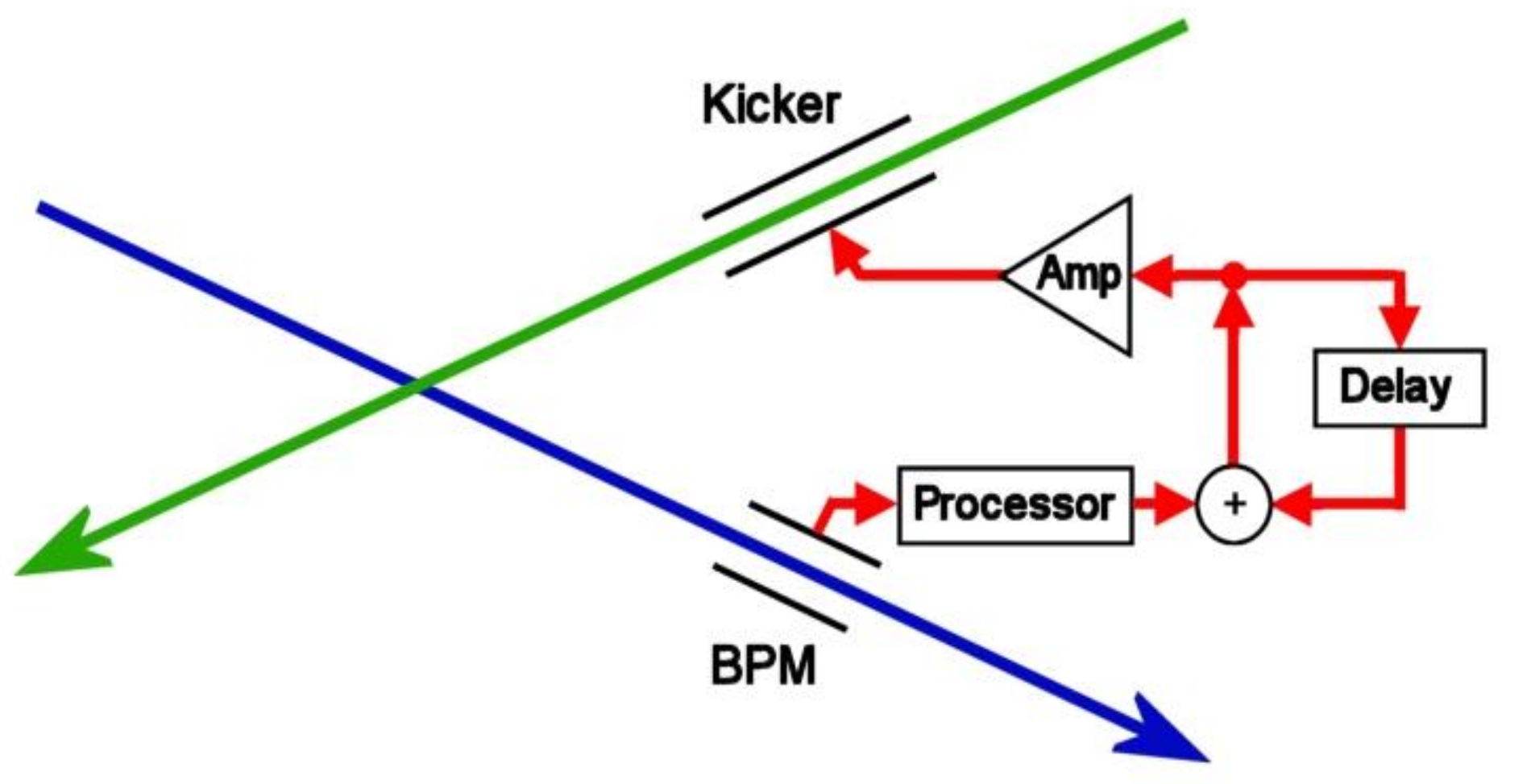# Latest Performance Results from the FONT5 Intra-train Beam Position and Angle Feedback System at ATF2
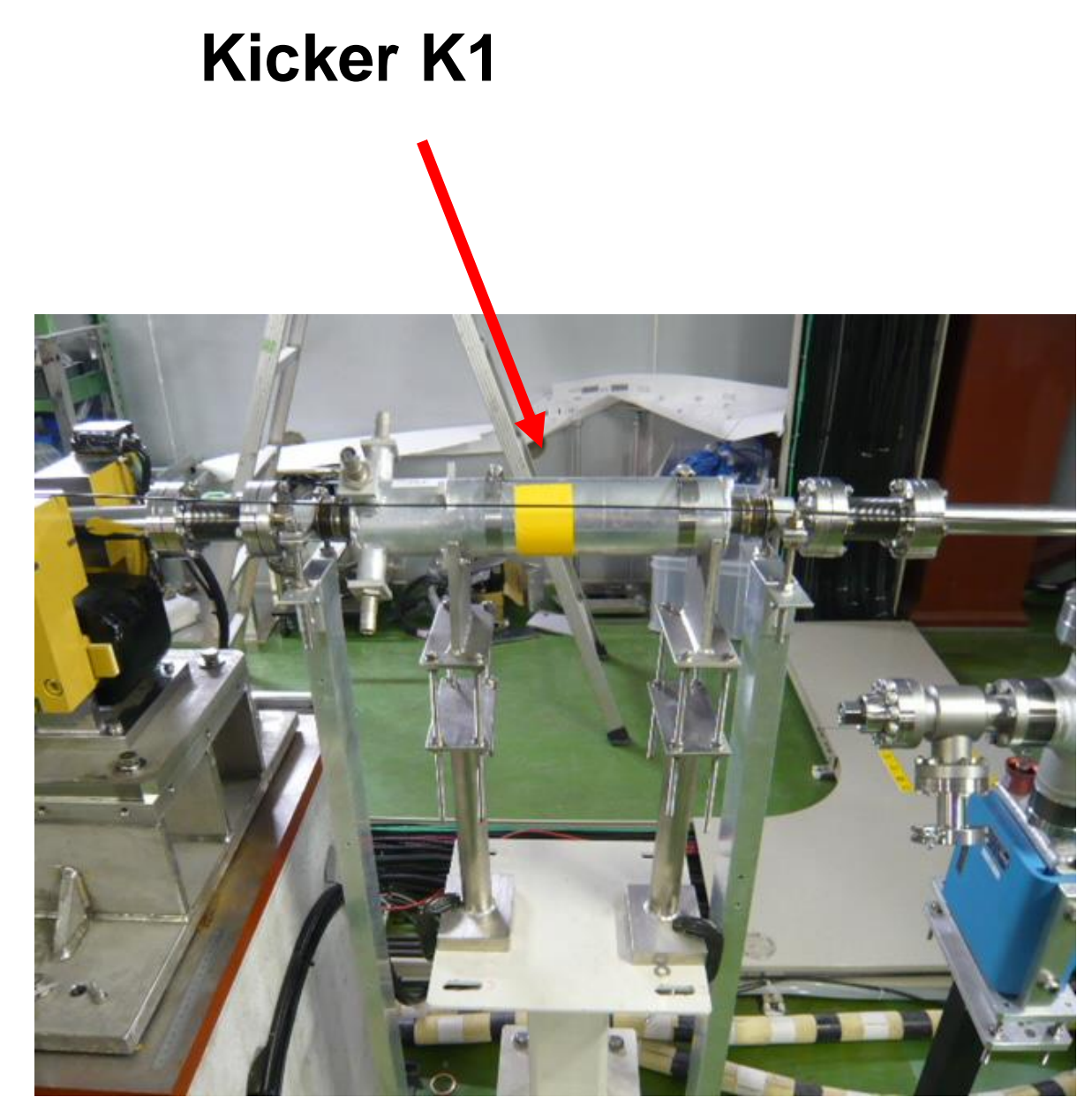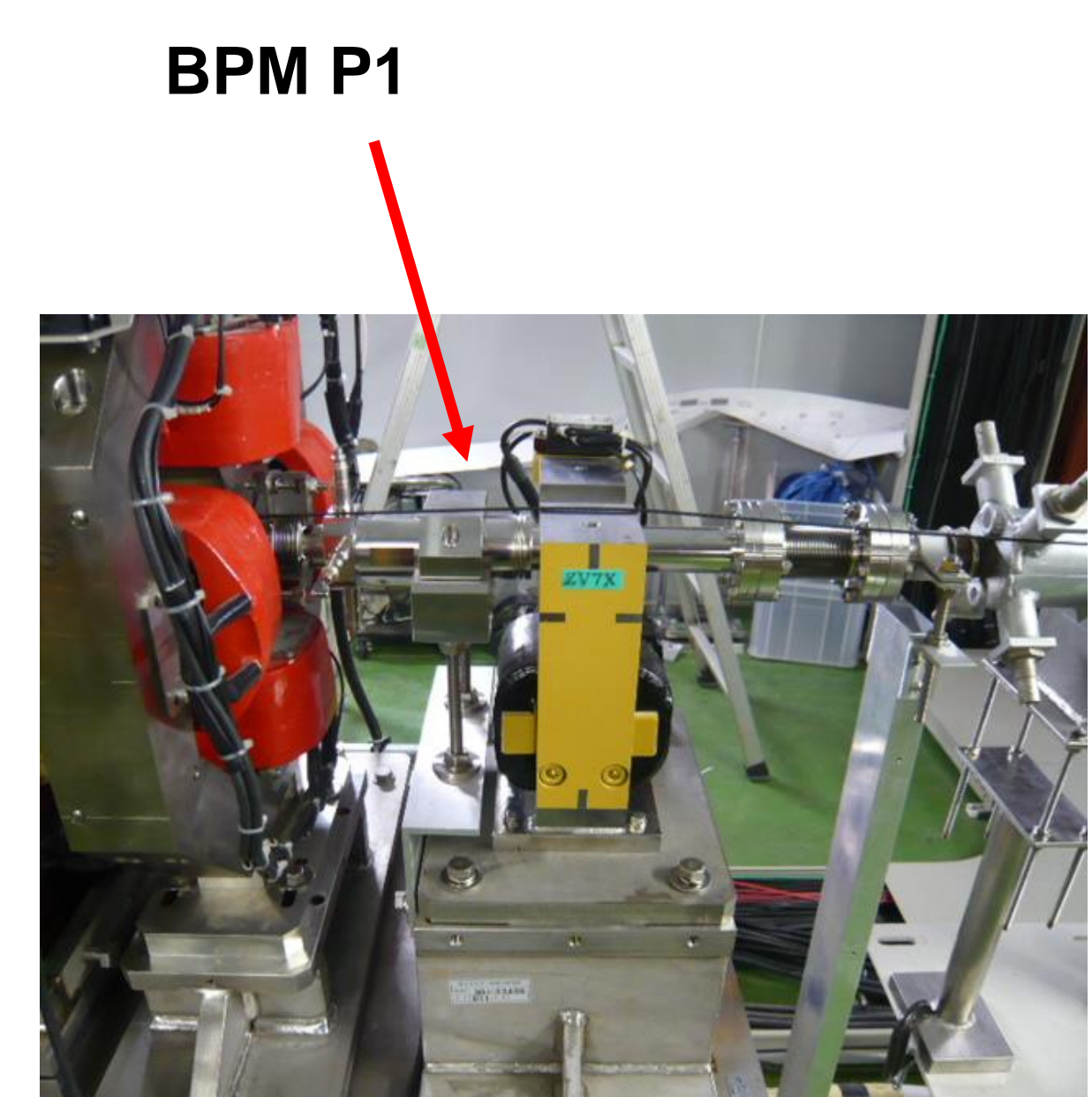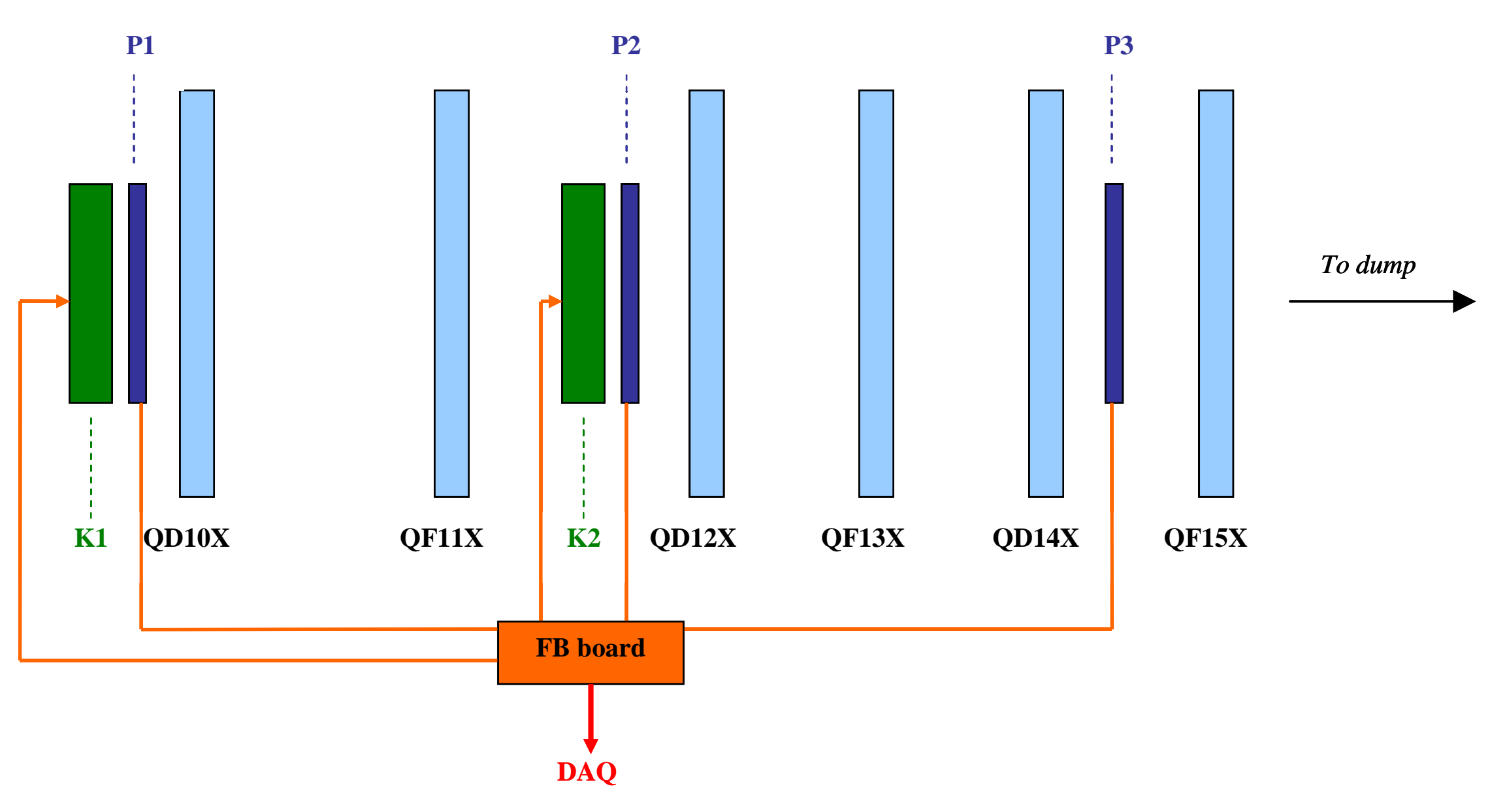
D.R. Bett[1], R. Apsimon[2], N. Blaskovic Kraljevic[1],
P.N. Burrows[1], G.B. Christian[1], B. Constance[2], M.R. Davis[1],
A. Gerbershagen[1,2], C. Perry[1], J. Resta Lopez[3]

[1] *John Adams Institute, Oxford University, UK;*

[2] *CERN;*   [3] *IFIC, Valencia, Spain*
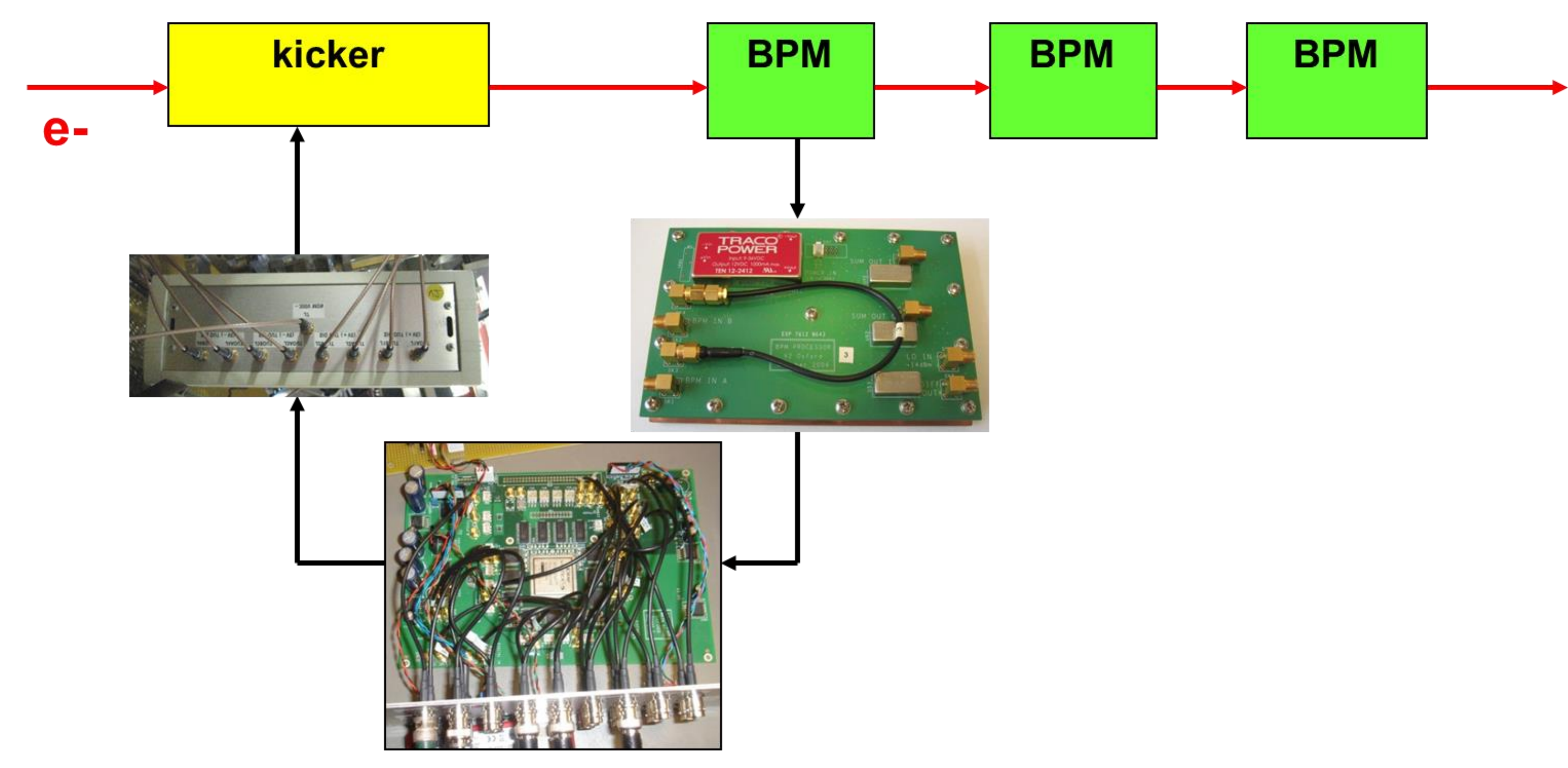
Linear Collider intra-train IP feedback concept:

Detect position offset of incoming bunches early in train. Calculate correction and apply with kicker to later bunches
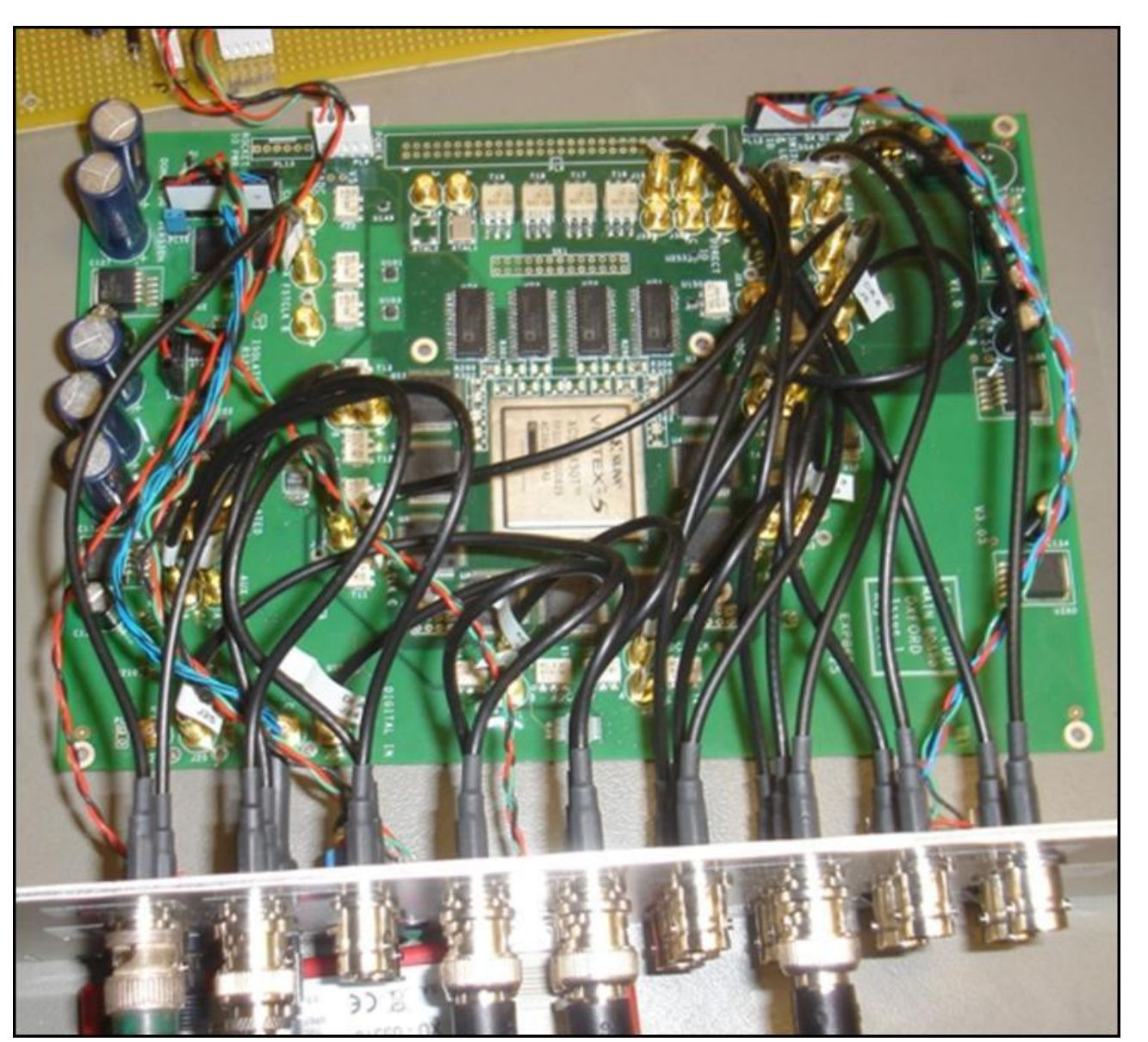
FONT5 digital prototype at KEK ATF2:

BPM P1   Kicker K1

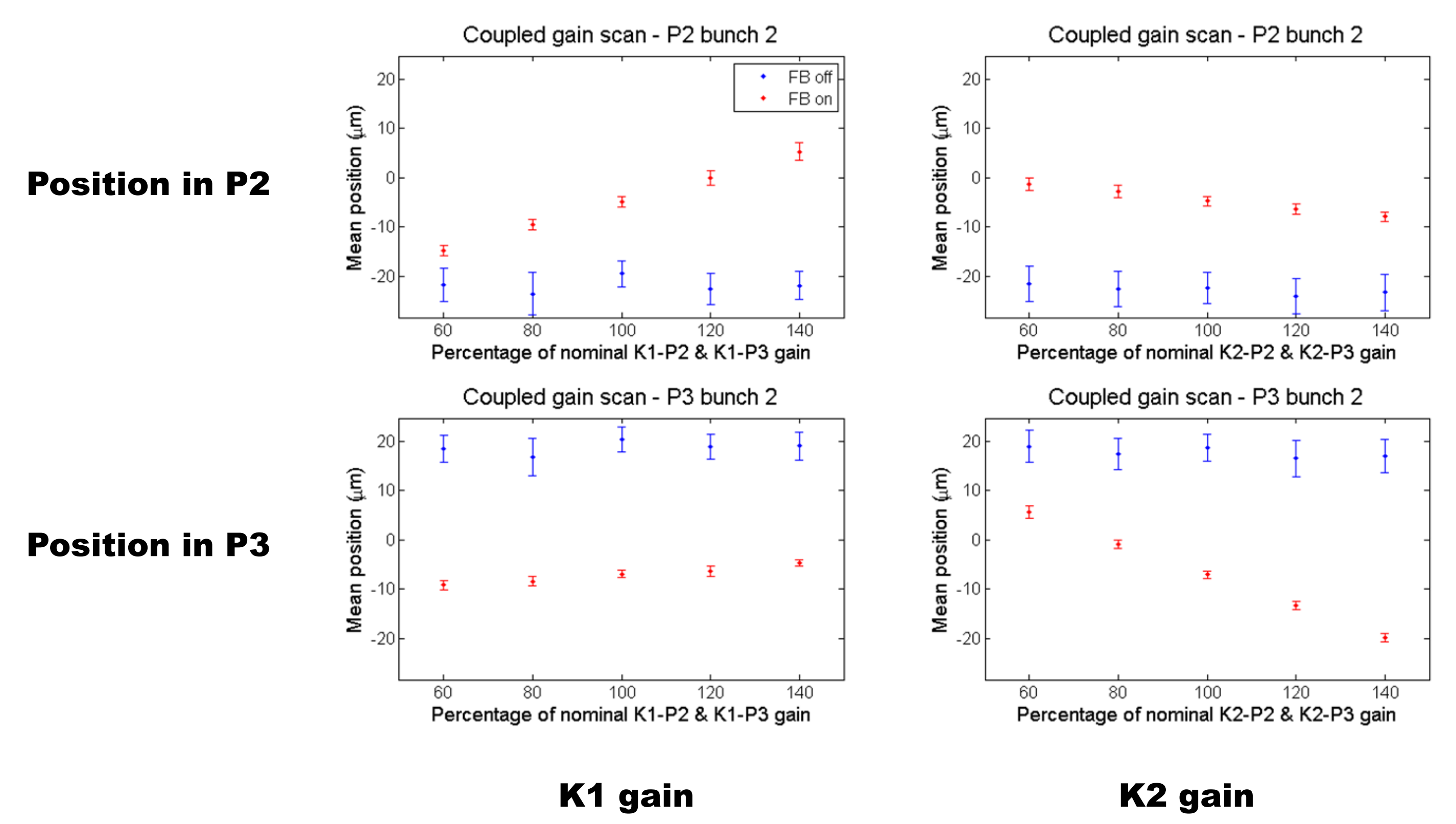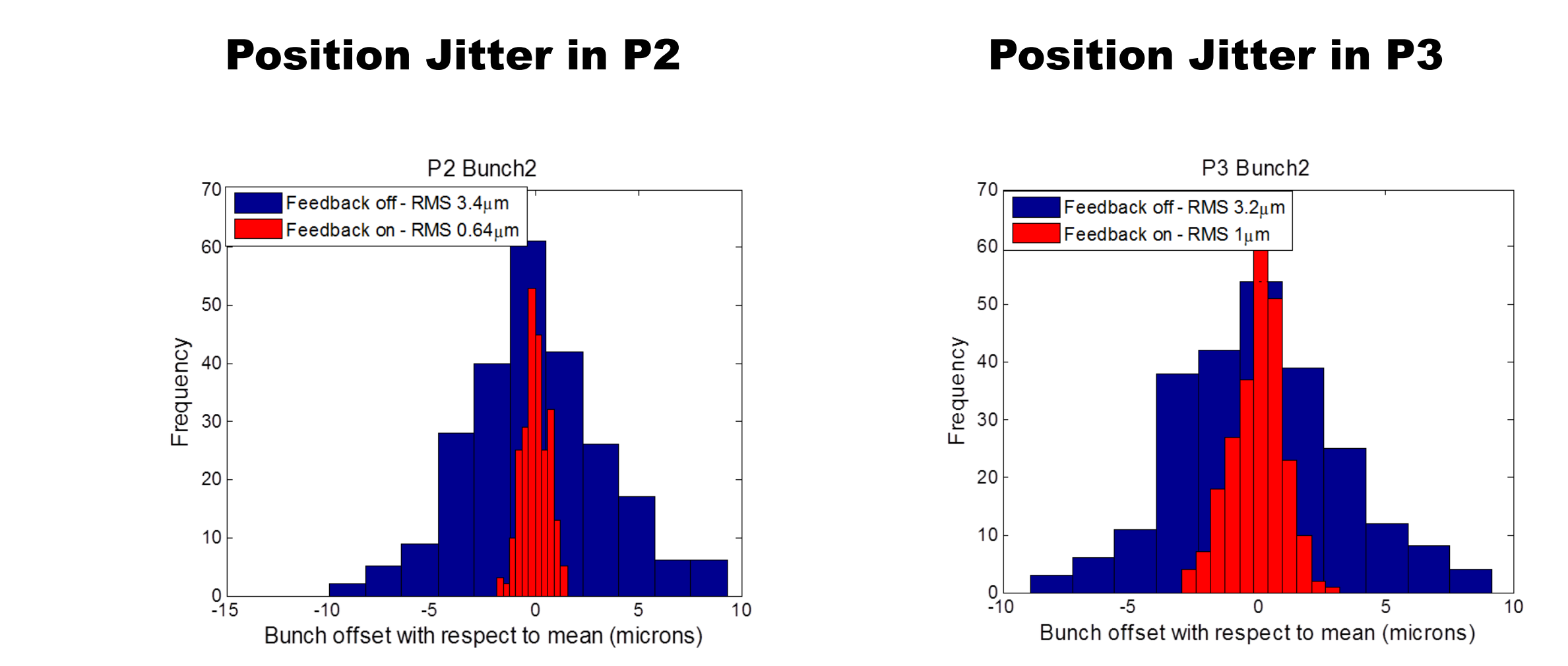## Feedback loop:

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:

coupled loop gain studies

K1 gain   K2 gain

coupled loop FB performance

Position Jitter in P2   **Position Jitter in P3**

bunch	1		2		
	FB off	on	FB off	on	Pred.
Jitter P2	3.42	3.39	3.42	0.64	
1-2 correl 98%					0.67
P3	3.24	3.16	3.21	1.04	
1-2 correl 97%					0.83

$$\sigma_2'^2 = \sigma_1^2 + \sigma_2^2 - 2\sigma_1\sigma_2\rho_{12} \geq 2\sigma_r^2$$

downstream performance

Coupled feedback allows a feedback correction to be maintained over an extended distance down the extraction line