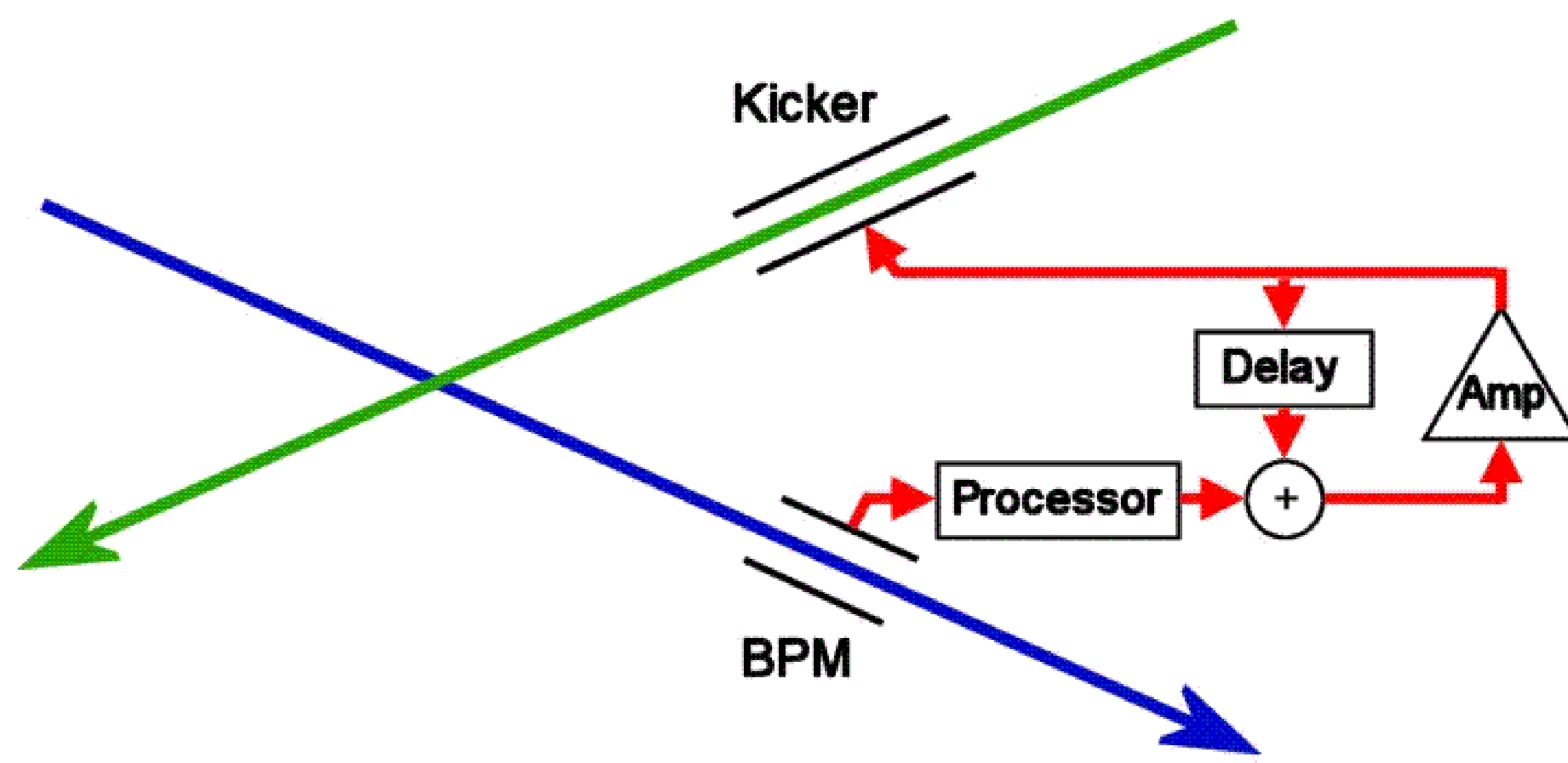


FONT4 ILC Intra-Train Beam-based Digital Feedback Prototype

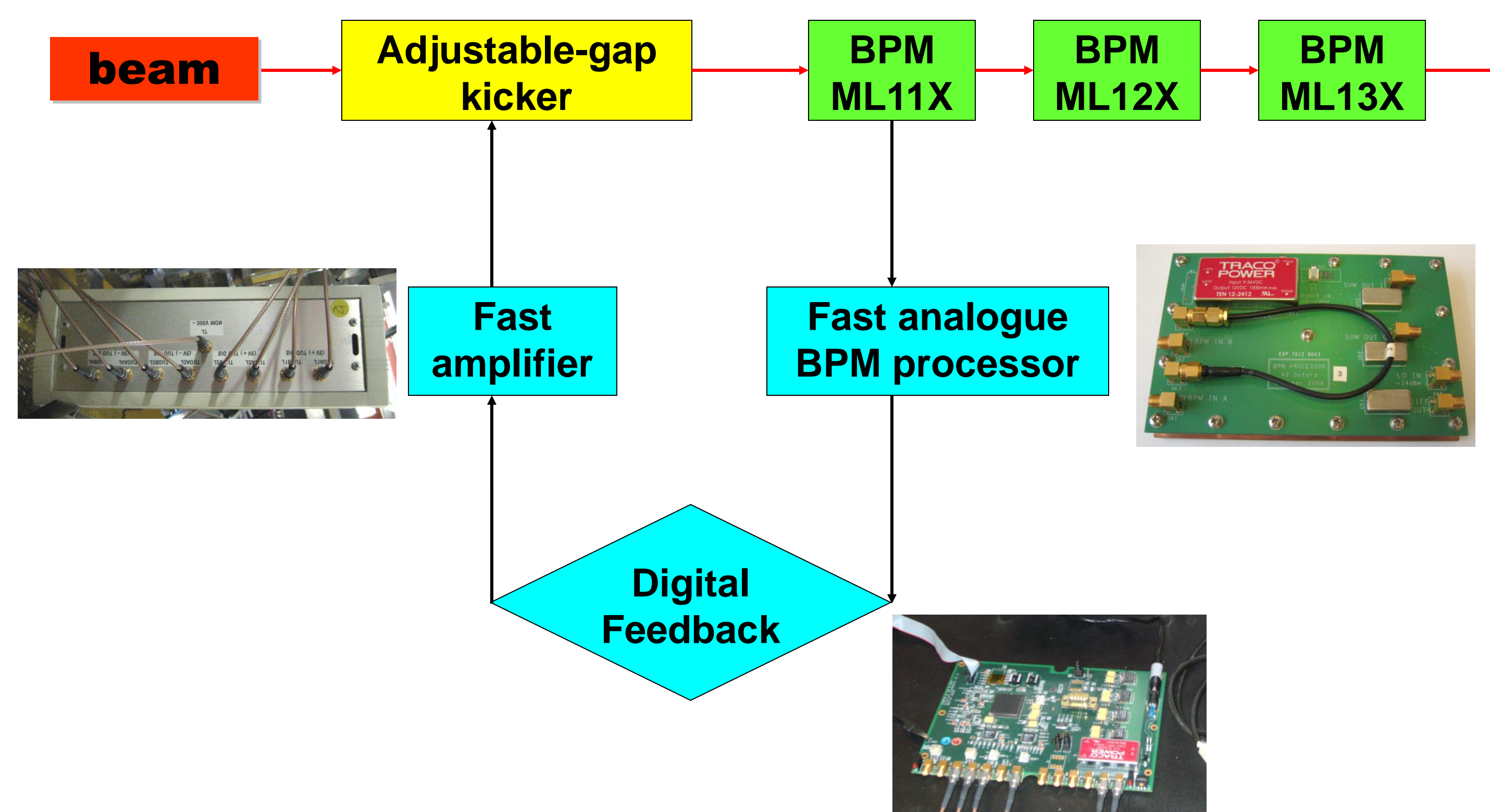
**P.N. Burrows, G. Christian, C. Clarke, B. Constance,
H. Dabiri Khah, T. Hartin, C. Perry, C. Swinson**
(John Adams Institute, Oxford University)
A. Kalinin (Daresbury Laboratory)
S. Molloy, G.R. White (SLAC)

Linear Collider intra-train feedback concept:



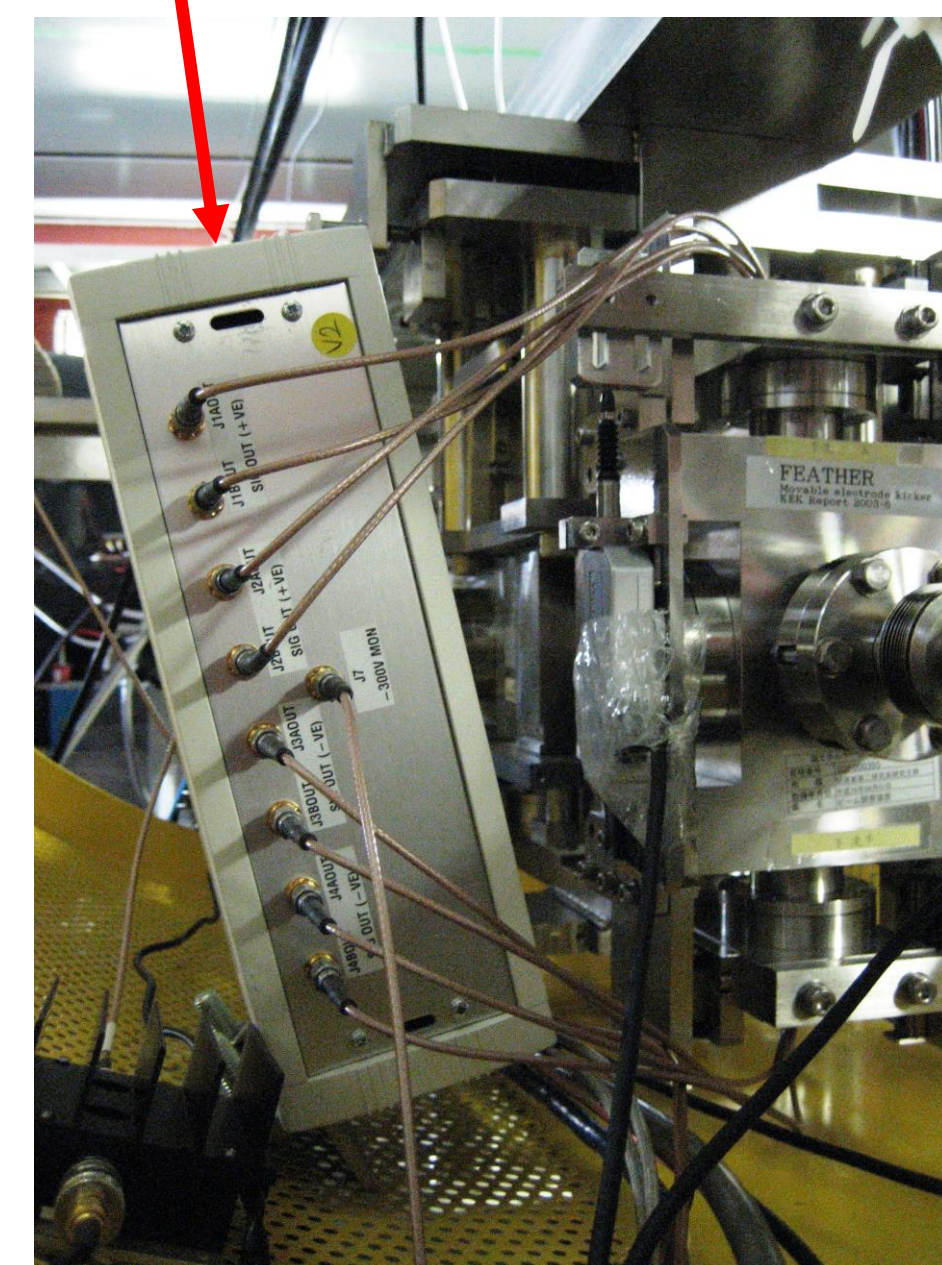
Detect position offset of incoming bunches early in train. Calculate correction and apply with kicker to later bunches

FONT4 digital prototype at KEK ATF:

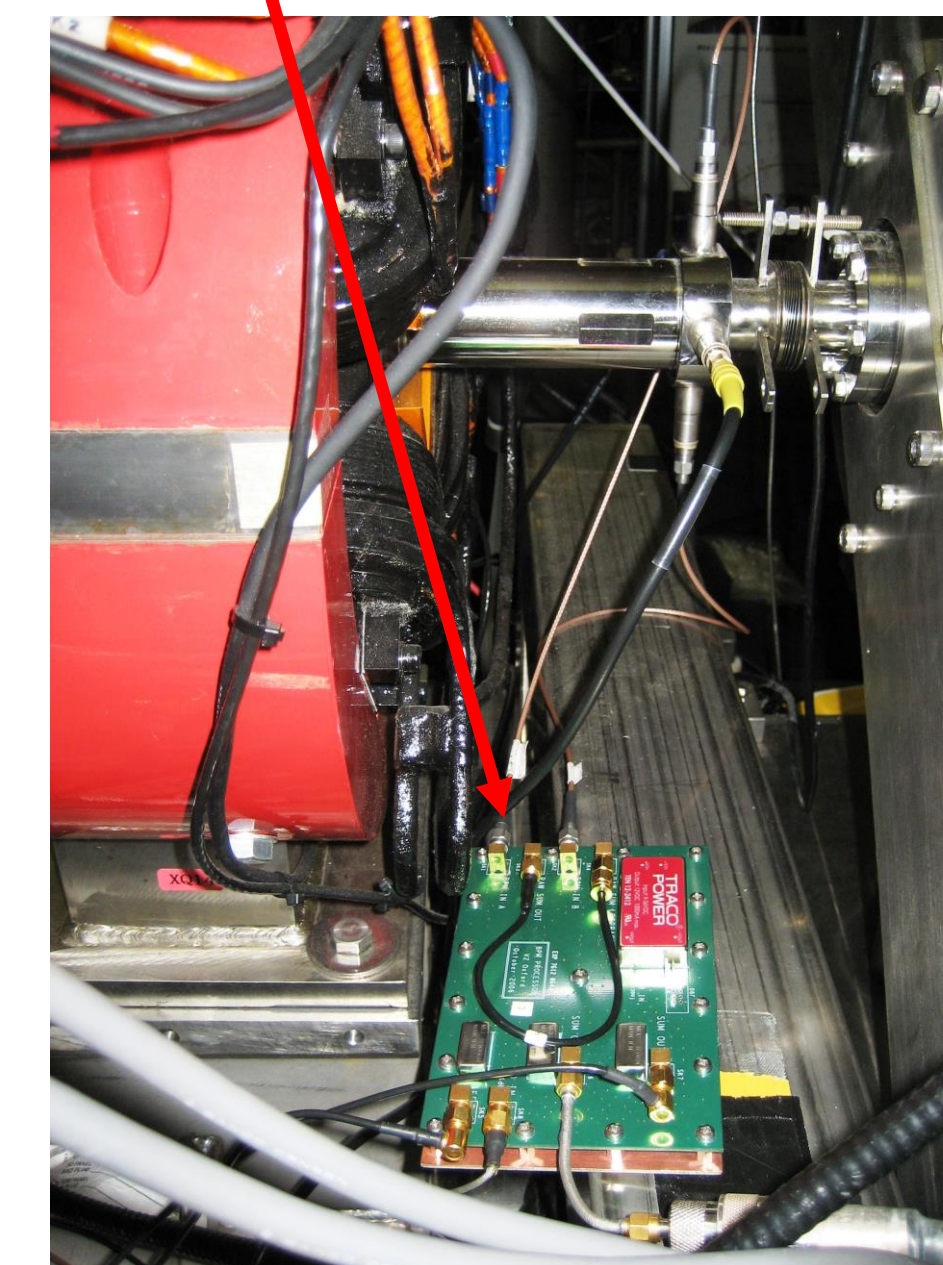


ATF extraction line:

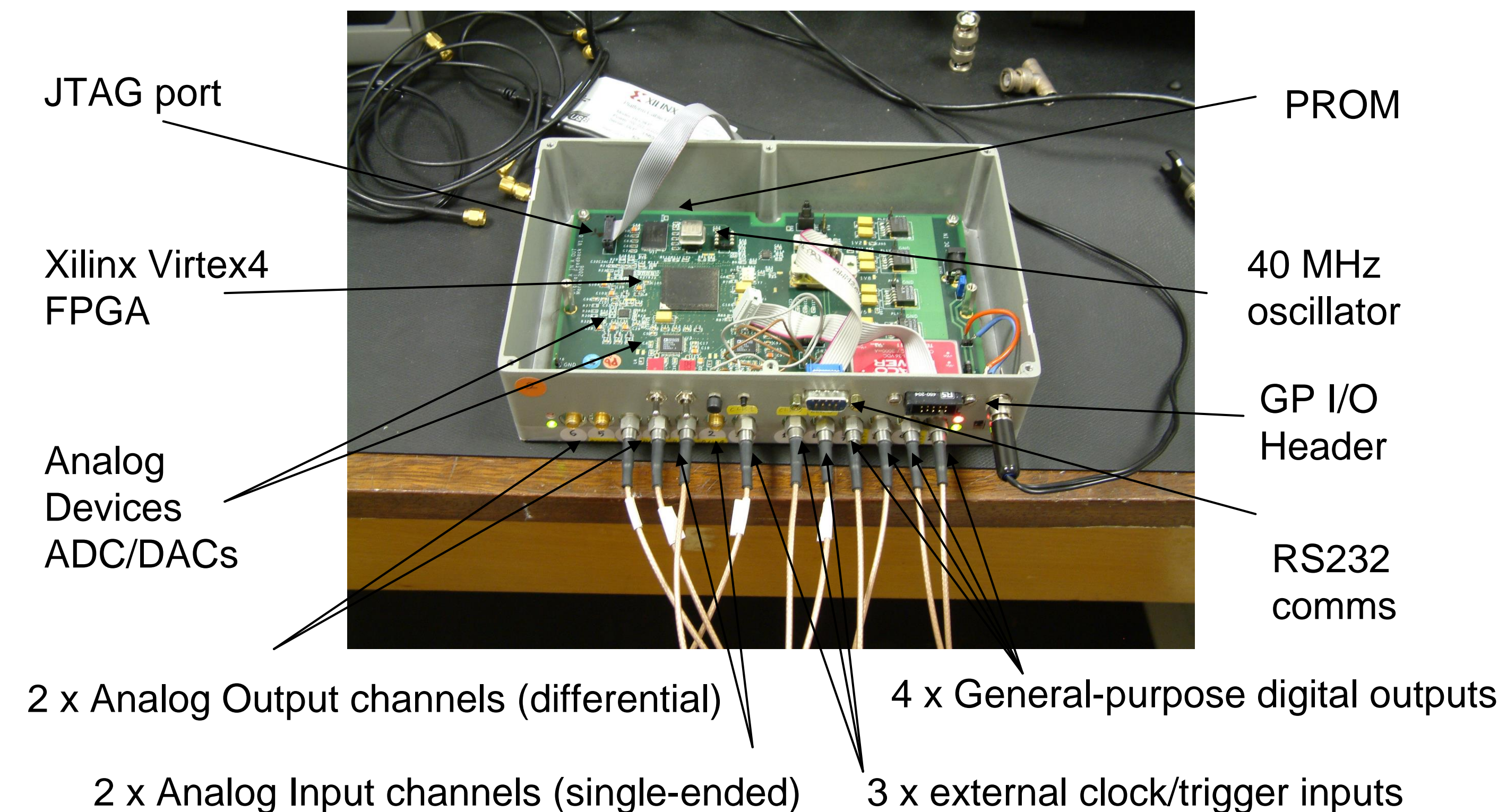
Amplifier



Analogue BPM processor

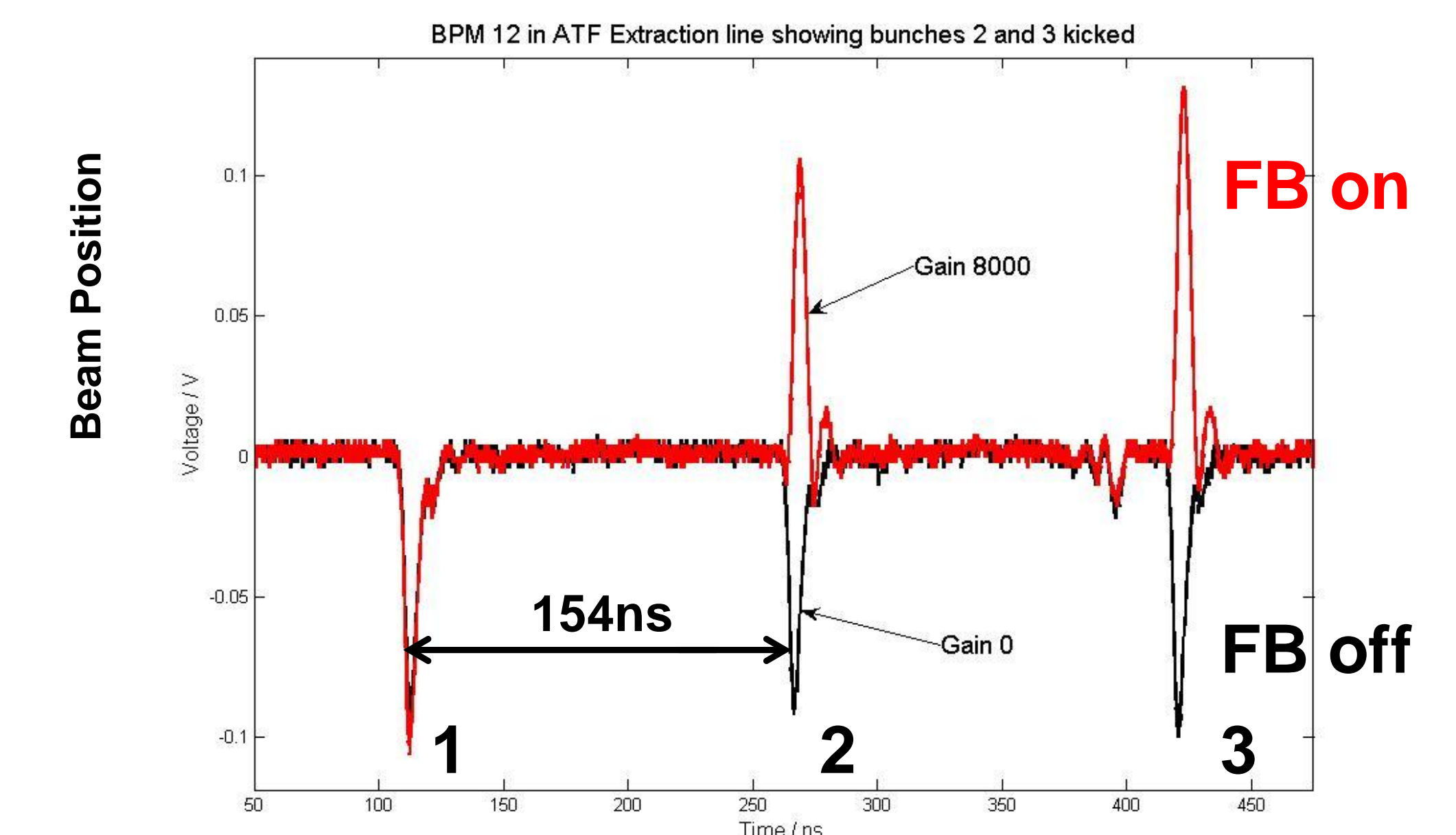


Digital feedback processor:

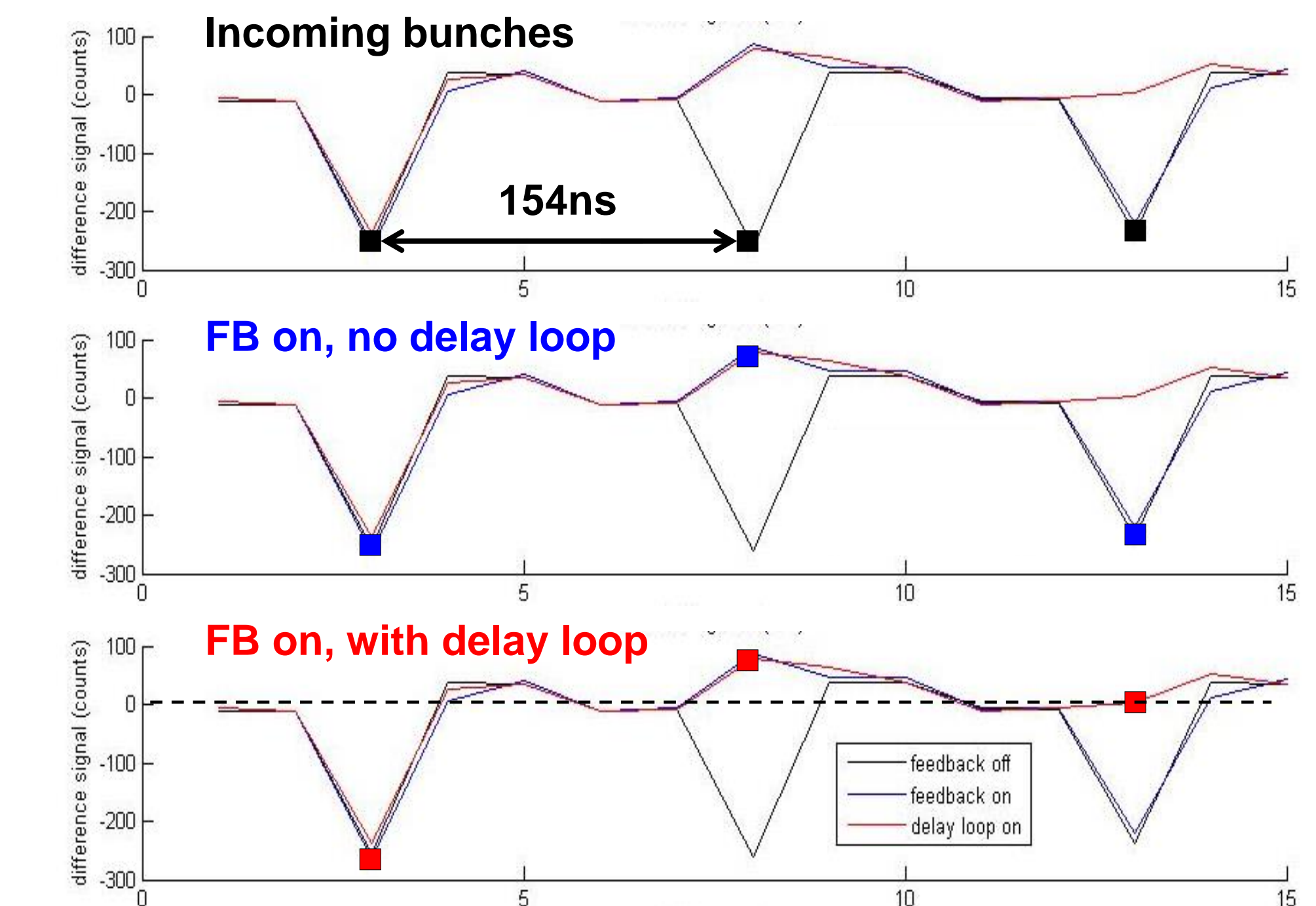


Beam test results:

1st closed-loop operation Dec. 2006



Delay loop tests Feb. 2007



Latency estimate:

- Time of flight kicker – BPM: 4ns
- Signal return time BPM – kicker: 10ns
- Irreducible latency: 14ns
- BPM processor: 7ns
- ADC/DAC (3.5 89 MHz cycles) 40ns
- Signal processing (8 357 MHz cycles) 25ns
- FPGA i/o 3ns
- Amplifier 40ns
- Kicker fill time 3ns
- Electronics latency: 118ns
- Total latency estimate: 132ns

Gain optimisation May 2007

