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Bunch-by-Bunch Processing on MicroTCA at Diamond

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At Diamond we have been developing the control system for our multi-bunch feedback system for more than a decade, adding increasingly more functionality. Until recently the digital signal processing was limited by our use of the ageing Libera TMBF platform, but starting in 2016 we have been migrating to a platform based on MicroTCA and commercial off the shelf hardware.

The new hardware provides the ability to capture and process large amounts of
data: one second's worth of bunch by bunch data can be captured and transferred for offline processing in little more than a second. Also there is a lot of unused FPGA capability which will be used for implementation of future high speed processing.

The DLS MBF processor currently provides the ability to perform detailed experiments on individual bunches or selected groups of bunches, and provides live detailed statistics of the motion of each bunch. Future work will include the ability to replay prepared data to facilitate prototype experiments. We also plan to implement a method to measure tune spectra relative to the tune, which should reduce the impact of slow tune variations.

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