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Progress towards Electron-beam Feedback at the Nanometre Level, for Linear Colliders and FELs, at the Accelerator Test Facility (ATF2) at KEK (12' + 3')

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Ultra-low latency beam-based digital feedbacks have been developed by the Feedback On Nanosecond Timescales (FONT) Group and tested at the Accelerator Test Facility (ATF2) at KEK in a programme aimed at beam stabilisation at the nanometre level at the ATF2 final focus. This is aimed at beam stabilisation for future electron-positron linear colliders, as well as in electron linacs for FEL light sources. Three prototypes were tested: 1) A feedback system based on high-resolution stripline BPMs was used to stabilise the beam orbit in the beamline region c. 50m upstream of the final focus. 2) Information from this system was used in a feed-forward mode to stabilise the beam locally at the final focus. 3) A final-focus local feedback system utilising cavity BPMs was deployed. In all three cases the degree of beam stabilisation was observed in high-precision cavity BPMs at the ATF2 interaction point. Latest results are reported on stabilising the beam position to approximately 50nm.

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