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Cavity beam position monitor signal matching by injection pulse

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Cavity beam position monitors (CBPMs) are very high-precision devices that, in recent years, have progressed from experimental equipment to standard linac diagnostics in many prominent facilities, most notably free electron lasers. However, the high sensitivity of these devices comes at the cost of a limited measurement range, even with high dynamic range electronics. Furthermore, CBPMs need to be calibrated in situ, ideally by introducing a known beam offset, which is often impractical in large installations. This paper reports on a method to match CBPM beam signals by injecting synchronized and tightly controlled bursts of radio frequency (RF) oscillations into the sensor cavity and reading back their superposition. The method allows compensation for static beam offsets (with beam) and calibrates CBPMs electronically (no beam required), thus removing some of the operational hurdles. We discuss the first demonstration of this method at the Accelerator Test Facility 2 (ATF2).

Footnotes

Paper preparation format

LaTeX

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