

A MULTI-BUNCH BPM FOR THE NEXT LINEAR COLLIDER*

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Abstract

The Next Linear Collider (NLC) will collide 180-bunch trains of electrons and positrons with bunch spacing of 1.4 ns. The small spot size ($\sigma_y < 3$ nm) at the interaction point requires precise control of emittance, which in turn requires the alignment of individual bunches in the train to within a fraction of a micron. Multi-bunch beam position monitors (BPMs) are to determine the bunch-to-bunch misalignment on each machine pulse. High bandwidth kickers will then be programmed to bring the train into better alignment on the next machine cycle. A prototype multi-bunch BPM system with bandwidth (350 MHz) sufficient to distinguish adjacent bunches has been built at SLAC. It is based on 5 G sample/s digitization of analog sum and difference channels. Calibration tone injection and logging of the single bunch impulse response provide the kernel for deconvolution of bunch-by bunch position from the sum and difference waveforms. These multi-bunch BPMs have been tested in the Accelerator Test Facility at KEK and in the PEP-II ring at SLAC. Results are presented in this paper.

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