BPM System for the SNS Ring and Transfer Lines

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The Spallation Neutron Source Ring accumulates about 1060 pulses of 52mA peak current 1GeV H-minus particles from the Linac thru the HEBT line, then delivers this accumulated beam in a single pulse to the mercury target via the RTBT line. Bunching frequency of beam in the HEBT line is 402.5MHz, and about 1MHz in the Ring and RTBT. Position monitor electrodes in HEBT are of the shorted stripline type, with apertures of 12cm except in the dispersive bend, where the aperture is 21cm. Ring and RTBT electrodes are open striplines, with apertures of 21, 26, 30, and 36cm. All pickups are dual plane. The electronics will be PC-based with the Analog/Digital Front End passing data and receiving control and timing thru a custom PCI interface developed by LANL[1]. LabVIEW will be used to direct the acquisition, process the data, and transfer results via ethernet to the EPICS control system. To handle the dynamic range required with well over 60dB variation in signal size, the Ring and RTBT electronics will employ a fast gain switching technique that will take advantage of the 300ns head-tail gap to provide position measurement during the entire accumulation cycle. Beam-based alignment will be utilized as part of the system calibration.

[1] J. Power et al, “Beam Position Monitors for the SNS Linac”, PAC2001, NY.