

Upgrades to PEP-II Tune Measurements

Alan S. Fisher, Mark Petree, Stephanie Allison, H.U. Wienands
Stanford Linear Accelerator Center
Michael Seeman, MIT
Jolene M. Robin, University of New Orleans

Abstract

The tune monitors for the two-ring PEP-II collider convert signals from one set of four BPM-type pickup buttons per ring into horizontal and vertical differences, which are then downconverted from 952 MHz (twice the RF) to baseband. Two-channel 10-MHz FFT spectrum analyzers show spectra in X-window displays in the Control Room, to assist PEP operators. Near the beam-beam limit, collisions broaden and flatten the tune peaks, often bringing them near the noise floor. We are now testing new downconverters that should increase the signal-to-noise ratio by about 5 dB. In addition, there will be two sets of pickups per ring, near focusing and defocusing quadrupoles, so that signals for both planes originate at locations with large amplitudes. We are also beginning tests of a tune tracker, based on a digital lock-in amplifier (one per tune plane) controlled by EPICS software feedback loops. This will monitor the phase of the beam's response to a sinusoidal excitation, adjusting the drive frequency to track the middle of the 180-degree phase transition across the tune resonance. Subsequently an outer loop may control the tune quadrupoles based on this tune measurement.