Damping Rings

U. Wienands, N. Toge

There is important work going on at LBNL and at SLAC:

Electron-cloud simulations:
Including magnet sections is relevant due to the high packing fraction of the rings.

Investigation of chamber coatings to reduce secondary emissions is of interest for NLC as well as other machines.

Improving the parametrization of the wiggler nonlinearities is worthwhile, esp. given that other electron rings have had difficulties with their wigglers (DaΦne, SSRL). This work should include measurement data from existing wigglers.

Acceptance of the damping rings looks acceptable. It is determined primarily by the chromaticity sextupoles and not the field quality of the magnets.

Recommendations:

Tracking studies have been done for ≈500 turns; we recommend to extend these to a whole damping time and, in certain cases, maybe to a full cycle (≈25000 turns). Misalignments should be included in the tracking.

At the next meeting we would like to see an updated impedance budget enumerating the contributions of the most significant components and an evaluation of the instability thresholds. We also like to see, in light of the large number of bunches and beam currents about 1 A, an estimate for multi-bunch instability thresholds for the most important modes.

It is intended to study raising the momentum compaction in order to increase the bunch length so as
to reduce IBS and raise instability thresholds. With the existing design of the rf system this means raising the dispersion and more aggressive use of wigglers. Studies of the effects of nonlinear wiggler fields (both theoretical and practical combinations of field harmonics) on the dynamic aperture, emittance coupling and tuneability will be required. The committee considers the use of a higher-harmonic cavity may serve as another solution to this issue. Beam-loading compensation can be used in this context to mitigate the effect of beam transients