

# Damping Rings

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# Emittance Tuning Instrumentation

- Measurement of beam position around the ring is essential to achieving and maintaining emittance targets
  - What is the required number and distribution of beam position monitors?
    - About half the number specified in the TDR guarantees  $< 1\text{pm-rad}$  vertical emittance
    - Precise and redundant measurement in the wiggler straight is much more important than in the arcs
  - What is the tolerance to component failure
    - If the total number of BPMs is about half the number specified in TDR, a 10% failure rate does not significantly compromise ability to achieve  $< 1\text{pm-rad}$
  - What is the required measurement accuracy?
    - TDR – 1 micron differential measurement error –
    - 1 micron is sufficient. But is it necessary ? Bandwidth?

# Dynamic Aperture

- Guide field magnet multipole errors limit dynamic aperture
  - What field quality is required for DA sufficient for large emittance injected beam?
    - TDR assumes multipoles errors as specified for the PEP-II magnets
    - We find that those requirements can be relaxed by an order of magnitude without compromising DA

## Conclusion:

DA in damping rings is dominated and limited by chromaticity sextupoles

# Outstanding Issues/Questions

- Simplification of arc magnet system
  - Fewer sextupoles (TDR - 4/arc cell)
  - combined function magnets? (dipole/quad/sextupole)
- Path length: implications of RF frequency shift, chicane, etc.?
- Installation strategies
- Survey and alignment
- Injection and Extraction