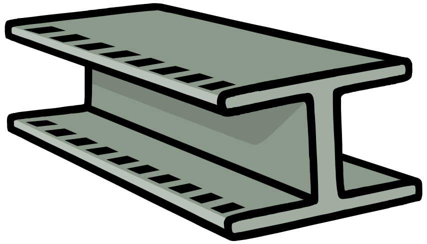  

(Beam Line Problems)

The following four slides are a prioritization of the linac topics (highest to lowest) within each category that I outlined in my last talk (8/20/07). I have tried to incorporate suggestions by PT and Kubo. Further suggestions are welcome.

Chris Adolphsen Sept 4, 2007

(1) Quad Package Design

a) Determine the cost/performance optimal quad/bpm aperture considering beam dynamics, cryo heat loads and the beam interception issues.

b) Based on the linac optics and magnet field requirements (from WP 2 and 3), design a set of SC quads and correctors for the linac.

c) Based on the linac bpm requirements (from WP 2 and 3), design the bpms and signal processing system.

d) Based on above results and the HOM absorber requirements from WP 4, work with cryomodule group to define layout of the quad package that achieves the required performance.

(2) Static Tuning

a) Do analytical estimates of the various emittance growth mechanisms in the linac to establish the relative sizes and scalings with energy and lattice strength. Use this info to optimize the linac lattice and identify the critical alignment, resolution and magnetic field requirements.

b) Compare simulations to analytic results - understand any significant deviations and 'cross-term' effects. Identify those mechanisms that ultimately limit further emittance reductions and suggest possible mitigations.

c) Develop better models of spatial misalignments based on the likely methods of installation and global alignment. Work with the installation/alignment groups to establish specs that are practical and meet requirements.

d) Specify requirements that keep multibunch emittance growth much less than single bunch growth.

e) Evaluate the various proposed linac steering methods in terms of performance and sensitivity to systematic errors.

f) Describe how various tuning algorithms could be used to further reduce the emittance growth

(3) Dynamic Tuning

a) Specify acceptable fast and slow ground motion in terms of amplitudes and correlations. For the latter, determine the implications for the ‘static’ tuning system.

b) Describe likely backgrounds (Halo, SR, MP, dark currents) and the methods for dealing with them and preventing beam interception in general.

c) Specify a fast FB system to stabilize the beam orbits, including the requirements on the magnet response times.

d) Specify methods for measuring the bunch/beam energy profile, matching the quad lattice and regulating the bunch energy at the end of the linacs

e) Specify system and procedures to monitor the bunch/beam emittance including the instrumentation requirements.

(4) Wakefield/Cavity Topics

a) Compute wake offsets due to FPC/HOM antennae intrusions and propose methods to reduce it.

b) Specify short and long range wakefields and cross (x-y) coupling effects.

c) Evaluate the effectiveness of the HOM absorber to remove the wake energy before it is absorbed in the 2K cryo system.

d) Simulate multi-cavity trapped modes to look for significant wakefield build up.

e) Develop cavity distortion model to match first/second band dipole mode properties. Analyze dipole mode signals to provide info on cavity properties.

f) Evaluate multipacting in power and HOM couplers.

g) Design a lower R, E field and B field cavity with 60 mm irises