Comments to "Overview of Main Linac Beam Dynamics areas that need to be better examined and better documented ", and Draft document for related WPs
DRAFT by K.Kubo 20070903

SUMMARY:

- Our group would like to make plans of (2) and (3) with your group (MLI), and other groups (RTML and BDS, etc.) if suitable.

- It seems we are not primarily responsible for (1) and (4). However we will contribute in estimation of impacts of these issues to beam dynamics.

Comment on (1) Quad Package Design

- We think this is mainly hardware work and it is natural that ML group makes plans for this.

- Our group will contribute in estimating impacts to beam dynamics.

Comment on (2) Static Tuning

- We will be able to (organize and) perform this work as a natural extension of the past works.
  - We like to join planning of this work, together with ML group.
- Comments on the statement: "Not clear what limits emittance growth from being reduced further (in theory and practice)".
  - It is not quite true. There were a lot of works changing various errors and looking at sensitivities to each error. And mostly, emittace scales as square of each error.
  - The problem is these works have not been necessarily well documented. Documentation have not been well organized and sometimes difficult to find.

Comment on (3) Installation and Operation

- There are a lot of activities in this field. (Especially in Europe.)
- "Long-range alignment" is strongly related to (2) "Static Tuning", and should be included there.

- "Backgrounds and machine protection" may not be performed by natural extension of present activities in our group.

- Items here are basically inter-area issues and should be organized as inter-area works.
  - Energy control (control in longitudinal phase space) : RTML and ML
  - Others: all LET (RTML, ML and BDS)

Comment on (4) Wakefield/Cavity Topics

- Similar to (1) Quad Package Design, we think this is mainly cavity designing work.

- Calculation of wakefield may not be our responsibility.

- Of course, our group will contribute for estimating impacts to beam dynamics.
  - Simulations using given wakefield
  - Estimation of tolerable wakefield parameters

DRAFT for WP: ML Static tuning

Goals of the Study

- The study will focus on main linac emittance tuning and preservation in the presence of static effects. It should incorporate the following refinements:

- A lot of works have already done. The past work should be reviewed and documented in well organized way. Also there are a few remaining issues to be studied:

- Effects of long range misalignment, then, set tolerances for realistic survey-alignment models.

Deliverables

The key deliverable is a "white paper" summarizing the results of the study. Additionally, the algorithms must be documented and made publicly available in some form, whether as source code or as a fully-developed technical note on the algorithms; this will allow other users to develop studies which take the tuning algorithms as a starting point.

Note on Time schedule

- Since this work should be followed by dynamic tuning study, the main part of this should be completed relatively early. Probably in a half year or so.

DRAFT for WP: Feedback/Feedforward model and simulations

Goals of the Project

The goal of the project is to develop a model of the ILC beam-based feedback and feedforward systems and to demonstrate its performance by simulations. The model should incorporate the following components:

- Train-to-train (5 Hz) feedback loops

- Intra-train (3 MHz) feedback loops

- Intra-train feed-forward loops

- Train-straightener feedback loops

- Dither feedback loops

- To the extent possible, the developed system should include specific locations for sensors and actuators, bandwidth requirements for sensors and actuators, and descriptions of the algorithms used by each loop, and communications between them, which are adequate for a moderately-skilled LET simulation guru to incorporate into a simulation package.

Deliverables

One or more technical notes which document the design and expected performance of the system.

DRAFT for WP: Control of longitudinal phase space of the beam

Goals of the Project

The goal of the project is to develop a model of the control system in the longitudinal phase space of the beam, and to demonstrate its performance by simulations. This includes

- Monitoring, tuning and control scheme of:
  - Bunch length, timing, energy spread (tuning of the bunch compressors)
  - Measuring the beam energy profile and matching the quad lattice
  - Regulation of energy at the end of the linac

Deliverables

One or more technical notes which document the design and expected performance of the system.

DRAFT for WP: Emittance monitoring

Goals of the Project

The goal of the project is to simulate performance of emittance monitoring system, and/or estimate required performance of the system. This should include diagnostics in RTML, ML and BDS.

Deliverables

One or more technical notes which document the design and expected performance of the system.

DRAFT for WP: Backgrounds and machine protection

Goals of the Project

The goal of the project is to simulate backgrounds, and performance of background mitigation system and machine protection system, and/or estimate required performance of the system. This study includes:

- Background
  - Beam Halo
  - Synchrotron radiation
  - Dark currents
- Machine protection scheme
  - Spoilers
  - Beam abort

Deliverables

One or more technical notes which document the expected background and performance of the mitigating system.

One or more technical notes which document the design and expected performance of the machine protection system.