



# Accelerator Physics Technical System Group Review

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## Status of Accelerator Physics Group (1)

- Which 'Area' we have, covered:  
LET (Low Emittance Transport), so far.
  - **From DR exit to IP (and to Dump)**
    - RTML
    - Main Linac
    - BDS
  - **Sources (Except for the undulator section for e+ production), Damping Ring**
    - No activity in our group. Area Group coordinates all works.



## Status of Accelerator Physics Group (2)

### RTML

- Lattice design completed
- Tuning studies has not been done much
  - **Worm sections (turnaround, BC wigglers, etc.)**
    - Simple 1-to-1 correction will not be satisfactory
  - **SCRF in BC1 and BC2**
    - Similar to main linac, but,
    - Large  $\sigma_E/E$  --> large dispersive effect
    - Large off crest phase --> tight tolerances
  - **Tuning for Longitudinal phase space - not studied much**
- Dynamic issues
  - **RF phase stability tolerances were estimated**
  - **Need studies on**
    - Design and performance of  $\square$ feed-forward (turnaround)
    - Design and performance of  $\square$ feed-back (Transverse and longitudinal)
  - **Some integration with downstream area will be necessary. (has not done yet.)**
- Need to give more manpower to this area



## Status of Accelerator Physics Group (3)

### Main Linac

- Lattice design for performance study completed
  - **Undulator section lattice exists**
  - **Other warm sections ? Not yet ?**
- Code benchmarking shows good agreements
- Static tuning studies has been (relatively) well done.
  - **Especially DFS (Dispersion Free Steering)**
    - Promising results from many people and many codes
  - **But not very much for other, or additional, steering methods**
  - **Bump tuning has been also shown to be effective.**
  - **Present status is probably fine for RDR stage**
- Dynamic studies
  - **Stability tolerances (vibrations, RF) are being studied.**
    - Some results but not enough
  - **Design and performance study of complete feedback have not been done.**
- Manpower should go from static issues to dynamic issues or to other areas.



## Status of Accelerator Physics Group (4)

### BDS

- Area Group coordinate most works
- Lattice design completed
- Alignment and tuning
  - **The old algorithm, which was good for 1 seed, turned out not to be good.**
  - **New algorithms are being tried.**
  - **Without dynamic errors, so far**
- Intra-train feedback
  - **Post Linac Fast Feedback**
  - **IP Angle Feedback. Based on BPM in BDS before IP**
  - **IP Position Feedback. Based on BPM after collision (beam-beam kick)**
  - **Luminosity feedback. Position-Angle scan. Maximize Luminosity per collision**
  - **Simulation Result, including Linac, BDS and IP, is promising.**
- Inter-train feedback
  - **1-to-1 steering is foreseen. No simulations yet**



## Status of Accelerator Physics Group (5)

LET integrated study: from DR exit to IP and extraction

- Partially integrated studies have started
  - **RTML and ML, ML and BDS**
- Some ideas for total integrated study of whole LET. But no actual study and simulations yet.

Non- LET area (Sources and DR)

- No activities in our group
  - **Except Undulator section for e+ production in e- main linac.**



## Possibilities for Cost Reductions Accelerator Physics

- Possible cost reduction by the Valencia workshop:
  - **None**



# Plans and Goals-1 Accelerator Physics

Plans and goals of this workshop and soon later

- Review status. Then,
- Agree to move static tuning to dynamic studies for Main Linac. (if it is appropriate. Static tuning studies in RTML and BDS have still high priority.)
- Agree on conceptual feedback design.
- Review realistic errors, or standard of errors. (Static and Dynamic)
- Discuss 'integrated' simulations, and agree on what is the realistic and effective way.
- Review and re-define tasks and a coordinator of each task.
- Agree on communication method (Web pages, TV/phone meetings)





## Plans and Goals-2 Accelerator Physics

Plans between this and the Valencia workshop

- Complete missing part of lattice design (Matching between areas. \*ML has just changed.).
- Simulations for static tuning
  - Mostly in RTML and BDS
- Simulations for dynamic errors.
  - RTML, Main Linac and BDS, basically separately.
  - Establish feedback system design from DR exit to IP, and simulate its performance.
- Start Integrated simulations.
  - Simple ones, e.g.: Using bunch compressor for alignment of main linac.
  - Start total integrated study
- Give refined numbers of tolerances and specs.
  - alignment, vibrations, strength stabilities, BPM resolution, etc..
- Start working for injector part (before DR) if required.



# Towards the TDR Accelerator Physics

Integrated studies of LET

- Need more computer power

Beam dynamics in Source Areas if required

Need iterations of

- Hardware engineering and
- Performance study