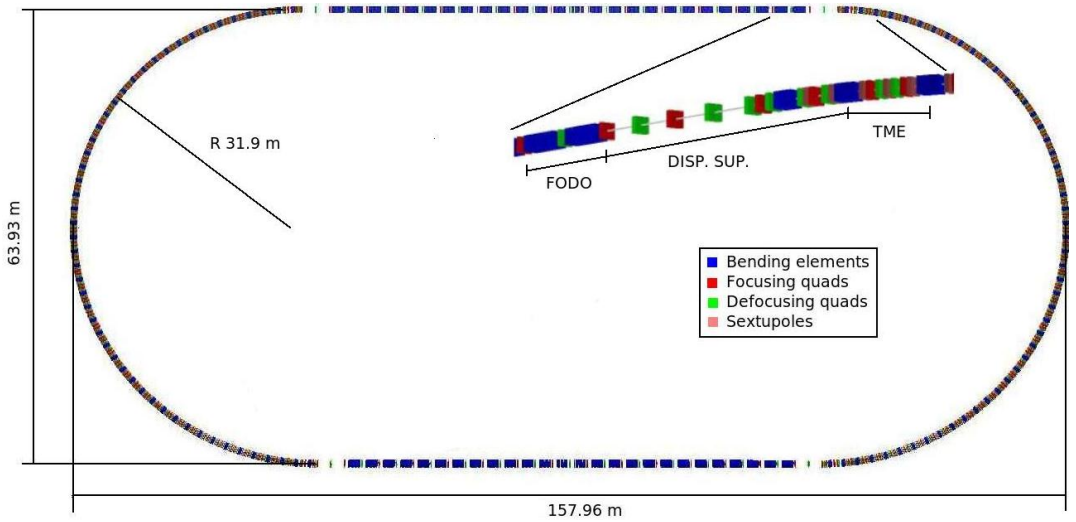
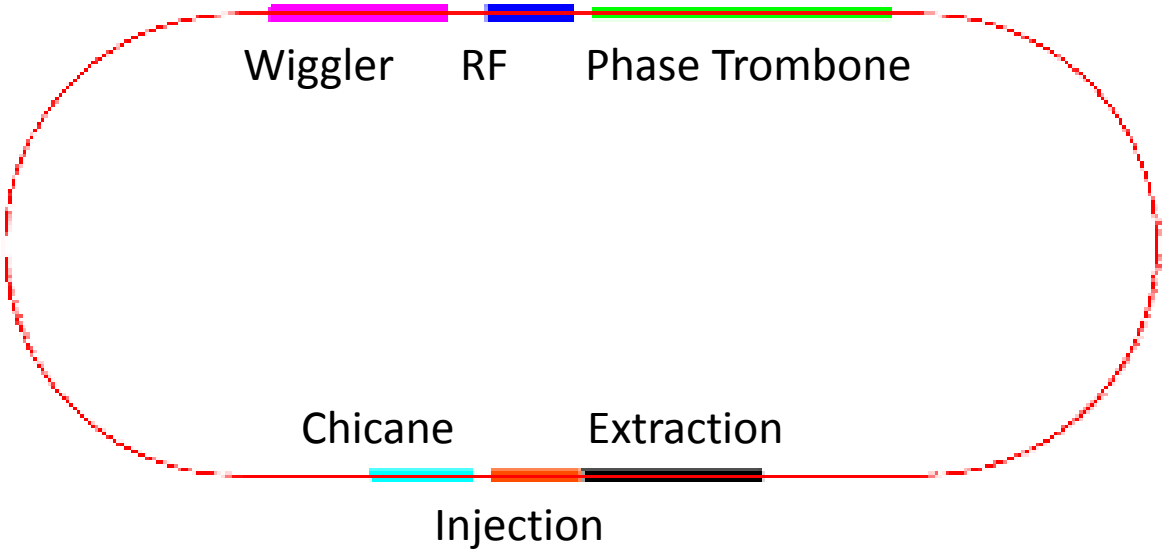
Low Emittance Generation and Preservation

K. Yokoya, D. Schulte

Damping Rings





Y. Papaphilipou
J. Uruakawa

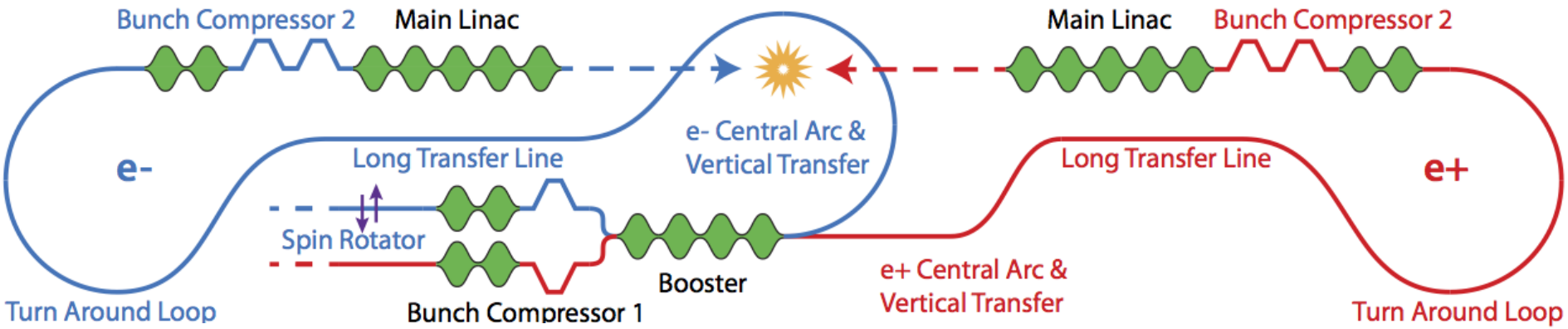
Figure 8.1. Damping ring layout: the circumference is 3238.7 m; the length of each straight is 710.2 m.

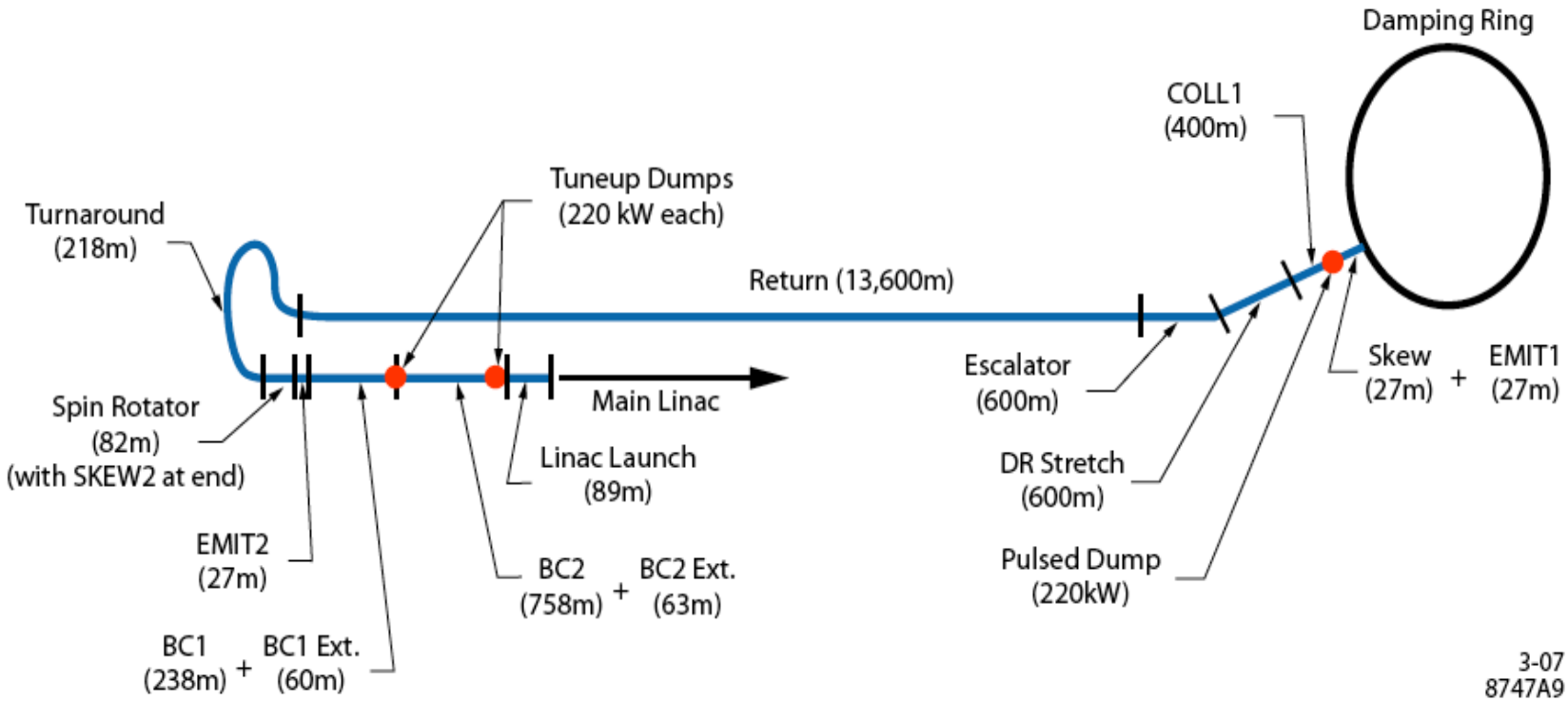
Damping Rings

- Similar concepts
  - Use of wigglers
  - …
- Similar issues
  - Dynamic aperture
  - Electron cloud
    - Acceptable secondary emission yield is comparable: 1.2 for ILC (t.b.c.) and 1.3 for CLIC
  - Fast beam-ion instability is important in both
  - Kickers
    - Impedance issues need to be studied for ILC
    - Similar kick stability required some 10^{-4}
    - ILC kickers need fast rise-time but kick only one bunch
    - CLIC kickers need good flat top but need to rise less fast
  - …
- Experimental programme relevant for both
  - Test infrastructure required to test ecloud performance of components

Ring To Main Linac

A. Latina
N. Solyak





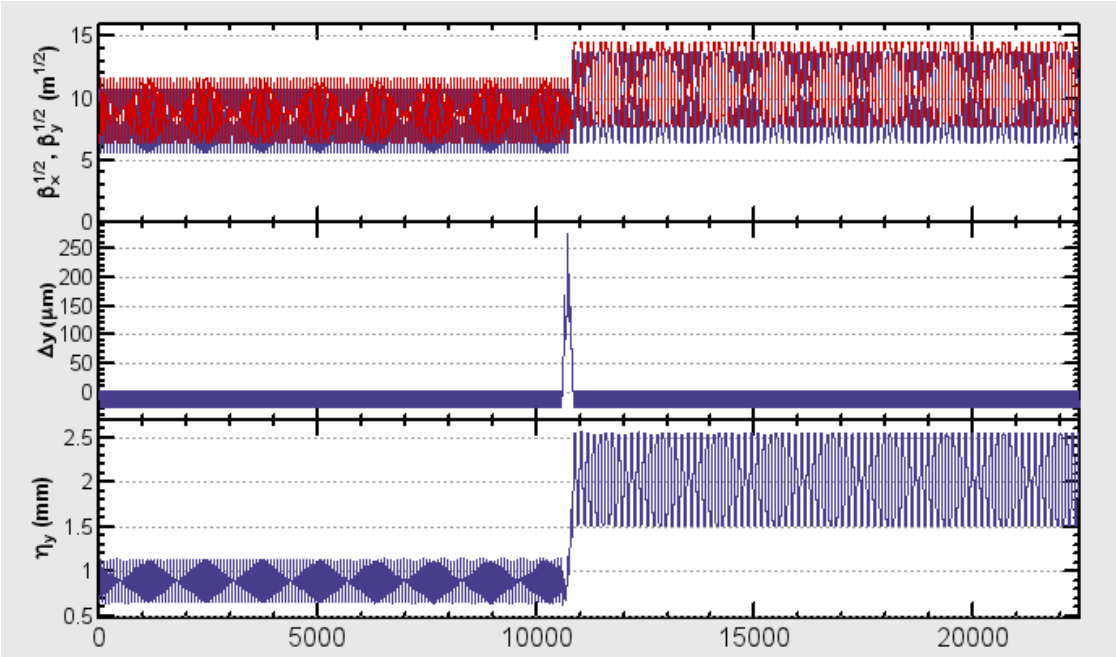
RTML

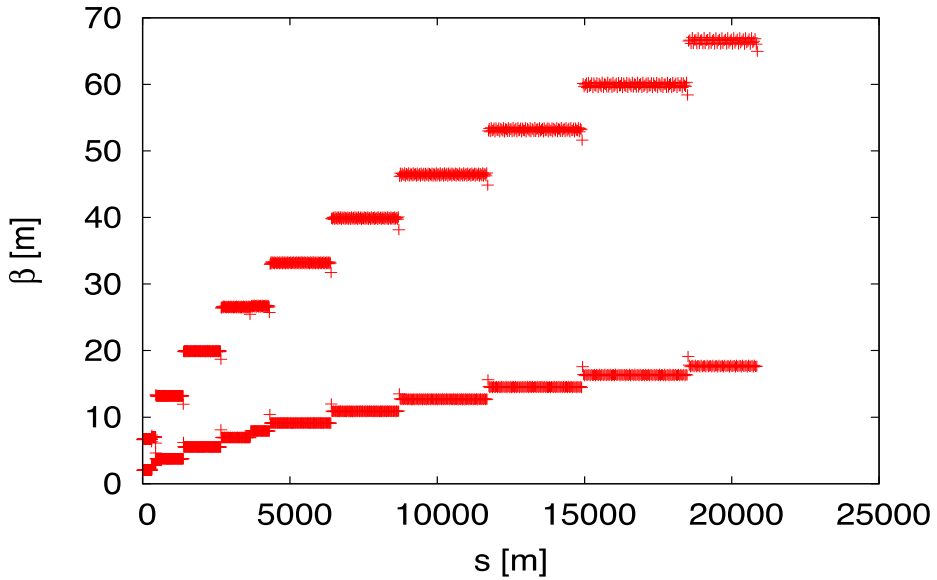
- Designs are different but many similarities
  - Should review some of the choices, e.g. central booster linac
  - Collimation needs and design
  - Instrumentation lines
- Issues
  - Coupler fields in ILC
  - Wakefields with long bunches in CLIC
  - Imperfections are most important in both projects
    - Significant emittance growth in ILC
    - Somewhat tight tolerances in CLIC
  - Improved tuning algorithms are useful for both projects

- Andrea has provided simulation results for TDR during the workshop

Main Linac

A. Latina
K. Kubo





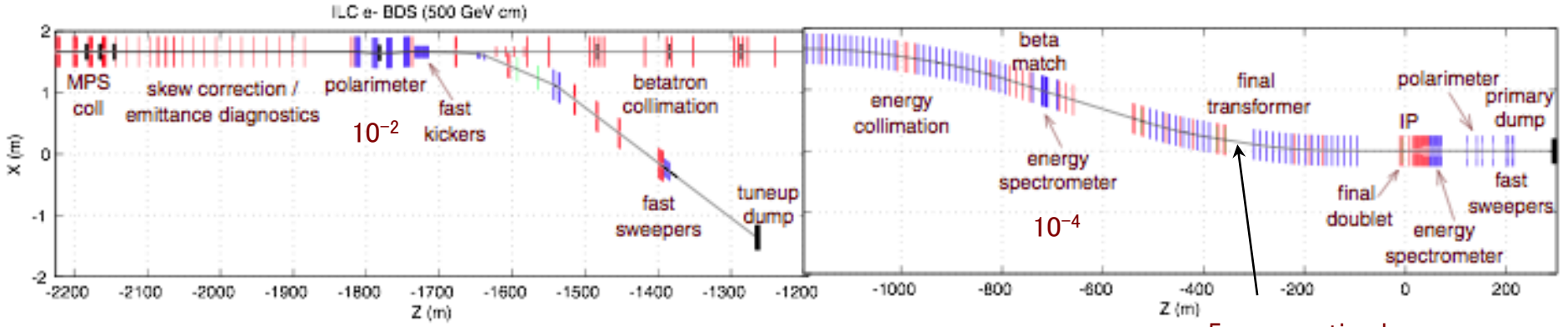
Main Linac

- Some difference in upgrade concept for second stage
- Most important are static and dynamic imperfections
- Very different level of misalignments (O(10) vs. O(300µm)
  - ILC components are in the cryostats
  - CLIC has a active alignment system based on LHC intersection alignment system and additional developments
- Both projects use beam-based alignment
  - Very similar methods
  - CLIC adds RF alignment at the end
  - Both can use tuning bumps
- High level of collaboration in the past (RDR)
  - Code to code benchmarking of tracking and correction procedures
- Hardware is very specific
- Experimental programme started to gain experiences with DFS

BDS

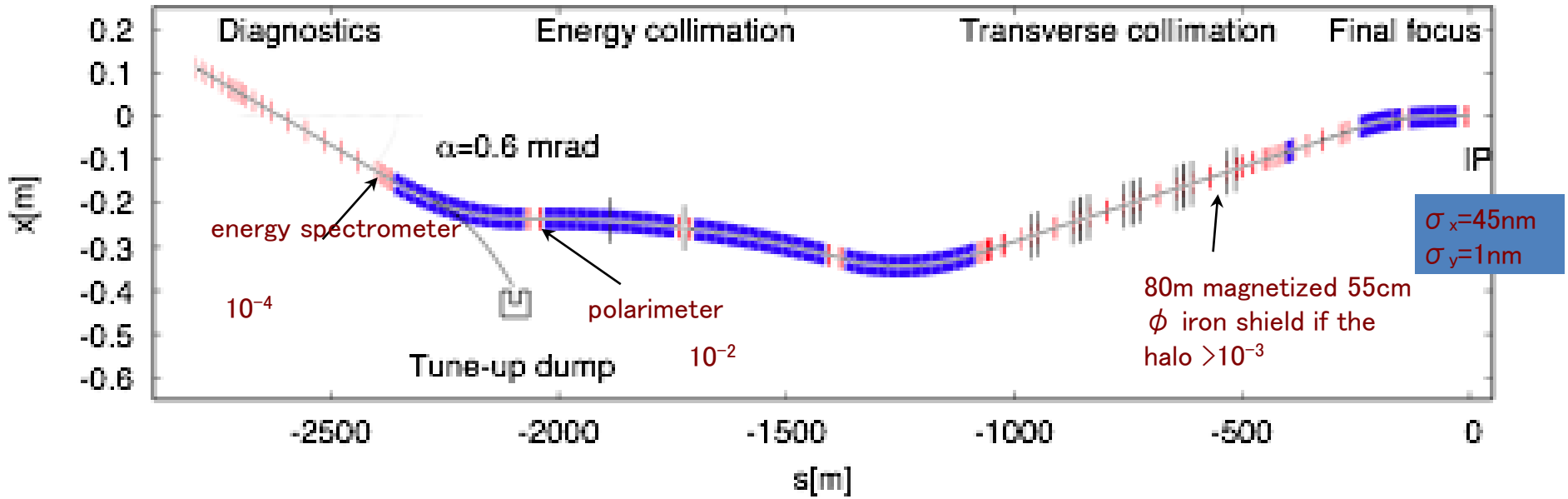
T. Tauchi
R. Tomas

ILC BDS, E_{cm} =500GeV



5m magnetized muon shield

CLIC BDS, E_{cm} =3TeV



BDS

- Many parts of the designs are similar
  - E.g. local chromaticity correction (Pantaleo-scheme)
- Some parts are different
  - E.g. order of the systems along the chain
  - Shorter CLIC FFS with less bandwidth
- Should review the differences
  - Some nice comparisons already in the talk
- The problems are quite similar
  - Design
  - Imperfections and tuning
  - Collimators
  - …
- The experimental programme is similar (ATF2)
  - Hardware components are different, e.g. final quadruoles (QD0)
- It maybe possible to find a baseline that works for both projects
  - With some small modifications
  - CLIC lattice has been tested for ILC and seems to work nicely

Machine Modelling

- Machine modelling has a very high synergy potential
  - Codes, algorithms and formulae can be shared easily
  - Quite some effort in details of hardware
  - Significant collaboration for RDR
- Examples
  - Collimator wakefield effects
    - Analytic calculation used for ILC
    - Detailed modelling available in CLIC tracking
    - New experimental programme underway to measure wakefields for CLIC at SLAC
  - Modelling of dynamic effects
  - Muon generation and attenuation
  - …

Conclusion

- Overall issues are generally quite similar
- Can feel reduced ILC resources due to concentration on main linac RF
- CLIC resources are quite stretched
- Appears a good idea to combine activities
  - Goes beyond a common working group to exchange information
  - Rather also share the work
  - Significant time required to fully understand relevant details of each project
  - Some of this has started: Rogelio and Andrea

- Important to introduce new people to the field
  - Real R&D remains to be done
  - For technical design need to have a solution, not only to know that there is one