BDS

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- Detectors
- Civil engineering

Collaboration

Three promising categories for collaboration

1. Generic work. Differences close to negligible. E.g. tool development. Just support this work.
2. Work with high synergy. Small effort needed to apply to both projects. E.g. correction procedure. Make sure solution is applied to other project.
3. Work with some synergy. Significant work is required to apply solutions from one design to the other. Foster information flow by common workshops and reviews.

In practice, the separation of the different levels of synergy may not always be fully straightforward.

Optics Design and Optimization

- Design concepts and strategy
  - Collimation system
  - Final focus system
  - Diagnostics sections
  - Extraction lines
- Optimisation tools
  - Share and cross apply
- Tracking tools
- Beam based correction/tuning/feedback

ATF2

- Almost everybody is involved
- Already a global collaboration with both projects
- Tuning procedures
- Flight simulator
- Commissioning

Collimators

- UK, CERN, SLAC
- Collimator survival is likely critical and limits system design
  - Collaboration LHC/ILC/CLIC on collimator hardware
- Collimator tests at ATF2/SLAC
- Extends beyond BDS
  - Machine protection
  - Other machines (LHC,...)
- Generic work on collimator materials
  - E.g. cristal collimation
- Wakefields

Crab Cavity

- SLAC, FNAL, UK, CERN, INFN, KEK, FP7
- Design
- Phase stability
- Collaboration is ongoing to large extent
- Synergy with LHC upgrade

Beam Instrumentation

- Many institutes
- BPMs
- Laser wires
- Extraction line instrumentation
- Energy spectrometer including magnet
- Polarimeter
- Luminometers
- Orbit feedback design
- Intra-pulse IP feedback
- Generic tasks foreseen in FP7
  - BPMs
  - Laser wires

Potential Other Topics

- Beam pipe and vacuum system
- Beam dumps
  - Synergy with other projects
- Superconducting final doublet
  - Could be of interest for CLIC as well

Machine Detector Interface

- SLAC, CERN
- General layout and integration
  - Common meeting/review required
  - Common engineering tools for detector design in preparation (DESY, CERN, IN2P3, FP7)
- Background and luminosity studies
  - Strengthen support
- Masking system
  - Constraints on vertex detector
- Detector field
  - Need a field for CLIC
- Magnet design
- Common simulation tools for detector studies
  - Need to review what is available

Background and Luminosity Studies

- Common simulation tools
  - BDSIM ()
    - Integration into GEANT?
  - FLUKA (CERN)
  - Halo and tail generation (CERN)
  - Common formats etc
- Study of machine induced background
  - In particular, neutrons, muons and synchrotron radiation
  - Mitigation strategies
    - e.g. tunnel fillers against muons
- Study of beam-beam background and luminosity spectrum

Support, Stabilization and Alignment

- LAPP, Oxford, CERN, FP7
  - Other please join
- Low-noise design
  - Noise level measurements (DESY, CERN)
    - Among others, measurements at LHC
  - Component design
- Mechanical design of quadrupole support
- Final quadrupole design
- Stabilization feedback design
  - Sensors
  - Actuators
  - Interferometers

Experimental Area Integration

- Common definitions
- Infra-structure
  - Work is quite generic
    - No large differences expected for CLIC detector to some ILC detector
  - Collaboration has started
  - LHC expertise
- Push-pull
  - Is an option for both projects
  - A collaboration has started
  - Brings ILC/CLIC/LHC expertise
- Crossing angle
  - Should we try to find a common crossing angle?
    - Investigate need/benefit

First Milestones

- Identify contact persons for different tasks
- Have identified solutions for LHC that can be applied to ILC and CLIC
- Have identified solutions for ILC that can be applied to CLIC

Beam Physics

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Introduction

- Large potential for synergy exists
  - It is already being exploited to some extent
- Common meetings
  - Helps to avoid to forget relevant effects
  - To profit from clever ideas of the other project
  - Some information exchange in ILC workshops
- Common standards
  - We should try to agree on standards where possible
- Common codes
  - Share the work of the codes
- Common studies
  - Fully exploit expertise of people

Common Standards

- Simplify collaboration
  - Benchmarking
  - Fast application of simulation tools on the other project
  - Reduces the likelihood of errors
  - Reduced resources requirements
- Some collaboration is already ongoing
- Machine models
  - AML is supported by both projects
- Imperfection models
  - A set of models is being developed for the ILC
  - CERN is contributing
- Interfaces
    - E.g. beam model to allow use of chain of codes

Common Codes

- A number of codes is needed
  - Tracking and correction procedures (too many, but more detail needed)
  - Background and losses (about OK, more benchmarking and more details may be needed)
  - Beam-beam (about OK, more detail needed)
- Benchmarking of codes is essential
  - Need to have at least two
  - Very time consuming
    - In particular creates a competition between more results and more certain results
- In this area strong collaboration already exists

Common studies

- For ILC a supporting second study is required for all critical results
  - Will do the same for CLIC at some point
- Serious work is needed to establish specifications for hardware
  - Many questions to be answered day to day
  - Seems project specific
- Seems reasonable to work together on the supporting studies
  - Less tight schedule
- Common workshops would be a first step

Specific Studies

- Damping ring
  - Alignment and tuning exist for ILC and CLIC
    - Benchmarking could be of interest (also ATF)
  - Electron cloud
    - Benchmarking of codes for specific cases could be interesting
  - Fast beam-ion instability
    - benchmarking
- RTML
  - Design for CLIC needs completion
  - Collaboration between ILC and CLIC exists on BC alignment for ILC
    - Should be extended to cover CLIC

Specific Studies (cont.)

- Main Linac
  - Strong contributions from CLIC to ILC
  - Would welcome contributions to CLIC
- BDS
  - Correction algorithm exist for ILC
    - Should be applied to CLIC
  - A correction algorithm is being developed for CLIC
    - Can be applied to ILC to serve as supporting study
- Luminosity measurement
  - A fast measurement is important for both projects
  - The luminosity spectrum reconstruction is important