

BDS simulations

Feedback On Nanosecond Timescales (FONT):

**Robert Apsimon, Philip Burrows, Neven Blaskovic,
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Davide Gamba, Alexander Gerbershagen, Young Im
Kim, Colin Perry, Jack Roberts**

John Adams Institute

Oxford University

BDS simulations

No formal effort on BDS simulations in previous k contract.
Oxford has strong background
in beam tracking/luminosity
simulations:

Glenn White,
Tony Hartin,
Javier Resta Lopez

Supported by the experimental
group developing FB systems



PUBLISHED BY IOP PUBLISHING FOR SISSA

RECEIVED: July 29, 2010
ACCEPTED: August 24, 2010
PUBLISHED: September 21, 2010

Luminosity performance studies of the compact
linear collider with intra-train feedback system at the
interaction point

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ABSTRACT: To achieve the design luminosity at future linear colliders, control of beam stability at the sub-nanometre level at the interaction point will be necessary. Any source of beam motion which results in relative vertical offsets of the two beams at the interaction point may significantly reduce the luminosity from the nominal value. Beam-based intra-train feedback systems located in the interaction region are foreseen to correct the relative beam-beam offset and thus to steer the two beams into collision. These feedback systems must be capable of acting within the bunch train. In addition, these feedback systems might considerably help to relax the tight stability tolerances required for the final doublet magnets. For the Compact Linear Collider (CLIC), the extremely short nominal bunch spacing (0.5 ns) and very short nominal pulse duration (156 ns) make the intra-train feedback implementation technically very challenging. In this paper the conceptual design of an intra-train feedback system for the CLIC interaction point is described. Results of luminosity performance simulations are presented and discussed for different scenarios of ground motion. We also show how the intra-train feedback system can help to relax the very tight tolerances of the vertical vibration on the CLIC final doublet quadrupoles.

Opportunity

Strong need for more effort on BDS design

(Europe can take a lead here also for ILC)

Have world-expert on BDS and final focus: Andrei Seryi

Strong group on feedback + feed forward systems

Opportunity to set up codes on Oxford Grid cluster

Rogelio + Daniel strongly supportive:

1 full-time person working on:

development of beam tuning techniques at ATF2 (and FACET)

implementation of ‘static’ tuning techniques for CLIC

Future work proposal

Low-emittance beam transport, and production of small beams:

**Develop and implement tuning tools tested at ATF2 + FACET.
Strong emphasis on static two-beam tuning.**

Extend and augment tracking code by implementing FB and stabilisation systems based on measured performance of systems at ATF2 and elsewhere.

Set up CLIC integrated beam tracking simulation on Oxford Grid cluster.

Evaluate CLIC luminosity performance under realistic machine condition scenarios.

Future proposed resources

Full-time postdoc 50/50 UK/CERN

Integrated into CLIC/ILC BDS team

Supported by:

Seryi, Burrows, Christian

New student: TBD