



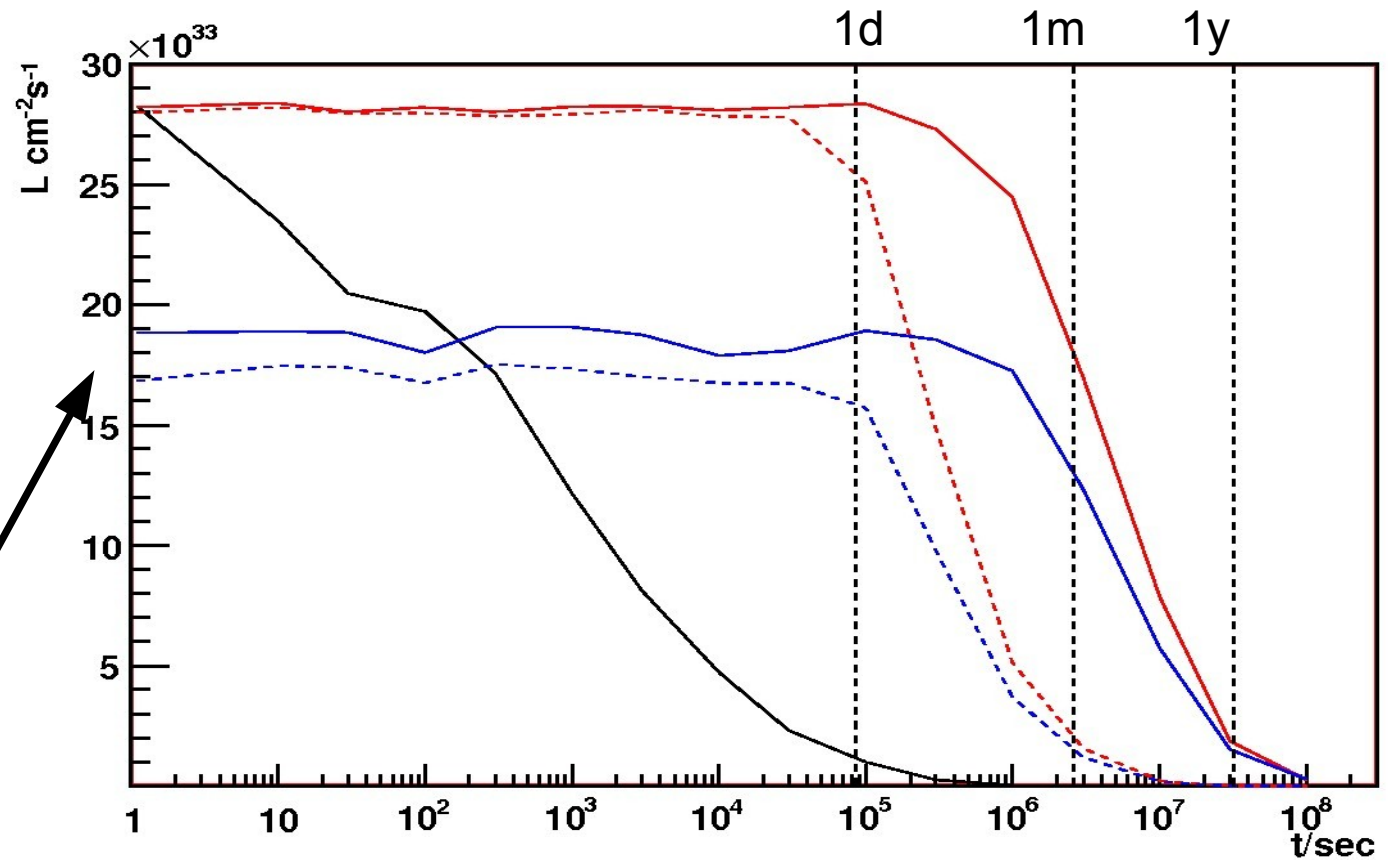
ILC Lattices etc. (Odds and Ends)



Dirk Krücker
ILC-Tech meeting
6/9/2007

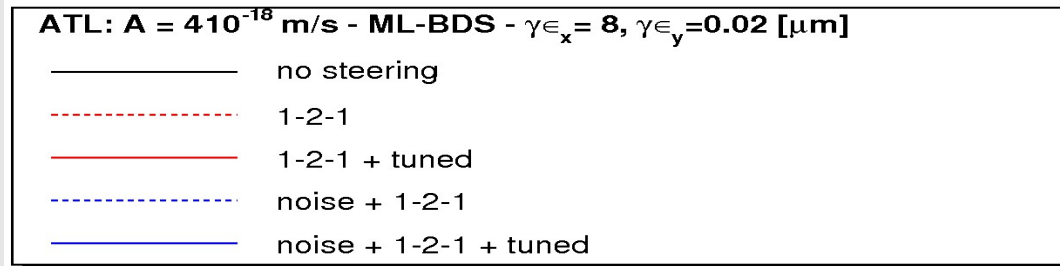
First Results – ML+BDS stability

- ATL in x and y
- 1-2-1 steering
- 40 collision each point
- 5 Tuning knobs:
 $w_x, w_y, d_x, d_y, c_{xy}$
- GUNIEAPIG for
- x-section calc.



L about 12% smaller

larger $\beta_x \beta_y$ in ILC2006e
lattice at IP

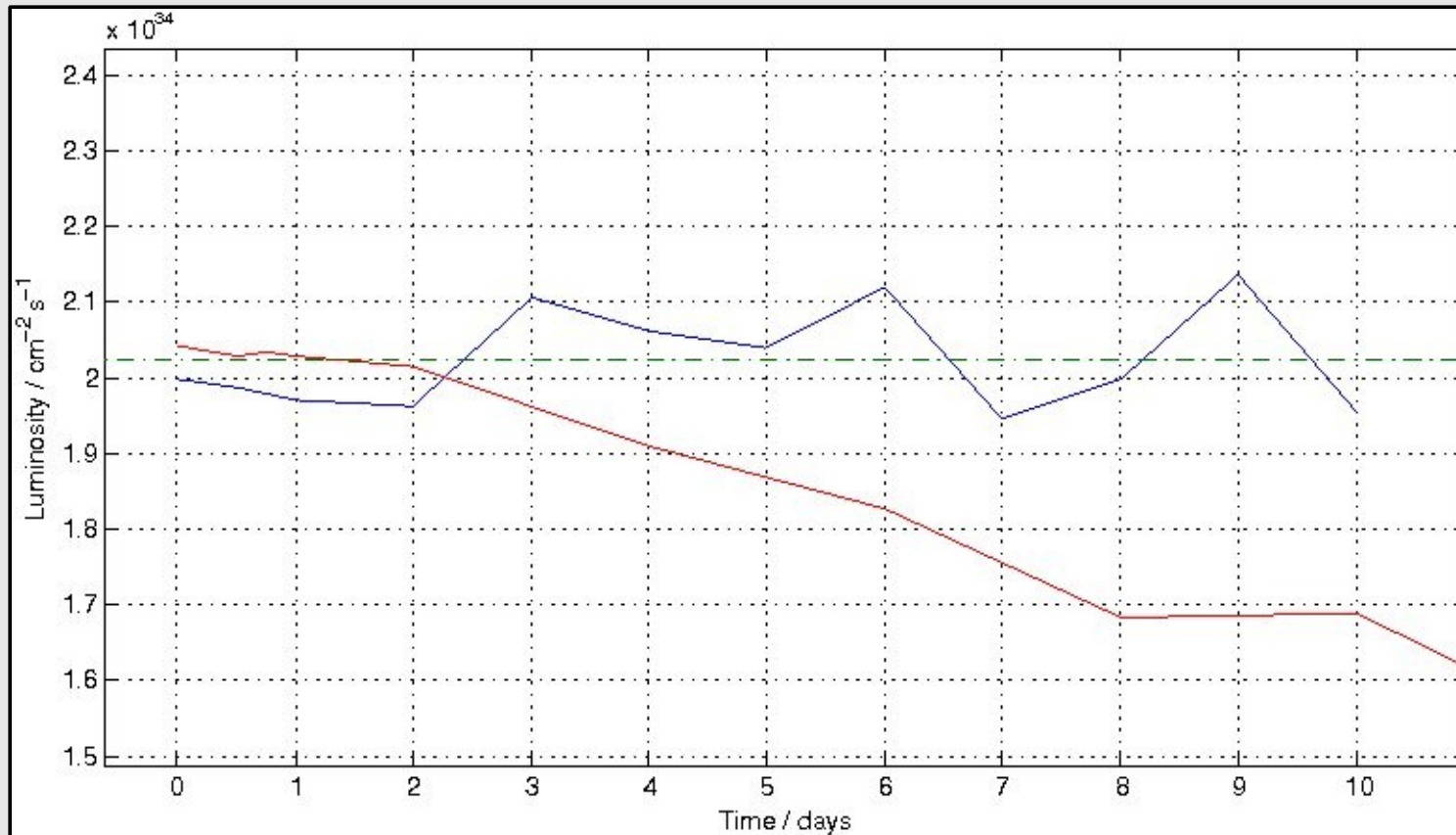


Noise:

add. Transverse errors, ML 300 nm, BDS 100 nm

approx RDR values: $\gamma\epsilon_x = 10$ $\gamma\epsilon_y = 0.02$ mu

Before we discuss the lattices: Glen White's results on stability



This is only 1 seed and looks like it could still be in agreement with my results. Glen promised to run more seeds but ATF2 keeps him busy.

- Lucretia – Guineapig
- Groundmotion: Model B (~ATL: **A = 5E-19 m/s**)
- 25 nm RMS magnet vibration pulse-pulse
- red line: lumi with just pulse-pulse feedback, perfect initial lattice
- Blue curve: Full error treatment, **only 1 seed**
 - alignment and tuning of the BDS before running the GM simulation
 - inear sextupole multi-knobs (dispersion, waist-shift (x&y) and x-y coupling) every 3 days
 - with this the mean luminosity (dashed green line) keeps above the ILC nominal.

← A factor of 10 smaller!

Glen e-mail 28.8.07:

I'm still working on it- I am very busy with ATF2 work [...] I ran a few more seeds, and **they look generally the same or worse than your case (even with less severe ATL)**. I seem to get worsening performance of my sextupole tuning knobs over time- probably due to driving the sextupoles further into their non-linear region. I have some ideas to improve the tuning knobs and be a little more clever about how I implement them along with the feedbacks for long-timescale running. So hopefully I can improve things, just need to find some time to do it....

But why are my β functions larger?

Where to look for ILC lattice files

- ILC2006c
 - ILC2006e
 - FNAL
modified ML
- M. Woodley
<http://www.slac.stanford.edu/~mdw/ILC/2006c/>
<http://www.slac.stanford.edu/~mdw/ILC/2006e/>
- N. Solyak <http://lattices.fnal.gov/> (not https !)
Read-only->Lines->ILC Linac->unofficial->valishev
->ILC2006e-989-28dec06
->ILC2006e-989-28dec06-NoUND

Lattice Revision History[©]

Date	Cav/CM	Q/CM	Comments
1/06	12	1/2	USColdLC by PT, TESLA-like, straight
3/06	8	1/4	PT + curved
5/06	8	1/3	BCD-like, simple periodic lattice
5/06	8	1/3	Added cryo boxes and warm straights
6/06	8	1/3	May 31 (ver. 3) cryo layout
9/06	8	1/3	SBEND version *)
10/06	8	1/3	M.Woodley RTML-ML-BDS **)
1/07	8	1/3	“8-8-8” Nov 21. cryo layout (ver. 4)
2/07	9-8-9	1/3	“9-8-9” Dec 28. cryo layout
4/07	9-8-9	1/3	“9-8-9” ML re-matched to BDS

*) <http://tdserver1.fnal.gov/project/ILC/ARCHIVE/ILC-ML-SbendCurvature.zip>

**) <http://www.slac.stanford.edu/~mdw/ILC/2006e/> ← *Undulator appears*

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2007

Lattice Directory Structure

ILC2006c/e

|-auxfiles

 |---wakes

|-comfiles

<- xxxx.mad files

 |---beamdelivery

 |-----test

 |---dampingring

 |---esource

 |---LET

<- low emittance tuning

 |---linac

 |---psource

 |---rtml

 |-configurations

|-deckfiles

 |---beamdelivery

 |---dampingring

 |---esource

 |---linac

 |---psource

 |---rtml

|-doc

|-parameters

I use as input lattice file for Merlin a twiss tape file from MAD.

- all elements with necessary parameters (length, field strength etc.)
- twiss parameters ($\alpha_{x,y}$ $\beta_{x,y}$), energy etc.

The file is created by a MAD file:

- e.g. ILC2006c/comfiles/LET/**eLET.mad** (matching with BDS included)
- ILC2006c/comfiles/linac/ELIN.mad similar for all subsystems
- ILC2006e/comfiles/LET/**ELET1.mad** (no matching)

ILC2006e:

- Undulator and RTML – no version without undulator
 - different MLCavK (loss parameter depends on wakefield)
2.0775E13 instead of 1.4461E13 V/C which agrees with the TESLA wakefields used in Merlin(1.42E13)
 - ...

FNAL version

- two lattices: with and without undulator
 - slightly different gradient: Ef=253GeV
 - ...

In short:

There is no finalized lattice file

Summary

- Simulation with correlated GM needs 2 lattice, w and wo undulator
 - available now from FNAL – needs some work
- In the files I used linac and BDS had not been properly matched
 - I missed that point before when I did the stability simulation
 - Not yet clear to me why I did not get the correctly matched files
 - Can do the matching myself – looks reasonable
- During the process of finding out what's wrong I produced different files for **Isabell**'s studies:
 1. Files based on ILC2006e with larger β at IP
 2. Same files with tuning applied ($w_{x,y} \rightarrow 0$)
 3. Simulation based on ILC2006c correct β values at IP
 - comfiles/beamdelivery/eff1.mad : 21 mm / 0.04 mm
 - RDR: 20 / 0.04 mm