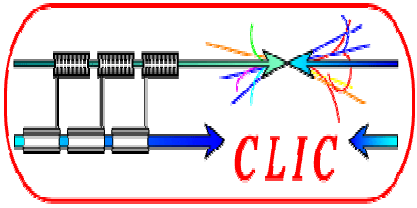


Comments on FFS

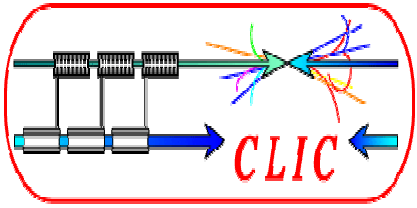
(FFS review, options and tuning)

Andrei Seryi, SLAC

October 14, 2009

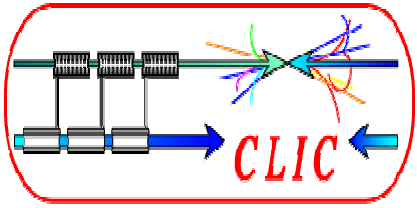
CLIC 09 Workshop

Plan

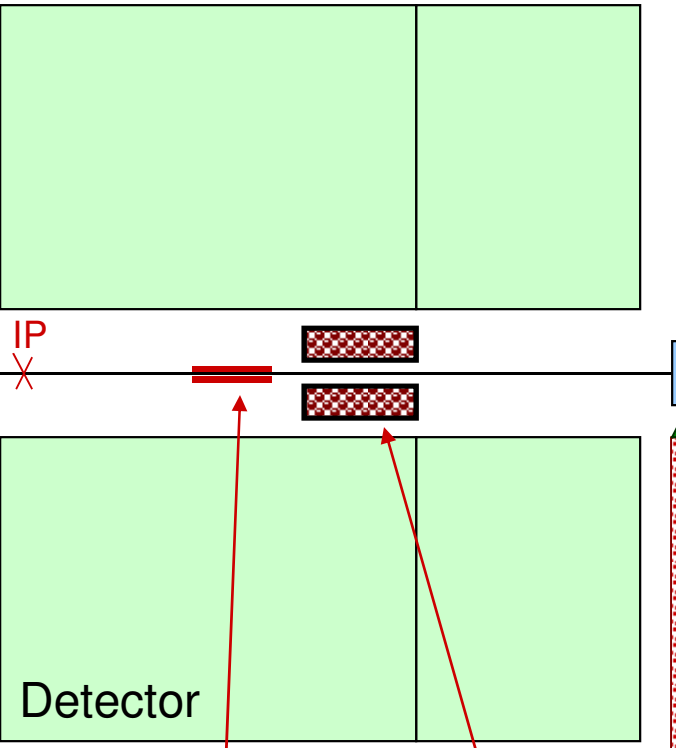


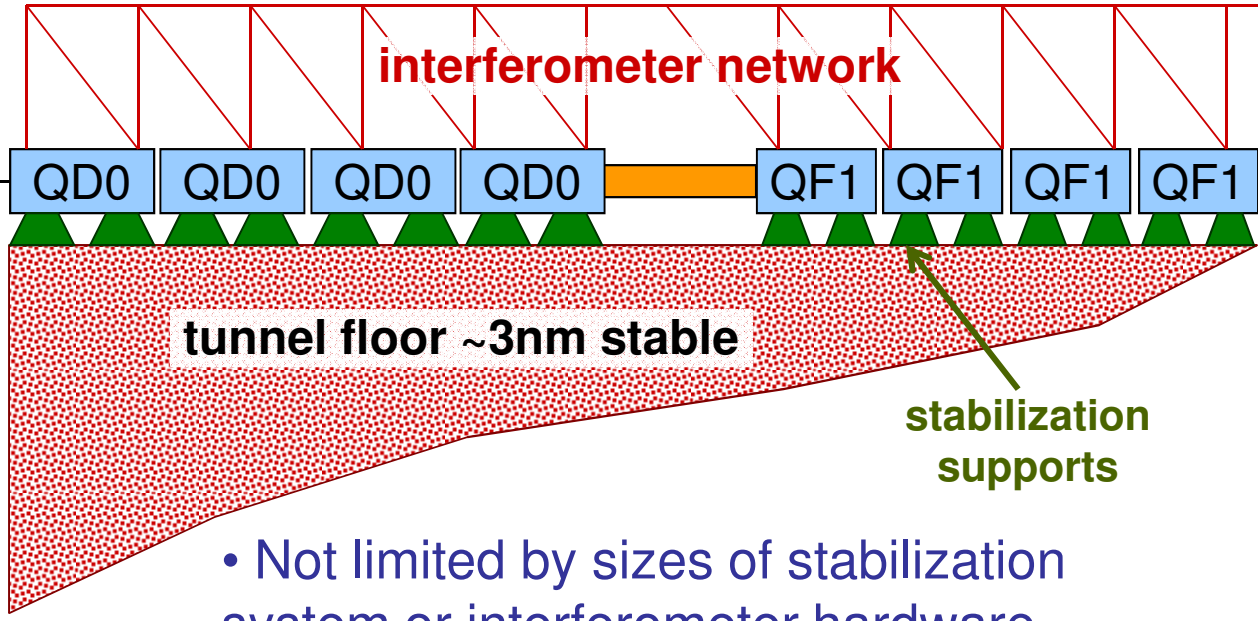
- Will focus only on the discussion of longer L* case and its tuning

New CLIC IR – advantages (CLIC08)



- Reduced feedback latency – several iteration of intratrain feedback over 150ns train
- FD placed on tunnel floor, which is ~ten times more stable than detector – easier for stabilization





Intratrain feedback kicker and BPM 2m from IP

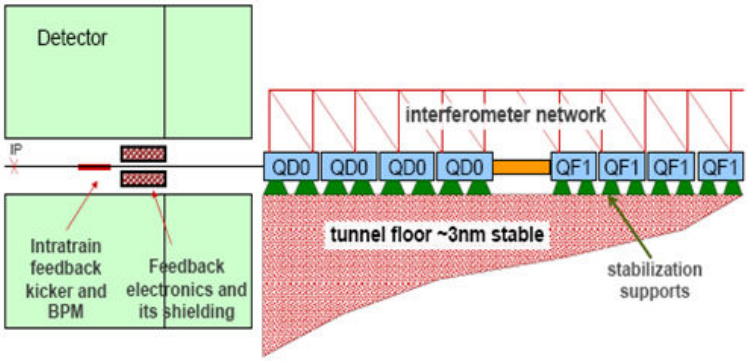
Feedback electronics and its shielding

- Not limited by sizes of stabilization system or interferometer hardware
- Reduced risk and increased feasibility
- May still consider shortened L* for upgrade

The present issue

CLIC08 : L* = 8m proposal

A. Seryi proposed to double the L* to simplify achieving stability of FD and ease the MDI.

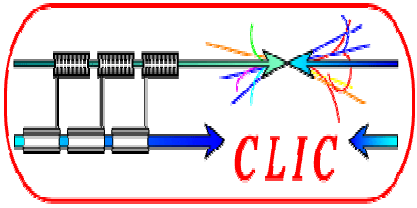


	L*=3.5 m	L*=8m
Luminosity	L_0	$0.72L_0$
β_y	0.07 mm	0.1 mm
QD0 jitter	0.15 nm	0.18 nm
QD0 support	detector	ground
QD0 tech	PM	PM
QD0 grad tolerances	5×10^{-6}	3×10^{-6}
Final focus length	400 m	800 m
Chromaticity	ξ	2ξ
Prealignment	10 μm	2μm

R. Tomas

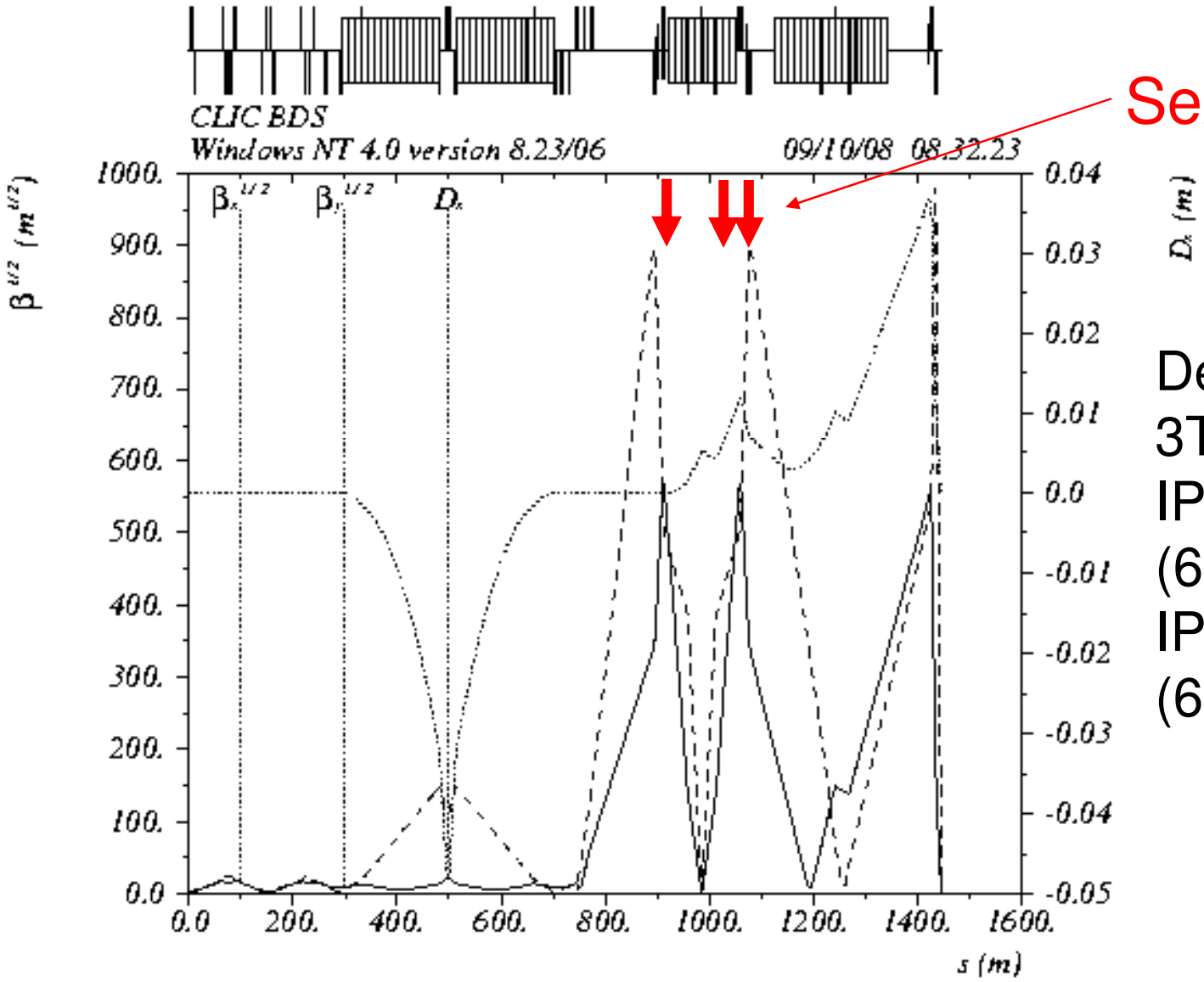
'Review of FFS design, options and Tuning' , A. Seryi , WG3, Wednesday.

Discussion

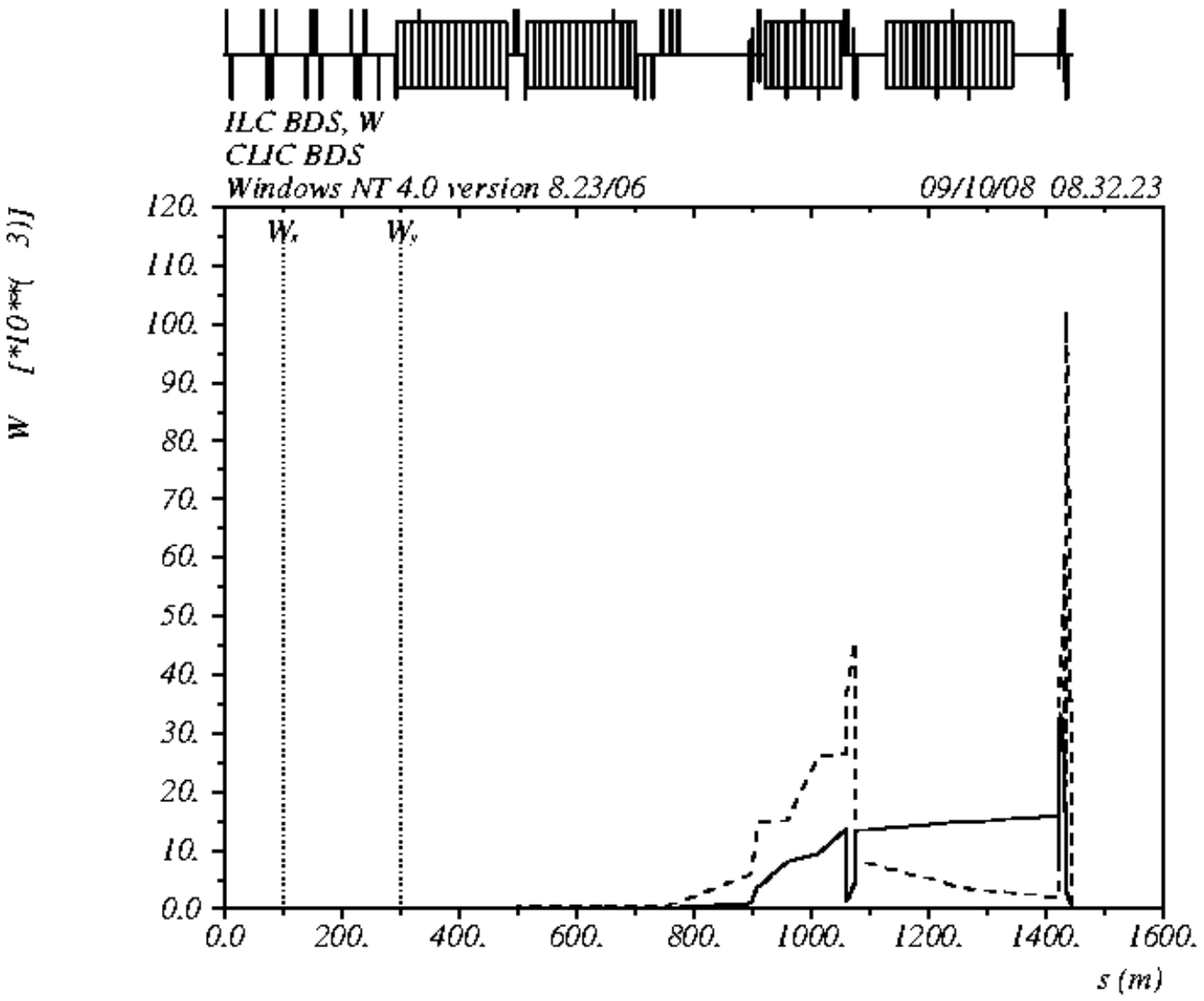


- See ~quadratic dependence of pre-alignment tolerance on L*
- Assuming the dependence is not algorithmic, it is very likely that it comes from sextupoles
  - **This could be verified, although this seems rather obvious**
  - **If so, there are several ways how the situation may be ameliorated**
  - **before discussing the ameliorations, lets look at the optics**

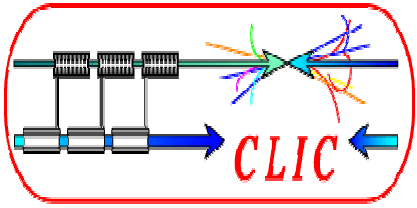
L*=8m version: CLIC_LSTAR17.mad



Designed for
3TeV CM,
IP emittances =
(660/20) nm
IP betas =
(6.9/0.068) mm

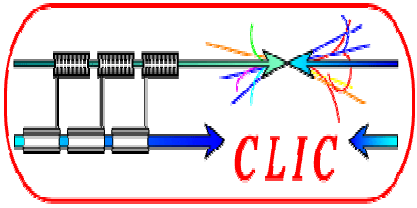

ILC BDS, W
CLIC BDS
Windows NT 4.0 version 8.23/06
09/10/08 08.32.23
W [*10**3]
W
W
120.
110.
100.
90.
80.
70.
60.
50.
40.
30.
20.
10.
0.0
0.0
200.
400.
600.
800.
1000.
1200.
1400.
1600.
s (m)

Possible improvements -1



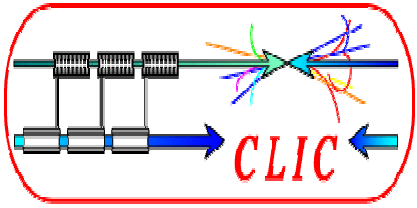
- Optics modification
  - **Small rearrangements of length in aberration correction section (ACS) that will reduce chromaticity caused by QF9, QD10, … and will give some reduction of the strength of SF6, SF5, SD4 sextupoles**
  - **Re-optimization of ACS aiming to reduce strength of these auxiliary sextupoles**
  - **By doing this, it is likely to reduce their strength by ~a factor of two**

Possible improvements -2



- Alignment and tuning strategy modification
  - **Consider starting tuning with reduced strength of sextupoles, then gradually increase it. This should shorten the time of tuning**
  - **Analyze the way how orbit in ACS is controlled during tuning and optimize it**
  - **Consider allowing special method of pre-alignment, with tighter requirements, over the ~200m length of ACS.**

Discussion



- It is very likely that the measures described above will allow relaxing the pre-alignment tolerances to at least ~5um, and reduction of tuning time