Collimation and Final Focus

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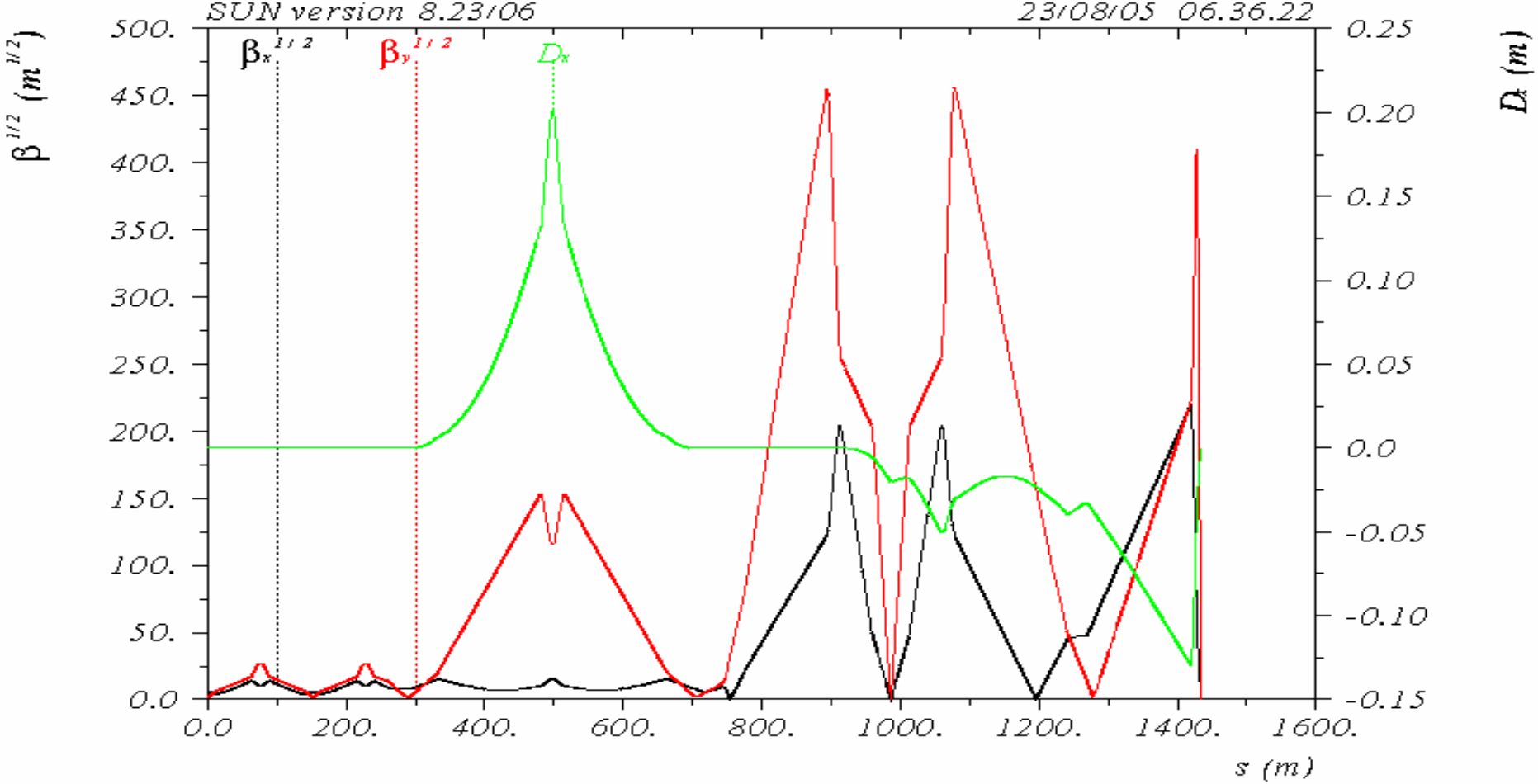
Basic Concept for a single pass collider Collimation

- Collimation is done at each pass just before the Final Focus section
- The scheme is based on one pair (two collimator at 180deg, primary and clean-up) of collimators for the Doublet phase and one pair for the IP phase (much looser), for each plane
- In addition in a region with non-zero dispersion the energy collimation is provided
- Additional collimator are included along the Final-Focus but they collimate a very small fraction ($<10^{-6}$) w.r.t. to the main ones

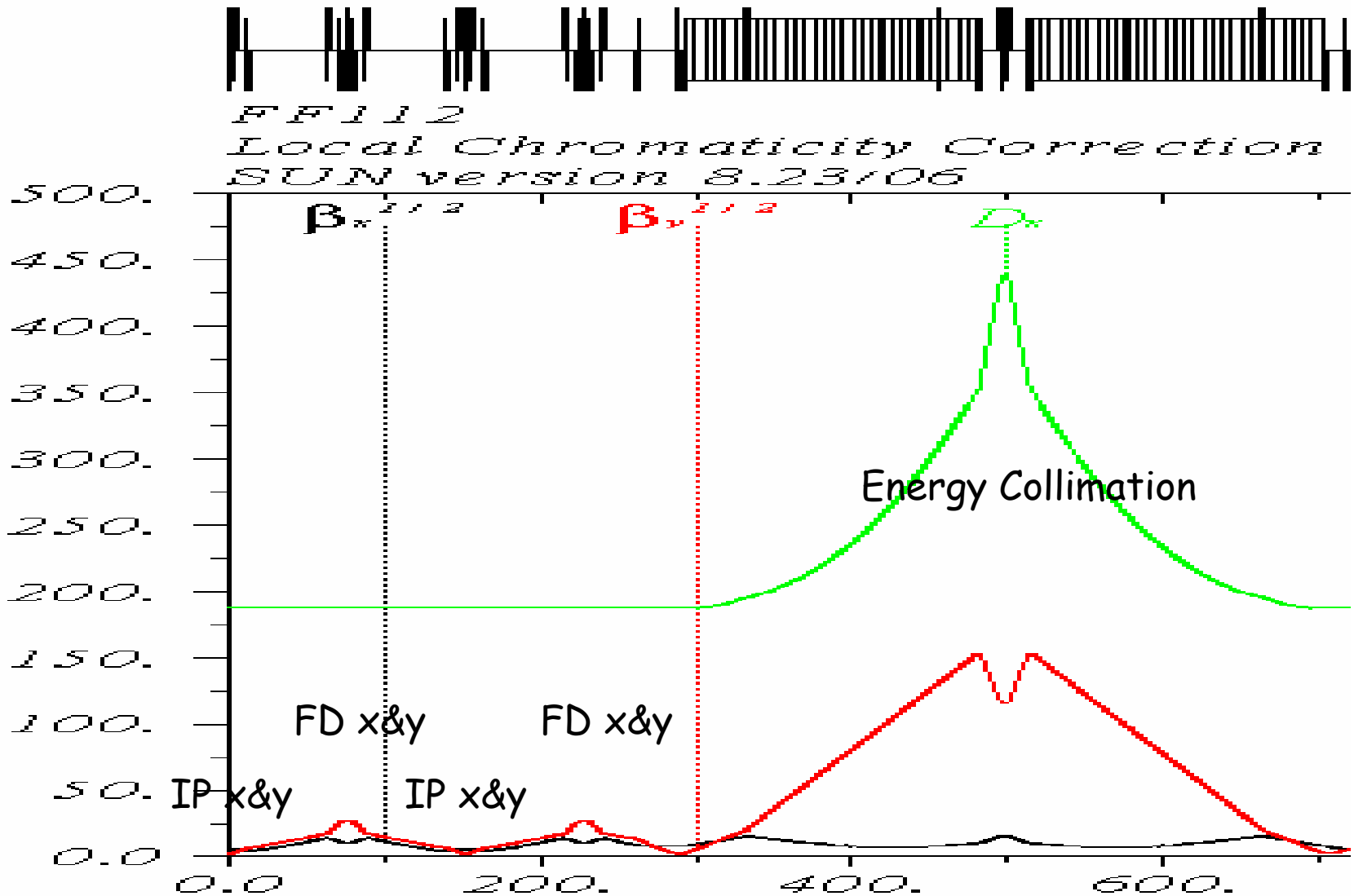
Basic Concept for a single pass collider Final Focus

- Have non-zero dispersion at the final quadrupoles
  (means D'<>0 at the IP if there is no bend in between)
- Two sextupoles placed at the high βx and at the high βy will cancel locally the chromatic aberrations
- Two more sextupoles placed upstream IN PHASE ($R_{12}=R_{34}=0$) are needed to cancel the geometric aberrations of the IP sextupoles, in principle with zero dispersion
  (At least one bend is needed between the two pairs)

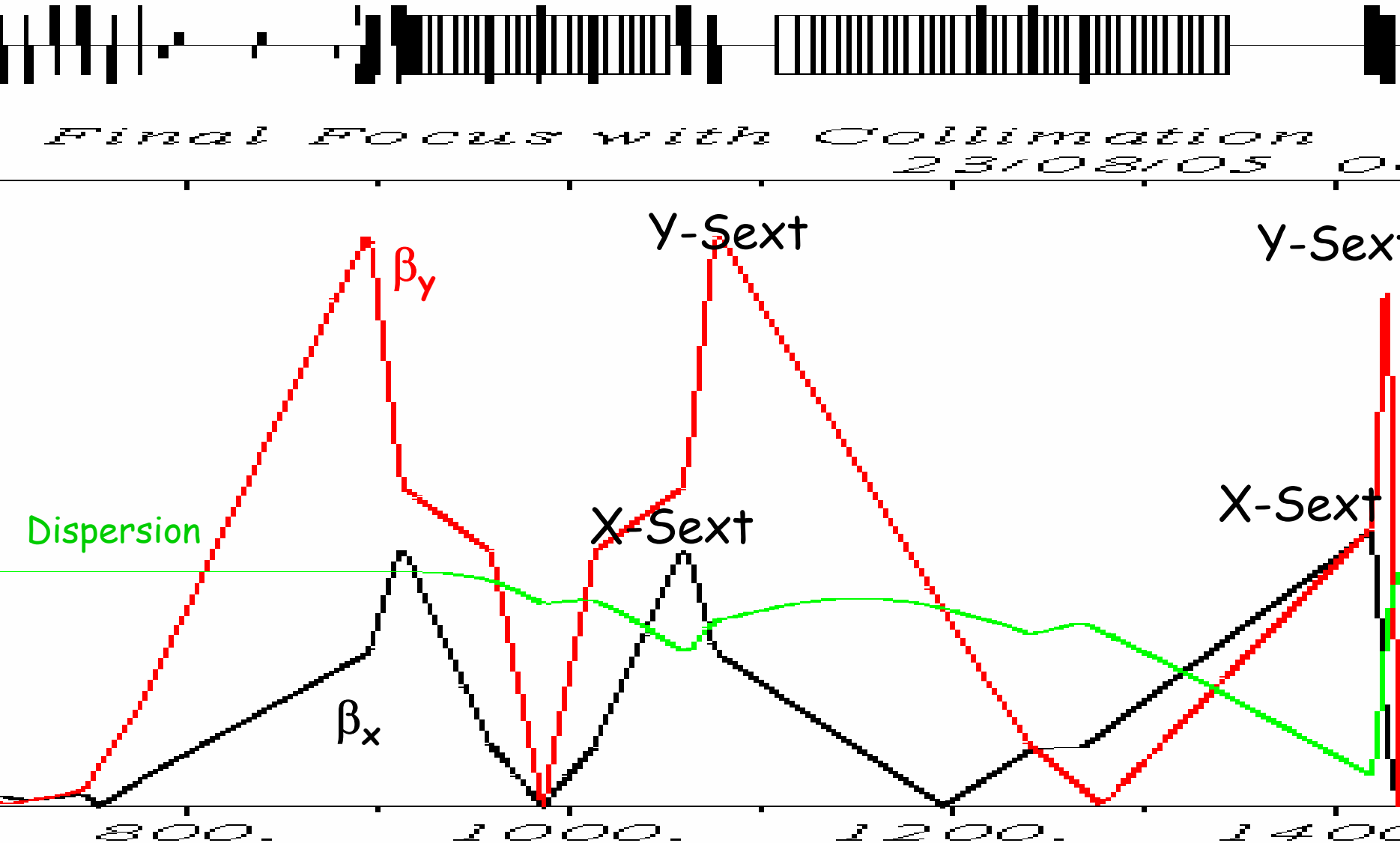
LC Beam Delivery System, Collimation and FF



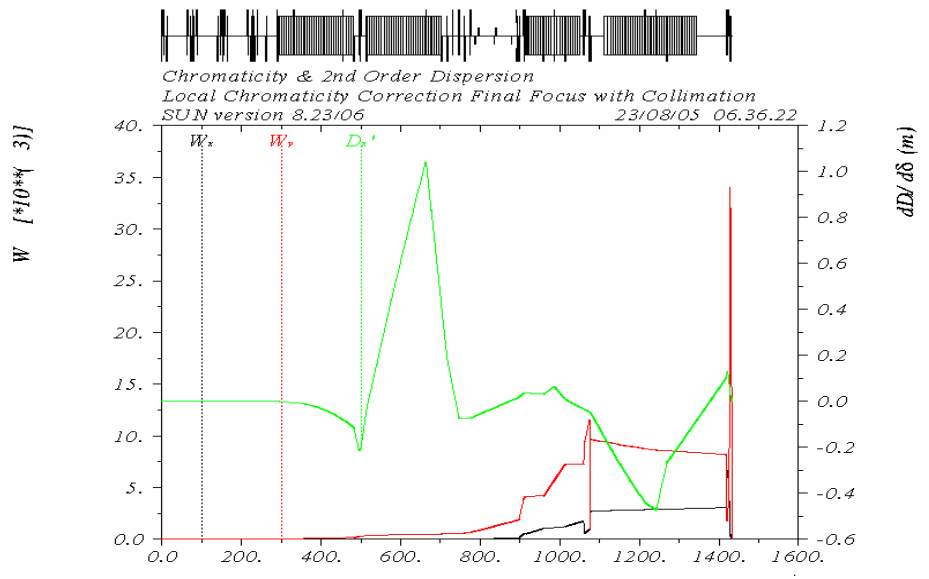
LC Beam Delivery System, Collimation

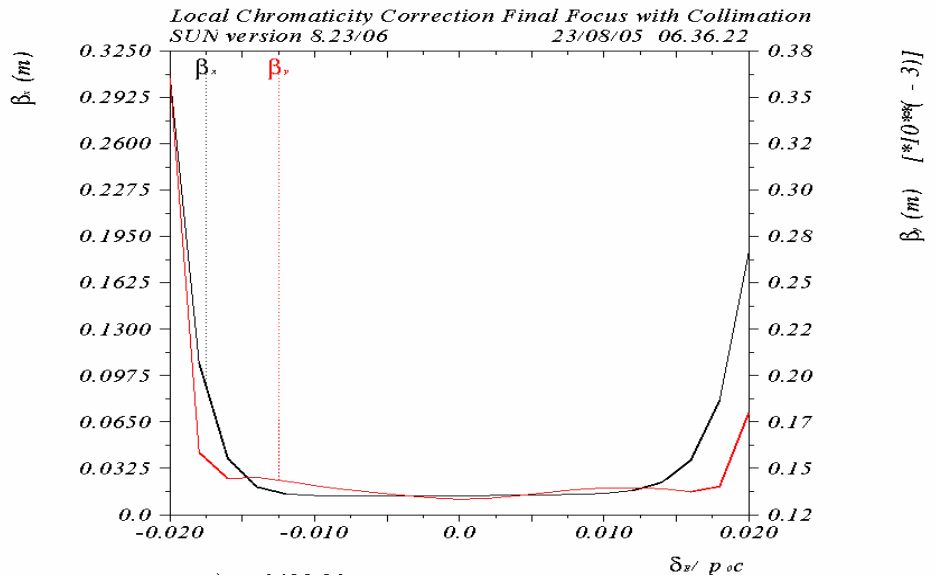


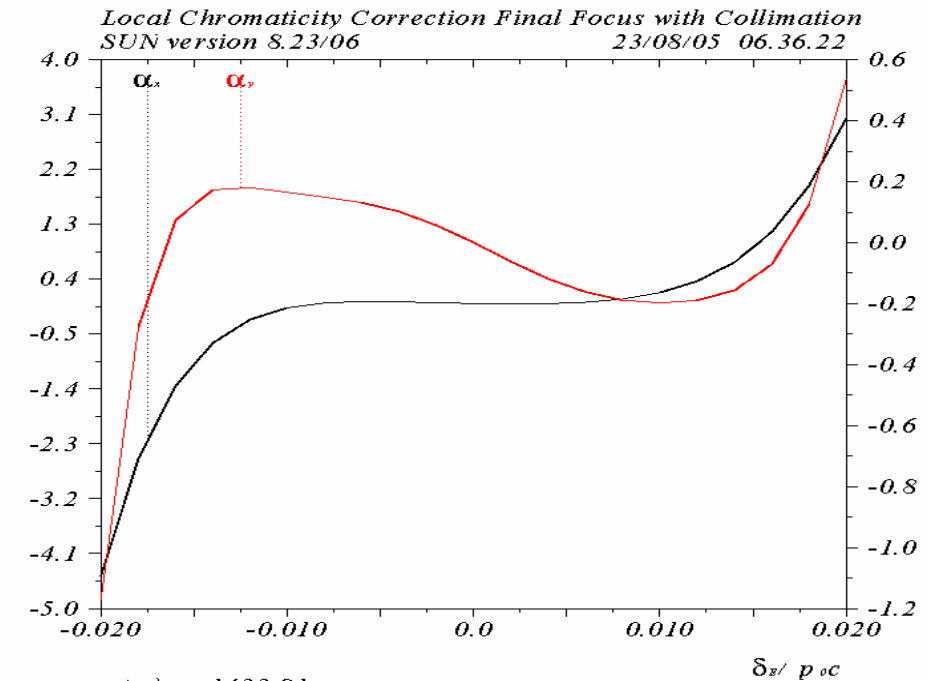
ILC FF

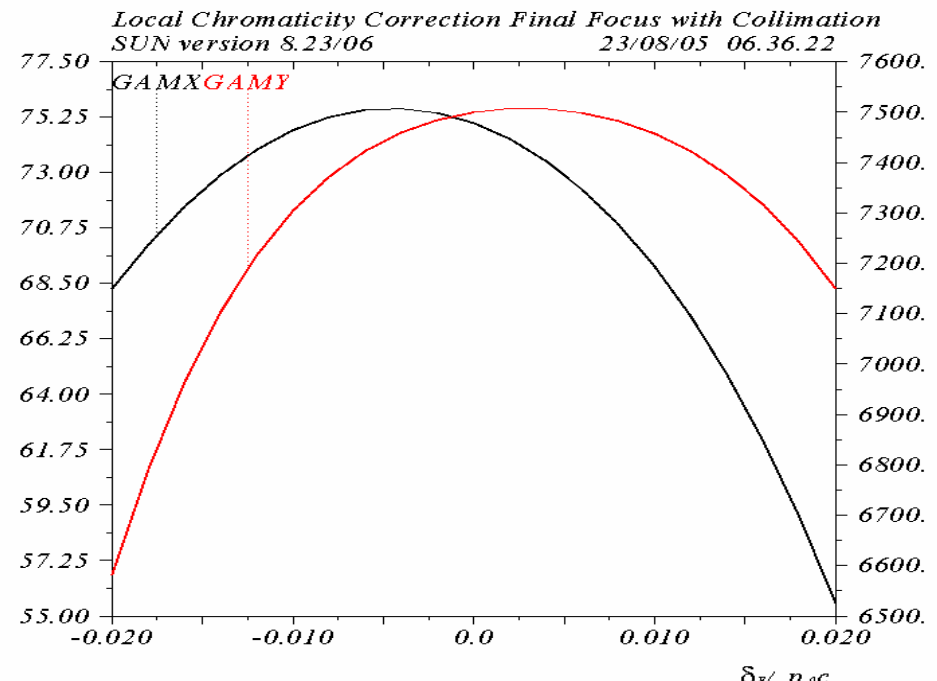

Final Focus with Collimation
23:08:05 06
Y-Sext
Y-Sext
β_y
X-Sext
X-Sext
Dispersion
β_x
800.
1000.
1200.
1400

Chromaticity through the BDS









From ILC to Linear B

- Collimators easier because ILC has to cope with the jaws-survival problem
- More current flowing through the BDS but less tails to collimate (no Linac upstream)
- Final Focus easier:

  Larger IP-βy >1mm (ILC βy=200um)

  Virtually no spot-size dilution due to Syncrotron-Radiation
- Scaling law of the BDS is more then linear with energy (power of 1.5 someone says), ATF(1Gev) is 65m long, probably the BDS could easily be shorter than 250m

L* and crossing angle

L*: the distance of the first quadrupole (SC) from the IP is about 3.5m in ILC, at that distance the two lines (incoming and outcoming) are separated, the first quad in the outgoing line is much later.

Crossing angle in ILC is about +-20mrad

Magnets and beam lines occupy about the inner +-40mrad

LinearB needs a crossing angle if we have to operate in bunch-trains mode, with bunch spacing along the train as small as 0.2m.

If we can find a solution were single bunches do collide, the crossing angle is not strongly needed anymore, although it might simplify the transport of the spent beam.

IR radius

We should aim to find a solution that allows a Beam Pipe radius of about 1cm at the IP.

This and the less demanding cooling needs should improve the resolution of the reconstruction.

Masking the SR will require a lot of studies.

Conclusions

Probably the BDS is the lesser of the problems, seems relatively straightforward.

The more delicate part (the IR), might be a little simpler than one in the "conventional" case.