Discussing FFS for Novel Concepts in LCs

R. Tomás, B. Dalena and A. Seryi

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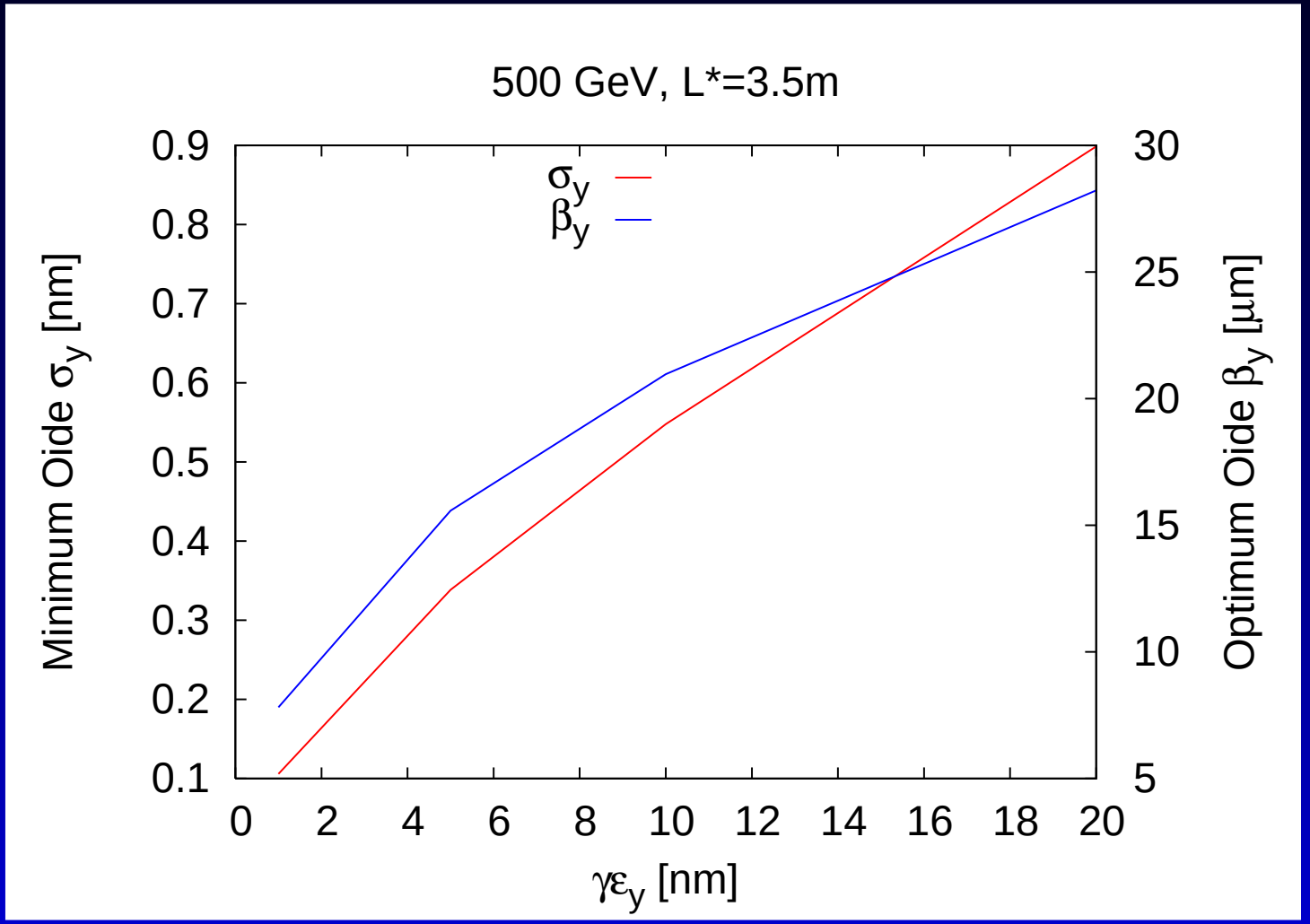
Some parameters

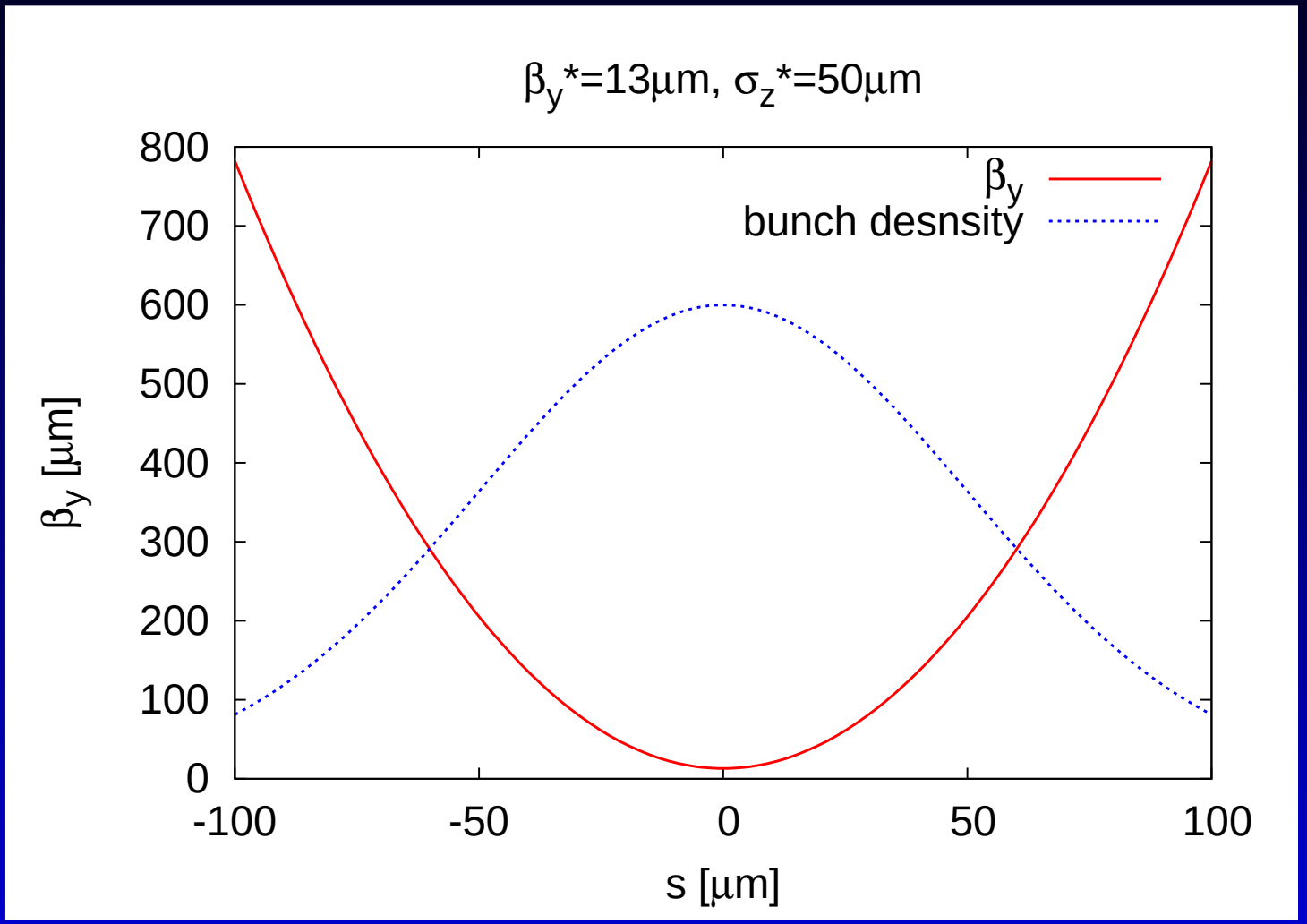
- E=500 GeV (in cm), dE/E=0.14% (rms)
- $\gamma\epsilon_y$=0.1 nm
- β_y^*=100 μm, L*=3.5m
- σ_y =0.1 nm, σ_x =10-100 nm
- $\sigma_z = 50\mu$m
- Traveling focus yes
- Lumi $\approx 10^{34}\ cm^{-2}s^{-1}$

Oide limit



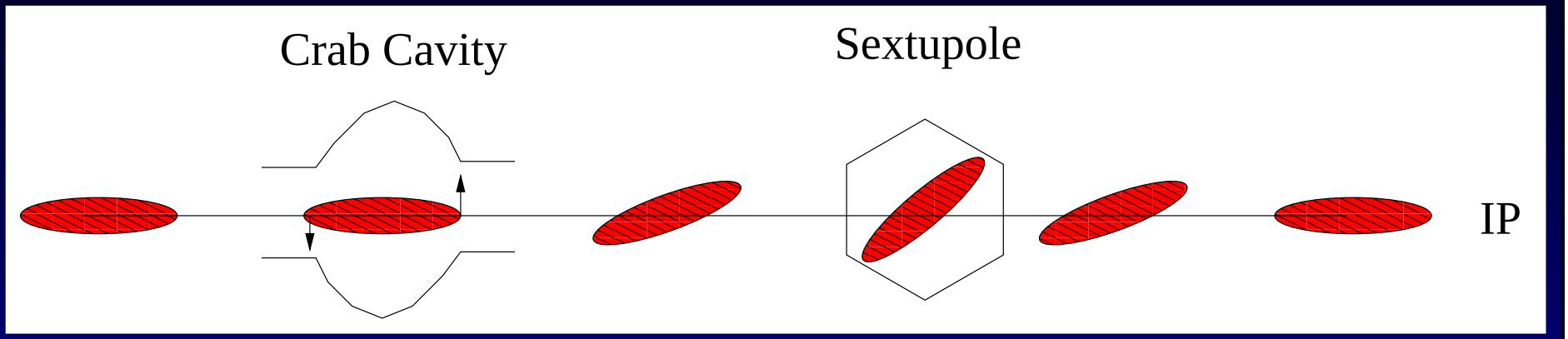
Oide allows for 0.1nm beams at $\gamma\epsilon_y$=1nm and $\beta_y \approx 10\mu$m

Hourglass effect



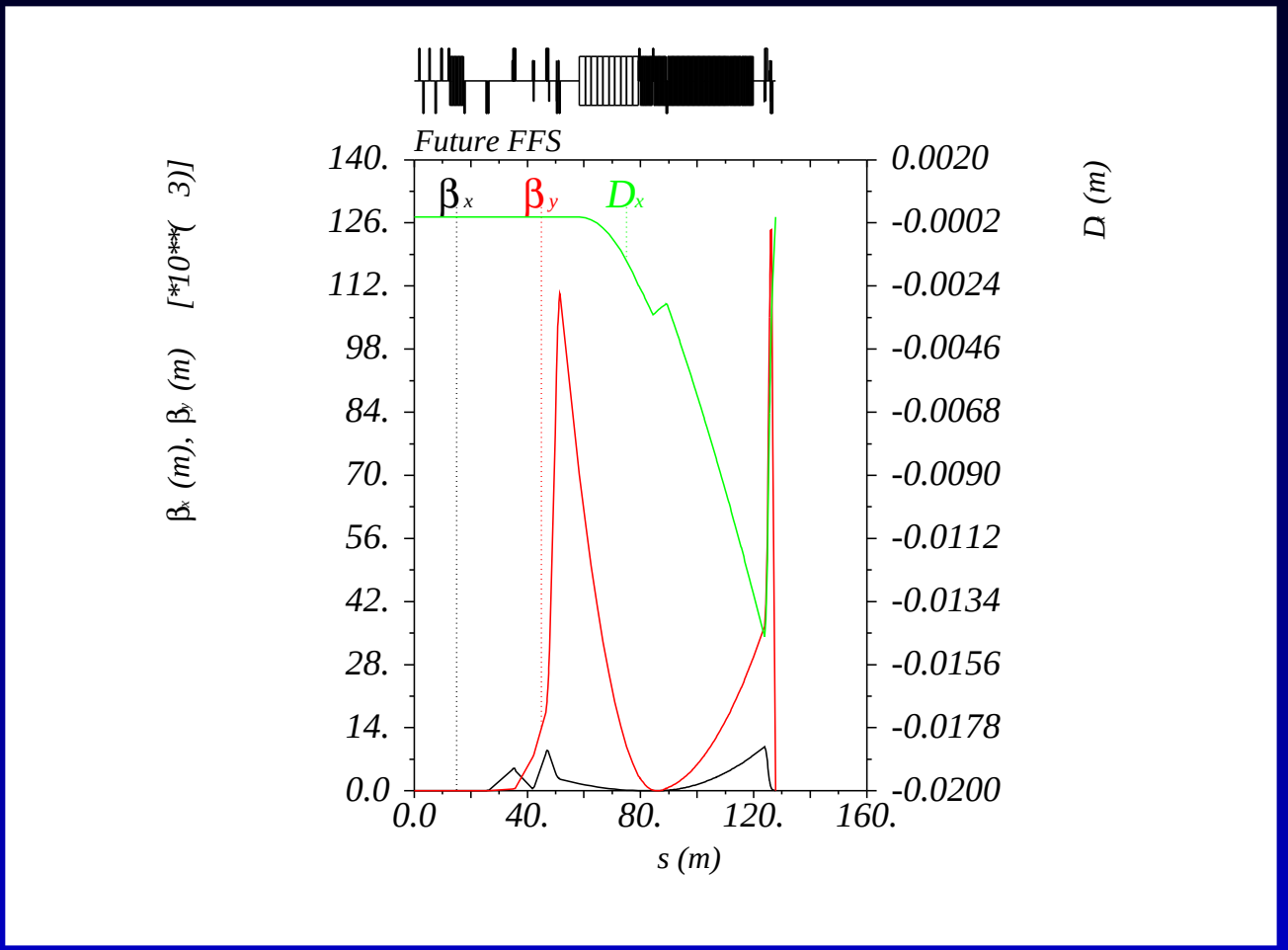
Hope that traveling focus can recover most of the lumi loss...

Traveling focus



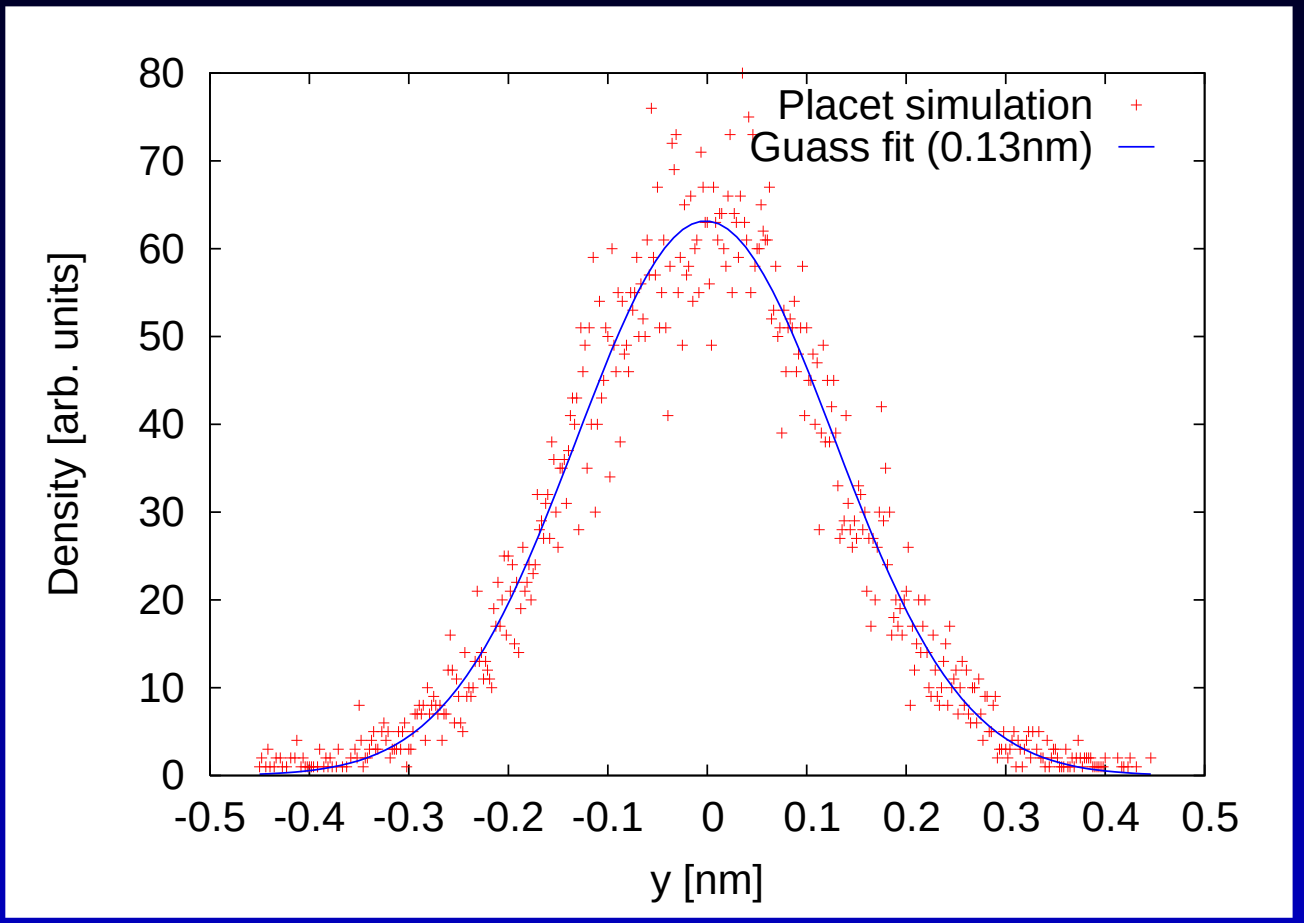
This scheme needs optics design and optimization, not done here.

Optics for L*=1m, β_y=15μm



Scaled from CLIC FFS and re-optimized with MAPCLASS

Beam spot size



$\gamma\epsilon_y$=1nm, β_y=15μm $\rightarrow$ σ_y=0.13nm and lumi=1.8e34 (per xsing)

(tracking with synchrotron radiation, σ_x=23nm)

Discussion

- Some margin exists to increase $\gamma\epsilon_y$ and decrease β_y
- Decreasing L* is not the only way, solutions might be found at L*=3.5m by optics optimization.
- Traveling focus is required, design and optimization challenging (?)
- Plasma focusing?
- Stabilization and IP feedback?
- Next generation FFS very open and challenging