

Final Focus Optics for the ATF

Beam from the ATF DR

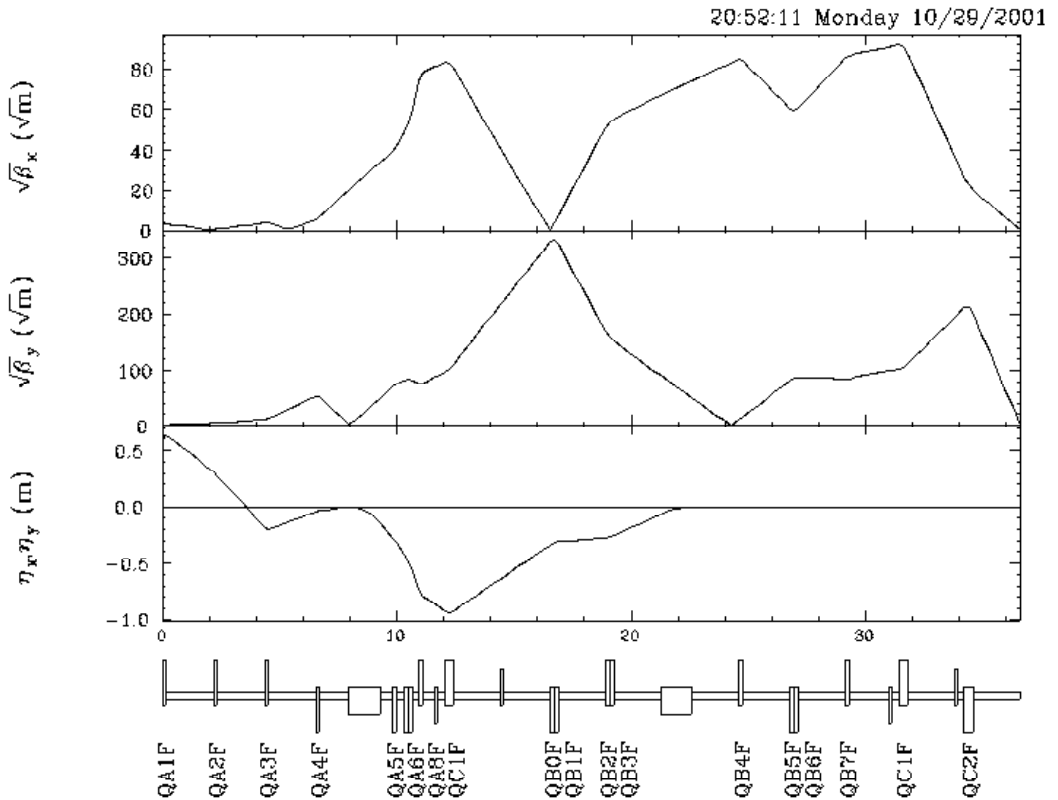
$E=1.54$ GeV

$\gamma\varepsilon_x=3 \times 10^{-6}$ m

$\gamma\varepsilon_x : \gamma\varepsilon_y=100:1$

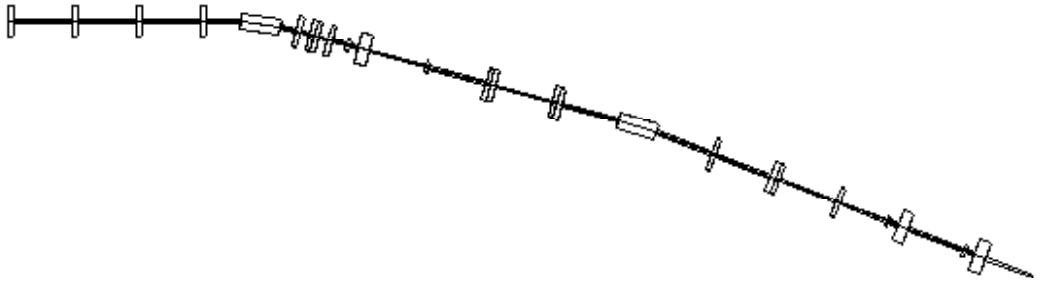
$\delta=0.1\%$ Gaussian Beam

Optics



Geometry

17:59:35 Friday 11/ 9/2001



Length:s=36.6 m

Performance

Tracking with 1000 particles

$$\varepsilon_x=1e-9 \text{ m}, \varepsilon_y=1e-11 \text{ m } \delta=0.1\% \text{ @EXT}$$

$$\rightarrow \sigma_x = 3.42 \mu\text{m} \quad \sigma_y = 36.8 \text{nm} \text{ @IP}$$

Vibration Tolerance

$$(\sigma^*_x < 4 \mu\text{m} \quad \sigma^*_y = 40 \text{ nm})$$

Drift Space: $\Delta L < 100 \mu\text{m}$

Bend: $\Delta K_0 / K_0 < 10^{-5}$

$$: \Delta\theta / \theta < 0.3 \text{ mrad}$$

Quad: $\Delta K_1 / K_1 < 10^{-4}$

$$: \Delta x < 10 \mu\text{m}$$

$$: \Delta y < 10 \mu\text{m}$$

$$: \Delta\theta / \theta < 0.1 \text{ mrad}$$

Sext: $\Delta K_2 / K_2 < 5 \times 10^{-3}$

$$: \Delta x < 10 \mu\text{m}$$

$$: \Delta y < 10 \mu\text{m}$$

$$: \Delta\theta / \theta < 1 \text{ mrad}$$

Alignment Tolerance

Correction

Correction1 + 5x Correction2

Correction1 :

3x(Orbit distortion Correction)

Final Q mover dz (50 μm step)

SX mover dx dy (10 μm step)

Correction2 :

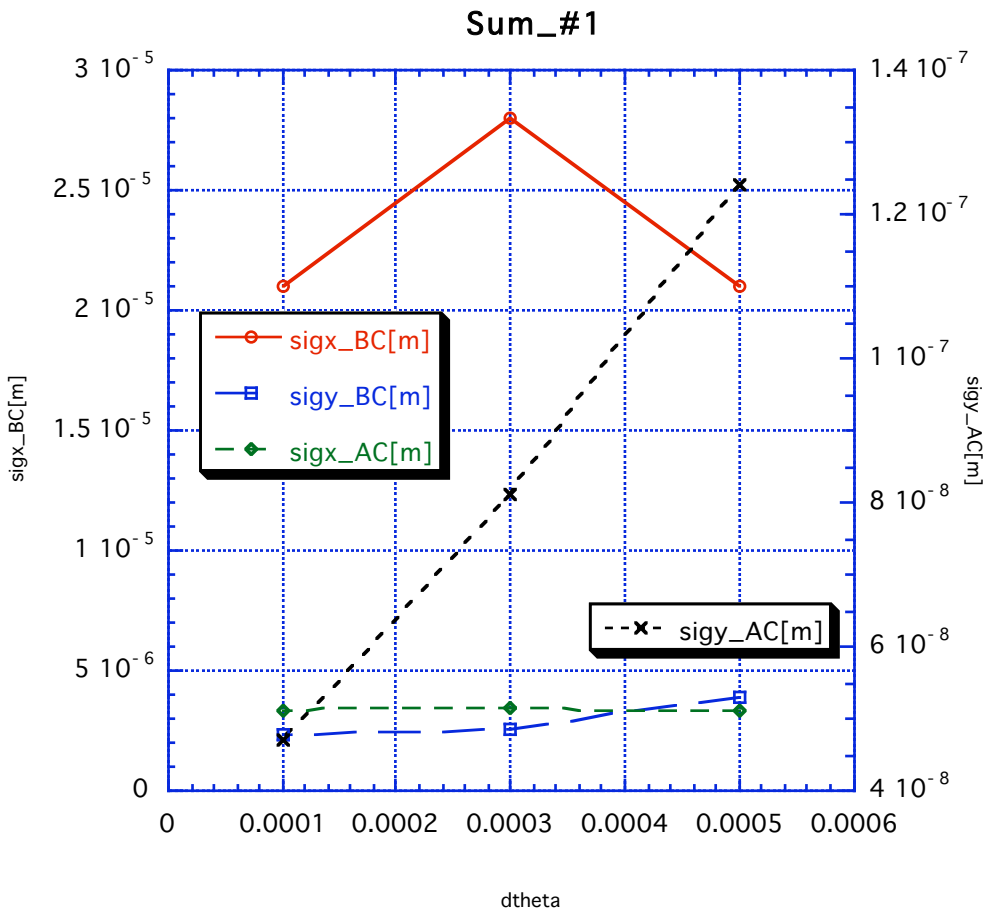
3x(Orbit+dispersion distortion Correction)

Final Q mover dz (50 μm step)

SX mover dx dy (10 μm step)

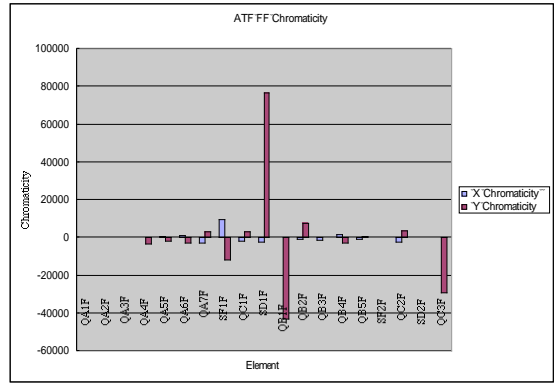
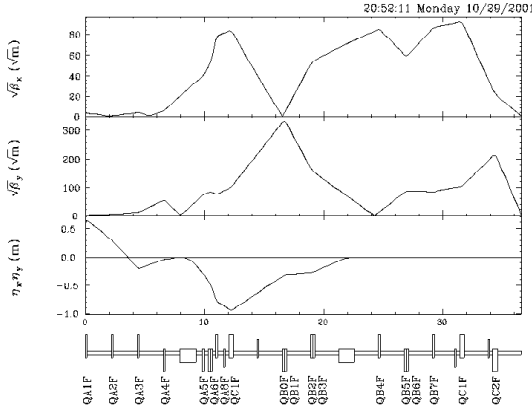
$\sigma_L=500\mu\text{m}$, $\sigma_x=100\mu\text{m}$, $\sigma_y=50\mu\text{m}$, $\sigma_k=1\text{e-}4$

1 σ -cut



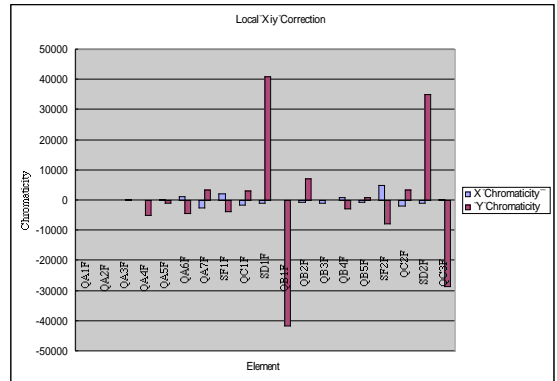
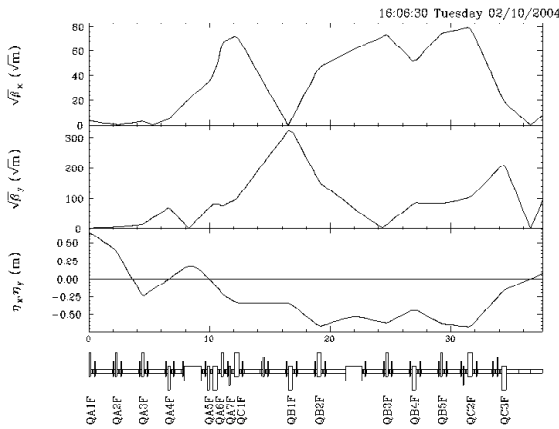
Optics Option

0.Original



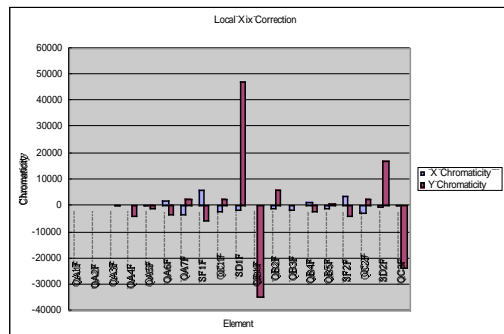
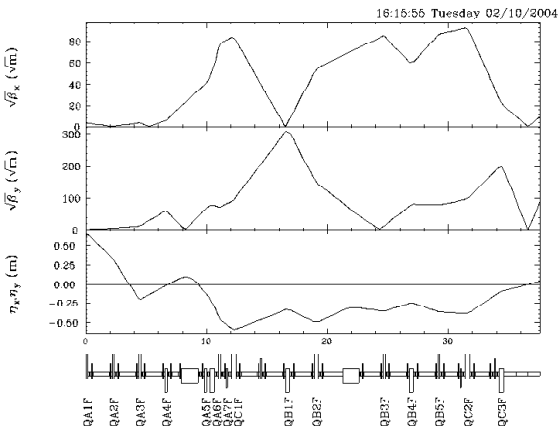
$$\sigma_x = 3.42\mu\text{m} \quad \sigma_y = 36.8\text{nm}$$

1.ξy correction



$$\sigma_x = 3.73\mu\text{m} \quad \sigma_y = 34.4\text{nm}$$

2.ξx correction



$$\sigma_x = 3.41\mu\text{m} \quad \sigma_y = 35.8\text{nm}$$