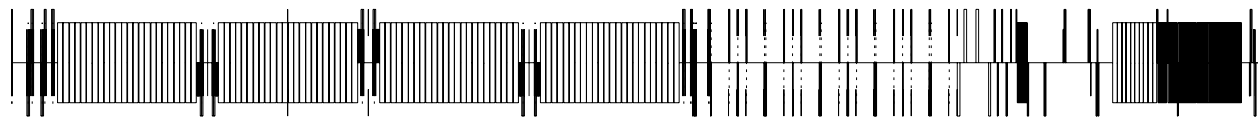
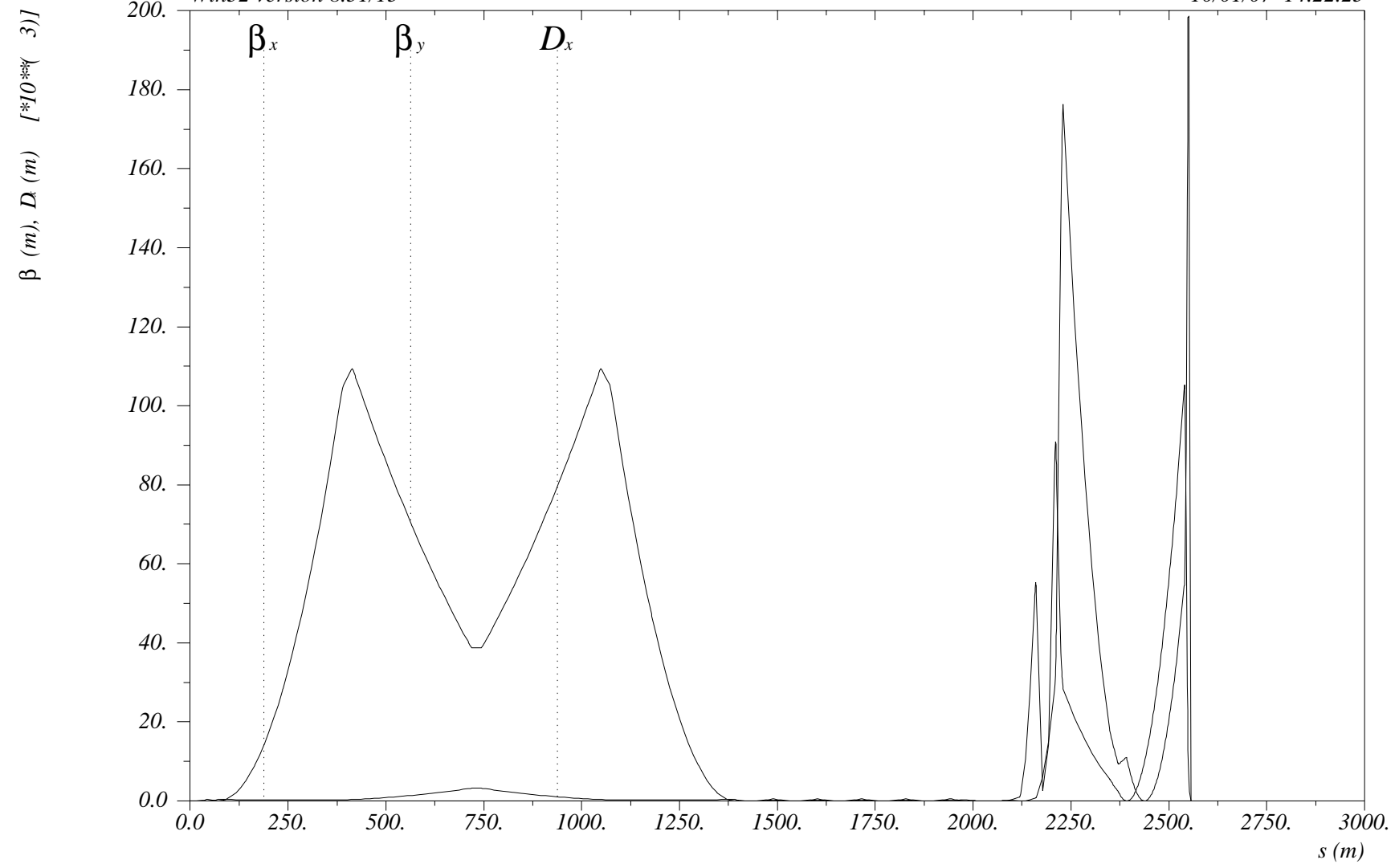


Alignment of the CLIC beam delivery system.

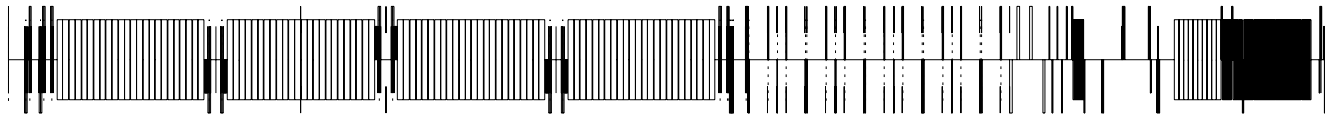


$L^* = 4.3 \text{ m}$, $Bx^* = 0.8 \text{ cm}$, $By^* = 0.15 \text{ mm}$
Win32 version 8.51/15

10/01/07 14.22.25

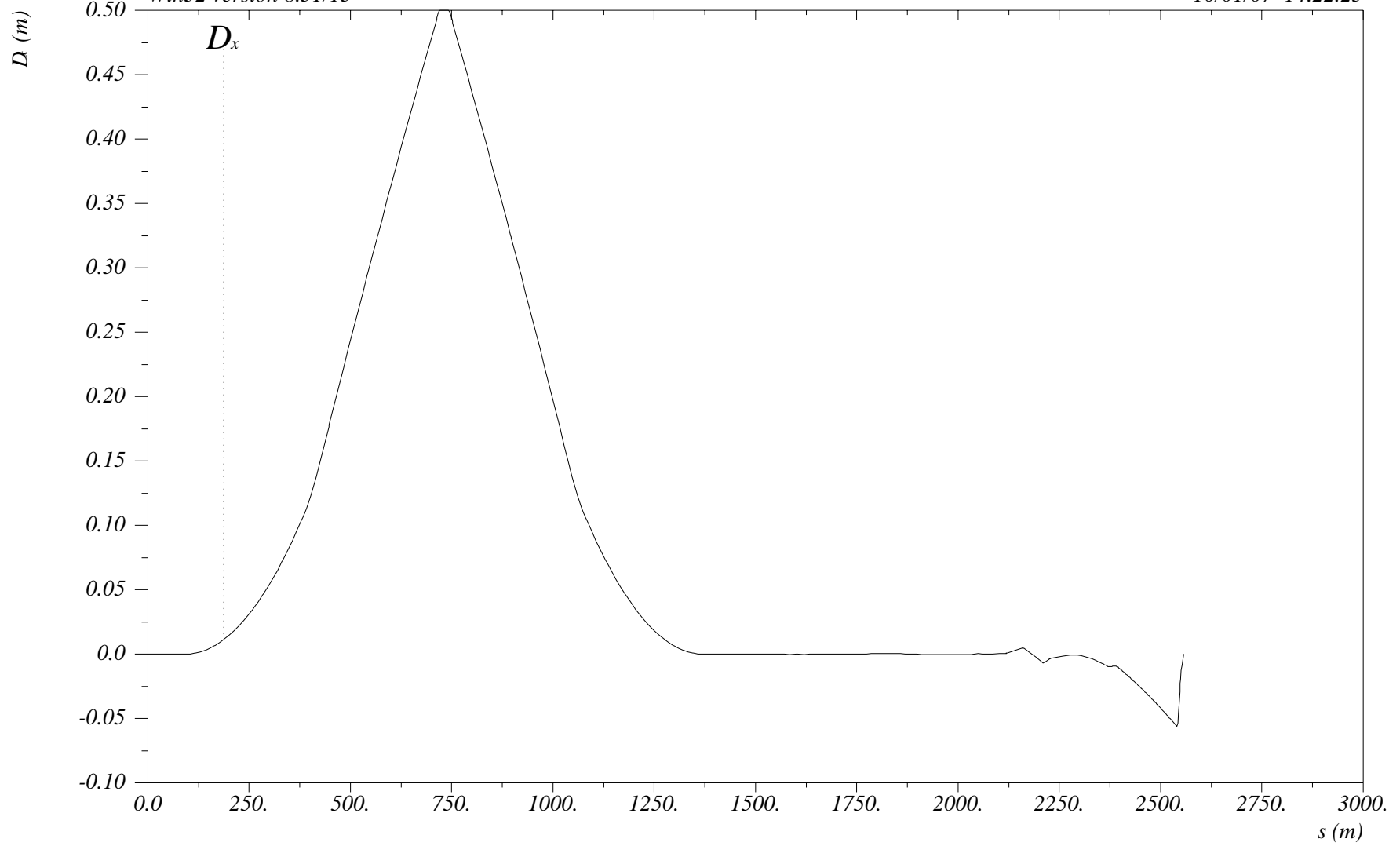


$\delta_E / p_{oc} = 0.$
Table name = TWISS



$L^* = 4.3 \text{ m}$, $Bx^* = 0.8 \text{ cm}$, $By^* = 0.15 \text{ mm}$
Win32 version 8.51/15

10/01/07 14.22.25

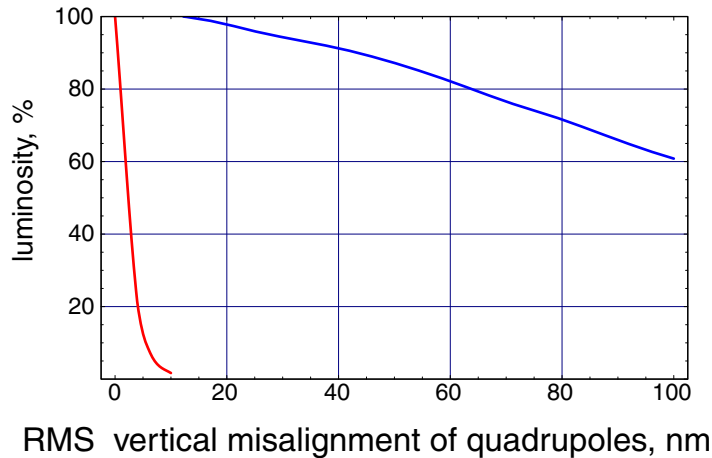


$\delta_E / p_{oc} = 0.$

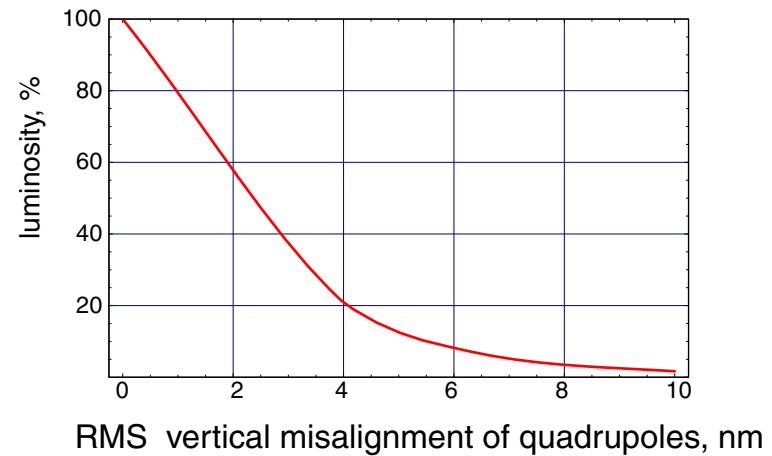
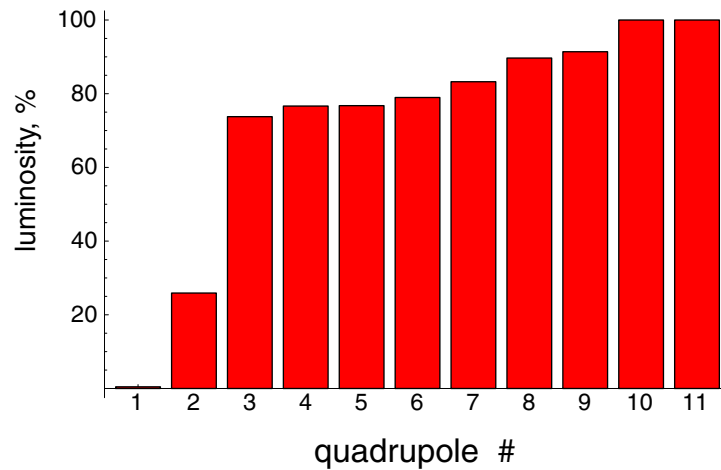
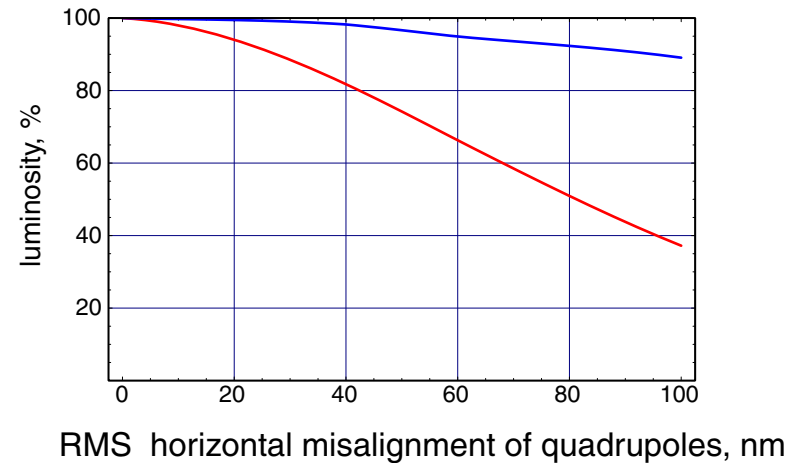
Table name = TWISS

TRANSVERSE MISALIGNMENT OF QUADRUPOLES

The red curve is luminosity versus rms transverse misalignment assigned to all quadrupoles of the BDS.



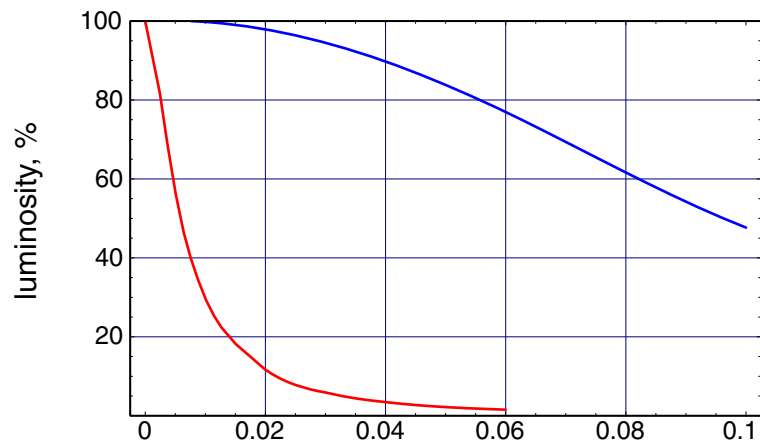
The blue curve presents luminosity versus rms transverse misalignment assigned to the BDS quadrupoles excepting 10 final quadrupoles located before IP.



Decrease of luminosity due to vertical misalignment of the final 11 quadrupoles. The vertical misalignment of 10 nm was separately assigned to each of them.

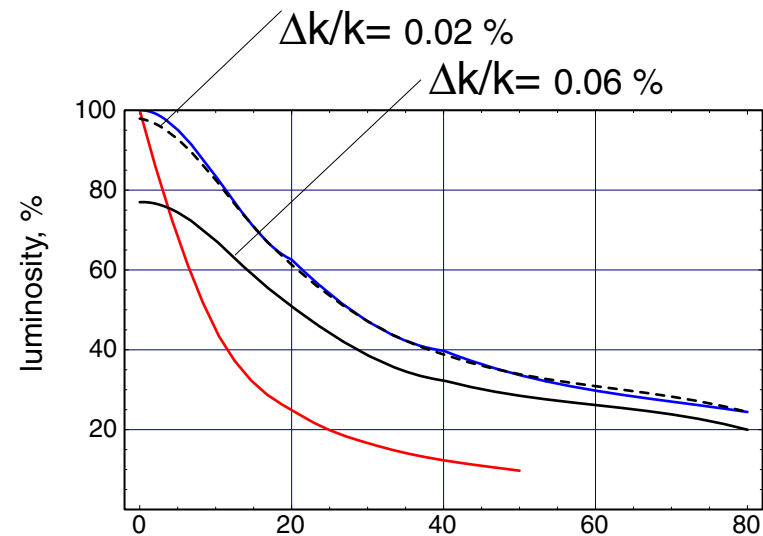
The luminosity decrease versus rms vertical misalignment of all quadrupoles located in the BDS.

FIELD ERROR IN QUADRUPOLES

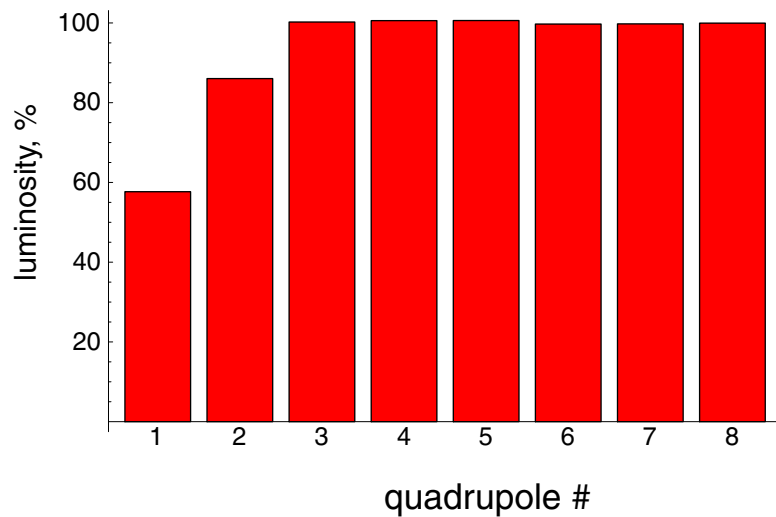


RMS deviation of quadrupole strength, %

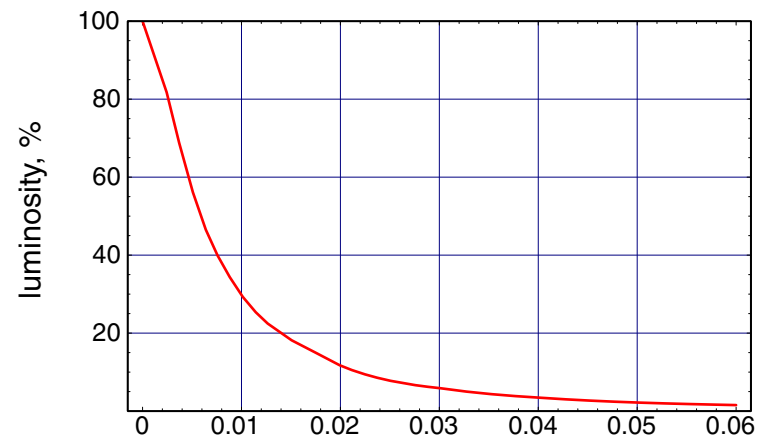
ROLL ANGLE OF QUADRUPOLES



RMS roll angle of the quadrupoles, μrad

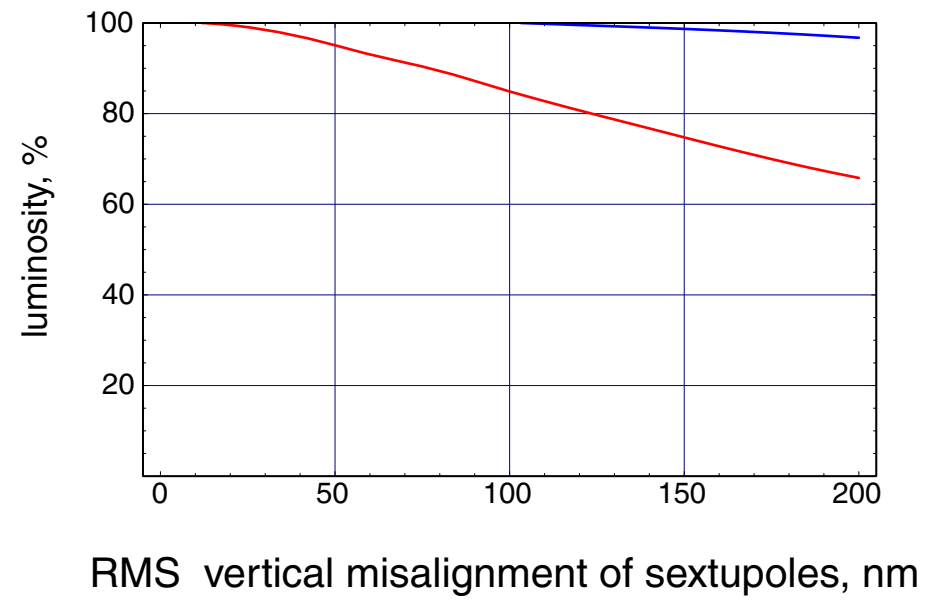


The luminosity resulted from independently change of the quadrupole strength of each quadrupole to 0.006 %.

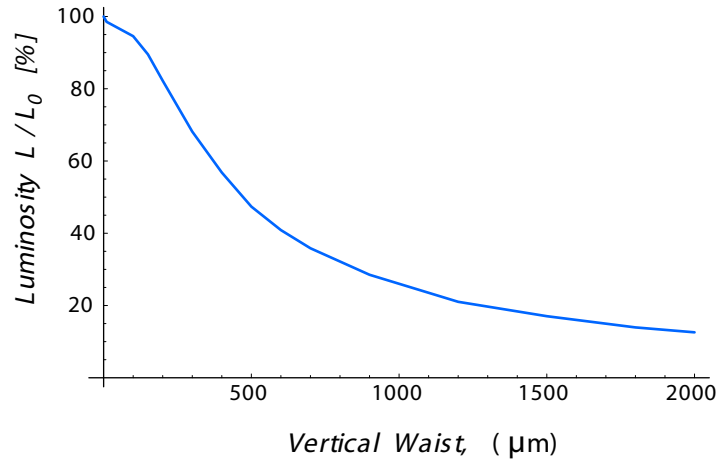


RMS deviation of quadrupole strength, %

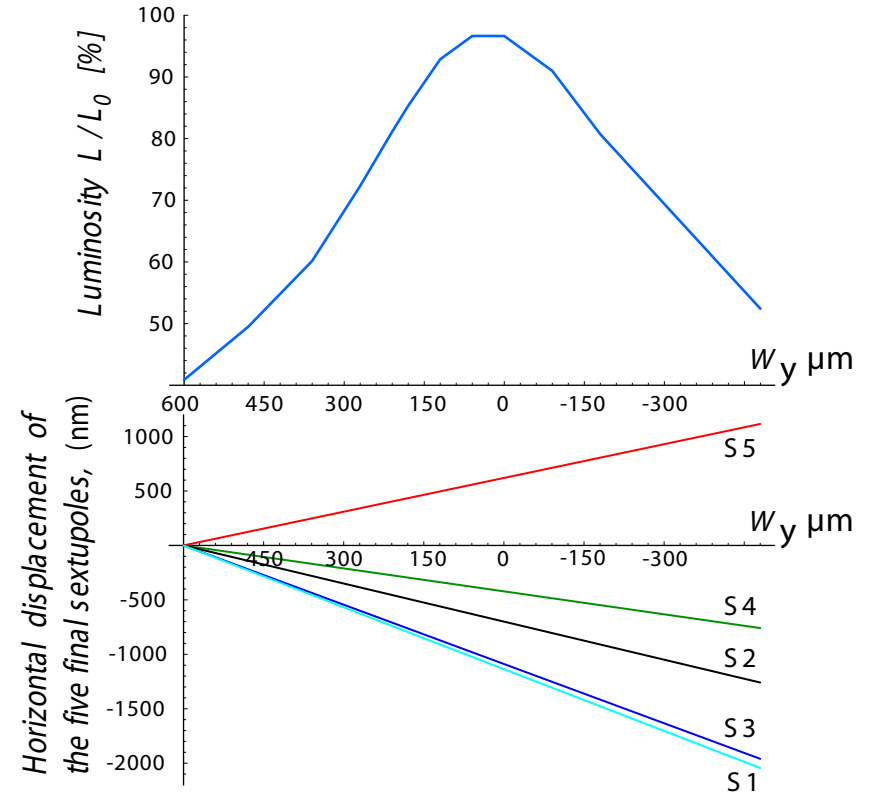
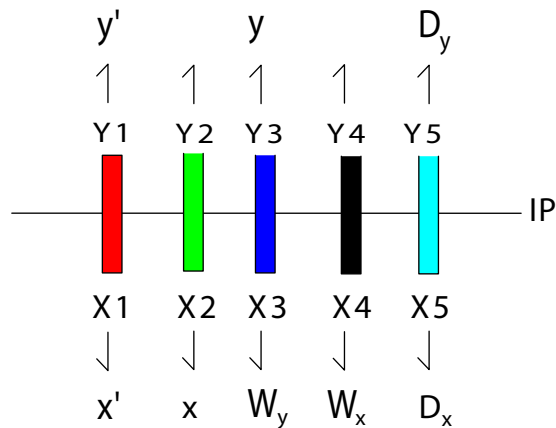
TRANSVERSE MISALIGNMENT OF SEXTUPOLES



Knobs Based on FFS Sextupoles



The luminosity loss as a function of the longitudinal displacement of the vertical waist



The recovery of luminosity loss by the horizontal movements of sextupoles

$$A X_q = B_q$$

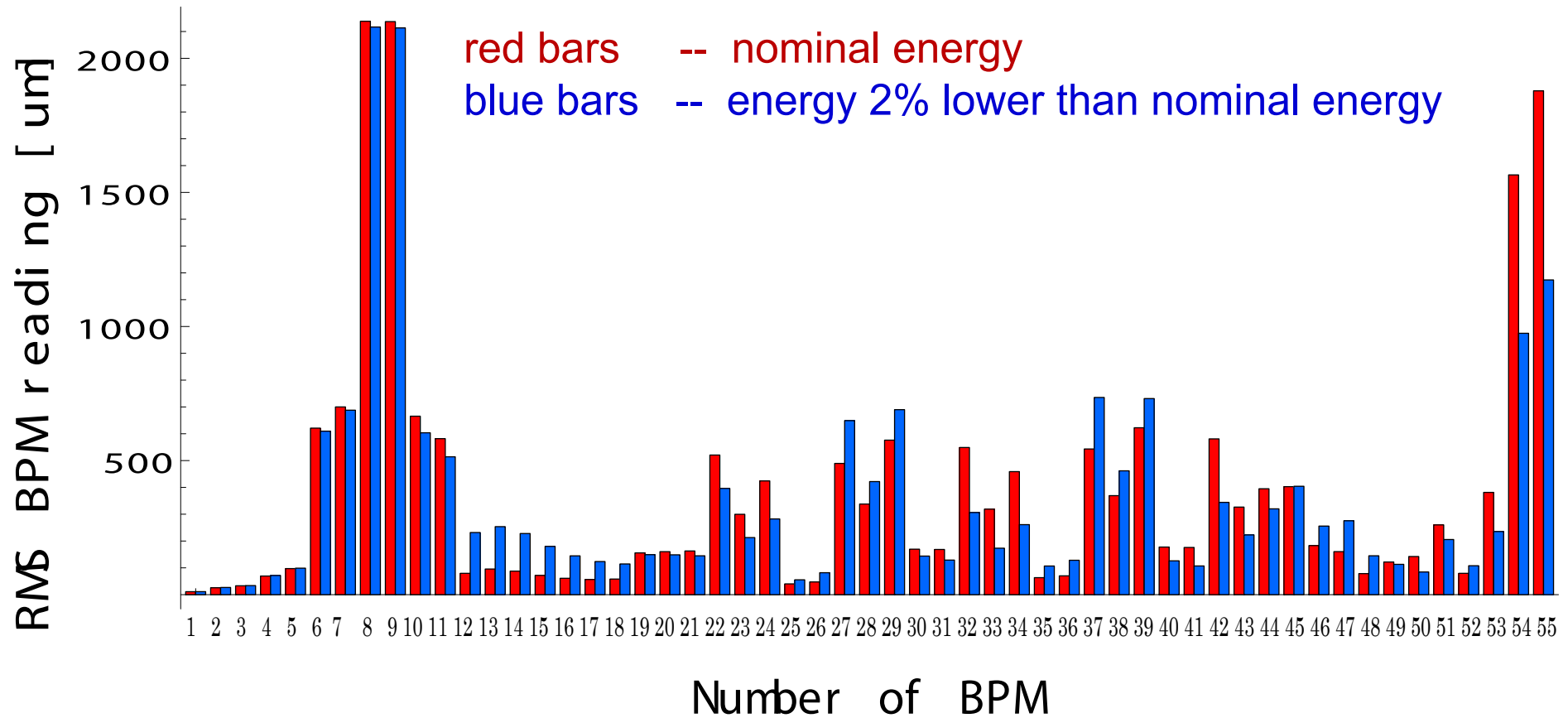
$$\det |A_0| \neq 0 \quad \det |A_2| \neq 0$$

$$B = B_q + B_m$$

$$\det |A_2 - A_0| = 0$$

$$X_q \neq (A_2 - A_0)^{-1} (B_{q2} + B_m - B_{q0} - B_m)$$

RMS BPM readings for the RMS horizontal quadrupole misalignment 10 um randomly assigned.



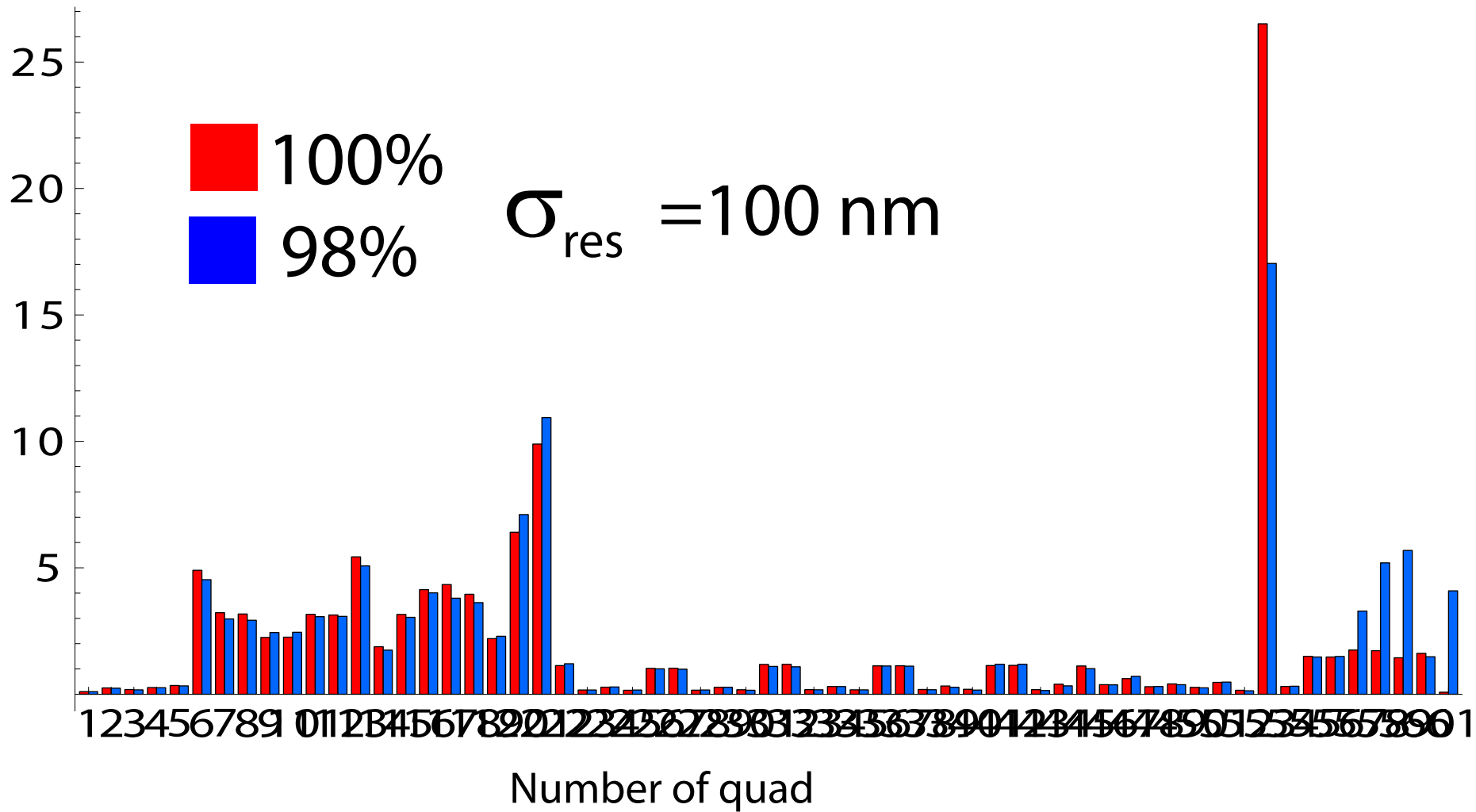
The simulations were done for the 2000 different seeds!

$$\bar{\sigma}_x = A^{-1} \bar{\sigma}_{\text{res}}$$

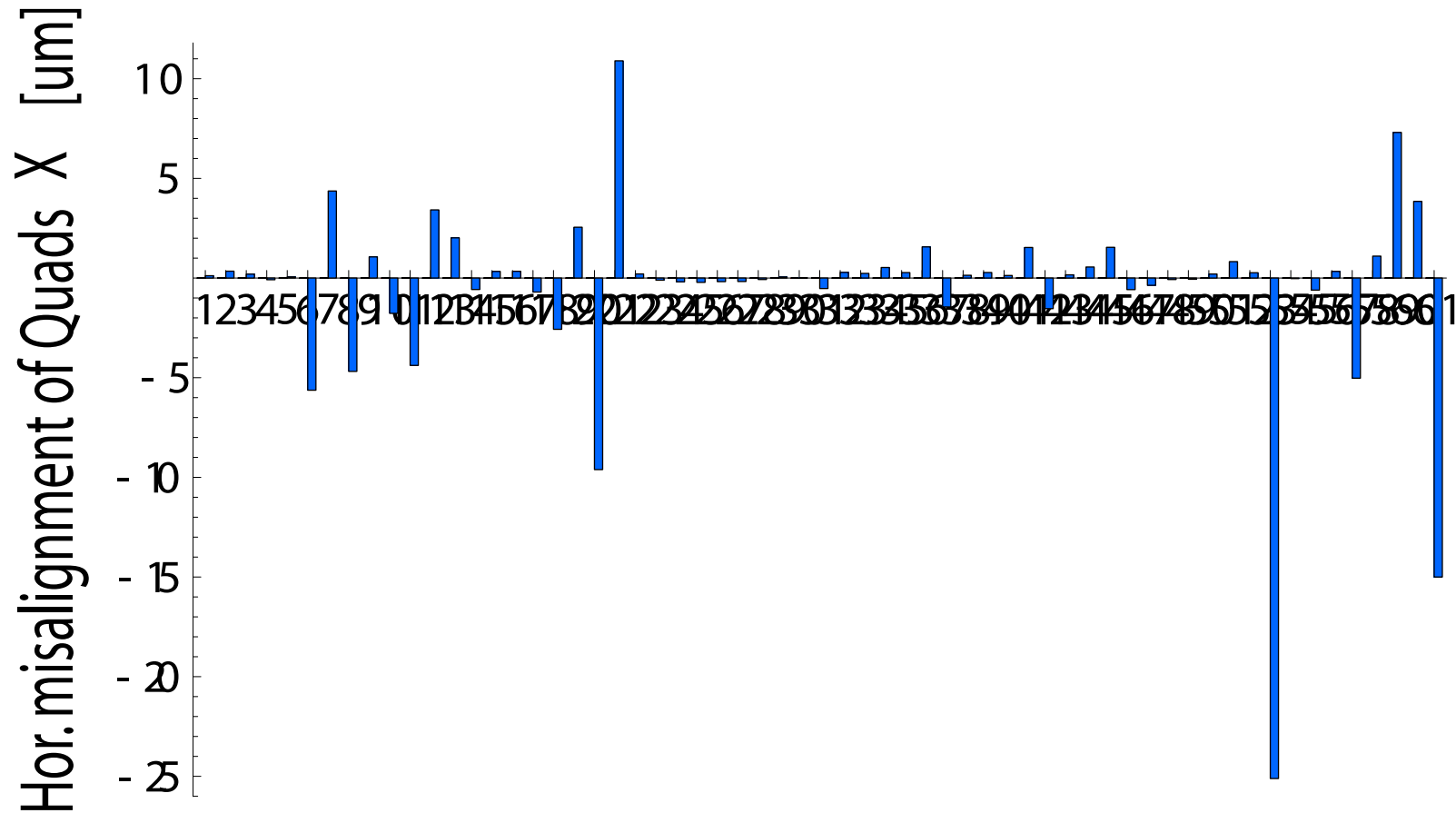
Hor. misalignment of Quads σ_x [um]

100%
98%

$\sigma_{\text{res}} = 100 \text{ nm}$



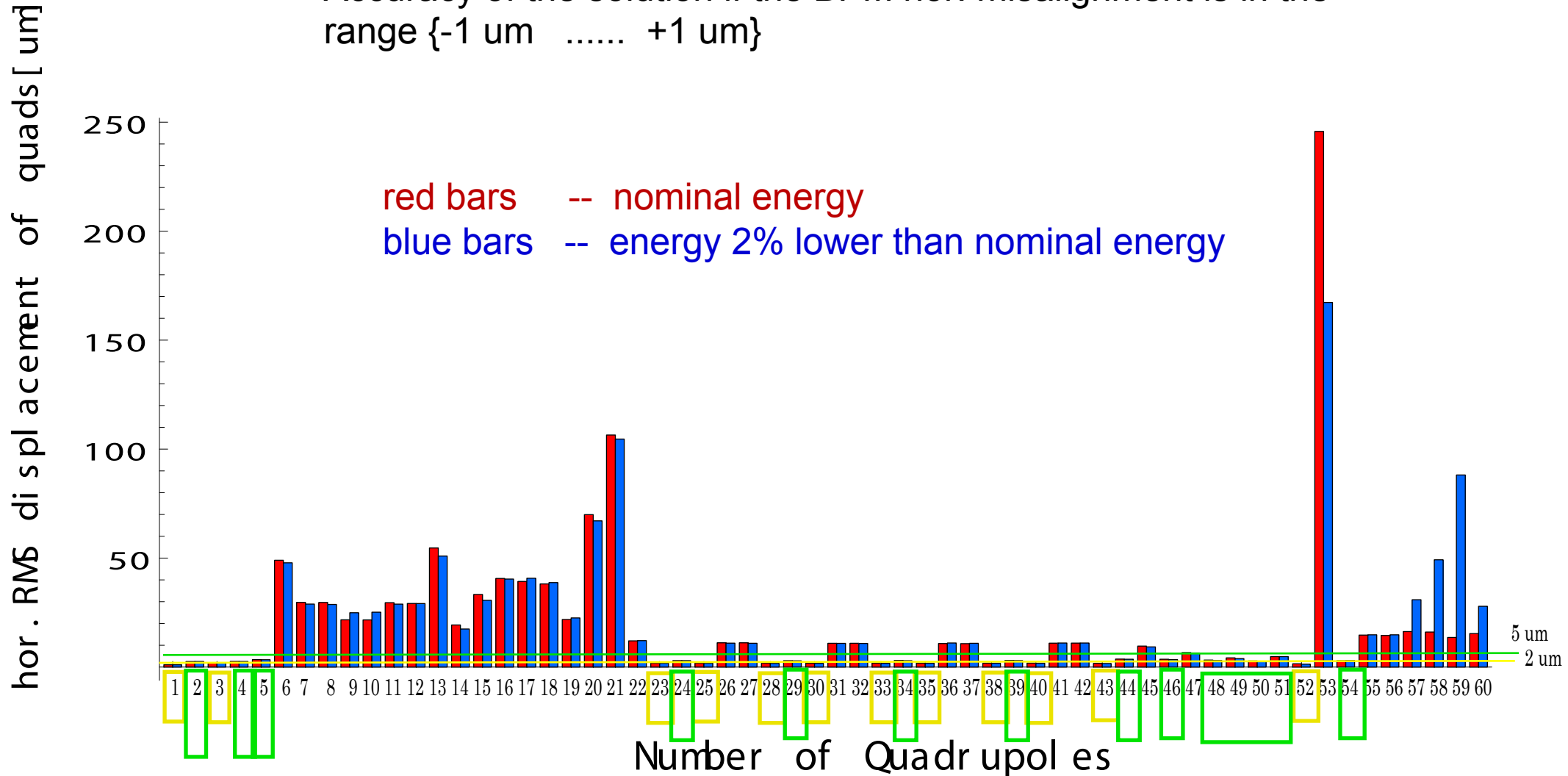
BPM resolution $\sigma_{\text{res}} = 100 \text{ nm}$



blue - difference between assigned alignment errors and simulated alignment errors

$L = 5.0 \times 10^{26}$

Accuracy of the solution if the BPM hor. misalignment is in the range $\{-1 \text{ um} \dots +1 \text{ um}\}$



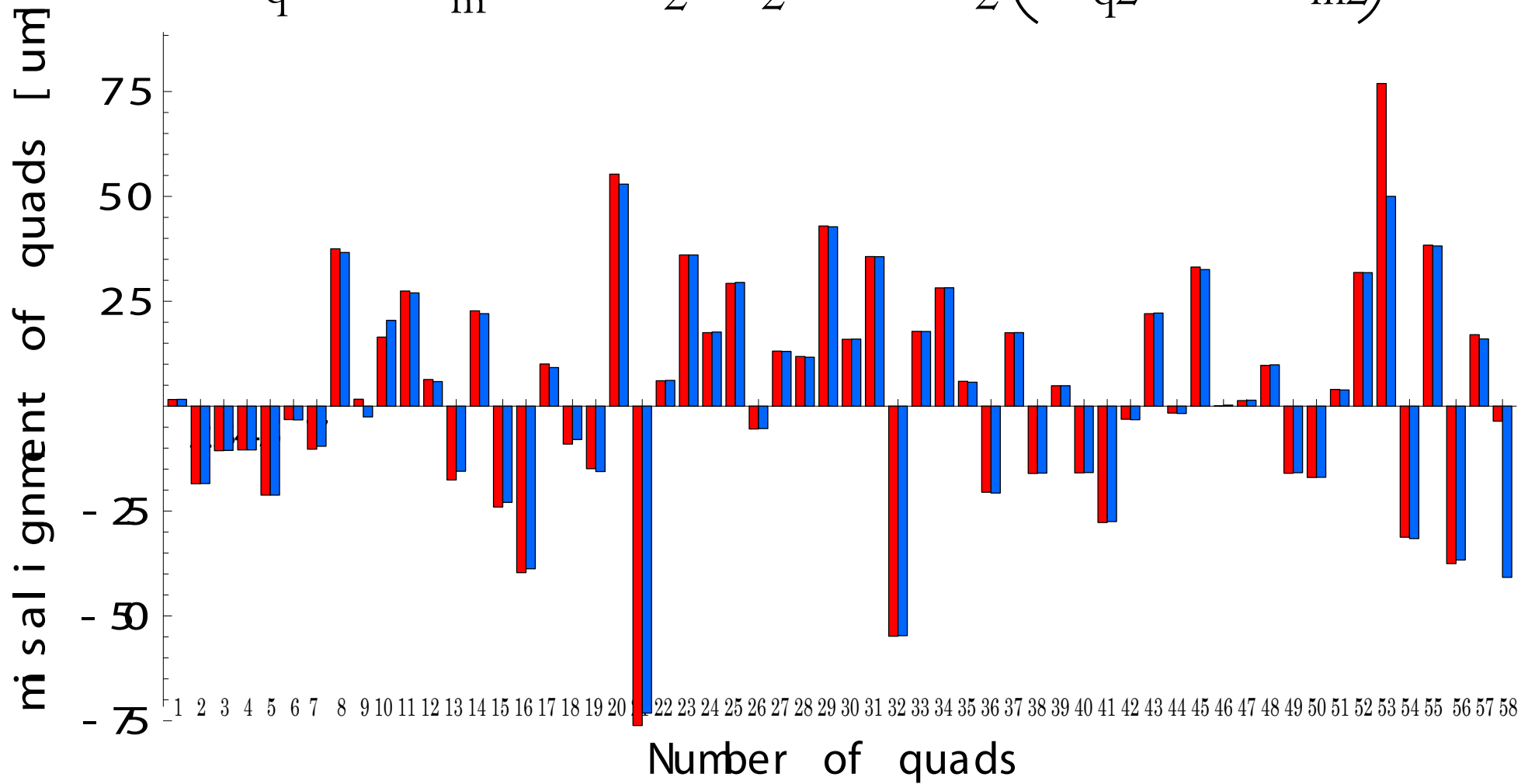
1, 3, 23, 25, 28, 30, 33, 35, 38, 40, 43, 52 < 2 um

2, 4, 5, 24, 29, 34, 39, 44, 46, 48, 49, 50, 51, 54 < 2 um

The simulations were done for the 2000 different seeds!

$$X_q + X_m = A_0^{-1} B_0 = A_0^{-1} (B_{q0} + B_{m0})$$

$$X_q + X_m = A_2^{-1} B_2 = A_2^{-1} (B_{q2} + B_{m2})$$



red bars -- nominal energy blue bars -- energy 2% lower than nominal energy

$$X_q(A_2 - A_0) = (B_{q2} + B_m - B_{q0} - B_m)$$

