

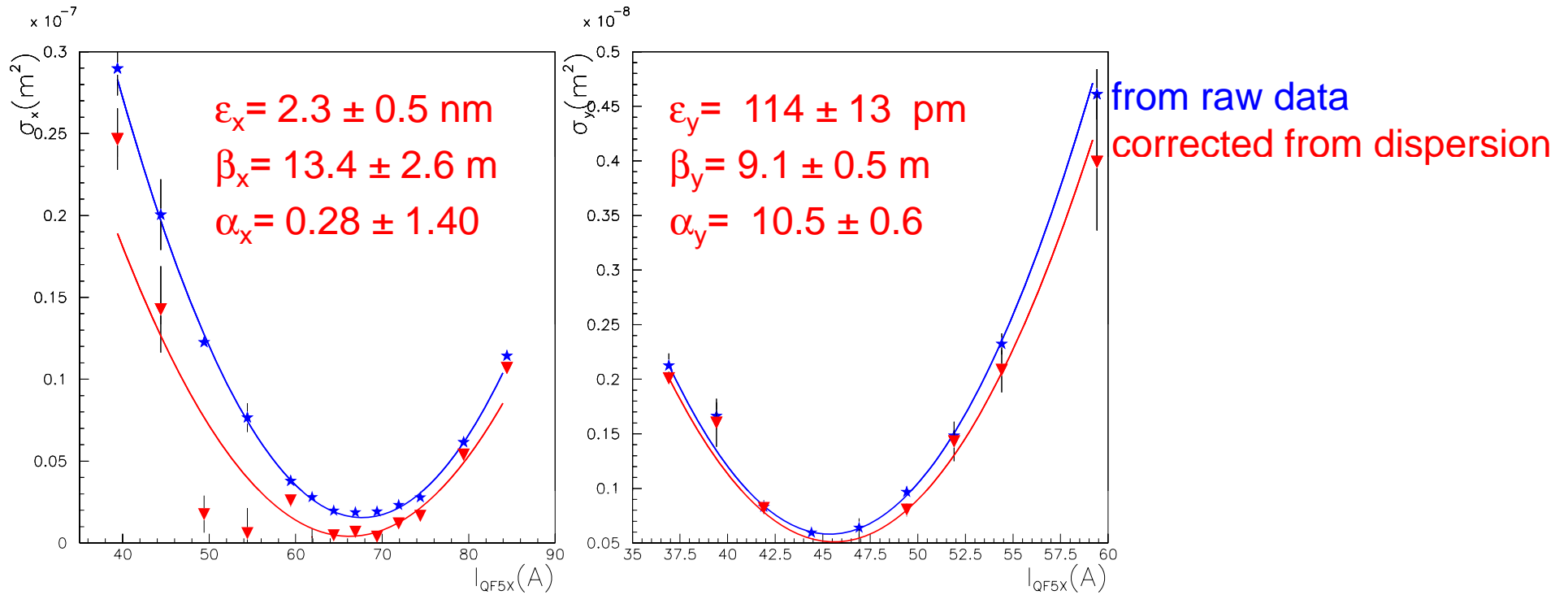
Updated coupling study

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Attempts to correct coupling from 12 March measurements

- Mark's hybrid optics (from Pavel's optics)
- Vertical emittance measured in the DR: **34 pm.rad**
- QF5X scan at MW3X → x & y Twiss parameters
- QK3X skew scan at MW3X → Coupling evidence
- Back propagation of twiss param to the entrance of Ext line.
- MAD simulation with 12March status →
Try to reproduce coupling adding a skew at QM7.
- Simple correction of coupling with MAD, using QK1X & QK3X.
- Applying these corrections, new measurements have been performed with QK3X and QF5X

1-QF5X scan at MW3X



Back propagation to the entrance of Ext line:

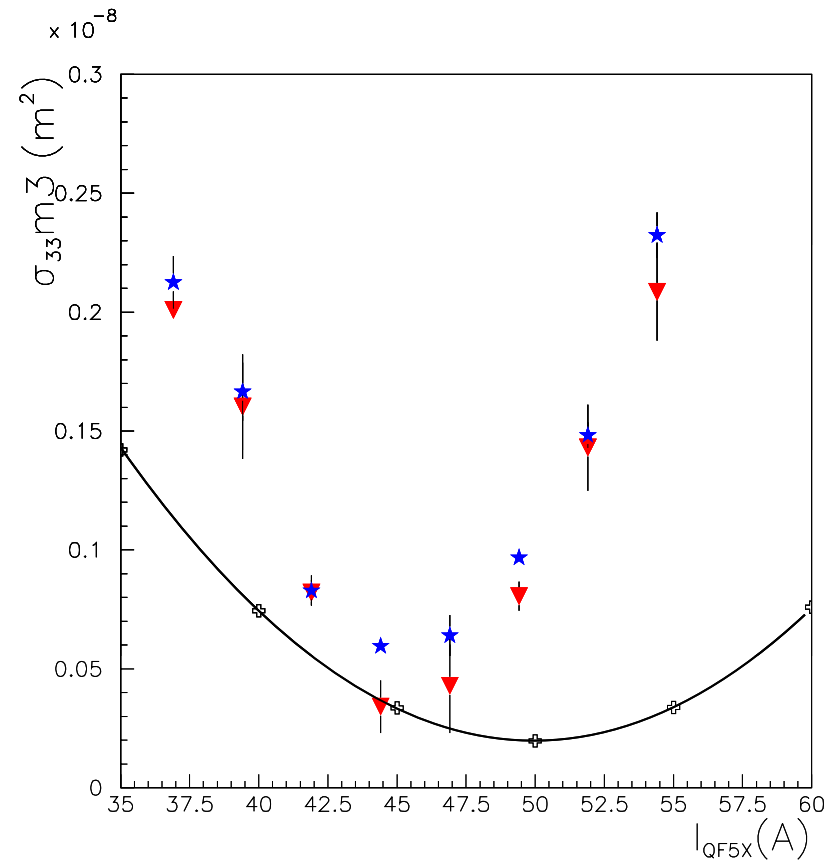
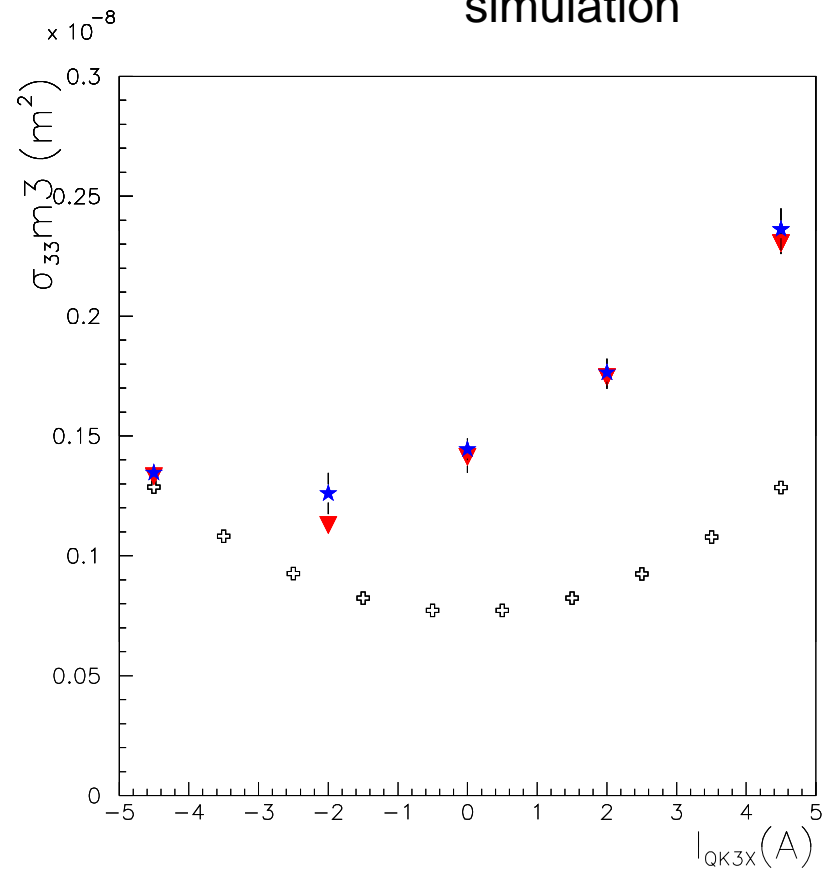
$$\beta_x = 16.9 \text{ m} \quad \alpha_x = 2.3$$

$$\beta_y = 0.62 \text{ m} \quad \alpha_y = 1.38$$

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2-MAD simulation without coupling source

from raw data
corrected from dispersion
simulation

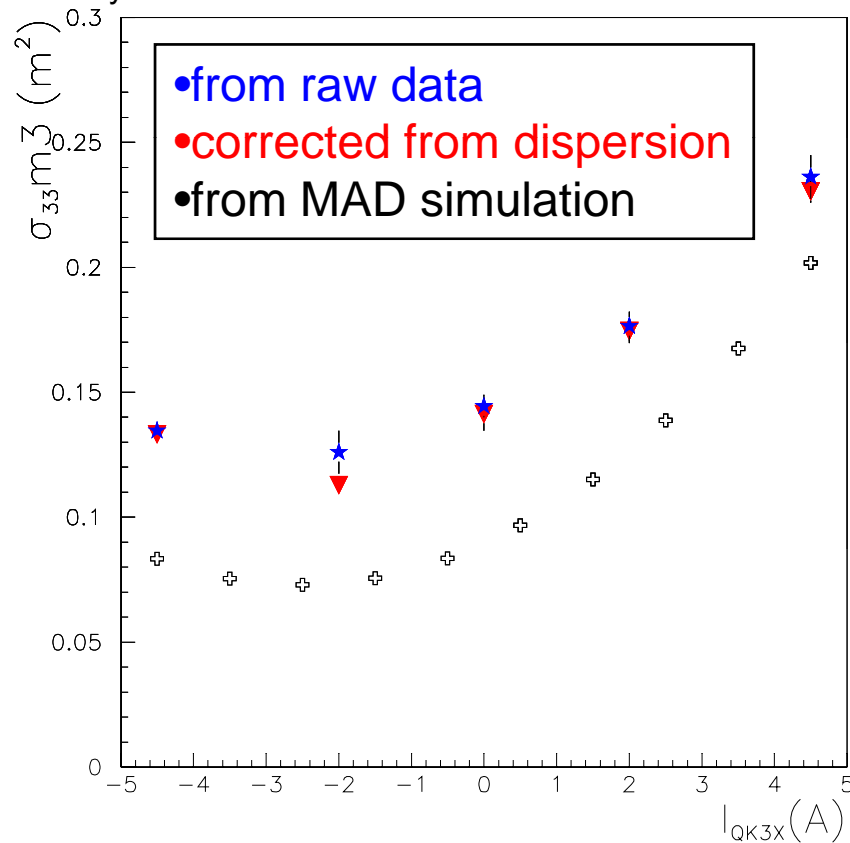


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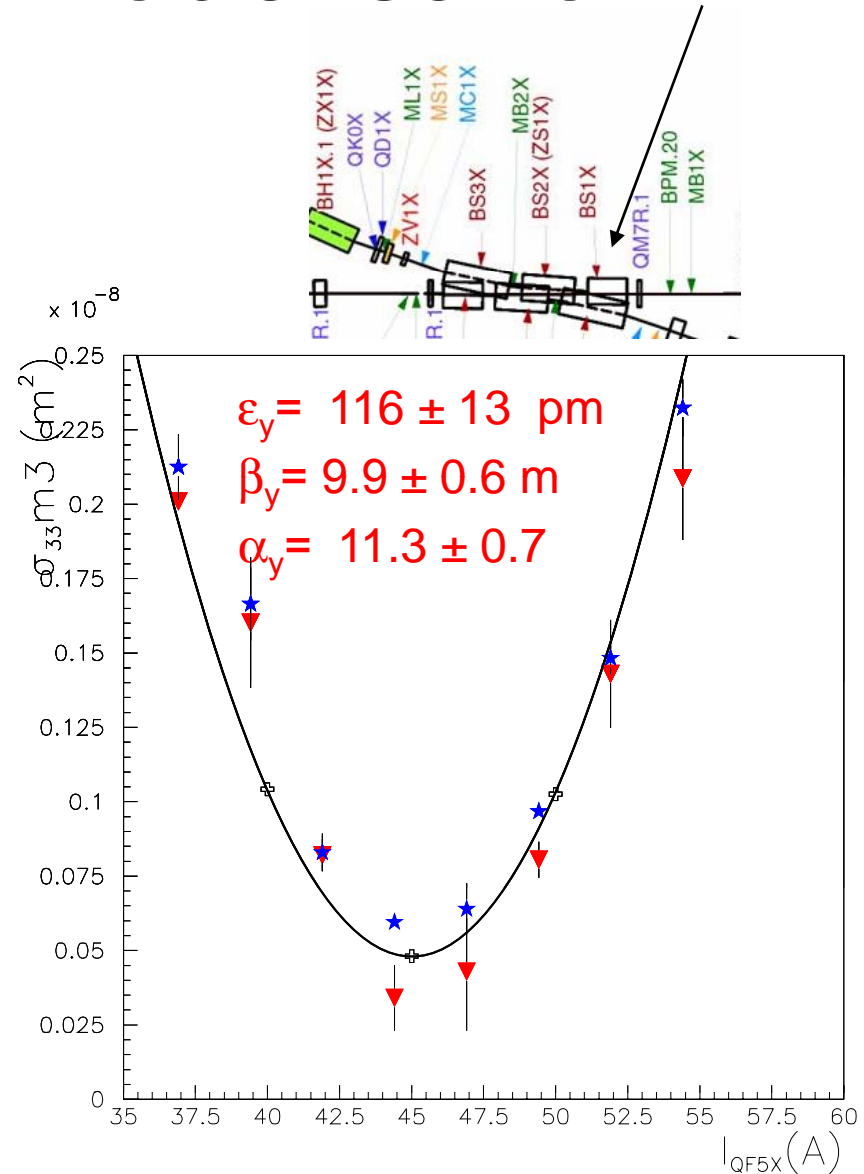
3- Coupling modelisation

Measurements are “reproduced” with Skew (Type QK1X) at QM7 set at 3.5A (corresponds to a strength of 0.018m^{-1}).

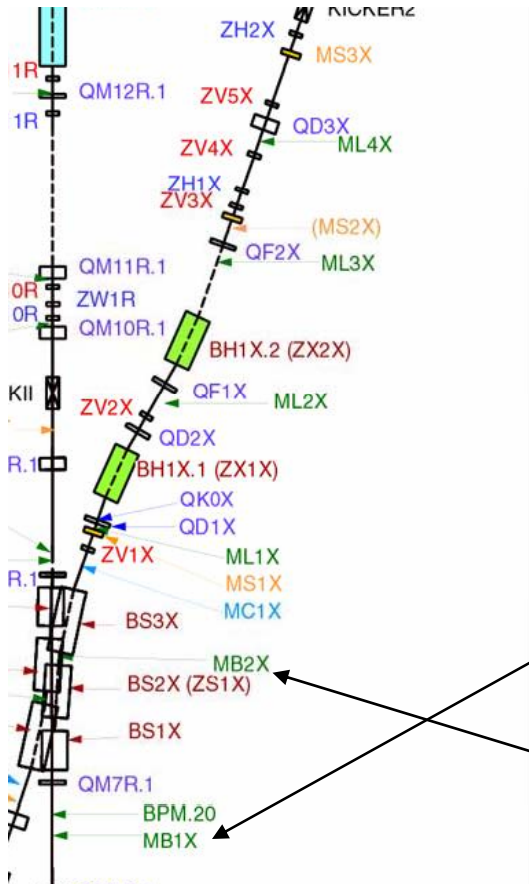
→ $\epsilon_y^{-8} = 107 \text{ pm}\cdot\text{rad}$



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Factor 3 in vertical emittance from QKADD[0.018m⁻¹]at QM7



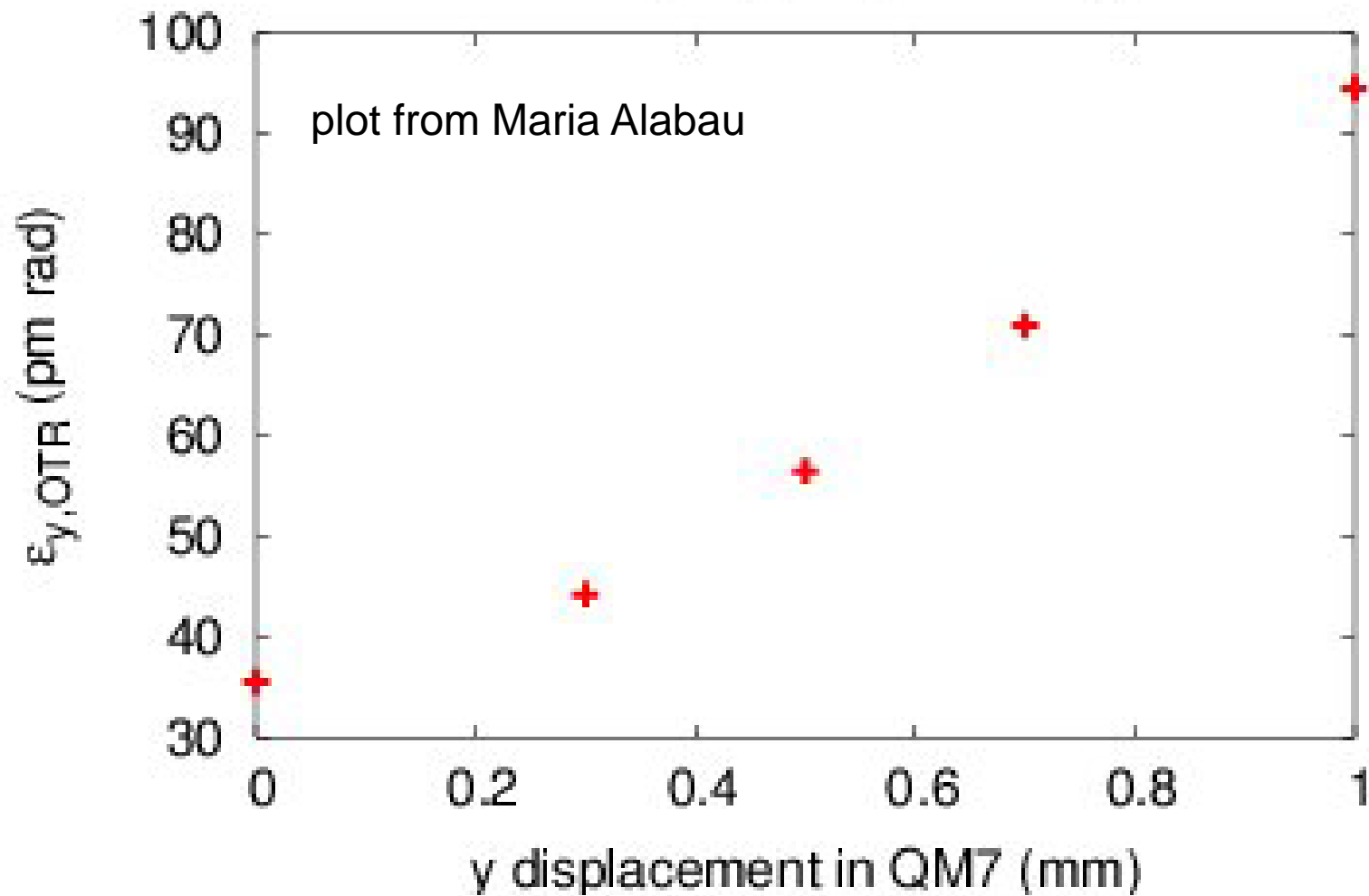
Emittances from mad (from sigma matrix) at BPM:

BPM	$\epsilon_x(m)$	$\epsilon_y(m)$
MB1X	2.20003e-09	3.40053e-11
MB2X	2.20246e-09	1.0978e-10
ML1X	2.20248e-09	1.09783e-10
ML2X	2.20245e-09	1.09783e-10

X 3.2

0.018m⁻¹ → corresponds to a bump of 0.5mm (from Philip calculations), which experimentally does not induce a vertical emittance growth of a factor 3...

Simulation with input $\epsilon_y=36$ μm and $\epsilon_x=2.4$ nm



Factor 2.7 at 1mm

Conclusions

- QM7 is probably not the only source of coupling in ATF EXT line
- Check for the uniqueness of coupling mimics.
Can we reproduce also the measurements for a skew at another position?
- ...