Emittance growth studies using static bumps in the ATF EXT line

Reproduce the simulation of the beam size at the OTR as a function of the bump amplitude

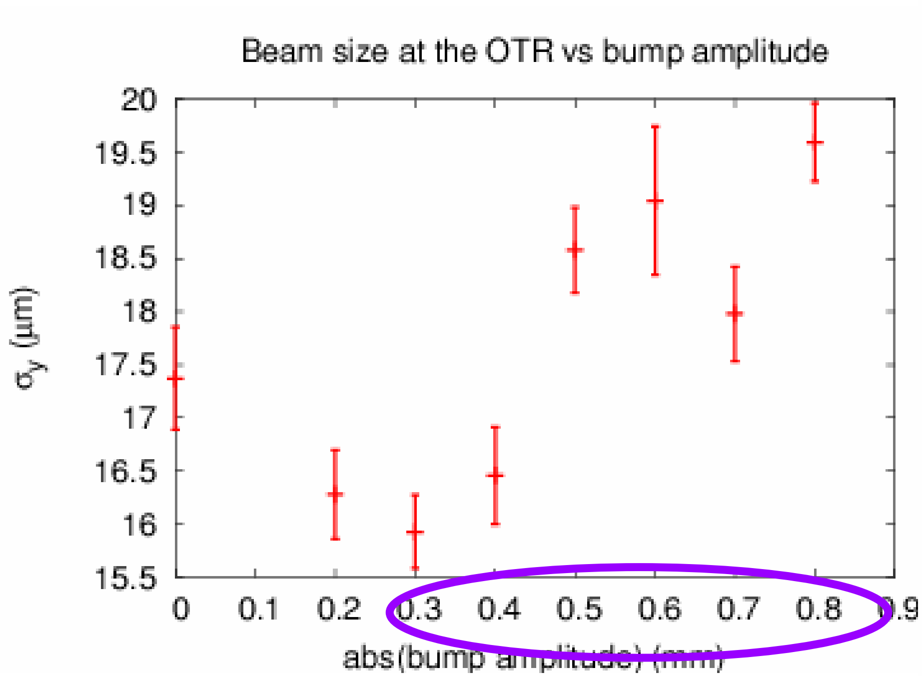
30th April 2008

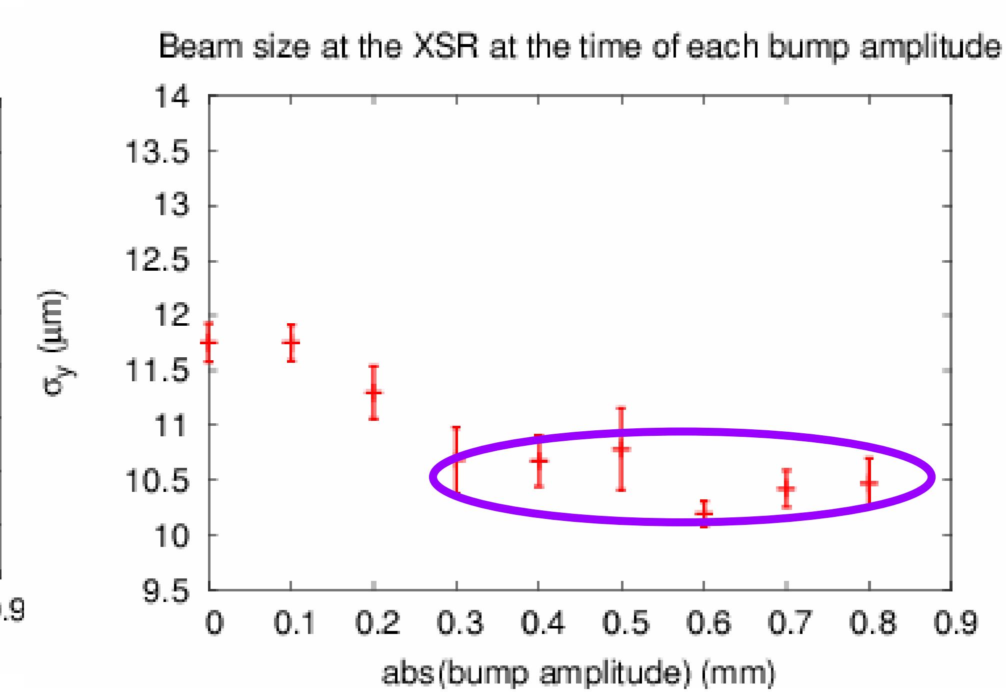
Emittance growth studies using static bumps in the ATF EXT line

Parasitic measurements 19th December 2007

Extraction Line (OTR)

Damping Ring (XSR)





→ Assumption: 0.3 mm bump corresponds to the minimum emittance, minimum displacement in QM7 → let's consider from 0.3 to 0.8 mm bump (total range 0.5 mm)

* Conversion factor channels-µm for OTR is not very precise

Emittance growth studies using static bumps in the ATF EXT line

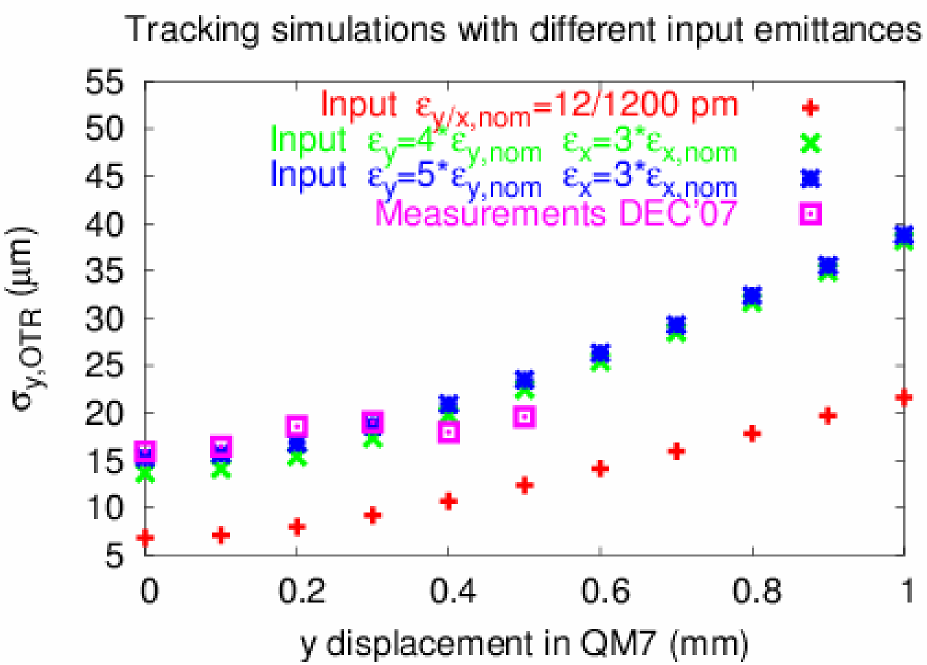
December'07 measurements

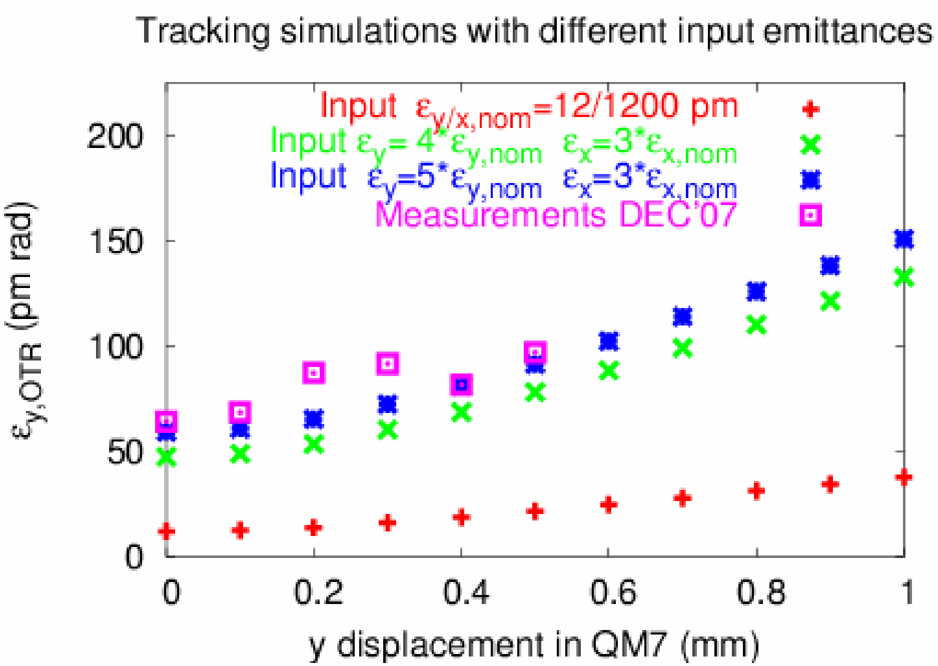
Tracking simulations in the Extraction Line

- With bumps created with ZV9R and ZV100R
- Including non-linearity in QM7
- For different input emittances

DR emittances during the shift computed from beam sizes and ß-functions at the XSR:

ε_y=51.48 pm ~ $4^*\varepsilon_{y,nom}$
ε_x=3.78 nm ~ $3^*\varepsilon_{x,nom}$



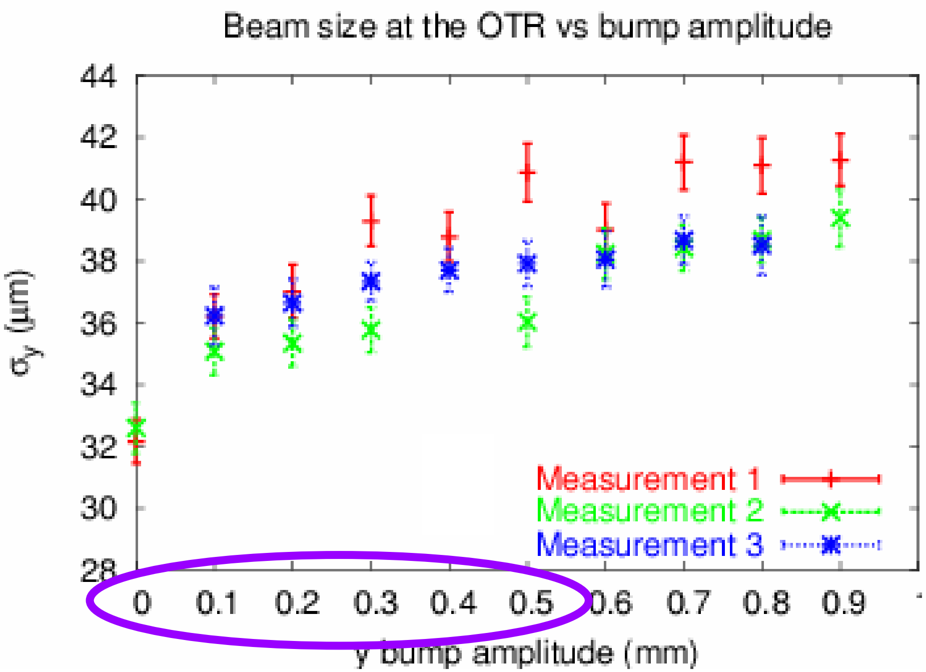


For the conversion to emittances of the measured beam sizes at the OTR, $ß_y$=3.96 m at the OTR location is considered.

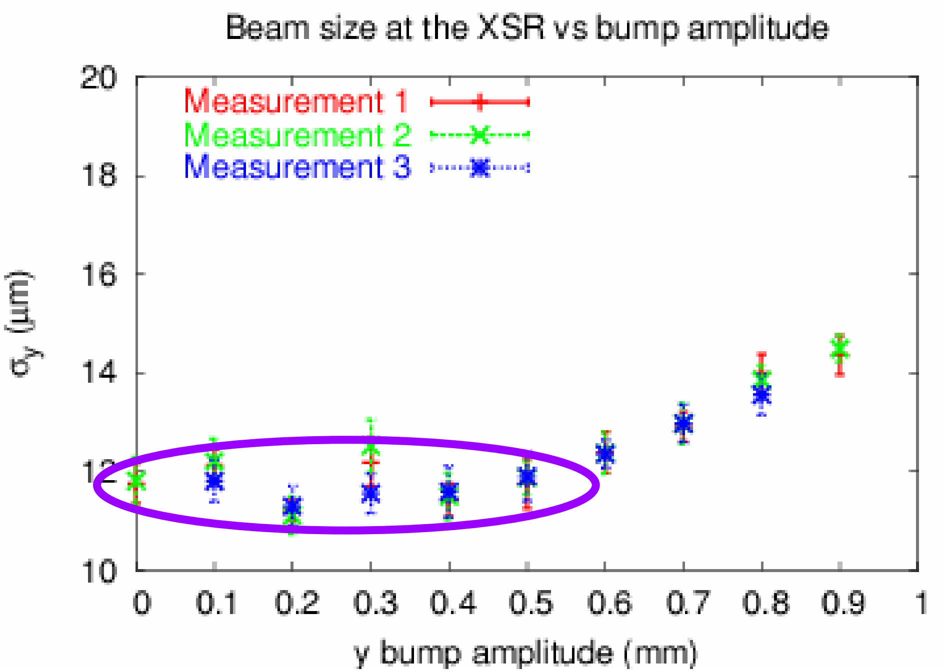
Emittance growth studies using static bumps in the ATF EXT line

Shift Tuesday 4th March 2008 (1:00 to 9:00 h)

Extraction Line (OTR)



Damping Ring (XSR)



→ Assumption: from 0 to 0.5 mm bump, no effect in the DR → Let's consider this range

* Conversion factor channels-μm for OTR is not very precise

Emittance growth studies using static bumps in the ATF EXT line

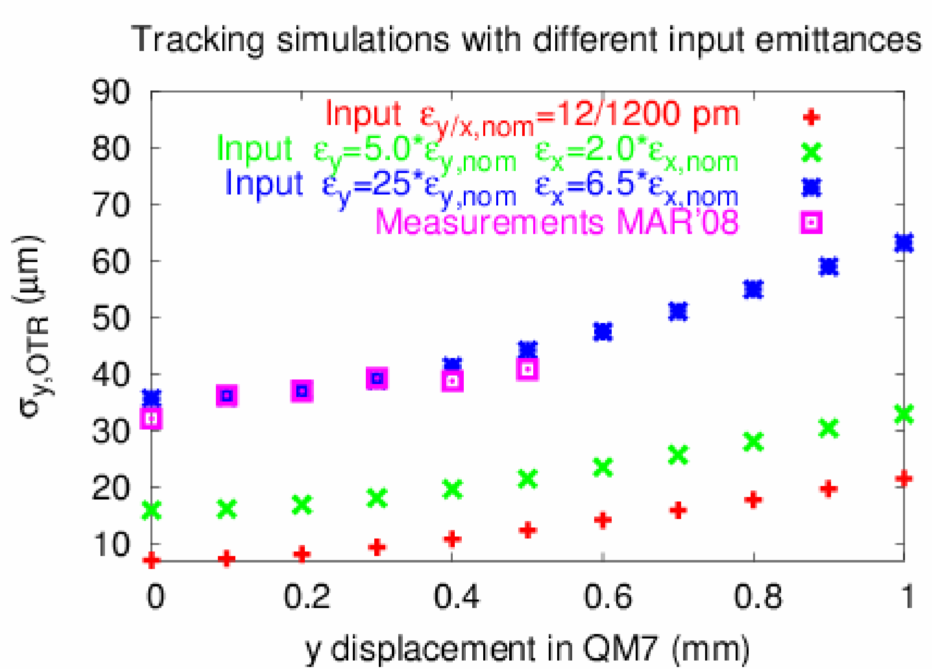
March'08 measurements

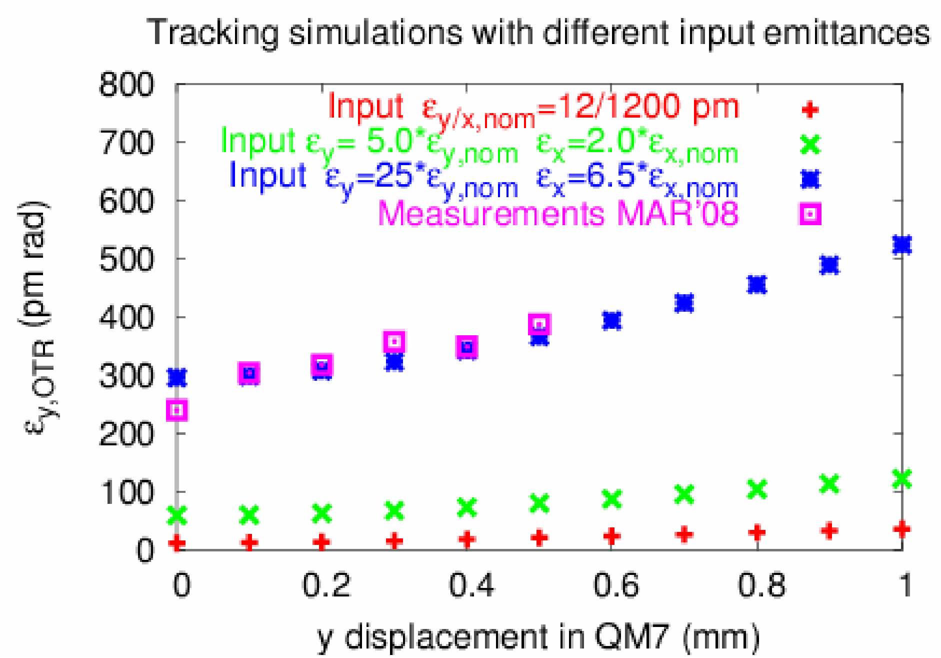
Tracking simulations in the Extraction Line

- With bumps created with ZV9R and ZV100R
- Including non-linearity in QM7
- For different input emittances

DR emittances during the shift computed from beam sizes and ß-functions at the XSR:

ε_y=60.3 pm ~ 5*$\varepsilon_{y,nom}$
ε_x=2.4 nm ~ 2*$\varepsilon_{x,nom}$





For the conversion to emittances of the measured beam sizes at the OTR, $ß_y$=4.32 m at the OTR location is considered.