

Emittance of ATF-DR and -EXT 2011-2013

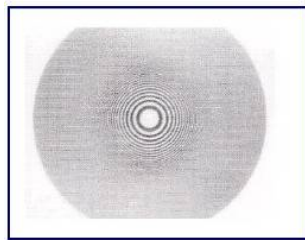
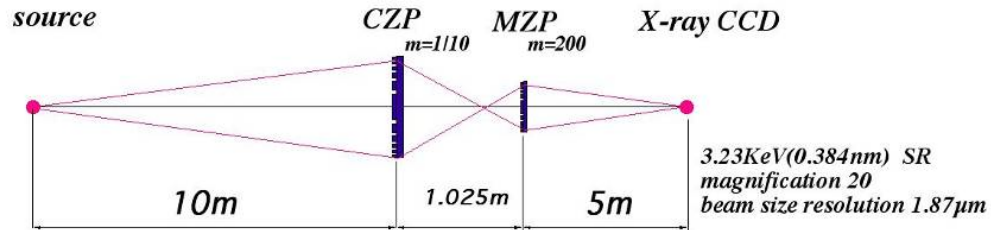
S.Kuroda(KEK)

Emittance Tuning in DR

- Usually done just after the start-up
- Routine emittance tuning
 - Dispersion correction
 - η_x in straight section is corrected by QM trim
 - η_y is corrected by correctors
 - Coupling correction
 - Correction of vertical leakage of the horizontal kicks by a couple of horizontal correctors.
 - Correction is done by Skew Q winding trim coil of SX.
- DR study in June: Beta beat correction
 - --> Repot by Y. Renier

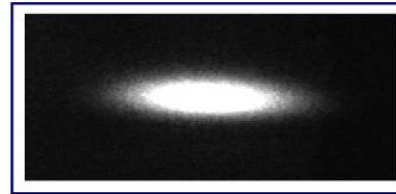
XSR Beam Size Monitor

X-ray SR monitor using zone plate (Tokyo Univ.)



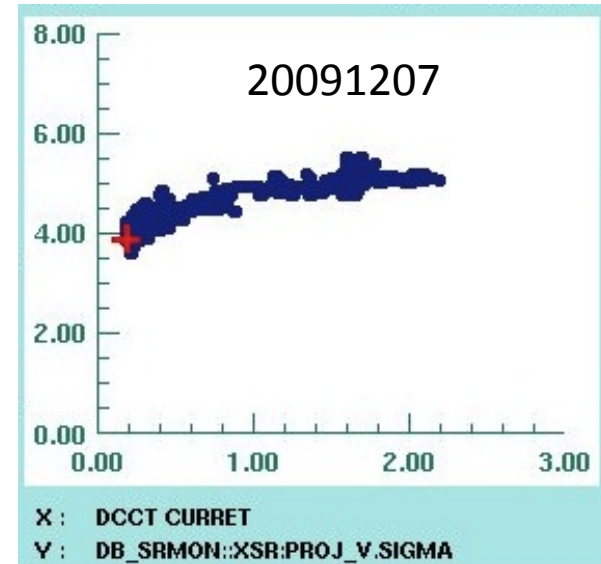
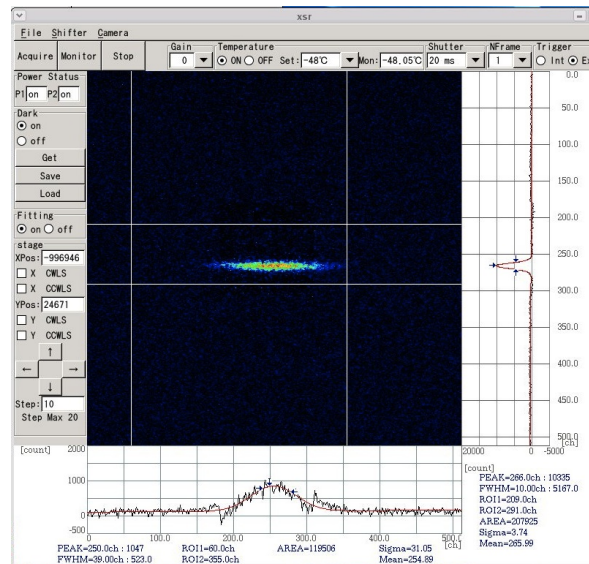
CZP : 3mm dia.
6497 zone rings
minimum zone width 108nm

MZP : 75µm dia.
584 zone rings
minimum zone width 127nm



Beam image (x:46.2, y:10.2µm)

microscope image of zone plate



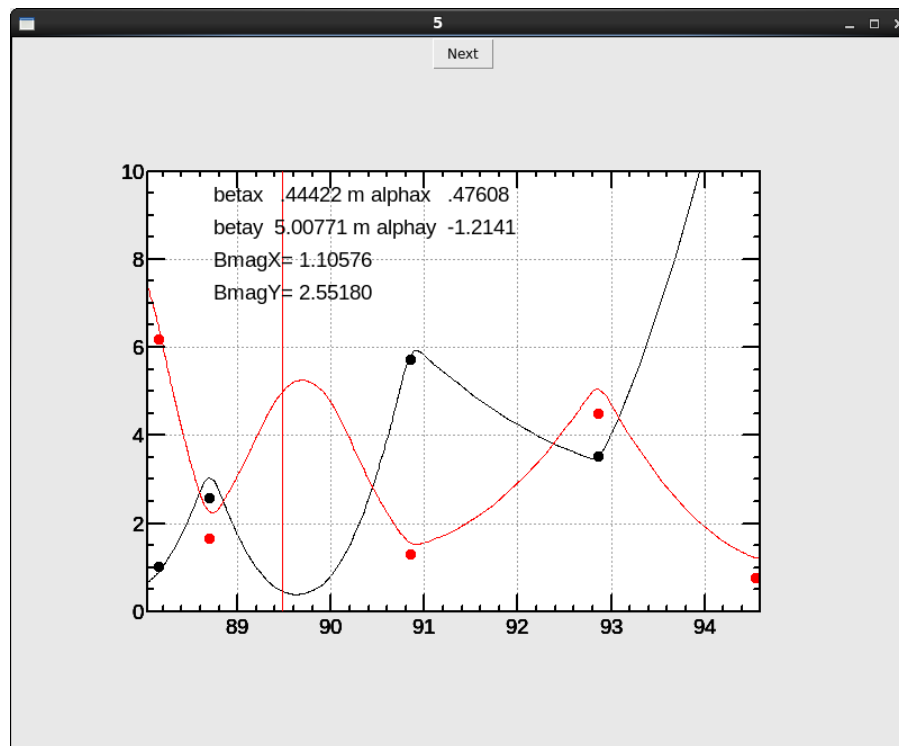
Beta Measurement

- Emittance is calculated by the formula;

$$\sigma_y^2 = \beta_y \varepsilon_y$$

β is calculated by fitting the β s at near Qs, which are measured by tune slope.

ex.)->



EXIT DR Beta function fit

| Qmag NAME | Bx | By |
|------------------------|---------|--------|
| Qmag NAME(1) QM3R.2 | 1.0302 | 6.1808 |
| Qmag NAME(2) QM4R.2 | 2.5680 | 1.6457 |
| Qmag NAME(3) QM5R.2 | 5.7168 | 1.3072 |
| Qmag NAME(4) QM6R.2 | 3.5189 | 4.5021 |
| Qmag NAME(5) QM7R.2 | 15.3215 | 0.7536 |

Load Data 09:26:06 Load data finished.

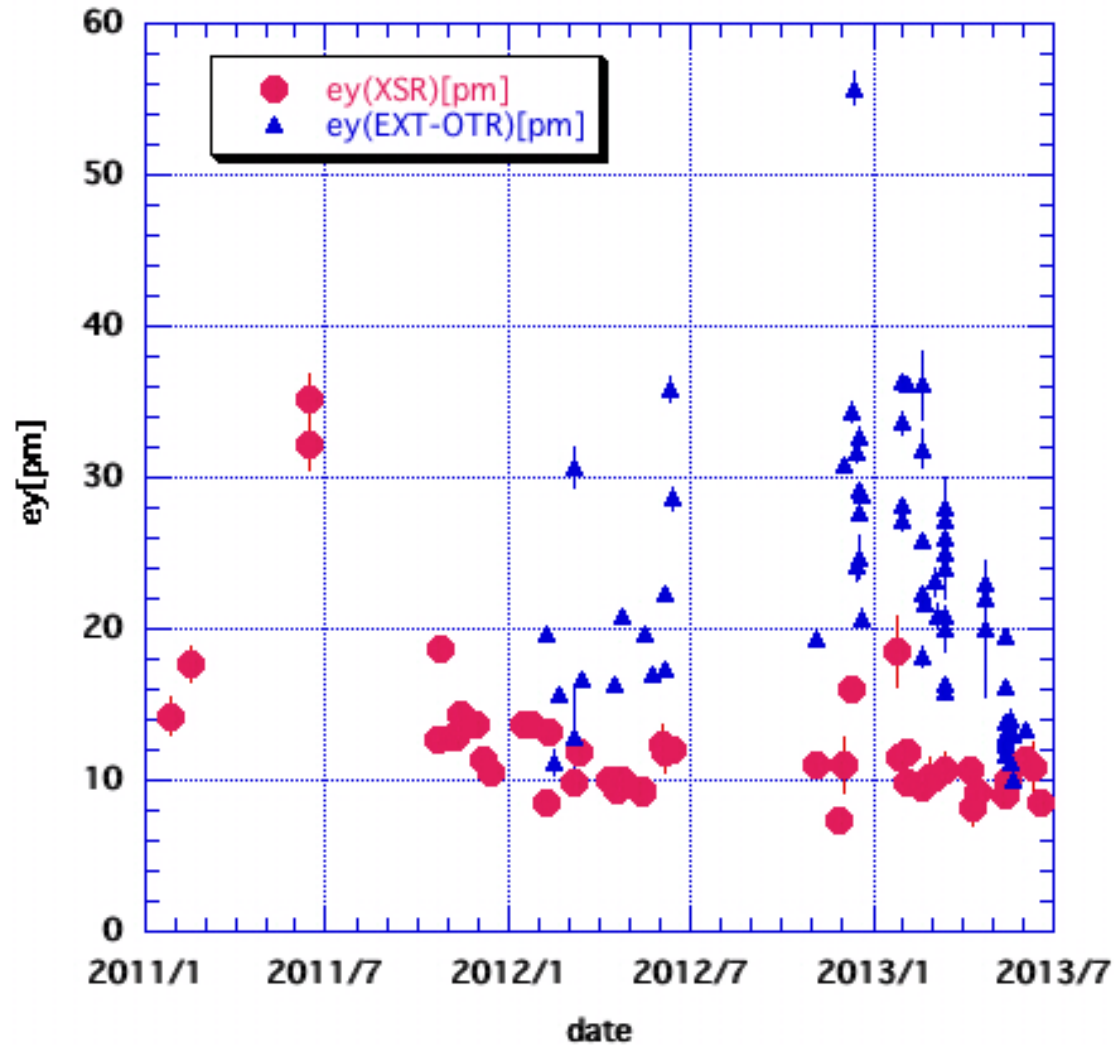
SAVE to SAD CALC.

SR_Betafit
OPTICS NAME SR_Betafit
09:26:11 preparing sad input file.

Name SR1
Offset 0.000

Summary of ε_y of ATF-DR 2011-2013

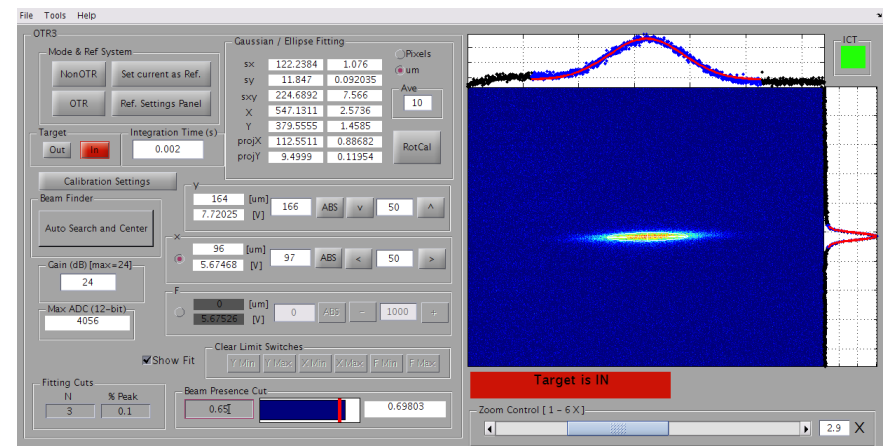
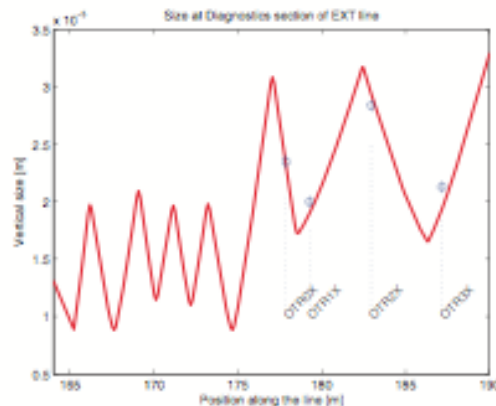
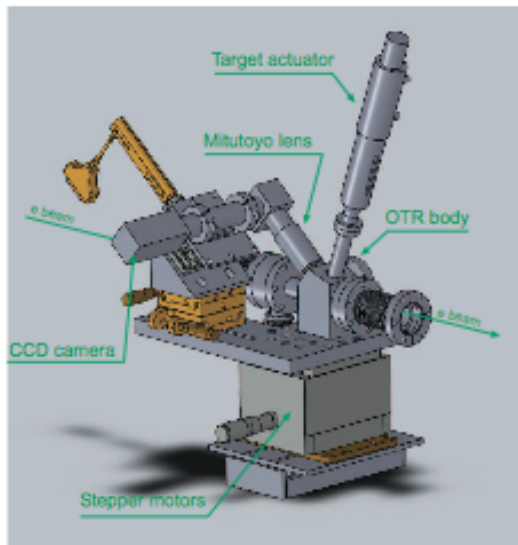
EmityDREXT2011-13.KG3.5



$\leftarrow \varepsilon_y \approx 10 \text{ pm}$

Emittance Tuning in EXT

- Dispersion correction
 - η_x is corrected by QF1X & QF6X
 - η_y is corrected by QS sum knob
- Coupling correction
 - QK or QS+orbit bump or both
- Emittance measurement by mOTR

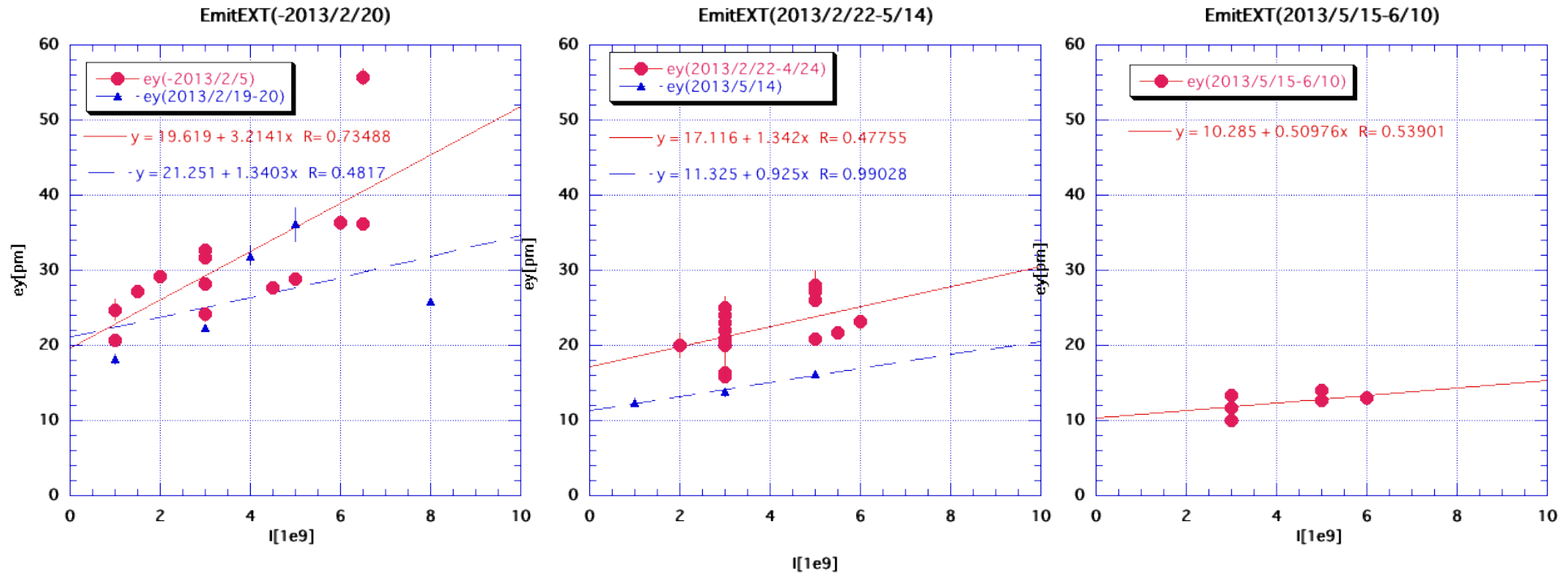


Works in ATF-EXT 2012-2013

| Date | mOTR Monitor | Coupling Correction | General |
|-----------|-------------------------|---------------------|---|
| | | QK | |
| 2012/Dec. | | | 1.Remove possible wake sources ¹⁾ 2.Ref.cav on mover for wake effect correction |
| 2013/2/18 | | QS ²⁾ | |
| 2013/2/20 | OTR3 not well-tuned | | |
| 2013/5/9 | | | Almost all bellows with shield |
| 2013/5/15 | OTR tuned ³⁾ | QS+QK | |

- 1) <http://atf.kek.jp/twiki/bin/view/ATFlogbook/Log20121212m>
- 2) QS magnets are used independently, and QKs are set to 0.
- 3) Report by G.White in ATF operation meeting 2013/5/17

Summary of ε_y of ATF-EXT 2012-2013



- -2012/2/20 large ε_y and strong I dep.
- Shielded bellows looks effective(though the statistics is low).
- Monitor tuning and coupling correction made ε_y closer to DR one.

Summary

- Vertical emittance in ATFDR was around 10pm since 2012.
- Many efforts has been done for small EXT emittance. There are still things to be studied. But the measured EXT emittance in June 2013 is very close to the DR emittance.