

Current Dependence of ϵ_y in ATF EXT (Summary of Study in 2000)

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Current dependence of ϵ_y was studied in 2000.
Emittance is measured by 5 wire scanners(WS)
in extraction(EXT) line of ATF.

Before measurement, dispersion correction is done usually.
Also coupling correction is done. But skew Q position is not ideal
(coupling correction skew Q is placed between WSs),
so the performance of the correction is ‘?’.

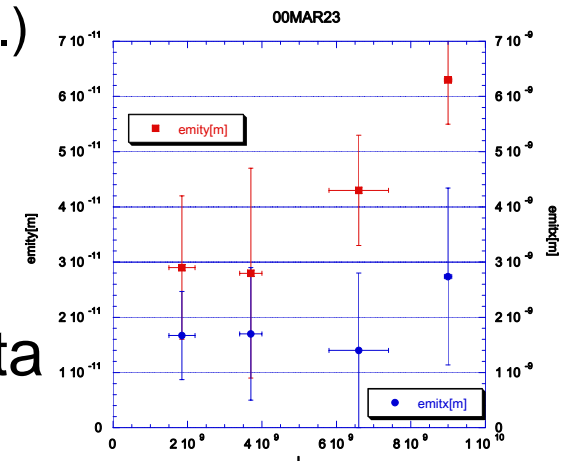
Nevertheless the measurement is done assuming x and y are
decoupled(4D measurement is limited by the accuracy.

Mar.2000

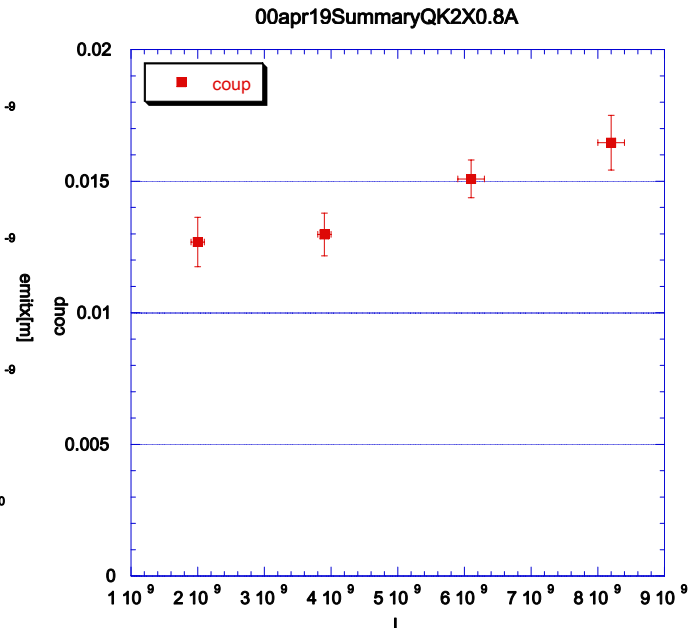
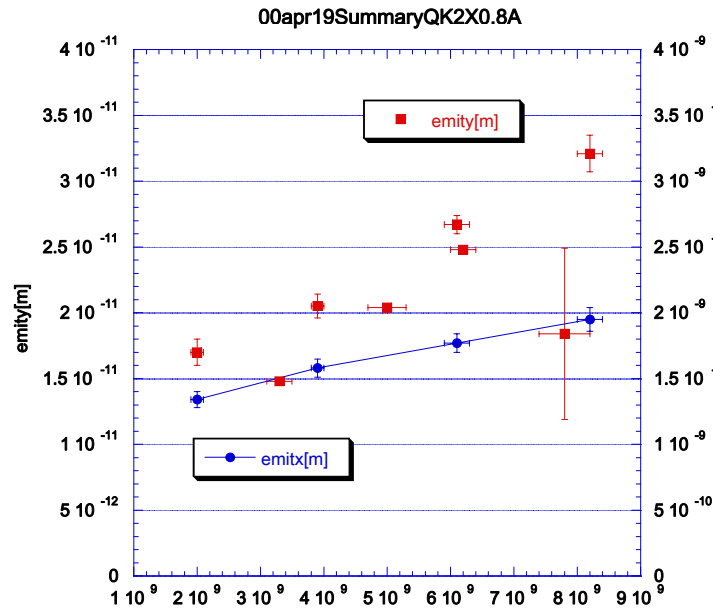
It sometimes give imaginary emittance.)

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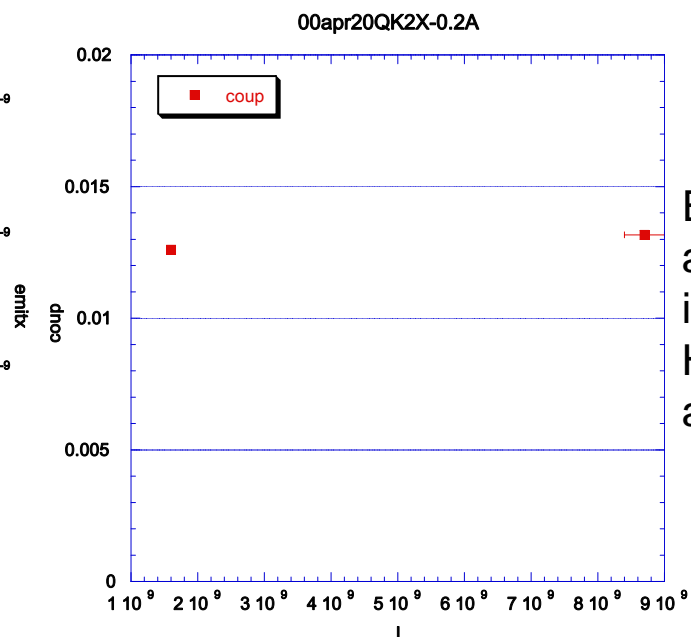
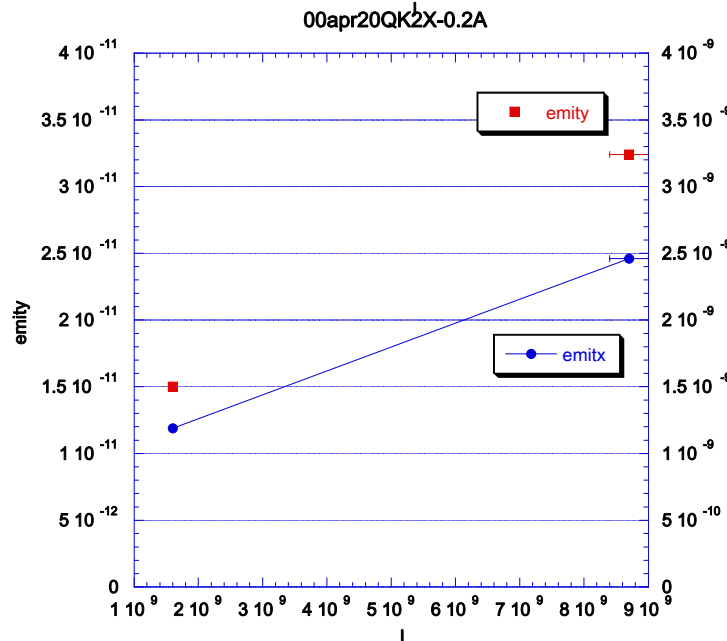
Effect of Coupling Correction



Correction with different Skew setting

QK2X=0.8A

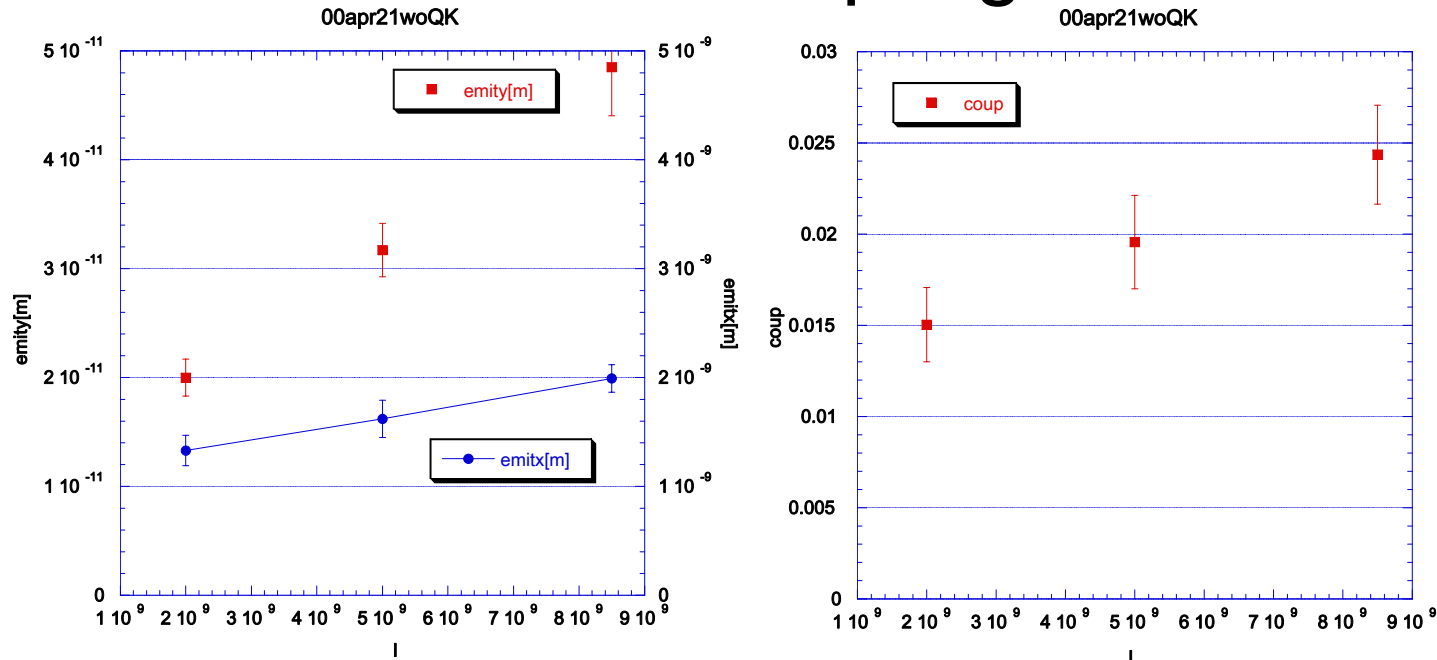
Emittance ratio is current dependent.



QK2X=-0.2A

Emittance ratio seems almost constant but it's due to large Hhorizontal emittance at high current.

Effect of Coupling Correction(2)



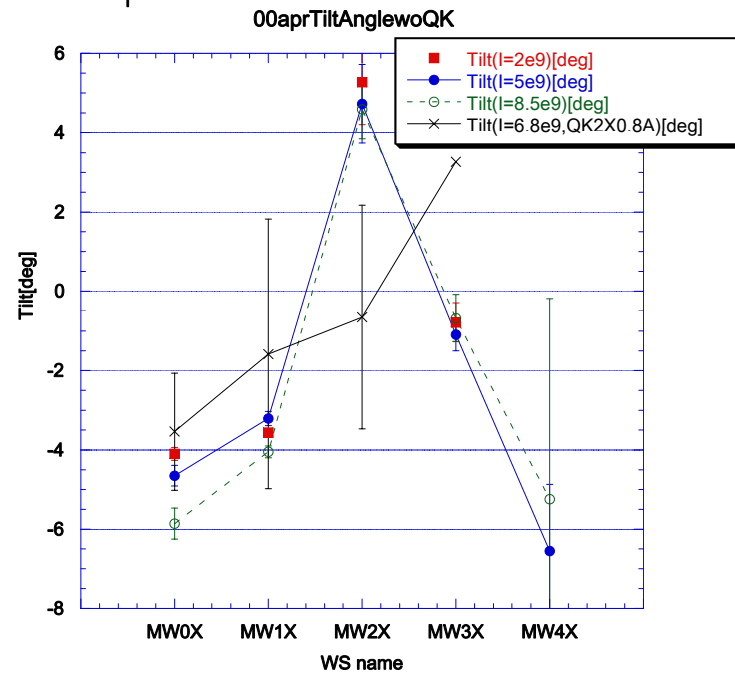
Without
Coupling
Correction

Correction was
effective to some
extent.

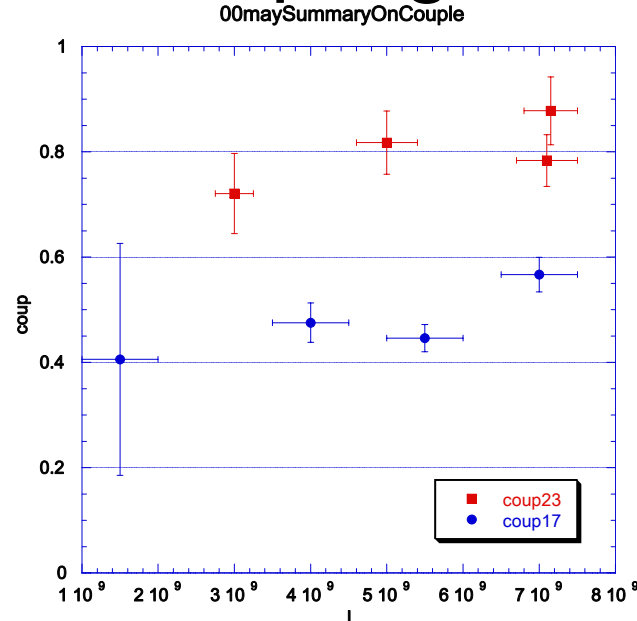
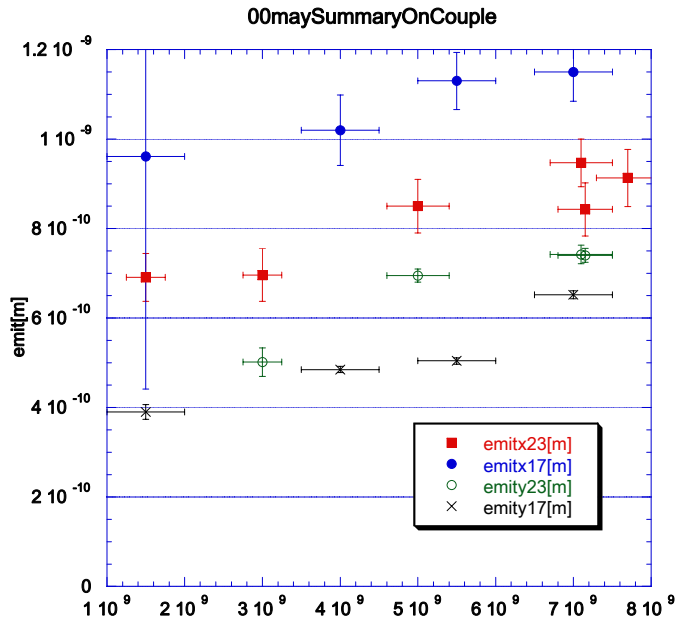
Tilt Angle

In addition to x and y wire, each WS has u-wire (tilted wire by 10 degree), which can be used to measure tilt angle of the beam profile.

Finite amount of tilt angle was observed .

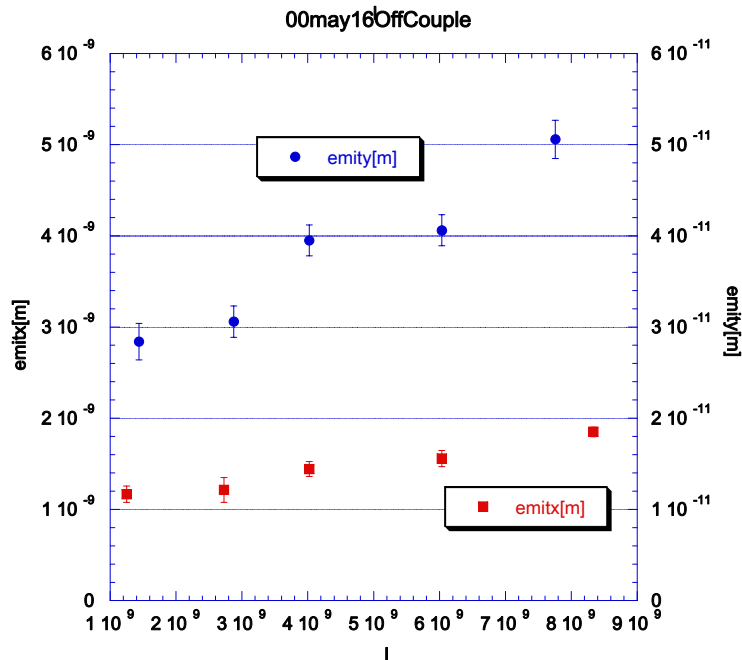


Measurement in Coupling Resonance



On Coupling

EmitX is always larger than emitY somehow.

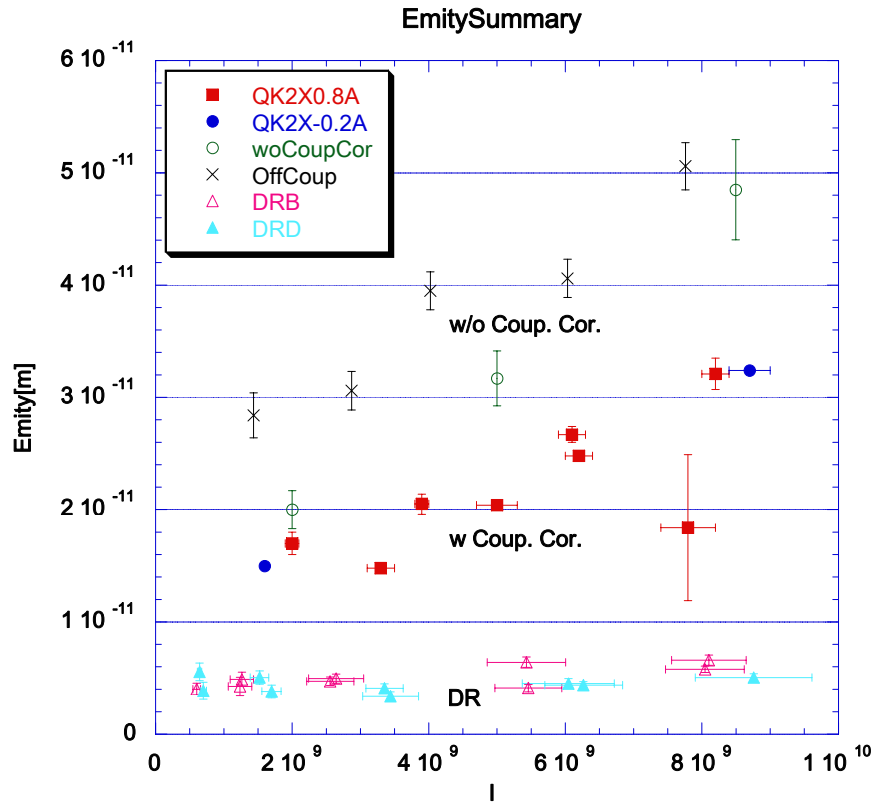


Off Coupling

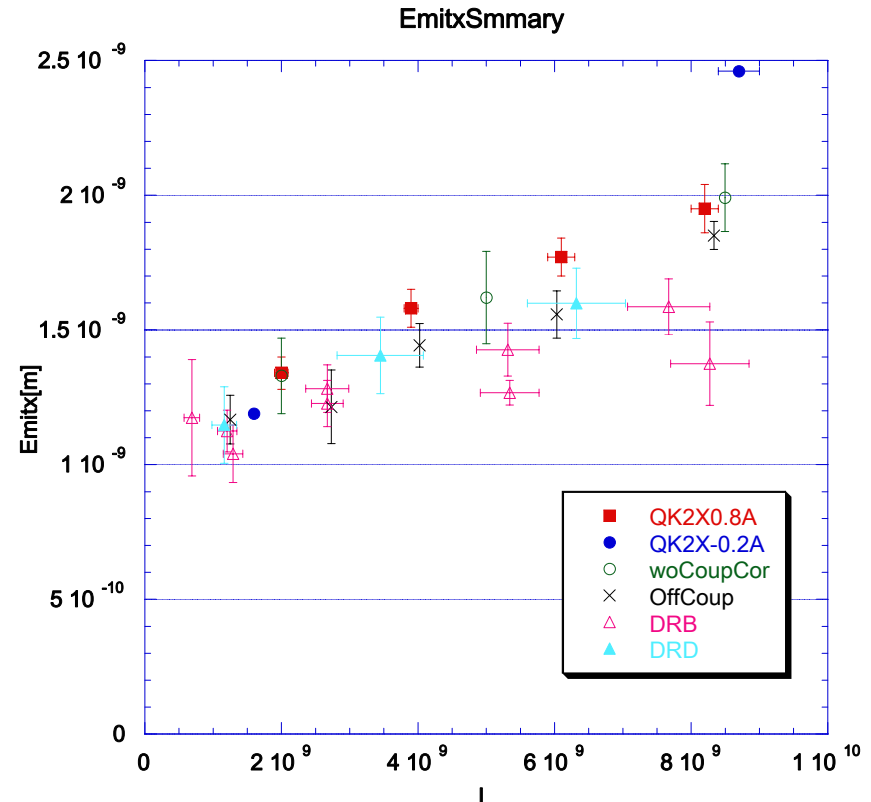
Measurement error is so large to say something definite from these data.

Comparison with DR Data

EmitY



EmitX



Emittance in DR was measured by Laser Wire in 2004.
(PRL92(2004)054802, by courtesy of Y.Honda)

Clear difference between EXT and DR
(and also w and w/o correction) is clear in EmitY.

Summary

- We have observed current-dependent vertical emittance growth in EXT.
- Coupling correction worked but still some amount of growth remained.(Skew Q position for the correction was not ideal. In ATF2, it will be improved.)
- Comparing with the DR emittance, observed emittance growth cannot be explained by intra-beam scattering only.

We still observe ϵ_y growth in EXT(Mar.2007).

