Status of Emittance in ATF DR (Autumn Run in 2009)

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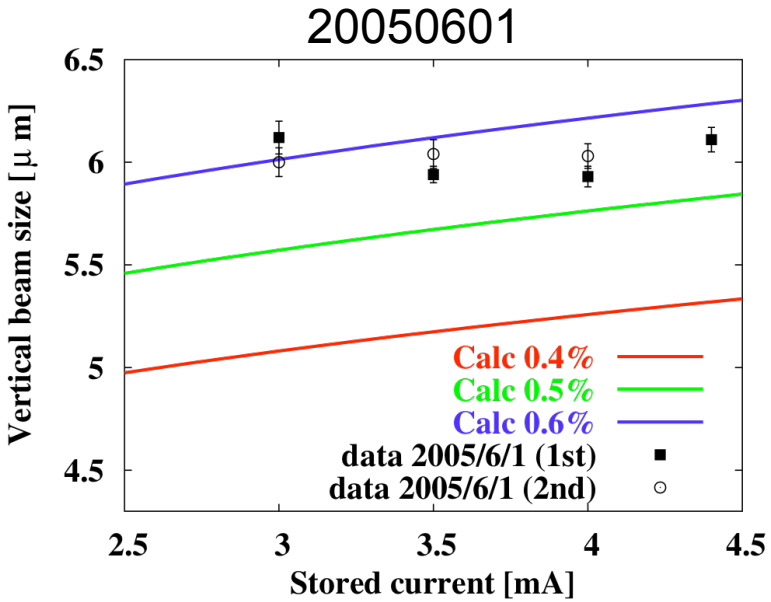
On Behalf of ATF DR Study Group

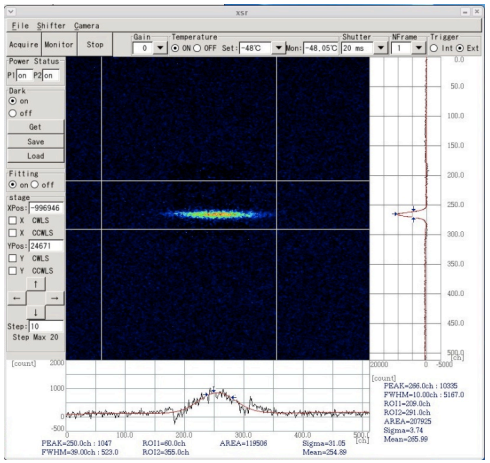
Works for ATF DR

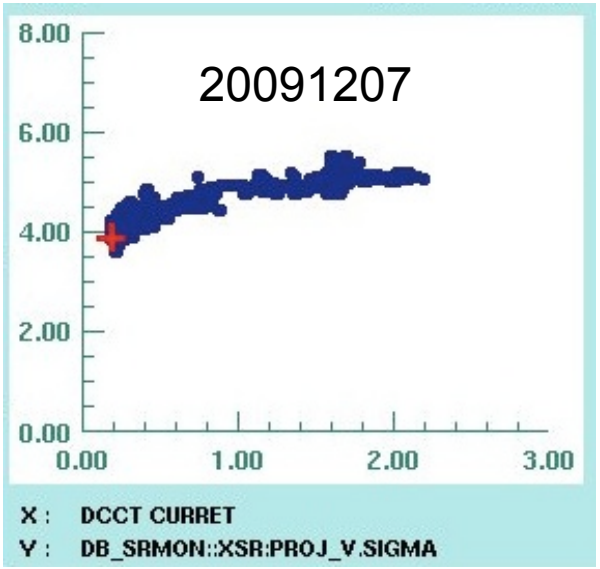
- Hardware issue
  - Re-alignment in summer shutdown
  - Beam size monitor improvement →following slides
- Beam tuning method
  - β beat correction
    - Correction with QM18R.1&QM15R.2 trim. ←K.Kubo
  - Dispersion correction
    - η_x in straight section is corrected by QM trim
    - η_y is corrected 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.

Improvement of Vertical Emittance measurement (½)
XSR monitor

T.Naito



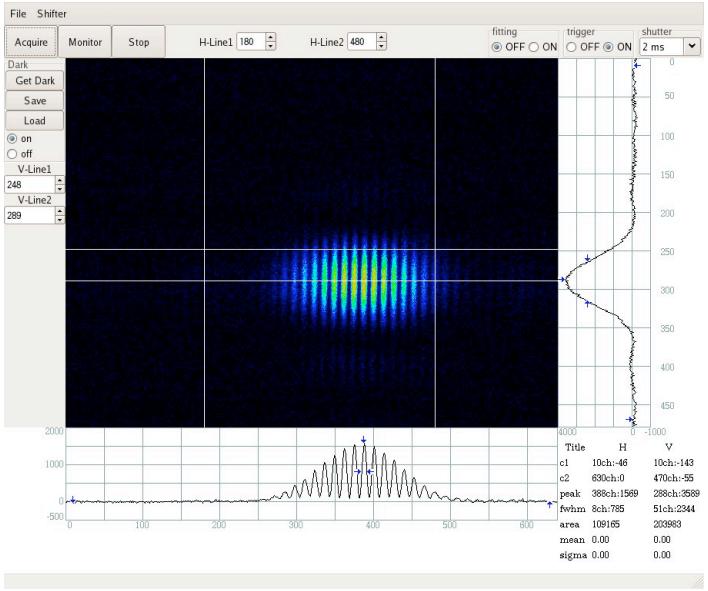


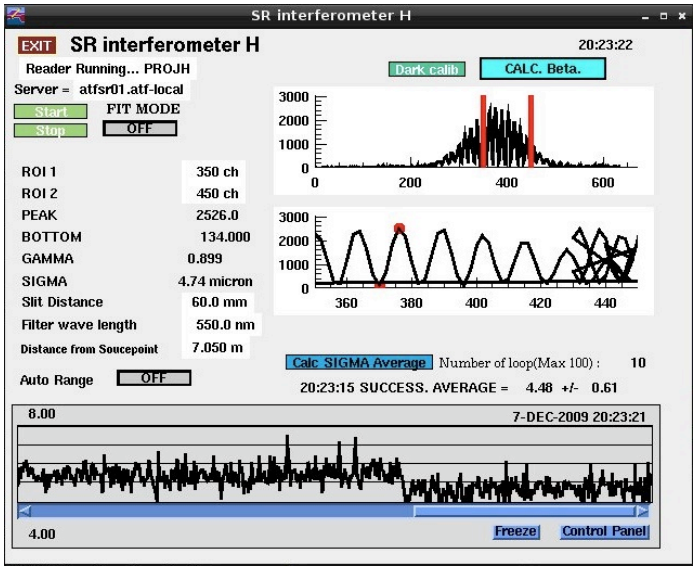


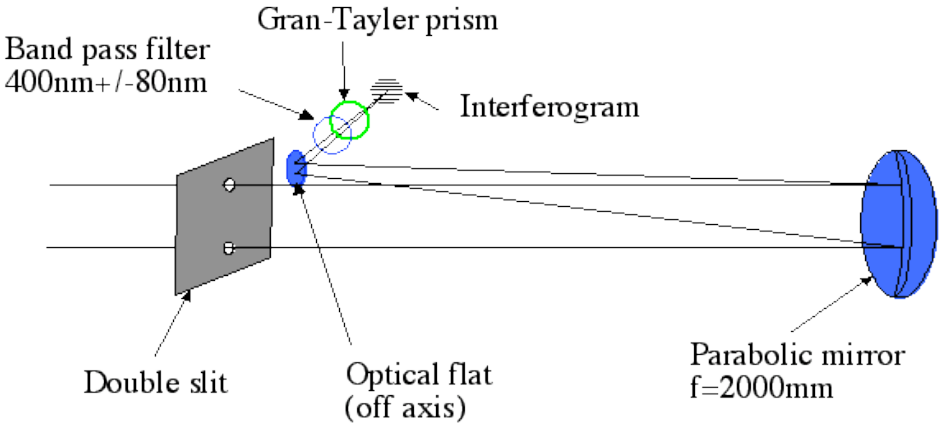
The X-ray SR monitor(XSRM) was affected by the mechanical vibration of the air blower for the RF waveguide. The air blower was located near the grating mirror of the XSRM. The beam profile was smeared and the measured vertical beam size was always larger than 6um. After insert air cushions between the air blower and the ground, the measured vertical beam size was recorded less than 4um, which is not yet limited by the monitor.

Improvement of Vertical Emittance measuremen(2/2)
SR interferometer

T.Naito







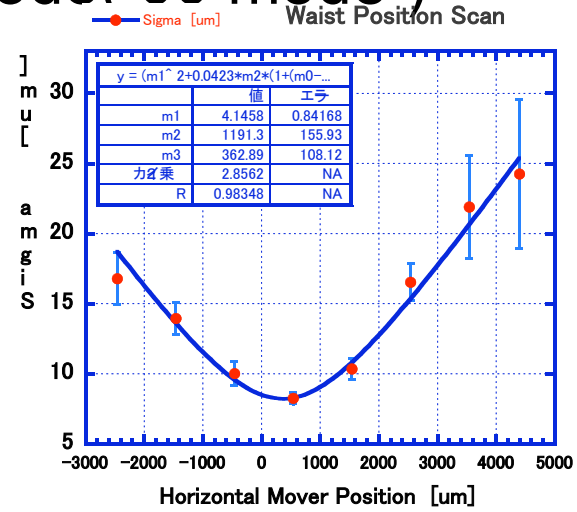
Double slit separation of 40mm was mainly limited by effective aperture of optical path between the source point and interferometer. In this time, the optical path was re-aligned, and as a result, the effective aperture was increased. According to this re-alignment the double slit separation was expanded up to 60mm. To reduce air turbulence, the optical path was covered with air tight duct. To reduce mechanical vibration of the mirrors on the optical table, the optical axis was rotated 90 degree. After these treatment, the measurement could clearly respond the beam size change from 5um to 4um. (left)

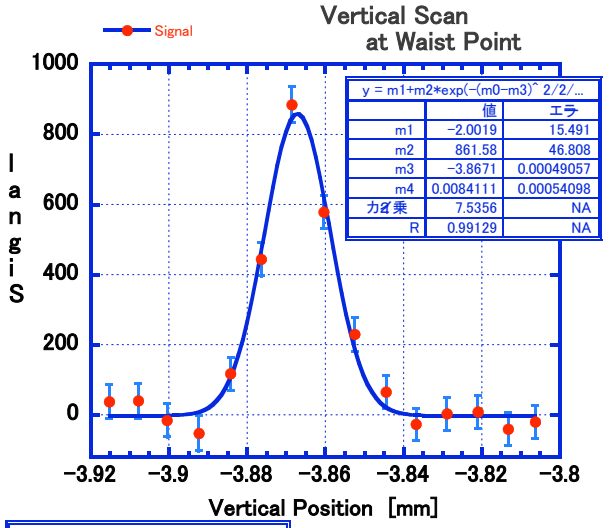
Laser Wire Measurement in DR

H.Shimizu

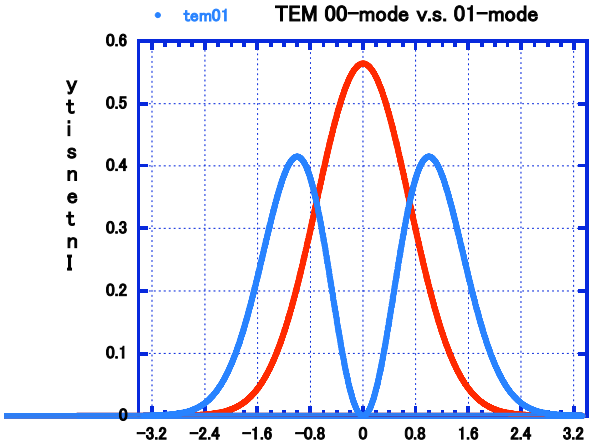
Fundamental mode(00 mode)

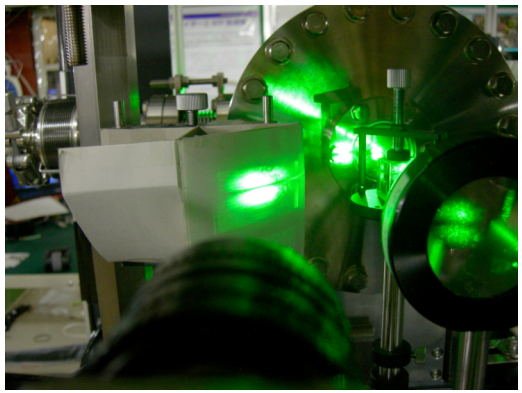
σ_e=4.1±0.8um

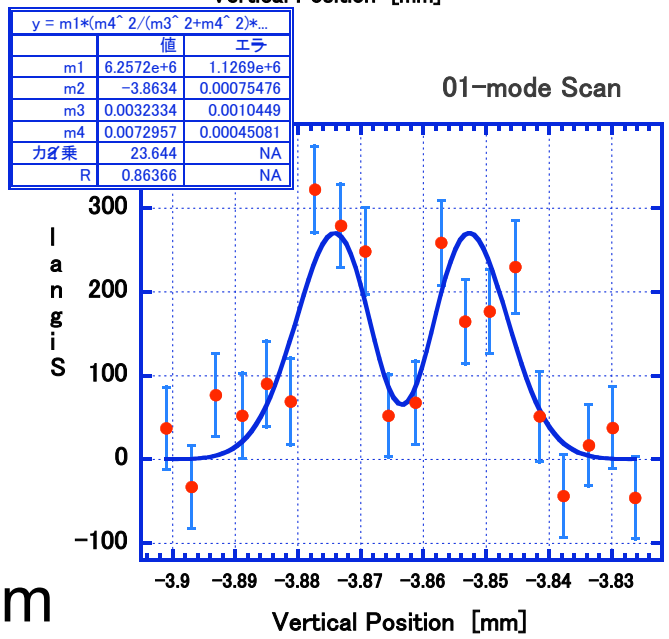




Higher order mode(01 mode)

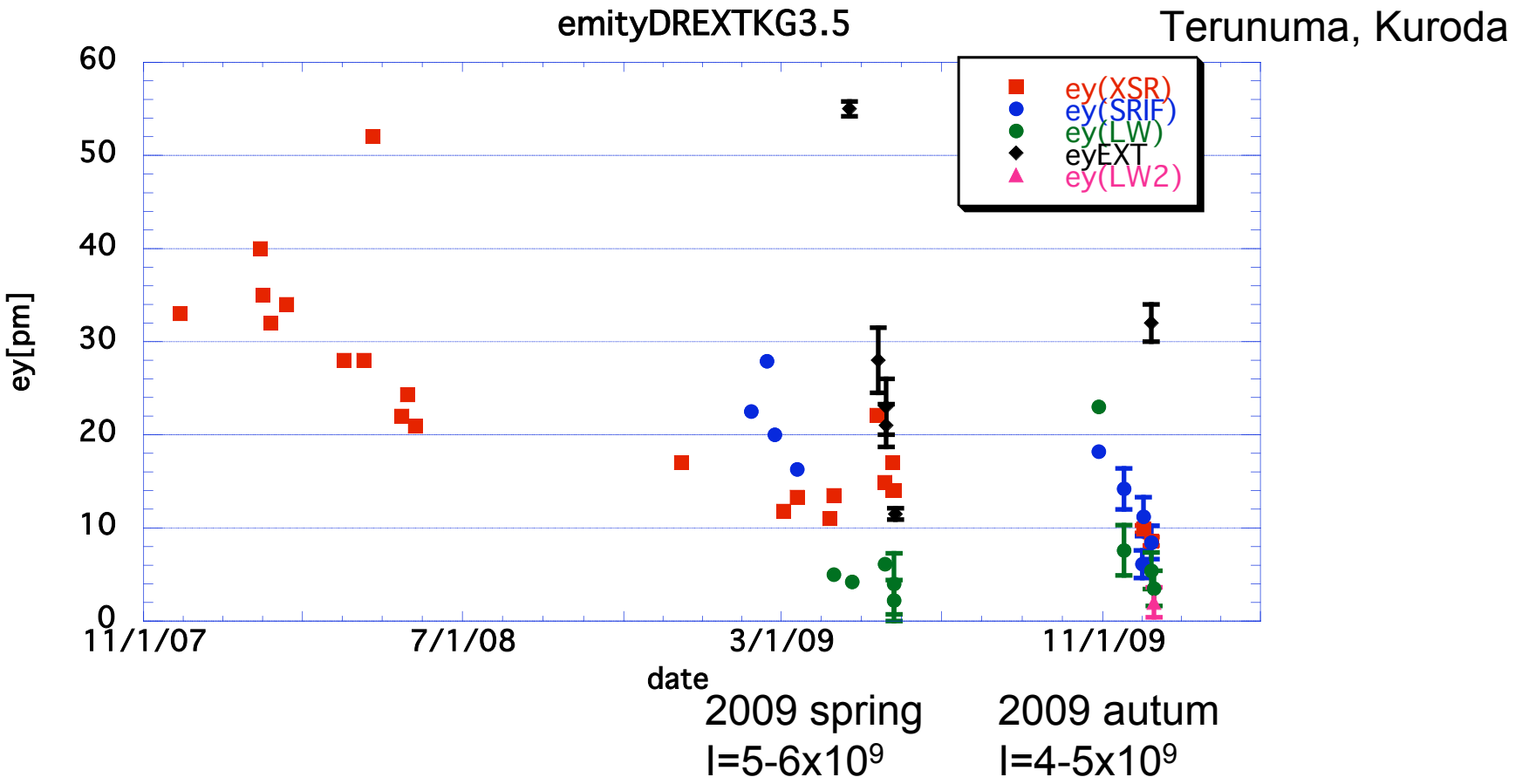






σ_e=3.2±1.0um

DR Emittance Summary



Emittance situation is similar to that in May 09.

Measured ε_y=8.56±0.46/ 8.43±1.79/ 3.50±1.78/ 2.00±1.61pm by XSR/ IF/ LW00/ LW01.

Study for the discrepancy is still on going.