

# Review and status of software tools for ATF2

S.Kuroda(KEK)

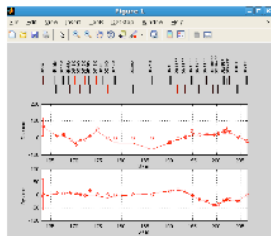
- Dispersion correction
- Coupling correction
- Emittance measurement & beta-matching
- Linear knob
- Beam size measurement at IP
- ...

# Dispersion Correction

## Flight Simulator Dispersion Measurement / Correction



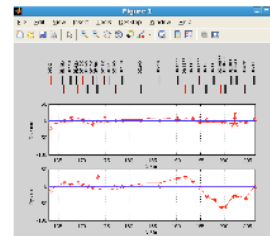
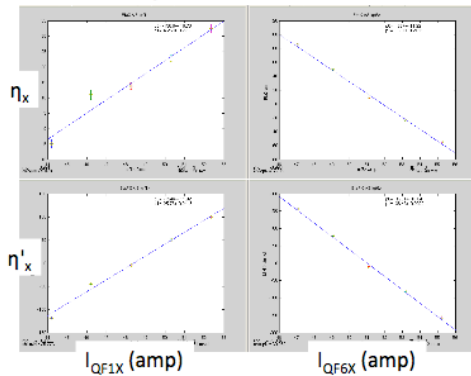
M. Woodley



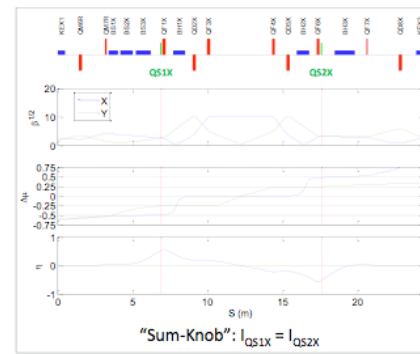
Before Correction

### Horizontal Dispersion Correction

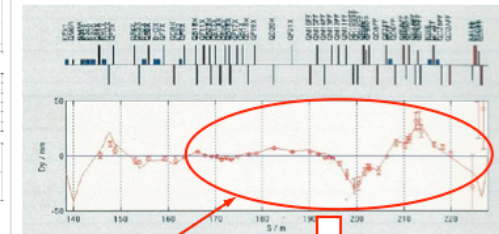
Response Matrix Measurement



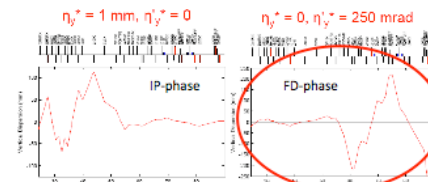
After Correction



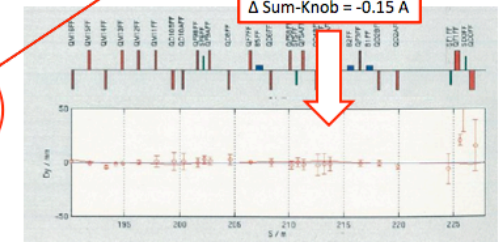
### Vertical Dispersion Correction (FD-phase)



$\Delta$  Sum-Knob = -0.15 A

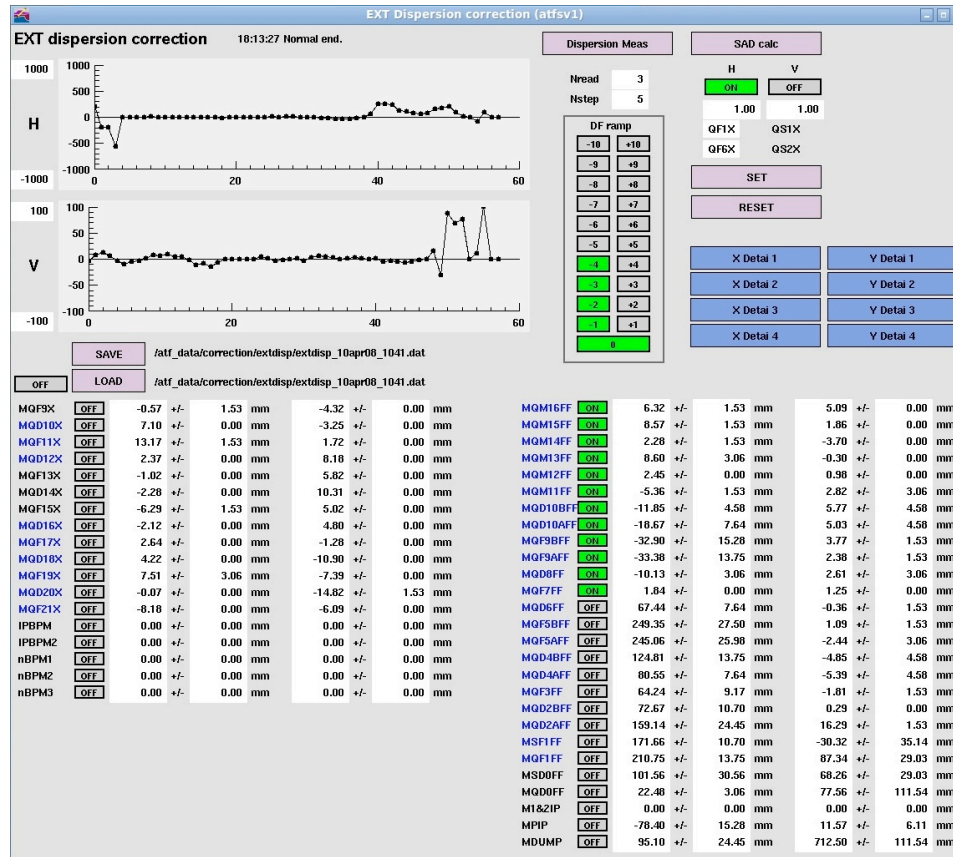


Simulated  $\eta_y^*$  (right) and  $\eta_y'^*$  (right), back-propagated from IP



# Dispersion Correction

- Dispersion measurement and correction based on V-system
  - Update to use not only stripline BPMs, but also cavity BPMs



T.Okugi

# Coupling Correction

- Quick correction;
  - 1 Skew Q for 1 WS
  - Maybe iteration is needed
- Simple software based on V-system
  - Need to be better?

# Emittance measurement and beta-matching

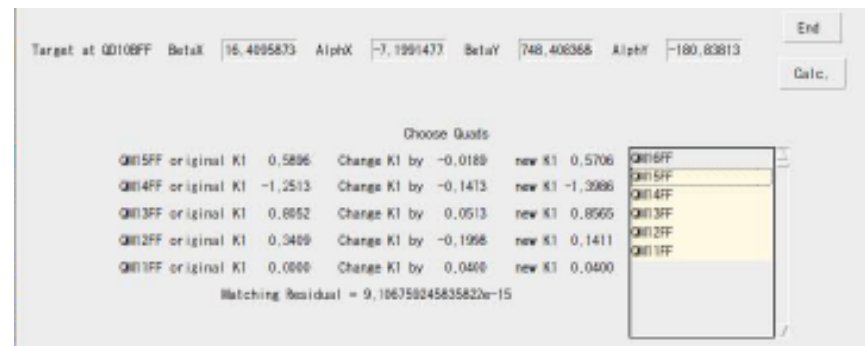
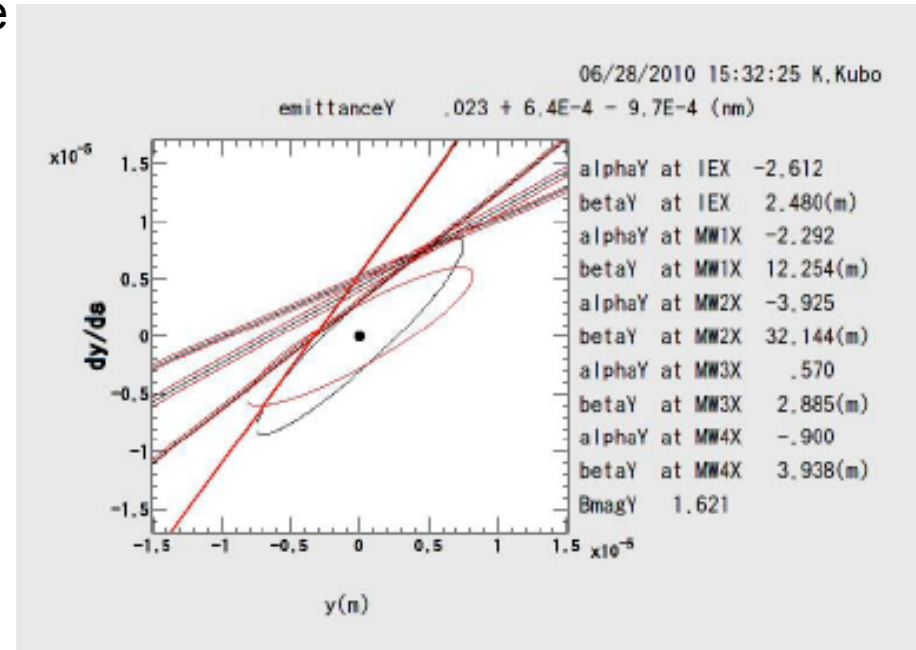
Use measured beam size by 3 - 5 wire scanners

Evaluate emittance and Twiss-parameters by fitting. (keeping emittance positive)

B-mag is calculated, compared with “design” beam.

Matching: Calculate setting of QM11-16FF (used magnets can be selected) for making downstream beam as designed

The magnets are downstream of the wire scanners. So, matching results cannot be checked by the same monitors.



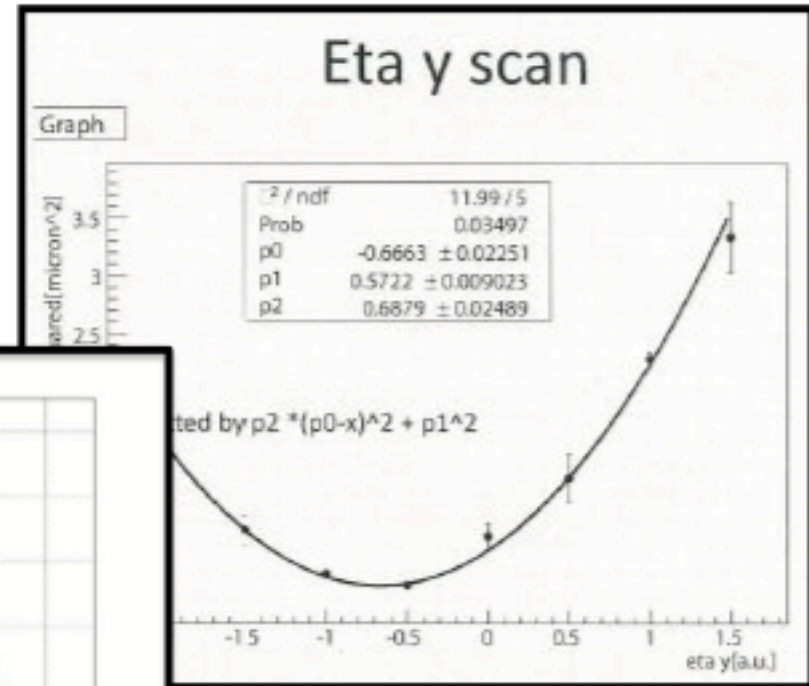
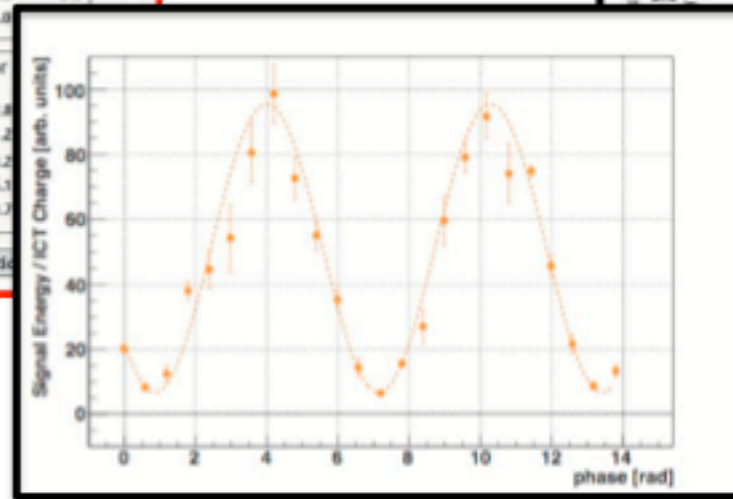
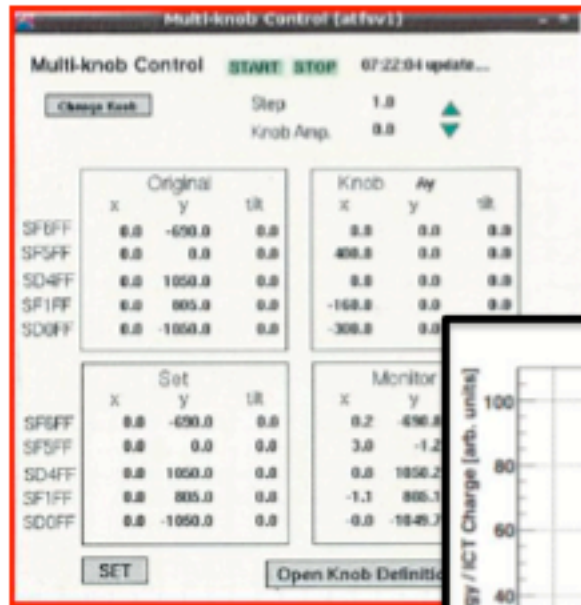
K. Kubo

# Emittance Measurement & Beta Matching

- Another program by M.Woodley based on Matlab
  - Solving linear eqs.
    - Emittance can be imaginary
- New software to be developed/modified for the newly installed OTR system



# IP Tuning with FFS Sextupole Multiknobs



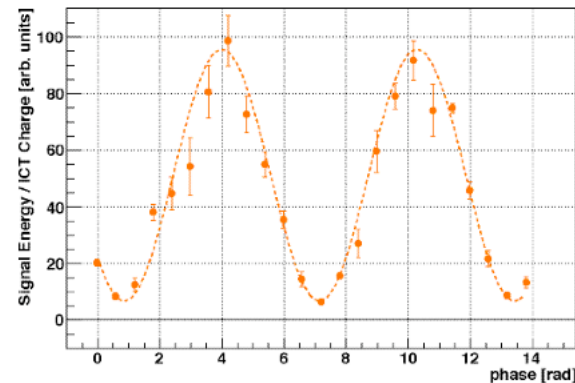
- Iterative use of various knobs to bring down IP spot size by scanning with IPBSM.

# Beam Size Measurement at IP

- Two software; data-taking&display
- Need experts to run
- Also experts are needed to tune the monitor itself



Best result of continuous tune week:  
May 17-21, 2010



Yoshio Kamiya and Shintake monitor group.  
Modulation Depth = 0.87 @ 8.0 deg. mode  
Beam Size is 310 +- 30 (stat.) +0-40 (syst.) nm



# FS Based Software

Orbit bumps (3 and 4 corrector / mover bumps)

\*IP tuning multiknobs (FFS sextupole mover based) - 2 applications

Orbit steering - 2 applications

\*Lattice check - response matrix experimental vs. optics comparison

\*BBA - Quad shunting and Sextupole BPM - Magnet field center determination

\*EXT Dispersion measurement and correction

EXT coupling correction

\*Multi-OTR application

Online Twiss plotting / analysis (MAD link)

\*Online dispersion measurement (SVD technique)

\*EXT stripline setup and calibration

Magnet standardisation

\*Parameter scan / wire scanner interface

\*Orbit feedback and IP position interpolation

G.White

# Summary

- Software for the IP beam size tuning is generally well-prepared.
- More users/more frequently use will make the programs better/more sophisticated.