

# Beamline Modeling Tools

ATF2 weekly meeting

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Tuesday, 9<sup>th</sup> September, 2008



SLAC

# Beamline Modeling Tools

- A collection of tools for lattice verification
  - Hardware (e.g. BPM resolution)
  - Lattice (e.g. R matrices)
  - Beam (e.g. Emittance)
- Substantial overlap with other groups
  - e.g. quad-bpm offset measurement likely to be deployed as part of the spot size tuning procedure.



# Incomplete list of tools (1)

- Orbit measurement
  - Absolute / difference, single-shot / averaging
- Emittance measurement
  - Quad scan or multi-wire
  - Wirescanner / screen
- Correlation plot
  - Scan a parameter while collecting a range of data
    - e.g. Plot the beam size and orbit against the strength of a quad
- BPM-Quad offset measurement
  - Corrector scans with quad shunting



# Incomplete list of tools (2)

- Bump calculation
  - $x$  or  $y$ , position or angle, 3- or 4-correctors
- R-matrix measurement
  - Measure 1<sup>st</sup> order R matrix with corrector kicks
- Twiss parameters
  - Theoretical and measured
- SVD test for faulty BPMs
- ...
- Anything else?



CLICK TO RUN

SAVE ALL DATA

LOAD DATASET

Points per scan

5

Averages per point

10

Quad Select

- QS1X
- QF1X
- QD2X
- QF3X
- QF4X**
- QD5X
- QF6X
- QS2X
- QF7X
- QD8X
- QF9X
- QK1X
- QD10X
- QF11X
- QK2X
- QD12X
- QF13X
- QD14X
- QF15X
- QK3X
- QD16X
- QF17X
- QK4X

QF4X

BPM 1 = MQD5X  
 BPM 2 = MQF6X  
 BPM 3 = MQF7X  
 BPM 4 = MQD8X

Quad shunt value

80 %

BPM Scan Range

+/- 1 mm

Measurement plane

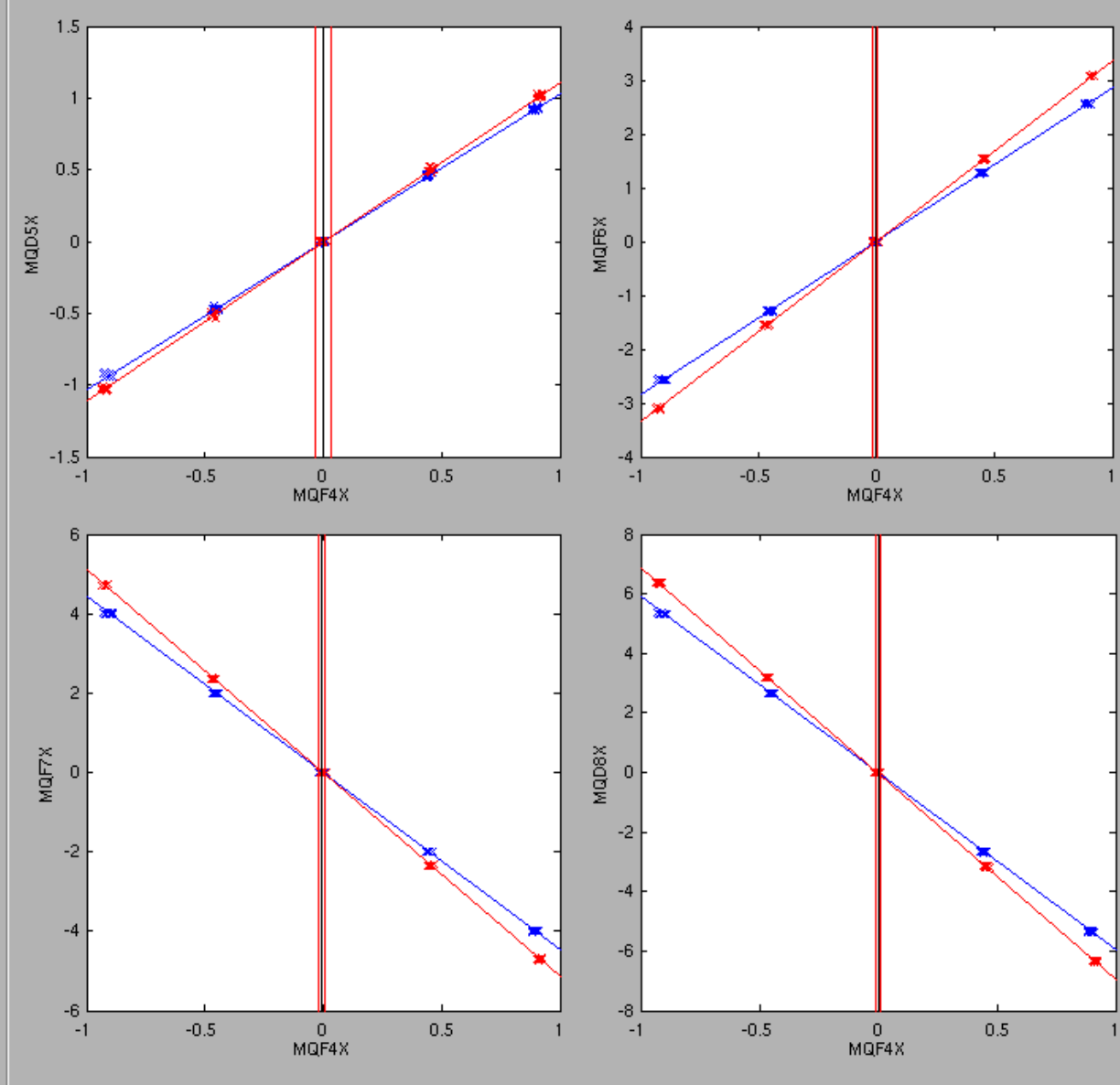
x Plane

y Plane

Status

Centre = -3.001 +/- 6.594 um

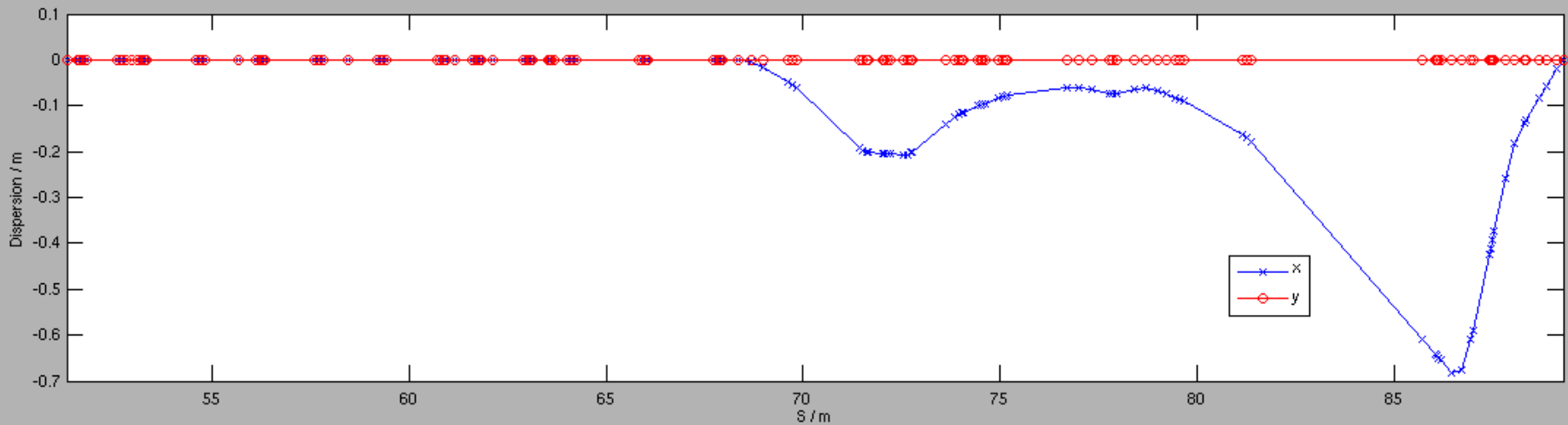
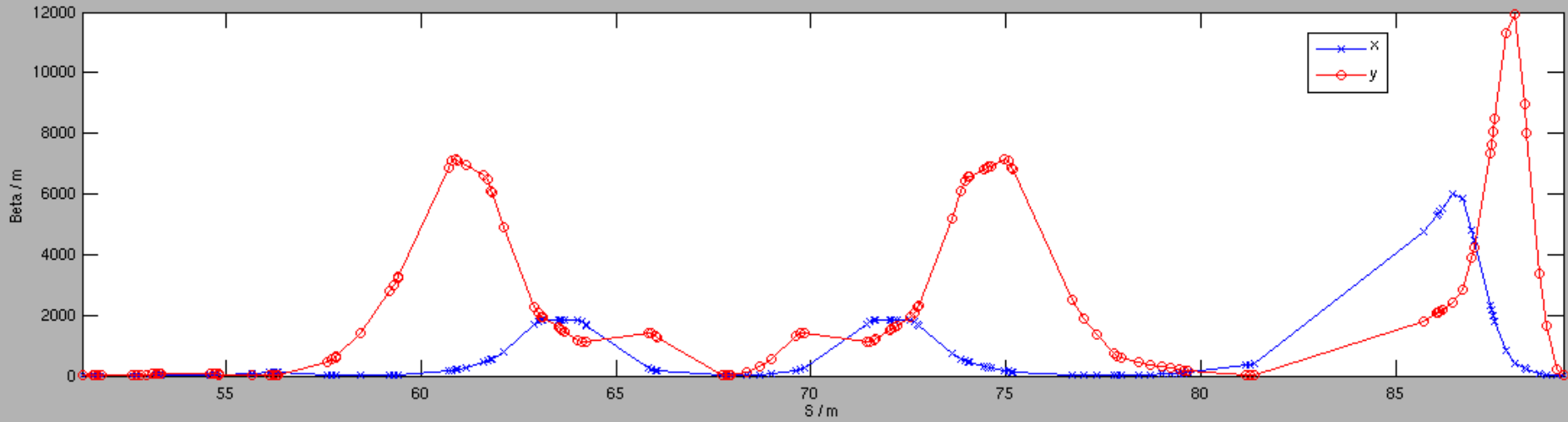
Plots



CALCULATE & PLOT

Region

Final Focus only



# Progress & Plans

- Several tools already well developed
  - BPM orbit display
  - BPM/Quad offset measurement
  - Bump calculation
    - GUI and command-line version callable from other routines
  - Twiss display
    - Only theoretical as yet, need to include twiss measurement
- Development using the Flight Simulator
  - Faster integration into ATF2 environment
- People should let me know of any tools they would like included.

