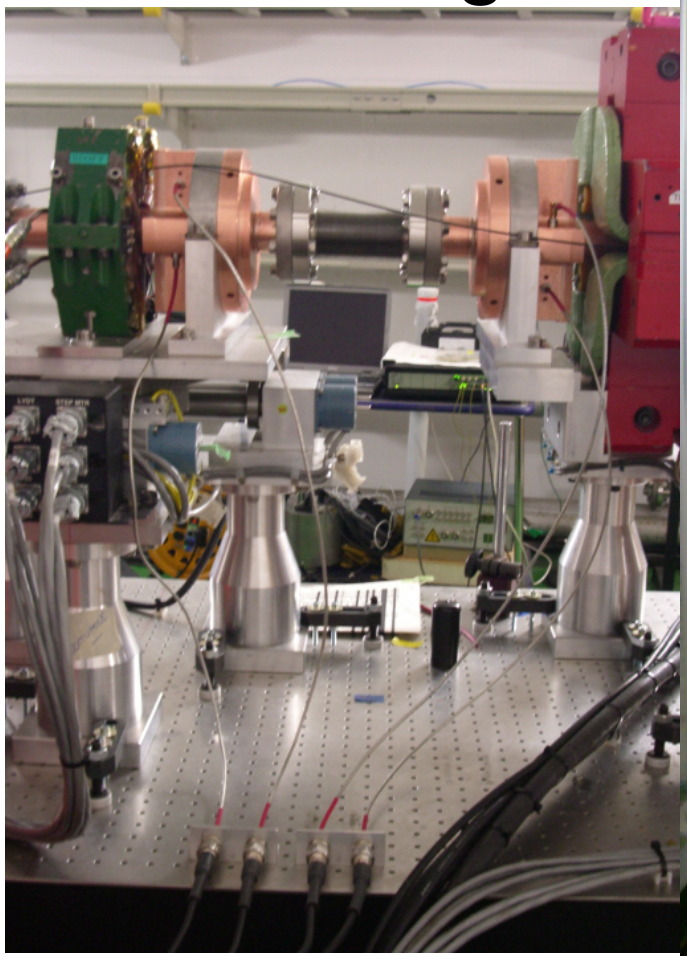
S/C Beam position monitor band

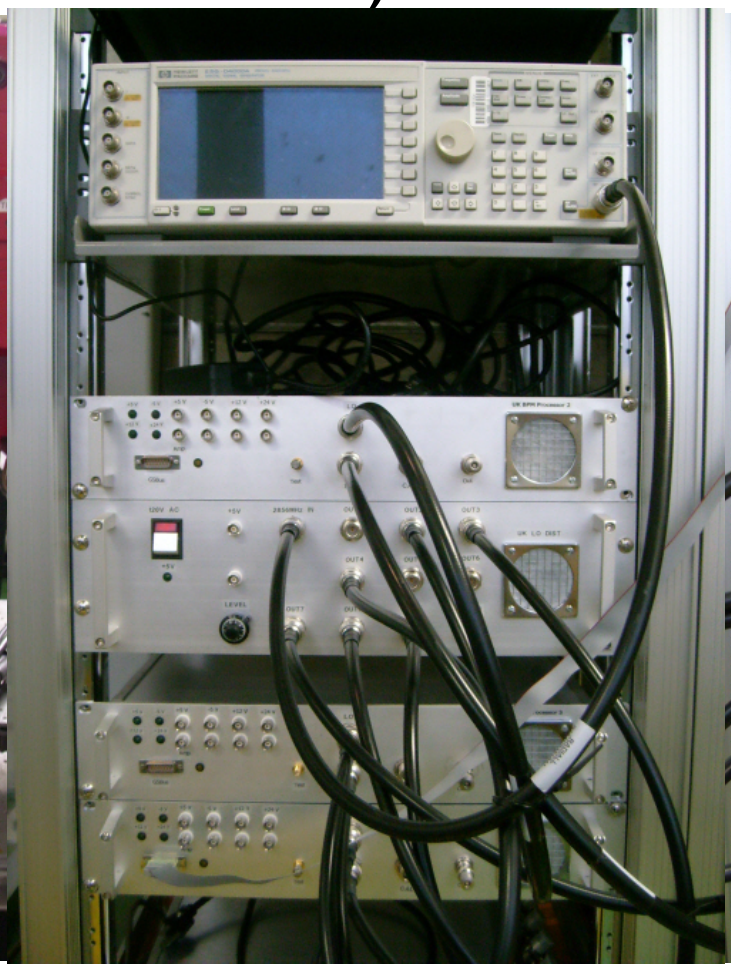
A. Aryshev, S. Boogert, G. Boorman, Y. Honda, J.Y. Huang, S.J. Hwang, J.Y. Kim, A. Lyapin, D. McCormick, S. Molloy, J. Nelson, Y.J. Park, S.J. Park, T. Tauchi, N. Terunuma, G. White.

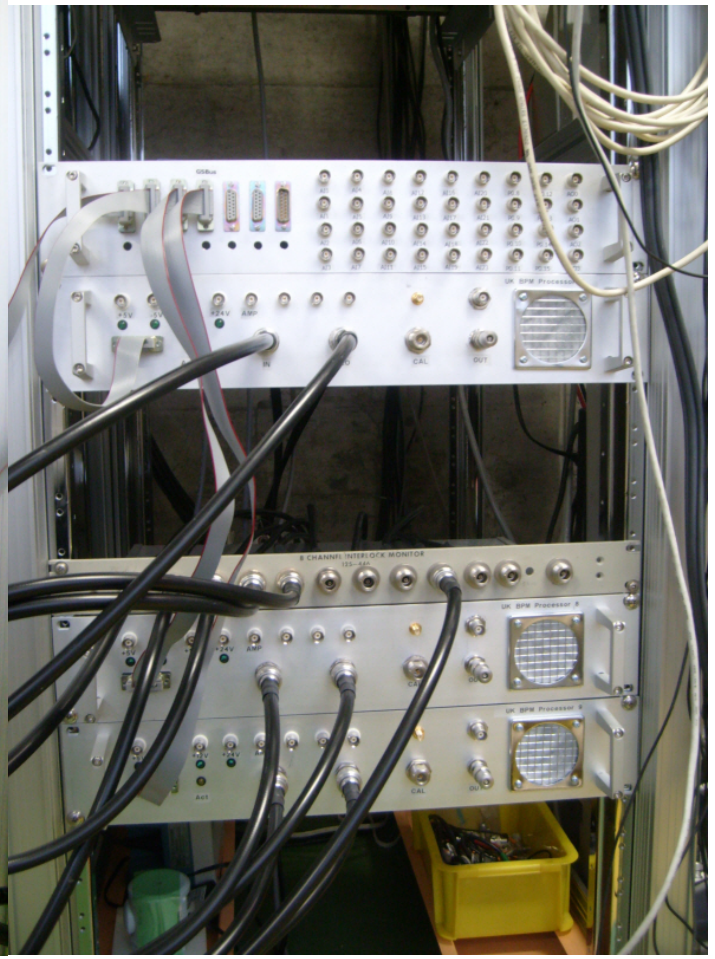
ATF2 project meeting
KEK, Tsukuba, Japan, 15th August 2008

S-band system

- Lyapin installed 50% of S-band electronics
- Remainder to be installed January (some problems with logic control cards)

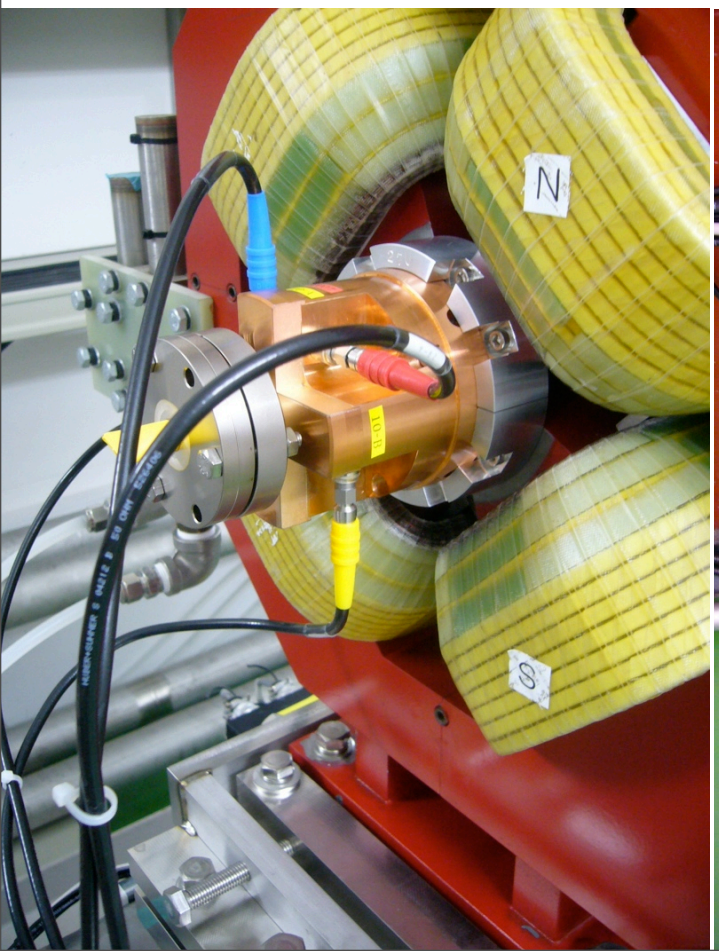


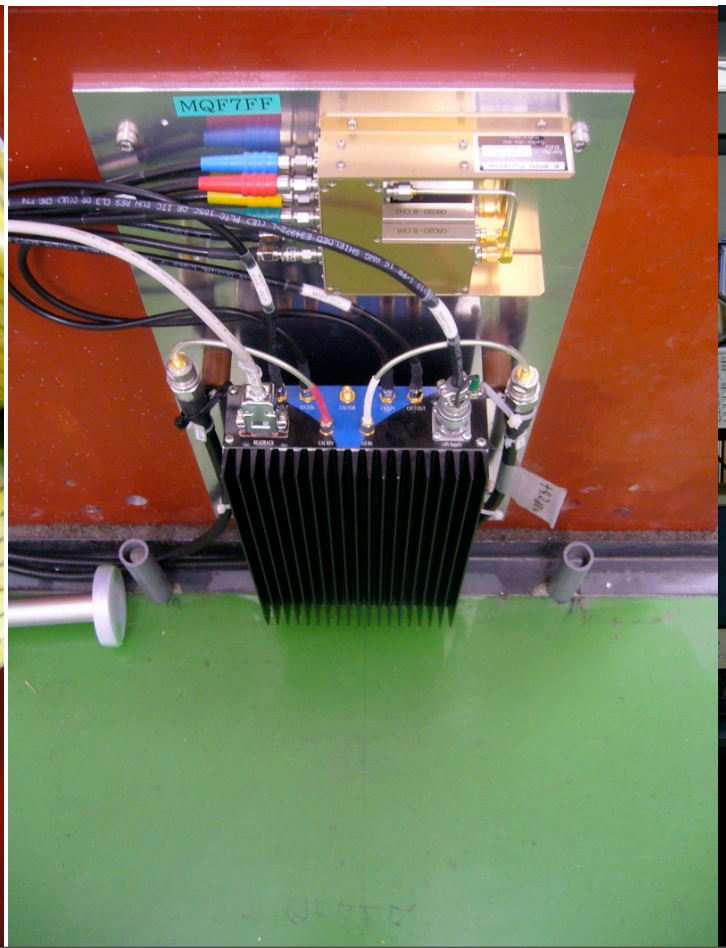


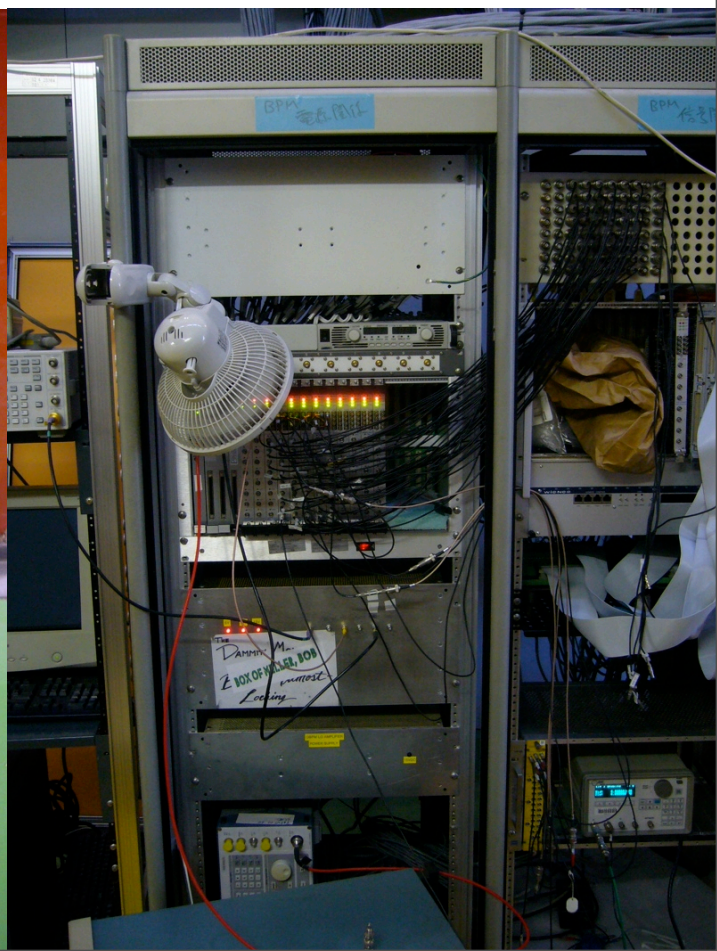


C-band system

- Fully installed and operational
- Tone calibration system, temperature monitoring







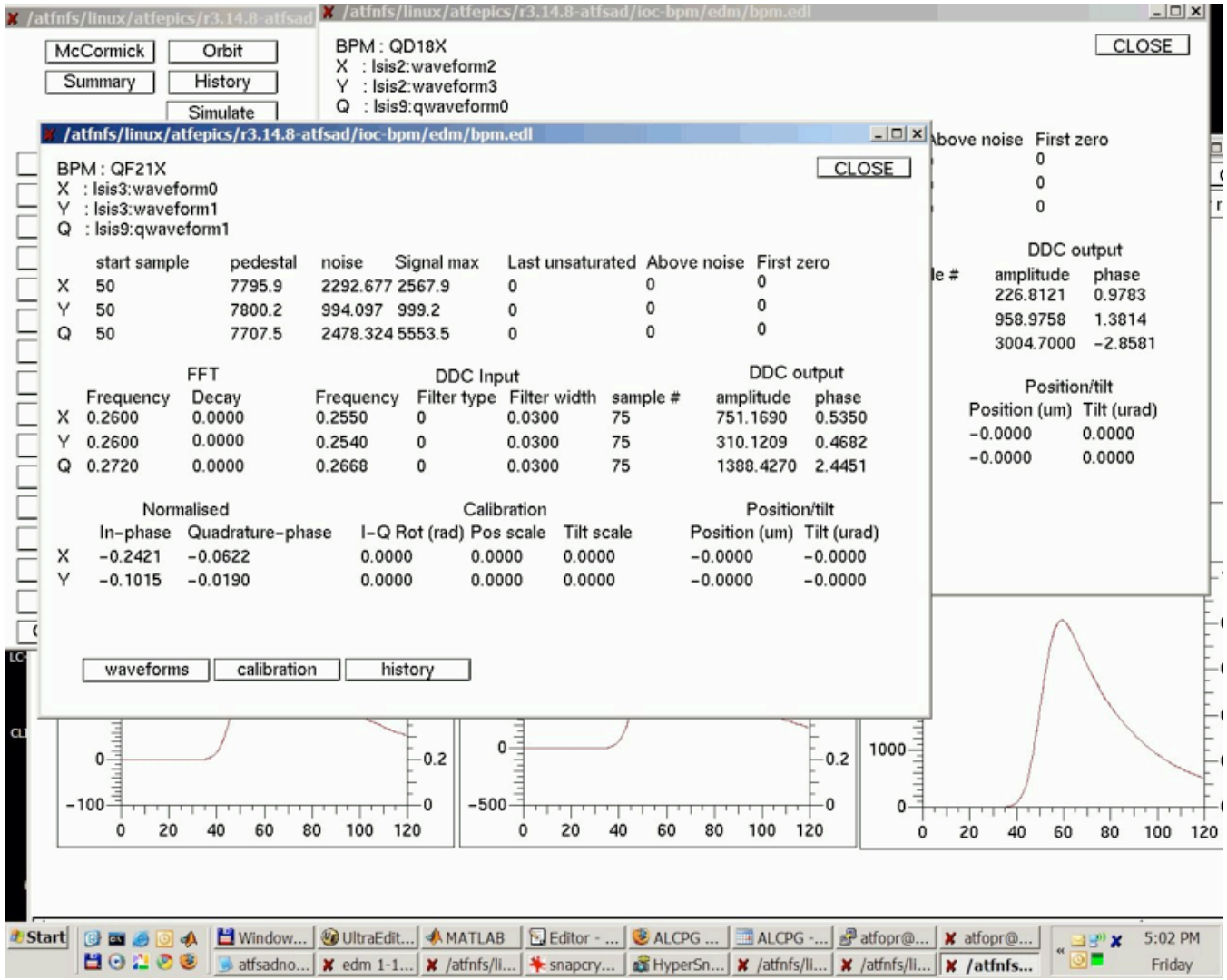
EDM waveform display

- Installed on atfsad and nanosun
  - For BPM amplitude steering (multi-train and multi-bunch)
  - Worked well enough since first beam (no stability or crash problems?)

- Since grown into full DDC (demodulation) processing code
  - Ability to control BPM processing without too much programming/matlab/FPGAs etc
  - Set parameters via EDM or

Online DDC algorithm

- Processing codes operating in ATF
  - Used by first real BPM shift
  - Consistent enironment for all
  - Simple displays

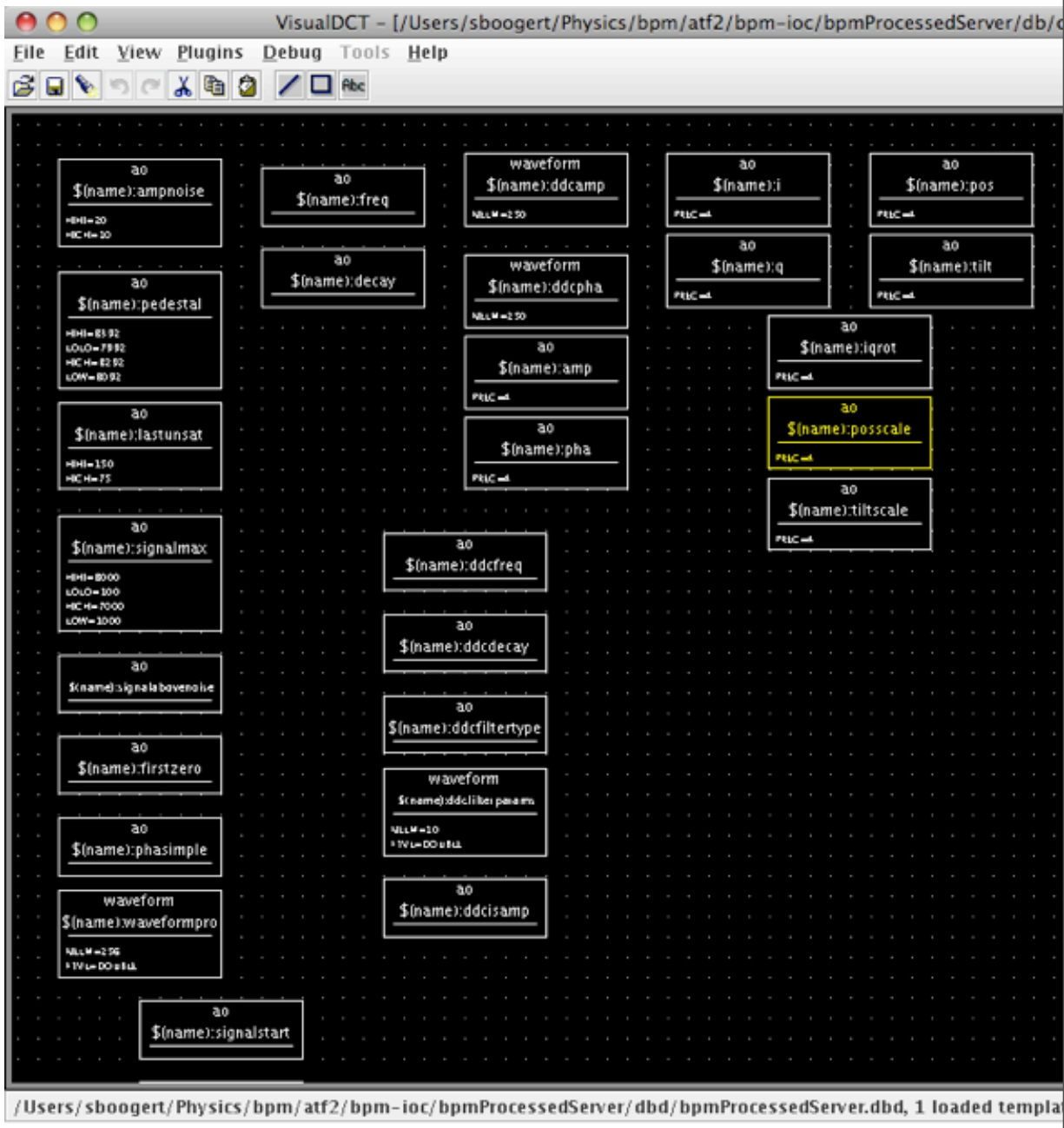


EPICS database available

- Available to all people interested in contributing the BPM system operation
  - Significant progress since nanoBPM, ESA, etc.
  - Online "spying" of complete digital algorithm, user modification without EPICS knowledge
    - bpmname:debuglevel
  - Many improvements to be made but basic structure is complete

EPICS processing database

- All data stored in processing database
  - Input data
  - Algorithm parameters
  - Output data
- Snapshot database for persistancy
- Offline version available

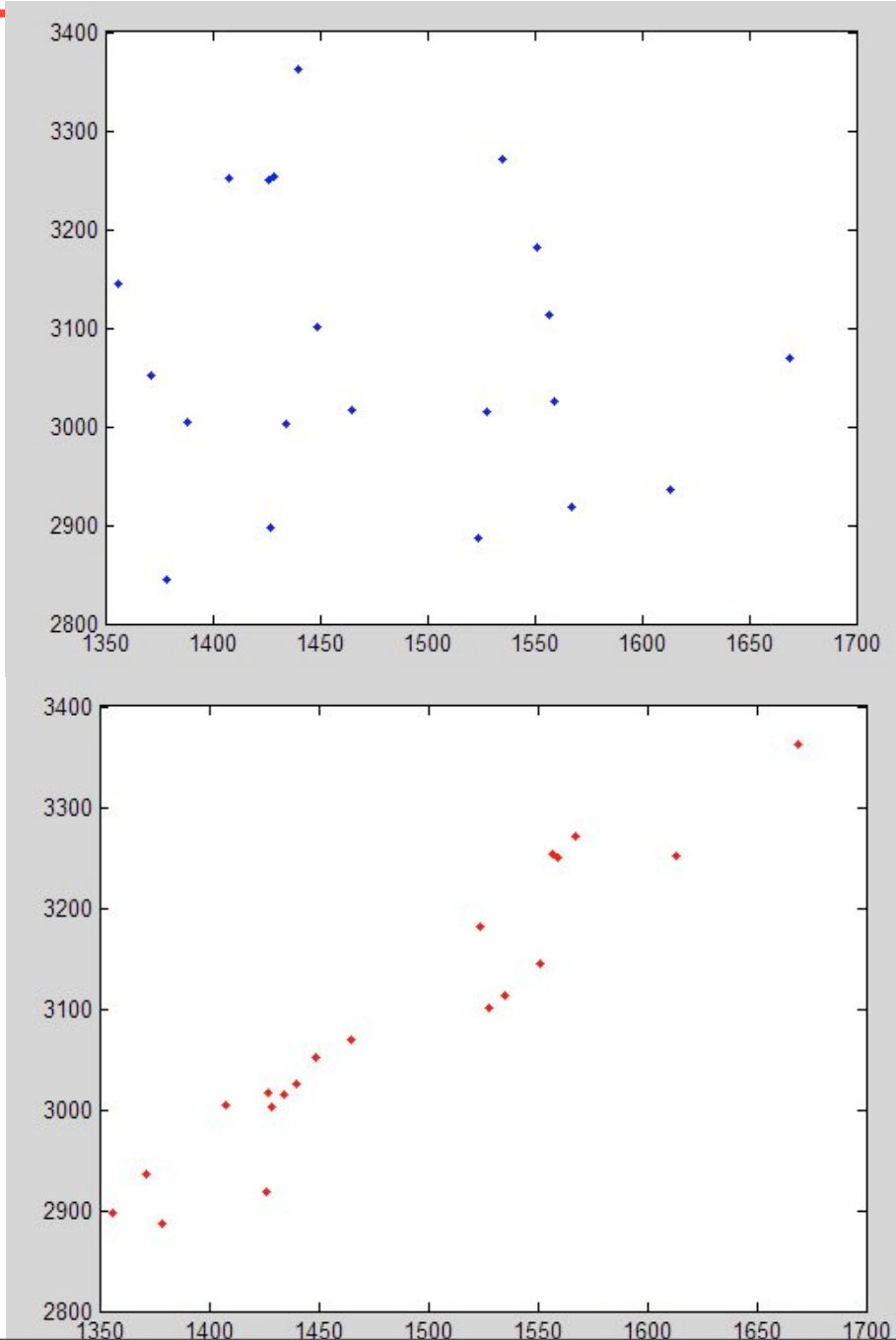


Position calibration

- Procedure (first try swing-owl shift 11/12/2008)
  - Signal start
  - Determine frequency
  - Mix cavity frequency with LO of same frequency
  - Determine filter width (not sensitive) and sample point
  - IQ rotation
  - Position and tilt scale
- Each BPM requires 6-7 parameters, require total

Charge normalization problem

- First shift problematic
  - Shift crew learning to operate new system
  - Implementing new functionality all the time (save/restore)
- Problem with data coherence
  - Almost certainly due to triggering of SIS modules first thing to check after this meeting!



Short term plan

- Calibrate all C-band BPMs
- Commission S-band BPM system
  - Requires new VME system (McCormick delivered ~few months ago)
  - Power and check S-Band electronics
- Automate mover calibration procedure
  - Connection with mover control (state machine)
  - Octave/matlab integration (required for more complicated calibration schemes)

Plan for next year

- S-Band readout VME system (or spare for C-band)
- Calibration
  - Scale changes due to environmental effects, mainly temperature changes
  - Inline modification of BPM parameters based on data taken now and early next year
- Long term stability of BPM system aiming for weekly calibration!
- Multibunch operation (more advanced algorithm)
- Replace VME system (long term support issues with existing Dawn VME system)

Comments

- BPM online log book
  - We will need to start an online BPM log-book. This should be the normal ATF log book but until then....
- Ordered new 1U blade server for BPM control (replace nanosun)
- Cabling for S-band needs to be resolved
  - Might require another penetration
- Effect of offset within quad during calibration

Summary

- Online BPM algorithms working for some months now (summer 2008)
  - EPICS CA based
  - Simple hooks for non-experts to design custom algorithms and code (e.g Multi-bunch)
- Hope to be able to steer BPM system with 10s um resolution this week. Improvements ready for next calender year (0.5 um). Then push towards best reproducible and stable performance (50 nm)