

Extraction line Laser-wire readout and controls

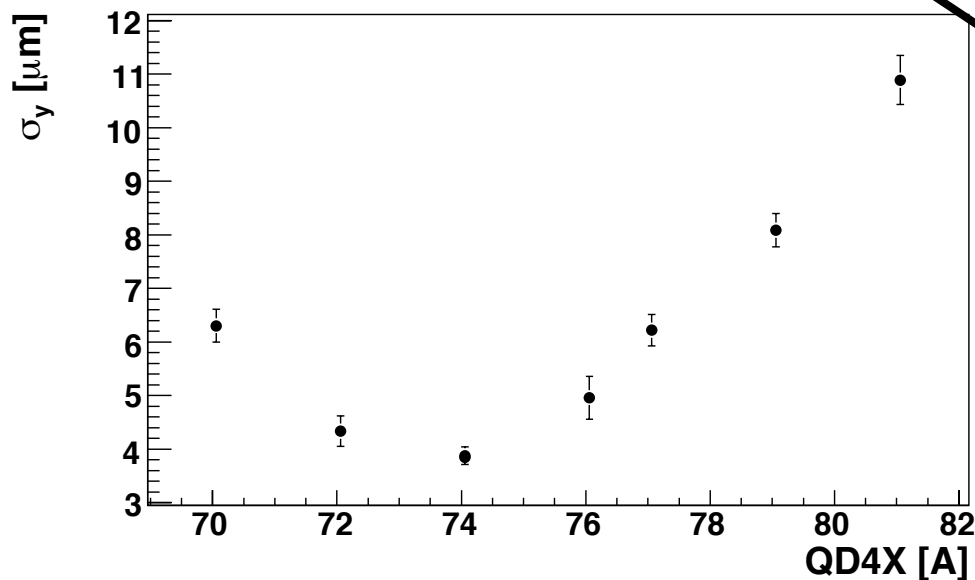
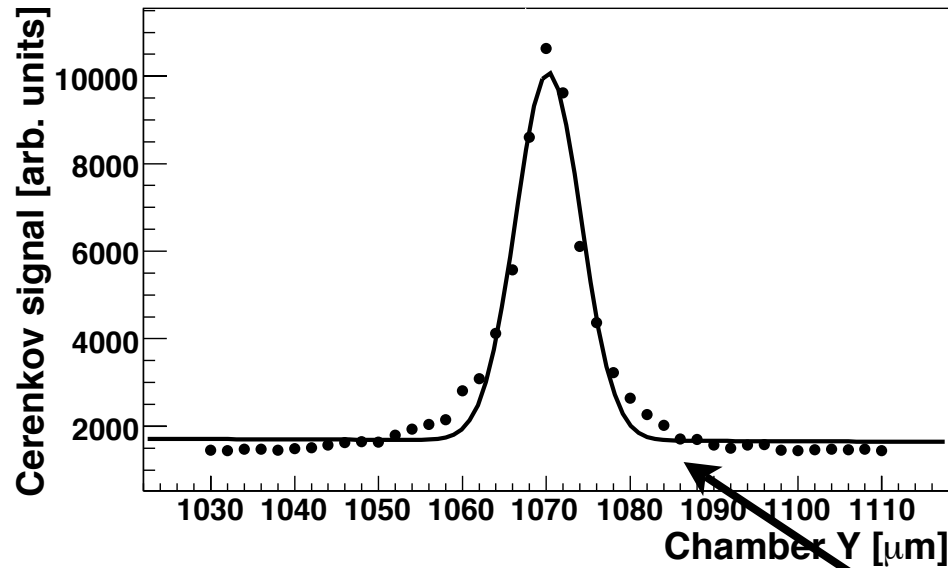
LAL ATF2 meeting 19/06/2008

A. Aryshev, S. Boogert & G. Boorman (JAI @ RHUL)

Introduction

- Overview of current readout and control system
 - Design and implementation
 - Experience/problems
 - Operations (limiting progress)
 - Relationship with data quality, ease of operations
- Requirements and extensions for ATF2
- Integration and availability of laser-wire devices to ATF2 users/control system
- Ultimately use as operator diagnostics

Current laser-wire status



- Currently laserwire is operating around 3 to 4 microns
- Design is for 1 micron
- Laser or electron beam could be problematic
- Interface to electron optics required
- Dispersion
- Horizontal beam size
- ATF2 twiss parameters

Introduction

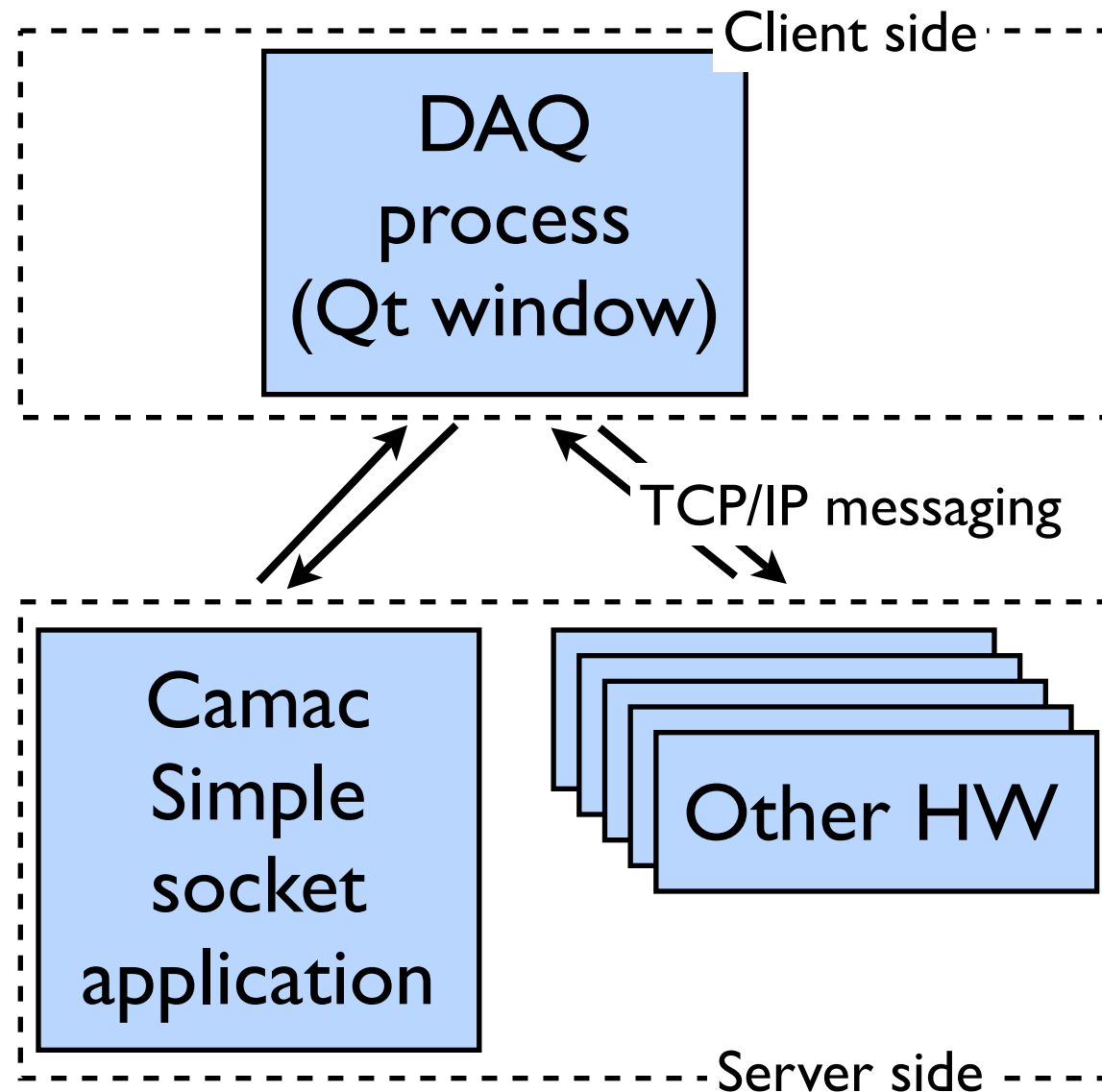
- Extraction line laser-wire is complex diagnostics installation
 - Laser (5 relative timing delays, 3 photodiodes)
 - Motion control (2 axis chamber, 4 axis vacuum manipulator, 6 DC servo optical control, 1 translation stage)
 - ADC channels (16 camac) digitizers, TDC, gates, etc
 - Wire scanner (stage/readback)
 - 2 Laser CCD cameras
 - Temperature monitoring
 - 1 RF source (357 MHz), phase control
 - 2 scopes (1 slow 500 MHz, 1 fast 5 GS)
 - Interface to ATF data (BPMs, magnet strengths, Vacuum, etc)

Control infrastructure

- Complete mixture of control
 - Linux (CAMAC, main DAQ computer)
 - Windows (Optical equipment, DC servos, laser power, Laser cameras)
 - Embedded systems (motion control)
- Development environment
 - GNU/Linux environment
 - Microsoft Visual studio 6
 - Labview
 - Main user control via Qt open source edition (QWt scientific widget set)

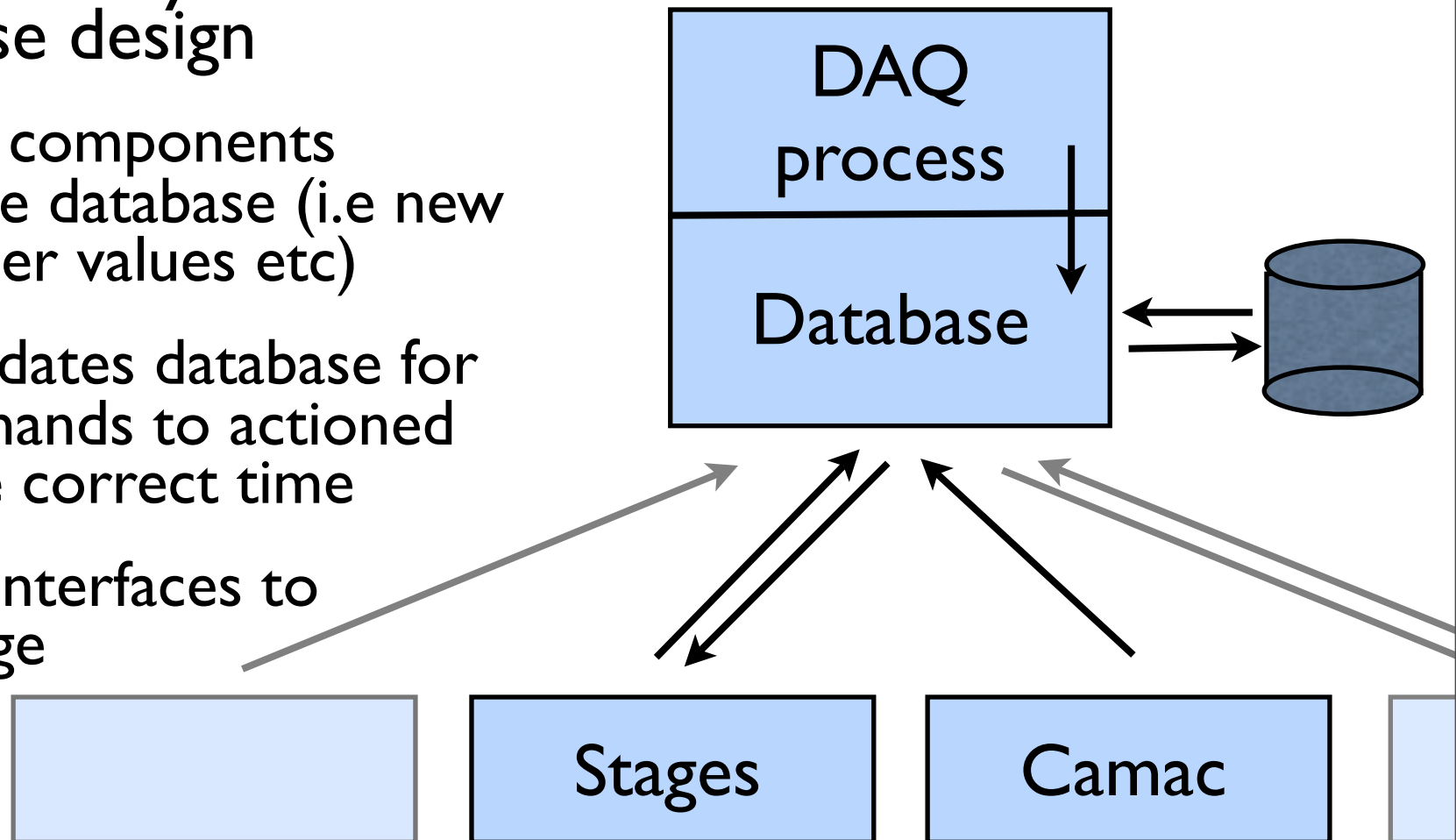
Control interfaces

- Simple control based on bi-directional TCP/IP message
 - Low data rates
 - Server-client model
 - based on remote CAMAC calls of toyo controllers
- Problems
 - Blocking
 - Single client



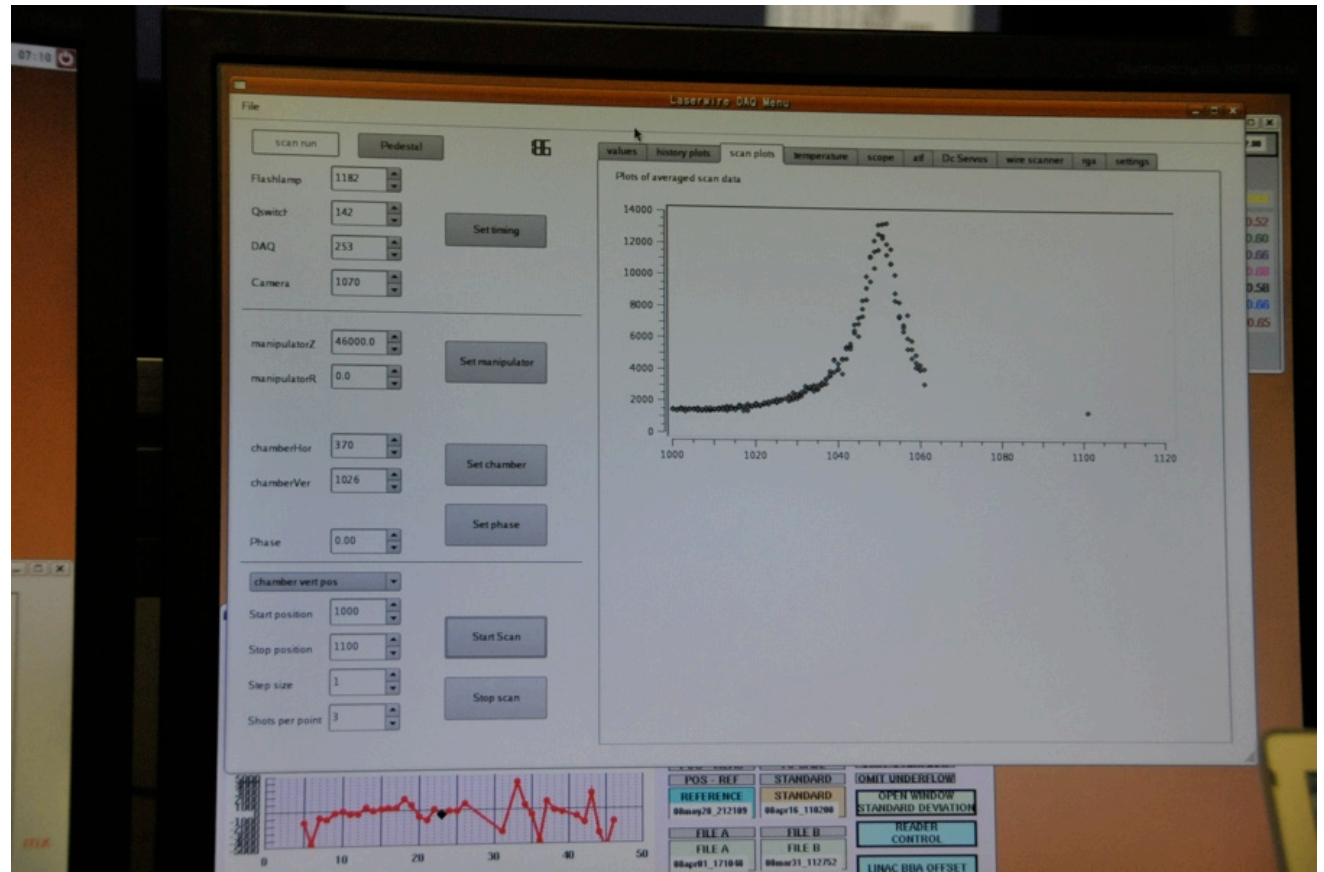
Laserwire DAQ more detail

- Based loosely around database design
- DAQ components update database (i.e new digitiser values etc)
- UI updates database for commands to actioned at the correct time
- Also interfaces to storage



Example of DAQ main window

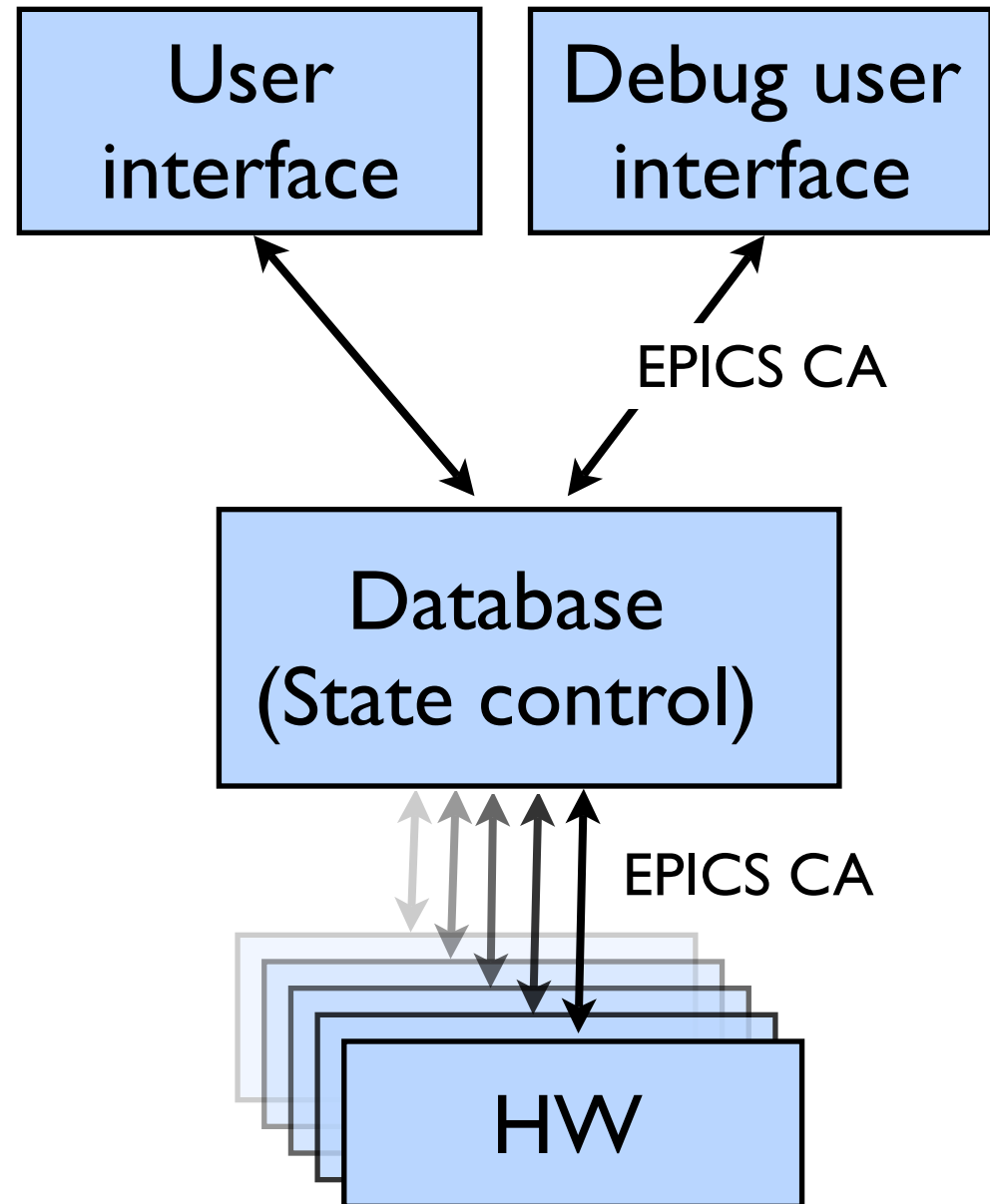
- Plot is Qwt widget
- Standard buttons wheels all connected to main DAQ database
- Excellent resource for laser-wire group



Qt based DAQ process running on ATF control computer

ATF2 laser-wire

- Redevelop laser-wire DAQ system
 - Problems with online analysis and data quality monitoring
 - Single client terrible for diagnostics, error checking, online analysis
 - Will replace inter-process communication with EPICS
 - Work will start after EPAC (A.Aryshev)
 - Mixture of legacy and new



Summary

- Will make all laser-wire data available
 - Detectors (background tuning)
 - BPMs (2 C-band BPMs, probably will integrate with normal C-band system)
 - Strip-line BPM, wall current monitor etc
 - Alternatively reintegrate into ATF2 control systems (but then require pulse by pulse readout)
- ATF2 LW will be migrated to EPICS
 - Labview-EPICS integration
 - Toyo CAMAC controller (see G.White, magnet mover IOC)