

# CBASS for Beamline Control and Data Acquisition

Crystallography at Brookhaven Acquisition Software System

John Skinner

PXRR – Protein Crystallography Research Resource

## Computing Staff:

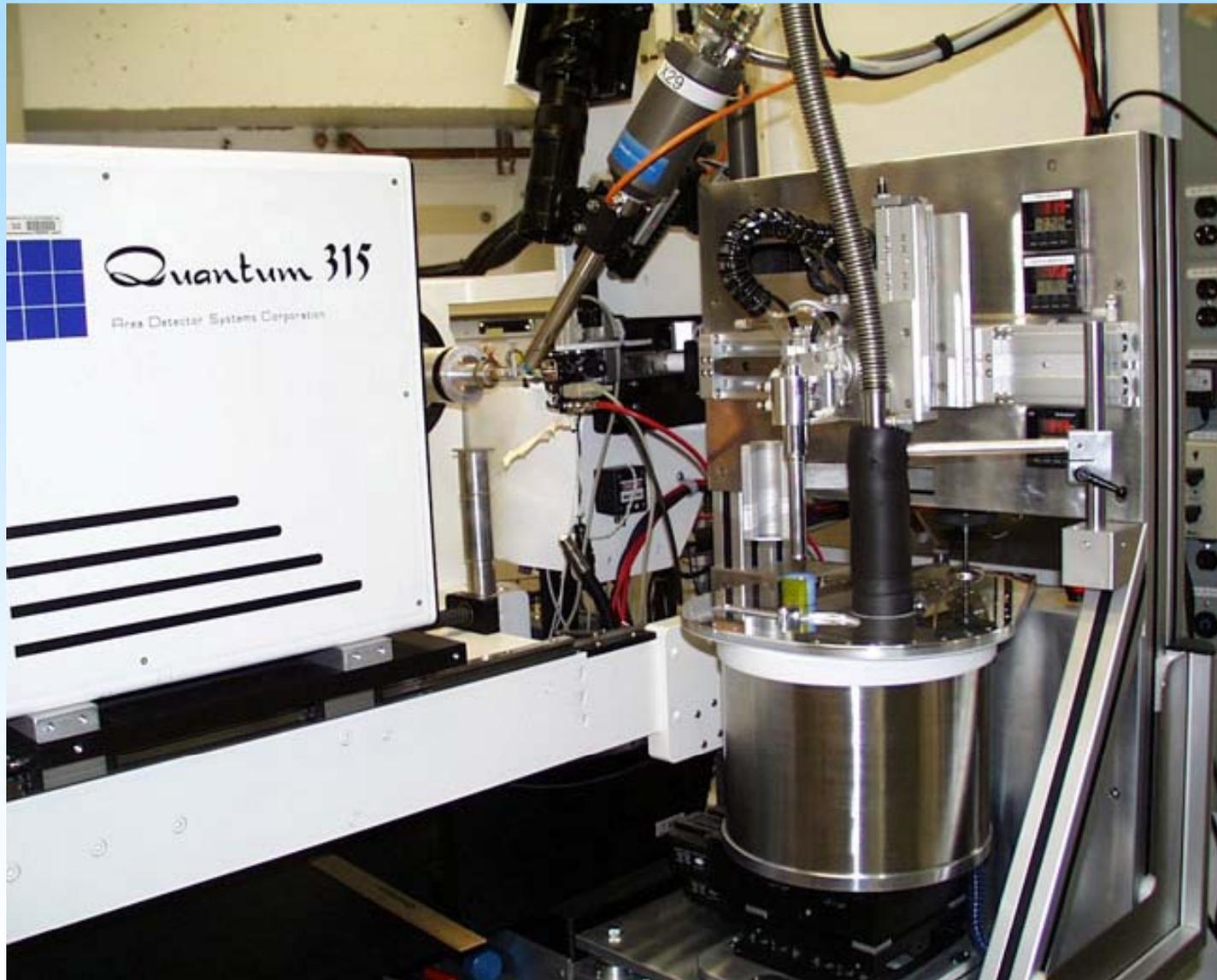
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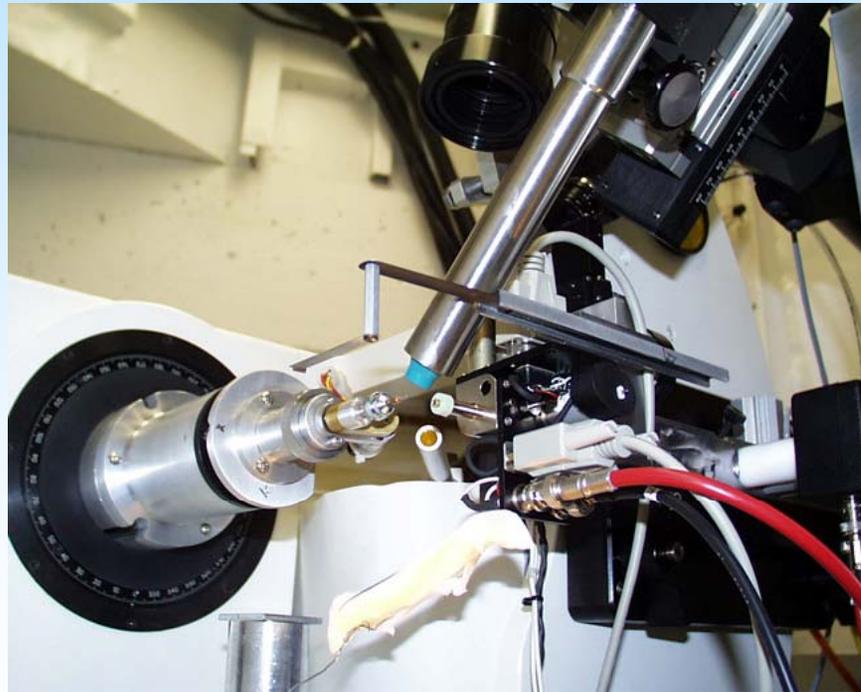


## Typical Protein Crystallography Setup



# Goniometer

Xtallogic Goniometers – Serial line to a Compumotor controller.

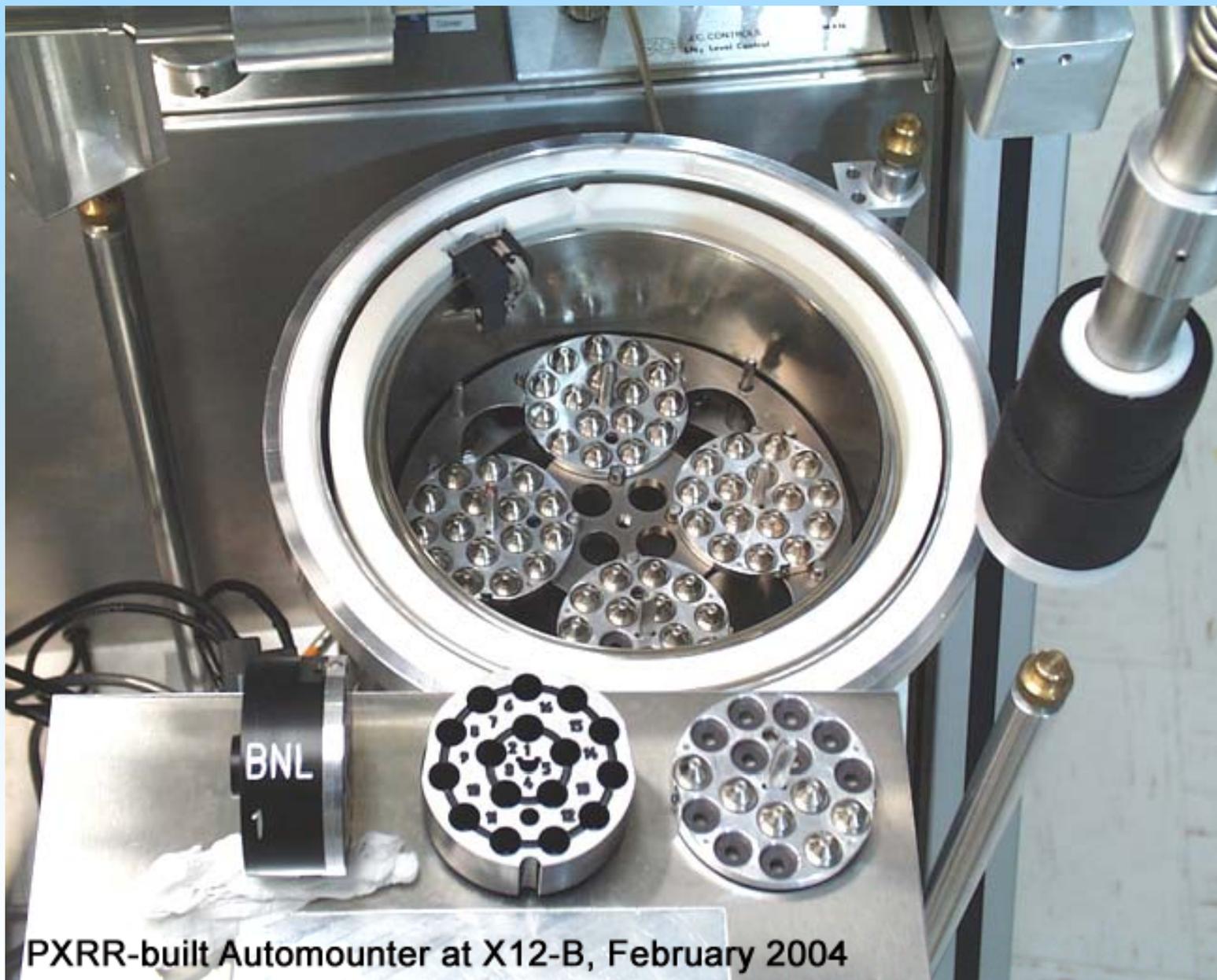


# ADSC Q315 Detector

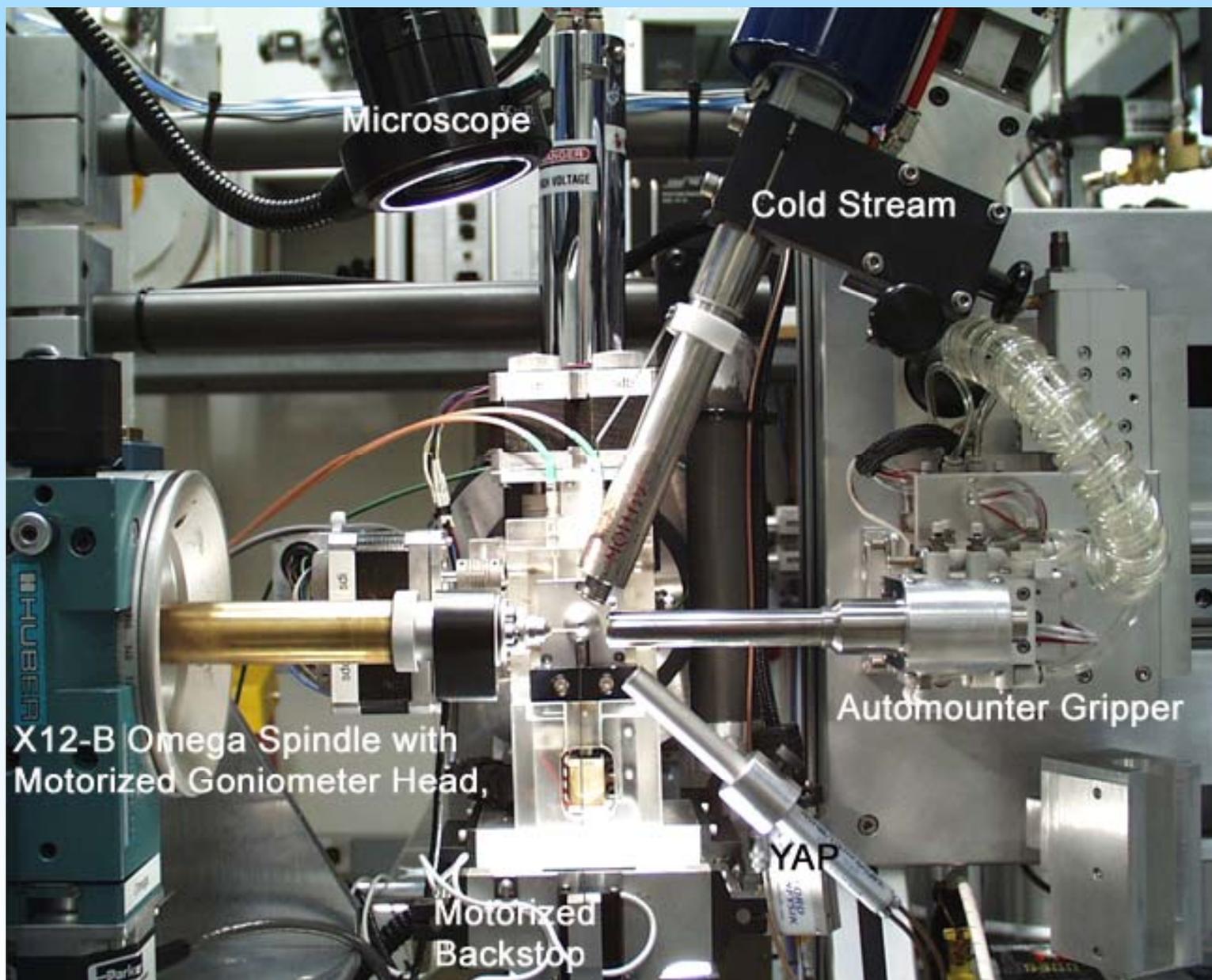


## Sample Automounter Dewar

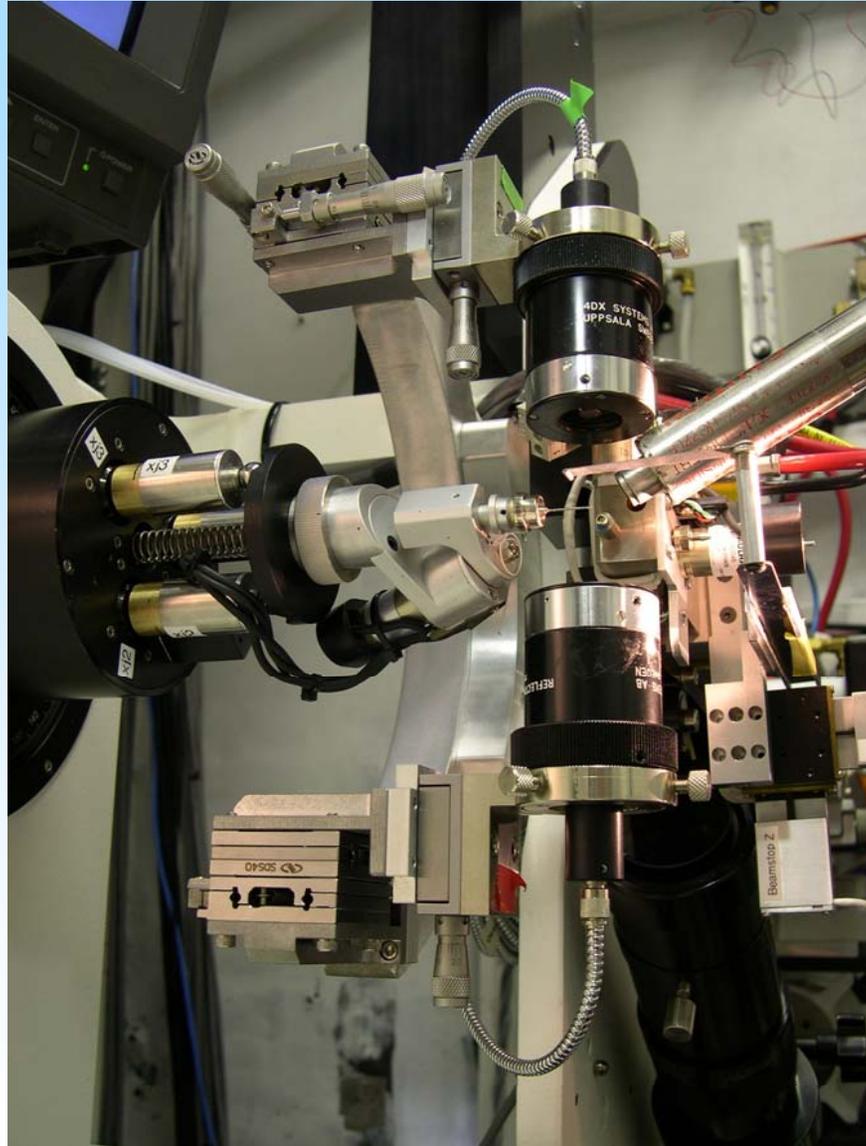




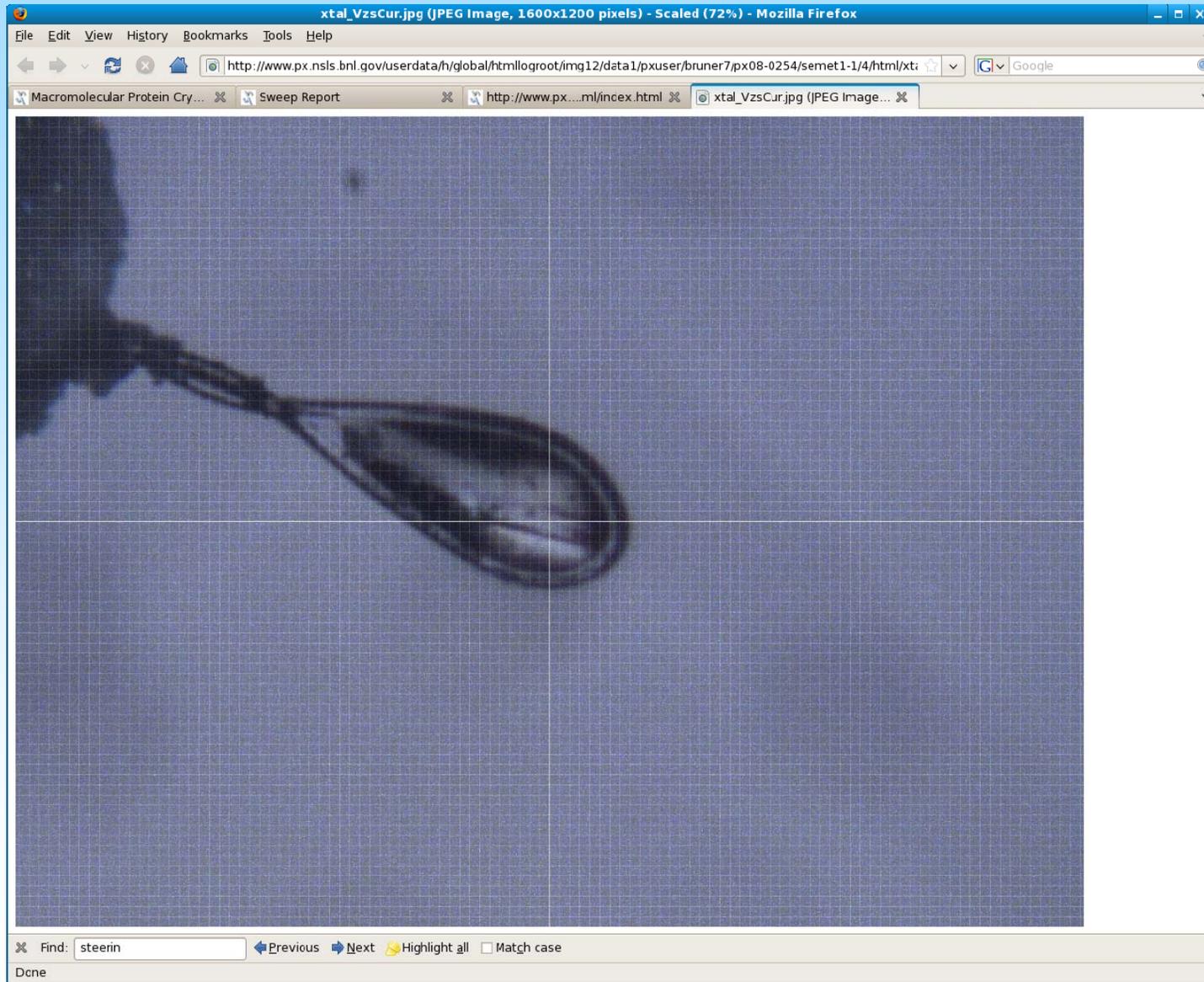
PXRR-built Automounter at X12-B, February 2004



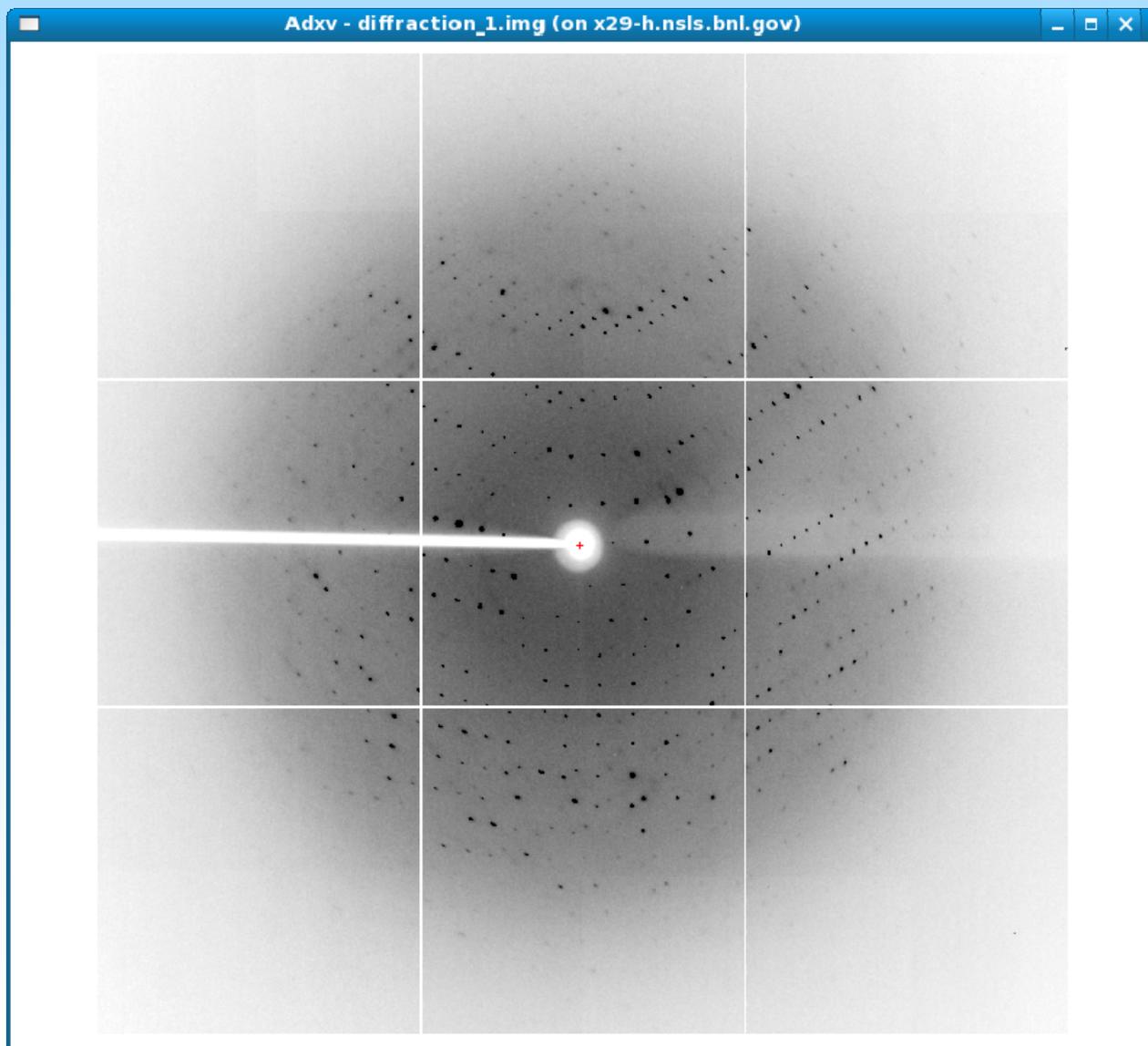
# Spectroscopy (Beamline X26C)



# Point Grey Grasshopper (2040x2040)



# Diffraction Image



# EPICS Components Common to PXRR Beamlines

VME Crate – RTEMS 4.7.1, EPICS Base 3.14.9, Motor Record 6.2.2

MVME 2307 or MVME 5500 Processors

OMS VME58 Motor Controllers

OMS MAXv Motor Controllers

Joerger Scaler

Acromag AVME 9440 Digital I/O



# PXDB Main Menu

The screenshot shows a Mozilla browser window titled "PX Web Task Selections - Mozilla". The address bar contains the URL: [http://www.px.nsls.bnl.gov/pxdb/px-cgi/top.cgi?group\\_auth\\_id=152&session\\_id=9720&session\\_cookie=493](http://www.px.nsls.bnl.gov/pxdb/px-cgi/top.cgi?group_auth_id=152&session_id=9720&session_cookie=493). The browser interface includes standard navigation buttons (Back, Forward, Reload, Stop) and a search box.

The main content area has a light orange background and features the following elements:

- PX Web Task Selections** (Section Header)
- PI: **Skinner**
- Inst.: **BNL**
- Group: **skinner**
- Navigation buttons: [Logout](#) and [Contact Us](#)
- Group Name: skinner**
- Beamtime Request**
  - [Rapid Access Request](#)
  - [Mail-In Request](#)
- Database Tools**
  - [Edit Group Info](#)
  - [Create/Edit Projects](#)
  - [Create New Person](#)
  - [Query Sweep Data](#)
- Mail-In Tools**
  - [Puck Setup](#)   [Cane Setup](#)
  - [Mail-In Status Log](#)
- Rapid Access Tools**
  - [Rapid Access Status Log](#)
- End Of Run**
  - [End Of Run form](#)
  - [End Of Run Status Log](#)

The browser's status bar at the bottom shows "Done" and a search input field.



# dna indexing results (in red) stored as sweep comments in PXDB

Sweep Report - Mozilla

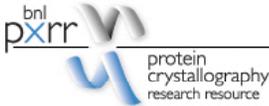
File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop http://www.px.nsls.bnl.gov/pxdb/px-cgi/report.cgi Search Print

Home Bookmarks

## Sweep Report

PI: Skinner  
Inst.: BNL  
Group: skinner



Logout Main Menu Contact Us

most recent sweep only **Submit this Query**

ALL X8C X12B	<input checked="" type="checkbox"/> show comments	<input checked="" type="checkbox"/> print-friendly comments	>= 0	from: Dec 30 2005 to: Dec 31 2005
--------------------	---	--	---------	--

beamline	group	px id	xtal id	file template	sweep	# images	tot exp. time	timestamp
OFFICE								
skinner								
<a href="#">PX04-4010</a> Standard Project								
		dna_st		<a href="#">px04-4010/dna_st/1/dna_st_1</a>	1	11	38.5	30-DEC-2005 10:49
		dna_st		<a href="#">px04-4010/dna_st/1/dna_st_1</a>	1	2	14	30-DEC-2005 10:48
		spacegroup = 16 mosaicity = 0.73 resolutionHigh = 2.091592 resolutionLow = 0.0 cell_a = 47.642128 cell_b = 55.23621 cell_c = 61.295685 cell_alpha = 90.0 cell_beta = 90.0 cell_gamma = 90.0						
		dna_s		<a href="#">px04-4010/dna_s/1/dna_s_1</a>	1	2	14	30-DEC-2005 10:47
		spacegroup = 16 mosaicity = 0.73 resolutionHigh = 2.091592 resolutionLow = 0.0 cell_a = 47.642128 cell_b = 55.23621 cell_c = 61.295685 cell_alpha = 90.0 cell_beta = 90.0 cell_gamma = 90.0						

Done



# HTML data sweep

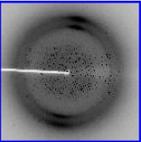
webtail.cgi: /img05/data1/x25/x25\_hli2/html/index.html - Mozilla

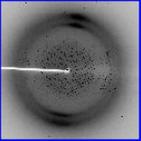
File Edit View Go Bookmarks Tools Window Help

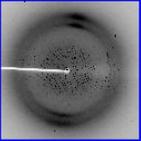
Back Forward Reload Stop [http://www.px.nsls.bnl.gov/matt/projects/webtail/webtail.cgi?/img05/data1/x25/x25\\_hli2/html/index.html](http://www.px.nsls.bnl.gov/matt/projects/webtail/webtail.cgi?/img05/data1/x25/x25_hli2/html/index.html) Search Print

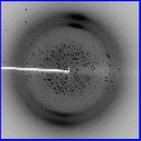
Home Bookmarks

Crystal Picture at Mon Mar 28 00:07:59 2005 

Data Image: [/img05/data1/x25/x25\\_hli2/t24\\_c2\\_15\\_series2\\_000.img](#)  
Image Time: Mon Mar 28 00:07:57 2005  
Phi Start = 90.000  
Phi End = 91.0  
Distance = 400.000  
2-Theta = 0  
Exposure Time = 60.00  
Wavelength = 1.1000  
Intensity at collimator: 760 , Ring Current: 246.4 , Merit: 30 

Data Image: [/img05/data1/x25/x25\\_hli2/t24\\_c2\\_15\\_series2\\_001.img](#)  
Image Time: Mon Mar 28 00:08:59 2005  
Phi Start = 91.000  
Phi End = 92.0  
Distance = 400.000  
2-Theta = 0  
Exposure Time = 60.00  
Wavelength = 1.1000  
Intensity at collimator: 760 , Ring Current: 246.4 , Merit: 30 

Data Image: [/img05/data1/x25/x25\\_hli2/t24\\_c2\\_15\\_series2\\_002.img](#)  
Image Time: Mon Mar 28 00:10:01 2005  
Phi Start = 92.000  
Phi End = 93.0  
Distance = 400.000  
2-Theta = 0  
Exposure Time = 60.00  
Wavelength = 1.1000  
Intensity at collimator: 758 , Ring Current: 246.0 , Merit: 30 

Data Image: [/img05/data1/x25/x25\\_hli2/t24\\_c2\\_15\\_series2\\_003.img](#)  
Image Time: Mon Mar 28 00:11:03 2005  
Phi Start = 93.000  
Phi End = 94.0  
Distance = 400.000  
2-Theta = 0  
Exposure Time = 60.00  
Wavelength = 1.1000  
Intensity at collimator: 752 , Ring Current: 245.9 , Merit: 30 

I0 Plot 

[http://px.nsls.bnl.gov/userdata/img05/data1/x25/x25\\_hli2/html/i01112010812.jpg](http://px.nsls.bnl.gov/userdata/img05/data1/x25/x25_hli2/html/i01112010812.jpg)

### CBASS

File Edit Tools Comments Help

Collect Setup Q Pucks Canes Beamline

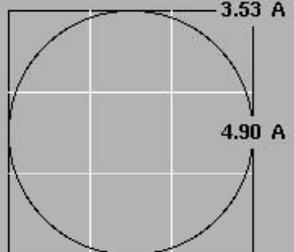
	Start	End	Width	Time	File Prefix	NumStart	Distance	Wavelength
1	0.0	1.0	1.0	1.0	use_SETUP_for_your_xtal_name	1	705.0	1.0750
2								
3								
4								

Goniostat	Omega	Kappa	Phi
Move	285.0000	0.0000	0.0000
Set Relative Zero ->	0.0000	0.0000	0.0000
Set Relative Zero To Current Position			

Detector Status	Idle 0
Detector Distance	705.0 Move
Edge Resolution	4.90 Move
Detector Tilt	0.0000 Move

Collect Data Open Shutter Close Shutter Home...  Pause On Beam Dump Clear Collection Clear Top Row Pause Count Abort

Attenuators



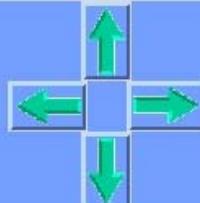
none  .01  .02  .04  .10

Beam Width 160.1000  
Change Width

Beam Height 100.1000  
Change Height

-3.2500  
Beamstop Horz.

3.4500  
Beamstop Vert.



File: none CBASS Ready

Command: Group... skinner PxID... px04-4010 wave: 1.0750 C2: 0 C3: 0 M: 0

```

Tue Nov 10 09:17:24 2009
set_group_name("skinner")
CBASS>
Tue Nov 10 09:17:24 2009
px_id("px04-4010")
CBASS>

```



# CBASS: Beamline Control Page

The screenshot shows the CBASS Beamline Control Page. At the top, there is a menu bar with 'File', 'Tools', and 'Comments'. Below it is a row of buttons: 'Collect', 'Setup', 'Robot', 'Pucks', 'Canes', and 'Beamline'. The main interface is divided into several sections. On the left, there is a table with columns: 'Time', 'Colli', 'Fluoro', 'Hutch', and 'Merit'. The 'Time' column has a value of '1.0' and a 'Count' button next to it. Below this table is a 'TableHrz' field with a value of '-7.3395', a 'TableVrt' field with a value of '0.7030', and a 'Tweak Table...' button. A green bar below the table indicates 'Shutter Closed'. To the right of the table, there are buttons for 'Move Monochromator' and 'Scan Monochromator'. Further right, there are fields for 'Target Position' and 'Scan Midpoint', each with 'Wave' and 'Energy' sub-fields. The 'Target Position' and 'Scan Midpoint' fields both have a 'Wave' value of '1.2000' and an 'Energy' value of '10.3321'. Below these are 'Scan Step Size' dropdowns with options 'Small', 'Large', and 'Other', and a 'Number of Points' field with a value of '21'. At the bottom of this section is a 'Count Time' field with a value of '1.0'. Below the main interface is a row of buttons: 'Realign', 'Open Shutter', 'Close Shutter', 'Select Wave...', 'Plot Spectrum', 'Analyze Spectrum', and 'Stop Motors'. At the very bottom, there is a 'Command:' field with a 'Group...' button and a command line showing 'skinner', 'PxID...', 'px04-4010', and 'wave: 1.2000 C2: 0 C3: 549 M: 0.0000'. Below the command line is a text area with the following text: 'channel 12: 0', 'channel 13: 0', 'channel 14: 0', 'channel 15: 0', 'channel 16: 0', and 'CBASS>'. The 'Stop Motors' button is highlighted in red.

Time	Colli	Fluoro	Hutch	Merit
1.0	0	549	0	0.0000

Wave	Energy
1.2000	10.3321
1.2000	10.3321

Scan Step Size:  Small  Large  Other .001

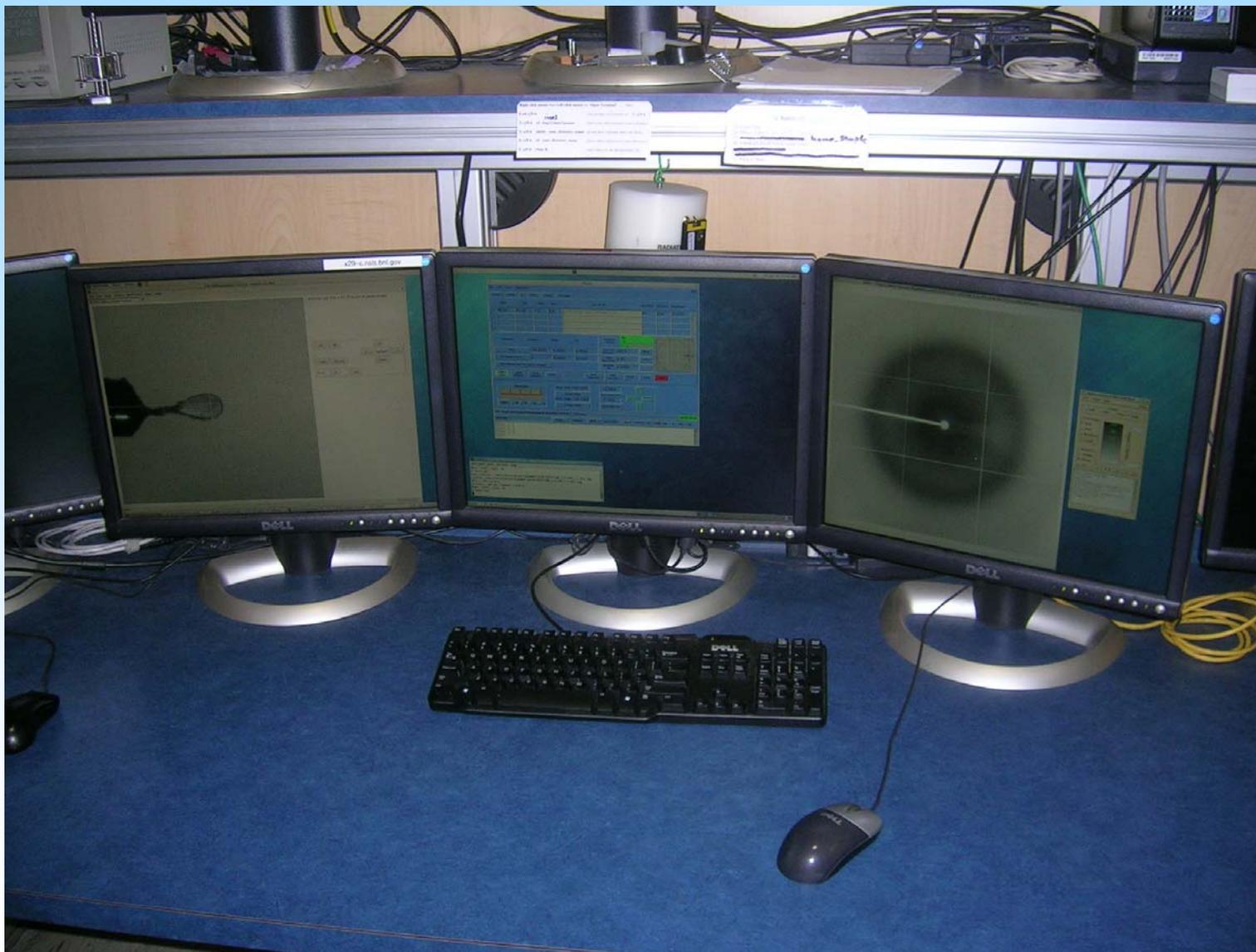
Number of Points: 21 Count Time: 1.0

Command: Group... skinner PxID... px04-4010 wave: 1.2000 C2: 0 C3: 549 M: 0.0000

```
channel 12: 0
channel 13: 0
channel 14: 0
channel 15: 0
channel 16: 0
CBASS>
```



# X29 Experiment Control Station



# CBASS Grid Scan Output

0	0	1	0	0	0	0	0	1	0	0	0
1	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	2	1	0
1	1	0	0	1	0	0	1	0	0	0	2
1	0	1	0	0	1	3	3	3	3	3	5
1	0	0	1	5	4	4	3	6	5	4	7
0	0	0	1	6	5	8	7	7	9	9	8
0	1	0	0	4	8	9	9	12	11	11	10
1	2	0	1	1	13	13	16	19	14	13	9
0	1	0	0	1	11	23	20	19	16	14	11
0	0	0	0	0	6	16	16	14	16	14	13
0	1	1	0	0	1	9	14	13	10	10	12

# Spectroscopy (Beamline X26C)

The screenshot shows a Mozilla Firefox browser window displaying the Ocean Optics website. The address bar shows the URL <http://www.oceanoptics.com/products/usb4000.asp>. The page features a navigation menu with links for Home, Contact Us, Catalog, Price List, and Order Info. Below the navigation is a blue banner with the Ocean Optics logo and the tagline "smart. innovative. flexible. solvers." A "SHOP NOW" button with a shopping cart icon is also present.

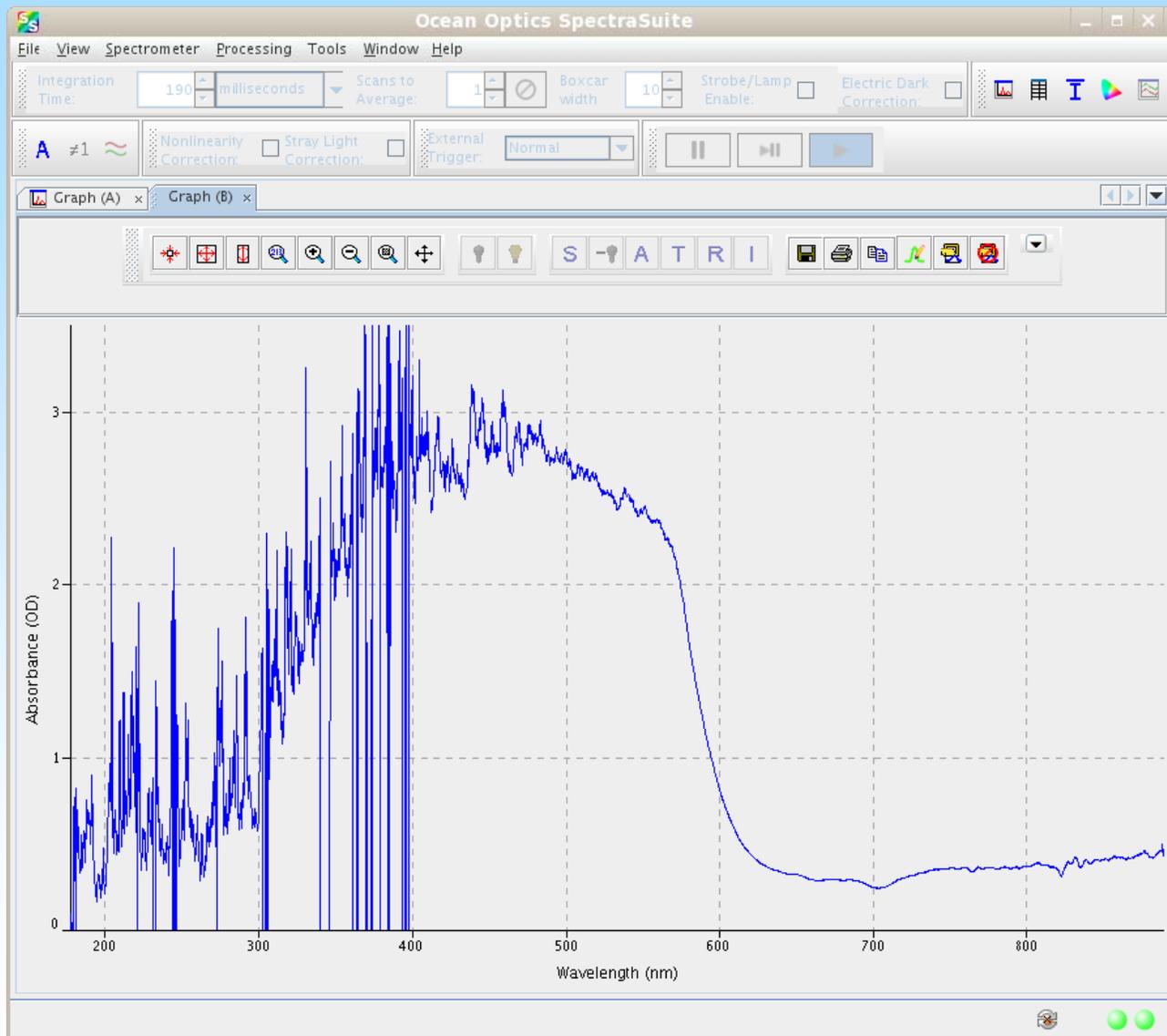
The main content area is titled "USB4000 Miniature Fiber Optic Spectrometer". On the left, there is a "PRODUCTS" sidebar with a list of categories: SPECTROMETERS, SENSORS, SOFTWARE, SAMPLING ACCESSORIES, LIGHT SOURCES, OPTICAL FIBERS, PROBES, STANDARDS, EDUCATION, OEM SOLUTIONS, OPTICAL COMPONENTS, and THIN FILMS. Each category has a plus sign icon.

The main text describes the product: "We've sold over 100,000 spectrometer channels for thousands of applications, and we've used that experience to make the most flexible, versatile and cost-effective spectrometer ever built. The USB4000 is our next-generation flagship spectrometer, with a 3648-element Toshiba linear CCD array for increased signal-to-noise and enhanced electronics for controlling the spectrometer and accessories. The USB4000 starts at \$2540. The USB4000 is made-to-order per your optical bench selections -- including order-sorting filters and entrance slits sizes -- which are available as separate line items."

An image of the USB4000 Miniature Fiber Optic Spectrometer is shown. It is a small, rectangular, black device with a fiber optic connector on the front and a USB port on the side.

On the right side of the product description, there are three call-to-action links: "Contact an Ocean Optics Applications Scientist", "Convenient Wavelength Calibration! Click here for Details", and "Special Grating Upgrade".

# Spectrophotometer Control with SpectraSuite



# Linux Workstation

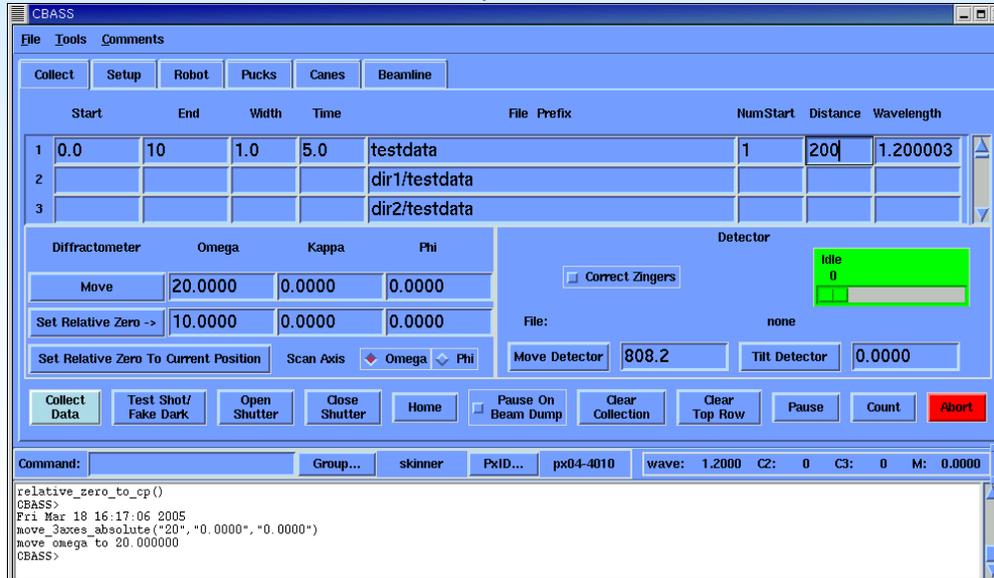
Ocean Optics Control Libraries

IOC from CLS (David Beauregard)

USB



Channel Access



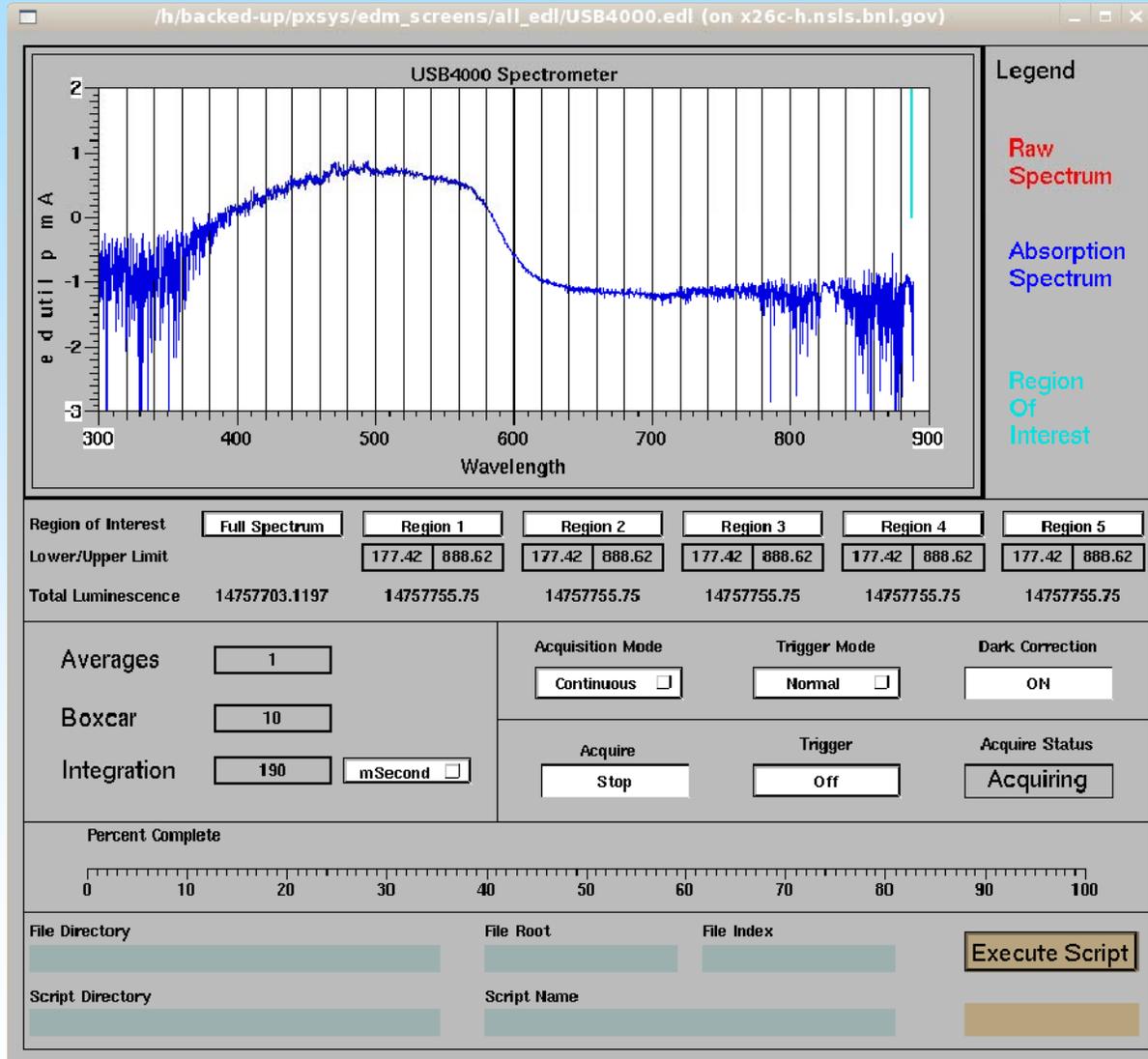
The screenshot shows the CBASS control software interface. It includes a menu bar (File, Tools, Comments), a toolbar with buttons for Collect, Setup, Robot, Pucks, Canes, and Beamline, and a main control area with various input fields and buttons. A table at the top lists scan parameters.

	Start	End	Width	Time	File Prefix	NumStart	Distance	Wavelength
1	0.0	10	1.0	5.0	testdata	1	200	1.200003
2					dir1/testdata			
3					dir2/testdata			

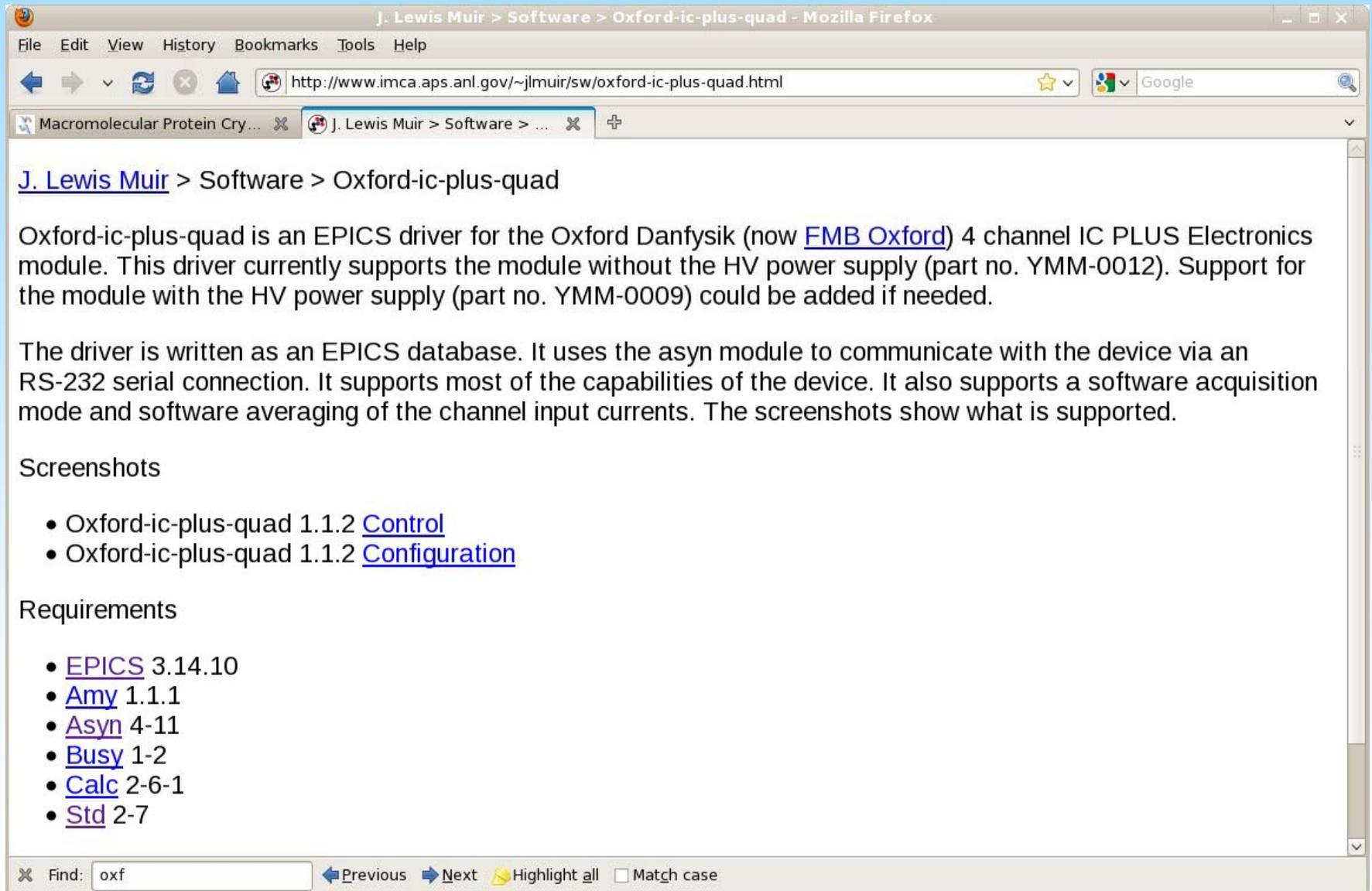
Diffraction parameters: Omega: 20.0000, Kappa: 0.0000, Phi: 0.0000. Detector status: Idle 0. Scan Axis: Omega. Command window shows: relative\_zero\_to\_cp(), CBASS>, Fri Mar 18 16:17:06 2005, move\_3axes\_absolute("20", "0.0000", "0.0000"), move\_omega to 20.000000, CBASS>



# EDM Client for Spectrophotometer



# Beam Position Monitor Driver



The screenshot shows a Mozilla Firefox browser window with the address bar containing the URL <http://www.imca.aps.anl.gov/~jlmuir/sw/oxford-ic-plus-quad.html>. The page title is "J. Lewis Muir > Software > Oxford-ic-plus-quad". The main content of the page is as follows:

**J. Lewis Muir > Software > Oxford-ic-plus-quad**

Oxford-ic-plus-quad is an EPICS driver for the Oxford Danfysik (now [FMB Oxford](#)) 4 channel IC PLUS Electronics module. This driver currently supports the module without the HV power supply (part no. YMM-0012). Support for the module with the HV power supply (part no. YMM-0009) could be added if needed.

The driver is written as an EPICS database. It uses the asyn module to communicate with the device via an RS-232 serial connection. It supports most of the capabilities of the device. It also supports a software acquisition mode and software averaging of the channel input currents. The screenshots show what is supported.

**Screenshots**

- Oxford-ic-plus-quad 1.1.2 [Control](#)
- Oxford-ic-plus-quad 1.1.2 [Configuration](#)

**Requirements**

- [EPICS](#) 3.14.10
- [Amy](#) 1.1.1
- [Asyn](#) 4-11
- [Busy](#) 1-2
- [Calc](#) 2-6-1
- [Std](#) 2-7

At the bottom of the browser window, there is a search bar with the text "oxf" and navigation buttons for "Previous", "Next", "Highlight all", and "Match case".



# X25 Beam Position Monitor

od-ic-plus-quad.adf (on x25-h.r ...)

## Oxford Danfysik IC Plus Quad

BPM 1

### Beam Position

Plot...

X (um): 389.67988 Y (um): -458.18765

### Input Current

Ch. 1

	9092	
Ch. 2	3613	4351
	12729	

Ch. 3

Ch. 1 + Ch. 2 + Ch. 3 + Ch. 4 = 29785

### Hardware IC Sum Acquisition

Acquires input current sum directly from hardware. In-driver software averaging is ignored.

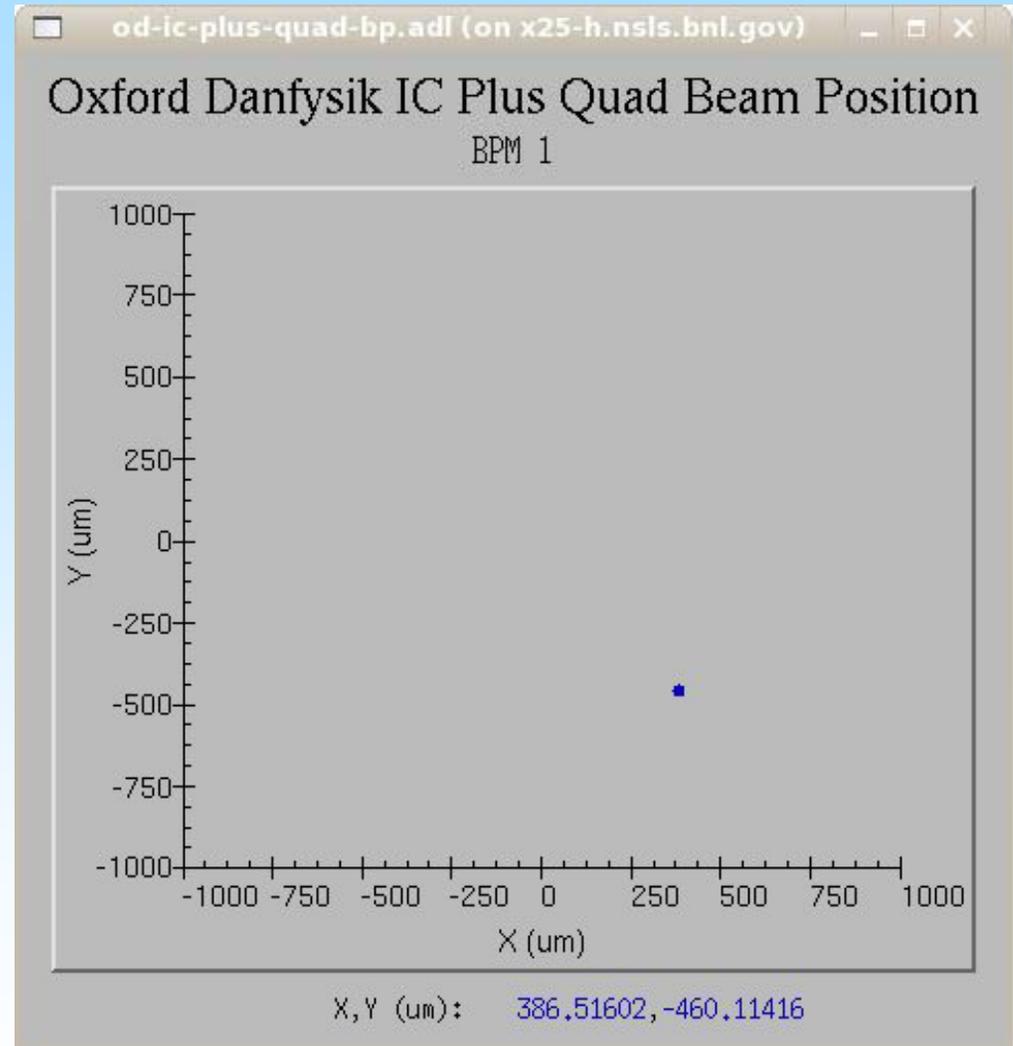
Time: 1.0 sec = 1 sample(s)

Sum: 0 IDLE

Normalized sum: 0

Start Stop Abort

Range: 4 Configure...



areaDetector: EPICS software for area detectors - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://cars9.uchicago.edu/software/epics/areaDetector.html

# areaDetector: EPICS software for area detectors

Module Owner: Mark Rivers: University of Chicago

This page is the home of **areaDetector**, an application for controlling area (2-D) detectors, including CCDs, pixel array detectors, and online imaging plates.

**NOTE:** This module replaces the [ccd](#) and [pilatusROI](#) modules. These older modules will no longer be supported, and users are encouraged to convert to this new areaDetector software.

Devices supported in **areaDetector** include:

From [Dectris](#)

- The [Pilatus](#) pixel-array detector.

From [Prosilica](#)

- High-speed, high-resolution CCD cameras. These use GigE and Firewire interfaces.

From [ADSC](#)

- Large CCD detectors for x-ray diffraction. This support is from Lewis Muir of IMCA-CAT at the APS.



areaDetector ADSC driver - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://cars9.uchicago.edu/software/epics/adscDoc.html

# areaDetector ADSC driver

January 26, 2009

Lewis Muir

University of Chicago

## Table of Contents

1. [Introduction](#)
2. [Dependencies](#)
3. [Building](#)
4. [Configuring](#)
5. [Image Modes](#)
6. [Trigger Modes](#)
7. [Dark Images](#)
8. [Driver Specific Values and Settings](#)
9. [Screenshots](#)
10. [Unsupported areaDetector "base" Features](#)
11. [Limitations](#)

## Introduction

This is a driver for [ADSC](#) detectors. Supported models are: Q4 (with the upgrade to four computers), Q4r, Q210, Q210r, Q270, Q315, and Q315r. This driver has been tested with the Q210 and Q210r. If you use this driver, please report your success, noting your detector model, to the author.



# Detector MEDM Displays

ADBase.adl (on x29-h.nsls.bnl.gov)

## Area Detector Control - x29a:det1:

### Setup

asyn port **ADSC1**  
 EPICS name **x29a:det1:**  
 Manufacturer **ADSC**  
 Model **Q315r**  
Connected

Connection

### Shutter

Shutter Mode

Status: Det. Closed EPICS Closed

Open/Close

Delay: Open  Close

EPICS shutter setup

### Readout

	X	Y
Sensor Size	6144	6144
Binning	2	2
Region start	2048	2048
Region size	2048	2048
Reverse	No	No
Image Size	3072	3072
Image Size (bytes)	18874368	
Gain	1.000	1.000
Data type	UInt16	UInt16

### Collect

Exposure time

Acquire period

# Images

# Images complete

# Exp./image

Image mode

Trigger mode

Done

Acquire

Detector state Idle

Time remaining

Image counter

Image rate

Array callbacks

### File

Driver file I/O

adsc.adl (on x29-h.nsls.bnl.gov)

## ADSC Detector x29a:det1:

State IDLE  
 Status Idle  
 Last error  
 Update rate for above properties

Error recovery

Continuous image mode

OK to expose

External trigger ctrl

Reuse darks

Dezinger

ADC/Binning

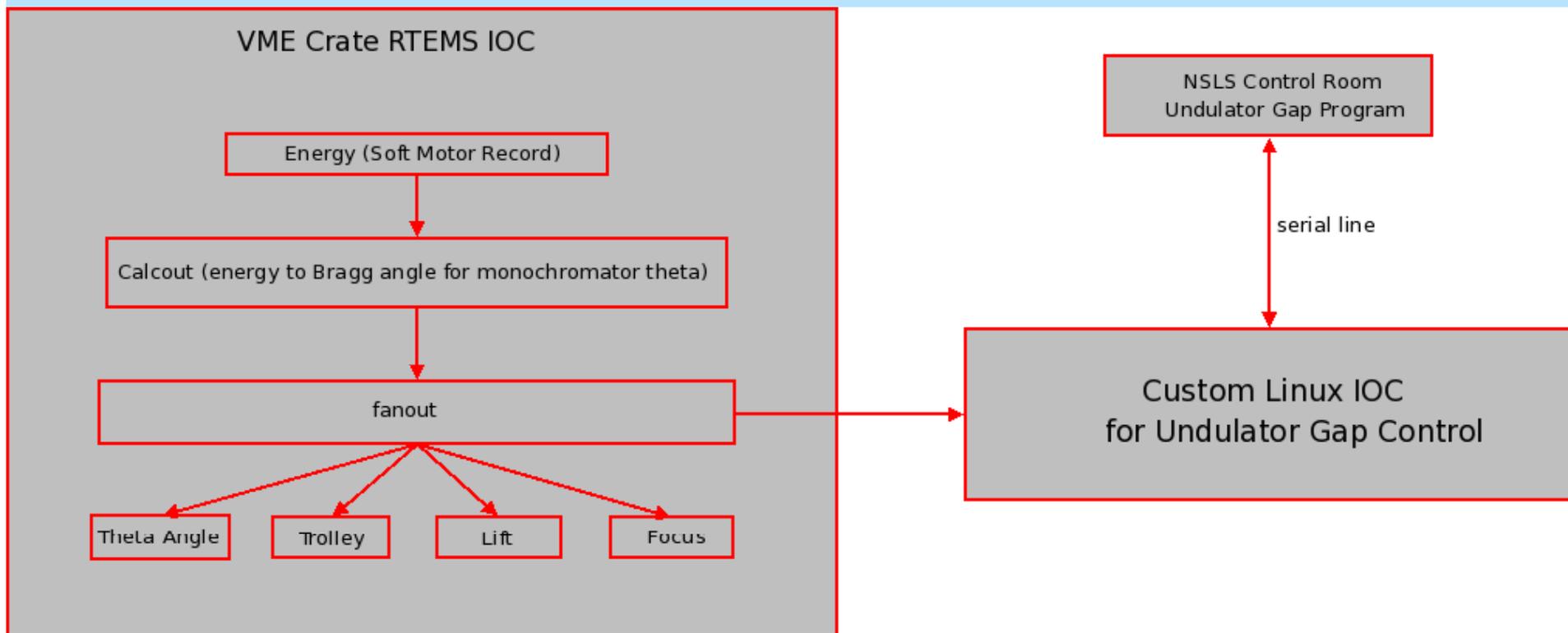
Raw images

Image transforms

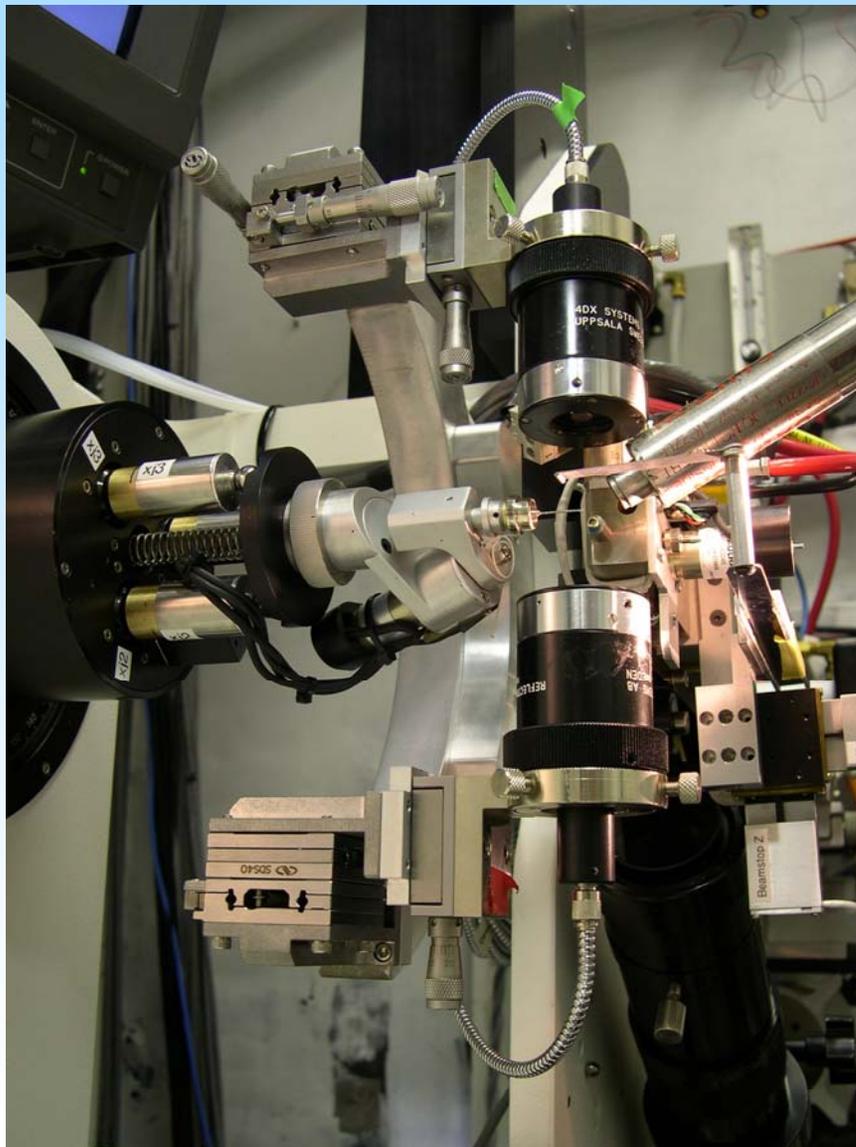
Stored darks

Beam center X (mm)	<input type="text" value="158.100"/>	<input type="text" value="158.100"/>
Beam center Y (mm)	<input type="text" value="156.500"/>	<input type="text" value="156.500"/>
Distance (mm)	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>
Two theta (deg)	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>
Axis	<input type="text" value="Omega"/>	<input type="text" value="Omega"/>
Wavelength (Å)	<input type="text" value="1.0808991"/>	<input type="text" value="1.0808991"/>
Image width (deg)	<input type="text" value="1.000"/>	<input type="text" value="1.000"/>
Phi (deg)	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>
Omega (deg)	<input type="text" value="419.000"/>	<input type="text" value="419.000"/>
Kappa (deg)	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>

# Undulator Gap Control



# Sample Alignment



# Point Grey Grasshopper Firewire Digital Camera (2040x2040)

The screenshot shows a web browser window titled "X29 Diffractometer Control - Mozilla Firefox". The address bar contains the URL <http://x29-h.nsls.bnl.gov/axisvid/tryf.html>. The main content area is a large grid with a dark, blurry image of a sample. To the right of the grid is a control panel with the text "Microns per tick = 33 (You are in zoom mode)". The control panel includes buttons for "+90", "-90", "Up", "Down", "Sample", "Load", "UnLoad", "Zoom", "in", and "out".

# Firewire Camera areaDetector Driver

firewireDCAM: firewireDCAM EPICS Support Module - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://controls.diamond.ac.uk/downloads/support/firewireDCAM/1-1/documentation/html/index.html

Main Page Related Pages Classes Files Directories Search for

## firewireDCAM EPICS Support Module

1-1

Author: Ulrik Pedersen, Diamond Light Source Ltd.

December 2008

The firewireDCAM module is distributed under the LGPL. See the COPYING and COPYING.LESSER files for details or visit <http://www.gnu.org/licenses>

### Introduction

This module is a Linux firewire (IEEE 1394) camera driver plug-in for another EPICS support module/framework: [areaDetector](#) by Mark Rivers, University of Chicago.

### Firewire IEEE1394 Cameras

This module uses a set of open source libraries to control the cameras. The main library is [libdc1394](#) which is able to control firewire cameras that comply with the IIDC DCAM protocol. Please see the [libdc1394 list of cameras](#) and the [libdc1394 FAQ](#) for more details about which cameras can be used with libdc1394 (note that the developer of this module has only tested with a limited number of camera models: Point Grey Flea2 and AVR Pike)

Digital video recorders with tapes or other local memory typically does not comply with the IIDC DCAM protocol! Cameras that produce compressed images are not supported either. This module does not and is not planned to provide any compression or decompression features. If such feature is needed it is recommended to develop a compression plug-in to the areaDetector framework.

The module supports both 1394A [400Mb/s] and 1394B [800Mb/s] mode cameras but only in 8 bit per pixel MONO mode, and 24 bits per pixel RGB mode!

### Where to get it

Released versions of the module can be downloaded as source code tarballs from the Diamond website. See [DLS controls](#) "EPICS support modules".

Development versions can be checked out of the Subversion repository for the [EPICS applications](#) project. A user account is not required to check out/download the code from the subversion repository, just issue the following command:

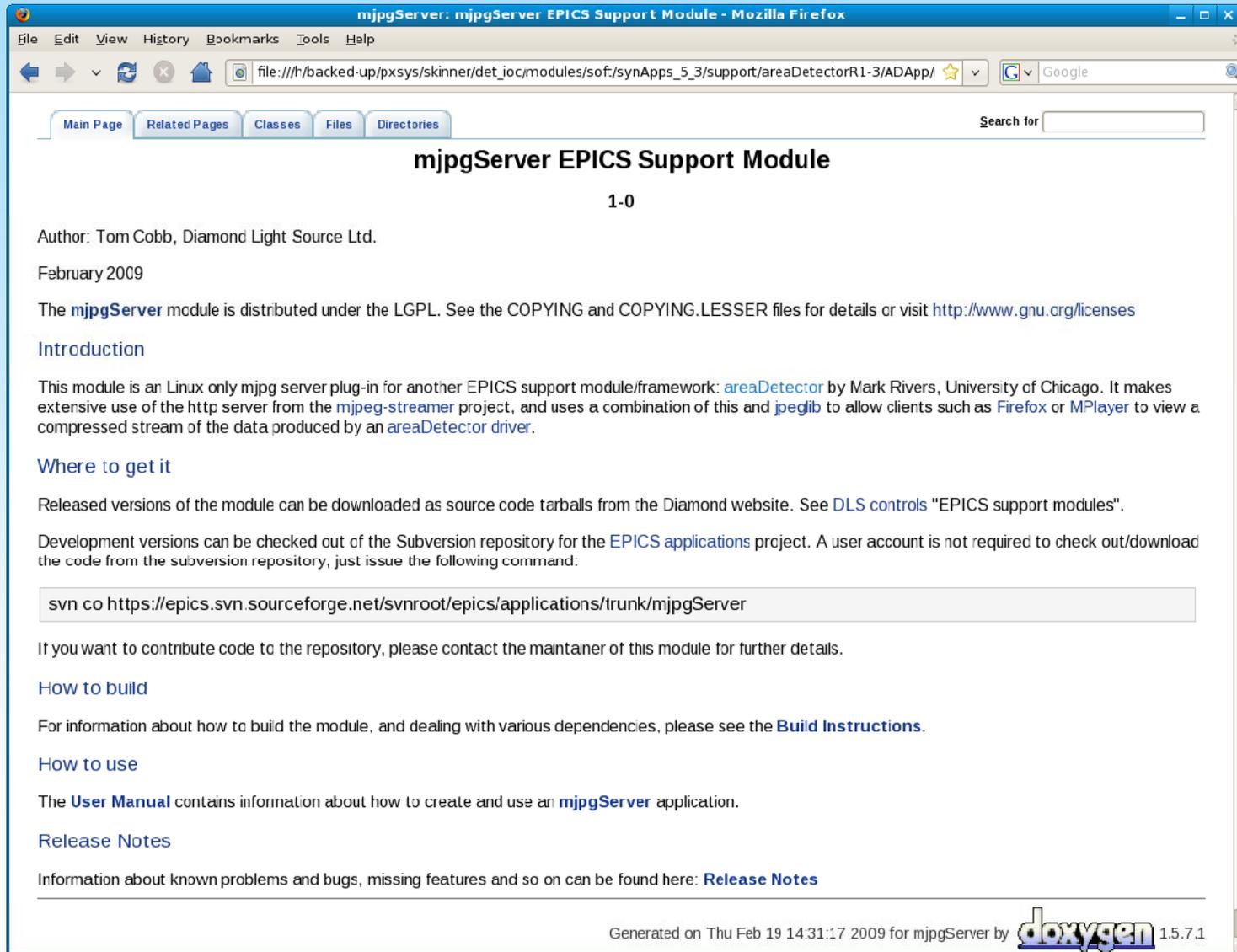
```
svn co https://epics.svn.sourceforge.net/svnroot/epics/applications/trunk/firewireDCAM
```

If you want to contribute code to the repository, please contact the maintainer of this module for further details.

Done



# MjpegSever areaDetector Plug-in



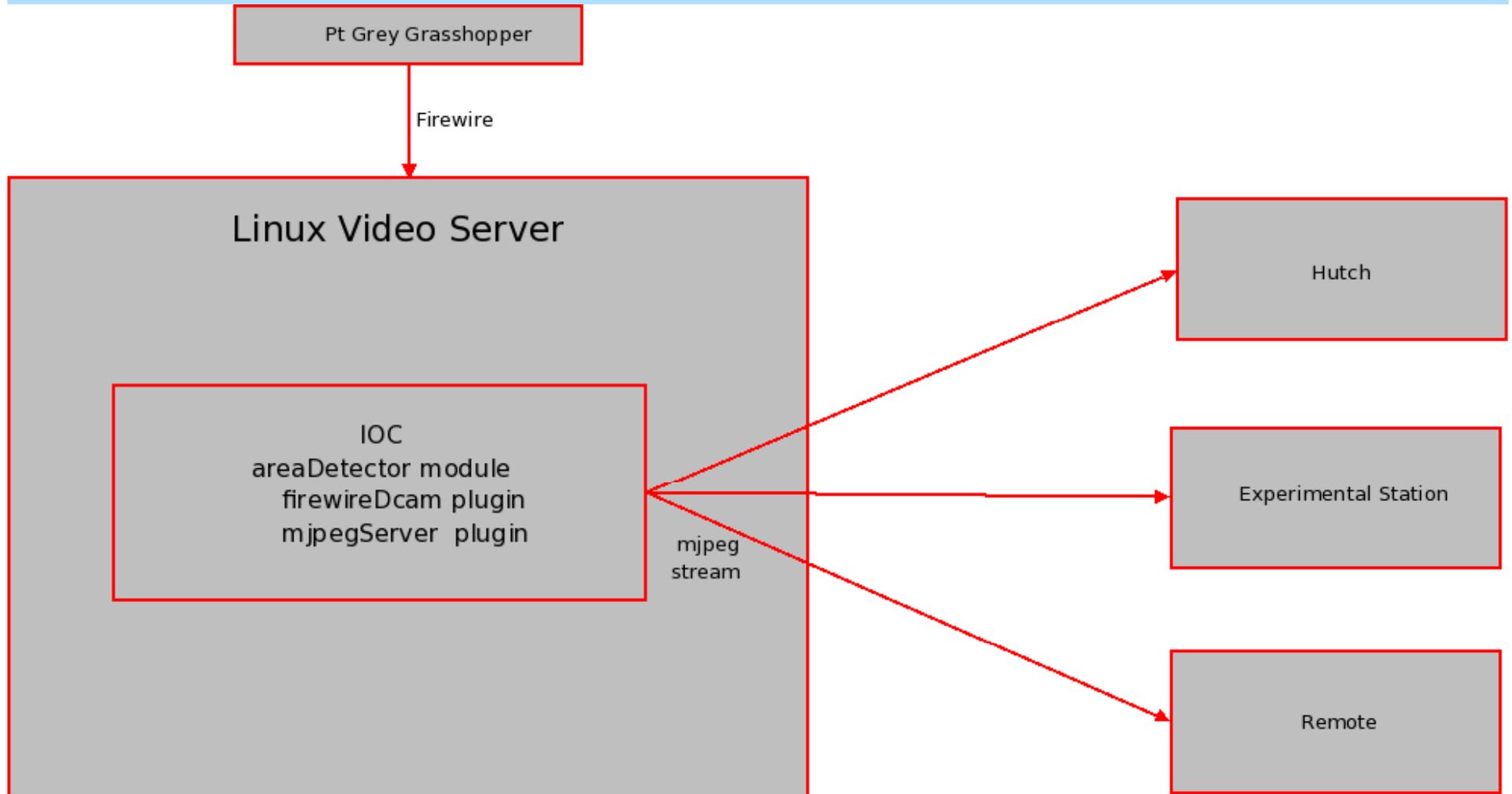
The screenshot shows a Mozilla Firefox browser window with the title "mjpegServer: mjpegServer EPICS Support Module - Mozilla Firefox". The address bar shows the file path: "file:///h:/backed-up/pxsys/skinner/det\_ioc/modules/sof/synApps\_5\_3/support/areaDetectorR1-3/ADApp/". The page content includes:

- Navigation tabs: Main Page, Related Pages, Classes, Files, Directories.
- Search for:
- Section header: **mjpegServer EPICS Support Module**
- Version: **1-0**
- Author: Tom Cobb, Diamond Light Source Ltd.
- Date: February 2009
- Text: The **mjpegServer** module is distributed under the LGPL. See the COPYING and COPYING.LESSER files for details or visit <http://www.gnu.org/licenses>
- Section: **Introduction**
- Text: This module is an Linux only mjpeg server plug-in for another EPICS support module/framework: **areaDetector** by Mark Rivers, University of Chicago. It makes extensive use of the http server from the **mjpeg-streamer** project, and uses a combination of this and **jpeglib** to allow clients such as **Firefox** or **MPlayer** to view a compressed stream of the data produced by an **areaDetector** driver.
- Section: **Where to get it**
- Text: Released versions of the module can be downloaded as source code tarballs from the Diamond website. See **DLS controls** "EPICS support modules".
- Text: Development versions can be checked out of the Subversion repository for the **EPICS applications** project. A user account is not required to check out/download the code from the subversion repository, just issue the following command:
- Code block: 

```
svn co https://epics.svn.sourceforge.net/svnroot/epics/applications/trunk/mjpegServer
```
- Text: If you want to contribute code to the repository, please contact the maintaner of this module for further details.
- Section: **How to build**
- Text: For information about how to build the module, and dealing with various dependencies, please see the **Build Instructions**.
- Section: **How to use**
- Text: The **User Manual** contains information about how to create and use an **mjpegServer** application.
- Section: **Release Notes**
- Text: Information about known problems and bugs, missing features and so on can be found here: **Release Notes**
- Footer: Generated on Thu Feb 19 14:31:17 2009 for mjpegServer by **doxygen** 1.5.7.1



# Firewire Camera Control (version 2)



# Keyence Machine Vision Automounter Assist

The screenshot shows the Keyence website for the CV-2100 Series Machine Vision system. The browser window is titled "Machine Vision: High Speed Processing and Performance, CV-2100 Series - KEYENCE - Mozilla Firefox". The address bar shows the URL "http://www.keyence.com/products/vision/machine/cv2100/cv2100.php".

The website header includes the Keyence logo, navigation menus for "HOME", "PRODUCTS", "APPLICATIONS", "DOWNLOADS", "SUPPORT/SERVICES", "NEWS/TOPICS", "COMPANY", and "CONTACT". The main content area is titled "CV-2100 Series Machine Vision" and features a large image of the machine and a hand holding a probe. Text highlights "CV-022 Most Compact and Best-In-Class Performance" and "Ultra-Small Double-Speed".

Key features and benefits listed include:
 

- Fastest in its class
- Ultra-high-speed processing of 20,000 parts/min
- Digital image transfer
- Repeatability of -0.05 pixels
- On-screen statistical data processing

 The fastest machine vision system in its class, Single window inspection with 333 parts per second performance.

The "Online Support and Services" section includes links for "My Keyence", "My Favorite", and "My Downloads", along with icons for "EXPERT", "PRICE INFO", "TRIAL/LEAD", "SHIPPING", "CATERGOS", "MANUAL", "2D CAD DATA", and "3D CAD DATA".

The "CV-2100 Digital Machine Vision System Features" section lists:
 

- High Speed Processing:** Fastest in its class processing of 20,000 parts/min. New image processing engine with a double speed progressive scan camera.
- Advanced Functions:** Advanced image processing functions such as Trend Edge and Edge Area Correction enable quick and accurate visually inspection of any target.
- Standard Functions:** The CV-2100 vision system includes the most comprehensive set of standard features on the market. High-speed rotation search, partial image reading and more.
- Inspection Tools:** Various inspection tools such as Area, Pattern Search, Multiple Search, Edge Angle, and much more.

The "Digital Machine Vision System Applications" section shows examples for:
 

- Automotive/Metal:** Machine vision application examples in the Automotive and Metal Industries.
- ICs/Electronics:** Machine vision application examples in the IC and Electronics Industries.
- Rubber/Plastic:** Machine vision application examples in the Rubber and Plastic Industries.
- Medical/Biological:** Machine vision application examples in the Food and Packaging Industries.



# Keyence Machine Vision

Run No.	Eval	Run No.	Eval	Total NG
01	NG	6	---	NG
02	OK	7	---	
03	OK	8	---	
04	OK	9	---	
05	OK	10	---	
06	---	11	---	
07	---	12	---	
08	---	13	---	
09	---	14	---	
10	---	15	---	
11	---	16	---	
12	---	17	---	
13	---	18	---	
14	---	19	---	
15	---	20	---	

# Keyence Machine Vision

Win No.	Eval	Win No.	Eval	Total
01	OK	16	---	OK
02	OK	17	---	
03	OK	18	---	
04	OK	19	---	
05	OK	20	---	
06	---	21	---	
07	---	22	---	
08	---	23	---	
09	---	24	---	
10	---	25	---	
11	---	26	---	
12	---	27	---	
13	---	28	---	
14	---	29	---	
15	---	30	---	

## Software Philosophy at the PXRR

### 1) Put as much as possible under EPICS Control

- reduces the amount of higher level code
- allows control and monitoring from many existing EPICS clients (medm,edm)
- takes advantage of components made available by the EPICS community.

### 2) Control software must be easy to extend and modify.



# NPEI (PSI,KEK, 2009)

The screenshot shows a Mozilla Firefox browser window with the address bar displaying `http://controls.web.psi.ch/cgi-bin/twiki/view/Main/NewPythonEpicsInterface`. The page title is "NewPythonEpicsInterface < Main < TWiki - Mozilla Firefox". The website header includes the Paul Scherrer Institut (PSI) logo and the text "GFA Controls Section". A navigation menu contains links for Home, SLS, XFEL, ABK, AIT, Diagnostics, Beam Dynamics, SLS Controls (old), and ACS-Home (old). The main content area is titled "New Python EPICS Interface" and includes a breadcrumb trail: "You are here: TWiki > Main Web > ProjectsPortal > NewPythonEpicsInterface". The page content is structured as follows:

- Main** (highlighted in yellow)
- [Log In or Register](#)
- Search** (with a search input field)
- Category Index
- Keyword Index
- Topic Index
- Changes
- Main Web**
- [Create New Topic](#)
- [Notifications](#)
- [Statistics](#)
- [Preferences](#)
- Webs**
- [Main](#)
- [News](#)
- [Sandbox](#)
- [TWiki](#)

The main content area contains a tree view of the "New Python EPICS Interface" topic:

- + [New Python EPICS Interface](#)
  - ↓ [Motivation](#)
  - ↓ [History](#)
  - ↓ [What is in SLS](#)
  - ↓ [Our Approach](#)
  - ↓ [Regression Test](#)
  - ↓ [How to Convert Old Codes](#)
  - ↓ [Test Suite](#)
  - ↓ [Documentation](#)
  - ↓ [Install](#)

Below the tree view, the "Motivation" and "History" sections are visible. The "History" section contains the following text:

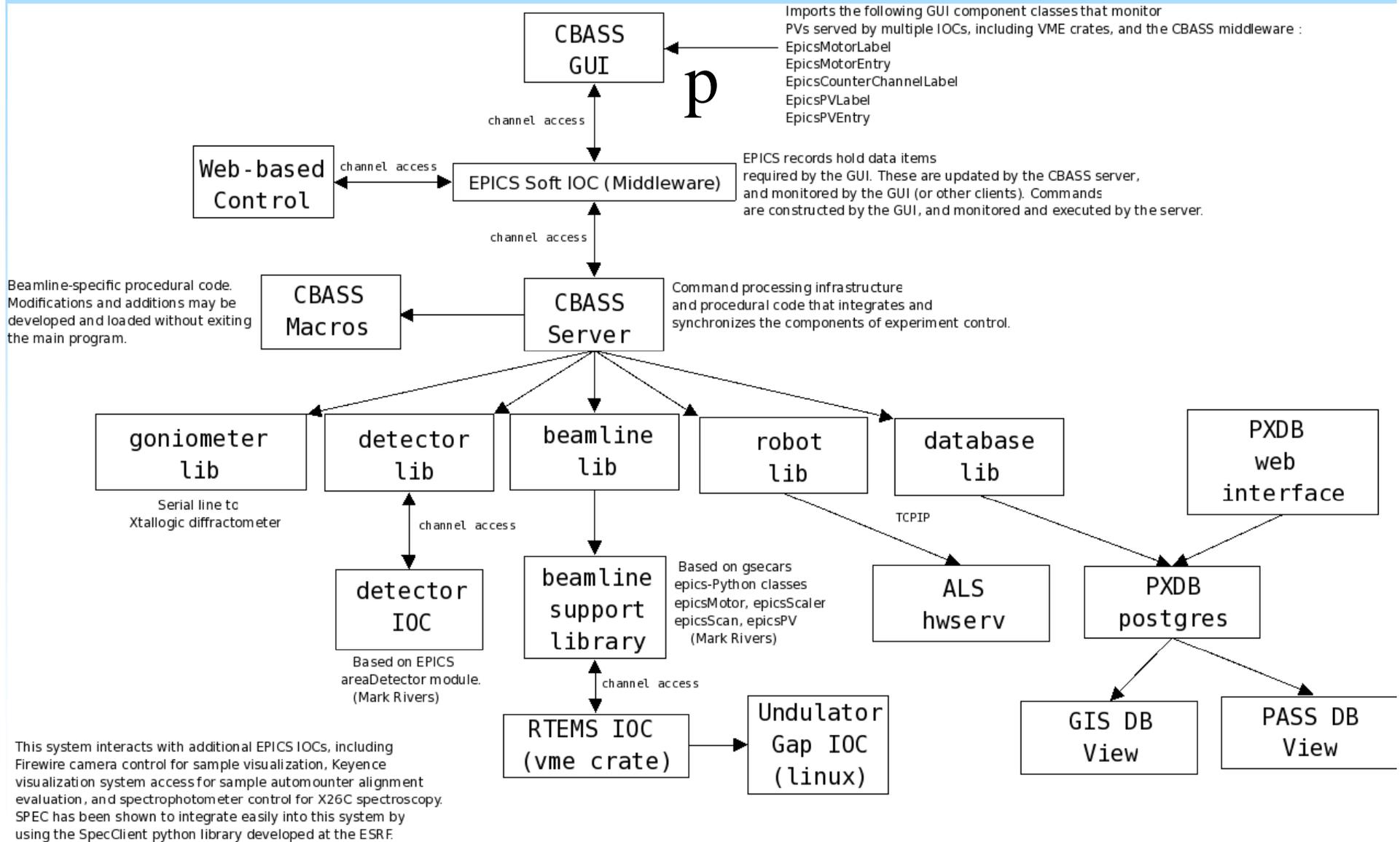
Geoff Savage created [caPython\(CaChannel\)](#) and Mark Rivers extended it to [epicsPV](#) and upon that created device support modules, `epicsMotor`, `epicsLogger`, `epicsScaler`, `epicsMed`, `epicsMca`. In today's point of view, it has the following limitations:

- Based on EPICS 3.13. Using APIs obsoleted in EPICS 3.14.
- For the same reason, no thread support.
- It is not actively maintained.
- The code is wrapped by SWIG-1.1 and requires extra work to be used by SWIG-1.3.

At the bottom of the page, the text reads: "On the other hand, Noboru Yamamoto created and still maintains [PythonCA](#). It has been brought update to date with EPICS 3.14".



# CBASS under the hood



## PXRR Computing Effort

Infrastructure – Networking, storage, cybersecurity, systems maintenance.

Matt Cowan  
Leon Flaks

EPICS .db files, motor configurations

Dieter Schneider  
Leon Flaks

PXDB

Rick Buono

Software Development – CBASS, RTEMS and Linux IOCs

John Skinner



Thanks to these people and many more...

David Beauregard – USB4000 Spectrophotometer

Stephanie Allison – MAXv Motor Controller

Mark Rivers – areaDetector Module, gsecars Python classes

Eric Norum – RTEMs

Till Straumann – RTEMs

Bill Nolan – Keyence driver

Ulrik Pederson – FirewireDCAM Module

Tom Cobb – mjpgServer Module

J. Lewis Muir – adsc and BPM drivers

Bernard Lavault - C3D

EDNA Staff

