



# EPICS Qt

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**EPICS** Fall Meeting October 2014 Saclay



Supported  
by





**2015**  
**ICALEPCS**  
melbourne • australia



# Presentation Summary

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- Qt Intro
- Qt Within the EPICS community
- Qt Update

# What is Qt



- Qt is a cross-platform application and UI framework for developers using C++.
- It can be used under an open source licence.
- Qt has had a good track record of ongoing development and expanding use.
- Strong community based governance.



DEVELOPER  
DAYS2014  
EUROPE  
Berlin, Oct 6-8



DEVELOPER  
DAYS2014  
NORTH AMERICA  
San Francisco, Nov 3-5

# Qt is an ecosystem



- An active open source community supporting documentation, forums, and tools
- Any applications we produce come with a lot of support from that community.



Qt forums

Welcome to the Qt-Project.org  
at the rules we wrote down to



# Qt roadmap



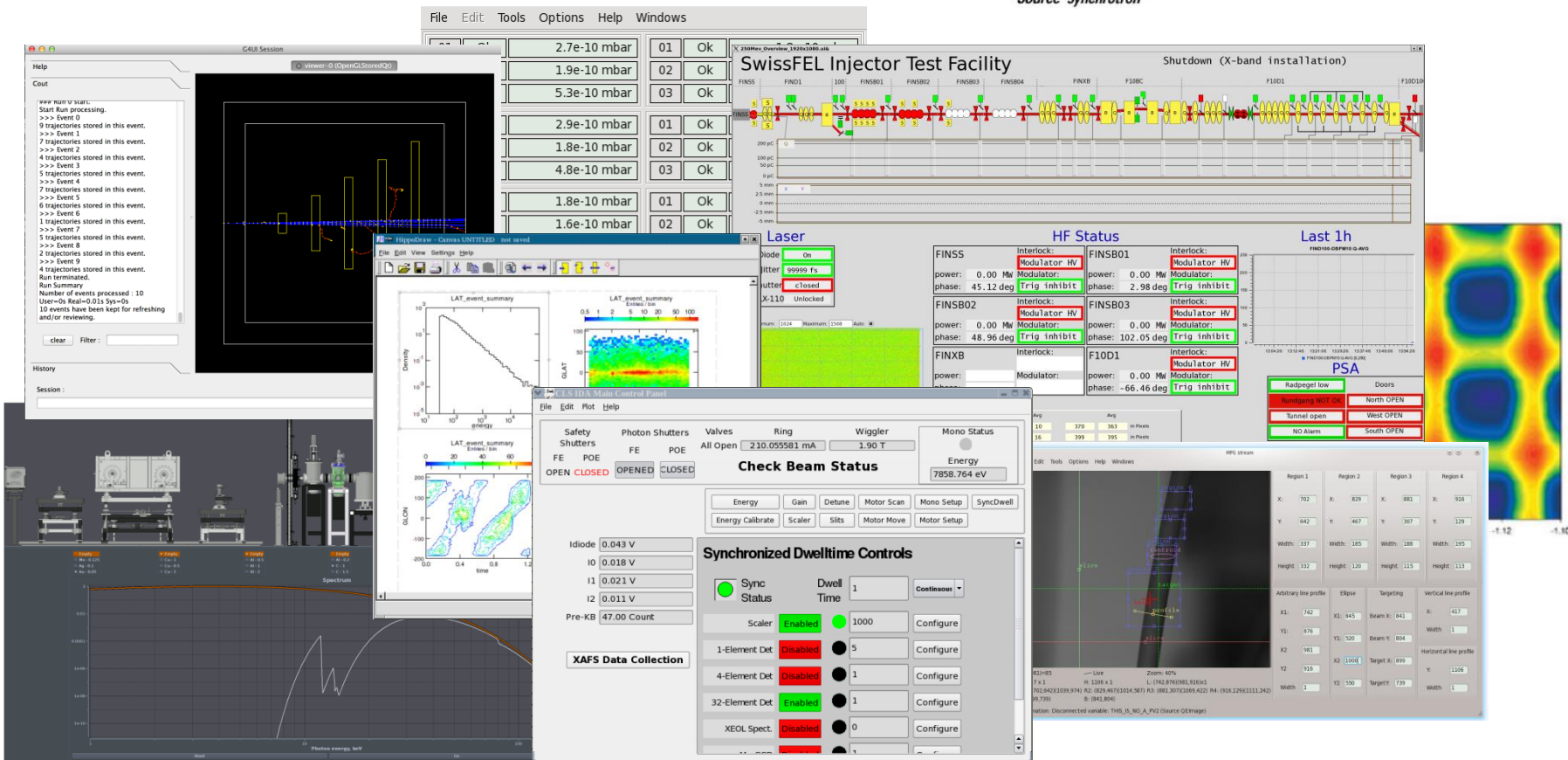
- Traditional desktop
- Embedded systems
- RTOS (including VxWorks)
- Touch screens
- Mobile platforms



# Can we benefit from Qt?



SWISS SYNCHROTRON



# Can we benefit from Qt?



PAUL SCHERRER INSTITUT



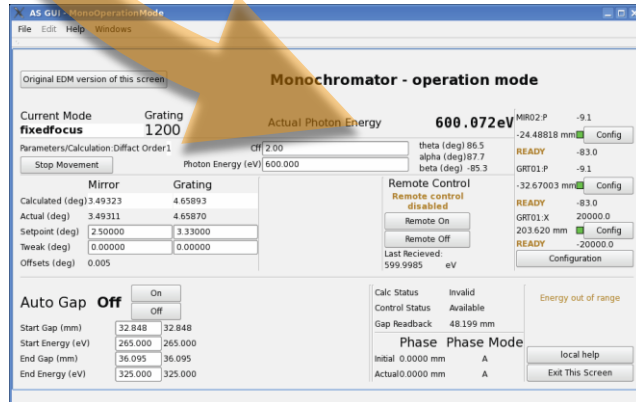
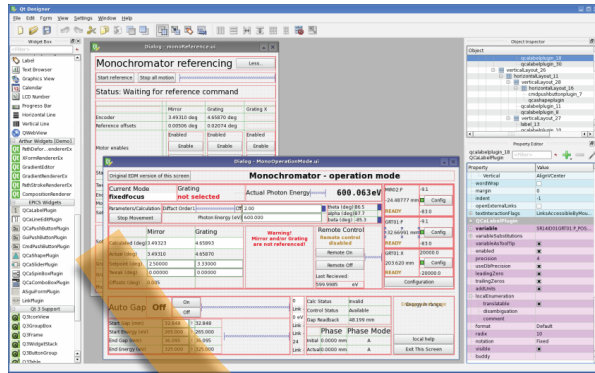
- The Paul Scherrer Institute:  
**MEDM conversion tools**
- The Australian Synchrotron:  
**Unifying GUI system**
- Lyncean Technologies:  
**Python physics and science applications.**



# Collaboration results – EPICSQT + caQtDM



- Just like before – only combined!
- Common documentation
- Common packaging
- Includes all functionality from the Australian Synchrotron application
- Includes PSI's MEDM conversion tools and extended functionality



# EPICSQt



Qt Designer

File Edit Form View Settings Window Help

Widget Box

Filter

- QLineEdit
- Progress Bar
- Horizontal Line
- Vertical Line
- QDeclarativeView
- QWebView
- Arthur Widgets [Demo]
- Display Widgets [Examples]
- Phonon
- EPICS Widgets
  - QEAnalogProgressBar
  - QEBitStatus
  - QECheckBox
  - QEComboBox
  - QEConfiguredLayout
  - QEFileBrowser
  - QEFileImage
  - QEForm
  - QEImage
  - QELabel
  - QELineEdit
  - QELog
  - QELogin
  - QENumericEdit
  - QEPeriodic
  - QEPlot
  - QEPushButton
  - QEPvProperties
  - QERadioButton
  - QERadioGroup
  - QERecipe
  - QEScript
  - QEShape

\$(MOTOR) - geobrickMinimal.ui\*

1.2041 1.2052 mrad

0.3000 < > Stop Kill

\$(MOTOR) - geobrickMore.ui\*

Operation

1.2041 1.2052 mrad

0.3000 < > Sync Stop Kill

Raw motor position 12052

Raw encoder position 12052

Following error 0.0000

Max following error 0.0000 Reset

Geobrick control ....

Low limit

Limit violation

High limit

Encoder loss Reset

Amp fault

User configuration

Velocity 1.0000 1.0000 mrad/se

Homed

User direction Positive Negative

User high limit 100.0000 mrad

User low limit -100.0000 mrad

User offset 0.0000 mrad

Home << >>

Set / use Use Set

Open Plot... More...

Property Editor

Filter

qeform : QEForm

Property	Value
Bold	
Italic	
Underline	
Strikeout	
Kerning	
Antialiasing	PreferDefault
cursor	Arrow
mouseTracking	
focusPolicy	NoFocus
contextMenuPolicy	DefaultContextMenu
acceptDrops	
toolTip	
statusTip	
whatsThis	
accessibleName	
accessibleDescription	
layoutDirection	LeftToRight
autoFillBackground	
styleSheet	
locale	English, UnitedStates
Language	English
Country	UnitedStates
inputMethodHints	ImhNone
QEForm	
uiFile	geobrickCore.ui
variableSubstitutions	MOTOR=SR12ID01MIR02:...
handleGuiLaunchRequests	
resizeContents	
messageSourceId	0
messageFormFilter	Match
messageSourceFilter	None

Property Editor Object Inspector

# EPICSQt



SR08ID01SST23:Z

File Edit Tools Options Help Windows

### 2B Large CT Z

-52.5000 -52.5000 mm ☒ Ready

2.5000 < > ☒ Stop

Raw motor position -262500 ☐ Low limit

Raw encoder position -262500 ☐ Limit violation

Following error 26.2500 ☐ High limit

Max following error 89.7497 ☐ Encoder loss ☐ Amp fault

Geobrick control Open loop ☐ Unexpected limit fault ☐ Homed

#### User Settings

Velocity 1

Offset 0

Direction -

Low limit -

Backlash dist 0

Copy RBV to VAL

#### Home Procedure

Home flag: Negative

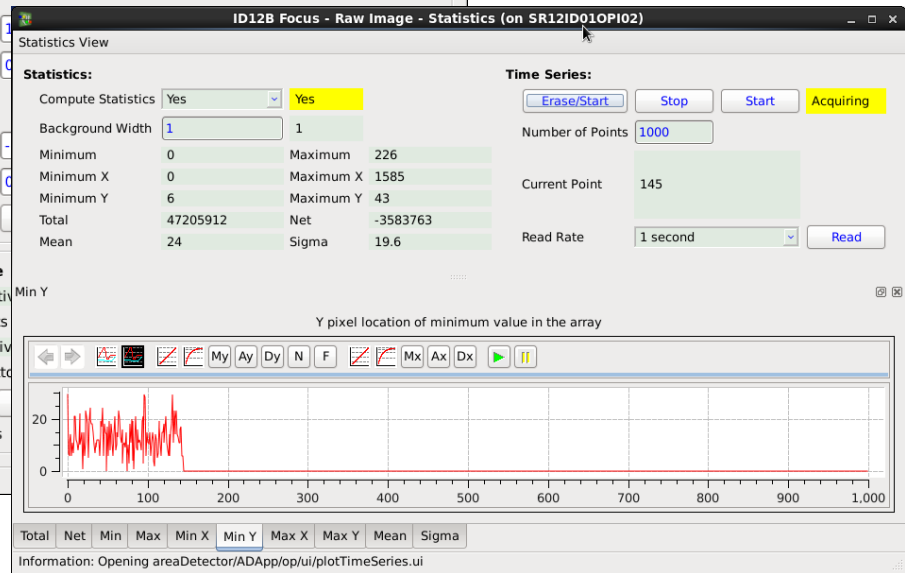
1. Adjust soft limits
2. Move to Negative
3. Press active button
4. Reset soft limits

Rotation stage

File Edit Tools Options >>

-52.5000 -52.5000 mm

2.5000 < > ☒ Stop



# EPICSQt - differentiation

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- UI presentation application that is not restricted to medm behaviour
  - Docks
  - Tabs
  - Application specific menu bars and toolbars
- Widget set that is not restricted to medm behaviour

# EPICSQt update

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# EPICSQt update - GUIs for Beamline Users





# EPICSQt update



**Change User Level**

Current Level: User

Login as:

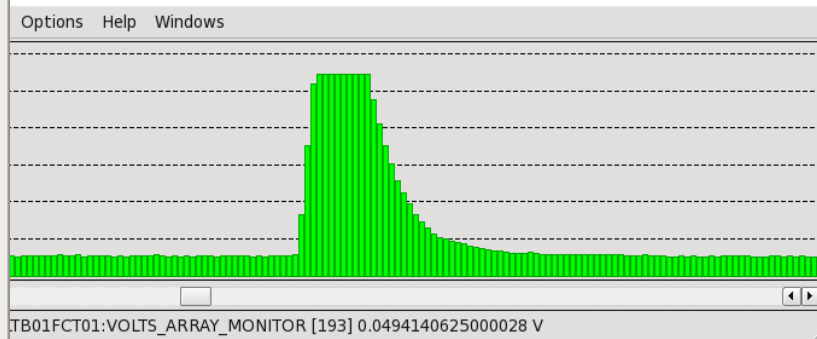
☒ User

☐ Scientist

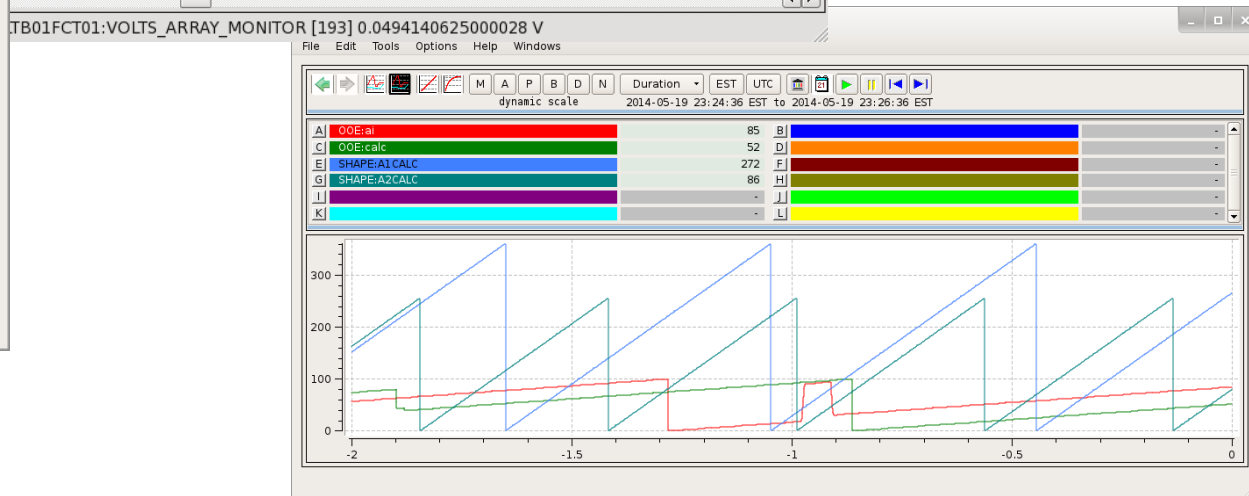
☐ Engineer

Login Logout

Cancel



- User levels
- Plotting
- Stripcharts



# EPICSQt update



- PV Scratch pad tool
- Logging

Simple logging example

User Login Logout

Time	Type	Message
2013/01/04 - 17:33:52	INFO	The user type was changed from 'User' to 'Scientist'
2013/01/04 - 17:33:54	INFO	The user type was changed from 'Scientist' to 'Engineer'
2013/01/04 - 17:33:56	INFO	The user type was changed from 'Engineer' to 'User'

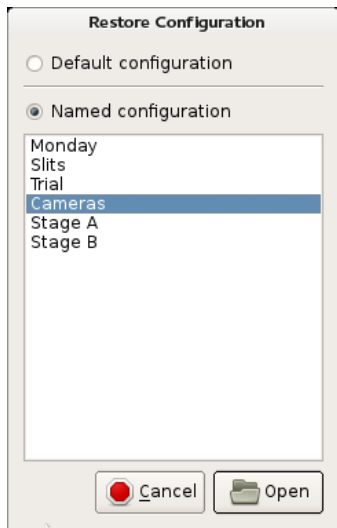
☒ Info messages ☒ Warning messages ☒ Error messages

Clear Save

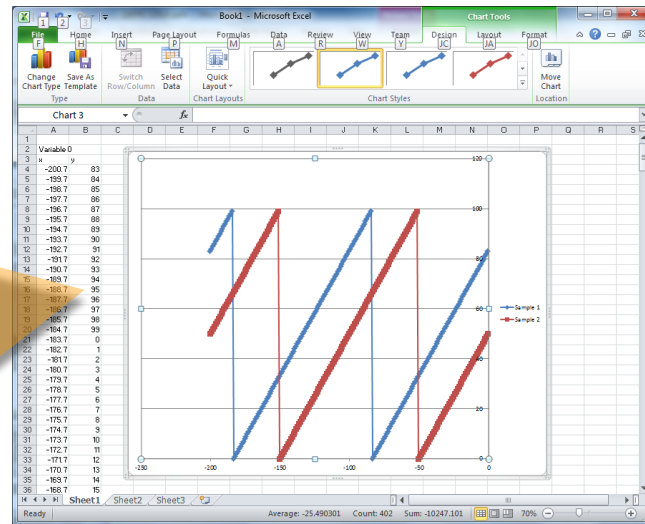
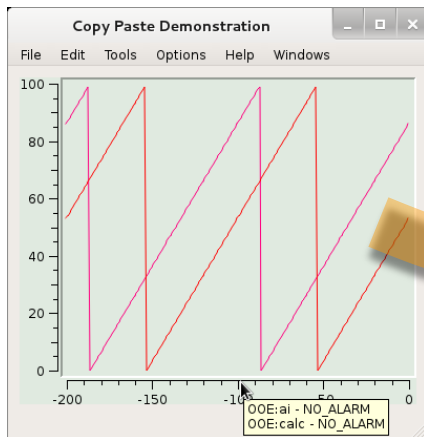
Information: The user type was changed from 'Engineer' to 'User'

File Edit Tools Options Help Windows		
PV Name	Description	Value
SR11BCM01:CURRENT_MONITOR	BCM Smooth Current	6.679 mA
SR11BCM01:LIFETIME_MONITOR	BCM Lifetime	18.29 Hrs
SR11BCM01:LIFETIME_MONITOR.EGU	BCM Lifetime	Hrs

# EPICSQt update



- Configuration Save/Restore
- Improved cut and paste



# EPICSQt update



- Dynamic tables
- PV Recipes
- User script management

Form - ccg\_unit.ui

Form - ccg\_sector.ui

	01	02	03
01	Ok	2.7e-10 mbar	1.8e-10 mbar
02	Ok	1.9e-10 mbar	1.2e-10 mbar
03	Ok	5.3e-10 mbar	2.2e-10 mbar
01	Ok	2.9e-10 mbar	2.0e-10 mbar
02	Ok	1.8e-10 mbar	1.2e-10 mbar
03	Ok	4.8e-10 mbar	3.1e-10 mbar
01	Ok	1.8e-10 mbar	2.5e-10 mbar
02	Ok	1.6e-10 mbar	2.7e-10 mbar
03	Ok	8.0e-11 mbar	3.4e-10 mbar
01	Ok	2.0e-10 mbar	2.5e-10 mbar
02	Ok	2.5e-10 mbar	2.2e-10 mbar
03	Ok	3.5e-10 mbar	5.6e-10 mbar
01	Ok	1.8e-10 mbar	1.4e-10 mbar
02	Ok	2.2e-10 mbar	1.7e-10 mbar
03	Ok	7.0e-11 mbar	3.7e-10 mbar
01	Ok	1.6e-10 mbar	1.8e-10 mbar
02	Ok	2.2e-10 mbar	1.8e-10 mbar
03	Ok	3.2e-10 mbar	6.0e-11 mbar
01	Ok	1.9e-10 mbar	1.2e-10 mbar
02	Ok	2.4e-10 mbar	1.8e-10 mbar
03	Ok	3.4e-10 mbar	4.5e-10 mbar

Recipe component

File Edit Tools Options Help Windows

Experiment start New Save Delete Apply Read

Script example

File Edit Tools Options Help Windows

MyScan New Save Delete Execute Abort

Add Remove Up Down Copy Paste

#	Enable	Program	arameter	Directory	Timeout	Stop	Log
1	<input checked="" type="checkbox"/>	init	5		10 s	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	scan			0 s	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	<input checked="" type="checkbox"/>	copy			0 s	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Information: Opening /home/andrew/script.ui

# EPICSQt update



- Documentation
- PV properties tool



PV Properties <3>

File Edit Help Windows

NAME SR11BCM01:CURRENT\_MONITOR

VAL 200.4032 mA

HOST IRIDIUM:5064

TIME 2013-07-15 22:02:40.000541038 EST

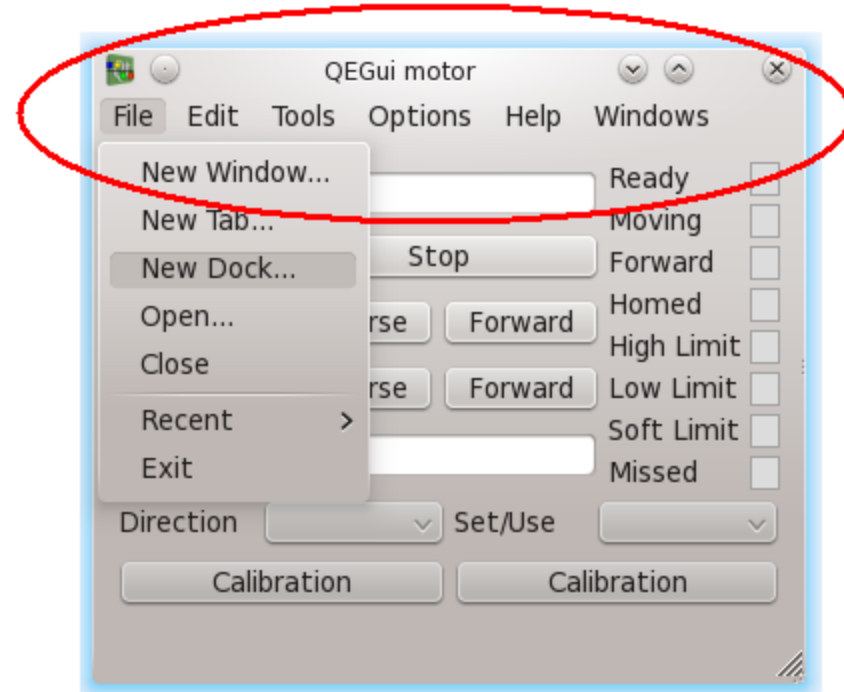
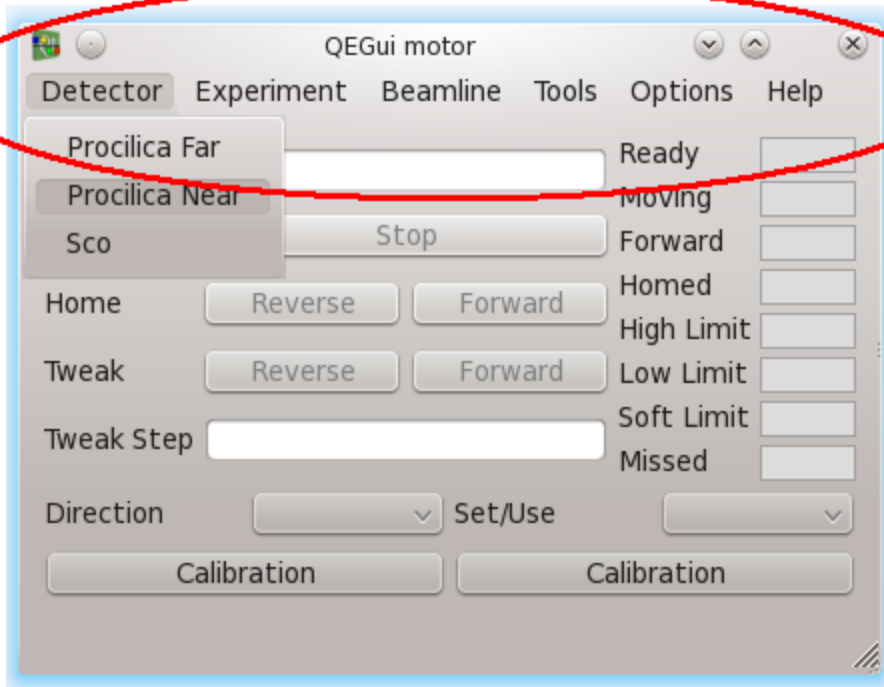
DBF DBF\_DOUBLE INDEX 1 / 1

Field	Value
RTYP	calc
NAME	SR11BCM01:CURRENT_MONITOR
DESC	Smooth Current
ASG	
SCAN	1 second
PINI	NO
PHAS	0
EVNT	0
TSE	0
TSEL	
DISV	1
DISA	0
SDIS	
DISP	0
PROC	0
STAT	NO_ALARM
SEVR	NO_ALARM
NSTA	NO_ALARM
NSEV	NO_ALARM
ACKS	NO_ALARM

# EPICSQt update



- Menu and tool bar customisation

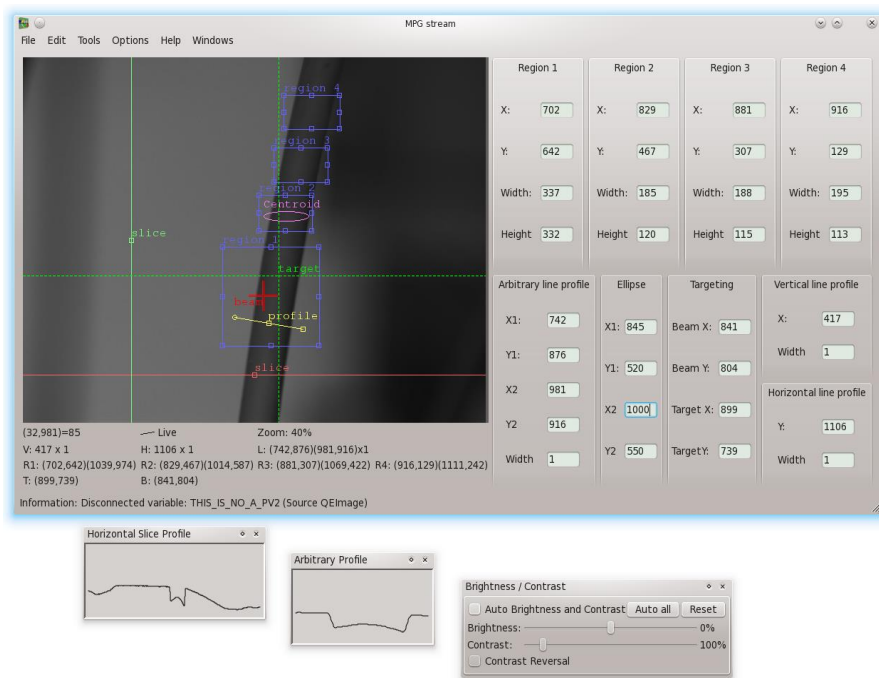




# EPICSQt update



- Imaging
  - Interactive AreaDetector integration
  - Interactive user tasks
  - Analysis tools
  - Local presentation options



# Get involved



## Epics Qt Collaboration

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