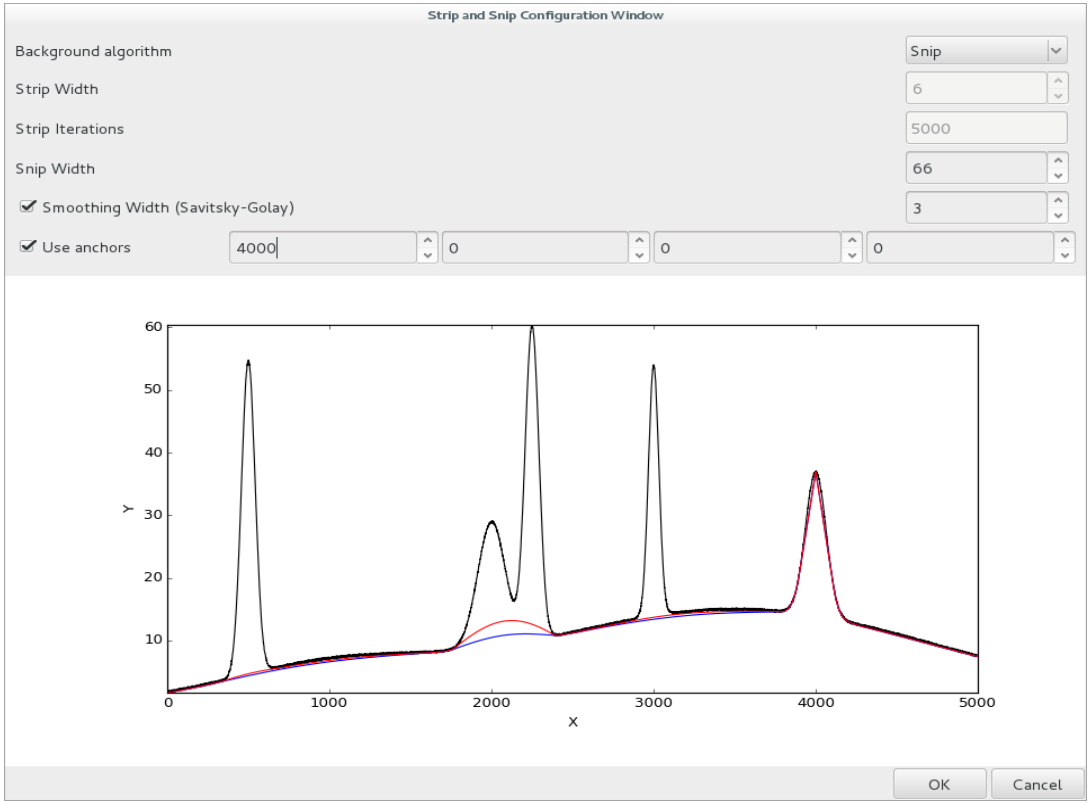
3rd Code Camp
January 23, 2017

THIS TALK

- Introduction
  - Novelties
- Status of silx
- Goals of the code camp
  - For users
  - For core developers
- Hands on!

silx.gui.fit.BackgroundDialog

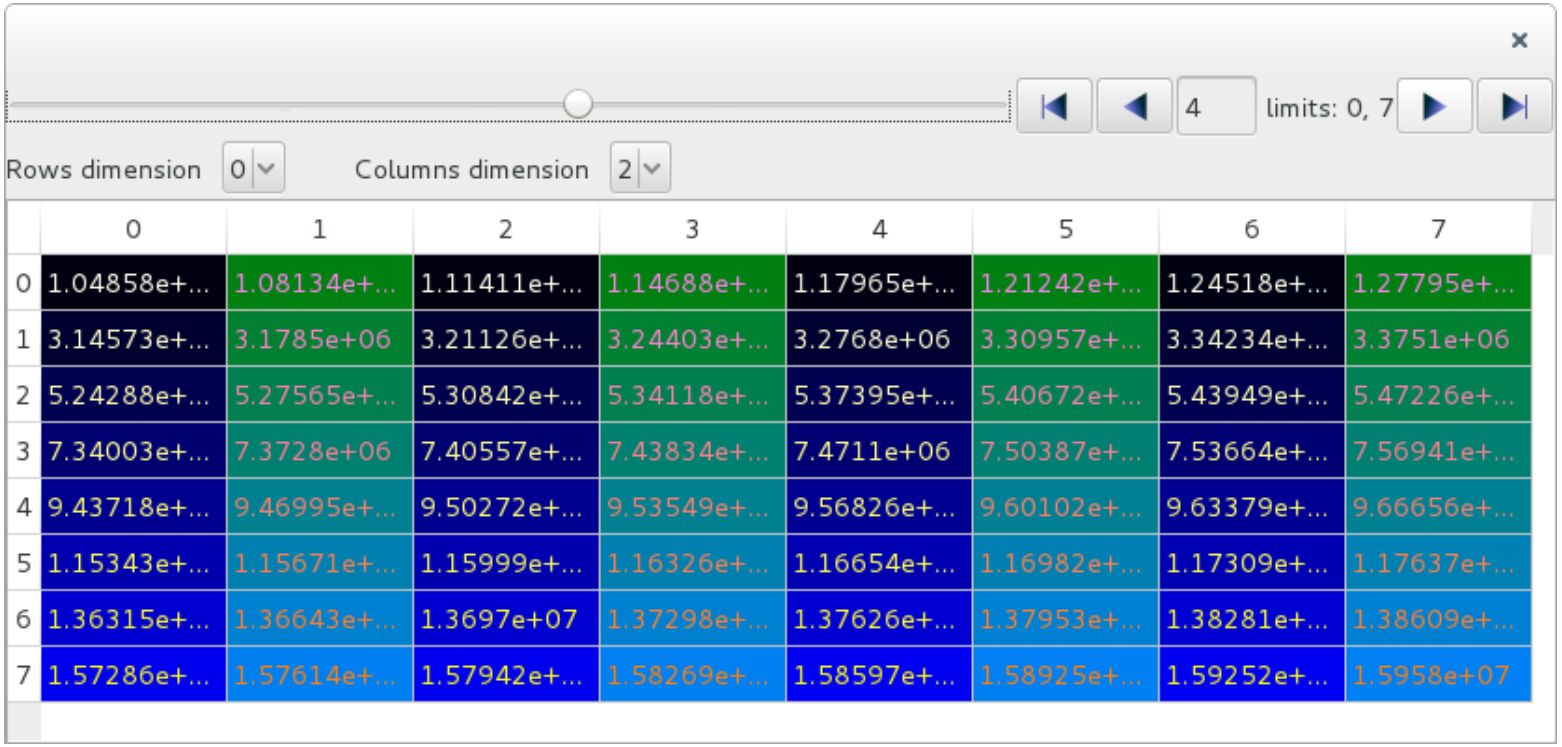
- Configure strip and SNIP background filters
- Included in Fit Widget



silx.gui.data.Arraytablewidget

- Display arrays and datasets of any number of dimensions in a TableView

- Lazy loading for datasets: only the currently displayed 2D slice is read from HDF5 file

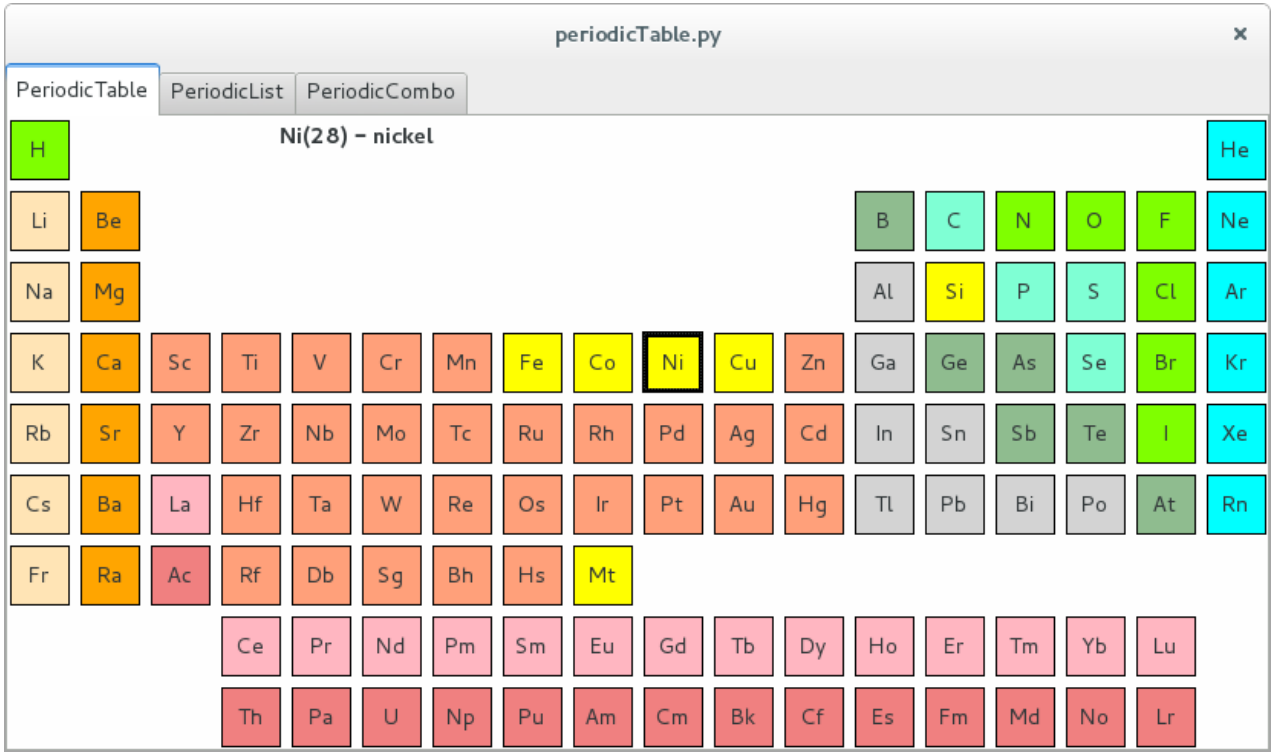


	0	1	2	3	4	5	6	7
0	1.04858e+...	1.08134e+...	1.11411e+...	1.14688e+...	1.17965e+...	1.21242e+...	1.24518e+...	1.27795e+...
1	3.14573e+...	3.1785e+06	3.21126e+...	3.24403e+...	3.2768e+06	3.30957e+...	3.34234e+...	3.3751e+06
2	5.24288e+...	5.27565e+...	5.30842e+...	5.34118e+...	5.37395e+...	5.40672e+...	5.43949e+...	5.47226e+...
3	7.34003e+...	7.3728e+06	7.40557e+...	7.43834e+...	7.4711e+06	7.50387e+...	7.53664e+...	7.56941e+...
4	9.43718e+...	9.46995e+...	9.50272e+...	9.53549e+...	9.56826e+...	9.60102e+...	9.63379e+...	9.66656e+...
5	1.15343e+...	1.15671e+...	1.15999e+...	1.16326e+...	1.16654e+...	1.16982e+...	1.17309e+...	1.17637e+...
6	1.36315e+...	1.36643e+...	1.3697e+07	1.37298e+...	1.37626e+...	1.37953e+...	1.38281e+...	1.38609e+...
7	1.57286e+...	1.57614e+...	1.57942e+...	1.58269e+...	1.58597e+...	1.58925e+...	1.59252e+...	1.5958e+07

silx.gui.widgets.PeriodicTable

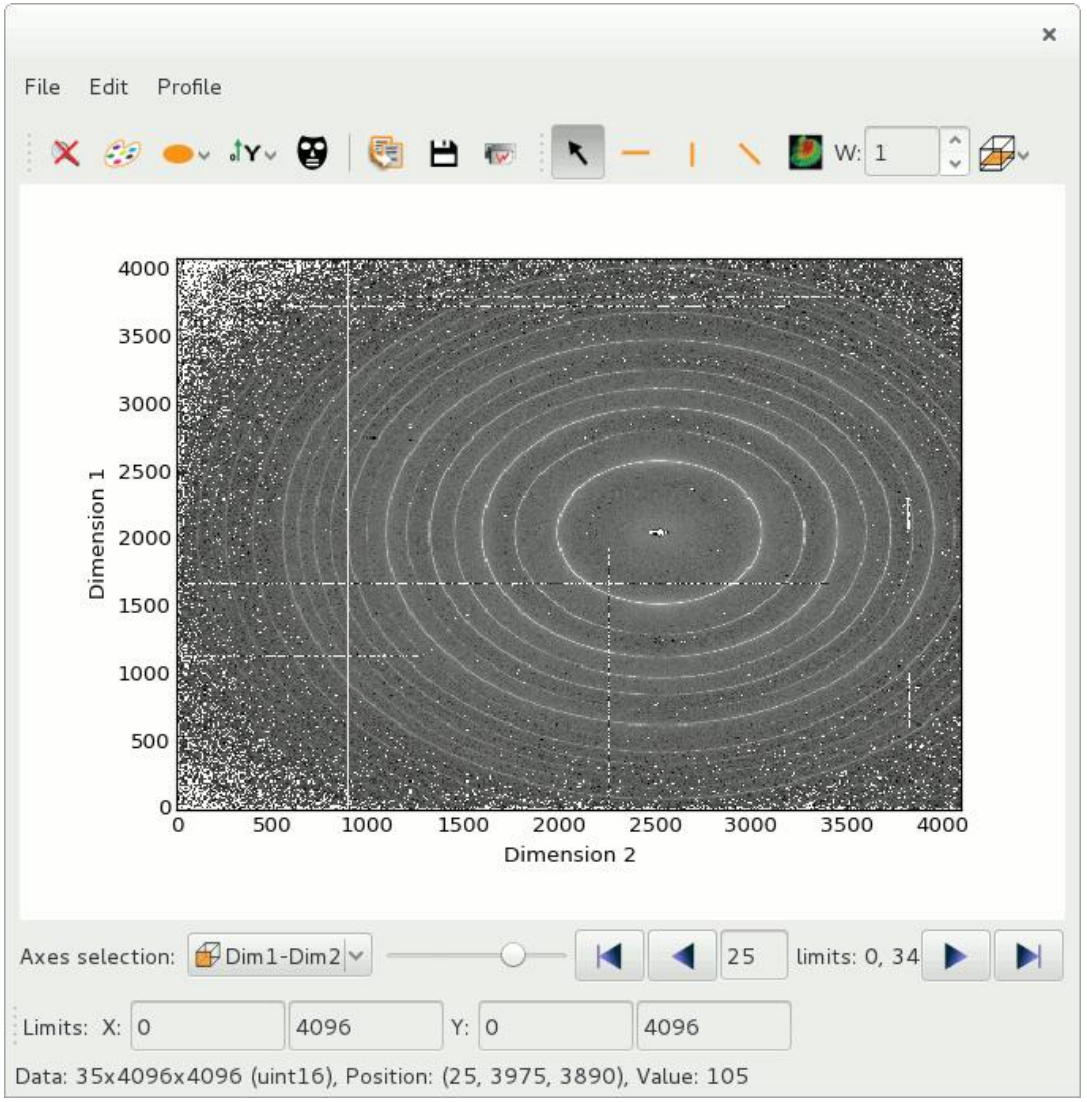
- Periodic table, list (QTreeView) and combo/dropdown list providing minimal data for elements: symbol, name, atomic number, mass

- Selectable elements, signals for element clicked and selection changed events



silx.gui.plot.StackView

- Viewing 3D arrays, 3D datasets or list of 2D arrays as a stack of images.
- Axes selection
- Profile tool to extract a 2D slice from the 3D stack
- Lazy loading for datasets (except when doing diagonal 3D profile)



Miscellaneous

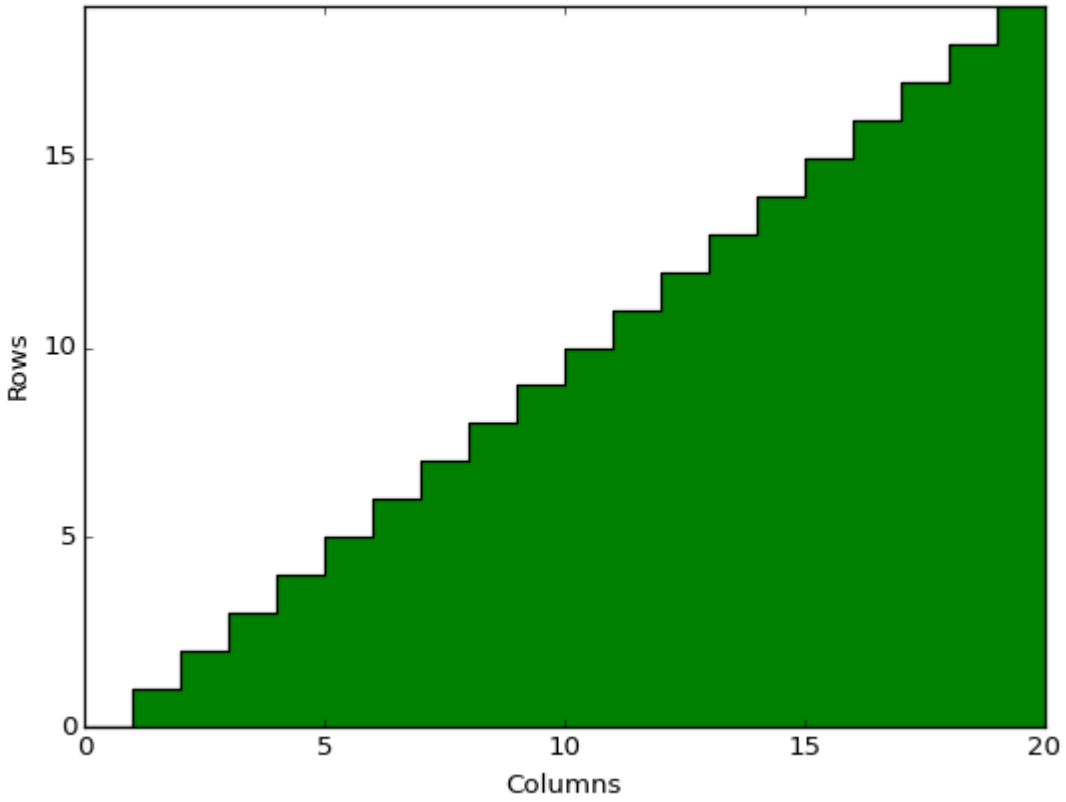
- Fit on a curve in a plot now uses the visible data, not the entire curve. Zoom can be used for setting a range

- Simple QTableWidget implementing cut/copy/paste (right-click context menu), used in ArrayTableWidget and FitWidget.

- New tutorial for custom fit configuration widgets

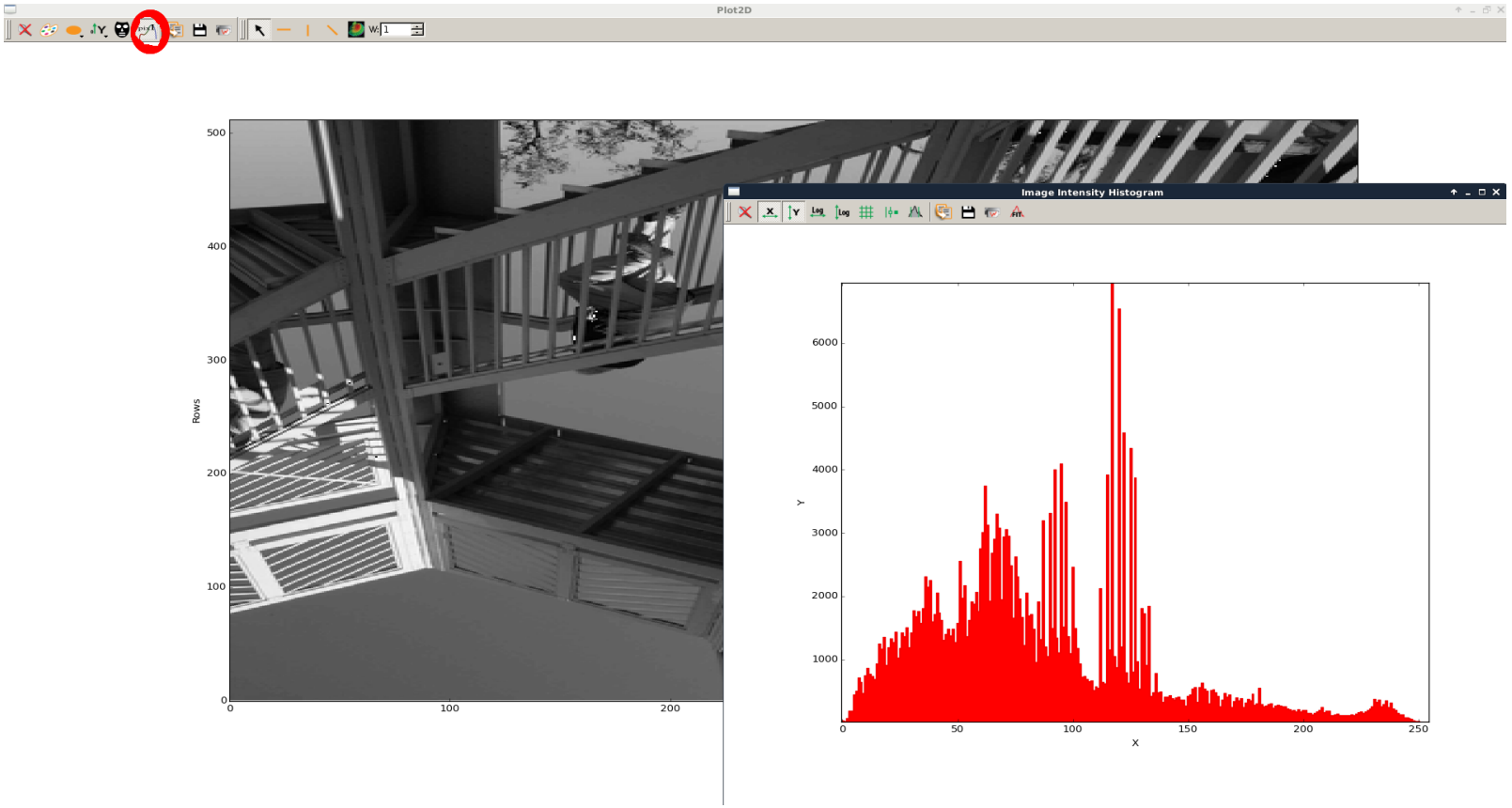
Display curves as Histograms

```
plot = ...
...
plot.addCurve(x, y, histogram='right', fill=True, color='green')
```

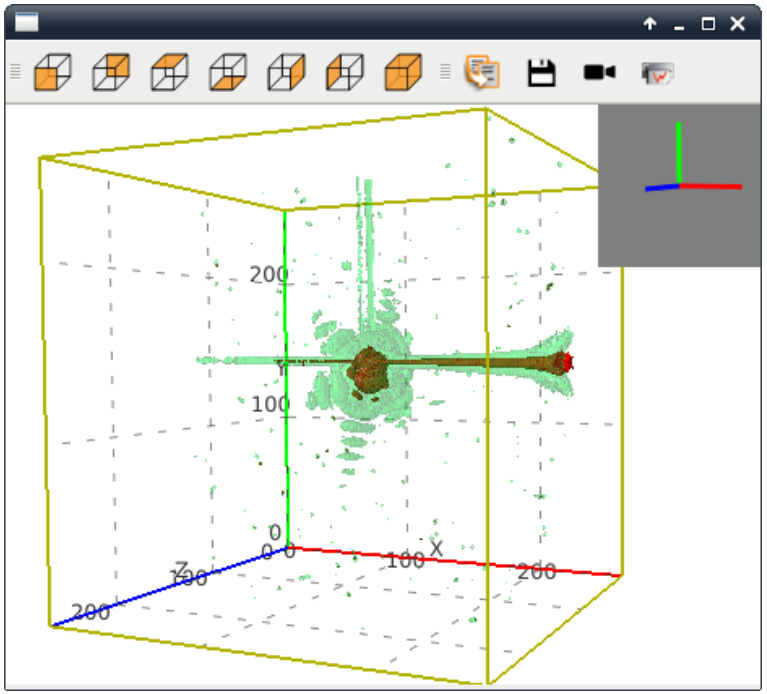


Show Pixel Intensities

- Plot Action
  - Create an histogram from active image pixel values

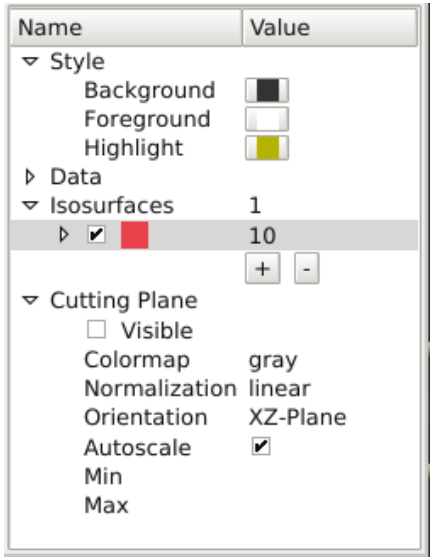


silx.gui.plot3d



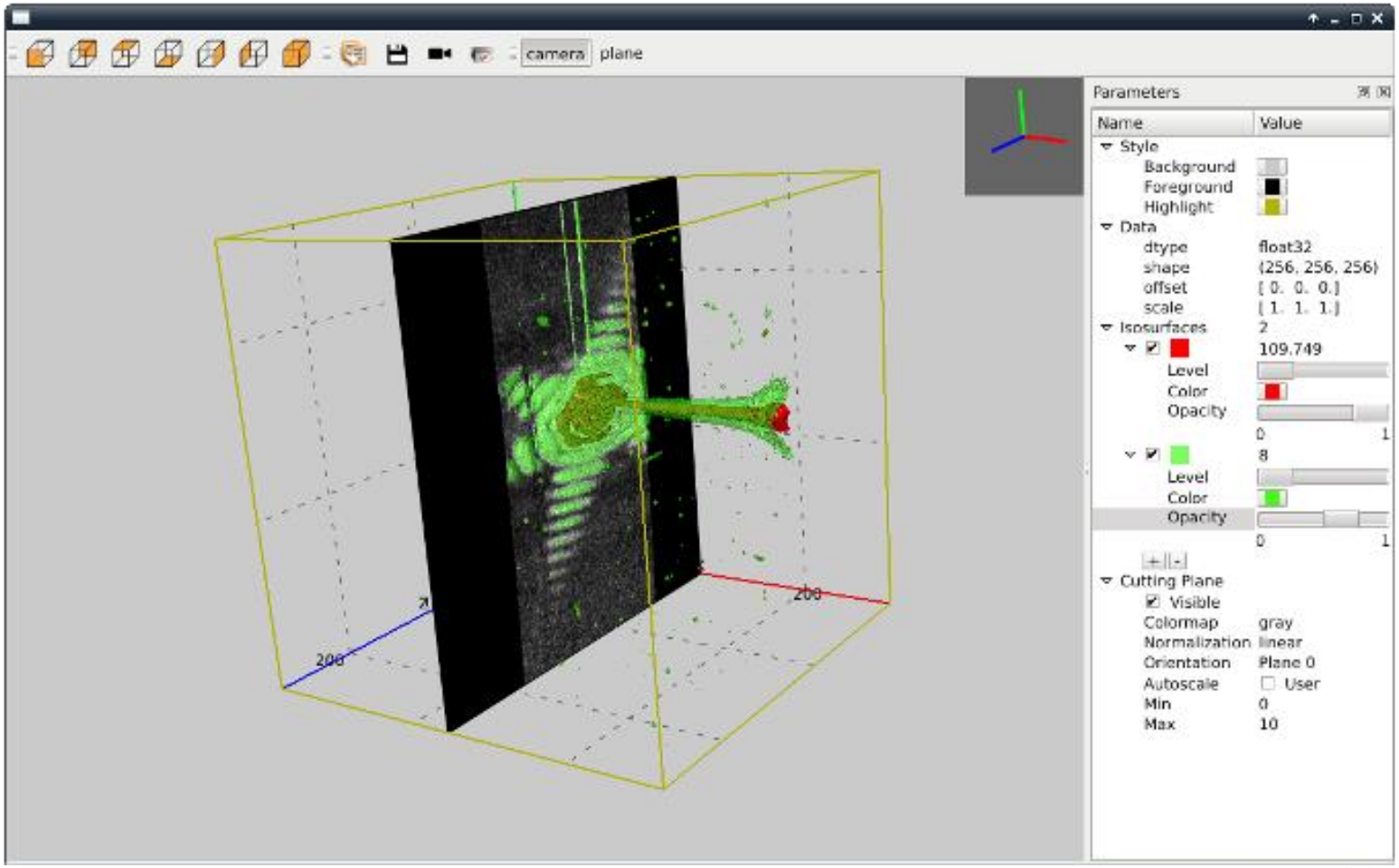
First version of silx 3D visualisation:

- Dependencies:
  - PyQt.QtOpenGL
  - PyOpenGL 3.x
  - OpenGL 2.1 subset
- Qt widgets for 3D plotting:
  - ScalarFieldView (scalar field visualisation)
    - Iso-surfaces
    - Cutting plane
- Based on an internal 3D scene structure.



silx.gui.plot3d

Demo: example/viewer3DVolume.py



silx.gui.plot3d

First version of silx 3D visualisation package:

- Available in next release: v0.4.0
- Modules:
  - silx.gui.plot3d.ScalarFieldView
  - silx.gui.plot3d.SFViewParamTree
- Documentation:
  - http://www.silx.org/doc/silx/dev/modules/gui/plot3d/
  - Sample code: example/viewer3DVolume.py

silx.gui.plot3d

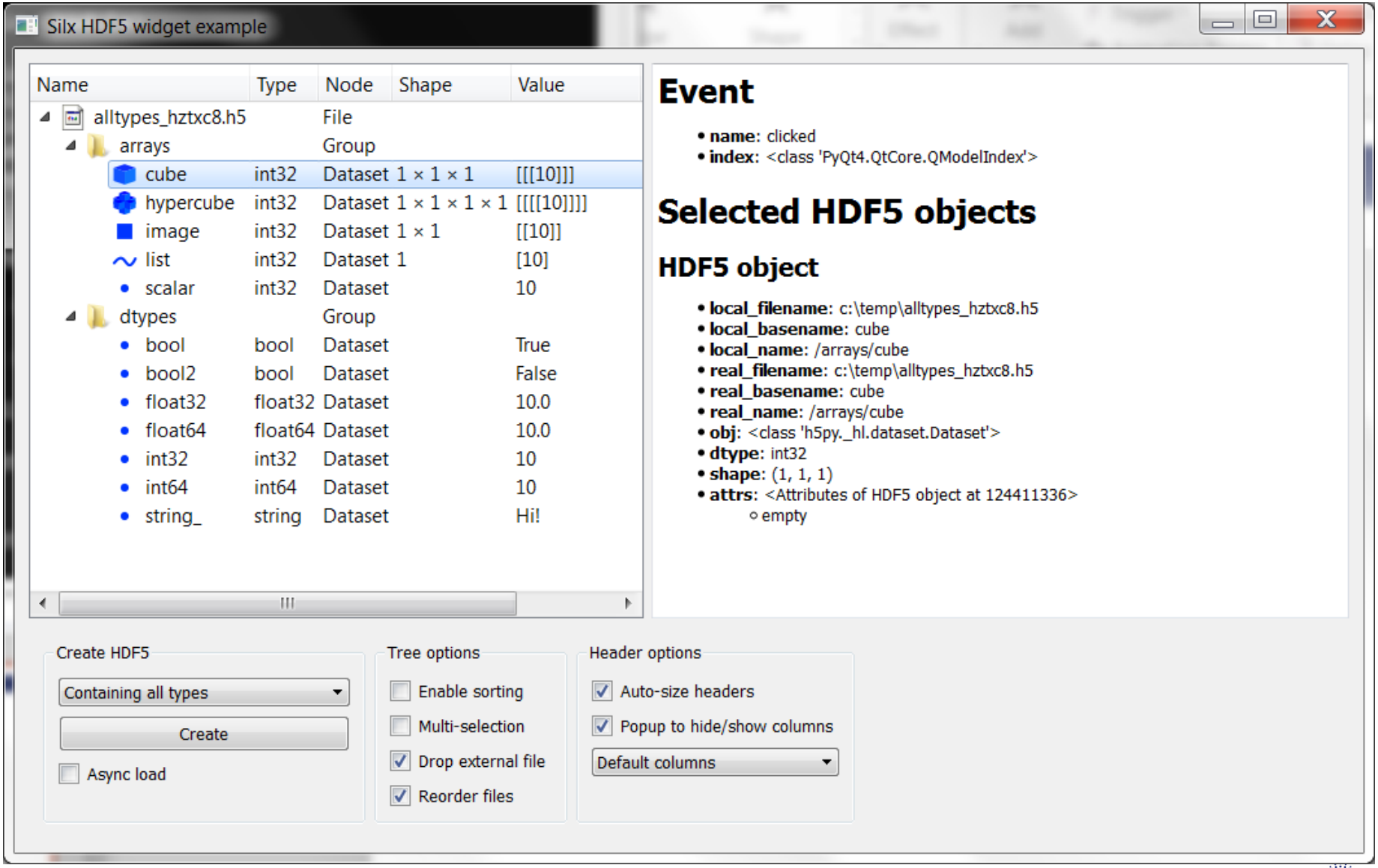
Future improvements:

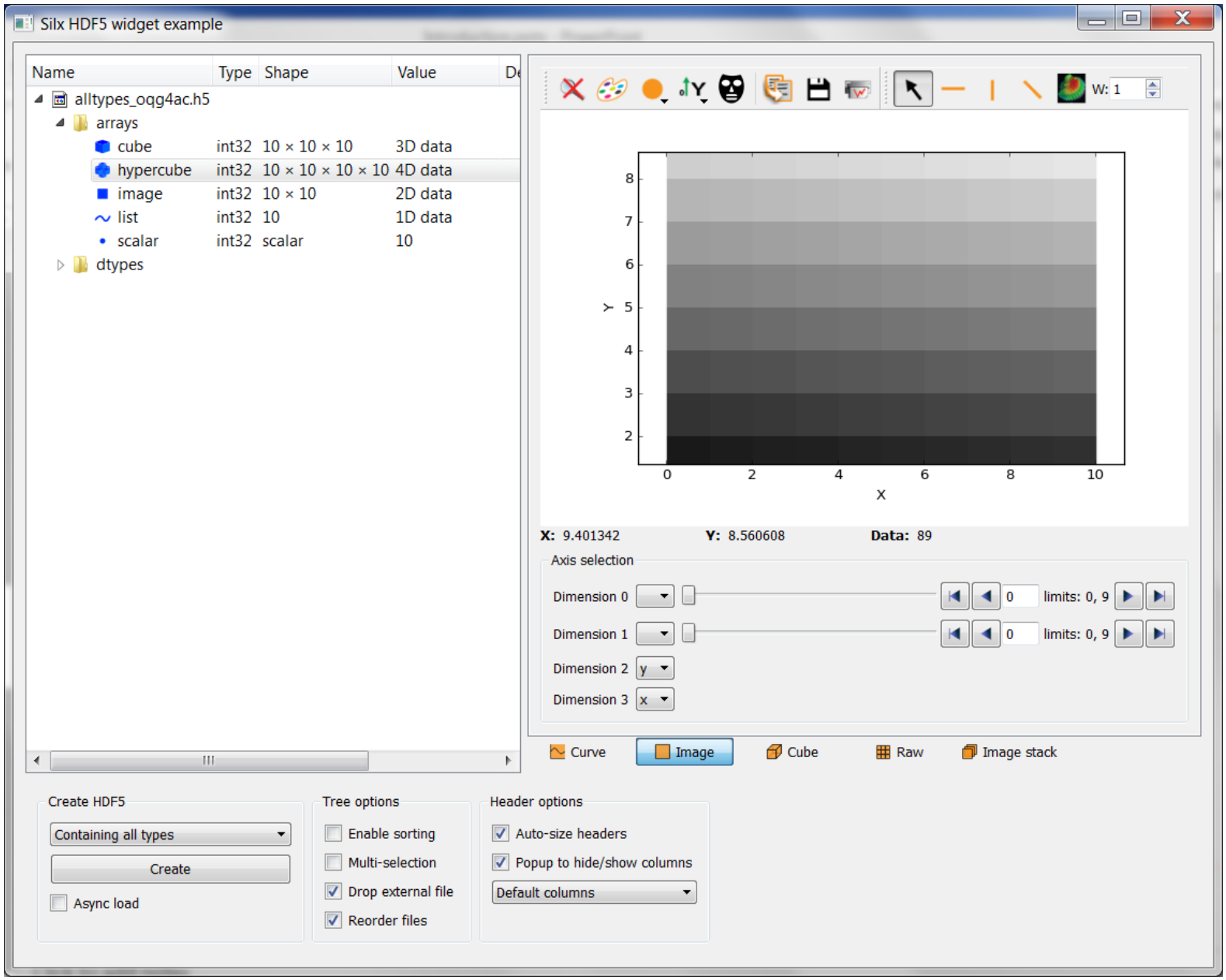
- Threaded iso-surface computation
- Visual improvements:
  - Improve axes ticks and labels layout
  - Support more data 'types': different dimension orders
  - Different transparency rendering modes
- Other visualisations: e.g., surface plot
- Tests and continuous integration
- …

Feedbacks on API welcome!

CURRENT STATUS (0.4.0A)

- Read ALL files using an API similar to the h5py one
- Convert SPEC files to ESRF HDF5 NeXus implementation
- Dump dictionaries to files in several formats
- Use FabIO for image formats other than TIFF
- Unified widget to deal with all data format


Silx HDF5 widget example
Name
Type
Node
Shape
Value
alltypes_hztxc8.h5
File
arrays
Group
cube
int32
Dataset
1 × 1 × 1
[[[10]]]
hypercube
int32
Dataset
1 × 1 × 1 × 1
[[[[10]]]]
image
int32
Dataset
1 × 1
[[10]]
list
int32
Dataset
1
[10]
scalar
int32
Dataset
10
dtypes
Group
bool
bool
Dataset
True
bool2
bool
Dataset
False
float32
float32
Dataset
10.0
float64
float64
Dataset
10.0
int32
int32
Dataset
10
int64
int64
Dataset
10
string_
string
Dataset
Hi!
Event
name: clicked
index: <class 'PyQt4.QtCore.QModelIndex'>
Selected HDF5 objects
HDF5 object
local_filename: c:\temp\alltypes_hztxc8.h5
local_basename: cube
local_name: /arrays/cube
real_filename: c:\temp\alltypes_hztxc8.h5
real_basename: cube
real_name: /arrays/cube
obj: <class 'h5py._hl.dataset.Dataset'>
dtype: int32
shape: (1, 1, 1)
attrs: <Attributes of HDF5 object at 124411336>
empty
Create HDF5
Containing all types
Create
Async load
Tree options
Enable sorting
Multi-selection
Drop external file
Reorder files
Header options
Auto-size headers
Popup to hide/show columns
Default columns

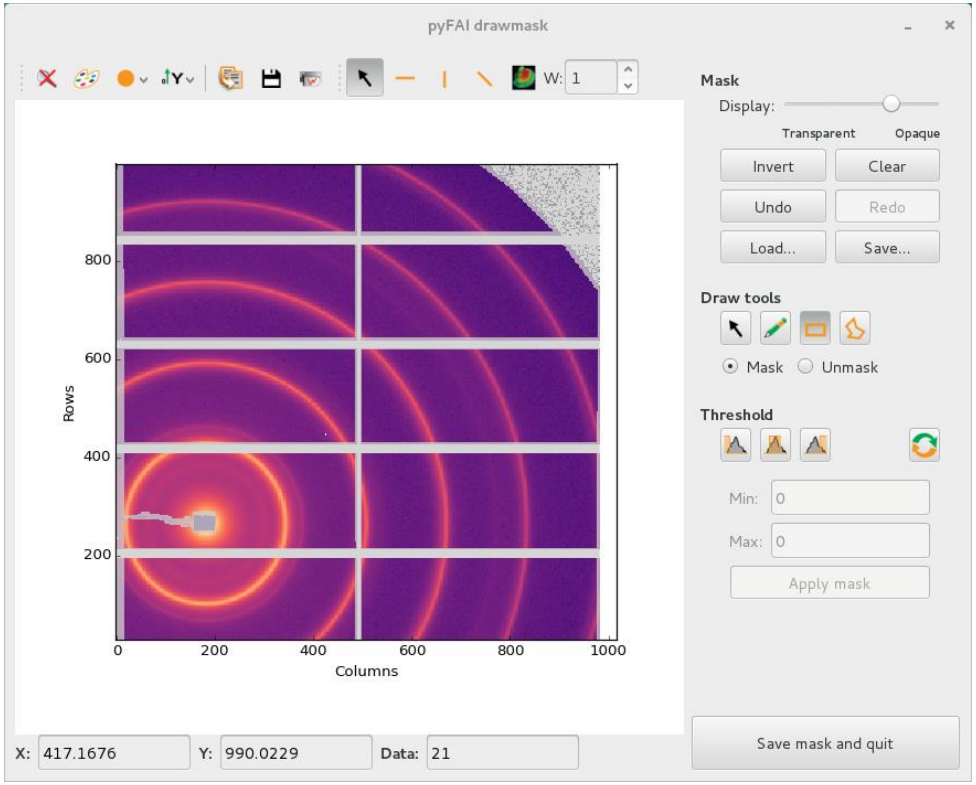

Silx HDF5 widget example
Name
Type
Shape
Value
alltypes_oqg4ac.h5
arrays
cube int32 10 × 10 × 10 3D data
hypercube int32 10 × 10 × 10 × 10 4D data
image int32 10 × 10 2D data
list int32 10 1D data
scalar int32 scalar 10
dtypes
W: 1
X: 9.401342
Y: 8.560608
Data: 89
Axis selection
Dimension 0
Dimension 1
Dimension 2
Dimension 3
limits: 0, 9
Curve
Image
Cube
Raw
Image stack
Create HDF5
Containing all types
Create
Async load
Tree options
Enable sorting
Multi-selection
Drop external file
Reorder files
Header options
Auto-size headers
Popup to hide/show columns
Default columns

CURRENT STATUS

- Weighted n-dimensional histograms
- Fast histogramming using look up tables
- Non-linear least squares fits with constraints
- 1D peak search
- Fitting functions with automatic estimation of initial parameters

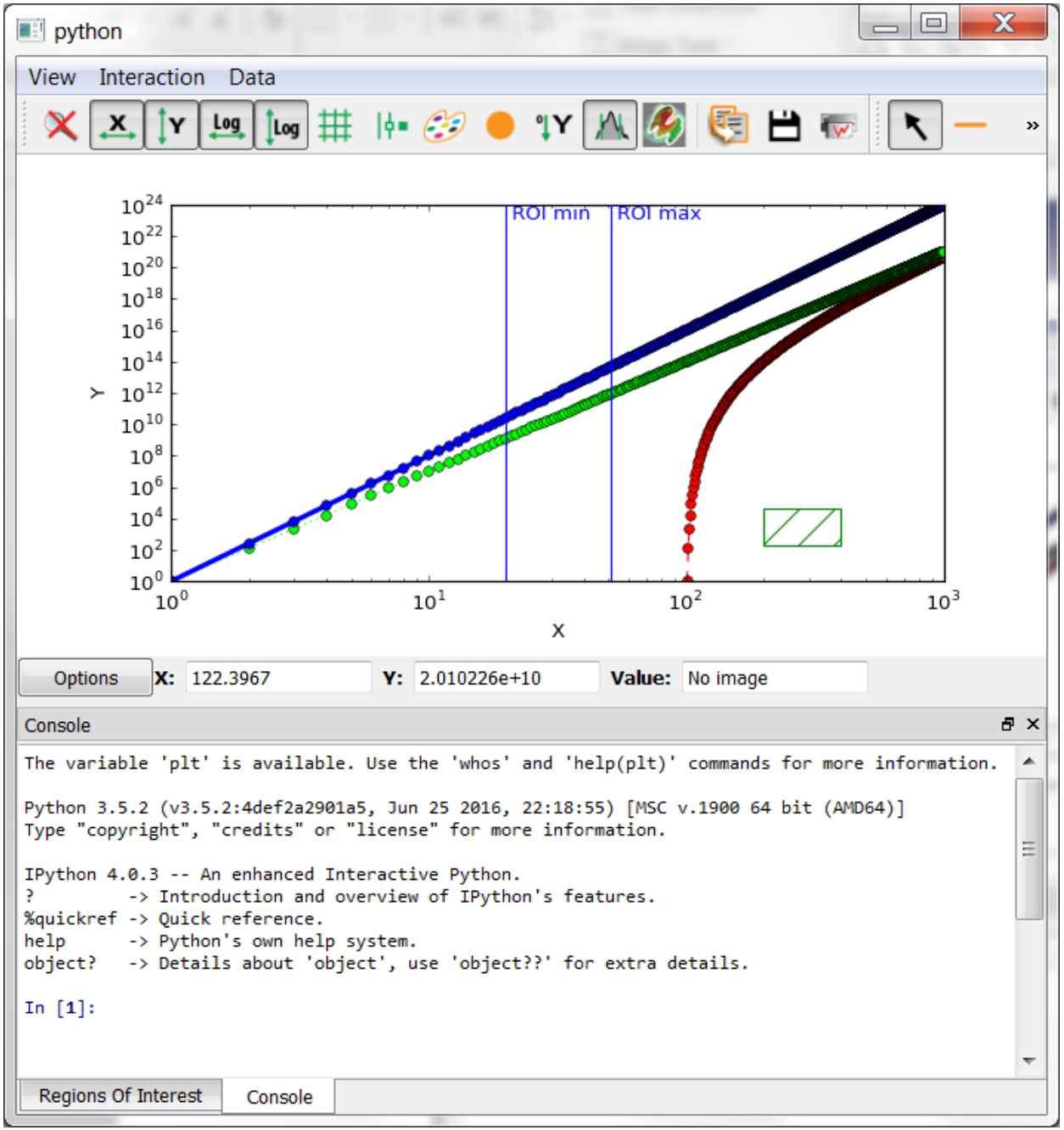
silx.image: Image processing tools

- Basic shapes for masks
  - Line profiles
  - Polygons
  - Circle
- Bilinear interpolation
  - Used to scale up/down images to display
- Gaussian blurring of images
  - GPU accelerated via OpenCL
- Image registration and alignment (SIFT)
  - GPU accelerated via OpenCL



CURRENT STATUS

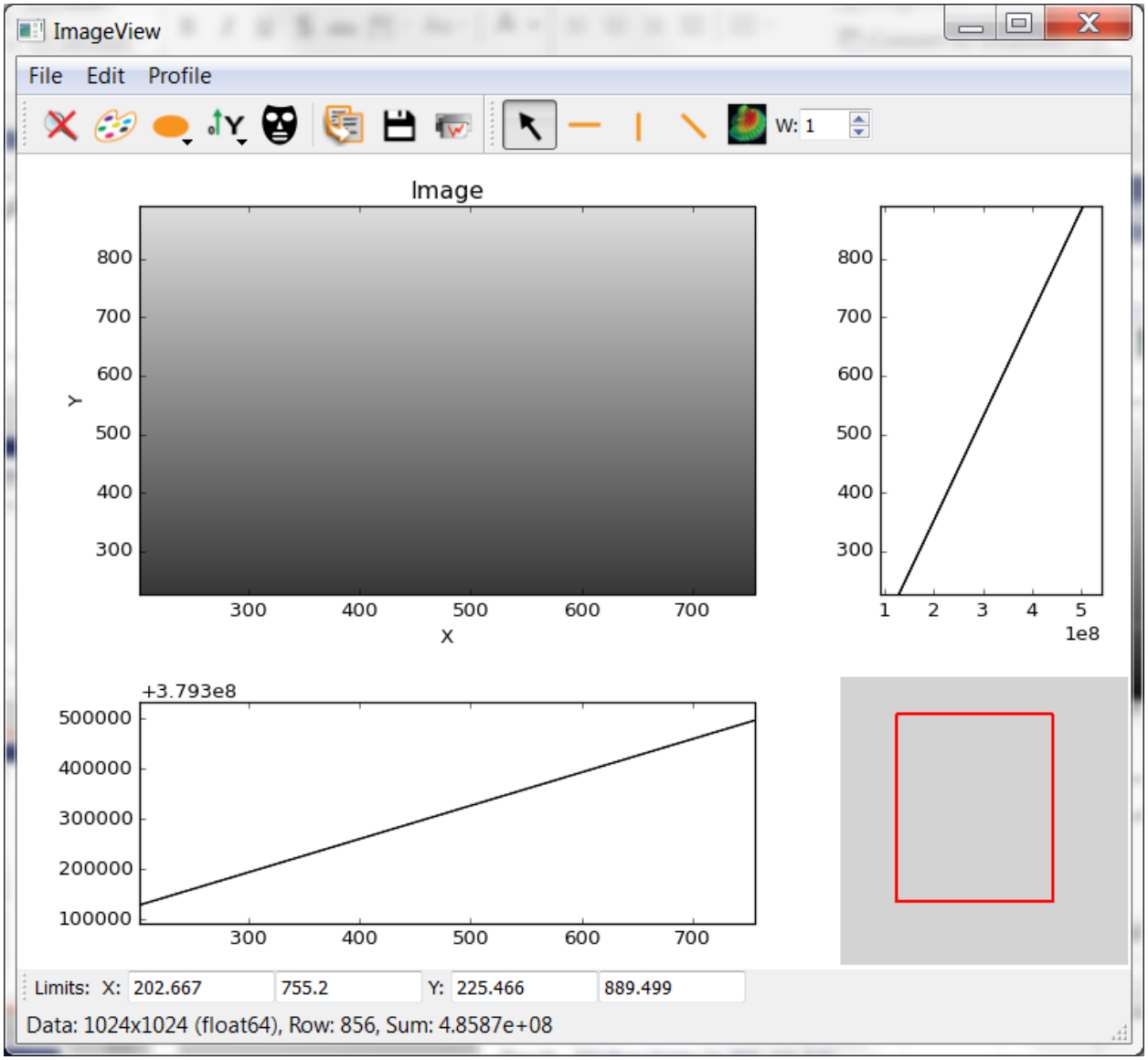
- Visualize 1D data
- Apply ROIs on them
- Control the plot via an interactive console
- Fitting capabilities


python
View
Interaction
Data
ROI min
ROI max
Y
X
Options
X: 122.3967
Y: 2.010226e+10
Value: No image
Console
The variable 'plt' is available. Use the 'whos' and 'help(plt)' commands for more information.
Python 3.5.2 (v3.5.2:4def2a2901a5, Jun 25 2016, 22:18:55) [MSC v.1900 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.
IPython 4.0.3 -- An enhanced Interactive Python.
? -> Introduction and overview of IPython's features.
%quickref -> Quick reference.
help -> Python's own help system.
object? -> Details about 'object', use 'object??' for extra details.
In [1]:
Regions Of Interest
Console

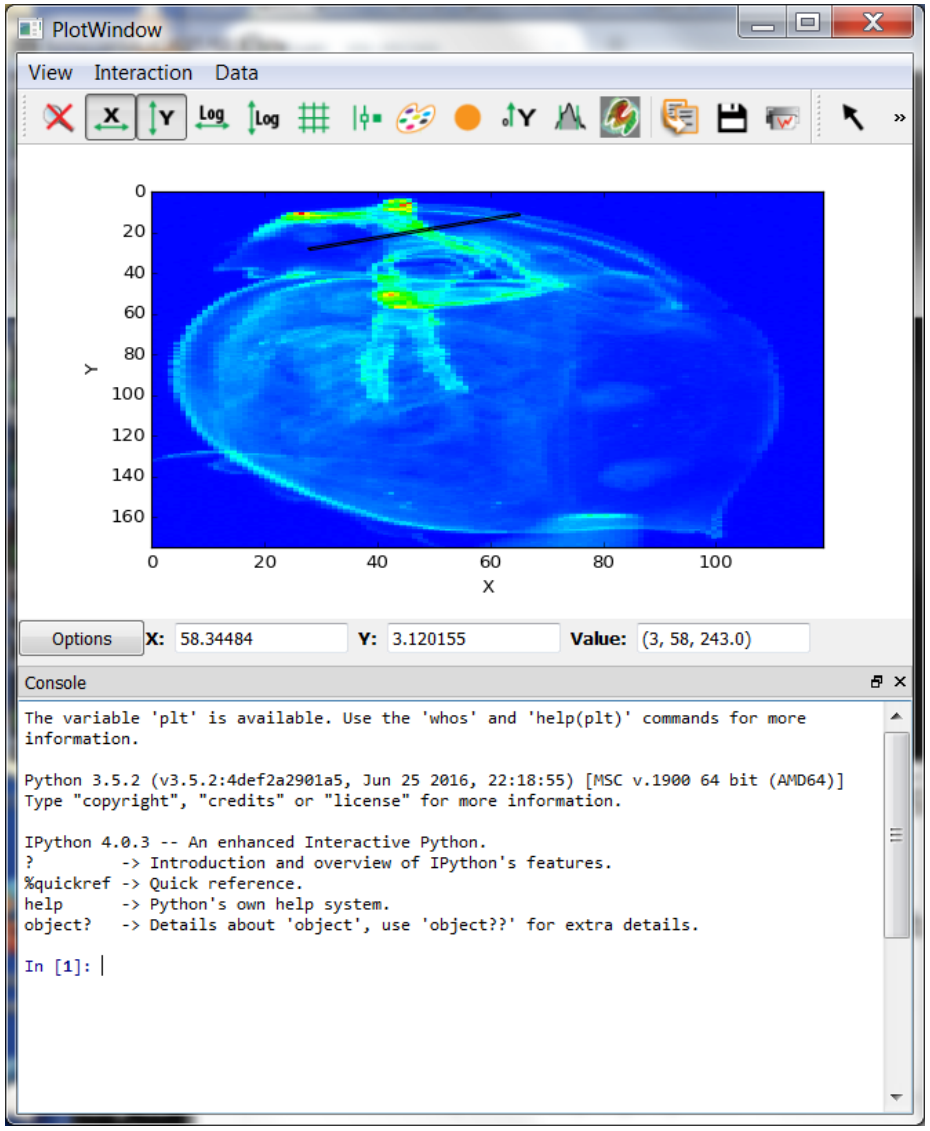
CURRENT STATUS

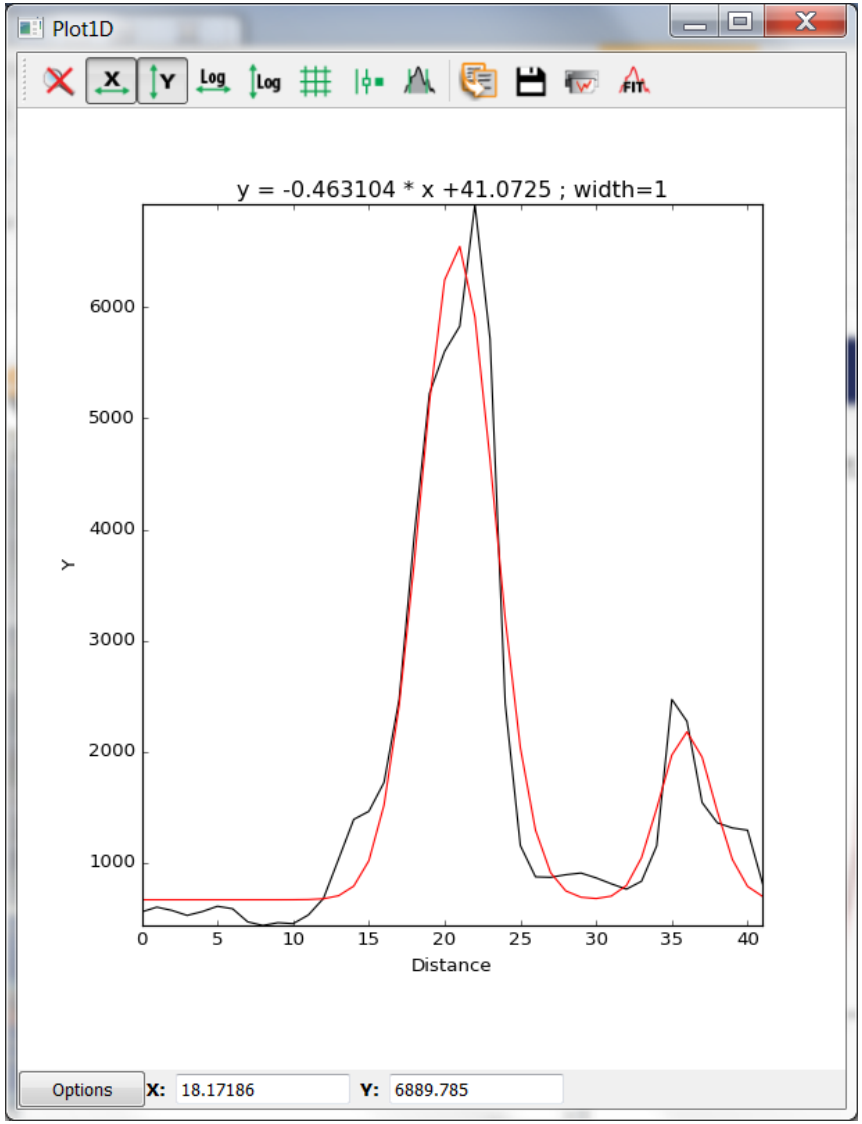
- Visualize 2D data
- Apply Profiles and Masks on them
- Apply different colormaps
- Plot an image with associated histograms
- Visualize 3D scalar fields (Isosurfaces)

Full-featured Widgets



Full-featured Widgets





ROLE OF NON-CORE DEVELOPERS

- Identify something you are interested on
- Try to achieve it
- Wow! I can do what I want, what next?
  - Start again
  - Make suggestions
  - Contribute with a demo/recipe
- I cannot do it
  - Ask help

ROLE OF CORE DEVELOPERS

- Help non-core developers
- Create issues
  - Bugs
  - Documentation
  - Desired features
- Fix issues
  - Bugs
  - Documentation
  - Unlikely for new features
- Review pull requests

HANDS ON!

- Try to start with a single entry point www.silx.org
  - You should be able to install 0.3.0 version
- For this code camp we'll use 0.4.0a, you can either:
  - clone the repository (and use your compilation chain)
  - install a nightly built package (debian)
  - use a pre-built binary wheel:
    - http://www.silx.org/pub/wheelhouse/