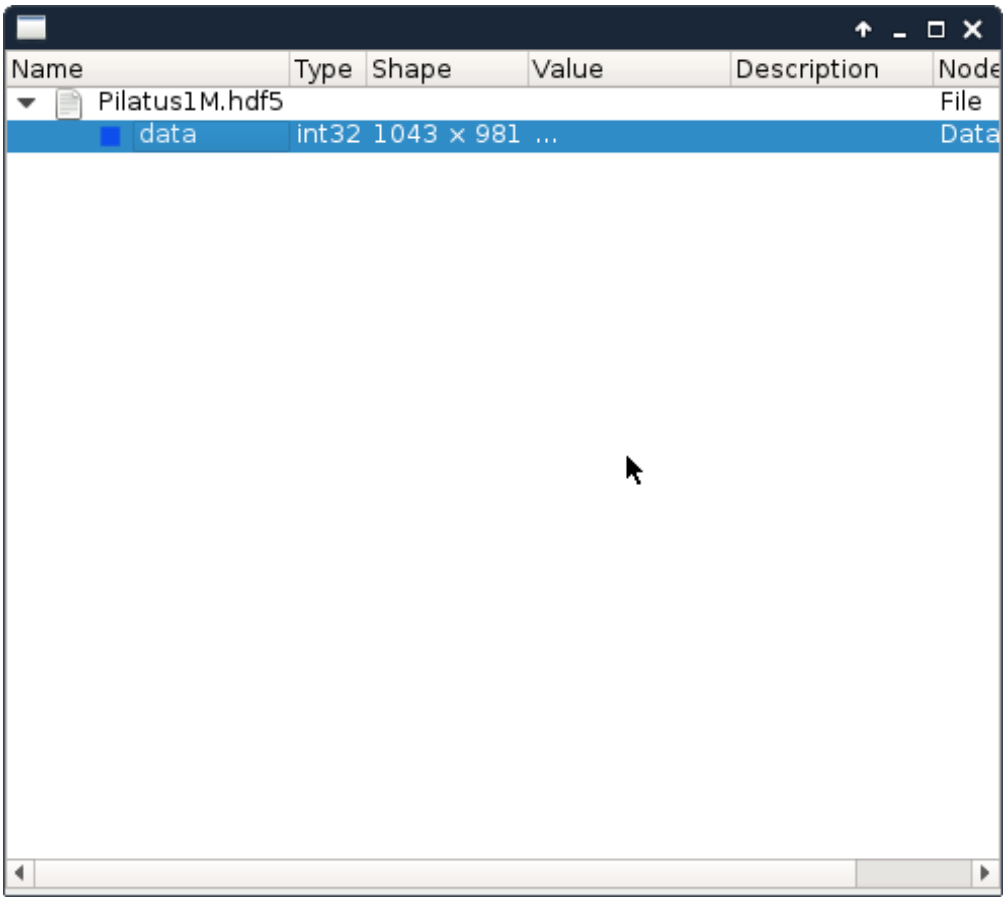
histogramExercise

November 14, 2016

1 open and show data (convert it to h5 to be loaded)

1.1 open the Pilatus1M dataset



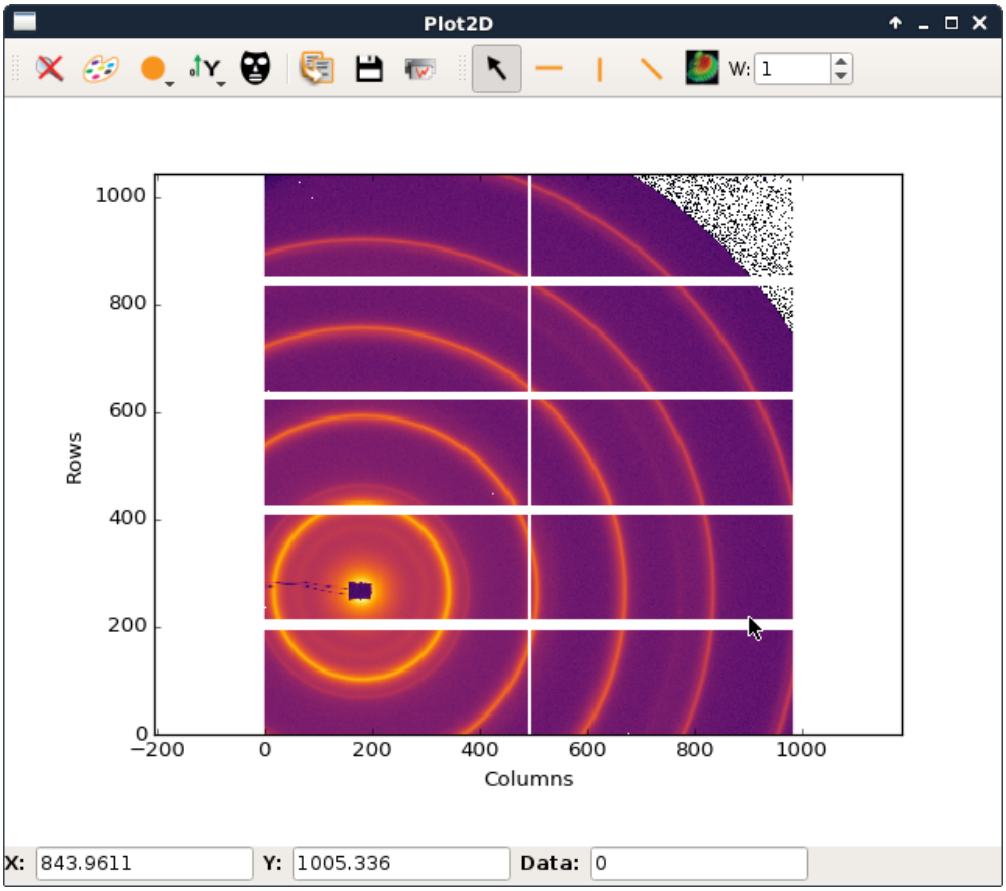
hdf5treeView

```
In [ ]: # from h5
        dataPath="data/Pilatus1M.hdf5"
        import h5py
        import numpy
```

```
#select the cube values:
f=h5py.File(dataPath)
# then select the 'Data/qspace' datagroup (array containing the cubes of th
data=f['data']
data = numpy.array(data, order='C', dtype='float32')
```

1.2 Plot the data

- using log scale



data plot by silx.gui.plot.Plot2D

```
In [ ]: # using silx
        from silx.gui.plot import Plot2D
        plot=Plot2D()
        plot.setKeepDataAspectRatio(True)
        colormap = {
            'name': 'inferno',
            'normalization': 'log',
            'autoscale': True,
            'vmin': 0.0,
```

```
        'vmax': 1.0
     }
plot.setDefaultColormap(colormap)
plot.addImage(data)
plot.show()
```

2 compute radii to center for each pixels

- center is at (180, 260)
- $r = \sqrt{(x - xc)^2 + (y - yc)^2}$

```
In [ ]: def computeradius(data, xcenter, ycenter):
            import numpy
            # do the azimutal integration
            xcenter=180
            ycenter=260
            r=numpy.zeros(data.shape)
            for y in range(data.shape[0]):
                for x in range(data.shape[1]):
                    r[y,x]=numpy.sqrt(numpy.square(x-xcenter)+numpy.square(y-ycente
            return r
```

```
In [1]: # V2
        import numpy
        def computeradius(data, xcenter, ycenter):

            # do the azimutal integration
            xcenter=180
            ycenter=260
            y, x=numpy.ogrid[:data.shape[0], :data.shape[1]]
            r=numpy.sqrt((x-xcenter)**2+(y-ycenter)**2)
            return r
```

```
In [ ]: # do the azimutal integration
        radii=computeradius(data, xcenter=180, ycenter=260)
```

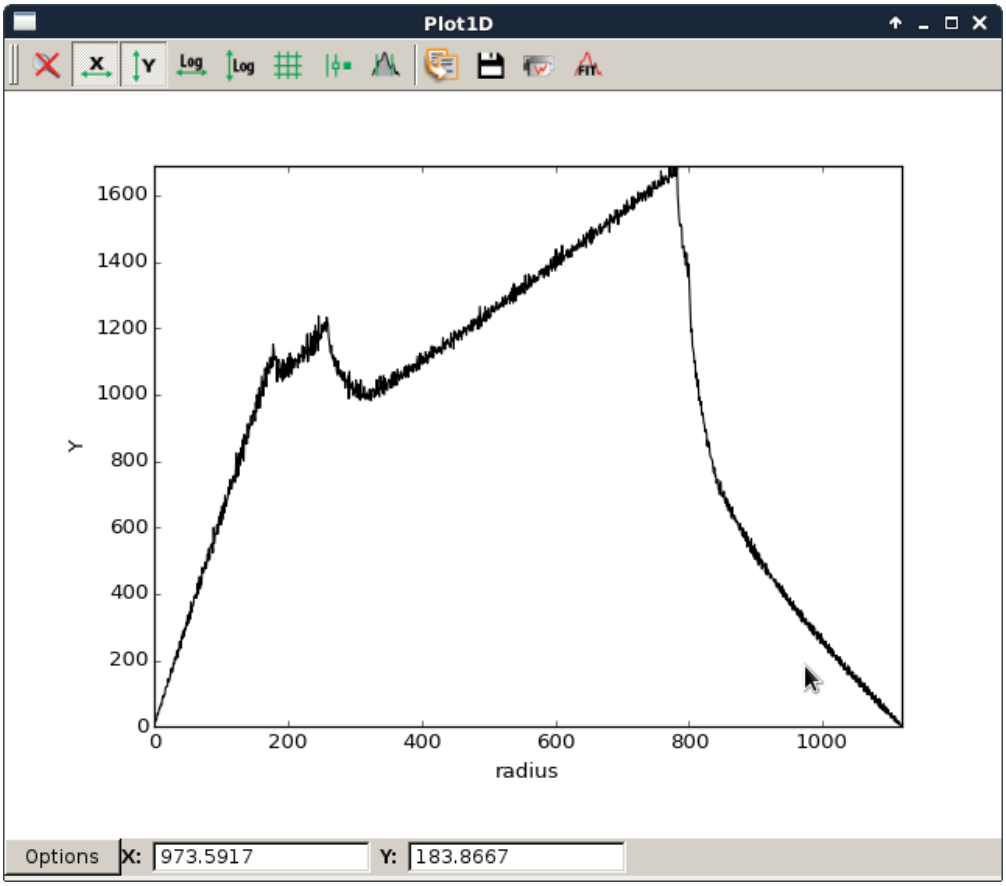
3 create the histogram of the radii

- histo_range=[0, int(numpy.ceil(radii.max()))]

```
In [ ]: nb_bins=int(numpy.ceil(radii.max()))
        histo_range=[0, nb_bins]
        ...
```

4 plot the histogram of the radii

```
In [ ]: from silx.gui.plot import Plot1D
        p=Plot1D()
```

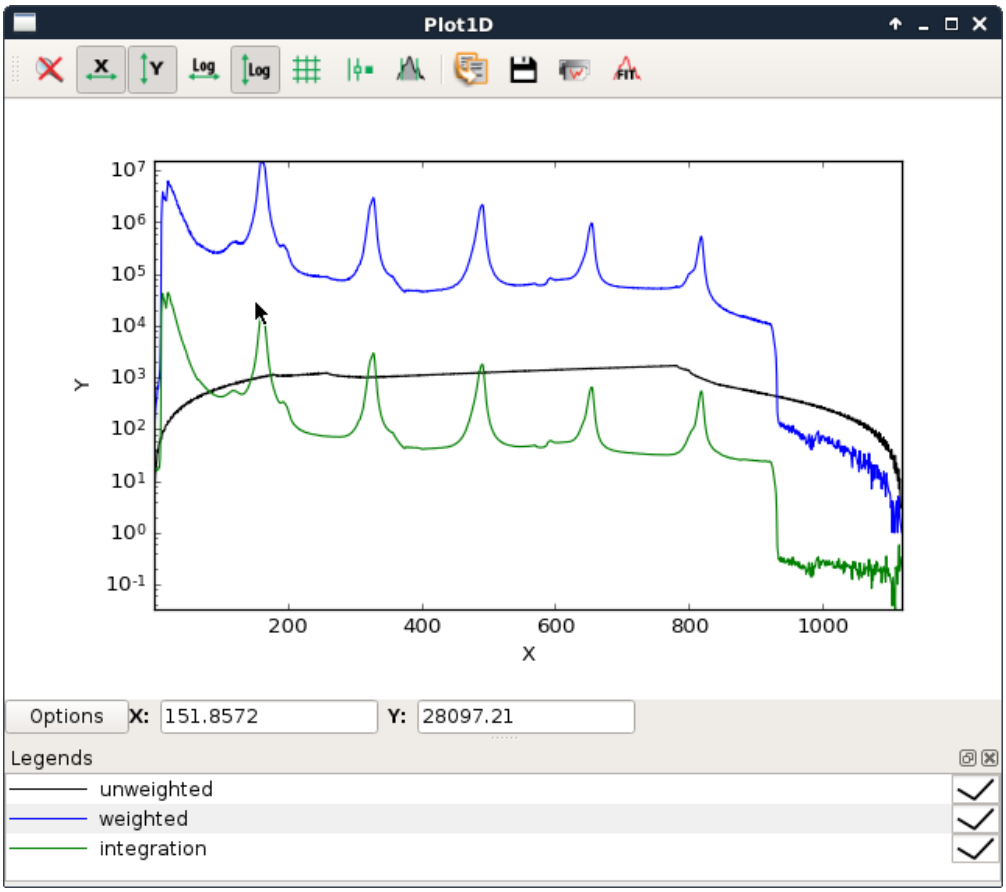


radii histogram

```
p.addCurve(...)
p.show()
```

5 azimutal integration using weights

- A simplification is to get the mean contribution of each pixels for each radius



azimutal integration

In [ ]: ...