



## DAWN: RIXS image processing software, I21

DAWN is an open source software ([licence](#)) for the visualisation and processing of scientific data. Although specifically developed for data from synchrotron based techniques, many of the features of DAWN are useful in other fields. DAWN loads data from many common formats (text files, tiffs, hdf5...), as well as those specific to x-ray techniques (NeXus, EDF, MAR...).

### Accessing DAWN from your own machine:

Visit the website <https://dawnsi.org/>, download and install the software matching your operating system. Installation instructions are provided on the website.

### Accessing DAWN from a linux machine at Diamond:

Open a terminal >> Type '`module load dawn/nightly`' ↵ >> '`dawn`' ↵

**Data location:** All of your data in will be stored in a location **'dls/i21/data/Year/Proposal\_ID/'**

### Processing a RIXS file:

#### Prerequisites:

Ask your local contact to provide:

1. Energy dispersion value (eV/pixel): For converting the CCD pixels to energy units in eV.
2. Slope correction value: For correcting the tilt of the image on the CCD detector.
3. Dark image file number: For subtracting the background signal that appears on the detector. The dark image file **must** have the same acquisition time as the RIXS image file.
4. RIXS image file number and an elastic spectrum collected immediately after it.

#### Tutorial Dataset

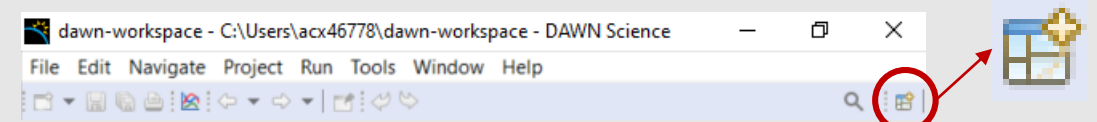
| File number    | File content  | Usage   | Acquisition time |
|----------------|---------------|---|------------------|
| i21-157111.nxs | Dark Image    | To subtract the Non-RIXS signals from the RIXS images         | 180 secs         |
| i21-157116.nxs | RIXS Image    | To process and get the RIXS spectrum                          | 180 secs         |
| i21-157117.nxs | Elastic Image | To find the zero energy reference for the RIXS spectrum above | 30 secs          |
| i21-157118.nxs | RIXS Image    | To process and get the RIXS spectrum                          | 180 secs         |
| i21-157119.nxs | Elastic Image | To find the zero energy reference for the RIXS spectrum above | 30 secs          |

#### Tutorial Dataset parameters

| Energy dispersion value (eV/pixel) | Slope correction value |
|------------------------------------|------------------------|
| 0.01                               | -0.065                 |

**DAWN perspectives:** DAWN is designed for different applications and has different perspectives for different purposes.

A perspective can be opened by clicking on the [Open Perspective](#) button in the toolbar.



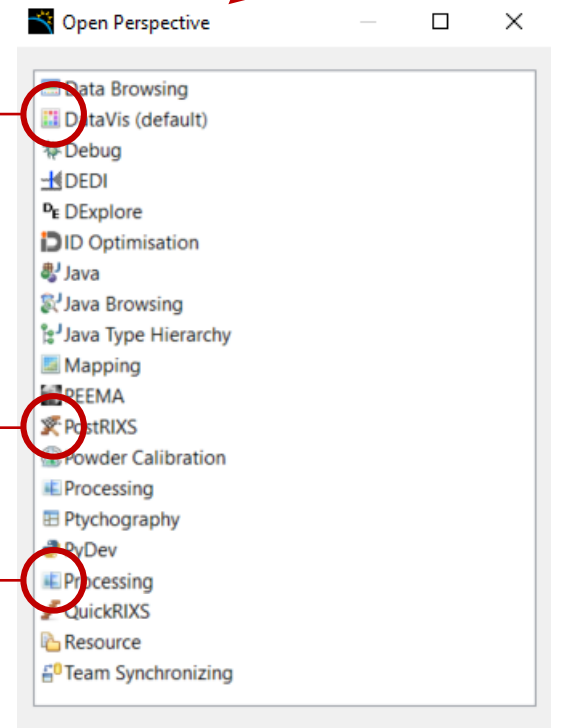
For visualising the data or exporting the data we will be using the [DataVis](#) perspective



For visualising the data or exporting the data we can also use the [PostRIXS](#) perspective



For RIXS processing we will be using the [Processing](#) perspective



## RIXS processing perspective:

The screenshot shows the RIXS processing perspective interface with the following components and annotations:

- Project Explorer:** Located on the left, it shows a tree view of the project files. Annotation: *This is where you will see the scanned file numbers.*
- Data Slice View:** A large central panel for selecting data slices. Annotation: *Data Slice View: This is where you will drag the files you want to process from the Project Explorer.*
- Processing:** A panel for selecting processing operations. Annotation: *Processing: This is where you will choose the kind of operations you want to do on the files in the Data Slice View.*
- Model:** A panel for setting parameters for the selected operations. Annotation: *Model: This is where you will put the parameters related to the operations you chose in the Processing panel.*
- Input:** A panel showing a preview of the selected data slice. It includes a graph with an X-Axis (0 to 100) and a Y-Axis (0 to 100). Annotation: *Input: When you click on a file in the panel above, you will see here the image it contains.*
- Output:** A panel showing the results of the processing. It includes a graph with an X-Axis (0 to 100) and a Y-Axis (0 to 100). Annotation: *Output: When you click on a process in the Processing panel, you will see here the results of the processing done on the file selected in Data Slice View Panel.*

The interface also includes a menu bar (File, Tools, Window, Help) and a status bar at the bottom showing "0 items selected".



## Loading your files for processing:

1. Right click on **data** and select **import**

2. Expand **General** and select **Data Folder Link** and click **Next**

3. **Browse** to and select your folder that contains the data files in the field **External folder** and press **finish**.

4. Expanding **data** will now show your **data folder**, which when expanded will show the data files.

**Data location:** All of your data in will be stored in a location '**dls/i21/data/Year/Proposal\_ID/**'

For the tutorial dataset you can save the tutorial data folder in your local drives and load it.

## Processing a RIXS file:

The screenshot displays the DAWN Science software interface. The **Project Explorer** on the left shows a file tree with folders like **data**, **examples**, **Proposal\_ID**, **processing**, **spool**, **temp**, and **xml**. Under **data**, there are several RIXS files with the extension **.nxs** (e.g., **i21-157111.nxs**, **i21-157116.nxs**, etc.) and some **.hdf** files. Two red arrows point from the **.nxs** files in the **Project Explorer** to the **Data Slice View** panel in the center. A text box with a grey background is overlaid on the **Data Slice View** panel, containing the following instructions:

Drag the RIXS image file/files that you want to process from the **Project explorer** panel to the **Data slice view** panel.  
Use only the files with extension '**.nxs**' and not the ones with '**.hdf**'.  
Do not drag the elastic image files.

The **Data Slice View** panel shows a list of selected files: **i21-157116.nxs** (143.5 KB, 12/01/21 04:49 PM) and **i21-157118.nxs** (143.5 KB, 12/01/21 04:56 PM). Below this list, there are buttons for **Previous**, **Current**, and **Next** slice of data.

The **Processing** panel on the right shows a table with the following data:

| Name                    | Value     |
|-------------------------|-----------|
| Elastic line scan       | NEXT_SCAN |
| Energy calibration file |           |
| Energy dispersion at... | NaN       |
| Slope override          |           |
| Width of strip          | 1         |

At the bottom, there are two empty plots labeled **Input** and **Output**, both with **X-Axis** ranging from 0 to 100 and Y-Axis ranging from 0 to 100.

# Processing a RIXS file:

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer File Viewer Data Slice View Processing Model 'Combined RIXS image reduction'

data

- examples
- Proposal\_ID
  - processing
  - spool
  - temp
  - xml
  - i21-157111.nxs 271.5 KB 12/01/21 04:33
  - i21-157116.nxs 143.5 KB 12/01/21 04:49
  - i21-157117.nxs 271.5 KB 12/01/21 04:49
  - i21-157118.nxs 143.5 KB 12/01/21 04:56
  - i21-157119.nxs 271.5 KB 12/01/21 04:57
  - xcam-157111.hdf 10.2 MB 12/01/21 04:57
  - xcam-157116.hdf 20.3 MB 12/01/21 04:57
  - xcam-157117.hdf 10.2 MB 12/01/21 04:57
  - xcam-157118.hdf 20.3 MB 12/01/21 04:57
  - xcam-157119.hdf 10.2 MB 12/01/21 04:57
- src

Current slice of data: [ - - - - ]

Input

100

90

80

70

60

50

40

30

20

10

0

0 10 20 30 40 50 60 70 80 90 100

X-Axis

2 items selected

Set up data for processing

Select dataset: /entry1/xcam/data [2, 1610, 3304]

☐ Line [1D] ☒ Image [2D]

| Dimens... | Display | Start:Stop:... | Axes                            |
|-----------|---------|----------------|---------------------------------|
| 0 [2]     |         | :              | /entry1/xcam/checktopup_time... |
| 1 [1610]  | Y       | :              | indices                         |
| 2 [3304]  | X       | :              | indices                         |

data[0,:,:]

0 500 1000 1500 2000 2500 3000

0 500 1000 1500 2000 2500

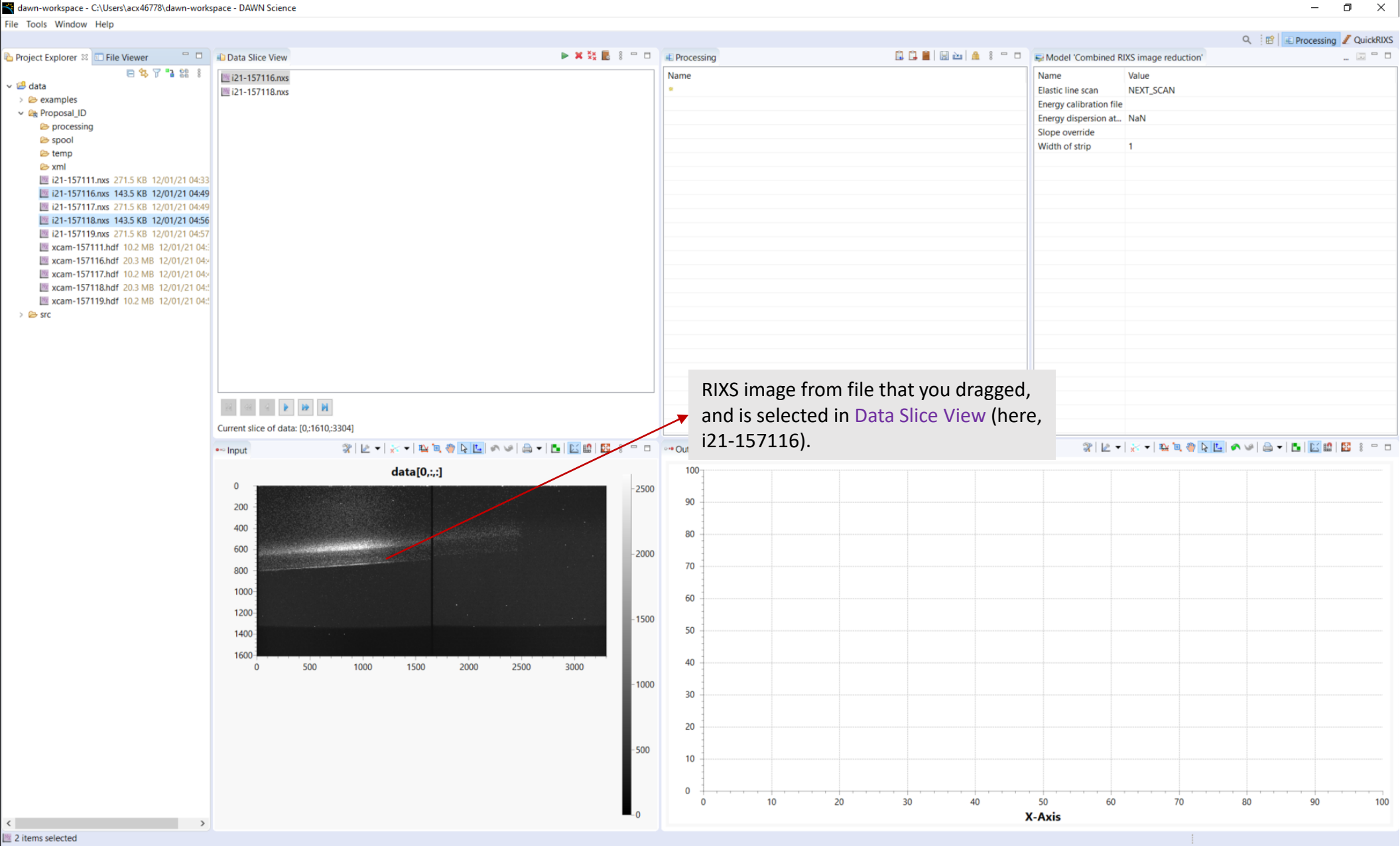
Click finish

Finish Cancel

Name Value

|                         |           |
|-------------------------|-----------|
| Elastic line scan       | NEXT_SCAN |
| Energy calibration file |           |
| Energy dispersion at... | NaN       |
| Slope override          |           |
| Width of strip          | 1         |

# Processing a RIXS file:



## Changing the colormap:

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

New Window  
Editor  
Appearance  
Show View  
Show Plot View  
Perspective  
Navigation  
Preferences

Project Explorer

- data
- ex
- Pro
- xml
- i21-157111.nxs 271.5 KB 12/01/21 04:33
- i21-157116.nxs 143.5 KB 12/01/21 04:49
- i21-157117.nxs 271.5 KB 12/01/21 04:49
- i21-157118.nxs 143.5 KB 12/01/21 04:56
- i21-157119.nxs 271.5 KB 12/01/21 04:57
- xcam-157111.hdf 10.2 MB 12/01/21 04:57
- xcam-157116.hdf 20.3 MB 12/01/21 04:57
- xcam-157117.hdf 10.2 MB 12/01/21 04:57
- xcam-157118.hdf 20.3 MB 12/01/21 04:57
- xcam-157119.hdf 10.2 MB 12/01/21 04:57
- src

Data Slice View

- i21-157116.nxs
- i21-157118.nxs

Processing

Name

Model 'Combined RIXS image reduction'

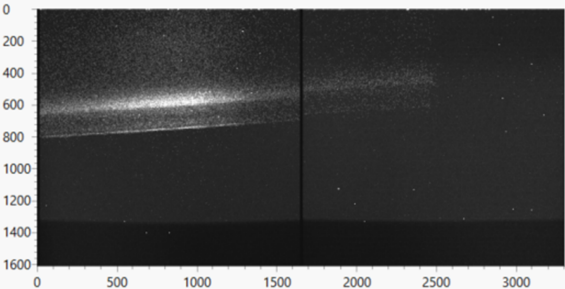
| Name                    | Value     |
|-------------------------|-----------|
| Elastic line scan       | NEXT_SCAN |
| Energy calibration file |           |
| Energy dispersion at... | NaN       |
| Slope override          |           |
| Width of strip          | 1         |

Click on 'Window' and then select 'Preferences'.

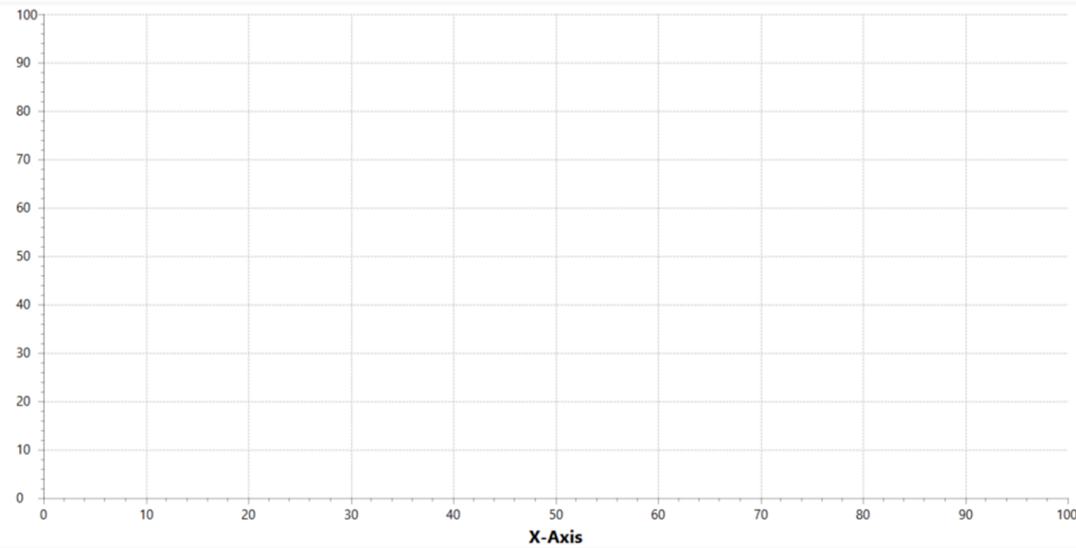
Current slice of data: [0;1610;3304]

Input

data[0,:,:]



Output



2 items selected

## Changing the colormap:

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer File Viewer Data Slice View Processing Model 'Combined RIXS image reduction'

data

- examples
- Proposal\_ID
  - processing
  - spool
  - temp
  - xml
  - i21-157111.nxs 271.5 KB 12/01/21 04:33
  - i21-157116.nxs 143.5 KB 12/01/21 04:49
  - i21-157117.nxs 271.5 KB 12/01/21 04:49
  - i21-157118.nxs 143.5 KB 12/01/21 04:56
  - i21-157119.nxs 271.5 KB 12/01/21 04:57
  - xcam-157111.hdf 10.2 MB 12/01/21 04:57
  - xcam-157116.hdf 20.3 MB 12/01/21 04:57
  - xcam-157117.hdf 10.2 MB 12/01/21 04:57
  - xcam-157118.hdf 20.3 MB 12/01/21 04:57
  - xcam-157119.hdf 10.2 MB 12/01/21 04:57

- src

Current slice of data: [0:1610:3304]

Input

data[0,:,:]

2 items selected

Preferences

Plot View

Plot 1DStack

Camera projection: Orthographic

Plot 2D

Default colour mapping: Jet (Blue-Cyan-Green-Yellow-Red)

Colour map expert mode: ☐

Auto contrast: ☒

Auto-contrast lower threshold (in %): 0

Auto-contrast upper threshold (in %): 99

Colour scaling: Linear

Show scrollbars: ☒

Keep Aspect Ratio: ☒

Restore Defaults Apply

Apply and Close Cancel

Click on 'Plot View' under 'Visualization Preferences' and select colourmap of your choice

| Name                    | Value     |
|-------------------------|-----------|
| Elastic line scan       | NEXT_SCAN |
| Energy calibration file |           |
| Energy dispersion at... | NaN       |
| Slope override          |           |
| Width of strip          | 1         |

X-Axis



## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer

- data
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    - pool
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    - i21-157111.nxs 271.5 KB 12/01/21 04:33
    - i21-157116.nxs 143.5 KB 12/01/21 04:49
    - i21-157117.nxs 271.5 KB 12/01/21 04:49
    - i21-157118.nxs 143.5 KB 12/01/21 04:56
    - i21-157119.nxs 271.5 KB 12/01/21 04:57
    - xcam-157111.hdf 10.2 MB 12/01/21 04:57
    - xcam-157116.hdf 20.3 MB 12/01/21 04:57
    - xcam-157117.hdf 10.2 MB 12/01/21 04:57
    - xcam-157118.hdf 20.3 MB 12/01/21 04:57
    - xcam-157119.hdf 10.2 MB 12/01/21 04:57

Data Slice View

i21-157116.nxs  
i21-157118.nxs

Perform background subtraction by fitting a PDF to the population of pixel values. The count at which the given signal to background ratio occurs is subtracted

Processing

Name Value

Image background subtraction - Fitted to a PDF [Background Subtraction]

Polynomial Background Subtraction 1D Approximation [Background Subtraction 2D]

Blob Extraction [Binary Image]

Image Stitching [External Data]

Pseudo-Flat Field Filter [Image Filter]

Image Threshold [Image Filter]

X Region Profile Normalize [Image Filter]

Downsample Image [Image Filter]

Mean Filter [Image Filter]

Median Filter [Image Filter]

Model 'Combined RIXS image reduction'

Name Value

Current slice of data: [0:1610:3304]

Input

data[0,:,:]

Output

X-Axis

Type in 'Image...' and select by double left clicking 'Image background subtraction-Fitted to a PDF [Background subtraction]' process in the Processing panel.

## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer File Viewer Data Slice View Processing Model 'Image background subtraction - Fitted to a PDF'

data

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  - spool
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  - i21-157119.nxs 271.5 KB 12/01/21 04:57
  - xcam-157111.hdf 10.2 MB 12/01/21 04:57
  - xcam-157116.hdf 20.3 MB 12/01/21 04:57
  - xcam-157117.hdf 10.2 MB 12/01/21 04:57
  - xcam-157118.hdf 20.3 MB 12/01/21 04:57
  - xcam-157119.hdf 10.2 MB 12/01/21 04:57
- src

i21-157116.nxs

i21-157118.nxs

Current slice of data: [0:1610:3304]

Input

data[0,:,:]

Output

g10 of Histogram counts, Log10 of Background fit against Intens

Log10 of Background fit

Intensity values

Log10 of Histogram counts Log10 of Background fit

Fitted PDF in 330:1355: residual = 1.63169e+08

'Gaussian' has 3 parameters:

- 0) posn = 330.500 in range [330.500, 333.000]
- 1) fwhm = 140.079 in range [1.00000, 263.255]
- 2) area = 4.91160e+06 in range [33497.0, 8.81827e+06]

Threshold = 508

Click in the slot of 'Dark Image file' and browse using the folder icon to select the Dark image file. Here, i21-157111.nxs.



## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer

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    - xcam-157116.hdf 20.3 MB 12/01/21 04:57
    - xcam-157117.hdf 10.2 MB 12/01/21 04:57
    - xcam-157118.hdf 20.3 MB 12/01/21 04:57
    - xcam-157119.hdf 10.2 MB 12/01/21 04:57
  - src

Data Slice View

i21-157116.nxs  
i21-157118.nxs

Processing

Name

Image background subtraction - Fitted to a PDF [Background Subtraction]

Model 'Image background subtraction - Fitted to a PDF'

| Name            | Value  |
|-----------------|--|
| Dark image file | C:\Users\acx46778\Desktop\Proposal_ID\i21-157111.nxs |

Click on the process name. You will see that these two panels are updated.

Current slice of data: [0;1610;3304]

Input

data[0,:]

Output

Plot of profile\_0, profile\_fit\_dark\_0 against X-Axis

Intensity values

profile\_fit\_dark\_0

profile\_0

Blips removed: 41  
Fitted function: residual = 1407.38  
'Linear' has 2 parameters:  
0) m = 1.01250 in range [-1.79769e+308, 1.79769e+308]  
1) c = -2.65977 in range [-1.79769e+308, 1.79769e+308]  
Peak is -1.63460 cf 335.186  
Dark image offset = 0.396244

This shows the RIXS line profile and the background line profile.

## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer

- data
  - examples
  - Proposal\_ID
    - processing
    - spool
    - temp
    - xml
    - i21-157111.nxs 271.5 KB 12/01/21 04:33
    - i21-157116.nxs 143.5 KB 12/01/21 04:49
    - i21-157117.nxs 271.5 KB 12/01/21 04:49
    - i21-157118.nxs 143.5 KB 12/01/21 04:56
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    - xcam-157111.hdf 10.2 MB 12/01/21 04:57
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    - xcam-157117.hdf 10.2 MB 12/01/21 04:57
    - xcam-157118.hdf 20.3 MB 12/01/21 04:57
    - xcam-157119.hdf 10.2 MB 12/01/21 04:57
  - src

Data Slice View

i21-157116.nxs  
i21-157118.nxs

Combined elastic and RIXS image reduction to spectra

Processing

Name

- Image background subtraction - Fitted to a PDF [Background Subtraction]
- Com
- Combined RIXS image reduction [RIXS spectrum processing]

Model 'Image background subtraction - Fitted to a PDF'

Name Value

Type in 'Com...' and select by double left clicking 'Combined RIXS image reduction [RIXS spectrum processing]' process in the Processing panel.

Current slice of data: [0:1610:3304]

Input

data[0,:]

Output

Plot of profile\_0, profile\_fit\_dark\_0 against X-Axis

Intensity values

profile\_0 profile\_fit\_dark\_0

Blips removed: 41  
Fitted function: residual = 1407.38  
'Linear' has 2 parameters:  
0) m = 1.01250 in range [-1.79769e+308, 1.79769e+308]  
1) c = -2.65977 in range [-1.79769e+308, 1.79769e+308]  
Peak is -1.63460 cf 335.186  
Dark image offset = 0.396244

## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer File Viewer Data Slice View Processing Model 'Combined RIXS image reduction'

data

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  - i21-157116.nxs 143.5 KB 12/01/21 04:49
  - i21-157117.nxs 271.5 KB 12/01/21 04:49
  - i21-157118.nxs 143.5 KB 12/01/21 04:56
  - i21-157119.nxs 271.5 KB 12/01/21 04:57
  - xcam-157111.hdf 10.2 MB 12/01/21 04:57
  - xcam-157116.hdf 20.3 MB 12/01/21 04:57
  - xcam-157117.hdf 10.2 MB 12/01/21 04:57
  - xcam-157118.hdf 20.3 MB 12/01/21 04:57
  - xcam-157119.hdf 10.2 MB 12/01/21 04:57
- src

Data Slice View

i21-157116.nxs  
i21-157118.nxs

Processing

Name

- Image background subtraction - Fitted to a PDF [Background Subtraction]
- Combined RIXS image reduction [RIXS spectrum processing]

Model 'Combined RIXS image reduction'

| Name                     | Value     |
|--------------------------|-----------|
| Elastic line scan        | NEXT_SCAN |
| Energy calibration fi... |           |
| Energy dispersion at...  | 0.01      |
| Slope override           |           |
| Width of strip           | 1         |

Click and type in the energy dispersion value provided to you in the 'Energy dispersion at' slot. Here, 0.01.

Current slice of data: [0:1610:3304]

Input

data[0,:,:]

Output

Plot of profile\_0,profile\_fit\_dark\_0 against X-Axis

Intensity values

profile\_fit\_dark\_0

Blips removed: 41  
Fitted function: residual = 1407.38  
'Linear' has 2 parameters:  
0) m = 1.01250 in range [-1.79769e+308, 1.79769e+308]  
1) c = -2.65977 in range [-1.79769e+308, 1.79769e+308]  
Peak is -1.63460 cf 335.186  
Dark image offset = 0.396244



## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer File Viewer Data Slice View Processing Model 'Combined RIXS image reduction'

data

- examples
- Proposal\_ID
  - processing
  - spool
  - temp
  - xml
  - i21-157111.nxs 271.5 KB 12/01/21 04:33
  - i21-157116.nxs 143.5 KB 12/01/21 04:49
  - i21-157117.nxs 271.5 KB 12/01/21 04:49
  - i21-157118.nxs 143.5 KB 12/01/21 04:56
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  - xcam-157111.hdf 10.2 MB 12/01/21 04:57
  - xcam-157116.hdf 20.3 MB 12/01/21 04:57
  - xcam-157117.hdf 10.2 MB 12/01/21 04:57
  - xcam-157118.hdf 20.3 MB 12/01/21 04:57
  - xcam-157119.hdf 10.2 MB 12/01/21 04:57
- src

Data Slice View

i21-157116.nxs  
i21-157118.nxs

Processing

Name

- Image background subtraction - Fitted to a PDF [Background Subtraction]
- Combined RIXS image reduction [RIXS spectrum processing]

Model 'Combined RIXS image reduction'

| Name                     | Value     |
|--------------------------|-----------|
| Elastic line scan        | NEXT_SCAN |
| Energy calibration fi... |           |
| Energy dispersion at...  | 0.01      |
| Slope override           | -0.065    |
| Width of strip           | 1         |

Click and type in the slope value provided to you in the 'Slope override' slot. Here, -0.065.

Current slice of data: [0:1610:3304]

Input

data[0,:,:]

Output

Plot of profile\_0,profile\_fit\_dark\_0 against X-Axis

Intensity values

profile\_fit\_dark\_0

Blips removed: 41  
Fitted function: residual = 1407.38  
'Linear' has 2 parameters:  
0) m = 1.01250 in range [-1.79769e+308, 1.79769e+308]  
1) c = -2.65977 in range [-1.79769e+308, 1.79769e+308]  
Peak is -1.63460 cf 335.186  
Dark image offset = 0.396244

## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer

- data
  - examples
  - Proposal\_ID
    - processing
    - spool
    - temp
    - xml
    - i21-157111.nxs 271.5 KB 12/01/21 04:33
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    - xcam-157118.hdf 20.3 MB 12/01/21 04:49
    - xcam-157119.hdf 10.2 MB 12/01/21 04:49
  - src

Data Slice View

i21-157116.nxs  
i21-157118.nxs

Processing

Image background subtraction - Fitted to a PDF [Background Subtraction]  
Combined RIXS image reduction [RIXS spectrum processing]

Model 'Combined RIXS image reduction'

| Name                     | Value     |
|--------------------------|-----------|
| Elastic line scan        | NEXT_SCAN |
| Energy calibration fi... |           |
| Energy dispersion at...  | 0.01      |
| Slope override           | -0.065    |
| Width of strip           | 1         |

Click on the process name. You will see that this panel update.

Current slice of data: [0:1610:3304]

Input

data[0,:]

Output

Plot of profile\_0,profile\_fit\_dark\_0 against X-Axis

Intensity values

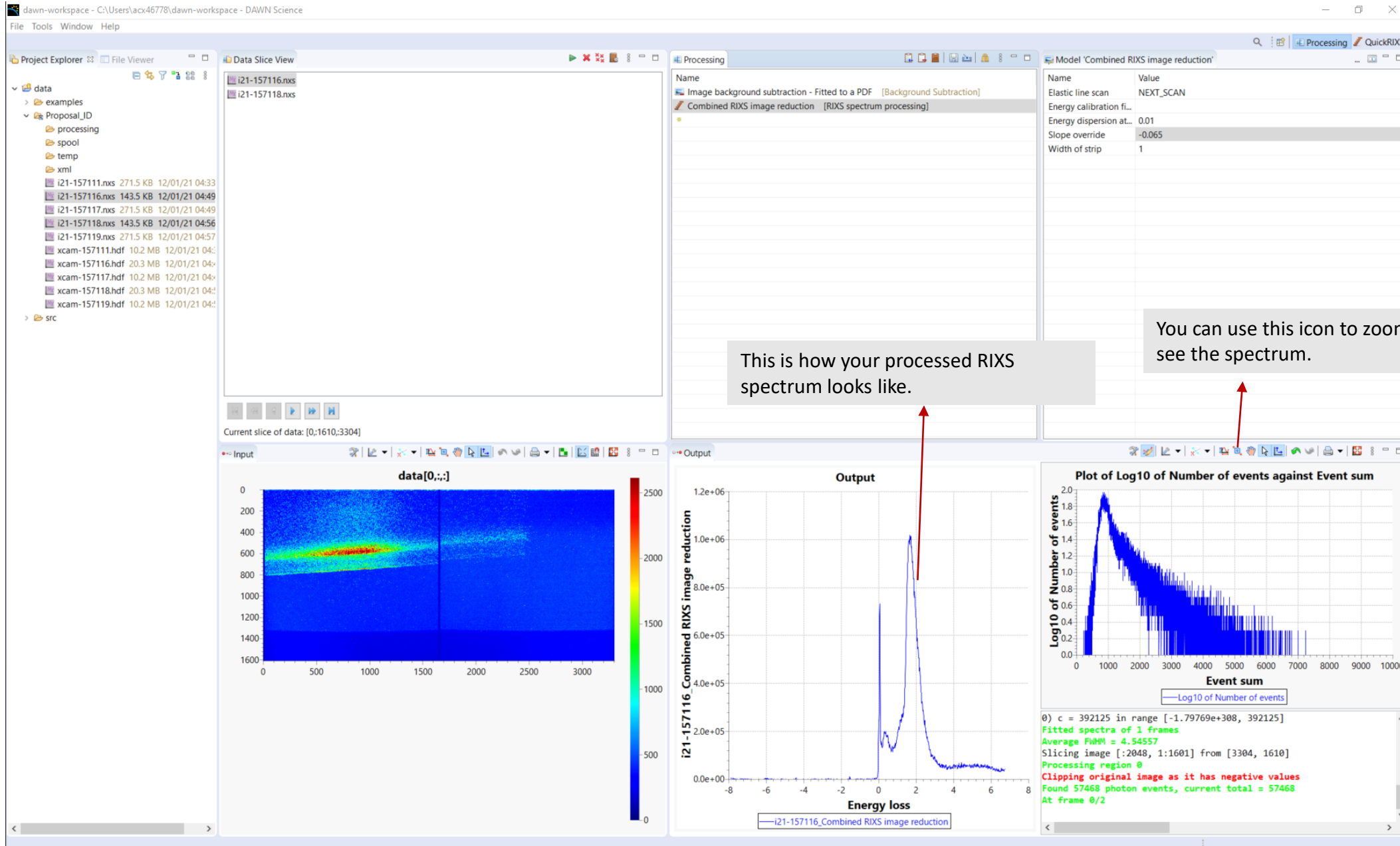
profile\_fit\_dark\_0

Blips removed: 41  
Fitted function: residual = 1407.38  
'Linear' has 2 parameters:  
0) m = 1.01250 in range [-1.79769, 1.79769]  
1) c = -2.65977 in range [-1.79769, 1.79769]  
Peak is -1.63460 cf 335.186  
Dark image offset = 0.396244

Wait till this update status disappears

Update...

## Processing a RIXS file: (Continued)



## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer File Viewer Data Slice View Processing Model 'Combined RIXS image reduction'

data

- examples
- Proposal\_ID
  - processing
  - spool
  - temp
  - xml
  - i21-157111.nxs 271.5 KB 12/01/21 04:33
  - i21-157116.nxs 143.5 KB 12/01/21 04:49
  - i21-157117.nxs 271.5 KB 12/01/21 04:49
  - i21-157118.nxs 143.5 KB 12/01/21 04:56
  - i21-157119.nxs 271.5 KB 12/01/21 04:57
  - xcam-157111.hdf 10.2 MB 12/01/21 04:57
  - xcam-157116.hdf 20.3 MB 12/01/21 04:57
  - xcam-157117.hdf 10.2 MB 12/01/21 04:57
  - xcam-157118.hdf 20.3 MB 12/01/21 04:57
  - xcam-157119.hdf 10.2 MB 12/01/21 04:57
- src

Process all files

Click on this play button to process all the RIXS files and save them.

Current slice of data: [0:1610:3304]

Input

data[0,:]

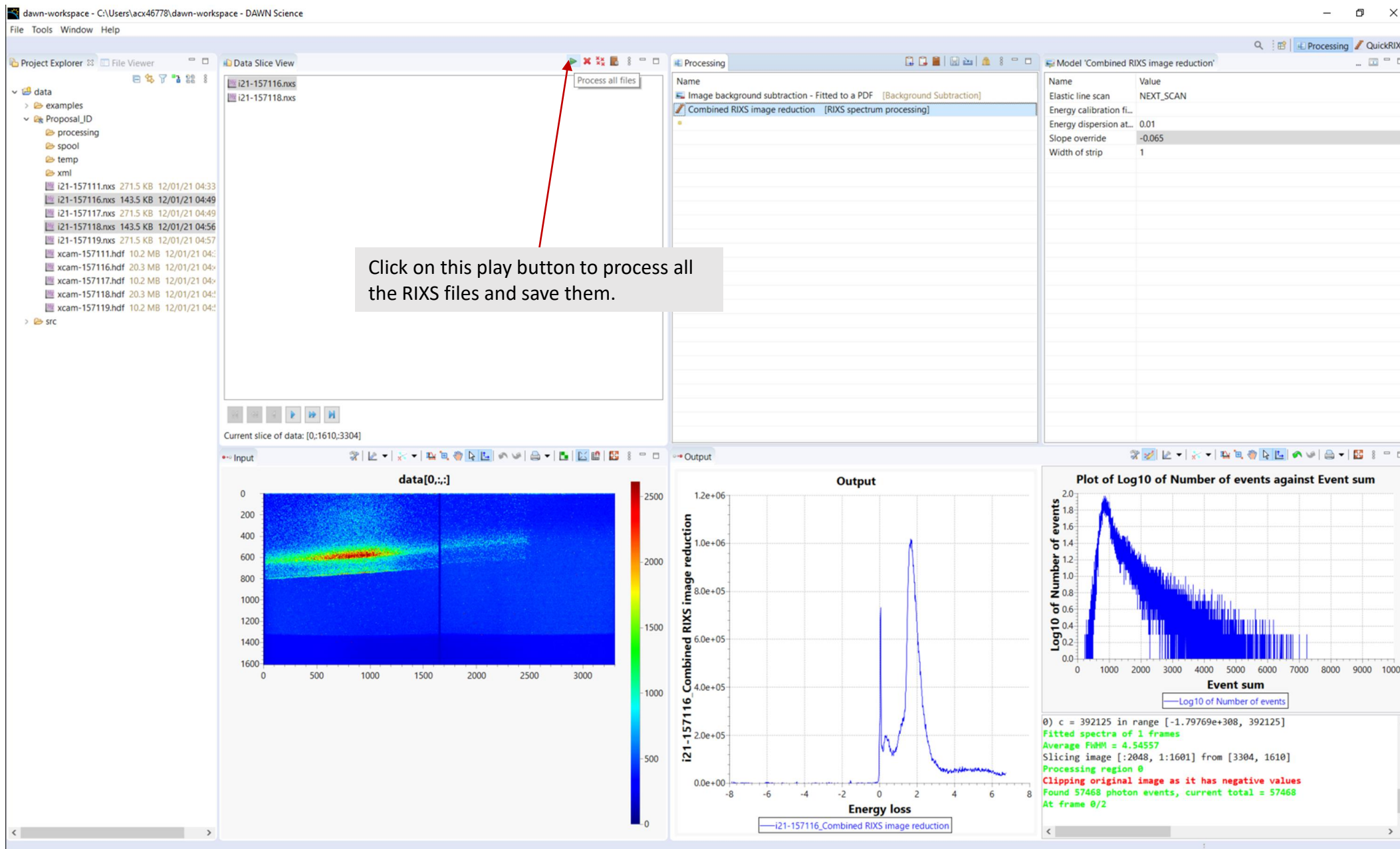
Output

Plot of Log10 of Number of events against Event sum

Log10 of Number of events

Event sum

0) c = 392125 in range [-1.79769e+308, 392125]  
Fitted spectra of 1 frames  
Average FWHM = 4.54557  
Slicing image [:2048, 1:1601] from [3304, 1610]  
Processing region 0  
Clipping original image as it has negative values  
Found 57468 photon events, current total = 57468  
At frame 0/2





## Processing a RIXS file: (Continued)

dawn-workspace - C:\Users\acx46778\dawn-workspace - DAWN Science

File Tools Window Help

Project Explorer

- data
  - examples
  - Proposal\_ID
    - processing
    - spool
    - temp
    - xml
    - i21-157111.nxs 271.5 KB 12/01/21 04:33
    - i21-157116.nxs 143.5 KB 12/01/21 04:49
    - i21-157117.nxs 271.5 KB 12/01/21 04:49
    - i21-157118.nxs 143.5 KB 12/01/21 04:56
    - i21-157119.nxs 271.5 KB 12/01/21 04:57
    - xcam-157111.hdf 10.2 MB 12/01/21 04:57
    - xcam-157116.hdf 20.3 MB 12/01/21 04:57
    - xcam-157117.hdf 10.2 MB 12/01/21 04:57
    - xcam-157118.hdf 20.3 MB 12/01/21 04:57
    - xcam-157119.hdf 10.2 MB 12/01/21 04:57
  - src

Data Slice View

i21-157116.nxs  
i21-157118.nxs

Processing

Name

- Image background subtraction - Fitted to a PDF [Background Subtraction]
- Combined RIXS image reduction [RIXS spectrum processing]

Model 'Combined RIXS image reduction'

| Name                    | Value     |
|-------------------------|-----------|
| Elastic line scan       | NEXT_SCAN |
| Energy calibration file |           |
| Energy dispersion at... | 0.01      |
| Slope override          | -0.065    |
| Width of strip          | 1         |

Please select a directory

Folder: C:\Users\acx46778\Desktop\Proposal\_ID

☐ Automatically load data to DataVis perspective

☐ Processed data only

☒ Link original data (no data copied)

☐ Process data into copy of original

OK Cancel

Current slice of data: [0:1610:3304]

Input

data[0,:]

Output

Plot of Log10 of Number of events against Event sum

sum

Log10 of Number of events

0) c = 392125 in range [-1.79769e+308, 392125]  
Fitted spectra of 1 frames  
Average FWHM = 4.54557  
Slicing image [:2048, 1:1601] from [3304, 1610]  
Processing region 0  
Clipping original image as it has negative values  
Found 57468 photon events, current total = 57468  
At frame 0/2

Energy loss

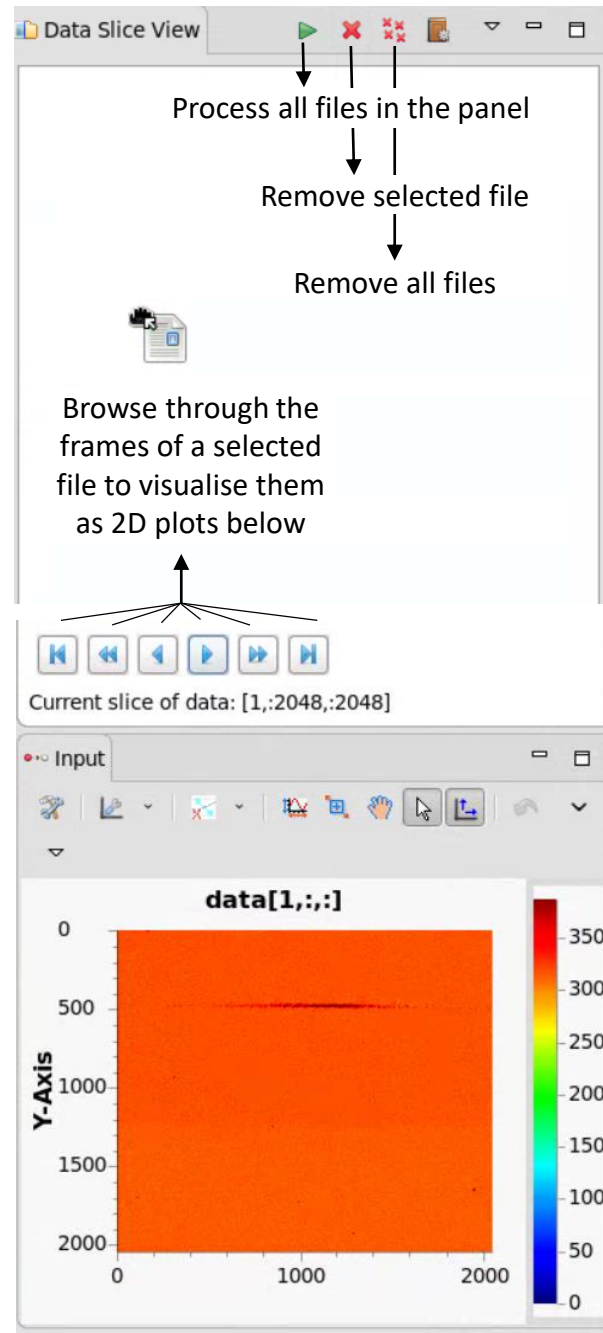
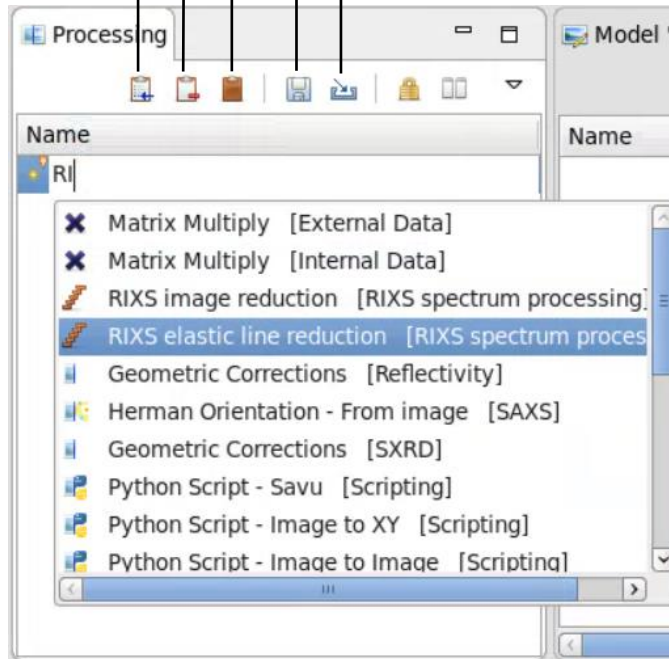
i21-157116\_Combined RIXS image reduction

Browse to a folder where you want to save the data. Do not use the parent data folder. You can use the 'processing' subfolder to save the data. Click on the 'Link original data (no data copied)' and OK.



## Processing a RIXS file: Basic button functionalities

- Load a saved list of operations with model parameters
- Save the list of operations along with model parameter
- Remove all operations
- Remove selected operation
- Insert operation



## Viewing processed RIXS files: PostRIXS perspective



File Window Help

RIXS Results Files

Filename

Go to file and browse and select the processed RIXS files

RIXS Plot

100  
90  
80  
70  
60  
50  
40  
30  
20  
10  
0

0 10 20 30 40 50 60 70 80 90 100

X-Axis

DataVis Processing QuickRIXS PostRIXS DExplore

RIXS Plot Options

Process:

Dataset Name

Align...

/dls/i21/data/2020/cm26439-4

## Viewing processed RIXS files: PostRIXS perspective



File Window Help

RIXS Results Files

Filename

- i21-148504\_processed\_combined\_rixs\_spectra\_200909\_194357.nxs
- i21-148506\_processed\_combined\_rixs\_spectra\_200909\_194412.nxs
- i21-148508\_processed\_combined\_rixs\_spectra\_200909\_194428.nxs

- ☒ Check
- ☐ Uncheck
- Display ▶
- Create joined file
- Deselect datasets
- Close
- Transfer ▶
- Convert

Shift select all the files, right click and click on 'Check'

RIXS Plot

100  
90  
80  
70  
60  
50  
40  
30  
20  
10  
0

0 10 20 30 40 50 60 70 80 90 100

X-Axis

RIXS Plot Options

Process:

Dataset Name

Align...

## Viewing processed RIXS files: PostRIXS perspective



File Window Help

RIXS Results Files

Filename

- ☒ i21-148504\_processed\_combined\_rixs\_spectra\_200909\_194357.nxs
- ☒ i21-148506\_processed\_combined\_rixs\_spectra\_200909\_194412.nxs
- ☒ i21-148508\_processed\_combined\_rixs\_spectra\_200909\_194428.nxs

RIXS Plot

Process: Combined RIXS image reduction

Dataset Name

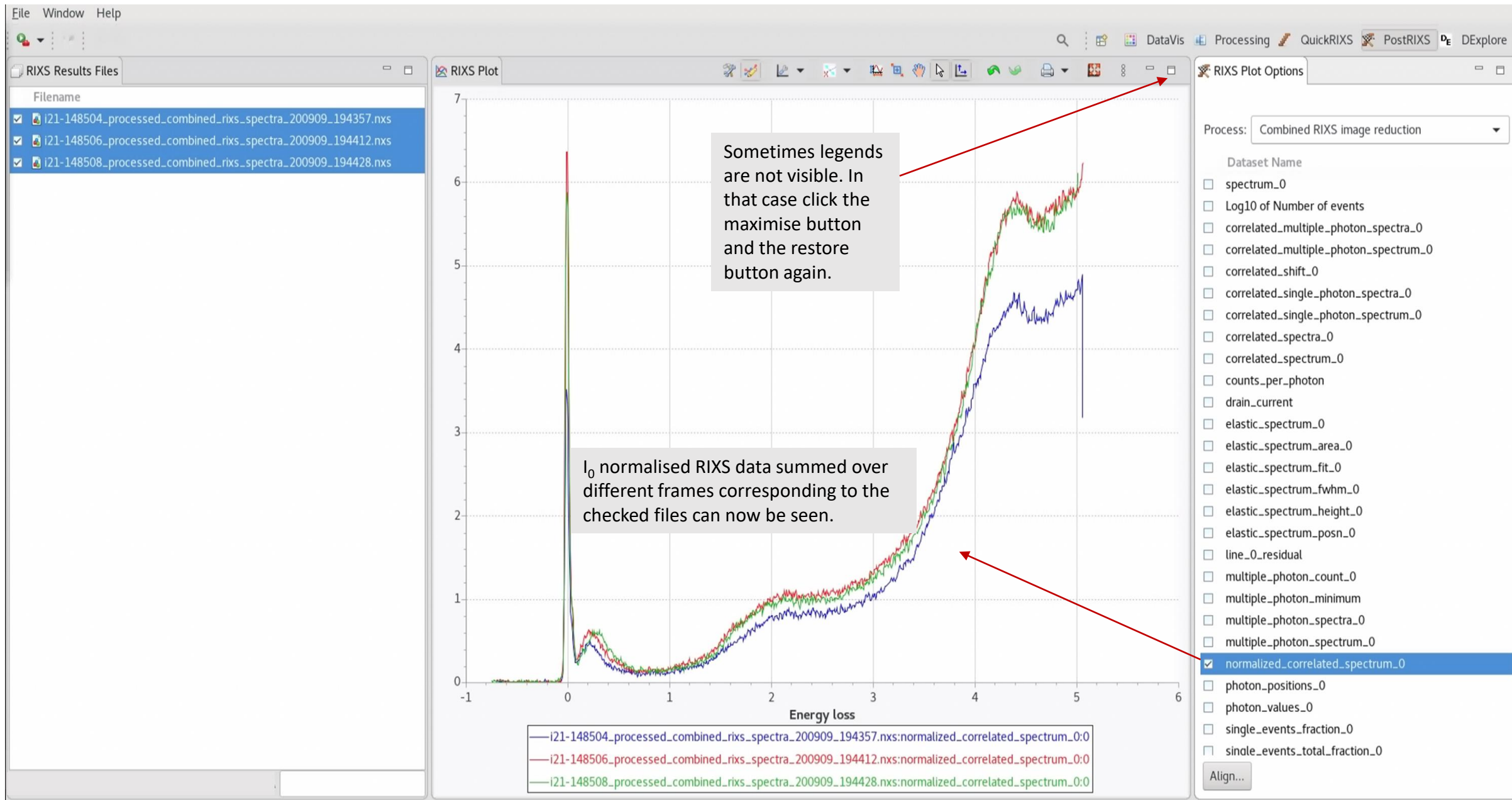
- ☐ spectrum\_0
- ☐ Log10 of Number of events
- ☐ correlated\_multiple\_photon\_spectra\_0
- ☐ correlated\_multiple\_photon\_spectrum\_0
- ☐ correlated\_shift\_0
- ☐ correlated\_single\_photon\_spectra\_0
- ☐ correlated\_single\_photon\_spectrum\_0
- ☐ correlated\_spectra\_0
- ☐ correlated\_spectrum\_0
- ☐ counts\_per\_photon
- ☐ drain\_current
- ☐ elastic\_spectrum\_0
- ☐ elastic\_spectrum\_area\_0
- ☐ elastic\_spectrum\_fit\_0
- ☐ elastic\_spectrum\_fwhm\_0
- ☐ elastic\_spectrum\_height\_0
- ☐ elastic\_spectrum\_posn\_0
- ☐ line\_0\_residual
- ☐ multiple\_photon\_count\_0
- ☐ multiple\_photon\_minimum
- ☐ multiple\_photon\_spectra\_0
- ☐ multiple\_photon\_spectrum\_0
- ☒ normalized\_correlated\_spectrum\_0
- ☐ photon\_positions\_0
- ☐ photon\_values\_0
- ☐ single\_events\_fraction\_0
- ☐ single\_events\_total\_fraction\_0

Align...

Check the  
'normalized\_correlated\_spectrum\_0'

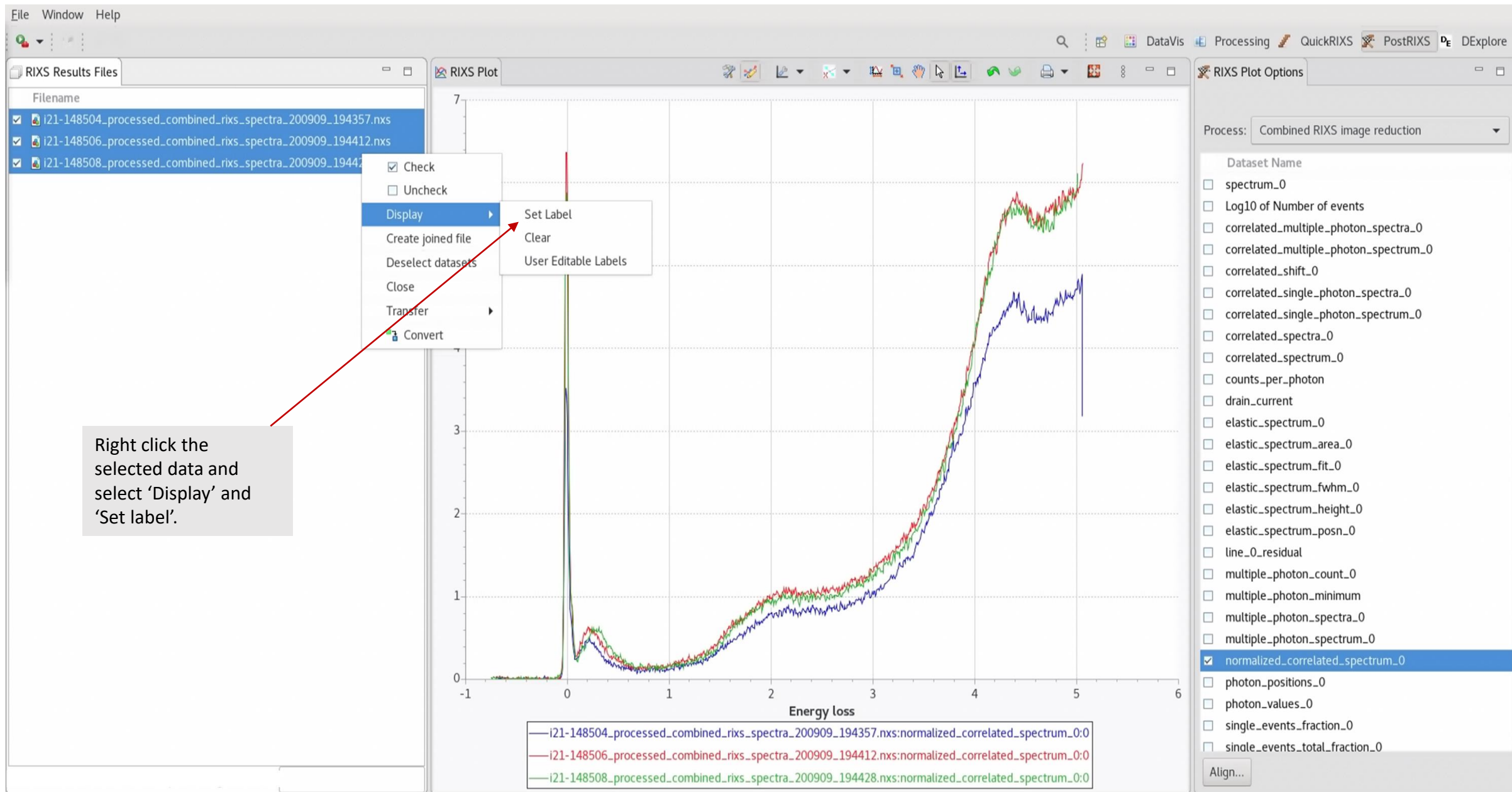
Energy loss

## Viewing processed RIXS files: PostRIXS perspective

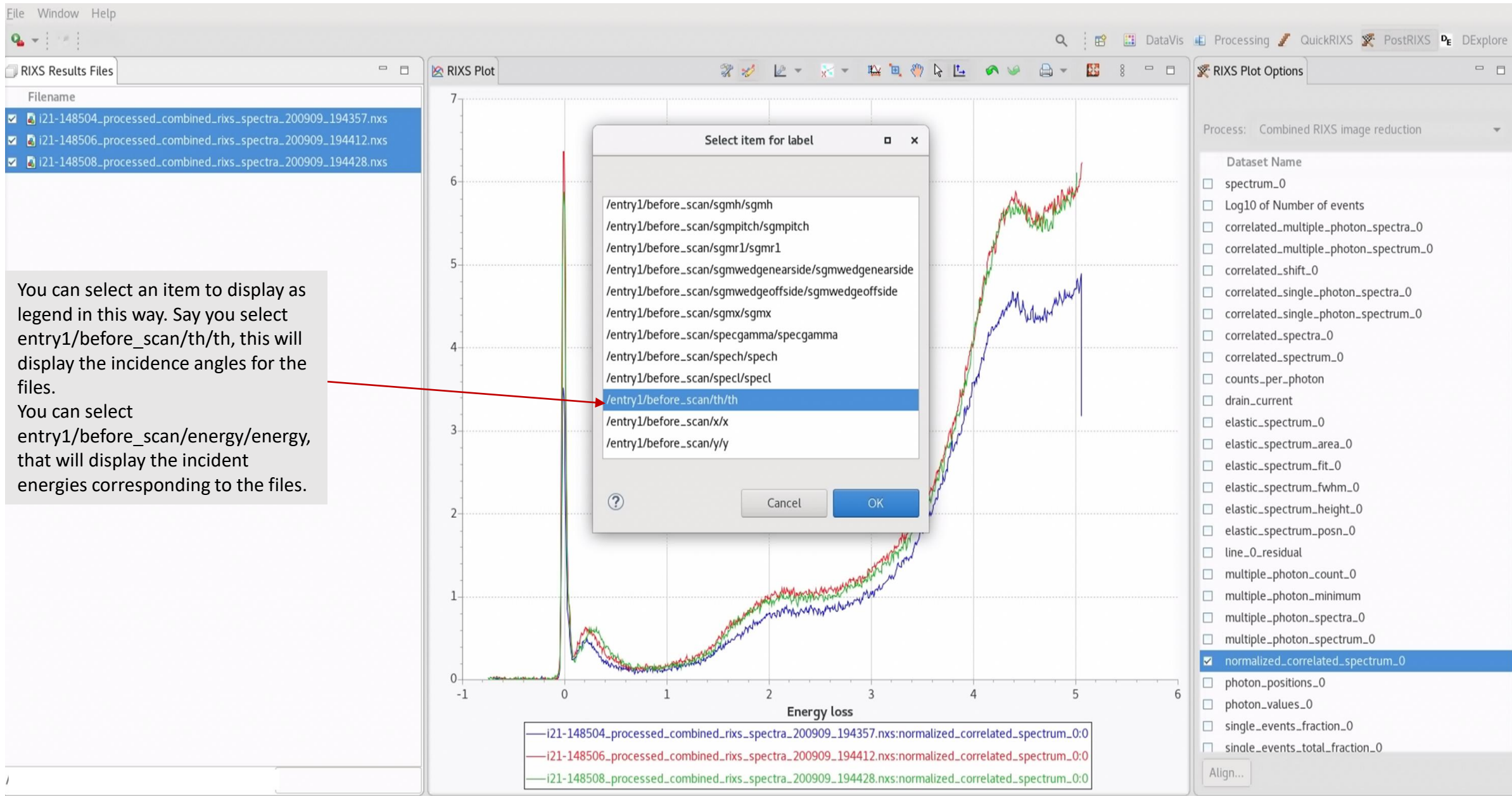




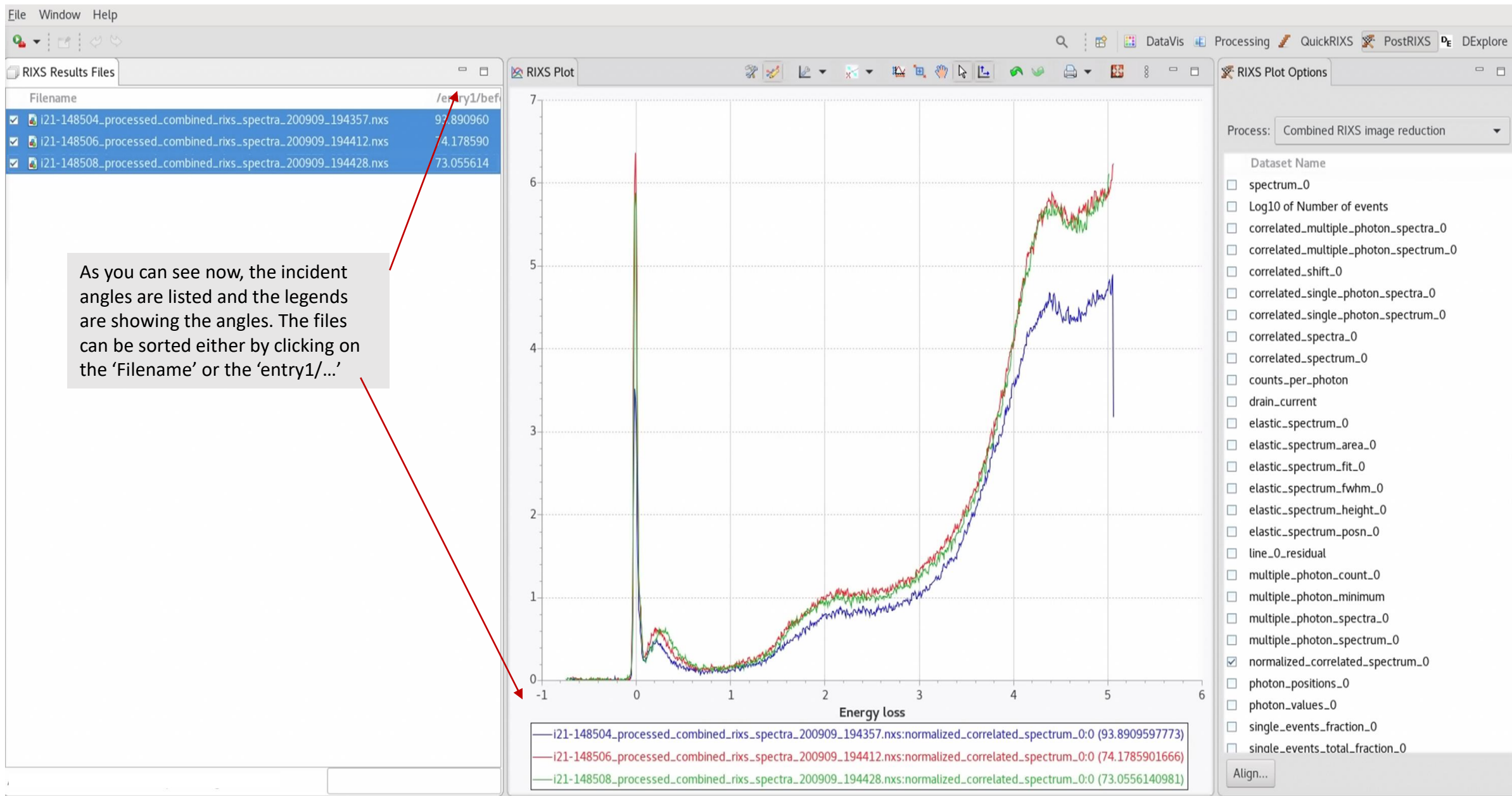
## Viewing processed RIXS files: PostRIXS perspective



## Viewing processed RIXS files: PostRIXS perspective

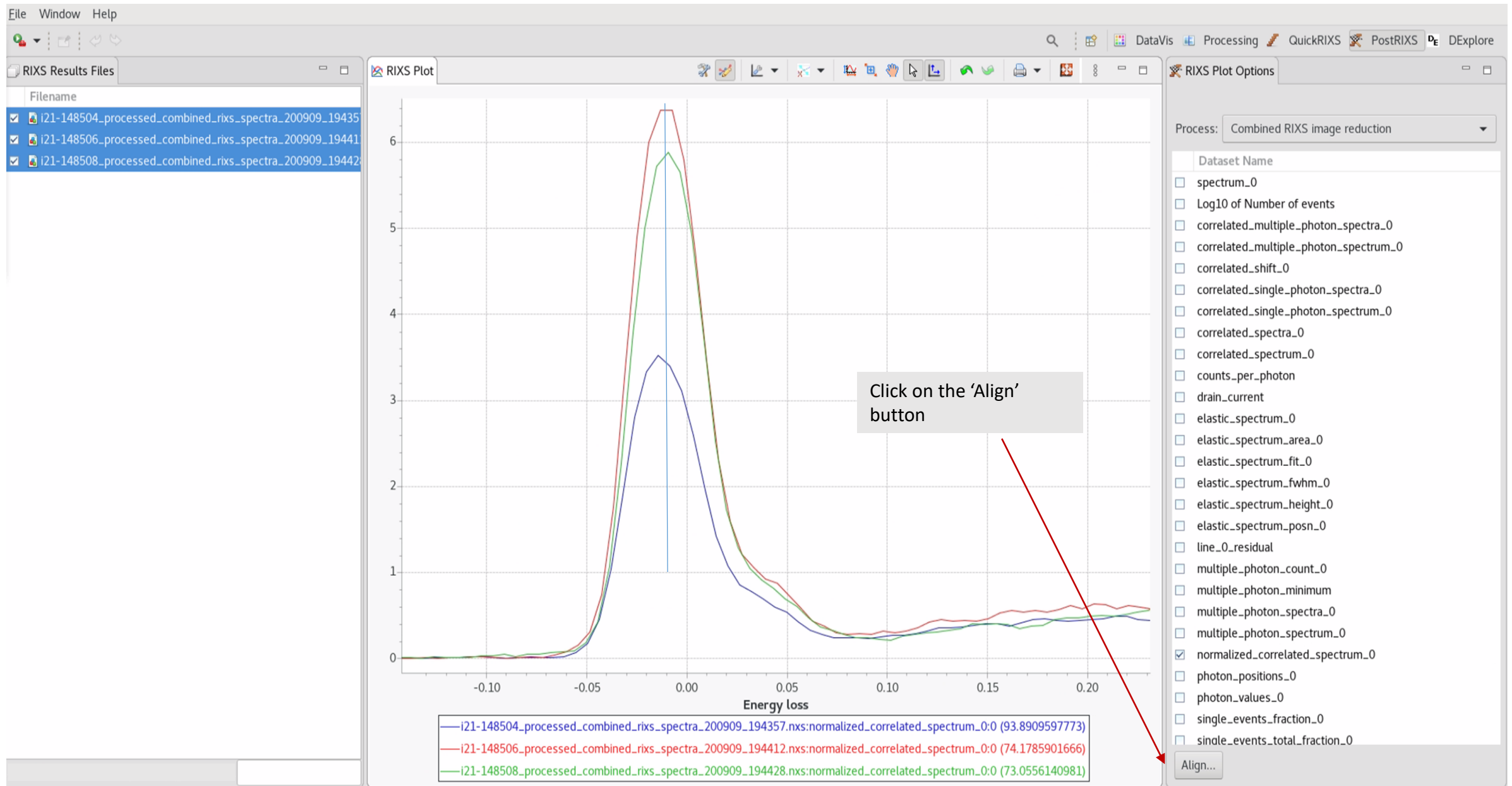


## Viewing processed RIXS files: PostRIXS perspective

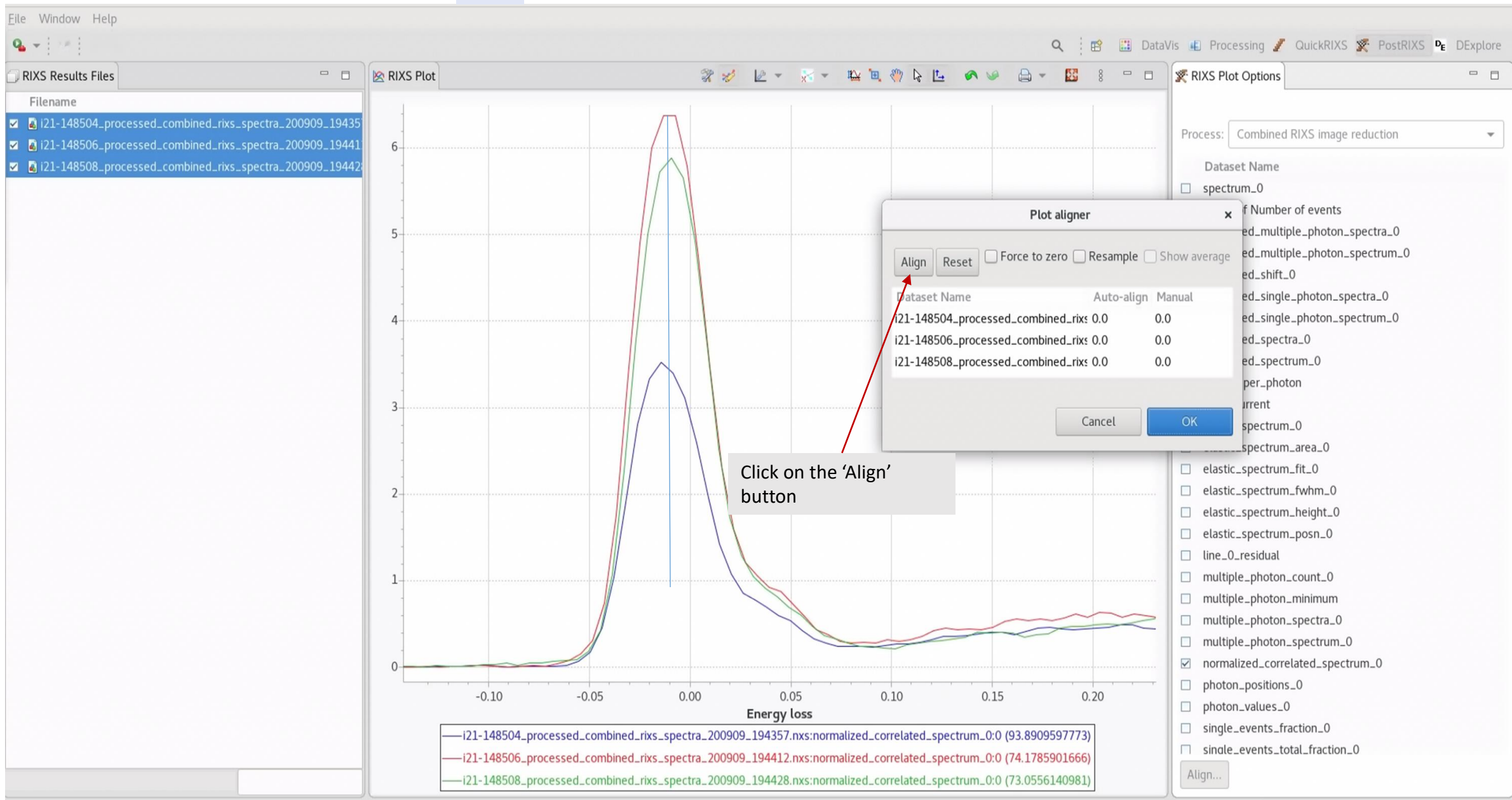




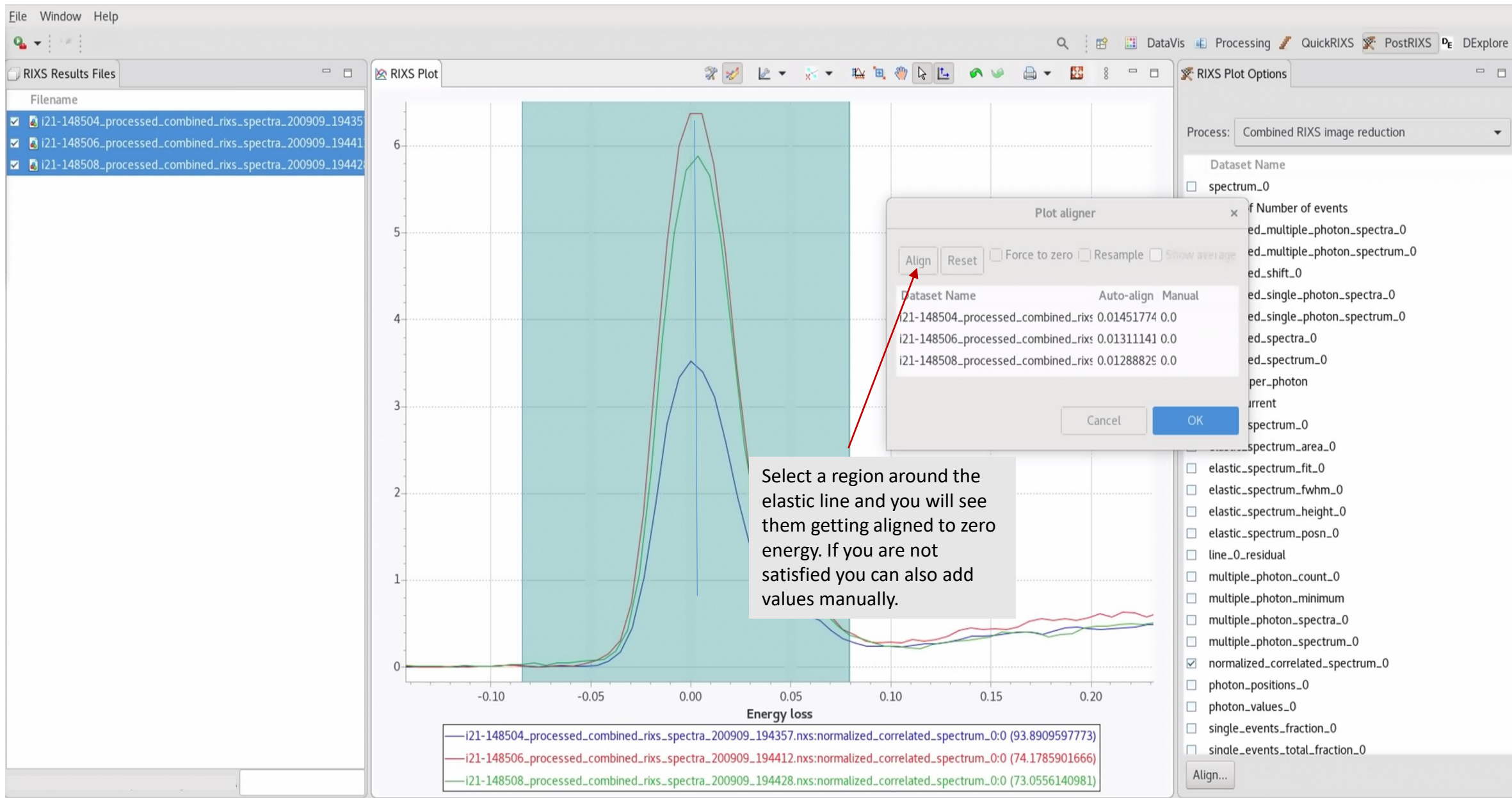
## Aligning processed RIXS files: PostRIXS perspective



## Aligning processed RIXS files: PostRIXS perspective



## Aligning processed RIXS files: PostRIXS perspective

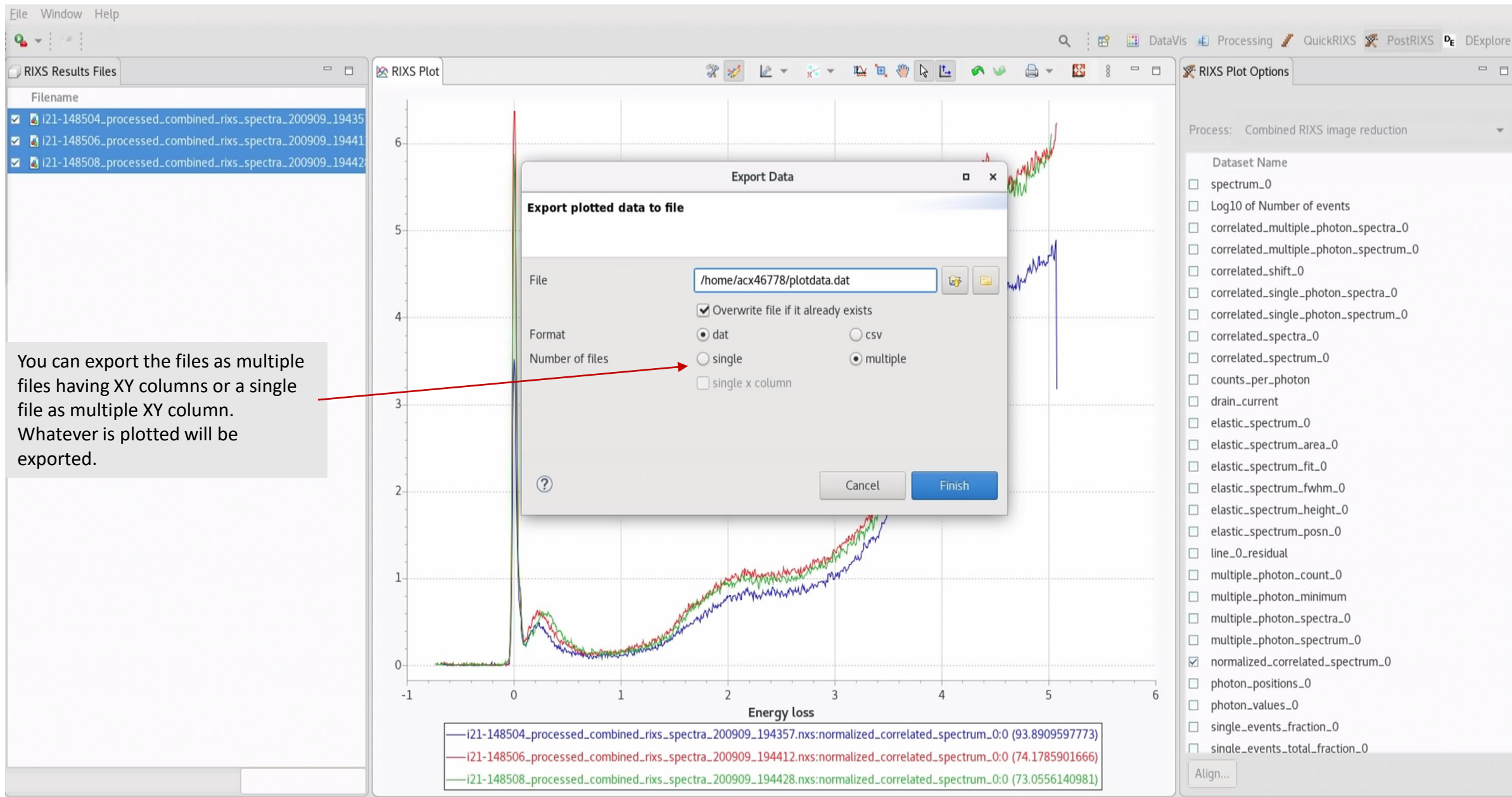


## Aligning processed RIXS files: PostRIXS perspective





## Aligning processed RIXS files: PostRIXS perspective



## Viewing a processed RIXS file: DataVIS perspective



File Plot Tools Transfer Window Help

0 255

Data Files

File Name

Go to file and browse and select any **one** of processed RIXS files

Plot

100  
90  
80  
70  
60  
50  
40  
30  
20  
10  
0

0 10 20 30 40 50 60 70 80 90 100

X-Axis

DataVis Processing QuickRIXS PostRIXS DExplore

Datasets

| Dataset Name | Shape |
|--------------|-------|
|--------------|-------|

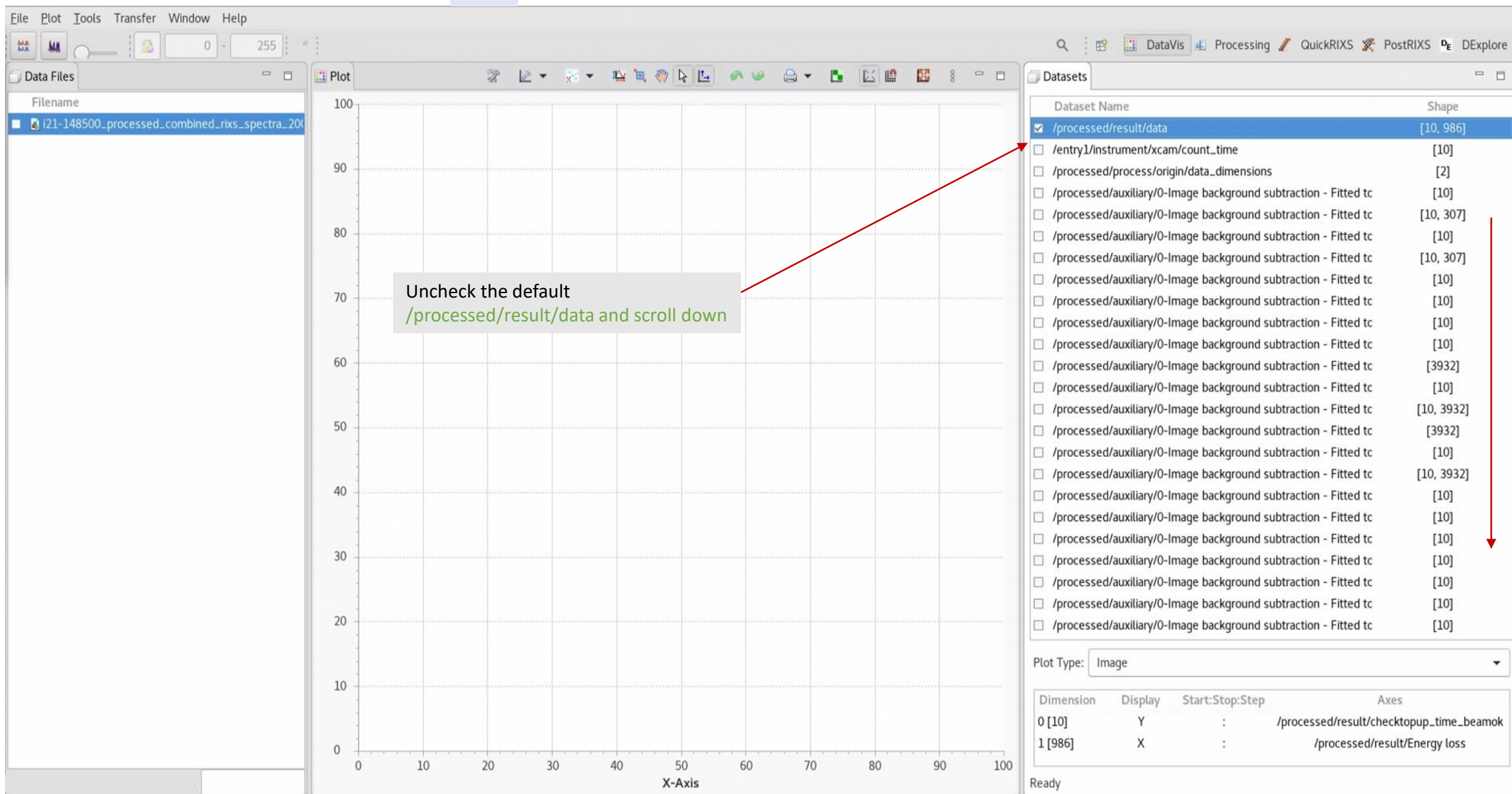
Plot Type:

Dimension Display Start:Stop:S Axes

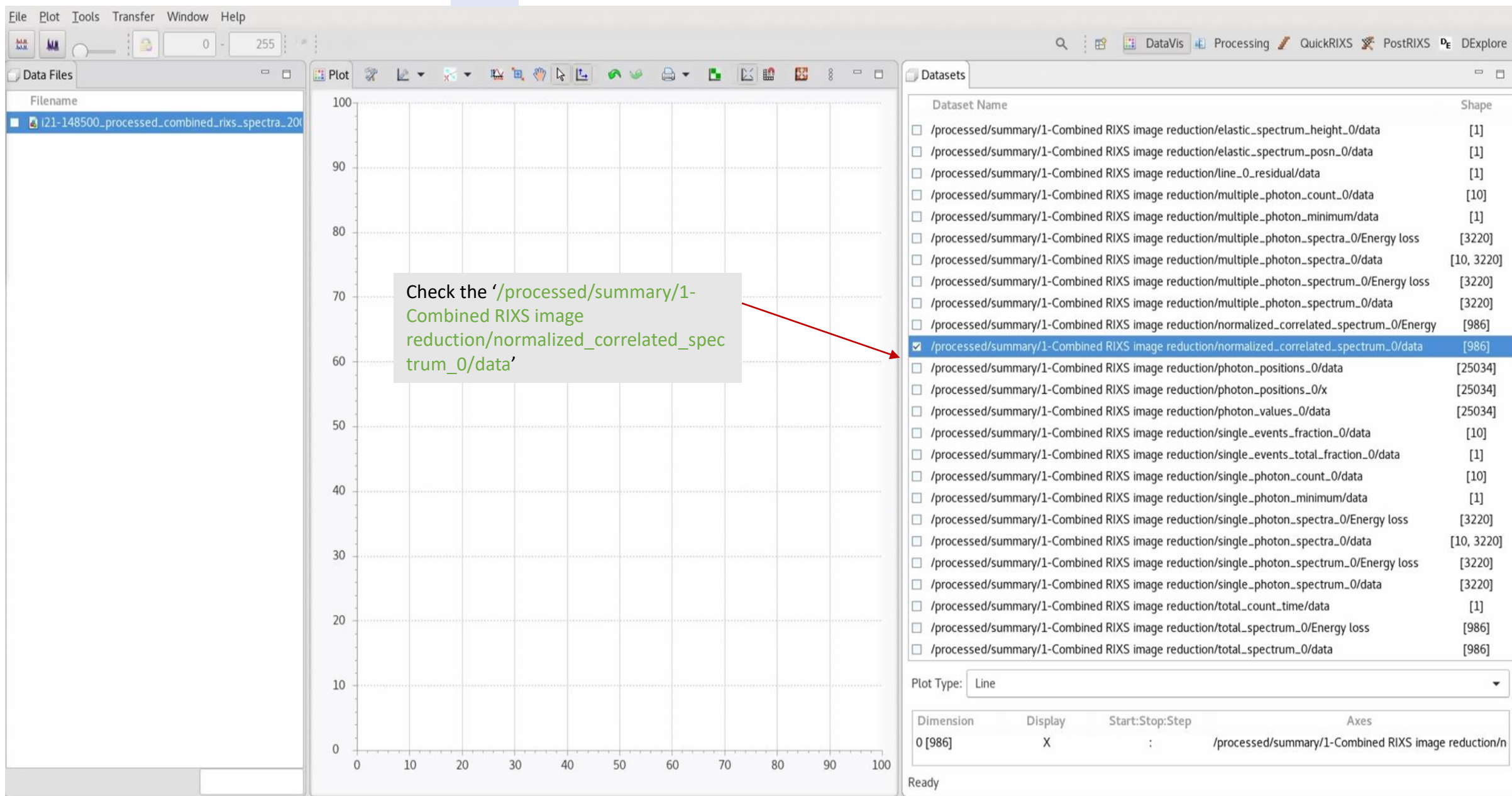
Ready

/dls/i21/data/2020/cm26439-4

## Viewing a processed RIXS file: DataVIS perspective

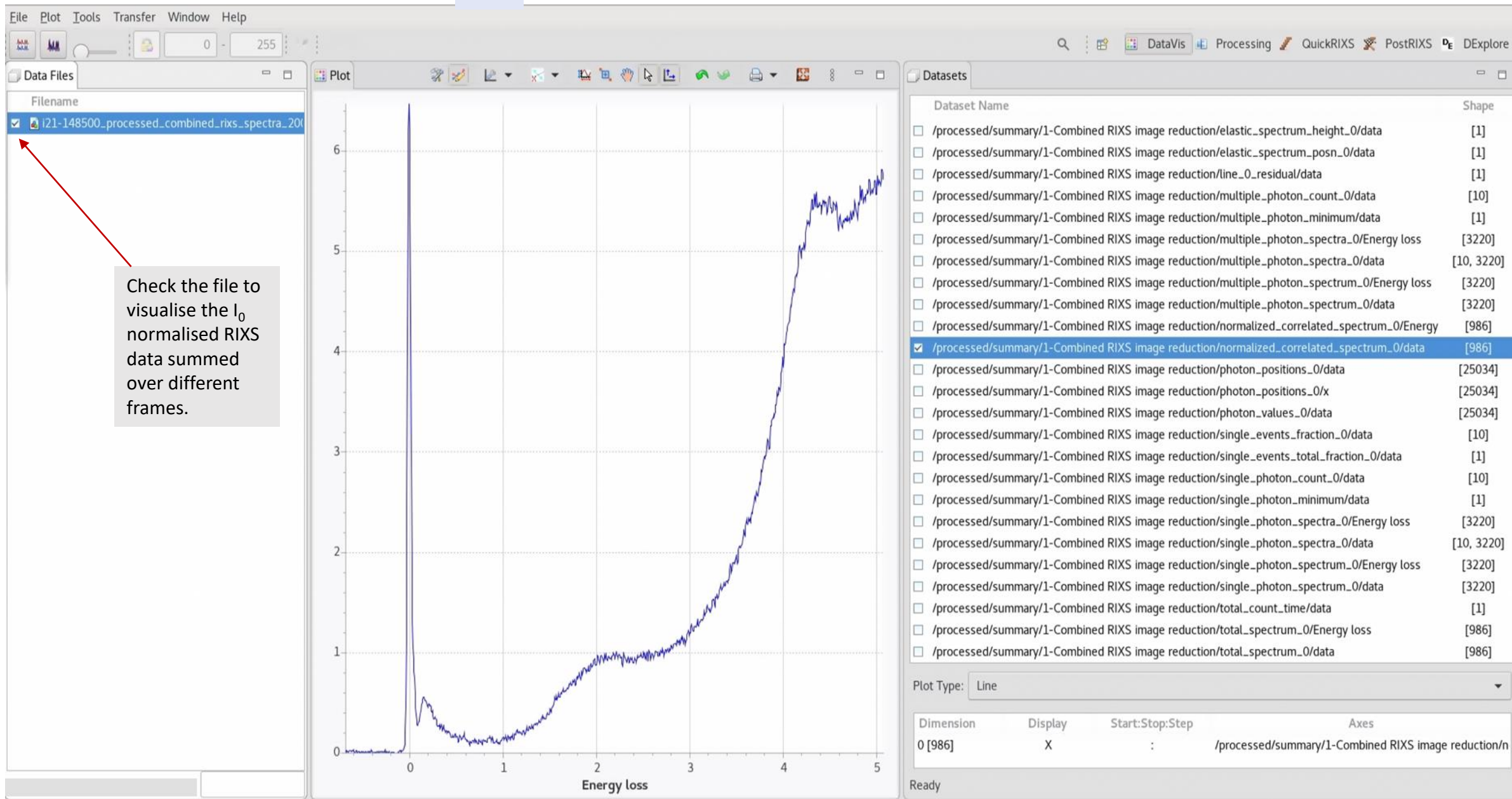


## Viewing a processed RIXS file: DataVIS perspective

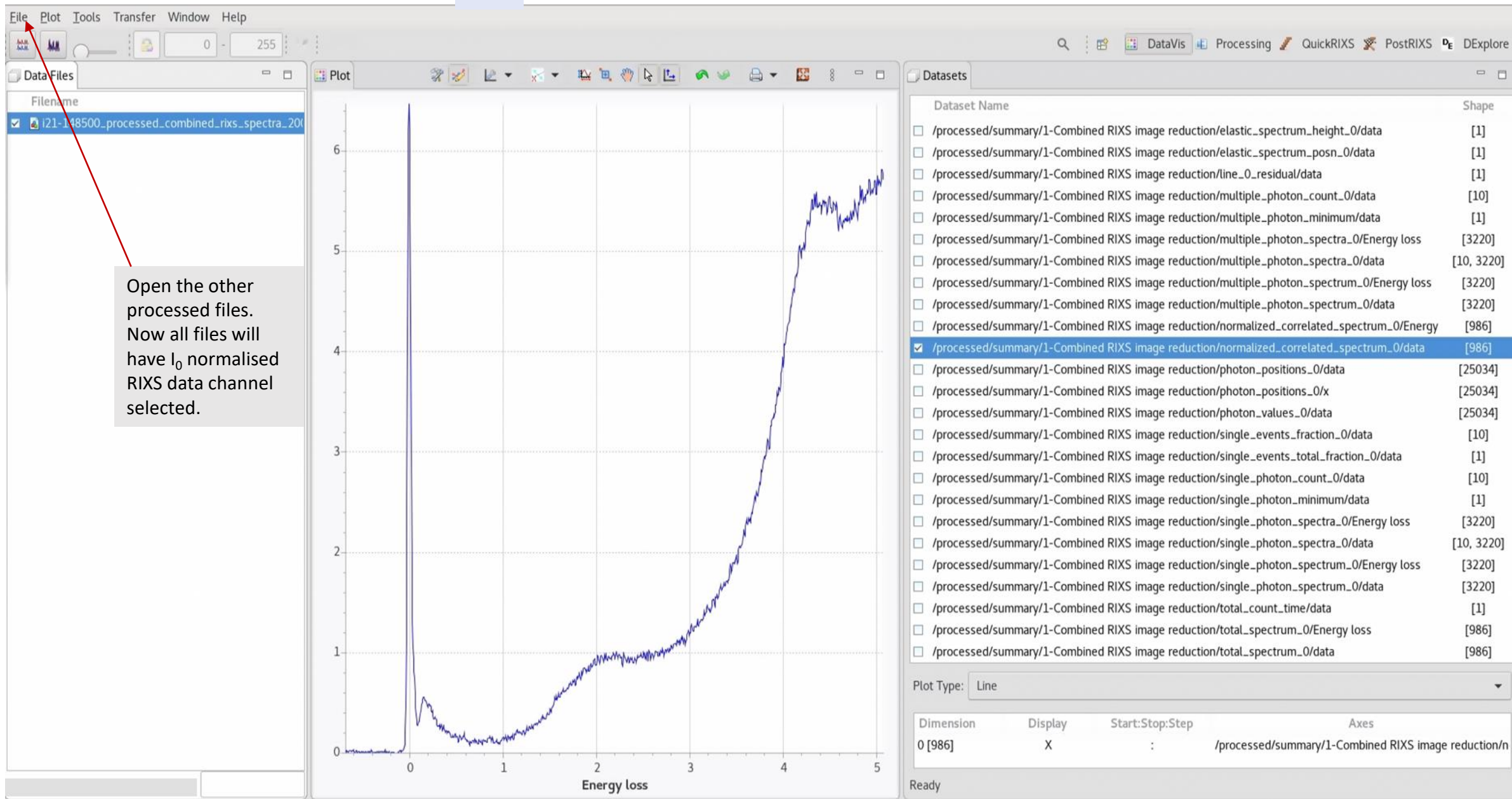




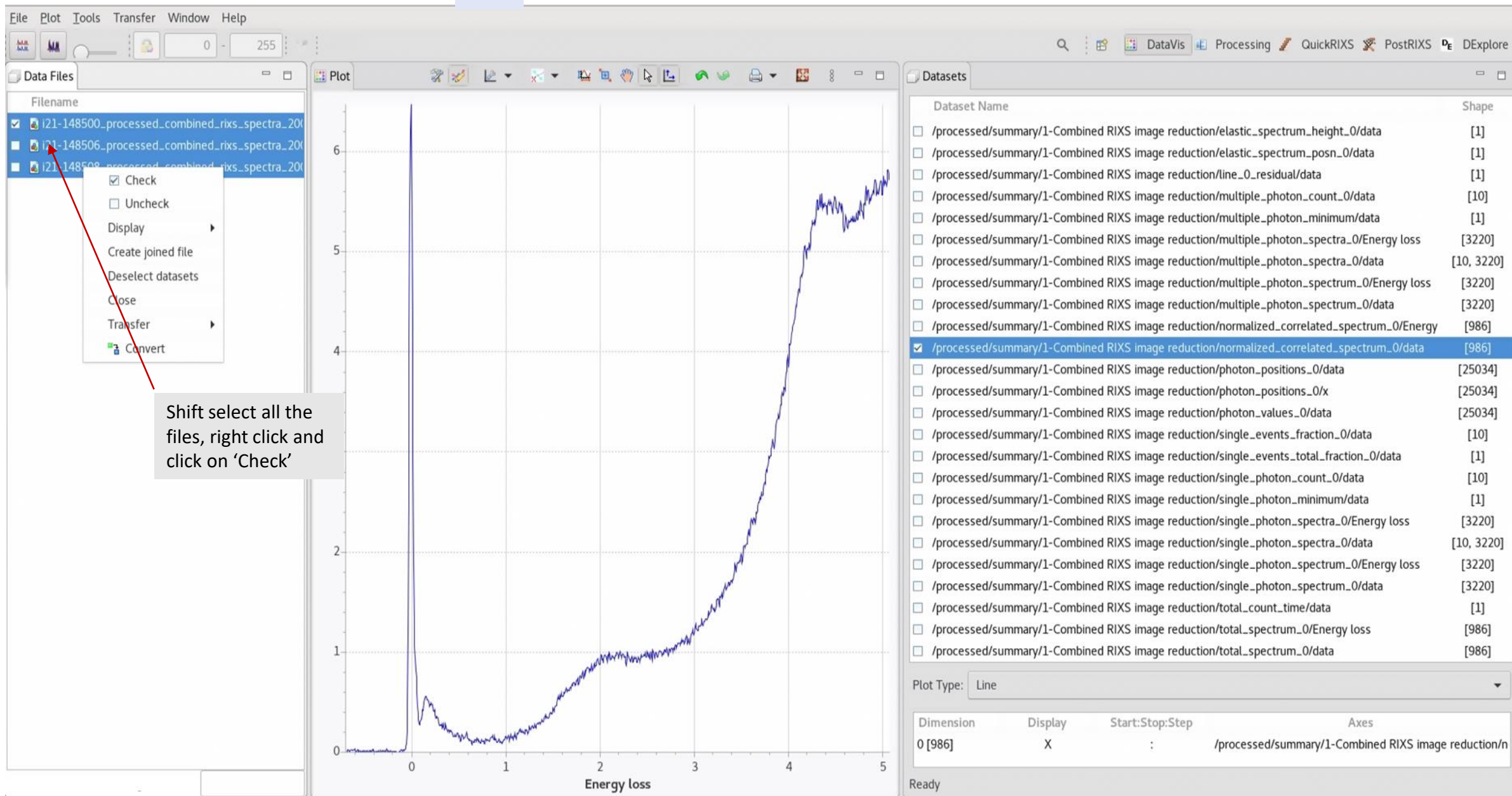
## Viewing a processed RIXS file: DataVIS perspective



## Viewing a processed RIXS file: DataVIS perspective

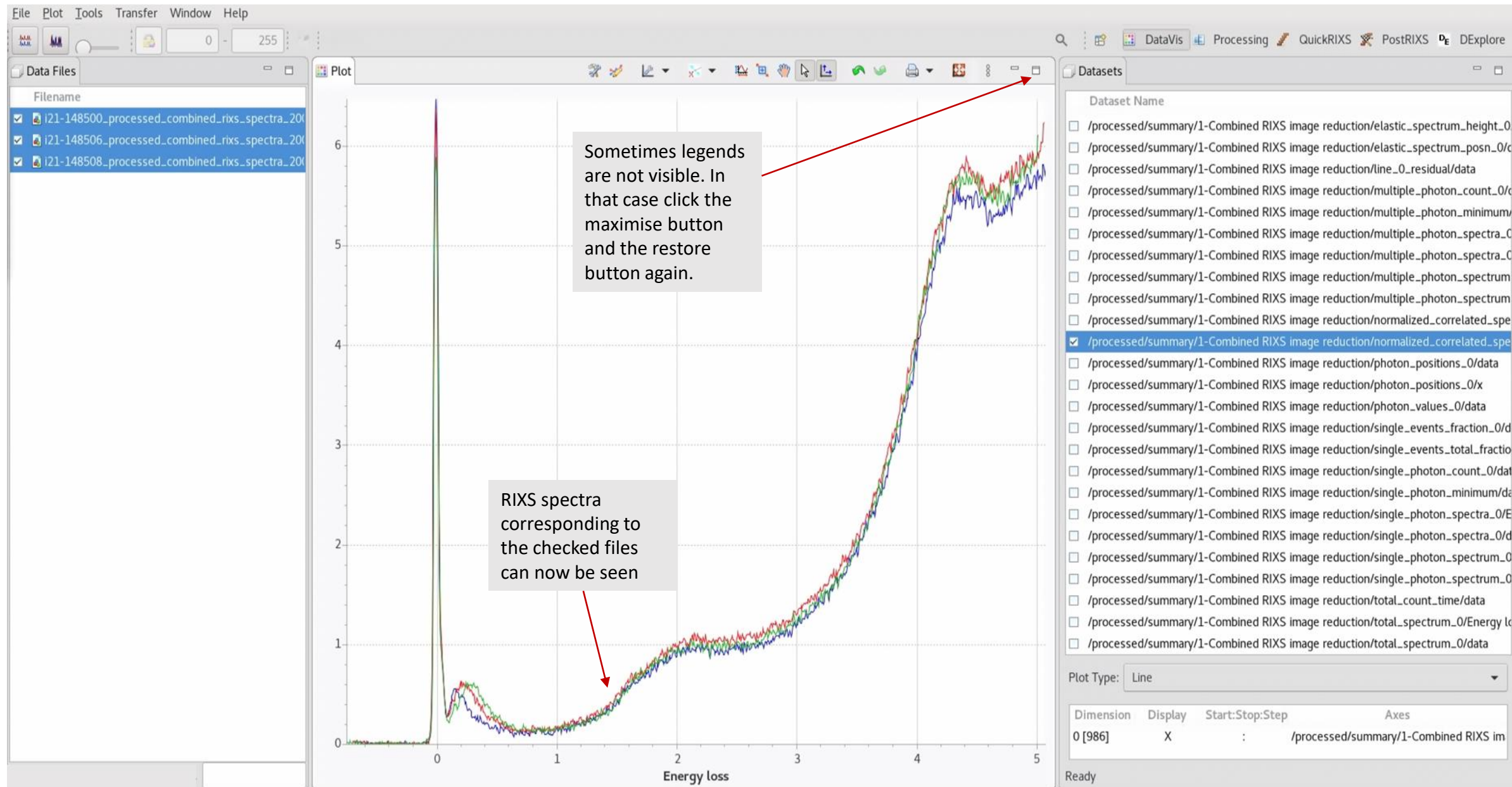


## Viewing a processed RIXS file: DataVIS perspective

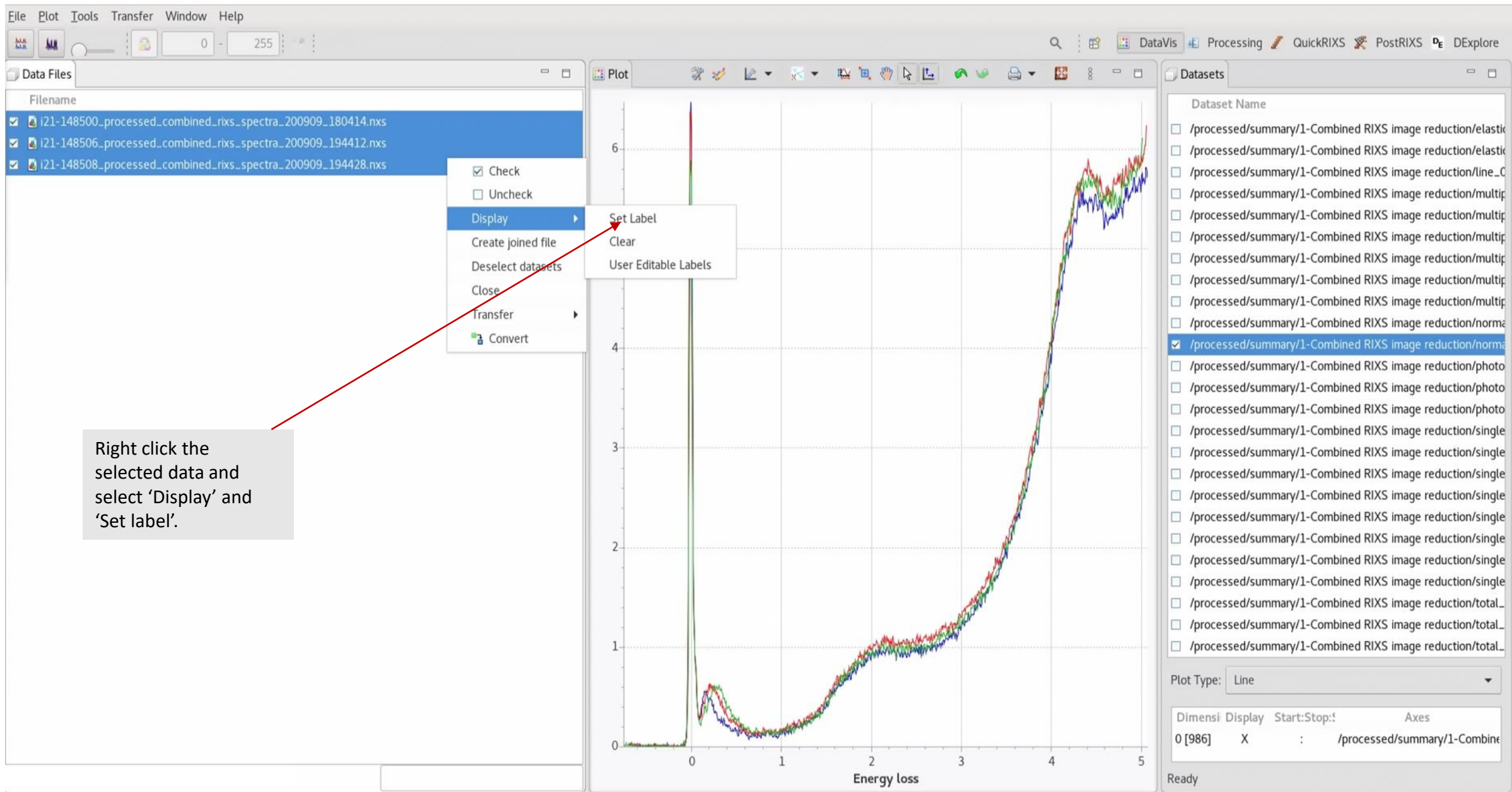




## Viewing a processed RIXS file: DataVIS perspective



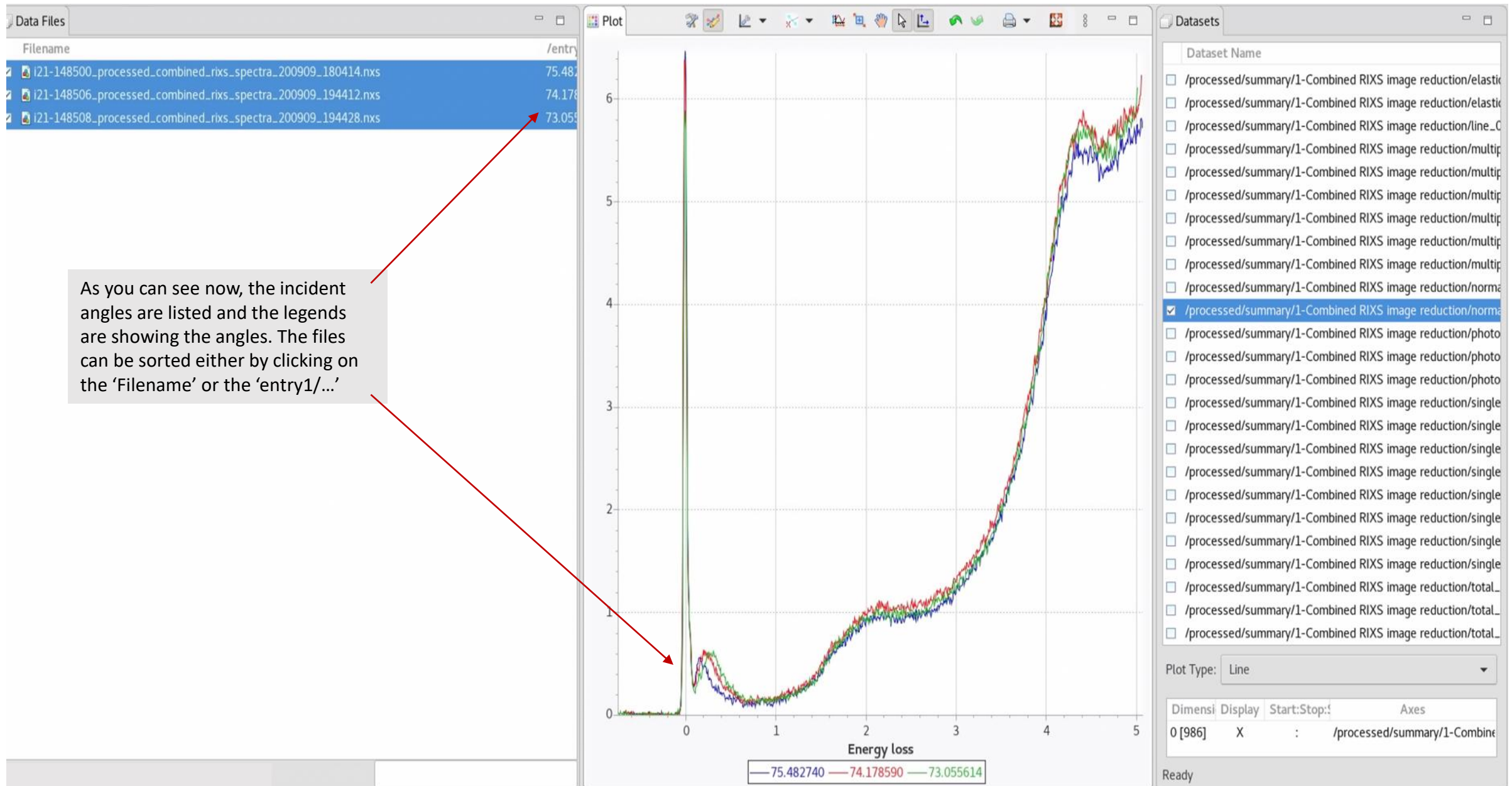
A 3x3 grid of colored squares. The top row contains orange, red, and pink squares. The middle row contains light green, a grey square, and a purple square. The bottom row contains green, light blue, and dark blue squares.



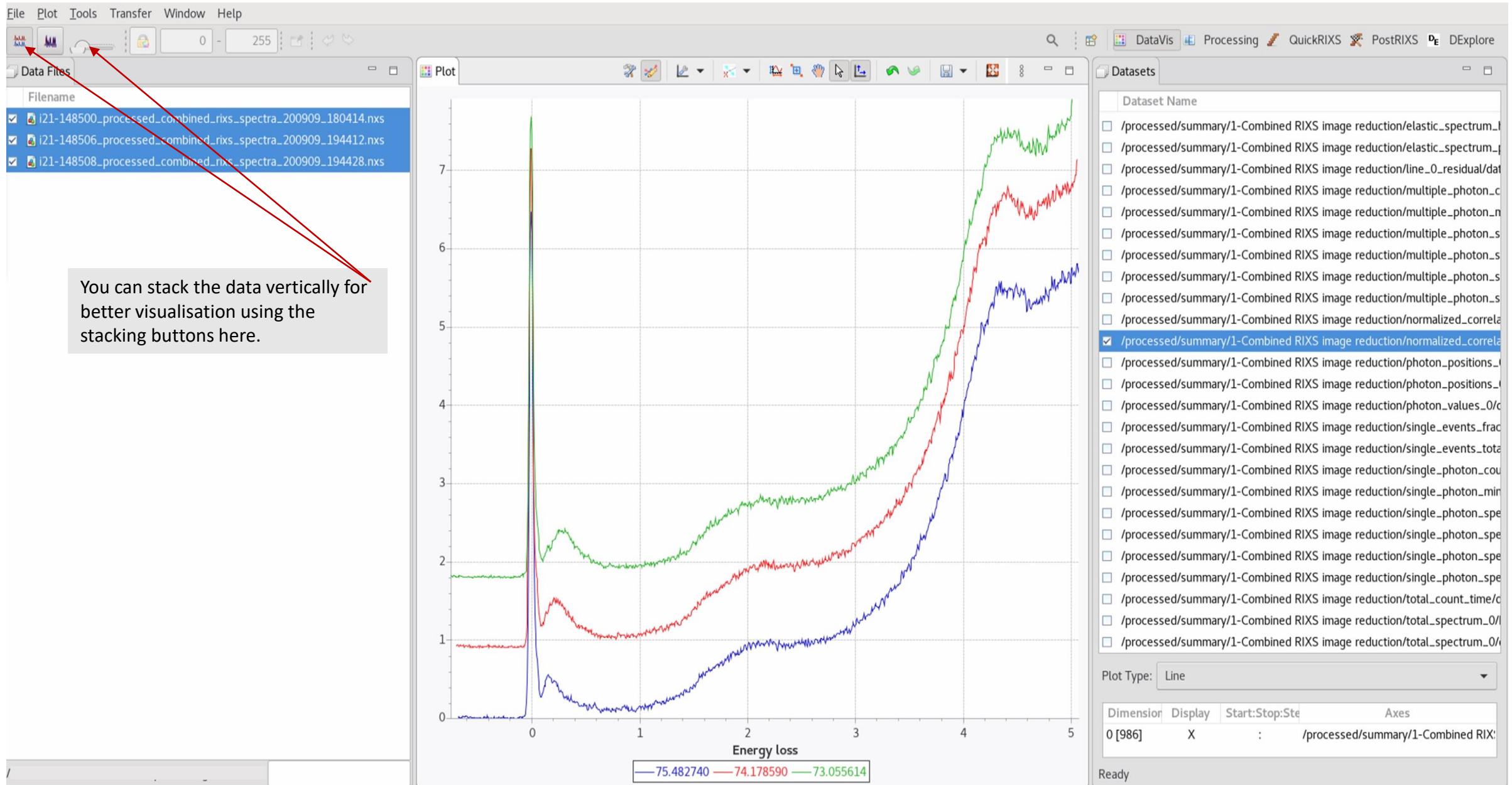




A 3x3 grid of colored squares. The top row contains orange, red, and pink squares. The middle row contains light green, a grey square, and a purple square. The bottom row contains green, light blue, and dark blue squares.

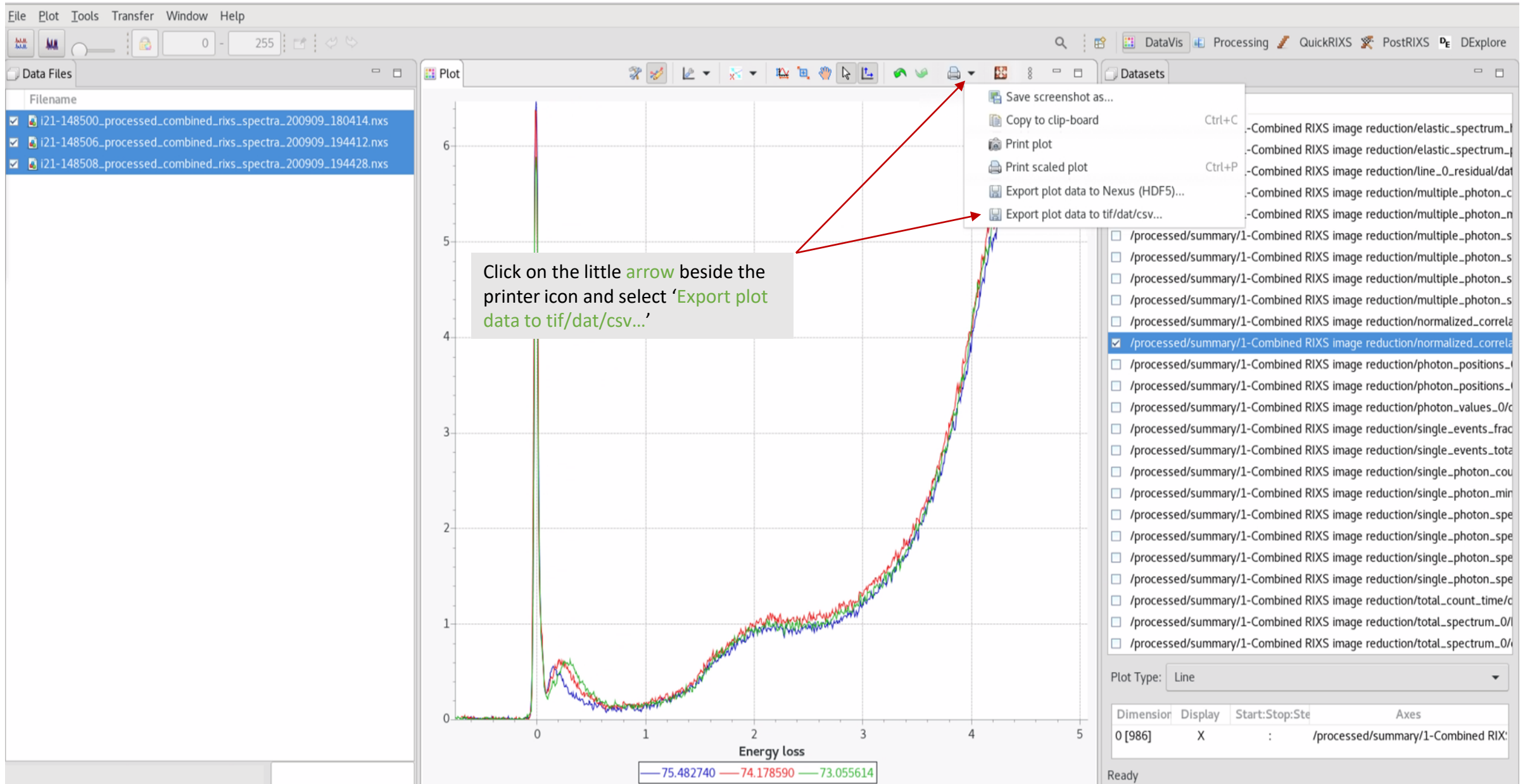


A 3x3 grid of colored squares. The top row contains orange, red, and pink squares. The middle row contains light green, a grey square, and a purple square. The bottom row contains green, light blue, and dark blue squares.

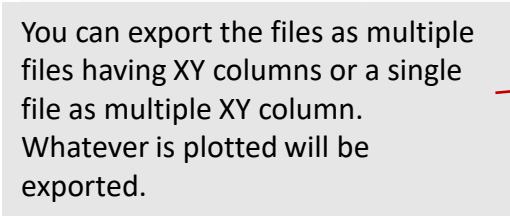




## Exporting processed RIXS files: DataVIS perspective



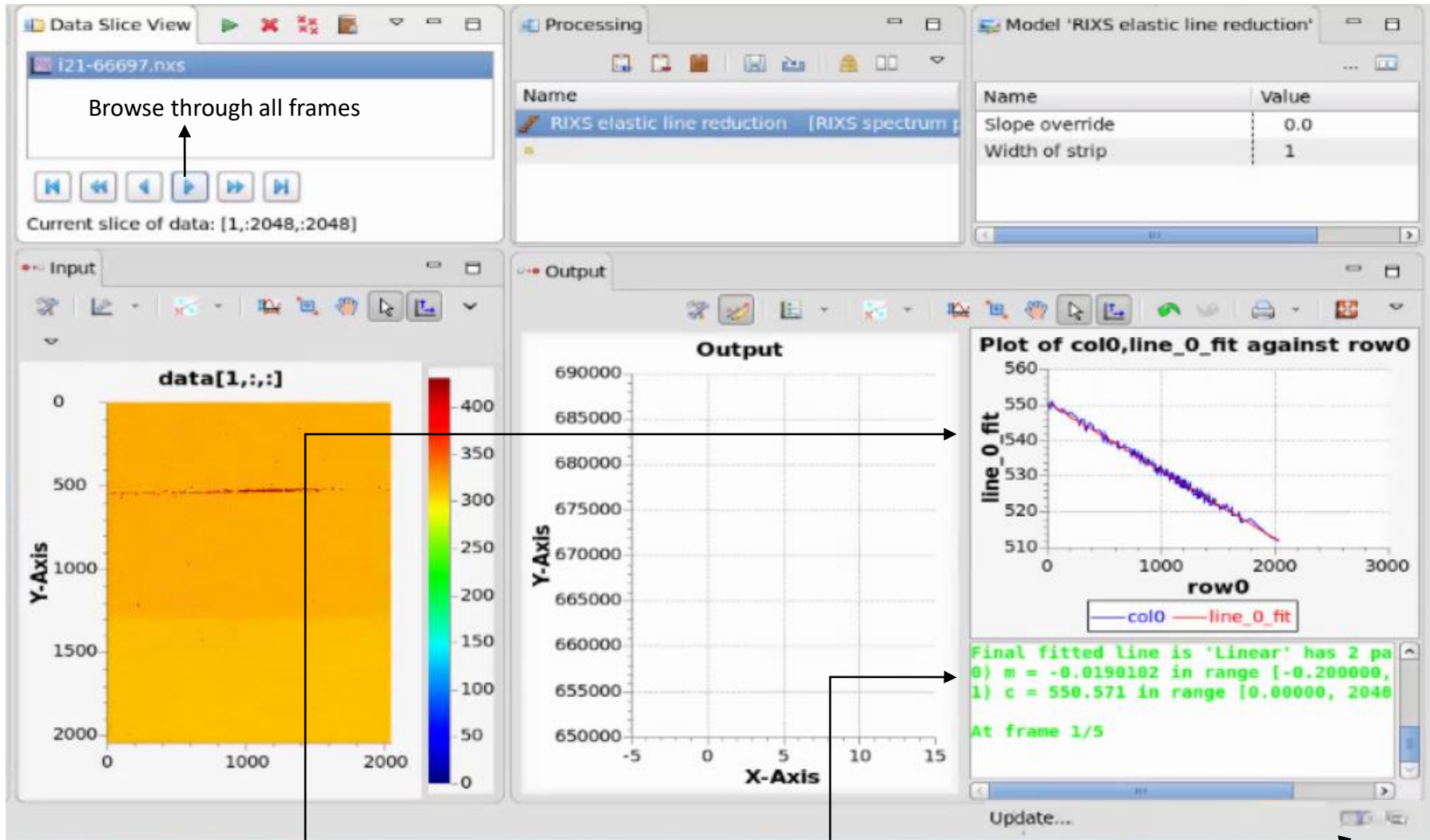
A 3x3 grid of colored squares. The top row contains orange, red, and pink squares. The middle row contains green, white, and purple squares. The bottom row contains blue, light blue, and dark blue squares.





## Finding energy dispersion value:

Drag and drop the energy dispersion file containing different frames with different incident energies into **Data Slice View** and choose **RIXS elastic line reduction** in **Processing**. As you sequentially scroll through the frames, each would be processed until you reach the last frame, where in the output you will see the energy dispersion value in eV/pixel.



Do not rush through the frames, let the processing of each frame finish (elastic line fit will appear, slope value for the frame will be shown and the update sign will disappear)

## Finding energy dispersion value:

Drag and drop the energy dispersion file containing different frames with different incident energies into **Data Slice View** and choose **RIXS elastic line reduction** in **Processing**. As you sequentially scroll through the frames, each would be processed until you reach the last frame, where in the output you will see the energy dispersion value in eV/pixel.

When you reach the last frame, the output will show the energy dispersion fitting and the panel below will show the value of energy dispersion in eV/pixel. Note this value as it will be needed for all the RIXS processing.

