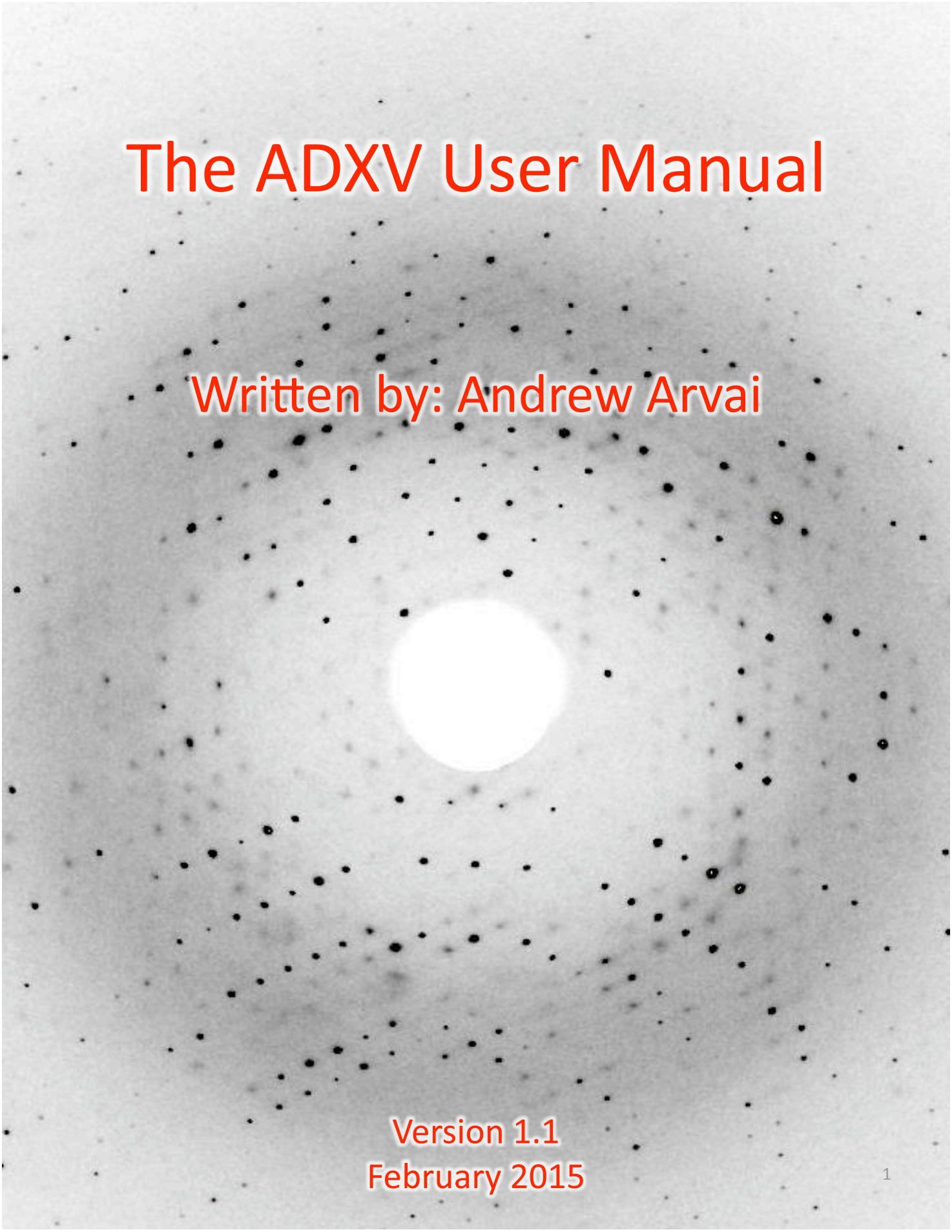

The ADXV User Manual

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Introduction

Adxv is a program to graphically display and analyze 2-D area detector data. It is optimized to display X-Ray crystallography diffraction images. Many common data formats are recognized, including ADSC SMV/IMG, CBF and HDF5. The data may be displayed as a 1-D cross section, 2-D image or 3-D surface. Sequential images may be displayed as an animation. The magnification, contrast and color mapping are adjustable. Displayed data may be saved in a variety of formats including ASCII, SMV/IMG, TIFF, JPEG and Postscript.

Adxv will run on most versions of Linux and OSX. It is based on X11/Motif so an X-server is required. It will run on Windows if the Cygwin libraries have been installed and an X-server is running.

Adxv is freely available to everyone. There is no registration, license or fee required to use it. You can download it from:

www.scripps.edu/~arvai/adxv.html

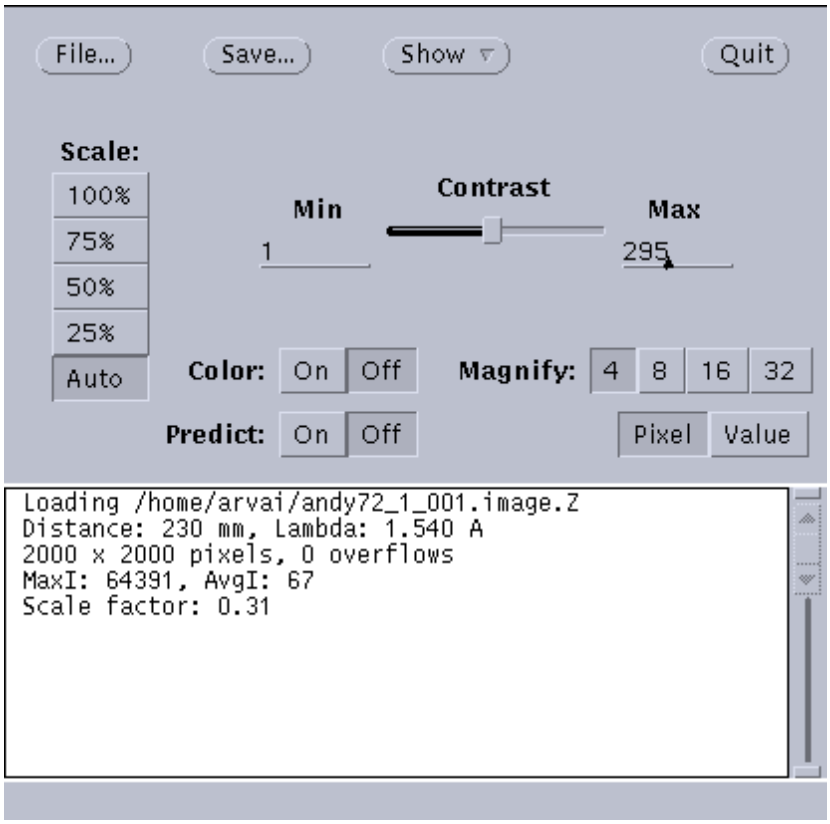
This manual is available here:

www.scripps.edu/~arvai/adxv/AdxvUserManual.pdf

The current version of Adxv is 1.9.10.

A Brief History of Adxv

In 1992 The Scripps Research Institute (TSRI) got a new Mar Image Plate Scanner. It was a great detector, although it used the VMS operating system and the display software (XIPS) was not so great. So I wrote a program called Xvip to display images on our Unix (Sun) workstations. Xvip was written in C and used the X11/Xview graphics libraries.



Xvip, circa 1993

Our Sun workstations were monochrome, so grayscale images were displayed using dithering. When we got color workstations, I modified Xvip to work with grayscale and color. A later version of Xvip was given to Mar Research, which evolved into what is now their MarView display program. In 1993, in collaboration with ADSC, I created a version of Xvip which was better suited for SAXS data. This program was called Marvip. In 1994 I combined the best features of Xvip and Marvip into the first version of Adxv. This was written with the X11/Motif libraries. Over the years Adxv has slowly evolved by adding more features, supporting more data formats and supporting the latest computers and operating systems.

Adxv. There is no substitute.

Supported File Formats

Format	File Extension
ADSC SMV/IMG (16 and 32-bit integer)	.img
Bruker	.sfrm
CBF (Standard and “mini-CBF”)	.cbf
EDF	.edf
Fuji Image Plate	.fuji
HDF5	.h5 / .hdf5
MarCCD	.mccd
Mar Image Plate	.image / .marxxxx
NUMPY	.npy
R-AXIS	.osc
TIFF (8, 16, 32 Bits/Pixel with 1 Sample/Pixel)	.tif / .tiff
Raw binary (8, 16, 32-bit integer and 32-bit float)	any
Adxv spot file	.adx
Cheetah pixelmap file	.h5
CrystFEL geometry file	.geom
Denzo .x file	.x

Adxv recognizes many file formats based on the file header, so the file extension can be anything. Files which have been compressed with gzip, compress or bzip may be read without uncompressing them.

The internal data representation of Adxv is 32-bit signed integer. If an input data format is floating point and the data values are very small or very large, you may want to run Adxv with the –iscale command line option to multiply the data by a scale factor before conversion to integer.

Notes for HDF5 files

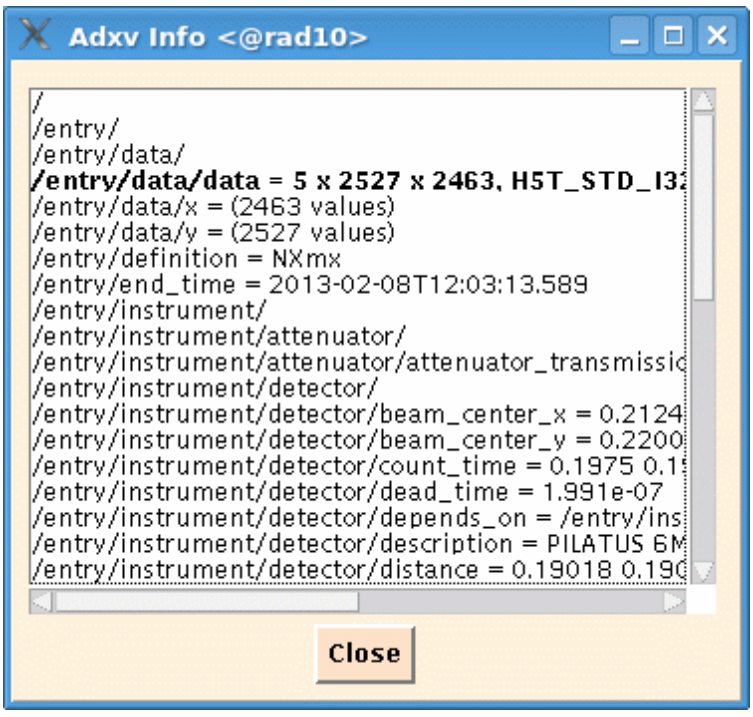
HDF5 files are containers for two kinds of objects - Datasets and Groups. Datasets contain multidimensional arrays of data and Groups are container structures which may contain Datasets or other Groups. Groups are analogous to directories and Datasets are like files.

By default Adxv will try to open the following Datasets in an hdf5 file:

/data
/data/data
/intensities
/real
/entry/data
/entry/data/data
/entry_1/data_1/data
/entry_1/image_1/data
/entry_1/instrument_1/detector_1/data
/entry/instrument/detector/data

If none of these are found, the Info Window is raised and you can examine the file header to find the dataset name. You can either double-click on the dataset or next time you can start Adxv with:

adxv -hdf5dataset <datasetname>



In the Info Window to the right, the dataset name is /entry/data/data

An hdf5 file may contain multiple datasets, each of which will be highlighted in a bold font in the Info Window.

For more information about hdf5 files see page 29 (Load Window) and page 41 (Info Window).

Starting Adxv

The usage to start Adxv from the command line is:

adxv [options] [file [predictions]]

The options which may be specified on the command line are listed starting on page 58. Following any command line options is the name of an image file to load. After the image file, a file with spot positions may also be specified.

For example to display an image you can do:

adxv test_1_001.img

Two windows will appear - the Control Window and the Image Window. The Image Window graphically displays the image using a grayscale colormap. Larger pixel values are darker and smaller pixel values are lighter. As the mouse is moved around the Image Window, the position of the cursor is displayed in both millimeters and pixels. The resolution (in Angstroms) and I/Sigma of the region under the cursor are also displayed.

In the Image Window, the Left mouse button may be pressed, dragged and then released to produce a 1-d cross-section plot. This plot will be displayed in a new Line Window. The middle mouse button may be pressed and dragged to "pan" around the image. Pressing the right mouse button will magnify and display the area under the cursor in a separate Magnify Window.

The Control Window may be used to modify the appearance of the displayed image. In the center of this window is a graphical display of the pixel to color mapping and immediately to the right of this is a vertical slider. Dragging the slider will adjust the contrast of the image. Pixel values larger than the value in the text box above the slider are drawn as black (or the top color in the colormap), and pixel values smaller than the value below the slider are drawn as white (or the bottom color in the colormap). There are radio buttons to adjust the image scale, and colormap. The default Scale is Auto and this will scale the image so it fits inside the Image Window. If 100% is selected, then each pixel in the image will be drawn as 1 pixel on the screen. If 50% is selected, then every other pixel in the image will be drawn. There are 3 choices for colormap (Gray, Heat and Rainbow). Each of these may be inverted. For example if the Gray color map is inverted, then large pixels are White and small pixels are Black.

The magnification factor used to display data in the Magnify Window may be adjusted from 1 to 128. If this is set to 8, then each pixel in the image will be drawn as an 8x8 pixel in the Magnify Window. The data in the Magnify Window may be displayed as Values, Pixels or 3-D. If Values is selected, then only numbers will be displayed. If Pixels is selected, then a magnified view of the pixels is displayed. If 3-D is selected, the data is displayed as a three-dimensional wire mesh.

Other Adxv windows can be accessed from the Control Window. Clicking with the Left mouse button on the menu bar at the top of the Control Window will display a menu with choices of Windows to display. Each of these windows, as well as the Control Window and Image Window, will be shown and explained in more detail later.

If the Control Window is not visible, simultaneously pressing the <SHIFT> key and the right mouse button in either the Image or Magnify Window will raise the Control Window to the top.

Examples

Display an image and overlay spots from a .adx file:

adxv Thau2_1_031.img Spots.adx

Draw resolution rings at 4 specific resolutions:

adxv -rings 8 3.5 2 1.5 trypsin_2_001.img

Display 1152x1152 binary unsigned short data, skip 2048 byte header and swap bytes:

adxv -ushort -nx 1152 -ny 1152 -skip 2048 -swap test_001.raw

Display an image and denzo predictions:

adxv nnos6_1_001.img nnos6_1_001.x

Specify an exact visual id and use OpenGL for the 3-D display:

adxv -visual 0x26 -gl

Read an HDF5 file and specify which dataset to display:

adxv -hdf5dataset /entry_1/image_1/data cxidb-3.cxi

Convert an image from CBF to IMG :

adxv -smv32bits –sa G8_1_00001.cbf G8_1_00001.img

Automatically save an image as a 1/10 scale jpeg file:

adxv -sa -jpeg_scale 0.1 nnos6_001.img nnos6_001.jpeg

Crop a 100x100 pixel region, where the upper left corner is at x=200, y=300, from an hdf5 file and save it as a 32-bit .img file.

adxv –smv32bits -sa -sa_crop 100x100+200+300 dark.h5 dark.img

Display CSPAD data and use a CrystFEL detector geometry file to correct the image:

adxv -pixelmap cspad.geom CxiDs1-image.h5

Display CSPAD data and use a Cheetah pixelmap file to correct the image:

adxv -pixelsize 0.110 -pixelmap pixelmap.h5 CxiDs1-image.h5

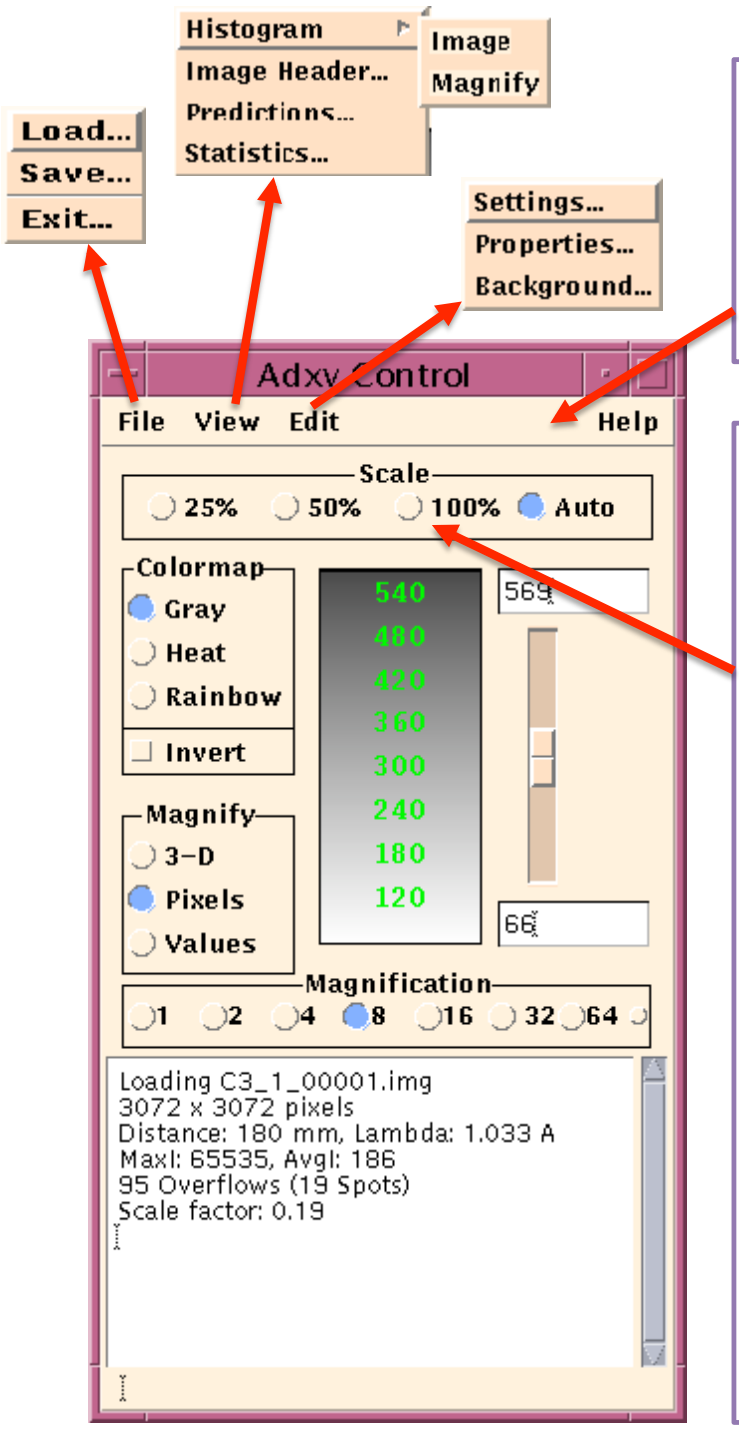
Use a larger font for the resolution rings. This will help if you have a large image, scale to 100% and then save as jpg or tiff:

adxv -rings -rfont "-*-lucidatypewriter-bold-r-normal-sans-180-*-*-*-*-*-*-*-*”

Here’s a short script to make a movie from a series of images:

```
#! /bin/csh
foreach i ( lyso_*.img  )
adxv -sa $i /tmp/$i:r.jpg
end
ffmpeg -r 25 -i /tmp/lyso_%03d.jpg -vb 20M lyso.mpg
```

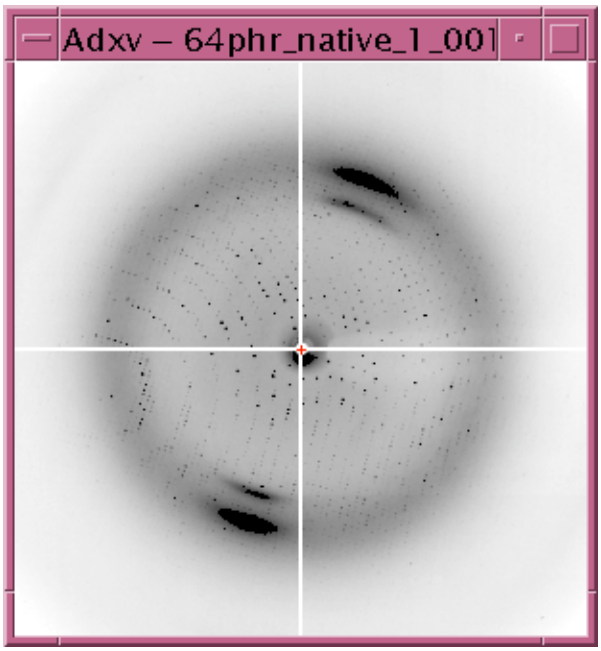
The Control Window



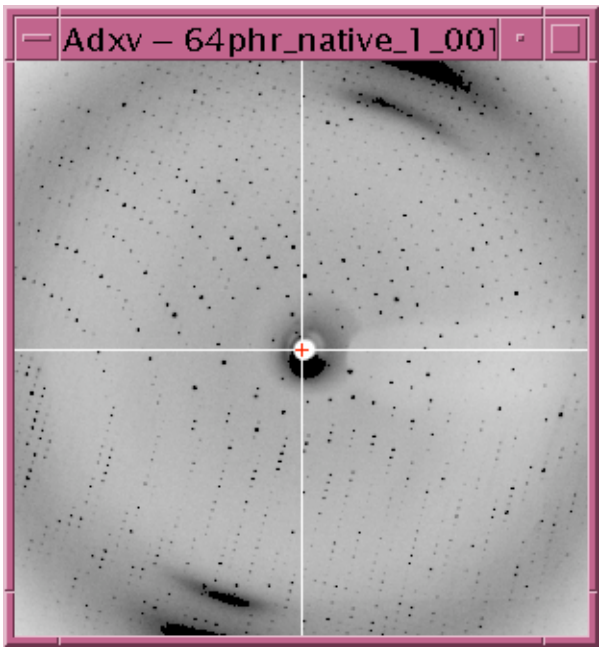
The top row contains a menu bar. Selecting one of these menu buttons will display a pull down menu. The items in these pull down menus will be discussed later.

Adjusts the scale of the image in the Image Display Window. When the scale is 100%, every pixel is displayed so that 1 pixel in the image is 1 pixel on the screen. When the scale is 25%, every 4th pixel in the image is displayed on the screen. For example if the image is 3072x3072 pixels and the scale is 25%, then the image displayed on the screen will be 768x768 pixels. When Auto is selected, the image is scaled so it fits inside the Image Window. The scale is calculated as the width of the image divided by the width of the Image Window. For example if the Image Window is 600 pixels wide and the image is 3072 pixels wide the scale will be 600/3072=0.195.

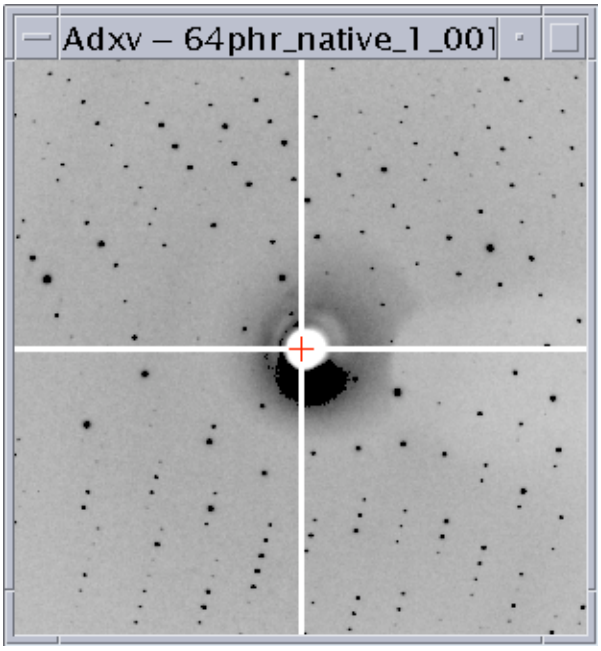
See examples below.



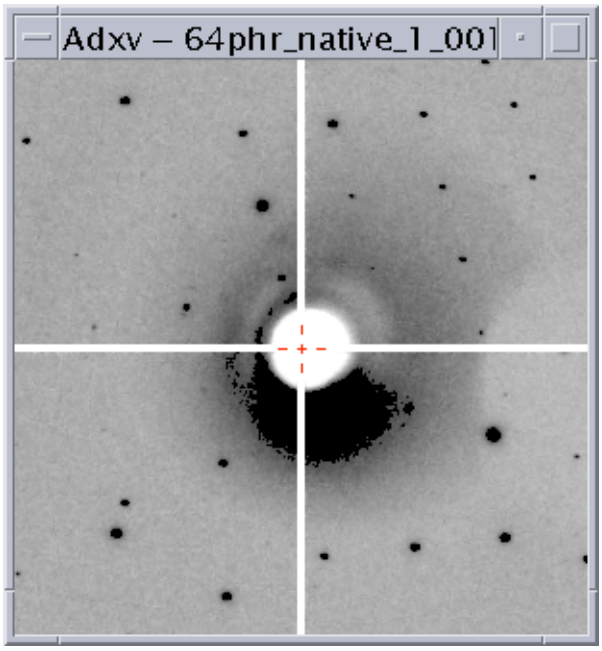
Auto



25%

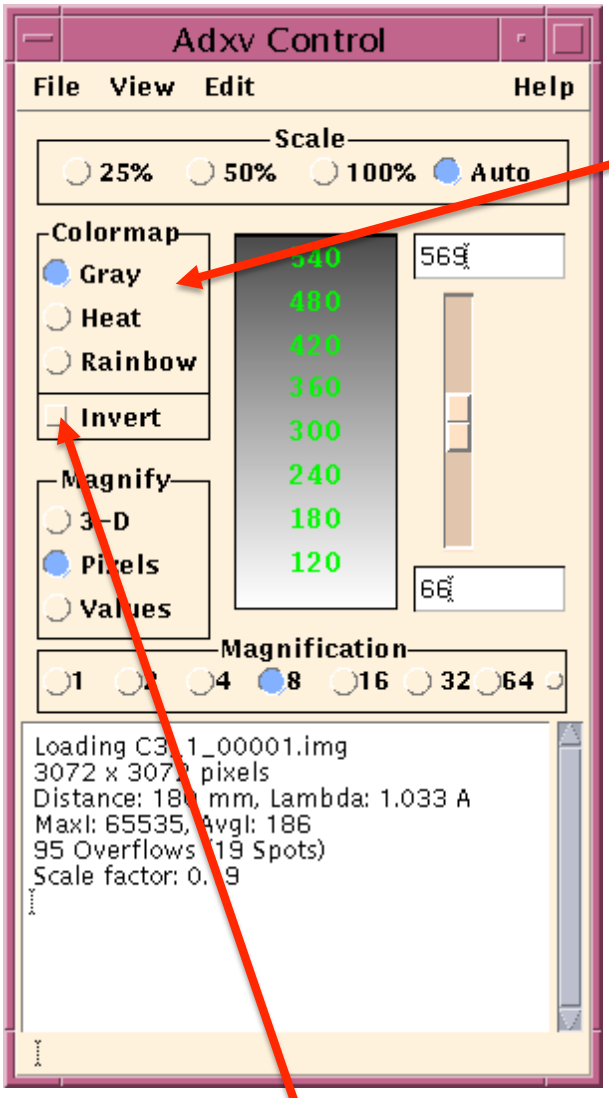


50%

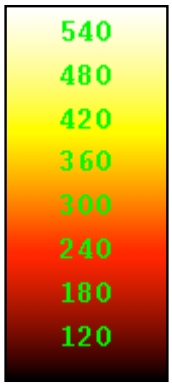


100%

The Image Window showing the same image displayed at different scales. When the scale is 25% or larger the image does not fit completely inside the Image Window. In this case, you can press and hold the Middle mouse button to move the image around. The beam center is drawn as a red cross in each image.



Adjusts the colormap of the image displayed in the Image and Magnify Windows. For example with Heat, larger pixel values are light Yellow, intermediate values are Orange and smaller values are dark Red.

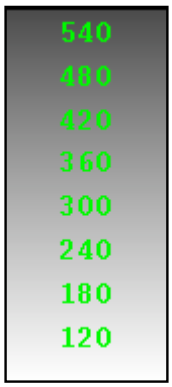


Heat

Rainbow

This inverts the colormap. For example, with Gray, larger pixel values are Black. When Invert is selected, larger pixel values are White.

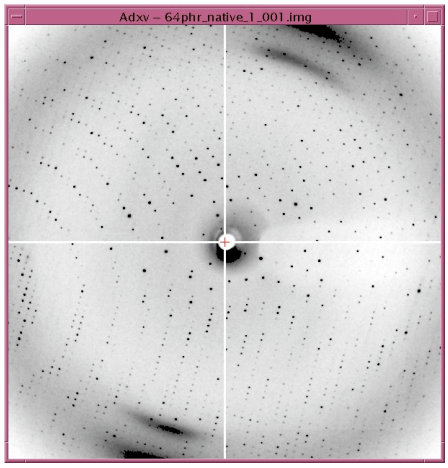
See examples of different colormaps below.



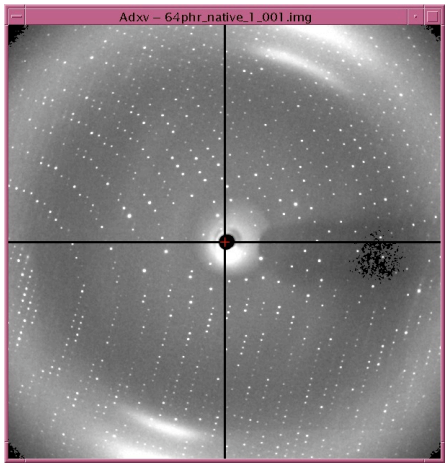
Gray

Gray + Invert

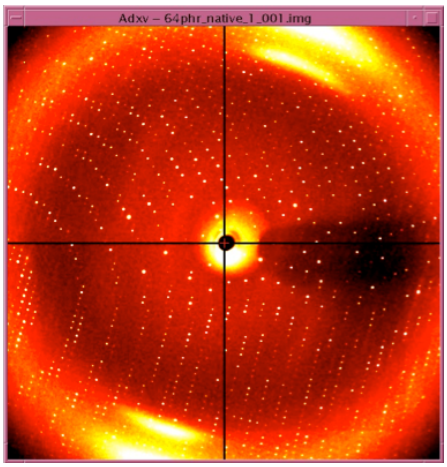
The Image Window showing different colormaps



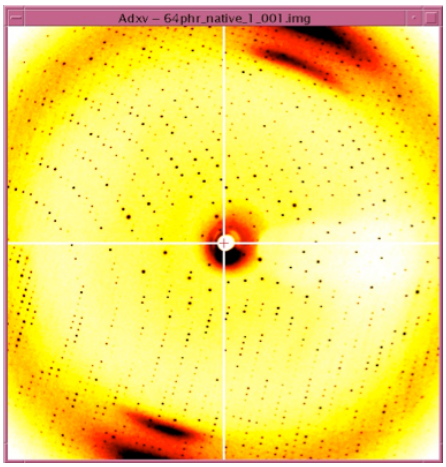
Gray



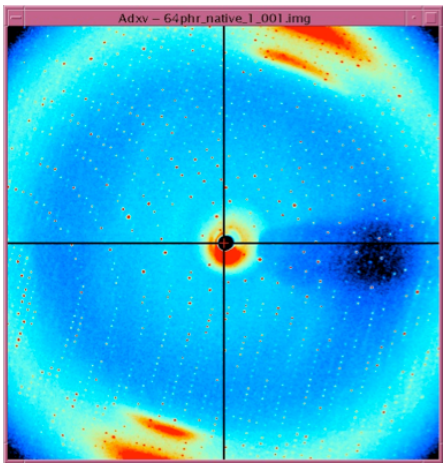
Gray + Invert



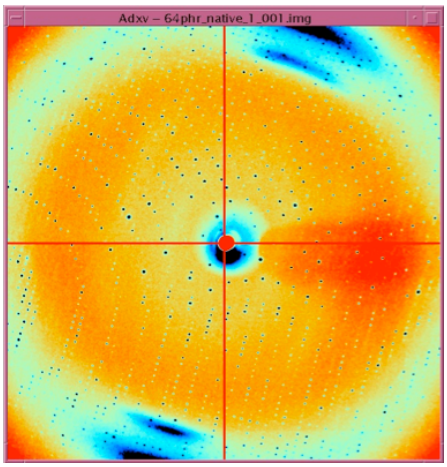
Heat



Heat + Invert

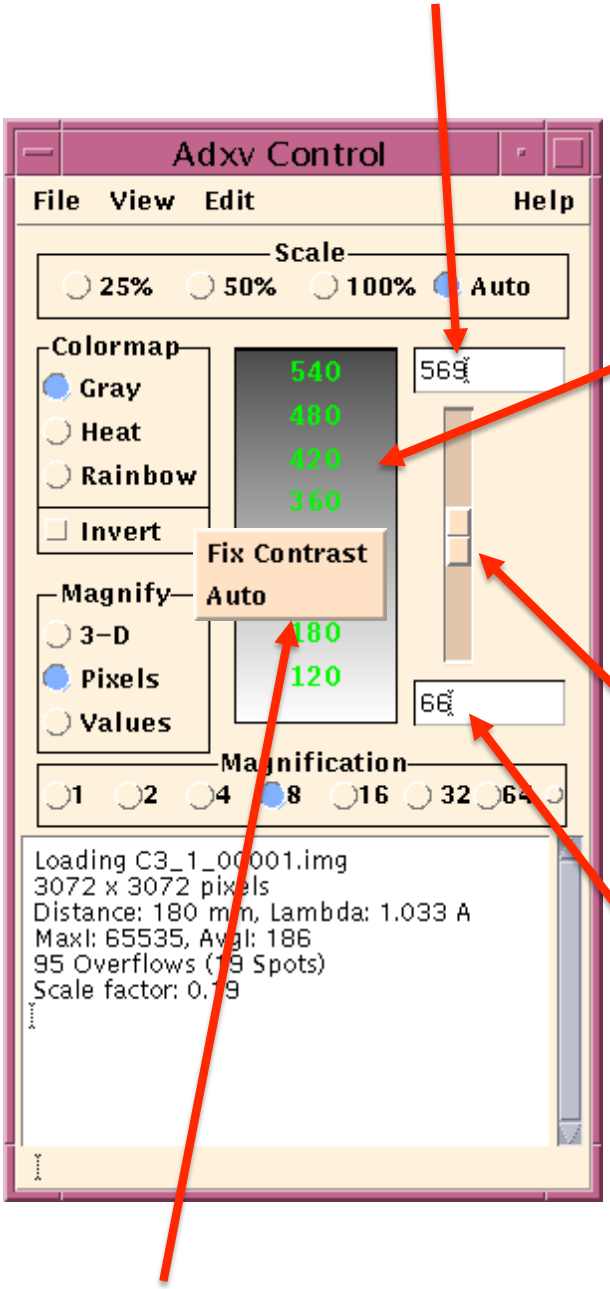


Rainbow



Rainbow + Invert

Pixel values larger than this value are drawn as Black. This may also be set and displayed in the Histogram Window.

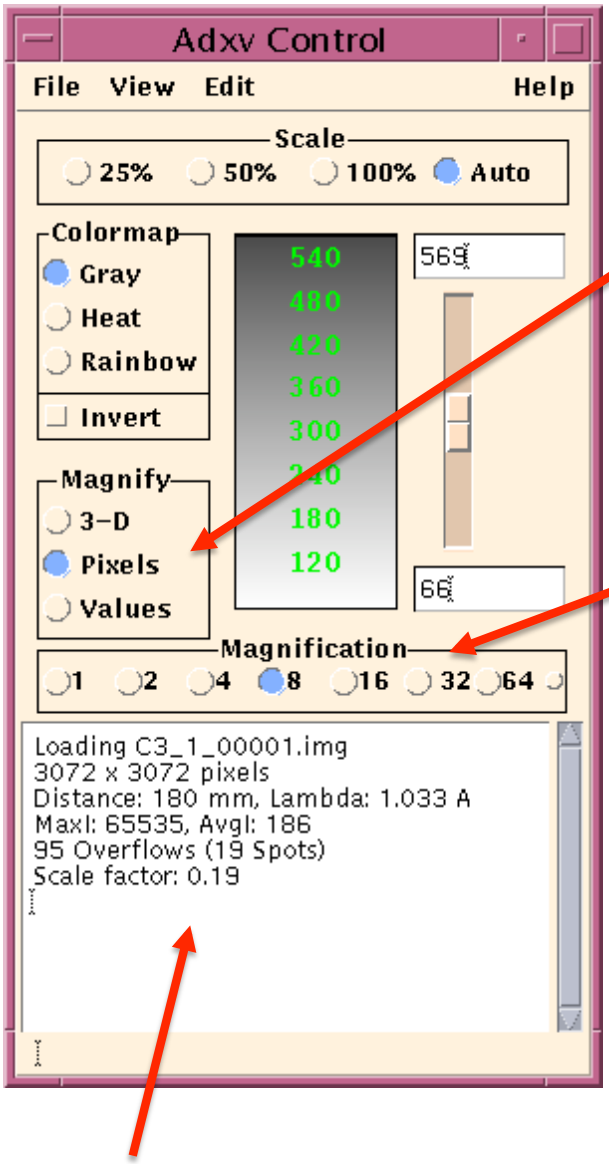


Graphical display of pixel value vs. color mapping. For example a pixel value of 360 will be drawn in medium gray and a pixel value of 120 will be drawn in light gray. The Middle mouse button may be pressed and dragged in this window to stretch and adjust the colormap. The behavior is analogous to stretching a rubber sheet. Selecting a different colormap or moving the contrast slider will reset the colormap.

Slider to adjust the contrast. Dragging this up increases the contrast and dragging it down decreases the contrast.

Pixel values smaller than this are drawn as White. May also be set and displayed in the Histogram Window.

If the Right mouse button is pressed in the colormap drawing area, this popup menu appears. Selecting “Fix Contrast” will not automatically update the contrast setting for each image as it is loaded. The Max and Min contrast settings will remain as from the last image loaded or as set by the user. This may also be set in the Settings window. When Fix Contrast is set, the Max and Min contrast values in the textboxes to the right will be drawn in a **Bold** font.



This selects how data is displayed in the Magnify Window. If **3-D** is selected the data is displayed as a wire mesh. **Pixels** displays magnified pixels and **Values** prints only numbers. See examples on Page 22.

Magnification factor of pixels drawn in the Magnify Window. 8 means that each pixel in the raw data is magnified 8 times and is drawn as an 8x8 pixel box in the Magnify Window. The range of magnifications is from 1 to 128. See examples on Page 21.

There is more information about magnification types and factors in the Magnify Window section (page 20).

Information about the image which was loaded. MaxI is the largest pixel value in the image. AvgI is the average pixel value. **Overflows** is the number of pixels which have overflowed the linear range of the detector. **Spots** is the number of groups of contiguous pixels which are overflowed, i.e. each "spot" may contain multiple overflowed pixels**. Scale factor** is how much the image was scaled to fit in the Image Window when the Scale mode is Auto. In this case the image is 19% the size of the entire image, so about every 5th pixel is displayed.

If Adxv is started with the –verbose flag, more information is printed:

```
Loading C3_1_00001.img
3072 x 3072 pixels
Distance: 180 mm, Lambda: 1.033 A
MinI: 0 at 0,0
MaxI: 65535 at 1612,1005
# of -1 pixels: 0
# of -2 pixels: 0
AvgI: 186, Sigma: 345.5
95 Overflows (19 Spots)
Scale factor: 0.19
```

-The x,y position of the smallest and largest pixels
-The number of -1 and -2 pixels
-The standard deviation (sigma) of all the pixels

The Image Window

The The Image Window graphically displays the image using a grayscale colormap. Larger pixel values are darker and smaller pixel values are lighter. As the mouse is moved around the Image Window, the position of the cursor is displayed in both mm and pixels. The resolution (in A) and the I/Sigma of the region under the cursor is also displayed. The beam center is drawn as a red cross in both the Image and Magnify windows.

The left mouse button may be pressed, dragged along the window and then released to produce a 1-d plot in a separate Line Window. The middle mouse button may be pressed and dragged to "pan" the image if the image does not fit in the window. Pressing the right mouse button will magnify and display the area under the cursor in a separate Magnify Window. If the <SHIFT> key and Right mouse button are pressed simultaneously, the Control Window will be raised. If the mouse has a scroll wheel, then in **Pixels** and **3-D** mode the scroll wheel can be used to adjust the magnification factor in the Magnify Window from 1 to 128.

If the <SHIFT> key and Left mouse button are pressed simultaneously, a position on the image is selected. Once three positions have been selected, the angle between two consecutive lines described by those three positions will be printed to the standard output. If two of the three positions are identical, the horizontal and vertical angle (relative to the crystal origin) between the two points is printed. If all three points are identical, the horizontal and vertical angle required to rotate that point to the beam center is printed. These options were useful in the old days to measure the angles of a lattice or estimate how far to rotate a crystal to align a zone.

If the <SHIFT> key and Middle mouse button are pressed simultaneously, the beam center will be set to the cursor position. This may also be done in the Magnify Window.

With the cursor is in the Image Window, two numbers followed by a carriage return may be typed and the Magnify Window will be raised and centered on that x,y pixel position. If the Right mouse button is pressed while the <SHIFT> key is also pressed, then the distance between successive clicks (in pixels and mm) will be printed to the terminal.

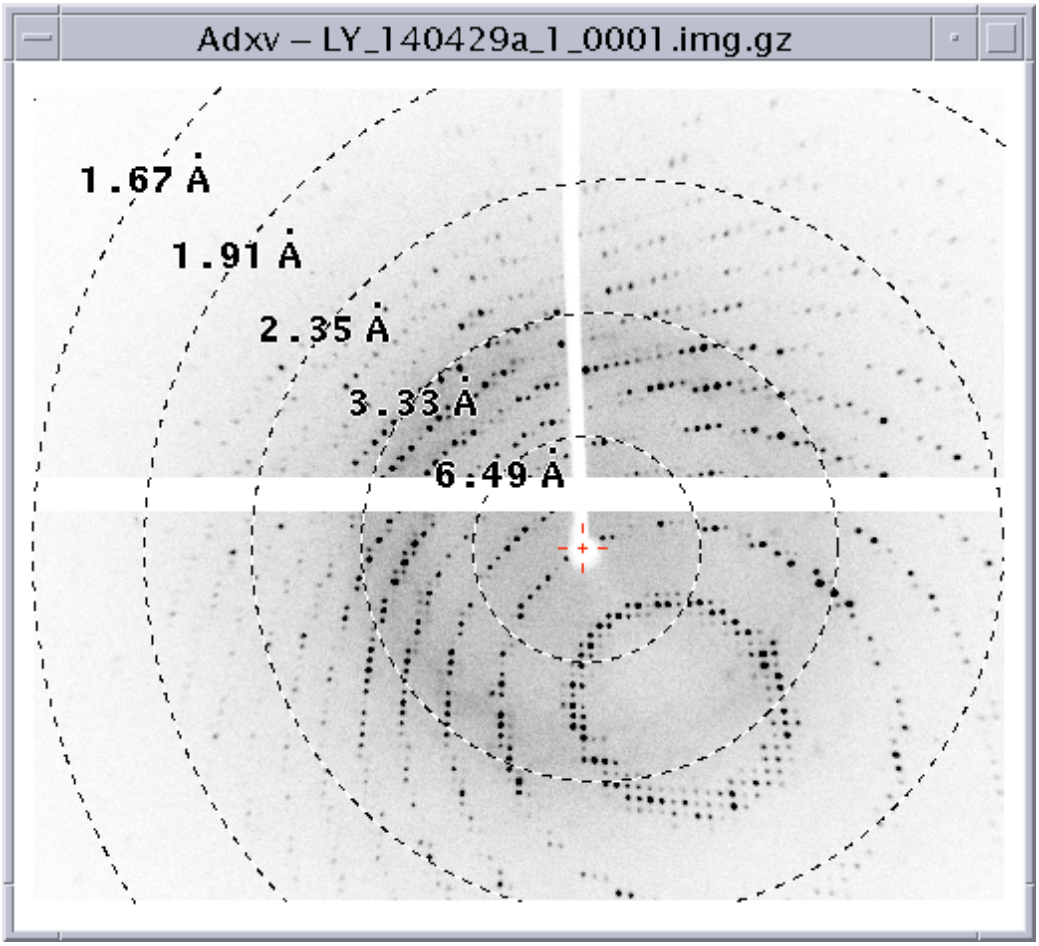


Image showing resolution rings. Notice that the beam center is drawn as a red cross. For this image 2-theta is non-zero, so the resolution rings are not circular. Resolution rings may be turned on or off in the Properties Window, which is discussed later. The font used for the rings may be set with the –rfont command line option. If you want to draw only the rings, without the resolutions printed, you can use the –rings_only command line option. Rings may also be drawn at specific resolutions with the –rings command line option.

The following keys may be typed while the cursor is in the Image Window

f	Raise the Load Window. The File Load Window is displayed.
h	Adjust the histogram contrast in the Image Window. The contrast of the **visible portion** of the data in the Image Window is automatically adjusted. Note that if the entire image is not visible, only the pixels visible in the Image Window are used to adjust the contrast.
l	Toggle lighting on and off in the Magnify Window. When using OpenGL graphics, this will toggle turning lighting on and off.
m	Adjust the histogram contrast in the Magnify Window. The contrast of the Magnify Window is automatically adjusted.
P|p	Toggle turning predictions on and off. When predictions are displayed, this will toggle displaying them or not displaying them.
r	Reset the display in the 3-d magnify window. The position and orientation of the data in the 3-d magnify window is reset to its original state.
s	Toggle smoothing in the Magnify Window. When using OpenGL graphics in line mode (-gl_lines), this will toggle between drawing the wire mesh with smooth lines (slower) or aliased lines (faster). When a surface is displayed this will toggle between drawing aliased and anti-aliased polygons.
w	Toggle between wire mesh and surface display in the Magnify Window. When using OpenGL graphics, this will toggle between a wire mesh and surface display of the data.
Arrow Keys	Adjust the cursor position. Pressing the arrow keys (up, down, left, right) will move the cursor by one pixel. If the Plot Type is Circle (set under Edit->Properties), the arrow keys will translate the center of the circle by one pixel.
?	Print help. This will print a summary of the keys which may be pressed.
<SHIFT> + Middle mouse button	Set the beam center to the current cursor position
<SHIFT> + Right mouse button	Raises the Control Window. Also prints the distance between successive Right mouse button clicks to the terminal.

The Magnify Window

The Magnify Window displays a magnified portion of the data from the Image Window. Pressing the right mouse button in the Image Window draws a box and displays a magnified view of the data within that box in a separate Magnify Window. The format of the displayed data may be selected by toggle buttons in the Control Window (see examples below). The default is "Pixels" where each pixel in the image is scaled by a magnification factor and displayed. If the magnification factor is 32 or larger, the value of each pixel will also be printed within each pixel. If "Values" is selected then only pixel values will be printed, not a magnified image. If "3-D" is selected then a three dimensional wire mesh representation of the data will be displayed. The function of the mouse buttons is different with the different display modes.

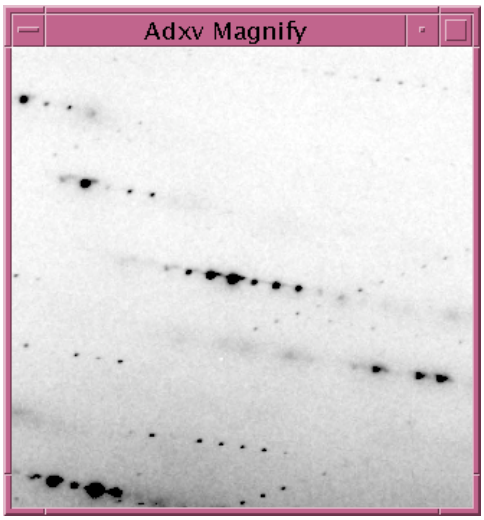
In **Values** mode the Left and Right mouse buttons have no effect. The Middle mouse button will pan the displayed data around the image.

In **Pixels** mode the Left mouse button will draw a line or circle (depending on the Plot Type setting in the Properties Window). The Middle mouse button again pans around the image and the Right button has no effect.

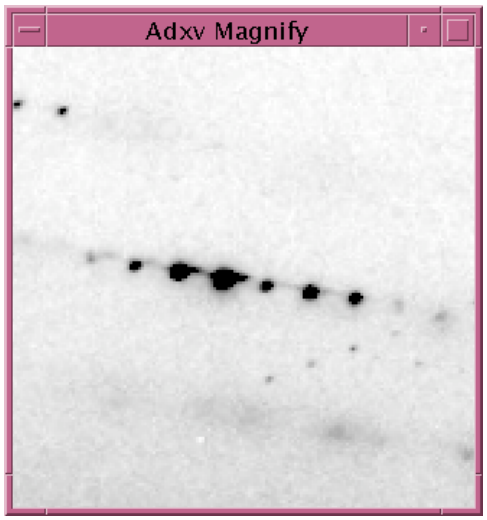
In **3-D** mode the Left mouse button rotates the wire mesh. The Middle mouse button translates the mesh (in X-Y) within the Magnify Window. The Right mouse button is used to scale the wire mesh in the Z direction. If Control-Right mouse button is pressed this will scale the wire mesh in all dimensions.

If the mouse has a scroll wheel, then in **Pixels** and **3-D** mode the scroll wheel can be used to adjust the magnification factor from 1 to 128.

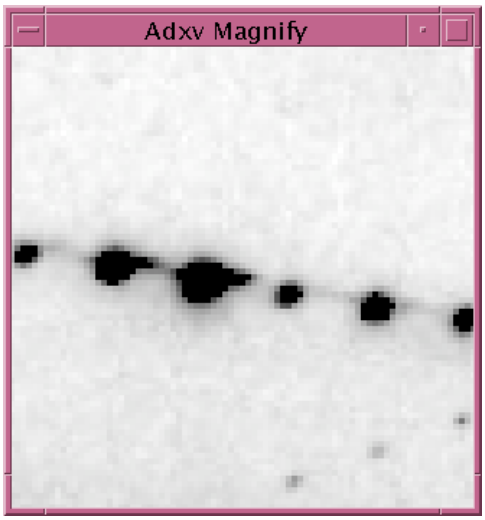
If Adxv is started with the -gl command line, then OpenGL graphics is used for 3-D mode.



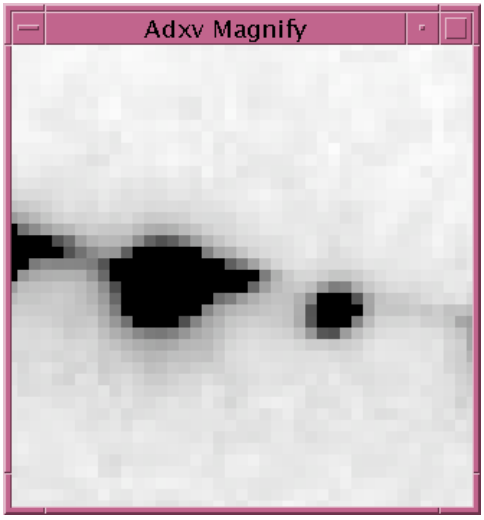
x 1



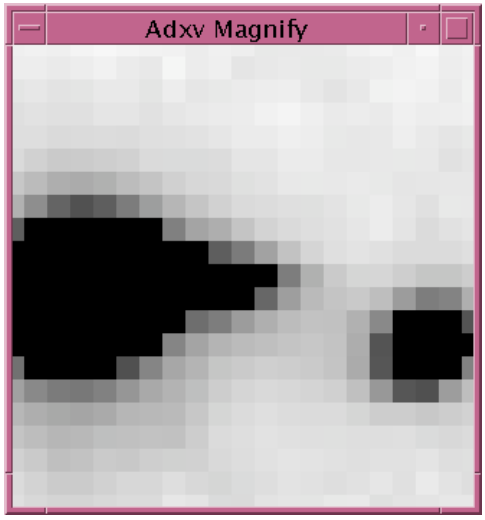
x 2



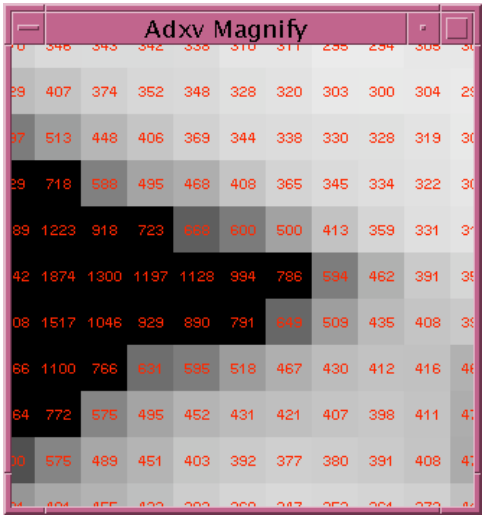
x 4



x 8

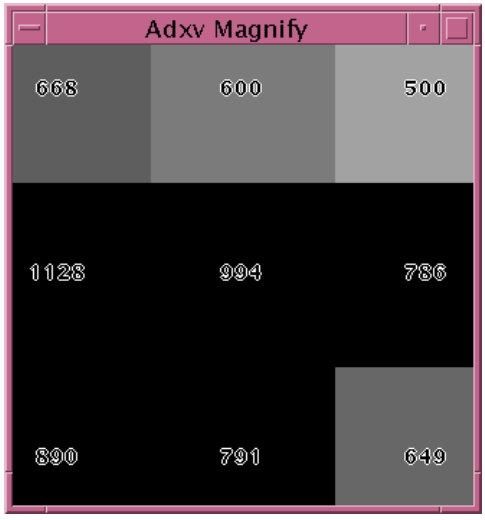


x 16



x 32

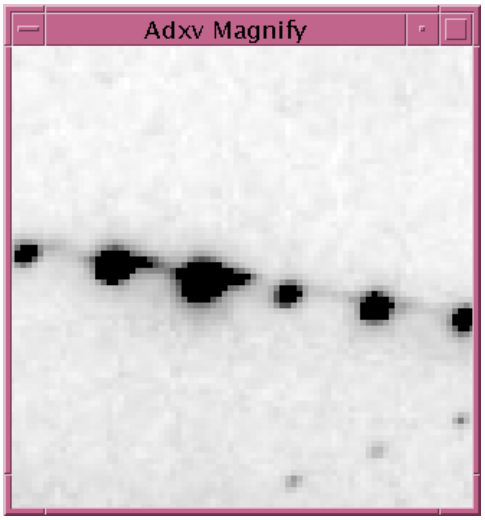
x 64



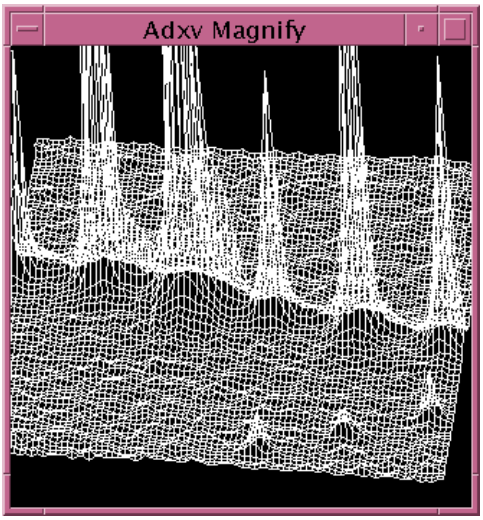
x 128

Magnify Window as the magnification increases from 1 to 128. The magnification mode is Pixels.

Comparison between **Pixels, 3-D** and **Values**.

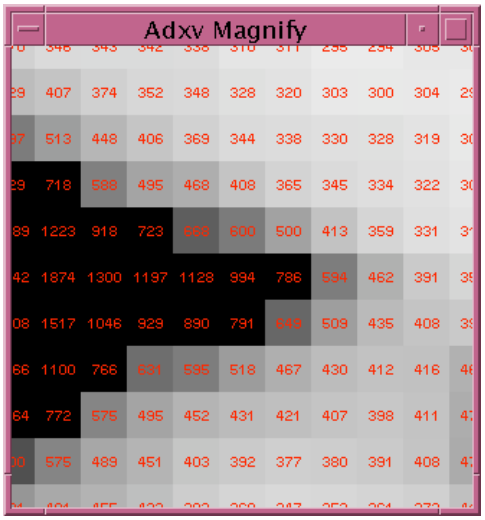


Pixels

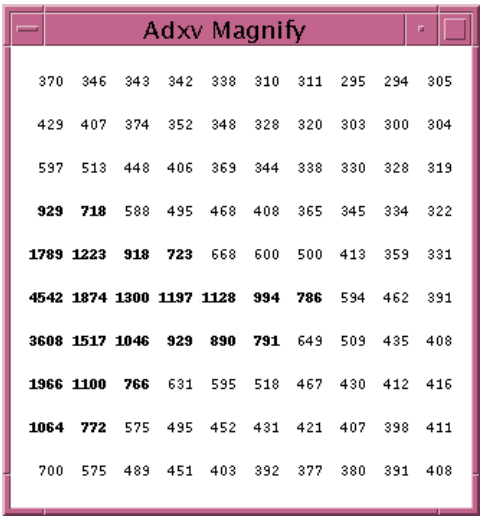


3-D

The same data is shown with Magnification set to Pixels (left) and 3-D (right). The magnification is 4 in both cases.



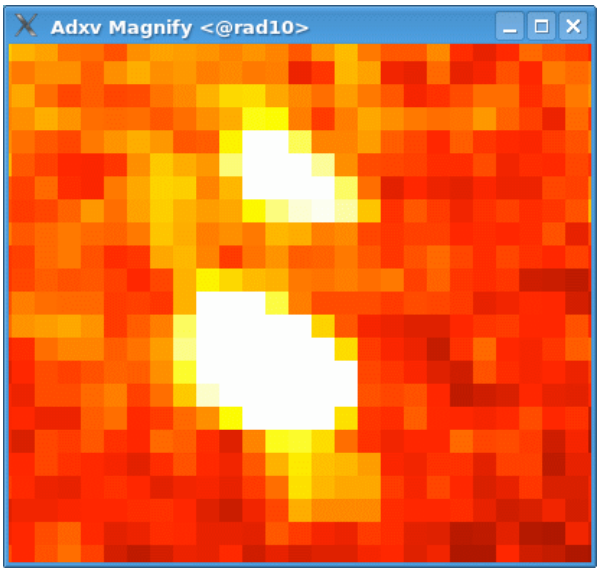
Pixels



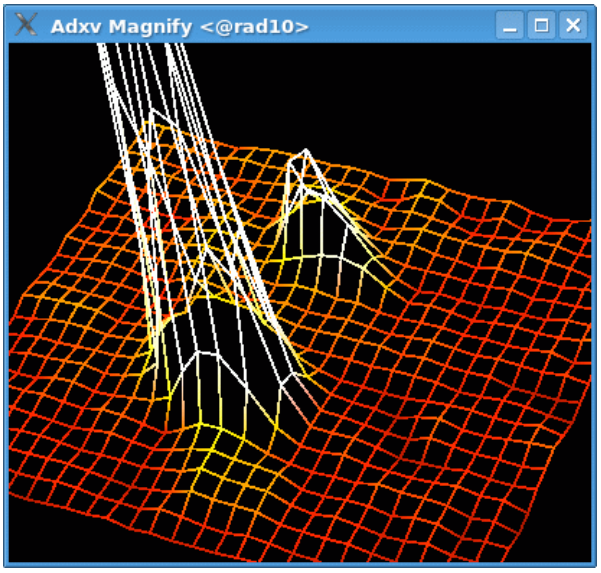
Values

Notice that when the magnification is 32 or larger, the pixel values are printed in each pixel. Depending on the number of digits needed for each value, a larger or smaller font may be used so that the value will fit within a pixel . For Values the magnification setting is disabled. The magnification depends on how many pixels can be fit in the Magnify Window and is usually about 32.

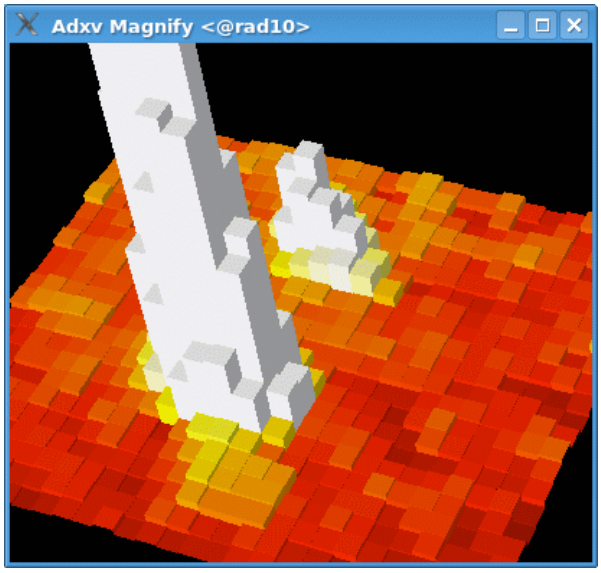
The Magnify Window when using GL (-gl command line option)



Pixels. The colormap is Heat.



3-D Wire Mesh. Type "**w**" to toggle between wire mesh and surface display.



3-D Surface. Type "**l**" to toggle lighting on and off.

The following keys may be typed in the Magnify Window

f	Raise the Load Window
h	Adjust the contrast to optimize display of the contents of the Magnify Window
p	Toggle display of spots on / off
r	Reset orientation of 3-D display
Arrow Keys	Adjust the cursor position. Pressing the arrow will move the cursor by one pixel.
?	Print help. This will print a summary of the keys which may be pressed
<SHIFT> + Middle mouse button	Set the beam center to the current mouse position
<SHIFT> + Right mouse button	Prints the distance between successive Right mouse button clicks to the terminal

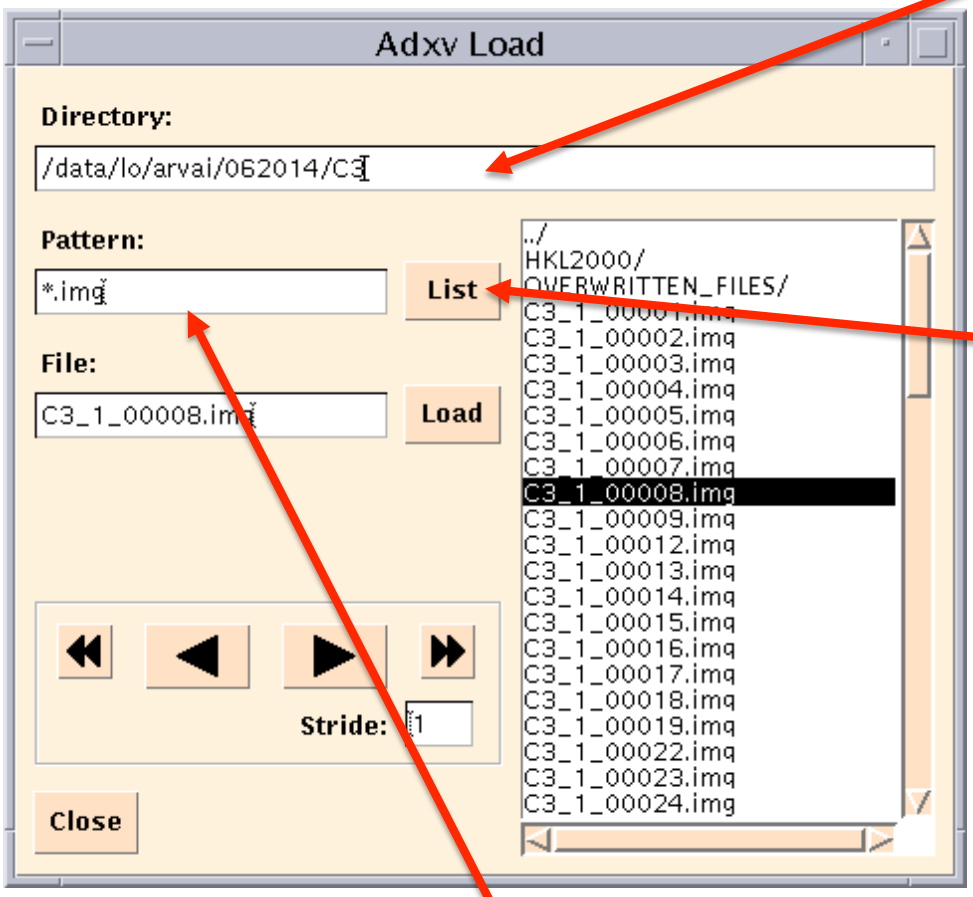
The following keys may be typed when using OpenGL graphics (-gl)

l	This will toggle turning lighting on and off.
r	The position and orientation of the data in the 3-D Magnify Window will be reset to its original state.
S	In line mode (-gl_lines), this will toggle between drawing the wire mesh with smooth lines (slower) or aliased lines (faster). When a surface is displayed this will toggle between drawing aliased and anti-aliased polygons.
w	This will toggle between a wire mesh and surface display of the data.
?	Print help. This will print a summary of the keys which may be pressed.

The Load Window

This window is accessed by clicking **File->Load** from the Control Window and is used to load files. Image files, Adxv spot (.adx), denzo output (.x) and CrystFEL geometry (.geom) files may be loaded.

Directory where files are located



Pressing the List button will list all files which match the regular expression in the Pattern text field.

About 20000 files may be listed at once. However, if there are too many files, you can list every 100'th file by making the pattern

***01.img**

Regular expression(s) to filter which files are listed in the scrolling window to the right. Some examples of patterns:

*0.img
[A-C]*.h5
lys3_?_*.cbf

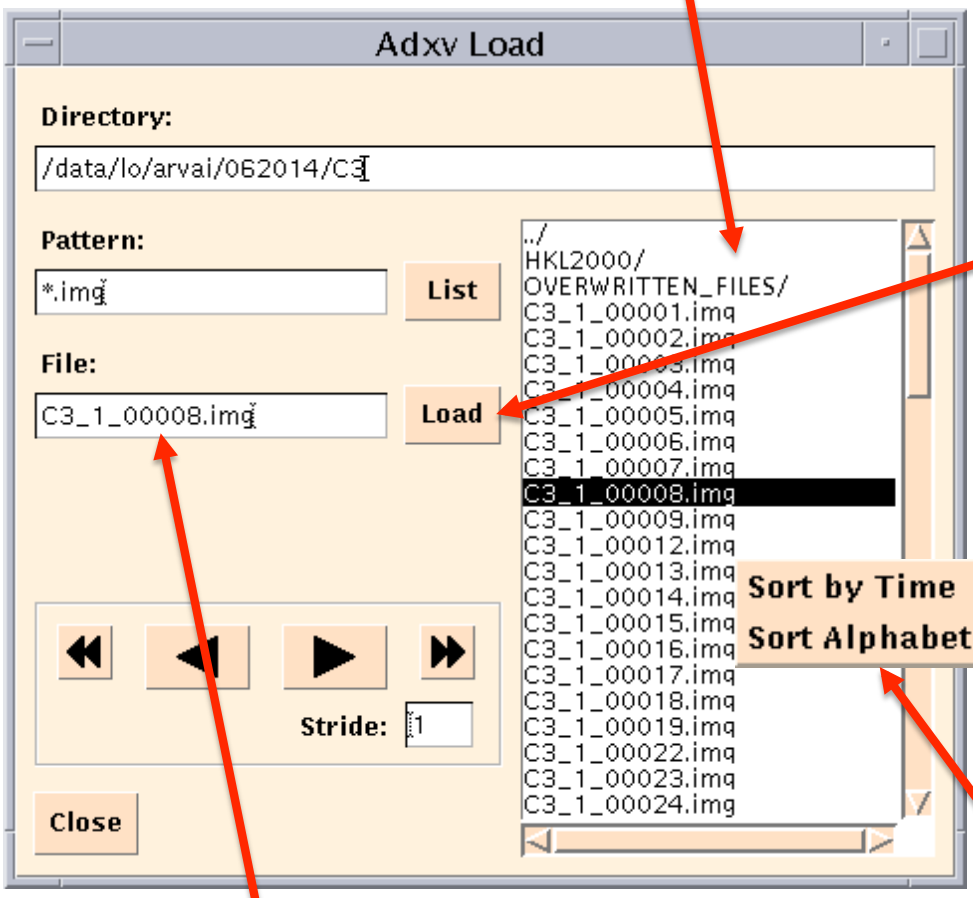
If **Pattern** is blank or *, all files are listed. Directories are always listed.

Typing a carriage return will re-scan the Directory for files matching the Pattern.

Directories are listed first, followed by files. Directory names have a trailing "/".

Single-clicking a directory will change into that directory. Clicking the ".." directory will move one directory up.

Double-clicking on a file will load and display that file.



Load and display the file in the text field to the left.

Pressing the Right mouse button in the file list section brings up a menu where you can choose to sort files alphabetically or by modification time. The default is alphabetical.

You can type a file name into this text field or select one with the mouse from the list on the right. To load a file you can either click the Load button, type a carriage return in the text field or double-click on the file in the list on the right

When files are listed, they are not sorted absolutely alphabetically. Sorting also takes into account run numbers and these are sorted from small to large. For example, files are sorted like this:

data_1_001.img
data_2_001.img
data_10_001.img
data_11_001.img

not like this:

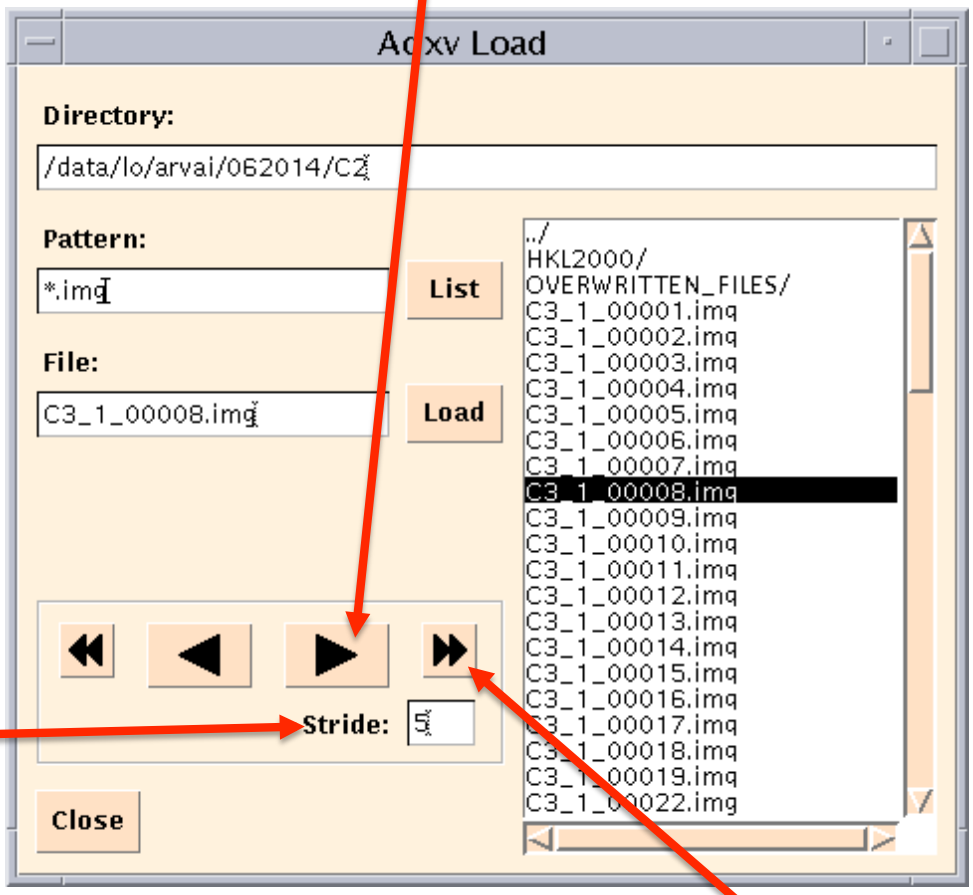
data_10_001.img
data_11_001.img
data_1_001.img
data_2_001.img

When **Sort by Time** is selected, more recent files are listed first, regardless of file name. Directories are still listed first.

To re-scan files in a directory, press the List button or type a carriage return in the Pattern text field.

Load and display the next file. In this case, the next file to load will be C3_1_00013.img. This is because the current file is number 8 and the stride is 5. If instead the left (previous) arrow button is pressed, then file number 3 would be loaded.

When a new file is loaded, if the Line or Magnify Windows are displayed, their contents will be updated to reflect the data in the new file. This also applies to movie mode.

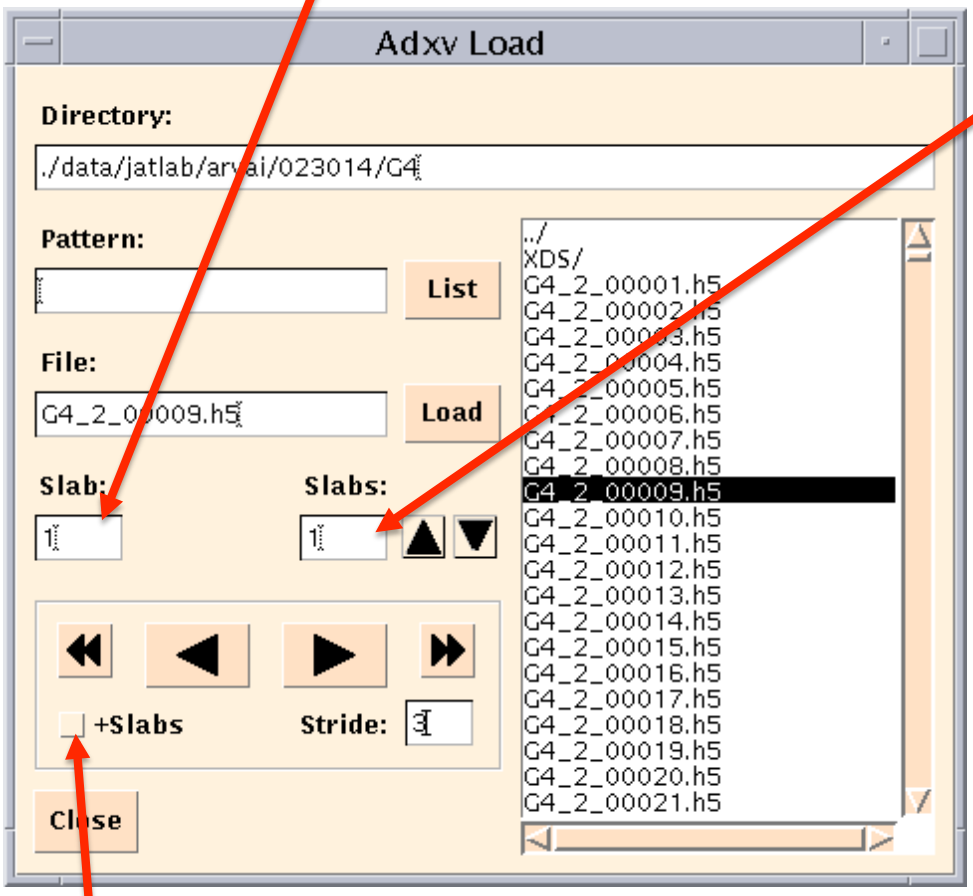


Specify every n'th file to load. For example if the Stride is 10, then every 10'th file will be loaded. If the Stride is 1, then every file will be loaded.

Movie mode. Continually load and display the next file. Press again to stop. In this case the Stride is 5, so every 5'th file (8, 13, 18, etc) will be continually loaded and displayed. If files are displayed too quickly, a pause can be added between them with the –delay command line option.

With three-dimensional hdf5 data, the Load Window will automatically show two additional text fields and a checkbox. These are used to select which slab(s) to display.

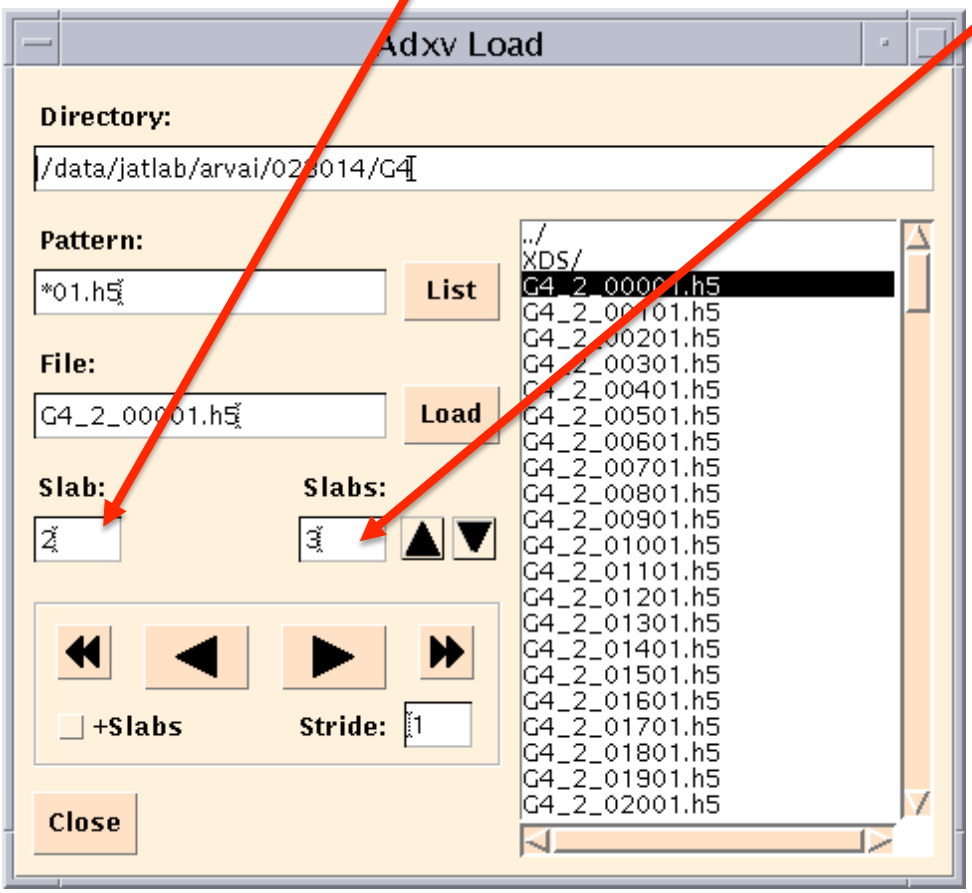
Specify the first slab to display. Each slab is a 2-d array of data. If the data is 100x2527x2463 pixels, then there are 100 slabs of data, where each slab is 2527x2463 pixels.



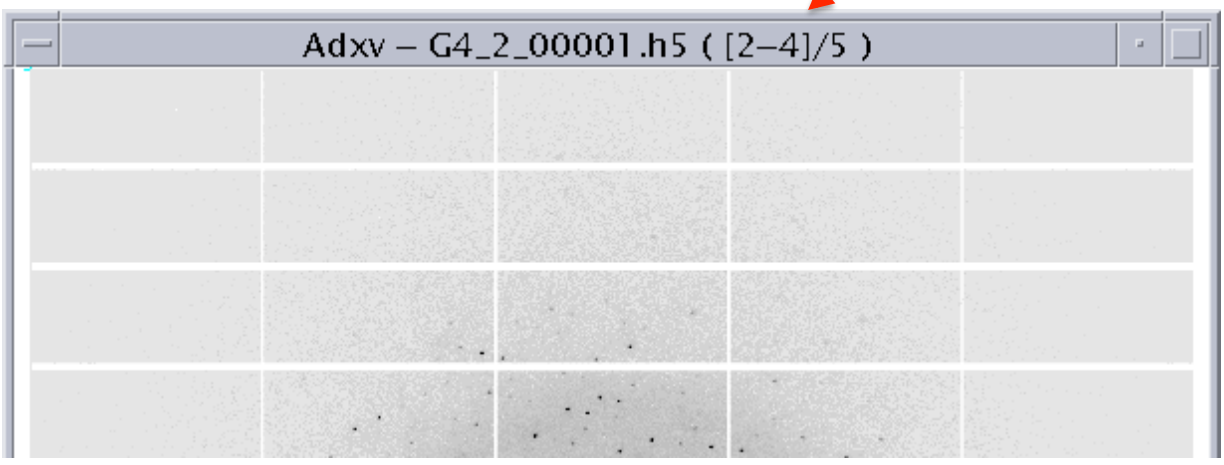
Number of slabs to combine and display. If Slabs is 5, then 5 slabs are summed and displayed. How to combine slabs (sum or average) may be specified in the Properties Window.

If this checkbox is checked, then the forward and backward arrows will display the next slab of data, not the next file. For example if you are displaying slab #1, the stride is 3, and you click the forward arrow button, then slab #4 will be displayed. If there are no more slabs, then the next file will be displayed.

Here a file (G4_2_00001.h5) is loaded which contains a total of 5 slabs. The first slab to display is 2 and the number of slabs to combine is 3. Thus, slabs 2-4 are combined and displayed.

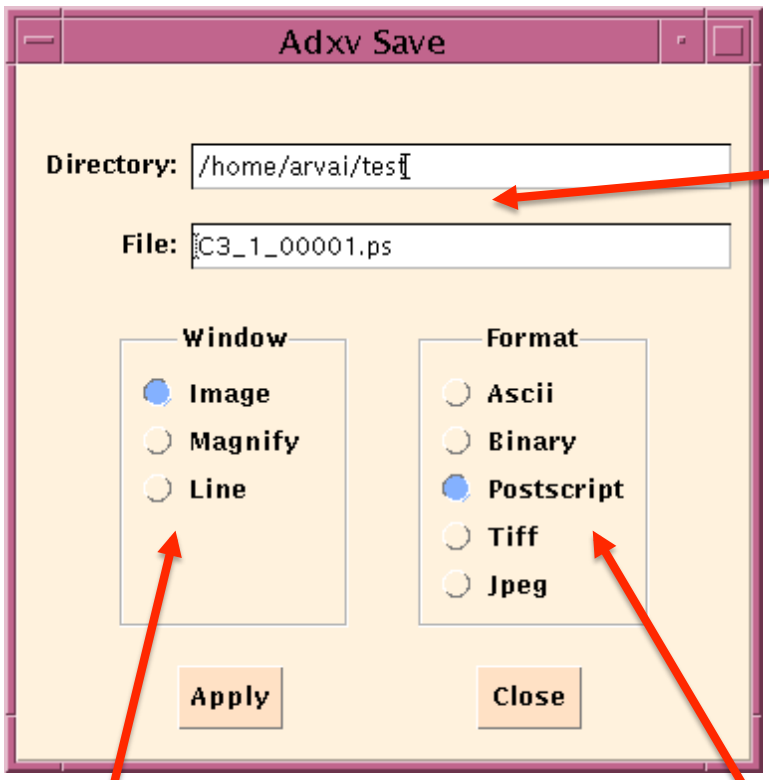


The title bar of the Image Window shows that slabs 2-4 are displayed out of a total of 5 slabs in the file.



The Save Window

This window is accessed by clicking **File->Save** in the Control Window. Data from the Image, Magnify and Line windows may be saved to a file in various formats. The Line window may display either a histogram or a 1-d cross section of the data. Whichever is displayed in the Line window will be saved.



Directory and File where the saved data will be written.

Selects which format the data will be saved as. See **Output File Formats** (below) for more information about these choices.

Selects which window data will be saved from.

Output File Formats

- Ascii

For the Image and Magnify Windows, the output is NX columns and NY rows, where NX is the width (in pixels) and NY is the height. For example, here is the output of a 5x5 pixel region displayed in the Magnify Window:

443 462 387 439 413
439 2156 1566 472 425
488 25600 19114 757 420
451 563 609 483 431
396 415 410 440 424

For the Line window, there is a short header, followed by pairs of X,Y values, where X is the distance (in pixels) and Y is the value. For example:

Line from image: /home/arvai/test_images/pilatus.cbf
Start: 1280 1119
End: 1290 1119
Linewidth: 1
Interpolation: 1
#
0 406.000000
1 469.000000
2 449.000000
3 488.000000
4 25600.000000
5 19114.000000
6 420.000000
7 410.000000
8 393.000000
9 434.000000

Note that the x-coordinate (distance) is relative to the Start position in the header.

• Binary

This is only an option for the Image Window. The entire image is written, regardless of how much is visible. The output format is ADSC img format. There is an ASCII header which looks like this:

```
{
HEADER_BYTES=  512;
DIM=2;
SIZE1=2463;
SIZE2=2527;
TYPE=unsigned_short;
BYTE_ORDER=little_endian;
DISTANCE=80.001;
PIXEL_SIZE=0.172000;
WAVELENGTH=0.980800;
}^L
```

The header is padded to HEADER_BYTES bytes and is then followed by the raw data, which is 16-bit unsigned shprt. The output data will be signed 32-bit integer if Adxv is started with the –smv32bits command line option. In this case the header is slightly different, with:

```
TYPE=long_integer;
```

Images may also be converted to and saved as .img files with the –sa command line option. See examples on pages 9 and 10.

Here is a library and documentation to read/write ADSC SMV/IMG files:

http://www.scripps.edu/~arvai/adxv/data/smv.tar.gz

- Postscript

Writes level2 color postscript. If Adxv is started with the –level1 command line option, then level1 postscript will be written.

- Tiff

Tagged image file format.

- Jpeg

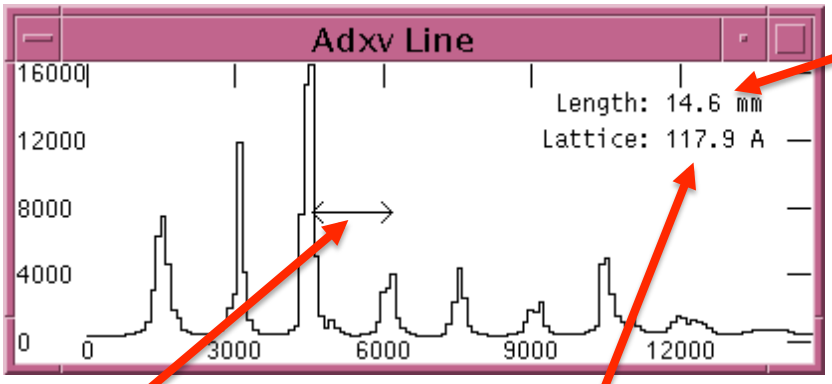
Standard JPEG format.

The Line / Histogram Window

The Line Window displays a 1-D cross-section plot of data from the Image or Magnify Windows. Pressing and dragging the left mouse button in the Image or Magnify Window will draw a rubberband line. When the mouse button is released, the data selected by that line will be displayed as a 1-D plot in the Line Window.

The horizontal scale is millimeters and the vertical scale is pixel value. The total length of the displayed data (in millimeters) is shown in the upper right. An estimate of the crystal lattice length based on distance between adjacent peaks is also shown.

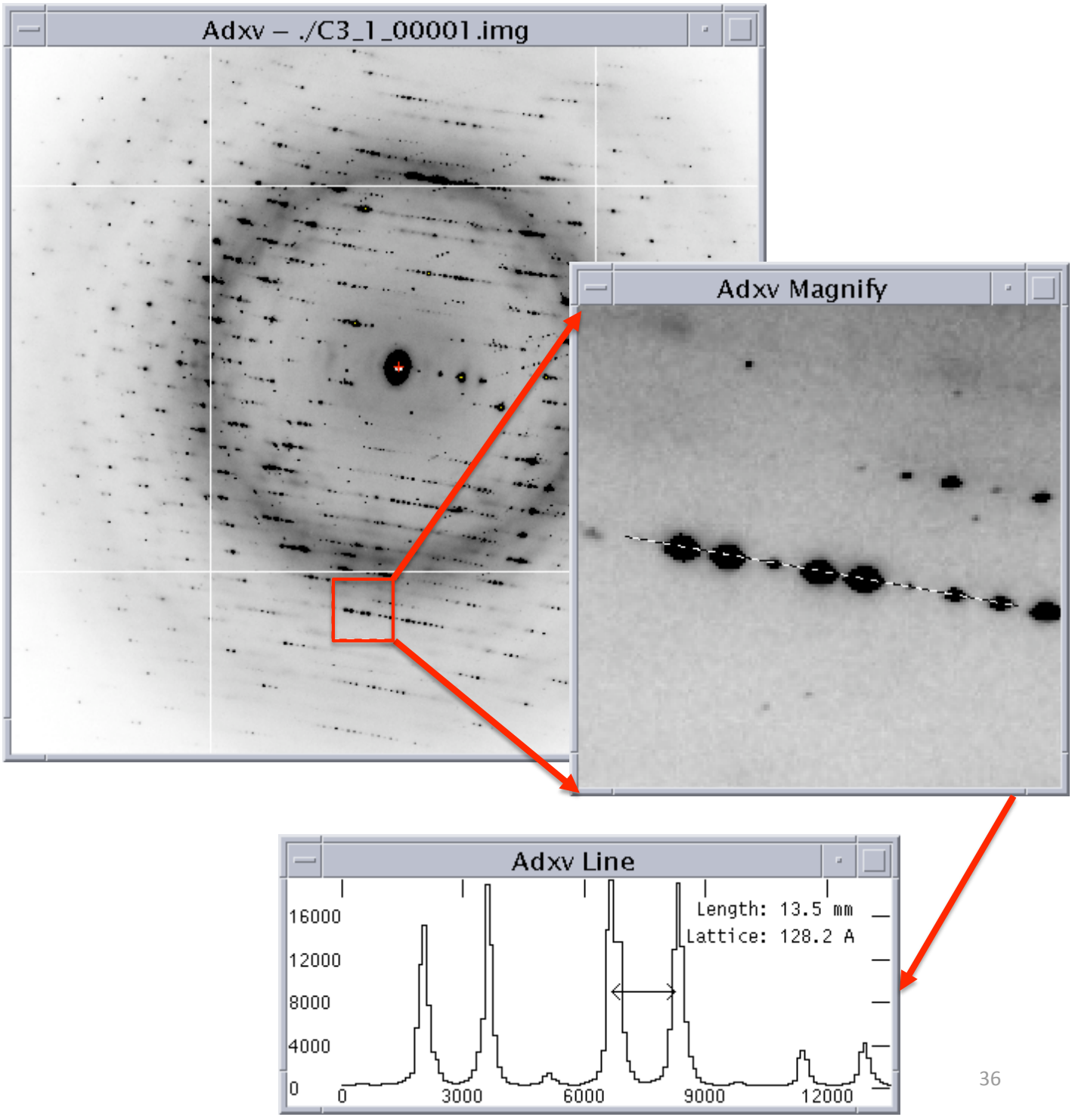
Pressing the Left mouse button will display the X and Y coordinates. Pressing and dragging the Middle mouse button will adjust the vertical scale of the plot



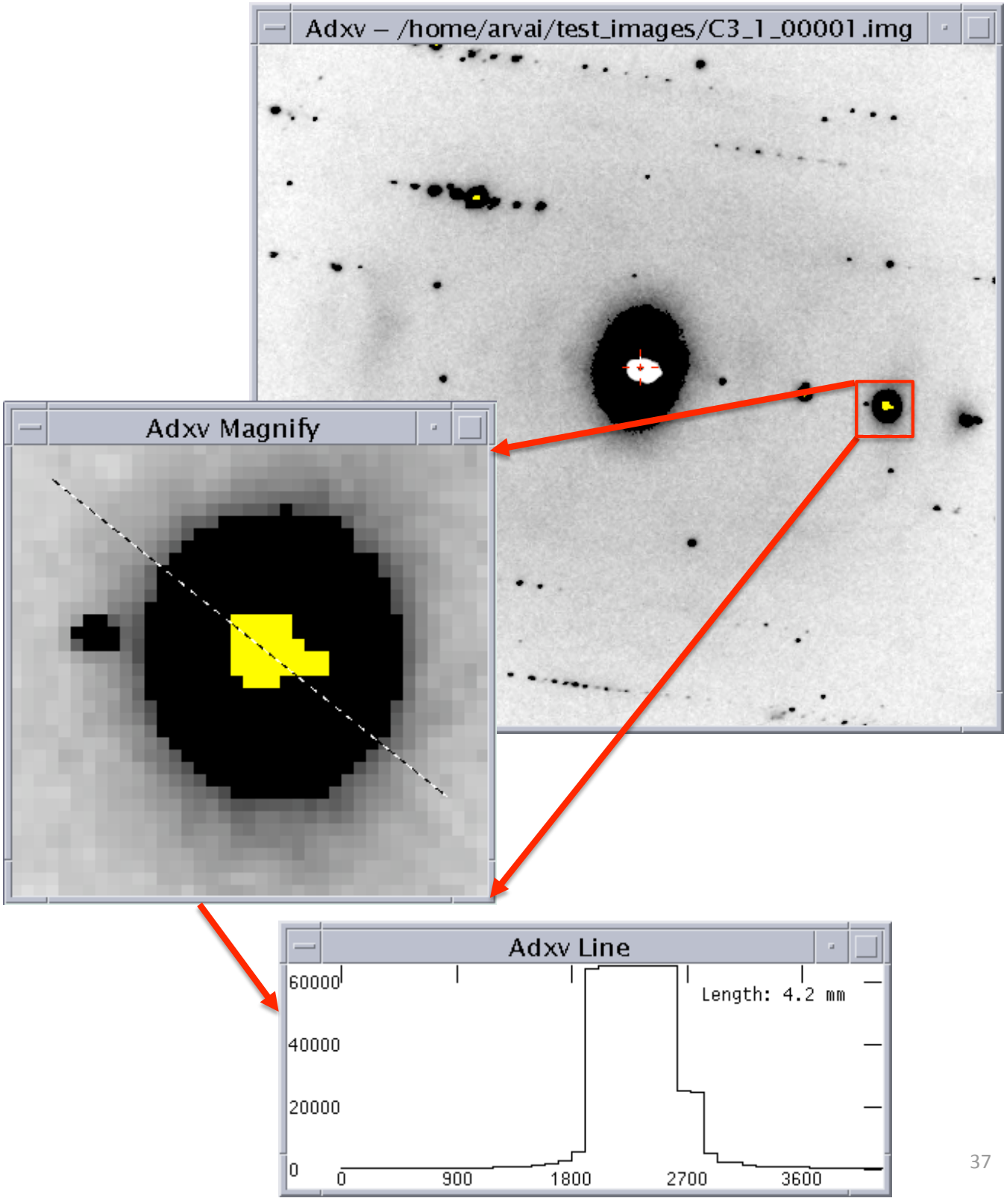
Total length of data (millimeters).

This spot spacing, corresponds to this reciprocal lattice spacing.

Magnifying a region of an image, and then plotting a cross-section through it.



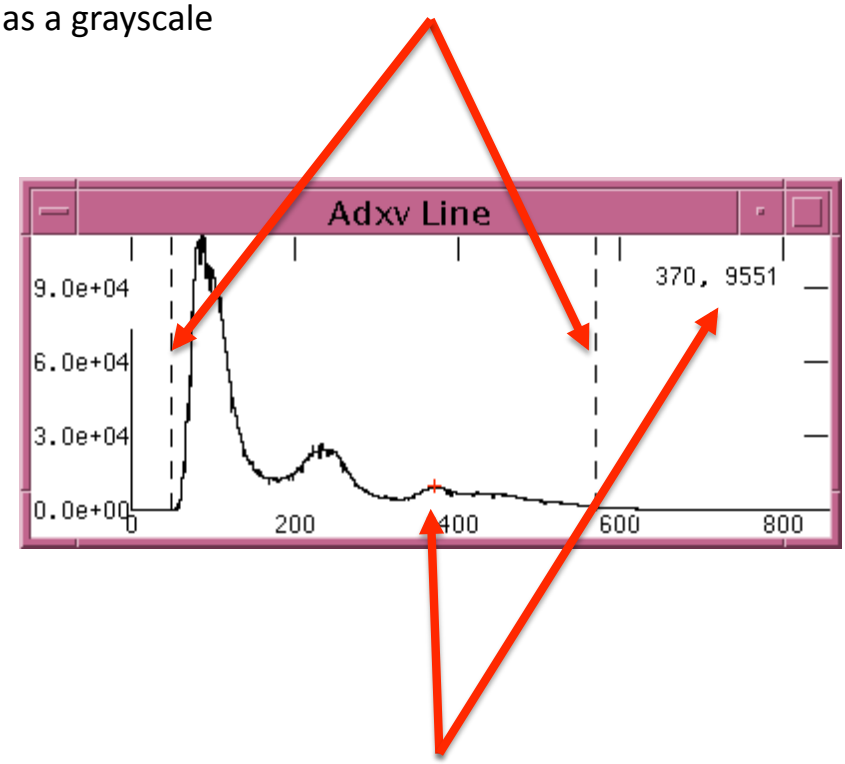
Overloaded pixels are drawn in Yellow. Notice the cross-section has a flat top.



The Line Window may also display a histogram of the data in the Image or Magnify Windows. This is selected from the View->Histogram pulldown menu in the Control Window. The histogram of either the Magnify Window (View->Histogram->Magnify) or the entire image (View->Histogram->Image) may be selected.

The horizontal scale is pixel value and the vertical scale is number of pixels.

Two vertical dashed lines are drawn at the pixel values displayed above and below the contrast slider in the Control Window and represent the min and max pixels values in the colormap. Values below the min pixel value are drawn as white and values above the max value are drawn as black. Pixel values intermediate to these values are drawn as a grayscale

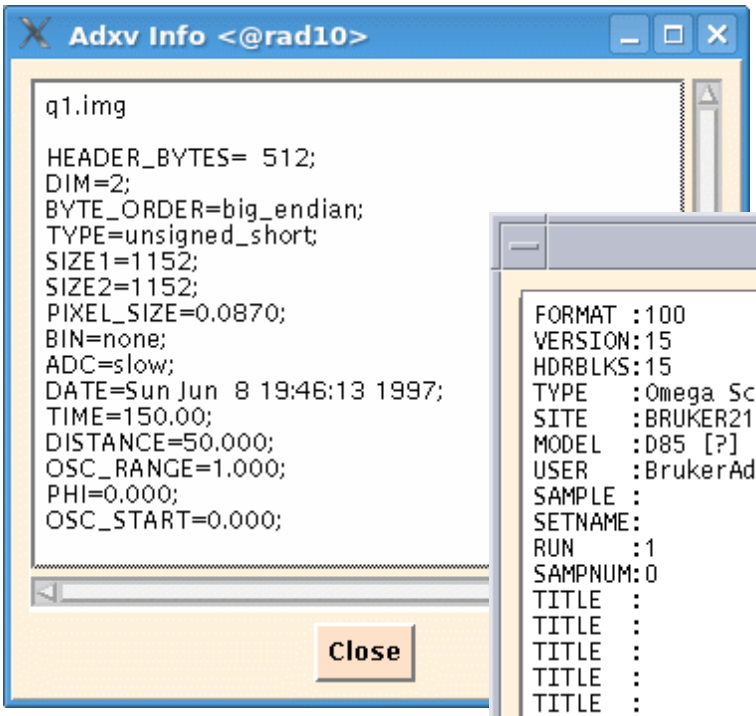


The Left Mouse button can be used to adjust the min pixel value slider and the Right Mouse button will adjust the max value. The Middle mouse button will adjust the vertical scale of the plot.

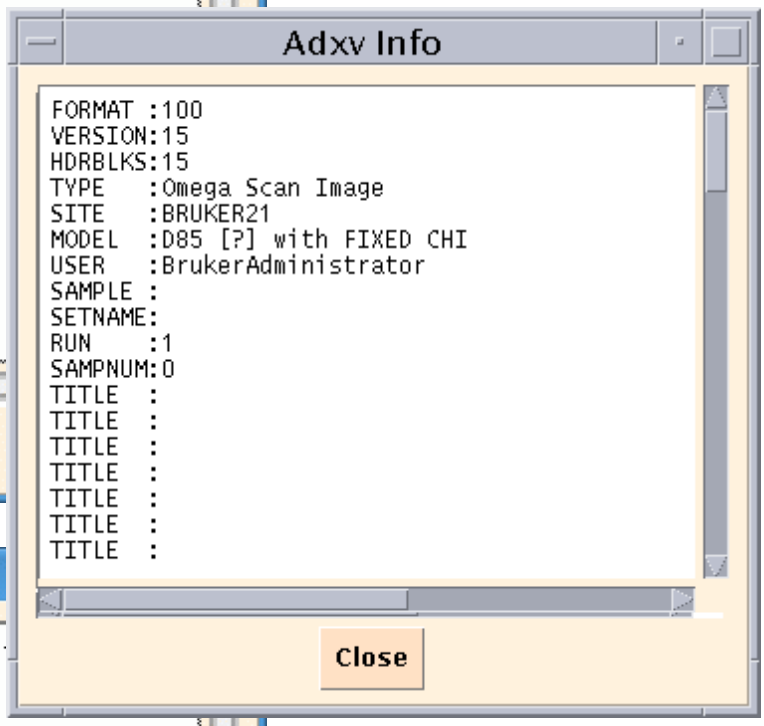
A small red cross is drawn at the horizontal position of the cursor. The X- and Y- values of this coordinate are displayed in the upper right. The left and right arrow keys may be pressed to move the cursor 1 pixel in each direction.

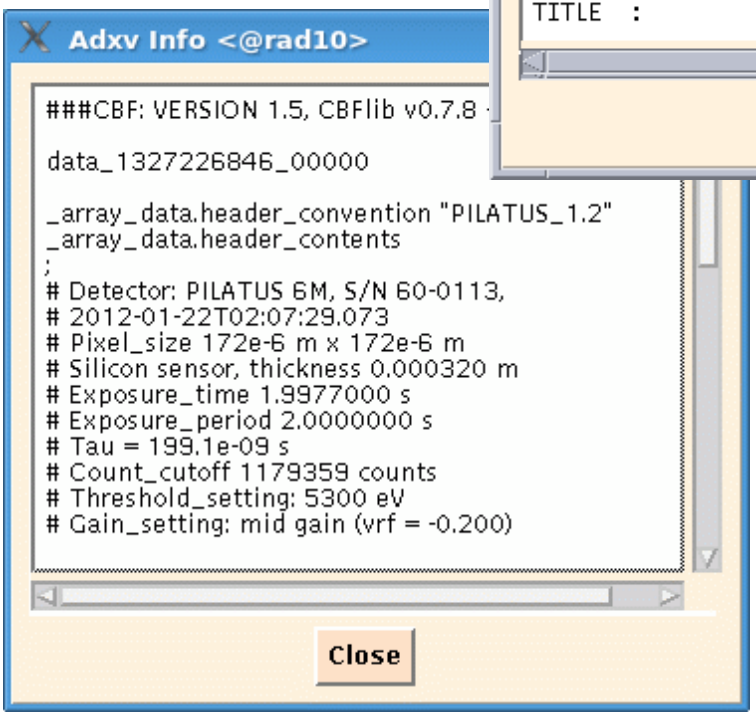
The Info Window

This window is accessed by clicking **View->Image Header** in the Control Window. This will show the image header for the displayed image. Below are some example image headers for various image formats.



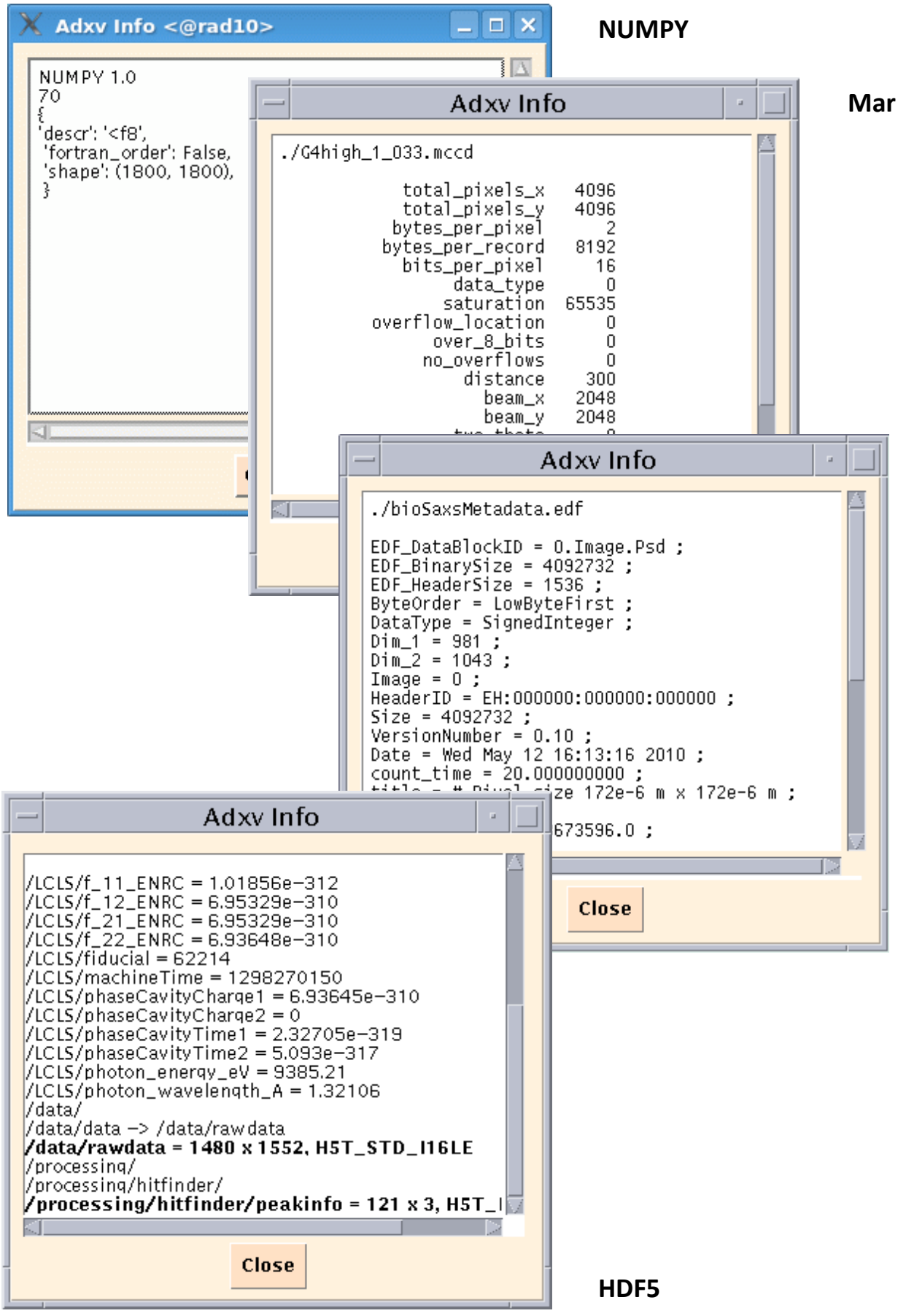
ADSC img





Bruker

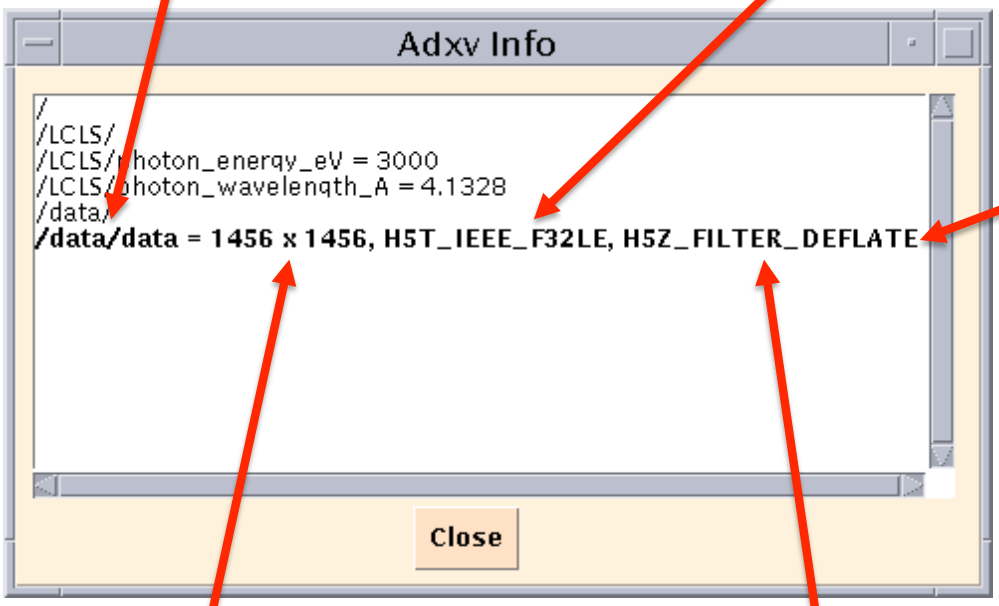
mini-CBF


Adxv Info <@rad10>
NUMPY 1.0
70
{
'descr': '<f8',
'fortran_order': False,
'shape': (1800, 1800),
}
Adxv Info
./G4high_1_033.mccd
total_pixels_x 4096
total_pixels_y 4096
bytes_per_pixel 2
bytes_per_record 8192
bits_per_pixel 16
data_type 0
saturation 65535
overflow_location 0
over_8_bits 0
no_overflows 0
distance 300
beam_x 2048
beam_y 2048
Adxv Info
./bioSaxsMetadata.edf
EDF_DataBlockID = 0.Image.Psd ;
EDF_BinarySize = 4092732 ;
EDF_HeaderSize = 1536 ;
ByteOrder = LowByteFirst ;
DataType = SignedInteger ;
Dim_1 = 981 ;
Dim_2 = 1043 ;
Image = 0 ;
HeaderID = EH:000000:000000:000000 ;
Size = 4092732 ;
VersionNumber = 0.10 ;
Date = Wed May 12 16:13:16 2010 ;
count_time = 20.000000000 ;
ize 172e-6 m x 172e-6 m ;
673596.0 ;
Close
Adxv Info
/LCLS/f_11_ENRC = 1.01856e-312
/LCLS/f_12_ENRC = 6.95329e-310
/LCLS/f_21_ENRC = 6.95329e-310
/LCLS/f_22_ENRC = 6.93648e-310
/LCLS/fiducial = 62214
/LCLS/machineTime = 1298270150
/LCLS/phaseCavityCharge1 = 6.93645e-310
/LCLS/phaseCavityCharge2 = 0
/LCLS/phaseCavityTime1 = 2.32705e-319
/LCLS/phaseCavityTime2 = 5.093e-317
/LCLS/photon_energy_eV = 9385.21
/LCLS/photon_wavelength_A = 1.32106
/data/
/data/data -> /data/rawdata
/data/rawdata = 1480 x 1552, H5T_STD_I16LE
/processing/
/processing/hitfinder/
/processing/hitfinder/peakinfo = 121 x 3, H5T_I
Close
NUMPY
Mar CCD
EDF
HDF5

With an hdf5 file, header entries with 2 or more dimensions are displayed in a bold font. If you double-click one of these with the Left mouse button, then Adxv will load that dataset. Adxv will also remember the dataset name and will try to load it from future hdf5 files.

Dataset name. If starting Adxv with the -hdf5dataset command line argument, this is the name you would use.

Data type. In this case, F32LE is floating point, 32-bit, little endian.



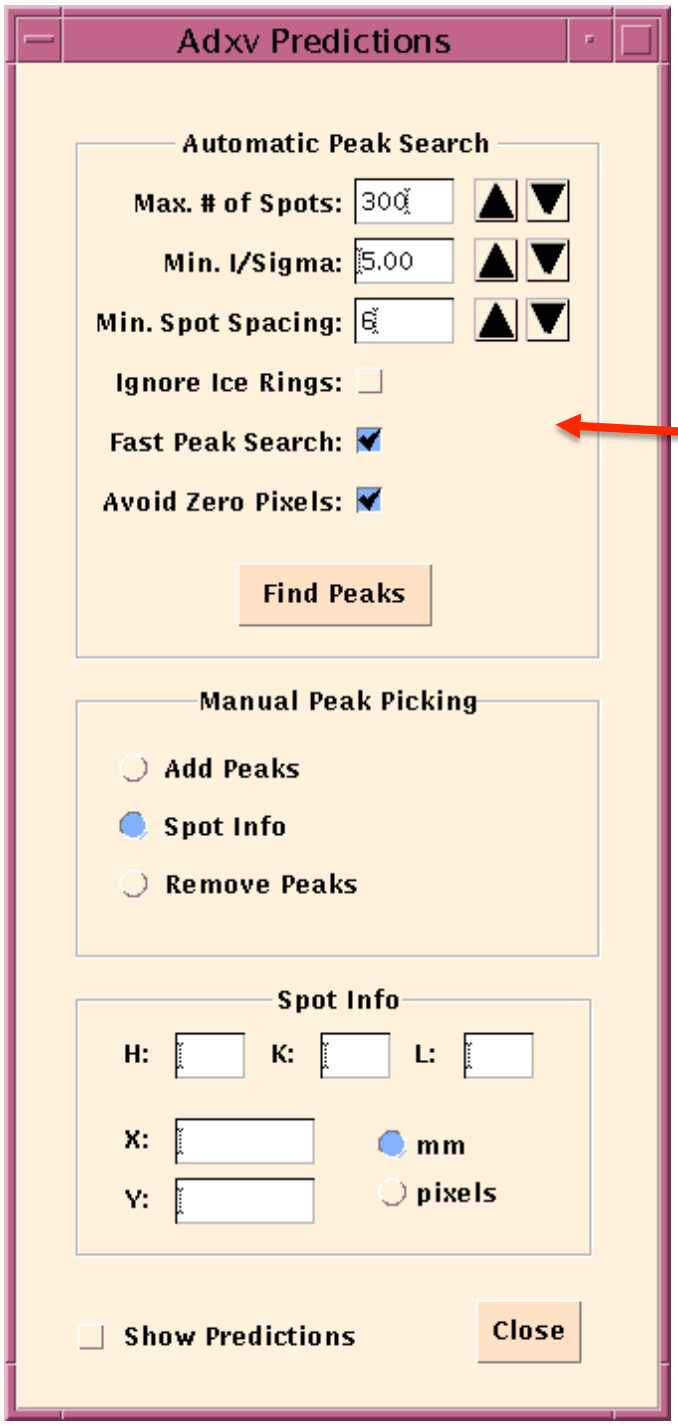
Double-click to load this dataset

Dimensions of the data array in pixels.

Filter (if any) needed to decompress the data. In additions to the standard HDF5 filters, Adxv will also recognize the LZ4 filter.

The Predictions Window

This window is accessed by clicking **View->Predictions** in the Control Window. Spots can be automatically or manually picked and displayed.



Max # of Spots specifies the maximum number of spots to find. All the found spots are sorted based on I/Sigma and the largest are saved. If Max is set to 0, then all spots are kept.

Min I/Sigma saves only spots larger than the specified I/Sigma.

Min. Spot Spacing saves only the larger of two spots if they are too close. Distance is in pixels.

Ignore Ice Rings will not use spots near ice rings.

Fast Peak Search uses a different peak search algorithm.

Avoid Zero Pixels ignores spots near pixels which have a value of 0

When **Find Peaks** is clicked, spots will be searched, saved in a files called **peaks.file** and then displayed on the image with a box around each spot

The first line of the **peaks.file** file is “DPS-PF A1.0”. This is followed by pairs of Y, X values. For example:

DPS-PF A1.0
614.36 796.76
542.30 798.36
579.09 791.72
672.28 573.30
.
.
.

If Adxv is started with the –peaks_adx command line option, then a **peaks.adx** file is also written. This contains X ,Y, I/Sigma:

796.76 614.36 362.67
798.36 542.30 231.83
791.72 579.09 202.38
573.30 672.28 172.72
.
.
.

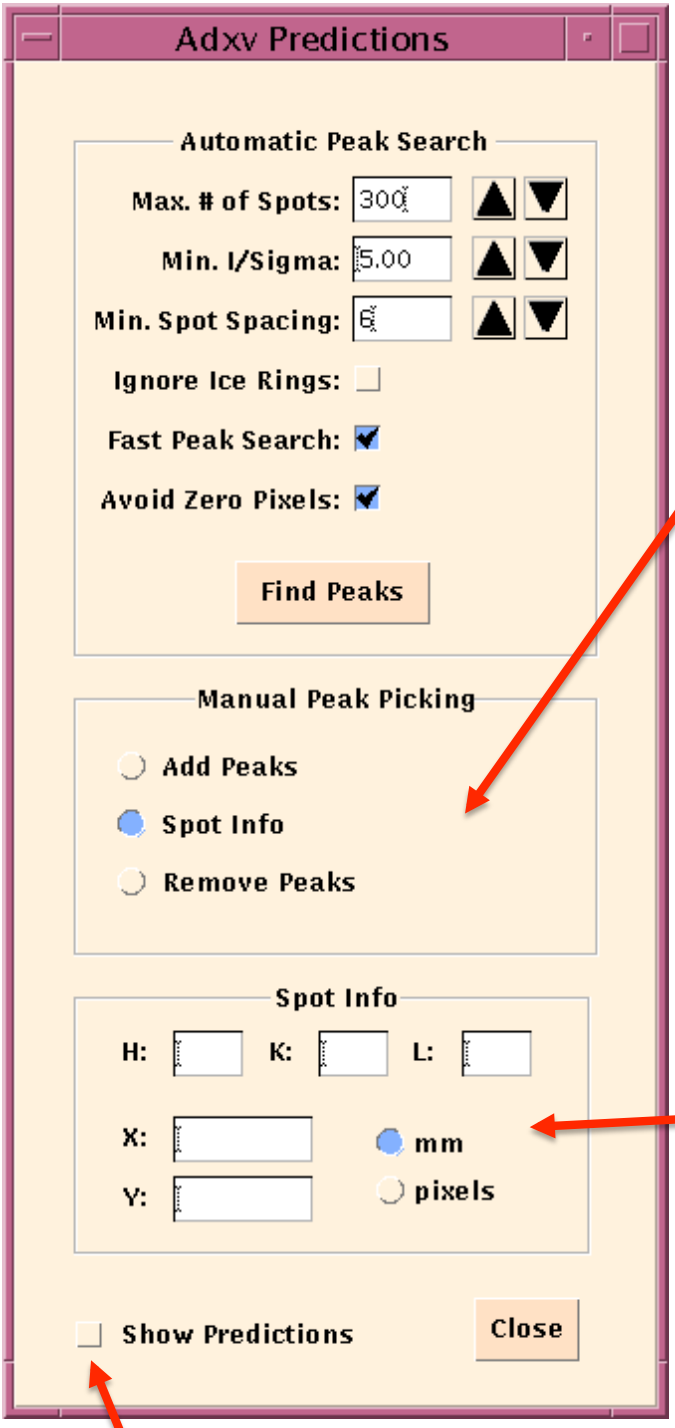
In both cases, the X,Y values are in pixels.

Both the peaks.file and peaks.adx files are recognized by Adxv as spot files and may be used to display spot positions. For example:

adxv test_1_001.img peaks.file

or

adxv test_1_001.img peaks.adx



Add Peaks – Select this to manually add spots. Click on a spot in either the Image or Magnify Windows with the Left mouse button to add a spot.

Spot Info – Clicking on a spot displays the X and Y position of the spot in the text boxes below.

Remove Spots – Clicking on a spot with the Left mouse button will remove it.

When a denzo .x file is loaded, clicking on a spot with the Left mouse button will display the HKL and X,Y value of that spot.

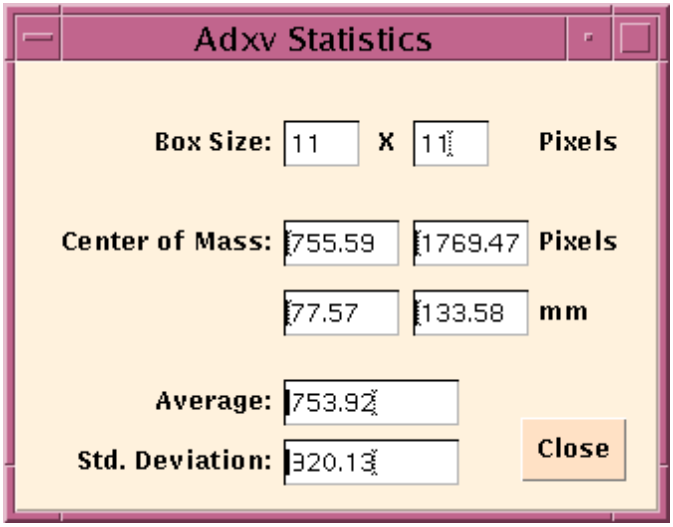
The displayed X,Y value may be selected to be mm or pixels, but the output peaks.file is always pixels.

Un-checking this box will turn off the display of spots. Same as typing “p” in the Image or Magnify Windows.

The Statistics Window

This window is accessed by clicking **View->Statistics** in the Control Window.

When the Right mouse button is clicked in either the Image or Magnify Windows, statistics of data in a box centered on the mouse position are calculated and displayed.



Box Size specifies the area of the region over which to calculate statistics. If the area of the Box is 0, then all the pixels in the Magnify Window are used.

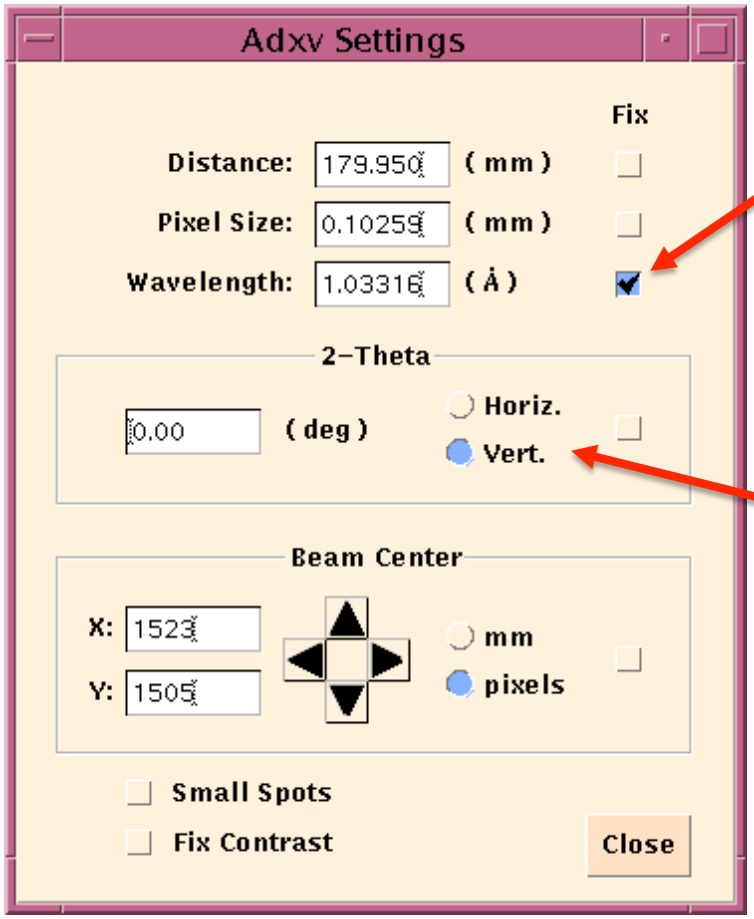
The **Center of Mass** is displayed in both Pixels and mm.

The **Average** pixel value as well as the **Standard Deviation** are calculated and displayed.

The Settings Window

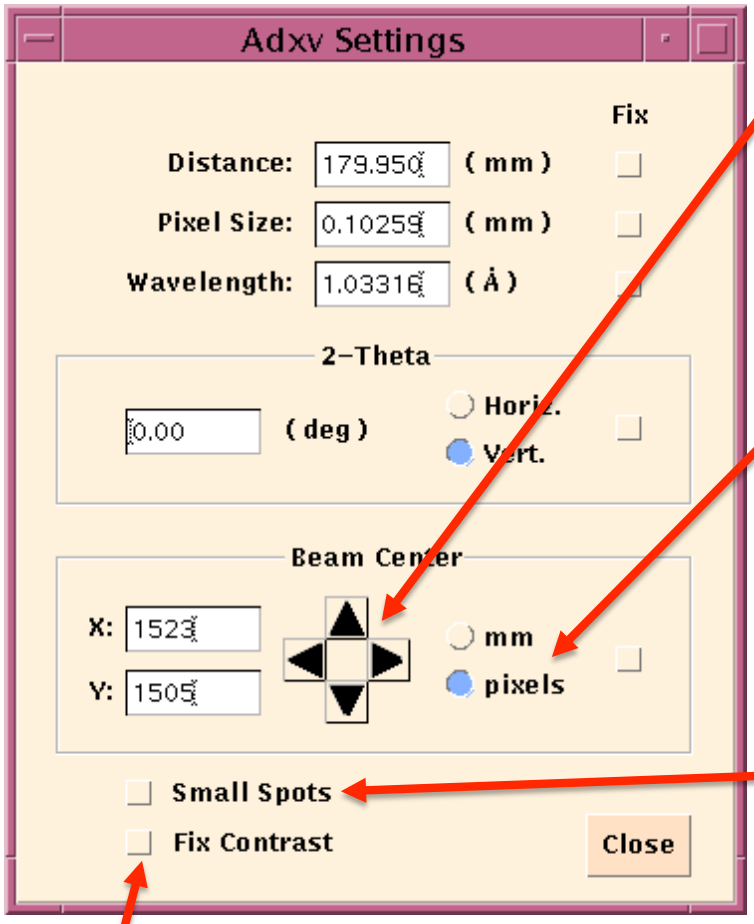
This window is accessed by clicking **Edit->Settings** in the Control Window. Distance and Pixel Size are in millimeters, Wavelength is in Angstroms and 2-Theta is in degrees. The beam center may be entered and displayed in pixels or millimeters, depending on the setting of the adjacent radio box.

When a new image is displayed, these values may be overwritten by values in the image header. To avoid this and keep the values as they are, check the box under Fix and next to the relevant parameter



Here the Wavelength is fixed, so a value read in from a new image will not change this.

2-theta may be Horizontal or Vertical. When Horizontal, the detector rotates about a vertical axis and when Vertical the detector rotates about a horizontal axis.



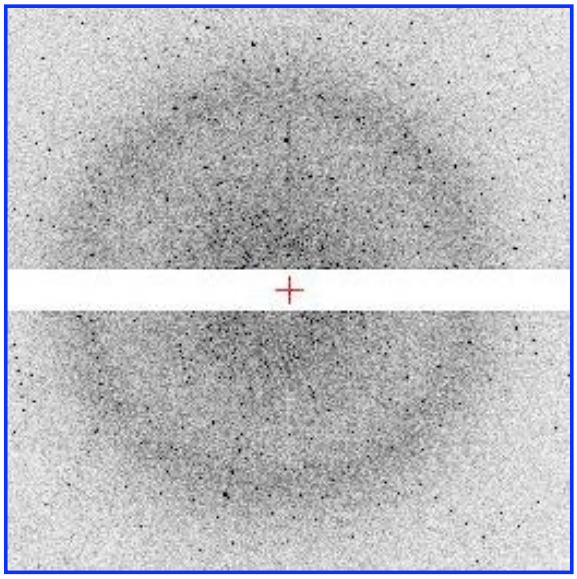
The position of the beam center may be moved by 1 pixel by clicking the appropriate arrow button

The coordinates of the beam center may be entered and displayed in the text boxes to the left in either millimeters or pixels by selecting mm or pixels, respectively.

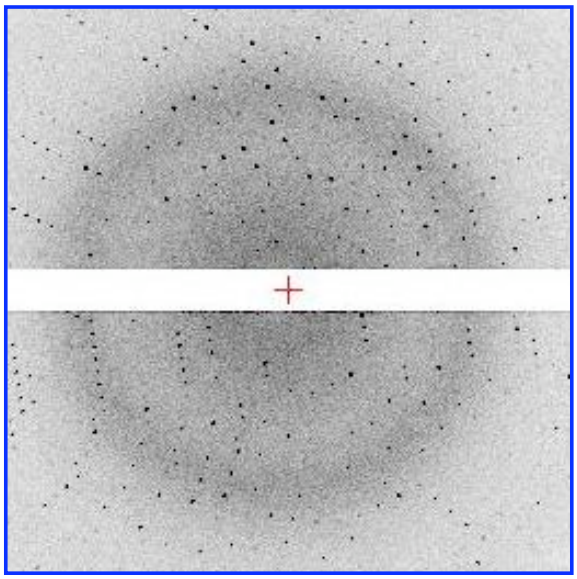
When Small Spots is checked, there is more smoothing of the image displayed in the Image Window. If spots are small and every n'th pixel is simply displayed without smoothing, then some spots may not be visible. This only affects the display in the Image Window, not the Magnify Window. See examples on the next page.

When Fix Contrast is checked, the image contrast is not automatically adjusted for each image as it is loaded. The may also be set from a pulldown menu selected by clicking the Right mouse button in the colormap drawing area of the Control Window.

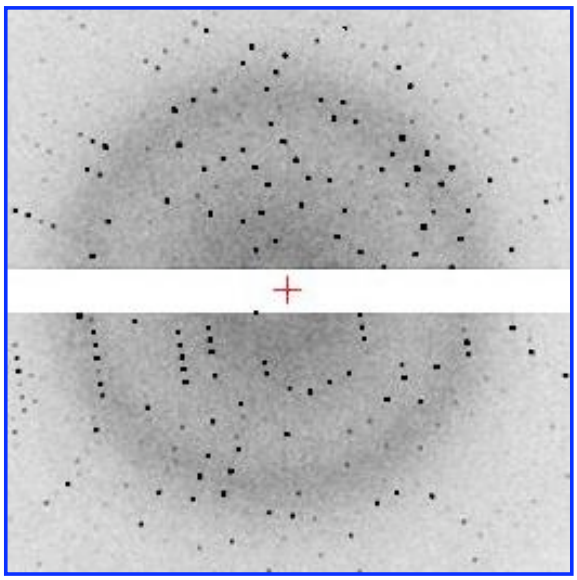
Effect of smoothing on an image which is scaled to 50%



No smoothing (every other pixel is displayed). This can be selected with the –nosmooth command line option.



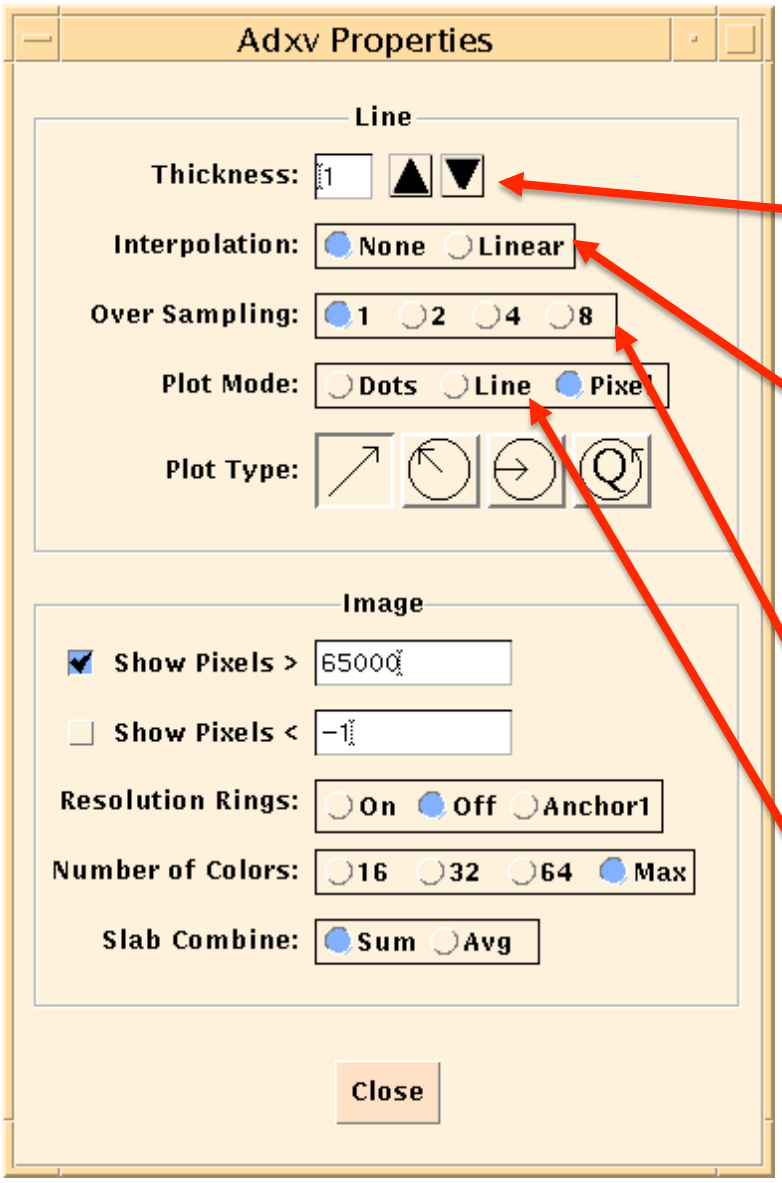
This is the default setting. There is no smoothing when the image is scaled to 100% and there is progressively more smoothing as the image scale is decreased.



More smoothing (about twice the default). This can be selected with the –small_spots command line option or by checking the Small Spots checkbox in the Settings Window.

The Properties Window

This window is accessed by clicking **Edit->Properties** in the Control Window. The upper set of properties affect the display of the Line Window and the lower set affect the display of the Image Window



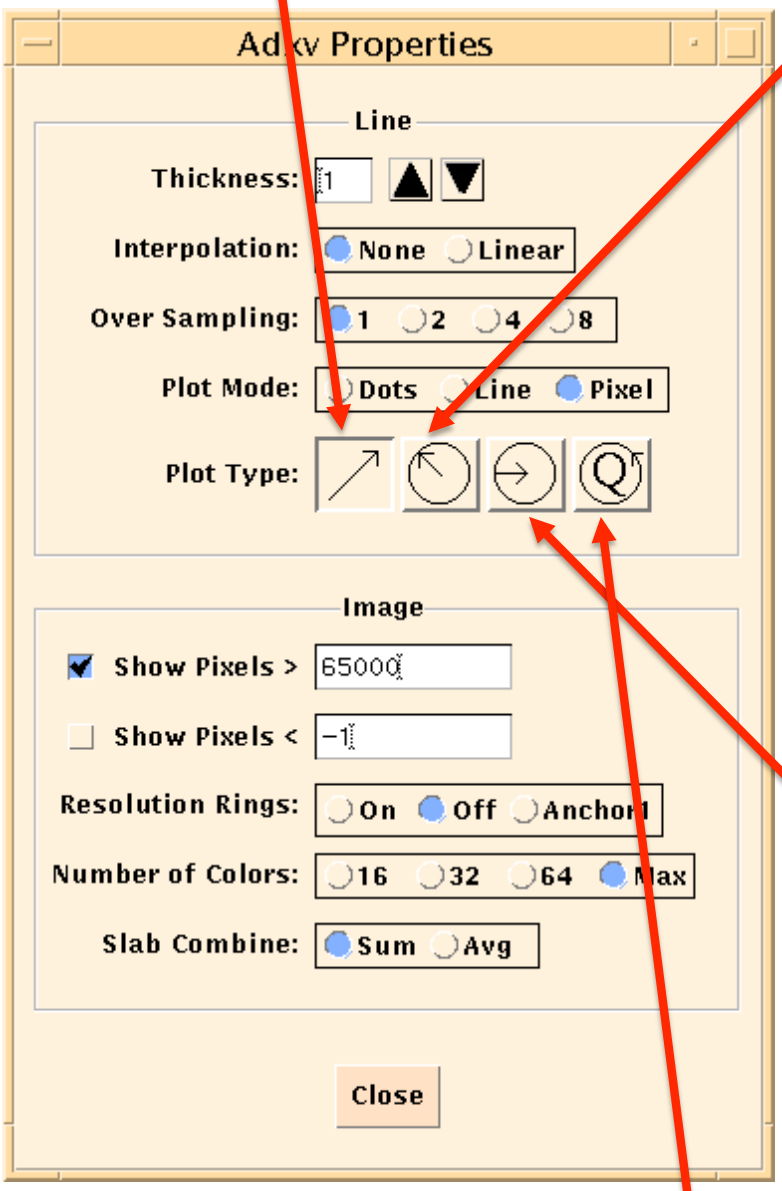
Number of pixels orthogonal to the line direction which are averaged to form each point displayed in the Line Window.

When a point falls between pixels, it's value may be either the closest pixel or interpolated from close pixels.

Number of points drawn per pixel of length.

The line may be displayed as individual points, a line connecting points, or a stair-step centered on each pixel.

The plot will be a straight line, where the first point is selected with the Left mouse button. The mouse is then dragged and the end point is where the mouse button is released

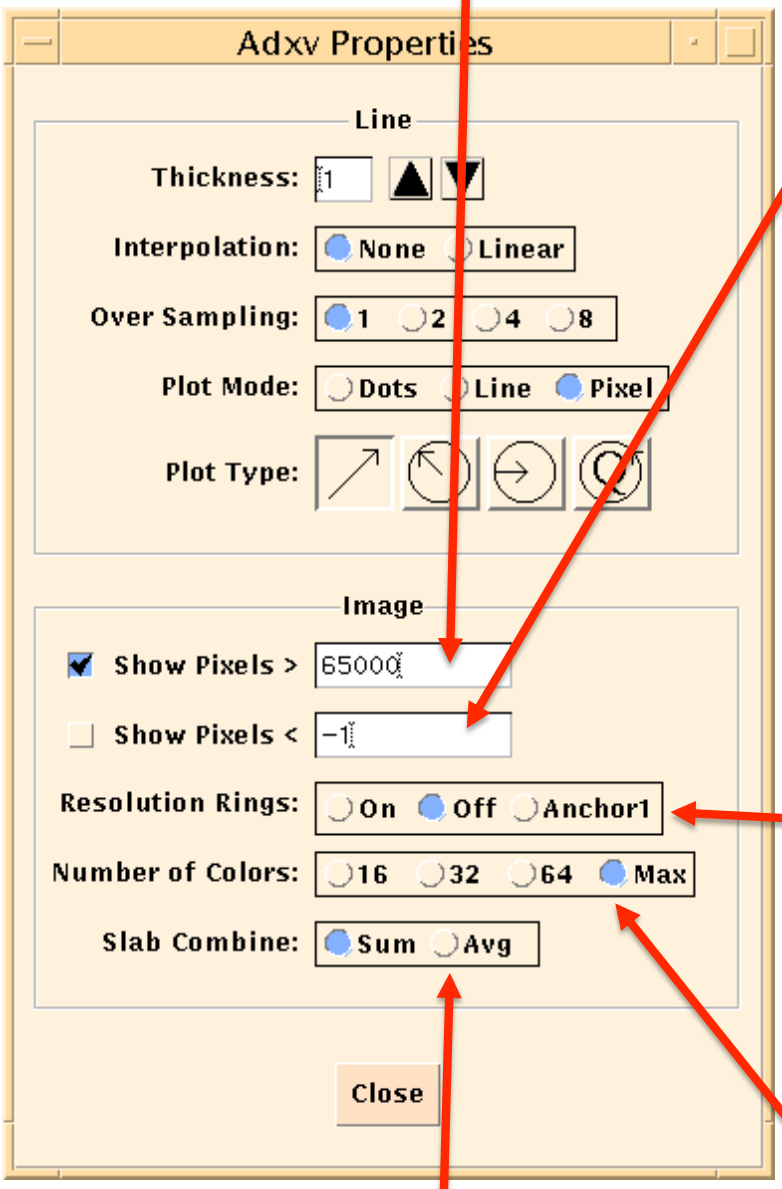


The Left mouse button will select the center of a circle. As the mouse is dragged, the radius of the circle increases. When the mouse button is released, a circular arc of data will be drawn, from 0 to 360 degrees around the circle. The plot is counter-clockwise starting from the right side.

Same as above, except the edge of the circle is selected and the mouse is then dragged to select the center.

As above, the center of a circle is selected with the Left mouse button and the mouse is dragged to select the radius. The horizontal axis of the plot is radius (i.e. distance from the center of the circle). The value at each radius is the circularly averaged pixel intensity at that radius. May be useful for SAXS.

Pixels which are greater than or equal to this value are displayed in a **Yellow** color. This is used to show overloaded pixels. When the Colormap is Heat, these pixels are Blue and when the Colormap is Rainbow these pixels are Green.



Pixels which are smaller than this value are displayed in a **Red** color. This is to show bad pixels, i.e. with a value of -2. When the Colormap is Heat, these pixels are Green and when the Colormap is Rainbow these pixels are Yellow.

Draw circles on the Image Window showing the resolution. Default is 5 circles. See the –rings and –rfont command line flags for more options. Note that these resolution rings are not circular when 2-theta is non-zero. When Anchor1 is selected, a circle is drawn about the beam center, through the next point selected with the Left mouse button. The diameter of this ring will change as the beam center is changed. This is useful for fitting the beam center from ice rings or checking anisotropic scattering.

Selects how to combine slabs when multiple slabs from an hdf5 file are displayed.

Number of colors to use for the colormap when displaying the image.

The Background Window

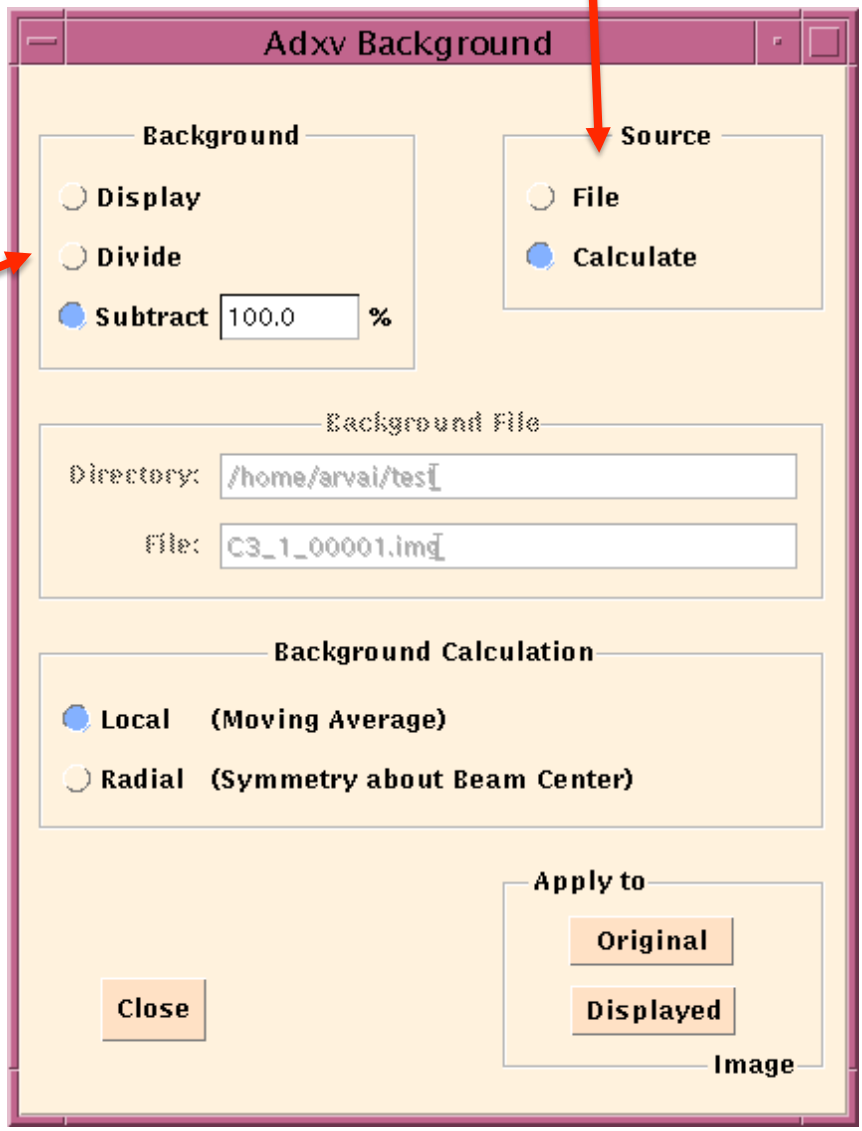
This window is accessed by clicking **Edit->Background** in the Control Window. You can display the background of an image as well as subtract or divide the background from an image. This may also be used to add or subtract images.

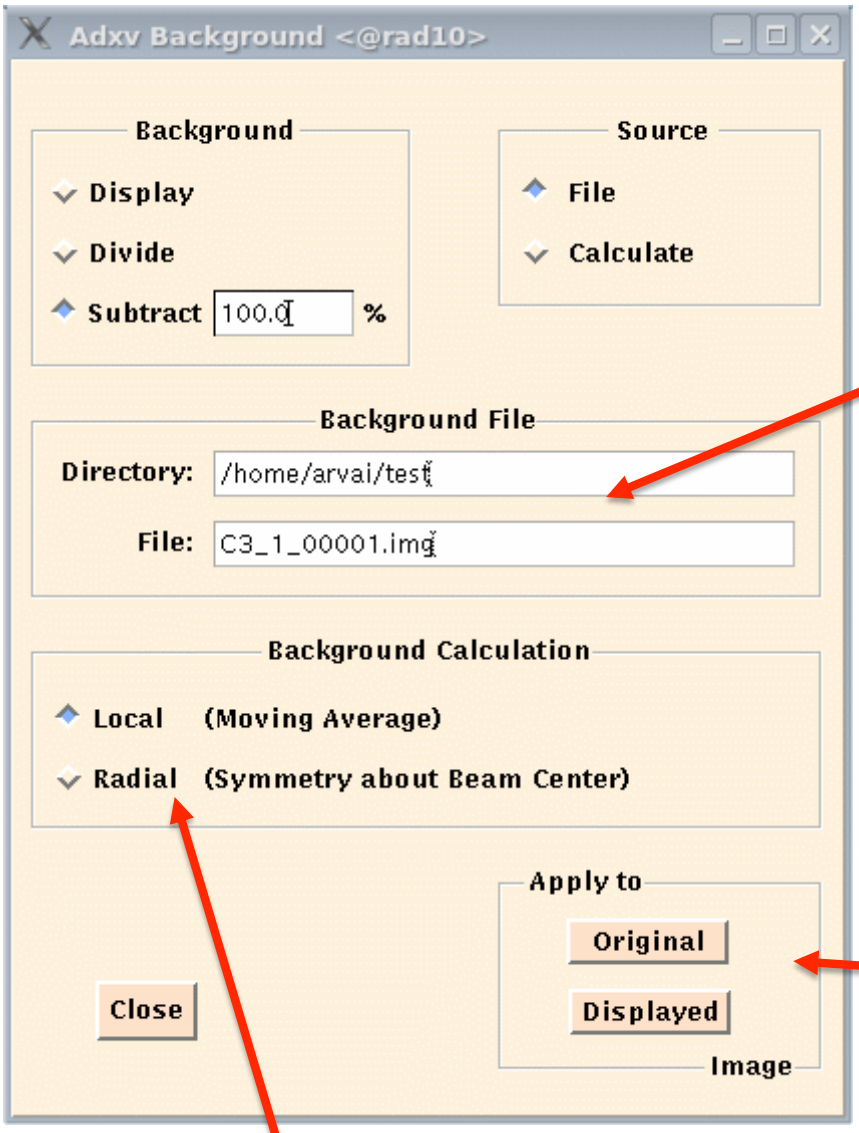
Select whether the background is read from a file or calculated from the current image.

Display will calculate and display the background of the current image.

Divide will divide the current image by either a file or a calculated background.

Subtract will subtract the background (either calculated or read from a file) from the current image. The percentage of the background to subtract may be specified. 50% specifies half the background will be subtracted. If the percentage is negative, the background is added. For example -100% can be used to sum two images.





If File is selected as the Source, then the **Directory** and **File** are specified here.

Select whether the background is applied to the **Original** image or the currently **Displayed** image. The difference is that the currently displayed image may already have had some background subtracted.

The background may be calculated using a **Local** moving average or based on **Radial** symmetry about the beam center. For the later, make sure the beam center is correct.

The Socket interface

When Adxv is started with the –socket command line option, it will listen for a connection on port 8100. Commands may be sent to Adxv over this connection. Commands can be sent to load images, display spots or raise windows. Below is a list of commands which can be sent.

box x y	Size of box drawn around spots.
define_type n color <color> radius <radius>	Define a spot type. Color is one of red, green or Blue. Radius is in pixels.
load_image <image file>	Load an image file
load_spots N	Read N spots
x y type	Spot at pixel position x y
end_of_pack	End of spot data
raise_window <window>	Raises a Window. <window> must be one of Control, Image, Magnify, Line, or Load.
exit	Exit Adxv

Here is an example:

http://www.scripps.edu/~arvai/adxv/data/adxv_socket_example.c

To run:

```
cc -o adxv_socket_example adxv_socket_example.c
adxv -socket &
./adxv_socket_example
```

This will load an image file, display 4 spots of various sizes and colors and raise the Load Window. You will need to change the name of the image file in the code. An example image is available here:

http://www.scripps.edu/~arvai/adxv/data/q1.img.gz

The Beam Center File

Whenever Adxv reads an image file, it checks to see if there is a **.adxv_beam_center** file in the directory where the image is being loaded from. If this file exists, then it will be used to set the beam center. The reason for this is that sometimes the beam center written in the image header is not correct. If it is adjusted one time, then all images in that directory will be displayed with the correct beam center.

If the .adxv_beam_center file does not exist or if the user adjusts the beam center in Adxv, then this file will be written. The file contains 4 ascii numbers:

beam_x beam_y nx ny

beam_x and **beam_y** are the coordinates of the beam center and **nx** and **ny** are the image dimensions. For the beam center to be used, the image dimensions of the displayed image must match nx and ny.

To not read or write the .adxv_beam_center file, Adxv can either be started with the **-no_adxv_beam_center** command line option or the **NO_ADXV_BEAM_CENTER** environment variable may be set.

Frequently asked Questions

Is there any license or fee for using Adxv?

No, it is free for anyone to use.

Where can I download adxv from?

www.scripps.edu/~arvai/adxv.html

What if Adxv complains about missing fonts?

You can install the missing fonts from these packages:

xorg-x11-fonts-75dpi.noarch
xorg-x11-fonts-ISO8859-1-75dpi.noarch

You can also download all the fonts Adxv needs from:

http://www.scripps.edu/~arvai/adxv/fonts.tar.gz

Put this file in a directory (i.e. /usr/share/adxvfonts/) and type:

gunzip --stdout fonts.tar.gz | tar xvf –

Then run Adxv with the font path option:

adxv -fp /usr/share/adxvfonts

What if I download Adxv and get "./adxv: Permission denied."?

chmod +x ./adxv

What if the Image Window doesn't refresh correctly under NX?

This is a bug in NX and should be fixed in newer versions of the NX server.

Try typing **Ctrl + Alt + E** to toggle lazy encoding.

Depending on the version of NX, try adding one of the following options on the machine which is running the nxserver:

/usr/NX/etc/node.cfg
AgentExtraOptions="-defer 0"

/etc/nxserver/node.conf
AGENT_EXTRA_OPTIONS_X="-defer 0"

Other things to try:

adxv -nopixmap
adxv -nopixmap -nobs
Complain to nomachine (https://www.nomachine.com/report-issues)
As a last resort, contact me (arvai@scripps.edu)

Is there a version of Adxv which runs under Windows?

If you install cygwin (http://www.cygwin.com/) and the x-server packages (http://x.cygwin.com/docs/ug/setup-cygwin-x-installing.html) then the cygwin version of Adxv should work. Adxv was compiled under Windows 8. This will also run under Windows 7, but only if you install the 32-bit version of cygwin. Thanks to Dr. Ilya Frantsuzov for this feedback.

Adxv crashes in with "Library not loaded: /usr/X11/lib/libXt.6.dylib"

In OSX 10.10 (Yosemite) the X11 libraries were moved from /usr/X11 to /opt/X11. You can make a symbolic link from /opt/X11 to /usr/X11:

ln -s /opt/X11 /usr/X11

What if none of the binaries run on my machine or I find a bug?

Contact me at arvai@scripps.edu

What if I want to donate money to fund Adxv support and development?

Definitely contact me.

Command line options

-autoload	Automatically load images listed in the file $XFORMSTATUSFILE. This file should contain one line with two values, an integer number and file name. This file is checked every two seconds and when the integer number changes, the specified file name is loaded and displayed.
-auto_sigma	As the cursor moves across the Image Window, the I/ Sigma of the region under the cursor is calculated more accurately, but more slowly. This is done by default in the Magnify Window.
-beam_center x y	Specify the beam center in mm. Default is read from the image header.
-beam_center_pixels x y	Specify the beam center in pixels. Default is read from the image header.
-border	Draw a 1 pixel border around the image.
-bruker	Input file is Bruker (.sfrm) format.
-char	Input file is binary signed chars
-colormap	Create a new colormap instead of using the default one.
-colors Gray|Heat|Rainbow	Defines the initial colormap colors. Default is Gray.
-contrast Min Max	Set the initial values for the contrast setting. Default is automatic.
-debug	Print debugging information.
-delay t	Delay (in milliseconds) for displaying images in movie mode.
-display DISPLAY	X11 display to use
-distance x	Specify the crystal to detector distance in mm. Default is read from the image header.

-double	Input file is binary doubles
-edf	Input file is EDF format
-fast_scan_mm H|V	Specify the fast scanning direction for mm coordinates displayed in the Image Window. Default is H (Horizontal). See also -scan_origin_mm
-fast_scan_px H|V	Specify the fast scanning direction for pixel coordinates displayed in the Image Window. Default is H (Horizontal). See also -scan_origin_px
-find_peaks	Run peak search and exit
-fix_contrast	Do not automatically re-adjust the contrast as each new image is read in. This may also be set in the Settings Window.
-flip H|V	Flip the image about a Horizontal or Vertical axis.
-flip_beam H|V	Flip the beam center about a Horizontal or Vertical axis.
-float	Input file is binary floats
-fp FontPath	The Font Path
-fuji	Input file is a Fuji image plate image.
-fuji10bit	Input file is a Fuji 10bit image plate image.
-gl **-use_gl**	If available, use OpenGL to render 3-d graphics in the Magnify Window.
-gl_lines	Draw OpenGL 3-d graphics as a wire mesh. Typing "w" in the Magnify Window will also toggle between a wire mesh or polygonal surface representation.
-gl_quad_strip_bug	Draw the 3-d polygonal surface using GL_QUADS instead of GL_QUAD_STRIP. This works around a bug in some X-Servers.
-hdf5dataset <dataset>	Name of HDF5 data set (i.e. /data)
-hist32bits	Larger dynamic range for histogram (slower)

-ifont <fontname>	Text font to use in the Image Window
-int **-raw**	Input file is raw binary signed integers (4 bytes/pixel).
-invert_colors	Invert the colormap colors
-iscale X	Scale factor to multiply pixel values by
-itext	Draw text in image window with white background
-jpeg_quality N	Output jpeg quality. 0 is worst, 100 is best, default is 75.
-jpeg_scale X	Output jpeg and tif scale. 0 - 1.0, default is 1.0
-level1	Output level1 postscript (default is level2)
-log	Take the log of all the pixels: p = log(p)*1000
-long	Input file is binary signed longs (8 bytes/pixel)
-marccd	Mar ccd image
-mosflm	Mimic Mosflm's coordinate system. Shortcut for: -rotate 90 -flip V -scan_origin_px UL-scan_origin_mm UL
-ncolors N	Use N colors for the colormap. Default is 1024. If N=0, use the maximum possible
-newpixmap	Create a new pixmap when a new image is read. The default is to only create a new pixmap if the new image is a different size
-no_adxv_beam_center	Neither read nor create the .adxv_beam_center file.
-noborder	Do not draw a border around the image (default)
-nobs	Do not use Backing Store on the display
-nofp	Do not try to set up font path (default)
-nodisplay	Do not display the image
-nopixmap	Use a Window instead of a Pixmap in the Image Window.

-norotate	Do not rotate mar .image files 90 degrees before displaying.
-nosmooth	When the image scale factor is less than 0.25, do not smooth the displayed image. When a large image is scaled down, small spots may not be visible if simply every n'th pixel is displayed. Smoothing is on by default.
-nolabelPixmap	Labels are not drawn from Pixmaps
-numpy	Input file is NUMPY format
-nx N	Number of pixels in horizontal (fast) direction
-ny N	Number of pixels in vertical (slow) direction
-o_direct	Open files with O_DIRECT for faster I/O
-offset N	Constant to add to all pixel values
-oldcontrast	Use older automatic contrast adjustment.
-overload N	Pixel overload value. Pixels larger than this are drawn as yellow. This may also be set in the Properties Window
-parallel	Use multiple processors (up to 16)
-peaks_adx	Write peaks.adx (X Y I/Sigma) for peak search.
-pixelmap <geometryfile>	CrystFEL geometry file or Cheetah pixelmap file
-pixelsize X	Pixelsize (mm)
-printheader	Print image header to the standard output
-ps	Display the Prediction Window at startup.
-q	Line Window horizontal scale is in q-space units
-rfont <fontname>	Font to use for resolution rings.
-rings [res1, res2, ...]	Display resolution rings
-rings_only	Draw only the rings, not the resolutions

-rotate 90 | 180 | 270	Rotate the image 90, 180 or 270 degrees before displaying it
-sa	Standalone mode. This reads an image file, automatically writes a jpeg, tiff or img file and then exits. It requires an input image file and output file name as the last two arguments, respectively. The output filename extension (.tiff, .jpeg or .img) specifies the output format.
-sa_crop WxH+X+Y	In standalone mode (-sa), this will crop the output image. The upper left corner is X,Y and the output dimensions are W x H (pixels).
-scandir	Use stat() instead of d_type field to determine the file type
-scan_origin_mm UL|UR| LL|LR	The scan origin for mm coordinates displayed in the Image Window. Default is LL (Lower Left). See also -fast_scan_mm.
-scan_origin_px UL|UR|LL| LR	The scan origin for pixel coordinates displayed in the Image Window. Default is UL (Upper Left). See also -fast_scan_px.
-short **-sshort**	Input file is raw binary signed shorts (2 bytes/pixel).
-show_underload	Show pixels below a threshold. See Properties Window.
-skip N	Skip N bytes before reading raw binary data. May be used to skip a file header.
-slab_combine Sum|Avg	Sum or Average data when combining multiple slabs. Default is Sum. Applies to multi-dimensional hdf5 data.
-slab N	First slab of multi-dimensional hdf5 data to display
-slabs N	Number of slabs of multi-dimensional hdf5 data to merge and display
-slowcbf	Slower routine to open CBF files
-small_cursor	Use a smaller crosshair cursor in the Image Window
-small_spots	Better image display for images with small spots

-smv32bits	Output img files will be 32-bit signed integer, instead of 16-bit unsigned short
-socket [port_number]	Adxv will listen for a socket connection on port number 8100. The port number may be set with the ADXV_DISPLAY_PORT environment variable.
-spindle_orient H|V	Spindle Orientation (for DPS)
-spindle_rot clock|anti	Spindle Rotation (for DPS)
-stride N	Number of Slabs/Files to step when loading the next image
-swab **-swap** **-swapbytes**	Swap the two 8-bit halves of each 16-bit word
-swap_beam_center	Swap x and y position of the beam center
-swaw	Swap the two 16-bit halves of each 32-bit word
-swadw	Swap the two 32-bit halves of each 64-bit word
-tiff	Input file format is TIFF
-tiff32	Output TIFF file format will be 32-bit integer
-twotheta X	2-Theta angle in degrees. Default is read from the image header
-uchar	Input file is raw binary unsigned chars (1 byte/pixel)
-underload N	Threshold below which to show small pixel values. May also be set in Properties Window.
-uint	Input file is binary unsigned integers (4 bytes/pixel)
-ushort	Input file is raw binary unsigned shorts (2 bytes/pixel)
-verbose	More verbose text messages
-visual Visual	Visual Class or ID to use. See xdpyinfo(1) or glxinfo(1).
-wavelength X	X-Ray wavelength in angstroms. Default is read from the image header.

Environment Variables

ADXV_DISPLAY_PORT	Port to listen for a socket connection. Default is 8100. Also set with –socket command line argument
ADXV_PATTERN	Pattern to list new images in the Load Window. Default is *.img.
ADXV_SHOW_PIXELS	Pixel overload value. Pixels larger than this are drawn in yellow. Default is 65000, but may be changed in the Property Window.
DISPLAY	Set the default host and display number.
MARHOME	If $MARHOME/fonts exists then this will be prepended to the X Font Path. See -nofp.
NO_ADXV_BEAM_CENTER	Do not read or write the .adxv_beam_center file
XFORMSTATUSFILE	File which specifies images to automatically load (see the -autoload command line option).
OMP_NUM_THREADS	Maximum number of threads to use when the -parallel command line option is used. Max is 16.