Data Browser: User Manual

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Contents

Introduction

The Data Browser is the main data visualization module in DAVE. It also has basic data manipulation functionality. In the following sections a brief description is given for some of the main tasks that can be performed with this application, from loading data to generating a hard copy of the final results. The included screenshots were taken on Windows XP – there may be minor differences in appearances compared to other platforms.

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Launching the Data Browser

The Data Browser is launched from the Visualization menu in DAVE as shown in the screenshot.
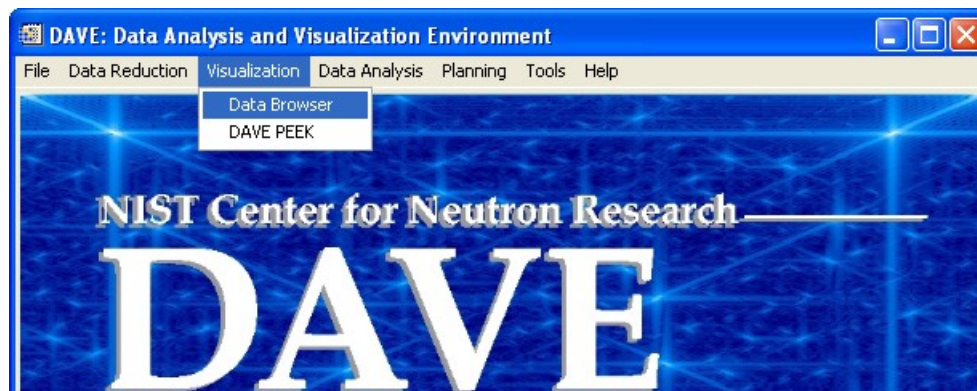
When launched, the main interface shown below is displayed.

Launching the Manual

An electronic version of this manual is available in pdf and is distributed with DAVE. The document can be viewed by clicking the <u>User Manual</u> button on the left pane of the main interface shown above.

Loading and removing data

Select the <u>Load Data</u> button from the main Data Browser interface. A file selection browser is displayed as shown. (The initial folder will be set to the DAVE **working directory** defined from the <u>File</u> menu of the DAVE main interface). Navigate to the folder containing the data to be loaded. Select a file – multiple files can be selected by holding down the control or shift key – and click on the <u>Open</u> button to load the selected file(s) or <u>Cancel</u> to exit without loading. Only DAVE format (.dave) files are supported by the Data Browser.

After loading, files are *automatically* sorted into two categories in the tree view located in the left pane of the main dialog of the Data Browser. Data with one independent variable (1D) are displayed in the **1-D Data** branch. Data with two independent variables (2D) are displayed in the **2-D Data** branch as indicated in the screenshot. The tree wid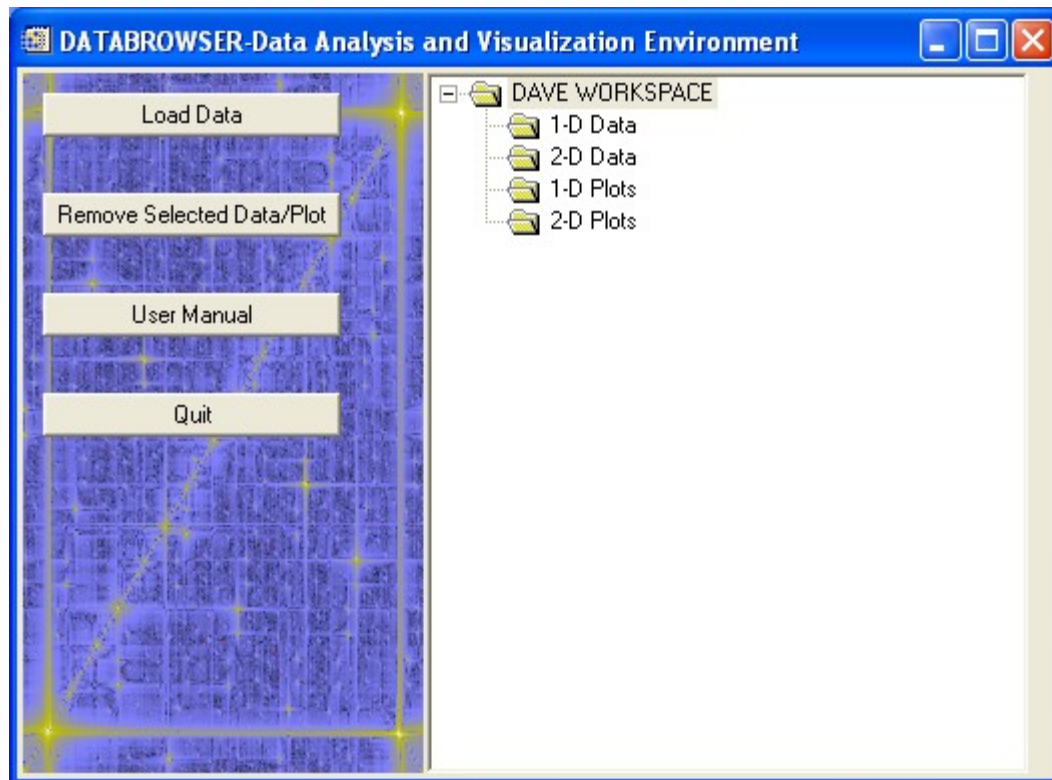get leaves representing the dataset are labeled with the base filename (without the .dave extension) from which the data was read from. The default labels can be changed later – see Modify dataset name/label section.

Datasets can be deleted or removed from the Data Browser by first highlighting the desired item(s) from the tree widgets and then clicking on the <u>Remove Selected Data/Plot</u> button. Note that you will unable to delete an dataset that is being used in a visualization. The visualization will have to be deleted first.
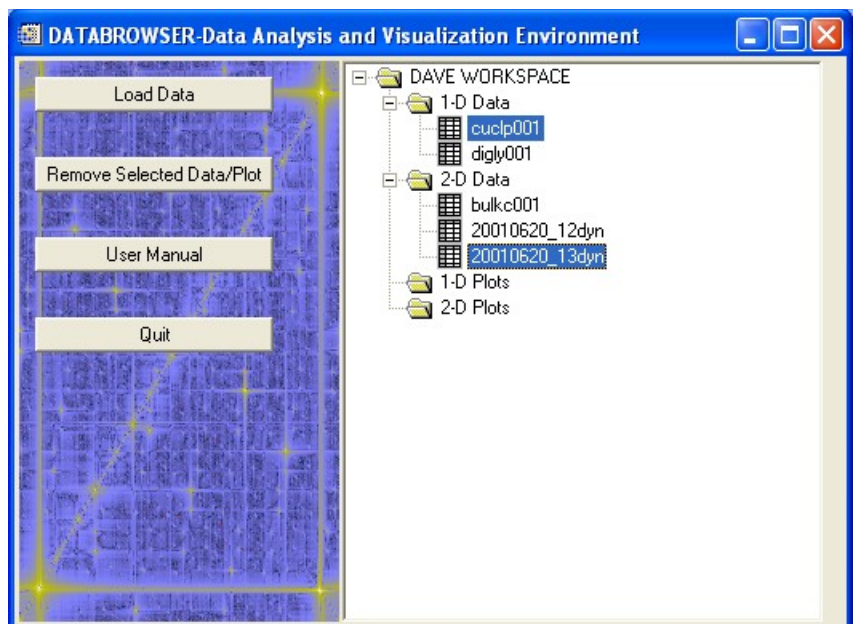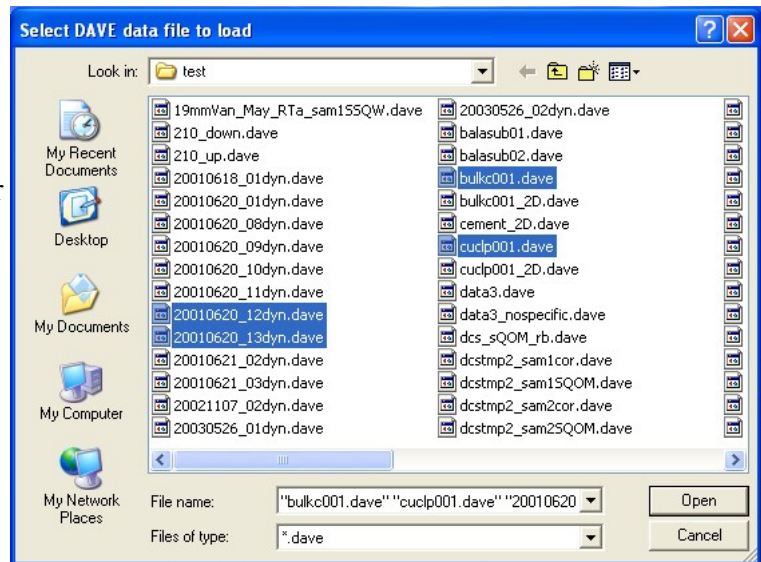
Context sensitive Menus

Context sensitive menus are used extensively in the Data Browser. All items listed in the tree view have menus associated with them. The menu is activated by clicking with the right-mouse button on a highlighted item or group of items that share a similar category. The pop-up menu that is displayed indicates the valid actions that can be performed on the selected item(s). No context menu will be displayed if there are no valid actions available for the selected item(s). The two screenshots below show context menus for a single 1-D data (top) and multiple 1-D data (lower). Note the differences between the two. Context sensitive menus are used throughout the Data Browser – simply click the right-mouse button on any item to find out if a pop-up menu is available.
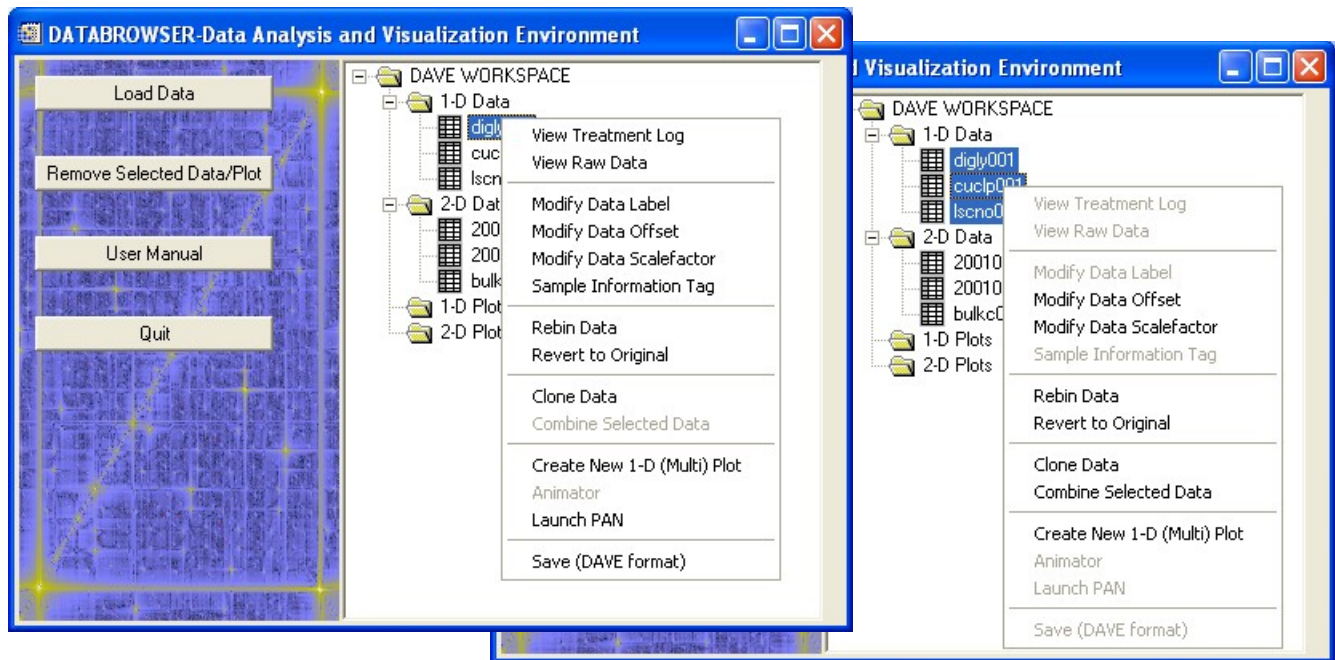
Dataset operations

View raw data

This option allows one to view the actual raw data contained in the dataset. Right-click on an item and select the View Raw Data option. When the mouse is released, a read-only view of the raw data together with some useful metadata will be presented in a new modal dialog window. You will have to dismiss the data display dialog after you are through with the inspection before you can execute any other action.

View data treatment log

This option displays the treatment log recorded so far for this dataset. Usually any significant modifications to the dataset is recorded. Right-click on an item from the tree view and select the View Treatment Log

option. The treatment history for the selected dataset will be displayed in a new modal dialog window.

Modify dataset name/label

The label by which a dataset is identified in the tree structure can be modified by right-clicking on the dataset and selecting the Modify Data Label option. A modal dialog will be displayed as shown. Enter the new label in the text field and then click on the Accept button to keep the changes or the Cancel button to discard the changes. If modified, the tree item will be updated with the new label.

Modify data offset (1D only)

It is possible to apply an arbitrary offset to the data (counts) in a dataset. However, this is only allowed for 1D datasets. Applying an offset can be useful in differentiating several plots included in a single multi-plot. Right-click on the 1D dataset(s) to be modified and select the Modify Data Offset option. The dialog shown to the right will be displayed. If multiple datasets were selected then use the drop-down list to make selections. For each dataset, its current offset will be shown – enter the desired offset in the New offset field and then use the *Enter* key on your keyboard to complete the entry (the *Enter* key must be used to complete the entry otherwise the previous value will be used). Repeat this for all the datasets available in the drop-down list. When satisfied, exit with the Accept button to commit the changes or the Cancel button to discard the changes.
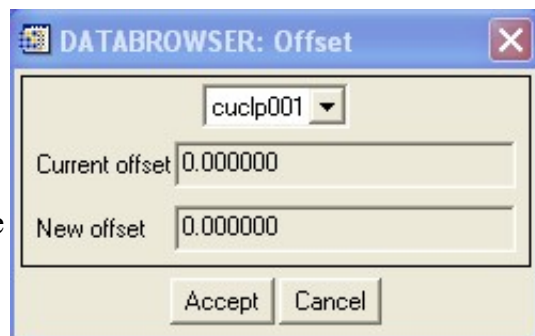
If a dataset is currently being utilized in a visualization, then changes to the offset property will cause the visualization to updated itself.

Modify data scalefactor

It is possible to apply an arbitrary scalefactor to the data (counts) in a dataset. This can be useful for normalization purposes, for example. Right-click on the dataset(s) to be modified and select the Modify Data Scalefactor option. The dialog shown to the right will be displayed. If multiple datasets were selected then use the drop-down list to make selections. For each dataset, its current scalefactor will be shown – enter the desired scalefactor in the New scalefactor field and then use the *Enter* key on your keyboard to complete the entry (the *Enter* key must be used to complete the entry otherwise the previous value will be used). Repeat this for all the datasets available in the drop-down list. When satisfied, exit with the Accept button to commit the changes or the Cancel button to
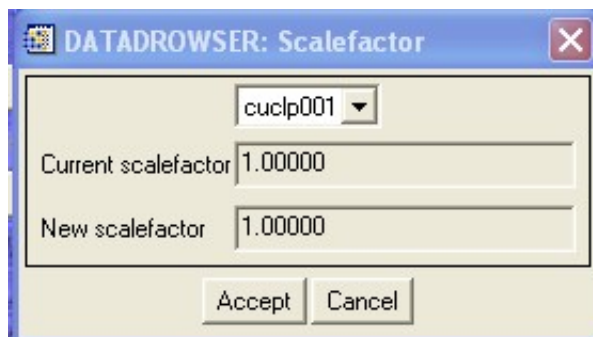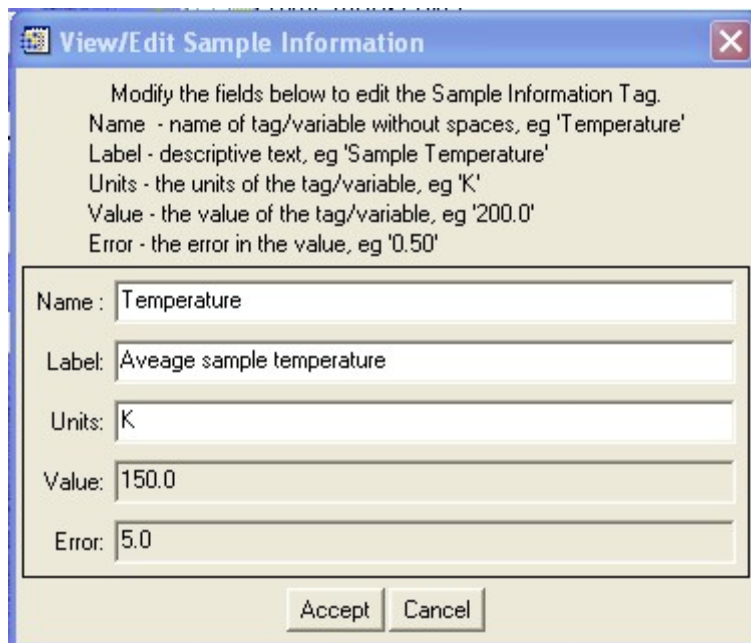
discard the changes.

If a dataset is currently being utilized in a visualization, then changes to the scalefactor property will cause the visualization to updated itself.

Modify sample information tag

Use this option to view or modify the sample information tag – a user-defined label for a dataset. This tagging consists of a name, description and value. For example a user might make several measurements of a particular sample at different temperatures. The labeling may be used to identify these measurements as part of a series.

To begin, right-click on the dataset whose tag is to be modified or viewed and select the Sample Information Tag option. The dialog to the right will be displayed showing several attributes that make up the tag. If the dataset was already labeled, the current values of the attributes will be displayed otherwise default null values will be shown. If necessary, modify the attributes using the following guidelines:

View/Edit Sample Information

Modify the fields below to edit the Sample Information Tag.
Name - name of tag/variable without spaces, eg 'Temperature'
Label - descriptive text, eg 'Sample Temperature'
Units - the units of the tag/variable, eg 'K'
Value - the value of the tag/variable, eg '200.0'
Error - the error in the value, eg '0.50'

Name : Temperature

Label: Aveage sample temperature

Units: K

Value: 150.0

Error: 5.0

Accept   Cancel

Name – name of tag. This is significant and is used to associate many datasets as belonging to the same category. In the example above, the user might enter the name 'Temperature'. All datasets in the same category should have the same Name tag!

Label – descriptive text. This is insignificant and simply provides a means of describing the tag.

Units – the physical units of the tag, if applicable eg K in this case

Value – the value of the tag. Eg 150 if that was the temperature.

Error – error in the value, if applicable.

When satisfied, exit with the Accept button to commit the changes or the Cancel button to discard the changes. Although the specifying the sample information tag is optional, if present some applications within DAVE do make use of it. For example the Data Browser is able to combine datasets that belong to the same series to produce a composite dataset.

Cloning a dataset

Used to make an identical copy of a dataset. Right-click on the dataset to be cloned and select the Clone Data option. An identical copy of the dataset will be created and placed in the same branch but as the original. The new dataset will share the same name as the original plus a prefix 'Copy of'.

The created dataset can easily be removed as described in the ***Loading and removing data*** section.

Data rebinning

Used to rebin the a dataset with respect to the independent axis(es). Right click on the dataset(s) to be rebinned and select the Rebin Data option. A modal dialog will be displayed as indicated below: the top screenshot shows the dialog when a single 1D dataset is selected and the bottom one when multiple 2D datasets are selected. In both cases, the current binning of the data are shown and there are field available to specify the following parameters:

- Bin settings (minimum,maximum,width). Avoid specifying a new bin width that is smaller than the intrinsic bin width of the data. Do not forget to use the Enter key to complete changes made in text fields (the previous values will be used if you fail to do so).

- If multiple datasets were selected, use the drop-down list to make selections. Also, if you wish to apply the same bin settings to all the datasets that were selected prior to launching the module, then click on the Apply these settings to all datasets button. You can check that this has been done by choosing another dataset from the drop-down list and inspecting the new settings.

- If the dataset is 2D, then use the *rebin axis* section (in bottom screenshot) to specify the rebin axis (along which the data will be rebinned).

- If the *Truncate data over specified bin range* box is checked, then the rebinned data will be truncated to the minimum and maximum values of the independent axis values specified. If unchecked, then data outside the rebinning range will remain untouched in the final output.

When satisfied, exit with the <u>Accept</u> button to commit the changes or the <u>Cancel</u> button to discard the changes. If the dataset is currently being utilized in a visualization, any change in the data will cause the visualization to updated itself.

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Taking data slices/cuts (2D only)

Take a slice or cut from a 2D data along either of the independent axis, integrating along a user specified range along the cut axis. A new 1D dataset is produced as a result of the cut. Right click on the dataset from which the cut is to be made and select the <u>Cut Data</u> option. A modal dialog will be displayed as indicated below.
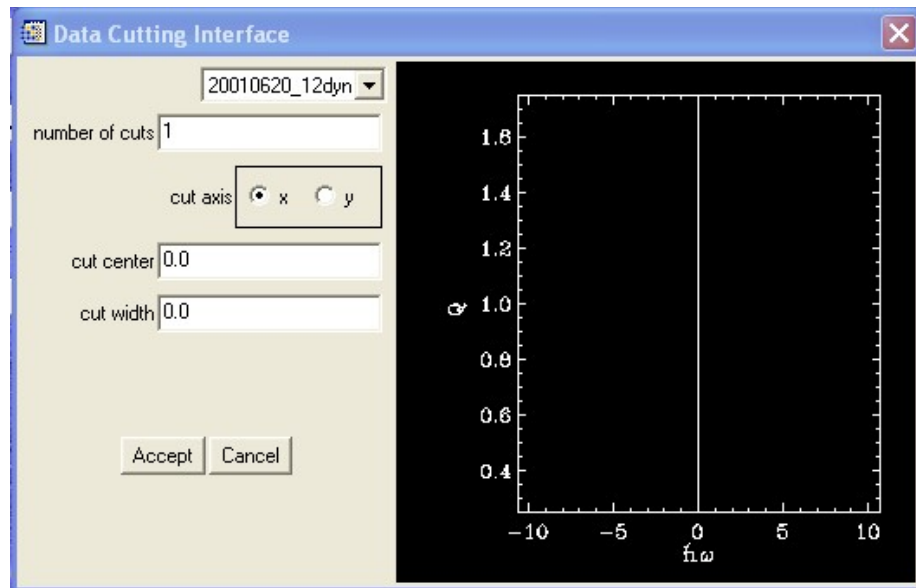
The left part of the dialog shows editable cut parameters and the right part gives a visual representation of the cut parameters – it is also possible to use the graphics window to specify the cut parameters. The x and y axis scales and labels reflect the data contents. To perform a cut, you will need to specify the following (please, use the Enter key to complete text field entries:

- Cut axis. Choose the cut axis. This indicates the axis along which the cut will be performed (the integration will be performed along that axis). A vertical line will appear in the graphics area perpendicular to the cut axis.

- Number of cuts. The default is 1 but it is possible to make multiple slices of the data at the same time. Simply enter the desired number in the field. If a number greater than 1 is entered, a new slider will appear in the dialog (this is indicated in the next screenshot below).

- Cut number. Only applies if multiple cuts are being requested. Use the slider to cycle between the different cuts before specifying the cut parameters (next).

- Cut center and width. Specify the cut center and width in the text fields and press the Enter key – a visual representation of the cut range will be indicated in the display area. Alternatively, click on the left mouse on the graphics area and drag to locate the cut center; click and drag the right mouse to specify the cut width. If multiple cuts are to be performed, repeat this process after cycling to a

different cut number using the slider.
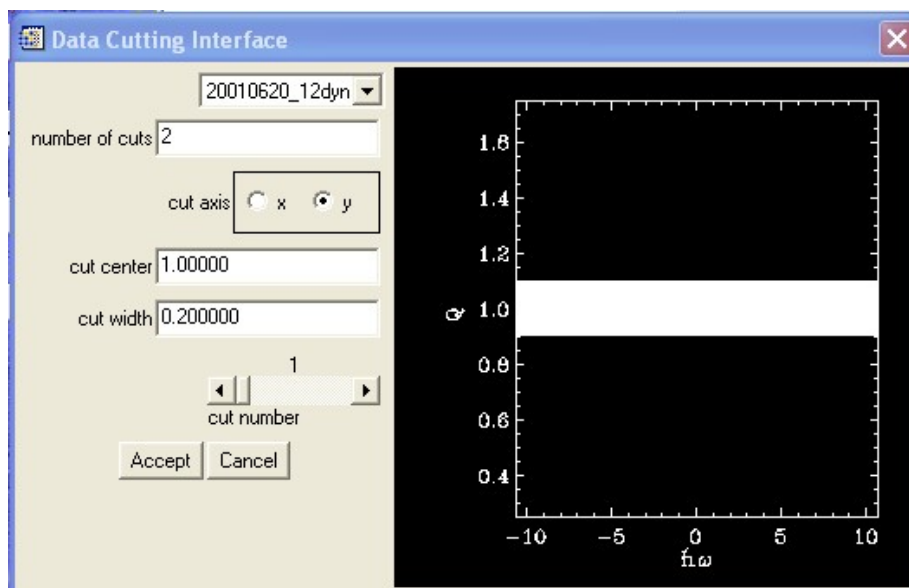
On completion, the dialog may be similar to the above screenshot. In this case, 2 cuts are being performed on the y-axis (Q). The first cut consists of an integration along the y-axis from $0.9 < Q < 1.1$ ($Q = 1.0 \pm 0.2$).

When satisfied, exit with the <u>Accept</u> button to commit the changes or the <u>Cancel</u> button to discard them. If the changes were accepted, then the sliced data will be created in the 1-D Data branch of the tree widget. The new 1D datasets will have the same name as the 2D data but with a prefix ***cut_<cut_number>***. In the situation indicated in the screenshot above the 1D datasets created will be cut_0_20010620_12dyn and cut_1_20010620_12dyn. It is advisable to use the <u>Modify dataset name/label</u> operation to rename the datasets to something more meaningful.

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Extracting spectra (2D only)

Use this operation to extract individual spectra (along both x and y axes) from a 2D dataset. The results are new 1D datasets. Right-click on the dataset from which the spectra are to be extracted and select the <u>Extract Spectra</u> option. The modal dialog shown will be displayed.

First choose the independent axis for the selected spectra (the extracted data will have this axis as its independent axis)

Then specify the spectra numbers (using a 1-based index) – make use of ranges as indicated in the dialog.

When satisfied, exit with the <u>Accept</u> button to commit the changes or the <u>Cancel</u> button to discard them. If the changes were accepted, then the extracted spectra will be created in the 1-D Data branch of the tree. The new 1D datasets will have the same name as the 2D data but with a prefix: ***spec<index>_of_<x|y>-axis_***. For example if the x-axis was selected and spectrum 1 was specified in the above dialog, the 1D datasets created will be spec1_of_y-axis_20010620_13dyn. It is advisable to use the <u>Modify dataset name/label</u>

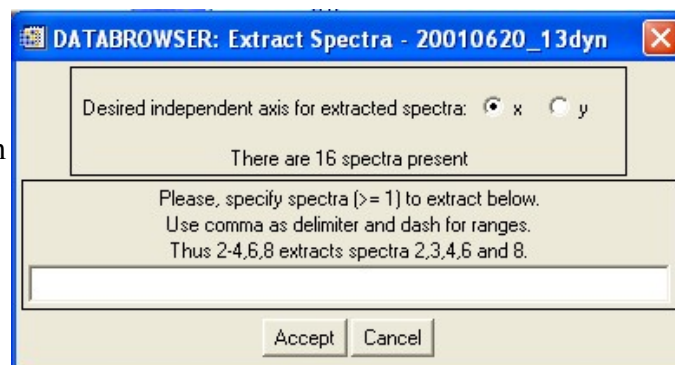operation to rename the dataset(s) to something more meaningful.

Transpose 2D data

Used to take the transpose of a 2D dataset's data. In addition, the independent axes are swapped. Right-click on the dataset to be transposed and select the Transpose Data option. The data will be transposed as described.

If the dataset is currently being utilized in a visualization, this change will cause the visualization to updated itself.

Combining datasets

Use this operation to combine several 1D datasets into a single 2D dataset. The 1D datasets can also be created on the fly from the same slice/cut of multiple 2D datasets. The information present in the sample information tag for each dataset is used to form the second. Independent axis of the combined data. It is therefore not possible to combined datasets for which one or more of them do not have their information tag/label defined. Furthermore, it is required that the datasets have **the same tag name** but **different tag values**. If these conditions are not satisfied, appropriate warning messages will be displayed.

Use the Sample Information Tag operation to ensure the above conditions are satisfied then proceed as follows.

Starting from multiple 1D datasets. Select the 1D datasets to be combined, right-click on the selection and choose the Combine Selected Data option. If all sample information tag preconditions are satisfied, then a new 2D dataset is created in the *2-D Data* branch of the tree.

Starting from multiple 2D datasets. Select the 2D datasets to be combined, right-click on the selection and choose the Combine Selected Data option. A cut data dialog will appear (see Taking data slices/cuts operation) for you to specify the data slice to be taken from each 2D dataset before proceeding to combining them. If all sample information tag preconditions are satisfied, then a new 2D dataset is created in the *2-D Data* branch of the tree

The default name of the new 2D dataset is ***Combined data <index>*** where index is an automatically generated number. Use the Modify dataset name/label operation to rename the dataset(s) to something more meaningful.

Undoing dataset modifications

Used to revert all modifications that have been made on a dataset. Unfortunately, it is not possible to simply undo the last change – using this feature will restore the dataset to it's pristine copy as originally read from disk. Right-click on the dataset to undo all changes and select the Revert to Original option. The data will be reverted to it's original version.

If the dataset is currently being utilized in a visualization, this change will cause the visualization to updated itself.

Least-squares fit (PAN)

Use this option to send a dataset to the PAN data analysis module for fitting. Right-click on the dataset to be fitted and select the Launch PAN option. PAN will be started with the selected dataset already loaded.

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Saving datasets to DAVE format file

Right-click on the file to be saved and select the Save (DAVE format) option. Specify the desired filename in the file dialog that is displayed – the default filename is the original filename from which the data was read, where applicable.

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# Visualizing 1D data

Creating line/symbol (multi-)plot

Line (or symbol) plots of 1-D data can be easily generated by performing the following actions:

- Select the data of interest using the left mouse from the **1-D Data** branch of the tree view. Multiple data can be selected.

- *Click and release* the right mouse on the highlighted item(s) to display the context menu.

- Move down along the pop-up menu to the item labeled Create New 1-D (Multi) Plot and select this by clicking on it.

- A new window will appear with a plot of the selected data and a new entry is created in the **1-D Plot** branch of the tree view. The initial defaults should be similar to the following screenshot where two datasets were selected from the **1-D Data** container and plotted.

The default plot naturally requires some modification before it can be declared satisfactory. The default plot depends on the contents of the dataset(s) being displayed. In this example data from HFBS which are collected in point mode are being displayed (the data collection mode for DCS is histogram so the default plot mode would be histogram). The default legend, title, axis labels and ranges all require some tweaking. Error bars can be switched on; plot attributes (color symbol type etc) call all be customized.

After making some changes, the end results are shown in the lower screenshot. Please, visit the relevant sub-section underneath Visualizing 1D data to learn how to customize a 1D visualization.

Note that after the visualization has been created, any modifications to the data will alter the visualization. For example if the data is rebinned.
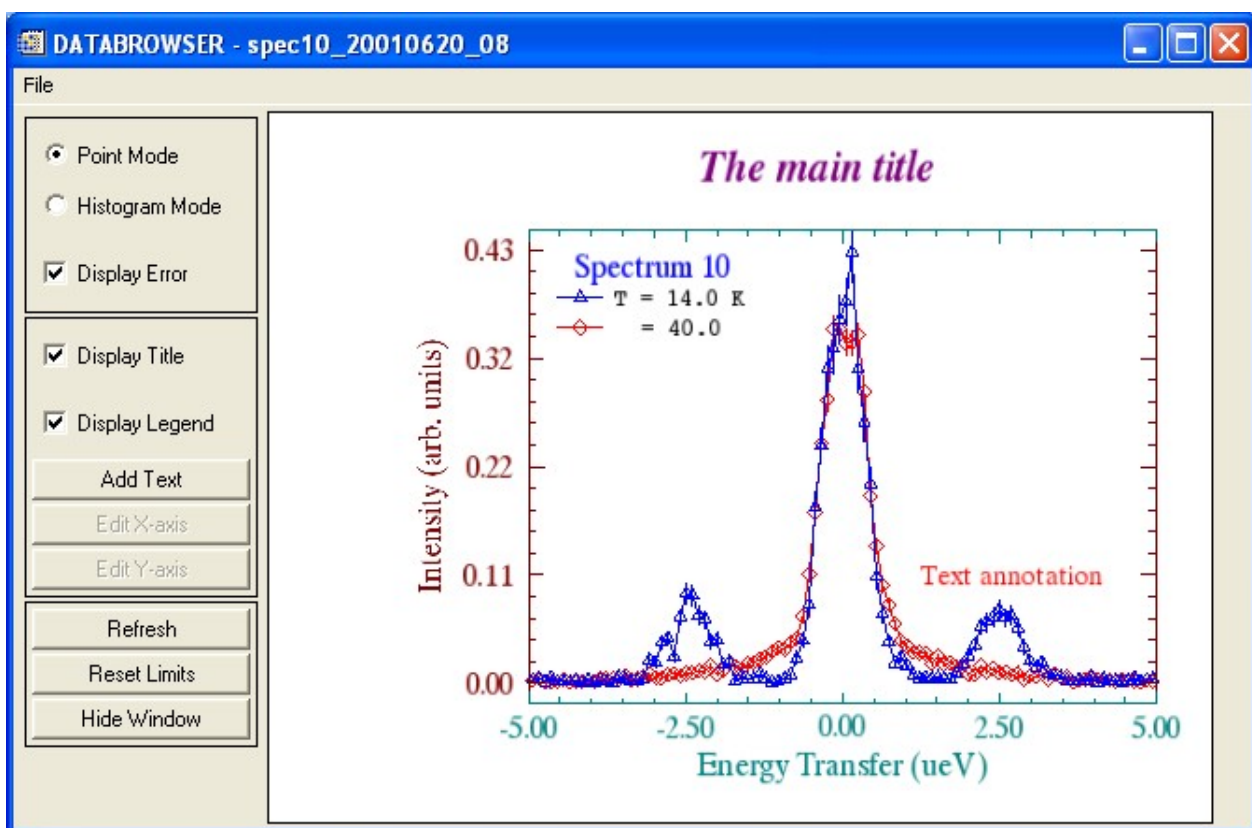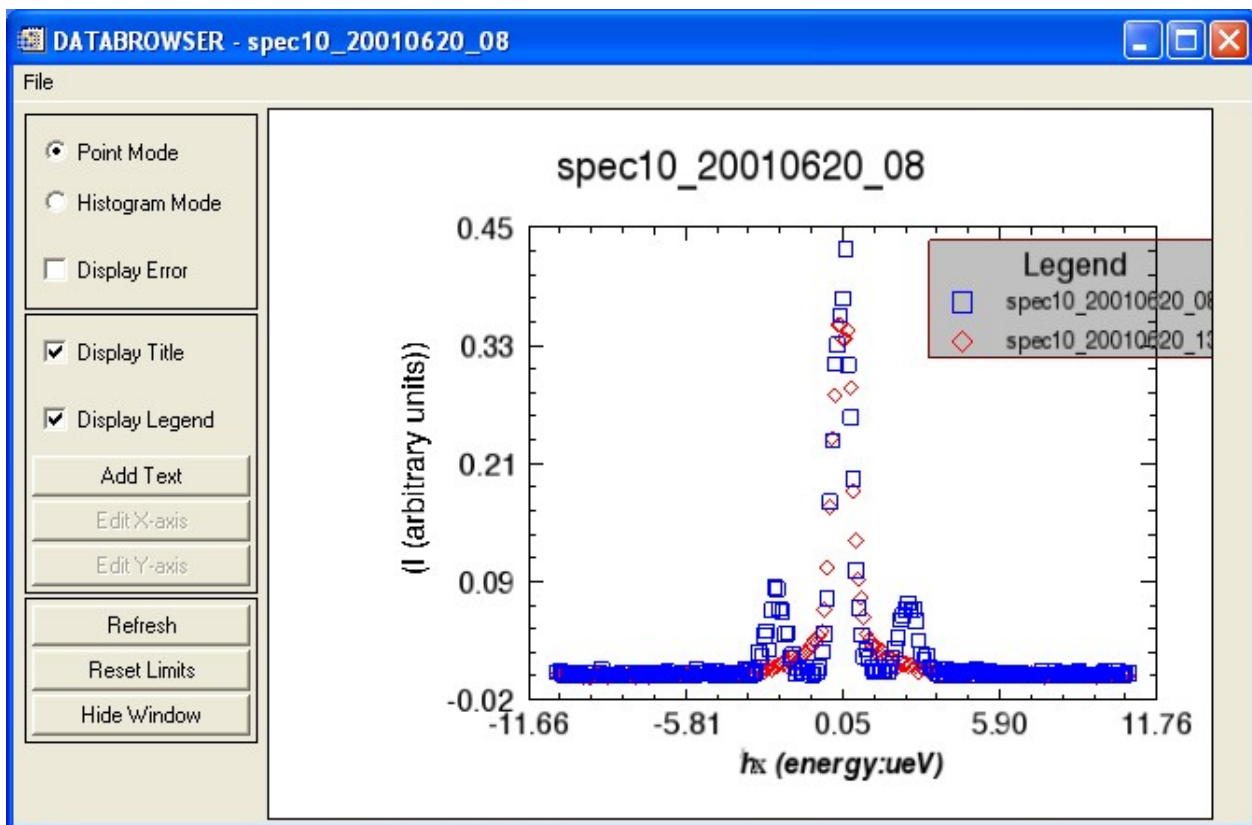
Toggling between point/histogram mode

The default mode for a 1D plot is determined by the collection mode of the data as specified in the dataset. To force a change of mode, select the <u>Histogram Mode</u> radio button for histogram display or the <u>Point Mode</u> radio button for point display. These buttons are located in the top left section of the main visualization window. The plot will be updated – if switching to histogram mode, the plot type will also be changed to line.

Displaying data errors

Data uncertainty in are not displayed by default. To switch this on, toggle the <u>Display Error</u> check button located in the top left section of the main visualization window. The plot will be updated with errorbars.

Enable/disable main title

The main plot title (the data or z-axis label) is displayed by default when a new plot is created. It is possible to toggle it off/on by unchecking/checking the <u>Display Title</u> check box located on the left area of the visualization window. To edit the title text, see the <u>Editing title and text annotations</u> section.

Enable/disable plot legend

A plot legend is displayed by default when a new plot is created. It is possible to toggle it off/on by unchecking/checking the <u>Display Legend</u> check box located on the left area of the visualization window. The plot legend will displayed or hidden as requested. To edit the legend, see the <u>Editing plot legend</u> section.

Adding text annotations

To add a miscellaneous text annotation to a plot visualization, click on the Add Text button located on the left area of the visualization window. A new text label (with text 'New text') will appear at the bottom left corner of the graphics window. Use the context sensitive menu to modify it as described in the <u>Editing title and text annotations</u> section.

Editing title and text annotations

To modify a text annotation (including main title), right-click on the text and select an attribute to modify directly or choose the <u>Properties...</u> option if you wish to make several changes at the same time. If the Properties... option is selected, the non-modal dialog indicated below will be displayed. There are two tabs in the dialog an <u>Attributes</u> tab for modifying the text attributes and a <u>Location</u> tab for moving/positioning the text in the graphics window.

The following can be altered from the attributes tab:

- Text. Modify the text to be displayed. Enter the new value in the text field. The entered value should be updated in the graphics window as you type.

- Color. Set the text color by selecting a new color from the drop-down list.

- Font. Select a new text font from the drop down list. Only a limited number of fonts families are available. Change to HERSHEY vector fonts if you wish to specify special characters by embedding formating commands within the text.

- Fontsize. Select a font size from the combo-box list. If your desired size is not present, you can enter a new value followed by the Enter key to complete the entry.

- Bold. Toggle between bold and normal.

- Italic. Toggle between italic and normal.
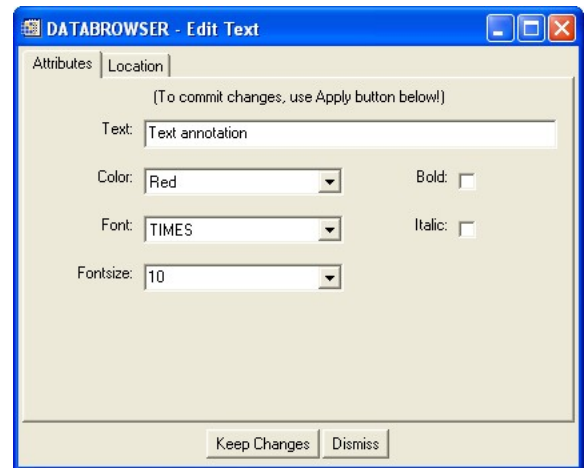
Select the Location tab to change the position of the text. Use the sliders to move the text along the x, y and z axes. Changing the z value of the text can move it in front or behind another object on the display.

When satisfied with the changes, use the Keep Changes button to save the modifications and close the dialog. The Dismiss button will also close the dialog but will delete all the changes that have been made to the text since the dialog was launched

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Editing plot legend

To modify plot legend, right-click on it and select the Properties... option. The non-modal dialog shown will be displayed. There are four tabs in the dialog. A General tab for setting the legend title and frame properties. An Item Attribute tab for setting attributes of the items in the legend. An Item Labels tab for specifying the text of the items in the legend. A Location tab for positioning the legend

General tab:

- Legend Title properties. Set the legend title, font, fontsize and color. Leave empty if you do not want a legend title to be displayed.

- Frame properties. Set the legend frame fill color, edge color and line thickness. Use the same edge color as the background color of the graphics window if you do not want the frame outline to be seen.
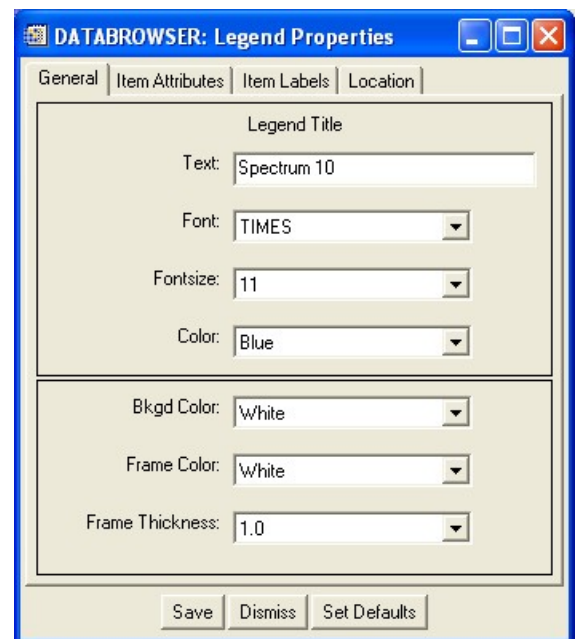
Item Attributes tab:

Use this to set the common properties of the items in the legend. This includes the font family, size and

color; the glyph (symbols) width and the spacing between legend items.

Item Labels tab:

Set the text to be displayed for each legend item. A separate field will be available for each item.

Location tab:

Position the legend by using the sliders to move it along the x and y axes.

As usual, when satisfied with the changes use the Save button to keep the changes and close the dialog. Use the Dismiss button to close the dialog and discard all the changes made. Use the Set Defaults button to revert all quantities to their default values.

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Editing axis properties

Right-click on the axis to modify and either perform a single modification by selecting a new value for one of the many attributes directly or select the Properties... option to make multiple changes at the same time. If Properties... is selected then the non-modal dialog shown to the left will be displayed. The dialog contains 3 tabs; in the Label Text tab, the axis label is set; in the Range tab, the display range for the axis can be set and in the Format tab, additional formating controls can be set. Whenever any change is made, you must press the Apply button to *commit the change and to update* the graphics display.

Label Text tab:

Here, the axis label text can be entered in the text field provided. The font family font color, font size and other font attributes (bold and/or italic) can be set.

Range tab:

If the Use custom range settings check box is set, then it will be possible to specify the minimum, maximum and step size for the axis range to be displayed in the fields provided. By default, the display range spans the entire axis data. (To change axis scale from log to linear and vise versa, close the dialog, right-click on the axis and select the Log Scale or Linear Scale option as appropriate.) If the display range is set in this way (as oppose to using rubber-band zooming) then it can only be undone by using the Set Defaults button as described next.

Format tab:

The number of minor tick marks, tick length, tick direction and the precision (number of decimal places) to which the axis labels should be displayed can be set here.

Whenever a change is made, remember to use the Apply button to commit changes and update the graphics display.

When satisfied with the changes you wish to make, use the Dismiss button to close the dialog.

To revert to the default values for the axis range, use the Set Defaults button. Fonts and other attributes are not affected!
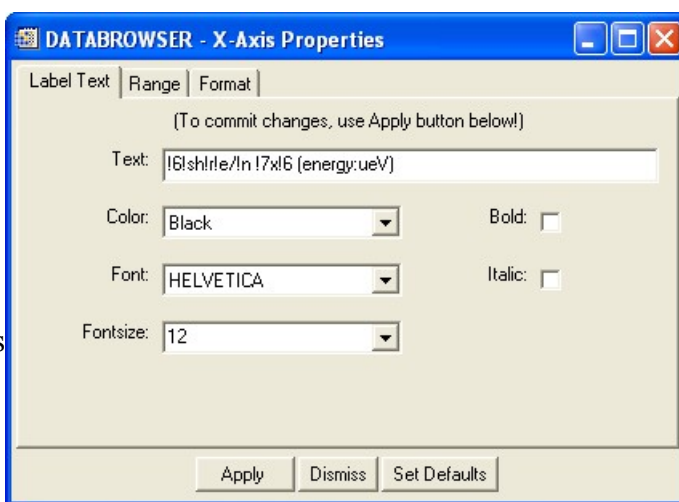
Rubber-band box zooming

This provides a fast an effective means of zooming into a region of interest of the plot by using the mouse to define it. Press and hold down the left mouse button to define an origin for the region of interest. Drag the mouse while still holding the left mouse button – a box will be drawn representing the region of interest as shown in the screenshot. When satisfied with the box size, release the mouse – a new plot is created with the dimensions of the box defining the x and y limits.
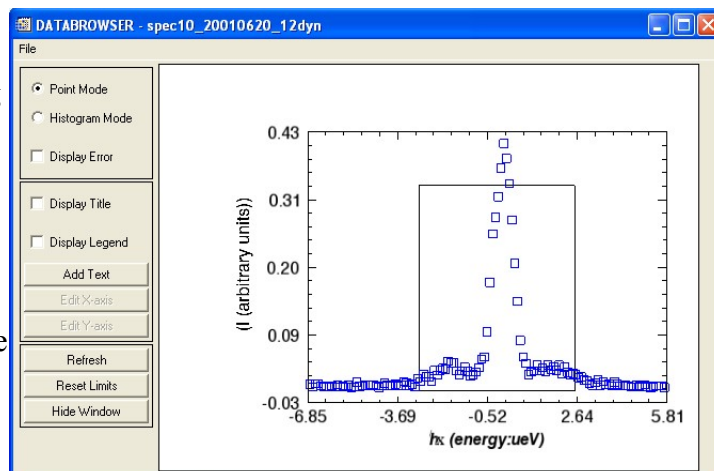
Multiple zoom levels are possible by repeatedly defining rubber-band boxes as long as there is at least one data point present in the region of interest.

To undo (all levels) of the rubber-band zoom, press the Reset Limits button located on the bottom left side of the main visualization window.

Setting data display range

Use this option to set a more permanent (compared to using rubber-band zooming) axis display range Right-click on the axis and select Properties...

Choose the Range tab in the dialog that is displayed.

Make sure the Use custom range settings check box is checked.

Set the desired minimum, maximum and tick interval in the fields provided.

Use the Apply button at the bottom of the dialog to commit the changes and to update the plot. (You use the Set Defaults button to revert to the default axis data range.)

When satisfied with the changes, use the Dismiss button to close the dialog

Resetting data display range

If the display range was set using rubber-band zooming then reset it using the Reset Limits button located on the bottom left of the main visualization window.

If the range was set using the axis Properties... dialog, then re-launch the dialog by right-clicking on the axis and selecting the Properties... option. Click on the Set Defaults button and then click on the Apply &Exit button to commit the changes and close the dialog.

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