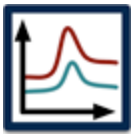
Plot



version 0.99
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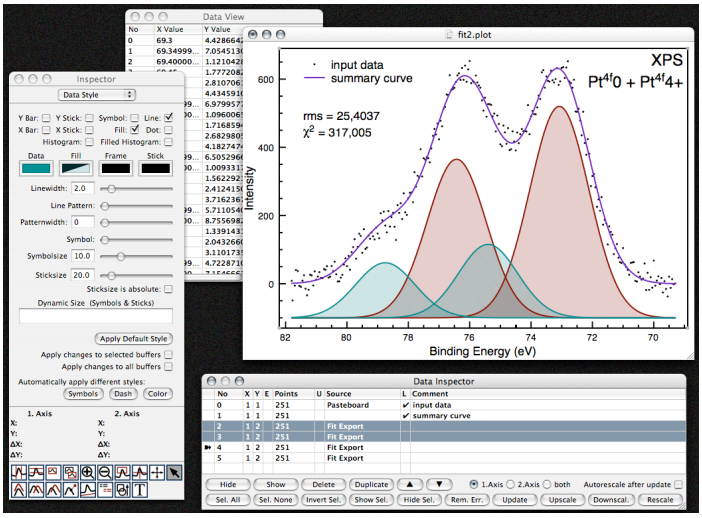
Table of Content

1. Plot Introduction

This documentation is valid for *Plot* version 0.99



Screenshot

Plot is a scientific 2D plotting program for Mac OS X. Plot is a completely rewritten descendant of *SciPlot* which was a plotting program for NeXTStep.

Plot is designed for everyday plotting, it is easy to use, it creates high quality plots, and it allows easy and powerful manipulations and calculations of data.

Basically *Plot* allows to work with multiple documents where every document consists of one or more XY data sets (called buffer in *Plot*). Unlike some other programs each XY data buffer is independent (without are shared X axis or so). In addition it is also possible to save individual X and Y error values for each data point.

There is also the possibility to add subviews (plots inside plots) to your document. A subview is completely independent with its own data buffers, graphic attributes etc.

Data can be imported from **ASCII** or **binary files**, directly from a **MySQL database**, with a ***Perl* based** import filter or from old *SciPlot* files. It is also possible to insert data buffers by using copy and paste from other programs (e.g. Excel)

Plot supports many plotting styles like lines, symbols, grids, bars, filled areas, sticks, dots, histograms, errorbars, automatic legend, text and graphic objects, etc.

Plot has many data manipulation methods integrated: curve fitting, spline fit, fft smooth, least square smooth, spline interpolation, differentiation, integration, FFT, least square regression, normalizing, moving, data calculations, function generator, etc.

The data buffers are managed by the ***Data Inspector***.

To make plotting easy many attributes (e.g. axis ranges, axis labels) will be generated automatically but it is possible to change most graphic attribute by hand.

The main tool in *Plot* is the ***Inspector*** which controls all attributes of your document, show measured values and allow the **mouse mode** selection. The ***Inspector*** also controls the graphic attributes of the data buffers.

There is also a tool called ***Data View*** which allows direct manipulation of data points in a spreadsheet like table.

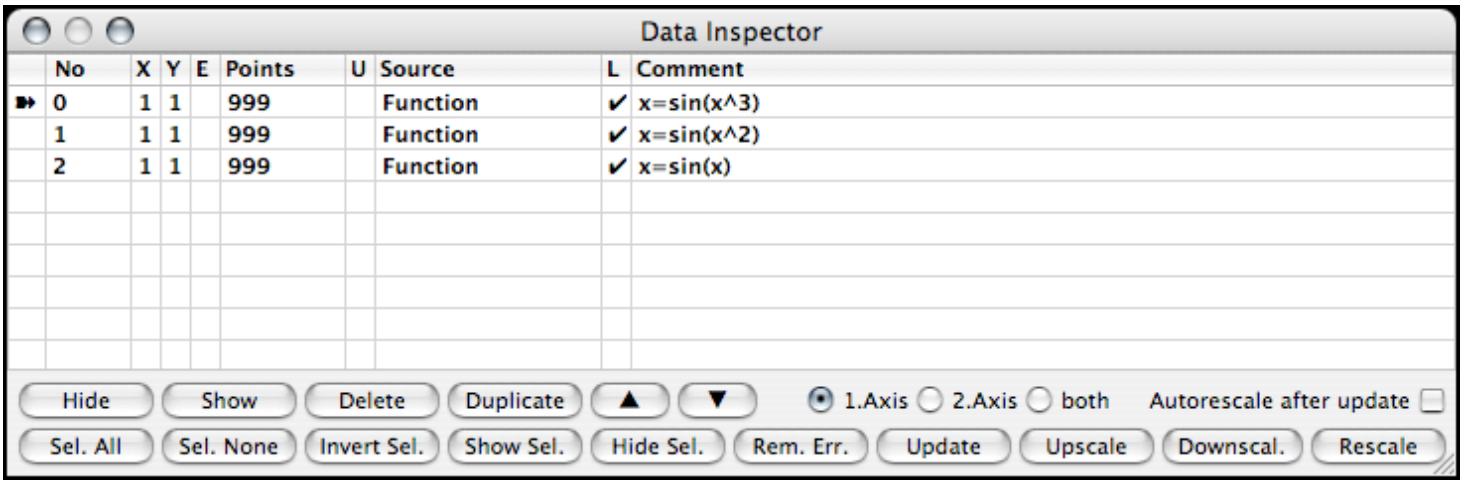
Plot has also a builtin **programming interface** which allow editing of ***Plot* macros**, ***Perl* import filters** and ***Perl* data filter**. The **macro language** has ~ 210 builtin commands and allow to automate complex tasks.

Last not least there is a ***Calculator*** for instant calculations.

Of course there are also several **menu items** which allow many operations.

2. Data Inspector

The *Data inspector* mainly controls the data buffer in your document. Each line represents a set of XY data. It is possible to select some buffers and transfer them via copy and paste to another *Plot* document.



Data Inspector

The columns in the *Data Inspector* show all important data about the buffer and allow some changes:

1. column: In this column appears an arrow which indicates the *working buffer*, e.g. if you select the *Data Style* Tab in the *Inspector* it show the attributes of the buffer with the arrow in front. Changing the working buffer is done by double clicking in this column.

No column: The number of the buffer. The buffer number can be useful for **macro programming**.

X column: Shows if the buffer belongs to the first (left) X axis or to the second (right) X axis of the plot. Can be changed by double clicking the column.

Y column: Shows if the buffer belongs to the first (bottom) Y axis or to the second (top) Y axis of the plot. Can be changed by double clicking the column.

E column: This column indicates that the buffer contains error values.

Points column: Number of data points in the buffer.

U column: Indicates if the buffer should automatically updated from dynamic data sources like *MySQL*. You can change the state by double clicking the column.

Source column: The source of the data. This column is editable.

L column: If checked the buffers comment will be shown in the automatically generated legend. You can change the state by double clicking the column.

Comment column: As the name says. This column is editable.

At the bottom of this inspector appears a gallery of buttons:

Hide and **Show** hides or shows all selected buffers. Hidden buffers will not displayed but the data are still available for later use. The hide/show state of a buffer can also be changed by double clicking the *Points* or *No* column.

Delete: delete all selected buffers.

Duplicate: duplicates all selected buffers.

Up, **Down**: with this buttons you can move the current working buffer up and down. The order in the *Data inspector* is also the order in which the buffer will be plotted and changing the order may also change the appearance of your document.

The **1.Axis, 2.Axis, both**: radio button defines if operations like rescale take effect on both axis or only on one of them.

If **Autorescale after update** is selected the document will be rescaled after an data update from dynamic sources like *MySQL*.

Sel. All: Select all buffers.

Sel. None: Unselect all buffers.

Invert Sel.: Inverts the buffer selection

Show Sel.: Shows only selected buffers

Hide Sel.: Hide only selected buffers.

Rem. Err.: This function removes error values from all selected buffer. For large buffers this can reduce the file size.

Update: Buffers with dynamic data sources like *MySQL* will be updated.

Upscale and **Downscal.**: Increase or lowers the range of the plot.

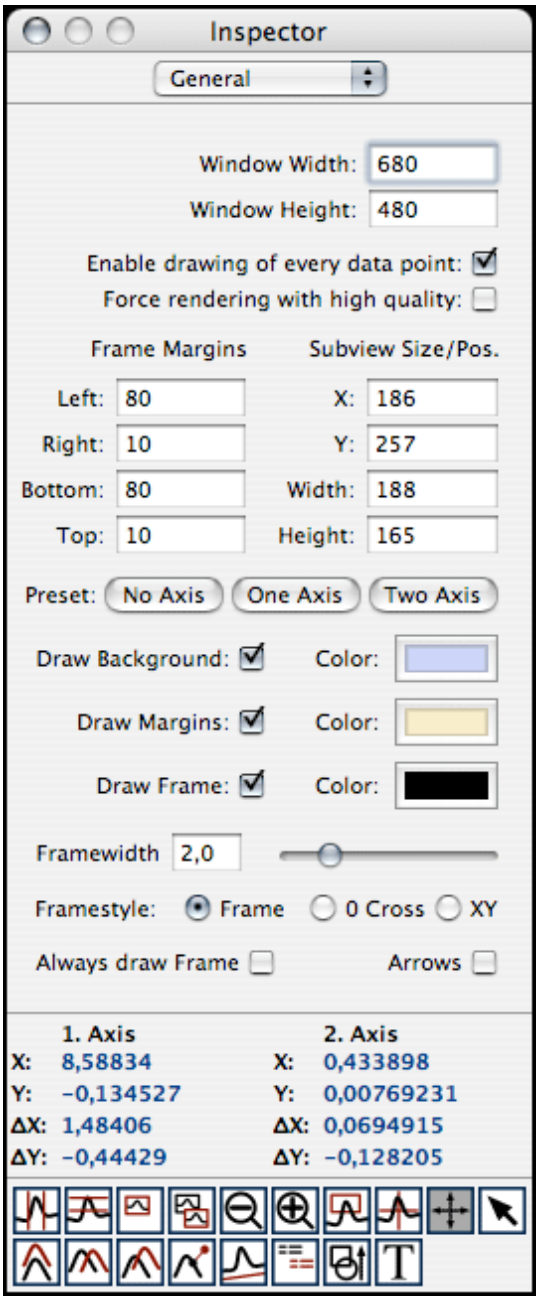
Rescale: Rescales the plot so that every datapoint is just visible.

3. Inspector

With the *Inspector* you can control every attribute of your document and data buffer. The *Inspector* is divided into three parts. The upper area is the main part with different tabs. The middle part show values e.g measured with the crosshair **mouse mode**. In the lower part of the *Inspector* you can select the **mouse mode** which controls the behavior of the mouse in your document.

The following *Inspectors* are available:

General Inspector
Data Style Inspector
Axis Inspector
Axis Format Inspector
Axis Labels Inspector
Error Bars Inspector
Legend Inspector
Calculations Inspector
Normalize Inspector
Spline Fit Inspector
Fit Inspector
Text Inspector
Graphic Inspector
Advanced Inspector



Inspector

4. General Inspector

The *General Inspector* controls some general attributes of your document.

Window Width, **Window Height**: The size of the window in pixel. Useful to generate two documents with the same size.

Enable drawing of every data point: If checked *Plot* draws always every data point. Typically *Plot* decides how many data points will be plotted and the result is reasonable. In some cases enabling this option can enhance your plot.

Force rendering with high quality: *Plot* automatically decides how to render your plot. Checking this option forces to render always in highest quality (which can dramatically slow down *Plot* on huge data sets).

Frame Margins: The margins between window and plot frame. You can use the mouse to control the framesize if you choose the select tool (see **mouse modes**).

Subview Size/Pos.: The size and location of the currently selected subview.

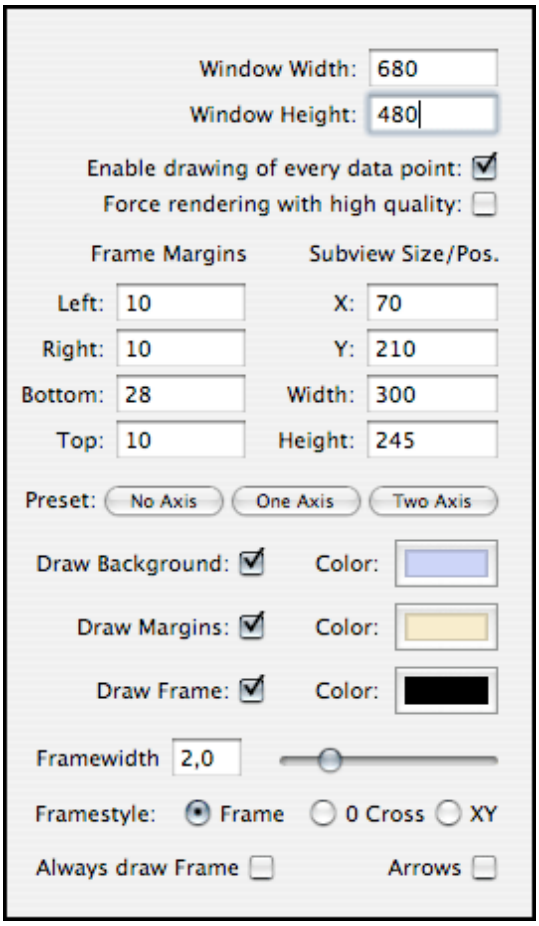
Preset: Allows easy selection of margin preset for plot with one or two axis.

Draw Background: Defines the background color inside the plot frame and if the background should be drawn or not.

Draw Margins: Defines the background color on the margins and if the margin background should be drawn or not.

Draw Frame Defines the color of the plot frame and if the frame should be drawn or not.

Framewidth: Defines the width of the frame.



General Inspector

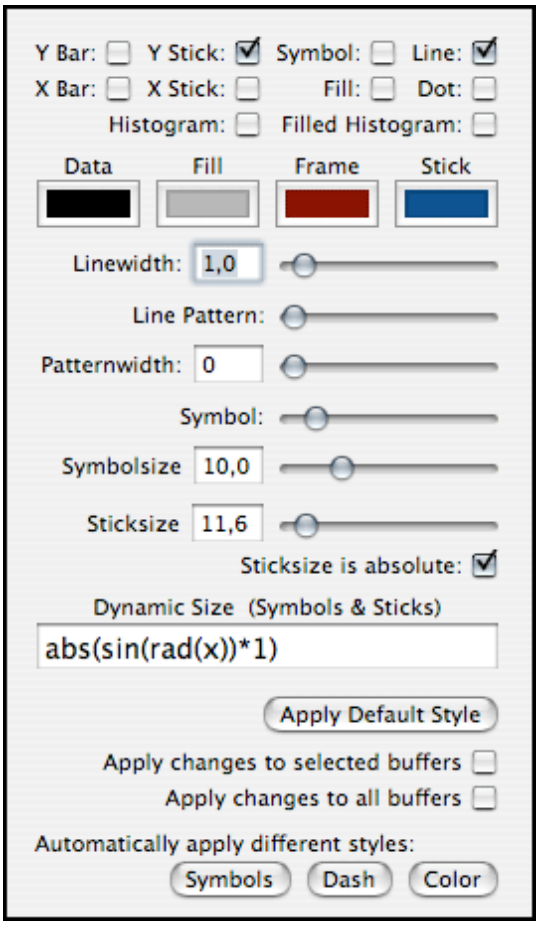
Framestyle: Allows to select different framestyles. If *Frame* is selected a full frame will be plotted, *XY* style plots only a line on the X and Y axis, *0 Cross* draws a XY cross at the null position.

Always draw frame: Forces to plot a full frame even if your framestyle is *XY* or *0 cross*.

Arrows: Draw arrows and the line ends for framestyle *0 Cross* and *XY*.

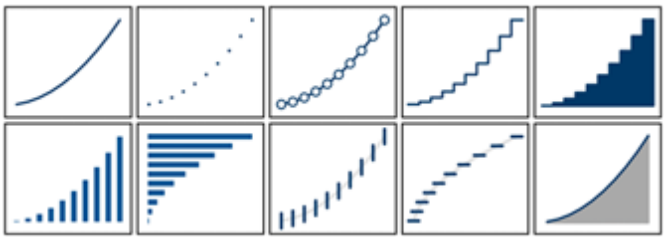
5. Data Style Inspector

The *Data Style Inspector* controls the graphic attributes of each data buffer.



Data Style Inspector

Y Bar, **Y Stick**, **Fill**, **Symbol**, **Line**, **X Bar**, **X Stick**, **Fill**, **Dot**, **Histogram**, **Filled Histogram**: Defines in which style a buffer should be drawn. All styles can be combined.



Lines, Dots, Symbols, Histogram, Filled Histogram, Y Bars, X Bars, Y Sticks, X Sticks, Filled Area

Data: Defines the color for the data points, symbols, lines etc.

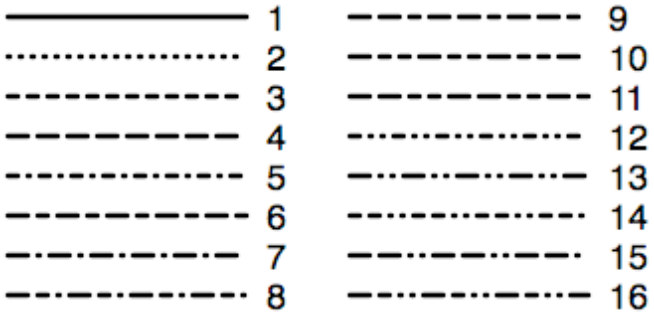
Fill: Defines the color for filled areas and filled histograms.

Frame: Defines the color for the frame of bars.

Stick: Defines the color for sticks.

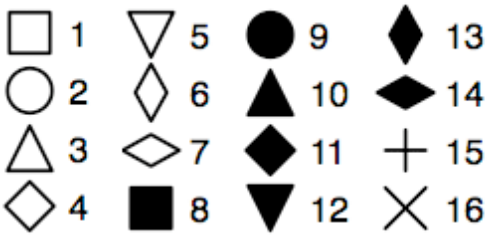
Linewidth: Defines the width of lines.

Line Pattern: Defines the dash pattern for the line style. 16 pattern are available.



Patternwidth: Allows to stretch the dash patterns.

Symbol: Defines the symbol which will be used for symbol style. 16 symbols are available.



Symbolsize: Defines the symbol size.

Sticksize: Defines the size (= length) for the sticks in the stick style.

Sticksize is absolute: If checked the length of sticks is defined in the coordinate system of the plot. Together with the dynamic size field this allows very flexible stick length and symbol size.

Dynamic Size: Allows to enter an expression which defines the size of symbols or the length of sticks. The following special variables are available:

x	x value
y	y value
ex	x error value

ey	x error value
bn	buffer number
np	number of buffers
np	number of datapoints
dp	the current datapoint

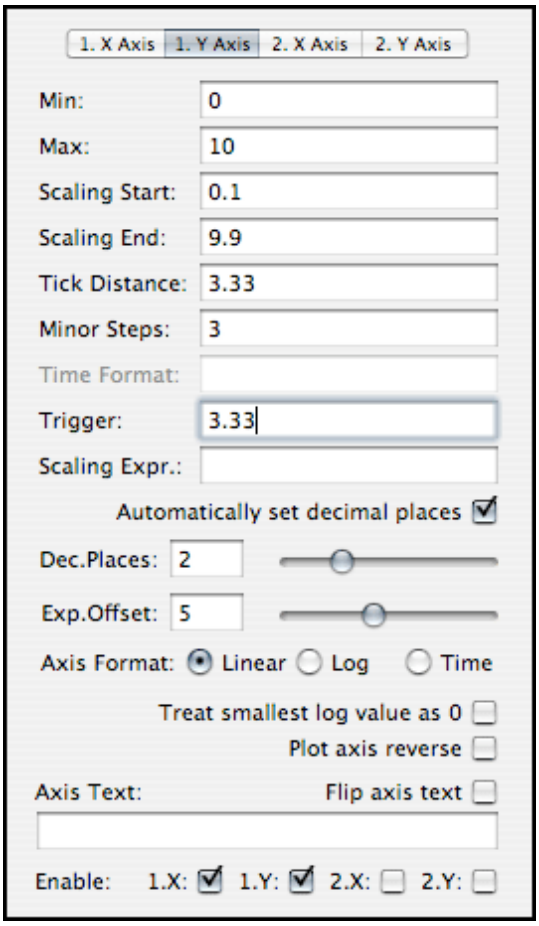
Apply Default Style: When clicked the default data style will be applied.

Apply changes to selected buffers: If checked changes will provided to all selected buffers and not only to the current working buffer (the buffer with the arrow in the first column of the ***Data Inspector***).

Apply changes to all buffers: If checked changes will provided to every data buffer and not only to the current working buffer (the buffer with the arrow in the first column of the ***Data Inspector***).

Automatically apply different styles: This is a comfortable way to assign different styles automatically to all buffers, available for symbols, dash pattern and colors.

6. Axis Inspector



Axis Inspector

The *Axis Inspector* allow settings depending to the 4 available axis. The button at the top of the inspector selects on which axis the attributes below apply to.

Min, **Max**: Controls the range of the axis. The range can also be changed with different **mouse modes**. Dependent on the number format you have to enter a number or a time value.

Scaling Start, **Scaling End**: Defines values where the scaling of the axis should start and stop. Dependent on the number format you have to enter a number or a time value.

Tick Distance: Defines the distance between two major ticks. If your axis is a time axis you have to enter *days:hours:minutes:seconds* or *w* (1 week) or *m* (1 month) or *y* (1 year).

Minor Steps: Defines the number of minor ticks between two major ticks.

Scaling Start, *Scaling End*, *Tick Width*, *Minor Steps* are optional values. If you leave the fields empty *Plot* calculates an optimal value automatically.

Time Format: Defines the format used for the displaying time values on time axis (**time format tokens**).

Trigger: This allow to define a *trigger*, a number where a tick should appear and all other ticks should depend on. for example: if you have an axis from 0 to 10 and you want ticks at 3.33 and 6.66 enter the values shown in the image.

Scaling Expr.: This allows scaling of axis numbers without changing the data itself. For example to display seconds instead of milliseconds enter `v/1000` in this field. *v* is the variable which represents the axis number.

Automatically set decimal places: If checked the number of decimal places for axis numbers will be determind automatically.

Dec.Places: The number of decimal places for axis numbers.

Exp.Offset: Allows you to define the limit, above which numbers are plotted in exponential notation. The number you define with the slider is the exponent of the limit.

Axis Format: Here you can select between linear axis, logarithmic axis and time axis.

Treat smallest log value as 0: If check the smallest value on a logarithmic axis will be replaced with 0 (even if this is not correct).

Plot axis reverse: If check the axis will be plotted in reverse direction.

Axis Text: The major label for the axis. This field has limited formating possibilities. If you want a more sophisticated axis label use a **text object** together with the auto positioning option.

Flip axis text: If checked the axis text orientation will be flipped.

Enable: Allows to enable or disable an axis completely.

7. Axis Format Inspector

The *Axis Format Inspector* controls the graphic attributes of the 4 available axis. The button at the top of the inspector selects on which axis the attributes below apply to.

If *Apply changes to all Buffer* is selected the changes will provided to all 4 axis.

Major Ticks: If checked major ticks will be drawn. The color field defines the color of the major ticks.

Length: Defines the length of the axis major ticks.

Width: Defines the width of the axis major ticks.

Minor Ticks: If checked minor ticks will be drawn. The color field defines the color of the minor ticks.

Length: Defines the length of the axis minor ticks.

Width: Defines the width of the axis minor ticks.

Tick Style: Allows to control on which side of the frame the ticks will be drawn.

Grid: If checked the major grid lines will be drawn. The color field defines the color of the major grid.

In Front: If checked the major grid will be drawn in front of the graphic.

Width: The width of the major grid lines.

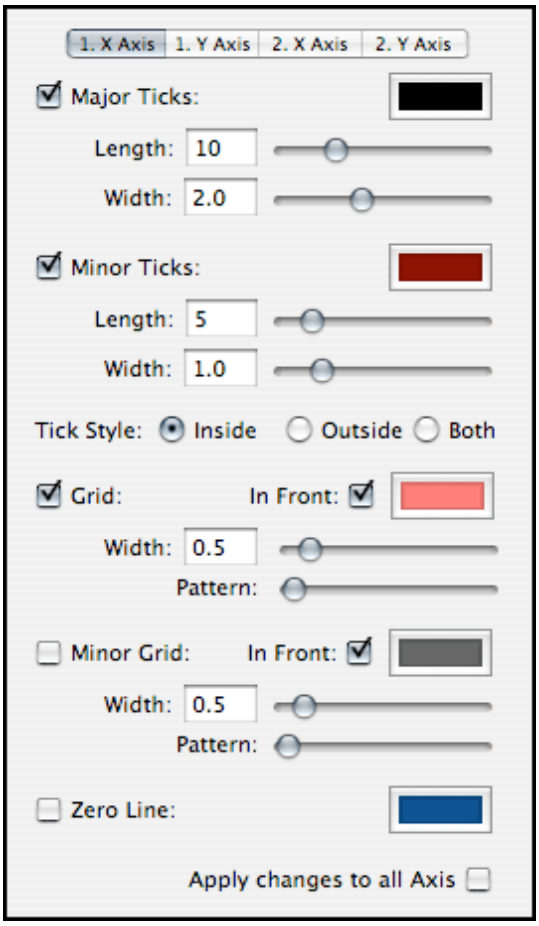
Pattern: Defines the dash pattern for the major grid.

Minor Grid: If checked the minor grid lines will be drawn. The color field defines the color of the minor grid.

In Front: If checked the minor grid will be drawn in front of the graphic.

Width: The width of the minor grid lines.

Pattern: Defines the dash pattern for the minor grid.



Axis Format Inspector

Zero Line: If this option is check a line at the value zero in the given color will be drawn.

8. Axis Labels Inspector

The *Axis Labels Inspector* controls the axis label attributes and allows to assign arbitrary labels instead of the automatically generated numbers. The button at the top of the inspector selects on which axis the attributes below apply to.

If Apply changes to all Buffer is selected the changes will provided to all 4 axis.

Text Font: The font for the axis labels.

Text Offset: The distance between text labels and the frame.

Number Font: The font for the axis numbers.

Text Offset: The distance between numbers and the frame.

Angle: The angle of axis numbers. The four buttons allow easy selection of the usual angles.

Alignment: Defines the alignment of axis numbers.

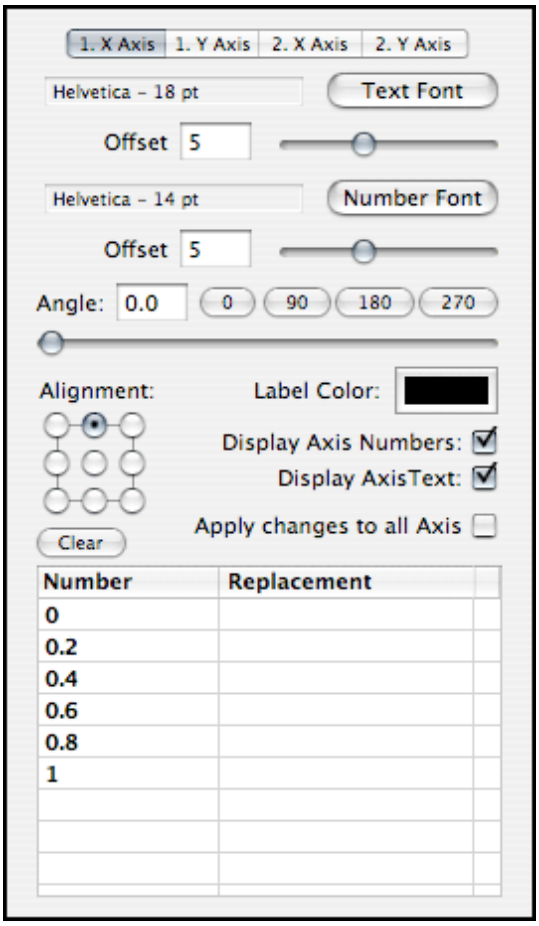
Label Color: Defines the color of axis numbers and axis text labels.

Display Axis Numbers: Only if checked axis numbers will be drawn.

Display Axis Text: Only if checked axis text labels will be drawn.

Clear: deletes all labels for the currently selected axis.

The table at the bottom with two columns shows on the left the numbers which are generated by *Plot*. In the right column you can enter a replacement for the numbers. It is a good idea to do this after you have defined the desired range for the axis because changing the range can make your labels invisible.



Axis Label Inspector

9. Error Bars Inspector

The *Error Bars Inspector* controls the error bars for your data points.

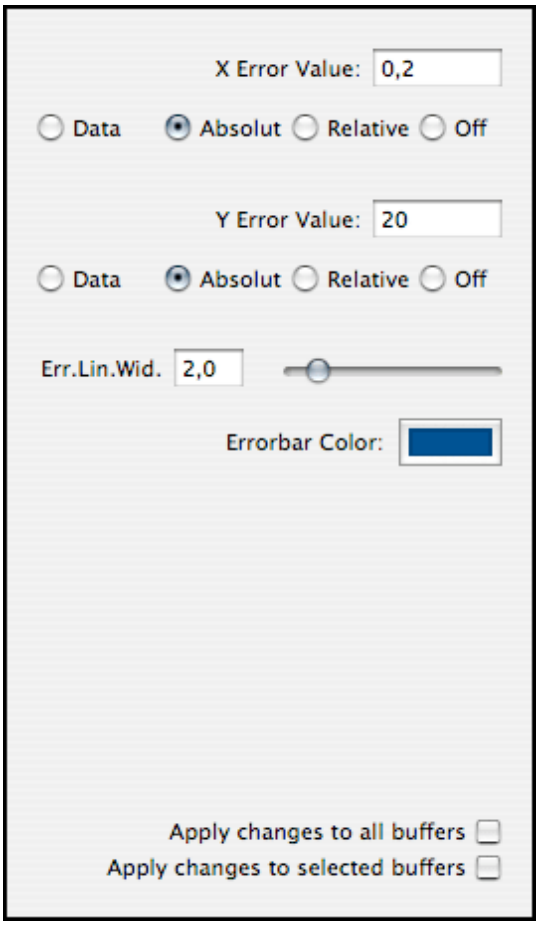
X Error Value, **Y Error Value**: Defines a value for errorbars. The radio button allows to switch between absolute, relative and individual data based error bars.

Err.Lin.Wid. Defines the linewidth for error bars.

Errorbar Color: The color for the error bars.

Apply changes to selected buffers: If checked changes will provided to all selected buffers and not only to the current working buffer (the buffer with the arrow in the first column of the ***Data Inspector***).

Apply changes to all buffers: If checked changes will provided to every data buffer and not only to the current working buffer (the buffer with the arrow in the first column of the ***Data Inspector***).



Error Bars Inspector

10. Legend Inspector

The *Legend Inspector* sets the attributes for the automatically generated legend. Only buffers with a checked *L* column in the ***Data Inspector*** appears in the legend.

Plot Legend: Enables or disables the legend. The color field defines the color of the legend text.

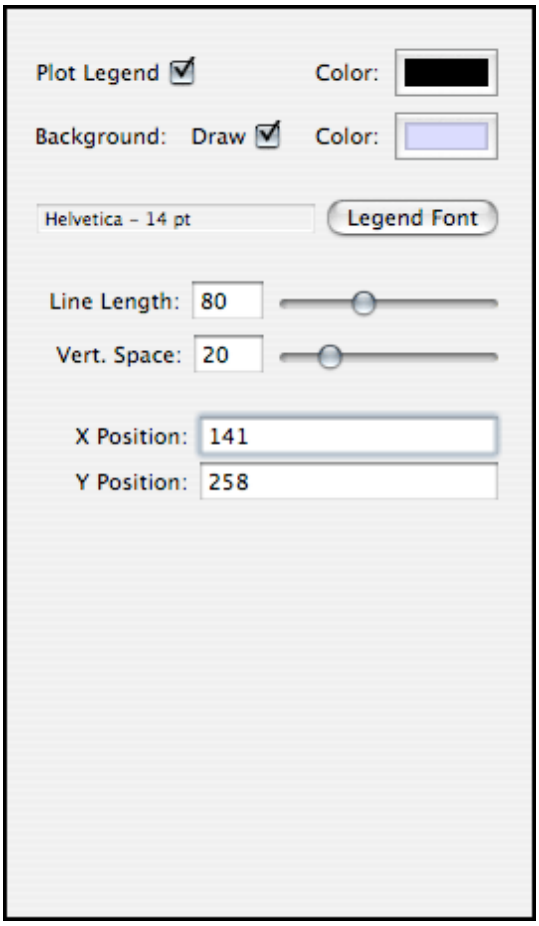
Background: Enables or disables drawing of legend background. The color field defines the background color.

Legend Font: The font for the legend.

Line Length: The length of lines in the legend.

Vert. Space: The vertical space between two legend entries.

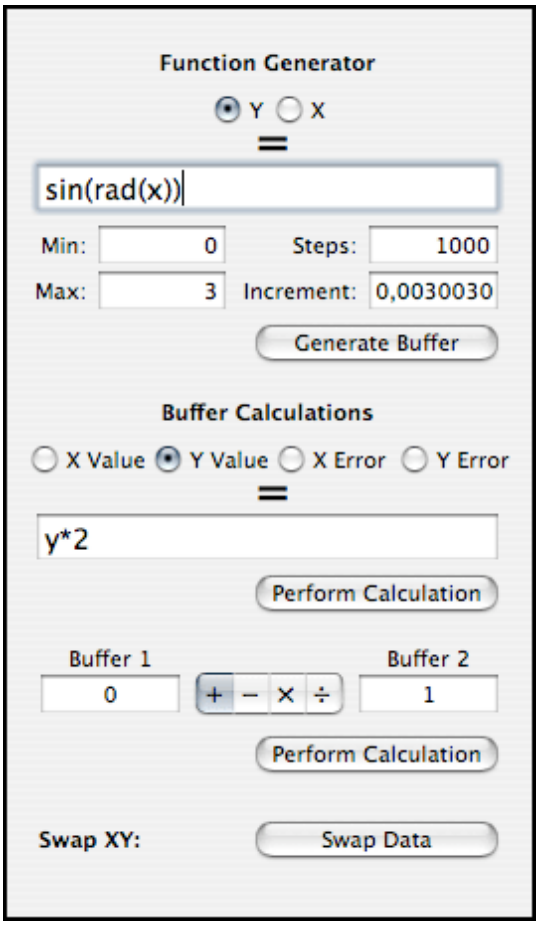
X Position, **Y Position**: The position of the legend. It is also possible to control the legend position with the **mouse mode** *Move Legend*.



Legend Inspector

11. Calculations Inspector

This inspector contains the function generator and the calculator which allows buffer calculations.



Calculations Inspector

11.1 Function Generator

As the name implies the *Function Generator* allows to generate function plots from arbitrary expressions.

X, **Y**: Select the target. Enter the **expression** in the field below.

Min, **Max**: The range in which the **expression** should be calculated.

Steps, **Increment**: The number of steps which should be calculated. These two fields depends on each other; if you enter one the other one will be calculated automatically. The number of steps is limited to 1000000.

Generate Buffer: Runs the function generator and generate a new buffer.

11.2 Buffer Calculations

The *Buffer Calculation* function allows to perform an arbitrary calculation on all selected buffers.

X Value, **Y Value**, **X Error**, **Y Error**: Select the target. Enter the **expression** in the field below.

Perform Calculation: Execute the calculation.

Buffer Calculations allow the use of some special variables:

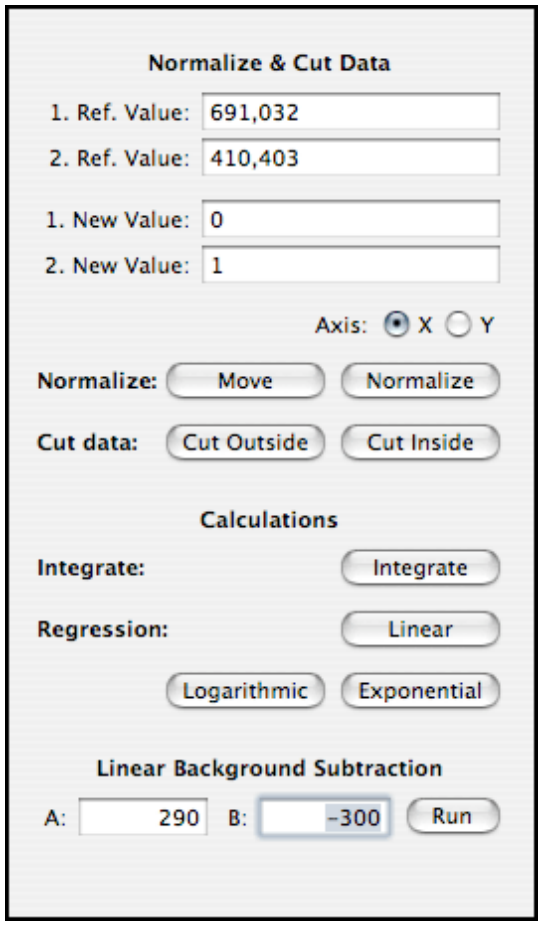
x	x value
y	y value
ex	x error value
ey	x error value
bn	buffer number
nb	number of buffers
cb	number of the current buffers
np	number of datapoints
dp	the current datapoint

Buffer 1, **Buffer 2**: The lower part of the calculation area allows to perform basic calculations between two buffers. This work also for buffers with different X axis and different numbers of data points. Only the overlapping area will be processed and missing points will be interpolated.

Swap XY: Clicking this button swaps the X and Y values in all selected buffers. Error values will also be swapped if available.

12. Normalize Inspector

With this inspector some manipulation of data like moving, normalizing etc. can be done.



Normalize Inspector

12.1 Normalize Functions

1. Ref. Value, **2. Ref. Value**: Defines two values from either the X or the Y axis. These values can also defined with the normalize **mouse modes**.

1. New Value, **2. New Value**: These values will only be used for the *Normalize* and *Move* function as new reference values.

Move: This function moves the selected buffers in the specified direction (selected with the *Axis* radio button) from the *1. reference* to the *1. new* value.

Normalize: This function manipulates the buffers by stretching or shrinking along the specified axis. The specified reference points in the data are changed in such a way that the *1. Ref. Value* becomes the *1. New Value* and the *2. Ref. Value* becomes the *2. New Value*.

Cut Outside: These function deletes all data points in all selected buffers which are not in the range between *1. Ref. Value* and *2. Ref. Value*.

Cut Inside: These function deletes all data points in all selected buffers which are in the range between *1. Ref. Value* and *2. Ref. Value*.

12.2 Calculations

Integrate: This function calculates the integral between X min (*1. Ref. Value*) and X max (*2. Ref Value*) and writes the result to the comment fields in the **Data Inspector**.

Regression: This function calculates the linear, logarithmic, or exponential regression between the X min (*1. Ref. Value*) and X max (*2. Ref. Value*) and generates a new buffer with the result. The following functions will be used:

Linear

$$A = \frac{\sum y - B * \sum x}{n}$$

$$B = \frac{n * \sum xy - \sum x - \sum y}{n * \sum x^2 - (\sum x)^2}$$

$$r = \frac{n * \sum xy - \sum x * \sum y}{\sqrt{\left(n * \sum x^2 - (\sum x)^2\right) * \left(n * \sum y^2 - (\sum y)^2\right)}}$$

$$y = A + Bx$$

Logarithmic

$$y = A + B * ln(x)$$

For A, B, and r replace x with ln(x) n the equations above.

Exponential

$$y = A * e^{Bx}$$

For A, B, and r replace y with ln(y) in the equations above.

12.3 Linear Background Subtraction

This function subtract a linear background from your data (y=y-a-bx). The reference values *a* and *b* can be set with the **mouse mode** *Linear Background*.

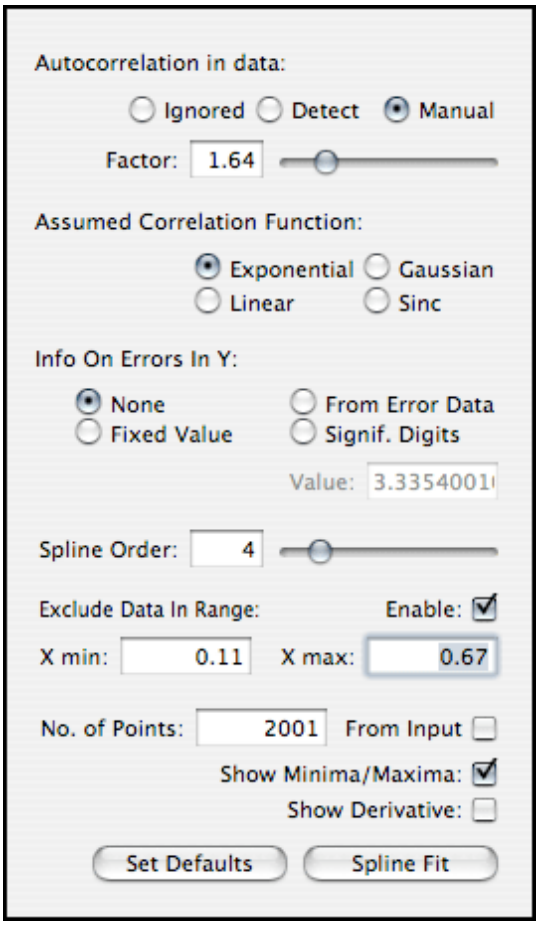
13. Spline Fit Inspector

This inspector controls the spline fit function in Plot.

Spline fit based on *spline2* written by **Barend J. Thijsse**. He allows to integrate his excellent program into *Plot* and he has also written the documentation below.

For complete reference informations look in the **sources** section.

The spline fit function marvelously enhances Plot and I have to thank Barend for this contribution.



Spline Fit Inspector

13.1 Introduction

Purpose: The purpose of spline fit is to separate the data into signal (underlying trend) and noise, by letting the fitted spline represent the underlying trend and the residuals of the fit represent the noise. The noise in the data can have any origin: measurement errors, statistical sampling, or even tiny roundoff errors.

Freestyle: The main difference with curve fitting is that with spline fitting you don't have to select a particular mathematical functional form to fit. Spline fit automatically determines a function that is flexible enough to represent the underlying trend, yet smooth enough not to fit the noise.

Method: Not knowing about the mathematical functional form of the underlying trend, spline fit has to base its judgement completely on the noise. It does so by constructing a great number of trial functions, fitting them in a least-squares sense to the data, and applying specialized statistical tests to the residuals of the fit. From all trial functions that pass these tests, spline fit finally selects the simplest one, i.e. the spline with the fewest number of knots. (click **here** for a detailed description).

User choices: Spline fit is good but not perfect. Since spline fit has so little to go on, there is no guarantee that the result is always correct. Although experience has shown that the default settings lead to good results in the majority of cases, the user will sometimes want to try other settings.

13.2 Options

Autocorrelation in data: Data sometimes contain autocorrelation, implying that the errors in neighboring data points are correlated. This happens, for example, if some sort of averaging or filtering process has operated after the noise originated. The presence of autocorrelation in data very often goes unnoticed to the eye, and it may seriously distract spline fit if not properly handled. There are three ways to deal with possible autocorrelation:

> **Ignore**: Often the best way to start. Spline fit assumes that the error in each Y value is independent of the error in the next Y value. If the fitted spline looks too wiggly, choose another option.
>
> **Detect**: Spline fit compares the residual of each Y value with the residuals in a range of subsequent data points and calculates from that the mean autocorrelation function. The mean autocorrelation function is statistically tested against the assumed theoretical autocorrelation function selected in the next section. The best match yields a value for the autocorrelation length, and the corresponding spline fit is shown.
>
> **Manual**: Same as *Detect*, but the autocorrelation length is set by the user as *Factor*, expressing the ratio between the autocorrelation length L and the average data spacing ΔX_{av}. The best spline fit under the condition of fixed autocorrelation length is shown. Use this option if the autocorrelation length is known, or if you want to play around by trial-and-error.

Factor: Used for the *Manual* option.

Assumed Correlation Function: The correlation function expresses the expectation value of $(r_{i+n}r_i)/(r_i)^2$, with $n >= 0$, where r_i are the weighted residuals for the fitted spline S(X): $r_i = (Y_i - S(X_i))/u_i$. Here u_i is the error (uncertainty) in the value Y_i, or an estimate of this error. In the next section the available information about these errors can be indicated. The correlation function is a function of n, the difference in the indices of the datapoints, or in more general terms, a function of ΔX, the distance between two datapoints along the X axis. The autocorrelation length L is a parameter in this function.

There are four choices available for the correlation function:

Exponential: $\exp(-|\Delta X|/L)$. In many cases this is a practical choice.

Gaussian: $\exp(-|\Delta X|^2/2L^2)$. This type of correlation results from Gaussian smoothing.

Linear: $1 - |\Delta X|/2L$ for $|\Delta X| < 2L$ and 0 otherwise. This type of correlation results from taking running averages.

Sinc: $\sin(2|\Delta X|/L)/(2|\Delta X|/L)$. The only function with a negative part.

Info On Errors In Y: One of the best properties of spline fit is that it almost always produces excellent results even if the user has no information on the errors u_i. This is a small miracle, given the fact that Spline Fit only has the residuals (noise) available to base its decisions on. The reason that this is possible is that spline fit uses special statistical tests, which are insensitive to user misjudgements of the errors in the data and even immune to a misjudgement in the form of a common scaling factor. For example, if all errors are estimated to be one quarter of what they are in reality, spline fit does not care.

None: The user has no particular information on the data errors. This is a very common situation. Spline fit assumes that all errors are equal, by setting u_i equal to 1 for all i.

From Error Data: User-estimates of the data errors u_i are supplied in the third column of the datafile. The user-estimates may be wrong by any common factor. Only the relative errors, from one datapoint to the next, count.

Fixed Value: The user sets the error in the Y data to a fixed value. With this choice, spline fit no longer uses the special statistical tests for the goodness-of-fit, but the common χ^2 test.

Signif. Digits: The user specifies the number of significant digits in the Y data as a fixed value. With this choice, spline fit no longer uses the special statistical tests for the goodness-of-fit, but the common χ^2 test.

Value: Used for the *Fixed Value* and *Signif. Digits* options.

Spline Order: The order of the spline function is one more than the degree of the polynomial pieces that make up the spline. A common choice is 4, which generates cubic splines. These have continuous first and second derivatives. The lowest order permitted is 1, which generates a histogram-like approximation.

Exclude Data In Range (X min, X max): With these, a data range can be specified that is excluded from the fit. This option can be used, for example, to exclude a peak from the fit, so that a curved baseline can be fitted to the remaining data

No. of Points: Defines the number of points for newly generated spline result and derivative bufffer. If the **From Input** button is checked the number of points will become the same as the input data has.

Show Minima/Maxima: Minima and maxima of the spline are shown as separate points.

Show Derivative: The derivative of the spline is added to the plot.

Set Defaults: Restores default spline fit parameter.

Spline Fit: Executes the spline fit and generates new buffers with the result.

13.3 Return Values

The spline fit returns some values to the **Data Inspector** and **Report Panel**:

rms: The quantity rms is the root mean square value of the noise amplitude in the data.

dws: The quantity dws is the generalized Durbin-Watson statistic for the fitted spline. A value in the range 1.9-2.2 usually indicates a good fit. Larger values are suspect, since they may indicate that some of the noise is fitted. Smaller values, which are very rare, definitely point to a systematic misfit.

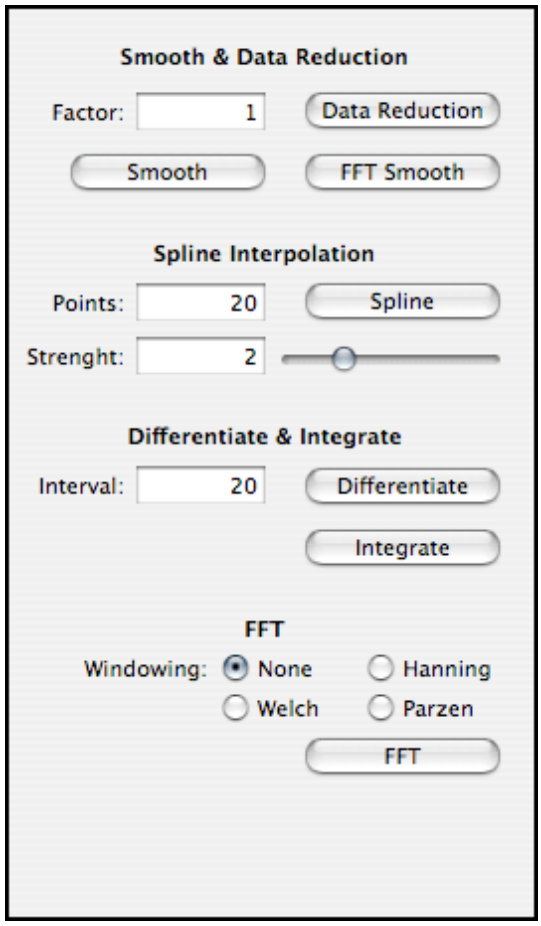
l: The parameter l is the number of intervals of the fitted spline. The number of internal knots is one less than this. Unless your data are extremely complicated or sparse, l should only be a fraction of the number of data points.

ksi: The autocorrelation length ξ reported for the spline fit is expressed as a number measured on the X axis. A value of zero or much smaller than the average data spacing ΔX indicates that the data are essentially uncorrelated.

acffit: The quantity acffit measures how closely the autocorrelation function of the fit-residuals matches the assumed autocorrelation function with autocorrelation length x (the previous number).

14. Fit Inspector

With this inspector some mathematical manipulation of data can be done.



Fit Inspector

14.1 Smooth & Datareduction

Data Reduction: Sometimes it is useful to reduce a large number of data points which consist mainly of noise to a more practical amount of points. This function takes *n* points (*n* is specified in the *Factor* field), builds the average, and replaces the *n* points with the new one.

FFT Smooth: This functions uses as effective smooth width the value from the *Factor* field and performs a FFT based smooth to reduce the noise on the buffer (see **sources**).

Smooth: This functions uses as effective smooth width the value from the *Factor* field and performs a least square smooth to reduce the noise on the buffer.

14.2 Spline Interpolation

This function calculates a nonparametric cubic spline interpolation (see **sources**) for all selected buffers.

Points: Defines the number of points which should be calculated for each interval.

Strength: Defines the *strength* of the interpolation. 2 is in most cases a god choice.

14.3 Differentiate & Integrate

This function allow to differentiate and integrate buffers (see **sources**).

Interval: This the effective interval which will be used to calculate the differentiation.

Differentiate: Differentiate all selected buffer and generate new buffers with the result data.

Integrate: Integrates all selected buffer and generate new buffers with the result data. The integrate function does not need the interval.

14.4 FFT (Fast Fourier Transform)

This function makes a Fast Fourier Transform for all selected buffers.

Windowing: This radio button defines the data windowing mode. For more information about FFT and data windowing read the **sources**.

15. Text Inspector

This inspector controls the graphical attributes of text objects.

Background: Enables or disables background drawing for text objects.

Color: The color of the text background.

Alignment: Defines the text alignment inside the text objects frame.

Angle: The angle of text objects. The four buttons allow easy selection of the usual angles.

X Position, **Y Position**: The position of the text.

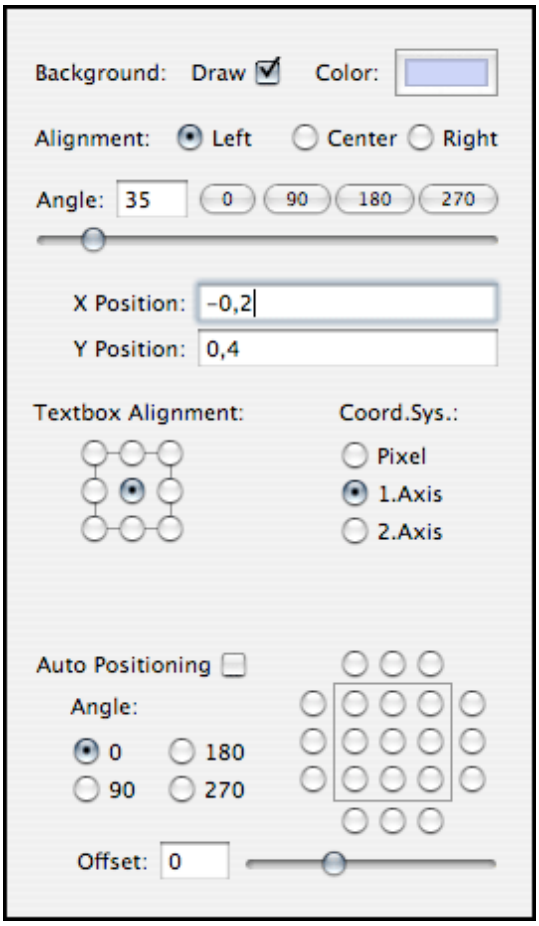
Textbox Alignment: Defines the alignment of the enclosing frame of a text object.

Coord.Sys.: Defines the coordinate system to which the text object belongs. This allows text with a fixed position in the window and also text which floats with the data.

Auto Positioning: This option allow to give a text a fixed position inside your plot. The button matrix on the right selects the position relative to the plot frame.

Auto Positioning Angle: The angle of auto positioning text objects.

Auto Positioning Offset: The offset between plot frame and auto positioning text.



Text Inspector

16. Graphic Inspector

This inspector controls the graphical attributes of graphic objects. Currently lines, arrows, rectangle, and circles are supported.

Type: Selects the graphic type.

Background: Enables or disables background drawing for rectangles and circles.

1. X Position, **1. Y Position**, **2. X Position**, **2. Y Position**: The position of the graphic object.

Width, **Height**: Size of the graphic object.

Coord.Sys.: Defines the coordinate system to which the graphic object belongs. This allows graphics with a fixed position in the window and also graphics which floats with the data.

Linewidth: Defines the width of lines.

Line Pattern: Defines the dash pattern for lines. 16 pattern are available.

Display: Display the graphic object on the background or in front.

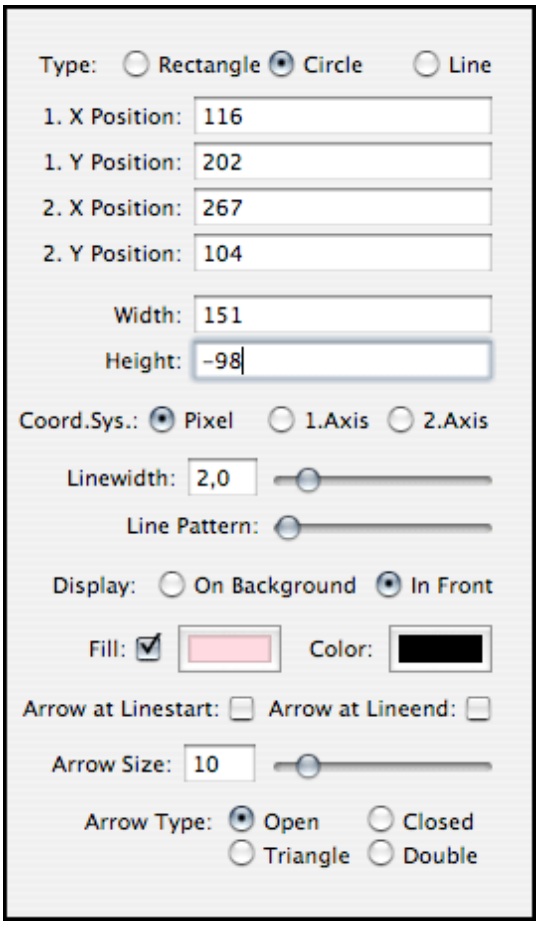
Fill: Enables filling of rectangles and circles. The color field defines the fill color.

Color: The line color of the graphic object.

Arrow at linestart, **Arrow at lineend**: Switch arrows on or off.

Arrow Size: The size of arrows.

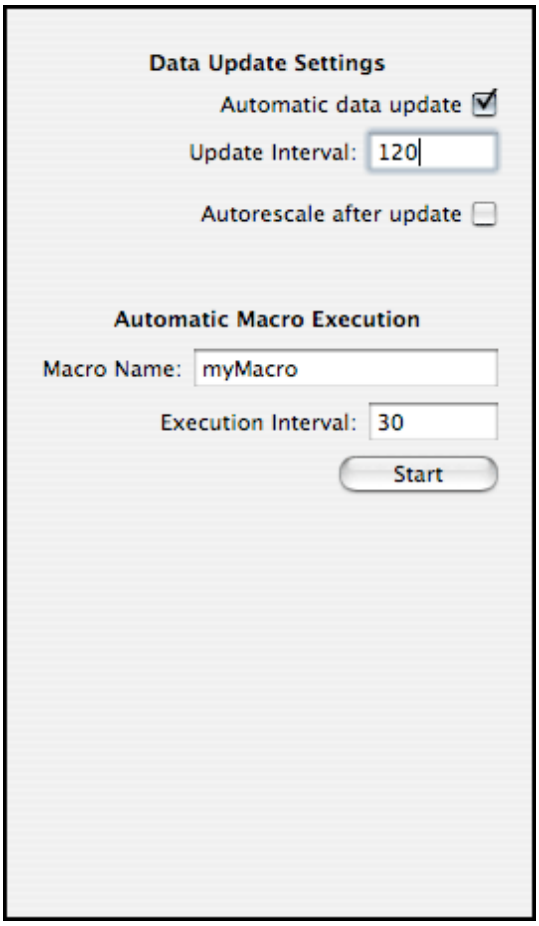
Arrow Type: The style of the arrows.



Graphic Inspector

17. Advanced Inspector

The *Advanced Inspector* controls some very special options which may be uninteresting for most of the users.



Advanced Inspector

17.1 Data Update Settings

Controlls the behavior of data buffer with dynamic data sources (e.g *MySQL*).

Automatic data update: If checked the automatic data update is active.

Update Interval: The interval in seconds for automatic data update.

Autorescale after update: If checked the document will be rescaled after data update.

17.2 Automatic Macro Execution

Allow to execute a **macro** with an specified interval.

Macro Name: The name of the macro which should be executed.

Execution Interval: The interval in seconds for automatic macro execution.

Start/Stop: Start or stop automatic macro execution.

18. Mouse Modes

The lower part of the ***Inspector*** allows to select different mouse modes. Mouse modes defines the behavior of the mouse in your document.

18.1 Measure

 This mode allow to measure points and the distance between two points with a crosshair. The result will be shown in the middle part of the ***Inspector***. The values will be displayed for both axis and depending on the axis mode as time value or as number.
Keyboard shortcut: `m`

18.2 Zoom

 Zooming, the plot will be rescaled to the selected rectangle.
Keyboard shortcut: `z`

18.3 Normalize X

 With this mouse mode two reference values on the X axis can be selected. The values will be used for the **Normalize Inspector** and the **Spline Fit Inspector**.
Keyboard shortcut: `n`

18.4 Normalize Y

 With this mouse mode two reference values on the Y axis can be selected. The values will be used for the **Normalize Inspector** and the **Spline Fit Inspector**.
Keyboard shortcut: `b`

18.5 Downscale

 If you click with this mouse mode inside your plot the clicked point will be centered and the range of the plot will be increased.
Keyboard shortcut: `d`

18.6 Upscale

 If you click with this mouse mode inside your plot the clicked point will be centered and the range of the plot will be lowered.
Keyboard shortcut: `u`

18.7 Range

 This is for easy navigating through your data. Clicking and moving in the plot changes the range accordingly. If you have a mouse wheel you can also zoom in and out. If your hold the option keys while zooming only the X axis changes. Holding the command key does the same for the Y axis.
Keyboard shortcut: `r`

18.8 Select Tool

 This mouse mode allows different manipulations on your plot. You can resize the frame of your plot;

 move and edit texts; select data points which will then highlighted in the **data view**; change the current working buffer; and select axis. After selection the appropriate inspector appears. If you select a text or graphic object you can use this keys:

left, right, up, down	move the object
control + left, right, up, down	move the 1. graphic object handle
option + left, right, up, down	move the 2. graphic object handle
backspace	delete the object
command+right, command+left	select the next or previous object

Keyboard shortcut: `s`

18.9 Move Y

 This mouse mode allows moving of data from all selected buffers in Y direction. This operation changes the data itself and not just the range of the plot.
Keyboard shortcut: `y`

18.10 Move X

 This mouse mode allows moving of data from all selected buffers in X direction. This operation changes the data itself and not just the range of the plot.
Keyboard shortcut: `x`

18.11 Move XY

 This mouse mode allows moving of data from all selected buffers in X and Y direction. This operation changes the data itself and not just the range of the plot.
Keyboard shortcut: `q`

18.12 Move Points

 With this mouse mode you can select and move a single data point. This operation changes the data itself and not just the range of the plot.
Keyboard shortcut: `p`

18.13 Linear Background

 Allows to define the reference values for linear background subtraction with the mouse.
Keyboard shortcut: `w`

18.14 Legend Moving

 With this mouse mode the automatically generated legend can be moved.
Keyboard shortcut: `l`

18.15 Graphic

 With this mouse mode graphic objects can be created, sized and moved.
Keyboard shortcut: `g`

18.16 Text


This mouse mode allows to add and edit text objects in your plot.
Keyboard shortcut: `t`

18.17 Subview


With this mouse mode new empty subviews can be generated.
Keyboard shortcut: `h`

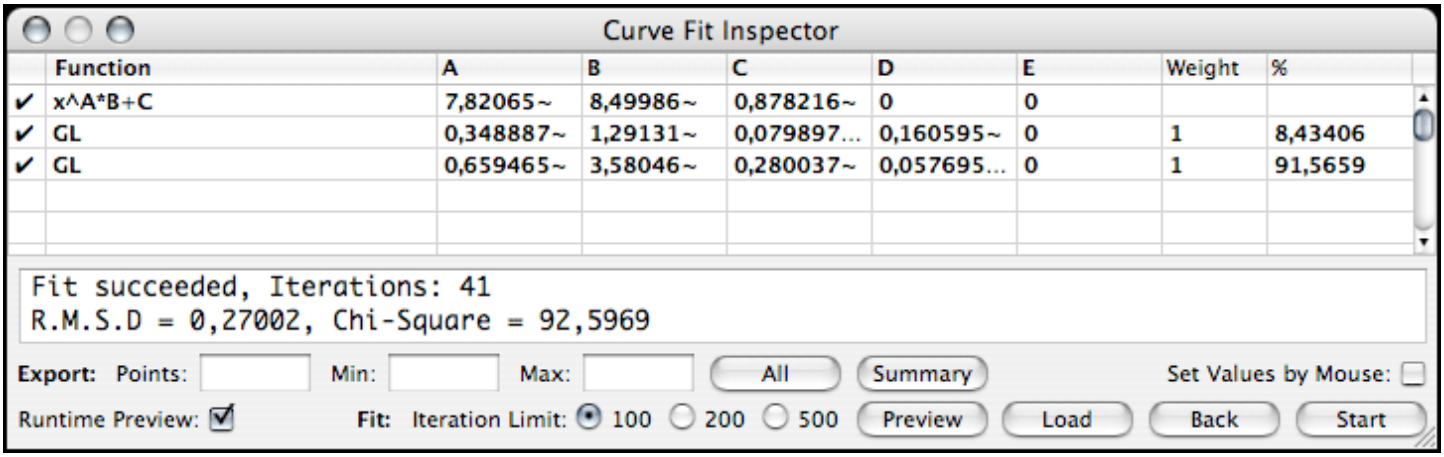
18.18 Change Subview


This mouse mode allow to change the size and position of a subview.
Keyboard shortcut: `j`

19. Curve Fit Inspector

This function allows you to fit data with some predefined functions or free defined functions. Fits are possible with up to 24 functions each with up to 5 free parameters. (read the **sources** for detailed description how the curve fit function works).

To start a fit two things are necessary. 1. the function(s) you will fit and 2. the start parameters for the function(s). Fitting will only work if the function you provide will match the data of your buffer otherwise the fit will not succeed and you will see an error message. Fitting work better the closer the start parameters match the data.



Curve Fit Inspector

The *Curve Fit Inspector* consists of a few controls and a table for the function and fit parameter definition.

Active functions are displayed with a check mark in the first column. Double clicking the first column changes the state.

Function: In this column you have to define the function you want to fit (see below).

A, **B**, **C**, **D**, **E**: This are the free parameters for the fit function.

Weight: The weight of a function for the integration routine (only used by the special functions).

%: The result of the integration will be displayed in this column (only calculated for the special functions).

Start: Starts the fit for the current working buffer.

Preview: Displays all the fit functions and the summary curve in the current document.

Back: Every time you start a fit the state will be saved in a history buffer. With this button you can go back trough the fit steps.

Load: Loads fit data from another document.

Export: Allows to export fit results as new buffers to the document.

> **All**: Exports all the fit functions and the summary curve as new buffer to your document.
>
> **Summary**: Exports the summary curve as new buffer to your document.
>
> **Points**, **Min**, **Max**: Defines the range and the number of points for curve export. If this fields are empty for each point in the current working buffer a new value will be calculated.

Iteration Limit: Defines a cycle limit after which it is possible to stop the fit.

Runtime Preview: If this button is checked a preview will be displayed after each fit cycle.

Set Values by Mouse: If this button is checked the values from the **mouse mode** *Measure* will be sent to the currently selected line in the parameter table (A = X position and B = Y position). After this the next line in the parameter table will selected automatically. This makes it easy to predefine a bunch of peaks.

19.1 Fit result

The text field in the middle of the inspector shows the status and the result of the fit. The first line displays the fit state and the second the fit result:

rms: Root mean square deviation of the last cycle:

$$R.M.S.D = \sqrt{\frac{\sum_{i=1}^{n} \left[y_i - y(x_i)\right]^2}{n}}$$

chi-square:

$$\chi^2 = \sum_{i=1}^{n} \left(\frac{y_i - y(x_i)}{\sigma_i} \right)$$

sigma is the error of your data. If your data set doesn't contain error values *Plot* makes a statistically approximation of the standard deviation.

19.2 Function definition

In the *Function* column you can enter normal mathematical **expression** as functions for fit (there are some special functions, see below).

Available variables:

x	x value
A	A parameter
B	B parameter
C	C parameter
D	D parameter
E	E parameter

```
Example: (x+A)^2+B
```

For the 5 fit parameter (A,B,C,D,E) the following syntax is possible:

<value>	a fixed value
<value>~	a value which should be fitted
<value>~<dvalue>	a value which should be fitted in the range from *value-dvalue* to *value+dvalue*
<row>[+,-,*,/]<rel>	sets value in relation to an entry of same column in a previous row

```
Examples: 284 1234~ 10.7~0.2 1-2.3 5*0.12
```

19.3 Special Functions

The fit function supports some special functions. These functions are easy to use and a little bit faster than free defined functions. The special functions can not be used together with other expressions in one row.

GL (Gauss-Lorentz mix curve)

$$l = \frac{l_0 * y^2}{y^2 + 4(1-M)(x-x_0)} * e^{-4\frac{M(x-x_0)^2}{y^2}}$$

A = position (x_0)
B = height (l_0)
C = width (α, FWHM)
D = Gauss-Lorentz ratio (M ,1.0=pure Gauss, 0.0 = pure Lorentz)

E = unused

DS (Doniach-Sunjic curve)

$$l = \frac{l_0(1-n\alpha) * \Gamma(1-\alpha)}{\left(\left(\frac{2(x-x_0)}{y} + k * cot(\frac{\pi}{2-\alpha})\right)^2 + 1\right)^{\frac{1-\alpha}{2}}} * cos(\chi)$$

$$\chi = \frac{\pi\alpha}{2} + (1-\alpha)atan\left(\frac{2k}{\gamma}(x-x_0) + cot\left(\frac{\pi}{2-\alpha}\right)\right)$$

n=0.588468, k=1 (right skew) or -1 (left skew)

A = position (x_0)
B = height (I_0)
C = width (γ, Lorentzian FWHM)
D = Anderson's exponent (α, -0.5 ... 0.5)
E = unused

ET (Gauss-Lorentz mix curve with exponential Tail)

$$l_e = l + (l_0 - l)e^{\frac{0.1|x-x_0|}{\alpha}}$$

A = position (x_0)
B = height (I_0)
C = width (γ, Lorentzian FWHM)
D = Gauss-Lorentz ratio (M ,1.0=pure Gauss, 0.0 = pure Lorentz)
E = tail exponent factor (α, -infinity - +infinity)

The numerical Gauss convolution of the following two functions (Lorentz and Doniach-Sunjic, $F(Y_0, x_0, \gamma, [\alpha])$) in the interval x_1 to x_n in steps of d_x is performed with the following formula:

$$i = 1...integer\left(\frac{x_N - x_1}{d_x} + 1\right)$$

$$l_i = Q_{y_0} d_x \sum_{j=-m}^{m} \left(F(x_1 + \Delta_{x_0} + d_x(i+j))e^{-\frac{j^2 d_x^2}{G^2}}\right)$$

$$m = integer\left(\frac{2G}{d_x}\right)$$

G is the FWHM of the convoluting Gauss function; y_0, x_0, γ, [α] are the parameters of the function to be convoluted, as in the earlier expressions for Lorentz and Doniach-Sunjic functions. The normalizing factor Q_{y0} and shift d_{x0} are defined as $Q_{y0}=y_0 / y'_0$ and $dx0=x'_0 - x_0$, where y'_0 and x'_0 are the amplitude and position of the maximum of the not normalized convoluted function.

GL* (Gauss convoluted Lorentz curve)

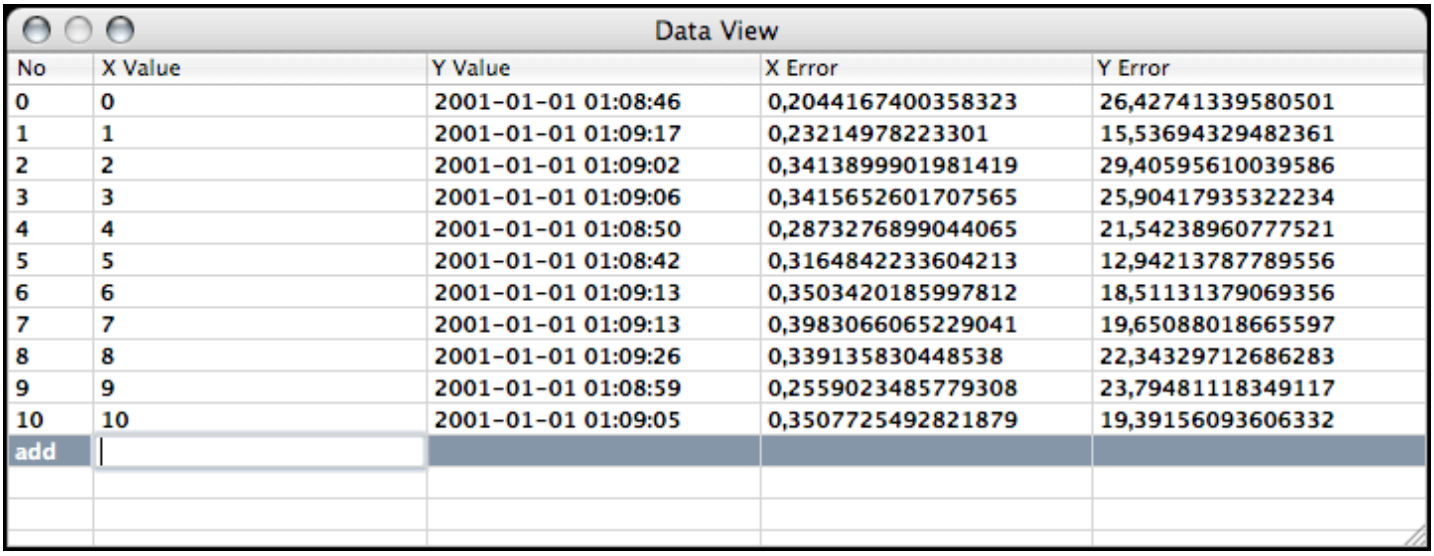
A = position
B = height
C = width (FWHM)
D = Gauss-Lorentz ratio (must be set to 0.0)
E = Gauss FWHM (0 - +infinity)

DS* (Gauss convoluted Doniach-Sunjic curve)

A = position
B = height
C = width (Lorentzian FWHM)
D = Anderson's exponent (-0.5 ... 0.5)
E = Gauss FWHM (0 - +infinity)

20. DataView

The *Data View* is a spreadsheet like editor for your data. It show the data of the working buffer.



No	X Value	Y Value	X Error	Y Error
0	0	2001-01-01 01:08:46	0,2044167400358323	26,42741339580501
1	1	2001-01-01 01:09:17	0,23214978223301	15,53694329482361
2	2	2001-01-01 01:09:02	0,3413899901981419	29,40595610039586
3	3	2001-01-01 01:09:06	0,3415652601707565	25,90417935322234
4	4	2001-01-01 01:08:50	0,2873276899044065	21,54238960777521
5	5	2001-01-01 01:08:42	0,3164842233604213	12,94213787789556
6	6	2001-01-01 01:09:13	0,3503420185997812	18,51131379069356
7	7	2001-01-01 01:09:13	0,3983066065229041	19,65088018665597
8	8	2001-01-01 01:09:26	0,339135830448538	22,34329712686283
9	9	2001-01-01 01:08:59	0,2559023485779308	23,79481118349117
10	10	2001-01-01 01:09:05	0,3507725492821879	19,39156093606332
add				

Data View

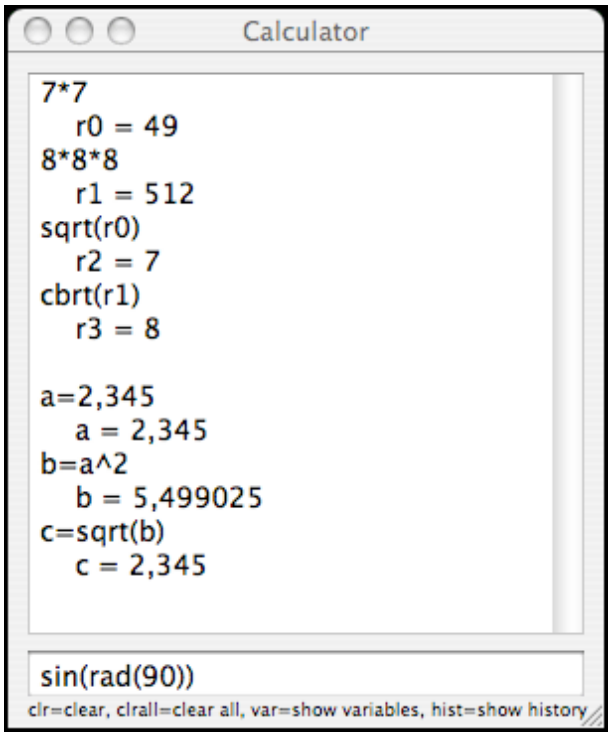
Double clicking on the *X Value* or *Y Value* column header switches the display format between number and time values.

The *X Error* and *Y Error* column stores individual error values for each data point.

If you select rows in the *Data View* the points will be highlighted in your document.

21. Calculator

This is a simple builtin calculator for instant calculations. The *Calculator* supports the common **math expressions** of *Plot*. Just enter your calculation in the lower text field and hit return to get the result in the upper textfield. The result of every calculation is stored in a variable (*r0* ... *r<n>*). These variables can be used in later calculation and also in all other functions where *Plot* allow expressions (e.g. in the function generator).



Calculator

There are three special commands in the calculator:

clr
: reset the calculator and deletes all variables and the history

clrall
: reset the calculator and deletes all variables, user variables and the history

vars
: show a list of available variables

hist
: show the calculator history

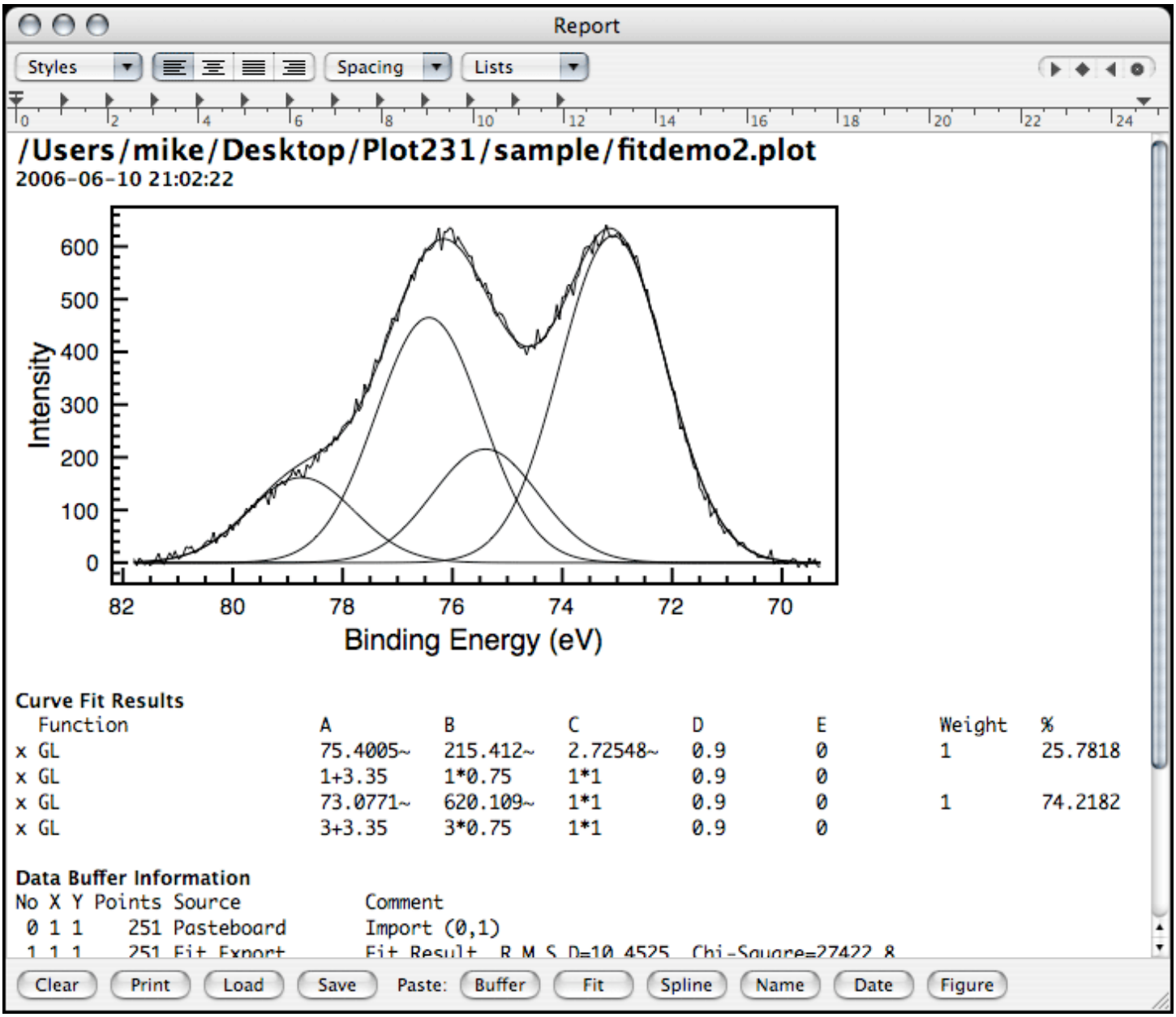
It is also possible to define user specific variables. Just enter:

<name>=<value>

User variables can also be used in all other functions where *Plot* allow expressions.

22. Report Panel

The report panel allows to collect all important information about your *Plot* document in a text editor like panel. The content of the panel can be free edited, saved, copied and printed as needed.



Report Panel

Clear: Deletes the report panel content

Print: Print the content of the report panel.

Load, **Save**: Allows to load and save report panel contents as RTFD files.

Paste: Clicking one of the paste button copies the corresponding information into the report panel.

23. Expressions

Plot functions which allow entering of mathematical expressions supports the following functions:

`+, -, *, /`	arithmetic operations
`%, mod`	modulo
`( )`	grouping
`^, **`	power
`rad(x), deg(x)`	conversion between radians and degrees
`sin(x),cos(x),tan(x)`	trigonometric functions
`asin(x),acos(x),atan(x)`	inverse trigonometric functions
`sinh(x),cosh(x),tanh(x)`	hyperbolic functions
`rnd(h)`	random number (h = height)
`ln(x),log(x)`	natural and logarithm to base 10
`sqrt(x)`	square root
`cbrt(x)`	cubic root
`frac(x)`	returns the fraction of x
`int(x)`	returns the integer of x
`round(x;n)`	round up and down to the nth place on the right of the decimal point
`gau(x;x0;a;w)`	Gauss (x0 = position, a = amplitude, w = width)
`lor(x;x0;a;w)`	Lorentz (x0 = position, a = amplitude, w = width)
`galo(x;x0;a;w;r)`	Gauss-Lorentz (x0 = position, a = amplitude, w = width, r =Gauss-Lorentz ratio (1.0=pure Gauss,0.0 = pure Lorentz))
`tail(x;x0;a;w;r;t)`	Gauss-Lorentz with exponential Tail (x0 = position, a = amplitude, w = width, r = Gauss-Lorentz ratio(1.0=pure Gauss,0.0 = pure Lorentz)), t = tail exponent factor
`j0(x), j1(x), jn(x,n)`	bessel functions
`y0(x), y1(x), yn(x,n)`	bessel functions
`pi`	3.14159265359
`e`	2.71828182846
`xval(b;i)`	x value of point *i* in buffer *b*
`yval(b;i)`	y value of point *i* in buffer *b*
`xerr(b;i)`	x error value of point *i* in buffer *b*
`yerr(b;i)`	y error value of point *i* in buffer *b*
`xmin(b)`	minimum x value in buffer *b*
`xmax(b)`	maximum x value in buffer *b*
`ymin(b)`	minimum y value in buffer *b*
`ymax(b)`	maximum y value in buffer *b*
`txmin(b)`	minimum x value over all buffer
`txmax(b)`	maximum x value over all buffer
`tymin(b)`	minimum y value over all buffer
`tymax(b)`	maximum y value over all buffer
`vxmin(b)`	minimum x value over all visible buffer
`vxmax(b)`	maximum x value over all visible buffer
`vymin(b)`	minimum y value over all visible buffer
`vymax(b)`	maximum y value over all visible buffer
`points(b)`	number of points in buffer *b*
`xpoint(v;a)`	x screen coordinate of v (a can be 1 for the first or 2 for the second axis).
`xvalue(v;a)`	x value of the screen coordinate v (a can be 1 for the first or 2 for the second axis).
`ypoint(v;a)`	y screen coordinate of v (a can be 1 for the first or 2 for the second axis).
`yvalue(v;a)`	y value of the screen coordinate v (a can be 1 for the first or 2 for the

`yvalue(v;a)`	second axis).
`findx(v;b)`	x value which depends to y in buffer b. If there are more than one it returns the first it found.
`findy(v;b)`	y value which depends to x in buffer b. If there are more than one it returns the first it found.

24. Time Format

Plot stores time data as the number of seconds relative to an absolute reference time: the first instant of 1 January, 2001, Greenwich Mean Time (GMT). Dates before then are stored as negative numbers; dates after then are stored as positive numbers.

To convert a UNIX time to a *Plot* time simply subtract 978307200.0 from the UNIX time.

24.1 Time format tokes

%a	Abbreviated weekday name
%A	Full weekday name
%b	Abbreviated month name
%B	Full month name
%c	Shorthand for “x", the locale format for date and time
%d	Day of the month as a decimal number (01-31)
%e	Same as %d but does not print the leading 0 for days 1 through 9 (unlike strftime(), does not print a leading space)
%F	Milliseconds as a decimal number (000-999)
%H	Hour based on a 24-hour clock as a decimal number (00-23)
%I	Hour based on a 12-hour clock as a decimal number (01-12)
%j	Day of the year as a decimal number (001-366)
%m	Month as a decimal number (01-12)
%M	Minute as a decimal number (00-59)
%p	AM/PM designation for the locale
%S	Second as a decimal number (00-59)
%w	Weekday as a decimal number (0-6), where Sunday is 0
%x	Date using the date representation for the locale, including the time zone (produces different results from strftime())
%X	Time using the time representation for the locale (produces different results from strftime())
%y	Year without century (00-99)
%Y	Year with century (such as 1990)
%Z	Time zone name (such as Pacific Daylight Time; produces different results from strftime())
%z	Time zone offset in hours and minutes from GMT (HHMM)

25. Preferences

The *Preferences Panel* allow to change some global setting in *Plot*

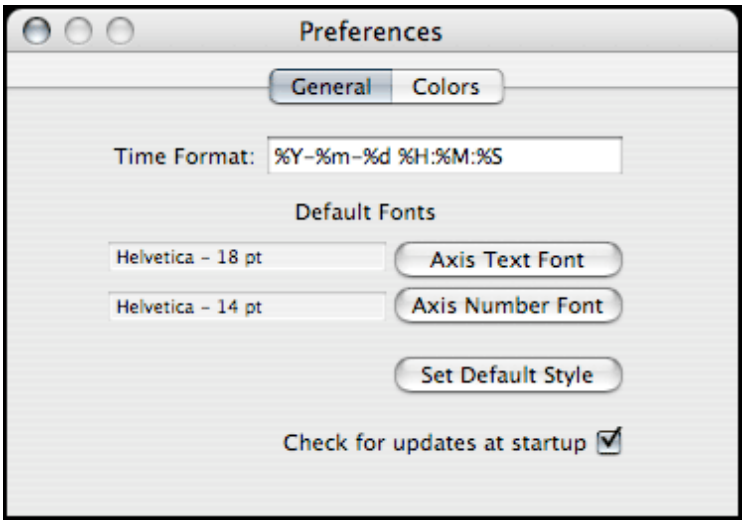
25.1 General

Time Format: Defines the **format** for time values used in *Plot*.

Default Font: Allow to define default fonts for axis labels and axis numbers.

Set Default Style: If clicked the style of the current working buffer in the current document will be the default style for newly generated data buffers.

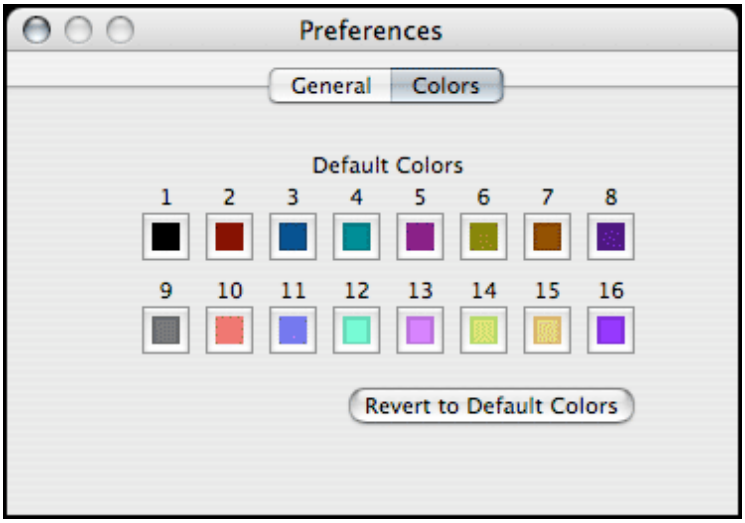
Check for updates at startup: If checked *Plot* will inform you if a program update is available.



General

25.2 Colors

Here you can define your own default colors used by *Plot*. It is also possible to restore the default colors provided by *Plot*.



Colors

26. Menu Item

Apart from the usual Apple menu items *Plot* has some more which will be described here:

File → Import → ASCII (<Shift>+<Command>+A)
Using this item brings up an open panel in which you can select a file for **ASCII import**.

File → Import → Binary (<Shift>+<Command>+B)
Using this item brings up an open panel in which you can select a file for **binary import**.

File → Import → MySQL (<Shift>+<Command>+L)
This items brings up the ***MySQl Import*** dialog which allows direct data import from a *MySQL* database.

File → Import → SciPlot (<Shift>+<Command>+O)
Allow to import data from old *SciPlot files*. This option allow to recover all data and some graphic attributes from SciPlot files. The result may look different as you know it from *SciPlot*.

File → Load Partial File → Layout (<Control>+<Command>+L)
File → Load Partial File → Data (<Control>+<Command>+V)
File → Load Partial File → Fit (<Control>+<Command>+X)
File → Load Partial File → Range (<Control>+<Command>+R)
File → Load Partial File → Colors (<Control>+<Command>+C)
File → Load Partial File → Fonts (<Control>+<Command>+F)
File → Load Partial File → Text & Graphic (<Control>+<Command>+T)
These item allow partial load of *Plot* files. This is handy to give different documents the same graphical attributes or reuse parts of other documents.

File → Export Image → PDF (<Option>+<Command>+P)
File → Export Image → JPG (<Option>+<Command>+J)
File → Export Image → EPS (<Option>+<Command>+E)
File → Export Image → PDF (<Option>+<Command>+F)
Saves your document in one of the given graphic format file. The JPG and PNG save dialog allow to select different resolutions.

File → Export ASCII
This exports all selected buffers of the current document as ASCII data. A new file for every buffer will be generated with the given name and the appended buffer number.

File → New Empty Buffer (<Shift>+<Command>+N)
Generates a new empty buffer in the current document. You can fill it with data by using the ***Data View***.

File → Delete Subview (<Command>+D)
Deletes the currently selected subview.

File → Cleaning → Delete All Text Objects
Deletes all text objects from the active view.

File → Cleaning → Delete All Graphic Objects
Deletes all graphic objects from the active view.

File → Cleaning → Delete All Subviews
Deletes all subviews from the current document.

View → Inspector (<Shift>+<Command>+I)
Brings up the **Inspector**

View → Data View (<Shift>+<Command>+D)
Brings up the **Data View**

View → Data Inspector (<Shift>+<Command>+V)
Brings up the **Data Inspector**

View → Curve Fit Inspector (<Shift>+<Command>+X)
Brings up the **Curve Fit Inspector**

View → Macro Inspector (<Shift>+<Command>+M)
Brings up the **Macro Inspector**

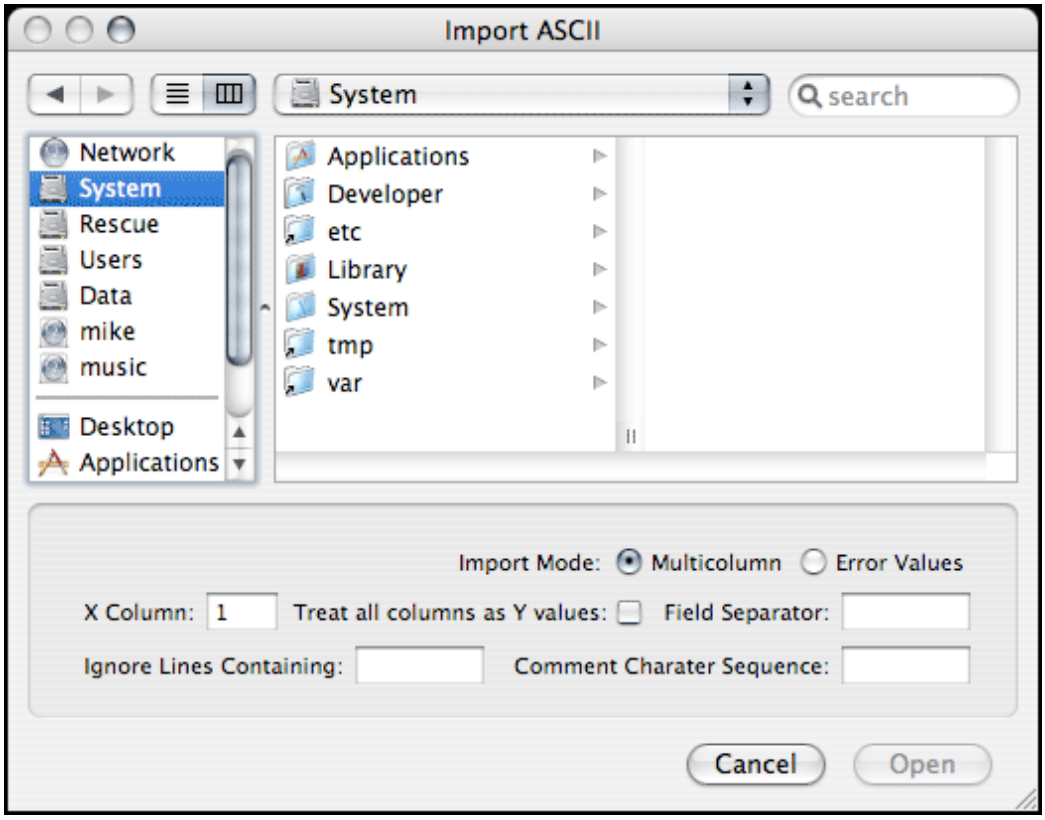
View → Calculator (<Command>+R)
Brings up the **Calculator**

Macro → ...
Shortcuts for all available **macros**

27. ASCII Import

General the ASCII import filter accept files with UNIX, Mac and Windows line end characters. Each line should contain at least one number. Numbers in the line will be separated by any character which could not be part of a number.

If the *Plot* builtin import filter is not able to import your data file you can build your own *Perl* based import filter in the **Macro Inspector**.



ASCII Import Panel

The import dialog allows to select between two modes of importing ASCII data.

> **Multicolumn**: The builtin import filter expects an ASCII file with one or more columns. If no field searator is specified columns will be separated by any character sequence which can not be part of a number.
>
> **Error Values**: This mode expects up to 4 columns of data. The 1. and 2. will be treated as X and Y values. The 3. and 4. as X error values and Y error values. If only three column are available the 3. will used as Y error values.

X Column: Defines which column should be the X column starting with 1 for the first column.

Treat all columns as Y values: If checked all columns will be interpreted a Y values and the X values will be generated as sequence number. This allows also to import files which have only one column.

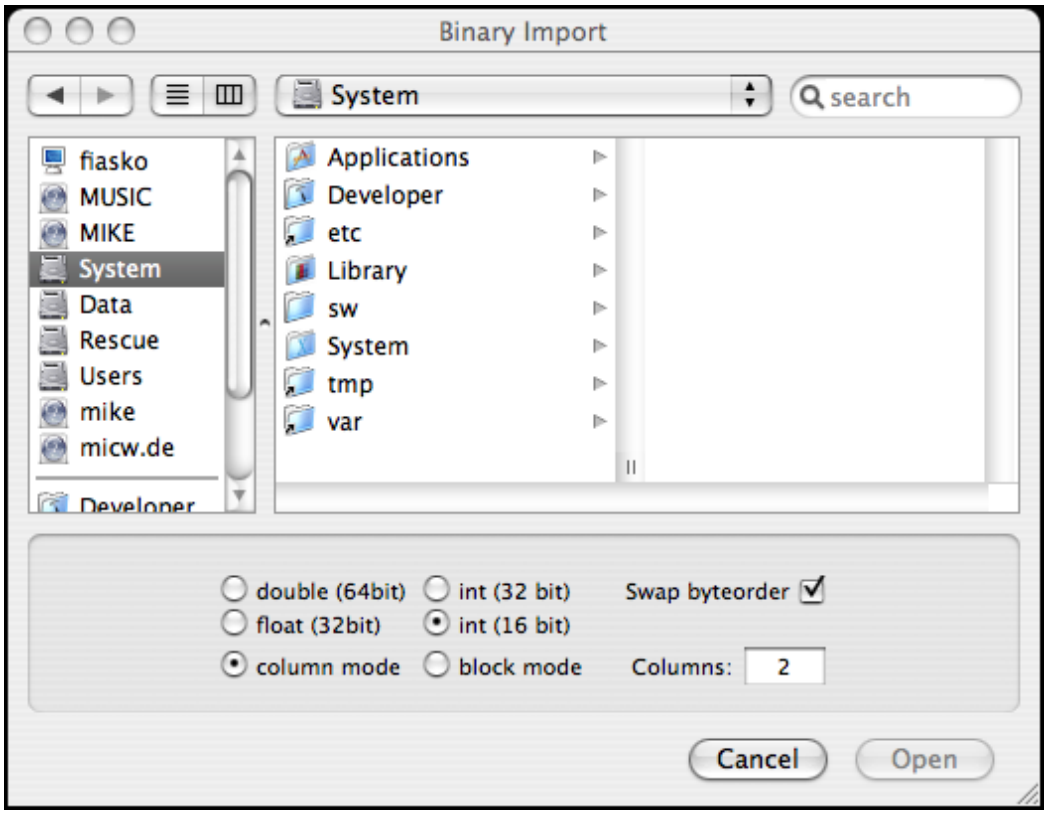
Field Separator: Defines the field separator for ASCII import. Explicit definition of the separator allows to import files with empty fields.

Ignore Lines Containing: Lines in your data file which contains this string will be ignored.

Comment Character Sequence: Anything in a line behind this string will be ignored.

28. Binary Import Filter

Plot allows importing of binary data. This can be done by selecting *Binary Import* from the *File* menu. In the open panel you have to select your binary file and to provide some extra informations.



Binary Import Panel

Data type: Specifies the type of date in your file. Valid type are double (64 bit), float (32 bit), integer (32 bit) or integer (16 bit).

Import mode: Defines how the data are ordered in you file. *Column mode* expects data ordered in columns and *Block mode* expects a block for each column.

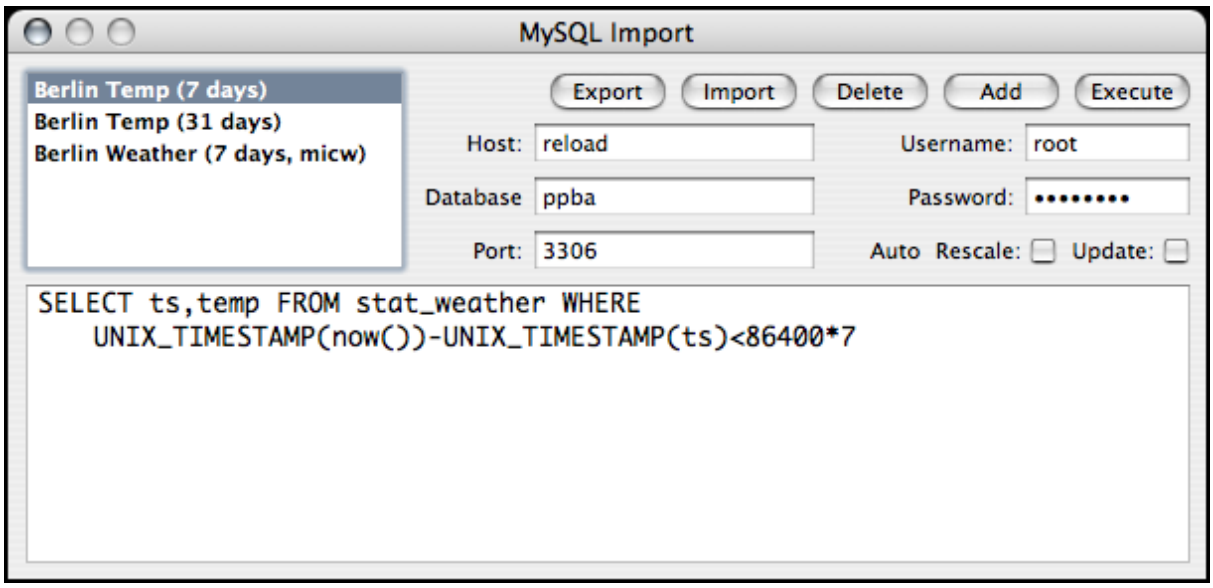
Swap byteorder: Allows to swap data which are generated on a platform with different byte order.

Columns: The number of columns in your file (has to be at least 1). If your file has only one column the values will be treated as Y values, the X value will be generated as sequence number. If you have more than one column the first will be treated as X value and every other column as Y value.

29. MySQL Import

This function allow direct import of data from a *MySQL* database. In the upper field of the panel you have to define the database parameters. The list on the left contains a list of all your *MySQL* queries. In the lower part you can enter an SQL query; typically in the form:

```
SELECT <x column>,<y column> FROM <table> WHERE ...
```



MySQL Import Panel

Import, **Export**: Allows to import or export the whole query set and store it in a file for later use.

Delete: Delete the selected *MySQL* query.

Add: Add a new empty *MySQL* query.

Execute: Performs the *MySQL* query and generate buffers as needed.

Host: The host where your database resides.

Database: The database name.

Port: The TCP port of your database (usually 3306).

Username, **Password**: *MySQL* login informations.

Auto Update: If checked the data will automatically updated e.g. if you open the document.

Auto Rescale: If checked your document will be rescaled after an data update.

30. Command Line Option

Plot support some command line options even if none interactive usage is not the focus of *Plot*.

-i <filename>
: Import the file and treat as multicolumn ASCII input.

-m <macro filename>
: Execute the content of the given filename as macro.

-h
: Hide all inspectors and panels.

-q
: Terminate *Plot* after macro execution.

Example: If you want to import a ASCII file and save the figure as PNG file make a macro file in you favorite text editor like this:

```
import /Users/mike/Desktop/test.dat 0
savepng /Users/mike/Desktop/test.png
```

and enter in you terminal something like this:

```
/Applications/Plot.app/Contents/MacOS/Plot -m import.macro -q -h
```

31. Macro Inspector

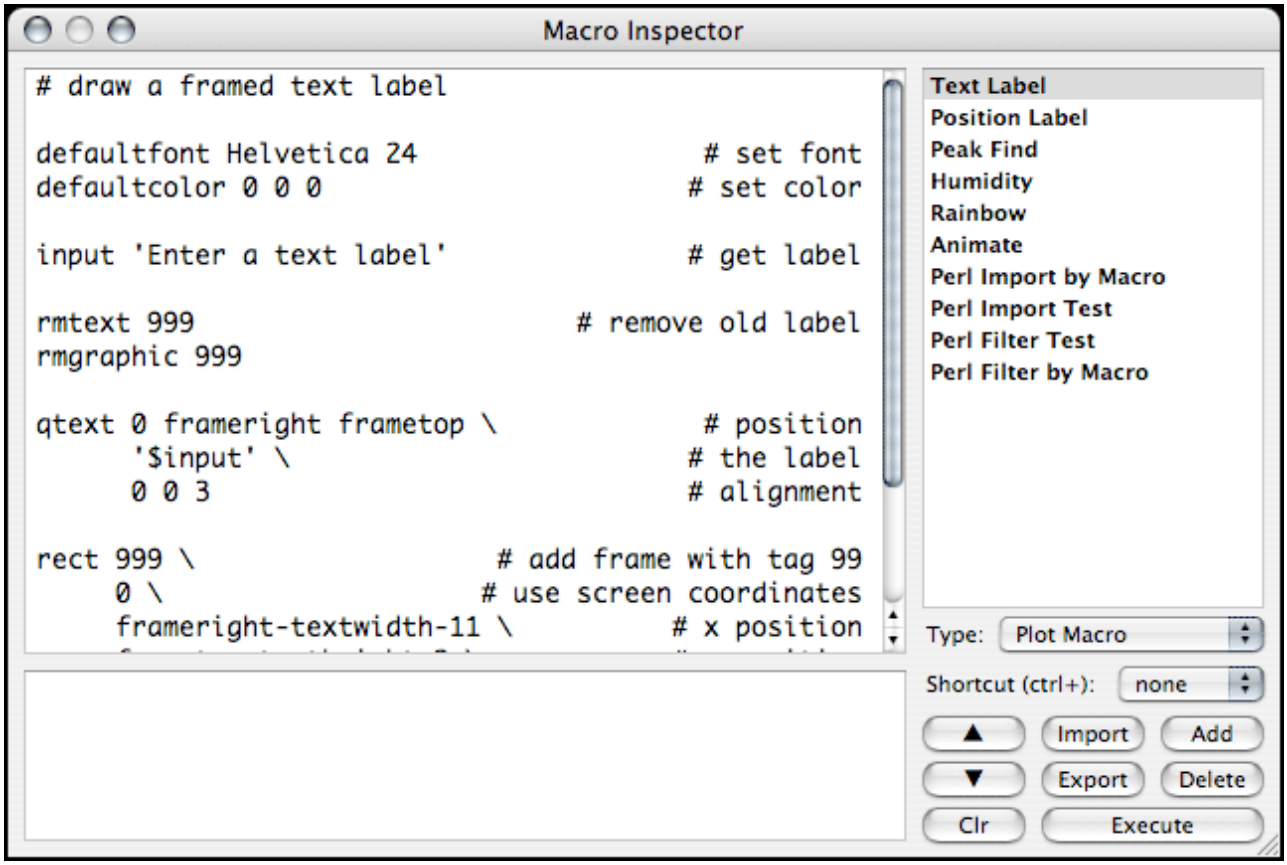
Plot has a build in programing interface which allow editing of three different types of programs.

builtin *Plot* macro language
: can be used to control nearly all function of *Plot* and automate complex tasks.

***Perl* based import filter**
: because of the power of *Perl* this option makes it possible to import every sort of data.

***Perl* based data filter**
: allows to send your data buffer to a perl script

The interface is the same for all of them. It is possible to call the the perl programs from the *Plot* macro language.



Macro Inspector

The big text field contain the macro itself. The small text field is the output console where messages or debug info can be printed. The list on the right contains a list of all your macros.

Type: Selects the type of your macro.

Shortcuts: You can create an unlimited number of macros but only 26 keyboard shortcuts for macros.

Up, **Down**: Moves the selected macro in the list up or down.

Import, **Export**: Allows to import or export the whole macro set and store it in a file for later use.

Add: Create a new empty macro.

Delete: Delete the currently selected macro.

Clr: This clears the console output.

Execute: Executes the macro on the current document.

32. Macro Language

32.1 Introduction

There are ~ 210 commands available in the *Plot* macro language. Most of the commands needs one or more argument. Simply enter the command followed by the arguments separated by spaces. If an argument contains spaces you have to quote the argument with `'` or `"`. Comments can be escaped with #. For example a command may look like this:

```
atext 1 'Axis Text'
```

This commands set tha axis text label for axis `1` (the first X axis).

32.2 Command Reference

Range Commands
Buffer Commands
Control Commands
Interactive Commands
Calculation Commands
Style Commands
Data Style Commands
Axis Style Commands
Legend Commands
Text & Graphic Commands
Document Commands
Miscellaneous Commands

32.3 Variables

During macro execution several variables are available. String variable starts with a `$`.

`cb`	number of the current working buffer in the document
`$date`	the current date
`$document`	the filename of the current document
`dx1`	the distance between the last two measures with the mouse (1. X axis)
`dx2`	the distance between the last two measures with the mouse (2. X axis)
`dy1`	the distance between the last two measures with the mouse (1. Y axis)
`dy2`	the distance between the last two measures with the mouse (2. Y axis)
`$file`	the filename from the `browse` command
`framebottom`	the position of bottom frame line
`frameleft`	the position of left frame line
`frameright`	the position of right frame line
`frametop`	the position of top frame line
`framewidth`	the width of the frame
`$home`	the users home directory
`input`	the result of the last input command
`$input`	the result of the last input command as string
`integral`	the result from the last `calcint` command
`l`	the run variable for loops
`lx`	the X value during a dataloop
`ly`	the Y value during a dataloop
`lxe`	the X error value during a dataloop
`lye`	the X error value during a dataloop
`lastbuffer`	the number of the last buffer generated with one of the calculation commands
`marginbottom`	the bottom margin

marginleft	the left margin
marginright	the right margin
margintop	the top margin
nb	number of data buffer in the document
option	the result of the askoption command
ref1	the 1. reference value
ref2	the 2. reference value
linbga, linbgb	the reference values for linear background subtraction
rega, regb, regr	the result of the last regresion
textheight	the height of the last added text
textwidth	the width of the last added text
$time	the current time
$user	the users name
windowheight	the window height
windowwidth	the window width
xpos1	the last result of the measure with the mouse (1. X axis)
xpos2	the last result of the measure with the mouse (2. X axis)
ypos1	the last result of the measure with the mouse (1. Y axis)
ypos2	the last result of the measure with the mouse (2. Y axis)
xmin1	min value of the 1. (bottom) X axis
xmax1	max value of the 1. (bottom) X axis
ymin1	min value of the 1. (left) Y axis
ymax1	max value of the 1. (left) Y axis
xmin2	min value of the 2. (top) X axis
xmax2	max value of the 2. (top) X axis
ymin2	min value of the 2. (right) Y axis
ymax2	max value of the 2. (right) Y axis

32.4 Arguments

In the command descriptions on the following pages optional argument are written with surrounded square brackets ([argument]) and required arguments with angle brackets (<argument>).

There are also some special arguments:

<BUFFER>

a list of one or more data buffers. Possible values are:

all	all buffers in the document
selected	selected buffers in the document
unselected	unselected buffers in the document
visible	visible buffers in the document
hidden	hidden buffers in the document
none	no buffer
b1,b2,b3,...,bn	a list of buffers where the arguments may be math expressions.
bs..be	buffers from *bs* to *be*

<AXIS>

a definition for the four axis. Possible values are:

all	all four axis
x	both X axis

y	both Y axis
1	1. X axis
2	1. Y axis
3	2. X axis
4	2. Y axis

<AXISGROUP>

the coordinate system:

0	both axis
1	first axis (left and bottom)
2	second axis (right and top)

<COOR>

the coordinate system:

0	screen coordinates
1	first axis (left and bottom)
2	second axis (right and top)

<RANGE>

a list of numbers (e.g. used for the `loop` command):

n	defines a range from 0 to *n*
from:to:step	defines a range where the arguments may be math expressions.
b1,b2,b3,...,bn	a list of numbers where the arguments may be math expressions.
bs..be	numbers from *bs* to *be*

33. Macro Language: Range Commands

`range <AXIS> <min> <max>`

Sets the axis min and max.

`rescale [AXISGROUP]`

Rescales the plot so that every datapoint is just visible.

`upscale <AXISGROUP> [factor]`

Lowers the range of the plot by the given factor (default=10).

`downscale <AXISGROUP> [factor]`

Increase the range of the plot by the given factor (default=10).

34. Macro Language: Buffer Commands

`select <BUFFER>`

Select buffers in the **Data Inspector**.

`setcurrent <number>`

Defines the current working buffer.

`invertselections`

Inverts the selection in the **Data Inspector**.

`hide <BUFFER>`

Hide buffers.

`show <BUFFER>`

Show buffers.

`delete <BUFFER>`

Delete buffers.

`duplicate <BUFFER>`

Duplicate buffers.

`setcomment <BUFFER> <text>`

set the comment field of buffers.

`addcomment <BUFFER> <text>`

add text to the comment field of buffers.

`getcomment <buffer> <var>`

defines a string varible with the comment field of the buffer.

`setsource <BUFFER> <text>`

set the source field of buffers.

`addsource <BUFFER> <text>`

add text to the source field of buffers.

`getsource <buffer> <var>`

defines a string varible with the source field of the buffer.

`belongx <BUFFER> <axis>`

defines if the buffers belongs to the 1. (bottom) or the 2. (top) X axis (possible values: 1, 2).

`belongy <BUFFER> <axis>`

defines if the buffers belongs to the 1. (left) or the 2. (right) Y axis (possible values: 1, 2).

`update`

update buffers which has a dynamic data source (e.g. *MySQL*).

`addvalue <buffer> <x value> <y value> <x error> <y error>`

add value pair to data buffer.

`setxvalue <buffer> <index> <value>`

set X value in data buffer.

`setxerror <buffer> <index> <value>`

set X error in data buffer.

`setyvalue <buffer> <index> <value>`

set Y value in data buffer.

`setyerror <buffer> <index> <value>`

set Y error in data buffer.

`rmvalue <buffer> <index>`

delete value from data buffer.

35. Macro Language: Control Commands

```
if <expr> <operator> <expr>
else
endif
```

Executes the commands between `if ...` and `else` if the condition is true. If the condition is false it executes the commands between `else` and `endif`. Possible operators are ==, `!`=, >, <, >=, <= for numerical comparison and `eq`, `ne` for string comparison. It is not possible to define if,else,endif statements inside another `if`, `else`, `endif` statements.

```
loop <RANGE>
```

Starts a loop for the given range. The running variable for the loop command is `l`. It is not possible to define loops inside another loop.

```
bufferloop <BUFFER>
```

Starts a loop for the given buffer numbers. The running variable for the loop command is `l`. It is not possible to define buffer loops inside another loop.

```
dataloop <buffer>
```

Starts a loop for all data points in the given buffer. The running variable for the loop command is `l`, in this case the same as the point number in the buffer. During the loop the varibles `lx`, `ly`, `lxe`, `lye` contains the values of the corresponding data point. It is not possible to define data loops inside another loop.

```
endloop
```

The endpoint of a `loop`, `bufferloop` or `dataloop` command.

---

36. Macro Language: Interactive Commands

`ask <text>`

This command stops the macro, shows an alert box, displays the `text`, and let you choose to stop or continue the macro.

`askoption <text> <button1> <button0>`

This command stops the macro, shows an alert box, displays the `text`, and provide two buttons. The result will be stored in the variable `option` (1 = `button1`, 0 = `button0`).

`browse`

Opens a panel for file selection. The selected filenmae will be stored in `$file`.

`input`

This command brings up an input panel an let you enter a value. The value will be stored in variables `input` and `$input`.

`plot`

Normally your document will be updated at the end of the macro execution. This command allow to update the document when called.

`print <argument> ...`

Print messages to the console window. Argument will be treated as expression or string.

`sleep <seconds>`

Stops the macro execution for the given time in seconds.

37. Macro Language: Calculation Commands

`fg <axis> <min> <max> <steps> <expr>`

Generate a function with the given parameters.

`<axis>`: The target axis (1 = X axis, 2 = Y axis)

`<min>`, `<max>`: The range for the new generated function.

`<steps>`: Number of steps for the the function.

`<expr>`: Expression which defines the function.

`bcalc <buffer1> <operator> <buffer2>`

Performs basic calculations between two buffers. This work also for buffers with different X axis and different numbers of data points. Only the overlapping area will be processed and missing points will be interpolated.

`<operator>`: + - * /

`calc <data> <expr> <BUFFER>`

Performs a calculation on the data in the buffers.

`<data>`: The target axis (1 = X values, 2 = Y values, 3 = X error, 4 = Y error)

`<expr>`: Expression which defines the calculation.

`swapxy <BUFFER>`

This function swaps the X and Y values. Error values will also be swapped if available.

`normx <ref1> <ref2> <new1> <new2> <BUFFER>`

This function manipulates the buffers by stretching or shrinking along the X axis. The specified reference points in the data are changed in such a way that the `ref1` value becomes the `new1` value and the `ref2` value becomes the `new2` value.

`normy <ref1> <ref2> <new1> <new2> <BUFFER>`

This function manipulates the buffers by stretching or shrinking along the Y axis. The specified reference points in the data are changed in such a way that the `ref1` value becomes the `new1` value and the `ref2` value becomes the `new2` value.

`movex <from> <to> <BUFFER>`

This function moves the buffers on the X axis.

`movey <from> <to> <BUFFER>`

This function moves the buffers on the Y axis.

`cutoutsidex <min> <max> <BUFFER>`

These function deletes all data points in the buffers which are not in the X range between `min` and `max`

`cutinsidex <min> <max> <BUFFER>`

These function deletes all data points in the buffers which are in the X range between `min` and `max`

`cutoutsidey <min> <max> <BUFFER>`

These function deletes all data points in the buffers which are not in the Y range between `min` and `max`

`cutinsidey <min> <max> <BUFFER>`

These function deletes all data points in the buffers which are in the Y range between `min` and `max`

`calcint <min> <max> <BUFFER>`

Integrates the buffers and add the result to the comment field. The result of the last integration is stored in the variable `integral`.

`linreg <min> <max> <BUFFER>`

Perform a linear regression between `min` and `max`. The result of the last regression will be stored in the variables `rega`, `regb` and `regr`.

`logreg <min> <max> <BUFFER>`

Perform a logarithmic regression between `min` and `max`. The result of the last regression will be stored in the variables `rega`, `regb` and `regr`.

`expreg <min> <max> <BUFFER>`

Perform a exponential regression between `min` and `max`. The result of the last regression will be stored in the variables `rega`, `regb` and `regr`.

`linbg <a> <b> <BUFFER>`

Perform a linear background subtraction (y=y+a+bx)

`splinefit <use exclude> <exclude min> <exclude max> <corr mode> <corr factor> <corr func> <sigma mode> <sigma value> <order> <minmax> <derivative> <points> <BUFFER>`

Performs a spline fit. For a detailed description of the parameters click **here**.

`<use exclude>`: Boolean value. If true use the exclude range.

`<exclude min>, <exclude max>`: Defines the exclude range.

`<corr mode>`: The correlation mode (0=ignore, 1=detect, 2=manual)

`<corr factor>`: Used for the manual correlation mode option.

`<corr func>`: Assumed correlation function (0=exponential, 1=gaussian, 2=linear, 3=sinc)

`<sigma mode>`: Info on errors In Y (0=none, 1=from error data, 2=fixed value, 3=significant digits)

`<sigma value>`: Used for the 'fixed value' and 'significant digits' options.

`<order>`: The spline order.

`<minmax>`: Boolean value. If true buffers for minima and maxima will be generated.

`<derivative>`: Boolean value. If true a buffer for the derivative will be generated.

`<points>`: Number of points for the spline result and derivative buffers.

`<BUFFER>`: The buffers witch should be spline fitted.

`smooth <factor> <BUFFER>`

This functions uses `factor` as the effective smooth width and performs a least square smooth to reduce the noise on the buffer.

`fftsmooth <factor> <BUFFER>`

This functions uses `factor` as the effective smooth width and performs a FFT based smooth to reduce the noise on the buffer (see **sources**).

`datareduction <n> <BUFFER>`

Sometimes it is useful to reduce a large number of data points which consist mainly of noise to a more practical amount of points. This function takes `n` points, builds the average, and replaces the n points with the new one.

`spline <points> <strength> <BUFFER>`

This function calculates a nonparametric cubic spline interpolation (see **sources**).

`<points>`: Defines the number of points which should be calculated for each interval.

`<strength>`: Defines the strength of the interpolation. 2 is in most cases a god choice.

`fft <windowing> <BUFFER>`

Performs a Fast Fourier Transform and generates a new buffer with the result.

`<windowing>`: 1=none, 2=Hanning, 3=Welch, 4=Parzen

`diff <interval> <BUFFER>`

Differentiate the buffers and generate new buffers with the result data (see **sources**).

`integrate <BUFFER>`

Integrates buffers and generate new buffers with the result data.

`setxval <BUFFER> <index> <value>`

Set X value at the given index of the buffers.

`setyval <BUFFER> <index> <value>`

Set Y value at the given index of the buffers.

`setxeval <BUFFER> <index> <value>`

Set X error value at the given index of the buffers.

`setyeval <BUFFER> <index> <value>`

Set Y error value at the given index of the buffers.

38. Macro Language: Style Commands

`margins <left> <right> <bottom> <top>`

Defines the margins between window and frame.

`windowsize <width> <height>`

Defines the window size.

`bgcolor <c> <c> <c>`

Defines the background color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`margincolor <c> <c> <c>`

Defines the margin color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`framecolor <c> <c> <c>`

Defines the frame color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`framewidth <width>`

Defines the frame width.

`framestyle <style>`

Defines the frame style. (0=full frame, 1=line at X and Y axis, 2=draw a cross at 0).

`forceframe <bool>`

If enabled a full frame will always be drawn (possible values: yes/no).

`framearrows <bool>`

If enabled arrow will be drawn for frame style 1 and 2.

39. Macro Language: Data Style Commands

`bstyle <lines> <symblos> <fill> <ybars> <xbar> <ystick> <xstick> <dots> <hist> <fhist> <BUFFER>`

Enable or disable styles for data buffers. All styles can be combined (possible values: yes/no).

`bstyleclear <BUFFER>`

removes all styles from buffer.

`bstylelines <bool> <BUFFER>`

add or remove line style (possible values: yes/no).

`bstylesymbols <bool> <BUFFER>`

add or remove symbol style (possible values: yes/no).

`bstylefill <bool> <BUFFER>`

add or remove filled area style (possible values: yes/no).

`bstyleybars <bool> <BUFFER>`

add or remove Y bar style (possible values: yes/no).

`bstylexbars <bool> <BUFFER>`

add or remove X bars style (possible values: yes/no).

`bstyleysticks <bool> <BUFFER>`

add or remove Y stick style (possible values: yes/no).

`bstylexsticks <bool> <BUFFER>`

add or remove X sticks style (possible values: yes/no).

`bstyledots <bool> <BUFFER>`

add or remove dot style (possible values: yes/no).

`bstylehist <bool> <BUFFER>`

add or remove histogram style (possible values: yes/no).

`bstylefhist <bool> <BUFFER>`

add or remove filled histogram style (possible values: yes/no).

`bcolor <c> <c> <c> <BUFFER>`

Defines the color for buffers. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`bfillcolor <c> <c> <c> <BUFFER>`

Defines the color for the fill style. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`bframecolor <c> <c> <c> <BUFFER>`

Defines the frame color for bars. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`bstickcolor <c> <c> <c> <BUFFER>`

Defines the stick color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`blinewidth <linewidth> <BUFFER>`

Defines the line width for buffers.

`blinepattern <pattern> <BUFFER>`

Defines the dash pattern for buffers (0-15).

`bpatternwidth <patternwidth> <BUFFER>`

Defines the width of dash pattern.

`bsymbol <symbol> <BUFFER>`

Defines the symbols for buffers (0-15).

`bsymbolsize <symbolsize> <BUFFER>`

defines the symbol size for buffers.

`bsticksize <sticksize> <BUFFER>`

defines the sticksize size for buffers.

`bstickabs <bool> <BUFFER>`

defines if the sticksize should be an absolute value or not (possible values: yes/no).

`bdynsize <BUFFER> [expr]`

sets an expression which defines the size of symbols or the length of sticks.

`bxerrorval <error> <BUFFER>`

Defines the value for X error bars.

`bxerror <type> <BUFFER>`

Defines the X error bar type (0=off, 1=absolute, 2=relative, 3=form data).

`byerrorval <error> <BUFFER>`

Defines the value for Y error bars.

`byerror <type> <BUFFER>`

Defines the Y error bar type (0=off, 1=absolute, 2=relative, 3=form data).

`berrorlinewidth <linewidth> <BUFFER>`

Defines the line width for error bars.

40. Macro Language: Axis Style Commands

`setaxis <x axis 1> <y axis 1> <x axis 2> <y axis 2>`

Enable or disable axis drawing (possible values: yes/no)

`ascalstart <AXIS> <start>`

Defines where axis scaling should start.

`ascalend <AXIS> <end>`

Defines where axis scaling should end.

`atickdist <AXIS> <dist>`

Defines the distance between two major ticks. If your axis is a time axis you have to enter `days:hours:minutes:seconds` or `w` (1 week) or `m` (1 month) or `y` (1 year).

`aminsteps <AXIS> <steps>`

Defines the number of minor ticks between two major ticks.

`atimeformat <AXIS> <format>`

Defines the format used for the displaying time values on time axis (**time format tokens**).

`atrigger <AXIS> <trigger>`

This allow to define a trigger, a number where a tick should appear and all other ticks should depend on.

`ascalexpr <AXIS> <expr>`

This allows scaling of axis numbers without changing the data itself. For example to display seconds instead of milliseconds enter `v/1000` in this field. *v* is the variable which represents the axis number.

`aexpoffset <AXIS> <offset>`

Allows you to define the limit, above which numbers are plotted in exponential notation. The number you define is the exponent of the limit.

`adecplaces <AXIS> <n>`

Defines the number of decimal places for axis numbers.

`adecplaces <AXIS> <bool>`

If enabled the number of decimal places for axis numbers will be determined automatically (possible values: yes/no).

`aformat <AXIS> <format>`

Defines the axis format (0=linear, 1=logarithmic, 2=time).

`asetsmalllogzero <AXIS> <bool>`

If enabled the smallest value on a logarithmic axis will be replaced with 0 (even if this is not correct) (possible values: yes/no).

`atext <AXIS> <text>`

Defines the axis text label.

`anumfont <AXIS> <font> <size>`

Defines the font for axis numbers.

`anumoffset <AXIS> <offset>`

The distance between numbers and frame.

`anumalign <AXIS> <align>`

Defines the alignment of axis numbers.

`<align>`: The textbox alignment.

`anumangle <AXIS> <angle>`

Defines the angle for axis numbers.

`atextfont <AXIS> <font> <size>`

Defines the font for axis text labels.

`atextoffset <AXIS> <offset>`

The distance between text label and frame.

`asetnum <AXIS> <bool>`

Enable or disable axis numbers (possible values: yes/no).

`asettext <AXIS> <bool>`

Enable or disable axis text labels (possible values: yes/no).

`asetfliptext <AXIS> <bool>`

Enable or disable flipped axis text labels (possible values: yes/no).

`atextcolor <AXIS> <c> <c> <c>`

Defines the color for axis numbers and text. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`asetzeroline <AXIS> <bool>`

Enable or disable a line at the value zero (possible values: yes/no).

`azerolinecolor <AXIS> <c> <c> <c>`

Defines the color for zero lines. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`aticklength <AXIS> <length>`

Defines the tick length.

`aminticklength <AXIS> <length>`

Defines the minor tick length.

`atickwidth <AXIS> <width>`

Defines the tick width.

`amintickwidth <AXIS> <width>`

Defines the minor tick width.

`asetticks <AXIS> <bool>`

Enable or disable axis ticks (possible values: yes/no).

`asetminticks <AXIS> <bool>`

Enable or disable axis minor ticks (possible values: yes/no).

`atickcolor <AXIS> <c> <c> <c>`

Defines the tick color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`amintickcolor <AXIS> <c> <c> <c>`

Defines the minor tick color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`atickstyle <AXIS> <style>`

Defines the tick style (0=inside, 1=outside, 2=both)

`asetgrid <AXIS> <bool>`

Enable or disable the grid (possible values: yes/no).

`asetmingrid <AXIS> <bool>`

Enable or disable the minor grid (possible values: yes/no).

`agridcolor <AXIS> <c> <c> <c>`

Defines the grid color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`amingridcolor <AXIS> <c> <c> <c>`

Defines the minor grid color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`agridwidth <AXIS> <width>`

Defines the grid width.

`amingridwidth <AXIS> <width>`

Defines the minor grid width.

`agridpattern <AXIS> <pattern>`

Defines the grid dash pattern (0-15).

`amingridpattern <AXIS> <pattern>`

Defines the minor grid pattern (0-15).

`agridfront <AXIS> <bool>`

Defines if the grid should be drawn in front or not (possible values: yes/no).

`amingridfront <AXIS> <bool>`

Defines if the minor grid should be drawn in front or not (possible values: yes/no).

`alabel <AXIS> <number> <replacement`

Defines a axis number replacement

41. Macro Language: Legend Commands

`setlegend <bool>`

Enable or disable the legend (possible values: yes/no).

`legendpos <x> <y>`

Defines the legend position.

`setlegendbg <bool>`

Enable or disable legend background (possible values: yes/no).

`legendlength <length>`

Defines the length for legend lines.

`legendspace <space>`

Defines the vertical space between two legend entries.

`legendcolor <c> <c> <c>`

Defines the color for legend text. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`legendbgcolor <c> <c> <c>`

Defines the legend background color. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

`legendfont <font> <font size>`

Defines the legend font.

42. Macro Language: Text & Graphic Commands

`text <tag> <x> <y> <font> <font size> <text> [c] [c] [c] [angle] [align] [pos] [offset] [cb] [cb] [cb]`

Adds a text label to the document.

`<tag>`: The `tag` argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

`<x>`, `<y>`: the position in screen coordinates of the text.

`<font>`: The font for the text (e.g. *Helvetica-Bold*)

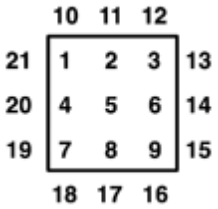
`<font size>`: The font size of the text.

`[c] [c] [c]`: The color of the text. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command `colormode` (0=RGB, 1=HSB).

`[angle]`: The text angle.

`[align]`: The text alignment (0=left, 1=center, 2=right).

`[pos]`: The position for automatically positioned text label (0=off, 1-21 fixed text positions).



`[offset]`: Offset for automatically positioned text label.

`[cb] [cb] [cb]`: The color of the text background. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command `colormode` (0=RGB, 1=HSB).

`ftext <tag> <COOR> <x> <y> <font> <font size> <text> [c] [c] [c] [angle] [align] [tbalign] [cb] [cb] [cb]`

Adds a floating text label to the document.

`<tag>`: The `tag` argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

`<COOR>`: The coordinate system to which the rectangle belongs.

`<x>`, `<y>`: the position of the text in the defined coordinates system.

`<font>`: The font for the text (e.g. *Helvetica-Bold*)

`<font size>`: The font size of the text.

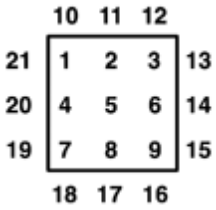
`[c] [c] [c]`: The color of the text. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command `colormode` (0=RGB, 1=HSB).

[angle]: The text angle.

[align]: The text alignment (0=left, 1=center, 2=right).

[tbalign]: The textbox alignment.

[pos]: The position for automatically positioned text label (0=off, 1-21 fixed text positions).



[offset]: Offset for automatically positioned text label.

[cb] [cb] [cb]: The color of the text background. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

---

qtext <COOR> <x> <y> <text> [angle] [align] [tbalign]

Adds a text label to the document. This command uses the default color and the default font. The generated text label has the tag 999.

<COOR>: The coordinate system to which the rectangle belongs.

<x>, <y>: the position in screen coordinates of the text.

[angle]: The text angle.

[align]: The text alignment (0=left, 1=center, 2=right).

[tbalign]: The textbox alignment.

---

rect <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [c] [c] [c]

Draw a rectangle with the given attributes.

<tag>: The tag argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

<COOR>: The coordinate system to which the rectangle belongs.

<x>, <y>: The position of the rectangle in the defined coordinates system.

<w>, <h>: The size of the rectangle in the defined coordinates system.

[linewidth]: The rectangles line width.

[dash]: The dash pattern for the rectangle (0-15).

[c] [c] [c]: The color of the rectangle. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

---

frect <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [cf] [cf] [cf]

Draw a filled rectangle with the given attributes.

<tag>: The tag argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

<COOR>: The coordinate system to which the rectangle belongs.

<x>, <y>: The position of the rectangle in the defined coordinates system.

<w>, <h>: The size of the rectangle in the defined coordinates system.

[linewidth]: The rectangles line width.

[dash]: The dash pattern for the rectangle (0-15).

[c] [c] [c]: The color of the rectangle. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

[cf] [cf] [cf]: The fill color of the rectangle. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

---

circle <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [c] [c] [c]

Draw a circle with the given attributes.

<tag>: The tag argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

<COOR>: The coordinate system to which the circle belongs.

<x>, <y>: The position of the circle in the defined coordinates system.

<w>, <h>: The size of the circle in the defined coordinates system.

[linewidth]: The circles line width.

[dash]: The dash pattern for the circle (0-15).

[c] [c] [c]: The color of the circle. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

---

fcircle <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [cf] [cf] [cf]

Draw a filled circle with the given attributes.

<tag>: The tag argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

<COOR>: The coordinate system to which the circle belongs.

<x>, <y>: The position of the circle in the defined coordinates system.

<w>, <h>: The size of the circle in the defined coordinates system.

[linewidth]: The circles line width.

[dash]: The dash pattern for the circle (0-15).

[c] [c] [c]: The color of the circle. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

[cf] [cf] [cf]: The fill color of the circle. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

---

arrow <tag> <COOR> <x1> <y1> <x2> <y2> <a1> <a2> <at> <as> [linewidth] [dash] [c] [c] [c]

Draw an arrow with the given attributes.

<tag>: The tag argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

<COOR>: The coordinate system to which the arrow belongs.

<x1>, <y1>, <x2>, <y2>: The start and end position of the arrow in the defined coordinates system.

<a1>, <a2>: Draw arrow at line start and/or end (possible values: yes/no)

<at>: The arrow type (0-3).

<as>: The arrow size.

[linewidth]: The arrow line width.

[dash]: The dash pattern for the arrow (0-15).

[c] [c] [c]: The color of the arrow. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command colormode (0=RGB, 1=HSB).

---

line <tag> <COOR> <x1> <y1> <x2> <y2> [linewidth] [dash] [c] [c] [c]

Draw a line with the given attributes.

<tag>: The tag argument should be an integer value which can be used later to address a graphic or text object. Interactively created text or graphic objects always have the tag 0.

<COOR>: The coordinate system to which the line belongs.

<x1>, <y1>, <x2>, <y2>: The start and end position of the line in the defined coordinates system.

`[linewidth]`: The line width.

`[dash]`: The dash pattern for the line (0-15).

`[c] [c] [c]`: The color of the line. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command `colormode` (0=RGB, 1=HSB).

`rmtext <tag>`

Remove text object with the tag `tag`.

`rmgraphic <tag>`

Remove graphic object with the tag `tag`.

`defaultfont <font> <font size>`

Defines a default font for all text and graphic commands.

`defaultcolor <c> <c> <c>`

Defines a default color for all text and graphic commands.

`<c> <c> <c>`: The color of the circle. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command `colormode` (0=RGB, 1=HSB).

43. Macro Language: Document Commands

`new`

Opens a new document.

`close`

Close the current document window.

`open <filename>`

Opens the document with the given filename.

`save`

Save the current document.

`saveas <filename>`

Save document to new file.

`savepng <filename> [dpi]`

Save document as PNG file. The default resolution is 72 dpi.

`savejpg <filename> [dpi]`

Save document as JPG file. The default resolution is 72 dpi.

`savepdf <filename>`

Save document as PDF file.

`saveeps <filename>`

Save document as EPS file.

`printdoc`

Print the current document.

`import <filename> <mode> [separator] [xcol] [noxcol] [comment] [ignore] [comment sequence]`

Import an ASCII file

`<mode>`: Import mode (0=multicolumn, 1=error values).

`[separator]`: Defines the field separator for ASCII import.

`[xcol]`: Defines the X column starting with 1 as the first column.

[noxcol]: If true all columns will be interpreted a Y values and the X values will be generated as sequence number.

[comment]: Overwrites the default comment for the imported buffers.

[ignore]: Lines containing this string will be ignored.

[comment sequence]: Anything in a line behind this sequence will be ignored for import.

`binaryimport <filename> <type> <mode> <swap> <columns> [comment]`

Performs a binary import of data.

<type>: Defines the data type (0=double (64bit), 1=float (32bit), 2=integer (32 bit), 3=integer (16 bit)).

<mode>: Defines the import mode (0=column mode, 1=block mode).

<swap>: Enables or disables byte order swapping.

<columns>: The number of columns to import.

`mysqlimport <host> <db> <user> <password> <port> <sql>`

Import data from mysql database.

`export <file> <BUFFER>`

Export buffers as ASCII file.

44. Macro Language: Miscellaneous Commands

`colormode <mode>`

With this command you can define if colors will be defined as RGB or HSB (0=RGB, 1=HSB).

`clr`

Clears the console output.

`setvar <var> <expr>`
`<var>=<expr>`

Defines a variable.

`setstring <var> <value>`
`$<var>=<expr>`

Defines a string variable.

`eval <name> <expr>`

Evaluates the expression and defines the result as string variable.

`format <name> <format> <expr> ... <expr>`

Returns a string created with the given format string. The format can be defined in the usual `printf` notation.

`hideapp`

Hide Plot. Useful for command line started macros.

`quitapp`

Quit Plot. Useful for command line started macros.

`repadd <font> <font size> [c] [c] [c] <text>`

Add a text to the report panel. Dependent on the colormode the three values are RGB or HSB values from 0.0 to 1.0. The colormode can be set with the command `colormode` (0=RGB, 1=HSB).

`qrepadd <text>`

Add a text to the report panel. This command uses the default color and the default font.

`reppaste <modul>`

Paste module to the report panel. Possible modules are: `name`, `date`, `figure`, `buffer`, `fit` and `spline`.

`repclear`

Clear the report panel content.

`repprint`

Print the report panel content.

`perlimport <name> <filename>`

This executes a *Perl* imprt filter for the given file. Look in the **perl import** section for detailed informations.

`perlfilter <name> <BUFFER>`

This executes a *Perl* filter for the given buffers. Look in the **perl filter** section for detailed informations.

45. Macro Quick Reference

45.1 Range Commands

range <AXIS> <min> <max>
rescale [AXISGROUP]
upscale <AXISGROUP> [factor]
downscale <AXISGROUP> [factor]

45.2 Buffer Commands

select <BUFFER>
setcurrent <number>
invertselections
hide <BUFFER>
show <BUFFER>
delete <BUFFER>
duplicate <BUFFER>
setcomment <BUFFER> <text>
setsource <BUFFER> <text>
getcomment <buffer> <var>
addcomment <BUFFER> <text>
addsource <BUFFER> <text>
getsource <buffer> <var>
belongx <BUFFER> <axis>
belongy <BUFFER> <axis>
update
addvalue <buffer> <x value> <y value> <x error> <y error>
setxvalue <buffer> <index> <value>
setxerror <buffer> <index> <value>
setyvalue <buffer> <index> <value>
setyerror <buffer> <index> <value>
rmvalue <buffer> <index>

45.3 Control Commands

if <expr> <operator> <expr>
else
endif
loop <RANGE>
bufferloop <BUFFER>
dataloop <buffer>
endloop

45.4 Interactive Commands

ask <text>
askoption <text> <button1> <button0>
browse
input
plot
print <argument> ...
sleep <seconds>

45.5 Calculation Commands

fg <axis> <min> <max> <steps> <expr>
bcalc <buffer1> <operator> <buffer2>

45.9 Data Style Commands

bstyle <lines> <symblos> <fill> <ybars> <xbar> <ystick> <xstick> <dots> <hist> <fhist> <BUFFER>
bstyleclear <BUFFER>
bstylelines <bool> <BUFFER>
bstylesymbols <bool> <BUFFER>
bstylefill <bool> <BUFFER>
bstyleybars <bool> <BUFFER>
bstylexbars <bool> <BUFFER>
bstyleysticks <bool> <BUFFER>
bstylexsticks <bool> <BUFFER>
bstyledots <bool> <BUFFER>
bstylehist <bool> <BUFFER>
bstylefhist <bool> <BUFFER>
bcolor <c> <c> <c> <BUFFER>
bfillcolor <c> <c> <c> <BUFFER>
bframecolor <c> <c> <c> <BUFFER>
bstickcolor <c> <c> <c> <BUFFER>
blinewidth <linewidth> <BUFFER>
blinepattern <pattern> <BUFFER>
bpatternwidth <patternwidth> <BUFFER>
bsymbol <symbol> <BUFFER>
bsymbolsize <symbolsize> <BUFFER>
bsticksize <sticksize> <BUFFER>
bstickabs <bool> <BUFFER>
bdynsize <BUFFER> [expr]
bxerrorval <error> <BUFFER>
bxerror <type> <BUFFER>
byerrorval <error> <BUFFER>
byerror <type> <BUFFER>
berrorlinewidth <linewidth> <BUFFER>

45.10 Axis Style Commands

setaxis <x axis 1> <y axis 1> <x axis 2> <y axis 2>
axisscalstart <AXIS> <start>
ascalend <AXIS> <end>
atickdist <AXIS> <dist>
aminsteps <AXIS> <steps>
atimeformat <AXIS> <format>
atrigger <AXIS> <trigger>
ascalexpr <AXIS> <expr>
aexpoffset <AXIS> <offset>
adecplaces <AXIS> <n>
adecplaces <AXIS> <bool>
aformat <AXIS> <format>
asetsmalllogzero <AXIS> <bool>
atext <AXIS> <text>
anumfont <AXIS> <font> <size>
anumoffset <AXIS> <offset>
atextfont <AXIS> <font> <size>
atextoffset <AXIS> <offset>
asetnum <AXIS> <bool>

calc <data> <expr> <BUFFER>
swapxy <BUFFER>
normx <ref1> <ref2> <new1> <new2> <BUFFER>
normy <ref1> <ref2> <new1> <new2> <BUFFER>
movex <from> <to> <BUFFER>
movey <from> <to> <BUFFER>
cutoutsidex <min> <max> <BUFFER>
cutinsidex <min> <max> <BUFFER>
calcint <min> <max> <BUFFER>
linreg <min> <max> <BUFFER>
logreg <min> <max> <BUFFER>
expreg <min> <max> <BUFFER>
linbg <a> <b> <BUFFER>
splinefit <use exclude> <exclude min> <exclude max> <corr mode> <corr factor> <corr func> <sigma mode> <sigma value> <order> <minmax> <derivative> <points> <BUFFER>
smooth <factor> <BUFFER>
fftsmooth <factor> <BUFFER>
datareduction <n> <BUFFER>
spline <points> <strength> <BUFFER>
fft <windowing> <BUFFER>
diff <interval> <BUFFER>
integrate <BUFFER>
setxval <BUFFER> <index> <value>
setyval <BUFFER> <index> <value>
setxeval <BUFFER> <index> <value>
setyeval <BUFFER> <index> <value>

45.6 Documents Commands

new
close
open <filename>
save
saveas <filename>
savepng <filename> [dpi]
savejpg <filename> [dpi]
savepdf <filename>
saveeps <filename>
printdoc
import <filename> <mode> [separator] [xcol] [noxcol] [comment] [ignore] [comment sequence]
binaryimport <filename> <type> <mode> <swap> <columns> [comment]
mysqlimport <host> <db> <user> <password> <port> <sql>
export <file> <BUFFER>

45.7 Miscellaneous Commands

colormode <mode>
clr
setvar <var> <expr>
<var>=<expr>
setstring <var> <value>
$<var>=<expr>

asettext <AXIS> <bool>
asetfliptext <AXIS> <bool>
atextcolor <AXIS> <c> <c> <c>
asetzeroline <AXIS> <bool>
azerolinecolor <AXIS> <c> <c> <c>
aticklength <AXIS> <length>
aminticklength <AXIS> <length>
atickwidth <AXIS> <width>
amintickwidth <AXIS> <width>
asetticks <AXIS> <bool>
asetminticks <AXIS> <bool>
atickcolor <AXIS> <c> <c> <c>
amintickcolor <AXIS> <c> <c> <c>
atickstyle <AXIS> <style>
asetgrid <AXIS> <bool>
asetmingrid <AXIS> <bool>
agridcolor <AXIS> <c> <c> <c>
amingridcolor <AXIS> <c> <c> <c>
agridwidth <AXIS> <width>
amingridwidth <AXIS> <width>
agridpattern <AXIS> <pattern>
amingridpattern <AXIS> <pattern>
agridfront <AXIS> <bool>
amingridfront <AXIS> <bool>
alabel <AXIS> <number> <replacement

45.11 Legend Commands

setlegend <bool>
legendpos <x> <y>
setlegendbg <bool>
legendlength <length>
legendspace <space>
legendcolor <c> <c> <c>
legendbgcolor <c> <c> <c>
legendfont <font> <font size>

45.12 Text & Graphic Commands

text <tag> <x> <y> <font> <font size> <text> [c] [c] [c] [angle] [align] [pos] [offset] [cb] [cb] [cb]
ftext <tag> <COOR> <x> <y> <font> <font size> <text> [c] [c] [c] [angle] [align] [tbalign] [cb] [cb] [cb]
qtext <COOR> <x> <y> <text> [angle] [align] [tbalign]
rect <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [c] [c] [c]
frect <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [cf] [cf] [cf]
circle <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [c] [c] [c]
fcircle <tag> <COOR> <x> <y> <w> <h> [linewidth] [dash] [cf] [cf] [cf]
arrow <tag> <COOR> <x1> <y1> <x2> <y2> <a1> <a2> <at> <as> [linewidth] [dash] [c] [c] [c]
line <tag> <COOR> <x1> <y1> <x2>

eval <name> <expr>
format <name> <format> <expr> ... <expr>
hideapp
quitapp
repadd <font> <font size> [c] [c] [c] <text>
qrepadd <text>
reppaste <modul>
repclear
repprint
perlimport <name> <filename>
perlfilter <name> <BUFFER>

45.8 Style Commands

margins <left> <right> <bottom> <top>
windowsize <width> <height>
bgcolor <c> <c> <c>
margincolor <c> <c> <c>
framecolor <c> <c> <c>
framewidth <width>
framestyle <style>
forceframe <bool>
framearrows <bool>
<y2> [linewidth] [dash] [c] [c] [c]
rmtext <tag>
rmgraphic <tag>
defaultfont <font> <font size>
defaultcolor <c> <c> <c>

46. Perl Import Filter

Perl based import filter can be very useful to import files with unusual data format. *Plot* builds an easy to access framework arround your script which allow to pass the data to *Plot*. Errors produced by the script will be shown in the console of the **Macro Inspector**.

To create a *Perl* import filter open the **Macro Inspector** choose *Add* in the panel an select *Perl Import* as type. In the large text field of the **Macro Inspector** you can now enter your script.

46.1 Predefinitions

The following variables and subroutines are available in your *Perl* import filter:

`$file`
: The filename of the file you want to import.

`&log()`
: Send output to the console in the **Macro Inspector**.

`@data[buffer][point number][column]`
: A three dimensional array which should contain the data at the end of your script.
`[buffer]`: The number of the buffer (starting with 0)
`[point number]`: The number of the data point (starting with 0)
`[column]`: The column number (0 = X value, 1 = Y value, 2 = X error, 3 = Y error)

`@commnet[buffer]`
: In this array you can set comments for each imported buffer (visible in the **Data Inspector**).

`@source[buffer]`
: In this array you can set source information for each imported buffer (visible in the **Data Inspector**).

`%var{key}`
: If the script is started from a macro this hash contains all number variables. The variables will also be returned to the macro.

`%svar{key}`
: If the script is started from a macro this hash contains all string varibles. The variables will also be returned to the macro.

46.2 Restrictions

- Do not send anything to STDERR and STDOUT.
- Do not use any interactive things.
- If your *Perl* script hangs *Plot* will hang too (sorry, this has to be changed in the future). You can kill a hanging *Perl* script from the Terminal.app

46.3 Example

The following example demonstrates how to import a file containing two columns separated by `<Tab>`. The script also checks for the correct number of columns and sets the buffer comment.

```
open(IN,$file);
$n=0;
while(<IN>) {
  @tmp=split('\t');
  if ($#tmp==1) {
    $data[0][$n][0]=$tmp[0];
    $data[0][$n][1]=$tmp[1];
    $n++
  }
}
close(IN);
$comment[0]='Test';
```

```
&log("$n number of points");
```

47. Perl Data Filter

Perl based data filter passes all selected buffers to a *Perl* script where the data can be manipulated. When the script has finished the data will be returned to *Plot* as new data buffers. *Plot* builds an easy to access framework arround your script which allow to pass the data to *Plot*. Errors produced by the script will be shown in the console of the **Macro Inspector**.

To create a *Perl* data filter open the **Macro Inspector** choose *Add* in the panel an select *Perl Filter* as type. In the large text field of the **Macro Inspector** you can now enter your script.

47.1 Predefinitions

The following variables and subroutines are available in your *Perl* import filter:

`&log()`
: Send output to the console in the **Macro Inspector**.

`@data[buffer][point number][column]`
: A three dimensional array which contain the data of all selected buffers at the beginning of the script. At the end of the script the array will be returned to *Plot*
`[buffer]`: The number of the buffer (starting with 0)
`[point number]`: The number of the data point (starting with 0)
`[column]`: The column number (0 = X value, 1 = Y value, 2 = X error, 3 = Y error)

`@commnet[buffer]`
: This array you contain the comments of your buffers.

`@source[buffer]`
: This array you contain the source information of your buffers

`$nb`
: The number of buffers passed to the script.

`%var{key}`
: If the script is started from a macro this hash contains all number variables. The variables will also be returned to the macro.

`%svar{key}`
: If the script is started from a macro this hash contains all string varibles. The variables will also be returned to the macro.

47.2 Restrictions

- Do not send anything to STDERR and STDOUT.
- Do not use any interactive things.
- If your *Perl* script hangs *Plot* will hang too (sorry, this has to be changed in the future). You can kill a hanging *Perl* script from the Terminal.app

47.3 Example

The following example demonstrates how to apply manipulations to your buffers (in this case 1.23 will be added to the Y values and a string will be appended to the comment field).

```
for ($j=0;$j<$nb;$j++) {
  $np=$#{$data[$j]}+1;
  $nc=$#{$data[$j][0]}+1;
  for ($i=0;$i<$np;$i++) {
    $data[$j][$i][1]+=1.23;
  }
  $comment[$j].=" added 1.23";
}
```

48. About Plot

48.1 History

A long time ago in the last millennium I wrote a program called *SciPlot* for the fantastic NeXT computers (the older ones of you maybe remember).

After the NeXT period I had the idea to make a similar program for windows computers. After some work on this I did not find any fun in programming for Windows computers and so I stopped the development of *SciPlot* for Windows.

Now we have Mac OS X and I started the *Plot* project which takes some of the ideas of *SciPlot* but is a completely rewritten program with a different focus than *SciPlot*.

48.2 Sources

Spline Fit

Freestyle data fitting
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Cambridge University Press

FFT Smooth & Differentiation

Numerical Recipes in C
W.H.Press, B.P.Flannery, S.A.Teukolsky, W.T.Vetterling
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48.3 About the author

Michael Wesemann

Nothing to say about me but you are invited to send **email** and also to visit also my **pets page**.

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