

# **Working with Origin**

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# Layout of Presentation

- 1. Importing data***
- 2. Creating and editing the data plots***
- 3. Data analysis and data fitting***
- 4. Worksheets***
- 5. Some Final Comments !***

# 1. Importing data

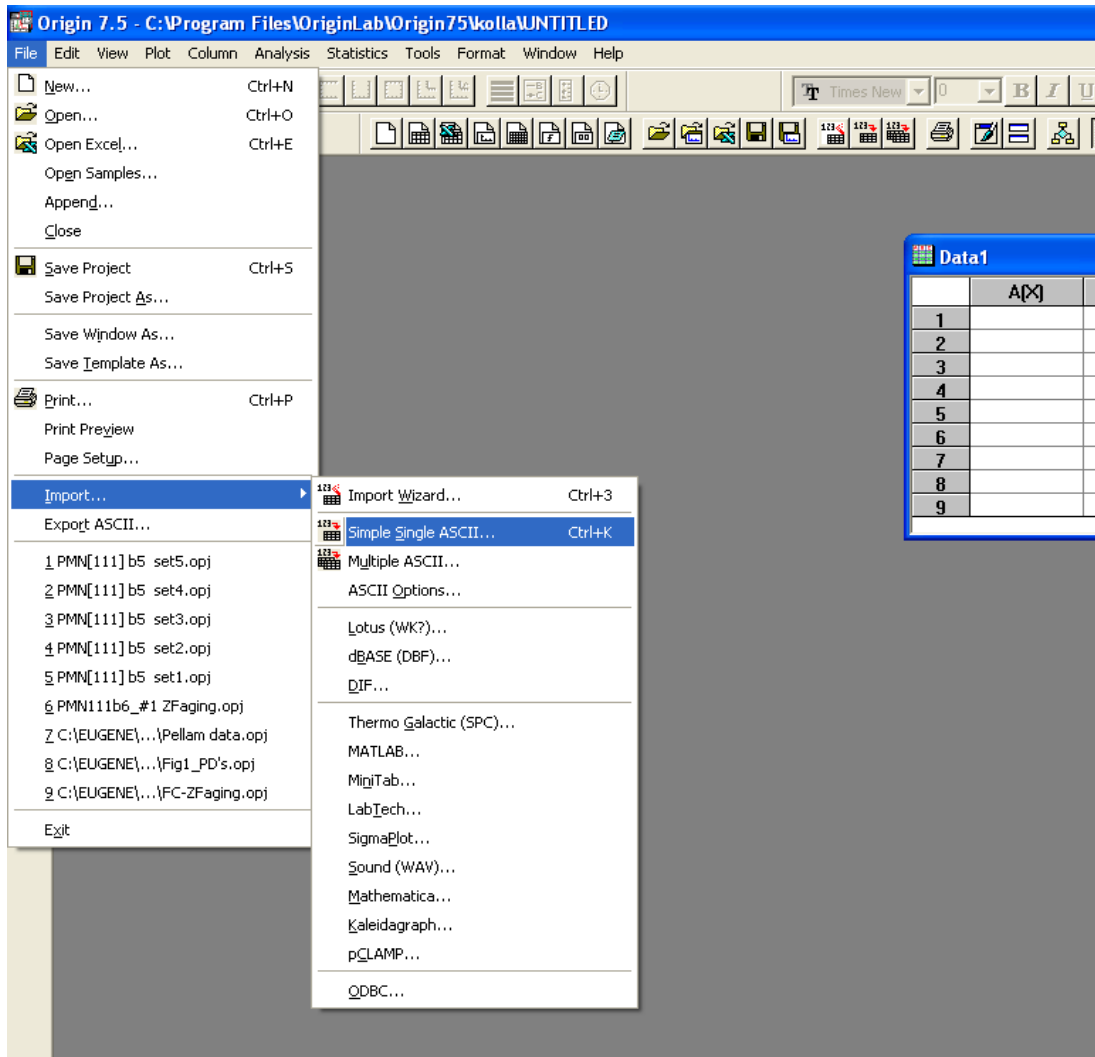


Fig -1

Example of importing of the **Simple Single ASCII** data set

Go to **File** menu, **Import**, choose what kind of data are you going to import

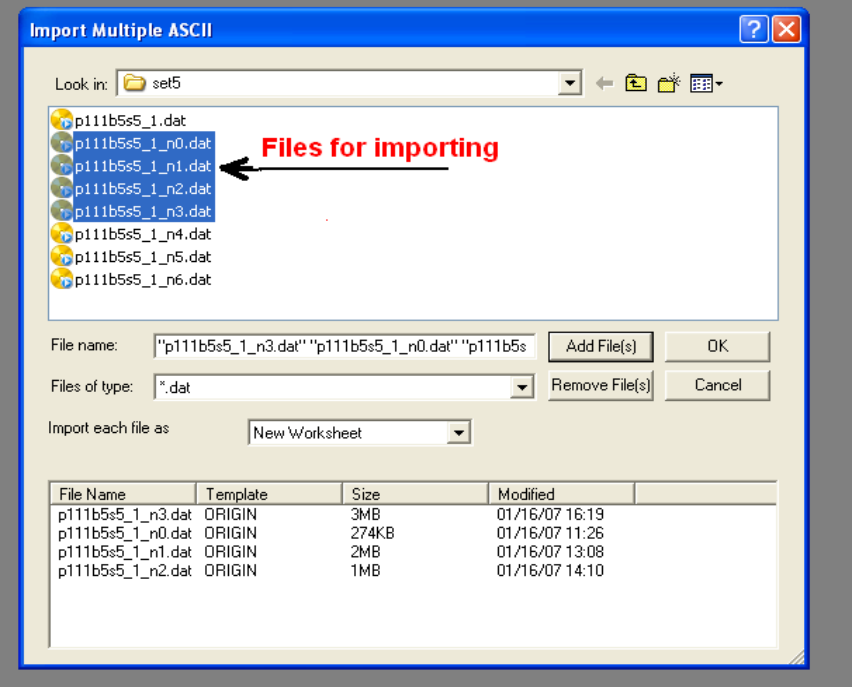
❖ For importing many data files.....

➤ Select **Multiple ASCII** option (Fig.1)

This will result in appearance a new window (Fig.2.). Here you can find a proper place on your computer containing data files, then mark them and add to the list of the imported files (push **Add file(s)** button. Import could be done in three different ways:

- (i) you can load each file in a separated worksheet
- (ii) you can import all data sets in the same one worksheet adding new columns to it
- (iii) you can import all data files in the same worksheet, but in new roes.

❖ *Data can be imported from Text files or in Excel format also.*



(Fig.2.)

# 2. Creating and editing the data plots.

- ❖ Open the worksheet which contains the data for plotting.
- ❖ Go to **Plot** menu and choose the kind of plot you like to create. In Fig.3 the **Line and Symbol** plot option is marked. It will be also possible latter to change this while editing the plot. It will be also possible to add more plots to the graph.

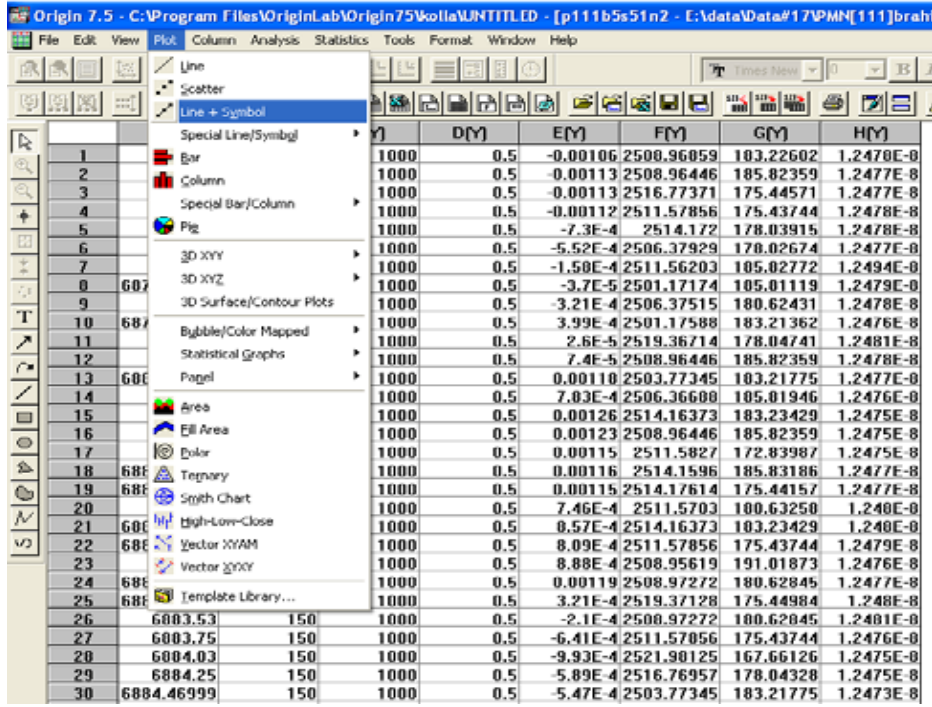


Fig.3

❖ After choosing the plot style the Plot Setup window will invite to data selection dialog (Fig.4.). Here in the top window is the list of all available data worksheets. Middle part of the Plot Setup window is dedicated to make links between **X** and **Y** axes and the columns in the worksheet

The graph which will open in the graph window will be very simple and have to work on it a lot to bring to the level required for report or publication.

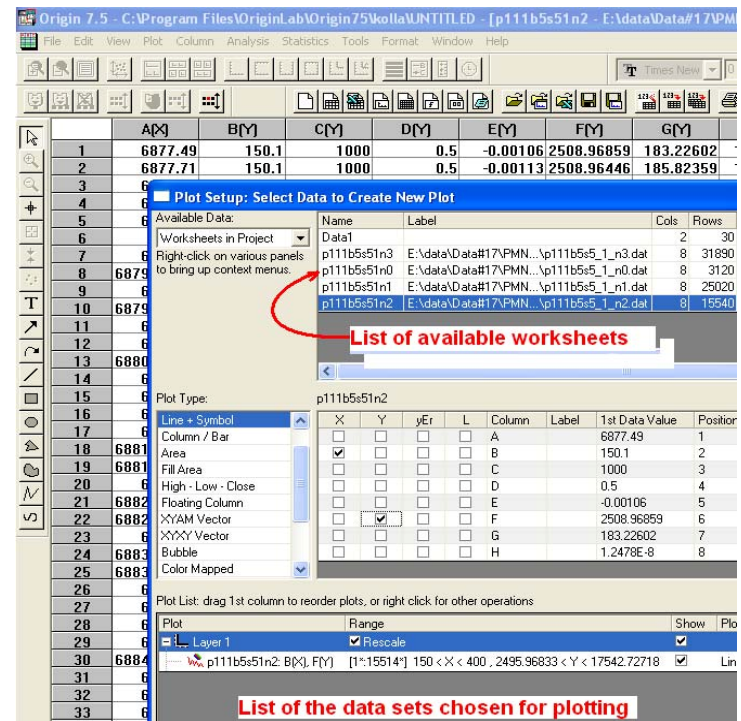


Fig . 4

- ❖ Click on **X** or **Y** axis and corresponding pop-up menu will appear (Fig.6.). Here you can change a lot related to graph design: type of the axis (linear, log10, ln etc.), scales, grids, tick labels, axes titles etc.
- ❖ You can easily switch from **Y** axis to **X** axis using selection window.
- ❖ The next, what you can do with the graph is to work on plot design – line style, colors, etc.

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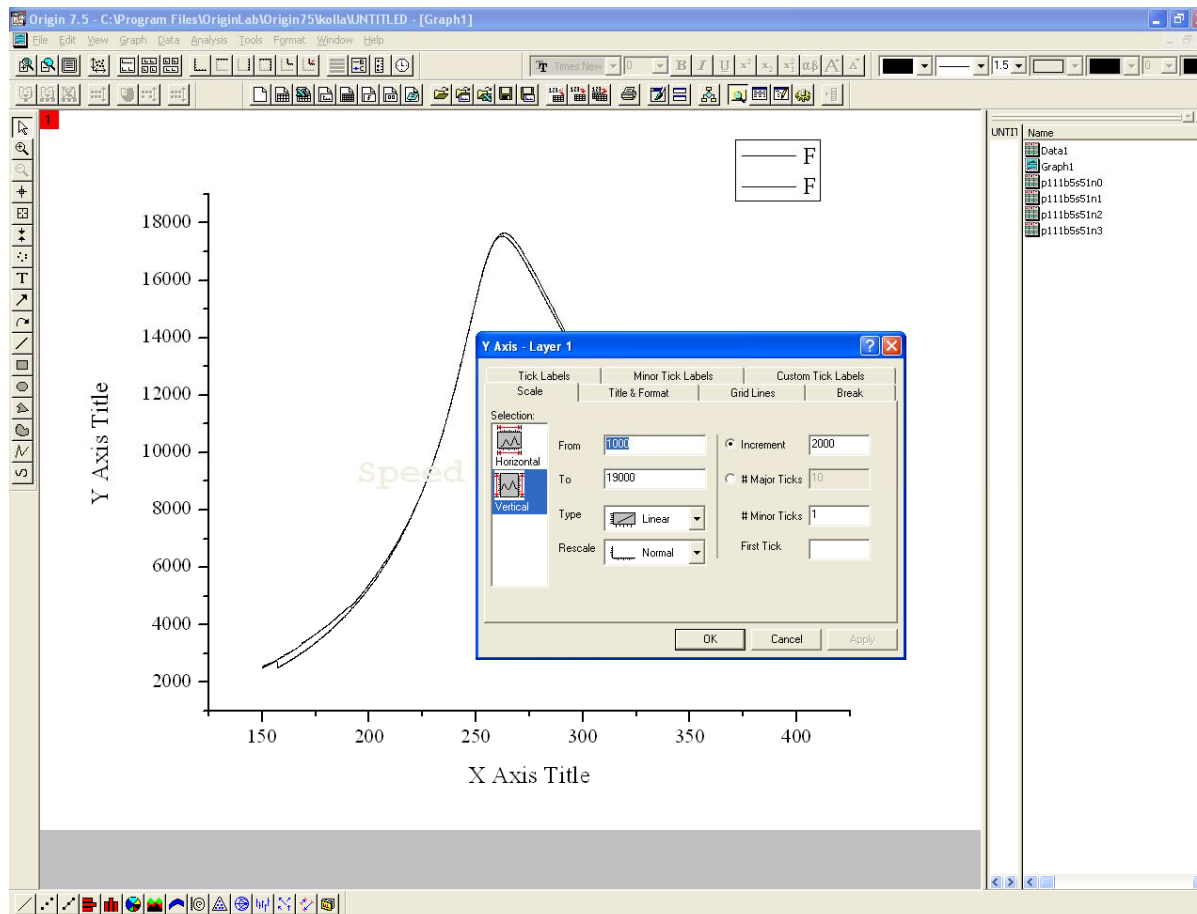


Fig. 6

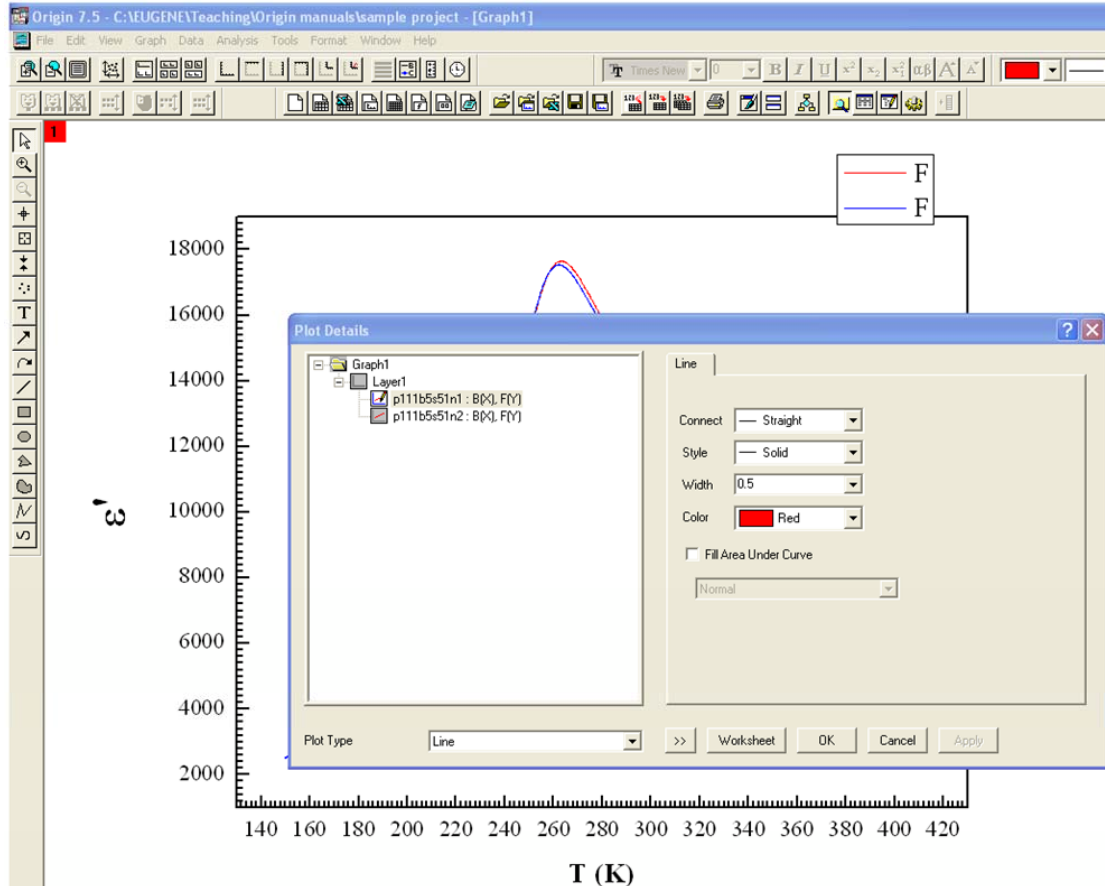
Not all points are plotted for p111b5s1n2\_F. See the Speed Mode option in Layer (Size/Speed) tab in Plot Details dialog.

Color Publication 1:p111b5s1n1\_F(1-25006) Graph1 |Radian

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❖ Click on the plotted line or go to the main menu **Format** → **Plot** and a new pop-up menu will appear on the graph (Fig.7). At this point you can redesign each plot depicted in the active graph. You can do it separately with each plot or you can use the **Group** (see Origin manual how to use the **Group** option) option and do all changes in all presented plots in the same time. This could be very helpful if you work with a large number of plots in the graph.

❖ If you have selected “**Line + Symbol**” there will be two more submenus for **Symbol** style and **Drop Lines** editing.

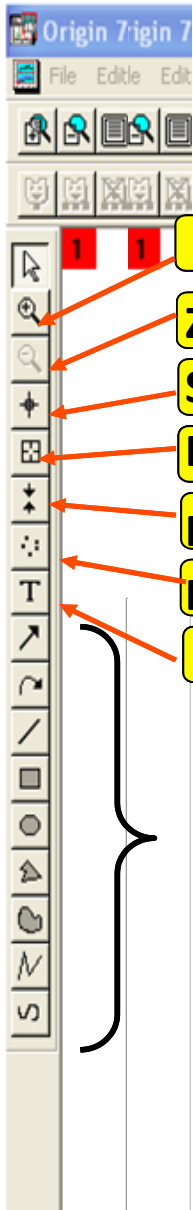




## **Templates.....**

After the graph design has been done you can save it as graph template for future use. Go to the main menu **File** → **Save Template As**. It will save your Graph without plots and you can use this template in this or in future project and it will save you a lot of time. You can use a special toolbar button (see Fig.8.) to open /use the earlier saved Template for plotting.

## Additional Toolbar....



Zoom

Zoom out

Screen reader

Data reader

Data selector

Draw data

Text

Different  
AutoShapes  
Tools

- ❖ Toolbar is very useful while working with graphs. Usually it is located on the left side of the main window.
- ❖ **Zoom in** makes enlarging of the particular selected area by replotting of the data included in this area but not as a simple zooming of the graphical image.
- ❖ **Screen reader** shows X, Y coordinates of the screen in respect to scales of the axes.
- ❖ **Data reader** shows X, Y coordinates of the selected data point in the graph.
- ❖ **Data selector** puts the limits for data in the graph which will be used in further data analysis (fitting, regressions etc.).
- ❖ **Draw data** is for manual creating of the plot in the graph; corresponding data will go to a new worksheet.
- ❖ **Text tool** is for writing text in any place of the graphical page.
- ❖ **AutoShapes** tools are for adding to the Graph page some lines arrows etc. All these graphical elements will be saved when saving this graph as a template.

# Multiple Graphs.....

❖ Go to Tools --- Layers

A pop up many Layer (Fig- 10) will appear. Here, one can add a plot to the graph ("**Add**") and also arrange the plots on the page ("**Arrange**")

In Fig.10 the Add submenu is shown. Here you can:

- (1) add a full scale plot with new left X and bottom new Y axes
- (2) add a full scale plot with a new X axis on the top of the graph with a common Y axis,
- (3) add a full scale plot with a new Y axis on the right side and common X axis,
- (4) add a full scale graph with a new top X axis and a new right Y axis,
- (5) add a small insert plot in the right top corner (shown in Fig.10.)
- (6) It is same as (5) but a new plot will contain the data from the original plot.

Except (6) the new plot will be created as a blank and you will need to attach the data by clicking on the corresponding tag and choosing the data for plotting

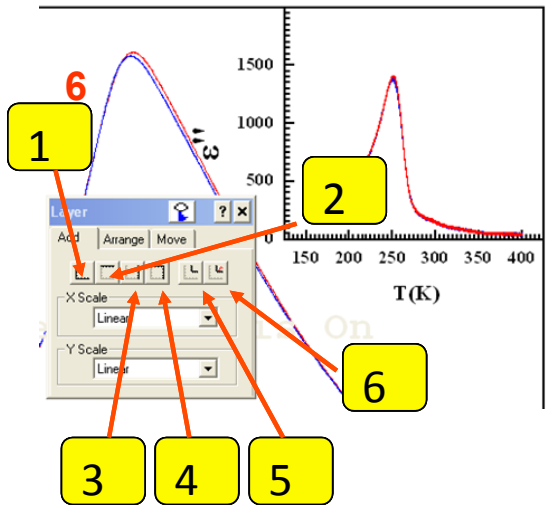


Fig. 10

### 3. Data analysis and data fitting

Origin provides some very powerful and convenient tools for data analysis and data fitting. To perform the polynomial fitting go **Analysis** → **Fit Polynomial**. The polynomial fit pop-up menu will appear (Fig.11)

Choose the **Order** of polynomial, **Xmin** and **Xmax** for fit curve and number of points for fit curve. To display the polynomial coefficients on the graph you have to check **Show formula on Graph**.

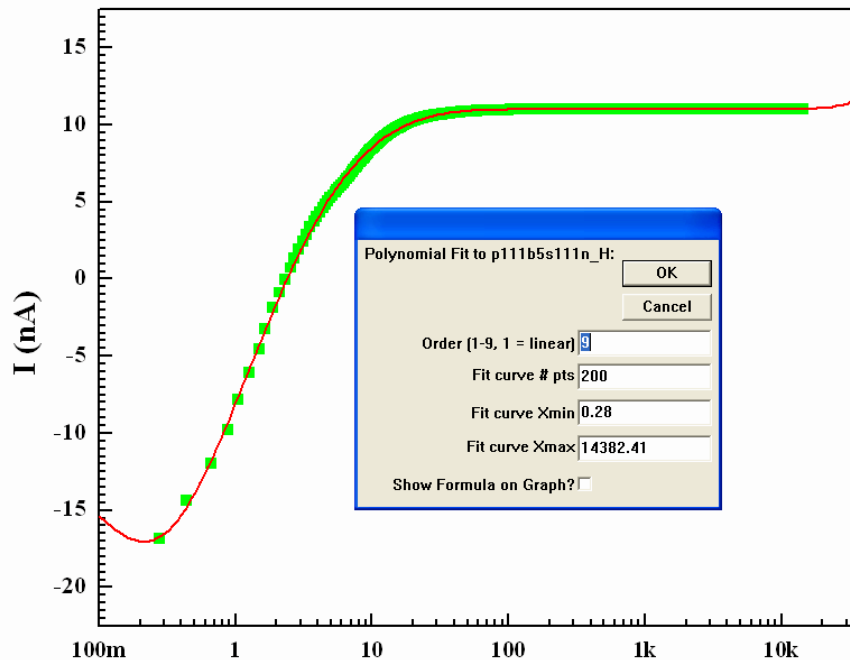


Fig. 11. Polynomial Fit menu

- To restrict the range of the data points involved in fitting you can use Data selector tool (see Fig.9).
- The maximum polynomial order number is 9.
- For fitting with linear function (polynomial order =1) you can use option *Analysis* → *Fit Linear*. It will do the same as *Fit Polynomial* with order =1.

# Nonlinear fitting

To perform the nonlinear fitting procedure go to main menu *Analysis* → *Non-Linear Curve Fit* → *Advanced Fitting Toll...* The multilayer pop-up Nonlinear Fitting menu is shown in Fig. 13. First step – you have to choose from the library the fitting function or write your own function. The library *Functions* are grouped in several *Categories*. For each library *Function* you can see the *Equation, Sample Curve or Function File* information (Sample Curve option in Fig.12). One can write his own user function using “User Function”

There are large no. of fitting options available!!

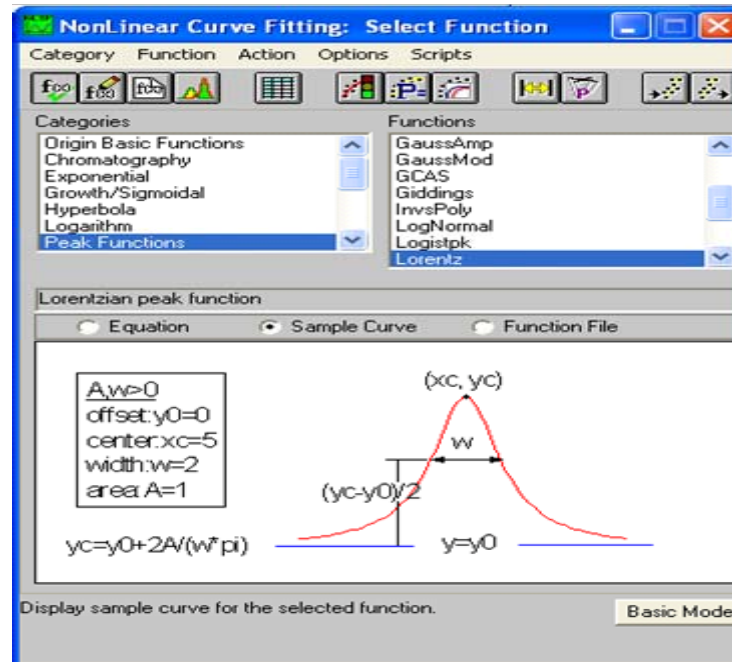


Fig. 12

# 4. Worksheets

To perform some operations with worksheet first you have to open it. Next right click on the column header. Column becomes highlighted and a pop-up window appears.

The screenshot shows the Origin 7.5 interface. A spreadsheet is open with columns labeled 'times[X]', 'TK[Y]', 'Pmm[Z]', 'Tm[K]', 'UacV[Y]', and 'fHz[Y]'. The 'TK[Y]' column header is right-clicked, opening a context menu. The 'Set Column Values...' option is selected, opening a dialog box. The dialog box contains the following fields and options:

- Abs(x): Absolute value
- For row (i): Auto
- to: Auto
- abs()
- col(TK)
- Col(Pmm)=
- col(TK)/100
- AutoUpdate (checkbox)
- Undo, OK, Cancel buttons

The spreadsheet data is as follows:

times[X]	TK[Y]	Pmm[Z]	Tm[K]	UacV[Y]	fHz[Y]
15.652	1.8233	25.08902	2.02288	5	27.3
16.133	1.82316	25.08902	2.02288	5	27.4
16.604	1.8233	25.08902	2.02288	5	27.5
17.064	1.82358	27.85198	2.05987	5	27.6
17.535	1.8233	28.5819	2.06925	5	27.7
18.026	1.82316	28.5819	2.06925	5	27.8
18.486	1.82302	27.59142	2.05649	5	27.9
18.957	1.8233	24.09838	2.00896	5	28
19.418	1.82344	25.1411	2.0236	5	28.1
19.888	1.82344	24.6719	2.01707	5	28.2
20.369	1.82344	26.60078	2.04343	5	28.3
20.84	1.8233	30.19798	2.08947	5	28.4

- ***Set As*** will assign a column ***X***, ***Y*** or ***Z*** (for 3D graphs) axes data.
- ***Set Column Values*** option will perform some mathematical operation on the data from one or several columns.
- ***Sort Column*** and ***Sort Worksheet*** will perform sorting of the column or worksheet respectively.
- ***Statistics on Column*** will open a new worksheet containing all statistical information (***Min***, ***Max***, ***Sum***, etc.) on data set in the column.
- ***Properties*** will open a new pop-up window (not shown in Fig.15) and here you can change the ***Column Name***, ***Column Label***, ***Column Width***, etc.



## **5. Final Comments**

Origin provides much more features and opportunities to work with data and graphs than we discussed above. It has a powerful engine for **3D** graphics, tools for smoothing the data depicted in plots. You can apply (main menu *Analysis*) on the plotted data the Fast Fourier Transform (*FFT*), perform some math (*Subtract* → *Strait Line* or *Reference Data*) and *Calculus* (*Differentiate, Integrate*) operation on data in plots. Fitting to some typical (*Exponential Growth. Exponential Decay etc.*) functions can be performed very simple without opening *Nonlinear Curve Fitting* window (Fig.14) – go to main menu *Analysis* and click on the listed function.

## **References**

Here is the link to the official Origin Lab WEB site:

<http://www.originlab.com>

For Tutorials go to:

<http://www.originlab.com/index.aspx?s=9&lm=72>

Manuals and other documentation:

<http://www.originlab.com/index.aspx?s=12&lm=66>

File Exchange page:

<http://www.originlab.com/fileexchange/index.aspx>

Please, feel free to contact me in Room No-189, Multistory Building, for any help regarding starting in Origin!