



Scientific Graphing and Analysis Software

Origin is on all Physics 403 computers.

What it can do:

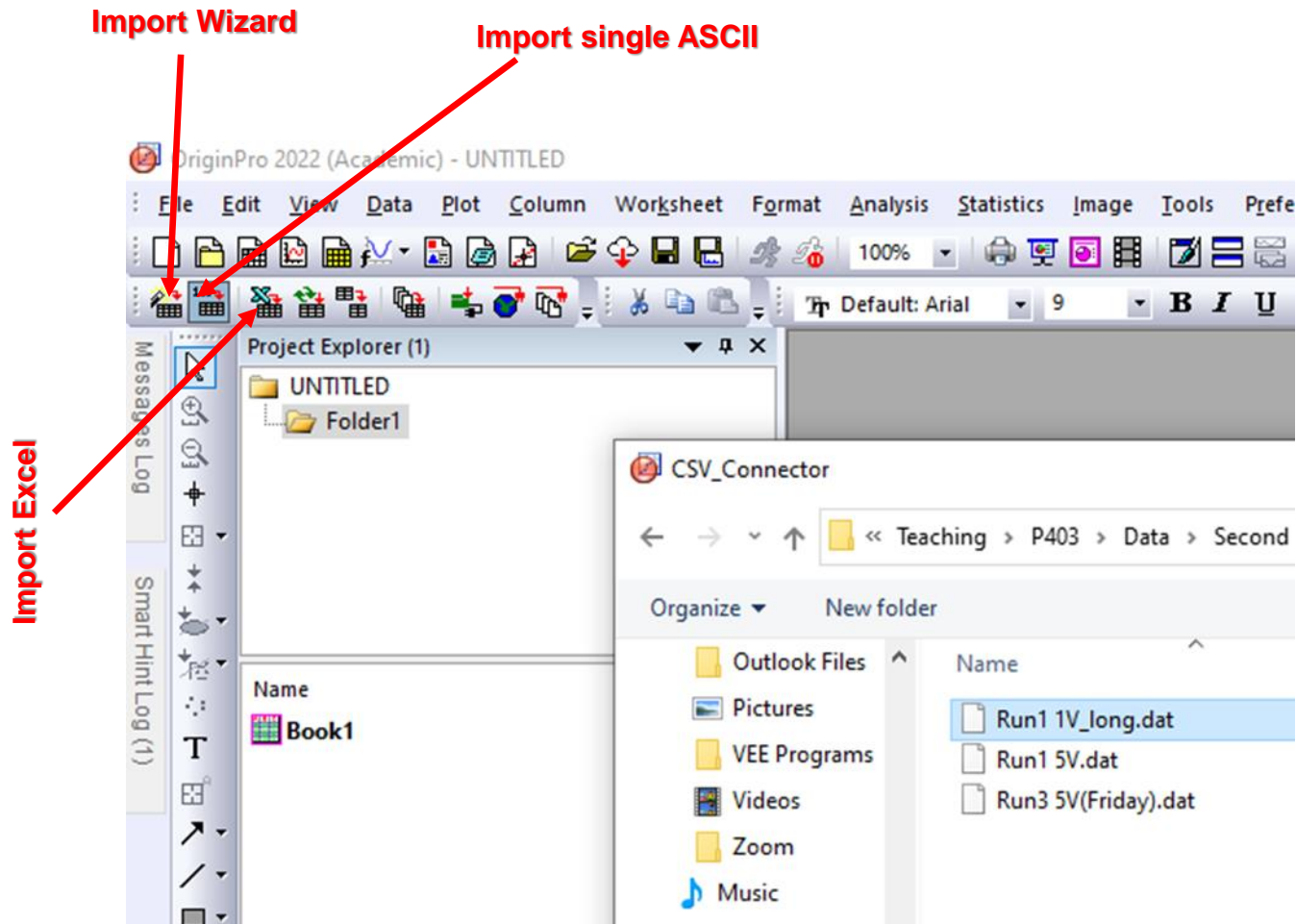
1. Graphical presentation of data

2. Data analysis

3. Preparation of publication-quality figures

- Specially designed for scientific graphics
- “Standard” Windows application, does not require knowledge of C++ or any other high level computer language
- Can write special functions or procedures using Origin programming tools

Importing data



Can drag and drop .dat or .txt files into empty spreadsheet
Or import files

Graphical presentation of data: Basic Plot

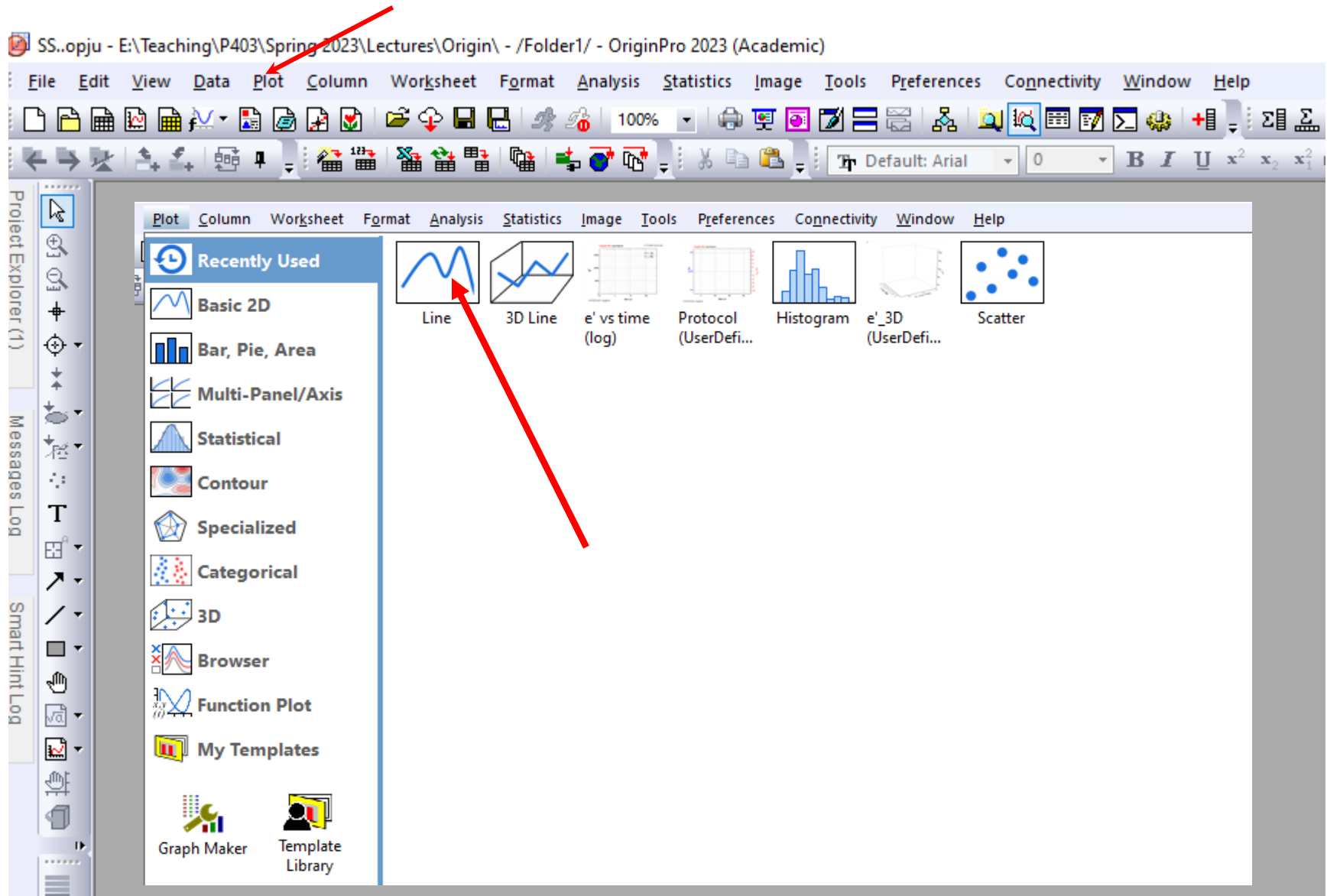
Plot menu

The screenshot displays the OriginPro 2023 software interface. The title bar indicates the file path: "SS..opju - E:\Teaching\P403\Spring 2023\Lectures\Origin\ - /Folder1/ - OriginPro 2023 (Academic)". The menu bar includes File, Edit, View, Data, Plot, Column, Worksheet, Format, Analysis, Statistics, Image, Tools, Preferences, Connectivity, Window, and Help. A red arrow points to the "Plot" menu. The toolbar contains various icons for file operations, editing, and analysis. The main workspace shows a data table window titled "Run11Vlong - Run1 1V_long.dat". The table has columns for A(X), B(Y), C(Y), D(Y), and E(Y). The first row of data is highlighted in yellow. Below the table, there are sparklines for each column, showing trends: A(X) increases, B(Y) fluctuates around a negative value, C(Y) fluctuates around a positive value, D(Y) fluctuates around a positive value, and E(Y) fluctuates around a positive value.

	A(X)	B(Y)	C(Y)	D(Y)	E(Y)
Long Name	time (s)	Vdt	T(K)	P (mm)	Tp (K)
Units					
Comments					
F(x)=					
Sparklines					
1	0.07	-1.6984	1.58361	2.36926	1.42113
2	0.27	-1.6995	1.51669	2.5413	1.43442
3	0.41	-1.6989	1.55345	2.36926	1.42113
4	0.55	-1.6989	1.55345	2.44746	1.42726
5	0.69	-1.6984	1.58361	2.44746	1.42726
6	0.82	-1.6989	1.55345	2.44746	1.42726
7	0.96	-1.6989	1.55345	2.44746	1.42726
8	1.1	-1.6989	1.55345	2.44746	1.42726
9	1.24	-1.6989	1.55345	2.5413	1.43442

Graphical presentation of data: Basic Plot

Plot menu



Graphical presentation of data: Basic Plot

Plot menu

SS..opju - E:\Teaching\P403\Spring 2023\Lectures\Origin\ - /Folder1/ - OriginPro 2023 (Academic)

File Edit View Data Plot Column Worksheet Format Analysis Statistics Image Tools Preferences Connectivity Window Help

Plot Setup: Select Data to Create New Plot

Plot Type:

- Line
- Scatter
- Line + Symbol
- Column / Bar
- Area
- Stacked Area
- Fill Area
- High - Low - Close
- Floating Column
- XYAM Vector
- XYXY Vector
- Bubble
- Color Mapped

Show(S) [Run11Vlong]"Run1 1V_long"

X	Y	yEr	L	Column	Long Name	Comments	Sampling Interval	Position
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<autoX>	From/Step=			0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	time (s)			1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B	Vdt			2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	C	T(K)			3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	D	P (mm)			4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E	Tp (K)			5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F	Uac (V)			6
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	G	f (Hz)			7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	H	X (V)			8
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I	Y(V)			9
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	J	R(V)			10

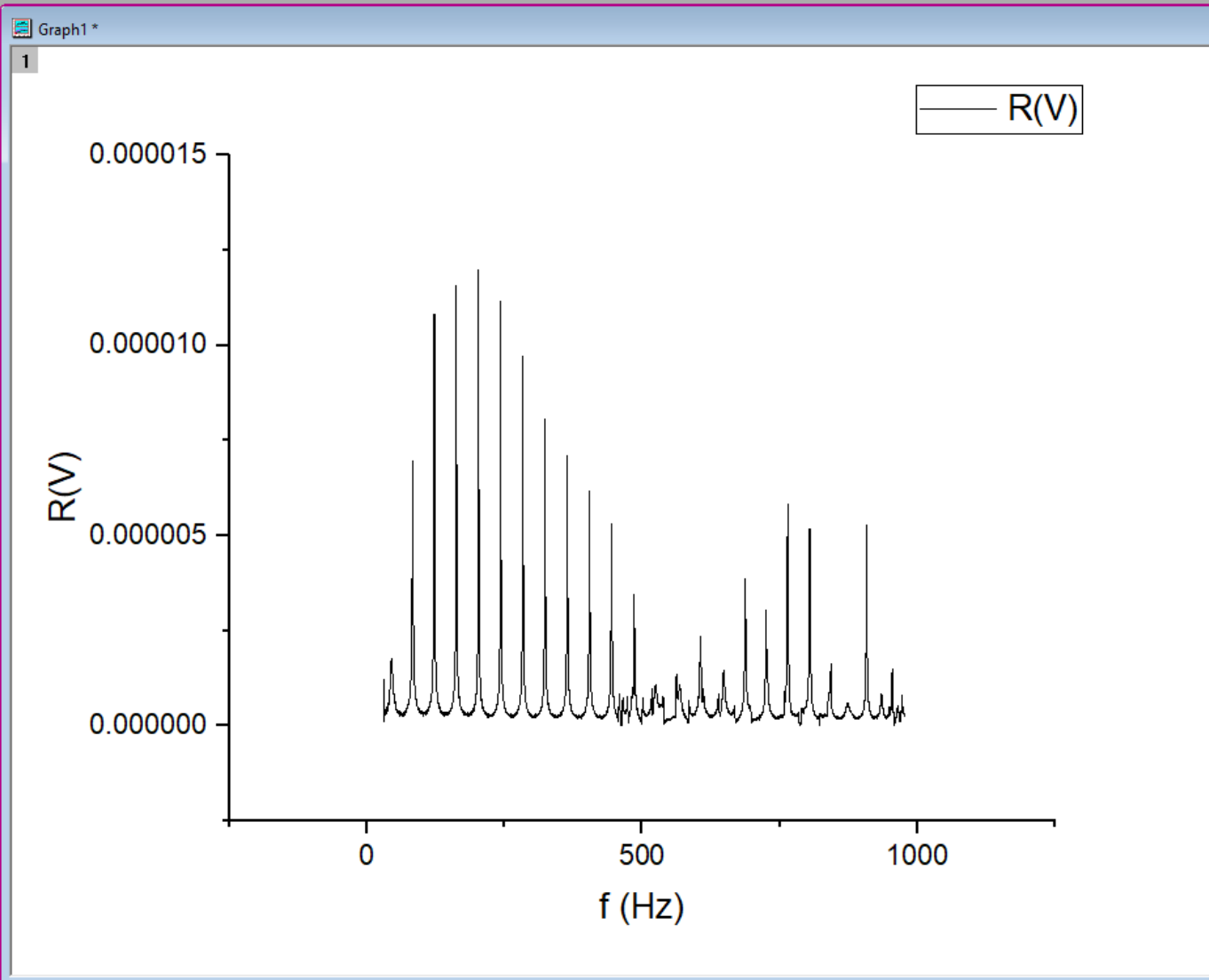
OK

Cancel

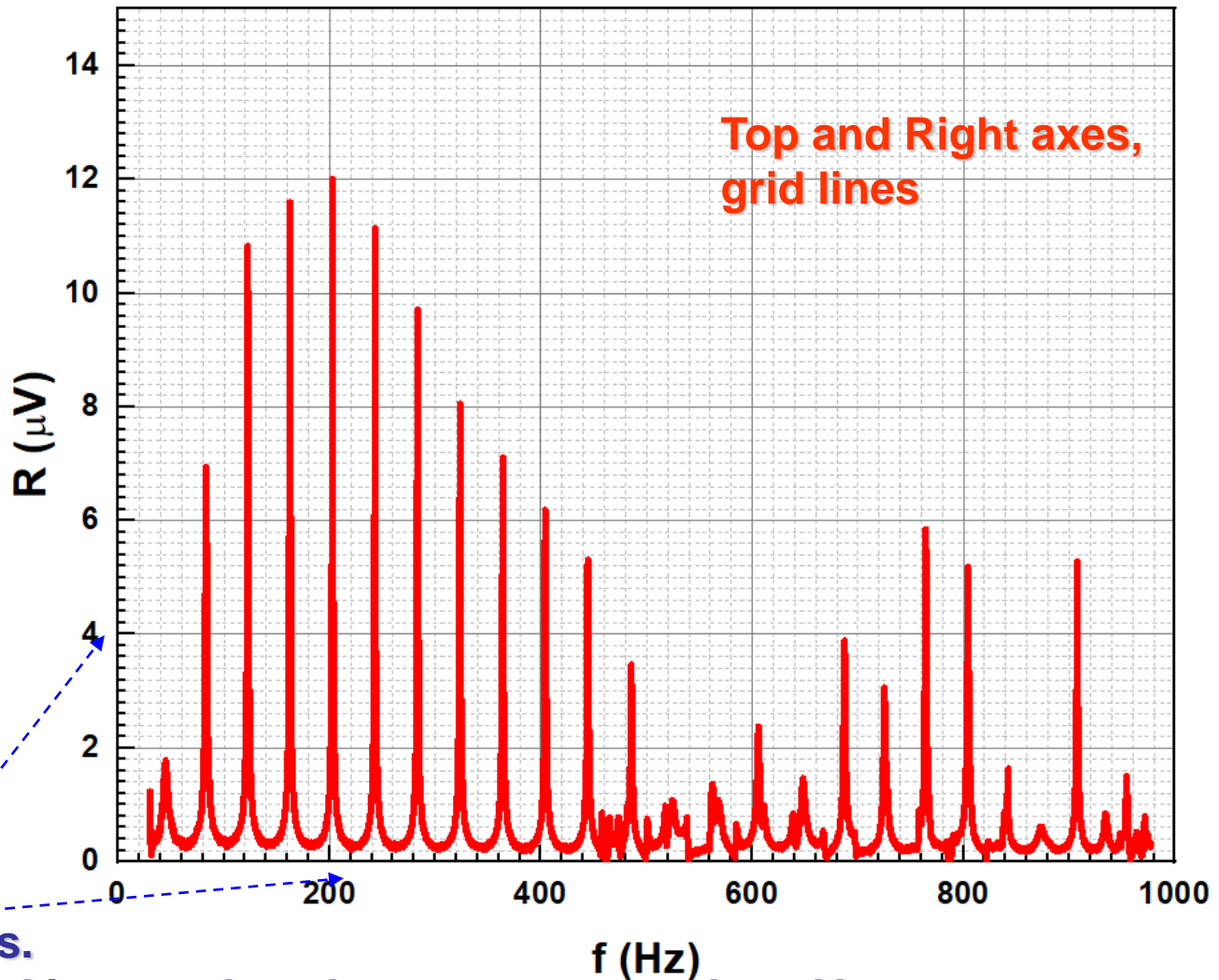
Graph Maker

Template Library

Graphical presentation of data: Basic Plot



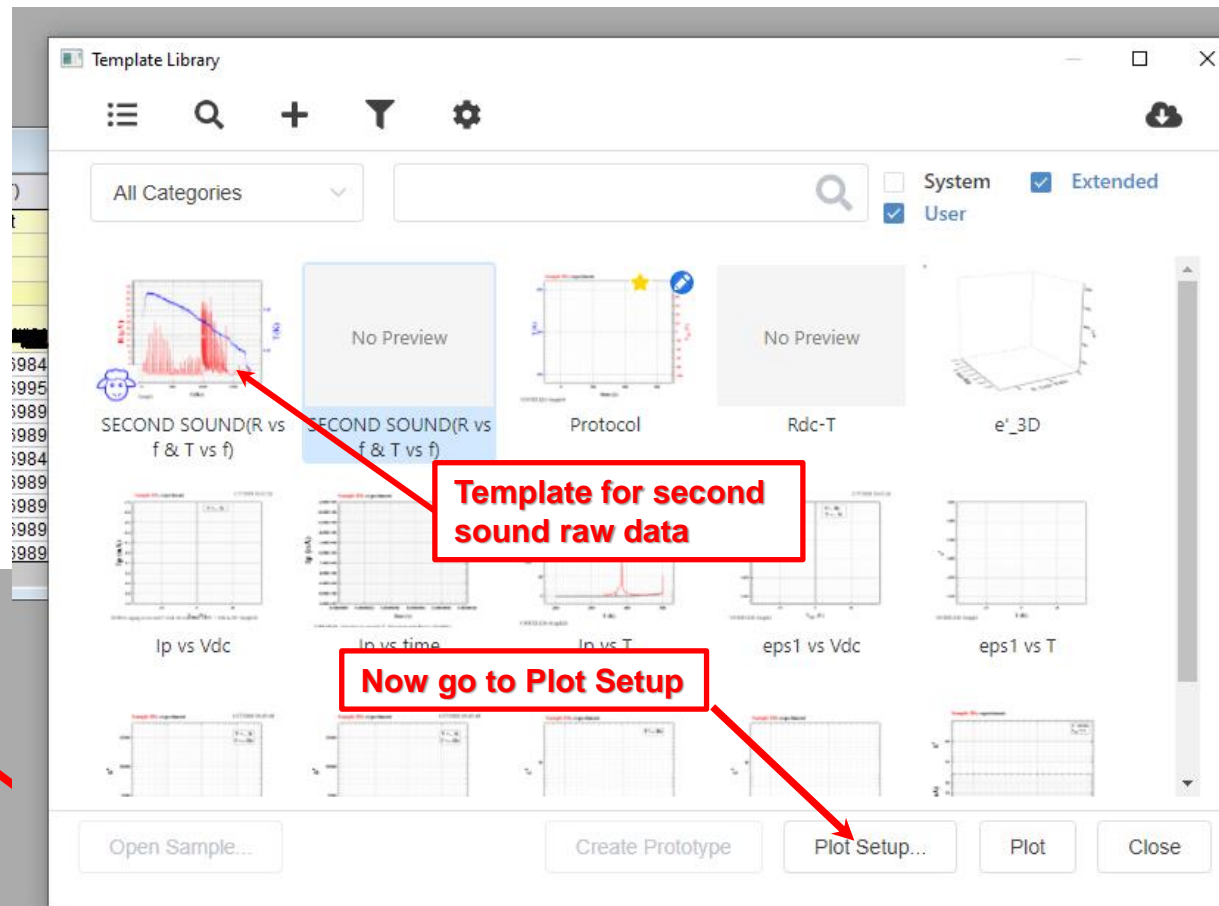
Graphical presentation of data: Basic Plot



Bold tick labels.

For a better-looking graph, volts were converted to μV

Graphical presentation of data: Templates



Templates Library

Template for second sound raw data

Now go to Plot Setup



<< Start Menu (F1)

Graphical presentation of data: Templates

Plot Setup: Select Data to Create New Plot

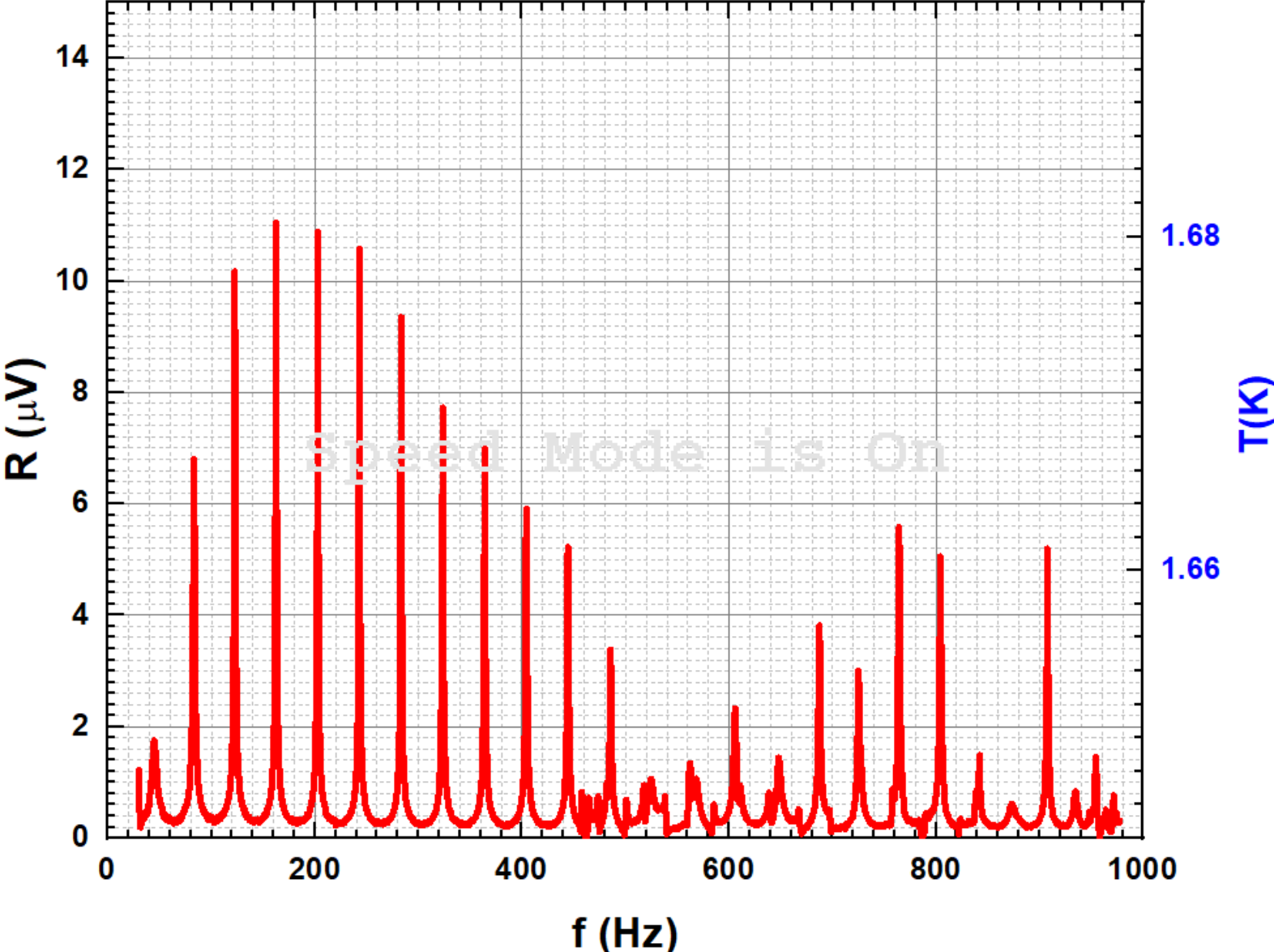
Plot Type:

	X	Y	yEr	L	Column	Long Name	Comments	Sampling Interval	Position
Line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	< autoX>	From/Step=			0
Scatter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	time (s)			1
Line + Symbol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B	Vdt			2
Column / Bar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	C	T(K)			3
Area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	D	P (mm)			4
Stacked Area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E	Tp (K)			5
Fill Area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F	Uac (V)			6
High - Low - Close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F	Uac (V)			6
Floating Column	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	G	f (Hz)			7
XYAM Vector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	H	X (V)			8
XYXY Vector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I	Y(V)			9
Bubble	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	J	R(V)			10
Color Mapped	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					

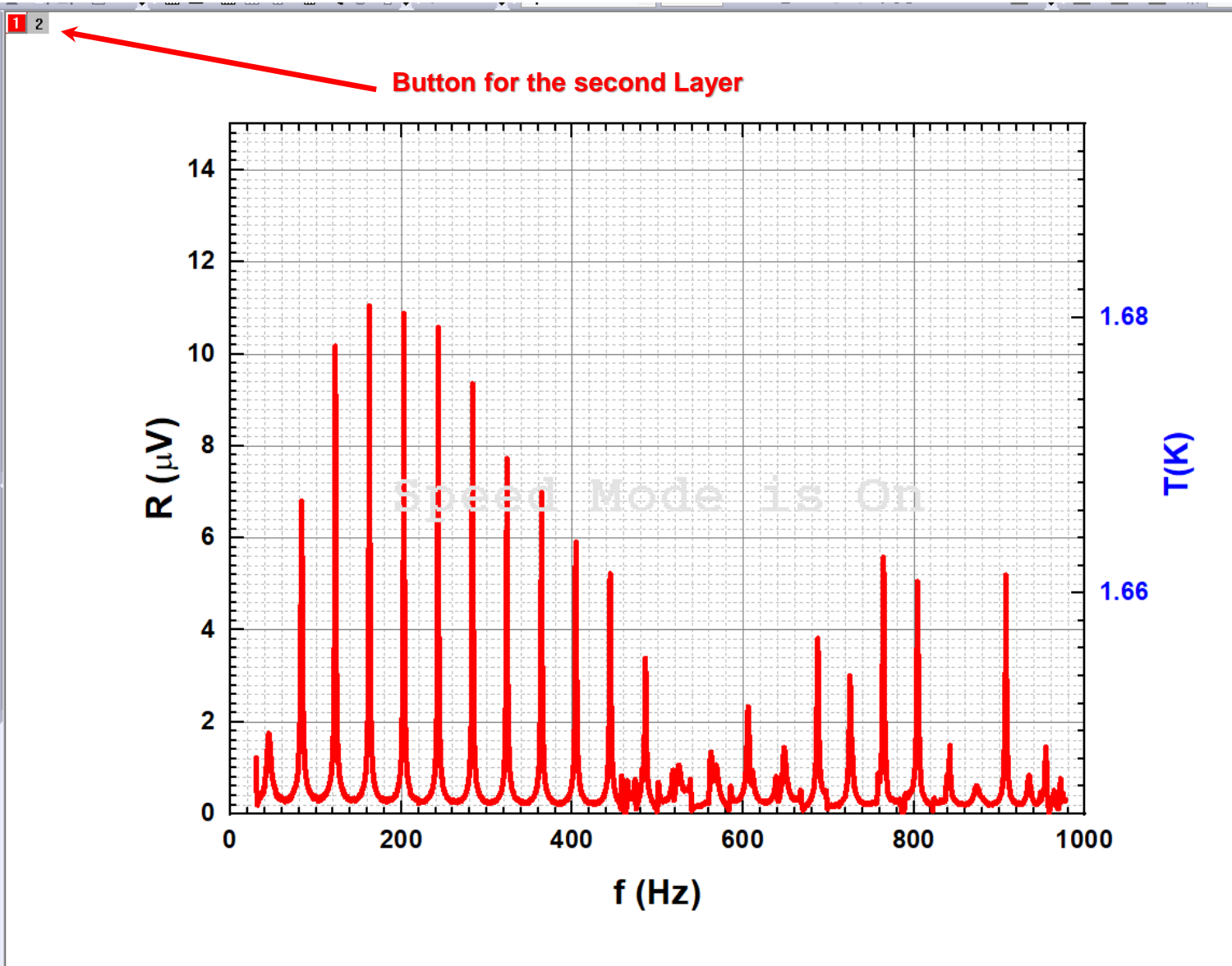
Plot List: Drag entries in 1st column to reorder or to move between layers. Right click for other options.

Plot	Range	Show	Plot Type	Legend
Layer 1	<input checked="" type="checkbox"/> Re	<input checked="" type="checkbox"/>		
Style Holder			Line	
Style Holder			Line	
Style Holder			Line	
Group				
Style Holder			Line	
Style Holder			Line	
Style Holder			Line	
Layer 2	<input checked="" type="checkbox"/> Re	<input checked="" type="checkbox"/>		

Graphical presentation of data: Templates



Graphical presentation of data: Extra Layer



Button for the second Layer

Plot Setup: Configure Data Plots in Layer

Plot Type: Show(S) [Run11Vlong]"Run1 1V_long"

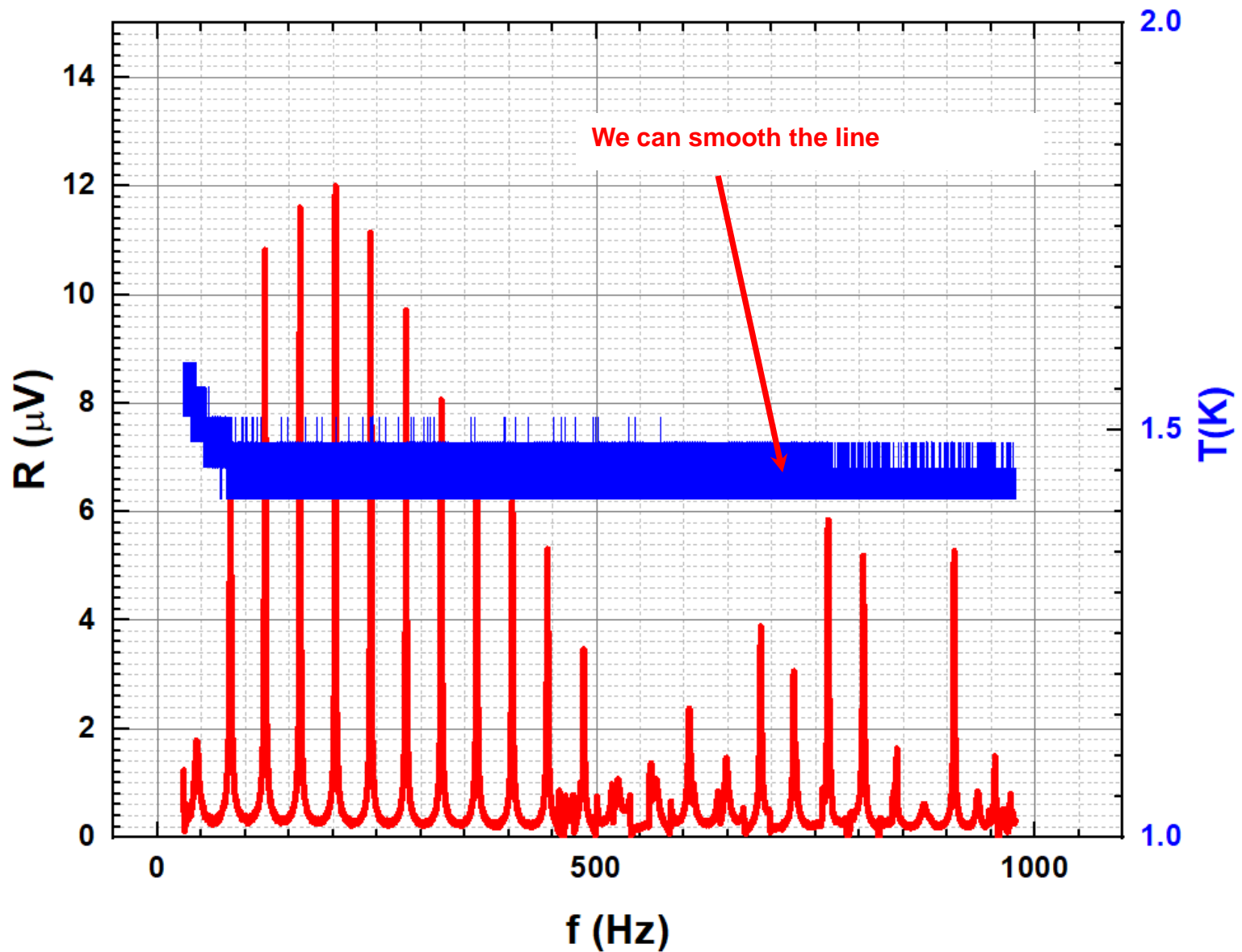
	X	Y	yEr	L	Column	Long Name	Comments	Sampling Interval	Position
Line	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<autoX>	From/Step=			0
Scatter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	time (s)			1
Line + Symbol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B	Vdt			2
Column / Bar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	C	T(K)			3
Area	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	D	P (mm)			4
Stacked Area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E	Tp (K)			5
Fill Area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F	Uac (V)			6
High - Low - Close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	G	f (Hz)			7
Floating Column	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	H	X (V)			8
XYAM Vector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I	Y(V)			9
XYXY Vector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	J	R(V)			10
Bubble	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Color Mapped									
Bubble + Color Mapped									

Plot List: Drag entries in 1st column to reorder or to move between layers. Right click for other options.

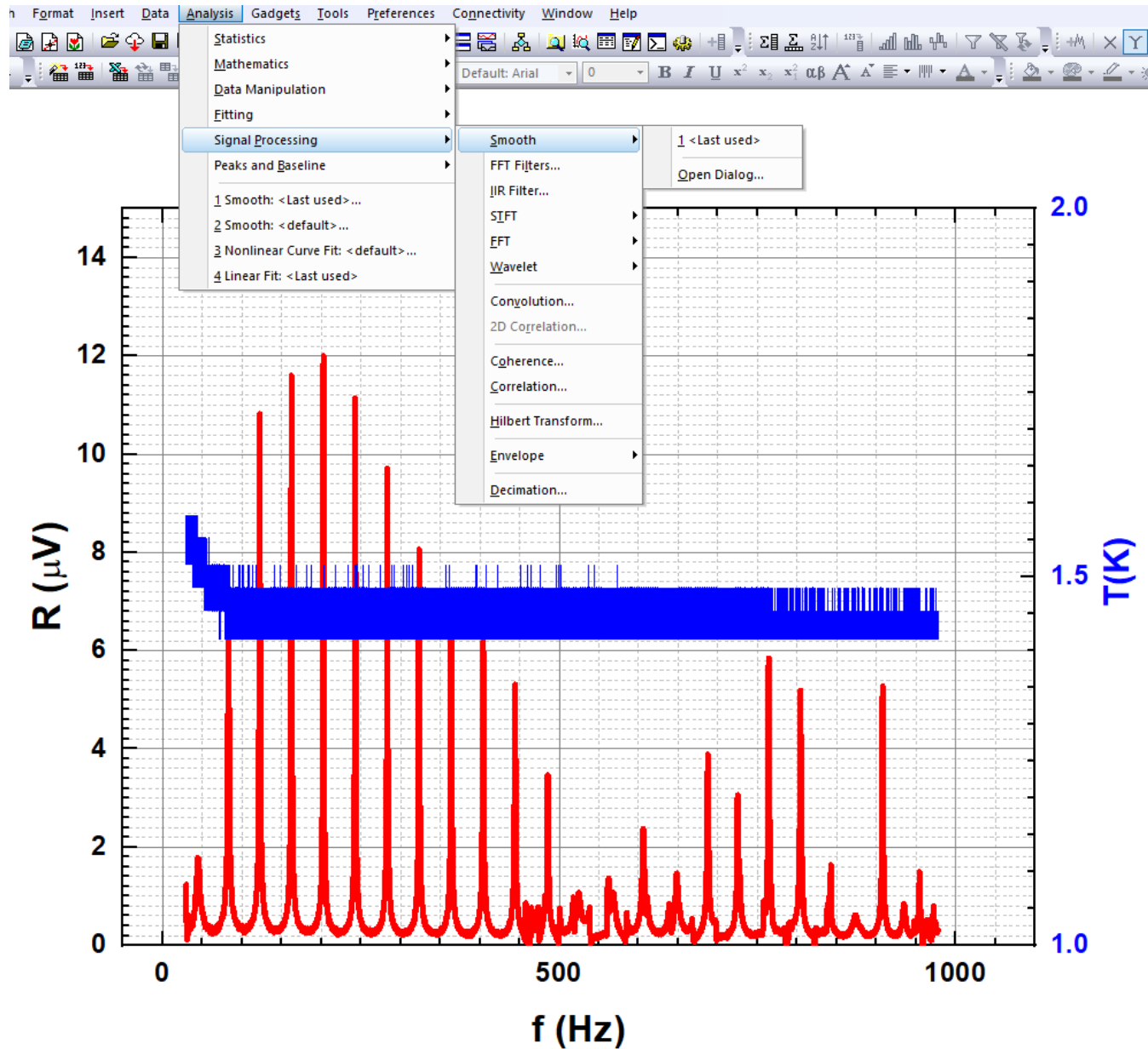
Plot	Range	Show	Plot Type	Legend
Layer 1	<input type="checkbox"/> Rescale	<input checked="" type="checkbox"/>		
[Run1 1V_long.dat]Run1 1V_long! "f (Hz)"(X), "R(V)"(Y)	[1*:94707*] 30.01 < X < 977.07, 0 < Y < 1.20039E-5	<input checked="" type="checkbox"/>	Line	R(V)
Layer 2	<input checked="" type="checkbox"/> Rescale	<input checked="" type="checkbox"/>		
[Run1 1V_long.dat]Run1 1V_long! "f (Hz)"(X), "T(K)"(Y)	[1*:94707*] 30.01 < X < 977.07, 0 < Y < 1.58361	<input checked="" type="checkbox"/>	Line	T(K)

Preview OK Cancel Apply

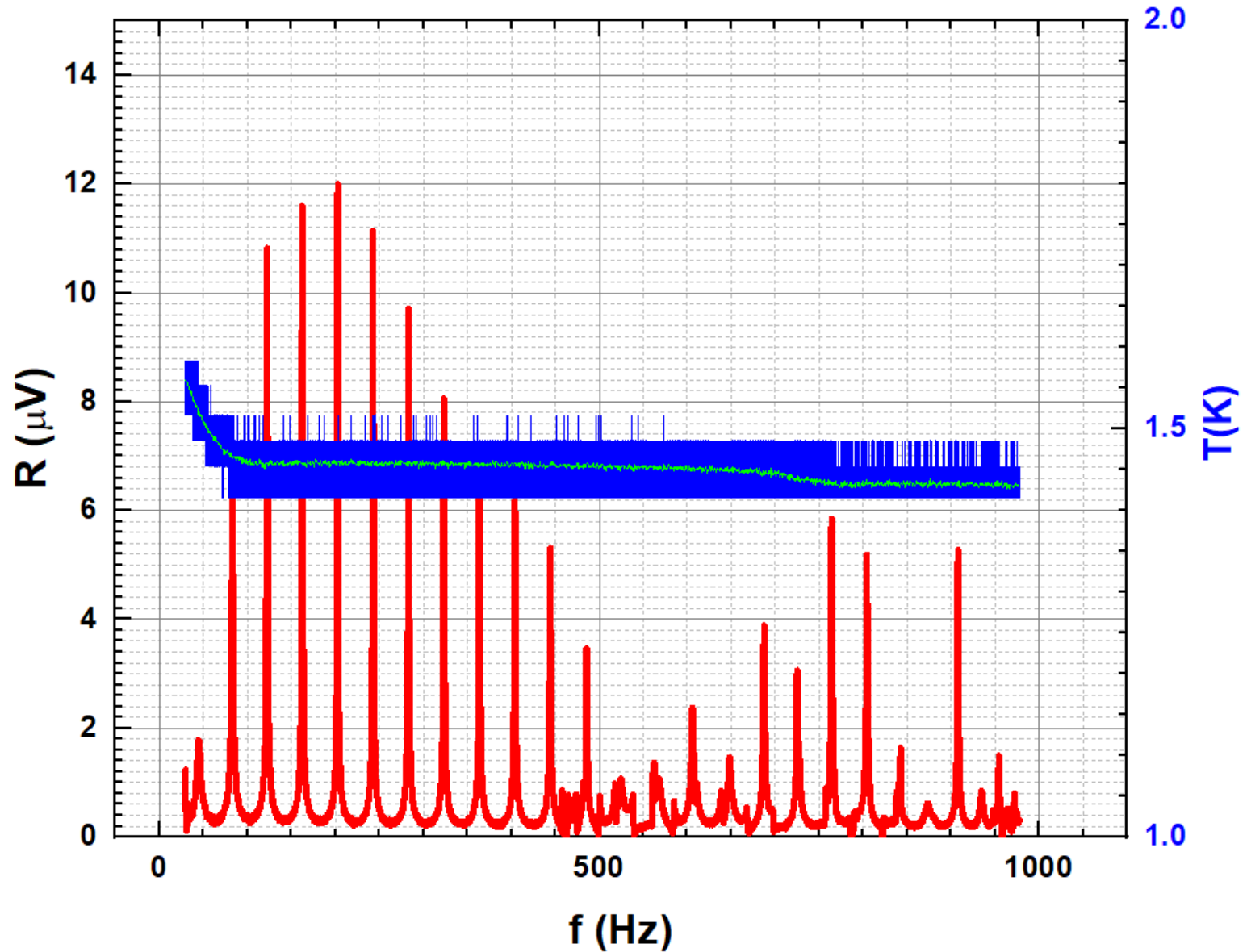
Graphical presentation of data: Extra Layer



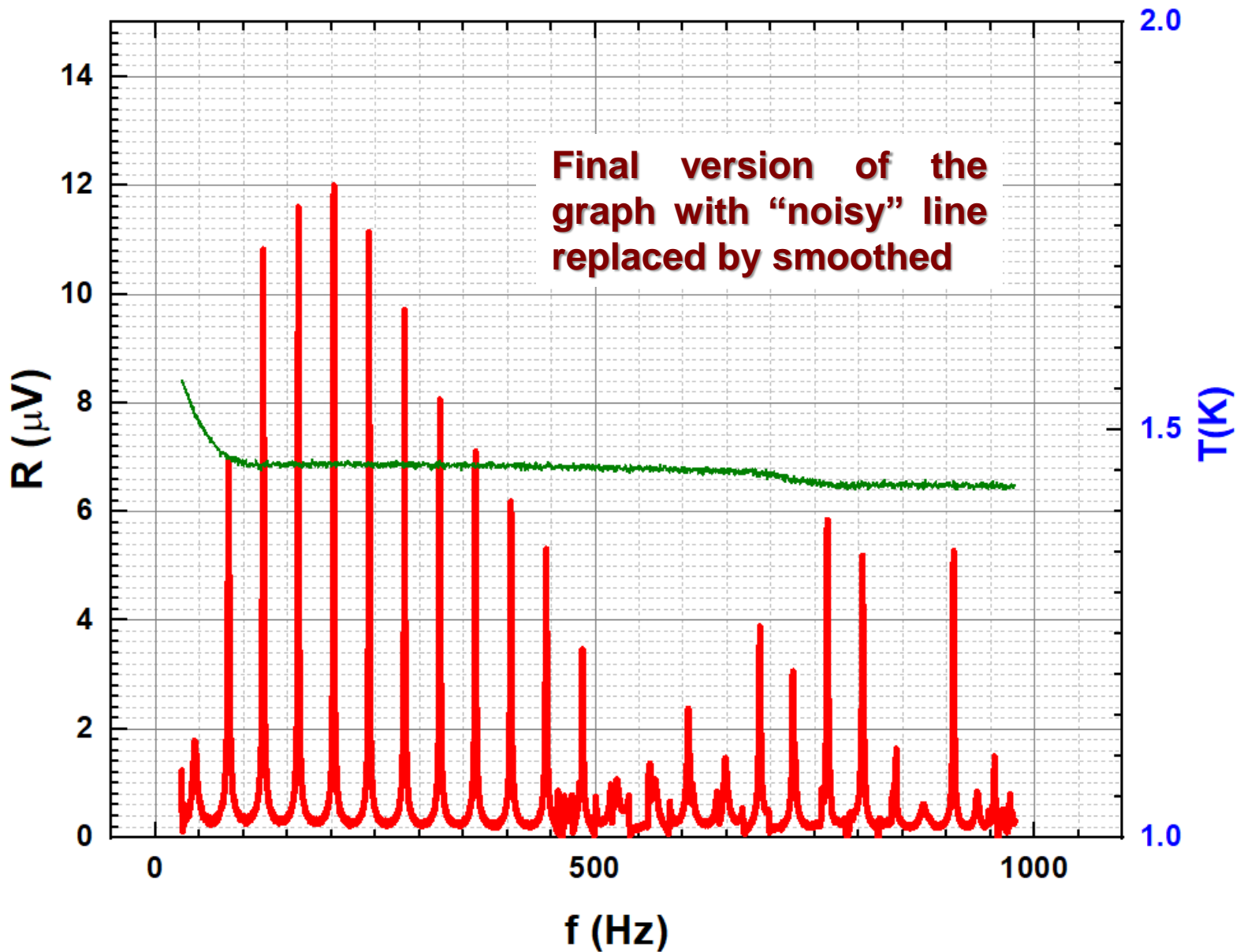
Graphical presentation of data: Extra Layer



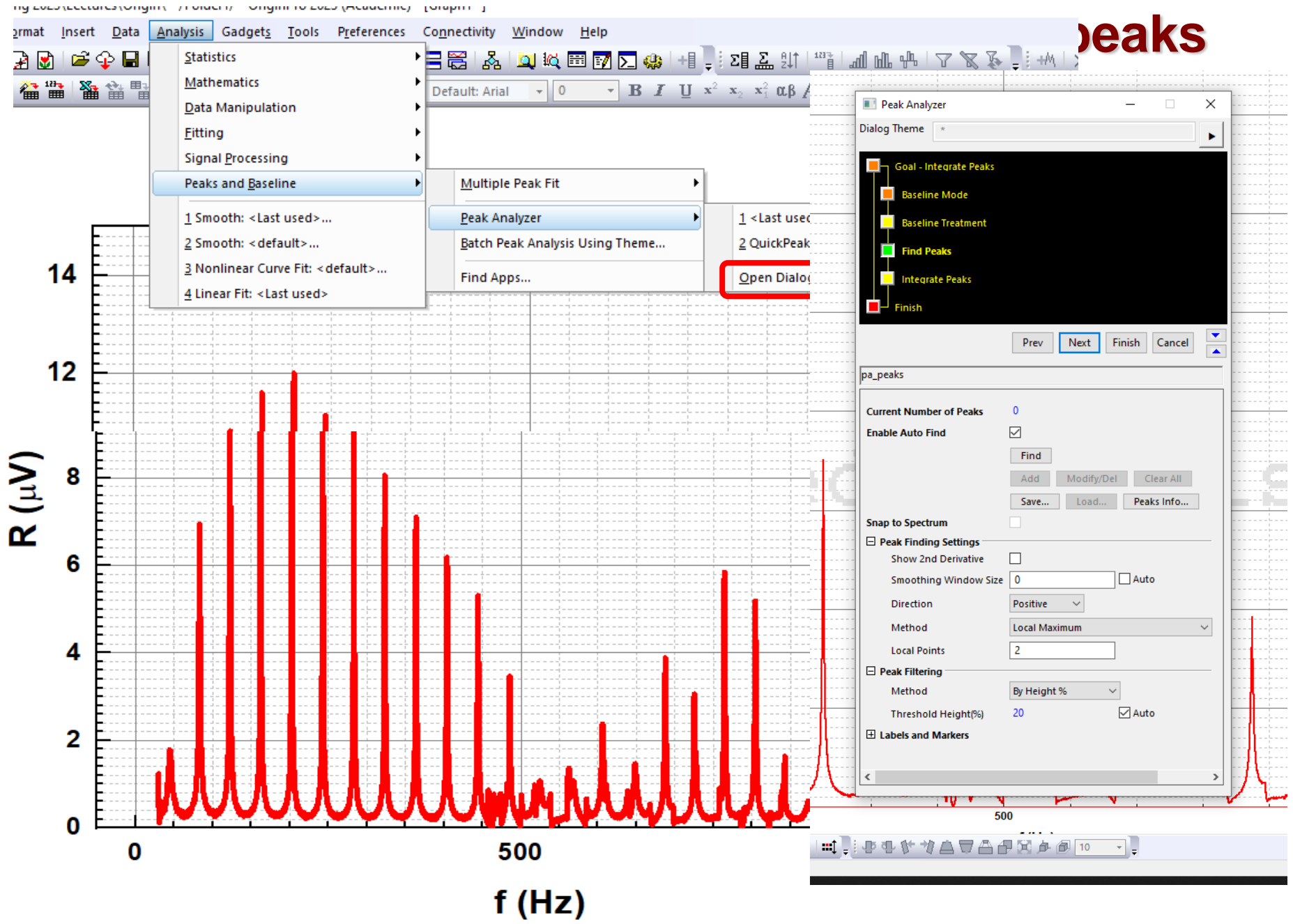
Graphical presentation of data: Extra Layer



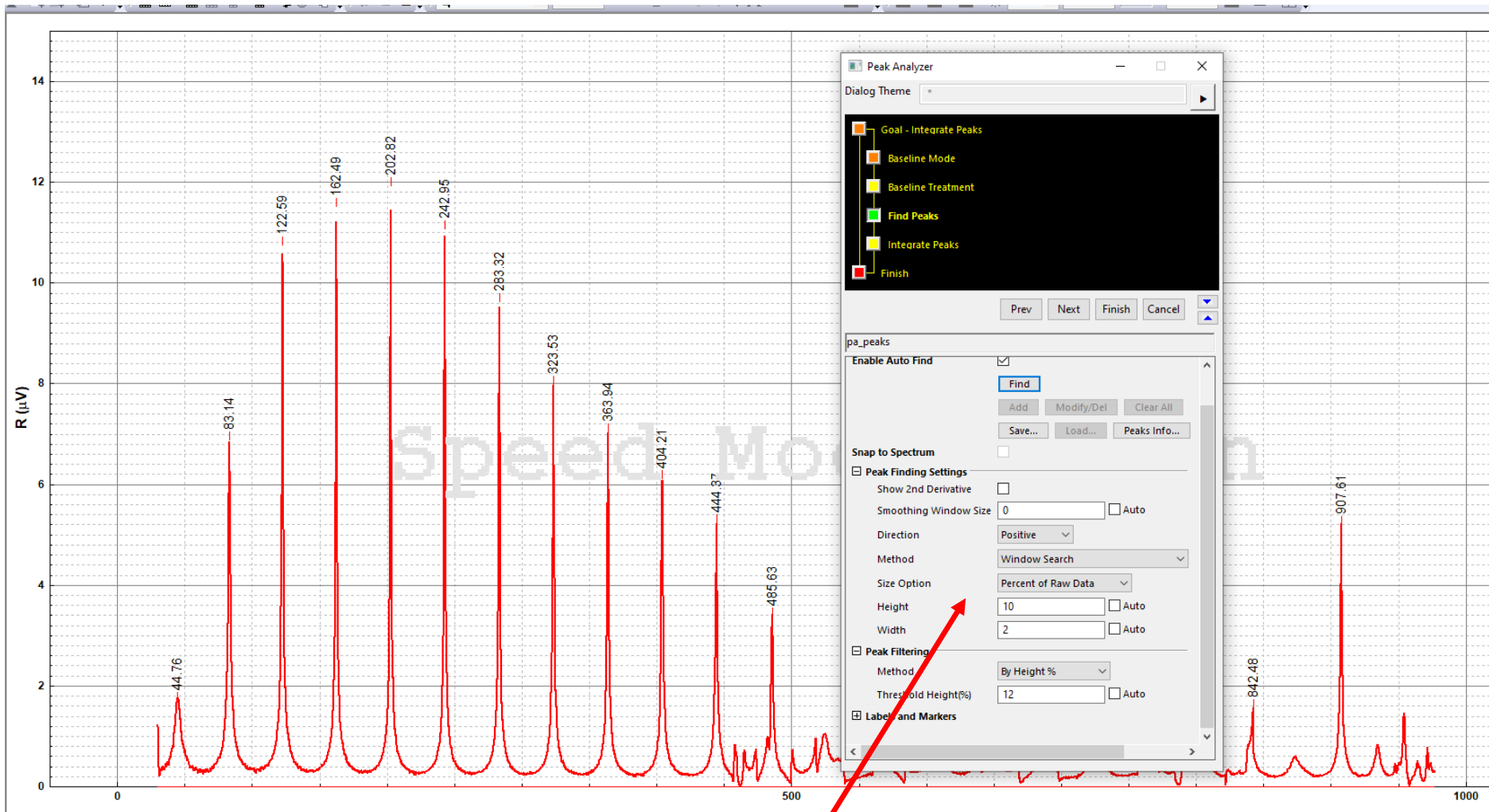
Graphical presentation of data: Extra Layer



peaks

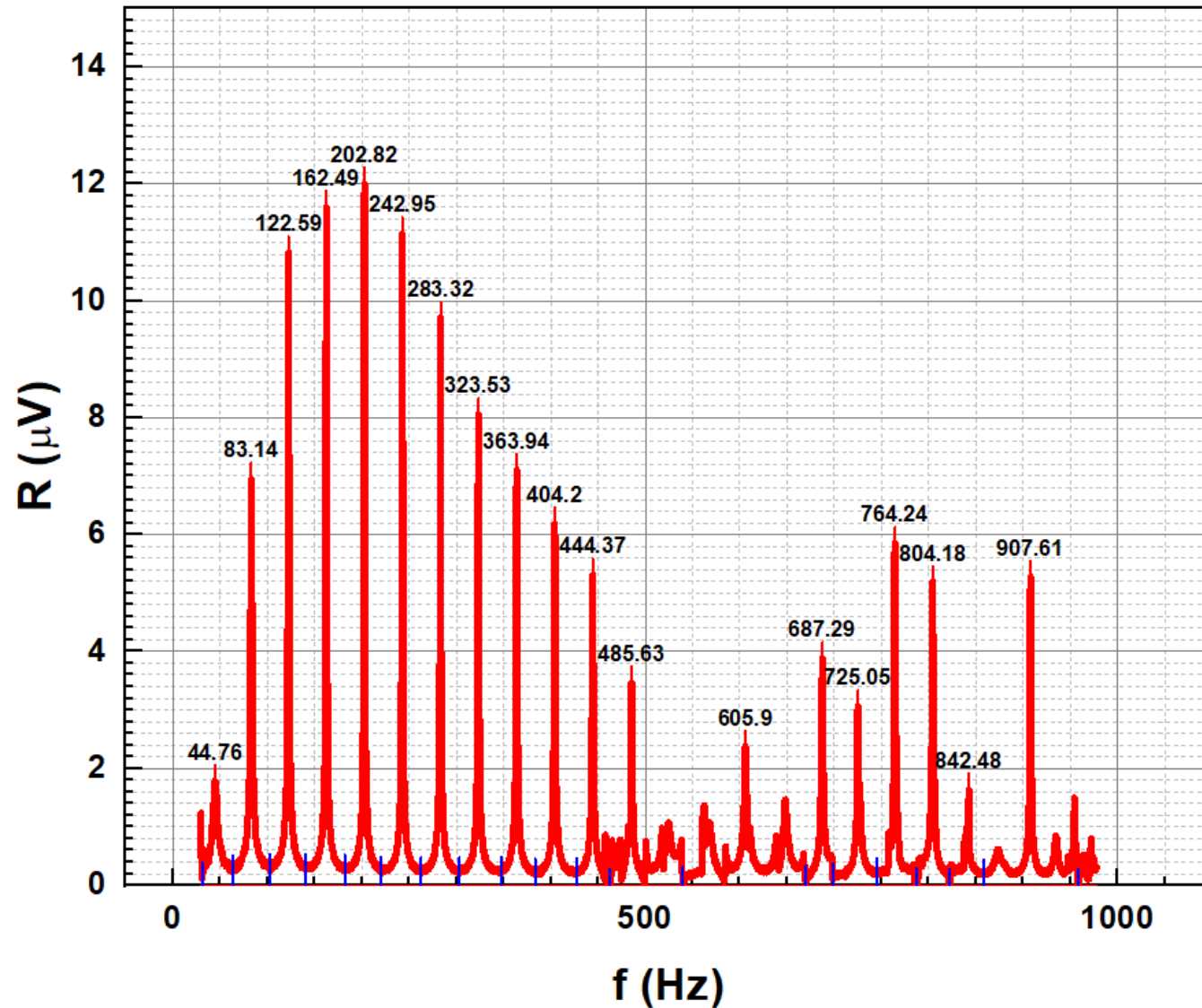


Graphical presentation of data: Finding peaks

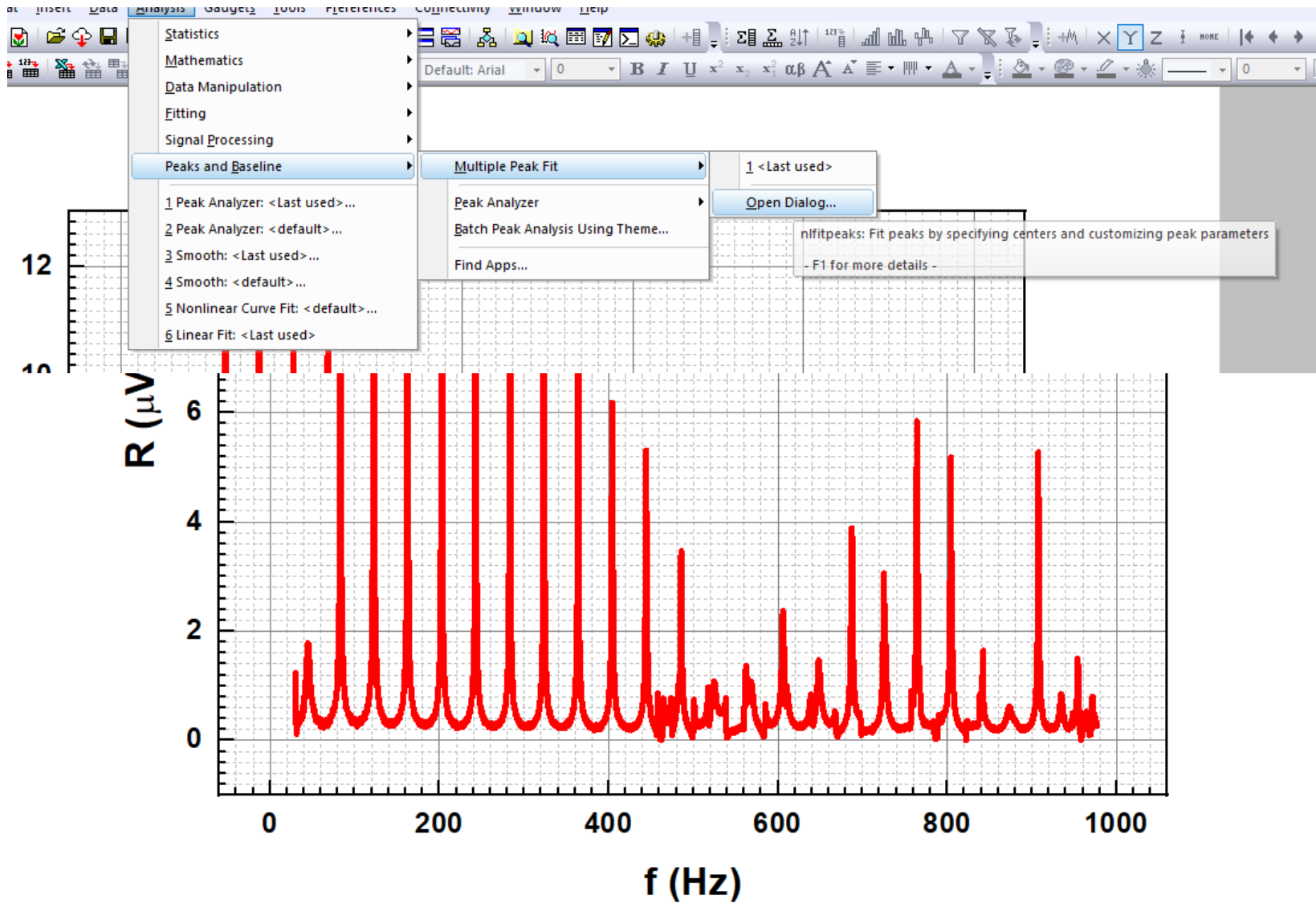


Choose the proper search parameters

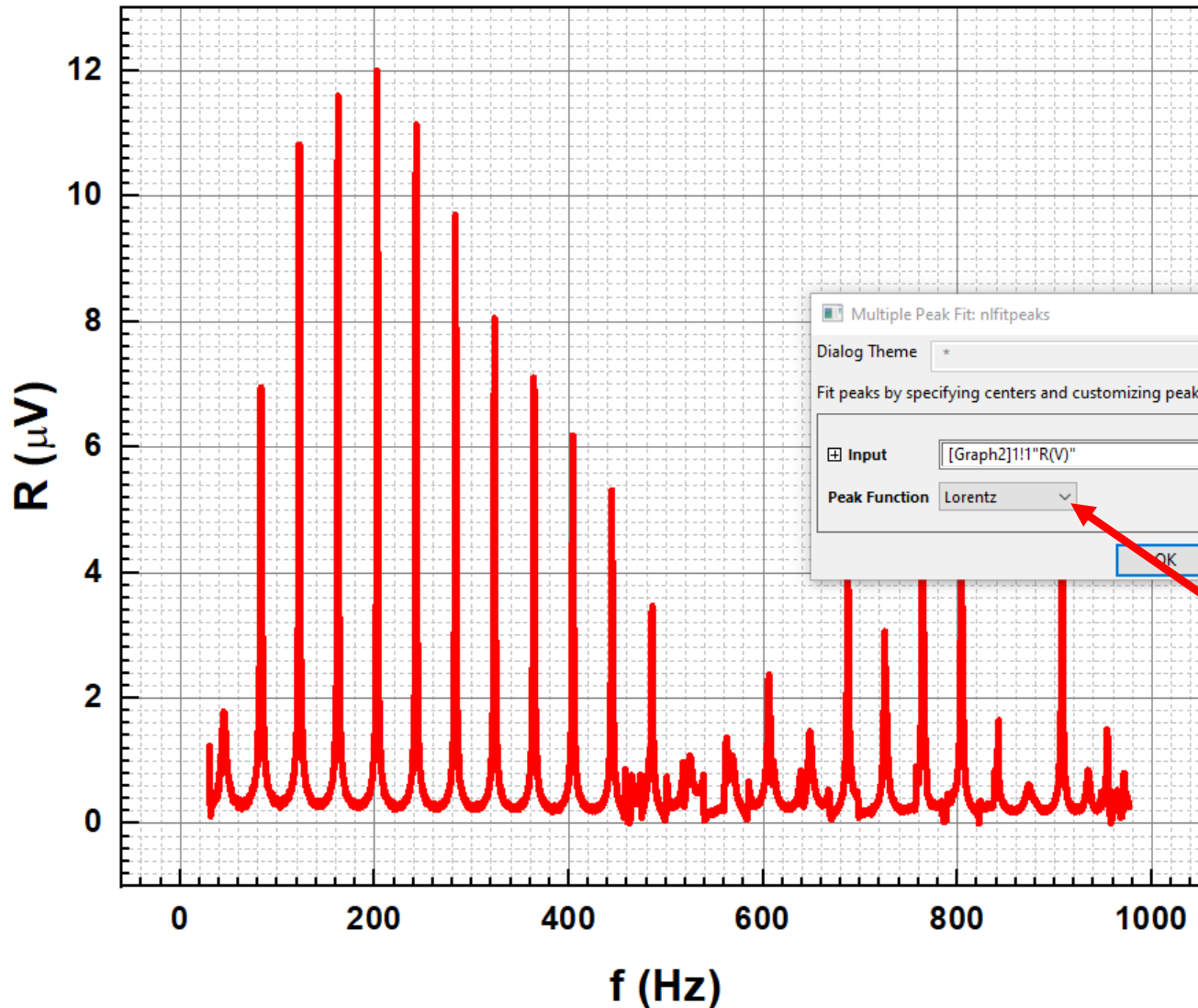
Graphical presentation of data: Finding peaks



Graphical presentation of data: Multiple peak Fit



Graphical presentation of data: Multiple peak Fit



Choose the expected line shape

Graphical presentation of data: Multiple peak Fit

Manually mark the expected peak positions

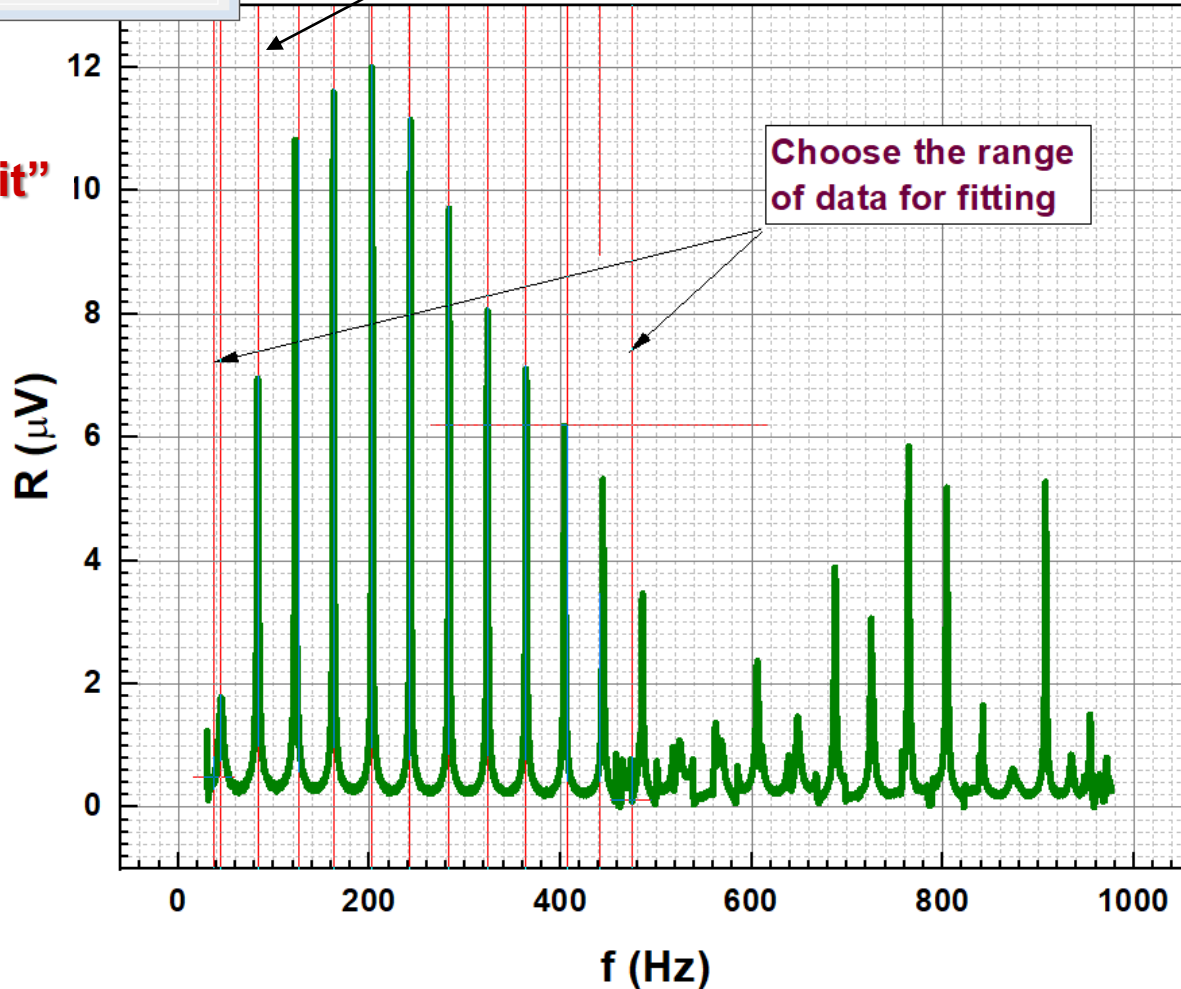
Push
"Open Nlfit"

1

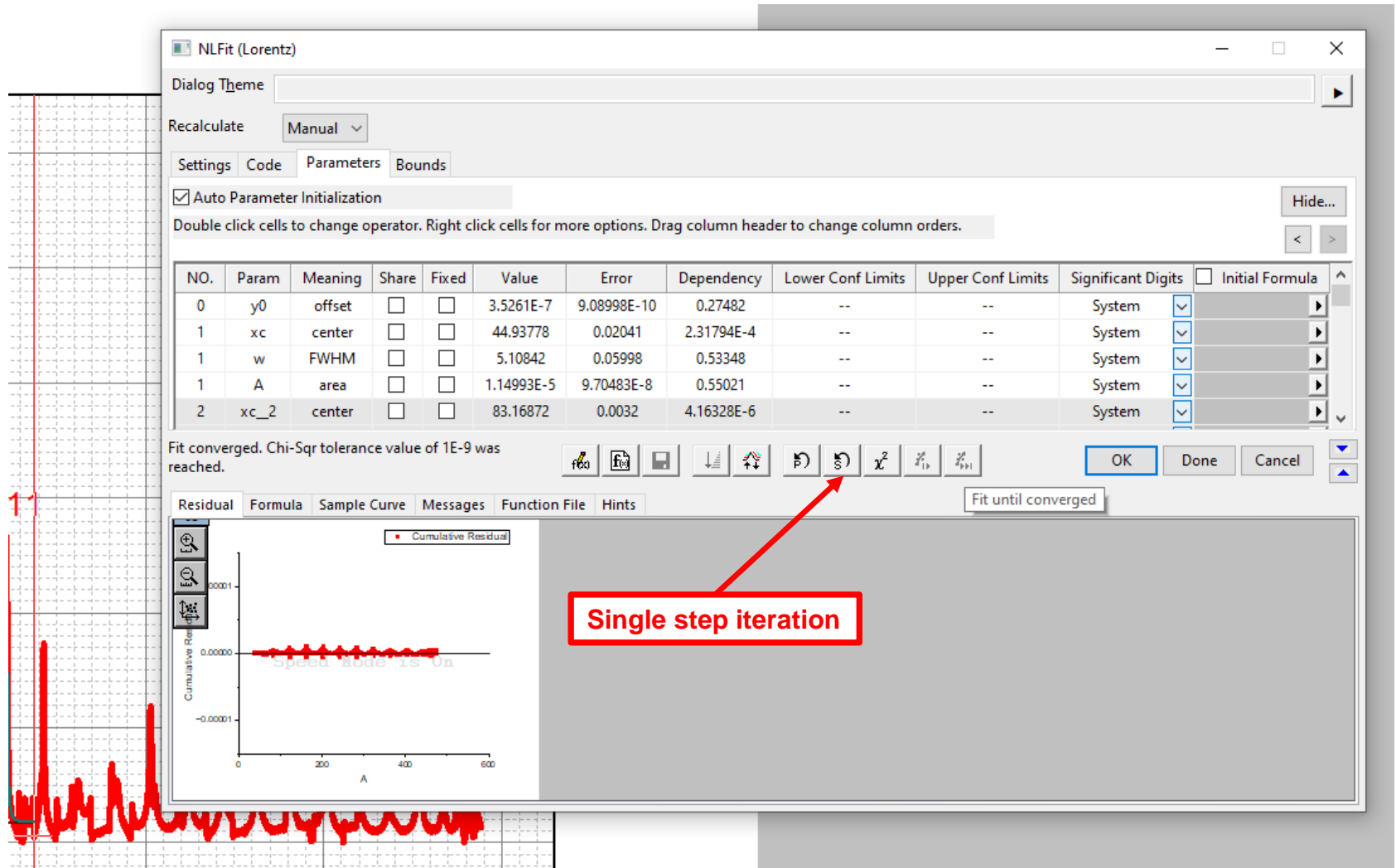
Get Points

Fit < You have picked 11 peaks.
X = 441.05263, Y = 6.20261E-6

Open NlFit

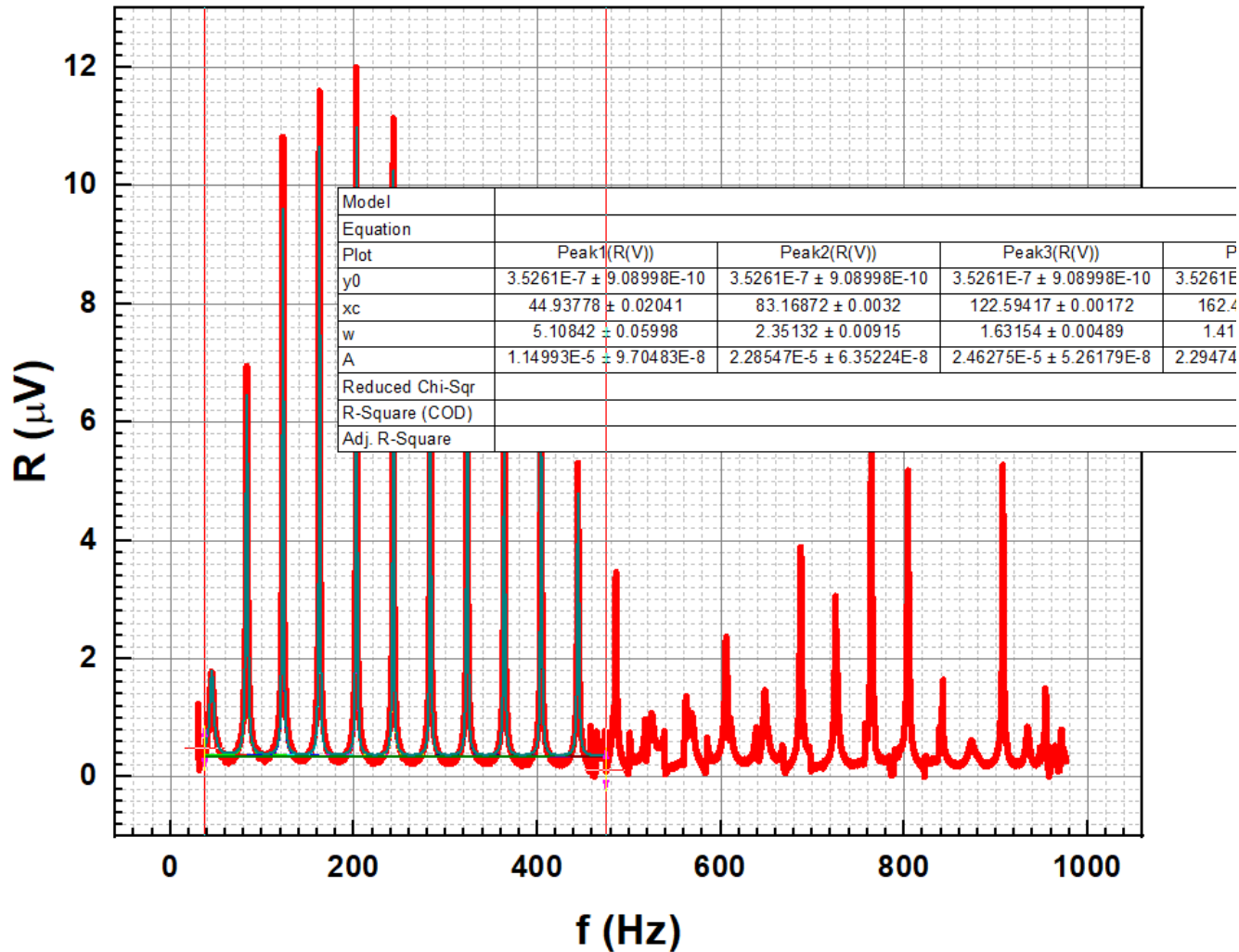


Graphical presentation of data: Multiple peak Fit



Recommendation: start first with "Single step iteration" and next if fitting goes in proper direction push "Fit until converged"

Graphical presentation of data: Multiple peak Fit



Finally, you will have the data plot with set of fitting lines plus the table with found parameters

Graphical presentation of data: Multiple peak Fit

All fitting results could be found in added layer to data worksheet

100 : Fit converged. Chi-Sqr tolerance value of 1E-9 was reached.

Summary

	y0		xc		w		A		H		Statistics	
	Value	Standard Error	Value	Standard Error	Value	Standard Error	Value	Standard Error	Value	Standard Error	Reduced Chi-Sqr	Adj. R-Square
Peak1(R(V))	3.5261E-7	9.08998E-10	44.93778	0.02041	5.10842	0.05998	1.14993E-5	9.70483E-8	1.43306E-6	1.15019E-8	2.62144E-14	0.98415
Peak2(R(V))	3.5261E-7	9.08998E-10	83.16872	0.0032	2.35132	0.00915	2.28547E-5	6.35224E-8	6.18792E-6	1.68499E-8		
Peak3(R(V))	3.5261E-7	9.08998E-10	122.59417	0.00172	1.63155	0.00489	2.46275E-5	5.2618E-8	9.60952E-6	2.02275E-8		
Peak4(R(V))	3.5261E-7	9.08998E-10	162.49202	0.0015	1.41975	0.00426	2.29474E-5	4.90025E-8	1.02897E-5	2.16838E-8		
Peak5(R(V))	3.5261E-7	9.08998E-10	202.81031	0.00139	1.30551	0.00395	2.17874E-5	4.69447E-8	1.06244E-5	2.26126E-8		
Peak6(R(V))	3.5261E-7	9.08998E-10	242.93645	0.0015	1.32379	0.00428	2.05619E-5	4.72812E-8	9.88834E-6	2.24559E-8		
Peak7(R(V))	3.5261E-7	9.08998E-10	283.3134	0.0018	1.42423	0.00513	1.91415E-5	4.90864E-8	8.55609E-6	2.16497E-8		
Peak8(R(V))	3.5261E-7	9.08998E-10	323.52904	0.00231	1.60858	0.00659	1.79125E-5	5.22522E-8	7.08916E-6	2.03714E-8		
Peak9(R(V))	3.5261E-7	9.08998E-10	363.9371	0.0027	1.70221	0.00769	1.67149E-5	5.37935E-8	6.25132E-6	1.98032E-8		
Peak10(R(V))	3.5261E-7	9.08998E-10	404.21923	0.0032	1.8129	0.00913	1.54766E-5	5.5566E-8	5.43479E-6	1.91892E-8		
Peak11(R(V))	3.5261E-7	9.08998E-10	444.35606	0.00381	1.89097	0.01086	1.38639E-5	5.67808E-8	4.66745E-6	1.8789E-8		

ANOVA

		DF	Sum of Squares	Mean Square	F Value	Prob>F
R(V)	Regression	33	7.12026E-8	2.15765E-9	82307.90245	<0.0001
	Residual	43715	1.14596E-9	2.62144E-14		
	Uncorrected Total	43749	1.01914E-7			
	Corrected Total	43748	7.23485E-8			

R(V): At the 0.05 level, the fitting function is significantly better than the function y=constant.

Fitted Curve

R(V)

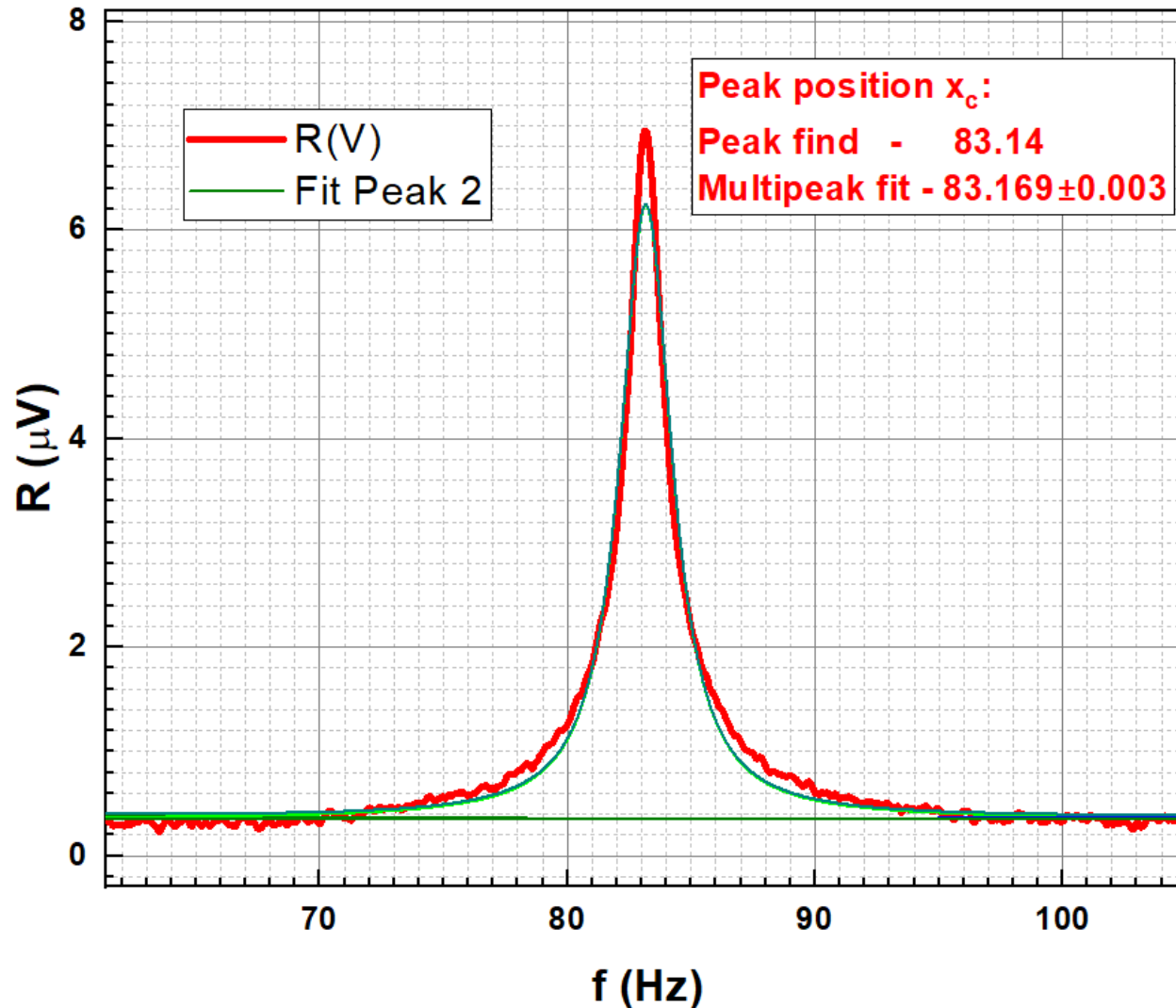
Run1 1V_long | nlfiteaksCurve1 | nlfiteaks2 | nlfiteaksCurve2 | X = 277.281465, Y(/1e-06) = 13.5085131



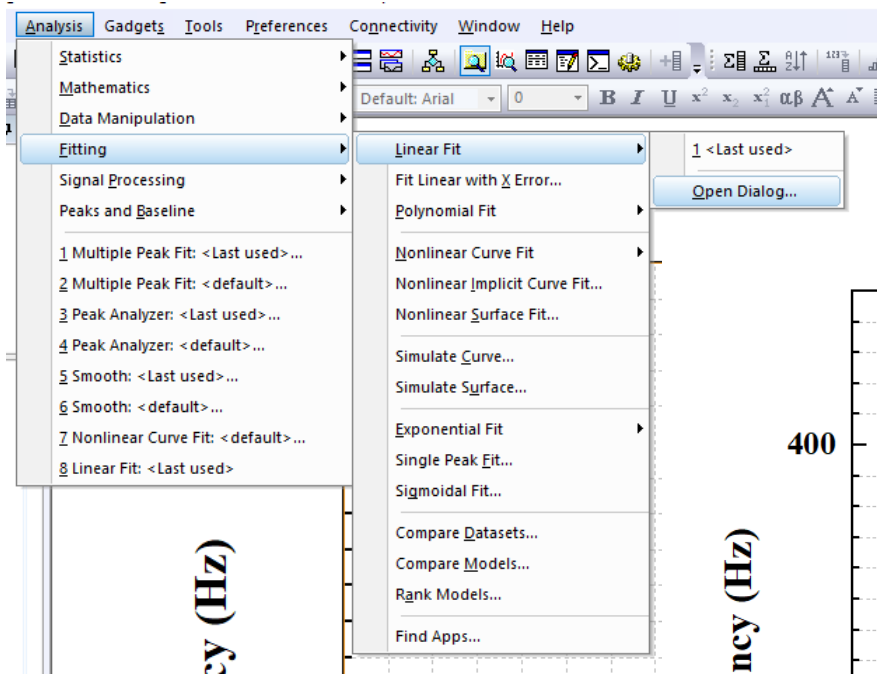
This layer contains all fitting results

Graphical presentation of data: Multiple peak Fit

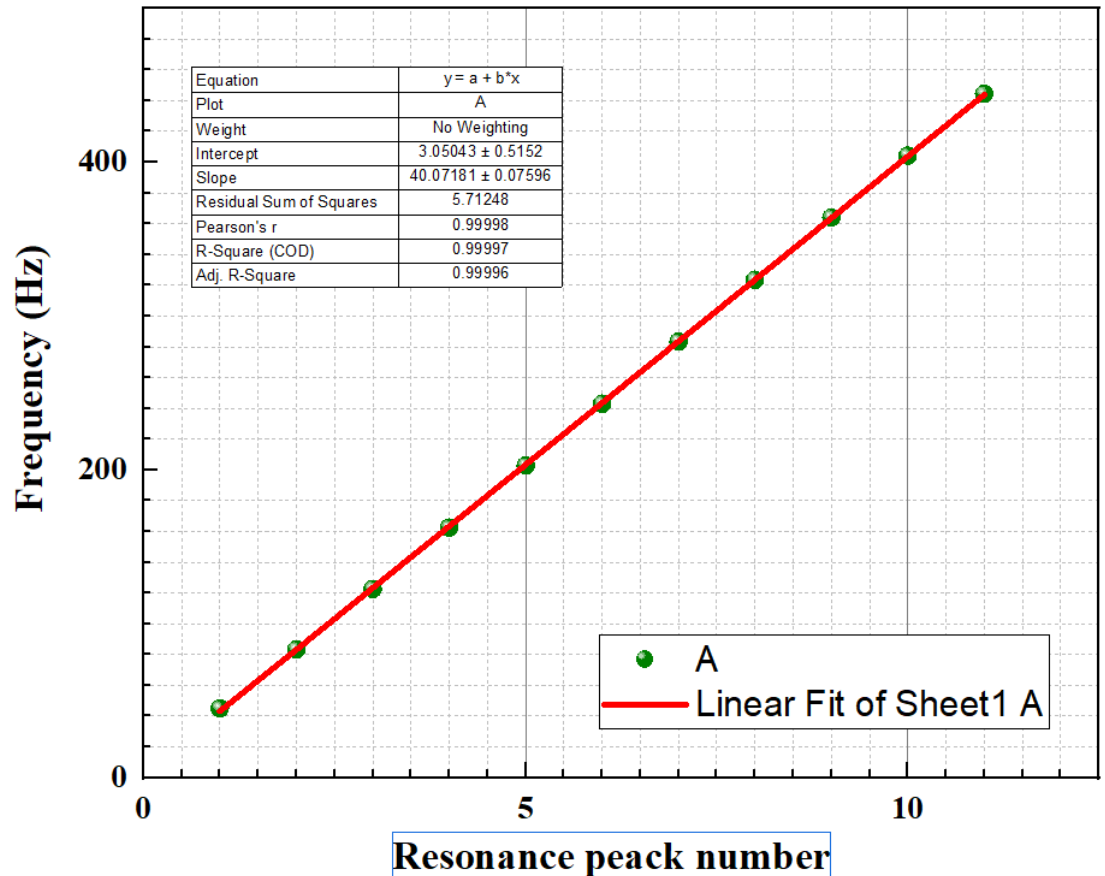
Comparing the results obtained by using
“Peak find” and “Multipeak fit” procedures



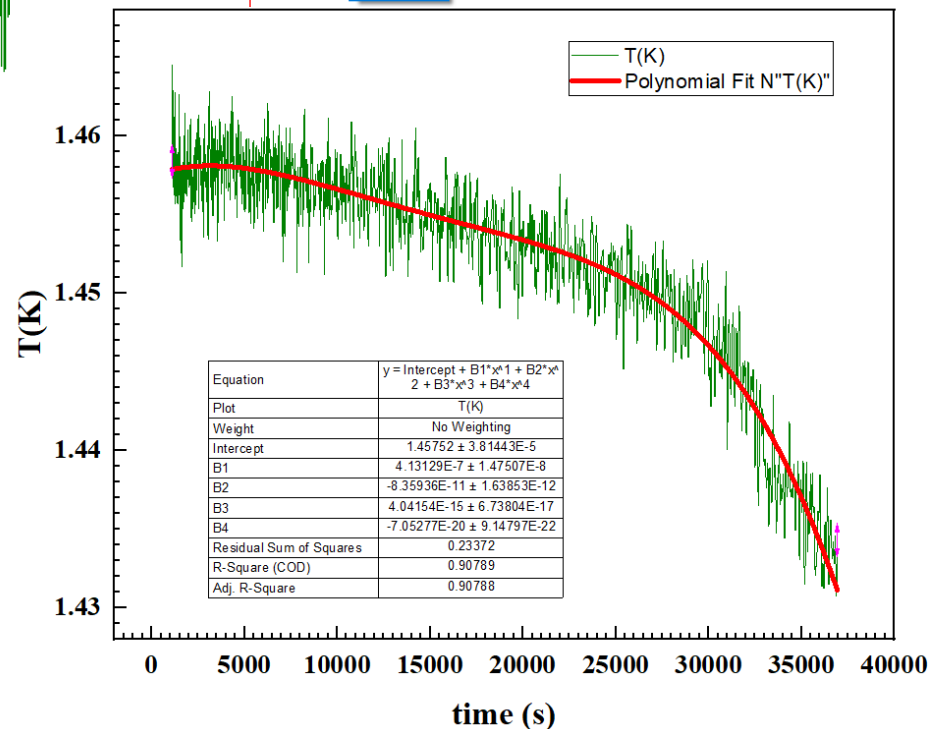
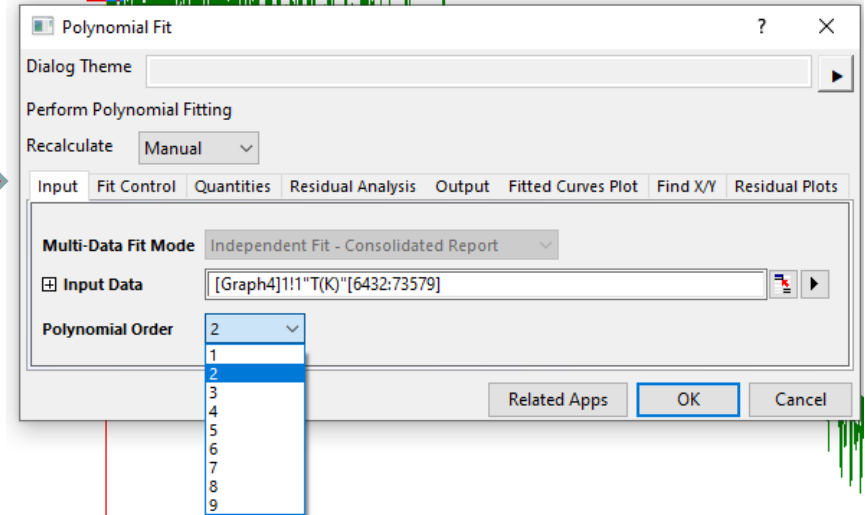
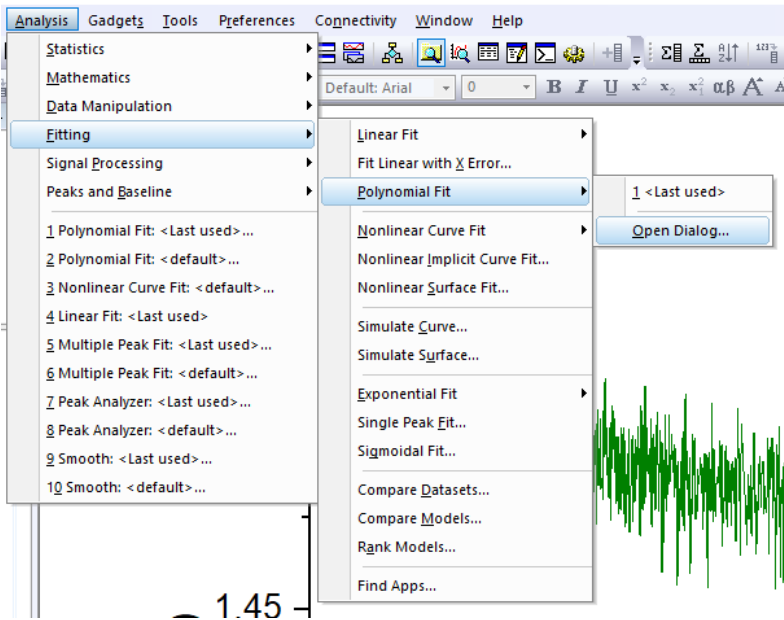
Graphical presentation of data: Fit Linear



**Example of linear fitting.
Data from *Second sound*
experiment**



Graphical presentation of data: Fit Polynomial



Graph showing the temperature variations during the taking data with results of polynomial fit

Working with data: Worksheets. Statistics on Column

The screenshot shows a spreadsheet with columns A(H) and rows 1-32. Column C(K) is selected, and a context menu is open. The 'Statistics on Column' option is highlighted. A dialog box titled 'Statistics on Columns (1/25/2023 14:52:11)' is displayed, showing a table of descriptive statistics for column C(K).

	N total	Mean	Standard Deviation	Sum	Minimum	Median	Maximum
T(K)	94340	1.45169	0.02566	136952.32874	1.41557	1.45404	1.58361

The results could find here

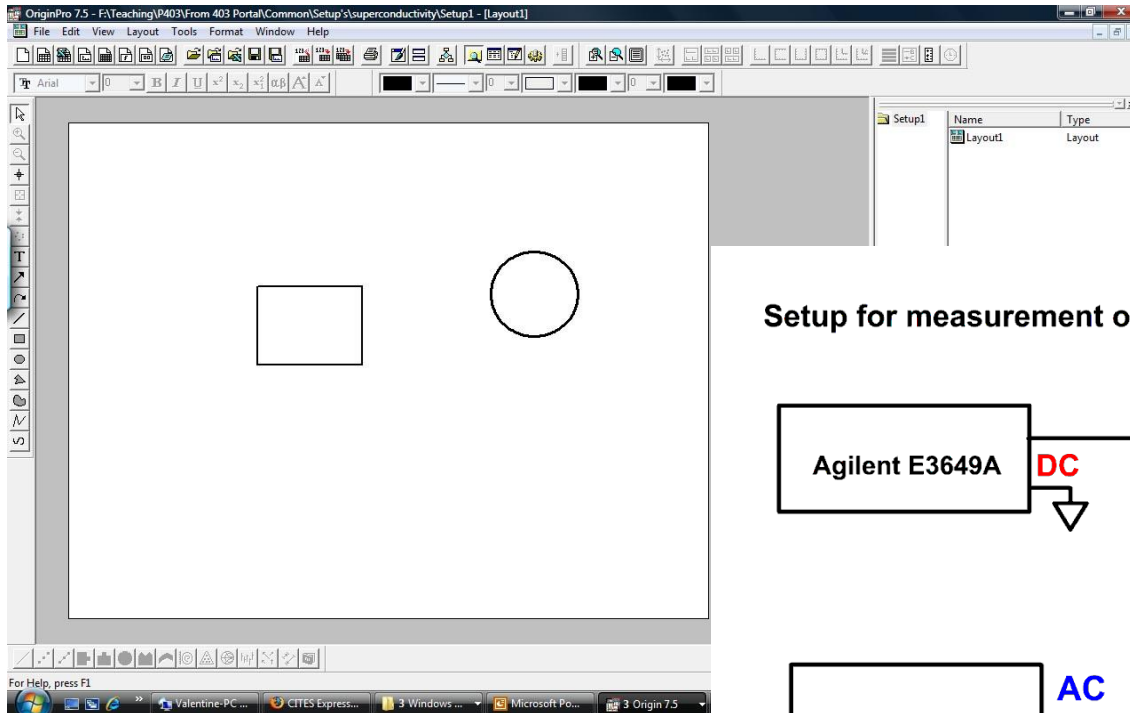
The screenshot shows a file explorer window with a folder named 'DescStatsOnCols1' selected. The address bar shows the path 'FitPolynomial3 \ DescStatsOnCols1 /' and the current view is set to '10'.

Working with data: Worksheets. "Set Column Values"

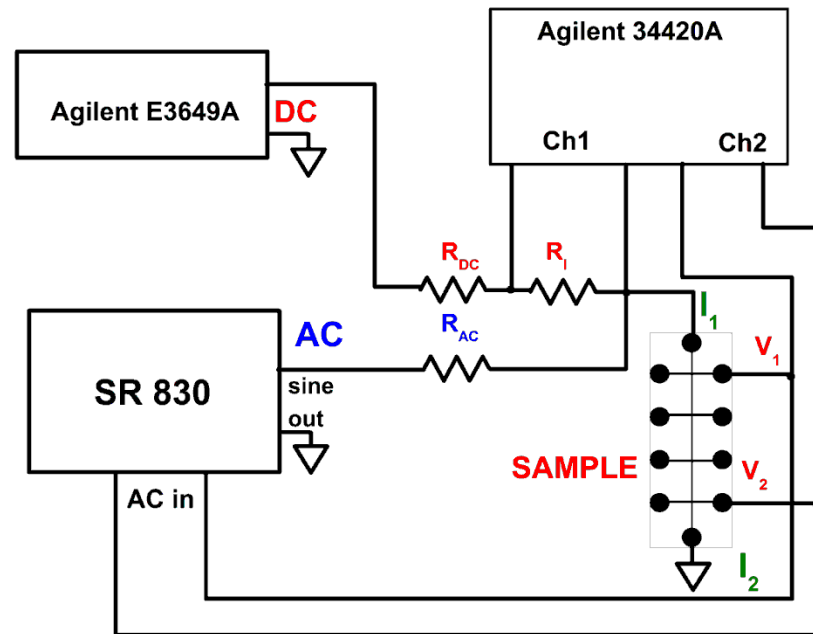
The image shows a screenshot of the LabTalk software interface. A context menu is open over column B, with the 'Set Column Values...' option selected. A dialog box titled 'Set Values - [SecondSound2]\'SecondSound_T2_16K VE...' is open, showing the formula `col(B) = col(B) - 273`. A data table is visible in the background, showing columns for time (s), temperature (T(K)), pressure (P (mm)), and other parameters. A large blue arrow points from the dialog box to the data table.

	A(X)	B(Y)	C(Y)	D(Y)	E(Y)	F(Y)	G(Y)	H(Y)	I(Y)
Long Name	time (s)	T(K)				f (Hz)	X (V)	Y(V)	R(V)
Units									
Comments									
F(x)=									
Sparklines									
1	5.35899	1.571							
2	5.84299	1.571							
3	6.281	1.571							
4	6.71799	1.571							
5	7.172	1.571							
6	7.60899	1.571							
7	8.437	1.571							
8	8.906	1.571							
9	9.39	1.571							
10	9.85899	1.571							
11	10.297	1.571							
12	10.71799	1.571							
13	11.156	1.571							
14	11.59299	1.571							
15	12.031	1.571							
16	12.46799	1.571							
17	12.89	1.571							
18	13.312	1.571							
19	13.73399	1.571							

Layouts



Setup for measurement of s/c properties



Custom tools

The screenshot displays the OriginPro 2015 (Academic) 64-bit interface. The main window shows a spreadsheet titled 'Book1' with columns 'A(X)' and 'B(Y)'. The spreadsheet contains the following data:

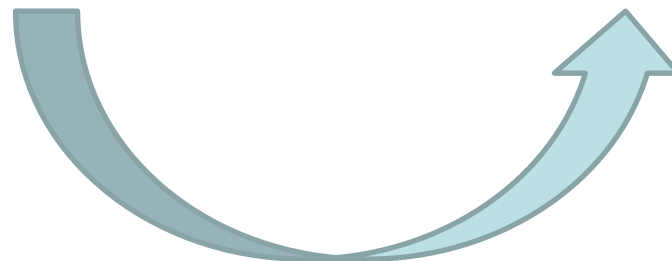
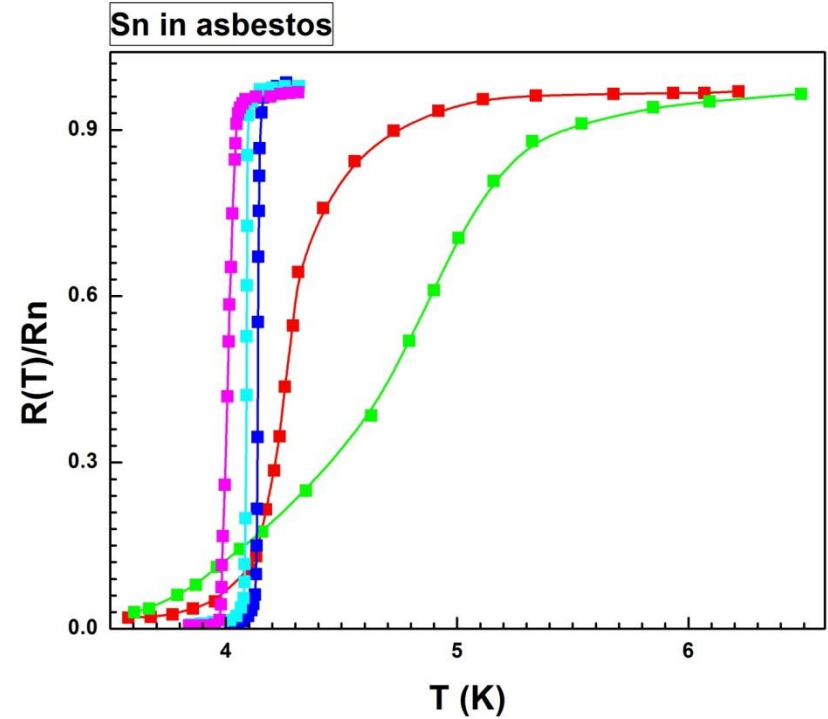
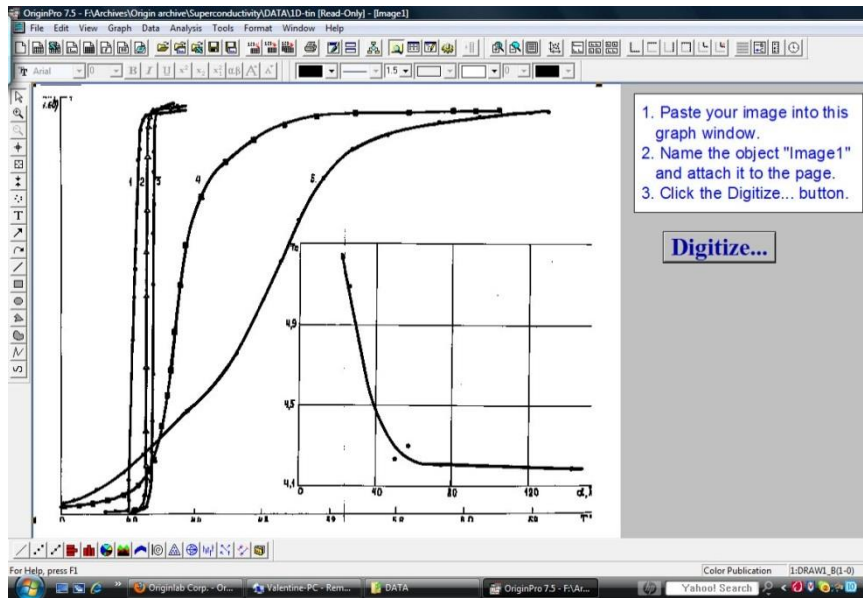
	A(X)	B(Y)
Long Name		
Units		
Comments		
F(x)=		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

The 'Tools' menu is open, showing the following options:

- Options... (Ctrl+U)
- Fitting Function Builder... (F8)
- Virtual Matrix Manager...
- Transfer User Files...
- Digitizer...** (highlighted)
- Video Builder...

The interface also includes a Project Explorer (1) on the left, a Quick Help pane, a Messages Log, and a Smart Hint Log. The status bar at the bottom indicates 'Sheet1'.

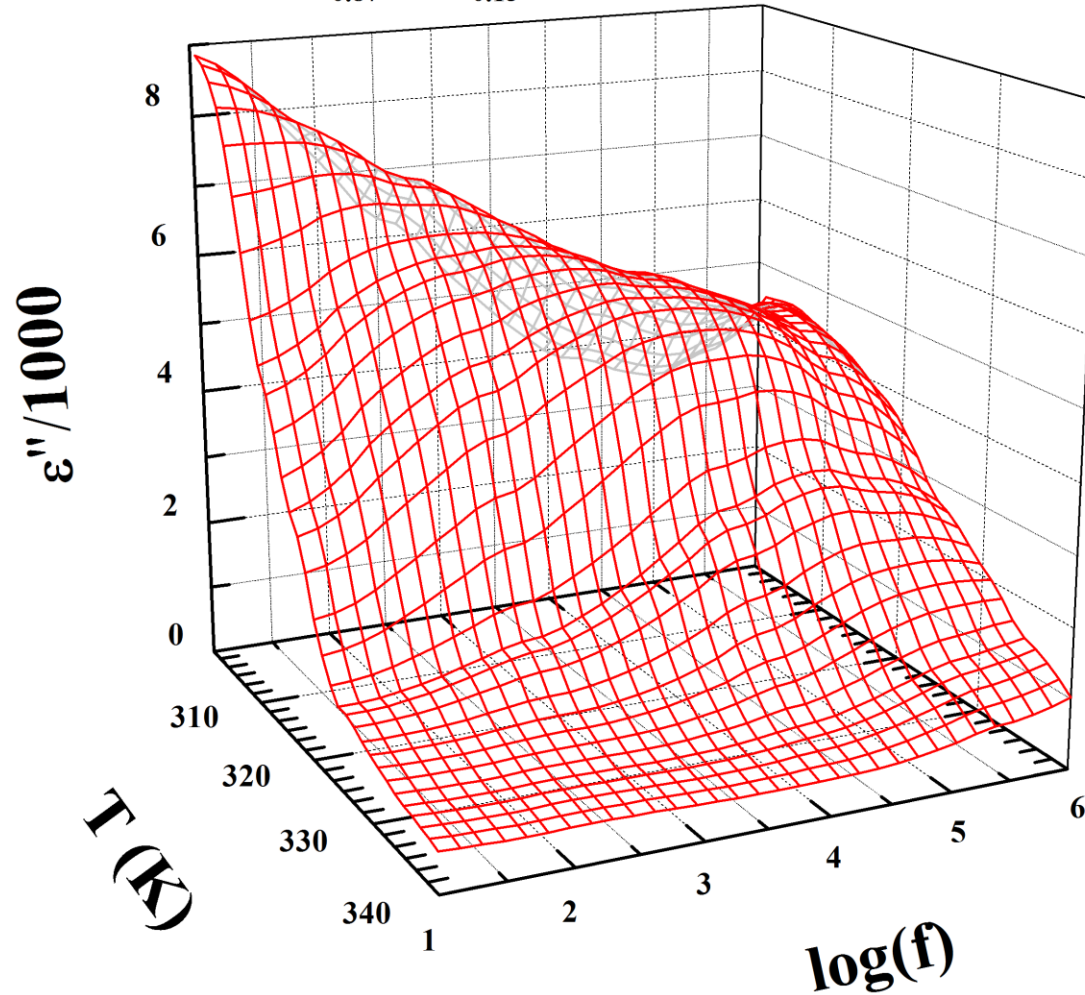
Using digitizer script



Example Origin graphs

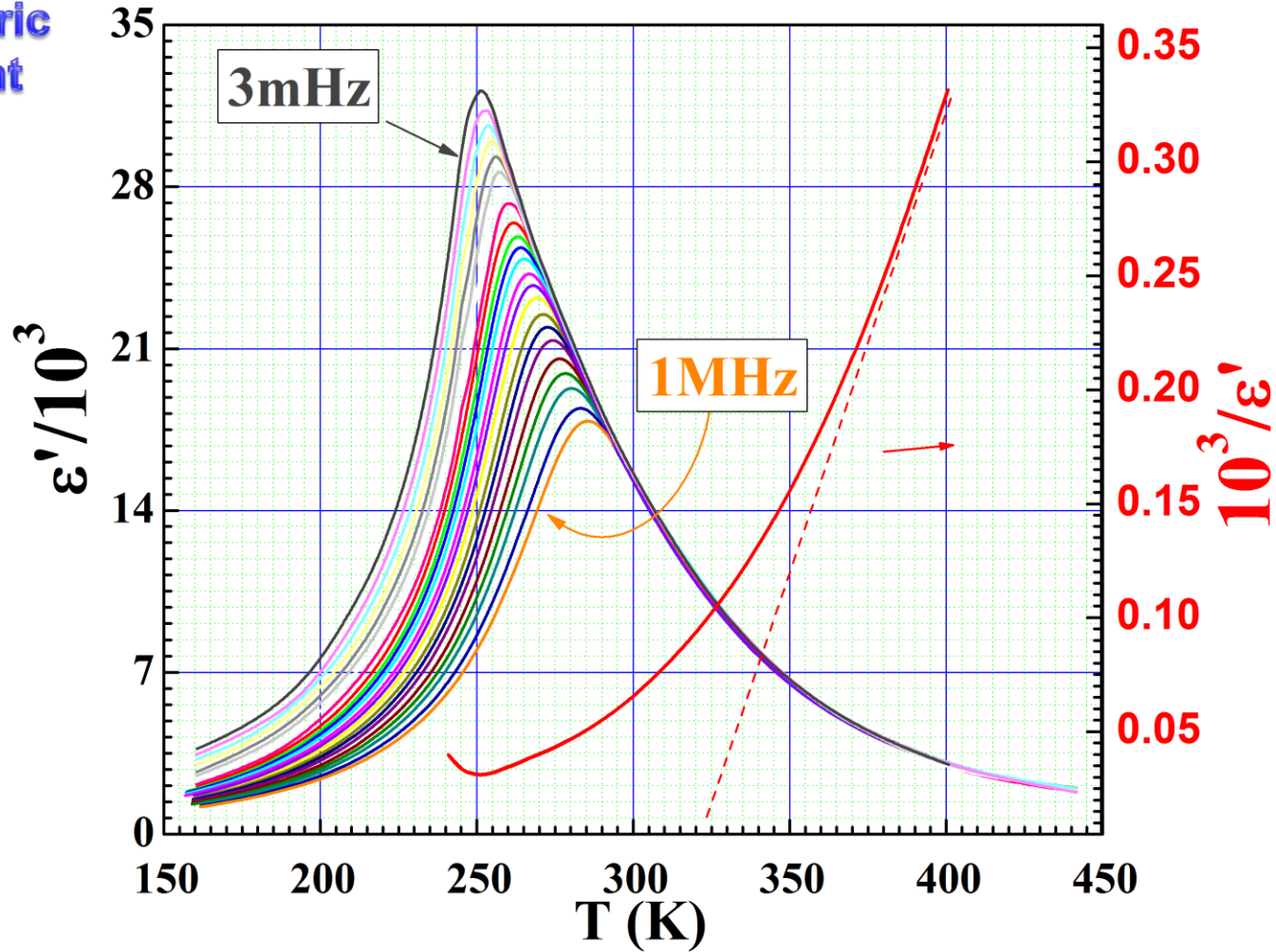
$(\text{PMN})_{0.87}(\text{PT})_{0.13}$, single crystal

Ferroelectric
Experiment



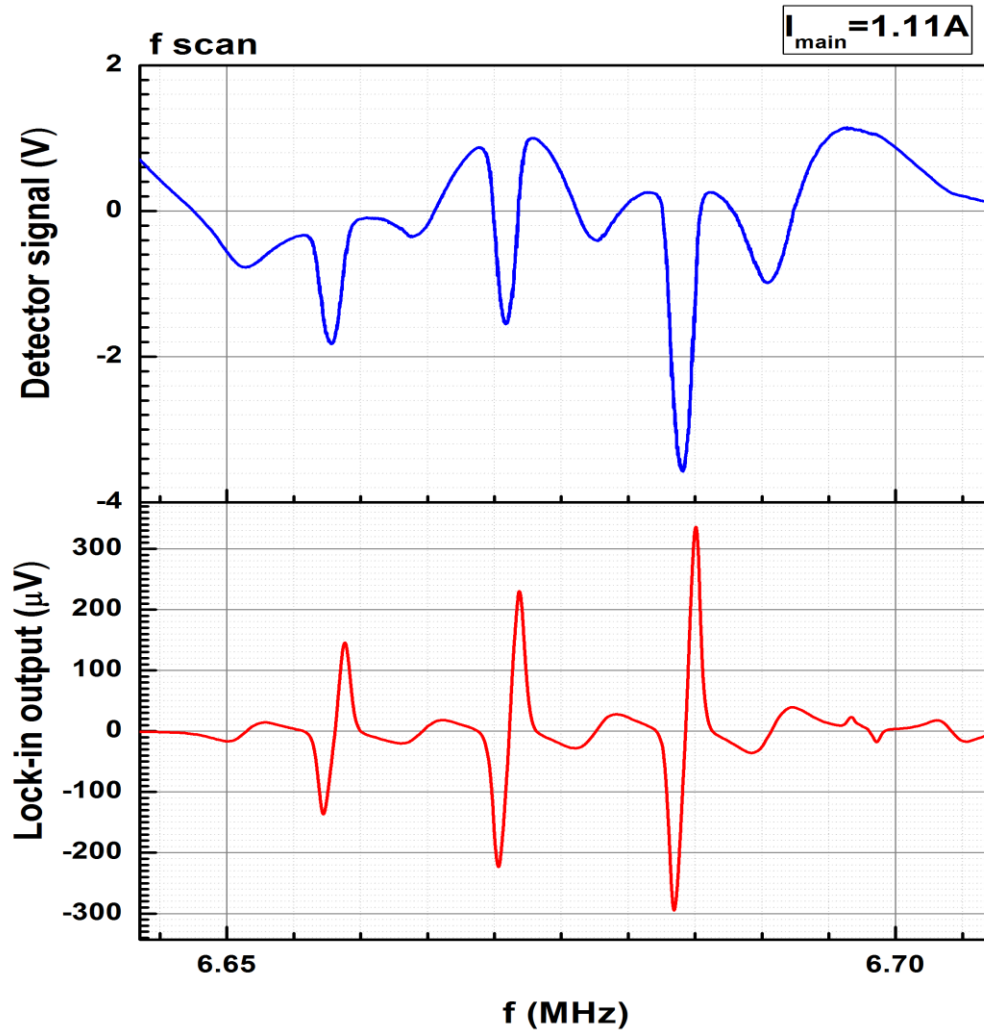
Example Origin graphs

Ferroelectric
Experiment



Example Origin graphs

Optical
pumping

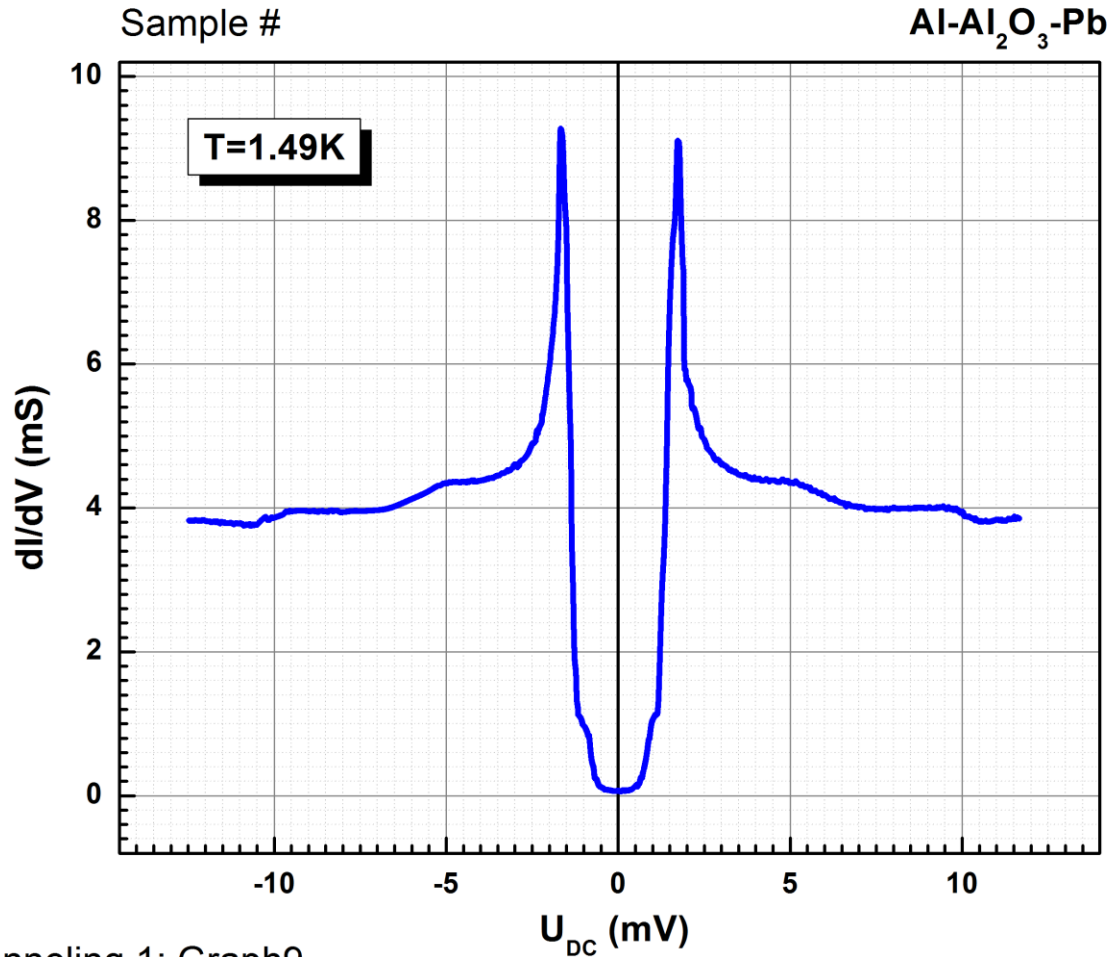


Mapping 0.5-2.5A from March 1st 2012: Graph7



Example Origin graphs

Tunneling
Experiment



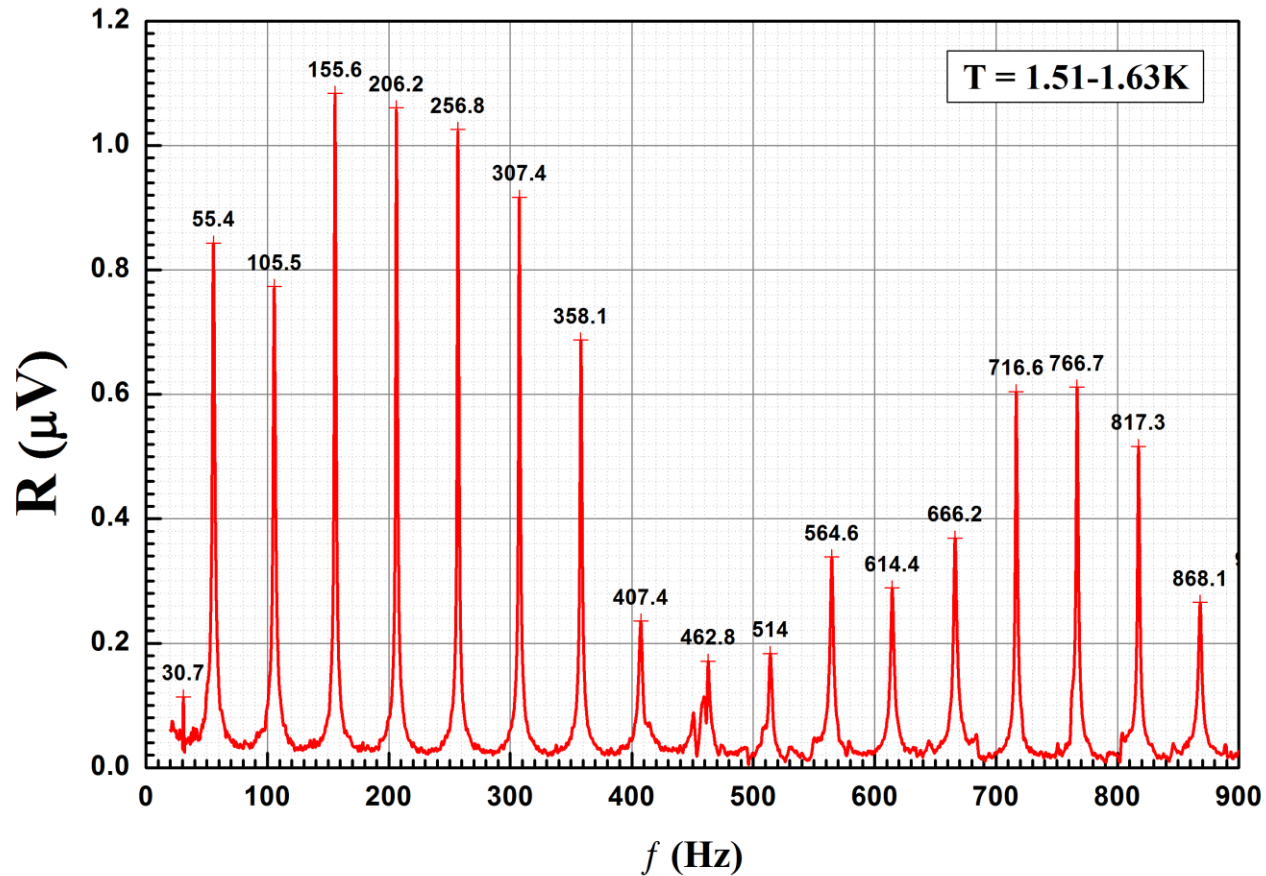
Tunneling 1: Graph9

Sample n2 run8 zoom temp 1.55K



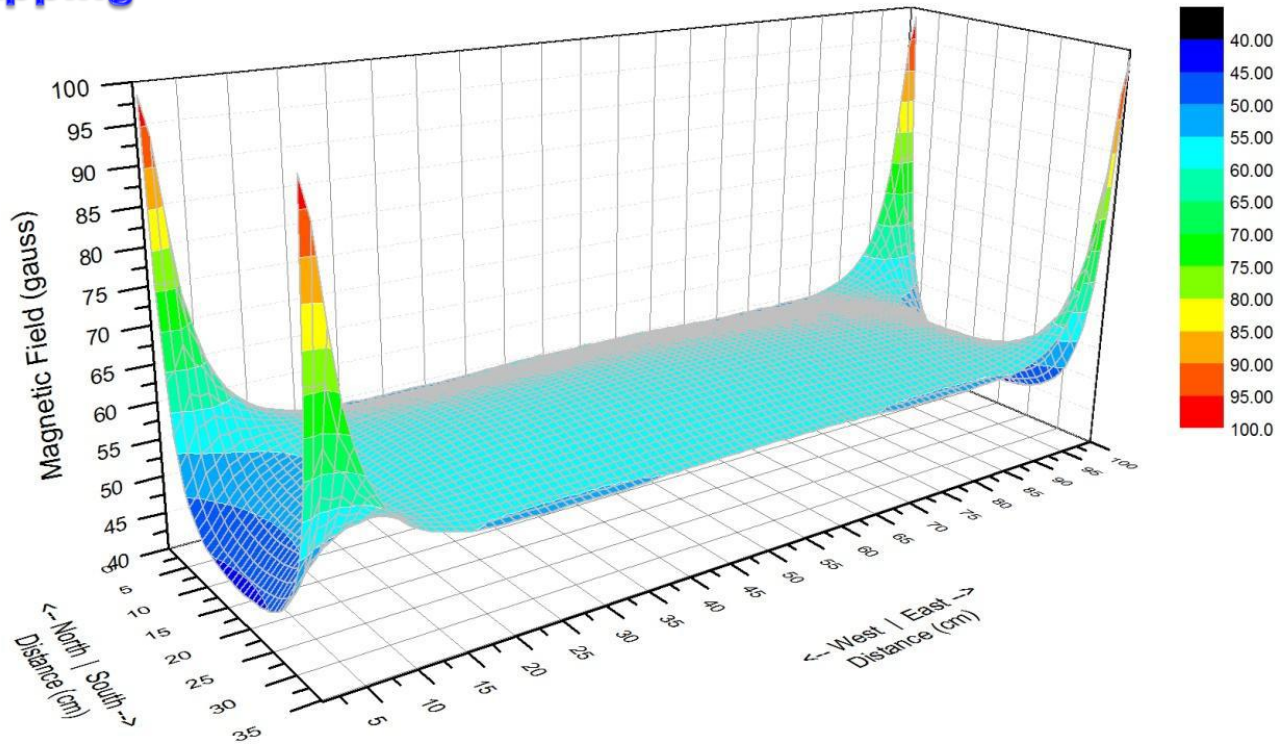
Example Origin graphs

Second
sound



Example Origin graphs

Magnet mapping



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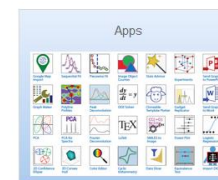
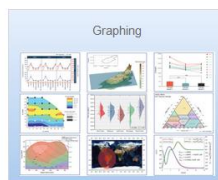
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Here is another way to run Origin without needing to install it on your own computer (e.g. if you have a Mac, which is not supported by Origin):

1. Connect to VPN
2. Install and run Citrix:
<http://it.engineering.illinois.edu/ews/lab-information/remote-connections/connecting-citrix>
3. Click on "Apps" and then "Origin"
4. To open and save files, use your EWS folder at this address: "smb://ad.uillinois.edu/engr-ews/[Your netID]"



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