



Scientific Graphing and Analysis Software

Origin is on all Physics 403 computers.

What it can do:

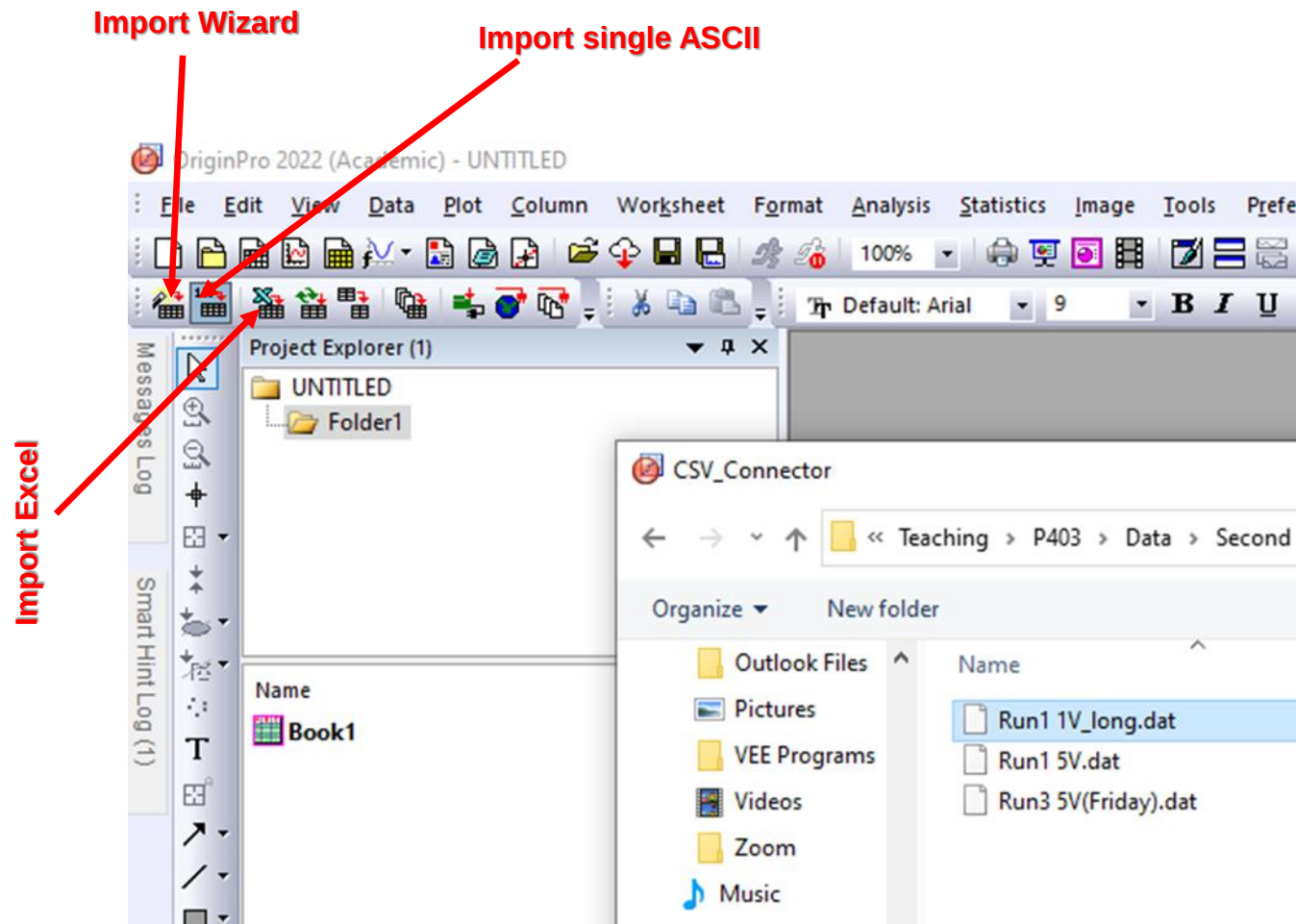
1. Graphical presentation of data

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

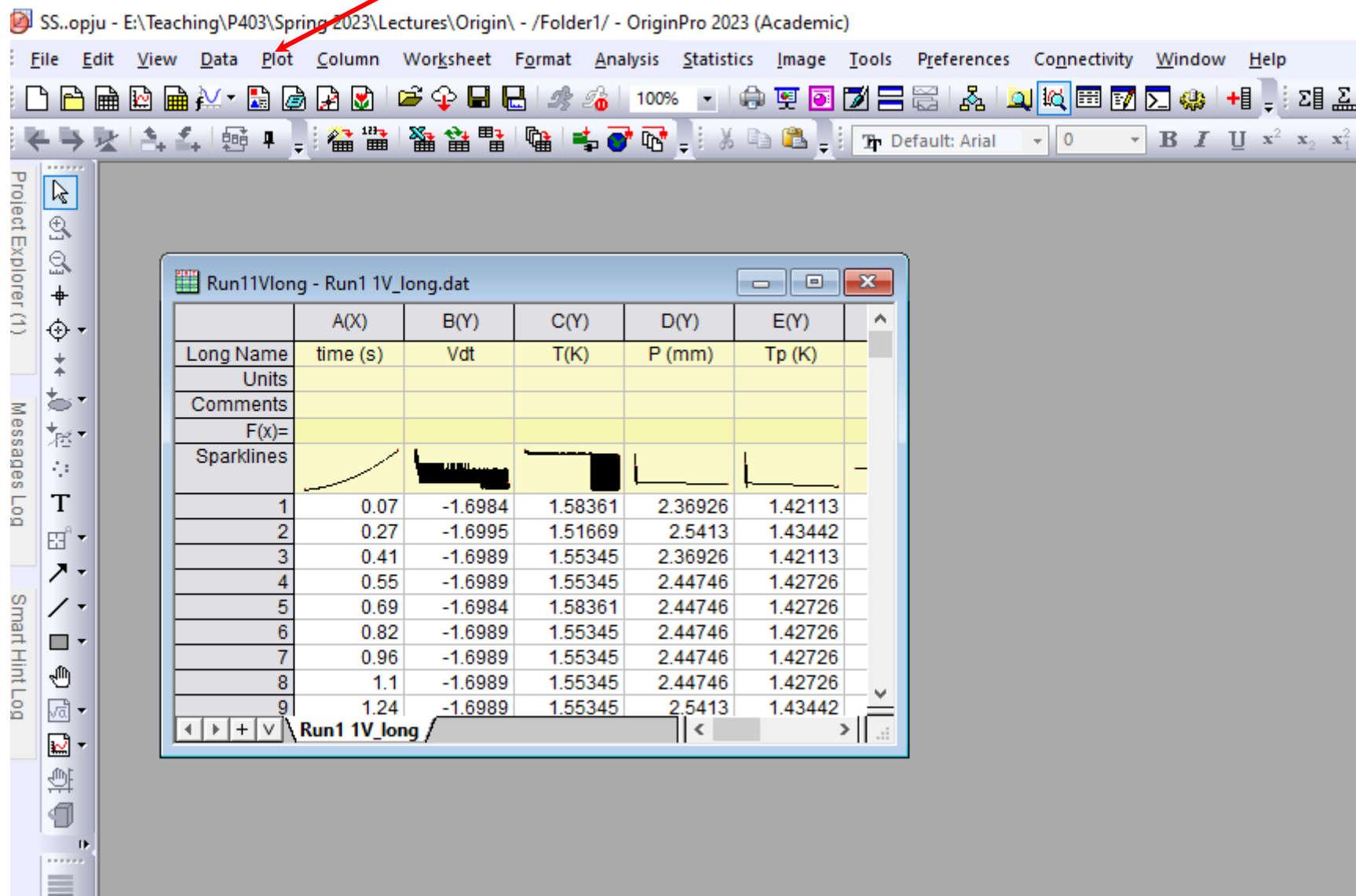
Importing data



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

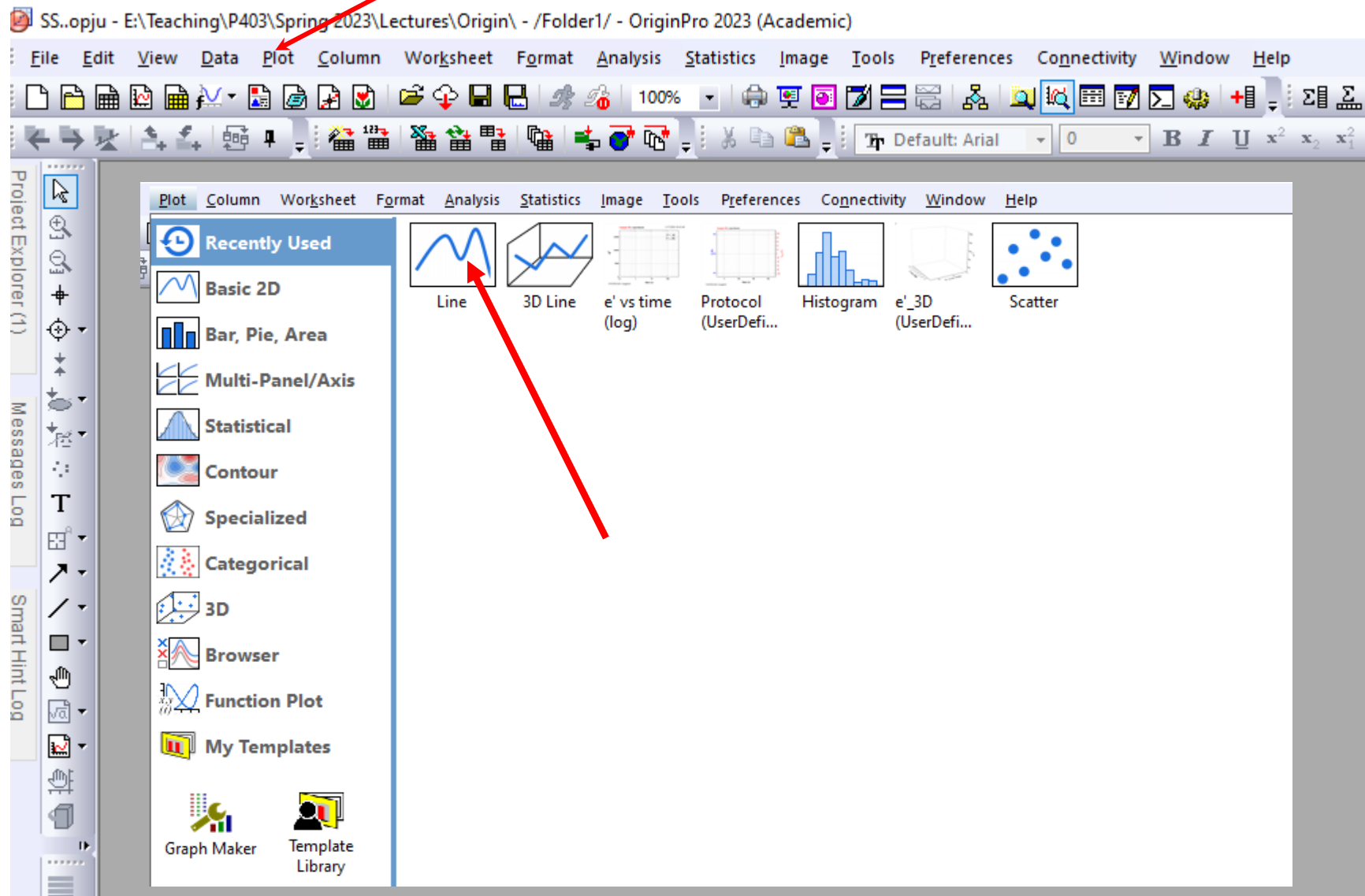
Graphical presentation of data: Basic Plot

Plot menu



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

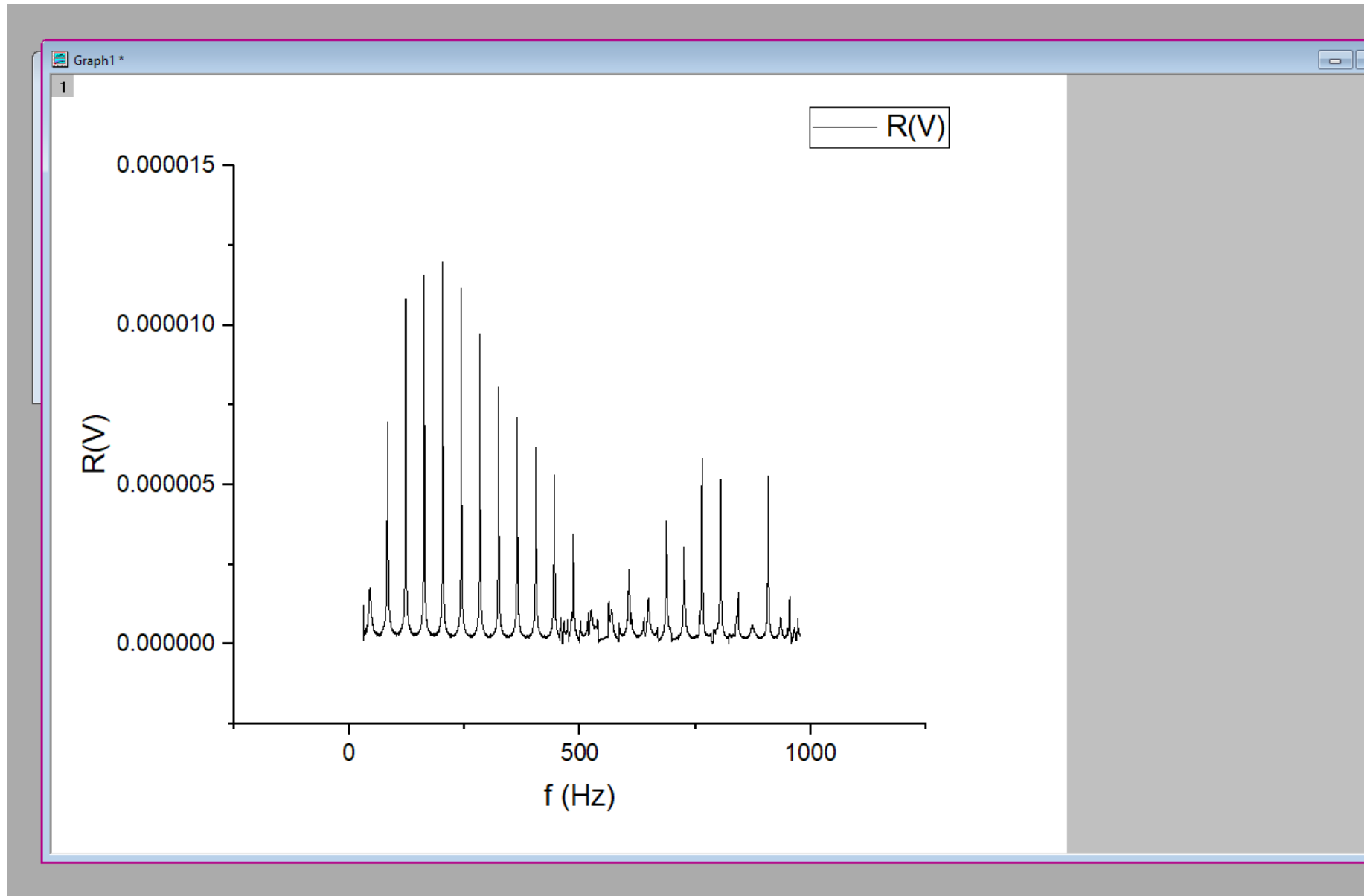
Plot Type: Line

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

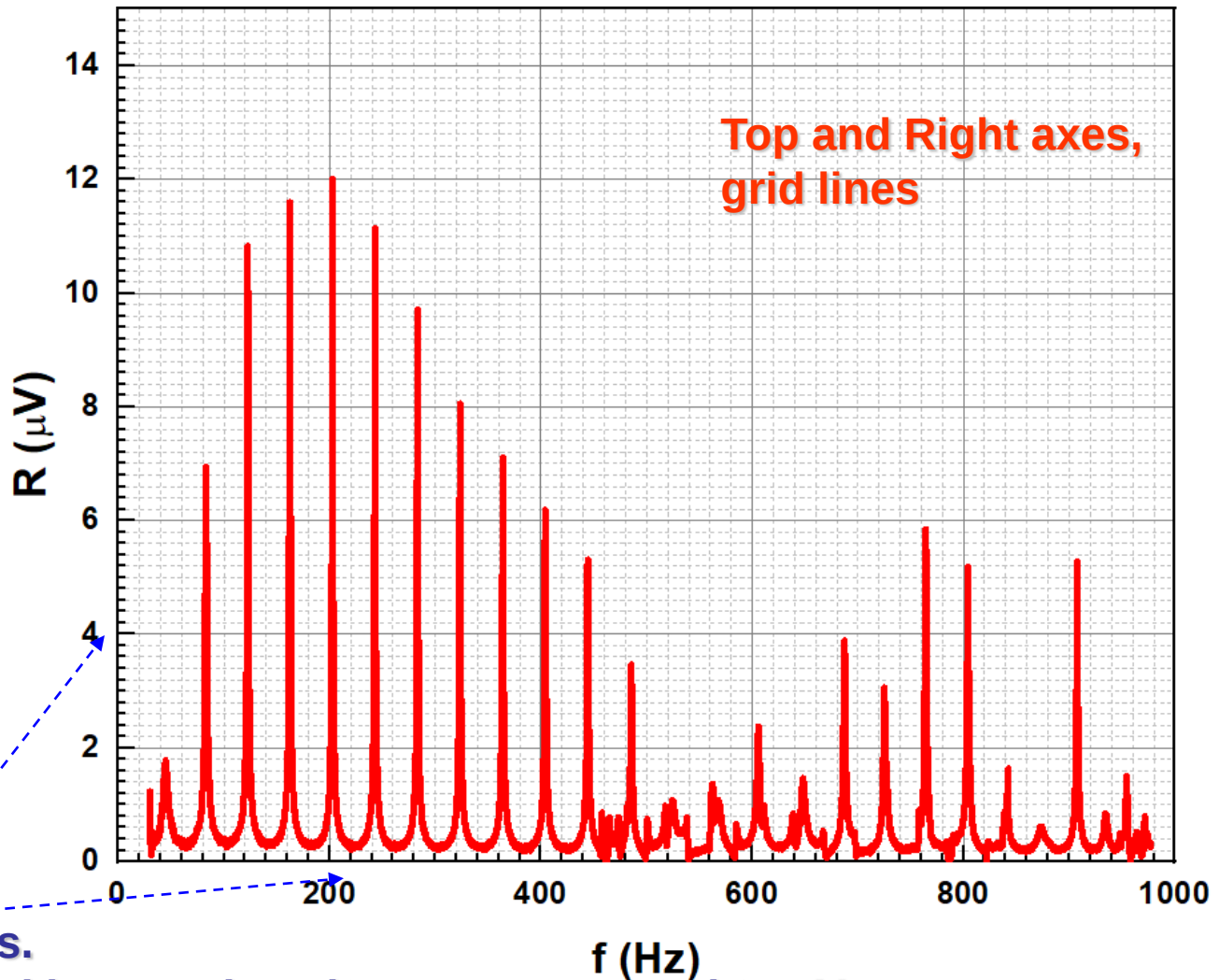
OK Cancel

Graph Maker Template Library

Graphical presentation of data: Basic Plot



Graphical presentation of data: Basic Plot

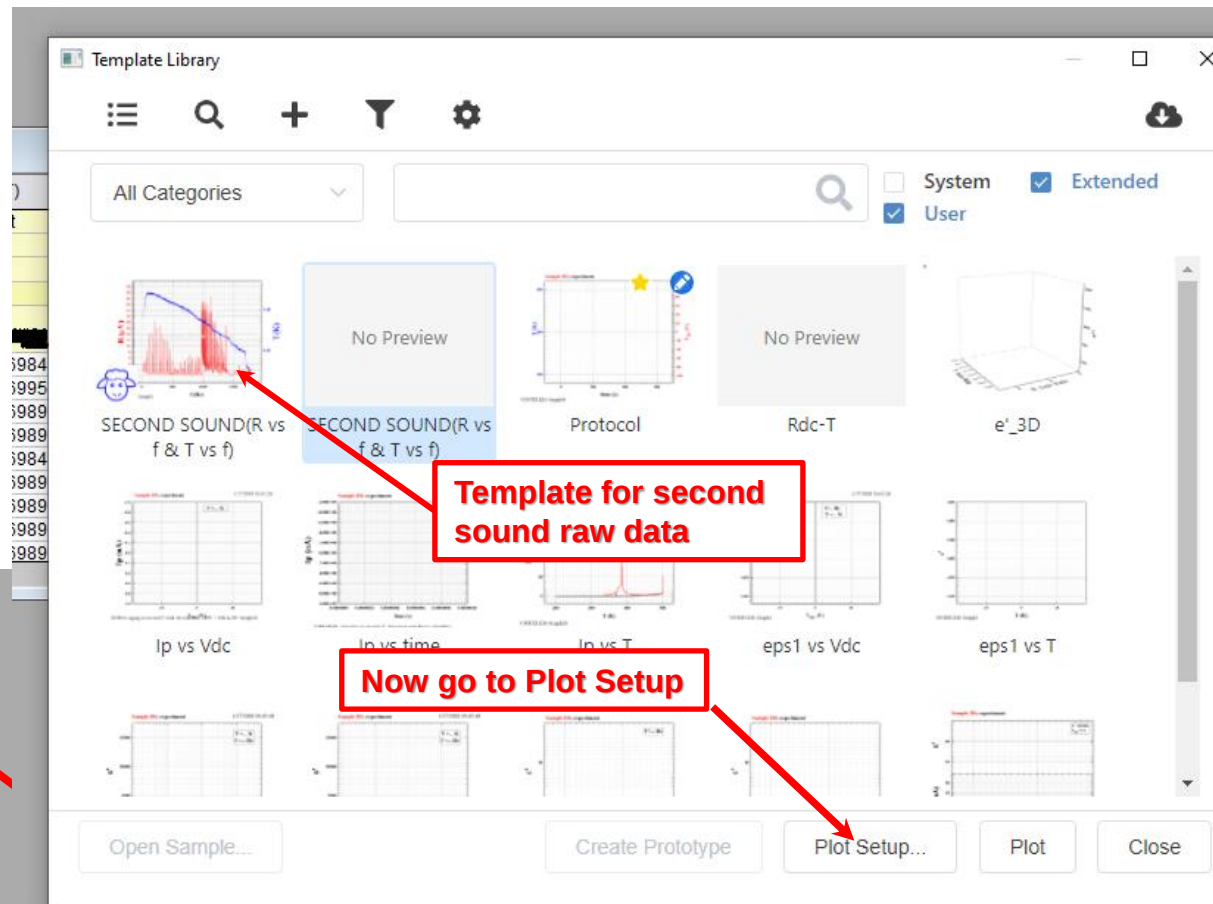


Bold tick labels.

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

Graphical presentation of data: Templates

Templates Library



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	☐	☐	☐	☐	<autoX>	From/Step=			0
Scatter	☐	☐	☐	☐	A	time (s)			1
Line + Symbol	☐	☐	☐	☐	B	Vdt			2
Column / Bar	☐	☐	☐	☐	C	T(K)			3
Area	☐	☐	☐	☐	D	P (mm)			4
Stacked Area	☐	☐	☐	☐	E	TP (K)			5
Fill Area	☐	☐	☐	☐	F	Uac (V)			6
High - Low - Close	☐	☐	☐	☐	G	f (Hz)			7
Floating Column	☒	☐	☐	☐	H	X (V)			8
XYAM Vector	☐	☐	☐	☐	I	Y(V)			9
XYXY Vector	☐	☐	☐	☐	J	R(V)			10
Bubble	☐	☒	☐	☐					
Color Mapped	☐	☐	☐	☐					

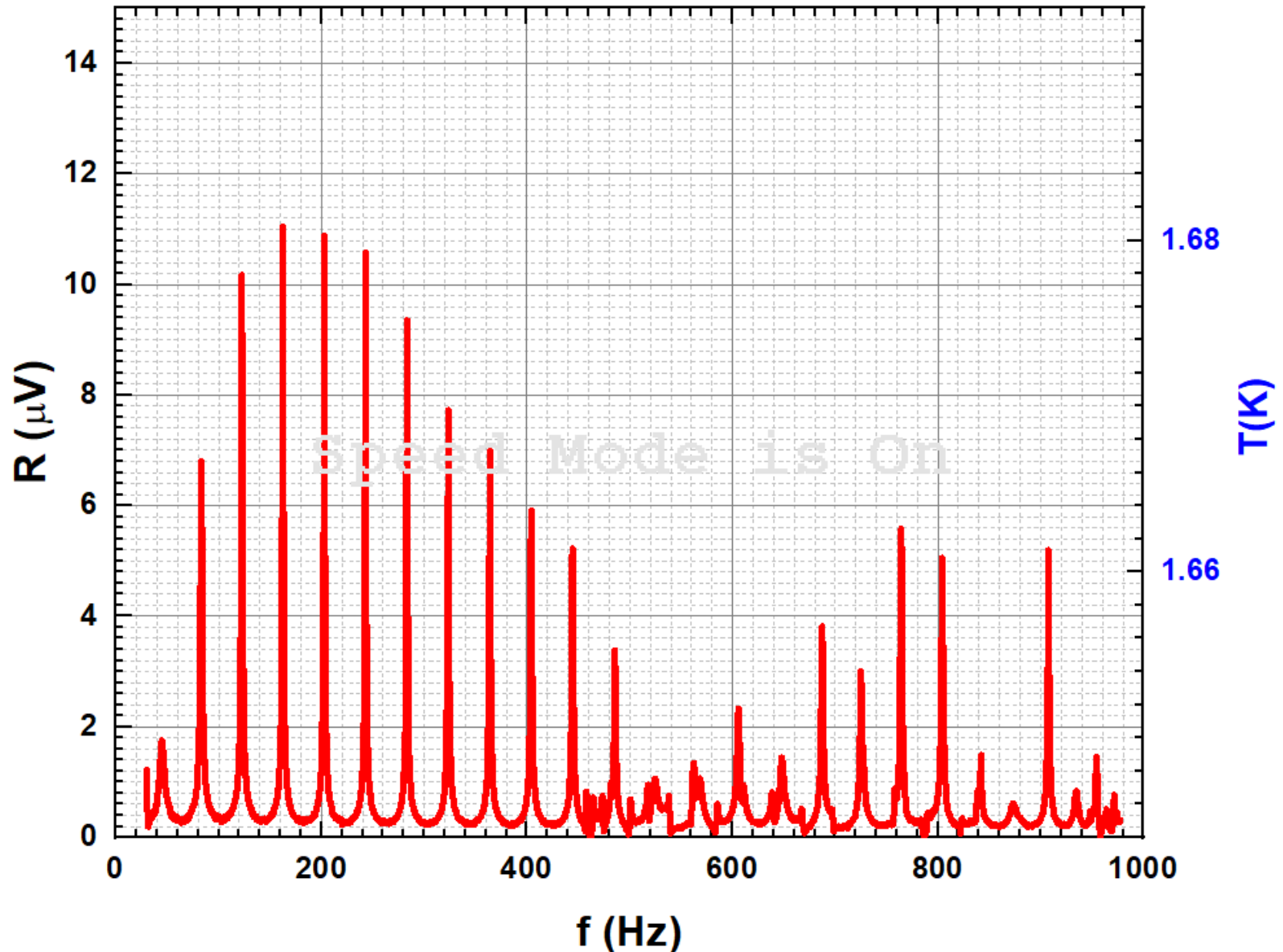
Plot List: Drag entries in 1st column to reorder or to move between layers. Right click for other options.

Plot	Range	Show	Plot Type	Legend
Layer 1	☒ Re	☒		
Style Holder			Line	
Style Holder			Line	
Style Holder			Line	
Group				
Style Holder			Line	
Style Holder			Line	
Style Holder			Line	
Layer 2	☒ Re	☒		

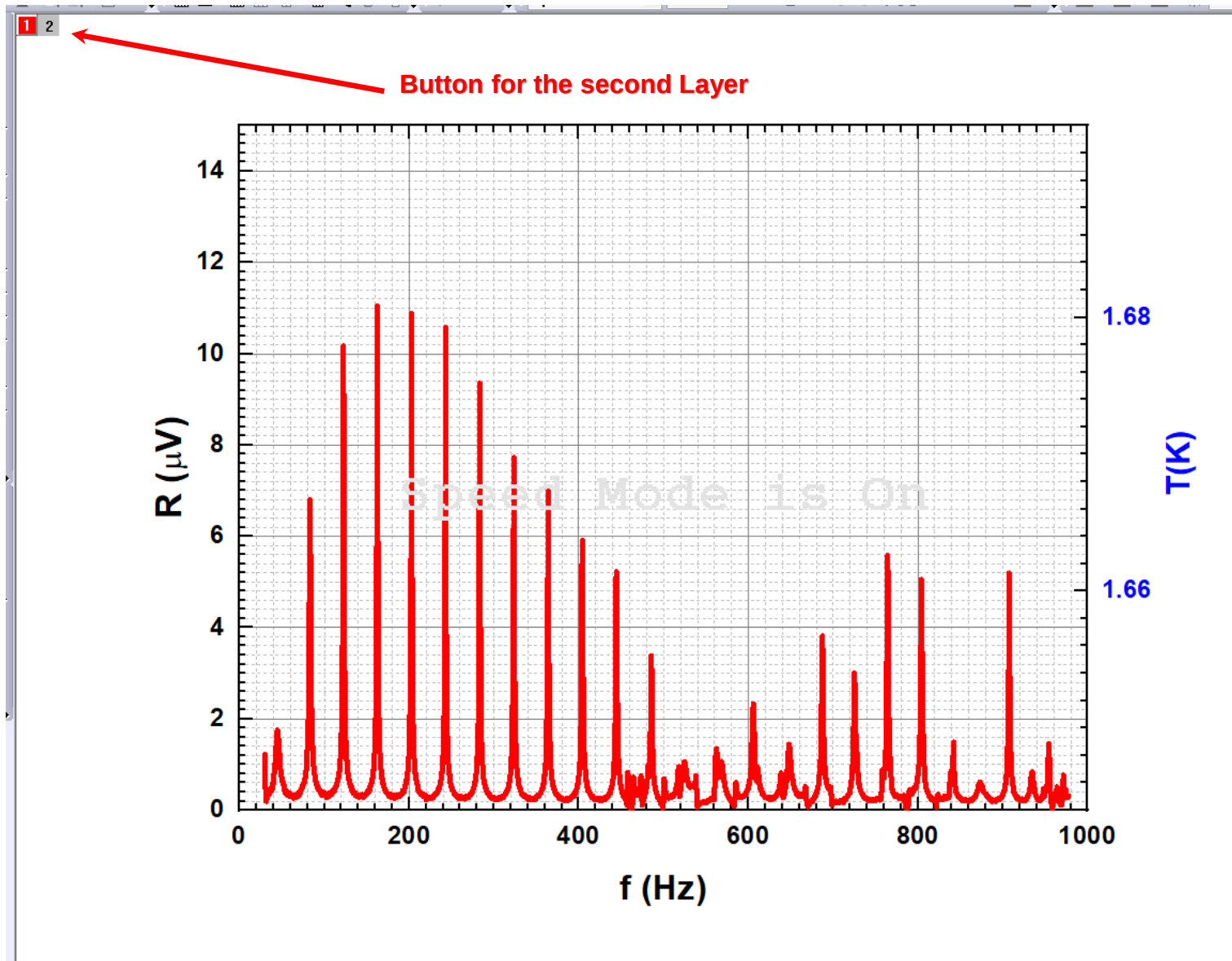
Preview OK Cancel Apply

Open Sample... Create Prototype

Graphical presentation of data: Templates



Graphical presentation of data: Extra Layer



1 2

Button for the second Layer

Plot Setup: Configure Data Plots in Layer

Plot Type:

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



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

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

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

Replace

Add



Plot	Range	Show	Plot Type	Legend
Layer 1	☐ Rescale	☒		
[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	☒	Line	R(V)
Layer 2	☒ Rescale	☒		
[Run1 1V_long.dat]Run1 1V_long! "f (Hz)"(X), "T(K)"(Y)	[1*:94707*] 30.01 < X < 977.07, 0 < Y < 1.58361	☒	Line	T(K)

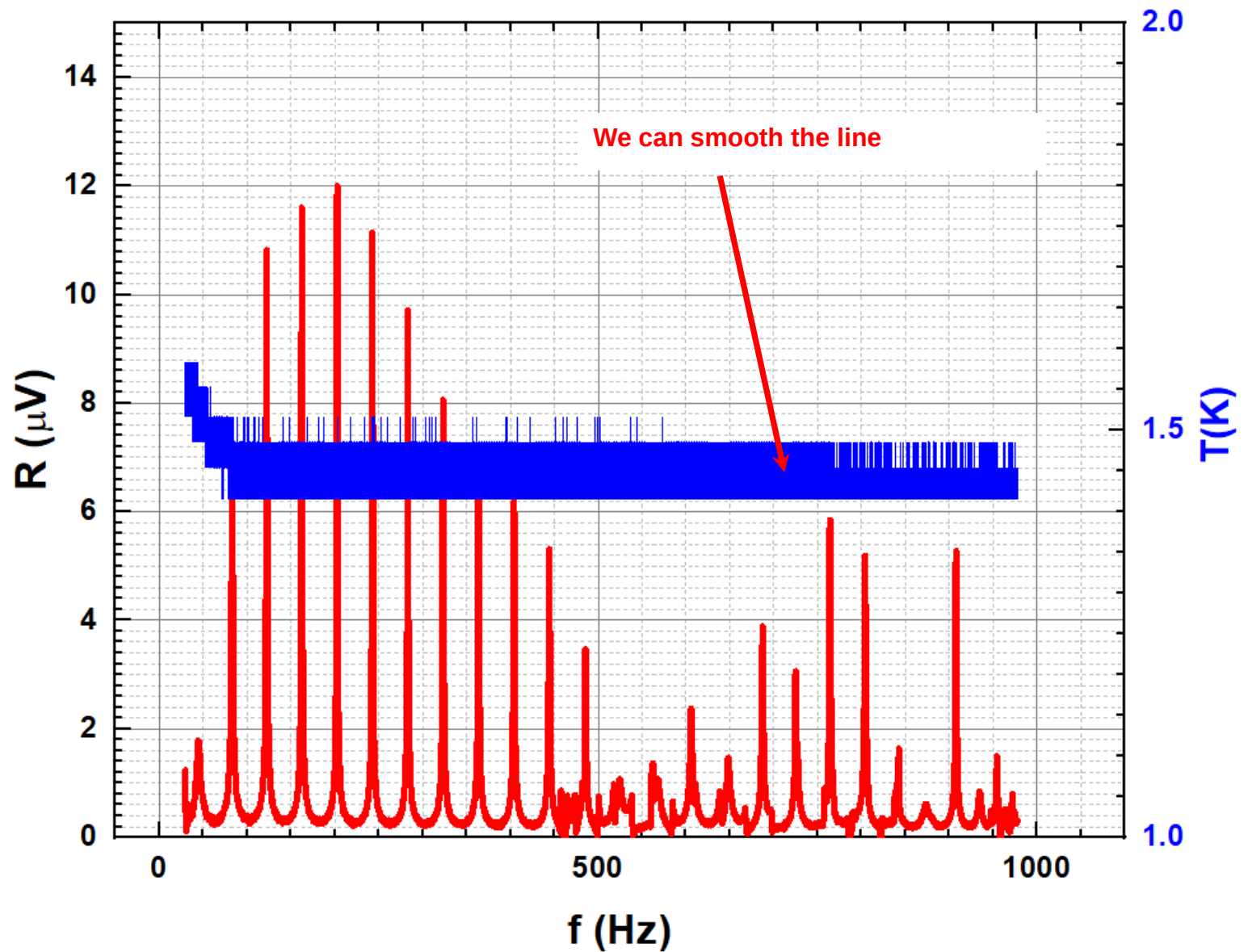
Preview

OK

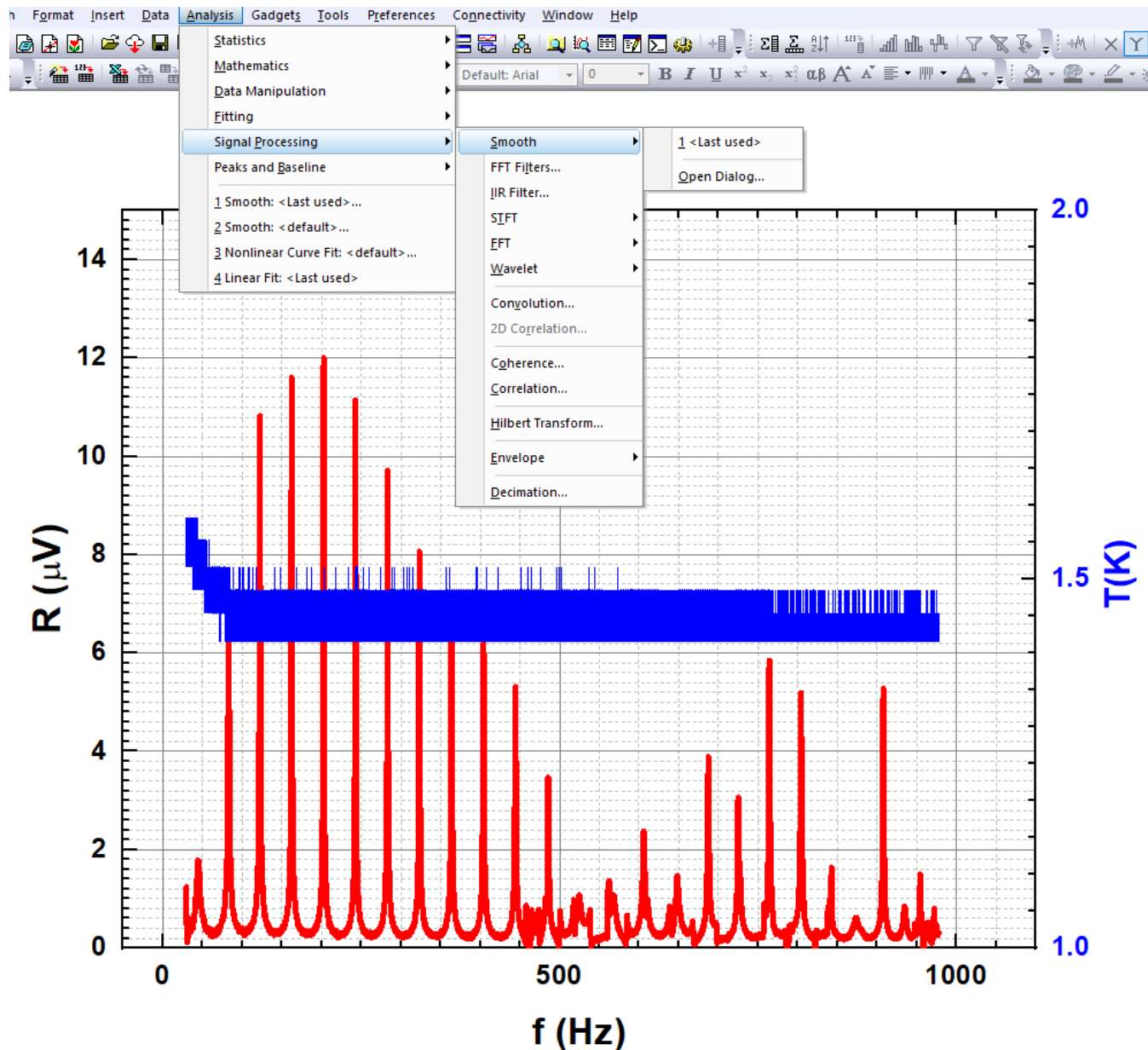
Cancel

Apply

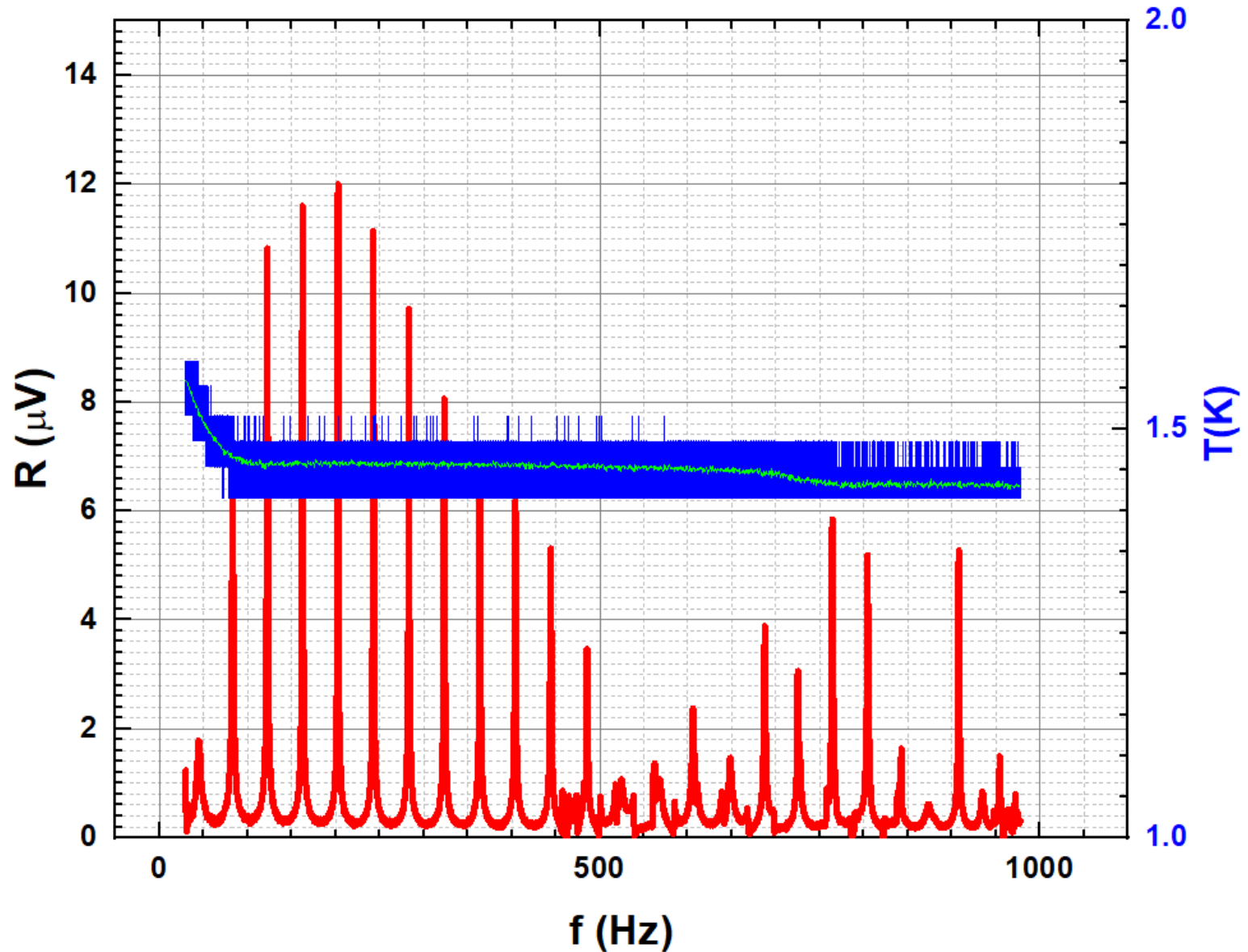
Graphical presentation of data: Extra Layer



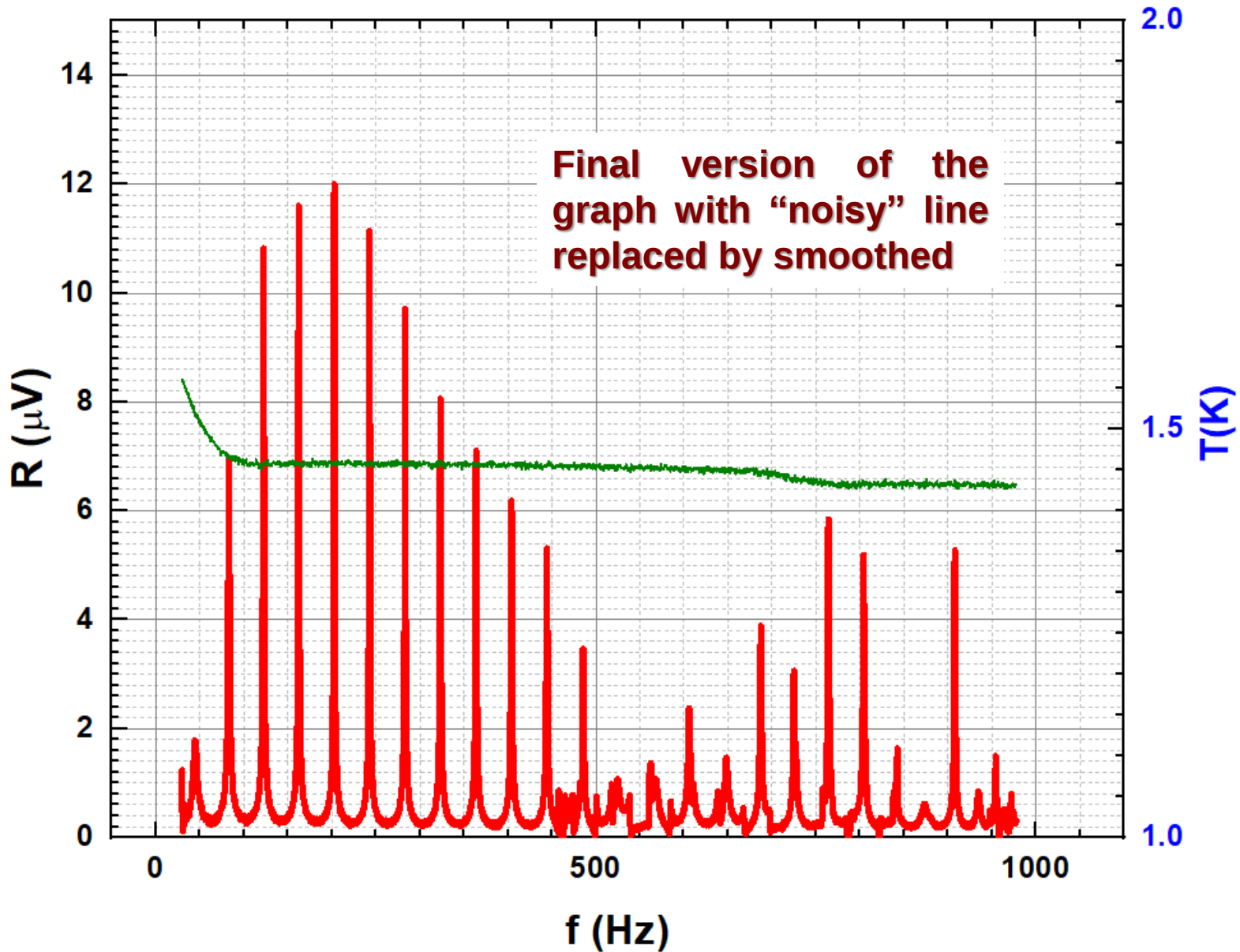
Graphical presentation of data: Extra Layer



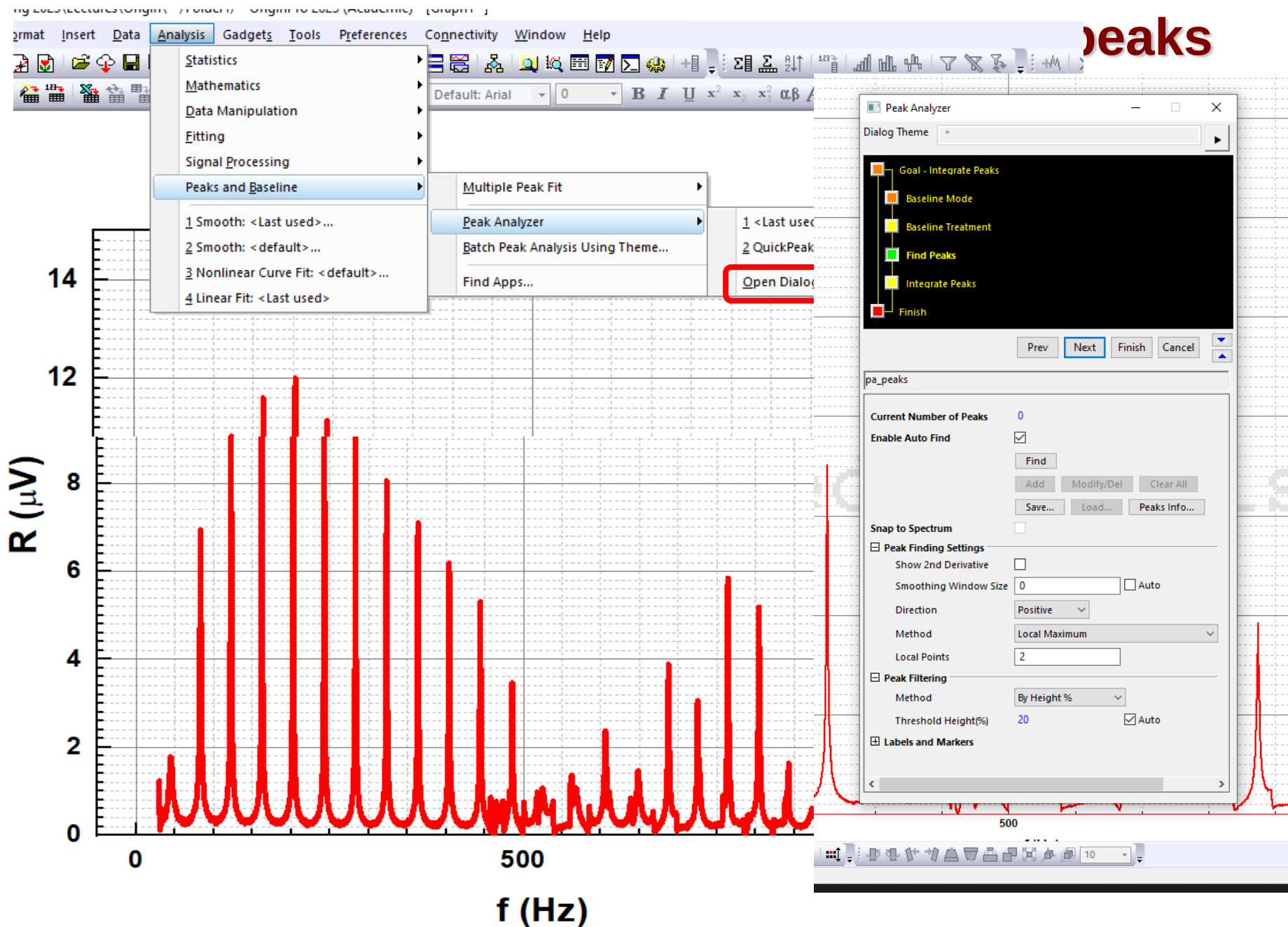
Graphical presentation of data: Extra Layer



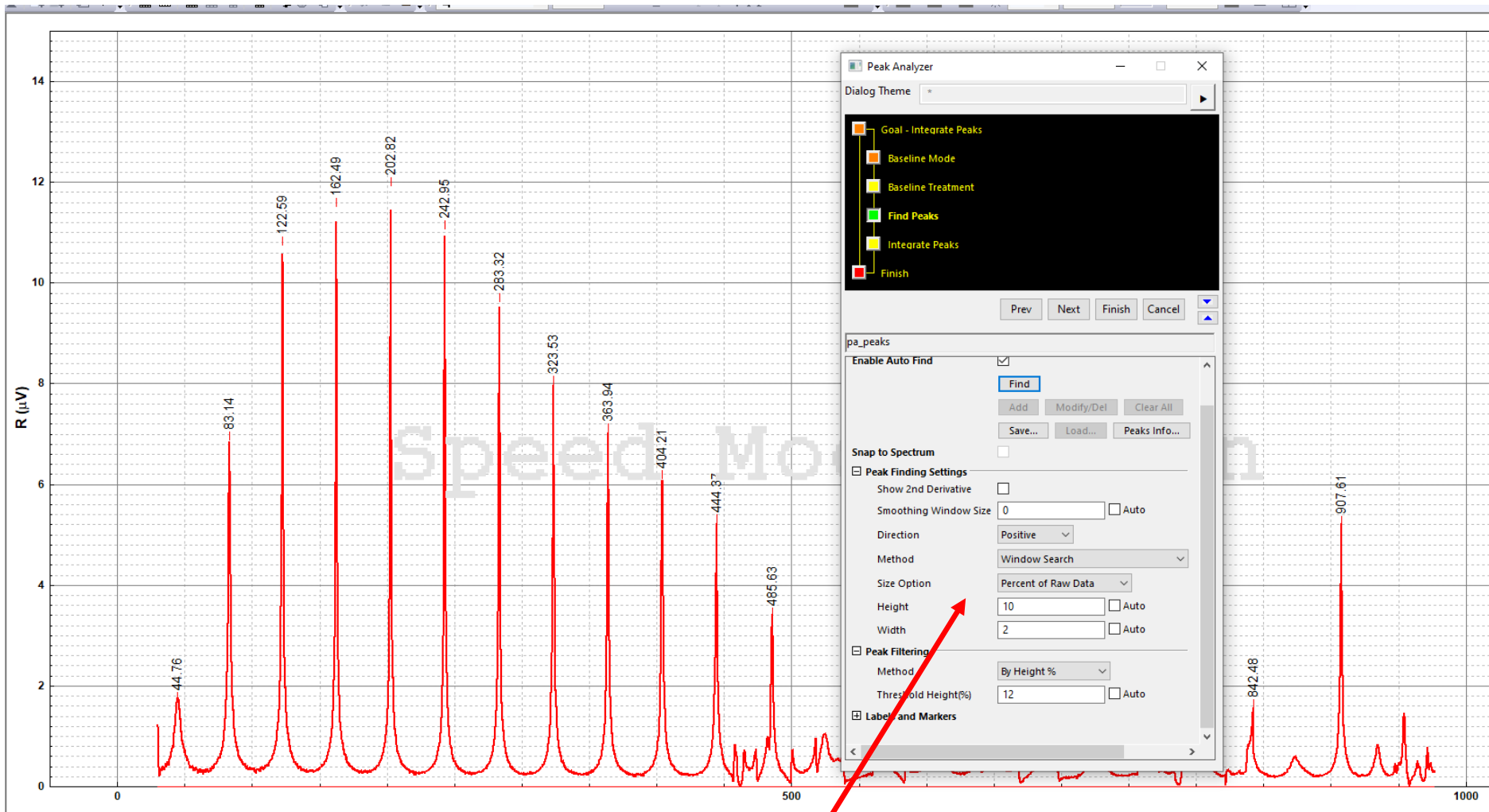
Graphical presentation of data: Extra Layer



peaks

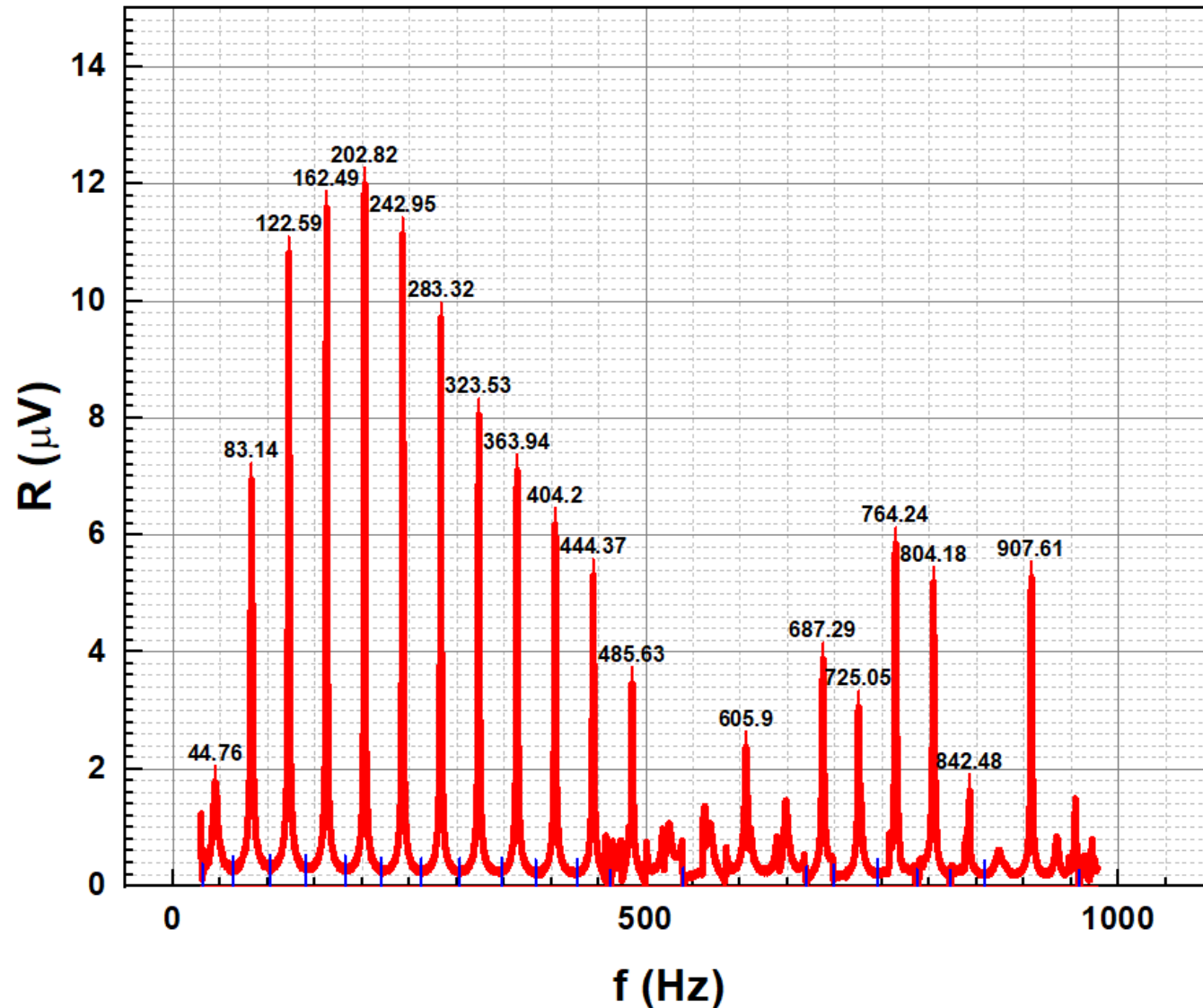


Graphical presentation of data: Finding peaks

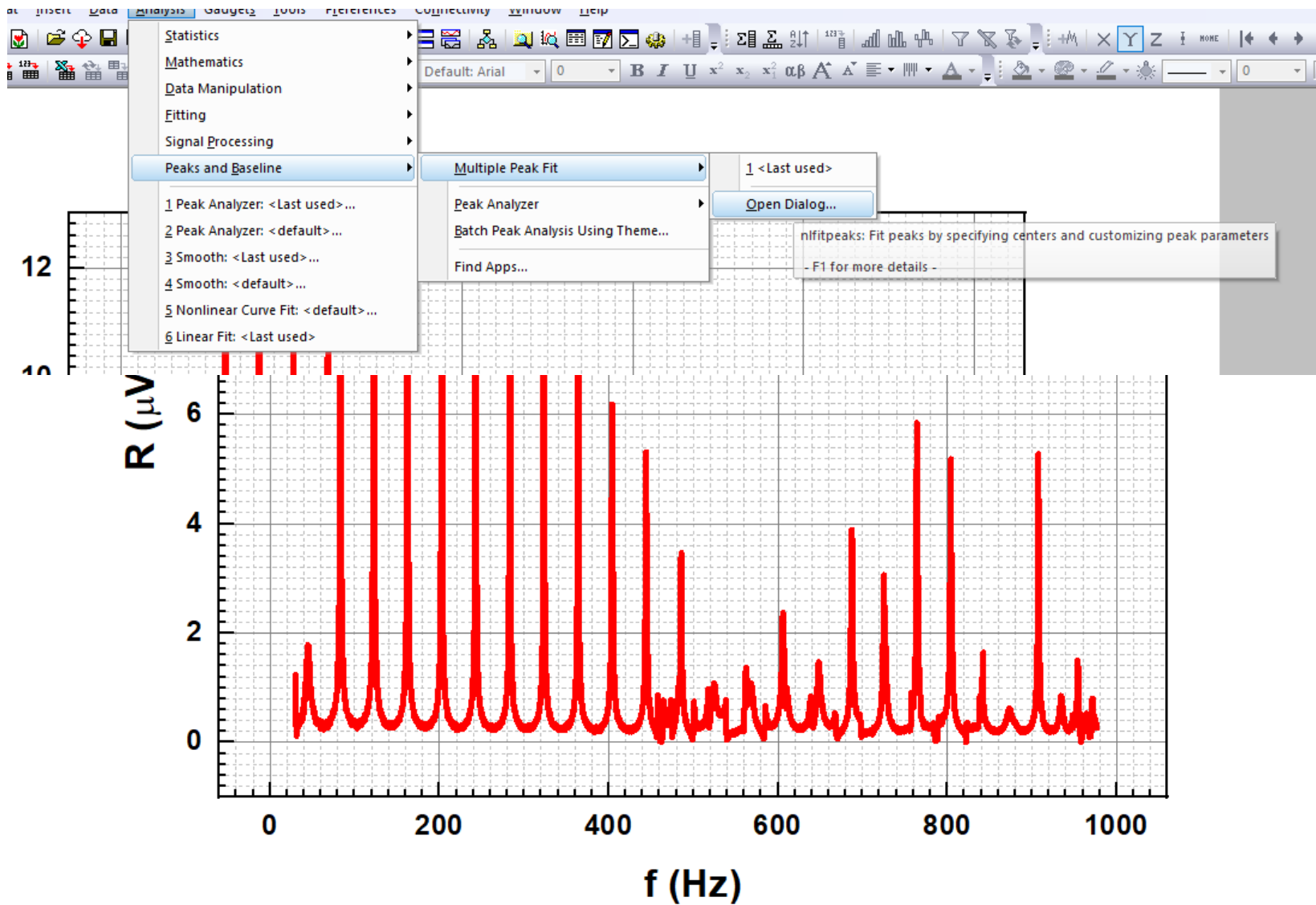


Choose the proper search parameters

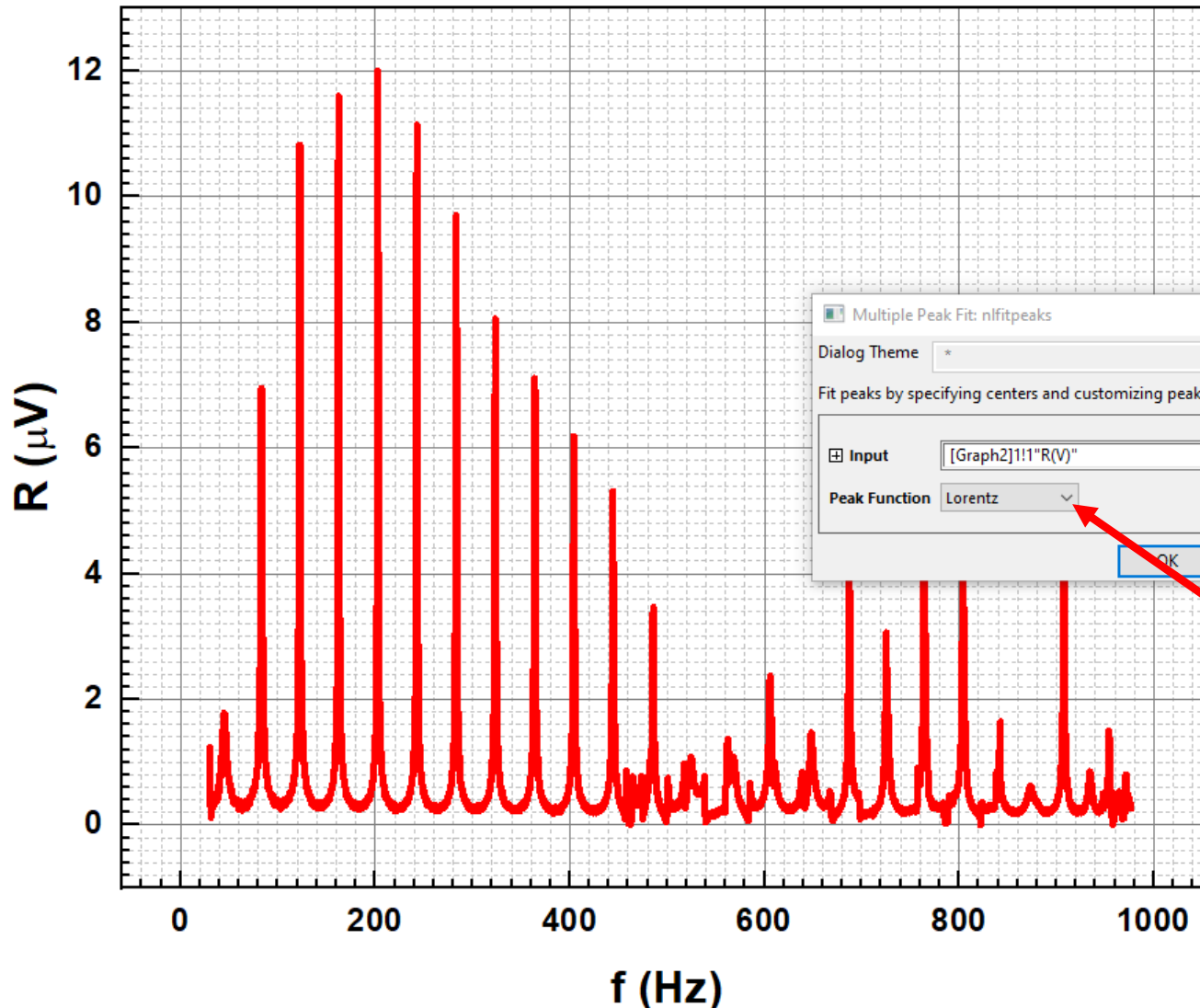
Graphical presentation of data: Finding peaks



Graphical presentation of data: Multiple peak Fit

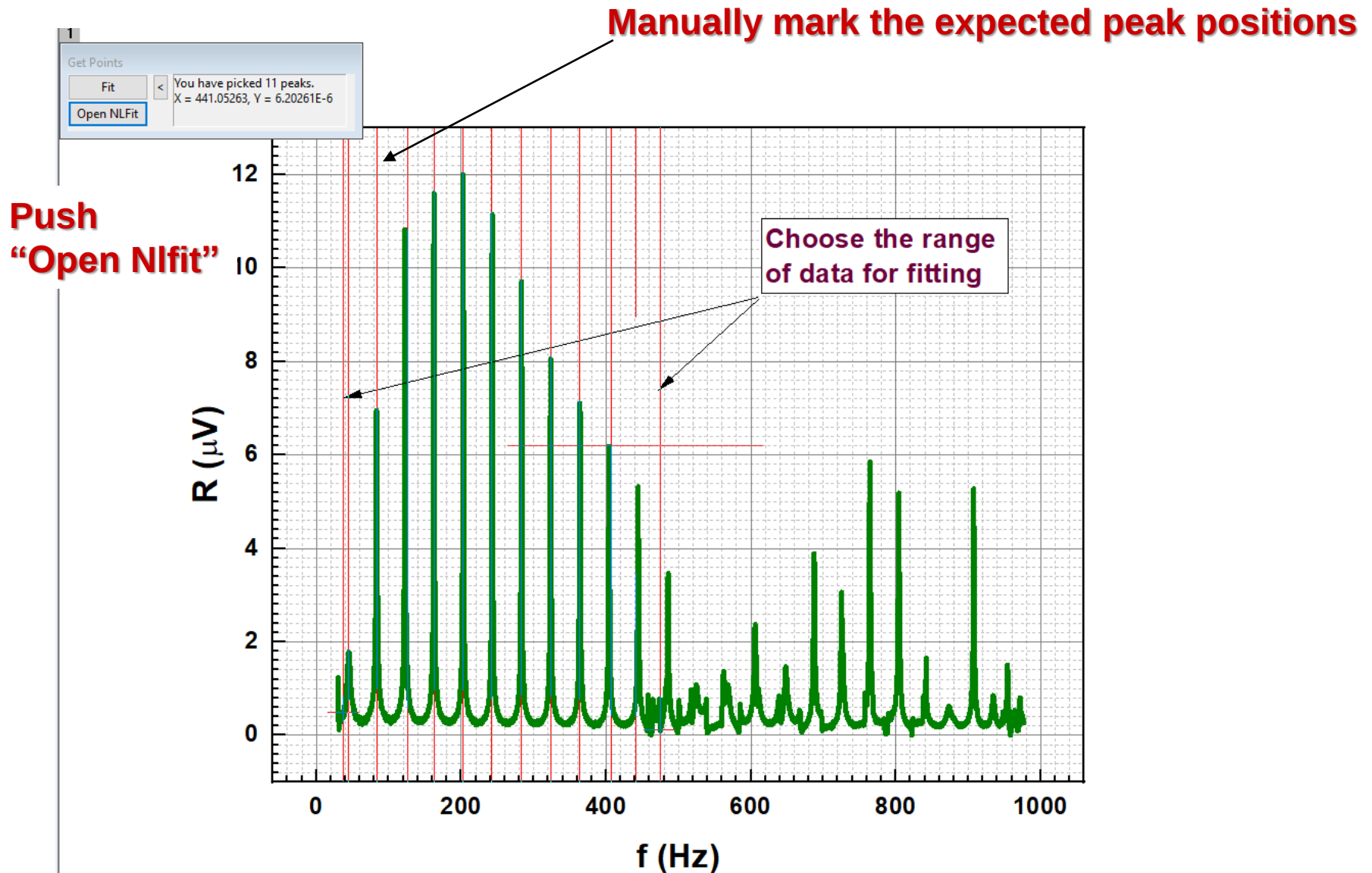


Graphical presentation of data: Multiple peak Fit

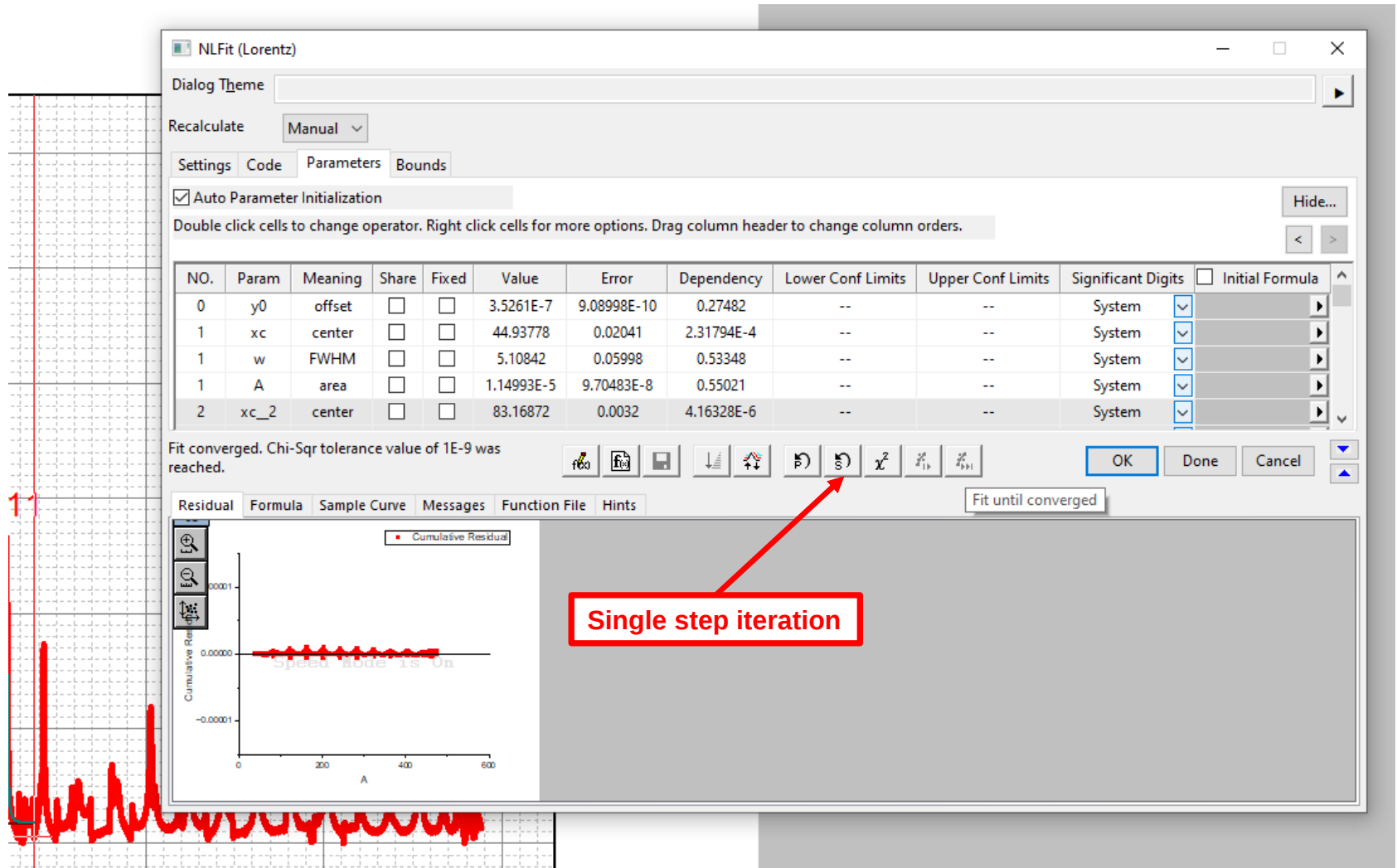


Choose the
expected
line shape

Graphical presentation of data: Multiple peak Fit

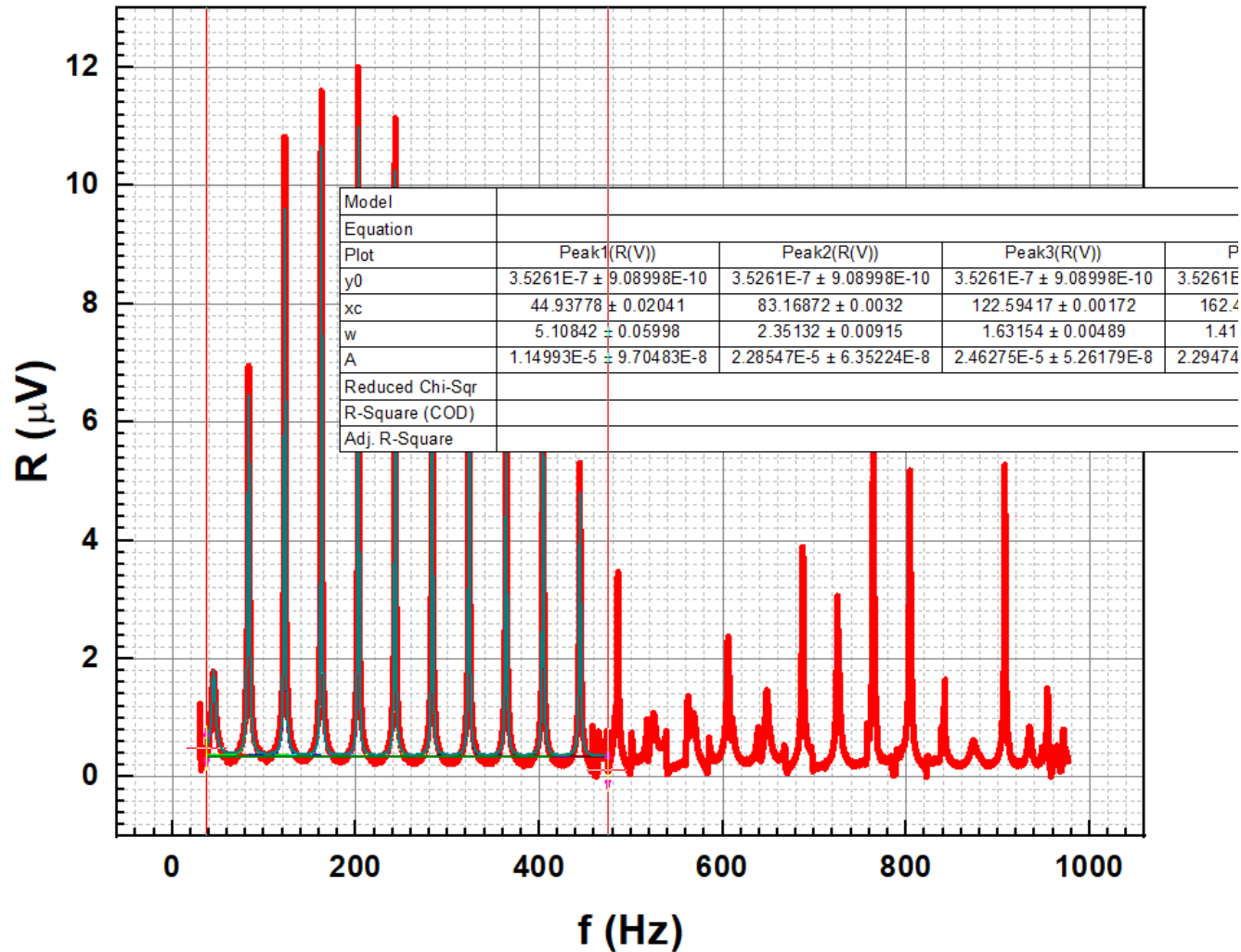


Graphical presentation of data: Multiple peak Fit



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.

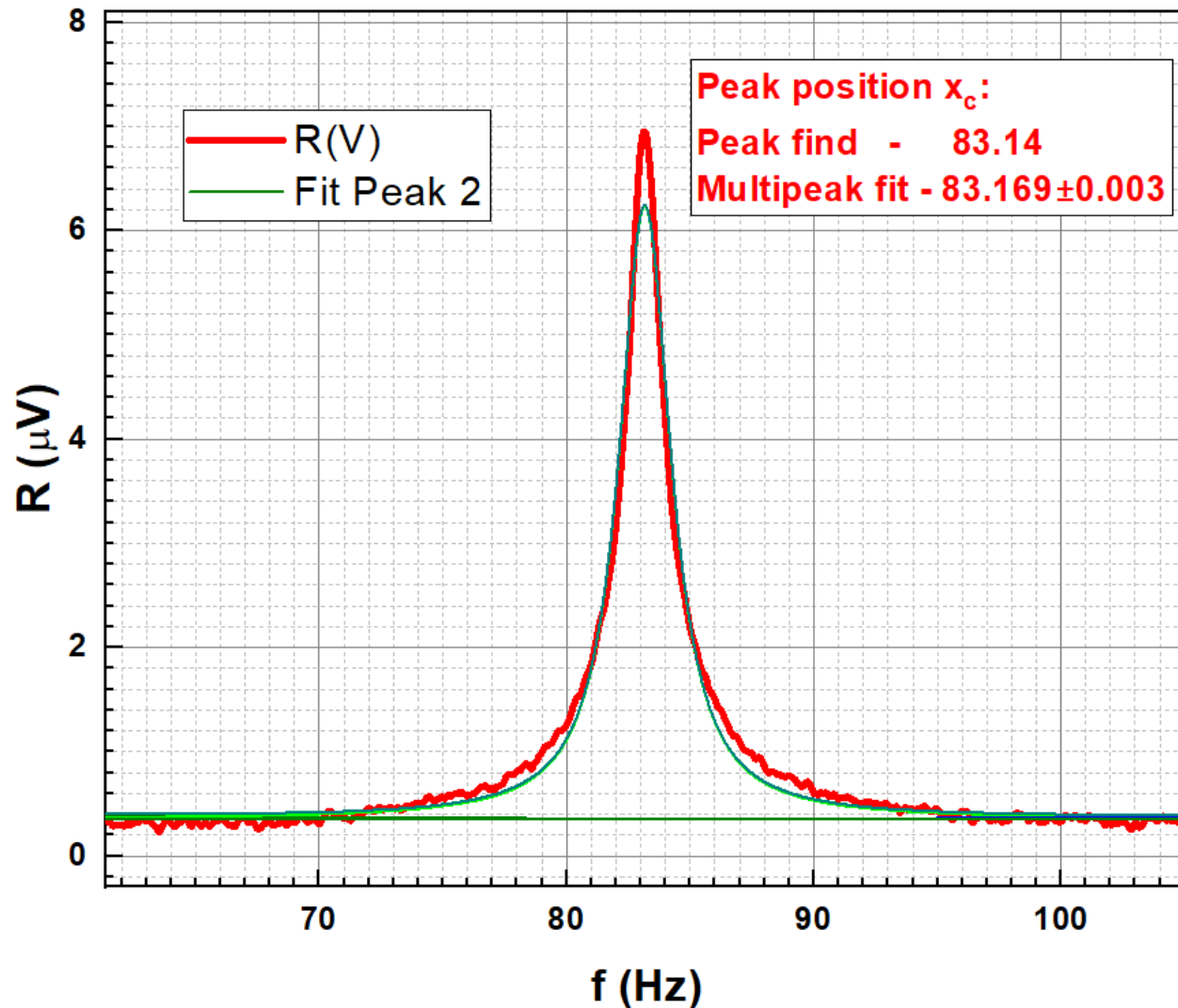
Fitted Curve

R(V)
Run1 1V_long
nlfitpeaksCurve1
nlfitpeaks2
nlfitpeaksCurve2
X = 277.281465, Y(/1e-06) = 13.5085131

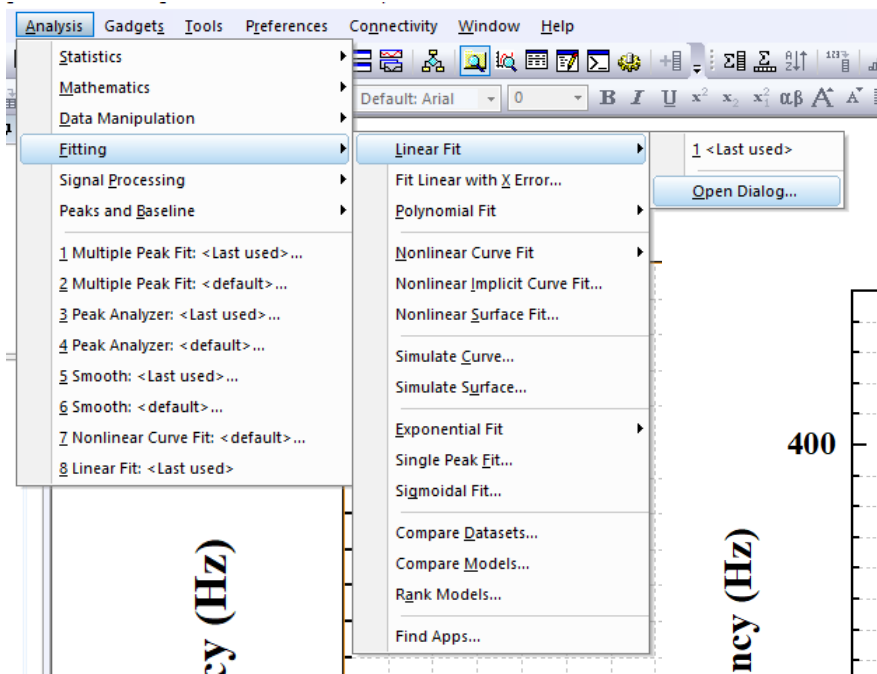
This layer contains all fitting results

Graphical presentation of data: Multiple peak Fit

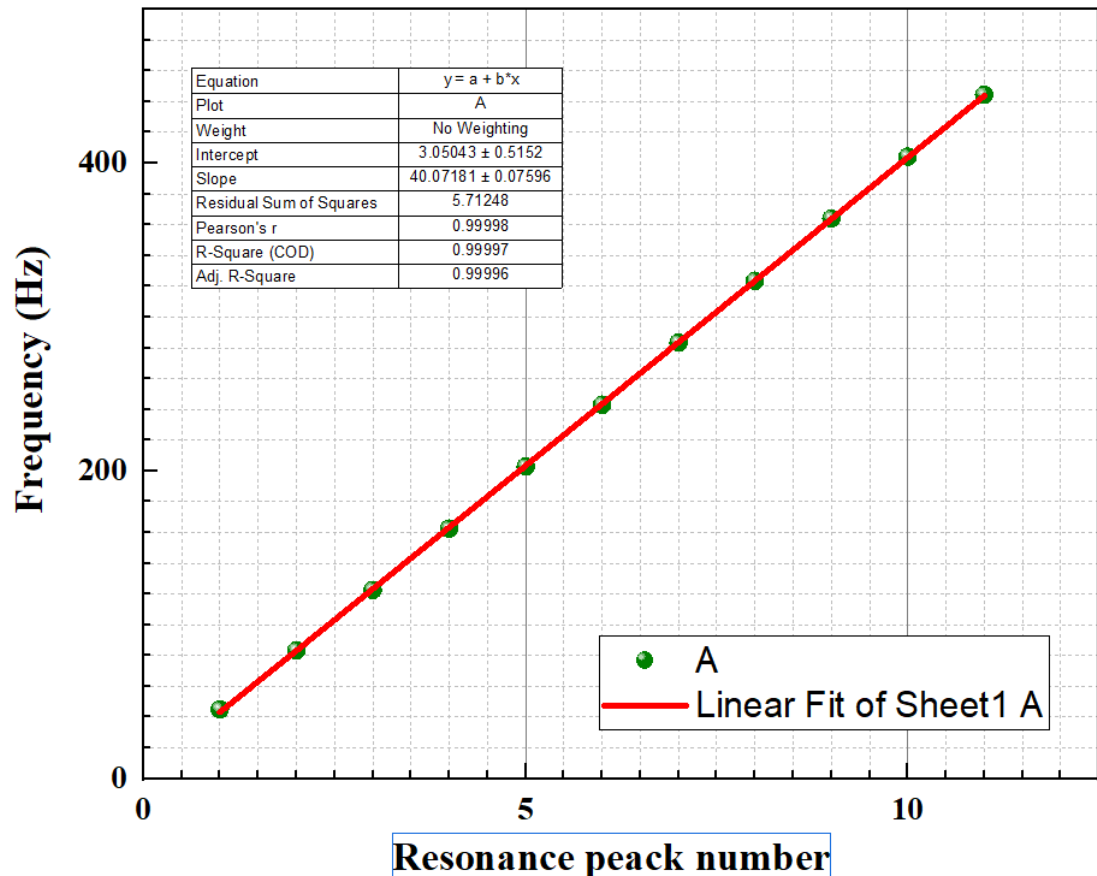
Comparing the results obtained by using
“Peak find” and “Multipeak fit” procedures



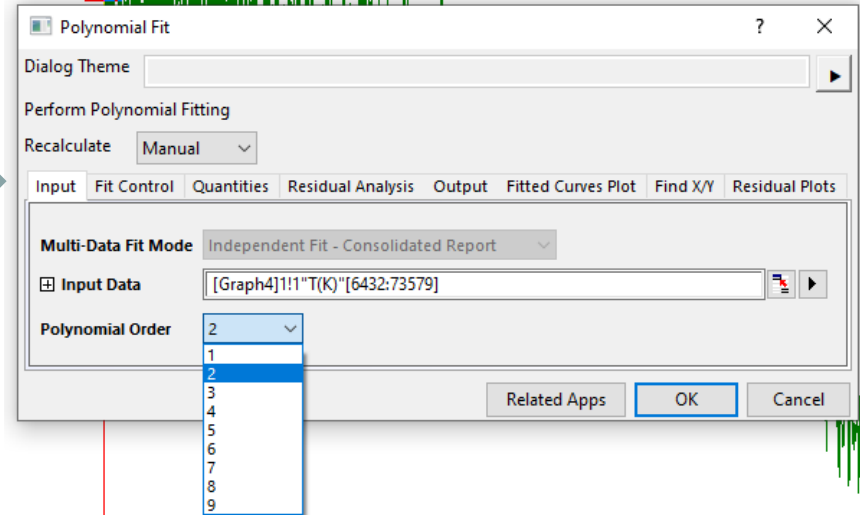
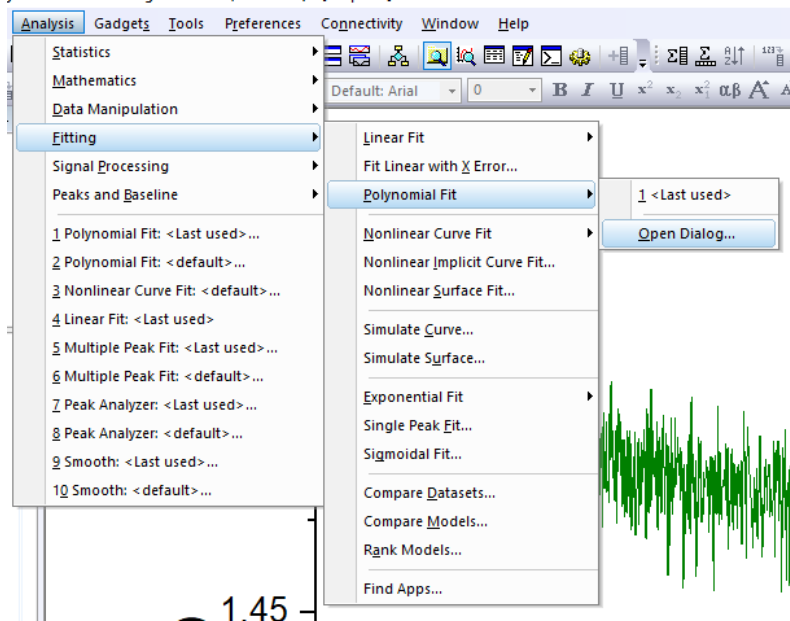
Graphical presentation of data: Fit Linear



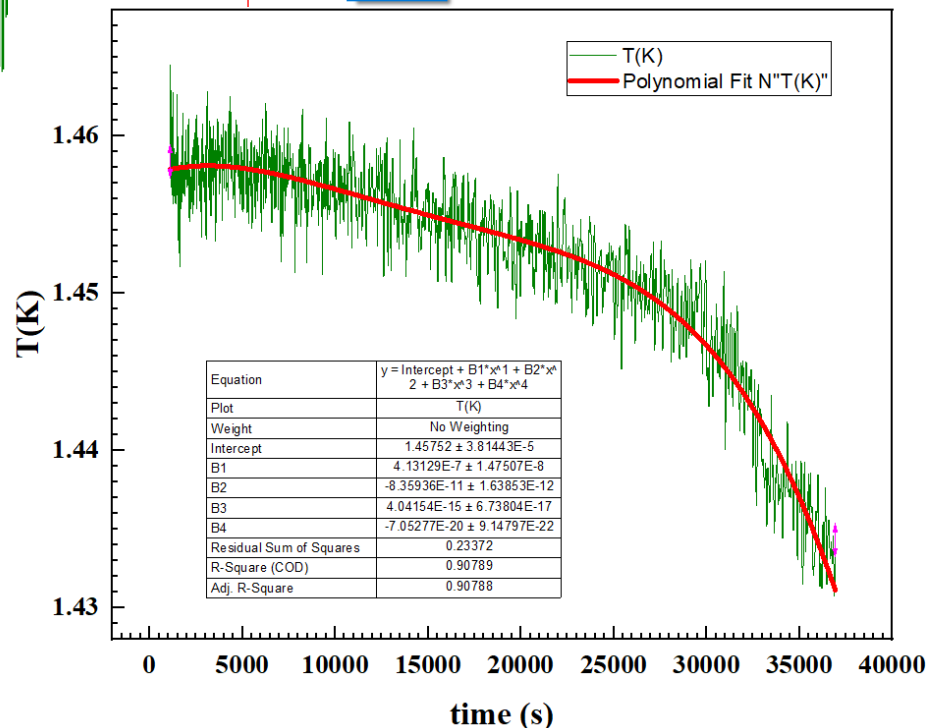
**Example of linear fitting.
Data from *Second sound*
experiment**



Graphical presentation of data: Fit Polynomial



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

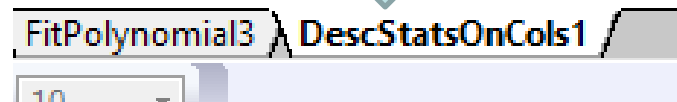


Working with data: Worksheets. Statistics on Column

The screenshot shows a data analysis software interface with a spreadsheet. The columns are labeled A(X1) through H(Y1). The data in column C(Y1) is being analyzed. A context menu is open over column C(Y1), and the 'Statistics on Column' option is selected. A 'Statistics on Columns' dialog box is displayed, showing a table of descriptive statistics for column T(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



Working with data: Worksheets. “Set Column Values”

SecondSound2 - SecondSound_T2_16K VERY_BIG

	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							

Set Column Values... Ctrl+Q

Set Values - [SecondSound2]"SecondSound_T2_16K VE...

Formula wcol(I) Col(A) Function Variables Options

Row(i): From <auto> To <auto>

Col(B) =

col (B) - 273

Recalculate Auto

OK Cancel Apply

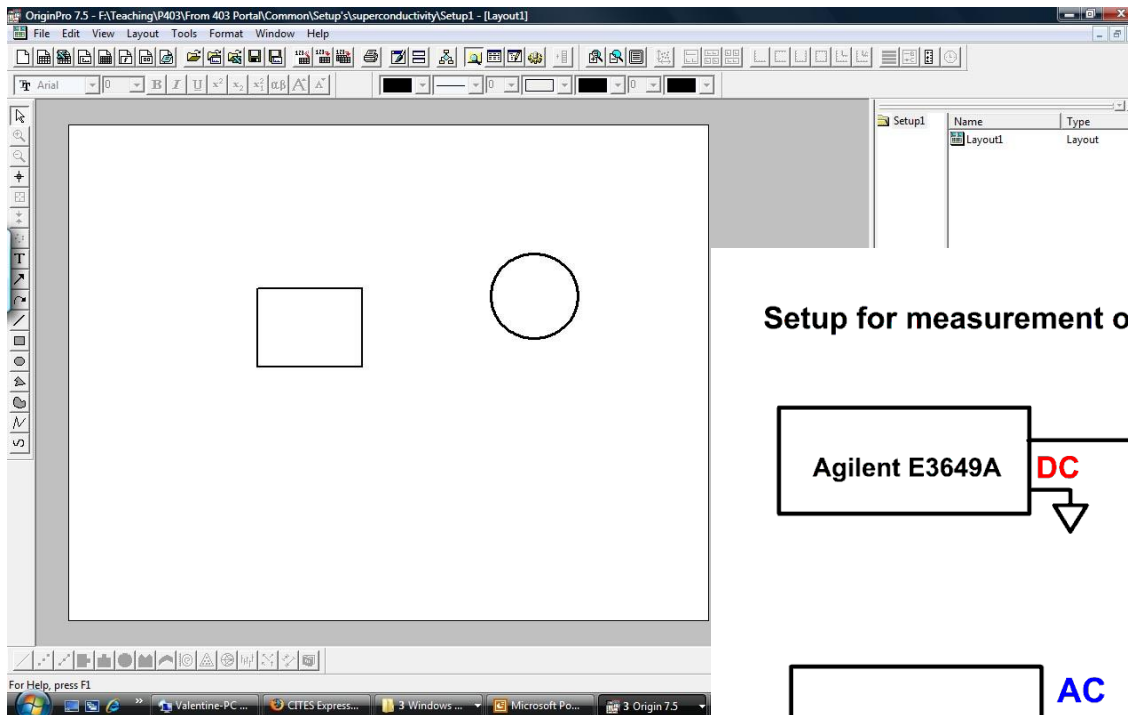
Before Formula Scripts

Enter LabTalk script to define variables or execute calculation before formula.

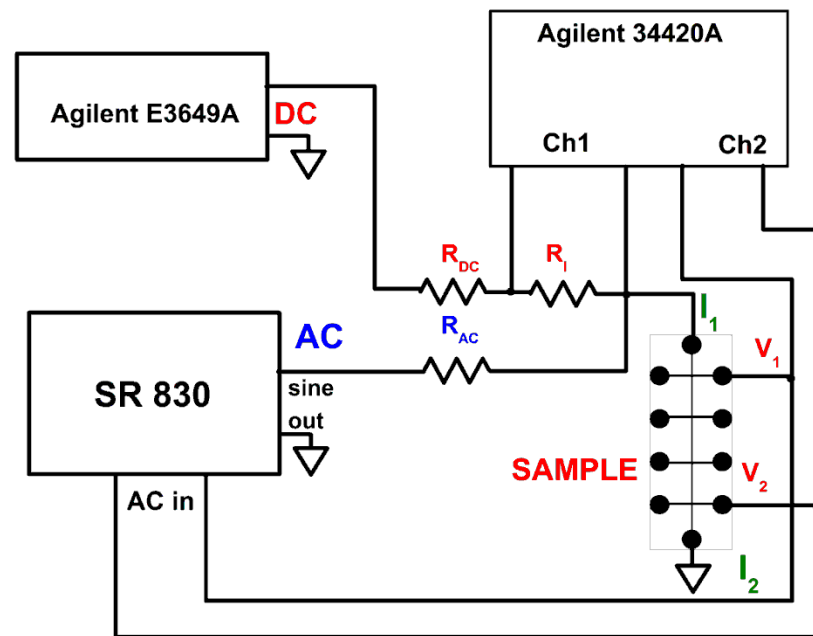
SecondSound2 - SecondSound_T2_16K VERY_BIG

	A(X)	B(Y)	C(Y)	D(Y)	E(Y)	F(Y)	G(Y)	H(Y)	I(Y)
Long Name	time (s)	T(K)	P (mm)	TP (K)	Uac (V)	f (Hz)	X (V)	Y(V)	R(V)
Units									
Comments									
F(x)=		col(B)-273							
Sparklines									
1	5.35899	-271.42831	12.9419	1.8147	5	20	5.48318E-8	-2.53787E-8	6.042
2	5.84299	-271.42862	12.6291	1.80774	5	20.1	5.49483E-8	-2.52622E-8	6.047
3	6.281	-271.42847	13.82822	1.83378	5	20.2	5.55303E-8	-2.44473E-8	6.067
4	6.71799	-271.42816	15.1315	1.86029	5	20.3	5.49483E-8	-2.32832E-8	5.967
5	7.172	-271.42831	13.0983	1.81814	5	20.4	5.39005E-8	-2.20026E-8	5.821
6	7.60899	-271.42831	14.6623	1.85095	5	20.5	5.42498E-8	-2.00235E-8	5.782
7	8.437	-271.42831	15.1315	1.86029	5	20.6	5.57632E-8	-1.89758E-8	5.890
8	8.906	-271.42847	12.42062	1.80303	5	20.7	5.77422E-8	-1.76952E-8	6.039
9	9.39	-271.42862	13.82822	1.83378	5	20.8	6.00708E-8	-1.64147E-8	6.227
10	9.85899	-271.42831	16.33062	1.88327	5	20.9	6.27483E-8	-1.50177E-8	6.452
11	10.297	-271.42831	16.5391	1.88714	5	21	6.53095E-8	-1.32714E-8	6.664
12	10.71799	-271.42816	14.87078	1.85513	5	21.1	6.76378E-8	-1.09431E-8	6.851
13	11.156	-271.42831	11.89918	1.791	5	21.2	7.01989E-8	-8.84762E-9	7.075
14	11.59299	-271.42831	13.4111	1.82492	5	21.3	7.24108E-8	-8.03271E-9	7.28
15	12.031	-271.42831	15.80918	1.87343	5	21.4	7.39242E-8	-8.38196E-9	7.439
16	12.46799	-271.42831	16.12198	1.87936	5	21.5	7.45063E-8	-9.31328E-9	7.508
17	12.89	-271.42831	14.6623	1.85095	5	21.6	7.4157E-8	-1.04774E-8	7.489
18	13.312	-271.42847	14.3495	1.8446	5	21.7	7.36914E-8	-1.14088E-8	7.456
19	13.73399	-271.42831	13.4111	1.82492	5	21.8	7.32257E-8	-1.22237E-8	7.42

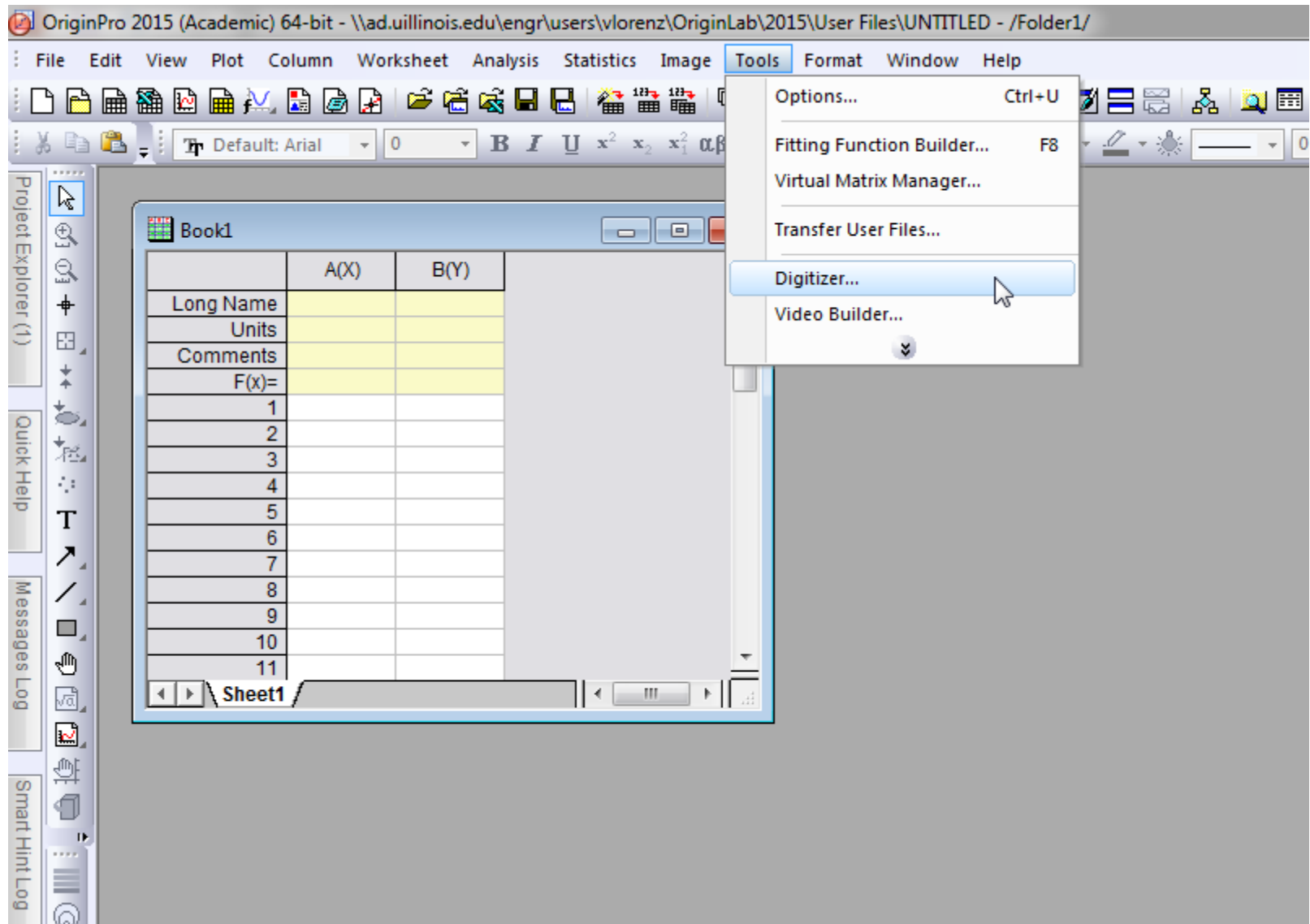
Layouts



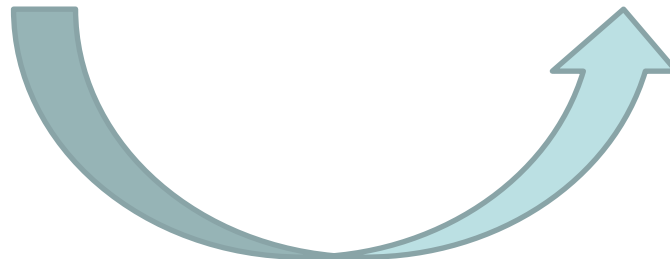
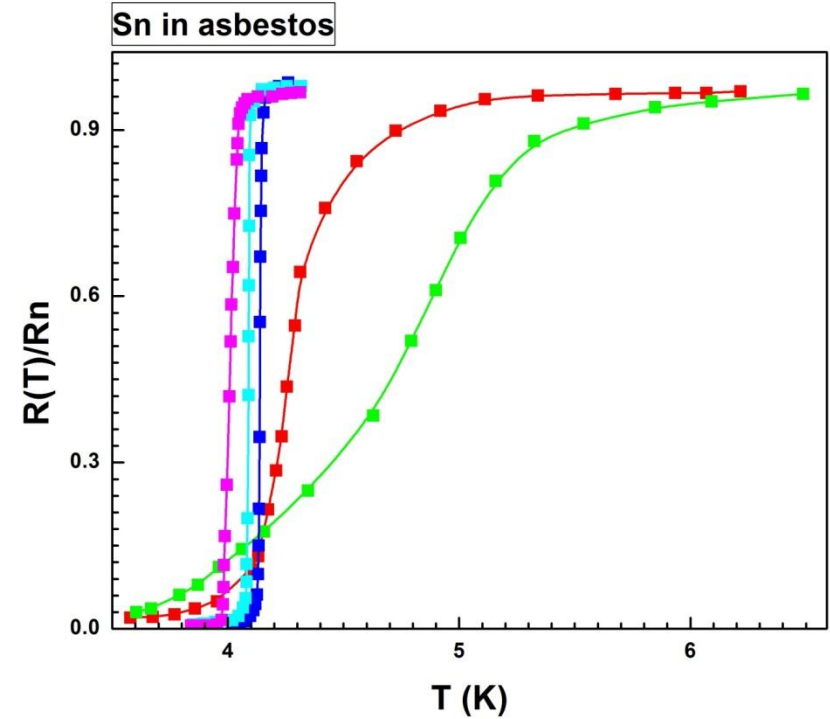
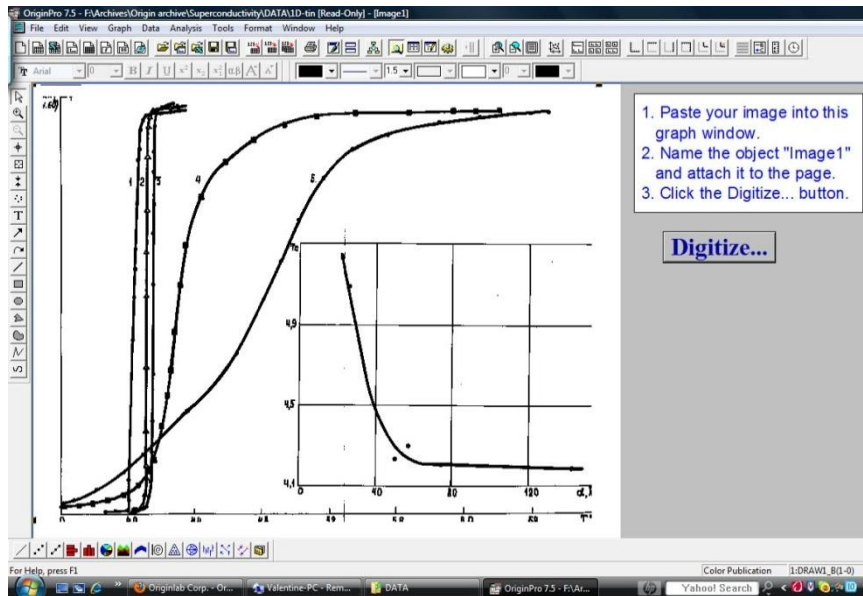
Setup for measurement of s/c properties



Custom tools



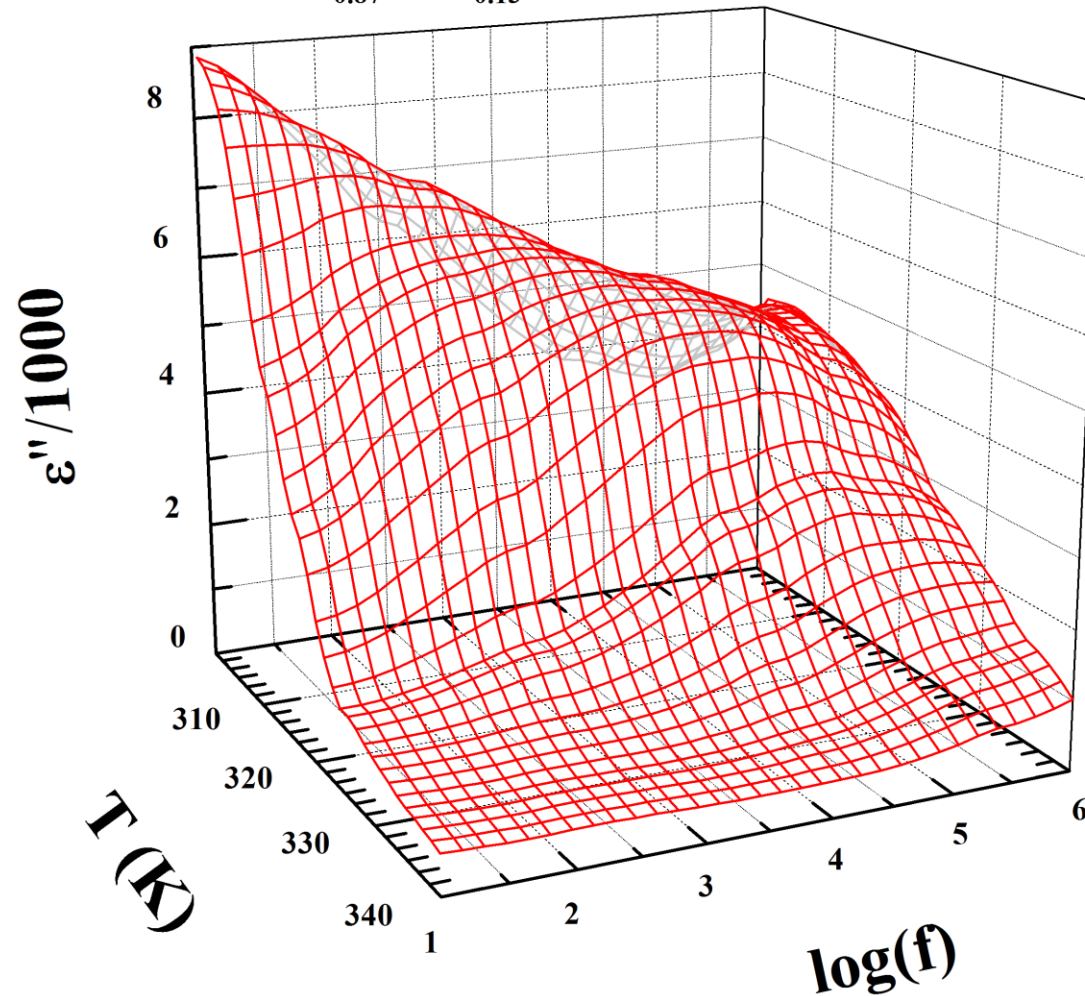
Using digitizer script



Example Origin graphs

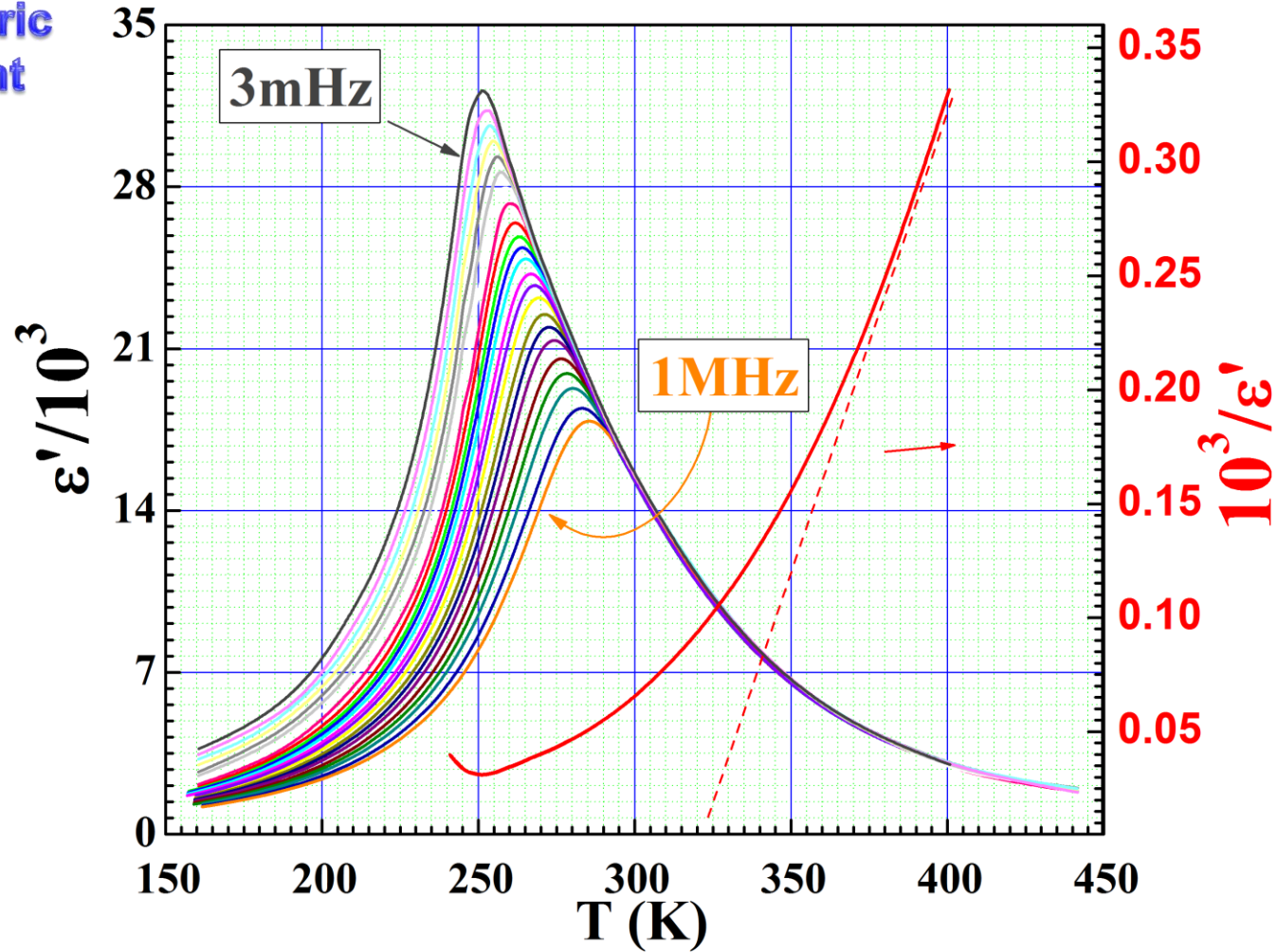
$(\text{PMN})_{0.87}(\text{PT})_{0.13}$, single crystal

Ferroelectric
Experiment



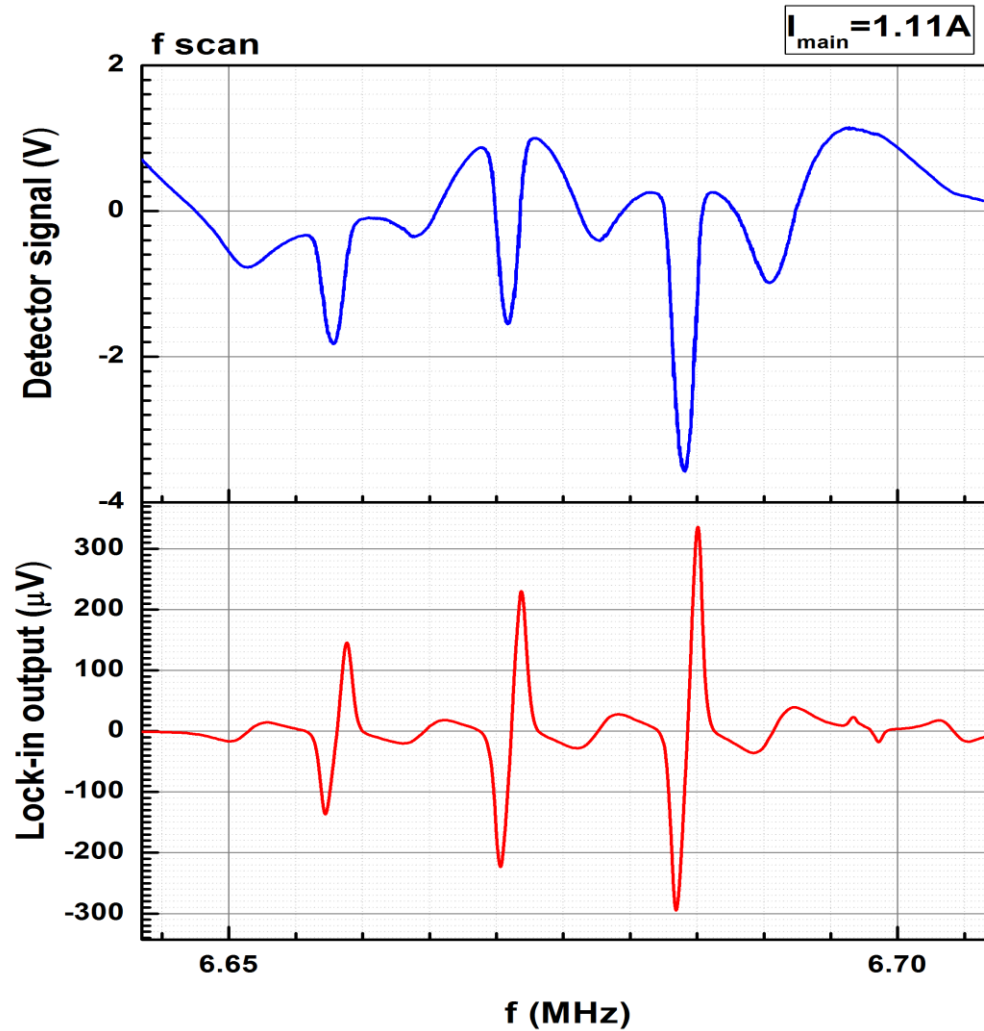
Example Origin graphs

Ferroelectric
Experiment



Example Origin graphs

Optical
pumping

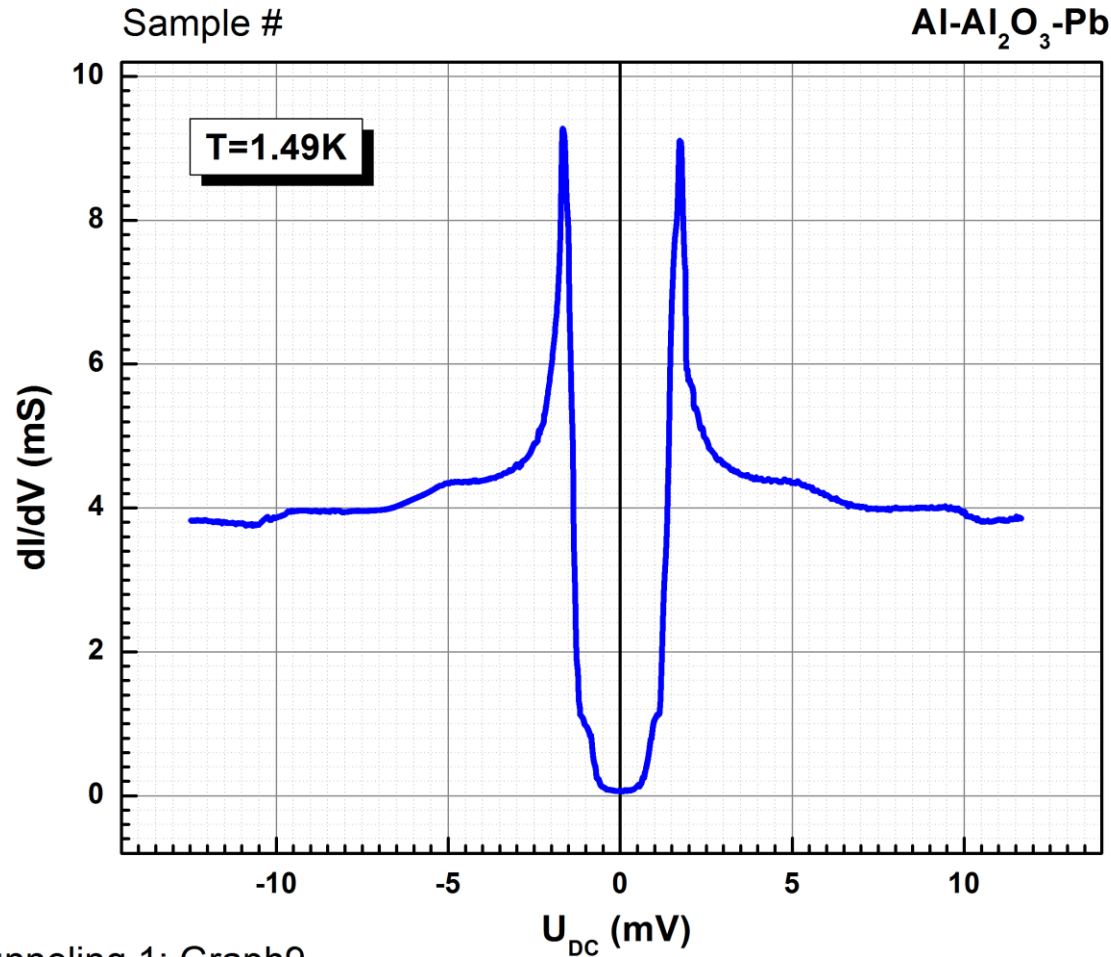


Mapping 0.5-2.5A from March 1st 2012: Graph7



Example Origin graphs

Tunneling
Experiment



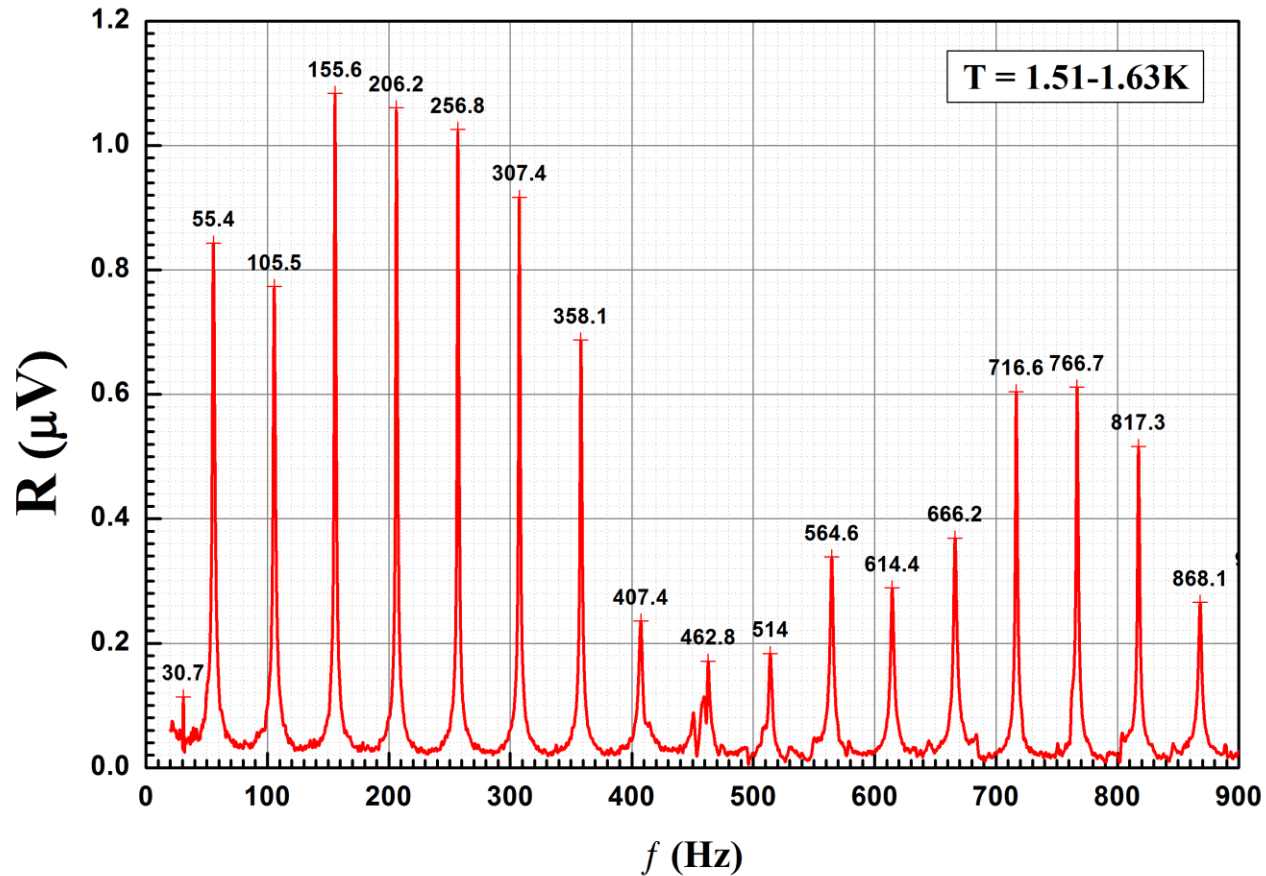
Tunneling 1: Graph9

Sample n2 run8 zoom temp 1.55K



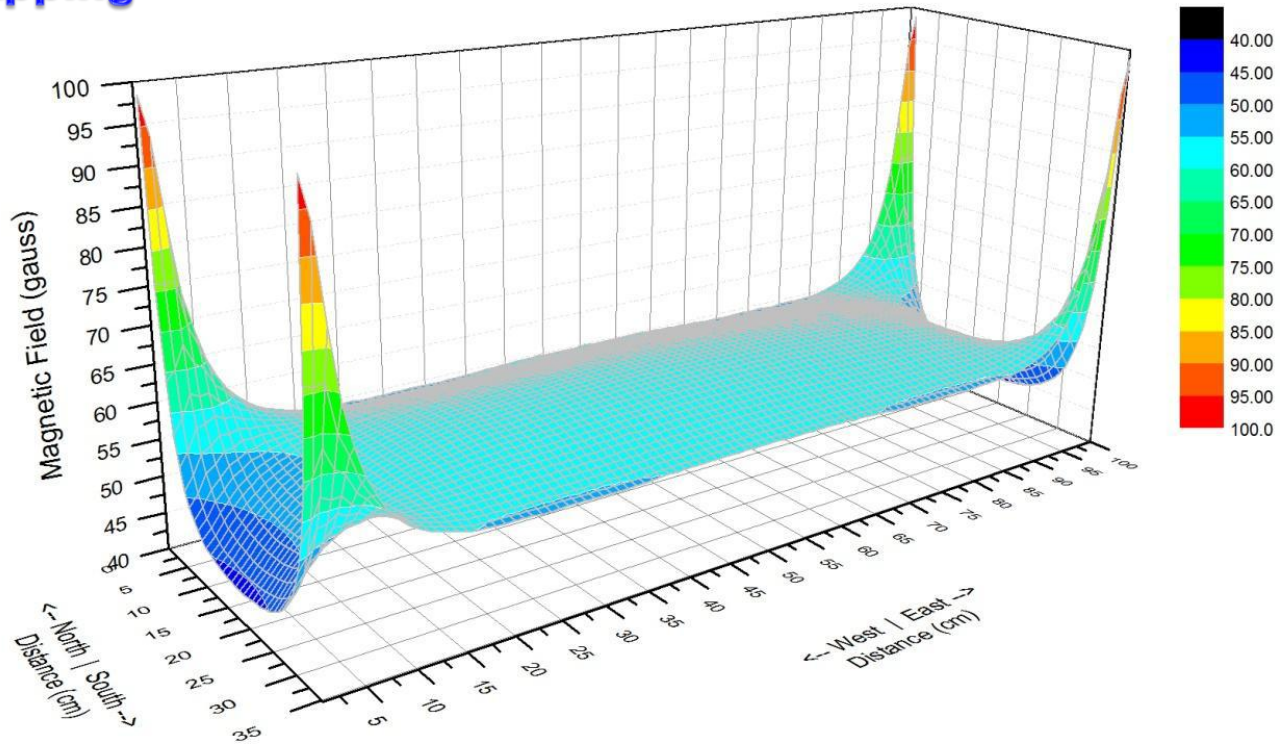
Example Origin graphs

Second
sound



Example Origin graphs

Magnet mapping



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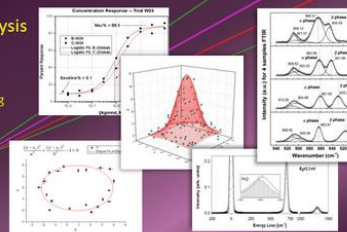
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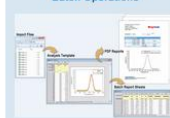
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Apps



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Running Origin remotely

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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