mentoring

For Master student in Physics Department

Mentoring Meet-up

Origin Data Analysis Tutorial

Freie Universität Berlin

Origin Install Guide Page
(FU Physik software wiki)

ORIGIN® 2019
Graphing & Analysis

mentoring

Freie Universität Berlin

Data Import

DRAG & DROP
(on to a workbook)

EASY & FAST

Sometimes imports files in a wrong way

Import Wizard

Complicate

Manipulate import detail &
Import several files simultaneously

BEFORE IMPORT ANY DATA,
MAKE SURE YOU HAVE A NEW WORKBOOK

Graph Plot

Plot Type

Linear vs Scatter

Axis information

Plot Design

Frame Axis scale Graph Title

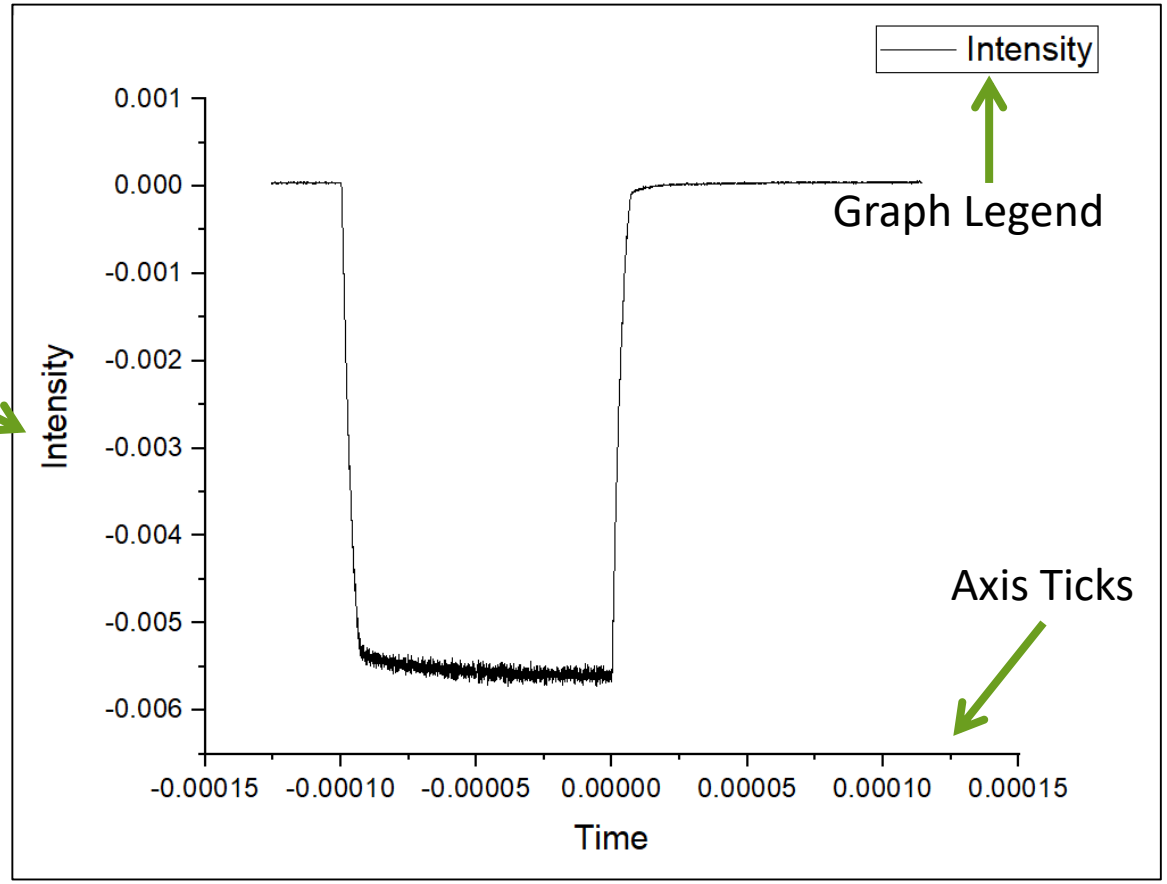
Color Grid

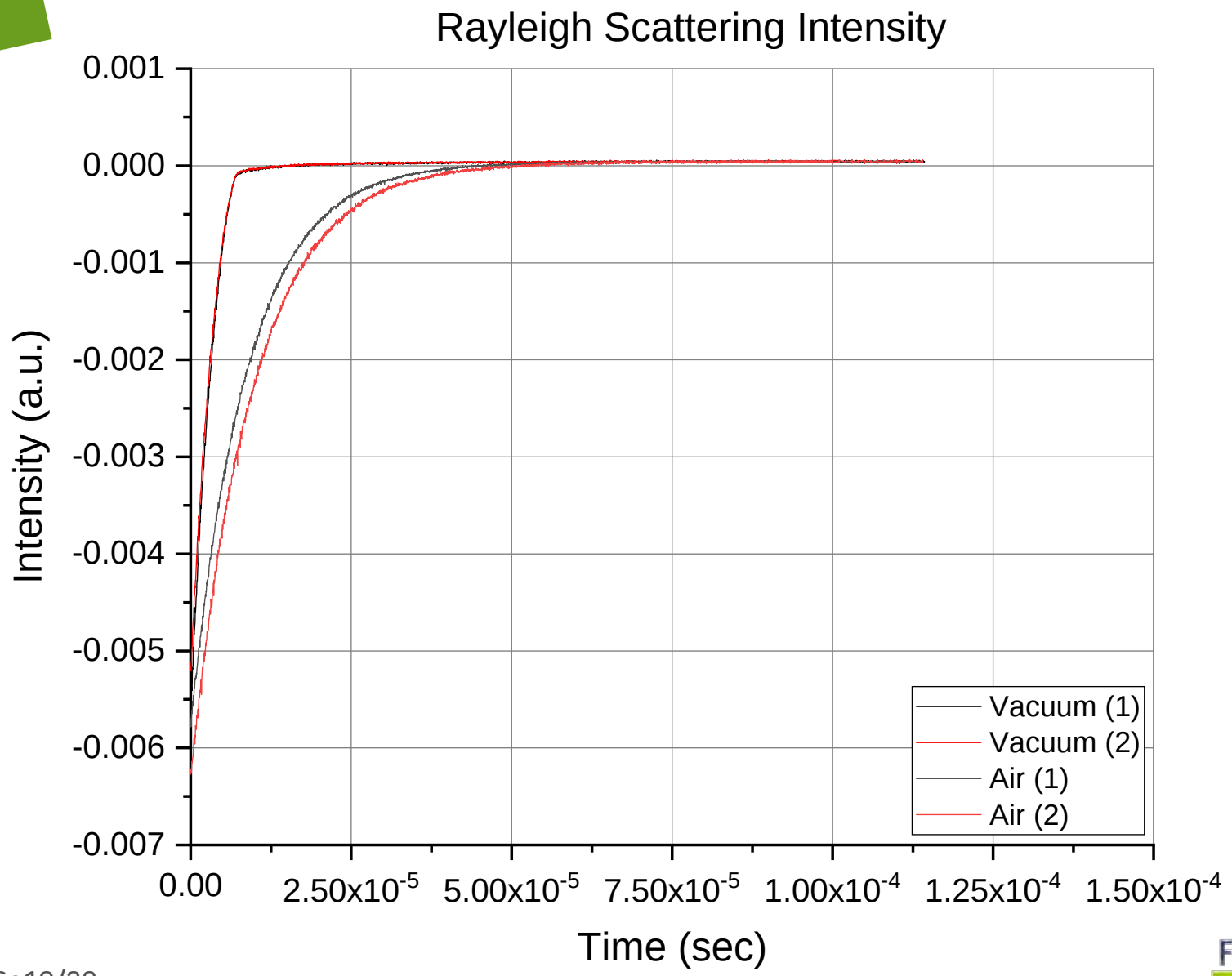
Multiple Graph

Multiple Axis

Multiple Panel

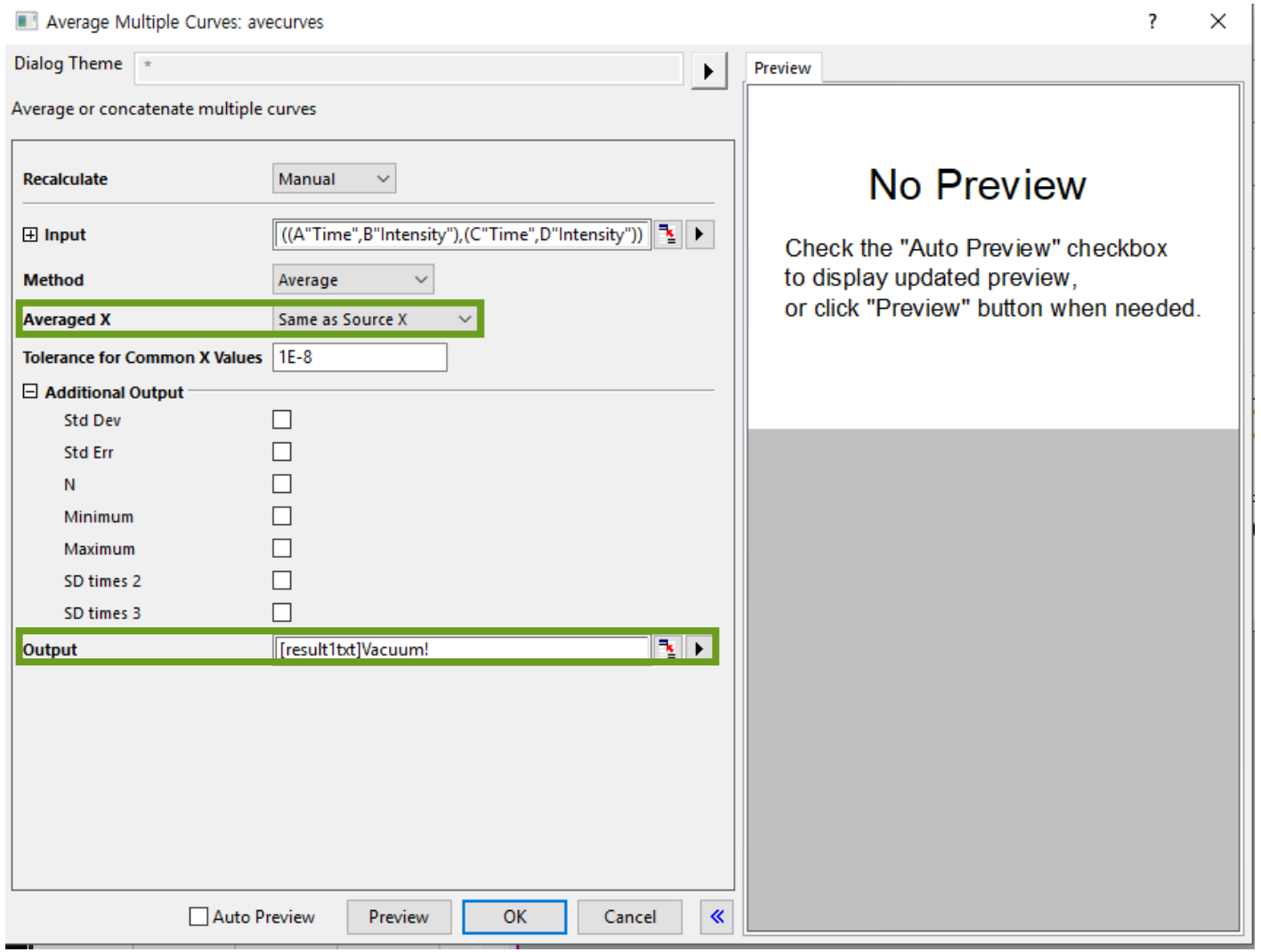
Graph Overlap

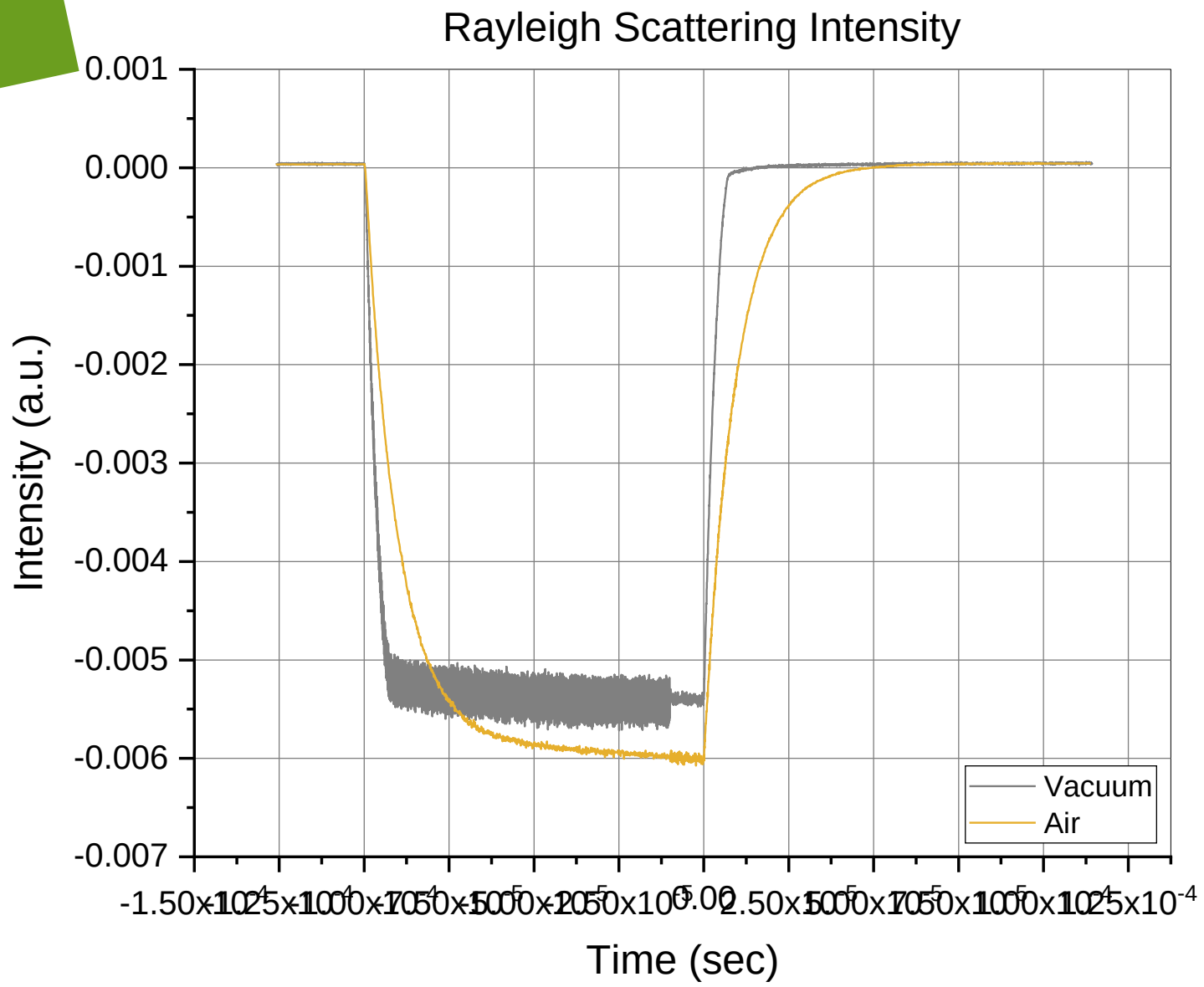



Rayleigh Scattering Intensity
Intensity (a.u.)
0.001
0.000
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
-0.007
0.00
2.50x10-5
5.00x10-5
7.50x10-5
1.00x10-4
1.25x10-4
1.50x10-4
Time (sec)
Vacuum (1)
Vacuum (2)
Air (1)
Air (2)

Data Analysis

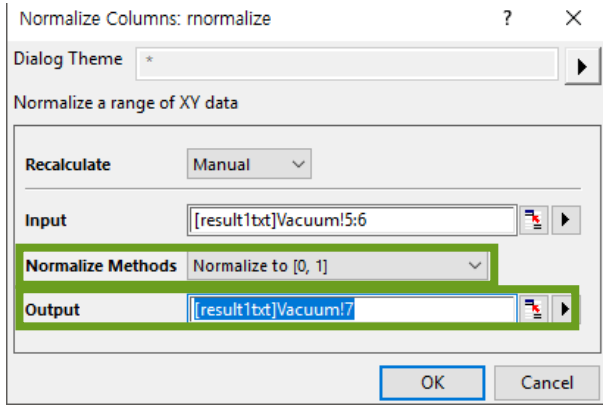
Curve Average

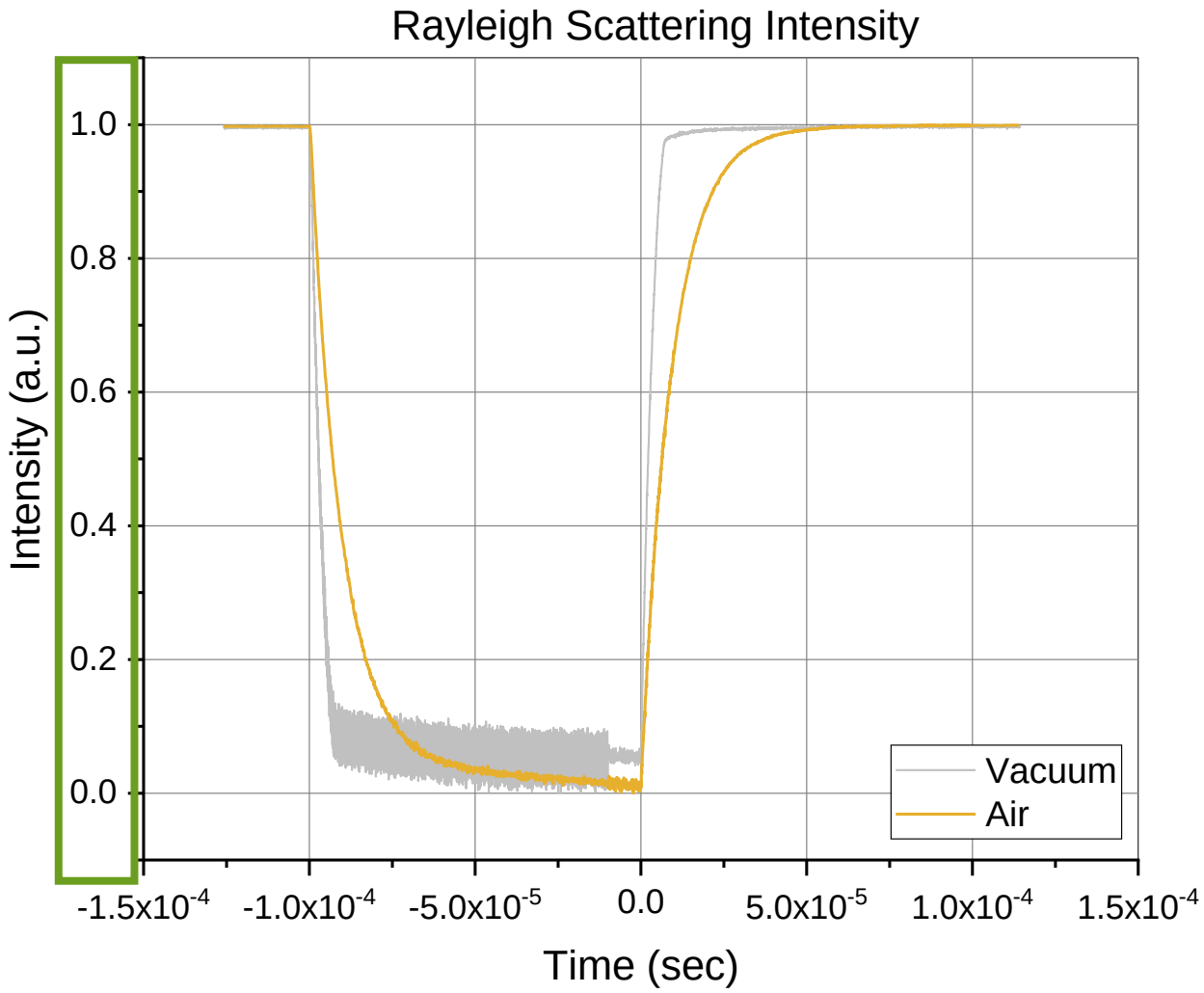



Rayleigh Scattering Intensity
Intensity (a.u.)
0.001
0.000
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
-0.007
Vacuum
Air
Time (sec)

Data Analysis

Normalization





Fitting

Fitting Function

Data Range

Based on Theory & Own Idea

Gaussian vs Lorentzian

Types of Exponential Function

Trigonometric Function

…

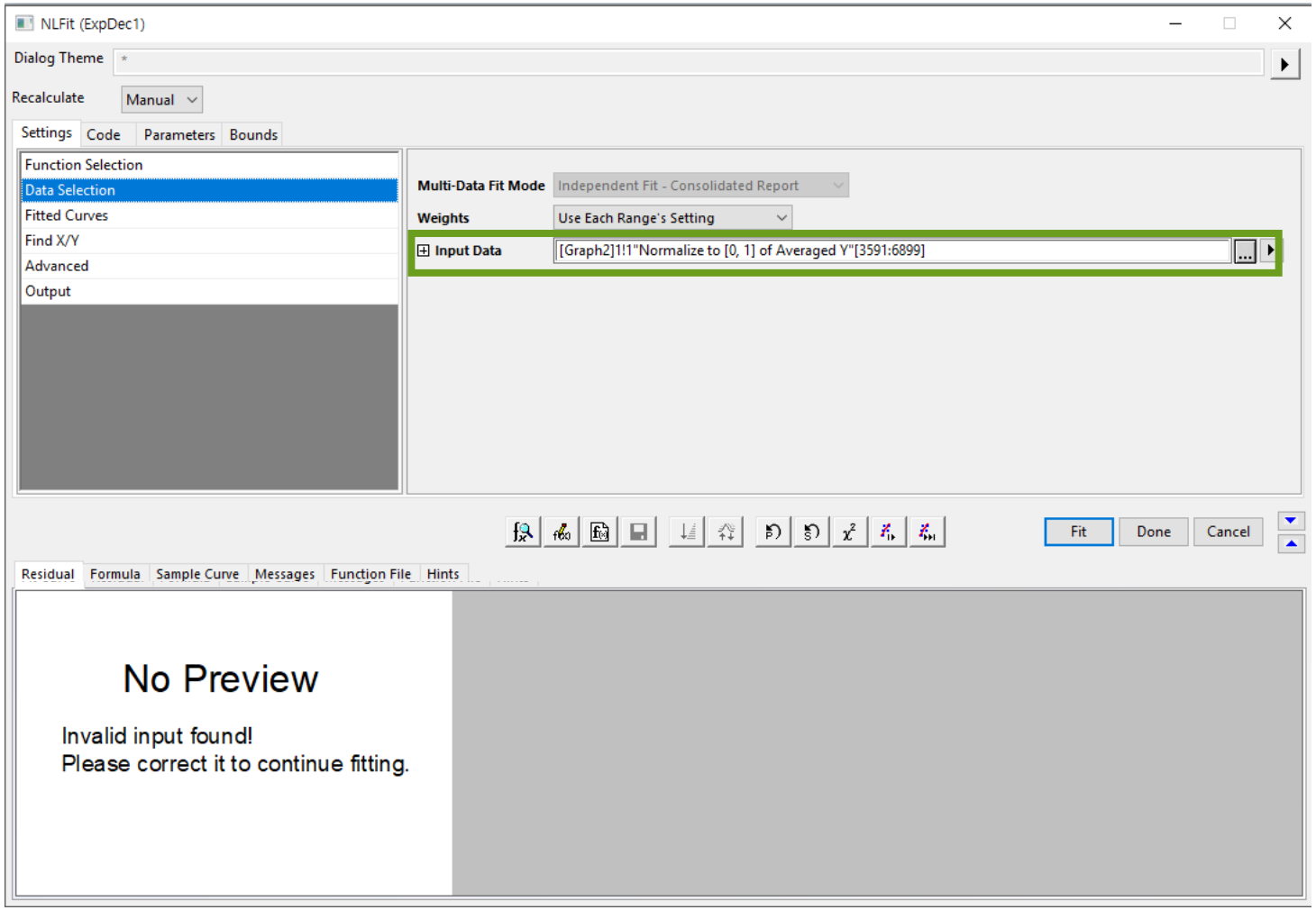
- Exponential Decay Function
- Time start form 0

Data Range

Make a new graph

Left Toolbar (Data Selector)

Fix the fitting range



Fitting Table

Model	ExpDec1
Equation	y = A1*exp(-x/t1) + y
Plot	Normalized Vacuum
y0	0.99657 ± 1.69015E-
A1	-1.02552 ± 0.00223
t1	2.69892E-6 ± 8.5354
Reduced Chi-	8.64896E-5
R-Square (CO	0.99179
Adj. R-Square	0.99178

Reduces Chi-Sqr

Scale Error with square, is equal to the residual sum of square (RSS) divided by the degree of freedom. (=Variations of residue)
Close to 1, Good fit.

R-Square (COD)

the coefficient of determination (COD).
A percentage of the response variable variation that explained by the fitted regression line, Always be between 0 and 1.
Close to 1 > Good fit.

Adj. R-Square

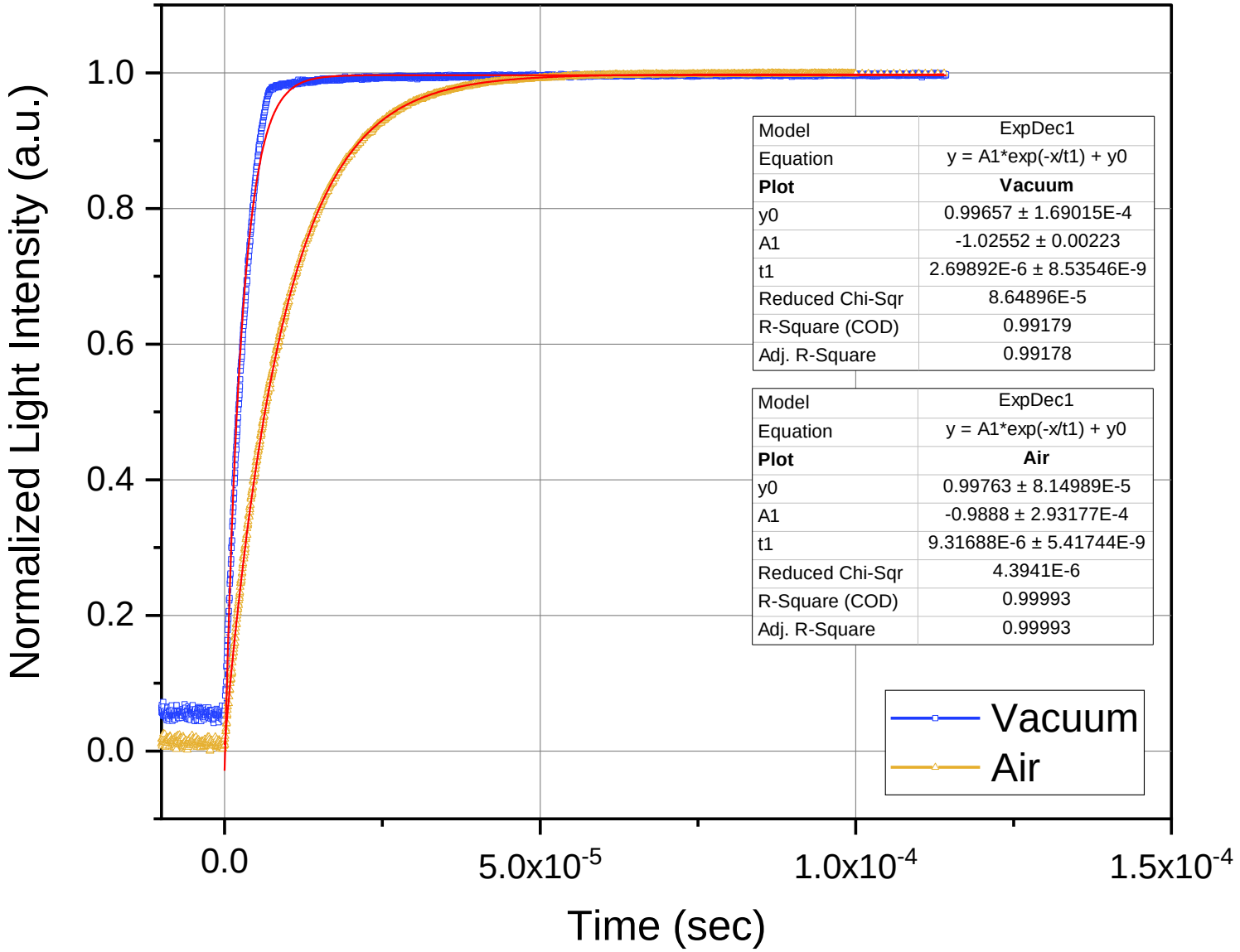
The Adj. R-square is a modified version of R-square, which is adjusted for the number of predictor in the fitted line.
Thus, it can be used to compare with the fitted lines with different numbers of predictors.

Exercise 1

Plot this into a one graph:

- Normalized Vacuum & Normalized Air data with each fitting function
- Find both decay function by using [Exp.Dic 1] function
- Determine each R-square value and decay constant(t1)
- Compare both decay constant

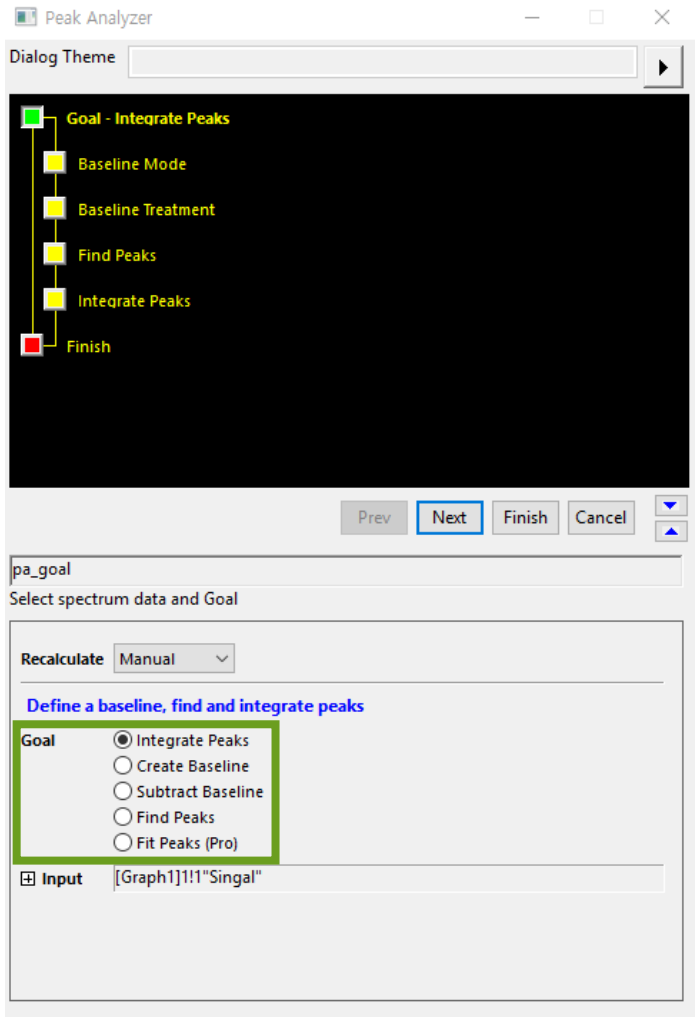
Rayleigh Scattering Intensity in different conditions



Model	ExpDec1
Equation	y = A1*exp(-x/t1) + y0
Plot	**Vacuum**
y0	0.99657 ± 1.69015E-4
A1	-1.02552 ± 0.00223
t1	2.69892E-6 ± 8.53546E-9
Reduced Chi-Sqr	8.64896E-5
R-Square (COD)	0.99179
Adj. R-Square	0.99178

Model	ExpDec1
Equation	y = A1*exp(-x/t1) + y0
Plot	**Air**
y0	0.99763 ± 8.14989E-5
A1	-0.9888 ± 2.93177E-4
t1	9.31688E-6 ± 5.41744E-9
Reduced Chi-Sqr	4.3941E-6
R-Square (COD)	0.99993
Adj. R-Square	0.99993

Peak Searching



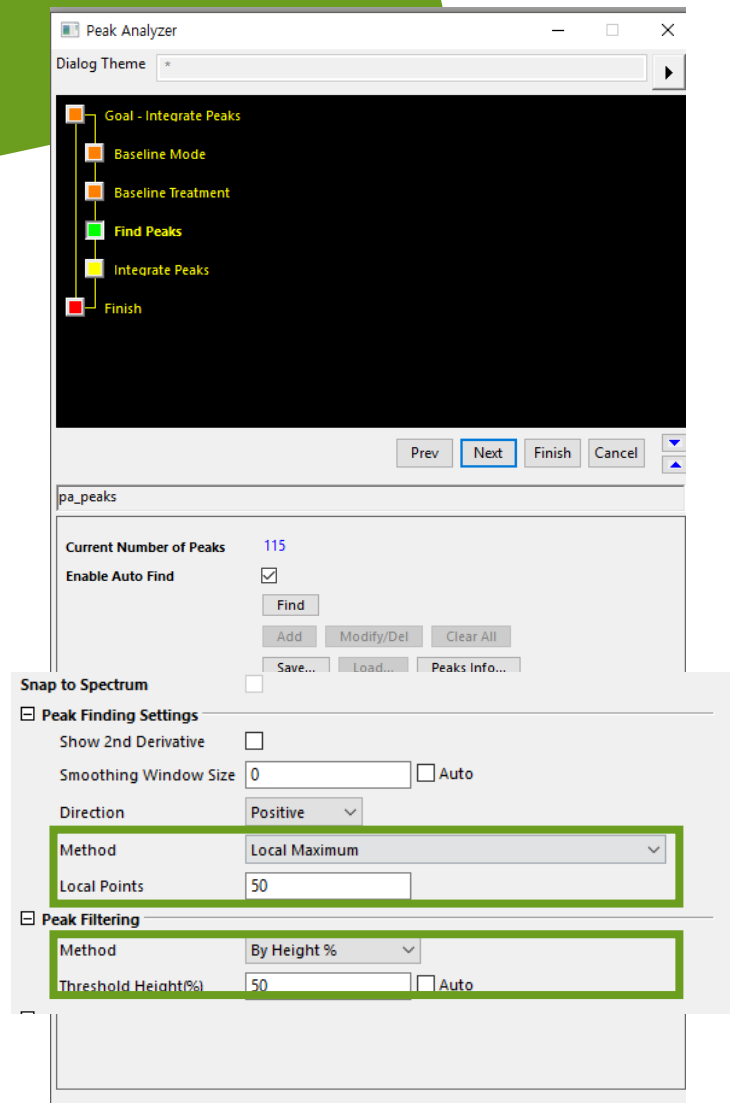
Peak Searching Mode

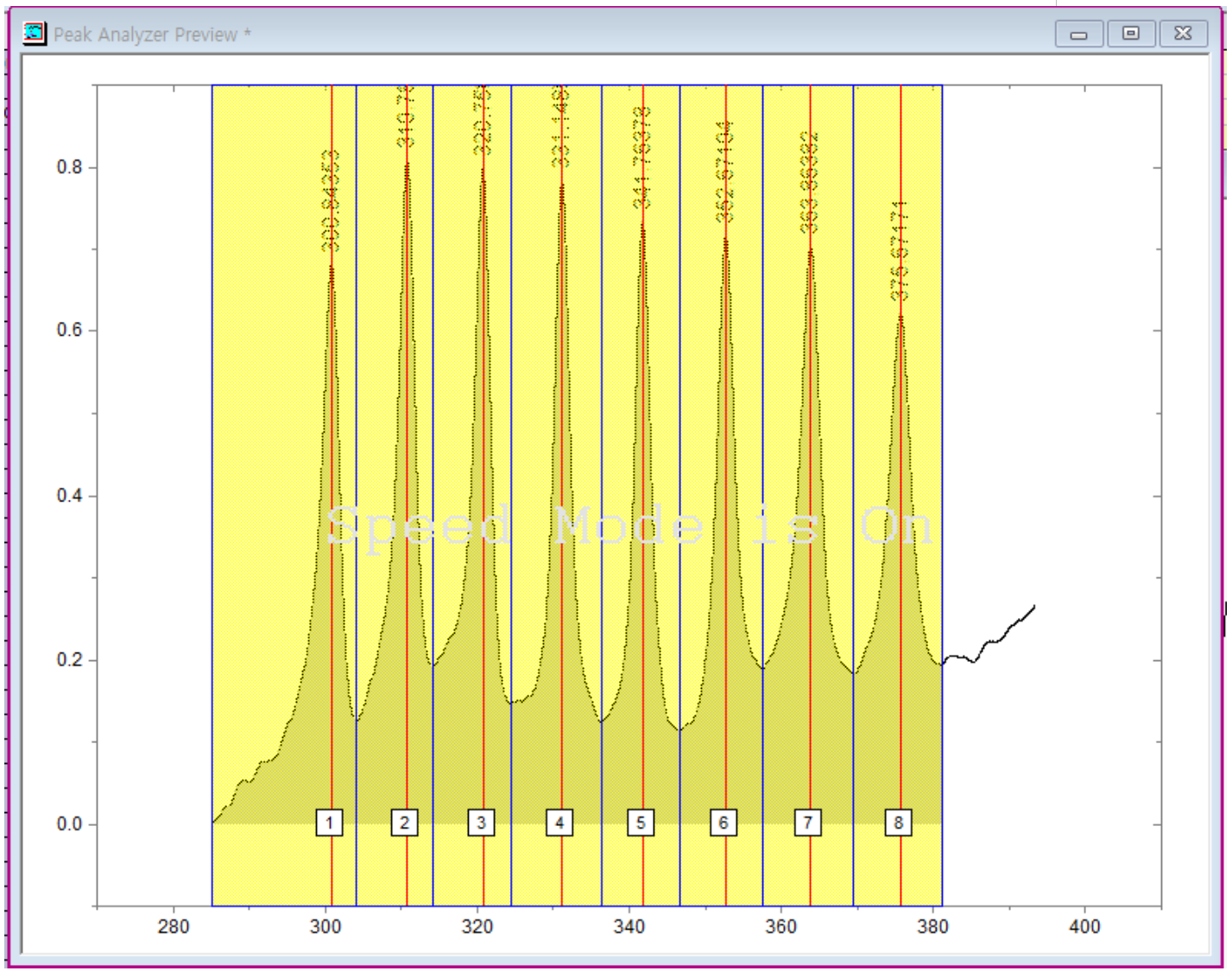
- Integrate Peaks
- Find Peaks
- Fit Peaks (Pro)

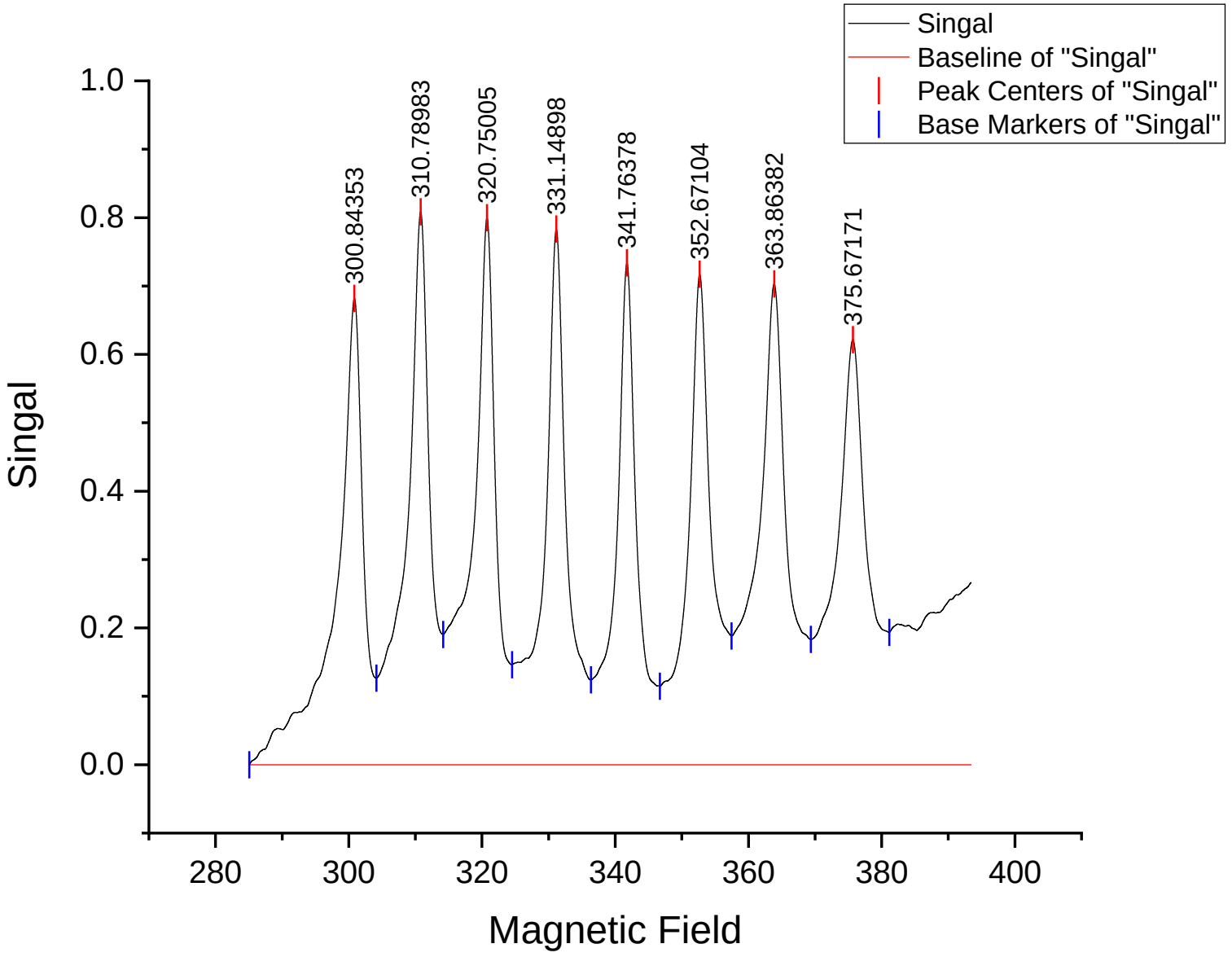
Baseline Analyzing Mode

- Create Baseline
- Subtract Baseline

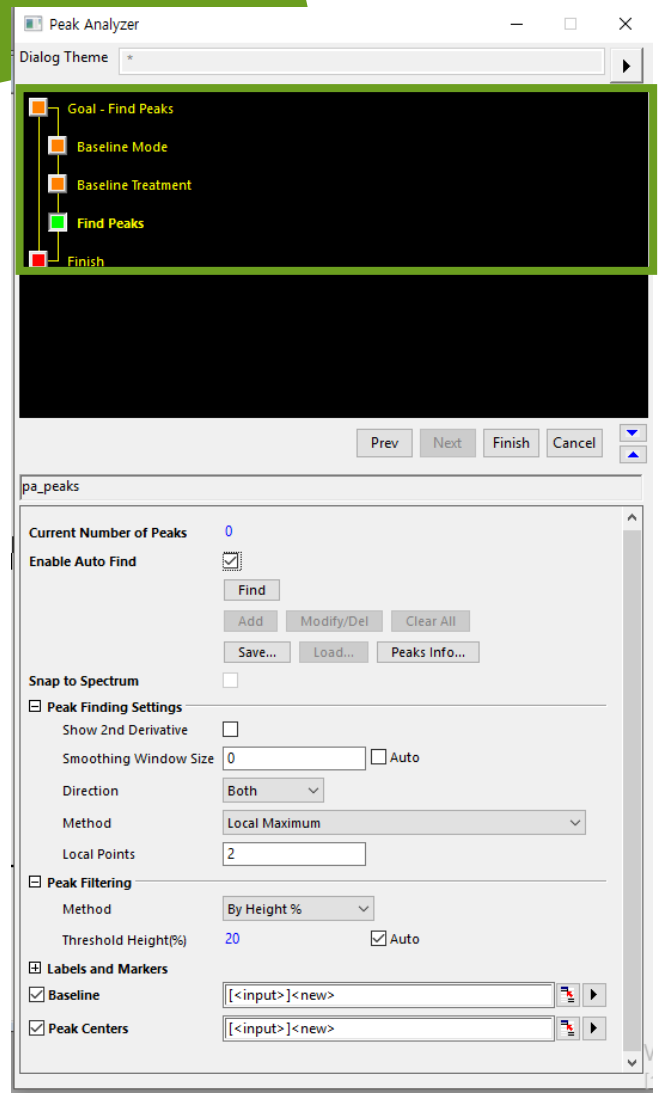
Integrate Peaks

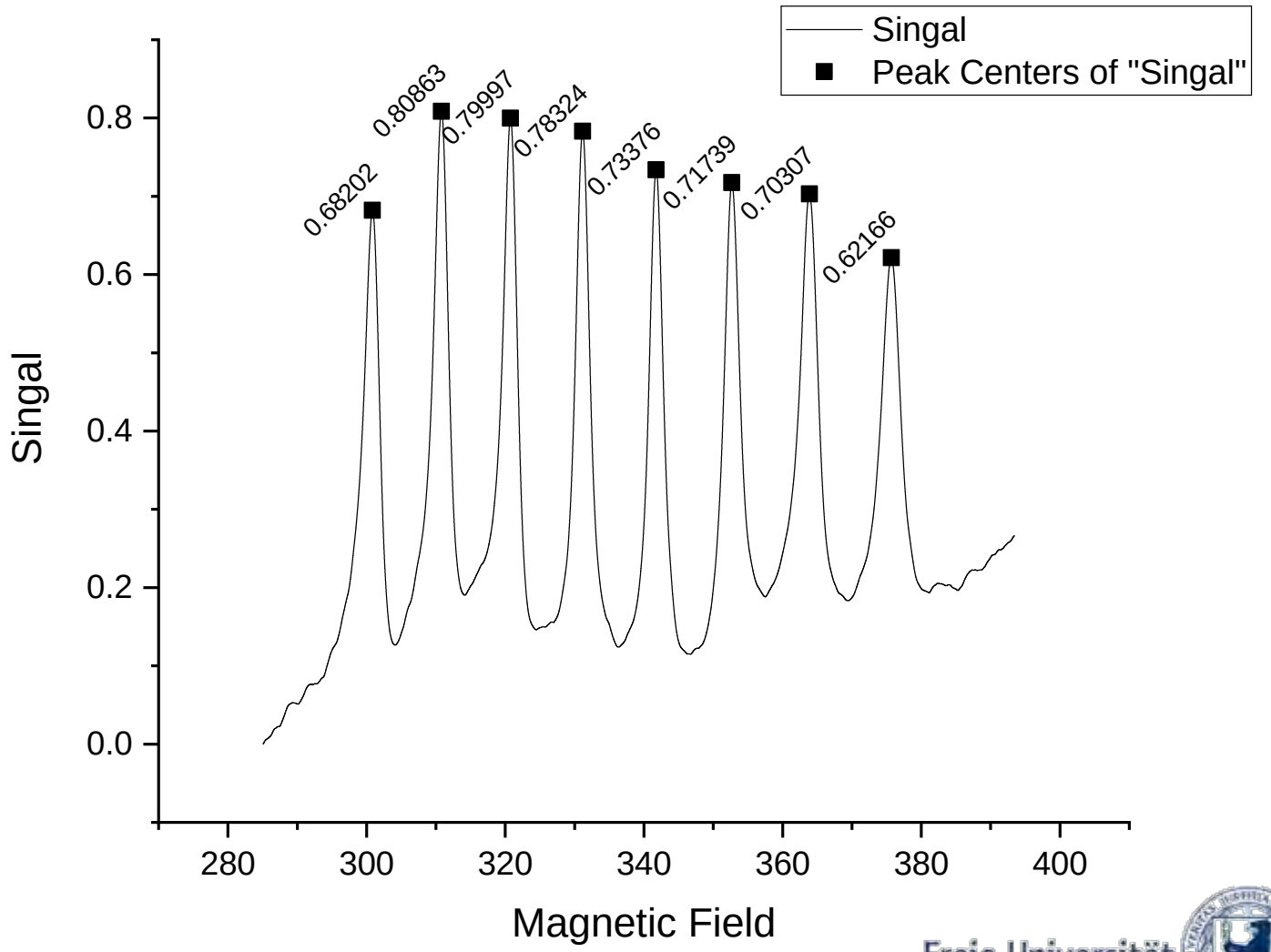




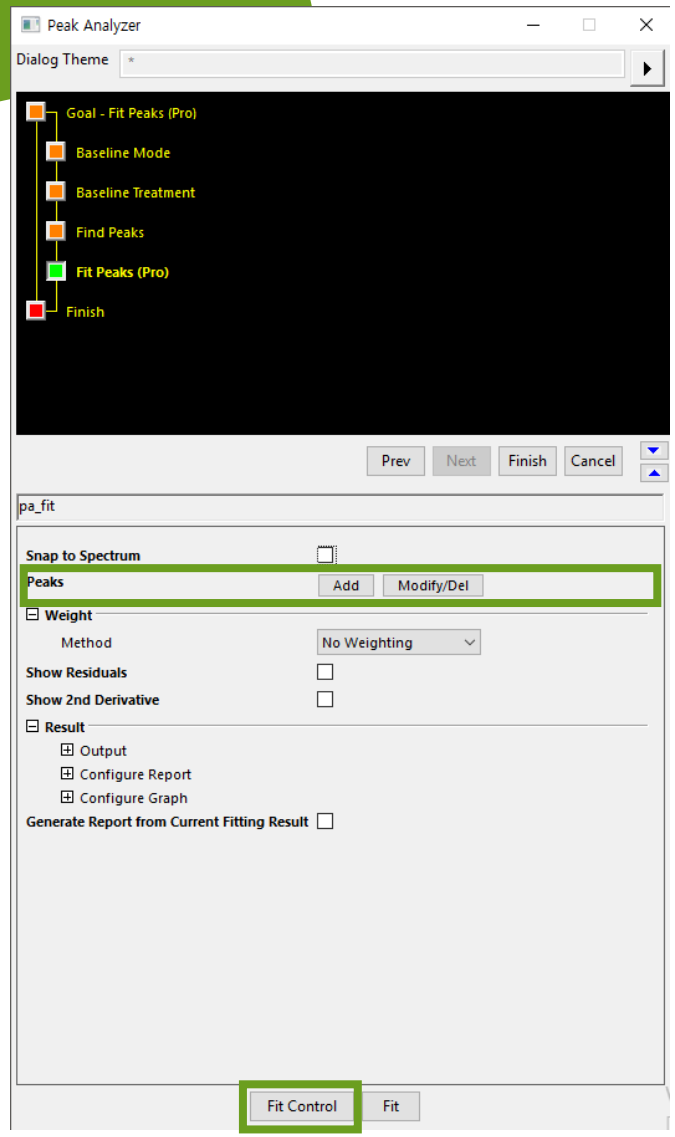

Singal
Baseline of "Singal"
Peak Centers of "Singal"
Base Markers of "Singal"
300.84353
310.78983
320.75005
331.14898
341.76378
352.67104
363.86382
375.67171
Singal
Magnetic Field
1.0
0.8
0.6
0.4
0.2
0.0
280
300
320
340
360
380
400

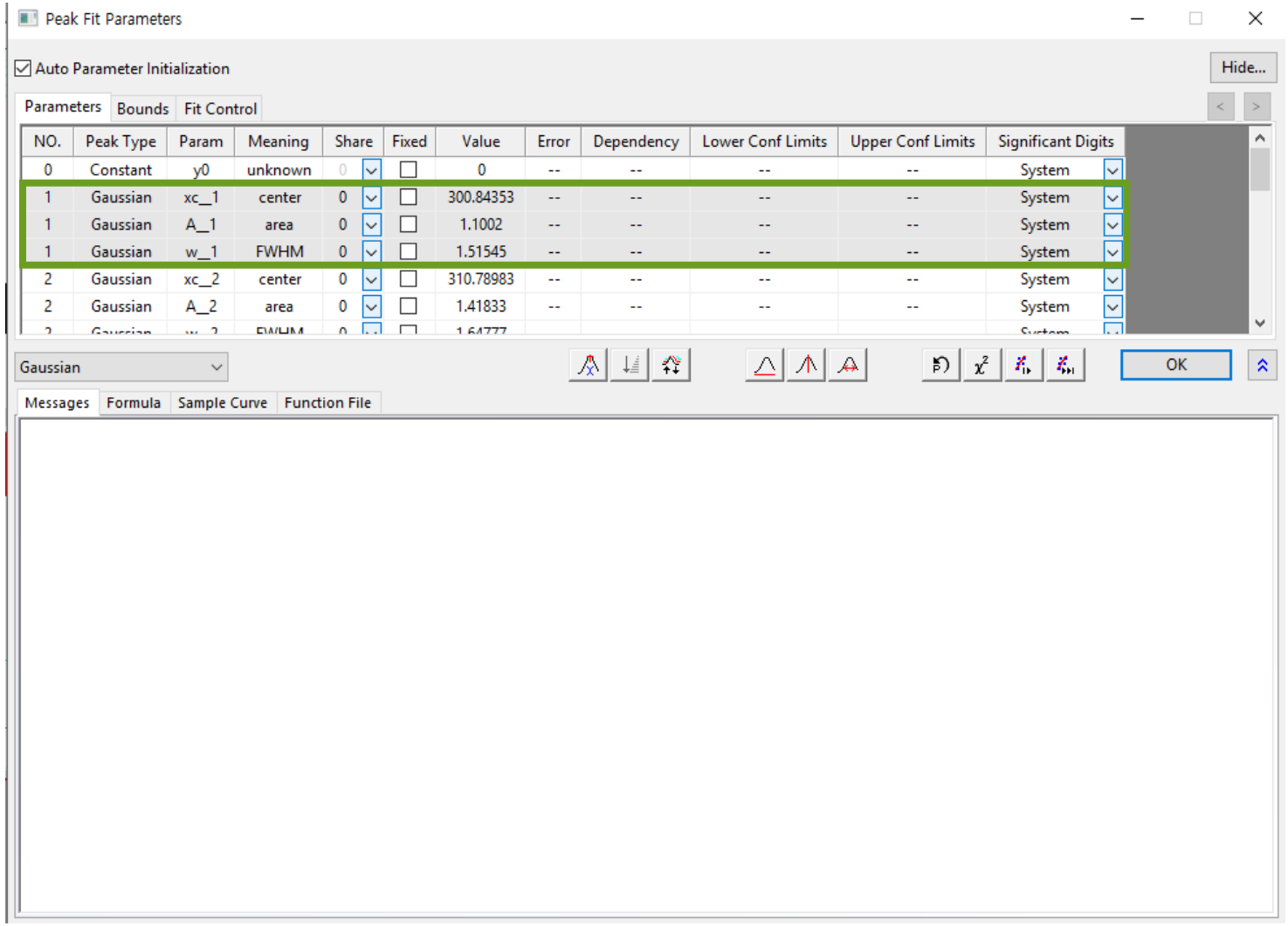
Find Peak


Peak Analyzer
Dialog Theme
Goal - Find Peaks
Baseline Mode
Baseline Treatment
Find Peaks
Finish
Prev
Next
Finish
Cancel
pa_peaks
Current Number of Peaks
0
Enable Auto Find
Find
Add
Modify/Del
Clear All
Save...
Load...
Peaks Info...
Snap to Spectrum
Peak Finding Settings
Show 2nd Derivative
Smoothing Window Size
0
Auto
Direction
Both
Method
Local Maximum
Local Points
2
Peak Filtering
Method
By Height %
Threshold Height(%)
20
Auto
Labels and Markers
Baseline
[<input>]<new>
Peak Centers
[<input>]<new>


Singal
Peak Centers of "Singal"
0.68202
0.80863
0.79997
0.78324
0.73376
0.71739
0.70307
0.62166
Singal
0.0
0.2
0.4
0.6
0.8
280
300
320
340
360
380
400
Magnetic Field

Find Peak (Pro)





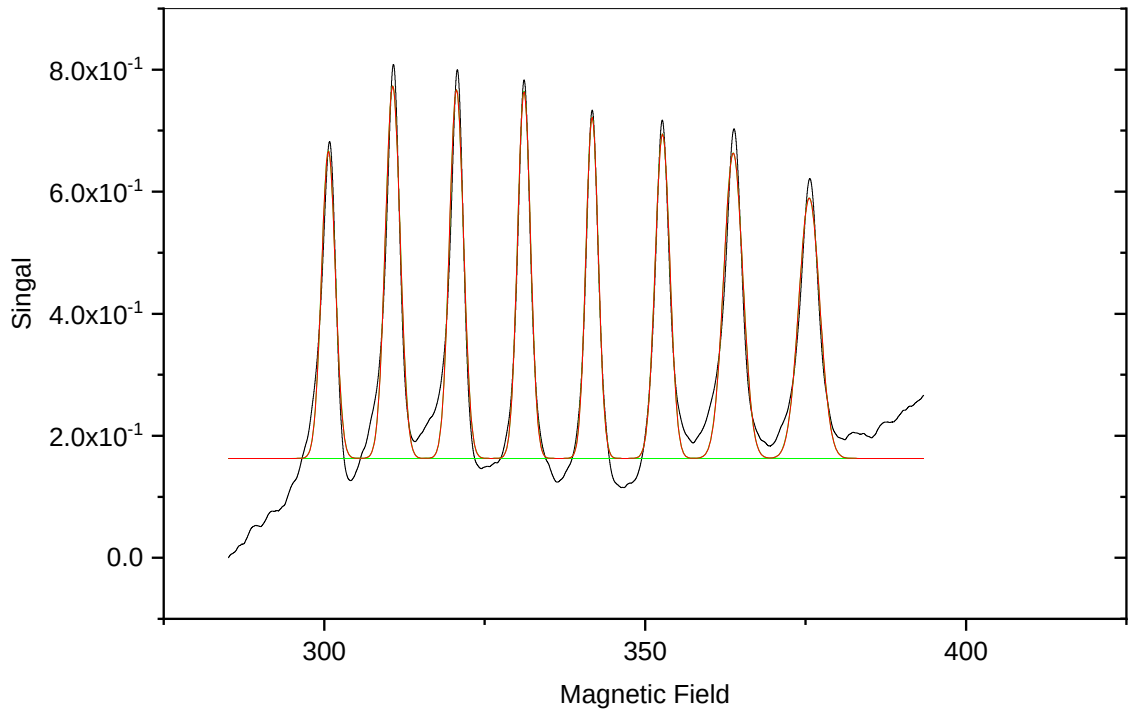
Peak Analysis

Data Set:[Book1]"Result 5"!B"Singal" Date:2019-11-04

BaseLine:Constant

Chi^2=2.34301E-003 Adj. R-Square=9.30068E-001 # of Data Points=46700

SS=1.09360E+002 Degrees of Freedom=46675



Fitting Results

Peak Index	Peak Type	Area Intg	FWHM	Max Height	Center Grvty	Area IntgP
1	Gaussian	1.3575	2.53025	0.50402	300.66805	10.65831
2	Gaussian	1.7473	2.68978	0.61027	310.68673	13.71877
3	Gaussian	1.6581	2.57992	0.60377	320.61497	13.0184
4	Gaussian	1.51755	2.37026	0.60147	331.14266	11.91487
5	Gaussian	1.34899	2.26652	0.55914	341.75308	10.59149
6	Gaussian	1.5186	2.68511	0.53131	352.71792	11.92311
7	Gaussian	1.85749	3.48809	0.50027	363.73993	14.58391
8	Gaussian	1.73104	3.81096	0.42672	375.58757	13.59113

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Find peaks and compare

- Import Result 6
- Find peaks for each data set
- Compare peaks in between 160-400 pixels
- Find the relationships between peak position and current

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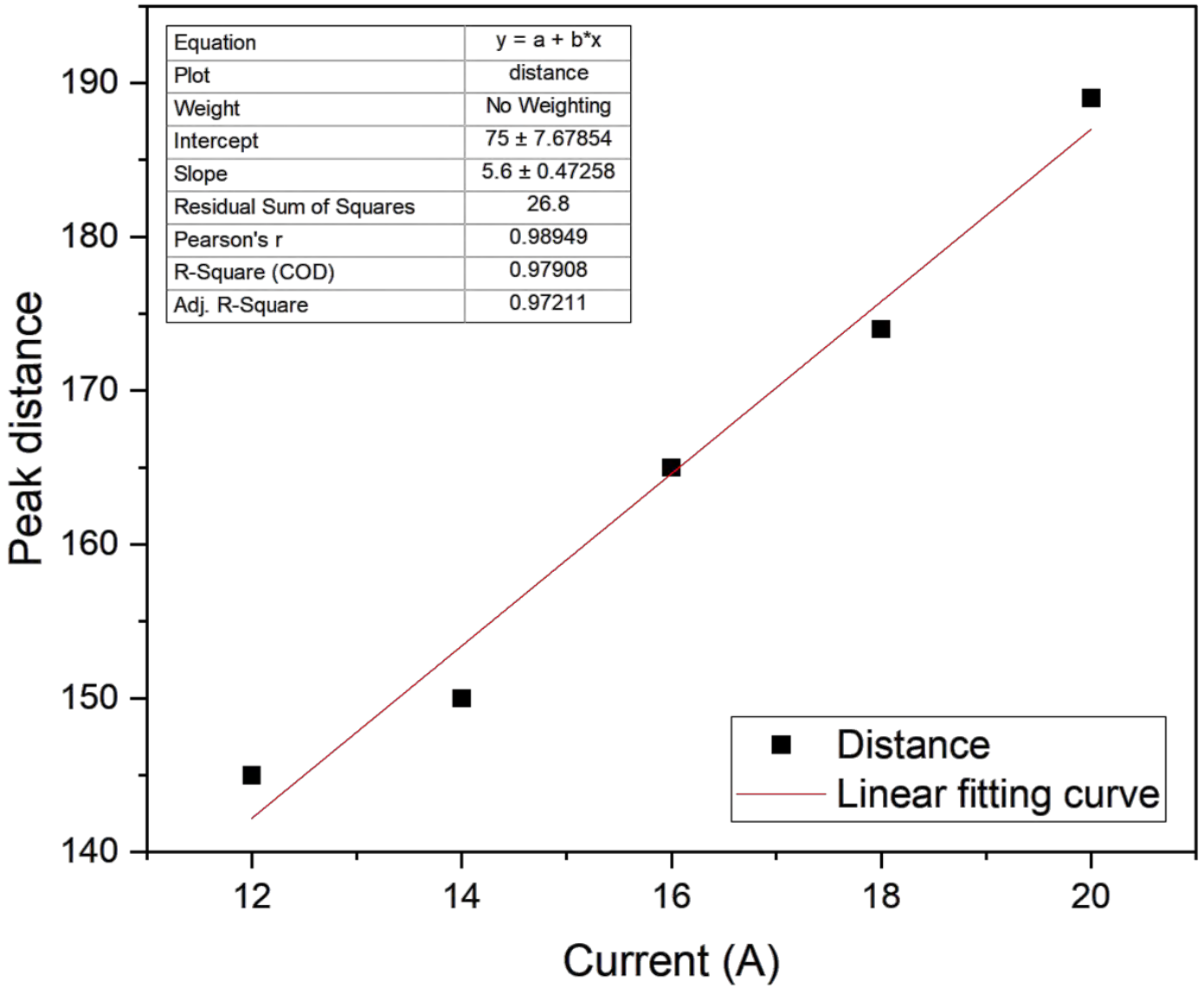

Distance = peak2-peak1

Peak 2 = late peak in 160-400 range
Peak1 = first peak in 160-400 range

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Read a code,
share your question

Future Plan: Regularly meeting for data analyzing?

Study & Life tips in Berlin?

Christmas market?

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