

# ROI Analysis



This presentation takes you through Region of Interest (ROI) Analysis.

There are many reasons to pursue this time of manual selection of spectrum, it can include reducing variation and selecting peaks that have less interference of others. Be deliberate about what ranges you choose, and don't be afraid to try different modifications to improve your data

# ROI Analysis

The screenshot shows the Artax software interface. The top menu bar includes 'File', 'Measurement', 'Analyze', 'Spectrum', 'Project', 'Options', 'Device', 'Export', and 'User ?'. The 'Project' menu is open, showing options: 'New Project', 'Close Project', 'Display Spectra', 'Add Spectra', 'Add Picture', 'Add Clipboard', 'Add Node', and 'Remove Object'. The 'New Project' option is highlighted. The main window displays a blank grid with 'Pulses' on the y-axis (0 to 1000) and '- keV -' on the x-axis (0 to 20). A status bar at the bottom shows 'E:', 'Cnts:', 'User: Administrator', and 'OFFLINE'.

Document 1

File Measurement Analyze Spectrum Project Options Device Export User ?

Live Time: 10 s Chicago Stone

Spectrum Scan

Pulses

1000

800

600

400

200

0

0 5 10 - keV - 15 20

E: Cnts: User: Administrator OFFLINE

To begin, go to 'Project' and then 'New Project'

When you first open up Artax, you will have a blank grid

# ROI Analysis

Document 2

File Measurement Analyze Spectrum Project Options Device Export User ?

Live Time: 10 s Chicago Stone

New project x

Project Objects

Spectrum Project Scan

x 1E5 pulses

14

12

10

8

6

4

2

0

0.10 0.50 0.60

E: 2.84 keV Cnts: 4317 User: Administrator OFFLINE

You will see three tabs, Spectrum, Project, and Scan. You want to go to Spectrum

A File Explorer pane will open to the left

# ROI Analysis

Artax

Document 1

File Measurement Analyze Spectrum Project Options Device Export User ?

New project

Project

- Open Project...
- Save Project As...
- Close Project
- Display Spectra
- Add Spectra
- Add Picture
- Add Clipboard
- Add Node**
- Remove Object

Right click on 'Objects'

Select 'Add Node', this will create a sub-folder in the pane

1000

800

600

400

200

0

0 5 10 15 20

- keV -

E: Cnts: User: Administrator OFFLINE



# ROI Analysis

The screenshot shows the Artax software interface. At the top, the menu bar includes 'File', 'Measurement', 'Analyze', 'Spectrum', 'Project', 'Options', 'Device', and 'Export'. A 'New project' window is open on the left, showing a tree view with 'Project' and 'Objects'. The main window displays a spectrum plot with 'Pulses' on the y-axis (ranging from 400 to 1000) and '- keV -' on the x-axis (ranging from 0 to 20). A 'Node' dialog box is open in the center, with the title 'Node' and the text 'Input new node name:'. The input field contains 'Points UM'. Below the input field are 'OK' and 'Cancel' buttons. Three callout boxes provide instructions: one points to the 'Points UM' text, another points to the 'OK' button, and a third points to the 'UM' part of the text.

Always make sure the first word is Points followed by a Space

You can add a second name here to identify the data

A pop-up window will prompt you to enter a name

E: Cnts: User: Administrator OFFLINE

# ROI Analysis

The screenshot displays the Grab software interface. At the top, the menu bar includes 'Grab', 'File', 'Edit', 'Capture', 'Window', and 'Help'. The system tray on the right shows the time as 'Fri 9:28 PM' and a battery level of '87%'. The main window features a menu bar with 'File', 'Measurement', 'Analyze', 'Spectrum', 'Project', and 'Options'. A 'New project' dialog box is open, showing a file explorer with a tree view containing 'Project', 'Objects', and 'Points UM'. A callout box points to the plus sign next to the 'Objects' folder. Below the file explorer is a large grid area with a dashed grid. At the bottom, a status bar shows 'E:', 'Cnts:', 'User: Administrator', and 'OFFLINE'. A graph is visible at the bottom right, with a y-axis ranging from 0 to 400 and an x-axis labeled '- keV -' ranging from 0 to 20.

Note that there is now a expand/contract sign beside the 'Objects' Folder

Clicking on the plus sign will reveal the sub-folder you created

# ROI Analysis

The image shows a screenshot of the Artax software interface on a Mac. The window title is "Document 1". The menu bar includes "File", "Measurement", "Analyze", "Spectrum", "Project", "Options", "Device", "Export", and "User ?". The "File" menu is open, showing options: "Open Project...", "Open Spectrum..." (highlighted with a blue bar and "Ctrl+O" next to it), "Open ROI...", "Reopen", "Save Project As...", "Save Spectrum As..." (with "Ctrl+S" next to it), "Save ROI As...", "Save Image As...", and "Exit". A callout box with a black border and white background points to the "Open Spectrum..." menu item. Inside the callout box, the text reads: "Go to 'File' and then 'Open Spectrum'". The main window area contains a grid for a spectrum plot. The y-axis is labeled "Pulses" and ranges from 0 to 600. The x-axis is labeled "- keV -" and ranges from 0 to 20. The plot area is currently empty. The status bar at the bottom shows "E:", "Cnts:", "User: Administrator", and "OFFLINE". The top of the screen shows the Mac OS X system menu with the Apple logo, "Artax", and various system icons including network, Bluetooth, Wi-Fi, and battery (87%). The system clock shows "Fri 9:29 PM".

Go to 'File' and then 'Open Spectrum'

# ROI Analysis

A File Explorer window will open

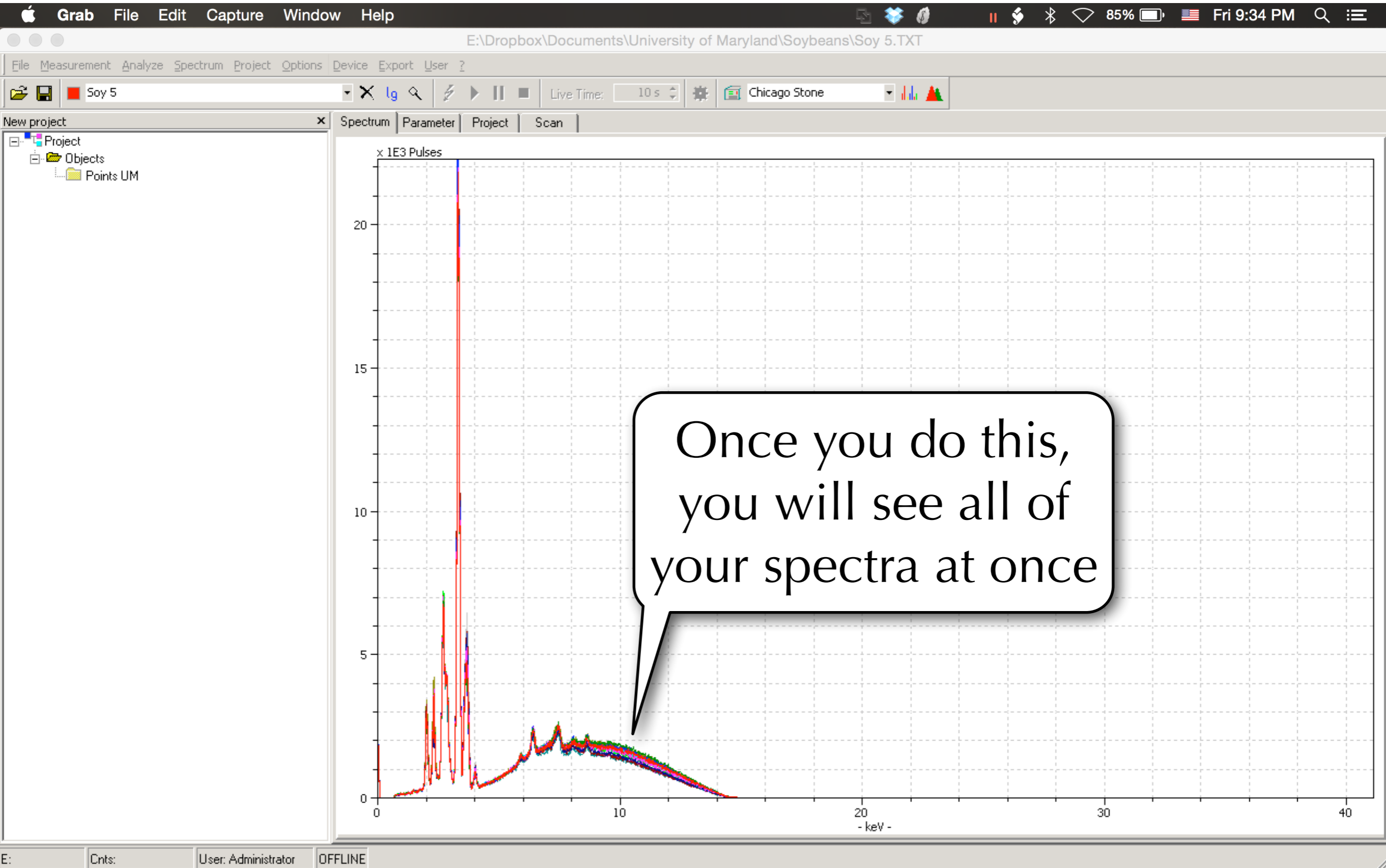
The screenshot shows the Artax software interface. A File Explorer window is open, displaying a list of files in the 'Soybeans' folder. The files are: Soy 1.TXT, Soy 22.TXT, Soy 25.TXT, Soy 26.TXT, Soy 28.TXT, Soy 29.TXT, Soy 30.TXT, Soy 31.TXT, Soy 32.TXT, Soy 34.TXT, Soy 36.TXT, Soy 38.TXT, Soy 4.TXT, and Soy 5.TXT. The 'File name' field at the bottom of the File Explorer window contains the following text: "Soy 1.TXT" "Soy 22.TXT" "Soy 25.TXT" "Soy 26.TXT" "Soy 28.TXT" "Soy 29.TXT" "Soy 30.TXT" "Soy 31.TXT". The 'Files of type' field is set to 'ANSI file (\*.txt)'. The 'Open' button is highlighted. In the background, the Artax software interface is visible, including a menu bar with 'File', 'Measurement', 'Analyze', 'Spectrum', 'Project', 'Options', 'Device', 'Export', and 'User'. A status bar at the bottom shows 'E:', 'Cnts:', 'User: Administrator', and 'OFFLINE'. A plot area is visible at the bottom of the Artax window, showing a grid with axes labeled from 0 to 200 and 0 to 20.

Hold down the 'Shift' key on the keyboard to start selecting multiple spectra to analyze with Artax

Select 'TRACER spectra (".pdz")' or .txt to find your data



# ROI Analysis



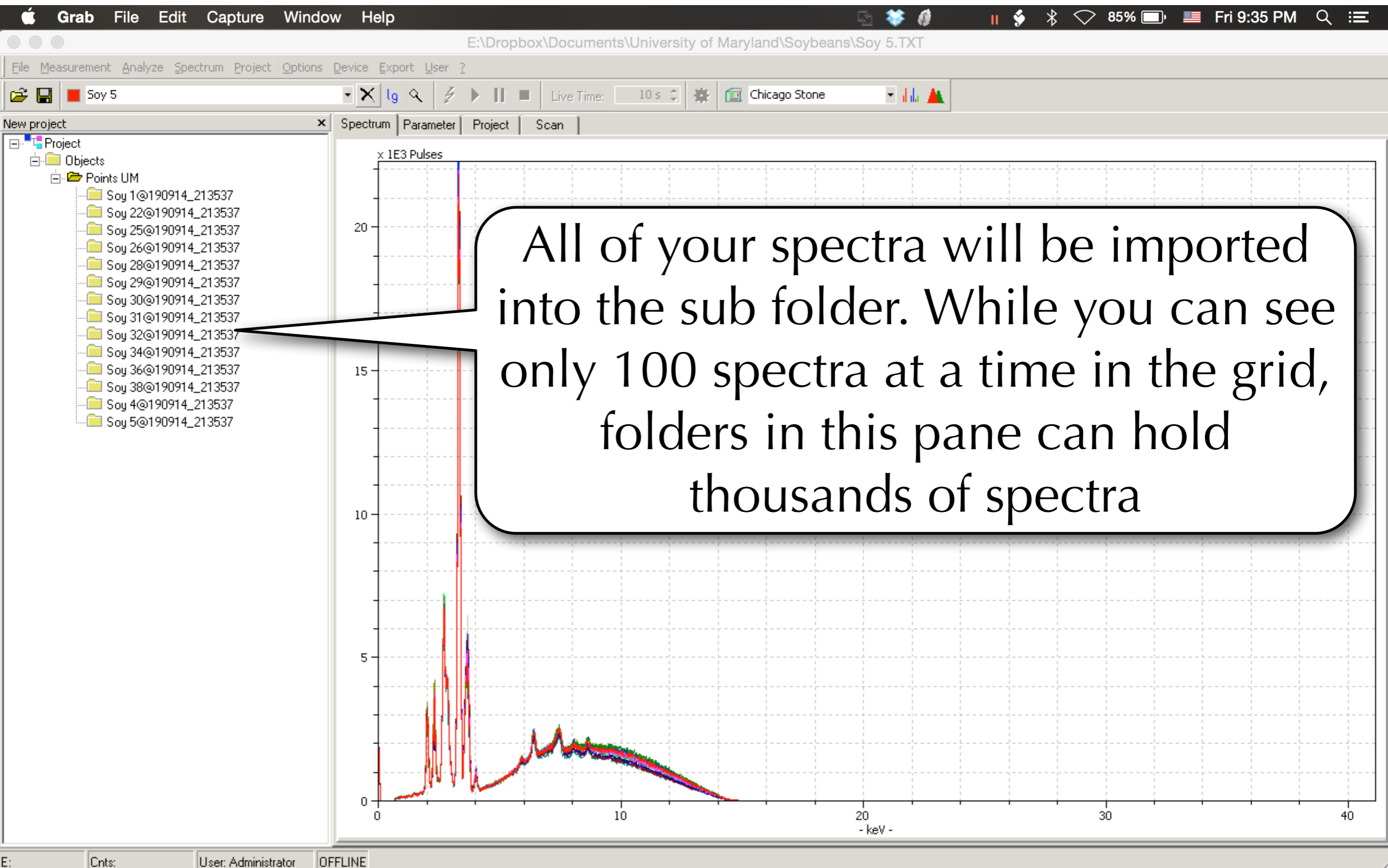
# ROI Analysis

The screenshot displays the Artax software interface. The top menu bar includes 'File', 'Measurement', 'Analyze', 'Spectrum', 'Project', 'Options', and 'Dev'. The main window shows a project named 'Soy 5' with a file explorer on the left. A context menu is open over the 'Soy 5' folder, listing options: 'Open Project...', 'Save Project As...', 'Close Project', 'Display Spectra', 'Add Spectra', 'Add Picture', 'Add Clipboard', 'Add Node', and 'Remove Object'. The 'Add Spectra' option is highlighted. Below the menu, a spectral plot is visible on a grid. The x-axis is labeled '- keV -' and ranges from 0 to 40. The y-axis ranges from 0 to 15. The plot shows several sharp peaks, with the most prominent one at approximately 14 keV. A red vertical line is drawn at this peak. Two callout boxes provide instructions: 'Right click on the data folder you created earlier' and 'Select 'Add Spectra''.

Right click on the data folder you created earlier

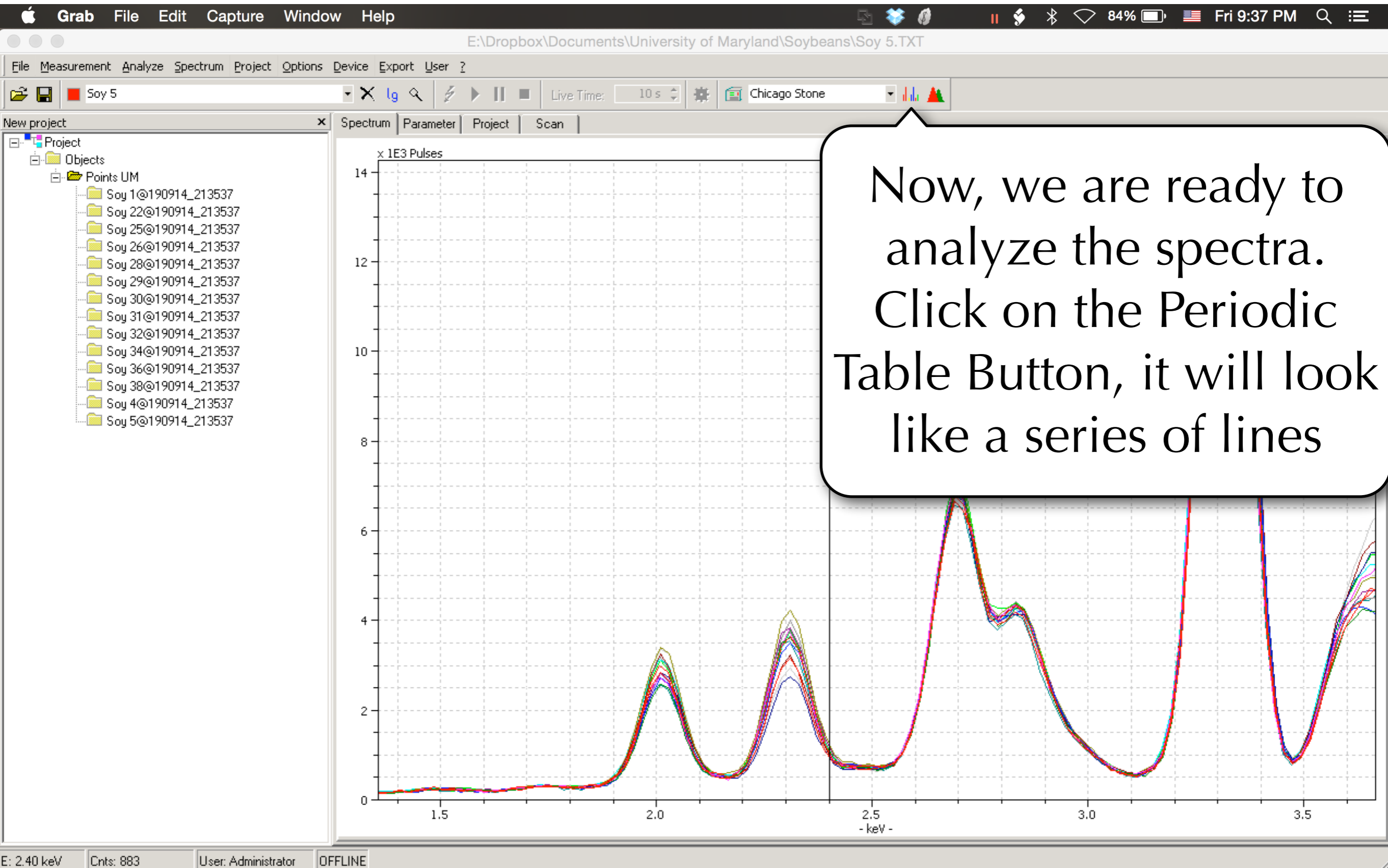
Select 'Add Spectra'

# ROI Analysis



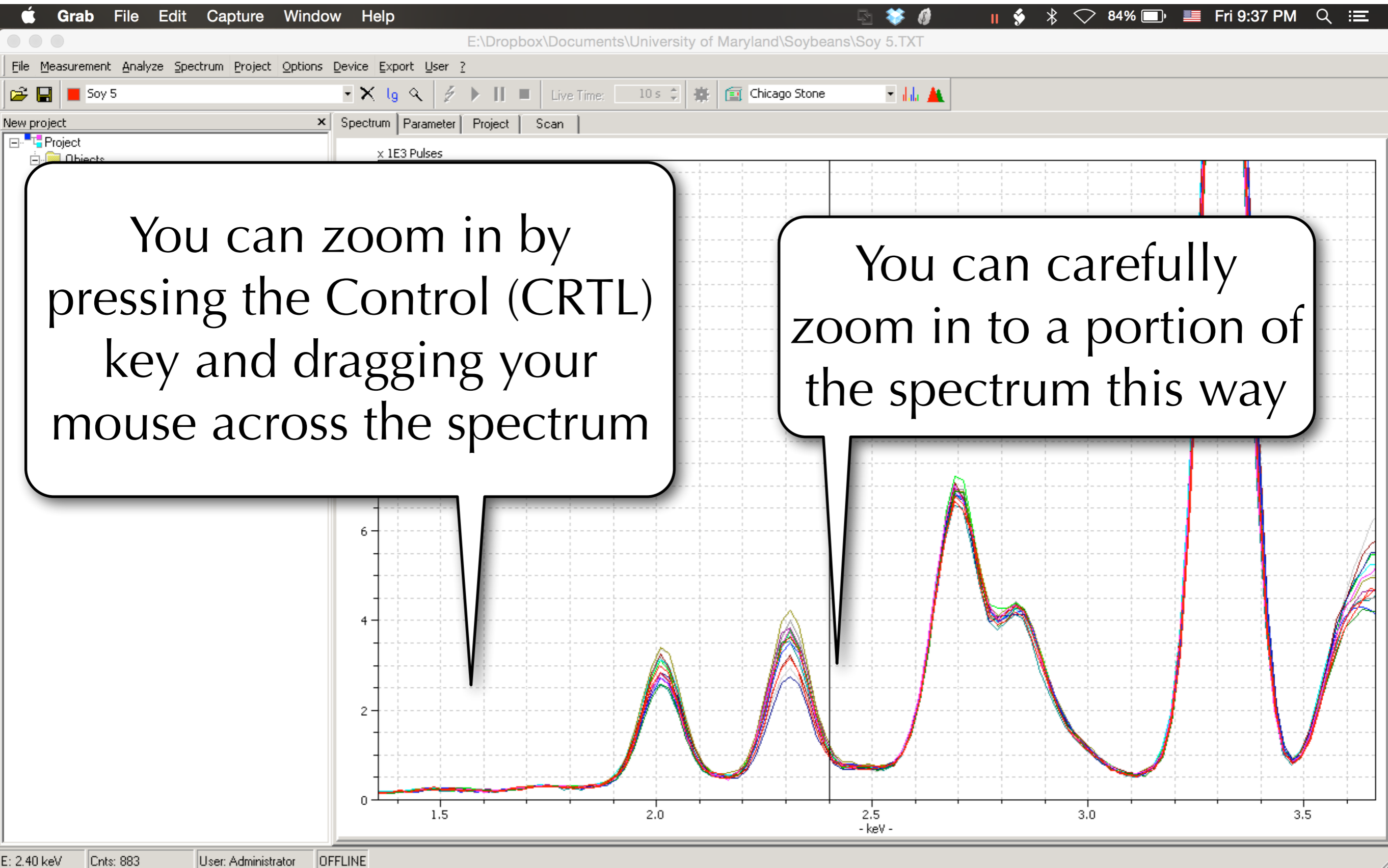


# ROI Analysis

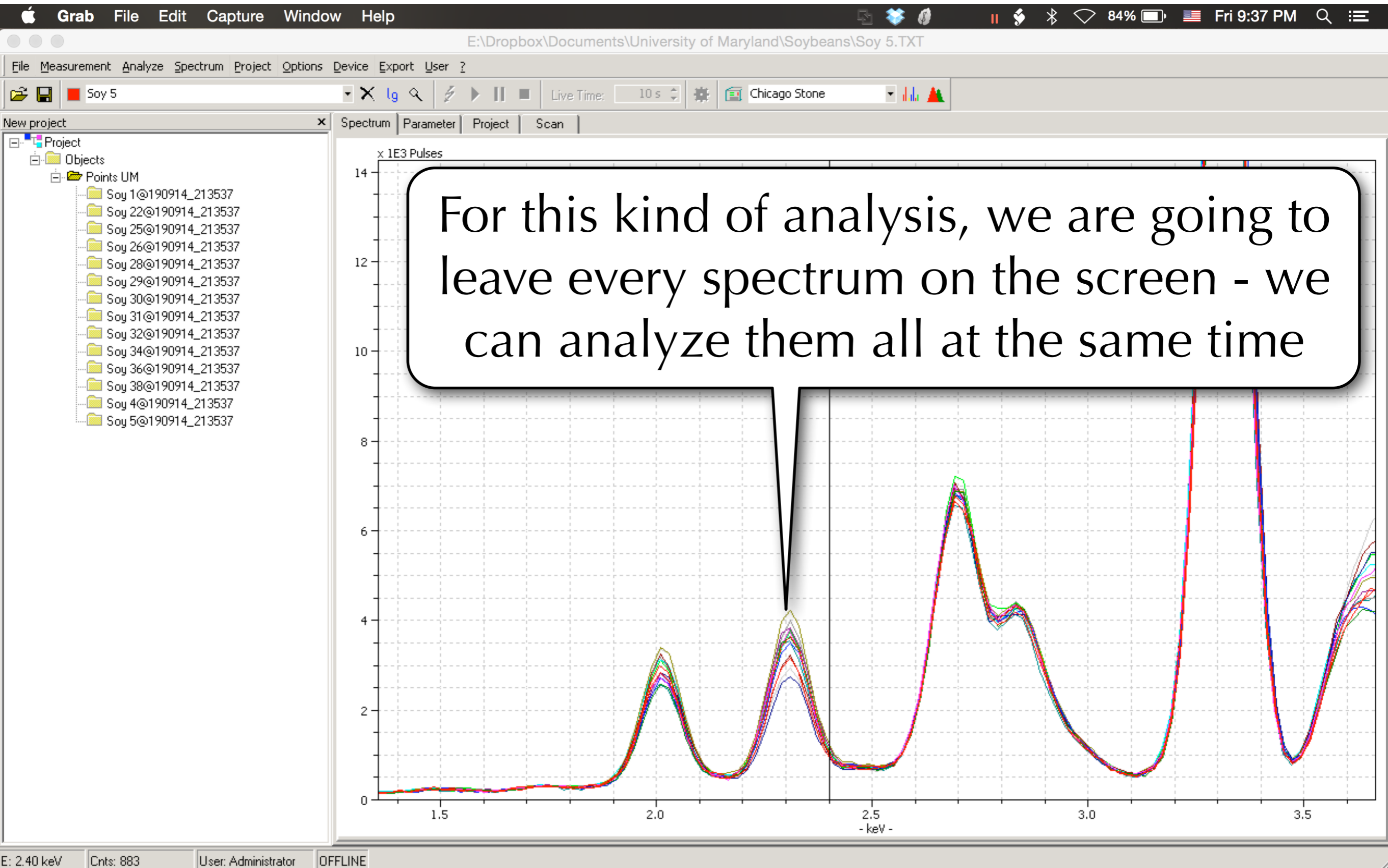




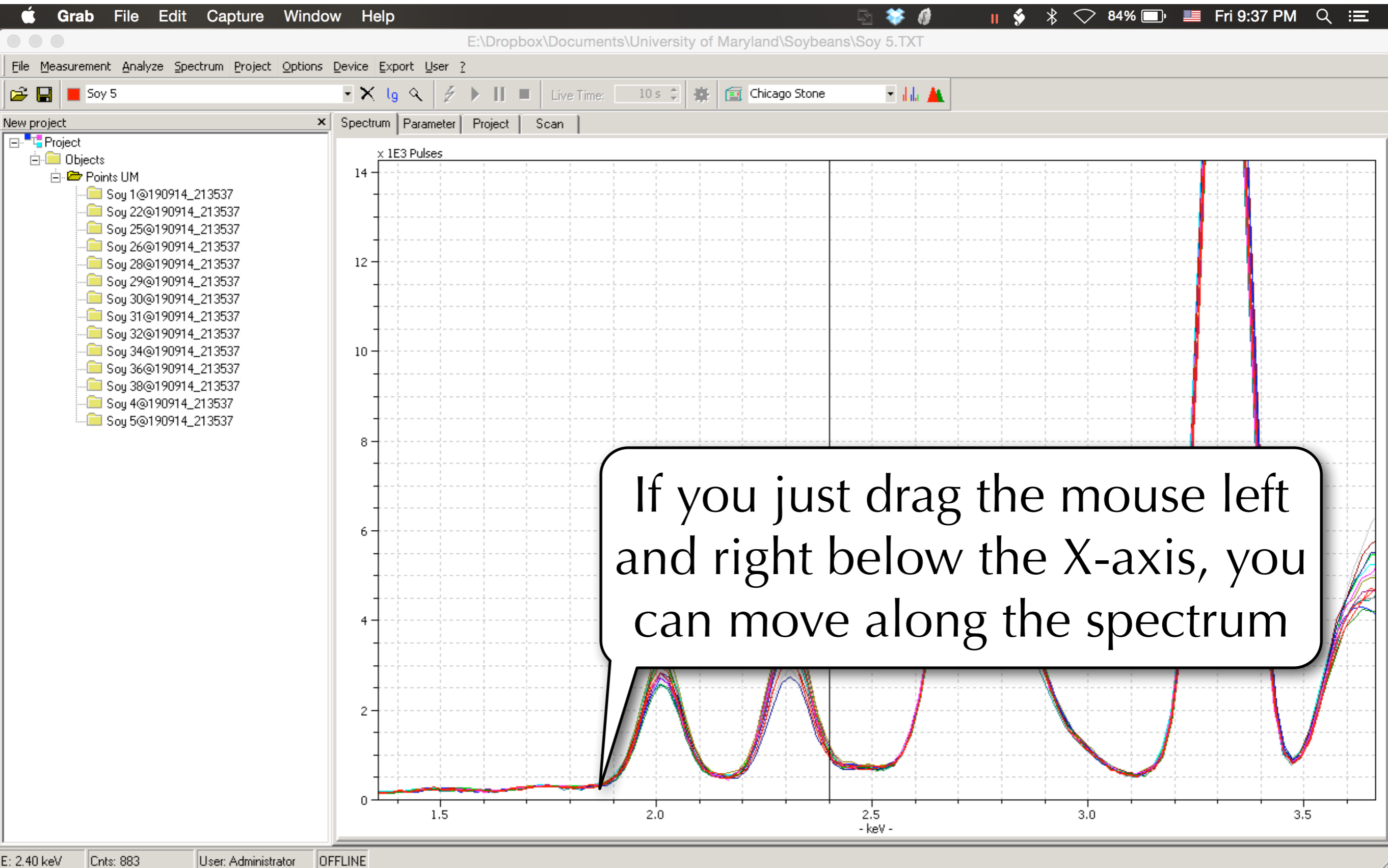
# ROI Analysis



# ROI Analysis



# ROI Analysis

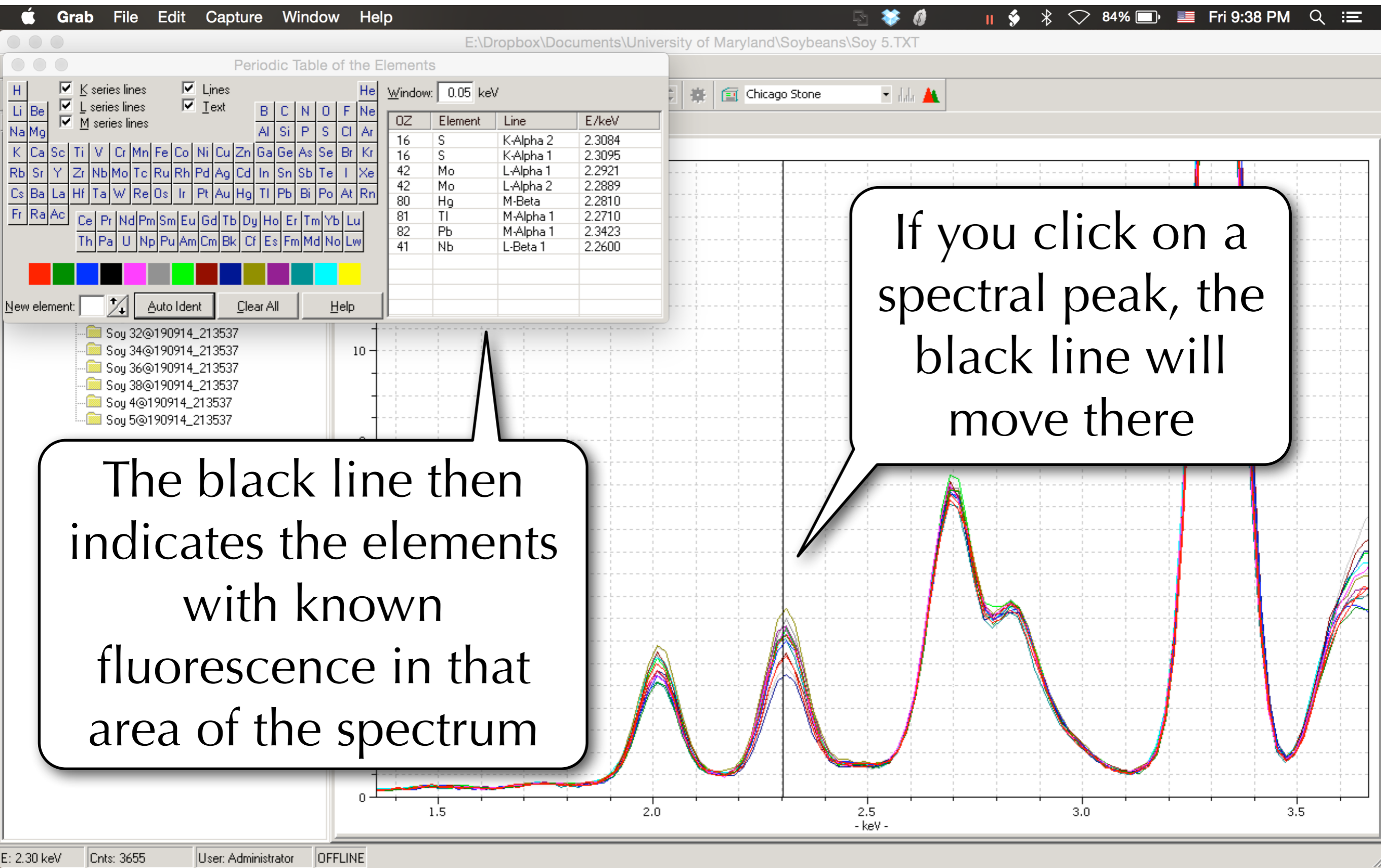




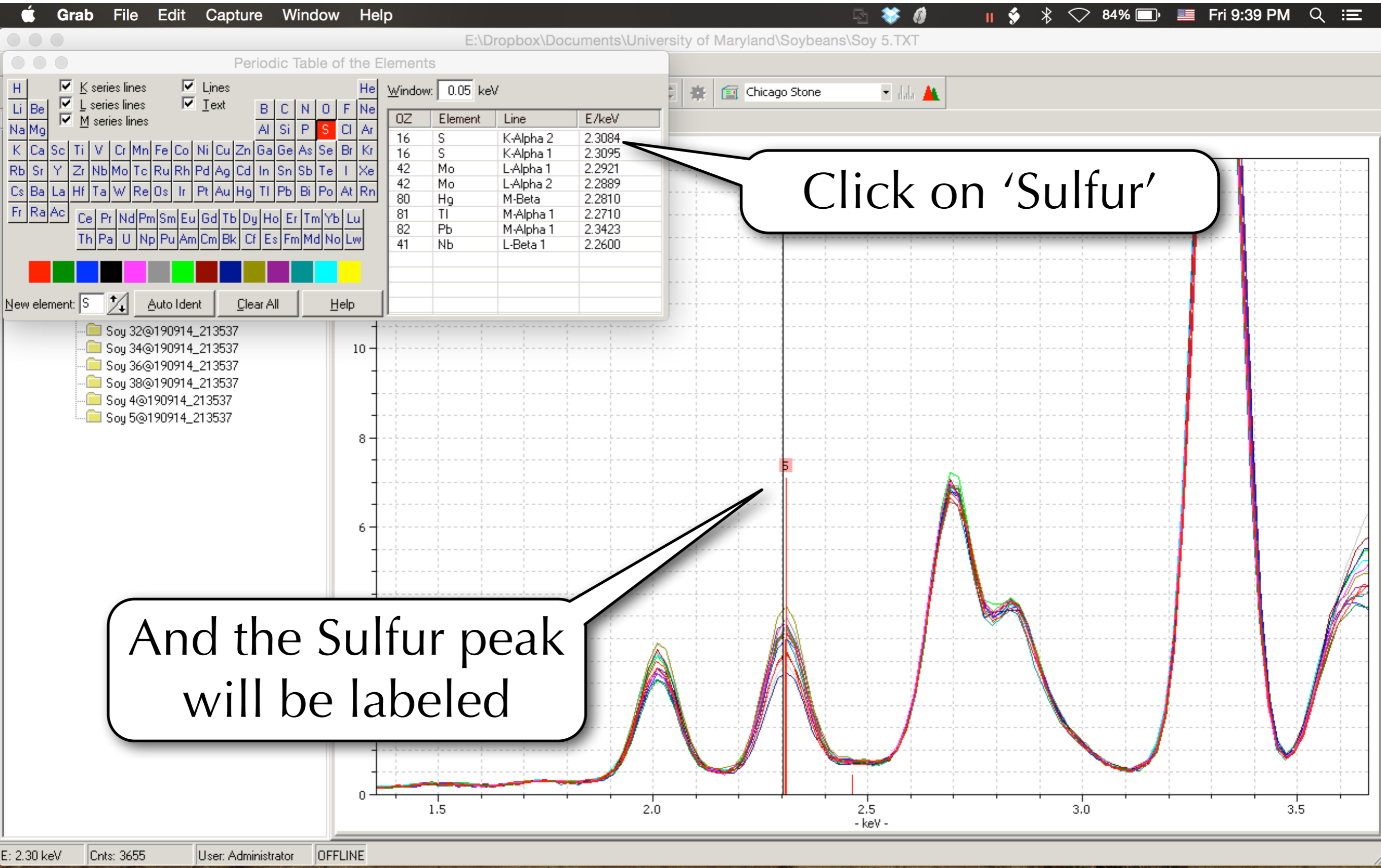




# ROI Analysis

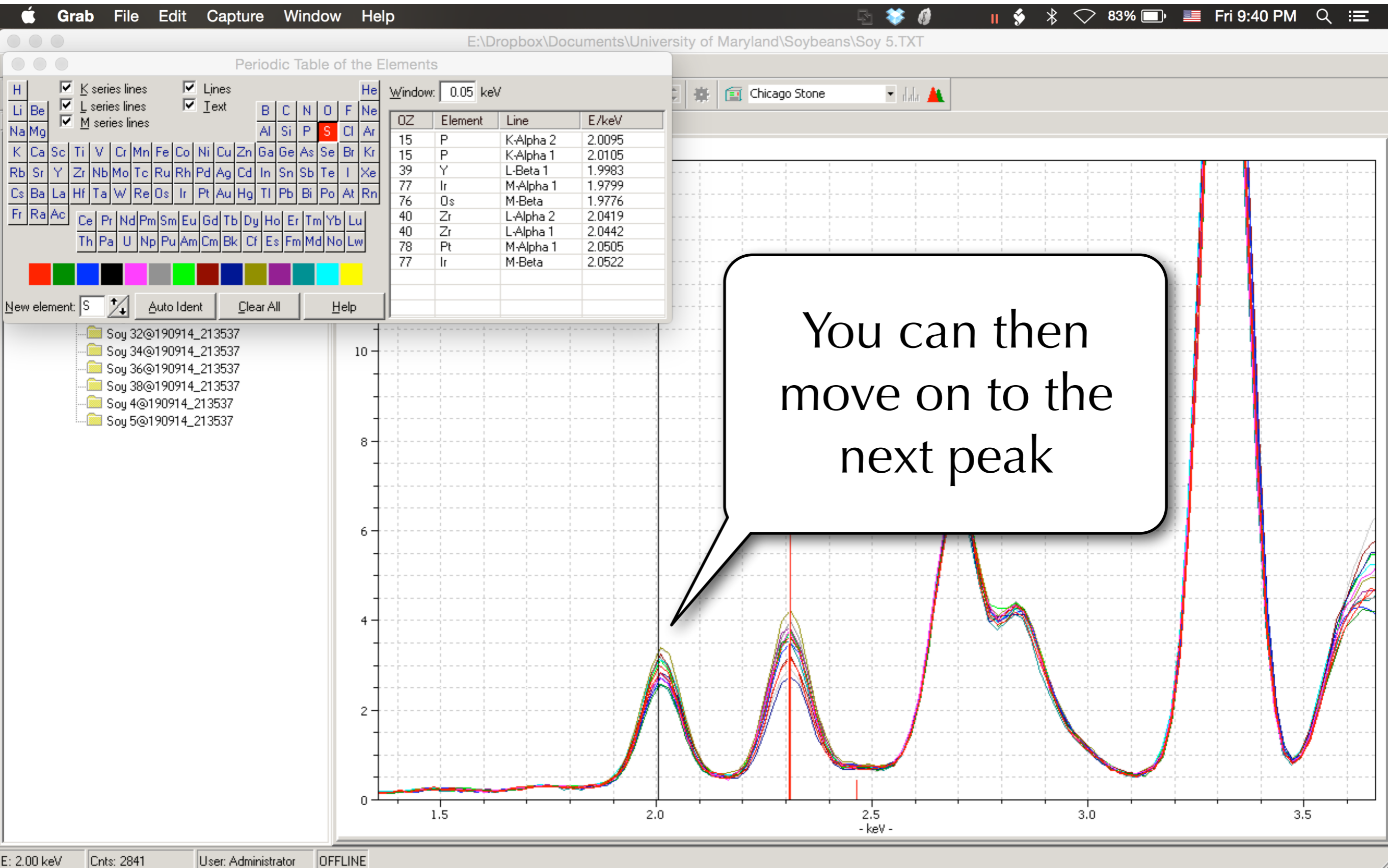


# ROI Analysis

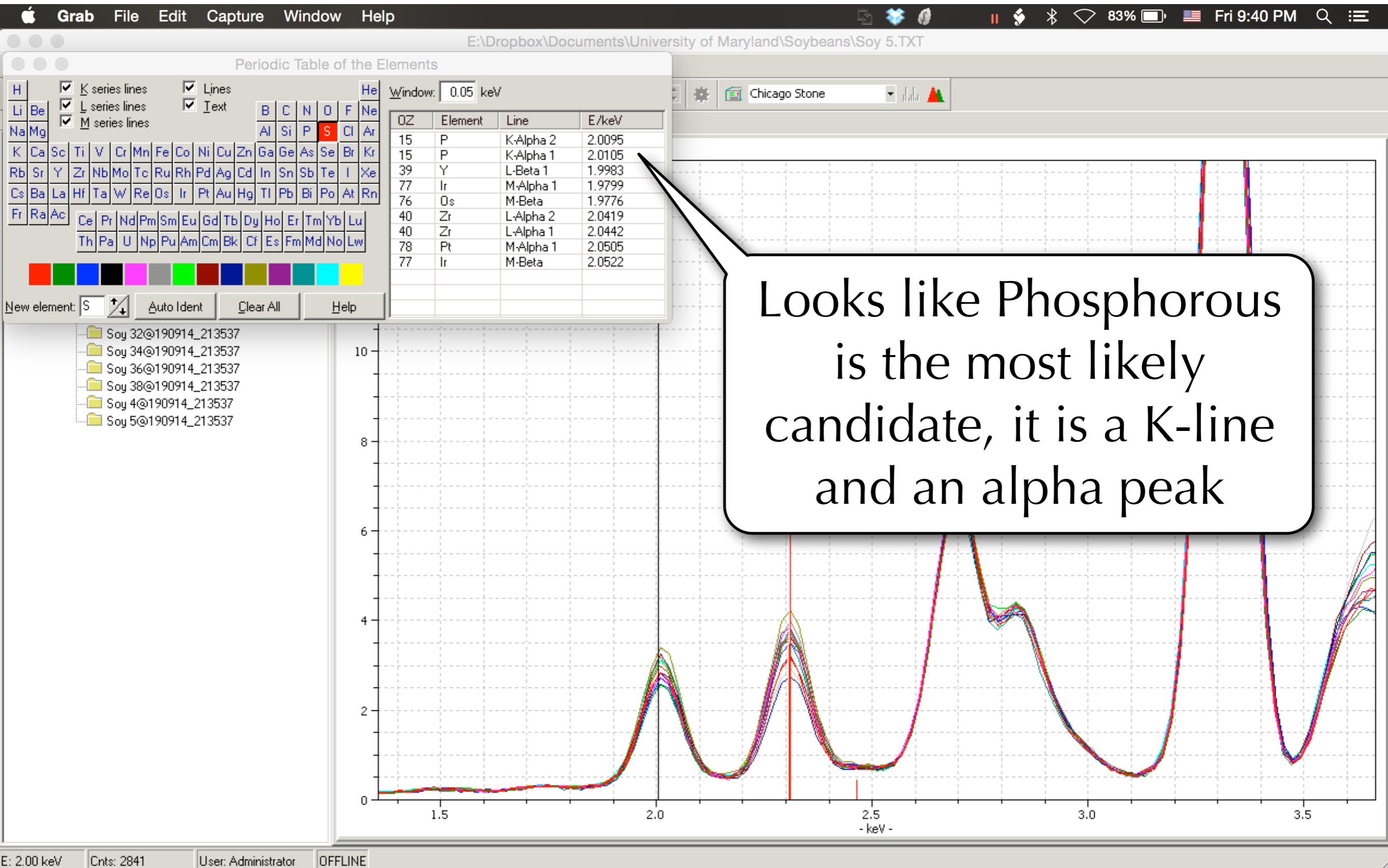




# ROI Analysis

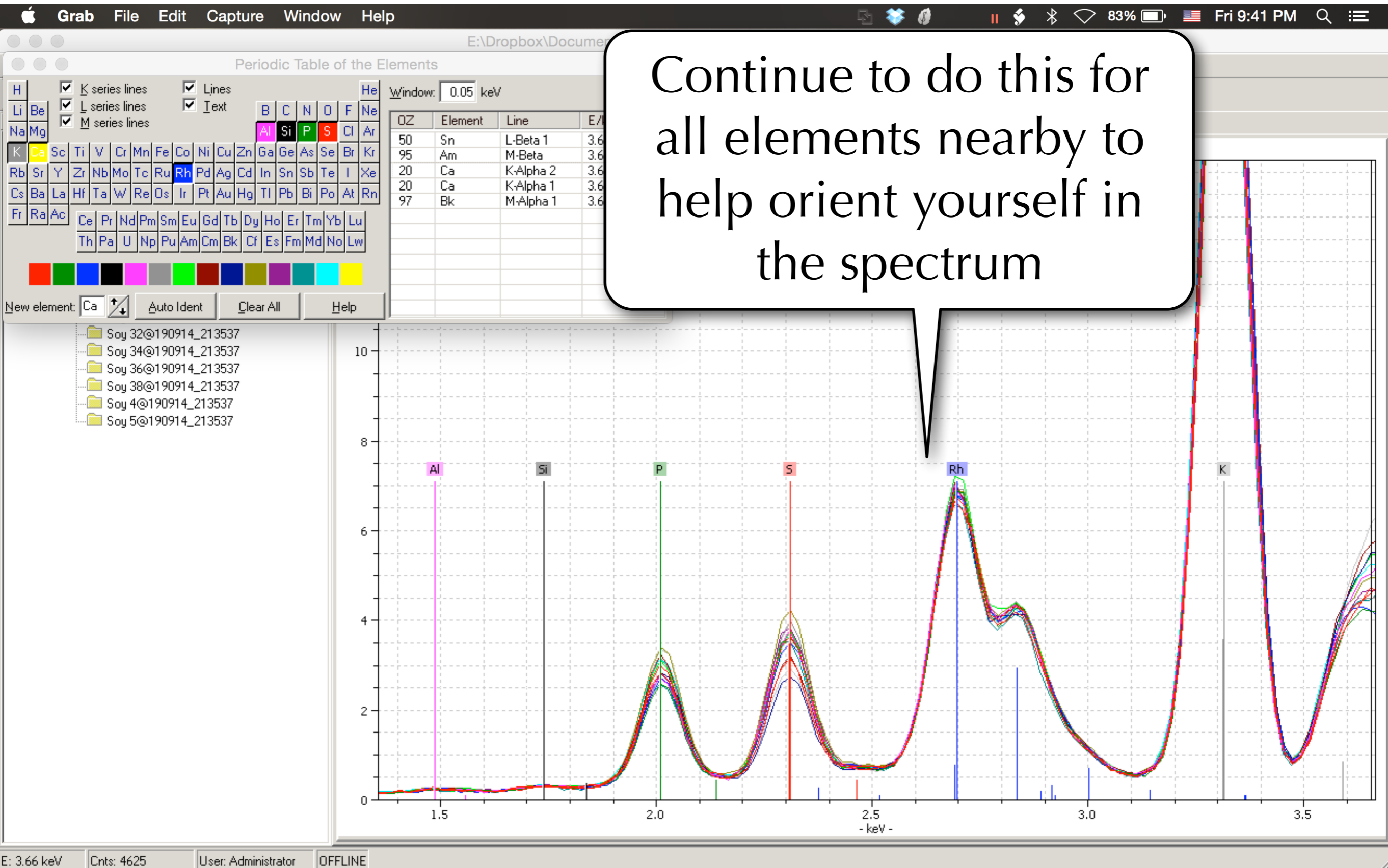


# ROI Analysis

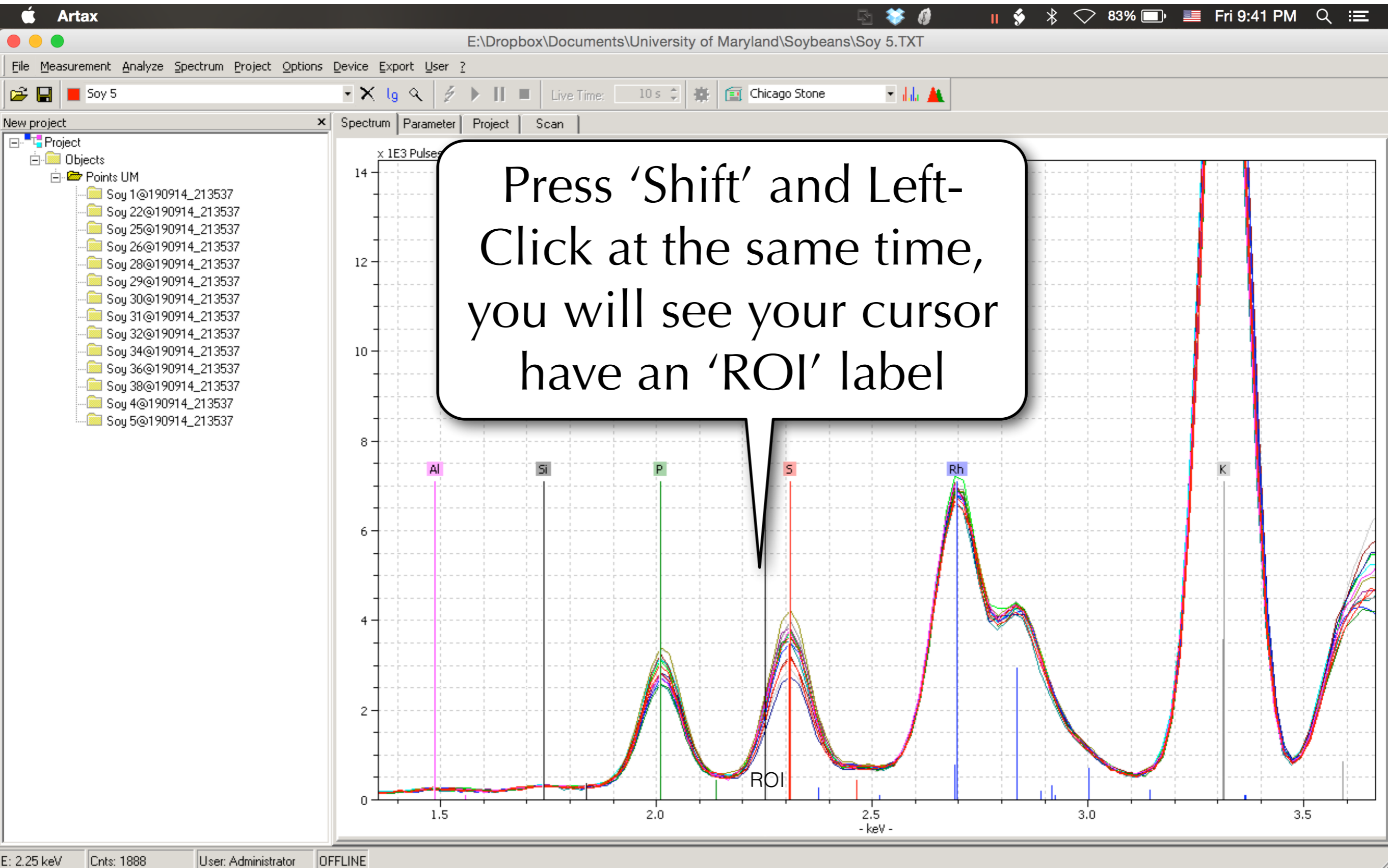




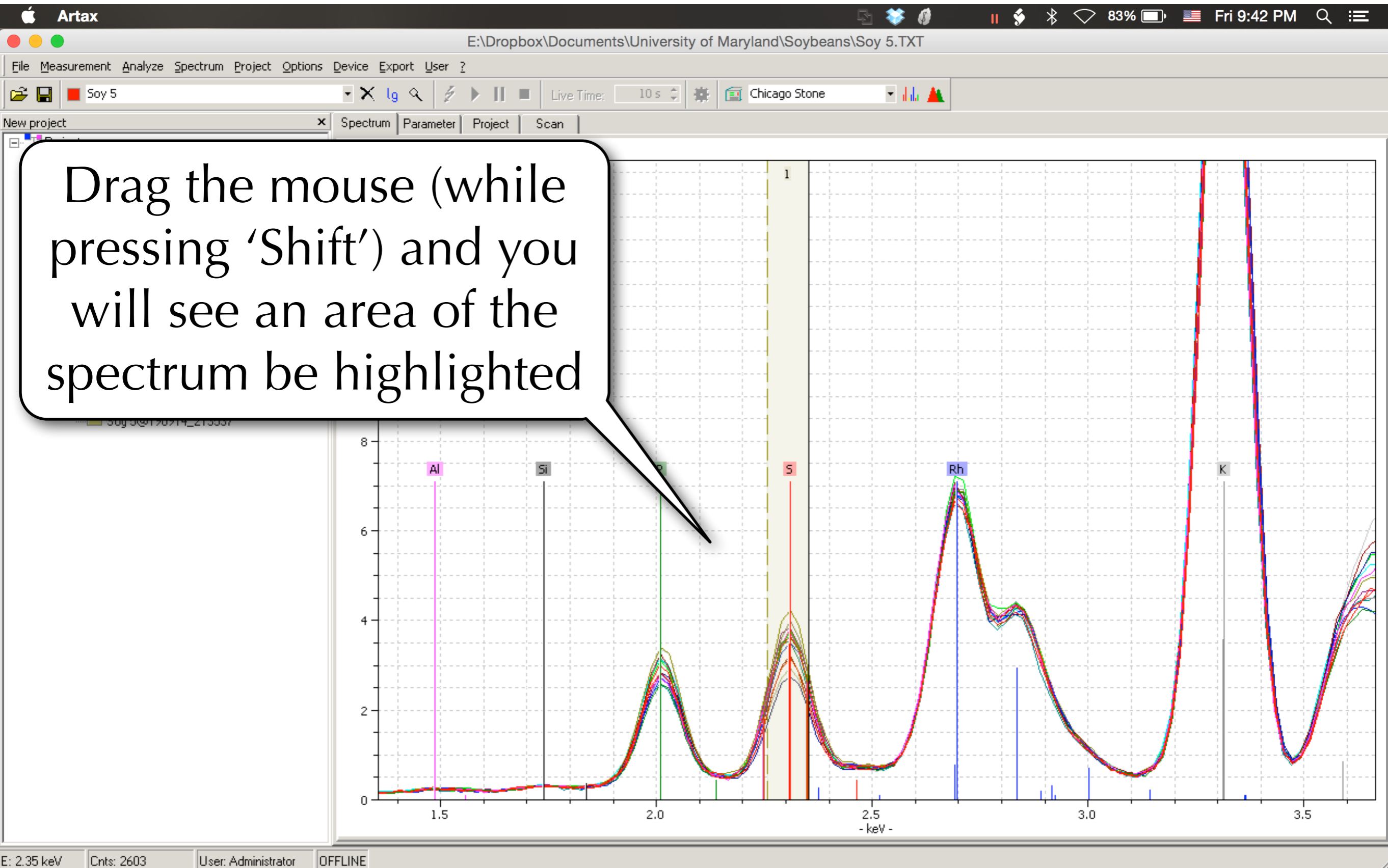
# ROI Analysis



# ROI Analysis

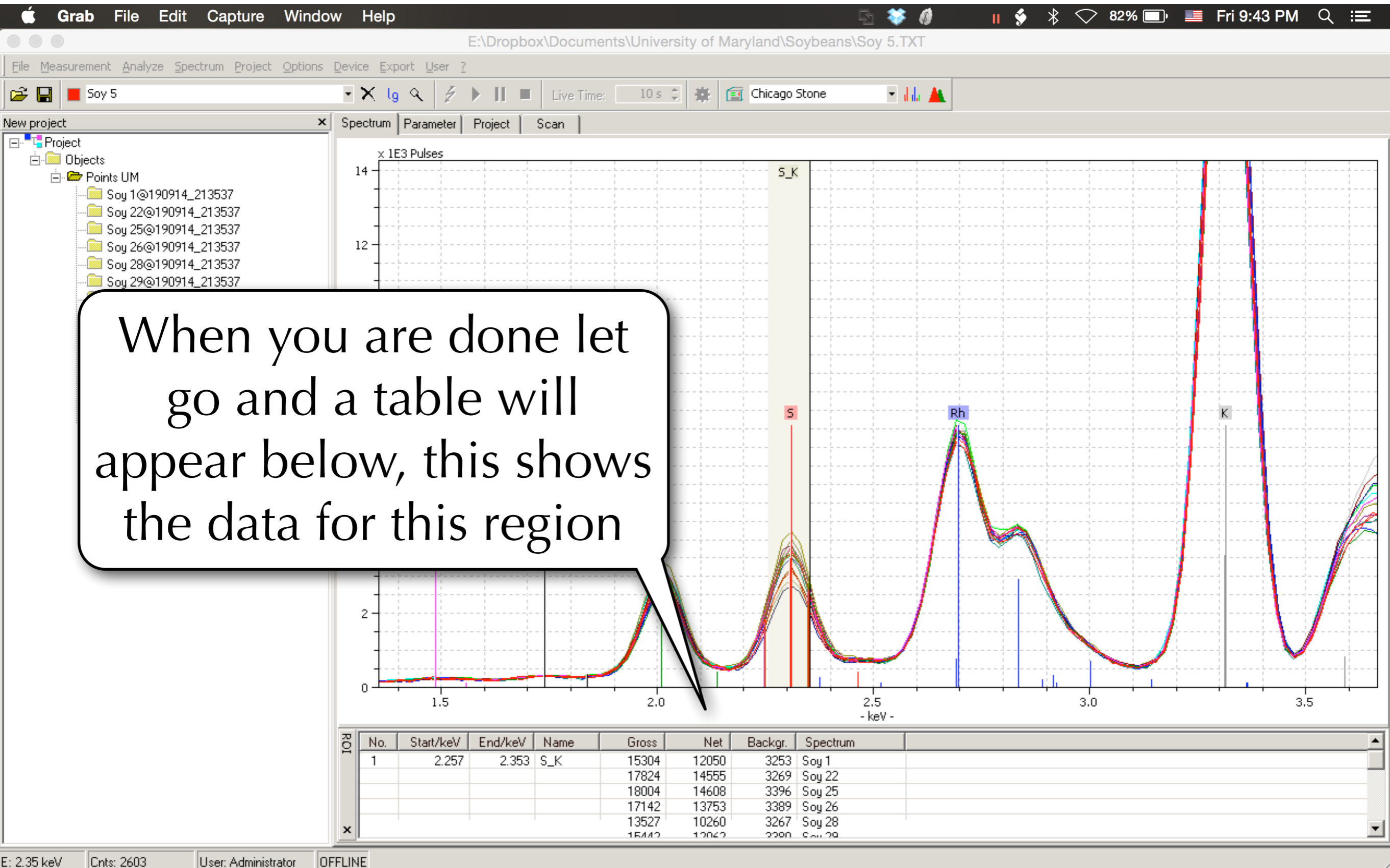


# ROI Analysis

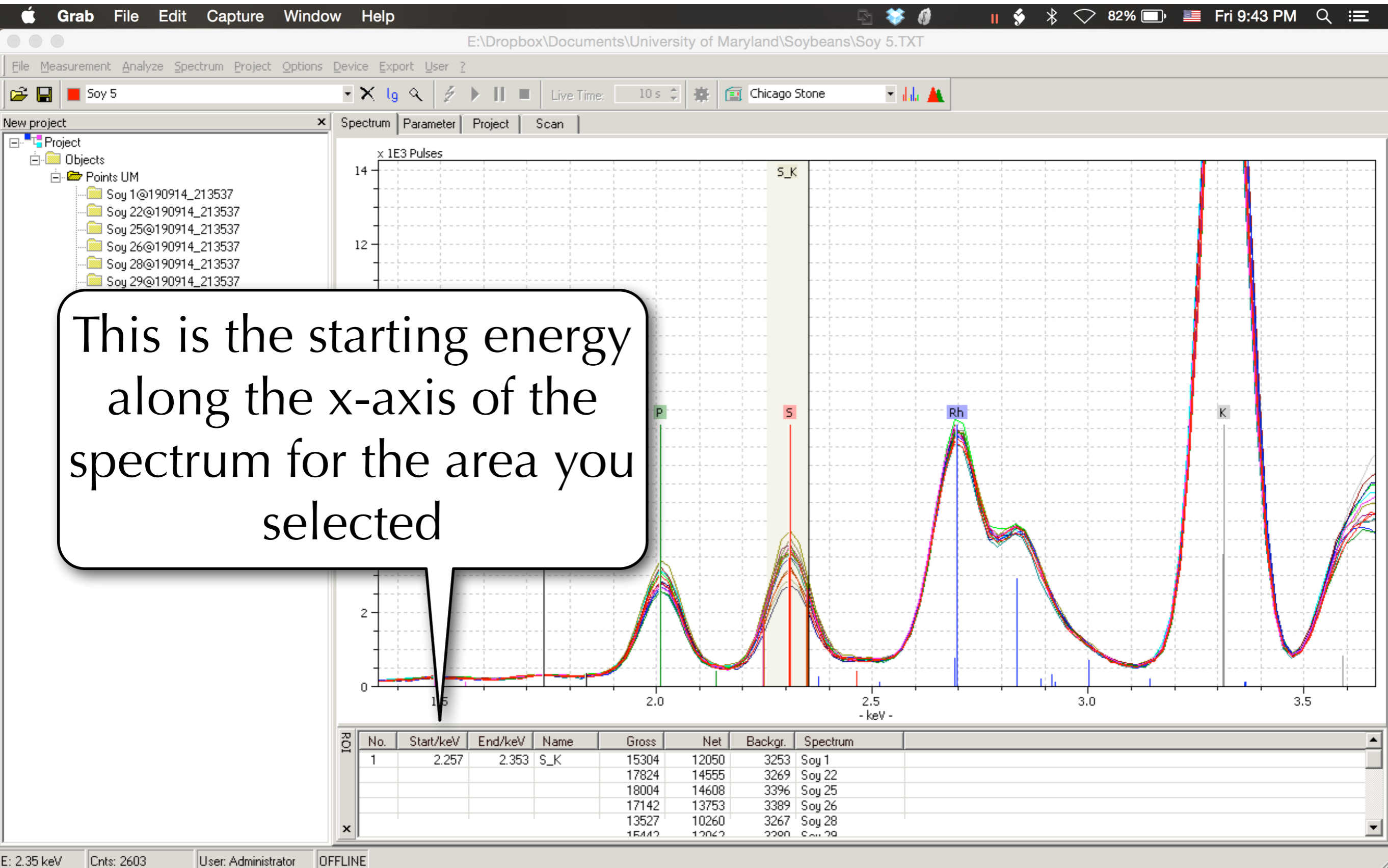




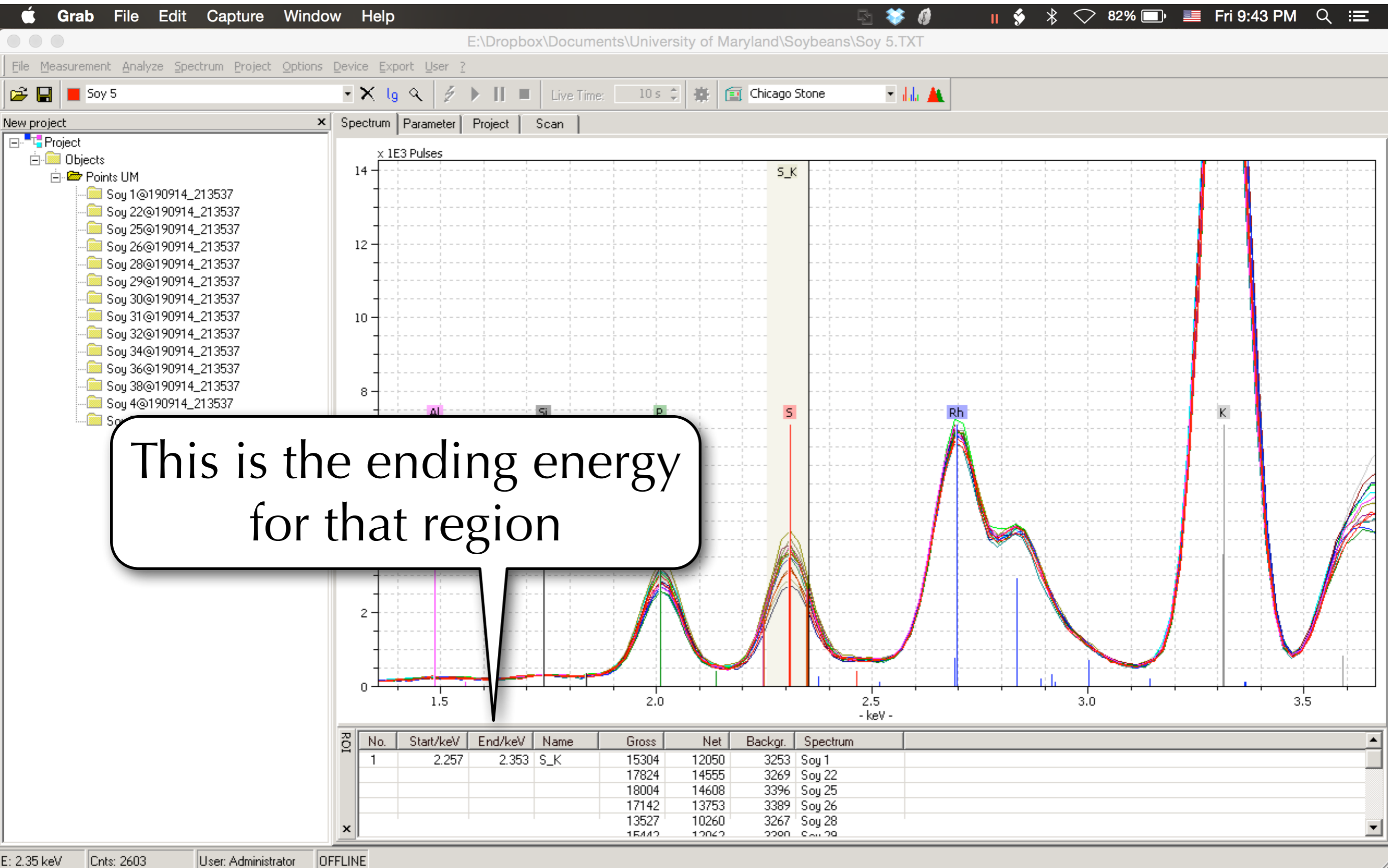
# ROI Analysis



# ROI Analysis

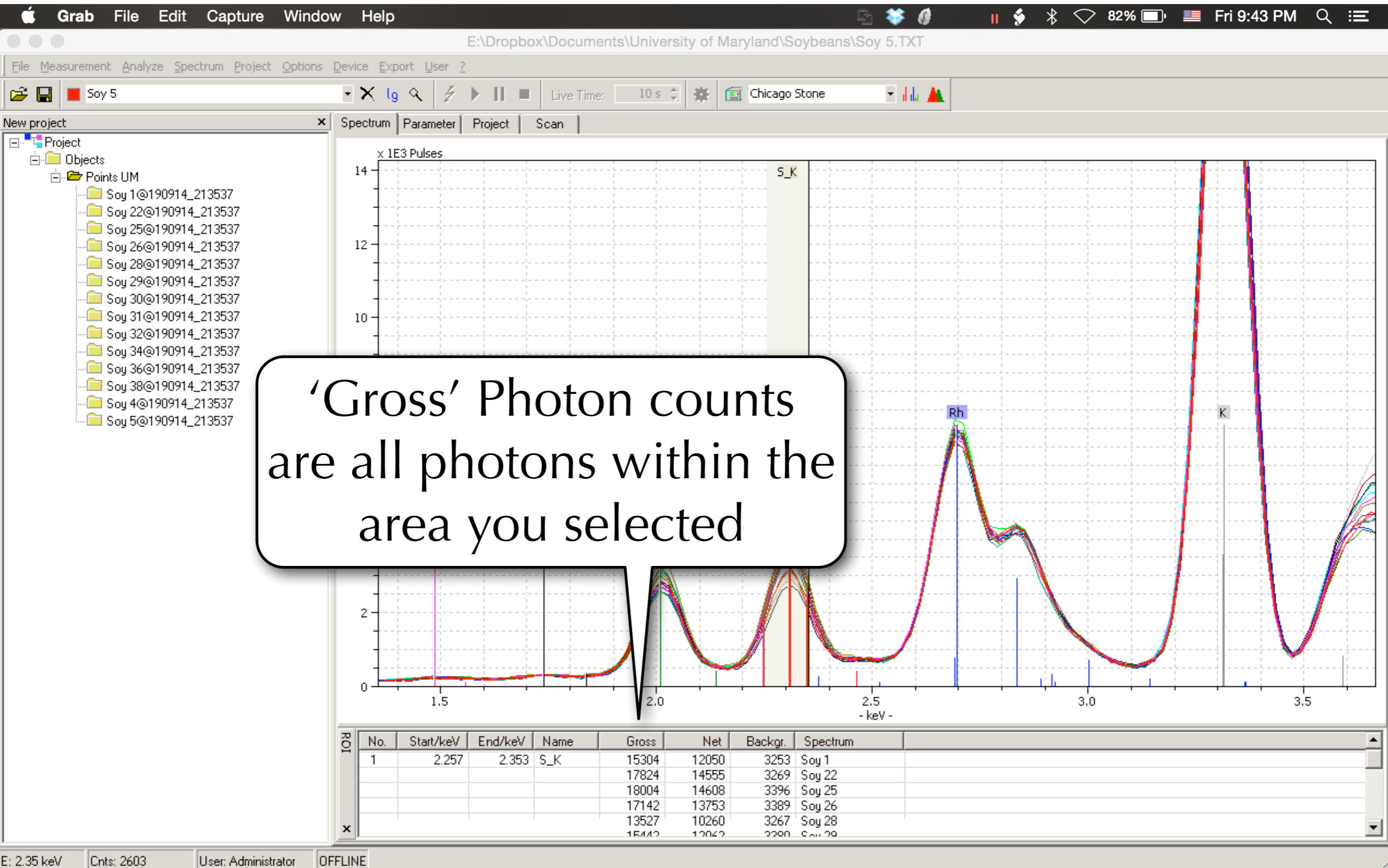


# ROI Analysis

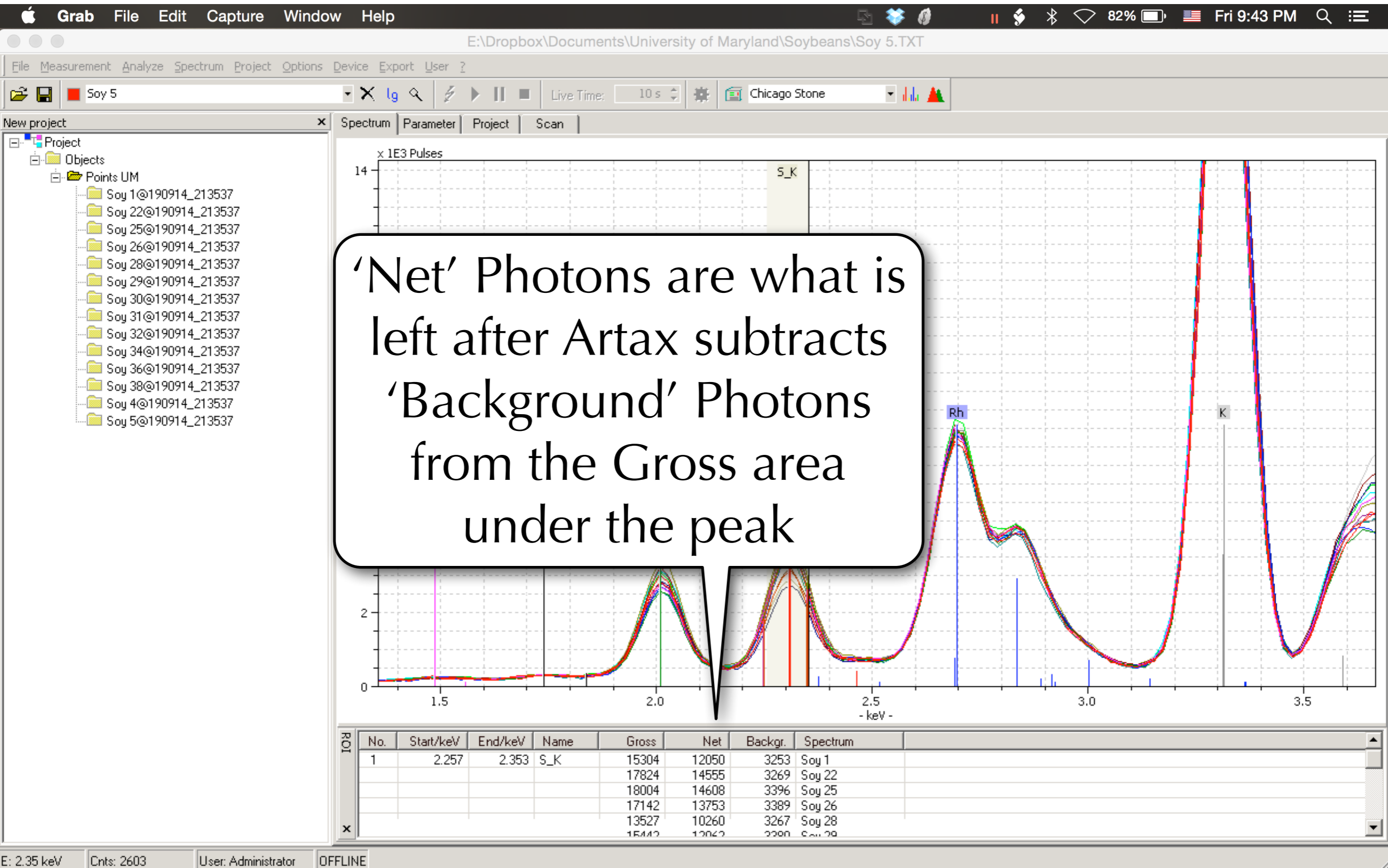




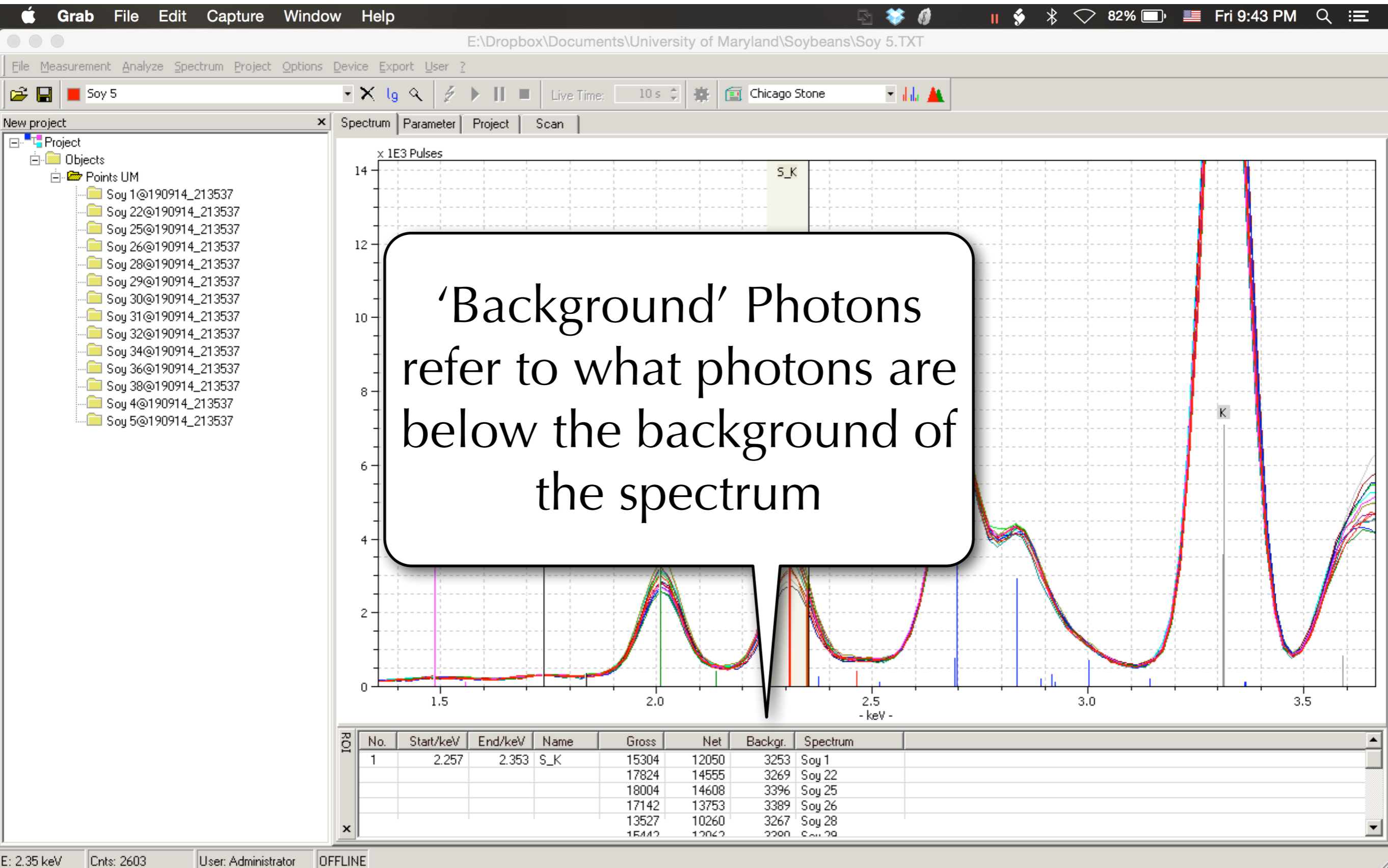
# ROI Analysis



# ROI Analysis

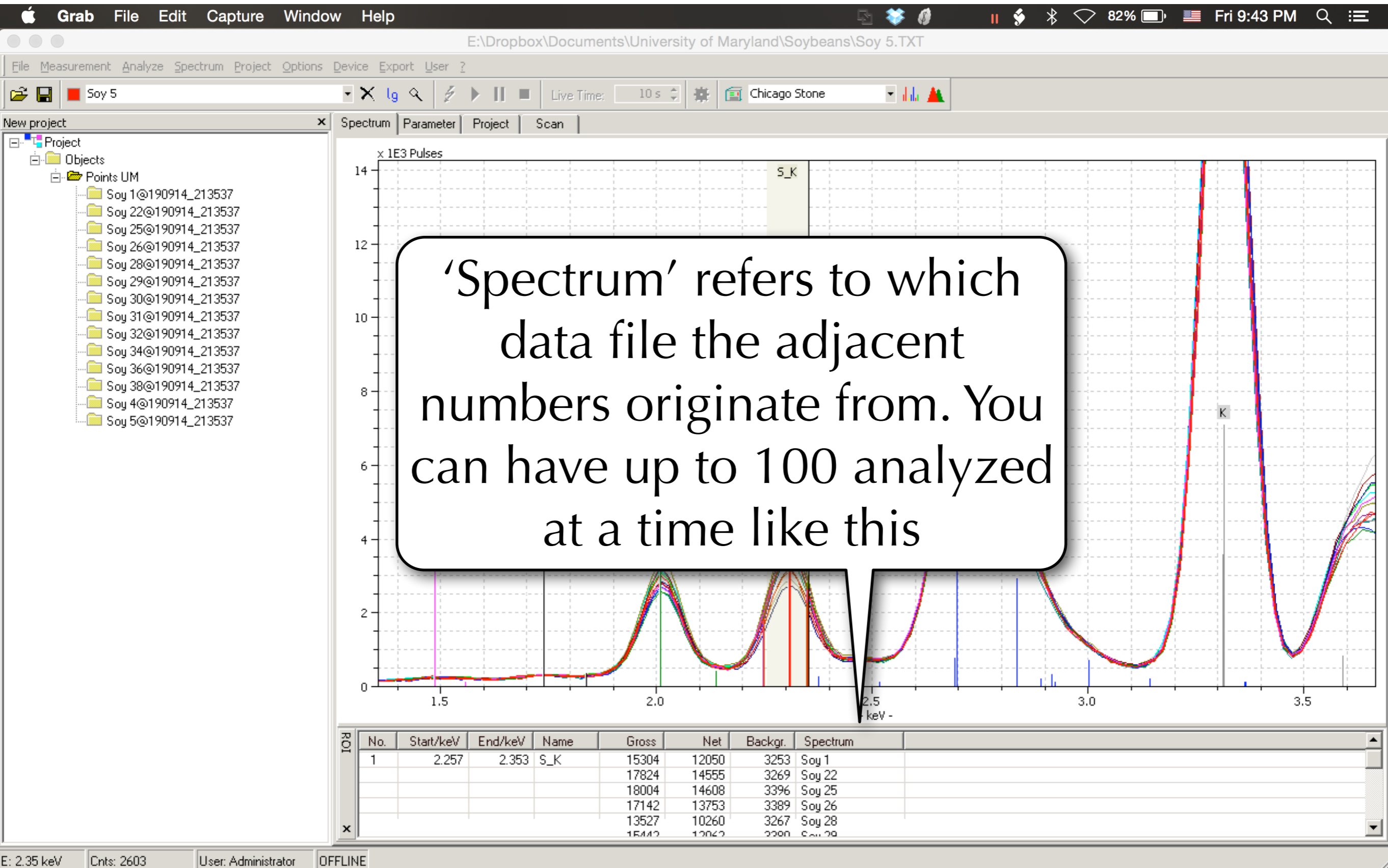


# ROI Analysis





# ROI Analysis



# ROI Analysis

Artax

E:\Dropbox\Documents\University of Maryland\Soybeans\Soy 5.TXT

File Measurement Analyze Spectrum Project Options Device Export User ?

Soy 5

Live Time: 10 s Chicago Stone

New project

Project

- Objects
  - Points UM
    - Soy 1@190914\_213537
    - Soy 22@190914\_213537
    - Soy 25@190914\_213537
    - Soy 26@190914\_213537
    - Soy 28@190914\_213537
    - Soy 29@190914\_213537
    - Soy 30@190914\_213537
    - Soy 31@190914\_213537
    - Soy 32@190914\_213537
    - Soy 34@190914\_213537
    - Soy 36@190914\_213537
    - Soy 38@190914\_213537
    - Soy 4@190914\_213537
    - Soy 5@190914\_213537

Spectrum

Parameter Project Scan

x 1E3 Pulses

Al Si P S Rh K

2

0 1.5 2.0 2.5 - keV - 3.0 3.5

ROI	No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum
	1	2.257	2.353	S_K	15304	12050	3253	Soy 1
					17824	14555	3269	Soy 22
					18004	14608	3396	Soy 25
					17142	13753	3389	Soy 26
					13527	10260	3267	Soy 28
					15442	12042	3200	Soy 29

Delete ROI

Delete All ROI

Copy ROI

E: 2.35 keV Cnts: 2603 User: Administrator OFFLINE

# ROI Analysis

The screenshot shows a Numbers spreadsheet with a table containing the following data:

No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum
1	2.257	2.353	S_K	15304	12050	3253	Soy 1
				17824	14555	3269	Soy 22
				18004	14608	3396	Soy 25
				17142	13753	3389	Soy 26
				13527	10260	3267	Soy 28
				15442	12062	3380	Soy 29
				20422	16739	3683	Soy 30
				18957	15549	3408	Soy 31
				17710	14244	3466	Soy 32
				17819	14290	3529	Soy 34
				19057	15482	3576	Soy 36
				14465	11082	3384	Soy 38
				17192	13945	3247	Soy 4
				17715	14225	3490	Soy 5

At the bottom of the spreadsheet, summary statistics are displayed:

- SUM: 481,166.61
- AVERAGE: 10,692.591333...
- MIN: 1
- MAX: 20,422
- COUNTA: 68

A callout box on the right side of the spreadsheet contains the text: "You can then paste this data in the application of your choice".



# ROI Analysis

Artax

E:\Dropbox\Documents\University of Maryland\Soybeans\Soy 5.TXT

File Measurement Analyze Spectrum Project Options Device Export User ?

Live Time: 10 s Chicago Stone

um Parameter Project Scan

x 1E3 Pulses

S\_K

Rh

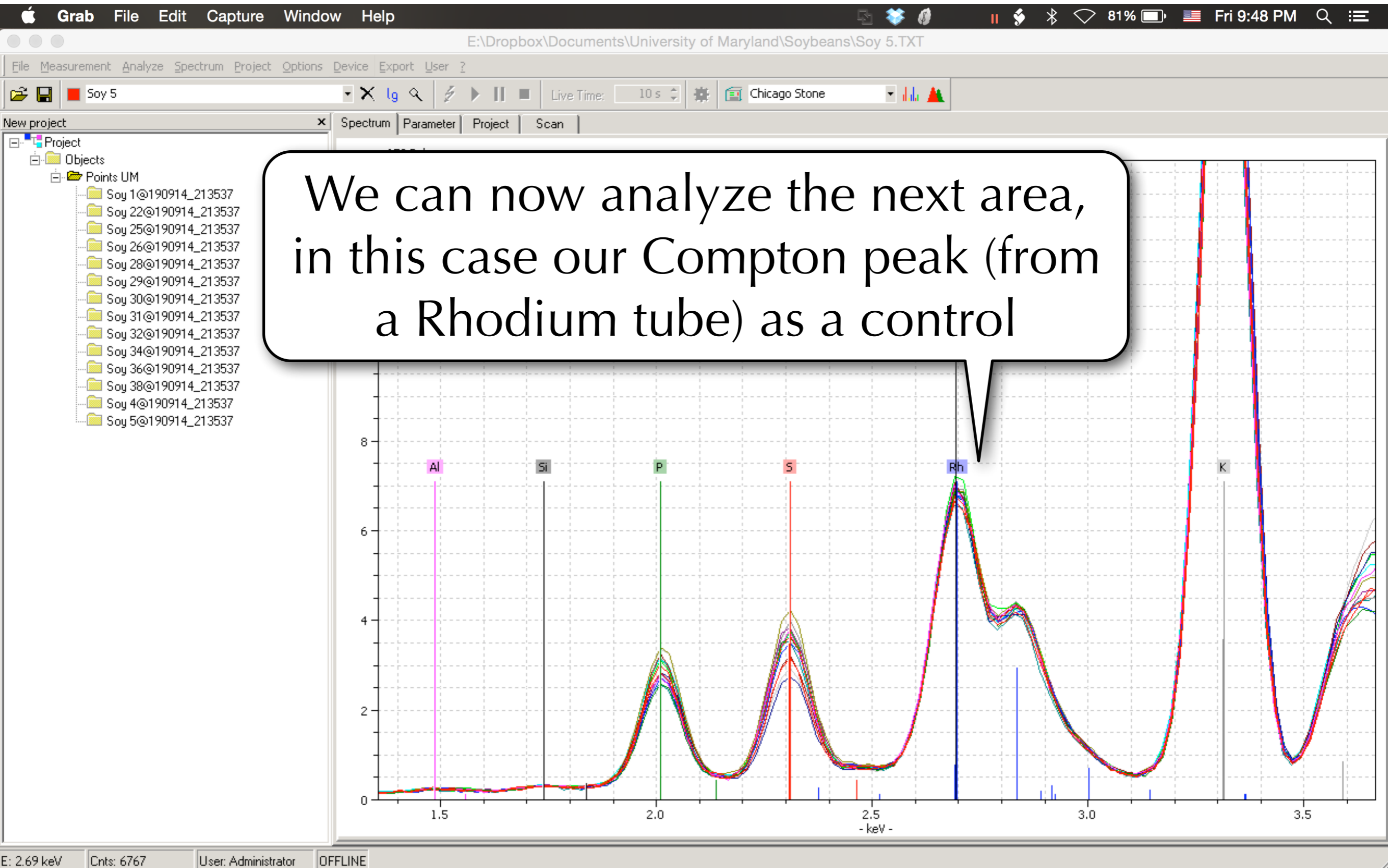
K

Once this is done, go to 'Spectrum' in the Menu Bar and select 'Delete All ROI'

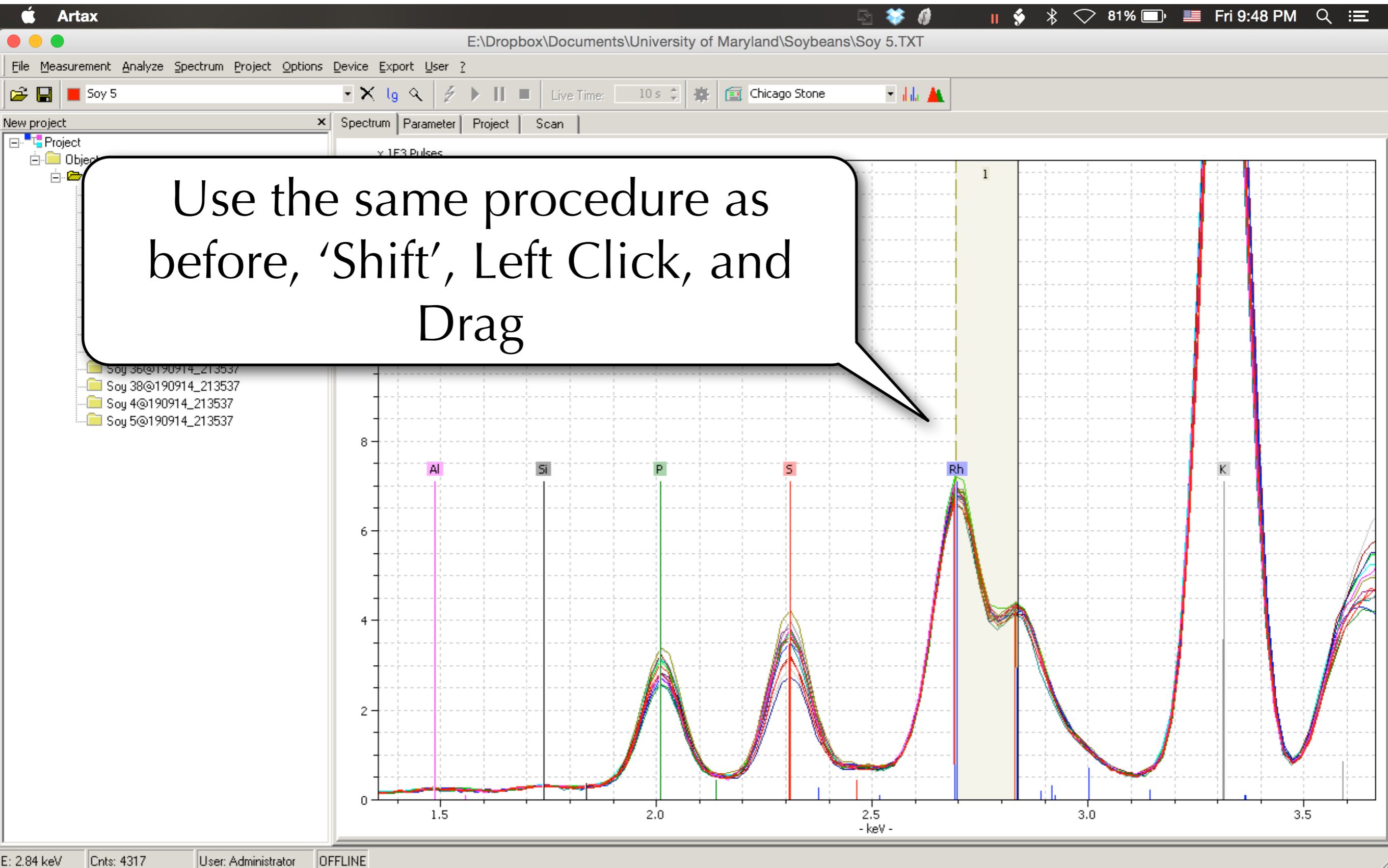
ROI	No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum
	1	2.257	2.353	S_K	15304	12050	3253	Soy 1
					17824	14555	3269	Soy 22
					18004	14608	3396	Soy 25
					17142	13753	3389	Soy 26
					13527	10260	3267	Soy 28
					15442	12042	3200	Soy 29

E: 2.35 keV Cnts: 2603 User: Administrator OFFLINE

# ROI Analysis



# ROI Analysis





# ROI Analysis

Artax

E:\Dropbox\Documents\University of Maryland\Soybeans\Soy 5.TXT

File Measurement Analyze Spectrum Project Options Device Export User ?

Soy 5 Live Time: 10 s Chicago Stone

New project x Spectrum Parameter Project Scan

Project

- Objects
  - Points UM
    - Soy 1@190914\_213537
    - Soy 22@190914\_213537
    - Soy 25@190914\_213537
    - Soy 26@190914\_213537
    - Soy 28@190914\_213537
    - Soy 29@190914\_213537
    - Soy 30@190914\_213537
    - Soy 31@190914\_213537
    - Soy 32@190914\_213537
    - Soy 34@190914\_213537
    - Soy 36@190914\_213537
    - Soy 38@190914\_213537
    - Soy 4@190914\_213537
    - Soy 5@190914\_213537

x 1E3 Pulses

Al Si P S Rh Rh\_L K

2 1.5 2.0 2.5 - keV - 3.0 3.5

ROI

No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum
1	2.494	2.838	Rh_L	39902	34683	5219	Soy 1
				40662	35461	5201	Soy 22
				41648	36146	5502	Soy 25
				40667	35397	5271	Soy 26
				40176	34865	5311	Soy 28
				41402	36072	5330	Soy 29

Delete ROI  
Delete All ROI  
Copy ROI

E: 2.84 keV Cnts: 4317 User: Administrator OFFLINE

# ROI Analysis

The screenshot shows a Numbers spreadsheet with a table of ROI data. The table has 12 columns: No., gr., Spectrum, No., Start/keV, End/keV, Name, Gross, Net, Backgr., and Spectrum. The data is organized into rows for different Soy products, with the first row being a header for 'Rh\_L' and subsequent rows listing 'Soy 1' through 'Soy 38' and 'Soy 4' through 'Soy 5'. A callout bubble points to the table with the text 'And then paste it in the same spreadsheet'.

No.	gr.	Spectrum	No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum
1	1	3253 Soy 1	1	2.694	2.838	Rh_L	39902	34683	5219	Soy 1
2		3269 Soy 22					40662	35461	5201	Soy 22
3		3396 Soy 25					41648	36146	5502	Soy 25
4		3389 Soy 26					40667	35397	5271	Soy 26
5		3267 Soy 28					40176	34865	5311	Soy 28
6		3380 Soy 29					41602	36072	5530	Soy 29
7		3683 Soy 30					41929	36313	5616	Soy 30
8		3408 Soy 31					41105	35768	5337	Soy 31
9		3466 Soy 32					41024	35610	5414	Soy 32
10		3529 Soy 34					42753	37291	5462	Soy 34
11		3576 Soy 36					41750	36262	5488	Soy 36
12		3384 Soy 38					40593	35286	5307	Soy 38
13		3247 Soy 4					39364	34325	5039	Soy 4
14		3490 Soy 5					40861	35474	5387	Soy 5

And then paste it in the same spreadsheet

# ROI Analysis

Grab File Edit Capture Window Help

Untitled.numbers — Edited

125% View Zoom

Function Table Chart Text Shape Media Comment

Share Tips

Format Sort & Filter

Sheet 1

A L M N O P Q R S T

Artax ROI Analysis

No.	Name	Gross	Net	Backgr.	Spectrum	Normalized
138	Rh_L	39902	34683	5219	Soy 1	
		40662	35461	5201	Soy 22	
		41648	36146	5502	Soy 25	
		40667	35397	5271	Soy 26	
		40176	34865	5311	Soy 28	
		41602	36072	5530	Soy 29	
		41929	36313	5616	Soy 30	
		41105	35768	5337	Soy 31	
		41024	35610	5414	Soy 32	
		42753	37291	5462	Soy 34	
		41750	36262			
		40593	35286			
		39364	34325			
		40861	35474			

Table Styles

Headers & Footer

Table Name

Table Font Size A A

Table Outline 0.35 pt  Outline table name

Grid Lines

Alternating Row Color

Row & Column Size

Formatted Normalized

I can now normalize my Sulfur data to the Compton Peak



# ROI Analysis

The screenshot shows a Numbers spreadsheet titled "Artax ROI Analysis" with columns for No., Name, Gross, Net, Backgr., Spectrum, and Normalized. A callout box points to the '=' key in the formula bar, with the text: "Hit the '=' key on the keyboard to create a formula".

No.	Name	Gross	Net	Backgr.	Spectrum	Normalized
1	38 Rh_L	39902	34683	5219	Soy 1	
3		40662	35461	5201	Soy 22	
4		41648	36146	5502	Soy 25	
5		40667	35397	5271	Soy 26	
6		40176	34865	5311	Soy 28	
7		41602	36072	5530	Soy 29	
8		41929	36313	5616	Soy 30	
9		41105	35768	5337	Soy 31	
10		41024	35610	5414	Soy 32	
11		42753	37291	5462	Soy 34	
12		41750	36262			
13		40593	35286			
14		39364	34325			
15		40861	35474			

**Functions**

Search

- All
- Recent
- Date and Time
- Duration
- Engineering
- Financial
- Logical & Info
- Numeric
- Reference
- Statistical
- Text
- Trigonometric

ABS  
ACCRINT  
ACCRINTM  
ACOS  
ACOSH  
ADDRESS  
AND  
AREAS  
ASIN  
ASINH  
ATAN  
ATAN2  
ATANH

Insert Function

**fx ABS**

The ABS function returns the absolute value of a number value or of a duration value.

$ABS(num-dur)$

- num-dur:** A number value or duration value.

**Notes**

- The result returned by ABS is either a positive number value, positive duration value, or 0.

**Examples**

- $=ABS(A1)$  returns 5, if cell A1 contains 5.
- $=ABS(8-5)$  returns 3.
- $=ABS(5-8)$  returns 3.
- $=ABS(0)$  returns 0.

# ROI Analysis

The screenshot shows a Numbers spreadsheet with a table of data. A callout box points to the 'Gross' value of 15304 for the 'S\_K' entry. The 'Formula Result' bar at the bottom shows the value 15304.

No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum	No.	Start/keV	End/keV
1										
2	1	2.257	2.353	S_K	15304	12050	3253	E2	1	2.694
3				17824	14555	3269	Soy 22			
4				8004	14608	3396	Soy 25			
5				7142	13753	3389	Soy 26			
6				3527	10260	3267	Soy 28			
7				5442	12062	3380	Soy 29			
8				0422	16739	3683	Soy 30			
9				8957	15549	3408	Soy 31			
10				7710	14244	3466	Soy 32			
11				819	14290	3529	Soy 34			
12				057	15482	3576	Soy 36			
13							Soy 38			
14							Soy 4			
15							Soy 5			

Then select the Sulfur  
Gross Photons

Formula Result: 15304

**Functions**

Search

- All
- Recent
- Date and Time
- Duration
- Engineering
- Financial
- Logical & Info
- Numeric
- Reference
- Statistical
- Text
- Trigonometric

ABS

The ABS function returns the absolute value of a number value or of a duration value.

ABS(num-dur)

- num-dur: A number value or duration value.

**Notes**

- The result returned by ABS is either a positive number value, positive duration value, or 0.

**Examples**

- =ABS(A1) returns 5, if cell A1 contains 5.
- =ABS(8-5) returns 3.
- =ABS(5-8) returns 3.
- =ABS(0) returns 0.

# ROI Analysis

The screenshot shows a Numbers spreadsheet with a table of ROI data. The table has columns for No., Gross, Net, Backgr., Spectrum, No., Start/keV, End/keV, Name, Gross, and Net. A formula bar above the table shows the formula  $=E2 \div M2$ . A callout box points to the formula bar with the text "And divide them by Rhodium". The function panel on the right shows the ABS function details.

No.	Gross	Net	Backgr.	Spectrum	No.	Start/keV	End/keV	Name	Gross	Net
1	15304	12050	3253	Soy 1	1	2.0			39902	
	17824	14555	3269	Soy 22					40662	
	18004	14608	3396	Soy 25					41648	
	17142	13753	3389	Soy 26					40667	
	13527	10260	3267	Soy 28					40176	
	15442	12062	3380	Soy 29					41602	
	20422	16739	3683	Soy 30					41929	
	18957	15549	3408	Soy 31					41105	
	17710	14244	3466	Soy 32					41024	
	17819	14290	3529	Soy 34					42753	
	19057	15482	3576	Soy 36					41750	
	14465	11082	3384	Soy 38						
	17192	13945	3247	Soy 4						
	17715	14225	3490	Soy 5						

Formula Result: 0.383539672196882

Function Panel: ABS

The ABS function returns the absolute value of a number value or of a duration value.

$ABS(num-dur)$

- num-dur:** A number value or duration value.

**Notes**

- The result returned by ABS is either a positive number value, positive duration value, or 0.

**Examples**

- $=ABS(A1)$  returns 5, if cell A1 contains 5.
- $=ABS(8-5)$  returns 3.
- $=ABS(5-8)$  returns 3.
- $=ABS(0)$  returns 0.



# ROI Analysis

The screenshot shows a Numbers spreadsheet titled "Artax ROI Analysis". The table contains the following data:

No.	eV	Name	Gross	Net	Backgr.	Spectrum	Normalized
1	2.838	Rh_L	39902	34683	5219	Soy 1	0.38353967219
			40662	35461	5201	Soy 22	
			41648	36146	5502	Soy 25	
			40667	35397	5271	Soy 26	
			40176	34865	5311	Soy 28	
			41602	36072	5530	Soy 29	
			41929	36313	5616	Soy 30	
			41105	35768	5337	Soy 31	
			41024	35610	5414	Soy 32	
			42753	37291	5462	Soy 34	
			41750	36262	5488	Soy 36	
			40593	35286			
			39364	34325			
			40861	35474			

A callout box points to the value 0.38353967219 in the "Normalized" column of the first row, with the text: "This gives you your normalized photons".

The spreadsheet interface includes a menu bar (Grab, File, Edit, Capture, Window, Help), a toolbar (Function, Table, Chart, Text, Shape, Media, Comment), and a right-hand sidebar with options for Table, Cell, Text, and Arrange. The sidebar also shows "Table Styles", "Headers & Footer", "Table Font Size", "Table Outline", "Grid Lines", and "Row & Column Size".

# ROI Analysis

Grab File Edit Capture Window Help

Untitled.numbers — Edited

View Zoom 125%

Function Table Chart Text Shape Media Comment

Share Tips

Format Sort & Filter

Sheet 1

Table Cell Text Arrange

Table Styles

Headers & Footer

Table Font Size

Table Outline

Grid Lines

Alternating Row Color

Row & Column Size

SUM 5.863392235 AVERAGE 0.418813731 MIN 0.336693548 MAX 0.487061461 COUNTA 14

No.	eV	Name	Gross	Net	Backgr.	Spectrum	Normalized
1	2.838	Rh_L	39902	34683	5219	Soy 1	0.38353967219
			40662	35461	5201	Soy 22	0.43834538389
			41648	36146	5502	Soy 25	0.43228966577
			40667	35397	5271	Soy 26	0.42152113507
			40176	34865	5311	Soy 28	0.33669354838
			41602	36072	5530	Soy 29	0.37118407768
			41929	36313	5616	Soy 30	0.48706146104
			41105	35768	5337	Soy 31	0.46118477070
			41024	35610	5414	Soy 32	0.43169851794
			42753	37291	5462	Soy 34	0.41678946506
			41750	36262	5488	Soy 36	0.45645508982
			40593	35286	5307	Soy 38	0.35634222649
			39364	34325	5039	Soy 4	0.43674423330
							0.43354298720

Artax ROI Analysis

Copy and paste this into your spreadsheet

# ROI Analysis

Artax ROI Analysis

No.	Backgr.	Spectrum	Normalized	Known
1	34683	5219 Soy 1	0.38353967219	2.61
2	35461	5201 Soy 22	0.43834538389	2.44
3	36146	5502 Soy 25	0.43228966577	3.05
4	35397	5271 Soy 26	0.42152113507	2.75
5	34865	5311 Soy 28	0.33669354938	1.98
6	36072	5530 Soy 29	0.37118407168	2.14
7	36313	5616 Soy 30	0.48706141004	3.44
8	35768	5337 Soy 31	0.46118410070	2.94
9	35610	5414 Soy 32	0.4316917794	3.2
10	37291	5462 Soy 34	0.416791506	2.82
11	36262	5488 Soy 36	0.456418982	2.8
12				2.17
13				4.1
14				2.85

SUM 45.153392235    AVERAGE 1.612621151    MIN 0.336693548    MAX 4.1    COUNTA 30

Now you can compare this data to known values as a quality test



# ROI Analysis

The screenshot shows the Numbers application interface. The main window displays a table with the following data:

No.	Backgr.	Spectru
1	34683	5219 Soy 1
2	35461	5201 Soy 22
3	36146	5502 Soy 25
4	35397	5271 Soy 26
5	34865	5311 Soy 28
6	36072	5530 Soy 29
7	36313	5616 Soy 30
8	35768	5337 Soy 31
9	35610	5414 Soy 32
10	37291	5462 Soy 34
11	36262	5488 Soy 36
12	35286	5307 Soy 38
13	34325	5039 Soy 4
14	35474	5387 Soy 5

A chart selection menu is open, showing various chart types under '2D', '3D', and 'Interactive' categories. A callout box points to a scatterplot option in the '2D' category.

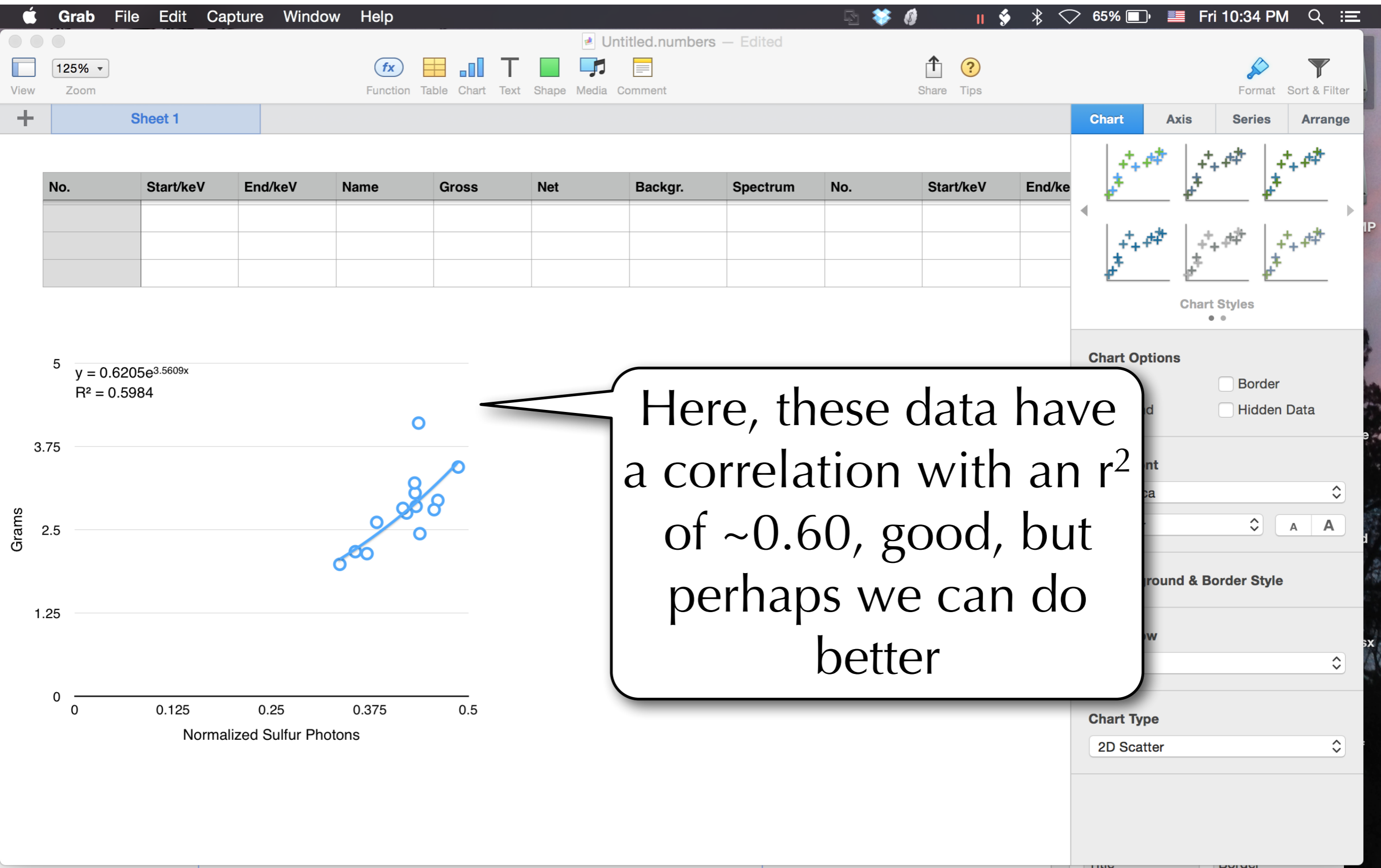
The right sidebar shows the 'Table' style panel, which includes options for 'Table Styles', 'Headers & Footer', 'Table Font Size', and 'Table Outline'. The 'Table Name' checkbox is checked.

The status bar at the bottom displays summary statistics: SUM 45.153392235, AVERAGE 1.612621151, MIN 0.336693548, MAX 4.1, and COUNTA 30.

System status at the top right shows: Fri 10:29 PM, 67% battery, and various system icons.

A scatterplot can be made to compare the normalized photons to known values

# ROI Analysis

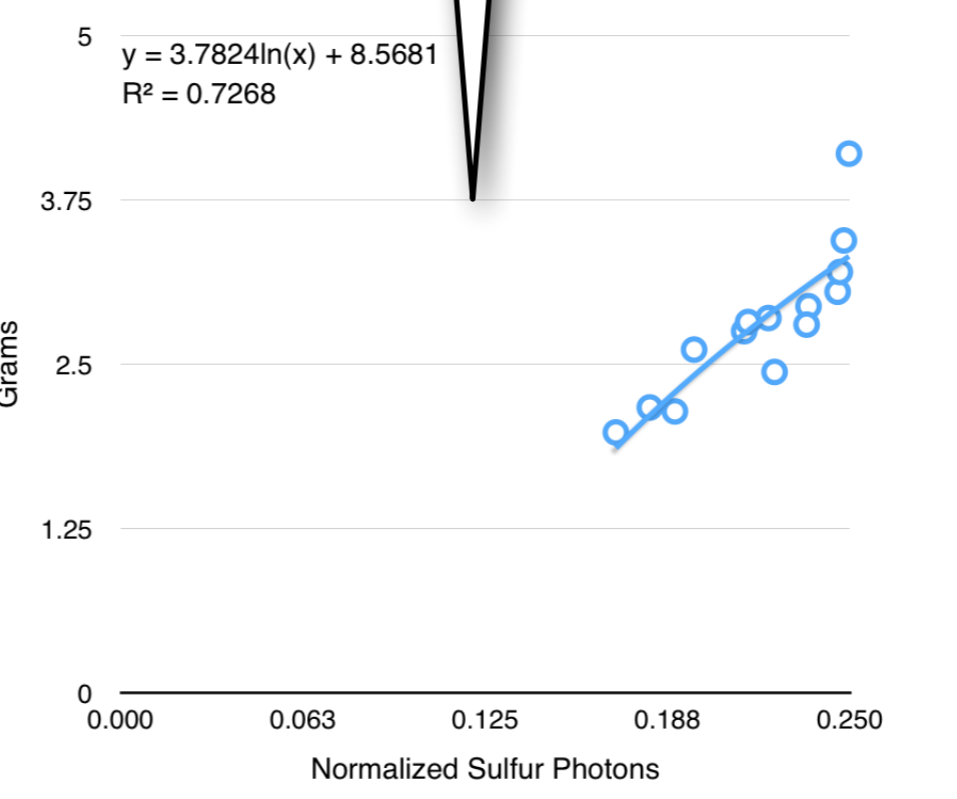
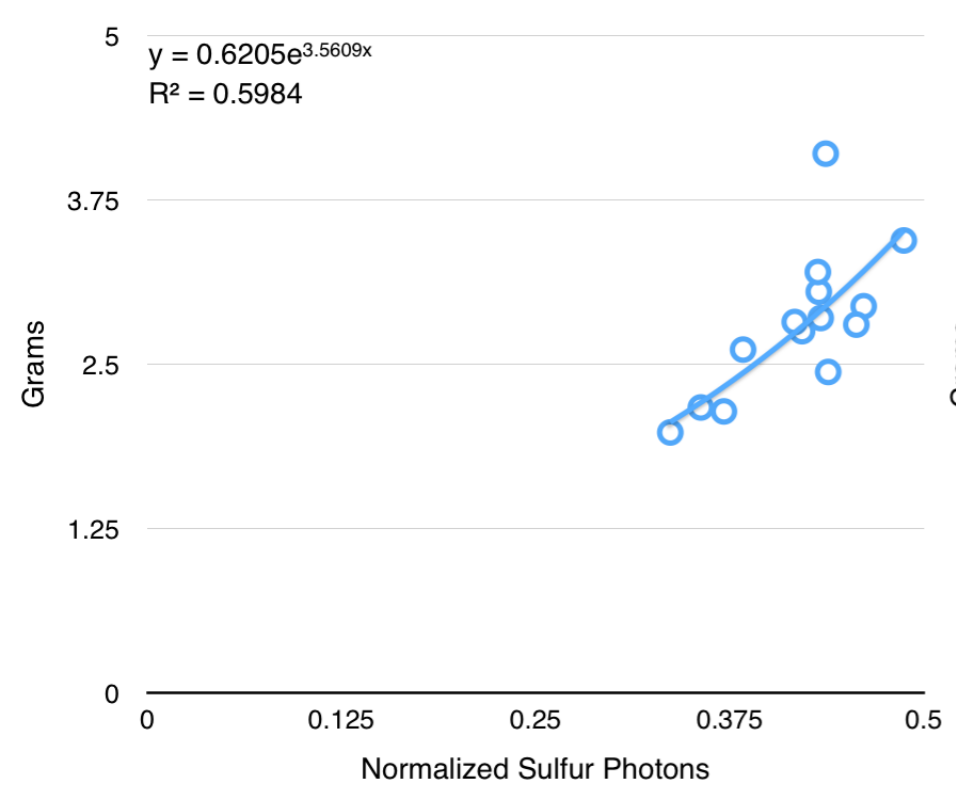


# ROI Analysis

For comparison, a different area of Compton was selected, using more of that peak

No.	Start/keV	End/keV	N

No.	Start/keV	End/keV	N



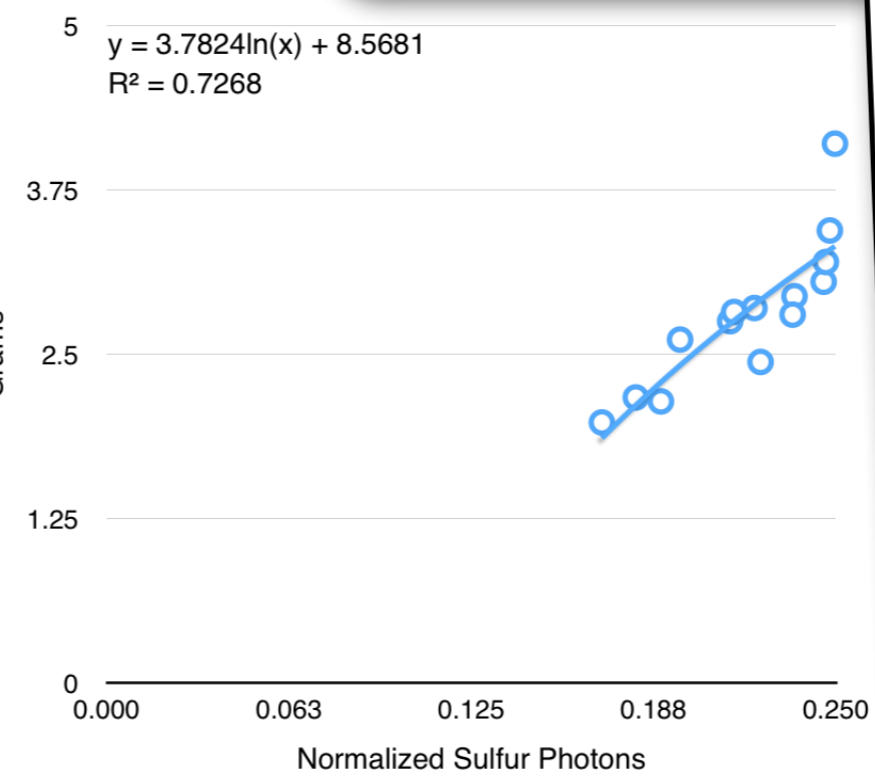
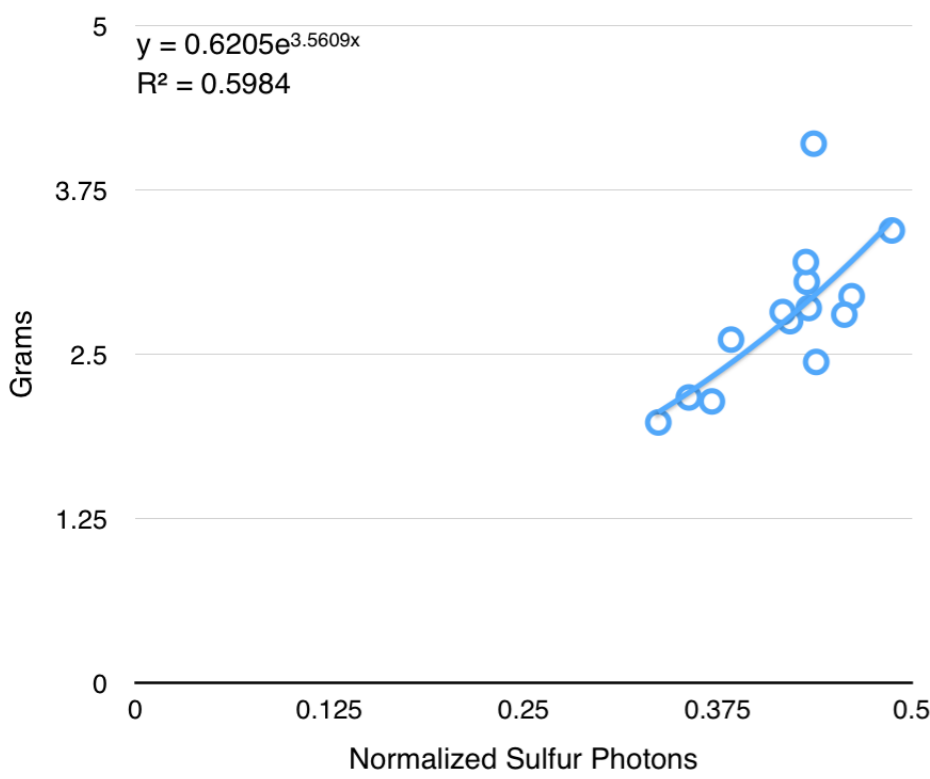
Nothing selected.  
Select an object to format.



# ROI Analysis

No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum	No.	Start/keV	End/keV

This can be seen as the Sulfur:Compton ratio is lower



Nothing selected.  
Select an object to format.

# ROI Analysis

Grab File Edit Capture Window Help

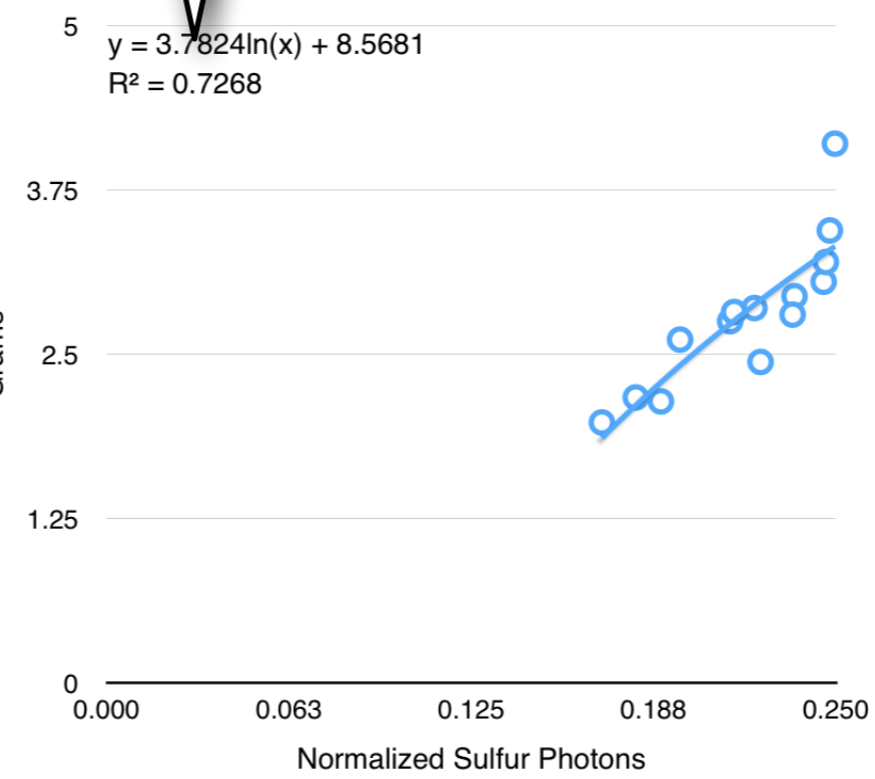
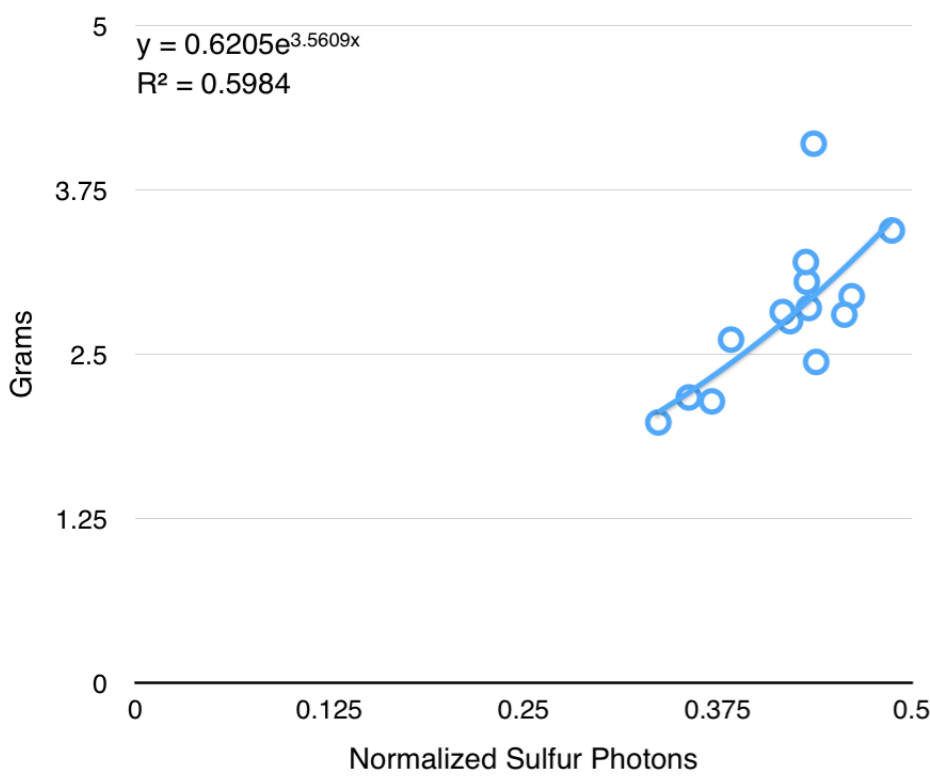
65% Fri 10:34 PM

Untitled.numbers — Edited

Function Table Chart Text Shape Media Comment Share Tips Format Sort & Filter

This time, these data have a correlation with an  $r^2$  of  $\sim 0.73$

No.	gr.	Spectrum	No.	Start/keV	End/keV



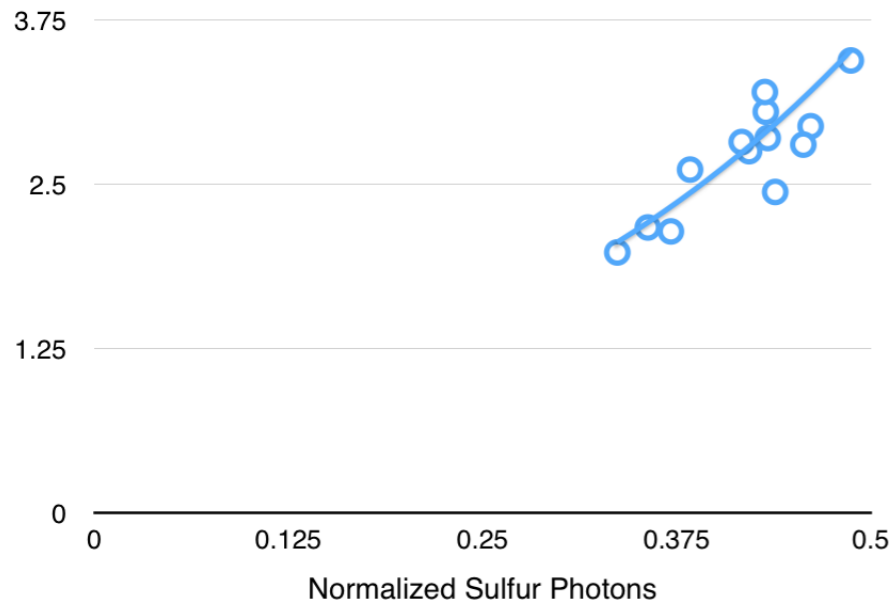
Nothing selected.  
Select an object to format.

# ROI Analysis

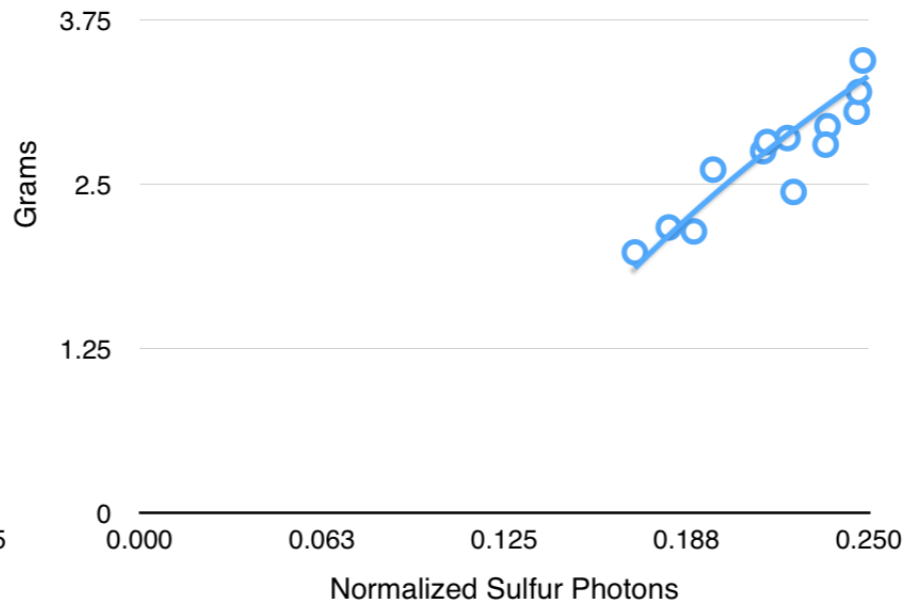
Be very deliberate on how you select your ROI, and don't be afraid to experiment - the energy range you choose can eliminate interferences that would add variation

No.	Start/keV	Er

$$y = 0.6205e^{3.5609x}$$
$$R^2 = 0.5984$$



$$y = 3.7824\ln(x) + 8.5681$$
$$R^2 = 0.7268$$



Nothing selected.  
Select an object to format.



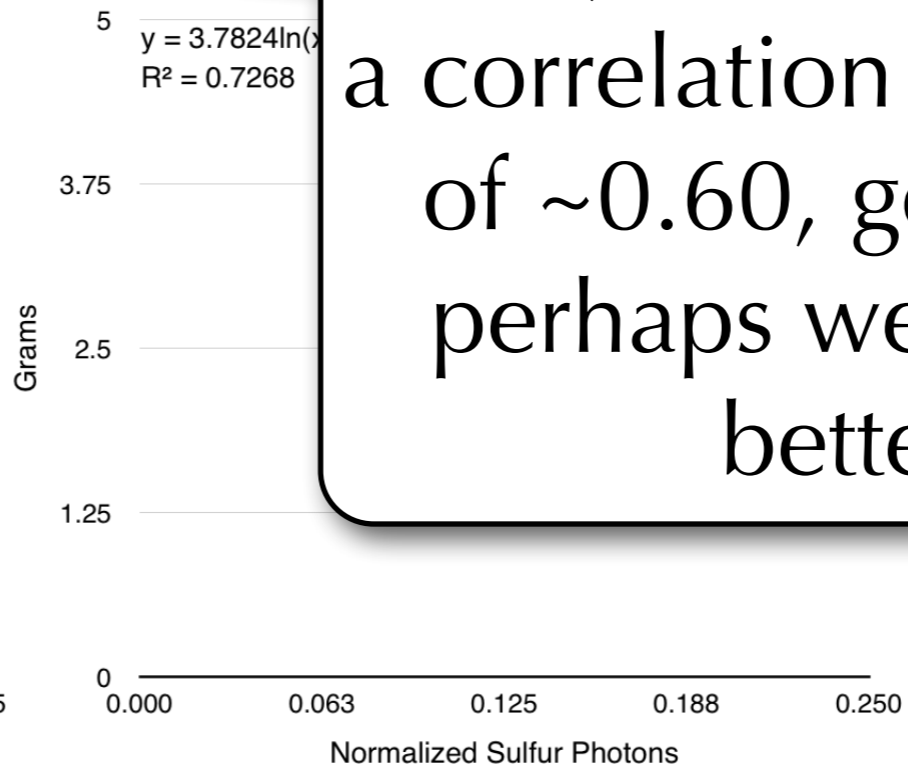
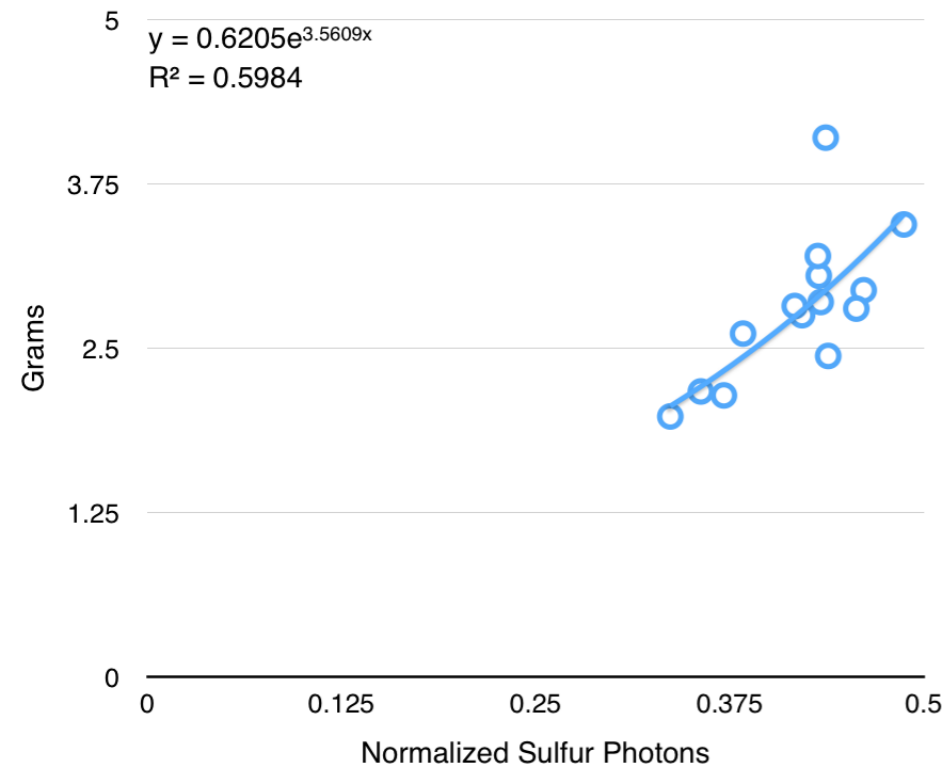
# ROI Analysis

Grab File Edit Capture Window Help 65% Fri 10:34 PM

Untitled.numbers — Edited  
Function Table Chart Text Shape Media Comment Share Tips Format Sort & Filter

Sheet 1

No.	Start/keV	End/keV	Name	Gross	Net	Backgr.	Spectrum	No.	Start/keV	End/keV



Here, these data have a correlation with an  $r^2$  of  $\sim 0.60$ , good, but perhaps we can do better

Nothing selected.  
an object to format.